RogueWave SOFTWARE

Accelerating Great Code

TOTALVIEW® FOR HPC REFERENCE GUIDE

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Rogue Wave Software, Inc.

Product Information: (303) 473-9118 (800) 487-3217
Fax: (303) 473-9137
Web: http://www.roguewave.com

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Part 4: Appendices

About this Guide

Overview

The information in this guide is organized in parts:

- Part I, "CLI Commands," on page 3 contains descriptions of all the CLI commands, the variables that you can set using the CLI, and other CLI-related information.
- Part II, "Running TotalView," on page 336 documents all possible command-line options as well as those that customize the behavior of the **tvdsvr**.
- Part III, "Platforms and Operating Systems," on page 358 provides general information on compilers, runtime environments, operating systems, and supported architectures.
- Part IV, "Appendices," on page 415 includes Appendix A which describes how to create startup profiles for environments that TotalView does not define.

Resources

Please see Appendix C in the user guide for information on:

- TotalView family differences, which details the differences among TotalView Enterprise, TotalView Team, and TotalView Individual
- a complete list of TotalView documentation

- conventions used in the documentation
- contact information

PART I

CLI Commands

This part of the reference guide describes the TotalView Command Line Interface (CLI).

Chapter 1

CLI Command Summary

This chapter contains a summary of all TotalView debugger CLI commands. The commands are described in detail in Chapter 2, "CLI Commands," on page 16 and Chapter 3, "CLI Namespace Commands," on page 178.

actionpoint

Gets and sets action point properties

TV::actionpoint *action* [*object-id*] [*other-args*]

alias

Creates a new user-defined pseudonym for a command

alias *alias-name defn-body*

Views previously defined aliases

alias [*alias-name*]

capture

Returns a command's output as a string

capture [-out | -err | -both] [-f *filename* **]** *command*

dactions

Displays information about action points

dactions [*ap-id-list*] [**-at** *source-loc*]
[**-enabled** | **-disabled**]
[**-enabled_blocks** | **-disabled_blocks**]
[-block_images]
[-block_lines]

Saves action points to a file

dactions -save [*filename*]

Loads previously saved action points

dactions -load [*filename*]

dassign

Changes the value of a scalar variable

dassign *target value*

dattach

Brings currently executing processes under TotalView control

dattach [**-g** *gid*] [**-r** *hname*]
[**-ask_attach_parallel** | **-no_attach_parallel**]
[**-replay** | **-no_replay**]
[**-go** | **-halt**] [**-rank** *num*]
[**-c** { *core-file* | *recording-file* }]
[**-e**] *executable* [*pid-list*]
[**-parallel_attach_subset** *subset_specification*]

dbarrier

Creates a barrier breakpoint at a source location

dbarrier *breakpoint-expr* **[-stop_when_hit { group | process | none }]**
[-stop_when_done { group | process | none }] [**-pending**]

Creates a barrier breakpoint at an address

dbarrier -address *addr* **[-stop_when_hit { group | process | none }]**
[-stop_when_done { group | process | none }] [**-pending**]

dbreak

Creates a breakpoint at a source location

dbreak *breakpoint-expr* [**-p** | **-g** | **-t**] [[**-l** *lang*] **-e** *expr*] [**-pending**]

Creates a breakpoint at an address

dbreak -address *addr* [**-p** | **-g** | **-t**] [[**-l** *lang*] **-e** *expr*] [**-pending**]

dcache

Clears the remote library cache

dcache -flush

dcalltree

Displays parallel backtrace data

[-data *pbv_data_array***] [-show_details] [-sort** *columns*] **[-hide_backtrace]**
[-save_as_csv *filename***] [-save_as_dot** *filename***]**

dcheckpoint

Creates a checkpoint on IBM AIX

dcheckpoint [**-delete** | **-halt**]

dcont

Continues execution and waits for execution to stop

dcont

dcuda

Manages NVIDIA® CUDA™ GPU threads, providing the ability to inspect them, change the focus, and display their status.

dcuda

ddelete

Deletes some action points

ddelete *action-point-list*

Deletes all action points

ddelete -a

ddetach

Detaches from the processes

ddetach

ddisable

Disables some action points

ddisable *action-point-list* [**-block** *number-list*]

Disables all action points

ddisable -a

ddlopen

Loads a shared object library

ddlopen [**-now** | **-lazy**] [**-local** | **-global**] [**-mode** *int*] *filespec*

Displays information about shared object libraries

ddlopen [**-list** *dll-ids*...]

ddown

Moves down the call stack

ddown [*num-levels*]

dec2hex

Converts a decimal number into hexadecimal

TV::dec2hex *number*

denable

Enables some action points

denable *action-point-list*

Enables all disabled action points in the current focus

denable -a

dexamine

Display memory contents

dexamine [**-column_count** *cnt*] [**-count** *cnt*] [**-data_only**]
[**-show_chars**] [**-string_length** *len*] [**-format** *fmt*]
[**-memory_info**] [**-wordsize** *size*] *variable_or_expression*

dflush

Removes the top-most suspended expression evaluation

dflush

Removes all suspended **dprint** computations

dflush -all

Removes **dprint** computations preceding and including a suspended evaluation ID

dflush *susp-eval-id*

dfocus

Changes the target of future CLI commands to this P/T set

dfocus *p/t-set*

Executes a command in this P/T set

dfocus [*p/t-set command*]

dga

Displays global array variables

dga [**-lang** *lang_type*] [*handle_or_name*] [*slice*]

dgo

Resumes execution of target processes

dgo

dgroups

Adds members to thread and process groups

dgroups -add [**-g** *gid*] [*id-list*]

Deletes groups

dgroups -delete [**-g** *gid*]

Intersects a group with a list of processes and threads

dgroups -intersect [**-g** *gid*] [*id-list*]

Prints process and thread group information

dgroups [**-list**] [*pattern-list*]

Creates a new thread or process group

dgroups -new [*thread_or_process*] [**-g** *gid*] [*id-list*]

Removes members from thread or process groups

dgroups -remove [**-g** *gid*] [*id-list*]

dhalt

Suspends execution of processes

dhalt

dheap

Shows Memory Debugger state

dheap [**-status**]

Applies a saved configuration file

dheap -apply_config { **default** | *filename* }

Shows information about a backtrace

dheap -backtrace [*subcommands*]

Compares memory states

dheap -compare *subcommands* [*optional_subcommands*]
[*process* | *filename* [*process* | *filename*]]

Enables or disables the Memory Debugger

dheap { **-enable** | **-disable** }

Enables or disables event notification

dheap -event_filter *subcommands*

Writes memory information

dheap -export *subcommands*

Specifies which filters the Memory Debugger uses

dheap -filter *subcommands*

Writes guard blocks (memory before and after an allocation)

dheap -guard [*subcommands*]

Enables and disables the retaining (hoarding) of freed memory blocks

dheap -hoard [*subcommands*]

Displays Memory Debugger information

dheap -info [**-backtrace**] [*start_address* [*end_address*]]

Indicates whether an address is within a deallocated block

dheap -is_dangling *address*

Locates memory leaks

dheap -leaks [**-check_interior**]

Enables or disables Memory Debugger event notification

dheap -[no]notify

Paints memory with a distinct pattern

dheap -paint [*subcommands*]

Enables and disables the ability to catch bounds errors and use-after-free errors retaining freed memory blocks

dheap -red_zones [*subcommands*]

Enables and disables allocation and reallocation notification

dheap -tag_alloc *subcommand start_address* [*end_address*]

Displays the Memory Debugger's version number

dheap -version

dhistory

Displays information about the state of the program as it is being replayed. If you have received a timestamp, you can go back to the line that was executing at that time.

dhistory [-info] [-get_time] [-go_time *time* **] [-go_live]**
[-enable] [-disable]

dhold

Holds processes

dhold -process

Holds threads

dhold -thread

dkill

Terminates execution of target processes

dkill [**-remove**]

dlappend

Appends list elements to a TotalView variable

dlappend *variable-name value* [...]

dlist

Displays code relative to the current list location

dlist [**-n** *num-lines*]

Displays code relative to a named location

dlist *breakpoint-expr* [**-n** *num-lines*]

Displays code relative to the current execution location

dlist -e [**-n** *num-lines*]

dll

Manages shared libraries

TV::dll *action* [*dll-id-list*] [**-all**]

dload

Loads debugging information

dload [**-g** *gid*] [**-mpi** *starter_value*] [**-r** *hname*]
[**-replay** | **-noreplay**]
[**-env** *variable=value*] ... [**-e**] *executable*
[**-parallel_attach_subset** *subset_specification*]

dmstat

Displays memory use information

dmstat

dnext

Steps source lines, stepping over subroutines

dnext [**-back**] [*num-steps*]

dnexti

Steps machine instructions, stepping over subroutines

dnexti [**-back**] [*num-steps*]

dout

Executes until just after the place that called the current routine

dout [**-back**] [*frame-count*]

dprint

Prints the value of a variable or expression

dprint [**-nowait**] [**-slice** *slice_expr*] [-stats [-data]] *variable_or_expression*

dptsets

Shows the status of processes and threads in an array of P/T expressions

dptsets [*ptset_array*] ...

drerun

Restarts processes

drerun [*cmd_arguments*] [**<** *infile*]
[**>** [**>**][**&**] *outfile*]
[**2>** [**>**] *errfile*]

drestart

Restarts a checkpoint on AIX

drestart [**-halt**] [**-g** *gid*] [**-r** *host*] [**-no_same_hosts**]

Restarts a checkpoint on SGI

drestart [*process-state*] [**-no_unpark**] [**-g** *gid*] [**-r** *host*]
[**-ask_attach_parallel** | **-no_attach_parallel**]
[**-no_preserve_ids**] *checkpoint-name*

drun

Starts or restarts processes

drun [*cmd_arguments*] [**<** *infile*]
[**>** [**>**][**&**] *outfile*]
[**2>** [**>**] *errfile*]

dsession

Loads a session

dsession [-load *session_name* **]**

dset

Creates or changes a CLI state variable

dset *debugger-var value*

Views current CLI state variables

dset [*debugger-var*]

Sets the default for a CLI state variable

dset -set_as_default *debugger-var value*

dstatus

Shows current status of processes and threads

dstatus

dstep

Steps lines, stepping into subfunctions

dstep [**-back**] [*num-steps*]

dstepi

Steps machine instructions, stepping into subfunctions

dstepi [**-back**] [*num-steps*]

dunhold

Releases a process

dunhold -process

Releases a thread

dunhold -thread

dunset

Restores a CLI variable to its default value

dunset *debugger-var*

Restores all CLI variables to their default values

dunset -all

duntil

Runs to a line

duntil [**-back**] *line-number*

Runs to an address

duntil [**-back**] **-address** *addr*

Runs into a function

duntil *proc-name*

dup

Moves up the call stack

dup [*num-levels*]

dwait

Blocks command input until the target processes stop

dwait

dwatch

Defines a watchpoint for a variable

dwatch *variable* [**-length** *byte-count*] [**-p** | **-g** | **-t**]
[[**-l** *lang*] **-e** *expr*] [**-t** *type*]

Defines a watchpoint for an address

dwatch -address *addr* **-length** *byte-count* [**-p** | **-g** | **-t**]
[[**-l** *lang*] **-e** *expr*] [**-t** *type*]

dwhat

Determines what a name refers to

dwhat *symbol-name*

dwhere

Displays locations in the call stack

dwhere [-level *level-num*] [*num-levels*] [**-args**] [-locals] [-registers]
[**-noshow_pc**][**-noshow_fp**][**-show_image**]

Displays all locations in the call stack

dwhere -all [**-args**] [-locals] [-registers]
[**-noshow_pc**][**-noshow_fp**][**-show_image**]

dworker

Adds or removes a thread from a workers group

dworker { *number* | *boolean* }

errorCodes

Returns a list of all error code tags

TV::errorCodes

Returns or raises error information

TV::errorCodes *number_or_tag* [**-raise** [*message*]]

exit

Terminates the debugging session

exit [**-force**]

expr

Manipulates values created by **dprint -nowait**

TV::expr *action* **[** *susp-eval-id* **] [** *other-args* **]**

focus_groups

Returns a list of groups in the current focus

TV::focus_groups

focus_processes

Returns a list of processes in the current focus

TV::focus_processes [**-all** | **-group** | **-process** | **-thread**]

focus_threads

Returns a list of threads in the current focus

TV::focus_threads [**-all** | **-group** | **-process** | **-thread**]

group

Gets and sets group properties

TV::group *action* [*object-id*] [*other-args*]

help

Displays help information

help [*topic*]

hex2dec

Converts to decimal

TV::hex2dec *number*

process

Gets and sets process properties

TV::process *action* [*object-id*] [*other-args*]

quit

Terminates the debugging session

quit [**-force**]

read_symbols

Reads symbols from libraries

TV::read_symbols -lib *lib-name-list*

Reads symbols from libraries associated with a stack frame

TV::read_symbols -frame [*number*]

Reads symbols for all frames in the backtrace

TV::read_symbols -stack

respond

Provides responses to commands

TV::respond *response command*

scope

Gets and sets internal scope properties

TV::scope *action* [*object-id*] [*other-args*]

source_process_startup

"Sources" a **.tvd** file when a process is loaded

TV::source_proccess_startup *process_id*

spurs

Manages threads using commands modeled after the GDB SPU Runtime System (SPU) library.

spurs add [directory *directory-list* ...]

stty

Sets terminal properties

stty [*stty-args*]

symbol

Returns or sets internal TotalView symbol information

TV::symbol *action* [*object-id*] [*other-args*]

thread

Gets and sets thread properties

TV::thread *action* [*object-id*] [*other-args*]

type

Gets and sets type properties

TV::type *action* [*object-id*] [*other-args*]

type_transformation

Creates type transformations and examines properties

TV::type_transformation *action* [*object-id*] [*other-args*]

unalias

Removes an alias

unalias *alias-name*

Removes all aliases

unalias -all

Chapter 2

CLI Commands

Command Overview

This chapter lists all of CLI commands with a brief description.

General CLI Commands

These commands provide information on the general CLI operating environment:

- alias: Creates or views pseudonyms for commands and arguments.
- capture: Sends output to a variable for commands that print information
- dlappend: Appends list elements to a TotalView variable.
- dset: Changes or views values of TotalView variables.
- dunset: Restores default settings of TotalView variables.
- help: Displays help information.
- stty: Sets terminal properties.
- unalias: Removes a previously defined alias.

CLI Initialization and Termination Commands

These commands initialize and terminate the CLI session, and add processes to CLI control:

- dattach: Brings one or more processes currently executing in the normal runtime environment (that is, outside TotalView) under TotalView control.
- ddetach: Detaches TotalView from a process.
- ddlopen: Dynamically loads shared object libraries.
- dgroups: Manipulates and manages groups.
- dkill: Kills existing user processes, leaving debugging information in place.
- dload: Loads debugging information about the program into TotalView and prepares it for execution.
- drerun: Restarts a process.
- drun: Starts or restarts the execution of user processes under control of the CLI.
- dsession: Loads a session into TotalView.
- exit, quit: Exits from TotalView, ending the debugging session.

Program Information Commands

The following commands provide information about a program's current execution location, and support browsing the program's source files:

- dcalltree: Displays parallel backtrace data.
- ddown: Navigates through the call stack by manipulating the current frame.
- dexamine: Displays memory contents.
- dflush: Unwinds the stack from computations.
- dga: Displays global array variables.
- dlist: Browses source code relative to a particular file, procedure, or line.
- dmstat: Displays memory usage information.
- dprint: Evaluates an expression or program variable and displays the resulting value.
- dptsets: Shows the status of processes and threads in a P/T set.
- dstatus: Shows the status of processes and threads.
- dup: Navigates through the call stack by manipulating the current frame.
- dwhat: Determines what a name refers to.
- dwhere: Prints information about the thread's stack.

Execution Control Commands

The following commands control execution:

- dcont: Continues execution of processes and waits for them.
- dfocus: Changes the set of processes, threads, or groups upon which a CLI command acts.
- dgo: Resumes execution of processes (without blocking).
- dhalt: Suspends execution of processes.
- dhistory (replay): Provides information for ReplayEngine and supports working with timestamps.
- dhold: Holds threads or processes.
- dnext: Executes statements, stepping over subfunctions.
- dnexti: Executes machine instructions, stepping over subfunctions.
- dout: Runs out of current procedure.
- dstep: Executes statements, moving into subfunctions if required.
- dstepi: Executes machine instructions, moving into subfunctions if required.
- dunhold: Releases held threads.
- duntil: Executes statements until a statement is reached.
- dwait: Blocks command input until processes stop.
- dworker: Adds or removes threads from a workers group.

Action Points

The following action point commands define and manipulate the points at which the flow of program execution should stop so that you can examine debugger or program state:

- dactions: Views information on action point definitions and their current status; this command also saves and restores action points.
- dbarrier: Defines a process barrier breakpoint.
- dbreak: Defines a breakpoint.
- ddelete: Deletes an action point.
- ddisable: Temporarily disables an action point.
- denable: Re-enables an action point that has been disabled.

- dwatch: Defines a watchpoint.

Platform-Specific CLI Commands

- dcuda: Manages NVIDIA® CUDA™ GPU threads, providing the ability to inspect them, change the focus, and display their status.
- spurs: Manages threads using commands modeled after the GDB SPU Runtime System (SPU) library.

Other Commands

The commands in this category do not fit into any of the other categories:

- dassign: Changes the value of a scalar variable.
- dcache: Clears the remote library cache.
- dcheckpoint: Creates a file that can later be used to restart a program.
- dheap: Displays information about the heap.
- drestart: Restarts a checkpoint.

alias

Creates or views pseudonyms for commands

Format

Creates a new user-defined pseudonym for a command

alias *alias-name defn-body*

Views previously defined aliases

alias [*alias-name*]

Arguments

alias-name

The name of the command pseudonym being defined.

defn-body

The text that Tcl substitutes when it encounters *alias-name*.

Description

The **alias** command associates a specified name with some defined text. This text can contain one or more commands. You can use an alias in the same way as a native TotalView or Tcl command. In addition, you can include an alias as part of the definition of another alias.

If you do not enter an *alias-name* argument, the CLI displays the names and definitions of all aliases. If you specify only an *alias-name* argument, the CLI displays the definition of the alias.

Because the **alias** command can contain Tcl commands, *defn-body* must comply with all Tcl expansion, substitution, and quoting rules.

The TotalView global startup file, **tvdinit.tvd**, defines a set of default one or two-letter aliases for all common commands. To see a list of these commands, type **alias** with no argument in the CLI -window.

You cannot use an alias to redefine the name of a CLI-defined command. You can, however, redefine a built-in CLI command by creating your own Tcl procedure. For example, the following procedure disables the built-in dwatch command. When a user types **dwatch**, the CLI executes this code instead of the built-in CLI code.

```
proc dwatch {} {
   puts "The dwatch command is disabled"
}
```

NOTE >> Be aware that you can potentially create aliases that are nonsensical or incorrect because the CLI does not parse *defn-body* (the command's definition) until it is used. The CLI detects errors only when it tries to execute your alias.

When you obtain help for any command, the help text includes any TotalView predefined aliases.

To delete an alias, use the **unalias** command.

Examples

```
alias nt dnext
```

Defines a command called **nt** that executes the dnext -command.

```
alias nt
```

Displays the definition of the **nt** alias.

```
alias
```

Displays the definitions of all aliases.

```
alias m {dlist main}
```

Defines an alias called **m** that lists the source code of function **main()**.

```
alias step2 {dstep; dstep}
```

Defines an alias called **step2** that does two dstep commands. This new command applies to the focus that exists when this alias is used.

```
alias step2 {s ; s}
```

Creates an alias that performs the same operations as that in the previous example, differing in that it uses the alias for **dstep**. You could also create the following alias which does the same thing: **alias step2 {s 2}**.

```
alias step1 {f p1. dstep}
```

Defines an alias called **step1** that steps the first user thread in process 1. All other threads in the process run freely while TotalView steps the current line in your program.

RELATED TOPICS

Initializing TotalView in the *TotalView for HPC User Guide*
unalias **Command**

capture

Returns a command's output as a string

Format

capture [**-out** | **-err** | **-both**] [**-f** *filename*] *command*

Arguments

-out

Captures only output sent to **stdout**.

-err

Captures only output sent to **stderr**.

-both

Captures output sent to both **stdout** and **stderr**. This is the default.

-f *filename*

Sends the captured output to *filename*. The file must be a writable Tcl file descriptor.

command

The CLI command (or commands) whose output is being captured. If you specify more than one command, you must enclose them within braces (**{ }**).

Description

The **capture** command executes *command*, capturing in a string all output that would normally go to the console. After *command* completes, it returns the string. This command is analogous to the UNIX shell's back-tick feature (`*command*`). The **capture** command obtains the printed output of any CLI command so that you can assign it to a variable or otherwise manipulate it.

Examples

```
set save_stat [ capture st ]
```

Saves the current process status to a Tcl variable.

```
set arg [ capture p argc]
```

Saves the printed value of argc into a Tcl variable.

```
set vbl [ capture {foreach i {1 2 3 4} \
  {p int2_array($i )}} ]
```

Saves the printed output of four array elements into a Tcl variable. Here is sample output:

```
int2_array(1) = -8 (0xfff8)
int2_array(2) = -6 (0xfffa)
int2_array(3) = -4 (0xfffc)
int2_array(4) = -2 (0xfffe)
```

Because the **capture** command records all information sent to it by the commands in the **foreach** loop, you do not have to use a **dlist** command.

```
exec cat << [ capture help commands ] > cli_help.txt
```

Writes the help text for all CLI commands to the **cli_help.txt** file.

```
set ofile [open cli_help.txt w]
capture -f $ofile help commands
close $ofile
```

Also writes the help text for all CLI commands to the **cli_help.txt** file. This set of commands is more efficient than the previous command because the captured data is not -buffered.

RELATED TOPICS

drun **Command**
drerun **Command**

dactions

Displays information, and saves and reloads action points

Format

Displays information about action points.

dactions [*ap-id-list*] [**-at** *source-loc*] [**-enabled** | **-disabled**] [**-enabled_blocks** |**-disabled_blocks**] [**-block_images** | **-block_lines**]

Saves action points to a file.

dactions -save [*filename*]

Loads previously saved action points.

dactions -load [*filename*]

Suppresses or unsuppresses action points.

dactions [**-suppress** | **-unsuppress**]

Arguments

ap-id-list

A list of action point identifiers. If you specify individual action points, the information that appears is limited to these points.

Do not enclose this list within quotes or braces. See the examples at the end of this section for more information.

Without this argument, the CLI displays summary information about all action points in the processes in the focus set. If you enter one ID, the CLI displays full information for it. If you enter more than one ID, the CLI displays just summary information for each.

-at *source-loc*

Displays the action points at *source-loc*. See **dbreak** for the details on the form of *source-loc*.

-enabled

Shows only enabled action points.

-disabled

Shows only disabled action points.

-suppress

Effectively disables all existing action points. If the code is run, threads will not stop at any action points. Although you can create new action points (and delete existing ones), the new actions points too will be effectively disabled.

-unsuppress

Restores all action points to the state they were in when suppressed. Any new action points added are set as enabled.

-enabled_blocks

When displaying the full information for an action point, only shows the enabled address blocks. (See example below.)

-disabled_blocks

When displaying the full information for an action point, only shows the disabled address blocks. (See example below.)

-block_images

When displaying the full information for an action point, shows the image name of each address block.

-block_lines

When displaying the full information for an action point, shows the source line of each address block.

-full

Forces the display of full information.

-save

Writes information about action points to a file.

-load

Restores action point information previously saved in a file.

filename

The name of the file into which TotalView reads and writes action point information. If you omit this file name, TotalView writes action point information to a file named *program_name*.**TVD.v3breakpoints**, where *program_name* is the name of your program.

Description

The **dactions** command displays information about action points in the processes in the current focus. If you do not indicate a focus, the default focus is at the process level. The information is printed; it is not returned.

Using the Action Point Identifier

To get the action point identifier, just enter **dactions** with no arguments. You need this identifier to delete, enable, and disable action points.

The identifier is returned when TotalView creates the action point. The CLI prints this ID when the thread stops at an action point.

You can include action point identifiers as arguments to the command when more detailed information is needed. The **-enabled** and **-disabled** options restrict output to action points in one of these states.

You cannot use the **dactions** command when you are debugging a core file or before TotalView loads executables.

Saving and Loading Action Points

The **-save** option writes action point information to a file so that either you or TotalView can restore your action points later. The **-load** option immediately reads the saved file. Using the *filename* argument with either option writes to or reads from this file. If you do not use this argument, TotalView names the file *program_name*.**TVD.v3breakpoints** (where *program_name* is the name of your program), and writes it to the directory in which your program resides.

The information saved includes expressions associated with the action point and whether the action point is enabled or disabled. For example, if your program's name is **foo**, TotalView writes this information to **foo.TVD.v3breakpoints**.

NOTE >> TotalView does not save information about watchpoints.

If a file with the default name exists, TotalView can read this information when it starts your program. When TotalView exits, it can create the default. For more information, see the **File > Preference** Action Points Page information in the TotalView for HPC online Help.

Suppressing and Unsuppressing Action Points

Suppress effectively disables all existing action points. If the code is run, threads will not stop at any action points. Although you can create new action points (and delete existing ones), the new action points too will be effectively disabled. Unsuppress restores all action points to the state they were in when suppressed. Any new action points added are set as enabled.

Command alias

Alias	Definition	Description
ac	**dactions**	Displays all action points

Examples

```
ac -at 81
```

Displays information about the action points on line 81. (This example uses the alias instead of the full command name.) Here is the output from this command:

```
ac -at 81
1 shared action point for group 3:
   1 addr=0x10001544 [arrays.F#81] Enabled
         Share in group: true
          Stop when hit: group
```

```
dactions 1 3
```

Displays information about action points 1 and 3, as follows:

```
2 shared action points for process 1:
```

```
     1 addr=0x100012a8 [arrays.F#56] Enabled
     3 addr=0x100012c0 [arrays.F#57] Enabled
```

If you have saved a list of action points as a string or as a Tcl list, you can use the eval command to process the list's elements.

For example:

```
d1.<> dactions
2 shared action points for group 3:
    3 [global_pointer_ref.cxx#52] Enabled
    4 [global_pointer_ref.cxx#53] Enabled
d1.<> set group1 "3 4"
3 4
d1.<> eval ddisable $group1
d1.<> ac
2 shared action points for group 3:
    3 [global_pointer_ref.cxx#52] Disabled
      4 [global_pointer_ref.cxx#53] Disabled
```

`dfocus p1 dactions`

Displays information about all action points defined in process 1.

`dfocus p1 dactions -enabled`

Displays information about all enabled action points in process 1

`dactions` *n* `[-enabled_blocks|-disabled_blocks]`

This extended example demonstrates the use of these two options.

Set a break point:

```
d1.<> b {bar<std::vector<int, std::allocator<int> > >::bar(int)}
Incorporating 10079 bytes of DWARF '.debug_info' information for tx_test2.cxx
(linenumber)...done
1
```

Entering `dactions` reports on only the top-level action point associated with this action point number:

```
d1.<> dactions
1 shared action point for group 3:
   1 [bar<std::vector<int,\ std::allocator<int>\ >\ >::bar(int)]    Enabled
```

Entering `dactions n` reports on all action point instances (the address block) associated with this action point number:

```
d1.<> dactions 1
1 shared action point for group 3:
   1 [bar<std::vector<int,\ std::allocator<int>\ >\ >::bar(int)] Enabled
     Address 0: [Enabled]  bar<std::vector<int,std::allocator<int> > >::bar+0x12
(0x004013d2)
     Address 1: [Enabled]  bar<std::vector<int,std::allocator<int> > >::bar+0x84
(0x00401444)
```

```
     Address 2: [Disabled] bar<std::vector<double,std::allocator<double> >
>::bar+0x12 (0x00401496)
     Address 3: [Disabled] bar<std::vector<double,std::allocator<double> >
>::bar+0x86 (0x0040150a)
     Share in group: true
     Stop when hit: process
```

Using `-enabled_blocks` reports on only enabled action point instances (the address block) associated with this action point number:

```
d1.<> dactions 1 -enabled_blocks
1 shared action point for group 3:
   1 [bar<std::vector<int,\ std::allocator<int>\ >\ >::bar(int) Enabled
     Address 0: [Enabled]  bar<std::vector<int,std::allocator<int> > >::bar+0x12
(0x004013d2)
     Address 1: [Enabled]  bar<std::vector<int,std::allocator<int> > >::bar+0x84
(0x00401444)
     Share in group: true
     Stop when hit: process
```

Using `-disabled_blocks` reports on only disabled action point instances (the address block) associated with this action point number:

```
d1.<> dactions 1 -disabled_blocks
1 shared action point for group 3:
   1 [bar<std::vector<int,\ std::allocator<int>\ >\ >::bar(int)] Enabled
     Address 2: [Disabled] bar<std::vector<double,std::allocator<double> >
>::bar+0x12 (0x00401496)
     Address 3: [Disabled] bar<std::vector<double,std::allocator<double> >
>::bar+0x86 (0x0040150a)
     Share in group: true
     Stop when hit: process
d1.<>
```

You could use this information, for example, to enable the currently disabled action point addresses:

```
d1.<> denable -block 2 3
```

RELATED TOPICS

Setting Action Points in the *TotalView for HPC User Guide*
Saving Actions Points to a File in the *TotalView for HPC User Guide*
Action Point > Enable in the TotalView online Help
Action Point > Disable in the TotalView online Help
Action Point > Load All in the TotalView online Help
Action Point > Save All in the TotalView online Help
Action Point > Save As in the TotalView online Help
TV::auto_save_breakpoints **Variable**

dassign

Changes the value of a scalar variable

Format

dassign *target value*

Arguments

target

The name of a scalar variable in your program.

value

A source-language expression that evaluates to a scalar value. This expression can use the name of another variable.

Description

The **dassign** command evaluates an expression and replaces the value of a variable with the evaluated result. The location can be a scalar variable, a dereferenced pointer variable, or an element in an array or structure.

The default focus for the **dassign** command is *thread*. If you do not change the focus, this command acts upon the *thread of interest* (TOI). If the current focus specifies a width that is wider than **t** (thread) and is not **d** (default), - **dassign** iterates over the threads in the focus set and performs the assignment in each. In addition, if you use a list with the **dfocus** command, the **dassign** command iterates over each list member.

The CLI interprets each symbol name in the expression according to the current context. Because the value of a source variable might not have the same value across threads and processes, the value assigned can differ in your threads and processes. If the data type of the resulting value is incompatible with that of the target location, you must cast the value into the target's type. (*Casting* is described in the *TotalView for HPC User Guide*.)

Assigning Characters and Strings

- If you are assigning a character to a *target*, place the character value within single-quotation marks; for example, **'c'**.
- You can use the standard C language escape character sequences; for example, **\n and \t**. These escape sequences can also be in a character or string assignment.
- If you are assigning a string to a *target*, place the string within quotation marks. However, you must escape the quotation marks so they are not interpreted by Tcl; for example, **\"The quick brown fox\"**.

If *value* contains an expression, the TotalView expression system evaluates the expression. See "Using the Evaluate Window" in the *TotalView for HPC User Guide* for more information.

Command alias

Alias	Definition	Description
as	**dassign**	Changes a scalar variable's value

Examples

```
dassign scalar_y 102
```

Stores the value 102 in each occurrence of variable **scalar_y** for all processes and threads in the current set.

```
dassign i 10*10
```

Stores the value 100 in variable **i**.

```
dassign i i*i
```

Does not work and the CLI displays an error message. If **i** is a simple scalar variable, you can use the following statements:

```
set x [lindex [capture dprint i] 2]
dassign i [expr $x * $x]
```

```
f {p1 p2 p3} as scalar_y 102
```

Stores the value 102 in each occurrence of variable **scalar_y** contained in processes 1, 2, and 3.

RELATED TOPICS

Changing the Value of Variables in the *TotalView for HPC User Guide*
Changing a Variable's Data Type in the *TotalView for HPC User Guide*

dattach

Brings currently executing processes under TotalView control

Format

dattach [**-g** *gid*] [**-r** *hname*]
[**-ask_attach_parallel** | **-no_attach_parallel**]
[**-replay** | **-no_replay**]
[**-go** | **-halt**] [**-rank** *num*]
[**-e**] *executable* [*pid-list*]
[**-c** *core-file* | *recording-file*]
[**-parallel_attach_subset** *subset-specification*]

Arguments

-g *gid*

Sets the control group for the processes being added to group *gid*. This group must already exist. (The CLI **GROUPS** variable contains a list of all groups. See "GROUPS" on page 255 for more information.)

-r *hname*

The host on which the process is running. The CLI launches a TotalView Server on the host machine if one is not already running. See the Setting Up Parallel Debugging Sessions chapter of the *TotalView for HPC User Guide* for information on the launch command used to start this server.

Setting a host sets it for all PIDs attached to in this command. If you do not name a host machine, the CLI uses the local host.

-ask_attach_parallel

Specifies that TotalView should ask before attaching to parallel processes of a parallel job. The default is to automatically attach to processes. For additional information, see the Parallel Page in the **File > Preferences** Dialog Box in the in-product help.

-no_attach_parallel

Does not attach to any additional parallel processes in a parallel job. For additional information, see the **Parallel Page** in the **File > Preferences** Dialog Box in the in-product help.

-replay | -no_replay

Enables or disables the ReplayEngine the next time the program is restarted.

-go | -halt

Specifies to explicitly continue or halt target execution after attaching. The default is to leave the target's run state as it was before the attach.

-rank *num*

Specifies the rank associated with the executable being loaded. While this can be used independently, this option is best used with core files.

-e

Tells the CLI that the next argument is an executable file name. You need to use **-e** if the executable name begins with a dash (-) or consists of only numeric characters. Otherwise, you can just provide the executable file name.

executable

The name of the executable. Setting an executable here sets it for all PIDs being attached to in this command. If you do not include this argument, the CLI tries to determine the executable file from the process. Some architectures do not allow this to occur.

pid-list

A list of system-level process identifiers (such as a UNIX PID) naming the processes that TotalView controls. All PIDs must reside on the same system, and they are placed in the same control group.

If you need to place the processes in different groups or attach to processes on more than one system, you must use multiple **dattach** commands.

-c *core-file* | *recording-file*

Loads the core file *core-file* or the ReplayEngine *recording-file*, which restores a previous ReplayEngine debugging session. If you use this option, you must also specify an executable name (*executable*).

-parallel_attach_subset *subset_specification*

Defines a list of MPI ranks to attach to when an MPI job is created or attached to. The list is space-separated; each element can have one of three forms:

rank: specifies that rank only

rank1-rank2: specifies all ranks between rank1 and rank2, inclusive

rank1-rank2:stride: specifies every strideth rank between rank1 and rank2

A rank must be either a positive decimal integer or **max** (the last rank in the MPI job).

A *subset_specification* that is the empty string (**""**) is equivalent to **0-max**.

For example:

```
dattach -parallel_attach_subset {1 2 4-6 7-max:2} mpirun
```

attaches to ranks 1, 2, 4, 5, 6, 7, 9, 11, 13,....

Description

The **dattach** command attaches to one or more processes, making it possible to continue process execution under TotalView control.

NOTE >> **TotalView Individual:** You can attach only to processes running on the computer upon which you installed TotalView Individual.

This command returns the TotalView process ID (DPID) as a string. If you specify more than one process in a command, the **dattach** command returns a list of DPIDs instead of a single value.

TotalView places all processes to which it attaches in one **dattach** command in the same control group. This lets you place all processes in a multiprocess program executing on the same system in the same control group.

If a program has more than one executable, you must use a separate **dattach** command for each one.

If you have not loaded *executable* already, the CLI searches for it. The search includes all directories in the -**EXECUTABLE_PATH** CLI variable.

The process identifiers specified in the *pid-list* must refer to existing processes in the runtime environment. TotalView attaches to the processes, regardless of their execution states.

Command alias

Alias	Definition	Description
at	**dattach**	Brings the process under TotalView control

Examples

```
dattach mysys 10020
```

Loads debugging information for **mysys** and brings the process known to the run-time system as PID 10020 under TotalView control.

```
dattach -e 123 10020
```

Loads file 123 and brings the process known to the run-time system by PID 10020 under TotalView control.

```
dattach -g 4 -r Enterprise myfile 10020
```

Loads **myfile** that is executing on the host named **Enterprise** into group 4, and brings the process known to the run-time system by PID 10020 under TotalView control. If a TotalView Server (**tvdsvr**) is not running on **Enterprise**, the CLI will start it.

```
dattach my_file 51172 52006
```

Loads debugging information for **my_file** and brings the processes corresponding to PIDs 51172 and 52006 under TotalView control.

```
set new_pid [dattach -e mainprog 123]
dattach -r otherhost -g $CGROUP($new_pid) -e slave 456
```

Begins by attaching to **mainprog** running on the local host; then attaches to **slave** running on the **otherhost** host and inserts them both in the same control group.

RELATED TOPICS

Using the Root Window in the *TotalView for HPC User Guide*
Attaching to Processes in the *TotalView for HPC User Guide*
Examining Core Files in the *TotalView for HPC User Guide*
File > New Program Command in the online Help
ddetach **Command**
TV::parallel_attach **Variable**

dbarrier

Defines a process or thread barrier breakpoint

Format

Creates a barrier breakpoint at a source location

dbarrier *breakpoint-expr* **[-stop_when_hit** *width* **][-stop_when_done** *width* **] [-pending]**

Creates a barrier breakpoint at an address

dbarrier -address *addr* **[-stop_when_hit** *width* **][-stop_when_done** *width* **] [-pending]**

Arguments

breakpoint-expr

This argument can be entered in more than one way, usually using a line number or a pathname containing a file name, function name, and line number, each separated by **#** characters (for example, **file#line**). For more information, see Chapter 9, "Qualifying Symbol Names" in the *TotalView for HPC User Guide*.

For more information on breakpoint expressions, see **dbreak** on page 39, particularly Breakpoint Expressions.

-address *addr*

The barrier breakpoint location as an absolute address in the address space of the program.

-stop_when_hit *width*

Identifies, using the *width* argument, any additional processes or threads to stop when stopping the thread that arrives at a barrier point.

If you do not use this option, the value of BARRIER_STOP_ALL indicates what to stop.

The argument *width* may have one of the following three values:

group

Stops all processes in the control group when the execution reaches the barrier point.

process

Stops the process that hit the barrier.

none

Stops only the thread that hit the barrier; that is, the thread is held and all other threads continue running. If you apply this width to a process barrier breakpoint, TotalView stops the process that hit the breakpoint.

-stop_when_done *width*

After all processes or threads reach the barrier, releases all processes and threads held at the barrier. (*Released* means that these threads and processes can run.) Setting this option stops additional threads contained in the same **group** or **process**.

If you do not use this option, the value of **BARRIER_STOP_WHEN_DONE** indicates any other processes or threads to stop.

Use the *width* argument indicates other stopped processes or threads. You can enter one of the following three values:

group

Stops the entire control group when the barrier is satisfied.

process

Stops the processes that contain threads in the satisfaction set when the barrier is satisfied.

none

Stops the satisfaction set. For process barriers, **process** and **none** have the same effect. This is the default if the **BARRIER_STOP_WHEN_DONE** variable is **none**.

-pending

If TotalView cannot find a location to set the barrier, adding this option creates the barrier anyway. As shared libraries are read, TotalView checks to see if it can be set in the newly loaded library. For more information on this option, see **dbreak** on page 39.

Description

The **dbarrier** command sets a process or thread barrier breakpoint that triggers when execution arrives at a location. This command returns the ID of the newly created breakpoint.

The **dbarrier** command is most often used to synchronize a set of threads. The P/T set defines which threads the barrier affects. When a thread reaches a barrier, it stops, just as it does for a breakpoint. The difference is that TotalView prevents—that is, holds—each thread that reaches the barrier from responding to resume commands (for example, **dstep**, **dnext**, and **dgo**) until *all* threads in the affected set arrive at the barrier. When all threads reach the barrier, TotalView considers the barrier to be *satisfied* and releases these threads. Note that they are just *released*, not continued. That is, TotalView leaves them stopped at the barrier. If you continue the process, those threads stopped at the barrier also run along with any other threads that were not participating with the barrier. After the threads are released, they can respond to resume commands.

If the process is stopped and then continued, the held threads, including the ones waiting on an unsatisfied barrier, do not run. Only unheld threads run.

The satisfaction set for the barrier is determined by the current focus. If the focus group is a thread group, TotalView creates a thread barrier:

- When a thread hits a process barrier, TotalView holds the thread's process.
- When a thread hits a thread barrier, TotalView holds the thread; TotalView might also stop the thread's process or control group. While they are stopped, neither is held.

TotalView determines the default focus width based on the setting of the SHARE_ACTION_POINT variable. If it is set to true, the default is group. Otherwise, it is process.

TotalView determines the processes and threads that are part of the satisfaction set by taking the intersection of the share group with the focus set. (Barriers cannot extend beyond a share group.)

The CLI displays an error message if you use an inconsistent focus list.

NOTE >> Barriers can create deadlocks. For example, if two threads participate in two different barriers, each could be left waiting at different barriers that can never be satisfied. A deadlock can also occur if a barrier is set in a procedure that is never invoked by a thread in the affected set. If a deadlock occurs, use the **ddelete** command to remove the barrier, since deleting the barrier also releases any threads held at the barrier.

The **-stop_when_hit** option specifies if other threads should stop when a thread arrives at a barrier.

The **-stop_when_done** option controls the set of additional threads that are stopped when the barrier is finally satisfied. That is, you can also stop an additional collection of threads after the last expected thread arrives, and all the threads held at the barrier are released. Normally, you want to stop the threads contained in the control group.

If you omit a *stop* option, TotalView sets the default behavior by using the BARRIER_STOP_ALL and BARRIER_STOP_WHEN_DONE variables. For more information, see the **dset** command.

Use the **none** argument for these options to not stop additional threads.

- If **-stop_when_hit** is **none** when a thread hits a thread barrier, TotalView stops only that thread; it does not stop other threads.
- If **-stop_when_done** is **none**, TotalView does not stop additional threads, aside from the ones that are already stopped at the barrier.

TotalView places the barrier point in the processes or groups specified in the current focus, as follows:

- If the current focus does not indicate an explicit group, the CLI creates a process barrier across the share group.
- If the current focus indicates a process group, the CLI creates a process barrier that is satisfied when all members of that group reach the barrier.
- If the current focus indicates a thread group, TotalView creates a thread barrier that is satisfied when all members of the group arrive at the barrier.

The following example illustrates these differences. If you set a barrier with the focus set to a control group (the default), TotalView creates a process barrier. This means that the **-stop_when_hit** value is set to **process** even though you specified **thread**.

```
d1.<> dbarrier 580 -stop_when_hit thread
2
d1.<> ac 2
1 shared action point for group 3:
  2 addr=0x120005598 [../regress/fork_loop.cxx#580] Enabled (barrier)
   Share in group: true
```

```
    Stop when hit: process
    Stop when done: process
    process barrier; satisfaction set = group 1
```

However, if you create the barrier with a specific workers focus, the stop when hit property remains set to **thread**:

```
1.<> baw 580 -stop_when_hit thread
1
d1.<> ac 1
1 unshared action point for process 1:
  1 addr=0x120005598 [../regress/fork_loop.cxx#580]
                  Enabled (barrier)
   Share in group: false
   Stop when hit: thread
   Stop when done: process
   thread barrier; satisfaction set = group 2
```

Command alias

Alias	Definition	Description
ba	**dbarrier**	Defines a barrier.
baw	**{dfocus pW dbarrier -stop_when_done process}**	Creates a thread barrier across the worker threads in the process of interest (POI). TotalView sets the set of threads stopped when the barrier is satisfied to the process that contains the satisfaction set.
BAW	**{dfocus gW dbarrier -stop_when_done group}**	Creates a thread barrier across the worker threads in the share group of interest. The set of threads stopped when the barrier is satisfied is the entire control group.

Examples

```
dbarrier 123
```

Stops each process in the control group when it arrives at line 123. After all processes arrive, the barrier is satisfied, and TotalView releases all processes.

```
dfocus {p1 p2 p3} dbarrier my_proc
```

Holds each thread in processes 1, 2, and 3 as it arrives at the first executable line in procedure **my_proc**. After all threads arrive, the barrier is satisfied and TotalView releases all processes.

```
dfocus gW dbarrier 642 -stop_when_hit none
```

Sets a thread barrier at line 642 in the workers group. The process is continued automatically as each thread arrives at the barrier. That is, threads that are not at this line continue running.

RELATED TOPICS

Setting Breakpoints and Barriers in the *TotalView for HPC User Guide*
Barrier Points in the *TotalView for HPC User Guide*
Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*
Creating a Satisfaction Set in the *TotalView for HPC User Guide*
Holding and Releasing Processes and Threads in the *TotalView for HPC User Guide*
Action Point > Set Barrier Command in the online Help
dactions **Command**
dbreak **Command**
denable **Command**
ddisable **Command**

dbreak

Defines a breakpoint

Format

Creates a breakpoint at a source location

dbreak *breakpoint-expr* **[-p | -g | -t] [[-l** *lang* **] -e** *expr* **] [-pending]**

Creates a breakpoint at an address

dbreak -address *addr* **[-p | -g | -t] [[-l** *lang* **] -e** *expr* **] [-pending]**

Arguments

breakpoint-expr

This argument can be entered in more than one way, usually using a line number or a pathname containing a file name, function name, and line number, each separated by **#** characters (for example, **file#line**). For more information, see Chapter 9, "Qualifying Symbol Names" in the *TotalView for HPC User Guide*.

Breakpoint expressions are discussed later in this section.

-address *addr*

The breakpoint location specified as an absolute address in the address space of the program.

-p

Stops the process that hit this breakpoint. You can set this option as the default by setting the **STOP_ALL** variable to **process**. See **dset** on page 135 for more information.

-g

Stops all processes in the process's control group when execution reaches the breakpoint. You can set this option as the default by setting the **STOP_ALL** variable to **group**. See **dset** on page 135 for more information.

-t

Stops the thread that hit this breakpoint. You can set this option as the default by setting the **STOP_ALL** variable to **thread**. See **dset** on page 135 for more information.

-l *lang*

Sets the programming language used when you are entering expression *expr*. Enter either: **c**, **c++**, **f7**, **f9**, or **asm** (for C, C++, FORTRAN 77, Fortran 9x, and assembler, respectively). If you do not specify a language, TotalView assumes the language in which the routine at the breakpoint was written.

-e *expr*

When the breakpoint is hit, TotalView evaluates expression *expr* in the context of the thread that hit the breakpoint. The language statements and operators you can use are described in Chapter 8, "Setting Action Points" in the *TotalView for HPC User Guide*.

-pending

If TotalView cannot find a location to set the breakpoint, adding this option creates the breakpoint anyway. As shared libraries are read, TotalView checks to see if it can be set in the newly loaded library.

Description

The **dbreak** command defines a breakpoint or evaluation point triggered when execution arrives at the specified location, stopping each thread that arrives at a breakpoint. This command returns the ID of the new breakpoint. If a line does not contain an executable statement, the CLI cannot set a breakpoint.

If you try to set a breakpoint at a line at which TotalView cannot stop execution, it sets one at the nearest following line where it can halt execution.

Specifying a procedure name without a line number sets an action point at the beginning of the procedure. If you do not name a file, the default is the file associated with the current source location.

The -pending Option

If, after evaluating the breakpoint expression, TotalView determines the location represented by the expression does not exist, it can still set a breakpoint if you use the **-pending** option. This option checks shared libraries that are subsequently loaded to see if a breakpoint can be set. If a location is found, it is set. Stated in a different way, TotalView normally creates and sets a breakpoint at the same time. The option tells it to separate these two actions.

When the displaying information on a breakpoint's status, the CLI displays the location where execution actually stops.

A stop group Breakpoint

If the CLI encounters a *stop group* breakpoint, it suspends each process in the group as well as the process that contains the triggering thread. The CLI then shows the identifier of the triggering thread, the breakpoint location, and the action point identifier.

Default Focus Width

TotalView determines the default focus width based on the setting of the SHARE_ACTION_POINT variable. If set to **true**, the default is group. Otherwise, it is process.

Breakpoint Expressions

Breakpoint expressions, also called breakpoint specifications, are used in both breakpoints and barrier points, so this discussion is relevant to both.

One possibly confusing aspect of using expressions is that their syntax differs from that of Tcl. This is because you need to embed code written in Fortran, C, or assembler in Tcl commands. In addition, your expressions often include TotalView built-in functions. For example, if you want to use the TotalView **$tid** built-in function, you need to type it as **\$tid**.

A breakpoint expression can evaluate to more than one source line. If the expression evaluates to a function that has multiple overloaded implementations, TotalView sets a breakpoint on each of the overloaded functions.

Set a breakpoint at the line specified by *breakpoint-expr* or the absolute address *addr*. You can enter a breakpoint expression that are sets of addresses at which the breakpoint is placed, and are as follows:

- **[[##image#]filename#]line_number**

  Indicates all addresses at this line number.

- A function signature; this can be a partial signature.

  Indicates all addresses that are the addresses of functions matching *signature*. If parts of a function signature are missing, this expression can match more than one signature. For example, "**f**" matches "**f(void)**" and "**A::f(int)**". You cannot specify a return type in a signature.

- **class** *class_name*

  Specifies that the breakpoint should be planted in all member functions of class *class_name*.

- **virtual** *class*::*signature*

  Specifies that the breakpoint should be planted in all virtual member functions that match *signature* and are in the class or derived from the class.

Command alias

Alias	Definition	Description
b	**break**	Sets a breakpoint
bt	**{dbreak t}**	Sets a breakpoint only on the *thread of interest*

Examples

For all examples, assume that the current process set is **d2.<** when the breakpoint is defined.

```
dbreak 12
```

Suspends process 2 when it reaches line 12. However, if the STOP_ALL variable is set to **group**, all other processes in the group are stopped. In addition, if SHARE_ACTION_POINT is **true**, the breakpoint is placed in every process in the group.

```
dbreak -address 0x1000764
```

Suspends process 2 when execution reaches address 0x1000764.

```
b 12 -g
```

Suspends all processes in the current control group when execution reaches line 12.

```
dbreak 57 -l f9 -e {goto $63}
```

Causes the thread that reaches the breakpoint to transfer to line 63. The host language for this statement is Fortran 90 or Fortran 95.

```
dfocus p3 b 57 -e {goto $63}
```

In process 3, sets the same evaluation point as the previous example.

RELATED TOPICS

Action Point > Properties Command in the online Help
Action Point > At Location Command in the online Help
Setting Breakpoints and Barriers in the *TotalView User Guide*
Defining Evaluation Points and Conditional Breakpoints in the *TotalView User Guide*
Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*
dactions **Command**
dbreak **Command**
denable **Command**
ddisable **Command**

dcache

Clears the remote library cache

Format

dcache -flush

Arguments

-flush

Deletes all files from the library cache that are not currently being used.

Description

The **dcache -flush** command removes the library files that it places in your cache, located in the **.TotalView/lib_-cache** subdirectory in your home directory.

When you are debugging programs on remote systems that use libraries that either do not exist on the host or whose version differ, TotalView copies the library files into your cache. This cache can become large.

TotalView automatically deletes cached library files that it hasn't used in the last week. If you need to reclaim additional space at any time, use this command to remove files not currently being used.

RELATED TOPICS

Initializing TotalView in the *TotalView for HPC User Guide*

dcalltree

Displays parallel backtrace data

Format

dcalltree [-data *pbv_data_array***] [-show_details] [-sort** *columns***] [-hide_backtrace] [-save_as_csv** *filename***] [-save_as_dot** *filename***]**

Arguments

-data *pbv_data_array*

Captures the data from calling **dcalltree** in an associative Tcl array rather than writing the data to the console.

-show_details

Displays the data with all processes and threads displayed.

-hide_backtrace

Displays the data with only root and leaf nodes displayed.

-sort *column*

Sorts the data display based on the data in a particular column. The possible arguments are *Processes*, *Location*, PC, *Host*, *Rank*, ID, and *Status*.

-save_as_csv *filename*

Saves the backtrace data as a file of comma-separated values under the name *filename*.

-save_as_dot *filename*

Saves the backtrace data as a dot file under the name *filename*. Dot is a plain text graph description language.

Description

The TotalView GUI has a Parallel Backtrace View window that displays the state of every process and thread in a parallel job. The **dcalltree** command makes this same data available either in the console window, or, with the **-data** switch, as a Tcl associative array.

The associative array has the following format:

```
{
    {
      Key        <value>
      Level      <value>
      Processes  <value>
      Location   <value>
      PC         <value>
      Host       <value>
      Rank       <value>
      ID         <value>
      Status     <value>
    }
    {
      ...
    }
```

```
}
```

The **-show_details** and **-hide_backtrace** switches pull in opposite directions. The **-show_details** switch shows the maximum data, including all processes and threads. The **-hide_backtrace** command hides any intermediate nodes, displaying only the root and leaf nodes. If used together, this results in a display of root and leaf nodes and all threads. This reduction can help to de-clutter the data display if the number of processes and threads is large.

Examples

```
dfocus group dcalltree
```

This example first changes the focus to the group using dfocus, then calls **dcalltree** with no switches. Note that the ID column is a compressed **ptlist** describing process and thread count, range, and IDs. See Compressed List Syntax (ptlist) for more information.

```
Processes Location          PC             Host    Rank ID                   Status
--------- --------          --             ----    ---- --                   ------
12        /                 ...            <local> -1   4:12[p1-4.1-3]       ...
 4        _start            0x004011b9     <local> -1   4:4[p1-4.1]          ...
  4       __libc_start_main 0x2b3425358184 <local> -1   4:4[p1-4.1]          ...
   4      main              0x004035bf     <local> -1   4:4[p1-4.1]          ...
    4     fork_wrapper      0x00402790     <local> -1   4:4[p1-4.1]          ...
     4    forker            0x0040274b     <local> -1   4:4[p1-4.1]          ...
      4   snore             0x00401c11     <local> -1   4:4[p1-4.1]          ...
       1  snore#681         0x00401c05     <local> -1   2.1 - 47502964801120 Stopped
       1  snore#705         0x00401c9b     <local> -1   4.1 - 47502964801120 Breakpoint
       2  wait_a_while      0x00401a09     <local> -1   2:2[p1.1, p3.1]      Stopped
        2 __select_nocancel 0x2b34253f56e2 <local> -1   2:2[p1.1, p3.1]      Stopped
 8        start_thread      0x2b3424db1143 <local> -1   4:12[p1-4.1-3]       ...
  8       snore_or_leave    0x004021cb     <local> -1   4:8[p1-4.2-3]        ...
   8      snore             ...            <local> -1   4:8[p1-4.2-3]        ...
    1     snore#681         0x00401c05     <local> -1   1.2 - 1082132800     Breakpoint
    1     snore#681         0x00401c05     <local> -1   1.3 - 1090525504     Stopped
    1     snore#705         0x00401c9b     <local> -1   2.2 - 1082132800     Breakpoint
    1     snore#681         0x00401c05     <local> -1   2.3 - 1090525504     Stopped
    1     snore#681         0x00401c05     <local> -1   4.2 - 1082132800     Stopped
    1     snore#681         0x00401c05     <local> -1   4.3 - 1090525504     Stopped
    2     wait_a_while      ...            <local> -1   1:2[p3.2-3]          ...
```

```
dcalltree -show_details
```

By adding the **-show_details**, switch, you get more complete output:

```
Processes  Location          PC             Host    Rank ID                   Status
---------  --------          --             ----    ---- --                   ------
12         /                 ...            <local> -1   4:12[p1-4.1-3]       ...
 4         _start            0x004011b9     <local> -1   4:4[p1-4.1]          ...
  4        __libc_start_main 0x2b3425358184 <local> -1   4:4[p1-4.1]          ...
```

```
  4       main              0x004035bf     <local> -1   4:4[p1-4.1]          ...
   4      fork_wrapper      0x00402790     <local> -1   4:4[p1-4.1]          ...
    4     forker            0x0040274b     <local> -1   4:4[p1-4.1]          ...
     4    snore             0x00401c11     <local> -1   4:4[p1-4.1]          ...
      1   snore#681         0x00401c05     <local> -1   2.1 - 47502964801120 Stopped
      1   snore#705         0x00401c9b     <local> -1   4.1 - 47502964801120 Breakpoint
      2   wait_a_while      0x00401a09     <local> -1   2:2[p1.1, p3.1]      Stopped
       2  __select_nocancel 0x2b34253f56e2 <local> -1   2:2[p1.1, p3.1]      Stopped
        1 __select_nocancel 0x2b34253f56e2 <local> -1   1.1 - 47502964801120 Stopped
        1 __select_nocancel 0x2b34253f56e2 <local> -1   3.1 - 47502964801120 Stopped
 8         start_thread      0x2b3424db1143 <local> -1   4:12[p1-4.1-3]       ...
  8        snore_or_leave    0x004021cb     <local> -1   4:8[p1-4.2-3]        ...
   8       snore             ...           <local> -1   4:8[p1-4.2-3]        ...
    1      snore#681         0x00401c05     <local> -1   1.2 - 1082132800     Breakpoint
    1      snore#681         0x00401c05     <local> -1   1.3 - 1090525504     Stopped
    1      snore#705         0x00401c9b     <local> -1   2.2 - 1082132800     Breakpoint
    1      snore#681         0x00401c05     <local> -1   2.3 - 1090525504     Stopped
    1      snore#681         0x00401c05     <local> -1   4.2 - 1082132800     Stopped
    1      snore#681         0x00401c05     <local> -1   4.3 - 1090525504     Stopped
    2      wait_a_while      ...            <local> -1   1:2[p3.2-3]          ...
     1     __select_nocancel 0x2b34253f56e2 <local> -1   3.3 - 1090525504     Stopped
     1     wait_a_while#580  0x004019e9     <local> -1   3.2 - 1082132800     Breakpoint
```

```
dcalltree -show_details -hide_backtrace
```

Adding the **-hide_backtrace** switch reduces the clutter somewhat:

```
Processes Location          PC             Host    Rank ID                   Status
--------- --------          --             ----    ---- --                   ------
12        /                 ...           <local> -1   4:12[p1-4.1-3]       ...
 1        __select_nocancel 0x2b34253f56e2 <local> -1   3.3 - 1090525504     Stopped
 1        __select_nocancel 0x2b34253f56e2 <local> -1   1.1 - 47502964801120 Stopped
 1        __select_nocancel 0x2b34253f56e2 <local> -1   3.1 - 47502964801120 Stopped
 1        snore#681         0x00401c05     <local> -1   2.1 - 47502964801120 Stopped
 1        snore#705         0x00401c9b     <local> -1   4.1 - 47502964801120 Breakpoint
 1        snore#681         0x00401c05     <local> -1   1.2 - 1082132800     Breakpoint
 1        snore#681         0x00401c05     <local> -1   1.3 - 1090525504     Stopped
 1        snore#705         0x00401c9b     <local> -1   2.2 - 1082132800     Breakpoint
 1        snore#681         0x00401c05     <local> -1   2.3 - 1090525504     Stopped
 1        snore#681         0x00401c05     <local> -1   4.2 - 1082132800     Stopped
 1        snore#681         0x00401c05     <local> -1   4.3 - 1090525504     Stopped
 1        wait_a_while#580  0x004019e9     <local> -1   3.2 - 1082132800     Breakpoint
```

Here is code to get the location of all threads that are at a breakpoint:

```
dcalltree -data pbv_data_array -show_details
foreach { data_record } [array get pbv_data_array] {
```

```
    set print_location 0
    set break_location
    foreach {title value} $data_record {
       if {$title == "Location"} {
           set break_location $value
       }
       if {$value == "Breakpoint"} {
           set print_location 1
       }
       if {1 == $print_location} {
           puts stdout "Breakpoint found at $break_location"
           set print_location 0
       }
    }
}
```

RELATED TOPICS

Parallel Backtrace View in the *TotalView User Guide*

dcheckpoint

Creates a checkpoint image of processes (IBM RS6000 only)

Format

Creates a checkpoint on IBM RS6000 machines.

dcheckpoint [**-by** *process_set*] [**-delete** | **-halt**]

Arguments

-by *process_set*

This option can take two possible values:

pe

Checkpoint the Parallel Environment job. This value is the default.

pid

Checkpoint the focus process.

-delete

Processes exit after the checkpoint occurs.

-halt

Processes halt after the checkpoint occurs.

Description

The **dcheckpoint** command saves program and process information to a file. This information includes process and group IDs. Later, use the **drestart** command to restart the program.

NOTE >> This command does not save TotalView breakpoint information. To save breakpoints, use the **dactions** command.

By default, TotalView checkpoints the Parallel Environment job. To checkpoint a particular process, make that process the focus and use the **pid** argument to **-by**. If the focus is a group that contains more than one process, the CLI displays an error -message.

By default, the checkpointed processes stop, allowing you to investigate a -program's state at the checkpointed position. You can modify this behavior with the **-delete** and **-halt** options.

When you request a checkpoint:

- TotalView temporarily stops (that is, *parks*) the processes that are being checkpointed. Parking ensures that the processes do not run freely after a **dcheckpoint** or **drestart** operation. (If they did, your code would begin running before you could control it.)
- The CLI detaches from processes before they are checkpointed. After checkpointing, the CLI automatically reattaches to them.

Examples

```
dcheckpoint
```

Checkpoints the Parallel Environment job. All associated processes stop.

```
f3 dcheckpoint -by pid
```

Checkpoints process 3. Process 3 stops.

```
dcheckpoint -by pe -halt
```

Checkpoints the Parallel Environment job. All associated processes halt.

RELATED TOPICS

Tools > Create Checkpoint Command in the online Help
Tools > Restart Checkpoint Command in the online Help
drestart **Command**

dcont

Continues execution and waits for execution to stop

Format

dcont

Arguments

This command has no arguments

Description

The **dcont** command continues all processes and threads in the current focus, and then waits for all of them to stop.

This command is a Tcl macro, with the following definition:

```
proc dcont {args} {uplevel dgo; "dwait $args" }
```

You often want this behavior in scripts. You seldom want to do interactively.

NOTE >> You can interrupt this action using *Ctrl+C* to stop process execution.

A **dcont** command completes when all threads in the focus set of processes stop executing. If you do not indicate a focus, the default focus is the process of interest (POI).

Command alias

Alias	Definition	Description
co	**dcont**	Resume
CO	**{dfocus g dcont}**	Resume at group-level

Examples

`dcont`

Resumes execution of all stopped threads that are not held and which belong to processes in the current focus. (This command does not affect threads that are held at barriers.) The command blocks further input until all threads in all target processes stop. After the CLI displays its prompt, you can enter additional commands.

`dfocus p1 dcont`

Resumes execution of all stopped threads that are not held and that belong to process 1. The CLI does not accept additional commands until the process stops.

`dfocus {p1 p2 p3} co`

Resumes execution of all stopped threads that are not held and that belong to processes 1, 2, and 3.

CO

Resumes execution of all stopped threads that are not held and that belong to the current group.

RELATED TOPICS

Starting Processes and Threads in the *TotalView for HPC User Guide*
dgo **Command**
dwait **Command**

dcuda

Manages GPU threads

Format

dcuda block [(Bx,By,Bz)]
dcuda thread [(Tx,Ty, Tz)]
dcuda kernel
dcuda device [<n>]
dcuda sm [<n>]
dcuda warp [<n>]
dcuda lane [<n>]
dcuda info-system
dcuda info-device
dcuda info-sm
dcuda info-warp
dcuda info-lane
dcuda focus (Bx,By,Bz),(Tx,Ty, Tz)
dcuda hwfocus <D/S/W/L>

Arguments

Bx,By, Bz

The x, y and z block indices

Tx, Ty, Tz

The x,y, and z thread indices

D/S/W/L

The coordinates defining the physical space of the hardware:

D: device number
S: streaming multiprocessor (SM)
W: warp (WP) number on the SM
L: lane (LN) number on the warp

Description

The dcuda commands allow you to manage and view GPU threads, in either the logical coordinate space of block and thread indices (<<<(Bx,By,Bz),(Tx,Ty,Tz)>>>) or the physical coordinate space that defines the hardware (the device number, the streaming multiprocessor number on the device, the warp number on the SM, and lane number on the warp).

dcuda block [(Bx,By,Bz)]

- With no arguments, shows the current CUDA block
- With a block argument of the form (Bx,By,Bz), changes the CUDA focus to that block. Omitted parameters (i.e., Bz) are unchanged.

dcuda thread [(Tx,Ty,Tz)]

- With no arguments, shows the current CUDA thread.
- With a thread argument of the form (Tx,Ty,Tz), changes the CUDA focus to that thread. Omitted parameters (i.e., Ty and Tz, or just Tz) are unchanged.

dcuda kernel

Displays the logical and hardware coordinates of the current CUDA context.

dcuda device [<n>]

- With no arguments, shows the current CUDA device.
- With a numeric argument, changes the CUDA device focus to that device.

dcuda sm [<n>]

- With no arguments, shows the current CUDA SM (streaming multiprocessor).
- With a numeric argument, changes the CUDA SM focus to that SM.

dcuda warp [<n>]

- With no arguments, shows the current CUDA warp.
- With a numeric argument, changes the CUDA warp focus to that warp.

dcuda lane [<n>]

- With no arguments, shows the current CUDA lane.
- With a numeric argument, changes the CUDA lane focus to that lane.

dcuda info-system

Displays the CUDA devices in the system.

dcuda info-device

Displays currently running SMs in the current device.

dcuda info-sm

Displays valid warps in the current SM.

dcuda info-warp

Displays valid lanes in the current warp.

dcuda info-lane

Displays the current lane.

dcuda focus (Bx,By, Bz),(Tx,Ty,Tz)

Changes the focus via CUDA logical coordinates of the form `<<<(Bx,By,Bz),(Tx,Ty,Tz)>>>`.

The following abbreviations are also accepted:

```
<<<Tx>>>
<<<(Tx)>>>
<<<(Tx,Ty)>>>
<<<(Tx,Ty,Tz)>>>
<<<(Bx),(Tx)>>>
<<<(Bx),(Tx,Ty)>>>
<<<(Bx),(Tx,Ty,Tz)>>>
<<<(Bx,By),(Tx)>>>
<<<(Bx,By),(Tx,Ty)>>>
<<<(Bx,By),(Tx,Ty,Tz)>>>
<<<(Bx,By,Bz),(Tx)>>>
<<<(Bx,By,Bz),(Tx,Ty)>>>
<<<(Bx,By,Bz),(Tx,Ty,Tz)>>>
```

Angle brackets are optional, but must be balanced.

dcuda hwfocus <D/S/W/L>

Changes the focus via CUDA hardware coordinates of the form D/S/W/L, S/W/L, W/L, or L.

Command alias

Alias	Definition	Description
cuda	**dcuda**	Writes out the focus thread, as in **dcuda kernel**.

Examples

Displaying device information

```
dcuda info-device
```

Output:

```
DEV: 0/1  Device Type: gt200   SM Type: sm_13   SM/WP/LN: 30/32/32  Regs/LN: 128
SM:  0/30  valid warps: 0x0000000000000001
```

```
dcuda info-sm
```

Output:

```
DEV: 0/1  Device Type: gt200   SM Type: sm_13   SM/WP/LN: 30/32/32  Regs/LN: 128
SM:  0/30  valid warps: 0x0000000000000001
WP:  0/32  valid/active/divergent lanes: 0x0000000f/0x0000000f/0x00000000  block:
(0,0,0)
```

```
dcuda info-warp
```

Output:

```
  DEV: 0/1  Device Type: gt200   SM Type: sm_13   SM/WP/LN: 30/32/32  Regs/LN: 128
  SM:  0/30  valid warps: 0x0000000000000001
  WP:  0/32  valid/active/divergent lanes: 0x0000000f/0x0000000f/0x00000000  block:
  (0,0,0)
  LN:  0/32  pc=0x000000001ef2efa8  thread: (0,0,0)
  LN:  1/32  pc=0x000000001ef2efa8  thread: (1,0,0)
  LN:  2/32  pc=0x000000001ef2efa8  thread: (0,1,0)
  LN:  3/32  pc=0x000000001ef2efa8  thread: (1,1,0)
```

```
dcuda info-lane
```

Output:

```
DEV: 0/1  Device Type: gt200   SM Type: sm_13   SM/WP/LN: 30/32/32  Regs/LN: 128
SM:  0/30  valid warps: 0x0000000000000001
WP:  0/32  valid/active/divergent lanes: 0x0000000f/0x0000000f/0x00000000  block:
(0,0,0)
```

Displaying the focus

```
dcuda warp sm
```

Output:

```
sm 0 warp 0
```

```
dcuda lane device
```

Output:

```
device 0 lane 3
```

```
dcuda thread
```

Output:

```
thread (1,1,0)
```

```
dcuda kernel
```

Output:

```
device 0, sm 0, warp 0, lane 3,  block (0,0,0), thread (1,1,0)
```

Changing the focus

In these commands, note that TotalView assigns CUDA threads a negative thread ID. In the examples here, the CUDA thread is labeled "1.-1".

```
dcuda thread (1,1,0)
```

Changes the CUDA focus to the thread represented by logical coordinates 1,1,0.

```
New CUDA focus (1.-1): device 0, sm 0, warp 0, lane 3,   block (0,0,0), thread
(1,1,0)
```

```
dcuda lane 2
```

Changes the CUDA focus to lane 2.

```
New CUDA focus (1.-1): device 0, sm 0, warp 0, lane 2,   block (0,0,0), thread
(0,1,0)
```

```
dcuda lane 1 sm 0
```

Changes the CUDA focus to lane 1 and to SM 0.

```
New CUDA focus (1.-1): device 0, sm 0, warp 0, lane 1,   block (0,0,0), thread
(1,0,0)
```

```
dcuda thread 0,0,0
```

Changes the CUDA focus to thread 0,0,0.

```
New CUDA focus (1.-1): device 0, sm 0, warp 0, lane 0,   block (0,0,0), thread
(0,0,0)
```

```
dcuda thread 1
```

Changes the CUDA focus to thread 1,0,0.

```
New CUDA focus (1.-1): device 0, sm 0, warp 0, lane 1,   block (0,0,0), thread
(1,0,0)
```

RELATED TOPICS

Using the CUDA Debugger in the *TotalView for HPC User Guide*

ddelete

Deletes action points

Format

Deletes the specified action points

ddelete *action-point-list*

Deletes all action points

ddelete -a

Arguments

action-point-list

A list of the action points to delete.

-a

Deletes all action points in the current focus.

Description

The **ddelete** command permanently removes one or more action points. If you delete a barrier point, the CLI releases the processes and threads held at it.

If you do not indicate a focus, the default focus is the process of interest (POI).

Command alias

Alias	Definition	Description
de	**ddelete**	Deletes action points

Examples

```
ddelete 1 2 3
```

Deletes action points 1, 2, and 3.

```
ddelete -a
```

Deletes all action points associated with processes in the current focus.

```
dfocus {p1 p2 p3 p4} ddelete -a
```

Deletes all the breakpoints associated with processes 1 through 4. Breakpoints associated with other threads are not affected.

```
dfocus a de -a
```

Deletes all action points known to the CLI.

RELATED TOPICS

Action Point > Delete All Command in the online Help

ddetach

Detaches from processes

Format

ddetach

Arguments

This command has no arguments.

Description

The **ddetach** command detaches the CLI from all processes in the current focus. This *undoes* the effects of attaching the CLI to a running process; that is, the CLI releases all control over the process, eliminates all debugger state information related to it (including action points), and allows the process to continue executing in the normal runtime environment.

You can detach any process controlled by the CLI; the process being detached need not have been loaded with a **dattach** command.

After this command executes, you are no longer able to access program variables, source location, action point settings, or other information related to the detached process.

If a single thread serves as the set, the CLI detaches the process that contains the thread. If you do not indicate a focus, the default focus is the process of interest (POI).

Command alias

Alias	Definition	Description
det	**ddetach**	Detaches from processes

Examples

```
ddetach
```

Detaches the process or processes that are in the current focus.

```
dfocus {p4 p5 p6} det
```

Detaches processes 4, 5, and 6.

```
dfocus g2 det
```

Detaches all processes in the control group associated with process 2.

RELATED TOPICS

Detaching from Processes in the *TotalView for HPC User Guide*
dattach **Command**

ddisable

Temporarily disables action points

Format

Disables the specified action points

ddisable *action-point-list* [**-block** *number-list*]

Disables all action points

ddisable -a

Arguments

action-point-list

A list of the action points to disable.

-block *number-list*

If you set a breakpoint on a line that is ambiguous, use this option to identify the instances to disable. Obtain a list of these numbers using the **dactions** command.

-a

Disables all action points.

Description

The **ddisable** command temporarily deactivates action points. To delete an action point, use **ddelete**.

You can explicitly name the IDs of the action points to disable or you can disable all action points.

If you do not indicate a focus, the default focus is the process of interest (POI).

Command alias

Alias	Definition	Description
di	**ddisable**	Temporarily disables action points

Examples

```
ddisable 3 7
```

Disables the action points with IDs 3 and 7.

```
di -a
```

Disables all action points in the current focus.

```
dfocus {p1 p2 p3 p4} ddisable -a
```

Disables all action points associated with processes 1 through 4. Action points associated with other processes are not affected.

```
di 1 -block 3 4
```

Disables the action points associated with blocks 3 and 4. That is, one logical action point can map to more than one actual action point if you set the action point at an ambiguous location.

```
ddisable 1 2 -block 3 4
```

Disables the action points associated with blocks 3 and 4 in action points 1 and 2.

RELATED TOPICS

Action Point > Disable Command in the online Help

ddlopen

Dynamically loads shared object libraries

Format

Dynamically loads a shared object library

ddlopen [**-now** | **-lazy**] [**-local** | **-global**] [**-mode** *int*] *filespec*

Displays information about shared object libraries

ddlopen [**-list** { *dll-ids*...}]

Arguments

-now

Includes **RTLD_NOW** in the **dlopen** command's mode argument. (Now immediately resolves all undefined symbols.)

-lazy

Includes **RTLD_LAZY** in the **dlopen** command's mode argument. (Lazy tries to resolve unresolved symbols as code is executed, rather than now.)

-local

Includes **RTLD_GLOBAL** in the **dlopen** command's mode argument. (Local makes library symbols unavailable to libraries that the program subsequently loads.) This argument is the default.

-global

Includes **RTLD_LOCAL** in the **dlopen** command's mode argument. (Global makes library symbols available to libraries that the program subsequently loads.)

-mode *int*

The integer arguments are ORed into the other mode flags passed to the **dlopen()** function. (See your operating system's documentation for information on these flags.)

filespec

The shared library to load.

-list

Displays information about the listed DLL IDs. If you omit this option or use the **-list** without a DLL ID list, TotalView displays information about all DLL IDs.

dll-ids

A list of one or more DLL IDs.

Description

The **ddlopen** command dynamically loads shared object libraries, or lists the shared object libraries loaded using this or the **Tools > Debugger Loaded Libraries** command.

For a *filespec* argument, TotalView performs a **dlopen** operation on this file in each process in the current P/T set. On the IBM AIX operating system, you can add a parenthesized library module name to the end of the *filespec* argument.

NOTE >> **dlopen**(3), **dlerror**(3), and other related routines are not part of the default runtime libraries on AIX, Solaris, and Red Hat Linux. Instead, they are in the **libdl** system library. Consequently, you must link your program using the **-ldl** option if you want to use the **ddlopen** command.

The **-now** and **-lazy** options indicate whether **dlopen** immediately resolves unresolved symbol references or defers resolving them until the target program references them. If you don't use either option, TotalView uses your operating system's default. (Not all platforms support both alternatives. For example, AIX treats **RTLD_LAZY** the same as **RTLD_NOW**).

The **-local** and **-global** options determine if symbols from the newly loaded library are available to resolve references. If you don't use either option, TotalView uses the target operating system's default. (Linux supports only the **-global** option**;** if you don't specify an option, the default is the **-local** option.)

After entering this command, the CLI waits until all **dlopen** calls complete across the current focus. The CLI then returns a unique *dll-id* and displays its prompt, which means that you can enter additional CLI commands. However, if an event occurs (for example, a **$stop,** a breakpoint in user function called by static object constructors, a SEGV, and so on), the **ddlopen** command throws an exception that describes the event. The first exception subcode in the **errorCode** variable is the DLL ID for the suspended **dlopen()** function call.

If an error occurs while executing the **dlopen()** function, TotalView calls the **dlerror()** function in the target process, and then prints the returned string.

A DLL ID describes a shareable object that was dynamically loaded by the **ddlopen** command. Use the **TV:dll** command to obtain information about and delete these objects. If all **dlopen()** calls return immediately, the **ddlopen** command returns a unique DLL ID that you can also use with the **TV::dll** command.

Every DLL ID is also a valid breakpoint ID, representing the expressions used to load and unload DLLs; you can manipulate these breakpoints using the **TV::expr** command.

If you do not use a *filespec* argument or if you use the **-list** option without using a DLL ID argument, TotalView prints information about objects loaded using **ddlopen**. If you do use a DLL ID argument, TotalView prints information about DLLs loaded into all processes in the focus set; otherwise, TotalView prints information about just those DLLs. The **ddlopen** command prints its output directly to the console.

The **ddlopen** command calls the **dlopen()** function and it can change the string returned by the **dlerror()** function. It can also change the values returned to the application by any subsequent **dlerror()** call.

Examples

```
ddlopen "mpistat.so"
```

Loads **mpistat.so** library file. The returned argument lists the process into which TotalView loaded the library.

```
dfocus g ddlopen "mpistat.so(mpistat.o)"
```

Loads the module **mpistat.o** in the AIX DLL library **mpistat.so** into all members of the current process's control group.

```
ddlopen -lazy -global "mpistat.so"
```

Loads **mpistat.so** into process 1, and does not resolve outstanding application symbol requests to point to **mpistat**. However, TotalView uses the symbols in this library if it needs them.

```
ddlopen
```

Prints the list of shared objects dynamically loaded by the **ddlopen** command.

RELATED TOPICS

Preloading Shared Libraries in the *TotalView for HPC User Guide*
Tools > Debugger Loaded Libraries Command in the online Help
TV::dll **Command**

ddown

Moves down the call stack

Format

ddown [*num-levels*]

Arguments

num-levels

Number of levels to move down. The default is 1.

Description

The **ddown** command moves the selected stack frame down one or more levels and prints the new frame's number and function name.

Call stack movements are all relative, so using the **ddown** command effectively moves down in the call stack. (If up is in the direction of the **main()** function, then down is back to where you were before you moved through stack frames.)

Frame 0 is the most recent—that is, the currently executing—frame in the call stack, frame 1 corresponds to the procedure that invoked the currently executing frame, and so on. The call stack's depth is increased by one each time a procedure is entered, and decreased by one when it is exited.

The command affects each thread in the focus. That is, if the current width is process, the **ddown** command acts on each thread in the process. You can specify any collection of processes and threads as the target set.

In addition, the **ddown** command modifies the current list location to be the current execution location for the new frame; this means that a **dlist** command displays the code that surrounds this new location.

The context and scope changes made by this command remain in effect until the CLI executes a command that modifies the current execution location (for example, the **dstep** command), or until you enter either a **dup** or **ddown** command.

If you tell the CLI to move down more levels than exist, the CLI simply moves down to the lowest level in the stack, which was the place where you began moving through the stack frames.

Command alias

Alias	Definition	Description
d	**ddown**	Moves down the call stack

Examples

`ddown`

Moves down one level in the call stack. As a result, for example, **dlist** commands that follow refers to the procedure that invoked this one. The following example shows what prints after you enter this command:

```
0 check_fortran_arrays_ PC=0x10001254,
   FP=0x7fff2ed0 [arrays.F#48]

d 5
```

Moves the current frame down five levels in the call stack.

RELATED TOPICS

dup **Command**

denable

Enables action points

Format

Enables some action points

denable *action-point-list* [**-block** *number-list*]

Enables all disabled action points in the current focus

denable -a

Arguments

action-point-list

The identifiers of the action points being enabled.

-a

Enables all action points.

-block *number-list*

If you set a breakpoint on a line that is ambiguous, this option names which instances to enable. Use the **dactions** command to obtain a list of these numbers.

Description

The **denable** command reactivates action points that you previously disabled with the **ddisable** command. The **-a** option enables all action points in the current focus.

If you did not save the ID values of disabled action points, use **dactions** to obtain a list of this information.

If you do not indicate a focus, the default focus is the process of interest (POI).

Command alias

Alias	Definition	Description
en	**denable**	Enables action points

Examples

```
denable 3 4
```

Enables two previously identified action points.

```
dfocus {p1 p2} denable -a
```

Enables all action points associated with processes 1 and 2. This command does not affect settings associated with other processes.

```
en -a
```

Enables all action points associated with the current focus.

```
f a en -a
```

Enables all actions points in all processes.

```
en 1 -block 3 4
```

Enables the action points associated with blocks 3 and 4. That is, one logical action point can map to more than one actual action point if you set the action point at an ambiguous location.

```
denable 1 2 -block 3 4
```

Enables the action points associated with blocks 3 and 4 in action points 1 and 2.

RELATED TOPICS

Enabling Action Points in the *TotalView for HPC User Guide*
Action Points > Enable Command in the online Help
ddisable **Command**
dbarrier **Command**
dbreak **Command**
dwatch **Command**

dexamine

Displays memory contents

Format

dexamine [**-column_count** *cnt*] [**-count** *cnt*] [**-data_only**] [**-show_chars**] [**-string_length** *len*] [**-format** *fmt*] [**-memory_info**] [**-wordsize** *size*] *variable_or_expression*

Arguments

-cols *cnt*
-column_count *cnt*

Specifies the number of columns to display. Without this option, the CLI determines this number of columns based on the data's wordactid size and format.

-c *cnt*
-count *cnt*

Specifies the number of elements to examine. Without this option, the CLI displays the entire object. This number is determined by the object's datatype. If no type is available, the default value for *cnt* is 1 element.

-d
-data_only

Does not display memory values with a prefixed *address:* field or address annotations. This option is incompatible with **-memory_info**.

-f *fmt*
-format *fmt*

Specifies the format to use when displaying memory. The default format is **hex**. You can abbreviate each of these to the first character in the format's name.

address

Interprets memory as addresses; the word size is always the size of a pointer

binary

Binary; this can also be abbreviated to **t**

char

Unsigned character

dec

Signed decimal value of size 1, 2, 4, or 8 bytes

float

Signed float value, either 4 or 8 byte word size

hex

Unsigned hexadecimal value of size 1, 2, 4, or 8 bytes

instruction

Sequence of instructions

oct

Unsigned octal value of size 1, 2, 4, or 8 bytes

string

String

-m
-memory_info

Shows information about the type of memory associated with the address. Without this option, the CLI does not display this information. This argument is incompatible with **-data_only**. When you use this option, the CLI annotates address each line in the dump as follows:

[d]: .data
[t]: .text
[p]: .plt
[b]: .bss
[?]: Another type of memory (such as stack address)

If you have enabled memory debugging, the following annotations can also appear:

[A]: Allocated block of memory
[D]: Deallocated block of memory
[G]: Address is a guard region
[C]: Address is a corrupted guard region

If the address being examined is within an allocated block, this option tells the Memory Debugger to automatically include the pre-guard region if the user specified guards in the memory debugging configuration.

-sc
-show_chars

Shows a trailing character dump for each line. Without this option, the CLI does not show the trailing characters.

-sl *len*
-string_length *len*

Specifies the maximum size string to display. Without this option, the length is all characters up to the first null character.

-w *size*
-wordsize *size*

Specifies the "word size" to apply to the format. The default word size is '1' for most formats. For 'address' format, the word size is always the size of a target pointer. The values can be 1, 2, 4, 8 or one of the following: **b** (byte), **h** (half word), **w** (word), or **g** (giant).

variable_or_expression

A variable or an expression that can be resolved into a memory address.

Description

Examines memory at the address of the specified variable or the address resulting from the evaluation of an expression. If you specify an expression, the result of the evaluation must be an lvalue.

In most cases, you will enclose the expression in **{}** symbols.

NOTE >> Instead of using the listed **dexamine** options, you can instead use the gdb examine command syntax.

Command alias

Alias	Definition	Description
x	**dexamine**	Examines (dumps) memory

dflush

Unwinds stack from suspended computations

Format

Removes the top-most suspended expression evaluation.

dflush

Removes the computation indicated by a suspended evaluation ID and all those that precede it

dflush *susp-eval-id*

Removes all suspended computations

dflush -all

Arguments

susp-eval-id

The ID returned or thrown by the **dprint** command or which is printed by the **dwhere** command.

-all

Flushes all suspended evaluations in the current focus.

Description

The **dflush** command unwinds the stack to eliminate frames generated by suspended computations. Typically, these frames can occur when using the **dprint -nowait** command. Other possibilities are if an error occurred in a function call in an eval point, in an expression in a **Tools > Evaluate** window, or if you use a **$stop** function.

Use this command as follows:

- If you don't use an argument, the CLI unwinds the top-most suspended evaluation in all threads in the current focus.
- If you use a *susp-eval-id*, the CLI unwinds each stack of all threads in the current focus, flushing all pending computations up to and including the frame associated with the ID.
- If you use the **-all** option, the CLI flushes all suspended evaluations in all threads in the current focus.

If no evaluations are suspended, the CLI ignores this command. If you do not indicate a focus, the default focus is the *thread of interest*.

Examples

The following example uses the **dprint** command to place five suspended routines on the stack. It then uses the **dflush** command to remove them. This example uses the **dflush** command in three different ways.

```
#
# Create 5 suspended functions
#
d1.<> dprint -nowait nothing2(7)
```

```
7
Thread 1.1 hit breakpoint 4 at line 310 in "nothing2(int)"
d1.<> dprint -nowait nothing2(8)
8
Thread 1.1 hit breakpoint 4 at line 310 in "nothing2(int)"
d1.<> dprint -nowait nothing2(9)
9
Thread 1.1 hit breakpoint 4 at line 310 in "nothing2(int)"
d1.<> dprint -nowait nothing2(10)
10
Thread 1.1 hit breakpoint 4 at line 310 in "nothing2(int)"
d1.<> dprint -nowait nothing2(11)
11
Thread 1.1 hit breakpoint 4 at line 310 in "nothing2(int)"
...

#
# The top of the call stack looks like:
#
d1.<> dwhere    0 nothing2    PC=0x00012520, FP=0xffbef130 [fork.cxx#310]
   1 ***** Eval Function Call (11) ****************
   2 nothing2   PC=0x00012520, FP=0xffbef220 [fork.cxx#310]
   3 ***** Eval Function Call (10) ****************
   4 nothing2   PC=0x00012520, FP=0xffbef310 [fork.cxx#310]
   5 ***** Eval Function Call (9) ***************
   6 nothing2   PC=0x00012520, FP=0xffbef400 [fork.cxx#310]
   7 ***** Eval Function Call (8) ****************
   8 nothing2   PC=0x00012520, FP=0xffbef4f0 [fork.cxx#310]
   9 ***** Eval Function Call (7) ****************
  10 forker     PC=0x00013fd8, FP=0xffbef648 [fork.cxx#1120]
  11 fork_wrap  PC=0x00014780, FP=0xffbef6c8 [fork.cxx#1278] ...
#
# Use the dflush command to remove the last item pushed
# onto the stack. Notice the frame associated with "11"
# is no longer there.
#
d1.<> dflush
d1.<> dwhere
   0 nothing2    PC=0x00012520, FP=0xffbef220 [fork.cxx#310]
   1 ***** Eval Function Call (10) ****************
   2 nothing2    PC=0x00012520, FP=0xffbef310 [fork.cxx#310]
   3 ***** Eval Function Call (9) ****************
   4 nothing2    PC=0x00012520, FP=0xffbef400 [fork.cxx#310]
   5 ***** Eval Function Call (8) ****************
   6 nothing2    PC=0x00012520, FP=0xffbef4f0 [fork.cxx#310]
   7 ***** Eval Function Call (7) ****************
   8 forker      PC=0x00013fd8, FP=0xffbef648 [fork.cxx#1120]
   9 fork_wrap   PC=0x00014780, FP=0xffbef6c8 [fork.cxx#1278]
```

```
#
# Use the dflush command with a suspened ID argument to remove
# all frames up to and including the one associated with
# suspended ID 9. This means that IDs 7 and 8 remain.
#
d1.<> dflush 9
# Top of call stack after dflush 9
d1.<> dwhere
   0 nothing2    PC=0x00012520, FP=0xffbef400 [fork.cxx#310]
   1 ***** Eval Function Call (8) ***************
   2 nothing2    PC=0x00012520, FP=0xffbef4f0 [fork.cxx#310]
   3 ***** Eval Function Call (7) ***************
   4 forker      PC=0x00013fd8, FP=0xffbef648 [fork.cxx#1120]
   5 fork_wrap   PC=0x00014780, FP=0xffbef6c8 [fork.cxx#1278]
#
# Use dflush -all to remove all frames. Only the frames
# associated with the program remain.
#

d1.<> dflush -all
# Top of call stack after dflush -all
d1.<> dwhere
   0 forker     PC=0x00013fd8, FP=0xffbef648 [fork.cxx#1120]
   1 fork_wrap  PC=0x00014780, FP=0xffbef6c8 [fork.cxx#1278]
```

RELATED TOPICS

Tools > Evaluate Command in the online Help
Built-In Statements in the *TotalView for HPC User Guide*

dfocus

Changes the current (Process/Thread P/T) set

Format

Changes the target of future CLI commands to this P/T set or returns the value of the current P/T set

dfocus [*p/t-set*]

Executes a command in this P/T set

dfocus *p/t-set command*

Arguments

p/t-set

A set of processes and threads to be the target of subsequent CLI commands.

command

A CLI command that operates on its own local focus.

Description

The **dfocus** command changes the set of processes, threads, and groups upon which a command acts. This command can change the focus for all commands that follow, or just the command that immediately follows.

The **dfocus** command always expects a P/T value as its first argument. This value can be either a single arena specifier or a list of arena specifiers. The default focus is **d1.<**, which selects the first user thread. The **d** (for default) indicates that each CLI command is free to use its own default width.

If you enter an optional *command*, the focus is set temporarily, and the CLI executes the *command* in the new focus. After the *command* executes, the CLI restores focus to its original value. The *command* argument can be a single command or a list.

If you use a *command* argument, the **dfocus** command returns the result of this command's execution. If you do not enter use a *command* argument, the **dfocus** command returns the focus as a string value.

NOTE >> Instead of a P/T set, you can enter a P/T set expression. These expressions are described in "Using P/T Set Operators" in the *TotalView for HPC User Guide*.

Command alias

Alias	Definition	Description
f	**dfocus**	Changes the object upon which a command acts

Examples

```
dfocus g dgo
```

Continues the TotalView group that contains the focus process.

```
dfocus p3 {dhalt; dwhere}
```

Stops process 3 and displays backtraces for each of its threads.

```
dfocus 2.3
```

Sets the focus to thread 3 of process 2, where 2 and 3 are TotalView process and thread identifier values. The focus becomes **d2.3**.

```
dfocus 3.2
dfocus .5
```

Sets and then resets command focus. A focus command that includes a dot and omits the process value uses the current process. Thus, this sequence of commands changes the focus to *process* 3, *thread* 5 (**d3.5**).

```
dfocus g dstep
```

Steps the current group. Although the *thread of interest* (TOI) is determined by the current focus, this command acts on the entire group that contains that thread.

```
dfocus {p2 p3} {dwhere ; dgo}
```

Performs a backtrace on all threads in processes 2 and 3, and then tells these processes to execute.

```
f 2.3 {f p w; f t s; g}
```

Executes a backtrace (**dwhere**) on all the threads in process 2, steps thread 3 in process 2 (without running any other threads in the process), and continues the process.

```
dfocus p1
```

Changes the current focus to include just those threads currently in process 1. The width is set to process. The CLI sets the prompt to **p1.<**.

```
dfocus a
```

Changes the current set to include all threads in all processes. After you execute this command, your prompt changes to **a1.<**. This command alters CLI behavior so that actions that previously operated on a thread now apply to all threads in all processes.

```
dfocus gW dstatus
```

Displays the status of all worker threads in the control group. The width is group level and the target is the workers group.

```
dfocus pW dstatus
```

Displays the status of all worker threads in the current focus process. The width is process level and the target is the workers group.

```
f {breakpoint(a) | watchpoint(a)} st
```

Shows all threads that are stopped at breakpoints or watchpoints.

```
f {stopped(a) - breakpoint(a)} st
```

Shows all stopped threads that are not stopped at breakpoints.

Chapter 21 of the *TotalView for HPC User Guide* contains additional **dfocus** examples.

RELATED TOPICS

Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*

dga

Displays Global Array variables

Format

dga [**-lang** *lang_type*] [*handle_or_name*] [*slice*]

Arguments

-lang

Specifies the language conventions to use. Without this option, TotalView uses the language used by the *thread of interest* (TOI).

lang_type

Specifies the language type to use when displaying a global array. The type must be either "**c**" or "**f**".

handle_or_name

Displays an array. This can be either a numeric handle or the name of the array. Without this argument, TotalView displays a list of all Global Arrays.

slice

Displays only a slice (that is, part of an array). If you are using C, you must place the array designators within braces **{}** because square brackets (**[]**) have special meaning in Tcl.

Description

The **dga** command displays information about Global Arrays.

If the focus includes more than one process, TotalView prints a list for each process in the focus. Because the arrays are global, each list is identical. If there is more than one thread in the focus, the CLI prints the value of the array as seen from that thread.

In almost all cases, you should change the focus to **d2.<** so that you don't include a starter process such as **prun**.

Examples

`dga`

Displays a list of Global Arrays, for example:

```
lb_dist
    Handle        -1000
  Ghosts        yes
  C type        $double[129][129][27]
  Fortran Type     \
             $double_precision(27,129,129)

bc_mask
  Handle        -999
  Ghosts        yes
  C type        long[129][129]
  Fortran Type  $integer(129,129)
```

```
dga bc_mask (:2,:2)
```

Displays a slice of the **bc_mask** variable, for example:

```
bc_mask(:2,:2) = {
    (1,1) = 1 (0x00000001)
 (2,1) = 1 (0x00000001)
 (1,2) = 1 (0x00000001)
 (2,2) = 0 (0x00000000)
}
```

```
dga -lang c -998 {[:1]{:1]}
```

Displays the same **bc_mask** variable as in the previous example in C format. In this case, the command refers to the variable by its handle.

RELATED TOPICS

Tools > Global Arrays Command in the online Help
Debugging Global Arrays Applications in the *TotalView for HPC User Guide*

dgo

Resumes execution of processes

Format

dgo

Arguments

-back

(ReplayEngine only) Runs the nonheld process in the current focus backward until it hits some action point or the beginning of recorded Replay history. This option can be abbreviated to **--b.**

Description

The **dgo** command resumes execution of all nonheld processes and threads in the current focus. If the process does not exist, this command creates it, passing it the default command arguments. These can be arguments passed into the CLI, or they can be the arguments set with the **drerun** command. If you are also using the TotalView GUI, you can set this value by using the **Process > Startup Parameters** command.

If a process or thread is held, it ignores this command.

You cannot use a **dgo** command when you are debugging a core file, nor can you use it before the CLI loads an executable and starts executing it.

If you do not indicate a focus, the default focus is the process of interest (POI).

Command alias

Alias	Definition	Description
g	**dgo**	Resumes execution
G	**{dfocus g dgo}**	Resumes group

Examples

```
dgo
```

Resumes execution of all stopped threads that are not held and which belong to processes in the current focus. (Threads held at barriers are not affected.)

```
G
```

Resumes execution of all threads in the current control group.

```
f p g
```

Continues the current process. Only threads that are not held can run.

```
f g g
```

Continues all processes in the control group. Only processes and threads that are not held are allowed to run.

```
f gL g
```

Continues all threads in the share group that are at the same PC as the *thread of interest* (TOI).

`f pL g`

Continues all threads in the current process that are at the same PC as the *TOI*.

`f t g`

Continues a single thread.

RELATED TOPICS

Starting Processes and Threads in the *TotalView for HPC User Guide*
Process > Go Command in the online Help
Thread > Go Command in the online Help
dcont **Command**

dgroups

Manipulates and manages groups

Format

Adds members to thread and process groups

dgroups -add [**-g** *gid*] [*id-list*]

Deletes groups

dgroups -delete [**-g** *gid*]

Intersects a group with a list of processes and threads

dgroups -intersect [**-g** *gid*] [*id-list*]

Prints process and thread group information

dgroups [**-list**] [*pattern-list*]

Creates a new thread or process group

dgroups -new [*thread_or_process*] [**-g** *gid*] [*id-list*]

Removes members from thread or process groups

dgroups -remove [**-g** *gid*] [*id-list*]

Arguments

-g *gid*

The group ID on which the command operates. The *gid* value can be an existing numeric group ID, an existing group name, or, if you are using the **-new** option, a new group name.

id-list

A Tcl list that contains process and thread IDs. Process IDs are integers; for example, 2 indicates process 2. Thread IDs define a *pid.tid* pair and look like decimal numbers; for example, 2.3 indicates process 2, thread 3. If the first element of this list is a group tag, such as the word **control**, the CLI ignores it. This makes it easy to insert all members of an existing group as the items to be used in any of these operations. (See the **dset** command's discussion of the **GROUP(gid)** variable for information on group designators.) These words appear in some circumstances when the CLI returns lists of elements in P/T sets.

pattern-list

A pattern to be matched against group names. The pattern is a Tcl regular expression.

thread_or_process

Keywords that create a new process or thread group. You can specify one of the following arguments: **t**, **thread**, **p**, or **process**.

Description

The **dgroups** command supports the following functions:

- Adding members to process and thread groups.
- Creating a group.

- Intersecting a group with a set of processes and threads.
- Deleting groups.
- Displaying the name and contents of groups.
- Removing members from a group.

dgroups -add

Adds members to one or more thread or process groups. The CLI adds each of these threads and processes to the group. If you add a:

- Process to a thread group, the CLI adds all of its threads.
- Thread to a process group, the CLI adds the thread's parent process.

You can abbreviate the **-add** option to **-a**.

The CLI returns the ID of this group.

You can explicitly name the items being added by using an *id-list* argument. Without an *id-list* argument, the CLI adds the threads and processes in the current focus. Similarly, you can name the group using the **-g** option. Without the **-g** option, the CLI uses the groups in the current focus.

If the *id-list* argument contains processes, and the target is a thread group, the CLI adds all threads from these processes. If it contains threads and the target is a process group, the CLI adds the parent process for each thread.

NOTE >> If you specify an *id-list* argument and you also use the *-g* option, the CLI ignores the focus. You can use two *dgroups -add* commands instead.

If you try to add the same object more than once to a group, the CLI adds it only once.

You cannot use this command to add a process to a control group. Instead, use the **CGROUP(dpid)** variable; for example:

```
dset CGROUP($mypid) $new_group_id
```

dgroups -delete

Deletes the target group. You can delete only groups that you create; you cannot delete groups that TotalView creates.

dgroups -intersect

Intersects a group with a set of processes and threads. If you intersect a thread group with a process, the CLI includes all of the process's threads. If you intersect a process group with a thread, the CLI uses the thread's process.

After this command executes, the group no longer contains members that were not in this intersection.

You can abbreviate the **-intersect** option to **-i**.

dgroups -list

Prints the name and contents of process and thread groups. If you specify a *pattern-list* as an argument, the CLI only prints information about groups whose names match this pattern. When entering a list, you can specify a *pattern*. The CLI matches this pattern against the list of group names by using the Tcl **regex** command.

NOTE >> If you do not enter a pattern, the CLI displays only groups that you have created with nonnumeric names.

You can abbreviate **-list** to **-l**.

dgroups -new

Creates a new thread or process group and adds threads and processes to it. If you use a name with the **-g** option, the CLI uses that name for the group ID; otherwise, it assigns a new numeric ID. If the group you name already exists, the CLI replaces it with the newly created group.

The CLI returns the ID of the newly created group.

You can explicitly name the items being added with an *id-list* argument. If you do not use an *id-list* argument, the CLI adds the threads and processes in the current focus.

If the *id-list* argument contains processes, and the target is a thread group, the CLI adds all threads from these processes. If it contains threads and the target is a process group, TotalView adds the parent process for each thread.

NOTE >> If you use an id-list argument and also use the **-g** option, the CLI ignores the focus.You can use two **dgroups -add** commands instead.

If you are adding more than one object and one of these objects is a duplicate, The CLI adds the nonduplicate objects to the group.

You can abbreviate the **-new** option to **-n**.

dgroups -remove

Removes members from one or more thread or process groups. If you remove a process from a thread group, The CLI removes all of its threads. If remove a thread from a process group, The CLI removes its parent process.

You cannot remove processes from a control group. You can, however, move a process from one control group to another by using the **dset** command to assign it to the CGROUP(dpid) variable group.

Also, you cannot use this command on read-only groups, such as share groups.

You can abbreviate the **-remove** option to **-r**.

Command alias

Alias	Definition	Description
gr	**dgroups**	Manipulates a group

Examples

dgroups -add
f tW gr -add

Adds the focus thread to its workers group.

```
dgroups -add
```

Adds the current focus thread to the current focus group.

```
set gid [dgroups -new thread ($CGROUP(1))]
```

Creates a new thread group that contains all threads from all processes in the control group for process 1.

```
f $a_group/9 dgroups -add
```

Adds process 9 to a user-defined group.

dgroups -delete
gr -delete -g mygroup

Deletes the **mygroup** group.

dgroups -intersect

```
dgroups -intersect -g 3 3.2
```

Intersects thread 3.2 with group 3. If group 3 is a thread group, this command removes all threads except 3.2 from the group; if it is a process group, this command removes all processes except process 3 from it.

```
f tW gr -i
```

Intersects the focus thread with the threads in its workers group.

```
f gW gr -i -g mygroup
```

Removes all nonworker threads from the **mygroup** group.

dgroups -list

```
dgroups -list
```

Displays information about all named groups; for example:

```
ODD_P: {process 1 3}
EVEN_P: {process 2 4}

gr -l *
```

Displays information about groups in the current focus.

```
1: {control 1 2 3 4}
2: {workers 1.1 1.2 1.3 1.4 2.1 2.2 2.3 2.4 3.1
            3.2 3.3 3.4 4.1 4.2 4.3 4.4}
```

```
  3: {share 1 2 3 4}
  ODD_P: {process 1 3}
  EVEN_P: {process 2 4}
```

dgroups -new

```
  gr -n t -g mygroup $GROUP($CGROUP(1))
```

Creates a new thread group named **mygroup** that contains all threads from all processes in the control group for process 1.

```
set mygroup [dgroups -new]
```

Creates a new process group that contains the current focus process.

dgroups -remove

dgroups -remove -g 3 3.2

Removes thread 3.2 from group 3.

```
f W dgroups -add
```

Marks the current thread as being a worker thread.

```
f W dgroups -r
```

Indicates that the current thread is not a worker thread.

RELATED TOPICS

Using the Group Editor in the *TotalView for HPC User Guide*
Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*
Setting Group Focus in the *TotalView for HPC User Guide*
Group > Edit Group Command in the online Help

dhalt

Suspends execution of processes

Format

dhalt

Arguments

This command has no arguments

Description

The **dhalt** command stops all processes and threads in the current focus.

If you do not indicate a focus, the default focus is the process of interest (POI).

Command alias

Alias	Definition	Description
h	**dhalt**	Suspends execution
H	**{dfocus g dhalt}**	Suspends group execution

Examples

```
dhalt
```

Suspends execution of *all running* threads belonging to processes in the current focus. (This command does not affect threads held at barriers.)

```
f t 1.1 h
```

Suspends execution of thread 1 in process 1. Note the difference between this command and **f 1.< dhalt**. If the focus is set as thread level, this command halts the first user thread, which is probably thread 1.

RELATED TOPICS

Stopping Processes and Threads in the *TotalView for HPC User Guide*
Updating Process Information in the *TotalView for HPC User Guide*
Group > Halt Command in the online Help
Process > Halt Command in the online Help
Thread > Halt Command in the online Help

dheap

Controls heap debugging

Format

Shows Memory Debugger state

dheap [-status]

Applies a saved configuration file

dheap -apply_config { default | *filename* **}**

Shows information about a backtrace

dheap -backtrace [*subcommands* **]**

Compares memory states

dheap -compare *subcommands* **[** *optional_subcommands* **]**
[*process* | *filename* **[** *process* | *filename* **]]**

Enables or disables the Memory Debugger

dheap { -enable | **-disable }**

Enables or disables event notification

dheap -event_filter *subcommands*

Writes memory information

dheap -export *subcommands*

Specifies the filters the Memory Debugger uses

dheap -filter *subcommands*

Writes guard blocks (memory before and after an allocation)

dheap -guard [*subcommands* **]**

Enables or disables the retaining (hoarding) of freed memory blocks

dheap -hoard [*subcommands* **]**

Displays Memory Debugger information

dheap -info [*subcommands* **]**

Indicates whether an address is in a deallocated block

dheap -is_dangling *address*

Locates memory leaks

dheap -leaks [-check_interior]

Enables or disables Memory Debugger event notification

dheap -[no]notify

Paints memory with a distinct pattern

dheap -paint [*subcommands* **]**

Enables or disables the ability to catch bounds errors and use-after-free errors retaining freed memory blocks

dheap -red_zones [*subcommands*]

Enables or disables allocation and reallocation notification

dheap -tag_alloc *subcommand* [*start_address* [*end_address*]]

Displays the Memory Debugger version number

dheap -version

Description

The **dheap** command is described in the Batch Scripting section of "Locating Memory Problems" in the *MemoryScape* documentation.

dhistory

Performs actions upon ReplayEngine

Format

Enable or disable recording mode

dhistory { -enable | -disable }

Get information about the current state of Replay

dhistory -info

Create a bookmark so you can return to a point in the execution history. The command returns an ID for referencing the bookmark.

dhistory { -create_bookmark [*comment***] | -cb [***comment***] }**

Go to a bookmark

dhistory { -goto_bookmark ID **| -gb** ID **}**

Return to the live execution point, that is, the end of the current recording, and continue recording

dhistory -go_live

List the bookmarks currently set, with IDs and comments

dhistory { -show_bookmarks | -sb }

Remove a bookmark, or all bookmarks

dhistory { { -delete_bookmark ID **| -db** ID **} | -clear_bookmarks }**

Save a recording file

dhistory -save [*recording-file* **]**

Deprecated arguments for setting and going to a bookmark (use the new 'bookmark' arguments)

dhistory { -get_time | -go_time *time* **}**

Arguments

-enable

Enables ReplayEngine, starting the history.

-disable

Disables ReplayEngine, ending the history.

-info

Writes ReplayEngine information including the current time, the live time, and whether the process is in Replay or Record mode. If you enter **dhistory** without arguments, **-info** is the default.

-create_bookmark *comment*

Creates a Replay bookmark at the current execution location so you can return to it later. You can specify an optional comment to this command and it will be stored with the bookmark for display when you use the `show_bookmarks` command. A bookmark is created with a unique numeric ID, which is the return value.

-goto_bookmark ID

Goes to the bookmark with the specified ID. This returns the focus process to the execution location where the bookmark was first created.

-go_live

Returns the process to the PC and back into Record mode. You can resume your "regular" debugging session.

-show_bookmarks

Displays all Replay bookmarks. This command shows the bookmark ID along with information about what line number, PC and function the bookmark is on. If you added a comment to help you remember the significance of the bookmark, it displays this as well.

-delete_bookmark ID

Deletes the bookmark with the given ID.

-clear_bookmarks

Deletes all Replay bookmarks.

-save *recording-file*

Saves the current replay history to a file. There is an optional argument to specify the name of the file to save to. The file specification can be a path or a simple file name, in which case it is saved in the current working directory. If no file is specified, the recording is saved in the current working directory with the file name `replay_`pid_hostname`.recording`.

To reload the recording file, use one of the following commands based on the functionality for loading core files. TotalView recognizes the recording file for what it is and acts appropriately.

To reload a recording at startup:

To reload a recording file when TotalView is running:

dattach *filename* **-c** *recording-file*

The *recording-file* argument can be either a path or a simple file name, in which case the current working directory is assumed.

-get_time — deprecated: use **create_bookmark**

Returns an integer value representing the program execution location at the current time. The integer value is a virtual timestamp. This virtual timestamp does not refer to the exact point in time; it has a granularity that is typically a few lines of code.

-go_time *time* — deprecated: use **goto_bookmark**

Places the process back to the virtual time specified by the *time* integer argument. The *time* argument is a virtual timestamp as reported by **dhistory -get_time**. You cannot use this command to move to a specific instruction but you can use it to get to within a small block of code (usually within a few lines of your intended point in execution history). This command is typically used either for roughly bookmarking a point in code or for searching execution history. It may need to be combined with stepping and **duntil** commands to return to an exact position.

Description

The **dhistory** command displays information about the current process either by default or when using the **-info** argument. In addition, options to this command can obtain a debugging time, which can be stored in a variable to go back to a particular time.

In addition, you can enable and display ReplayEngine as well as put it back into regular debugging mode using the **-go_live** option. You'll need to do this after your program is placed into replay mode. This occurs whenever you use any GUI or CLI command that moves to replay mode. For example, in the CLI, this can occur when you execute such commands as **dnext** or **dout**.

Command alias

Alias	Definition	Description
replay	**dhistory**	Performs actions upon ReplayEngine.

Examples

```
dhistory [-info]
```

Typing `dhistory` with no arguments or with the `-info` argument displays the following information:

```
History info for process 1

      Live time: 421 0x80485d6
   Current time: 421 0x80485d6
        Live PC: 0x80485d6
    Record Mode: True
  Replay Wanted: True
    Stop Reason: Normal result [waitpid, search, or goto_time
 Temp directory: /tmp/replay_jsm_local/replay_session_pZikY9
 Event log mode: circular
 Event log size: 268435456
```

```
replay -create_bookmark “This is where the crash occurs”
3
```

Creates a bookmark at the current execution location and returns an ID. The comment appears in the list of bookmarks displayed with `-show_bookmarks` (see below). Note the use of the `replay` alias for this command, which might be easier to remember than `dhistory`.

```
replay -show_bookmarks
```

Displays a list of the currently defined bookmarks:

```
bookmark: 1:  pc: 0x004005df,  function: main, line: 59, comment:
bookmark: 2:  pc: 0x004006b6, function: main, line: 69, comment:
bookmark: 3:  pc: 0x004006fb,  function: main, line: 75, comment: This is where the
crash occurs
```

```
replay -delete_bookmark 2
deleted bookmark: 2
```

Deletes the bookmark with the given ID, and returns a confirmation of the deleted bookmark.

dhold

Holds threads or processes

Format

Holds processes

dhold -process

Holds threads

dhold -thread

Arguments

-process

Holds processes in the current focus. Can be abbreviated to **-p**.

-thread

Holds threads in the current focus. Can be abbreviated to **-t**.

Description

The **dhold** command holds the threads and processes in the current focus.

NOTE >> You cannot hold system manager threads. In all cases, holding threads that aren't part of your program always involves some risk.

Command alias

Alias	Definition	Description
hp	**{dhold -process}**	Holds the focus process
HP	**{f g dhold -process}**	Holds all processes in the focus group
ht	**{f t dhold -thread}**	Holds the focus thread
HT	**{f g dhold -thread}**	Holds all threads in the focus group
htp	**{f p dhold -thread}**	Holds all threads in the focus process

Examples

```
f W HT
```

Holds all worker threads in the focus group.

```
f s HP
```

Holds all processes in the share group.

```
f $mygroup/ HP
```

Holds all processes in the group identified by the contents of **mygroup**.

RELATED TOPICS

Group > Hold Command in the online Help
Process > Hold Command in the online Help
Thread > Hold Command in the online Help
Group > Release Command in the online Help
Process > Release Threads Command in the online Help
dunhold **Command**

dkill

Terminates execution of processes

Format

dkill [-remove]

Arguments

-remove

Removes all knowledge of the process from its internal tables. If you are using TotalView Team, this frees a token so that you can reuse it.

Description

The **dkill** command terminates all processes in the current focus.

Because the executables associated with the defined processes are still loaded, using the **drun** command restarts the processes.

The **dkill** command alters program state by terminating all processes in the affected set. In addition, TotalView destroys any spawned processes when the process that created them is killed. The **drun** command can restart only the initial process.

If you do not indicate a focus, the default focus is the process of interest (POI). If, however, you kill the primary process for a control group, all of the slave processes are killed.

Command alias

Alias	Definition	Description
k	**dkill**	Terminates a process's execution

Examples

```
dkill
```

Terminates all threads belonging to processes in the current focus.

```
dfocus {p1 p3} dkill
```

Terminates all threads belonging to processes 1 and 3.

RELATED TOPICS

Starting Your Program in the CLI in the *TotalView for HPC User Guide*
Restarting and Deleting Programs in the *TotalView for HPC User Guide*
Group > Delete Command in the online Help
Group > Restart Command in the online Help

dlappend

Appends list elements to a TotalView variable

Format

dlappend *variable-name value* [...]

Arguments

variable-name

The variable to which values are appended.

value

The values to append.

Description

The **dlappend** command appends list elements to a TotalView variable. This command performs the same function as the Tcl **lappend** command, differing in that **dlappend** does not create a new debugger variable. That is, the following Tcl command creates a variable named **foo**:

```
lappend foo 1 3 5
```

In contrast, the CLI command displays an error message:

```
dlappend foo 1 3 5
```

Examples

```
dlappend TV::process_load_callbacks my_load_callback
```

Adds the **my_load_callback** function to the list of functions in the TV::process_load_callbacks variable.

RELATED TOPICS

dset **Command**

dlist

Displays source code lines

Format

Displays source code relative to the current list location

dlist [**-n** *num-lines*]

Displays source code relative to a named place

dlist *breakpoint-expr* [**-n** *num-lines*]

Displays source code relative to the current execution location

dlist -e [**-n** *num-lines*]

Arguments

-n *num-lines*

Displays this number of lines rather than the default number. (The default is the value of the MAX_LIST variable.) If *num-lines* is negative, the CLI displays lines before the current location, and additional **dlist** commands show preceding lines in the file rather than following lines.

This option also sets the value of the **MAX_LIST** variable to *num-lines*.

breakpoint-expr

The location at which the CLI begins displaying information. In most cases, specify this location as a line number or as a string that contains a file name, function name, and line number, each separated by **#** characters; for example: **file#func#line**.

For more information, see Chapter 9, "Qualifying Symbol Names" in the *TotalView for HPC User Guide*. The CLI creates defaults if you omit parts of this specification.

If you enter a different file, it is used for future display. This means that if you want to display information relative to the current thread's execution point, use the **-e** option to **dlist**.

If the breakpoint expression evaluates to more than one location, TotalView chooses one.

For other ways to enter these expressions, see "Breakpoint Expressions" on page 40. If you name more than one address, TotalView picks one.

-e

Sets the display location to include the current execution point of the *thread of interest* (TOI). If you use **dup** and **ddown** commands to select a buried stack frame, this location includes the PC (program counter) for that stack frame.

Description

The **dlist** command displays source code lines relative to a source code location, called the *list location*. The CLI prints this information; it is not returned. If you do not specify *source-loc* or **-e**, the command continues where the previous list command stopped. To display the thread's execution point, use the **dlist -e** command.

If you enter a file or procedure name, the listing begins at the file or procedure's first line.

The default focus for this command is thread level. If your focus is at process level, TotalView acts on each thread in the process.

The first time you use the **dlist** command after you focus on a different thread—or after the focus thread runs and stops again—the location changes to include the current execution point of the new focus thread.

Tabs in the source file are expanded as blanks in the output. The TAB_WIDTH variable controls the tab stop width, which defaults to 8. If **TAB_WIDTH** is set to **-**1, no tab processing is performed, and the CLI displays tabs using their ASCII value.

All lines appear with a line number and the source text for the line. The following symbols are also used:

@
: An action point is set at this line.

>
: The PC for the current stack frame is at the indicated line and this is the leaf frame.

=
: The PC for the current stack frame is at the indicated line and this is a buried frame; this frame has called another function so that this frame is not the active frame.

These correspond to the marks shown in the backtrace displayed by the **dwhere** command that indicates the selected frame.

Here are some general rules:

- The initial display location is **main()**.
- The CLI sets the display location to the current execution location when the focus is on a different thread.

If the *source-loc* argument is not fully qualified, the CLI looks for it in the directories named in the CLI EXECUTABLE_PATH variable.

Command alias

Alias	Definition	Description
l	**dlist**	Displays lines

Examples

The following examples assume that the MAX_LIST variables equals 20, which is its initial value.

`dlist`

Displays 20 lines of source code, beginning at the current list location. The list location is incremented by 20 when the command completes.

```
dlist 10
```

Displays 20 lines, starting with line 10 of the file that corresponds to the current list location. Because this uses an explicit value, the CLI ignores the previous command. The list location is changed to line 30.

```
dlist -n 10
```

Displays 10 lines, starting with the current list location. The value of the list location is incremented by 10.

```
dlist -n -50
```

Displays source code preceding the current list location; shows 50 lines, ending with the current source code location. The list location is decremented by 50.

```
dlist do_it
```

Displays 20 lines in procedure **do_it**. Changes the list location to be the 20th line of the procedure.

```
dfocus 2.< dlist do_it
```

Displays 20 lines in the **do_it** routine associated with process 2. If the current source file is named **foo**, you can also specify this as **dlist foo#do_it**, naming the executable for process 2.

```
dlist -e
```

Displays 20 lines starting 10 lines above the current execution location.

```
f 1.2 l -e
```

Lists the lines around the current execution location of thread 2 in process 1.

```
dfocus 1.2 dlist -e -n 10
```

Produces essentially the same listing as the previous example, differing in that it displays 10 lines.

```
dlist do_it.f#80 -n 10
```

Displays 10 lines, starting with line 80 in file **do_it.f**. Updates the list location to line 90.

dload

Loads debugging information

Format

dload [**-g** *gid*] [**-r** *hname*]
[{ -np | -procs | -tasks } num]
[-nodes num]
[-replay | -no_replay]
[-mpi *starter*]
[-starter_args *argument*]
[-env *variable=value*] ...
[**-e** *executable*]
[-parallel_attach_subset *subset_specification*]

Arguments

-g *gid*

Sets the control group for the process being added to the group ID specified by ***gid***. This group must already exist. (The CLI **GROUPS** variable contains a list of all groups.)

-r *hname*

The host on which the process will run. The CLI launches a TotalView Debugger Server on the host machine if one is not already running there. (See "Setting Up Remote Debugging Sessions" in the *TotalView for HPC User Guide* for information on the server launch commands.)

{ -np | -procs | -tasks } *num*

Indicates the number of processes or tasks that the starter program creates.

-nodes *num*

Indicates the number of nodes upon which your program will execute.

-replay | -no_replay

These options enable and disable the ReplayEngine the next time the program is restarted.

-starter_args *argument*

Indicates additional arguments to be passed to the starter program.

-env *variable=value*

Sets a variable that is added to the program's environment.

-e

Indicates that the next argument is an executable file name. You need to use **-e** if the executable name begins with a dash (-) or consists of only numeric characters. Otherwise, just provide the executable file name.

executable

A fully or partially qualified file name for the file corresponding to the program.

-parallel_attach_subset *subset_specification*

Defines a list of MPI ranks to attach to when an MPI job is created or attached to. The list is space-separated; each element can have one of three forms:

rank: specifies that rank only

rank1-rank2: specifies all ranks between rank1 and rank2, inclusive

rank1-rank2:stride: specifies every strideth rank between rank1 and rank2

A rank must be either a positive decimal integer or **max** (the last rank in the MPI job).

A *subset_specification* that is the empty string (**""**) is equivalent to **0-max**.

For example:

```
dload -parallel_attach_subset {1 2 4-6 7-max:2} mpirun
```

will attach to ranks 1, 2, 4, 5, 6, 7, 9, 11, 13,...

Description

The **dload** command creates a new TotalView process object for the *executable* file and returns its TotalView ID.

NOTE >> Your license limits the number of processes that you can run at the same time. For example, the maximum number of processes for TotalView Individual is 16. As some systems and run time environments create threads to manage a process, you may not be able to get this many processes running at the same time. (Only TotalView Individual counts threads against your license. TotalView Enterprise and Team allows an unlimited number of threads to run at the same time.)

Command alias

Alias	Definition	Description
lo	**dload**	Loads debugging information

Examples

```
dload do_this
```

Loads the debugging information for the **do_this** executable into the CLI. After this command completes, the process does not yet exist and no address space or memory is allocated to it.

```
dload -mpi POE -starter_args "hfile=~/my_hosts" \
       -np 2 -nodes
```

Loads an MPI job using the POE configuration. Two processes will be used across nodes. The **hfiles** starter argument is used.

```
lo -g 3 -r other_computer do_this
```

Loads the debugging information for the **do_this** executable that is executing on the **other_computer** machine into the CLI. This process is placed into group 3.

```
f g3 lo -r other_computer do_this
```

Does not do what you would expect it to do because the **dload** command ignores the **focus** command. Instead, this does exactly the same thing as the previous example.

```
dload -g $CGROUP(2) -r slowhost foo
```

Loads another process based on image **foo** on machine **slowhost**. The CLI places this process in the same group as process 2.

```
dload -env DISPLAY=aurora:0.0
       -env STARTER=~/starter myprog
```

Sets up two environment variables **$DISPLAY** and **$STARTER** for the program `myprog` and loads `myprog`'s debugging information.

RELATED TOPICS

Loading Executables in the *TotalView for HPC User Guide*
File > New Program Command in the online Help
dattach **Command**
drun **Command**

dmstat

Displays memory use information

Format

dmstat

Arguments

This command has no arguments

Description

The **dmstat** command displays information on your program's memory use, returning information in three parts:

- **Memory usage summary**: The minimum and maximum amounts of memory used by the text and data segments, the heap, and the stack, as well as the virtual memory stack usage and the virtual memory size.
- **Individual process statistics**: The amount of memory that each process is currently using.
- **Image information**: The name of the image, the image's text size, the image's data size, and the set of processes using the image.

The following table describes the displayed columns:

Column	Description
text	The amount of memory used to store your program's machine code instructions. The text segment is sometimes called the code segment.
data	The amount of memory used to store initialized and uninitialized data.
heap	The amount of memory currently used for data created at run time; for example, calls to the malloc() function allocate space on the heap while the free() function releases it.
stack	The amount of memory used by the currently executing routine and all the routines in its backtrace. If this is a multithreaded process, TotalView shows only information for the main thread's stack. Note that the stacks of other threads might not change over time on some architectures. On some systems, the space allocated for a thread is considered part of the heap. For example, if your main routine invokes function foo(), the stack contains two groups of information—these groups are called frames. The first frame contains the information required for the execution of your main routine, and the second, which is the current frame, contains the information needed by the foo() function. If foo() invokes the bar() function, the stack contains three frames. When foo() finishes executing, the stack contains only one frame.

Column	Description
stack_vm	The logical size of the stack is the difference between the current value of the stack pointer and the address from which the stack originally grew. This value can differ from the size of the virtual memory mapping in which the stack resides. For example, the mapping can be larger than the logical size of the stack if the process previously had a deeper nesting of procedure calls or made memory allocations on the stack, or it can be smaller if the stack pointer has advanced but the intermediate memory has not been touched. The stack_vm value is this size difference.
vm_size	The sum of the sizes of the mappings in the process's address space.

Examples

`dmstat`

dmstat is sensitive to the focus. Note this four-process program:

```
process: text      data     heap  stack   [stack_vm]     vm_size
   1   (9271): 1128.54K   16.15M   9976        10432      [16384]

image information:
                      image_name      text         data dpids
  ....ry/forked_mem_exampleLINUX       2524    16778479     1
       /lib/i686/libpthread.so.0       32172      27948     1
             /lib/i686/libc.so.6     1050688     122338     1
              /lib/ld-linux.so.2      70240      10813     1
```

`dfocus a dmstat`

The CLI prints the following for a four-process program:

```
     process:     text   data  heap  stack [stack_vm] vm_size
 1    (9979): 1128.54K 16.15M 14072 273168 [  278528]  17.69M
 5    (9982): 1128.54K 16.15M  9976  10944 [   16384]  17.44M
 6    (9983): 1128.54K 16.15M  9976  10944 [   16384]  17.44M
 7    (9984): 1128.54K 16.15M  9976  10944 [   16384]  17.44M

maximum:
 1    (9979): 1128.54K 16.15M 14072 273168 [  278528]  17.69M
minimum
 5    (9982): 1128.54K 16.15M  9976  10944 [   16384]  17.44M

image information:
                     image_name     text        data  dpids
....ry/forked_mem_exampleLINUX     2524    16778479  1 5 6 7
     /lib/i686/libpthread.so.0     32172      27948  1 5 6 7
           /lib/i686/libc.so.6   1050688     122338  1 5 6 7
            /lib/ld-linux.so.2    70240      10813  1 5 6 7
```

RELATED TOPICS

Generate a Memory Usage Report in the MemoryScape in-product help

Opening MemoryScape to examine memory usage in the "Creating Programs for Memory Debugging" chapter of *Debugging Memory Problems with MemoryScape*™

dnext

Steps source lines, stepping over subroutines

Format

dnext [-back] [*num-steps*]

Arguments

-back

(ReplayEngine only) Steps to the previous source line, stepping over subroutines. This option can be abbreviated to **-b.**

num-steps

An integer greater than 0, indicating the number of source lines to be executed.

Description

The **dnext** command executes source lines; that is, it advances the program by steps (source line statements). However, if a statement in a source line invokes a routine, the **dnext** command executes the routine as if it were one statement; that is, it steps *over* the call.

The optional *num-steps* argument defines how many **dnext** operations to perform. If you do not specify *num-steps*, the default is 1.

The **dnext** command iterates over the arenas in its focus set, performing a thread-level, process-level, or group-level step in each arena, depending on the width of the arena. The default width is **process** (**p**).

For more information on stepping in processes and threads, see **dstep** on page 141.

Command alias

Alias	Definition	Description
n	**dnext**	Runs the *thread of interest* (TOI) one statement, while allowing other threads in the process to run.
N	**{dfocus g dnext}**	A group stepping command. This searches for threads in the share group that are at the same PC as the *TOI*, and steps one such aligned thread in each member one statement. The rest of the control group runs freely.
nl	**{dfocus L dnext}**	Steps the process threads in lockstep. This steps the *TOI* one statement and runs all threads in the process that are at the same PC as the *TOI* to the same statement. Other threads in the process run freely. The group of threads that is at the same PC is called the lockstep group.This alias does not force process width. If the default focus is set to group, this steps the group.
NL	**{dfocus gL dnext}**	Steps lockstep threads in the group. This steps all threads in the share group that are at the same PC as the *TOI* one statement. Other threads in the control group run freely.
nw	{dfocus W dnext}	Steps worker threads in the process. This steps the *TOI* one statement, and runs all worker threads in the process to the same (goal) statement. The nonworker threads in the process run freely. This alias does not force process width. If the default focus is set to group, this steps the group.
NW	{dfocus gW dnext}	Steps worker threads in the group. This steps the *TOI* one statement, and runs all worker threads in the same share group to the same statement. All other threads in the control group run freely.

Examples

```
dnext
```

Steps one source line.

```
n 10
```

Steps ten source lines.

```
N
```

Steps one source line. It also runs all other processes in the group that are in the same lockstep group to the same line.

```
f t n
```

Steps the thread one statement.

```
dfocus 3. dnext
```

Steps process 3 one step.

RELATED TOPICS

Creating a Process by Single Stepping in the *TotalView for HPC User Guide*
Stepping and Setting Breakpoints in the *TotalView for HPC User Guide*
Creating a Process by Single Stepping in the *TotalView for HPC User Guide*
Stepping and Setting Breakpoints in the *TotalView for HPC User Guide*
Using Stepping Commands in the *TotalView for HPC User Guide*
Group > Next Command in the online Help
Process > Next Command in the online Help
Thread > Next Command in the online Help
dnexti **Command**
dstep **Command**
dfocus **Command**

dnexti

Steps machine instructions, stepping over subroutines

Format

dnexti [-back] [*num-steps*]

Arguments

-back

(ReplayEngine only) Steps a machine instruction back to the previous instruction, stepping over subroutines. This option can be abbreviated to **-b.**

num-steps

An integer greater than 0, indicating the number of instructions to be executed.

Description

The **dnexti** command executes machine-level instructions; that is, it advances the program by a single instruction. However, if the instruction invokes a subfunction, the **dnexti** command executes the subfunction as if it were one instruction; that is, it steps *over* the call. This command steps the *thread of interest* (TOI) while allowing other threads in the process to run.

The optional *num-steps* argument defines how many **dnexti** operations to perform. If you do not specify *num-steps*, the default is 1.

The **dnexti** command iterates over the arenas in the focus set, performing a thread-level, process-level, or group-level step in each arena, depending on the width of the arena. The default width is **process** (**p**).

For more information on stepping in processes and threads, see **dstep** on page 141.

Command alias

Alias	Definition	Description
ni	**dnexti**	Runs the *TOI* one instruction while allowing other threads in the process to run.
NI	**{dfocus g dnexti}**	A group stepping command. This searches for threads in the share group that are at the same PC as the *TOI*, and steps one such aligned thread in each member one instruction. The rest of the control group runs freely.
nil	**{dfocus L dnexti}**	Steps the process threads in lockstep. This steps the *TOI* one instruction, and runs all threads in the process that are at the same PC as the *TOI* to the same statement. Other threads in the process run freely. The group of threads that is at the same PC is called the lockstep group.This alias does not force process width. If the default focus is set to group, this steps the group.
NIL	**{dfocus gL dnexti}**	Steps lockstep threads in the group. This steps all threads in the share group that are at the same PC as the *TOI* one instruction. Other threads in the control group run freely.
niw	**{dfocus W dnexti}**	Steps worker threads in the process. This steps the *TOI* one instruction, and runs all worker threads in the process to the same (goal) statement. The nonworker threads in the process run freely. This alias does not force process width. If the default focus is set to group, this steps the group.
NIW	**{dfocus gW dnexti}**	Steps worker threads in the group. This steps the *TOI* one instruction, and runs all worker threads in the same share group to the same statement. All other threads in the control group run freely.

Examples

```
dnexti
```

Steps one machine-level instruction.

```
ni 10
```

Steps ten machine-level instructions.

```
NI
```

Steps one instruction and runs all other processes in the group that were executing at that instruction to the next instruction.

```
f t n
```

Steps the thread one machine-level instruction.

```
dfocus 3. dnexti
```

Steps process 3 one machine-level instruction.

RELATED TOPICS

Creating a Process by Single Stepping in the *TotalView for HPC User Guide*
Stepping and Setting Breakpoints in the *TotalView for HPC User Guide*
Using Stepping Commands in the *TotalView for HPC User Guide*
Process > Next Instruction Command in the online Help
Thread > Next Instruction Command in the online Help
dnexti **Command**
dstep **Command**
dfocus **Command**

dout

Executes until just after the place that called the current routine

Format

dout [-back] [*frame-count* **]**

Arguments

-back

(ReplayEngine only) Returns to the function call that placed the PC into the current routine. This option can be abbreviated to **-b.**

frame-count

An integer that specifies that the thread returns out of this many levels of subroutine calls. Without this number, the thread returns from the current level.

Description

The **dout** command runs a thread until it returns from either of the following:

- The current subroutine
- One or more nested subroutines

When you specify process width, TotalView allows all threads in the process that are not running to this goal to run free. (Specifying process width is the default.)

Command alias

Alias	Definition	Description
ou	**dout**	Runs the *thread of interest* (TOI) out of the current function, while allowing other threads in the process to run.
OU	**{dfocus g dout}**	Searches for threads in the share group that are at the same PC as the *TOI*, and runs one such aligned thread in each member out of the current function. The rest of the control group runs freely. This is a group stepping command.
oul	**{dfocus L dout}**	Runs the process threads in lockstep. This runs the *TOI* out of the current function, and also runs all threads in the process that are at the same PC as the *TOI* out of the current function. Other threads in the process run freely. The group of threads that is at the same PC is called the lockstep group.This alias does not force process width. If the default focus is set to group, this steps the group.
OUL	**{dfocus gL dout}**	Runs lockstep threads in the group. This runs all threads in the share group that are at the same PC as the *TOI* out of the current function. Other threads in the control group run freely.
ouw	**{dfocus W dout}**	Runs worker threads in the process. This runs the *TOI* out of the current function and runs all worker threads in the process to the same (goal) statement. The nonworker threads in the process run freely. This alias does not force process width. If the default focus is set to group, this steps the group.
OUW	**{dfocus gW dout}**	Runs worker threads in the group. This runs the *TOI* out of the current function and also runs all worker threads in the same share group out of the current function. All other threads in the control group run freely.

For additional information on the different kinds of stepping, see the **dstep** on page 141 command information.

Examples

```
f t ou
```

Runs the current *TOI* out of the current -subroutine.

```
f p dout 3
```

Unwinds the process in the current focus out of the current subroutine to the routine three levels above it in the call stack.

RELATED TOPICS

Executing to the Completion of a Function in the *TotalView User Guide*

Group > Out Command in the online Help
Process > Out Command in the online Help
Thread > Out Command in the online Help

dprint

Evaluates and displays information

Format

Prints the value of a variable

dprint [-nowait] [-slice "*slice_expr***"]** *variable*

Prints the value of an expression

dprint [-nowait] [-slice "*slice_expr***"] [-stats [-data]]** *expression*

Arguments

-nowait

Tells TotalView to evaluate the expression in the background. Use **TV::expr** to obtain the results, as they are not displayed.

-slice "*slice_expr***"**

Defines an array slice—that is, a portion of the array—to print. If the programming language is C or C++, use a backslash (\) when you enter the array subscripts. For example, **"\[100:110\]"**.

-stats

Displays statistical data about an array. When using this switch, the expression provided to **dprint** must resolve to an array. The **-slice** switch may be used with **-stats** to select a subset of values from the array to calculate statistics on.

-data

Returns the results of **dprint -stats** as data in the form of a Tcl nested associative array rather than as output to the console. See the description section for the structure of the array.

Note: This switch can be used *only* in conjunction with the **--stats** switch.

variable

A variable whose value is displayed. The variable can be local to the current stack frame or it can be global. If the displayed variable is an array, you can qualify the variable's name with a slice that displays a portion of the array,

expression

A source-language expression to evaluate and print. Because *expression* must also conform to Tcl syntax, you must enclose it within quotation marks it if it includes any blanks, and in braces (**{}**) if it includes brackets (**[ ]**), dollar signs (**$**), quotation marks (**"**), or other Tcl special characters.

Description

The **dprint** command evaluates and displays a variable or an expression. The CLI interprets the expression by looking up the values associated with each symbol and applying the operators. The result of an expression can be a scalar value or an aggregate (array, array slice, or structure).

If an event such as a **$stop**, SEGV, breakpoint occurs, the **dprint** command throws an exception that describes the event. The first exception subcode returned by **TV::**errorCodes is the *susp-eval-id* (a suspension-evaluation-ID). You can use this to manipulate suspended evaluations with the **dflush** and **TV::expr -**commands. For example:

```
dfocus tdpid.dtid TV::expr get susp-eval-id
```

NOTE >> If the expression calls a function, the focus must not specify more than one thread for each process.

If you use the **-nowait** option, TotalView evaluates the expression in the background. It also returns a *susp-eval-id* that you can use to obtain the results of the evaluation using **TV::expr**.

As the CLI displays data, it passes the data through a simple *more* processor that prompts you after it displays each screen of text. At this time, you can press the Enter key to tell the CLI to continue displaying information. Entering **q** stops printing.

Since the **dprint** command can generate a considerable amount of output, you might want to use the **capture** on page 22 command to save the output to a variable.

Structure output appears with one field printed per line; for example:

```
sbfo = {
   f3 = 0x03 (3)
   f4 = 0x04 (4)
   f5 = 0x05 (5)
   f20 = 0x000014 (20)
   f32 = 0x00000020 (32)
}
```

Arrays print in a similar manner; for example:

```
foo = {
   [0][0] = 0x00000000 (0)
   [0][1] = 0x00000004 (4)
   [1][0] = 0x00000001 (1)
   [1][1] = 0x00000005 (5)
   [2][0] = 0x00000002 (2)
   [2][1] = 0x00000006 (6)
   [3][0] = 0x00000003 (3)
   [3][1] = 0x00000007 (7)
}
```

You can append a slice to the variable's name to tell the CLI to display a portion of an array; for example:

```
d.1<> p -slice "\[10:20\]" random
random slice:(10:30) = {
   (10) = 0.479426
   (11) = 0.877583
   (12) = 0.564642
   (13) = 0.825336
   (14) = 0.644218
   (15) = 0.764842
   (16) = 0.717356
   (17) = 0.696707
```

```
    (18) = 0.783327
    (19) = 0.62161
    (20) = 0.841471
  }
```

The following is an another way of specifying the same slice:

```
d.1<> set my_var \[10:20\]
d.1<> p -slice $my_var random
random slice:(10:30) = {
```

The following example illustrates the output from **dprint -stats** command:

```
d1.<> dprint -stats twod_array

Count:                2500
Zero Count:           1
Sum:                  122500
Minimum:              0
Maximum:              98
Median:               49
Mean:                 49
Standard Deviation:   20.4124145231932
First Quartile:       34
Third Quartile:       64
Lower Adjacent:       0
Upper Adjacent:       98

NaN Count:            N/A
Infinity Count:       N/A
Denormalized Count:   N/A

Checksum:             41071
```

By adding the **-data** switch,

```
d1.<> dprint -stats -data twod_array
```

the statistics are returned in a Tcl nested associative array, which has the following structure:

```
{
  <dpid.dtid>
   {
     Count <value>
     ZeroCount <value>
     Sum <value>
     Minimum <value>
     Maximum <value>
     Median <value>
     Mean <value>
     StandardDeviation <value>
     FirstQuartile <value>
```

```
    ThirdQuartile <value>
    LowerAdjacent <value>
    UpperAdjacent <value>
    NaNCount <value>
    InfinityCount <value>
    DenormalizedCount <value>
    Checksum <value>
  }
 <dpid.dtid>
  {
    ...
  }
}
```

To access data for a single process/thread, use the following Tcl commands:

```
array set stats_data [dprint -stats -data <arrayexpression>]
array set stats $stats_data([lindex [array names stats_data] 0])
puts "Array Sum: $stats(Sum)"
```

The CLI evaluates the expression or variable in the context of each thread in the target focus. Thus, the overall format of **dprint** output is as follows:

```
first process or thread:
    expression result

second process or thread:
    expression result
...

last process or thread:
    expression result
```

TotalView lets you cast variables and cast a variable to an array. If you are casting a variable, the first array address is the address of the variable. For example, assume the following declaration:

```
float bint;
```

The following statement displays the variable as an array of one integer:

```
dprint {(int \[1\])bint:
```

If the expression is a pointer, the first addresses is the value of the pointer. Here is an array declaration:

```
float bing[2], *bp = bint;
```

TotalView assumes the first array address is the address of what **bp** is pointing to. So, the following command displays the array:

```
dprint {(int \[2\])bp}
```

You can also use the **dprint** command to obtain values for your computer's registers. For example, on most architectures, **$r1** is register 1. To obtain the contents of this register, type:

```
dprint \$r1
```

NOTE >> Do not use a $ when asking the **dprint** command to display your program's variables.

Command alias

Alias	Definition	Description
p	**dprint**	Evaluates and displays information

Examples

```
dprint scalar_y
```

Displays the values of variable **scalar_y** in all processes and threads in the current focus.

```
p argc
```

Displays the value of **argc**.

```
p argv
```

Displays the value of **argv**, along with the first string to which it points.

```
p {argv[argc-1]}
```

Prints the value of **argv[argc-1]**. If the execution point is in **main()**, this is the last argument passed to **main()**.

```
dfocus p1 dprint scalar_y
```

Displays the values of variable **scalar_y** for the threads in process 1.

```
f 1.2 p arrayx
```

Displays the values of the array **arrayx** for the second thread in process 1.

```
for {set i 0} {$i < 100} {incr i} {p argv\[$i\]}
```

If **main()** is in the current scope, prints the program's arguments followed by the program's environment strings.

```
f {t1.1 t2.1 t3.1} dprint {f()}
```

Evaluates a function contained in three threads. Each thread is in a different process:

```
Thread 1.1:
f(): 2 Thread 2.1:
f(): 3
Thread 3.1:
f(): 5
```

```
f {t1.1 t2.1 t3.1} dprint -nowait {f()}
1
```

Evaluates a function without waiting. Later, you can obtain the results using **TV::expr**. The number displayed immediately after the command, which is "1", is the *susp-eval-id*. The following example shows how to get this result:

```
f t1.1 TV::expr get 1 result
2
```

```
f t2.1 TV::expr get 1 result
Thread 1.1:
f(): 2
Thread 2.1:
f(): 3
Thread 3.1:
f(): 5
3
f t3.1 TV::expr get 1 result
5
```

RELATED TOPICS

Examining and Editing Data and Program Elements in the *TotalView for HPC User Guide*
Examining Arrays in the *TotalView for HPC User Guide*
Evaluating Expressions in the *TotalView for HPC User Guide*
Tools > Evaluate Command in the online Help
TV::errorCodes **Command**
TV::expr **Command**

dptsets

Shows the status of processes and threads

Format

dptsets [*ptset_array*] ...

Arguments

ptset_array

An optional array that indicates the P/T sets to show. An element of the array can be a number or it can be a more complicated P/T expression. (For more information, see "Using P/T Set Operators" in Chapter 21, "Group, Process, and Thread Control" of the *TotalView for HPC User Guide*.)

Description

The **dptsets** command shows the status of each process and thread in a Tcl array of P/T expressions. These array elements are P/T expressions (see "Using P/T Set Operators" in Chapter 21, "Group, Process, and Thread Control" of the *TotalView for HPC User Guide*, and the elements' array indices are strings that label each element's section in the output.

If you do not use the optional *ptset_array* argument, the CLI supplies a default array that contains all P/T set designators: **error**, **existent**, **held**, **running**, **stopped**, **unheld**, and **watchpoint**.

Examples

The following example displays information about processes and threads in the current focus:

```
d.1<> dptsets
unheld:
1:     808694   Stopped [fork_loopSGI]
  1.1: 808694.1 Stopped PC=0x0d9cae64
  1.2: 808694.2 Stopped PC=0x0d9cae64
  1.3: 808694.3 Stopped PC=0x0d9cae64
  1.4: 808694.4 Stopped PC=0x0d9cae64

existent:
1:     808694   Stopped [fork_loopSGI]
  1.1: 808694.1 Stopped PC=0x0d9cae64
  1.2: 808694.2 Stopped PC=0x0d9cae64
  1.3: 808694.3 Stopped PC=0x0d9cae64
  1.4: 808694.4 Stopped PC=0x0d9cae64

watchpoint:

running:

held:

error:
   stopped: 1:     808694   Stopped [fork_loopSGI]
```

```
  1.1: 808694.1 Stopped PC=0x0d9cae64
  1.2: 808694.2 Stopped PC=0x0d9cae64
  1.3: 808694.3 Stopped PC=0x0d9cae64
  1.4: 808694.4 Stopped PC=0x0d9cae64
...
```

The following example creates a two-element P/T set array, and then displays the results. Notice the labels in this example.

```
d1.<> set set_info(0) breakpoint(1)
breakpoint(1)
d1.<> set set_info(1) stopped(1)
stopped(1)
d1.<> dptsets set_info
0:
1:     892484   Breakpoint  [arraySGI]
  1.1: 892484.1 Breakpoint  PC=0x10001544, [array.F#81]

1:
1:     892484   Breakpoint  [arraySGI]
  1.1: 892484.1 Breakpoint  PC=0x10001544, [array.F#81]
```

The array index to **set_info** becomes a label identifying the type of information being displayed. In contrast, the information within parentheses in the **breakpoint** and **stopped** functions identifies the arena for which the function returns -information.

If you use a number as an array index, you might not remember what is being printed. The following very similar example shows a better way to use these array indices:

```
d1.<> set set_info(my_breakpoints) breakpoint(1)
breakpoint(1)
d1.<> set set_info(my_stopped) stopped(1)
stopped(1)
d1.<> dptsets set_info
my_stopped:
1:     882547   Breakpoint  [arraysSGI]
  1.1: 882547.1 Breakpoint  PC=0x10001544, [arrays.F#81]

my_breakpoints:
1:     882547   Breakpoint  [arraysSGI]
  1.1: 882547.1 Breakpoint  PC=0x10001544, [arrays.F#81]
```

The following commands also create a two-element array. This example differs in that the second element is the difference between three P/T sets.

```
d.1<> set mystat(system) a-gW
d.1<> set mystat(reallystopped) \
       stopped(a)-breakpoint(a)-watchpoint(a)
d.1<> dptsets t mystat
system:
Threads in process 1 [regress/fork_loop]:
```

```
1.-1:  21587.[-1] Running PC=0x3ff805c6998
1.-2:  21587.[-2] Running PC=0x3ff805c669c
...
Threads in process 2 [regress/fork_loop.1]:
2.-1:  15224.[-1] Stopped PC=0x3ff805c6998
2.-2:  15224.[-2] Stopped PC=0x3ff805c669c
...

reallystopped:
2.2    224.2 Stopped PC=0x3ff800d5758
2.-1   5224.[-1] Stopped PC=0x3ff805c6998
2.-2:  15224.[-2] Stopped PC=0x3ff805c669c
...
```

drerun

Restarts processes

Format

drerun [*cmd_args*] [*in_operation*]
[*out_operations*]
[*error_operations*]

Arguments

cmd_args

The arguments to be used for restarting a process.

in_operation

Names the file from which the CLI reads input.

< *infile*

Reads from *infile* instead of **stdin**. *infile* indicates a file from which the launched process reads information.

out_operations

Names the file to which the CLI writes output. In the following, *outfile* indicates the file into which the launched processes writes information.

> *outfile*

Sends output to *outfile* instead of **stdout**.

>& *outfile*

Sends output and error messages to *outfile* instead of **stdout** and **stderr**.

>>& *outfile*

Appends output and error messages to *outfile*.

>> *outfile*

Appends output to *outfile*.

error_operations

Names the file to which the CLI writes error output. In the following, *errfile* indicates the file into which the launched processes writes error information.

2> *errfile*

Sends error messages to *errfile* instead of **stderr**.

2>>*errfile*

Appends error messages to *errfile*.

Description

The **drerun** command restarts the process that is in the current focus set from its beginning. The **drerun** command uses the arguments stored in the ARGS(*dpmid*)and ARGS_DEFAULTvariables. These are set every time you run the process with different arguments. Consequently, if you do not specify the arguments that the CLI uses when restarting the process, it uses the arguments you used when the CLI previously ran the process. (See **drun** on page 131 for more information.)

The **drerun** command differs from the **drun** command in that:

- If you do not specify an argument, the **drerun** command uses the default values. In contrast, the **drun** command clears the argument list for the program. This means that you cannot use an empty argument list with the **drerun** command to tell the CLI to restart a process and expect that it does not use any arguments.
- If the process already exists, the **drun** command does not restart it. (If you must use the **drun** command, you must first kill the process.) In contrast, the **drerun** command kills and then restarts the process.

The arguments to this command are similar to the arguments used in the Bourne shell.

Issues When Using Starter Programs

Starter programs such as **poe** or **aprun** and the CLI can interfere with one another because each believes that it owns **stdin**. Because the starter program is trying to manage **stdin** on behalf of your processes, it continually reads from **stdin**, acquiring all characters that it sees. This means that the CLI never sees these characters. If your target process does not use **stdin**, you can use the **-stdinmode none** option. Unfortunately, this option is incompatible with **poe -cmdfile** option that is used when specifying **-pgmmodel mpmd**.

If you encounter these problems, try redirecting **stdin** within the CLI; for example:

```
drun < in.txt
```

Command alias

Alias	Definition	Description
rr	**{drerun}**	Restarts processes

Examples

```
drerun
```

Reruns the current process. Because it doesn't use arguments, the process restarts using its previous values.

```
rr -firstArg an_argument -aSecondArg a_second_argument
```

Reruns the current process. The CLI does not use the process's default arguments because replacement arguments exist.

RELATED TOPICS

Starting Processes and Threads in the *TotalView for HPC User Guide*
Command Arguments in the *TotalView for HPC User Guide*
Process > Startup Parameters in the online Help
drun **Command**
dgo **Command**
capture Command

drestart

Restarts a checkpoint (IBM RS6000 machines only)

Format

Restarts a checkpoint on IBM AIX

drestart [-halt] [-g *gid* **] [-r** *host* **] [-no_same_hosts]**

Arguments

-halt

TotalView stops checkpointed processes after it restarts them.

-g *gid*

Names the control group into which TotalView places all created processes.

-r *host*

Names the remote host upon which the restart occurs.

-no_same_hosts

Restart can use any available hosts. If you do not use this option, the restart occurs on the same hosts upon which the program was executing when the checkpoint file was made. If these hosts are not available, the restart operation fails.

Description

The **drestart** command restores and restarts all of the checkpointed processes. The CLI attaches to the base process, and if there are parallel processes related to this base process, TotalView then attaches to them.

Restarting using LoadLeveler

If you checkpointed a LoadLeveler POE job, you cannot restart it with this command. You must resubmit the program as a LoadLeveler job to restart the checkpoint. You also need to set the **MP_POE_RESTART_SLEEP** environment variable to an appropriate number of seconds. After you restart POE, start TotalView and attach to POE. POE tells TotalView when it is time to attach to the parallel task so that it can complete the restart operation.

NOTE >> When attaching to **POE**, parallel tasks will not have been created yet, so you should avoid trying to attach to them. Therefore, use the **-no_attach_parallel** option when using the **dattach** command to attach to POE.

Examples

```
drestart
```

Restarts the checkpointed processes. The CLI automatically attaches to parallel processes.

```
drestart -halt -no_same_hosts
```

Restarts the checkpointed processes using available hosts. Stops checkpointed processes after restoring them.

RELATED TOPICS

dcalltree **Command**
Tools > Create Checkpoint Command in the online Help
Tools > Restart Checkpoint Command in the online Help

drun

Starts or restarts processes

Format

drun [*cmd_arguments*][*in_operation infile*] [*out_operations outfile*]
[*error_operations errfile*]

Arguments

cmd_arguments

The argument list passed to the process.

in_operation

Names the file from which the CLI reads input.

< *infile*

Reads from *infile* instead of **stdin**. *infile* indicates a file from which the launched process reads information.

out_operations

Names the file to which the CLI writes output. In the following, *outfile* indicates the file into which the launched processes writes information.

> *outfile*

Sends output to *outfile* instead of **stdout**.

>& *outfile*

Sends output and error messages to *outfile* instead of **stdout** and **stderr**.

>>& *outfile*

Appends output and error messages to *outfile*.

>> *outfile*

Appends output to *outfile*.

error_operations

Names the file to which the CLI writes error output. In the following, *errfile* indicates the file into which the launched processes writes error information.

2> *errfile*

Sends error messages to *errfile* instead of **stderr**.

2>>*errfile*

Appends error messages to *errfile*.

Description

The **drun** command launches each process in the current focus and starts it running. The CLI passes the command arguments to the processes. You can also indicate I/O redirection for input and output information. Later in the session, you can use the drerun command to restart the program.

The arguments to this command are similar to the arguments used in the Bourne shell.

In addition, the CLI uses the following variables to hold the default argument list for each process:

ARGS_DEFAULT

The CLI sets this variable if you use the **-a** command-line *option* when you started the CLI or TotalView. (This option passes command-line arguments that TotalView uses when it invokes a process.) This variable holds the default arguments that TotalView passes to a process when the process has no default arguments of its own.

ARGS(*dpmid*)

An array variable that contains the command-line arguments. The index *dpid* is the process ID. This variable holds a process's default arguments. It is always set by the **drun** command, and it also contains any arguments you used when executing a drerun command.

If more than one process is launched with a single **drun** command, each receives the same command-line arguments.

In addition to setting these variables by using the **-a** *command-line* option or specifying *cmd_arguments* when you use this or the **drerun** command, you can modify these variables directly with the dset and dunset commands.

You can only use this command to tell TotalView to execute initial processes, because TotalView cannot directly run processes that your program spawns. When you enter this command, the initial process must have terminated; if it was not terminated, you are told to kill it and retry. (You could, use the **drerun** command instead because the **drerun** commands first kills the process.)

The first time you use the **drun** command, TotalView copies arguments to program variables. It also sets up any requested I/O redirection. If you re-enter this command for processes that TotalView previously started—or use it when you use the **dattach** command to attach to a process—the CLI reinitializes your program.

Issues When Using Starter Programs

Starter programs such as **poe** or **aprun** and the CLI can interfere with one another because each believes that it owns **stdin**. Because the starter program is trying to manage **stdin** on behalf of your processes, it continually reads from **stdin**, acquiring all characters that it sees. This means that the CLI never sees these characters. If your target process does not use **stdin**, you can use the **-stdinmode none** option. Unfortunately, this option is incompatible with **poe -cmdfile** option that is used when specifying **-pgmmodel mpmd**.

If you encounter these problems, try redirecting **stdin** within the CLI; for example:

```
drun < in.txt
```

Command alias

Alias	Definition	Description
r	**drun**	Starts or restarts processes

Examples

```
drun
```

Begins executing processes represented in the current focus.

```
f {p2 p3} drun
```

Begins execution of processes 2 and 3.

```
f 4.2 r
```

Begins execution of process 4. This is the same as **f 4 drun**.

```
dfocus a drun
```

Restarts execution of all processes known to the CLI. If they were not previously killed, you are told to use the **dkill** command and then try again.

```
drun < in.txt
```

Restarts execution of all processes in the current focus, setting them up to get standard input from **in.txt** file.

RELATED TOPICS

Starting Processes and Threadsin the *TotalView for HPC User Guide*
Command Arguments in the "Using the Command Line Interface (CLI)" chapter in the *TotalView for HPC User Guide*
Process > Startup Parameters in the online Help
drerun **Command**
dgo **Command**

dsession

Loads a session

Format

Loads a session.

dsession [-load *session_name* **]**

Arguments

-load *session_name*

Loads the session with the given *session_name*.

Description

Loads a previously created session. The session attributes are applied to the TotalView process object created for the executable named in the session. Returns the TotalView ID for the new object as a string value. A *session_name* that contains a space must be surrounded by quotes.

Sessions that attach to an existing process cannot be loaded this way; use the **dattach** command instead.

RELATED TOPICS

Loading a Session Using the Sessions Manager in the *TotalView for HPC User Guide*
Managing Sessions in the *TotalView for HPC User Guide*
dattach Command

dset

Changes or views CLI variables

Format

Changes a CLI variable

dset *debugger-var value*

Views current CLI variables

dset [*debugger-var*]

Sets the default for a CLI variable

dset -set_as_default *debugger-var value*

Arguments

debugger-var

Name of a CLI variable.

value

Value to be assigned to *debugger-var*.

-set_as_default

Sets the value to use as the variable's default. This option is most often used by system administrators to set site-specific defaults in the global **.tvdrc** startup script. Values set using this option replace the CLI built-in default.

Description

The **dset** command sets the value of CLI debugger variables. CLI and TotalView variables are described in Chapter 5, "TotalView Variables," on page 251.

If you use the **dset** command with no arguments, the CLI displays the names and current values for all CLI variables in the global namespace. If you use only one argument, the CLI returns and displays that variable's value.

The second argument defines the value that replaces a variable's previous value. You must enclose it in quotation marks if it contains more than one word.

If you do not use an argument, the CLI only displays variables in the current namespace. To show all variables in a namespace, enter the namespace name immediately followed by a double colon; for example, **TV::**.

You can use an asterisk (*****) as a wildcard character to tell the CLI to match more than one string; for example, **TV::g*** matches all variables in the **TV::** namespace beginning with **g**. For example, to view all variables in the **TV::** namespace, enter the following:

```
dset TV::
```

or:

```
dset TV::GUI::
```

You need to type the double colons at the end of this example when obtaining listings for a namespace. Without them, Tcl assumes that you are requesting information on a variable. For example, **dset TV::GUI** looks for a variable named GUI in the **TV** namespace.

Using -set_as_default

When you press a default button within a **File > Preferences** dialog box, TotalView reinitializes some settings to their original values. However, what happens if you set a value in your **tvdrc** file when you press a default button? In this case, setting a variable doesn't change what TotalView thinks the default is, so it still changes the setting back to its defaults.

The next time you invoke TotalView, TotalView will again use the value in your **tvdrc**.

You can tell TotalView that the value set in your **tvdrc** file is the default if you use the **-set_as_default** option. Now when you press a default button, it will use your value instead of its own.

If your TotalView administrator sets up a global **.tvdrc** file, TotalView reads values from that file and merges them with your preferences and other settings. If the value in the **.tvdrc** file changes, TotalView ignores the change because it has already set a value in your local preferences file. If the administrator uses the **-set_as_default** option, you can be told to press the default button to get the changes. If, however, the administrator doesn't use this option, the only way to get changes is by deleting your preferences file.

Examples

```
dset PROMPT "Fixme% "
```

Sets the prompt to **Fixme%** followed by a space.

```
dset *
```

Displays all CLI variables and their current settings.

```
dset VERBOSE
```

Displays the current setting for output verbosity.

```
dset EXECUTABLE_PATH ../test_dir;$EXECUTABLE_PATH
```

Places **../test_dir** at the beginning of the previous value for the executable path.

```
dset -set_as_default TV::server_launch_string \
   {/use/this/one/tvdsvr}
```

Sets the default value of the **TV::server_launch_string**. If you change this value, you can later select the **Defaults** button within the **File > Preferences** Launch String page to reset it to its original value.

```
dset TV::GUI::fixed_font_size 12
```

Sets the TotalView GUI to display information using a 12-point, fixed-width font. Commands such as this are often found in a startup file.

RELATED TOPICS

dlappend **Command**

dstatus

Shows current status of processes and threads

Format

dstatus

dstatus [**-g**]

dstatus [**-group_by** *process_state* | *replay* | *pheld* | *thread_state* | *pc*, | *function* | *line* |*apid* | *theld* | *stop_reason* **]**

Arguments

-g

Alias for **-group_by**.

-group_by

Reduces the display based on the following process-level or thread-level arguments. The reduction is shown using either a compressed process list for process-level properties (`plist`) or a compressed thread list for thread-level properties (**ptlist**). See Compressed List Syntax (ptlist) for a description of a **ptlist**.

Process level:

process_state

Limits the display to the state of the process.

replay

Groups by replay mode. A process can be in three replay states: `Replay Unavailable`, `Replay`, or -`Record`.

pheld

Groups the processes as either `Held` or `UnHeld`.

Thread level:

thread_state

The state of the thread

pc

The Program Counter of the thread

function

The function where the thread's pc is currently.

line

The line number for the current thread's pc

apid

The action point identifier that the thread's pc is on. If the thread is not at an action point, it will be grouped as `ap(none)`.

theld

Threads grouped as either `Held` or `UnHeld`.

stop_reason

The stop code and stop message for a stopped thread.

-pcount

Alias for the -**ptlist_element_count** argument

-ptlist_element_count *number*

Displays, at maximum, *number* elements (comma separated **plist**s or **ptlist**s) in the process/thread compressed list that is shown in a reduced **dstatus** display. If a reduction results in exceeding the **ptlist_element_count**, an ellipsis is appended. For instance, if **ptlist_element_count** is set to `5`:

```
[p1-4.1, p2.2, p3-4.3, p5.4, p6.1-2, ...]
```

To change the default value, use the TotalView State variable **ptlist_element_threshold**. For example:

```
dset TV::ptlist_element_threshold 10
```

-levels

The number of levels to show for a set of properties. If no levels are specified, then each property is reduced on a new line with indentation. If the number of levels is less than the number of specified properties, then the remaining properties are shown in a single reduction on one line.

-v

Show verbose output in the reduced display. Without **-v**, full paths of filenames and line numbers are not displayed.

-detail

Force full detailed information for the current state of each process and thread in the current focus. This option affects the amount of information displayed from grouping by function.

Description

With the **-group_by** option, the **dstatus** command displays an aggregated view of the process and thread state in the current focus. To make the display more useful, you can reduce it based on specific properties, provided as arguments as described above. The full detail shows the current state of each process and thread in the current focus. **ST** is aliased to `dfocus g dstatus` and acts as a group-status command. Type `help ptset` for more information.

If you have not changed the focus, the default is process. In this case, the **dstatus** command shows the status for each thread in process 1. In contrast, if you set the focus to **g1.<**, the CLI displays the status for every thread in the control group. When you limit thread state display by certain properties, the output is displayed as a compressed thread list, or **ptlist**.

Compressed List Syntax (ptlist)

A compressed **ptlist** consists of a process and thread count, followed by square-bracket-enclosed list of process and thread ranges separated by dot (`.`). If the thread range is missing, it's merely a compressed list of processes and it is referred to as a **plist**.

If the process range starts with the letter `p`, the process IDs are TotalView DPIDs (debugger unique process identifiers); otherwise, they are the MPI rank for the process, `MPI_COMM_WORLD`.

The thread IDs are always TotalView DTIDs (debugger unique thread identifiers). For example, the compressed **ptlist** `5:13[0-3.1-3, p1.1]` indicates that there are five processes and 13 threads in the list. The process and thread range `0-3.1-3` indicates MPI rank processes `0` through `3`, each with DTIDs `1` through `3`. The process range `p1.1` indicates process DPID `1` and thread DTID `1`, normally the MPI starter process named `mpirun`.

Command alias

Alias	Definition	Description
st	**dstatus**	Shows current status
ST	**{dfocus g dstatus}**	Shows group status

Examples

`dstatus`

Displays the status of all processes and threads in the current focus; for example:

```
1:     42898    Breakpoint  [arraysAIX]
   1.1: 42898.1  Breakpoint  \
              PC=0x100006a0,[./arrays.F#87]
```

`f a st`

Displays the status for all threads in all processes.

`f p1 st`

Displays the status of the threads associated with process 1. If the focus is at its default (**d1.<**), this is the same as typing **st**.

`ST`

Displays the status of all processes and threads in the control group having the focus process; for example:

```
1:     773686    Stopped  [fork_loop_64]
 1.1:773686.1  Stopped  PC=0x0d9cae64
 1.2:773686.2  Stopped  PC=0x0d9cae64
 1.3:773686.3  Stopped  PC=0x0d9cae64
 1.4:773686.4  Stopped  PC=0x0d9cae6
2:     779490  Stopped  [fork_loop_64.1]
 2.1:779490.1  Stopped  PC=0x0d9cae64
 2.2:779490.2  Stopped  PC=0x0d9cae64
 2.3:779490.3  Stopped  PC=0x0d9cae64
 2.4:779490.4  Stopped  PC=0x0d9cae64
```

`f W st`

Shows status for all worker threads in the focus set. If the focus is set to **d1.<**, the CLI shows the status of each worker thread in process 1.

`f W ST`

Shows status for all worker threads in the control group associated with the current focus.

In this case, TotalView merges the **W** and **g** specifiers in the **ST** alias. The result is the same as if you had entered **f gW st**.

```
f L ST
```

Shows status for every thread in the share group that is at the same PC as the *thread of interest* (TOI).

```
d1.<>  dfocus g dstatus -group_by thread_state, function
```

First reduces the focus by *thread_state*, then further breaks down and reduces the results according to the function the threads are in within each thread state. This call might output this reduced display:

```
Focus: 4:20[p1-4.1-5]
   Breakpoint : 4:4[p1.2, p3-4.2, p2.3]
        snore : 4:4[p1.2, p3-4.2, p2.3]
   Stopped : 4:16[p1-4.1, p2.2, p1.3, p3-4.3, p1-4.4-5]
        .___newselect_nocancel : 4:13[p1-4.1, p2.2, p3-4.3, p1.4]
        snore : 2:3[p1.3, p2.4-5]
```

The above output displays the reduction produced by the **group_by** command as a series of **ptlist**s. (See above, Compressed List Syntax (ptlist)).

```
dfocus group dwhere -group_by function
```

This **dwhere** call output shows that all the processes have the first three frames in their backtrace but then they diverge and one process is in function `rank0` while the other three processes are in `rankn`.

```
+/ : 10:10[0-9.1]
+_start
 +__libc_start_main
  +main
   +rank0 : 1:1[0.1]
   +rankn : 3:3[1.1, 5.1, 8.1]
```

RELATED TOPICS

Using the Root Window in the *TotalView for HPC User Guide*
Viewing Process and Thread State in the *TotalView for HPC User Guide*
The Root Window in the online Help
dwhat **Command**
dwhere **Command**

dstep

Steps lines, stepping into subfunctions

Format

dstep [-back] [*num-steps*]

Arguments

-back

(ReplayEngine only) Steps to the previous source line, moving into subroutines that called the current function. This option can be abbreviated to **-b.**

num-steps

An integer greater than 0, indicating the number of source lines to execute.

Description

The **dstep** command executes source lines; that is, it advances the program by steps (source lines). If a statement in a source line invokes a subfunction, the **dstep** command steps into the function.

The optional *num-steps* argument defines the number of **dstep** operations to perform. If you do not specify *num-steps*, the default is 1.

The **dstep** command iterates over the arenas in the focus set by doing a thread-level, process-level, or group-level step in each arena, depending on the width of the arena. The default width is **process** (**p**).

If the width is **process**, the **dstep** command affects the entire process that contains the thread being stepped. Thus, although the CLI is only stepping one thread, all other threads in the same process also resume executing. In contrast, the **dfocus t dstep** command steps only the thread of interest (TOI).

NOTE >> On systems having identifiable manager threads, the **dfocus t dstep** command allows the manager threads as well as the TOI to run.

The action taken on each term in the focus list depends on whether its width is thread, process, or group, and on the group specified in the current focus. (If you do not explicitly specify a group, the default is the control group.)

If some thread hits an action point other than the goal breakpoint during a step operation, that ends the step.

Group Width

The behavior depends on the group specified in the arena:

Process group

TotalView examines that group and identifies each process having a thread stopped at the same location as the *TOI*. TotalView selects one matching thread from each matching process. TotalView then runs all processes in the group and waits until the *TOI* arrives at its goal location; each selected thread also arrives there.

Thread group

The behavior is similar to process width behavior except that all processes in the program control group run, rather than just the process of interest (POI). Regardless of which threads are in the group of interest, TotalView only waits for threads that are in the same share group as the *TOI*. This is because it is not useful to run threads executing in different images to the same goal.

Process Width (default)

The behavior depends on the group specified in the arena. Process width is the default.

Process group

TotalView allows the entire process to run, and execution continues until the *TOI* arrives at its goal location. TotalView plants a temporary breakpoint at the goal location while this command executes. If another thread reaches this goal breakpoint first, your program continues to execute until the *TOI* reaches the goal.

Thread group

TotalView runs all threads in the process that are in that group to the same goal as the *TOI*. If a thread arrives at the goal that is not in the group of interest, this thread also stops there. The group of interest specifies the set of threads for which TotalView waits. This means that the command does not complete until all threads in the group of interest are at the goal.

Thread Width

Only the *TOI* is allowed to run. (This is not supported on all systems.)

Command alias

Alias	Definition	Description
s	**dstep**	Runs the *TOI* one statement, while allowing other threads in the process to run.
S	**{dfocus g dstep}**	Searches for threads in the share group that are at the same PC as the *TOI*, and steps one such aligned thread in each member one statement. The rest of the control group runs freely. This is a group stepping command.
sl	**{dfocus L dstep}**	Steps the process threads in lockstep. This steps the *TOI* one statement, and runs all threads in the process that are at the same PC as the *TOI* to the same (goal) statement. Other threads in the process run freely. The group of threads that is at the same PC is called the lockstep group.This alias does not force process width. If the default focus is set to group, this steps the group.
SL	**{dfocus gL dstep}**	Steps lockstep threads in the group. This steps all threads in the share group that are at the same PC as the *TOI* one statement. Other threads in the control group run freely.
sw	**{dfocus W dstep}**	Steps worker threads in the process. This steps the *TOI* one statement, and runs all worker threads in the process to the same (goal) statement. The nonworker threads in the process run freely. This alias does not force process width. If the default focus is set to group, this steps the group.
SW	**{dfocus gW dstep}**	Steps worker threads in the group. This steps the *TOI* one statement, and runs all worker threads in the same share group to the same (goal) statement. All other threads in the control group run freely.

Examples

```
dstep
```

Executes the next source line, stepping into any procedure call it encounters. Although the CLI only steps the current thread, other threads in the process run.

```
s 15
```

Executes the next 15 source lines.

```
f p1.2 dstep
```

Steps thread 2 in process 1 by one source line. This also resumes execution of all threads in process 1; they halt as soon as thread 2 in process 1 executes its statement.

```
f t1.2 s
```

Steps thread 2 in process 1 by one source line. No other threads in process 1 execute.

RELATED TOPICS

Creating a Process by Single Stepping in the *TotalView for HPC User Guide*
Stepping and Setting Breakpoints in the *TotalView for HPC User Guide*
Using Stepping Commands in the *TotalView for HPC User Guide*
Group > Step Command in the online Help
Process > Step Command in the online Help
Thread > Step Command in the online Help
dstepi **Command**
dnext **Command**
dfocus **Command**

dstepi

Steps machine instructions, stepping into subfunctions

Format

dstepi [-back] [*num-steps*]

Arguments

-back

(ReplayEngine only) Steps to the previous instruction, moving into subroutines that called the current function. This option can be abbreviated to **-b.**

num-steps

An integer greater than 0, indicating the number of instructions to execute.

Description

The **dstepi** command executes assembler instruction lines; that is, it advances the program by single instructions.

The optional *num-steps* argument defines the number of **dstepi** operations to perform. If you do not specify *num-steps*, the default is 1.

For more information, see **dstep** on page 141.

Command alias

Alias	Definition	Description
si	**dstepi**	Runs the *thread of interest* (TOI) one instruction while allowing other threads in the process to run.
SI	**{dfocus g dstepi}**	Searches for threads in the share group that are at the same PC as the *TOI*, and steps one such aligned thread in each member one instruction. The rest of the control group runs freely. This is a group stepping command.
sil	**{dfocus L dstepi}**	Steps the process threads in lockstep. This steps the *TOI* one instruction, and runs all threads in the process that are at the same PC as the *TOI* to the same instruction. Other threads in the process run freely. The group of threads that is at the same PC is called the lockstep group.This alias does not force process width. If the default focus is set to group, this steps the group.
SIL	**{dfocus gL dstepi}**	Steps lockstep threads in the group. This steps all threads in the share group that are at the same PC as the *TOI* one instruction. Other threads in the control group run freely.
siw	**{dfocus W dstepi}**	Steps worker threads in the process. This steps the *TOI* one instruction, and runs all worker threads in the process to the same (goal) statement. The nonworker threads in the process run freely. This alias does not force process width. If the default focus is set to group, this steps the group.
SIW	**{dfocus gW dstepi}**	Steps worker threads in the group. This steps the *TOI* one instruction, and runs all worker threads in the same share group to the same statement. All other threads in the control group run freely.

Examples

```
dstepi
```

Executes the next machine instruction, stepping into any procedure call it encounters. Although the CLI only steps the current thread, other threads in the process run.

```
si 15
```

Executes the next 15 instructions.

```
f p1.2 dstepi
```

Steps thread 2 in process 1 by one instruction, and resumes execution of all other threads in process 1; they halt as soon as thread 2 in process 1 executes its instruction.

```
f t1.2 si
```

Steps thread 2 in process 1 by one instruction. No other threads in process 1 execute.

RELATED TOPICS

Creating a Process by Single Stepping in the *TotalView for HPC User Guide*
Stepping and Setting Breakpoints in the *TotalView for HPC User Guide*
Using Stepping Commands in the *TotalView for HPC User Guide*
Group > Step Instruction Command in the online Help
Process > Step Instruction Command in the online Help
Thread > Step Instruction Command in the online Help
dstep **Command**
dnext **Command**
dfocus **Command**

dunhold

Releases a held process or thread

Format

Releases a process

dunhold -process

Releases a thread

dunhold -thread

Arguments

-process

Releases processes in the current focus. You can abbreviate the **-process** option argument to **-p**.

-thread

Releases threads in the current focus. You can abbreviate the **-thread** option to **-t**.

Description

The **dunhold** command releases the threads or processes in the current focus. You cannot hold or release system manager threads.

Command alias

Alias	Definition	Description
uhp	**{dfocus p dunhold -process}**	Releases the process of interest (POI)
UHP	**{dfocus g dunhold -process}**	Releases the processes in the focus group
uht	**{dfocus t dunhold -thread}**	Releases the thread of interest (TOI)
UHT	**{dfocus g dunhold -thread}**	Releases all threads in the focus group
uhtp	**{dfocus p dunhold -thread}**	Releases the threads in the current -process

Examples

```
f w uhtp
```

Releases all worker threads in the focus process.

```
htp; uht
```

Holds all threads in the focus process except the *TOI*.

RELATED TOPICS

Holding and Releasing Processes and Threads in the *TotalView for HPC User Guide*
Starting Processes and Threads in the *TotalView for HPC User Guide*
Group > Release Command in the online Help

Process > Release Threads Command in the online Help
Thread > Hold Command in the online Help
dhold **Command**

dunset

Restores default settings for variables

Format

Restores a CLI variable to its default value

dunset *debugger-var*

Restores all CLI variables to their default values

dunset -all

Arguments

debugger-var

Name of the CLI variable whose default setting is being restored.

-all

Restores the default settings of all CLI variables.

Description

The **dunset** command reverses the effects of any previous **dset** commands, restoring CLI variables to their default settings. See Chapter 5, "TotalView Variables," on page 251 for information on these variables.

Tcl variables (those created with the Tcl **set** command) are not affected by this command.

If you use the **-all** option, the **dunset** command affects all changed CLI variables, restoring them to the settings that existed when the CLI session began. Similarly, specifying *debugger-var* restores that one variable.

Examples

```
dunset PROMPT
```

Restores the prompt string to its default setting; that is, **{[dfocus]>}**.

```
dunset -all
```

Restores all CLI variables to their default settings.

RELATED TOPICS

dset **Command**

duntil

Runs the process until a target place is reached

Format

Runs to a line

duntil [-back] *line-number*

Runs to an address

duntil [-back] -address *addr*

Runs into a function

duntil [-back] *proc-name*

Arguments

-back

(ReplayEngine only) Steps to the previous instruction, moving into subroutines that called the current function. This option can be abbreviated to **-b.**

line-number

A line number in your program.

-address *addr*

An address in your program.

proc-name

The name of a procedure, function, or subroutine in your -program.

Description

The **duntil** command runs the thread of interest (TOI) until execution reaches a line or absolute address, or until it enters a function.

If you use a process or group width, all threads in the process or group not running to the goal are allowed to run. If a secondary thread arrives at the goal before the *TOI*, the thread continues running, ignoring this goal. In contrast, if you specify thread width, only the *TOI* runs.

The **duntil** command differs from other step commands when you apply it to a group, as follows:

Process group

Runs the entire group, and the CLI waits until all processes in the group contain at least one thread that has arrived at the goal breakpoint. This lets you *sync* all the processes in a group in preparation for group-stepping them.

Thread group

Runs the process (for **p** width) or the control group (for **g** width) and waits until all the running threads in the group of interest arrive at the goal.

There are some differences in the way processes and threads run using the **duntil** command and other stepping commands:

- **Process Group Operation**: TotalView examines the *TOI* to see if it is already at the goal. If it is, TotalView does not run the POI. -Similarly, TotalView examines all other processes in the share group, and runs only processes without a thread at the goal. It also runs members of the control group not in the share group.
- **Group-Width Thread Group Operation**: TotalView identifies all threads in the entire control group that are not at the goal. Only those threads run. Although TotalView runs share group members in which all worker threads are already at the goal, it does not run the workers. TotalView also runs processes in the control group outside the share group. The **duntil** command operation ends when all members of the focus thread group are at the goal.
- **Process-Width Thread Group Operation**: TotalView identifies all threads in the entire focus process not already at the goal. Only those threads run. The **duntil** command operation ends when all threads in the process that are also members of the focus group arrive at the goal.

Command alias

Alias	Definition	Description
un	**duntil**	Runs the *TOI* until it reaches a target, while allowing other threads in the process to run.
UN	**{dfocus g duntil}**	Runs the entire control group until every process in the share group has at least one thread at the goal. Processes that have a thread at the goal do not run.
unl	**{dfocus L duntil}**	Runs the *TOI* until it reaches the target, and runs all threads in the process that are at the same PC as the *TOI* to the same target. Other threads in the process run freely. The group of threads that is at the same PC is called the lockstep group. This does not force process width. If the default focus is set to group, this runs the group.
UNL	**{dfocus gL duntil}**	Runs lockstep threads in the share group until they reach the target. Other threads in the control group run freely.
unw	**{dfocus W duntil}**	Runs worker threads in the process to a target. The nonworker threads in the process run freely. This does not force process width. If the default focus is set to group, this runs the group.
UNW	**{dfocus gW duntil}**	Runs worker threads in the same share group to a target. All other threads in the control group run freely.

Examples

```
UNW 580
```

Runs all worker threads to line 580.

```
un buggy_subr
```

Runs to the start of the **buggy_subr** routine.

RELATED TOPICS

Executing to a Selected Line in the *TotalView for HPC User Guide*
Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*
Using Run To and duntil Commands in the *TotalView for HPC User Guide*
Group > Run To Command in the online Help
Process > Run to Command in the online Help
Thread > Run To Command in the online Help

dup

Moves up the call stack

Format

dup [*num-levels*]

Arguments

num-levels

Number of levels to move up. The default is **1**.

Description

The **dup** command moves the current stack frame up one or more levels. It also prints the new frame number and function.

Call stack movements are all relative, so **dup** effectively "moves up" in the call stack. ("Up" is in the direction of **main()**.)

Frame 0 is the most recent—that is, currently executing—frame in the call stack; frame 1 corresponds to the procedure that invoked the currently executing frame, and so on. The call stack's depth is increased by one each time a program enters a procedure, and decreases by one when the program exits from it. The effect of the **dup** command is to change the context of commands that follow. For example, moving up one level allows access to variables that are local to the procedure that called the current routine.

Each **dup** command updates the frame location by adding the appropriate number of levels.

The **dup** command also modifies the current list location to be the current execution location for the new frame, so a subsequent **dlist** command displays the code surrounding this location. Entering the **dup 2** command (while in frame 0) followed by a **dlist** command, for instance, displays source lines centered around the location from which the current routine's parent was invoked. These lines are in frame 2.

Command alias

Alias	Definition	Description
u	**dup**	Moves up the call stack

Examples

```
dup
```

Moves up one level in the call stack. As a result, subsequent **dlist** commands refer to the procedure that invoked this one. After this command executes, it displays information about the new frame; for example:

```
1 check_fortran_arrays_ PC=0x10001254,
  FP=0x7fff2ed0 [arrays.F#48]
```

```
dfocus p1 u 5
```

Moves up five levels in the call stack for each thread involved in process 1. If fewer than five levels exist, the CLI moves up as far as it can.

RELATED TOPICS

ddown **Command**

dwait

Blocks command input until the target processes stop

Format

dwait

Arguments

This command has no arguments

Description

The **dwait** command waits for all threads in the current focus to stop or exit. Generally, this command treats the focus the same as other CLI -commands.

If you interrupt this command—typically by entering Ctrl+C—the CLI manually stops all processes in the current focus before it returns.

Unlike most other CLI commands, this command blocks additional CLI input until the blocking action is complete.

Examples

```
dwait
```

Blocks further command input until all processes in the current focus have stopped (that is, none of their threads are still *running*).

```
dfocus {p1 p2} dwait
```

Blocks command input until processes 1 and 2 stop.

dwatch

Defines a watchpoint

Format

Defines a watchpoint for a variable

dwatch *variable* [**-length** *byte-count*] [**-g** | **-p** | **-t**] [[**-l** *lang*] **-e** *expr*] [**-t** *type*]

Defines a watchpoint for an address

dwatch -address *addr* **-length** *byte-count* [**-g** | **-p** | **-t**] [[**-l** *lang*] **-e** *expr*] [**-t** *type*]

Arguments

variable

A symbol name corresponding to a scalar or aggregate identifier, an element of an aggregate, or a dereferenced pointer.

-address *addr*

An absolute address in the file.

-length *byte-count*

The number of bytes to watch. If you enter a variable, the default is the variable's byte length.

If you are watching a variable, you need to specify only the amount of storage to watch if you want to override the default value.

-g

Stops all processes in the process's control group when the watchpoint triggers.

-p

Stops the process that hit this watchpoint.

-t

Stops the thread that hit this watchpoint.

-l *lang*

Specifies the language in which you are writing an expression. The values you can use for *lang* are **c**, **c++**, **f7**, **f9**, and **asm**, for C, C++, FORTRAN 77, Fortran-9x, and assembler, respectively. If you do not use a language code, TotalView picks one based on the variable's type. If you specify only an address, TotalView uses the C language.

Not all languages are supported on all systems.

-e *expr*

When the watchpoint is triggered, evaluates *expr* in the context of the thread that hit the watchpoint. In most cases, you need to enclose the expression in braces (**{ }**).

-t *type*

The data type of **$oldval**/**$newval** in the expression. If you do not use this option, TotalView uses the variable's datatype. If you specify an address and you also use an expression, you must use this option.

Description

The **dwatch** command defines a watchpoint on a memory location where the specified variables are stored. The watchpoint triggers whenever the value of the variable changes. The CLI returns the ID of the newly created watchpoint.

NOTE >> Watchpoints are not available on Macintosh computers running OS X, and IBM PowerPC computers running Linux Power.

The value set in the STOP_ALL variable indicates which processes and threads stop executing.

The watched variable can be a scalar, array, record, or structure object, or a reference to a particular element in an array, record, or structure. It can also be a dereferenced pointer variable.

To obtain a variable's address if your application demands that you specify a watchpoint with an address instead of a variable name:

- **dprint** *&variable*
- **dwhat** *variable*

The **dprint** command displays an error message if the variable is in a register.

See Chapter 8, "Using Watchpoints" in the *TotalView for HPC User Guide* for additional information on *watchpoints*.

If you do not use the **-length** option, the CLI uses the length attribute from the program's symbol table. This means that the watchpoint applies to the data object named; that is, specifying the name of an array lets you watch all elements of the array. Alternatively, you can watch a certain number of bytes, starting at the named location.

NOTE >> In all cases, the CLI watches addresses. If you specify a variable as the target of a watchpoint, the CLI resolves the variable to an absolute address. If you are watching a local stack variable, the position being watched is just where the variable happened to be when space for the variable was allocated.

The focus establishes the processes (not individual threads) for which the watchpoint is in effect.

The CLI prints a message showing the action point identifier, the location being watched, the current execution location of the triggering thread, and the identifier of the triggering threads.

One possibly confusing aspect of using expressions is that their syntax differs from that of Tcl. This is because you need to embed code written in Fortran, C, or assembler within Tcl commands. In addition, your expressions often include TotalView built-in functions.

Command alias

Alias	Definition	Description
wa	**dwatch**	Defines a watchpoint

Examples

For these examples, assume that the current process set at the time of the **dwatch** command consists only of process 2, and that **ptr** is a global variable that is a pointer.

```
dwatch *ptr
```

Watches the address stored in pointer **ptr** at the time the watchpoint is defined, for changes made by process 2. Only process 2 is stopped. The watchpoint location does not change when the value of **ptr** changes.

```
dwatch {*ptr}
```

Performs the same action as the previous example. Because the argument to the **dwatch** command contains a space, Tcl requires you to place the argument within braces.

```
dfocus {p2 p3} wa *ptr
```

Watches the address pointed to by **ptr** in processes 2 and 3. Because this example does not contain either a **-p** or **-g** option, the value of the STOP_ALL variable lets the CLI know if it should stop processes or groups.

```
dfocus {p2 p3 p4} dwatch -p *ptr
```

Watches the address pointed to by **ptr** in processes 2, 3, and 4. The **-p** option indicates that TotalView only stops the process triggering the watchpoint.

```
wa * aString -length 30 -e {goto $447}
```

Watches 30 bytes of data beginning at the location pointed to by **aString**. If any of these bytes change, execution control transfers to line 447.

```
wa my_vbl -type long
    -e {if ($newval == 0x11ffff38) $stop;}
```

Watches the **my_vbl** variable and triggers when **0x11ffff38** is stored in it.

```
wa my_vbl -e {if (my_vbl == 0x11ffff38) $stop;}
```

Performs the same function as the previous example. This example tests the variable directly rather than by using the **$newval** variable.

RELATED TOPICS

Using Watchpoints in the *TotalView for HPC User Guide*
Writing Code Fragments in the *TotalView for HPC User Guide*
Tools > Watchpoint Command in the online Help
dactions **Command**

dwhat

Determines what a name refers to

Format

dwhat *symbol-name*

Arguments

symbol-name

Fully or partially qualified name specifying a variable, procedure, or other source code symbol.

Description

The **dwhat** command displays the name and description of a named entity in a program.

NOTE >> To view information on CLI variables or aliases, use the dset or alias -commands.

The focus constrains the query to a particular context.

The default width for this command is thread (t).

Command alias

Alias	Definition	Description
wh	**dwhat**	Determines what a name refers to

Examples

The following examples the CLI display for various commands.

```
dprint timeout
  timeout = {
    tv_sec = 0xc0089540 (-1073179328)
    tv_usec = 0x000003ff (1023)
  }

dwhat timeout
```

In thread 1.1:

```
  Name: timeout; Type: struct timeval; Size: 8 bytes; Addr: 0x11fffefc0
    Scope: #fork_loop.cxx#snore \
        (Scope class: Any)   Address class: auto_var \
        (Local variable)

wh timeval
  In process 1: Type name: struct timeval; Size: 8 bytes; \
      Category: Structure
      Fields in type:
      { tv_sectime_t(32 bits)
```

```
        tv_usecint(32 bits)
      }

dlist
  20   float field3_float;
  21   double field3_double;
  22   en_check en1;
  23
  24 };
  25
  26 main ()
  27 {
  28   en_check vbl;
  29   check_struct s_vbl;
  30   vbl = big;
  31   s_vbl.field2_char = 3;
  32   return (vbl + s_vbl.field2_char);
  33 }

p vbl
  vbl = big (0)

wh vbl
```

In thread 2.3:

```
  Name: vbl; Type: enum en_check; \
      Size: 4 bytes; Addr: Register 01
      Scope: #check_structs.cxx#main \
      (Scope class: Any)
      Address class: register_var (Register \
              variable)

wh en_check
```

In process 2:

```
  Type name: enum en_check; Size: 4 bytes; \
      Category: Enumeration
      Enumerated values:
        big    = 0
        little = 1
        fat    = 2
        thin   = 3

p s_vbl
  s_vbl = { field1_int = 0x800164dc (-2147392292) field2_char = '\377' (0xff, or -1)
  field2_chars = "\003" <padding> = '\000' (0x00, or 0) field3_int = 0xc0006140 (-
  1073716928) field2_uchar = '\377' (0xff, or 255) <padding> = '\003' (0x03, or 3)
  <padding> = '\000' (0x00, or 0) <padding> = '\000' (0x00, or 0)
```

```
      field_sub = {
      field1_int = 0xc0002980 (-1073731200)
      <padding> = '\377' (0xff, or -1)
      <padding> = '\003' (0x03, or 3)
      <padding> = '\000' (0x00, or 0)
      <padding> = '\000' (0x00, or 0)
      field2_long = 0x0000000000000000 (0)
    ...
  }

wh s_vbl
```

In thread 2.3

```
  Name: s_vbl; Type: struct check_struct; \
        Size: 80 bytes; Addr: 0x11ffff240
     Scope: #check_structs.cxx#main \
         Scope class: Any)
     Address class: auto_var (Local variable)

wh check_struct
```

In process 2:

```
  Type name: struct check_struct; \
       Size: 80 bytes; Category: Structure
    Fields in type:
    {
    field1_intint(32 bits)
    field2_charchar(8 bits)
    field2_chars$string[2](16 bits)
    <padding>$char(8 bits)
    field3_intint(32 bits)
    field2_uchar unsigned char(8 bits)
    <padding>$char[3](24 bits)
    field_substruct sub_st(320 bits){
       field1_intint(32 bits)
       <padding>$char[4](32 bits)
       field2_longlong(64 bits)
       field2_ulongunsigned long(64 bits)
       field3_uintunsigned int(32 bits)
       en1enum en_check (32 bits)
       field3_doubledouble(64 bits)
    }
  ...
  }
```

RELATED TOPICS

View > Lookup Variable Command in the online Help
dstatus **Command**
dwhere **Command**

dwhere

Displays the current execution location and call stack

Format

Displays locations in the call stack

dwhere [-level *level-num*] [*num-levels*] [**-args**] [-locals] [-registers] [**-noshow_pc**][**-noshow_fp**][**-show_image**][-group_by *property*]

Displays all locations in the call stack

dwhere -all [**-args**] [-locals] [-registers] [**-noshow_pc**][**-noshow_fp**][**-show_image**]

Arguments

-all

Shows all levels of the call stack. This is the default.

-level *level-num*

Sets the level at which **dwhere** starts displaying information.

num-levels

Restricts output to this number of levels of the call stack. By default, all levels are shown.

-args

Displays argument names and values in addition to program location information. By default, the arguments are not shown.

-locals

Displays each frame's local variables. By default, the local variable information is not shown.

-noshow_pc

Does not show the PC. By default, the PC value is shown.

-noshow_fp

Does not show the FP. By default, the FP value is shown.

-registers

Displays each frame's registers. By default, the register information is not shown.

-show_image

Shows the executable name as well as the file name. By default, **dwhere** displays the associated image information if the source line cannot be found.

-group_by *property*

Aggregates stack backtraces of the focus threads, outputting a compressed **ptlist** that identifies the processes and threads containing equivalent stack frames in the backtrace. For information on the **ptlist** syntax, see Compressed List Syntax (ptlist).

This option requires a *property* argument to control the "equivalence" relationship of stack frames across the threads. See **The -group_by Option** for more information.

Description

The **dwhere** command prints the current execution locations and the call stacks—or sequences of procedure calls—that led to that point. The CLI shows information for threads in the current focus; the default shows information at the thread level.

Arguments control the amount of command output in two ways:

- The *num-levels* argument determines how many levels of the call stacks are displayed, counting from the uppermost (most recent) level. Without this argument, the CLI shows all levels in the call stack, which is the default.
- The **-a** option displays procedure argument names and values for each stack level.

A **dwhere** command with no arguments or options displays the call stacks for all threads in the target set.

The MAX_LEVELS variable contains the default maximum number of levels displayed when you do not use the *num-levels* argument.

Output is generated for each thread in the target focus. The output is printed directly to the console.

The -group_by Option

The **-group_by** option requires a *property* argument, which controls the "equivalence" relationship of stack frames across the threads. When you use the --**group_by** option, **dwhere** aggregates the stack frames of each of the focus threads, forming a tree of equivalent stack frames.

Starting at the base of the stack (closest to `main()` or the thread's start function), the **dwhere** command assigns each frame a distance from a synthetic root frame indicated by `/`. Two frames are equivalent only if all of the following apply:

- Their distance from the root is equal.
- They have the same parent frame.
- The selected property of frames is equivalent.

The following property values are supported, with their abbreviations in parentheses:

- *function* (*f*): Equivalence based on the name of the function containing the PC for the frame.
- *function+line* (*f+l*): Equivalence based on the name of the function and the file and line number containing the PC for the frame.
- *function+offset* (*f+o*): Equivalence based on the name of the function containing the PC for the frame and offset from the beginning of the function to the PC for the frame.

Looking at backtraces purely by the *function* property is the most coarse grained grouping of threads. Choosing a more fine grained grouping, such as a line number within the function, provides more detail about where in the code a given thread is executing, but it may also result in a much larger set of equivalent frames.

The **dwhere** command displays the current execution location(s) and the backtrace(s) for the threads in the current focus. If backtraces for multiple threads are requested, the stack displays are aggregated.

Lines denoting evaluation frames for compiled expressions or interpreted function calls are labeled with a suspended evaluation id. This id can be used to manipulate suspended evaluations with **dflush** and **TV::expr**.

Command alias

Alias	Definition	Description
w	**dwhere**	Displays the current location in the call stack

Examples

```
dwhere
```

Displays the call stacks for all threads in the current focus.

```
dfocus 2.1 dwhere 1
```

Displays just the most recent level of the call stack corresponding to thread 1 in process 2. This shows just the immediate execution location of a thread or threads.

```
f p1.< w 5
```

Displays the most recent five levels of the call stacks for all threads involved in process 1. If the depth of any call stack is less than five levels, all of its levels are shown.

This command is a slightly more complicated way of saying **f p1 w 5** because specifying a process width tells the **dwhere** command to ignore the thread indicator.

```
w 1 -a
```

Displays the current execution locations (one level only) of threads in the current focus, together with the names and values of any arguments that were passed into the current process.

RELATED TOPICS

dwhat **Command**
dstatus **Command**

dworker

Adds or removes a thread from a workers group

Format

dworker { *number* | *boolean* }

Arguments

number

If positive, marks the thread of interest (TOI) as a worker thread by inserting it into the workers group.

boolean

If **true**, marks the *TOI* as a worker thread by inserting it into the workers group. If **false**, marks the thread as a nonworker thread by removing it from the workers group.

Description

The **dworker** command inserts or removes a thread from the workers group.

If *number* is **0** or **false**, this command marks the *TOI* as a nonworker thread by removing it from the workers group. If *number* is **true** or is a positive value, this command marks the *TOI* as a worker thread by inserting it in the workers group.

Moving a thread into or out of the workers group has no effect on whether the thread is a manager thread. Manager threads are threads that are created by the pthreads package to manage other threads; they never execute user code, and cannot normally be controlled individually. TotalView automatically inserts all threads that are not manager threads into the workers group.

Command alias

Alias	Definition	Description
wof	**{dworker false}**	Removes the focus thread from the workers group
wot	**{dworker true}**	Inserts the focus thread into the workers group

RELATED TOPICS

Organizing Chaos in the *TotalView for HPC User Guide*
Creating Groups in the *TotalView for HPC User Guide*
Setting Group Focus in the *TotalView for HPC User Guide*
dgroups **Command**

exit

Terminates the debugging session

Format

exit [**-force**]

Arguments

-force

Exits without asking permission. This is most often used in scripts.

Description

The **exit** command ends the debugging session.

After you enter this command, the CLI confirms that you wish to exit, then exits. If you entered the CLI from the TotalView GUI, this command also closes the GUI window.

NOTE >> If you invoked the CLI from within the TotalView GUI, pressing Ctrl+D closes the CLI window without exiting from TotalView.

TotalView destroys all processes and threads that it makes. Any processes that existed prior to the debugging session (that is, TotalView attached to them because you used the **dattach** command) are detached and left executing.

The **exit** and **quit** commands are interchangeable and do the same thing.

Examples

```
exit
```

Exits TotalView, leaving any attached processes running.

RELATED TOPICS

File > Exit Command in the online Help
quit **Command**

help

Displays help information

Format

help [*topic*]

Arguments

topic

A CLI topic or command.

Description

The **help** command prints information about the specified topic or command. With no argument, the CLI displays a list of the topics for which help is available.

If the CLI needs more than one screen to display the help information, it fills the screen with data and then displays a *more* prompt. Press Enter to see more data or **q** to return to the CLI prompt.

When you enter a topic name, the CLI attempts to complete an entry. You can also enter one of the CLI built-in aliases; for example:

```
d1.<> he a
Ambiguous help topic "a". Possible matches:
   alias accessors arguments addressing_expressions
d1.<> he ac
"ac" has been aliased to "dactions":
dactions [ bp-ids ... ] [ -at <source-loc> ] [ -disabled | \
            -enabled ]
   Default alias: ac
...
d1.<> he acc
   The following commands provide access to the properties
   of TotalView objects:
   ...
```

Use the **capture** command to place help information into a variable.

Command alias

Alias	Definition	Description
he	**help**	Displays help information

Examples

`help help`

Prints information about the **help** command.

quit

Terminates the debugging session

Format

quit [**-force**]

Arguments

-force

Closes all TotalView processes without asking permission.

Description

The **exit** command terminates the TotalView session.

After you enter this command, the CLI confirms that you wish to exit, then exits. If you entered the CLI from the TotalView GUI, this command also closes the GUI window.

NOTE >> If you invoked the CLI from within the TotalView GUI, pressing Ctrl+D closes the CLI window without exiting from TotalView.

TotalView destroys all processes and threads that it makes. Any processes that existed prior to the debugging session (that is, TotalView attached to them because you used the **dattach** command) are detached and left executing.

The **exit** and **quit** commands are interchangeable and do the same thing.

Examples

```
quit
```

Exits TotalView, leaving any attached processes running.

RELATED TOPICS

File > Exit Command in the online Help
exit **Command**

spurs

Returns information on the spurs library use

Format

Displays help information

spurs [help]

Adds directories to the OBJECT_SEARCH_PATH variable

spurs add [directory *directory* **...]**

Creates an image-qualified breakpoint

spurs break [*spu-image-name spu-source-location-expression*]

Deletes breakpoints

spurs delete *breakpoint-id* **...**

Shows the directories in which TotalView searches for SPURS SPU ELF executables

spurs info [directory | **break]**

Prints information about the kernel, the taskset, tasks, and other SPURS objects

spurs print [kernel [*eaSpurs* **] |**
barrier *eaBarrier* |
event_flag *eaEventFlagSet* |
lfqueue *eaLFQueue* |
queue *eaQueue* |
semaphore *eaSemaphore* |
taskset [*eaTaskset* **]** |
task *eaTaskset taskID* **]**

Scans for information—this is a no-op

spurs scan

Arguments

directory

The directory or directories to be added to the CLI's OBJECT_SEARCH_PATH variable. For example:

```
spurs add directory directory1 directory2
```

Notice that directory names are separated by space characters.

spu-image-name

The name of the image that is or will be loaded by TotalView

spu-source-location-expression

An expression that resolves to a specific line in the image. For information on location expressions, see **dbreak** on page 39.

breakpoint-id

The action point ID to delete

*ea*Spurs

The kernel context at this PPU address

*ea*Barrier

The barrier object at this PPU address

*ea*EventFlagSet

The event flag object at this PPU address

*ea*LFQueue

The lfqueue object at this PPU address

*ea*Queue

The queue object at this PPU address

*ea*Semaphore

The semaphore object at this PPU address

*ea*Taskset

The taskset at this PPU address

*task*ID

The task at this index

Description

Modeled after the GDB "spurs" command, the **spurs** command was created so that developers who are familiar the GDB command have a similar set of commands in TotalView. However, not all GDB "spurs" commands are implemented.

TotalView supports the SPURS library. Here's this library's description in the SPURS documentation:

> libspurs is a user-level thread library for SPUs. In a SPURS environment (SPU Runtime System), SPU threads are managed by SPUs. For this reason, thread switching is more efficient than under PPU management and requires no PPU resources. Using SPURS also makes it easier to synchronize threads and adjust the load balance on multiple SPUs. SPURS is furthermore highly extensible and allows users to define their own thread models as necessary.

spurs [help]

To access help on the **spurs** command:

- Enter **spurs** to return a one-line description of its commands.
- Enter **spurs help** to display more information about each **spurs** subcommand.

spurs add [directory directory ...]

Displays either a one-line description of this command or adds directories to search when TotalView looks for SPURS SPU executables.

- **spurs add** writes a one-line description of this command.

- **spurs add directory** *directory* adds a directory or directories to the CLI's OBJECT_SEARCH_PATH variable. This variable contains the path used when searching for SPU ELF executable files. The directories are placed at the beginning of the list in the order in which they are named. If a directory is already in the list, the previously named directory is removed.

This command returns the modified OBJECT_SEARCH_PATH variable.

spurs break [spu-image-name spu-source-location-expression]

Displays either a one-line description of this command or adds a breakpoint.

- **spurs break** returns a one-line description of this command.
- **spurs break** *spu-image-name spu-source-loc-expression* creates an image-qualified breakpoint path. This is identical to the following CLI command:

dbreak -pending ##*spu-image-name***#***source-loc-expr*

This command creates a pending breakpoint that is located only with the image you name. However, if the image has already been loaded, TotalView sets an ordinary breakpoint rather than a pending breakpoint. The focus must be on an SPU thread.

This command returns the action point ID of the created breakpoint. You can use this ID with other CLI commands that act upon breakpoints; for example, **dactions**. **ddelete**, **ddisable**, **denable**, and others.

spurs delete breakpoint-id ...

Permanently removes one or more action points. The argument defines which action points to delete. Unlike **spurs break**, this command does not require that the command focus be set to an SPU thread.

spurs info [directory | break]

- **spurs info** returns a one-line description of this command.
- **spurs info directory** prints the OBJECT_SEARCH_PATH state variable
- **spurs info break** prints action point information about action points in the thread in the current focus.

spurs print

The spurs print command can be used in the following ways:

spurs print [**kernel** [*eaSpurs*] |
barrier *eaBarrier* |
event_flag *eaEventFlagSet* |
lfqueue *eaLFQueue* |
queue *eaQueue* |
semaphore *eaSemaphore* |
taskset [*eaTaskset*] |
task *eaTaskset taskID*]

spurs print

Displays one line of information on using this command.

spurs print kernel

Displays the kernel context for the SPU threads in the current or named focus. The focus must be one or more SPU threads.

cell_spurs_print_kernel is an alias for this command.

spurs print kernel *eaSpurs*

Displays the kernel context at PPU address *eaSpurs*. The command focus must be one or more PPU threads.

cell_spurs_print_kernel is an alias for this command.

spurs print barrier *eaBarrier*

Displays the barrier object at PPU address *eaBarrier*. The command focus must be one or more PPU threads.

cell_spurs_print_barrier_info is an alias for this command.

spurs print event_flag *eaEventFlagSet*

Displays the event flag object at PPU address *eaEventFlagSet*. The command focus must be one or more PPU threads.

cell_spurs_print_event_flag_info is an alias for this command.

spurs print lfqueue *eaLFQueue*

Displays the lfqueue object at PPU address *eaLFQueue*. The command focus must be one or more PPU threads.

cell_spurs_print_lfqueue_info is an alias for this command.

spurs print queue *eaQueue*

Displays the queue object at PPU address *eaQueue*. The command focus must be one or more PPU threads.

cell_spurs_print_queue_info is an alias for this command.

spurs print semaphore *eaSemaphore*

Displays the semaphore object at PPU address *eaSemaphore*. The command focus must be one or more PPU threads.

cell_spurs_print_semaphore_info is an alias for this command.

spurs print taskset

Prints the taskset for the focus SPU threads. The command focus must be one or more SPU threads.

cell_spurs_print_taskset is an alias for this command

spurs print taskset *eaTaskset*

Prints the taskset at PPU address *eaTaskset*. The command focus must be one or more SPU threads.

cell_spurs_print_taskset is an alias for this command

spurs print task *eaTaskset taskID*

Prints the task at index *taskID* in the taskset at PPU address *eaTaskset*. The command focus must be one or more PPU threads.

cell_spurs_print_task is an alias for this command.

spurs scan

This command is for compatibility with GDB. Unlike the GDB command, this command is a no-op as TotalView has no need to scan for SPU executables because searches for SPU executables happen dynamically.

stty

Sets terminal properties

Format

stty [*stty-args*]

Arguments

stty-args

One or more UNIX **stty** command arguments as defined in the **man** page for your operating system.

Description

The CLI **stty** command executes a UNIX **stty** command on the **tty** associated with the CLI window, allowing you to set all your terminal's properties. However, this is most often used to set erase and kill characters.

If you start the CLI from a terminal using the **totalviewcli** command, the **stty** command alters this terminal's environment. Consequently, the changes you make using this command are retained in the terminal after you exit.

If you omit the *stty-args* argument, the CLI returns help information on your current settings.

The output from this command is returned as a string.

Examples

```
stty
```

Prints information about your terminal settings, equivalent to having entered **stty** while interacting with a shell.

```
stty -a
```

Prints information on all your terminal settings.

```
stty erase ^H
```

Sets the *erase* key to Backspace.

```
stty sane
```

Resets the terminal's settings to values that the shell thinks they should be. For problems with command-line editing, use this command. (The **sane** argument is not available in all environments.)

unalias

Removes a previously defined alias

Format

Removes an alias

unalias *alias-name*

Removes all aliases

unalias -all

Arguments

alias-name

The name of the alias to delete.

-all

Removes all aliases.

Description

The **unalias** command removes a previously defined alias. You can delete all aliases using the **-all** option. Aliases defined in the **tvdinit.tvd** file are also deleted.

Examples

```
unalias step2
```

Removes the **step2** alias; **step2** is undefined and can no longer be used. If **step2** was included as part of the definition of another command, that command no longer works correctly. However, the CLI only displays an error message when you try to execute the alias that contains this removed alias.

```
unalias -all
```

Removes all aliases.

RELATED TOPICS

alias **Command**

Chapter 3

CLI Namespace Commands

Command Overview

This chapter lists all of CLI commands that are not in the top-level mainspace.

Accessor Functions

The following functions, all within the **TV::** namespace, access and set TotalView properties:

- actionpoint: Accesses and sets action point properties.
- expr: Manipulates values created by the **dprint -nowait** command.
- focus_groups: Returns a list containing the groups in the current focus.
- focus_processes: Returns a list of processes in the current focus.
- focus_threads: Returns a list of threads in the current focus.
- group: Accesses and sets group properties.
- process: Accesses and sets process properties.
- scope: Accesses and sets scope properties.
- symbol: Accesses and sets symbol properties.
- thread: Accesses and sets thread properties.
- type: Accesses and sets data type properties.
- type_transformation: Accesses and defines type transformations.

Helper Functions

The following functions, all within the **TV::** namespace, are most often used in scripts:

- dec2hex: Converts a decimal number into hexadecimal format.
- dll: Manages shared libraries.
- errorCodes: Returns or raises TotalView error information.
- hex2dec: Converts a hexadecimal number into decimal format.
- read_symbols: Reads shared library symbols.
- respond: Sends a response to a command.
- source_process_startup: Reads and executes a **.tvd** file when TotalView loads a process.

actionpoint

Sets and gets action point properties

Format

TV::actionpoint *action* [*object-id*] [*other-args*]

Arguments

action

The action to perform, as follows:

commands

Displays the subcommands that you can use. The CLI responds by displaying these four *action* subcommands. There are no arguments to this subcommand.

get

Retrieves the values of one or more action point properties. The *other-args* argument can include one or more property names. The CLI returns values for these properties in a list whose order is the same as the names you enter.

If you use the **-all** option instead of the *object-id*, the CLI returns a list containing one (sublist) element for each object.

properties

Lists the action point properties that TotalView can access. There are no arguments to this subcommand.

set

Sets the values of one or more properties. The *other-args* argument contains property name and value pairs.

object-id

An identifier for the action point.

other-args

Arguments that the **get** and **set** actions use.

Description

The **TV::actionpoint** command lets you examine and set the following action point properties and states:

address

The address of the action point.

block_count

The number of addresses associated with an actionpoint.

A single line of code can generate multiple instruction sequences. For example, there may be several entry points to a subroutine, depending on where the caller is. This means that an actionpoint can be set at many addresses even if you are placing it on a single line.

Internally, a block represents one of these addresses.

block_enabled

Each individual actionpoint block is an instruction that TotalView may replace with a trap instruction. (When a trap instruction is encountered, the operating system passes control to the debugger.)

Each block can be enabled or disabled separately. This property type returns a list with in which 1 indicates if the block is enabled and 0 if it is disabled.

This is the only property that can be set from within TotalView. All others are read-only

conflicted

Indicates that another action point shares at least one of the action point blocks. If this condition exists, the block is conflicted. If a block is conflicted, TotalView completely disables the action point.

The conflicted property is 1 if the actionpoint is conflicted, and 0 if it is not.

context

A string that totally identifies an action point.

The location of every action point is represented by a string. Even action points set by clicking on a line number are represented by strings. (In this case, the string is the line number.)

Sometimes, this string is all that is needed. Usually, however, more context is needed. For example, a line number needs a file name.

enabled

A value (either 1 or 0) indicating if the action point is enabled. A value of 1 means enabled. (settable)

expression

The expression to execute at an action point. (settable)

id

The ID of the action point.

language

The language in which the action point expression is written.

length

The length in bytes of a watched area. This property is only valid for watchpoints. (settable)

line

The source line at which the action point is set. This property is not valid for watchpoints.

satisfaction_group

The group that must arrive at a barrier for the barrier to be *satisfied*. (settable)

share

A value (either 1 or 0) indicating if the action point is active in the entire share group. A value of 1 means that it is. (settable)

stop_when_done

A value that indicates what is stopped when a barrier is satisfied (in addition to the satisfaction set). Values are **process**, **group**, or **none**. (settable)

stop_when_hit

A value that indicates what is stopped when an action point is hit (in addition to the thread that hit the action point). Values are **process**, **group**, or **none**. (settable)

type

The object's type. (See **type_values** for a list of possible types.)

type_values

Lists values that can TotalView can assign to the **type** property: **break**, **eval**, **process_barrier**, **thread_barrier**, and **watch**.

Examples

```
TV::actionpoint set 5 share 1 enable 1
```

Shares and enables action point 5.

```
f p3 TV::actionpoint set -all enable 0
```

Disables all the action points in process 3.

```
foreach p [TV::actionpoint properties] {
  puts [format "%20s %s" $p: \
  [TV::actionpoint get 1 $p]]
```

Dumps all the properties for action point 1. Here is what your output might look like:

```
                    address:  0x1200019a8
                    enabled:  0
                 expression:
                         id:  1
                   language:
                     length:
                       line:  /temp/arrays.F#84
          satisfaction_group:
        satisfaction_process:
          satisfaction_width:
                      share:  1
              stop_when_done:
               stop_when_hit:  group
                       type:  break
                type_values:  break eval pro-
                              cess_barrier
                              thread_barrier
                              watch
```

RELATED TOPICS

dactions **Command**

dec2hex

Converts a decimal number into hexadecimal

Format

TV::dec2hex *number*

Arguments

number

A decimal number to convert.

Description

The **TV::dec2hex** command converts a decimal number into hexadecimal. This command correctly manipulates 64-bit values, regardless of the size of a **long** value on the host system.

RELATED TOPICS

hex2dec Command

dll

Manages shared libraries

Format

TV::dll *action* [*dll-id-list*] [**-all**]

Arguments

action

The action to perform, as follows:

close

Dynamically unloads the shared object libraries that were dynamically loaded by the **ddlopen** commands corresponding to the list of *dll-id*s.

If you use the **-all** option, TotalView closes all of the libraries that it opened.

commands

Displays the subcommands that you can use. The CLI responds by displaying these four *action* subcommands. There are no arguments to this subcommand.

get

Retrieves the values of one or more **TV::dll** properties. The *other-args* argument can include one or more property names.

If you use the **-all** option as the *dll-id-list*, the CLI returns a list containing one (sublist) element for each object.

properties

Lists the **TV::dll** properties that TotalView can access. There are no arguments to this subcommand.

resolution_urgency_values

Returns a list of values that this property can take. This list is operating-system specific, but always includes **{lazy now}**.

symbol_availability_values

Returns a list of values that this property can take. This list is operating system specific, but always includes **{lazy now}**.

dll-id-list

A list of one or more dll-ids. There are the IDs returned by the **ddlopen** command.

-all

Closes all shared libraries that you opened using the **ddlopen** command.

Description

The **TV::dll** command either closes shared libraries that were dynamically loaded with the **ddlopen** command or obtains information about loaded shared libraries.

Examples

```
TV::dll close 1
```

Closes the first shared library that you opened.

RELATED TOPICS

ddlopen Command

errorCodes

Returns or raises TotalView error information

Format

Returns a list of all error code tags

TV::errorCodes

Returns or raises error information

TV::errorCodes *number_or_tag* [**-raise** [*message*]]

Arguments

number_or_tag

An error code mnemonic tag or its numeric value.

-raise

Raises the corresponding error. If you append a *message*, TotalView returns this string. Otherwise, TotalView uses the human-readable string for the error.

message

An optional string used when raising an error.

Description

The **TV::errorCodes** command lets you manipulate the TotalView error code information placed in the Tcl **errorCodes** variable. The CLI sets this variable after every command error. Its value is intended to be easy to parse in a Tcl script.

When the CLI or TotalView returns an error, **errorCodes** is set to a list with the following format:

TOTALVIEW *error-code subcodes... string*

where:

- The first list element is always **TOTALVIEW**.
- The second list element is always the error code.
- The *subcodes* argument is not used at this time.
- The last list element is a string describing the error.

With a tag or number, this command returns a list containing the mnemonic tag, the numeric value of the tag, and the string associated with the error.

The **-raise** option raises an error. If you add a message, that message is used as the return value; otherwise, the CLI uses its textual explanation for the error code. This provides an easy way to return errors from a script.

Examples

```
foreach e [TV::errorCodes] {
  puts [eval format {"%20s %2d %s"} \
  [TV::errorCodes $e]]}
```

Displays a list of all TotalView error codes.

RELATED TOPICS

dprint Command
TV::expr Command

expr

Manipulates values created by the dprint -nowait command

Format

TV::expr *action* [*susp-eval-id*] [*other-args*]

Arguments

action

The action to perform, as follows:

commands

Displays the subcommands that you can use. The CLI responds by displaying the subcommands shown here. Do not use additional arguments with this subcommand.

delete

Deletes all data associated with a suspended ID. If you use this command, you can specify an *other-args* argument. If you use the **-done** option, the CLI deletes the data for all completed expressions; that is, those expressions for which **TV::expr get** *susp-eval-id* **done** returns 1. If you specify **-all**, the CLI deletes all data for all expressions.

get

Gets the values of one or more **expr** properties. The *other-args* argument can include one or more values. The CLI returns these values in a list whose order is the same as the property names.

If you use the **-all** option instead of *susp-eval-id*, the CLI returns a list containing one (sublist) element for each object.

properties

Displays the properties that the CLI can access. Do not use additional arguments with this option.

susp-eval-id

The ID returned or thrown by the **dprint** command, or printed by the **dwhere** command.

other-args

Arguments required by the **delete** subcommand.

Description

The **TV::expr** command, in addition to showing you command information, returns and deletes values returned by a **dprint -nowait** command. You can use the following properties for this command:

done

TV::expr returns 1 if the process associated with *susp-eval-id* has finished in all focus threads. Otherwise, it returns 0.

expression

The expression to execute.

focus_threads

A list of *dpid.dtid* values in which the expression is being -executed.

id

The *susp-eval-id* of the object.

initially_suspended_process

A list of dpid IDs for the target processes that received control because they executed the function calls or compiled code. You can wait for processes to complete by entering the following:

```
dfocus p dfocus [TV::expr get \
    susp-eval-id \
    initially_suspended_processes] dwait
```

result

A list of pairs for each thread in the current focus. Each pair contains the thread as the first element and that thread's result string as the second element; for example:

```
d1.<> dfocus {1.1 2.1} TV::expr \
    get susp-eval-id result
{{1.1 2} {2.1 3}} d1.<>
```

The result of expression *susp-eval-id* in thread 1.1 is 2, and in thread 2.1 is 3.

status

A list of pairs for each thread in the current focus. Each pair contains the thread ID as the first element and that thread's status string as the second element. The possible status strings are **done**, **suspended**, and **{error** *diag***}.**

For example, if expression *susp-eval-id* finished in thread 1.1, suspended on a breakpoint in thread 2.1, and received a syntax error in thread 3.1, that expression's status property has the following value when **TV::expr** is focused on threads 1.1, 2.1, and 3.1:

```
d1.<> dfocus {t1.1 t2.1 t3.1} \
     TV::expr get 1 status
{1.1 done} {2.1 suspended} {3.1 {error {Symbol nothing2 not found}}}
d1.<>
```

RELATED TOPICS

dprint Command

focus_groups

Returns a list of groups in the current focus

Format

TV::focus_groups

Arguments

This command has no arguments

Description

The **TV::focus_groups** command returns a list of all groups in the current focus.

Examples

f d1.< TV::focus_groups

Returns a list containing one entry, which is the ID of the control group for process 1.

RELATED TOPICS

Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*
focus_processes **Command**
focus_threads **Command**
dfocus **Command**

focus_processes

Returns a list of processes in the current focus

Format

TV::focus_processes [**-all** | **-group** | **-process** | **-thread**]

Arguments

-all

Changes the default width to **all**.

-group

Changes the default width to **group**.

-process

Changes the default width to **process**.

-thread

Changes the default width to **thread**.

Description

The **TV::focus_processes** command returns a list of all processes in the current focus. If the focus width is something other than **d** (default), the focus width determines the set of processes returned. If the focus width is **d**, the **TV::focus_processes** command returns process width. Using any of the options changes the default width.

Examples

```
f g1.< TV::focus_processes
```

Returns a list containing all processes in the same control as process 1.

RELATED TOPICS

focus_processes **Command**
focus_threads **Command**
dfocus **Command**
Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*

focus_threads

Returns a list of threads in the current focus

Format

TV::focus_threads [**-all** | **-group** | **-process** | **-thread**]

Arguments

-all

Changes the default width to **all**.

-group

Changes the default width to **group**.

-process

Changes the default width to **process**.

-thread

Changes the default width to **thread**.

Description

The **TV::focus_threads** command returns a list of all threads in the current focus. If the focus width is something other than **d** (default), the focus width determines the set of threads returned. If the focus width is **d**, the **TV::focus_threads** command returns thread width. Using any of the options changes the default width.

Examples

```
f p1.< TV::focus_threads
```

Returns a list containing all threads in process 1.

RELATED TOPICS

focus_processes **Command**
focus_threads **Command**
dfocus **Command**
Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*

group

Sets and gets group properties

Format

TV::group *action* [*object-id*] [*other-args*]

Arguments

action

The action to perform, as follows:

commands

Displays the subcommands that you can use. The CLI responds by displaying these four *action* subcommands. Do not use additional arguments with this subcommand.

get

Gets the values of one or more group properties. The *other-args* argument can include one or more property names. The CLI returns the values for these properties in a list in the same order as you entered the property names.

If you use the **-all** option instead of *object-id*, the CLI returns a list containing one (sublist) element for each group.

properties

Displays the properties that the CLI can access. Do not use additional arguments with this option.

set

Sets the values of one or more properties. The *other-args* argument is a sequence of property name and value pairs.

object-id

The group ID. If you use the **-all** option, TotalView executes this operation on all groups in the current focus.

other-args

Arguments required by the **get** and **set** subcommands.

Description

The **TV::group** command lets you examine and set the following group properties and states:

actionpoint_count

The number of shared action points planted in the group. This is only valid for share groups and shared action points that are associated with the share group containing the process, rather than with the process itself.

When you obtain the results of this read-only value, the number may not look correct as this number also includes "magic breakpoints". These are breakpoints that TotalView sets behind the scene; they are not usually visible. In addition, these magic breakpoints seldom appear when you use the **dactions** command.

canonical_execution_name

The absolute file name of the program being debugged. If you had entered a relative name, TotalView finds this absolute name.

count

The number of members in a group.

executable

Like **canonical_execution_name**, this is the absolute file name of the program being debugged. It differs in that it contains symbolic links and the like that exist for the program.

id

The ID of the object.

member_type

The type of the group's members, either **process** or **thread**.

member_type_values

A list of all possible values for the **member_type -**property. For all groups, this is a two-item list with the first being the number of proess groups and the second being the number of thread groups. In many ways, this is related to the **type_values** property, which is a list values the **type** property may take.

members

A list of a group's processes or threads.

type

The group's type. Possible values are **control**, **lockstep**, **share**, **user**, and **workers**.

type_values

A list of all possible values for the **type** property.

Examples

```
TV::group get 1 count
```

Returns the number of objects in group 1.

RELATED TOPICS

focus_groups **Command**
dworker **Command**
process **Command**
thread **Command**
Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*

hex2dec

Converts a hexadecimal number to decimal

Format

TV::hex2dec *number*

Arguments

number

A hexadecimal number to convert.

Description

The **TV::hex2dec** command converts a hexadecimal number to decimal. You can type **0x** before this value. The CLI correctly manipulates 64-bit values, regardless of the size of a **long** value.

RELATED TOPICS

dec2hex **Command**

process

Sets and gets process properties

Format

TV::process *action* [*object-id*] [*other-args*]

Arguments

action

The action to perform, as follows:

commands

Displays the subcommands that you can use. The CLI responds by displaying these four *action* subcommands. Do not use other arguments with this subcommand.

get

Gets the values of one or more process properties. The *other-args* argument can include one or more property names. The CLI returns these property values in a list whose order is the same as the names you enter. If you use the **-all** option instead of *object-id*, the CLI returns a list containing one (sublist) element for each object.

properties

Displays the properties that the CLI can access. Do not use other arguments with this subcommand.

set

Sets the values of one or more properties. The *other-args* arguments contains pairs of property names and values.

object-id

An identifier for a process. For example, **1** represents process 1. If you use the **-all** option, the operation executes upon all objects of this class in the current focus.

other-args

Arguments required by the **get** and **set** subcommands.

Description

The **TV::process** command lets you examine and set process properties and states, as the following list describes:

cannonical_executable_name

The full pathname of the current executable.

clusterid

The ID of the cluster containing the process. This is a number uniquely identifying the TotalView server that owns the process. The ID for the cluster TotalView is running in is always **0** (zero).

data_size

The size of the process's data segment.

duid

The internal unique ID associated with an object.

executable

Like **canonical_execution_name**, this is the absolute file name of the program being debugged. It differs in that it contains an symbolic links and the like that exist for the program.

heap_size

The amount of memory currently being used for data created at runtime. Stated in a different way, the heap is an area of memory that your program uses when it needs to dynamically allocate memory. For example, calls to the **malloc()** function allocate space on the heap while the **free()** function releases the space.

held

A Boolean value (either **1** or **0**) indicating if the process is held. (**1** means that the process is held.)

hia_guard_max_size

The value set for the maximum size for guard blocks that surround a memory allocation. See the *Debugging Memory Problems with MemoryScape*™ for information on what this size represents.

hia_guard_payload_alignment

The number of bits the guard block is aligned to.

hia_guard_pre_pattern

The numerical value of the bit pattern written into the guard block preceding an allocated memory block.

hia_guard_pre_size

The number of bits into which the guard block preceding an allocated memory block is written.

hia_guard_post_pattern

The numerical value of the bit pattern written into the guard block following an allocated memory block.

hia_guard_post_size

The number of bits into which the guard block following an allocated memory block is written.

hia_paint_pattern_width

Deprecated

hostname

A name of the process's host computer and operating system (if needed); for example, linux-x86 would be returned if the program is running on a 32-bit linux system.

is_parallel

Contains a value indicating if the current process is a parallel process. If it is, its value is 1. Otherwise, its value is 0.

id

The process ID.

image_ids

A list of the IDs of all the images currently loaded into the process both statically and dynamically. The first element of the list is the current executable.

is_parallel

Contains a value indicating if the current process is a parallel process. If it is, its value is 1. Otherwise, its value is 0.

nodeid

The ID of the node upon which the process is running. The ID of each processor node is unique within a cluster.

parallel_attach_subset

Contains the specification for MPI ranks to be attached to when an MPI job is created or attached to. See **-parallel_attach_subset** *subset_specification*.

proc_name

The name of the process currently being executed.

rank

The rank of the currently selected process.

stack_size

The amount of memory used by the currently executing block or routines, and all the routines that have invoked it. For example, if your main routines invokes the **foo()** function, the stack contains two groups of information—these groups are called frames. The first frame contains the information required for the execution of your main routine and the second, which is the current frame, contains the information needed by the **foo()** function. If **foo()** invokes the **bar()** function, the stack contains three frames. When **foo()** finishes executing, the stack only contains one frame.

stack_vm_size

The logical size of the stack is the difference between the current value of the stack pointer and the address from which the stack originally grew. This value can be different from the size of the virtual memory mapping in which the stack resides. For example, the mapping can be larger than the logical size of the stack if the process previously had a deeper nest of procedure calls or made memory allocations on the stack, or it can be smaller if the stack pointer has advanced but the intermediate memory has not been touched.

The **stack_vm_size** value is this difference in size.

state

Current state of the process. See **state_values** for a list of states.

state_values

A list of all possible values for the **state** property: **break**, **error**, **exited**, **running**, **stopped**, or **watch**.

syspid

The system process ID.

target_architecture

The machine architecture upon which the current process is executing.

target_byte_ordering

The bit ordering of the current machine. This is either **little_endian** or **big_endian**.

target_processor

The kind of processor upon which the program is executing. For example, this could be **x86** or **x86-64**.

text_size

The amount of memory used to store your program's machine code instructions. The text segment is sometimes called the code segment.

threadcount

The number of threads in the process.

threads

A list of threads in the process.

vm_size

The sum of the mapping sizes in the process's address space.

Examples

```
f g TV::process get -all id threads
```

For each process in the group, creates a list with the process ID followed by the list of threads; for example:

```
{1 {1.1 1.2 1.4}} {2 {2.3 2.5}} {3 {3.1 3.7 3.9}}
```

```
TV::process get 3 threads
```

Gets the list of threads for process 3; for example:

```
1.1 1.2 1.4
```

```
TV::process get 1 image_ids
```

Returns a list of image IDs in process 1; for example:

```
1|1 1|2 1|3 1|4
```

RELATED TOPICS

Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*
focus_processes **Command**
group **Command**
thread **Command**

read_symbols

Reads shared library symbols

Format

Reads symbols from libraries

TV::read_symbols -lib *lib-name-list*

Reads symbols from libraries associated with a stack frame

TV::read_symbols -frame [*number*]

Reads symbols for all stack frames in the backtrace

TV::read_symbols -stack

Arguments

-lib [*lib-name-list*]

Tells TotalView to read symbols for all libraries whose names are contained within the *lib-name-list* argument. Each name can include the asterisk (*) and question mark (**?**) wildcard characters.

This command ignores the current focus; libraries for any process can be affected.

-frame [*number*]

Tells TotalView to read the symbols for the library associated with the current stack frame. If you also enter a frame number, TotalView reads the symbols for the library associated with that frame.

-stack

Reads the symbols for every frame in the backtrace. This is the same as right-clicking in the Stack Trace Pane and selecting the **Load All Symbols in Stack** command. If, while reading in a library, TotalView may also need to read in the symbols from additional libraries.

Description

The **TV::read_symbols** command reads debugging symbols from one or more libraries that TotalView has already loaded but whose symbols have not yet been read. They are not yet read because the libraries were included within either the TV::dll_read_loader_symbols_only or TV::dll_read_no_symbols lists.

For more information, see "Preloading Shared Libraries" in the *TotalView for HPC User Guide*.

respond

Provides responses to commands

Format

TV::respond *response command*

Arguments

response

The response to one or more commands. If you include more than one response, separate the responses with newline -characters.

command

One or more commands that the CLI executes.

Description

The **TV::respond** command executes a command. The *command* argument can be a single command or a list of commands. In most cases, you place this information in braces (**{}**). If the CLI asks questions while *command* is executing, you are not asked for the answer. Instead, the CLI uses the characters in the *response* string for the argument. If more than one question is asked and strings within the *response* argument have all been used, The **TV::respond** command starts over at the beginning of the *response* string. If *response* does not end with a newline, the **TV::respond** command appends one.

Do not use this command to suppress the **MORE** prompt in macros. Instead, use the following command:

```
dset LINES_PER_SCREEN 0
```

The most common values for *response* are **y** and **n**.

NOTE >> If you are using the TotalView GUI and the CLI at the same time, your CLI command might cause dialog boxes to appear. You cannot use the **TV::respond** command to close or interact with these dialog boxes.

Examples

```
TV::respond {y} {exit}
```

Exits from TotalView. This command automatically answers the "Do you really wish to exit TotalView" question that the **exit** command asks.

```
set f1 y
set f2 exit
TV::respond $f1 $f2
```

A way to exit from TotalView without seeing the "Do you really wish to exit TotalView" question. This example and the one that preceded are not really what you would do as you would use the **exit -force** command.

scope

Sets and gets internal scope properties

Format

TV::scope *action* [*object-id*] [*other-args*]

Arguments

action

The action to perform, as follows:

cast

Attempts to find or create the type named by the *other-args* argument in the given scope.

code_unit_by_soid

Look up loader symbols by using a regular expression to match the base name. For example:

```
TV::scope lookup $scope_id \
    loader_sym_by_regexp \
    "regular expression"
```

commands

Displays the subcommands that you can use. The CLI responds by displaying the subcommands shown here. Do not use additional arguments with this subcommand.

create

Allows you to create blocks, enum_type, named_constant, typedef, upc_shared_type, and variable symbols. The type of symbol determines the properties you meed to specify. In all cases, you must specify the **kind** property. If you are creating a located symbol such as a block, you need to provide a location. If you are creating a upc_shared_type, you need a target_type index.

dump

Dump all properties of all symbols in the scope and in the enclosed scope.

get

Returns properties of the symbols whose soids are specified. Specify the kinds of properties using the *other-args* argument.

If you use the **-all** option instead of *object-id*, the CLI returns a list containing one (sublist) element for each object.

lookup

Look up a symbol by name. Specify the kind of lookup using the *other-args* argument. The values you can enter are:

by_language_rules: Use the language rules of the language of the scope to find a single name.

by_path: Look up a symbol using a pathname.

by_properties [proptery_regexp_pair]: TotalView recurses down the scope tree after it visits a symbol. This means TotalView will search for matching symbols in the specified scope and any nested scope. The **walk** property shows an example.

by_type_index: Look up a symbol using a type index.

in_scope: Look up a name in the given scope and in all enclosing scopes, and in the global scope.

lookup_keys

Displays the kinds of lookup operations that you can perform.

properties

Displays the properties that the CLI can access. Do not use additional arguments with this option. The arguments displayed are those that are displayed for the scope of all types. Additional properties also exist but are not shown.(Only the ones used by all are visible.) For more information, see **TV::symbol**.

walk

Walk the scope, calling Tcl commands at particular points in the walk. The commands are named using the following options:

by_properties [proptery_regexp_pair]: TotalView recurses down the scope tree after it visits a symbol. This means TotalView will search for matching symbols in the specified scope and any nested scope. For example:

```
TV::scope walk $scope_id by_properties \
kind typedef base_name "^__BMN_.*$"
```

-pre_scope *tcl_cmd*: Names the commands called before walking a scope.

-pre_sym *tcl_cmd*: Names the commands called before walking a symbol.

-post_scope *tcl_cmd*: Names the commands called after walking a scope.

-post_symbol *tcl_cmd*: Names the commands called after walking a symbol.

tcl_cmd: Names the commands called for each symbol.

object-id

The ID of a scope.

other-args

Arguments required by the **get** subcommand.

Description

The **TV::scope** command lets you examine and set a scope's properties and states.

Examples

```
TV::scope create $scope kind [kind] \
    [required_property_regexp_pair]...
    [non-required_property_regexp_pair]...
```

This is the general specification for creating a symbol

```
TV::scope create 1|31 kind block location {ldam 0x12}
```

Create a block. A block should have a length. However, you can set the length later using the **set** property.

source_process_startup Reads, then executes a .tvd file when a process is loaded

Format

TV::source_proccess_startup *process_id*

Arguments

process_id

The PID of the current process.

Description

The **TV::source_process_startup** command loads and interprets the **.tvd** file associated with the current process. That is, if a file named *executable*.**tvd** exists, the CLI reads and then executes the commands in it.

RELATED TOPICS

Initializing TotalView in the *TotalView for HPC User Guide*

symbol

Gets and sets symbol properties

Format

TV::symbol *action* [*object-id*] [*other-args*]

Arguments

action

The action to perform, as follows:

code_unit_by_soid

Returns the containing scope of a line number. For example:

```
TV::symbol code_unit_by_soid $start_line
```

commands

Displays the subcommands that you can use. The CLI responds by displaying the subcommands shown here. Do not use additional arguments with this subcommand.

dump

Dumps all properties of the symbol whose soid (symbol object ID) is named. Do not use additional arguments with this command.

get

Returns properties of the symbols whose soids are specified here. The *other-args* argument names the properties to be returned.

properties

Displays the properties that the CLI can access. Do not use additional arguments with this option. These properties are discussed later in this section.

read_delayed

Only global symbols are initially read; other symbols are only partially read. This command forces complete symbol processing for the compilation units that contain the named symbols.

resolve_final

Performs a sequence of **resolve_next** operations until the symbol is no longer undiscovered. If you apply this operation to a symbol that is not undiscovered, it returns the symbol itself.

resolve_next

Some symbols only serve to hold a reference to another symbol. For example, a **typedef** is a reference to the aliased type, or a **const**-qualified type is a reference to the non-**const**s qualified type. These reference types are called *undiscovered symbols*. This operation, when performed on an undiscovered symbol, returns the symbol the type refers to. When this is performed on a symbol, it returns the symbol itself.

rebind

Changes one or more structural properties of a symbol. These operations can crash TotalView or cause it to produce inconsistent results. The properties that you can change are:

address: the new address:

base_name: the new base name. The symbol must be a base name.

line_number: the new line number. The symbol must be a line number symbol.

loader_name: the new loader name and a file name.

scope: the soid of a new scope owner.

type_index: the new type index, in the form **<n, m, p>**. The symbol must be a type.

set

Sets a symbol's property. Not all properties can be set. Determine which properties can be set using the **writable_properties** property. For example,

```
TV::symbol set $new_upc_type \
type_index $old_idx
```

writable_properties

Returns a list of writable properties. For example:

```
TV::symbol writable_properties $symbol_id
```

object-id

The ID of a symbol.

other-args

Arguments required by the **get** subcommand.

Description

The **TV::symbol** command lets you examine and set the symbol properties and states.

Symbol Properties

Table 1 lists the properties associated with the symbols information that TotalView stores. Not all of this information will be useful when creating transformations. However, it is possible to come across some of these properties and this information will help you decide if you need to use it in your transformation. In general, the properties used in the transformation files that Rogue Wave Software provided will be the ones that you will use.

Table 1: Symbol Properties

Symbol Kind	Has base_ name	Has type_ index	Property		
aggregate_- type	X	X	aggregate_kind artificial external_name	full_pathname id kind	length logical_scope_owner scope_owner
array_type	X	X	artificial data_addressing element_addressing external_name full_pathnameid	index_type_index kind logical_scope_owner lower_bound scope_owner stride_bound	submembers target_type_index upper_bound validator

Table 1: Symbol Properties

Symbol Kind	Has base_ name	Has type_ index	Property		
block	X		address_class artificial full_pathname	id kind length	location logical_scope_owner scope_owner
char_type	X	X	artificial external_name full_pathname	id kind logical_scope_owner	scope_owner target_type_index
code_type	X	X	artificial external_name full_pathname	id kind logical_scope_owner	scope_owner
ds_ undis-covered_ type	X	X	artificial id	kind logical_scope_owner scope_owner	target_type_index
enum_type	X	X	artificial enumerators external_name	full_pathname id kind	logical_scope_owner scope_owner value_size
file	X		artificial compiler_kind delayed_symbol demangler	full_pathname idkind language	logical_scope_owner scope_owner
float_type	X	X	artificial external_name full_pathname	id kind length	logical_scope_owner scope_owner
function_- type	X	X	artificial external_name full_pathname	id kind logical_scope_owner	scope_owner
image	X		artificial full_pathname	id	kind
int_type	X	X	artificial external_name full_pathname	id kind length	logical_scope_owner scope_owner
label	X		address_class artificial full_pathname	id kind location	logical_scope_owner scope_owner

Table 1: Symbol Properties

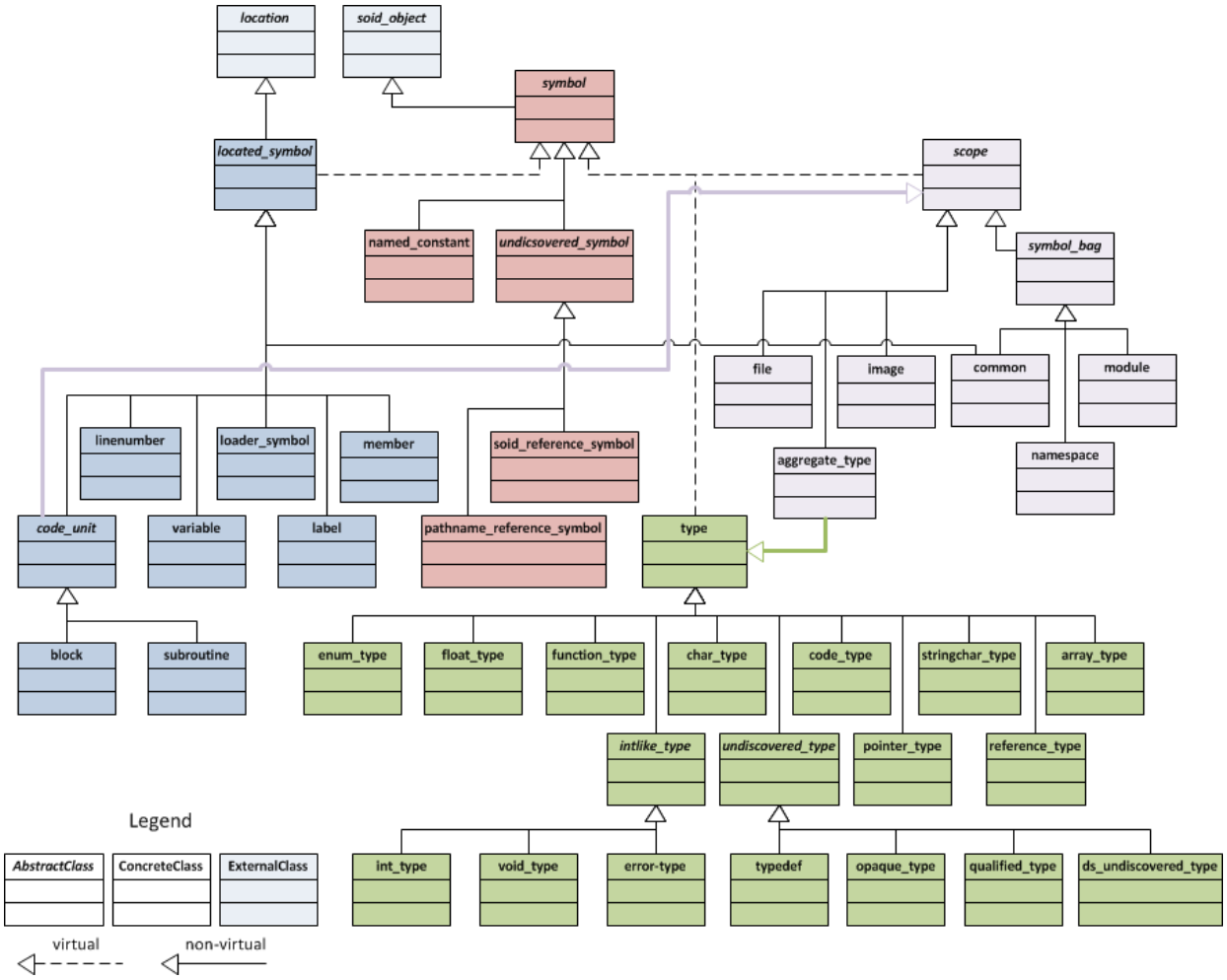
Symbol Kind	Has base_ name	Has type_ index	Property		
linenumber			address_class artificial full_pathname	id kind location	logical_scope_owner scope_owner
loader_sym-bol			address_class artificial full_pathname	id kind length	location logical_scope_owner scope_owner
member	X		address_class artificial full_pathname id	inheritance kind location logical_scope_owner	ordinal scope_owner type_index
module	X		artificial full_pathname	id kind	logical_scope_owner scope_owner
named_-constant	X		artificial full_pathname id	kind length logical_scope_owner	scope_owner type_index value
namespace	X		artificial full_pathname	idkind	logical_scope_owner scope_owner
opaque_type	X	X	artificial external_name full_pathname	id kind logical_scope_owner	scope_owner
pathname_-reference_sy mbol	X		artificial id full_pathname	kind lookup_scope logical_scope_owner	resolved_symbol_-pathname scope_owner
pointer_type		X	artificial external_name full_pathname id	kind length logical_scope_owner scope_owner	target_type_index validator
qualified_-type	X	X	artificial external_name full_pathname	id kind logical_scope_owner	qualification scope_owner target_type_index
soid_referen ce_symbol	X		artificial full_pathname id	kind logical_scope_owner resolved_symbol_id	scope_owner

Table 1: Symbol Properties

Symbol Kind	Has base_name	Has type_index	Property		
stringchar_type	X	X	artificial external_name full_pathname	id kind logical_scope_owner	scope_owner target_type_index
subroutine	X		address_class artificial full_pathname id	kind length location logical_scope_owner	return_type_index scope_owner static_chain static_chain_height
typedef	X	X	artificial external_name full_pathname	id kind length	logical_scope_owner scope_owner target_type_index
variable	X		address_class artificial full_pathname id	is_argument kind location logical_scope_owner	ordinal scope_owner type_index
void_type	X	X	artificial external_name full_pathname	id kind length	logical_scope_owner scope_owner
wchar_type	X	X	artificial external_name full_pathname	id kind logical_scope_owner	scope_owner target_type_index

Figure 1 on page 210 shows how these symbols are related.

Figure 1 – Symbols Architecture



Here are definitions of the properties associated with these symbols.

address_class

contains the location for a variety of objects such as a **func**, **global_var**, and a **tls_global**.

aggregate_kind

One of the following: **struct**, **class**, or **union**.

artificial

A Boolean (0 or 1) value where true indicates that the compiler generated the symbol.

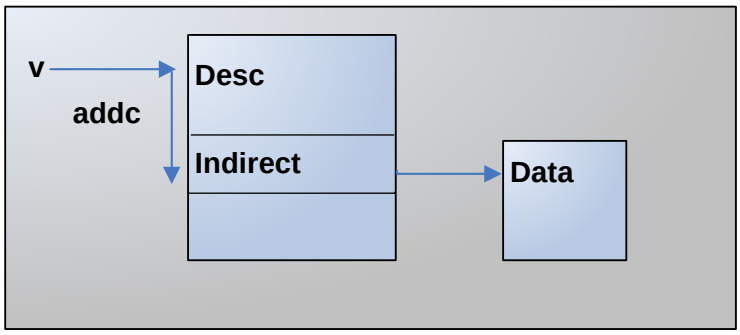
compiler_kind

The compiler or family of compiler used to create the file; for example, **gnu**, **xlc**, **intel**, and so on.

data_addressing

Contains additional operands to get from the base of an object to its data; for example, a Fortran by-desc array contains a descriptor data structure. The variable points to the descriptor. If you do an **addc** operation on the descriptor, you can then do an **indirect** operation to locate the data.

Figure 2 – Data Addressing



delayed_symbol

Indicates if a symbol has been full or partially read-in. The following constants are or'd and returned: **skim**, **index**, **line**, and **full**.

demangler

The name of demangler used by your compiler.

element_addressing

The location containing additional operands that let you go from the data's base location to an element.

enumerators

Name of the enumerator tags. For example, if you have something like **enum[R,G,B]**, the tags would be **R**, **G**, and **B**.

external_name

When used in data types, it translates the object structure to the type name for the language. For example, if you have a pointer that points to an **int**, the external name is **int ***.

full_pathname

This is the # separated static path to the variable; for example, **##image#file#externalname**....

id

The internal object handle for the symbol. These symbols always take the form *number*|*number*.

index_type_index

The array type's index **type_index**; for example, this indicates if the index is a 16-, 32-, 64-bit, and so on.

inheritance

For C++ variables, this string is as follows: **[virtual] [{ private | protected | public }] [base class]**

is_argument

A true/false value indicating if a variable was a parameter (dummy variable) passed into the function.

kind

One of the symbol types listed in the first column of the previous table.

language

A string containing a value such as C, C++, or Fortran.

length

The byte size of the object. For example, this might represent the size of an array or a subroutine.

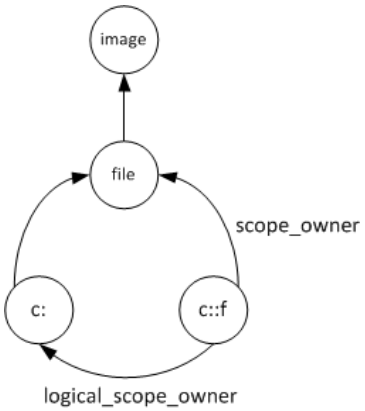
location

The location in memory where an object's storage begins.

logical_scope_owner

The current scope's owner as defined by the language's rules.

Figure 3 – Logical Scope Owner



lookup_scope

This is a pathname reference symbol that refers to the scope in which to look up a pathname.

lower_bound

The location containing the array's lower bound. This is a numeric value, not the location of the first array item.

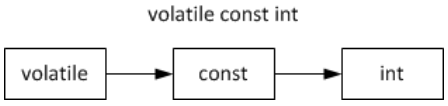
ordinal

The order in which a member or variable occurred within a scope.

qualification

A qualifier to a data type such as **const** or **volatile**. These can be chained together if there is more than one qualifier.

Figure 4 – Qualification



resolved_symbol_id

The soid to lookup in a soid reference symbol.

resolved_symbol_pathname

The pathname to lookup in a Fortran reference symbol.

return_type_index

The data type of the value returned by a function.

scope_owner

The ID of the symbol's scope owner. (This is illustrated by the figure within the **logical_scope_owner** definition.)

static_chain

The location of a static link for nested subroutines.

static_chain_height

For nested subroutines, this indicates the nesting level.

stride_bound

Location of the value indicating an array's stride.

submembers

If you have an array of aggregates or pointers and you have already dived on it, this property gives you a list of {*name type*} tuples where **name** is the name of the member of the array (or ***** if it's an array of pointers), and **type** is the soid of the type that should be used to dive in all into that field.

target_type_index

The type of the following entities: **array**, **ds_undiscovered_type**, **pointer**, and **typedef**.

type_index

One of the following: **member**, **variable**, or **named_constant**.

upper_bound

The location of the value indicating an array's upper bound or extent.

validator

The name of an array or pointer validator. This looks at an array descriptor or pointer to determine if it is allocated and associated.

value

For enumerators, this indicates the item's value in hexadecimal bytes.

value_size

For enumerators, this indicates the length in bytes

Symbol Namespaces

The symbols described in the previous section all reside within namespaces. Like symbols, namespaces also have properties. Table 1 lists the properties associated with a namespace. Figure 5 on page 215 illustrates how these namespaces are related.

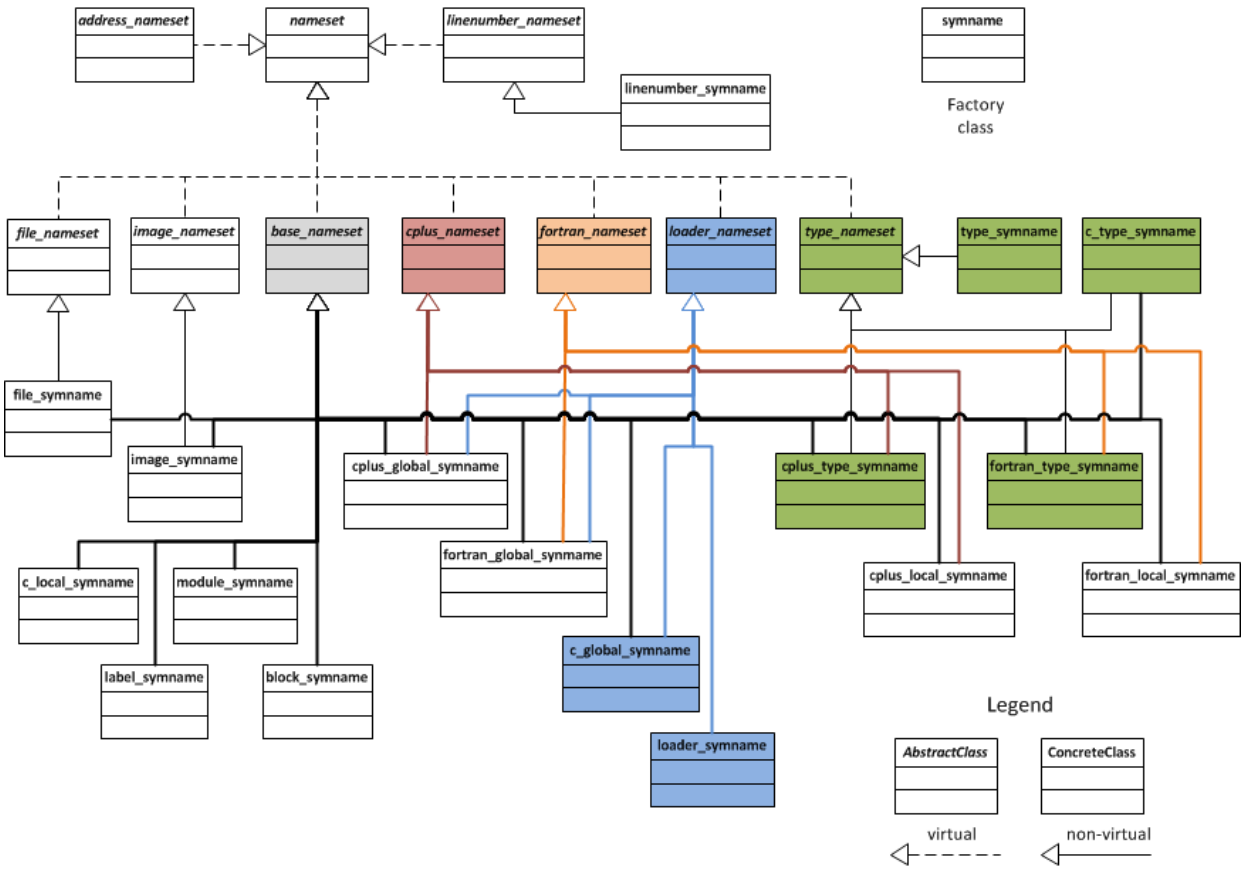
Table 2: Namespace Properties

Symbol Namespaces	Properties	
block_symname	base_name	
c_global_symname	base_name	loader_name
	loader_file_path	
c_local_symname	base_name	
c_type_symname	base_name	type_index
cplus_global_symname	base_name	cplus_template_types
	cplus_class_name	cplus_type_name
	cplus_local_name	loader_file_path
	cplus_overload_list	loader_name
cplus_local_symname	base_name	cplus_overload_list
	cplus_class_name	cplus_template_types
	cplus_local_name	cplus_type_name
cplus_type_symname	base_name	cplus_template_types
	cplus_class_name	cplus_type_name
	cplus_local_name	type_index
	cplus_overload_list	
file_symname	base_name	directory_path
	directory_hint	
fortran_global_symname	base_name	loader_file_path
	fortran_module_name	loader_name
	fortran_parent_function_name	
fortran_local_symname	base_name fortran_parent_function_name	

Table 2: Namespace Properties

Symbol Namespaces	Properties	
	fortran_module_name	
fortran_type_symname	base_name	fortran_parent_function_name
	fortran_module_name	type_index
image_symname	base_name	member_name
	directory_path	node_name
label_symname	base_name	
linenumber_symname	linenumber	
loader_symname	loader_file_path	loader_name
module_symname	base_name	
type_symname	type_index	

Figure 5 – Namespace Architecture



Many of the following properties are used in more than one namespace. The explanations for these properties will assume a limited context as their use is similar. Some of these definitions assume that you're are looking at the following function prototype:

```
void c::foo<int>(int &)
```

base_name

The name of the function; for example, **foo**.

cplus_class_name

The C++ class name; for example, c.

cplus_local_name

Not used.

cplus_overload_list

The function's signature; for example, **int &**.

cplus_template_types

The template used to instantiate the function; for example: **<int>**.

cplus_type_name

The data type of the returned value; for example, *void*.

directory_hint

The directory to which you were attached when you started TotalView.

directory_path

Your file's pathname as it is named within your program.

fortran_module_name

The name of your module. Typically, this looks like **module'var** or **module'subr'var**.

fortran_parent_function_name

The parent of the subroutine. For example, the parent is **module** in a reference such as **module'subr**. If you have an inner subroutine, the parent is the outer subroutine.

linenumber

The line number at which something occurred.

loader_file_path

The file's pathname.

loader_name

The mangled name.

member_name

In a library, you might have an object reference; for example, **libC.a(foo.so)**. **foo.so** is the member name.

node_name

Not used.

type_index

A handle that points to the type definition. Its format is **<number,number,number>**.

thread

Gets and sets thread properties

Format

TV::thread *action* [*object-id*] [*other-args*]

Arguments

action

The action to perform, as follows:

commands

Displays the subcommands that you can use. The CLI responds by displaying these four *action* subcommands. Do not use other arguments with this option.

get

Gets the values of one or more thread properties. The *other-args* argument can include one or more property names. The CLI returns these values in a list, and places them in the same order as the names you enter.

If you use the **-all** option instead of *object-id*, the CLI returns a list containing one (sublist) element for each object.

properties

Lists an object's properties. Do not use other arguments with this option.

set

Sets the values of one or more properties. The *other-args* argument contains paired property names and values.

object-id

A thread ID. If you use the **-all** option, the operation is carried out on all threads in the current focus.

other-args

Arguments required by the **get** and **set** subcommands.

Description

The **TV::thread** command lets you examine and set the following thread properties and states:

canonical_executable_name

The absolute file name of the program being debugged. If you had entered a relative name, TotalView find this absolute name.

continue_sig

The signal to pass to a thread the next time it runs. On some systems, the thread receiving the signal might not always be the one for which this property was set.

current_ap_id

The ID of the action point at which the current thread is stopped.

dpid

The ID of the process associated with a thread.

duid

The internal unique ID associated with the thread.

held

A Boolean value (either **1** or **0**) indicating if the thread is held. (**1** means that the thread is held.) (settable)

id

The ID of the thread.

manager

A Boolean value (either **1** or **0**) indicating if this is a system manger thread. (**1** means that it is a system manager thread.)

pc

The current PC at which the target is executing. (settable)

sp

The value of the stack pointer.

state

The current state of the target. See **state_values** for a list of states.

state_values

A list of values for the **state** property: **break**, **error**, **exited**, **running**, **stopped**, and **watch**.

stop_reason_message

The reason why the current thread is stopped; for example, **Stop Signal**.

systid

The system thread ID.

target_architecture

The machine architecture upon which the current thread is executing.

target_byte_ordering

The bit ordering of the current machine. This is either **little_endian** or **big_endian**.

target_processor

The kind of processor upon which the current thread is executing. For example, this could be **x86** or **x86-64**.

Examples

```
f p3 TV::thread get -all id
```

Returns a list of thread IDs for process 3; for example:

```
1.1 1.2 1.4
```

```
proc set_signal {val} {
    TV::thread set \
         [f t TV::focus_threads] continue_sig $val
```

```
}
```

Set the starting signal for the focus thread.

```
proc show_signal {} {
    foreach th [TV::focus_threads] {
        puts "Continue_sig ($th): \
           [TV::thread get $th continue_sig]";
    }
}
```

Show all starting signals

RELATED TOPICS

Using Groups, Processes, and Threads in the *TotalView for HPC User Guide*
focus_threads **Command**
group **Command**
process **Command**

type

Gets and sets type properties

Format

TV::type *action* [*object-id*] [*other-args*]

Arguments

action

The action to perform, as follows:

commands

Displays the subcommands that you can use. The CLI responds by displaying these four *action* subcommands. Do not use other arguments with this option.

get

Gets the values of one or more type properties. The *other-args* argument can include one or more property names. The CLI returns these values in a list, and places them in the same order as the names you enter.

If you use the **-all** option instead of *object-id*, the CLI returns a list containing one (sublist) element for each object.

properties

Lists a type's properties. Do not use other arguments with this option.

set

Sets the values of one or more type properties. The *other-args* argument contains paired property names and values.

object-id

An identifier for an object; for example, **1** represents process 1, and **1.1** represents thread 1 in process 1. If you use the **-all** option, the operation is carried out on all objects of this class in the current focus.

other-args

Arguments required by the **get** and **set** subcommands.

Description

The **TV::type** command lets you examine and set the following type properties and states:

enum_values

For an enumerated type, a list of **{name value}** pairs giving the definition of the enumeration. If you apply this to a non-enumerated type, the CLI returns an empty list.

id

The ID of the object.

image_id

The ID of the image in which this type is defined.

language

The language of the type.

length

The length of the type.

name

The name of the type; for example, **class foo**.

prototype

The ID for the prototype. If the object is not prototyped, the returned value is **{}**.

rank

(array types only) The rank of the array.

struct_fields

(**class**/**struct**/**union** types only). A list of lists that contains descriptions of all the type's fields. Each sublist contains the following fields:

{ *name type_id addressing properties* }

where:

name is the name of the field.
type_id is simply the *type_id* of the field.
addressing contains additional addressing information that points to the base of the field.
properties contains an additional list of properties in the following format:
"[virtual] [public|private|protected] base class"

If no properties apply, this string is null.

If you use **get struct_fields** for a type that is not a **class**, **struct**, or **union**, the CLI returns an empty list.

target

For an array or pointer type, returns the ID of the array member or target of the pointer. For commands without this argument applied to one of these types, the CLI returns an empty list.

type

Returns a string describing this type; for example, **signed integer**.

type_values

Returns all possible values for the **type** property.

Examples

```
TV::type get 1|25 length target
```

Finds the length of a type and, assuming it is a pointer or an array type, the target type. The result might look something like:

4 1|12

The following example uses the **TV::type properties** command to obtain the list of properties. It begins by defining a procedure:

```
proc print_type {id} {
    foreach p [TV::type   properties] {
       puts [format "%13s  %s" $p [TV::type get $id $p]]
    }
}
```

You then display information with the following command:

```
print_type 1|6
                    enum_values
                    id              1|6
                    image_id        1|1
                    language        f77
                    length          4
                    name            <integer>
                    prototype
                    rank            0
                    struct_fields
                    target
                    type            Signed Integer
                    type_values     {Array} {Array of characters} {Enumeration}...
```

type_transformation

Creates type transformations and examines properties

Format

TV::type_transformation *action* [*object-id*] [*other-args*]

Arguments

action

The action to perform, as follows:

commands

Displays the subcommands that you can use. The CLI responds by displaying the subcommands shown here. Do not use additional arguments with this subcommand.

create

Creates a new transformation object. The *object-id* argument is not used; *other-args* is **Array**, **List**, **Map**, **Set**, **Umap**, **Uset** or **Struct**, indicating the type of transformation being created. You can change a transformation's properties up to the time you install it. After being installed, you can longer change them.

get

Gets the values of one or more transformation properties. The *other-args* argument can include one or more property names. The CLI returns these property values in a list whose order is the same as the property names you entered.

If you use the **-all** option instead of *object-id*, the CLI returns a list containing one (sublist) element for the object.

properties

Displays the properties that the CLI can access. Do not use additional arguments with this option. These properties are discussed later in this section.

set

Sets the values of one or more properties. The *other-args* argument consists of pairs of property names and values. The argument pairs that you can set are listed later in this section.

object-id

The type transformation ID. This value is returned when you create a new transformation; for example, **1** represents process 1. If you use the **-all** option, the operation executes upon all objects of this class in the current focus.

other-args

Arguments required by **get** and **set** subcommands.

Description

The **TV::type_transformation** command lets you define and examine properties of a type transformation. The states and properties you can set are:

Common Properties

id

The type transformation ID returned from a **create** operation.

language

The language property specifies source language for the code of the aggregate type (class) to transform. This is always C++.

name

Contains a regular expression that checks to see if a symbol is eligible for type transformation. This regular expression must match the definition of the aggregate type (class) being transformed.

type_callback

The **type_callback** property is used in two ways.

(1) When it is used within a list or vector transformation, it names the procedure that determines the type of the list or vector element. The callback procedure takes one parameter, the symbol ID of the symbol that was validated during the callback to the procedure specified by the **validate_callback**. The call structure for this callback is:

type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

(2) When it is used within a struct transformation, it names the procedure that specifies the data type to be used when displaying the struct.

type_transformation_description

A string containing a description of what is being transformed; for example, you might enter "GNU Vector".

validate_callback

Names a procedure that is called when a data type matches the regular expression specified in the **name** property. The call structure for this callback is:

validate_callback *id*

where *id* is the symbol ID of the symbol being validated.

Your callback procedure should check the symbol's structure to insure that it should be transformed. While not required, most users will extract symbol information such as its type and its data members while validating the datatype. The callback procedure must return a Boolean value, where *true* means the symbol is valid and can be transformed.

compiler

Reserved for future use.

Array Properties

addressing_callback

Names the procedure that locates the address of the start of an array. The call structure for this callback is:

addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

This callback defines a TotalView addressing expression that computes the starting address of an array's first element.

lower_bounds_callback

Names the procedure that obtains a lower bound value for the array type being transformed. For C/C++ arrays, this value is always 0. The call structure for this callback is:

lower_bounds_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

upper_bounds_callback

Names the procedure that defines an addressing expression that computes the extent (number of elements) in an array. The call structure for this callback is:

upper_bounds_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

List Properties

list_element_count_addressing_callback

Names the procedure that determines the total number of elements in a list. The call structure for this callback is:

list_element_count_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

This callback defines an addressing expression that specifies how to get to the member of the symbol that specifies the number of elements in the list.

If your data structure does not have this element, you still must use this callback. In this case, simply return **{nop}** as the addressing expression and the transformation will count the elements by following all the pointers. This can be very time consuming.

list_element_data_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the data member of a list element. The call structure for this callback is:

list_element_data_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

list_element_next_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the next element of a list. The call structure for this callback is:

list_element_next_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

list_element_prev_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the previous element of a list. The call structure for this callback is:

list_element_prev_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

This property is optional. For example, you would not use it in a singly linked list.

list_end_value

Specifies if a list is terminated by NULL or the head of the list. Enter one of the following: **NULL** or **ListHead**

list_first_element_addressing_callback

Names the procedure that defines an addressing expression that specifies how to go from the head element of the list to the first element of the list. It is not always the case that the head element of the list is the first element of the list. The call structure for this callback is:

list_first_element_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

list_head_addressing_callback

Names the procedure that defines an addressing expression to obtain the head element of the linked list. The call structure for this callback is:

list_head_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

Struct Properties

struct_member_count_callback

Names the procedure that obtains the total number of members in a struct. The call structure for this callback is:

struct_member_count_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

struct_member_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the specified member of a struct. The call structure for this callback is:

struct_member_addressing_callback *id index*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure and *index* specifies the zero-based position of the member within the struct.

struct_member_type_callback

Names the procedure that obtains the type id of the specified member of a struct. The call structure for this callback is:

struct_member_type_callback *id index*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure and *index* specifies the zero-based position of the member within the struct.

struct_member_name_callback

Names the procedure that obtains the name of the specified member of a struct. The call structure for this callback is:

struct_member_name_callback *id index*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure and *index* specifies the zero-based position of the member within the struct.

Red/Black Tree Properties

The implementation of map/multimap and set/multiset STL types uses red/black trees. These properties are common to all these types.

rbtree_head_addressing_callback

Names the procedure that defines an addressing expression to obtain the head element of the map. The call structure for this callback is:

rbtree_head_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

rbtree_head_type_callback

Names the procedure that obtains the type id of the head of a map. The call structure for this callback is:

rbtree_head_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

rbtree_element_left_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the left sub-tree of the current element of a map. The call structure for this callback is:

rbtree_element_left_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

rbtree_element_right_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the right sub-tree of the current element of a map. The call structure for this callback is:

rbtree_element_right_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

rbtree_element_parent_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the parent of the current element of a map. The call structure for this callback is:

rbtree_element_parent_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

rbtree_element_count_addressing_callback

Names the procedure that determines the total number of elements in a map. The call structure for this callback is:

rbtree_element_count_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

This callback defines an addressing expression that specifies how to get to the member of the symbol that specifies the number of elements in the map.

If your data structure does not have this element, you still must use this callback. In this case, simply return **{nop}** as the addressing expression and the transformation will count the elements by following all the pointers. Unfortunately, this can be very time consuming.

rbtree_element_count_type_callback

Names the procedure that obtains the type id of the member that specifies the number of elements in the map. The call structure for this callback is:

rbtree_element_count_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

If your data structure does not have a count element, this property is not required.

rbtree_left_most_addressing_callback

Names the procedure that defines an addressing expression to obtain the left-most element of the map. The call structure for this callback is:

rbtree_left_most_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

Map/Multimap Properties

For map and multimap STL types these properties are used in combination with those for red/black trees above.

map_element_key_data_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the key of an element of a map. The call structure for this callback is:

map_element_key_data_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

map_element_key_type_callback

Names the procedure that obtains the type id of the key of a map. The call structure for this callback is:

map_element_key_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

map_element_type_callback

Names the procedure that obtains the type id of the element in the red/black tree that contains the key/value pair. The call structure for this callback is:

map_element_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the validate_callback procedure.

map_element_value_data_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the value of an element of a map. The call structure for this callback is:

map_element_value_data_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

map_element_value_type_callback

Names the procedure that obtains the type id of the value of a map. The call structure for this callback is:

map_element_value_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

map_iterator_end_value

Specifies if a map is terminated by NULL or the head of the map. Enter one of the following: **NULL** or **MapHead**

Set/Multiset Properties

For set and multiset STL types these properties are used in combination with those for red/black trees above.

set_element_data_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access an element of a set. The call structure for this callback is:

set_element_data_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

set_element_type_callback

Names the procedure that obtains the type id of an element in the set. The call structure for this callback is:

set_element_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

set_iterator_end_value

Specifies if a set is terminated by NULL or the head of the set. Enter one of the following: **NULL** or **SetHead**

Hashtable Properties

The implementations of unordered map/multimap and unordered set/multiset STL types use hash tables. These properties are common to all these types.

hashtable_head_addressing_callback

Names the procedure that defines an addressing expression to obtain the head element of the map. Depending on the implementation, this element may be the address of the bucket list or the beginning element of a forward list. The call structure for this callback is:

hashtable_head_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

hashtable_element_count_addressing_callback

Names the procedure that determines the total number of elements in a hashtable. The call structure for this callback is:

hashtable_element_count_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

This callback defines an addressing expression that specifies how to get to the member of the symbol that specifies the number of elements in the map.

hashtable_element_count_type_callback

Names the procedure that obtains the type id of the member that specifies the number of elements in the map. The call structure for this callback is:

hashtable_element_count_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

hashtable_element_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the next element. The call structure for this callback is:

hashtable_element_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

hashtable_begin_index_addressing_callback

Names the procedure that determines the index of the first used bucket in a hashtable. The call structure for this callback is:

hashtable_begin_index_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

This callback defines an addressing expression that specifies how to get to the member of the symbol that specifies the first used bucket in the hashtable. This allows a small optimization since the transformation can skip empty buckets at the start of the bucket table. If your data does not supply this value you can use **{nop}**.

hashtable_begin_index_type_callback

Names the procedure that determines the type of the value that contains the index of the first used bucket in a hashtable. The call structure for this callback is:

hashtable_begin_index_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

hashtable_bucket_count_addressing_callback

Names the procedure that determines the total number of buckets in a hash table. The call structure for this callback is:

hashtable_bucket_count_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

This callback defines an addressing expression that specifies how to get to the member of the symbol that specifies the number of buckets in a hashtable.

This property can be **{nop}** when the hash table elements can be found without scanning the bucket list, for example, when the elements are also stored in a forward list.

hashtable_bucket_count_type_callback

Names the procedure that obtains the type id of the member that specifies the number of buckets in a hash table. The call structure for this callback is:

hashtable_bucket_count_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

If you are not scanning the bucket list for the hashed values, this property is not required.

Unordered Map/Multimap Properties

For unordered map and unordered multimap STL types these properties are used in combination with those for hash tables above.

umap_element_key_data_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the key of an element of a map. The call structure for this callback is:

umap_element_key_data_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

umap_element_key_type_callback

Names the procedure that obtains the type id of the key of a map. The call structure for this callback is:

umap_element_key_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

umap_element_type_callback

Names the procedure that obtains the type id of the element in the hashtable that contains the key/value pair. The call structure for this callback is:

umap_element_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

umap_element_value_data_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access the value of an element of a map. The call structure for this callback is:

umap_element_value_data_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

umap_element_value_type_callback

Names the procedure that obtains the type id of the value of a map. The call structure for this callback is:

umap_element_value_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

Unordered Set/Multiset Properties

For unordered set and unordered multiset STL types these properties are used in combination with those for hash tables above.

uset_element_key_data_addressing_callback

Names the procedure that defines an addressing expression that specifies how to access an element of a set. The call structure for this callback is:

uset_element_key_data_addressing_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

uset_element_key_type_callback

Names the procedure that obtains the type id of an element in the set. The call structure for this callback is:

uset_element_key_type_callback *id*

where *id* is the symbol ID of the symbol that was validated using the **validate_callback** procedure.

Chapter 4

Batch Debugging Using tvscript

Overview

Batch debug programs by starting TotalView using the **tvscript** command, which allows TotalView to run unattended. If you invoke **tvscript** using **cron**, you can schedule debugging for a certain time, for instance in the evening, so reports are available in the morning.

To perform complex actions, use a script file, which can contain CLI and Tcl commands.

Here, for example, is how **tvscript** is invoked on a program:

```
tvscript \
  -create_actionpoint "method1=>display_backtrace -show_arguments" \   -
create_actionpoint "method2#37=>display_backtrace \      -show_locals -level 1"
\   -display_specifiers "noshow_pid,noshow_tid" \   -maxruntime "00:00:30" \
filterapp -a 20
```

You can also execute MPI programs using **tvscript**. Here is a small example:

```
tvscript -mpi "Open MP" -tasks 4 \
     -create_actionpoint \
       "hello.c#14=>display_backtrace" \
      ~/tests/MPI_hello
```

This chapter discusses **tvscript** command-line options.

tvscript Command Syntax

The syntax for the **tvscript** command is:

tvscript [*options* **] [** *filename* **] [** -**a** *program_args* **]**

options

TotalView and **tvscript** command-line options. You can use any options described in Chapter 7, "TotalView Command Syntax," on page 337 **tvscript** command-line options are described in the next section.

filename

The program being debugged.

-**a** *program_args*

Program arguments.

The command-line options most often used with **tvscript** are:

- **-mpi** (The MPI environments supported are those listed in the Parallel tab of the **File > New Program** dialog box.)
- **-starter_args**
- **-nodes**
- **-np** or **-procs** or **-tasks**

For more information on these command-line options, see Chapter 7, "TotalView Command Syntax," on page 337.

Blue Gene/L and Blue Gene/P

The syntax for using **tvscript** with an MPI on Blue Gene/L and Blue Gene/P systems is:

tvscript [*options* **] -mpi BlueGene -np** *number-of-processes* **-starter_args** "*filename* **[** *mpi-arguments*] **[-args** *program_args*]" **mpirun**

-np

The number of processes or tasks that the starter program will create.

-starter_args

Required, with the arguments following enclosed in quotes; the application executable (*filename*) to be debugged must be the first argument.

-mpi-arguments

The command arguments for **mpirun**, such as **"-cwd", "-mode"**, and **"-partition".**

-args

Command argument for **mpirun** that passes to the launched application on the compute node.

mpirun

Required; the executable at the end of the command line.

Blue Gene/Q with SLURM

The syntax for using **tvscript** with an MPI on Blue Gene/Q systems using SLURM is:

tvscript [*options* **] -mpi BlueGeneQ-SLURM -np** *number-of-processes* **-starter_args** "**[***srun-arguments***]** *filename* **[***program_args***]**" **srun**

-np

The number of processes or tasks that the starter program will create.

-starter_args

Required, with the arguments following enclosed in quotes; the application executable (*filename*) to be debugged must follow the arguments for **srun**.

srun-arguments

The command arguments for **srun.**

filename

The program being debugged.

program_args

The arguments for the program being debugged.

srun

Required; the executable at the end of the command line.

Blue Gene/Q for ANL's Cobalt Job Manager and IBM's runjob

The syntax for using **tvscript** on Blue Gene/Q for ANL's Cobalt job manager and IBM's **runjob**: is

tvscript [*options* **] -mpi BlueGeneQ-Cobalt -np** *number-of-processes* **-starter_args** "**[***runjob-arguments***] :** *filename* **[***program_args***]**" **runjob**

-np

The number of processes or tasks that the starter program will create.

-starter_args

Required, with the arguments following enclosed in quotes; the application executable (*filename*) to be debugged must follow the arguments for **runjob** *and* be separated by a colon (**:**).

runjob-arguments

The command arguments for **runjob.**

filename

The program being debugged.

program_args

The arguments for the program being debugged.

runjob

Required; the executable at the end of the command line.

Blue Gene/Q for the LoadLeveler job manager and IBM's runjob

The syntax for using **tvscript** on Blue Gene/Q for the LoadLeveler job manager and IBM's **runjob**: is

tvscript [*options* **] -mpi BlueGeneQ-LoadLeveler -np** *number-of-processes* **-starter_args** "**[***runjob-arguments***]** **--exe** *filename* **[***program_args***]**" **runjob**

-np

The number of processes or tasks that the starter program will create.

-starter_args

Required, with the arguments following enclosed in quotes; the application executable (*filename*) to be debugged must follow the arguments for **runjob** *and* **--exe**.

runjob-arguments

The command arguments for **runjob.**

filename

The program being debugged.

program_args

The arguments for the program being debugged.

runjob

Required; the executable at the end of the command line.

Cray Xeon Phi

The syntax for using **tvscript** on Cray Xeon Phi Knights Corner (KNC) native nodes is:

tvscript [*options* **] -mpi CrayKNC-aprun -np** *number-of-processes* **-starter_args** "**[***aprun-arguments***]** *filename* **[***program_args***]**" **aprun**

-np

The number of processes or tasks that the starter program will create.

-starter_args

Required, with the arguments following enclosed in quotes; the application executable (*filename*) to be debugged must follow the arguments for **aprun**.

aprun-arguments

The command arguments for **aprun** (except the **-k** argument).

filename

The program being debugged.

program_args

The arguments for the program being debugged.

aprun

Required; the executable at the end of the command line.

For example:

```
tvscript \
-create_actionpoint "tx_basic_mpi.c#98=>display_backtrace
      -show_arguments, print myid" \
-mpi CrayKNC-aprun -np 16 \
-starter_args "tx_basic_mpi" \
aprun
```

Cray XK7

The syntax for using **tvscript** on Cray XK7 is:

tvscript [*options* **] -mpi CrayXK7-aprun -np** *number-of-processes* **-starter_args**
"**[***aprun-arguments***]** *filename* **[***program_args***]**" **aprun**

-np

The number of processes or tasks that the starter program will create.

-starter_args

Required, with the arguments following enclosed in quotes; the application executable (*filename*) to be debugged must follow the arguments for **aprun**.

aprun-arguments

The command arguments for **aprun**.

filename

The program being debugged.

program_args

The arguments for the program being debugged.

aprun

Required; the executable at the end of the command line.

For example:

```
tvscript \
-create_actionpoint "tx_basic_mpi.c#98=>display_backtrace
      -show_arguments, print myid" \
-mpi CrayXK7-aprun -np 16 \
-starter_args "tx_basic_mpi" \
aprun
```

tvscript Options

-create_actionpoint "*source_location_expr* [=>*action*1[, *action*2]...]"

Creates an action point at a source location using an expression. (See "Action Point API" on page 245 for writing expressions.) When the action point is hit, **tvscript** can trigger one or more actions. Add one **-create_watchpoint** command-line option for each action point.

See **-event_action** for information about actions.

-event_action "*event_action_list*"

Performs an action when an event occurs. Events represent an unanticipated condition, such as **free_not_allocated** in the Memory Debugger. You can use more than one **-event_action** command-line option when invoking **tvscript**.

Here is how you enter an *event_action_list* :

*event*1=*action*1,*event*2=*action*2

or

*event*1=>*action*1,*action*2,*action*3

Table 3: Supported tvscript Events

Event Type	Event	Definition
General event	**any_event**	A generated event occurred.
Memory debugging event	**addr_not_at_start**	Program attempted to free a block using an incorrect address.
	alloc_not_in_heap	The memory allocator returned a block not in the heap; the heap may be corrupt.
	alloc_null	An allocation either failed or returned NULL; this usually means that the system is out of memory.
	alloc_returned_bad_alignment	The memory allocator returned a misaligned block; the heap may be corrupt.
	any_memory_event	A memory event occurred.
	bad_alignment_argument	Program supplied an invalid alignment argument to the heap manager.
	double_alloc	The memory allocator returned a block currently being used; the heap may be corrupt.
	double_dealloc	Program attempted to free an already freed block.
	free_not_allocated	Program attempted to free an address that is not in the heap.
	guard_corruption	Program overwrote the guard areas around a block.

Table 3: Supported tvscript Events

Event Type	Event	Definition
	hoard_low_memory_threshold	Hoard low memory threshold crossed.
	realloc_not_allocated	Program attempted to reallocate an address that is not in the heap.
	rz_overrun	Program attempted to access memory beyond the end of an allocated block.
	rz_underrun	Program attempted to access memory before the start of an allocated block.
	rz_use_after_free	Program attempted to access a block of memory after it has been deallocated.
	rz_use_after_free_overrun	Program attempted to access memory beyond the end of a deallocated block.
	rz_use_after_free_underrun	Program attempted to access memory before the start of a deallocated block.
	termination_notification	The target is terminating.
Source code debugging event	**actionpoint**	A thread hit an action point.
	error	An error occurred.

For each occurring event, define the action to perform:

Action Type	Action	Definition
Memory debugging actions	**check_guard_blocks**	Checks all guard blocks and write violations into the log file.
	list_allocations	Writes a list of all memory allocations into the log file.
	list_leaks	Writes a list of all memory leaks into the log file.
	save_html_heap_status_source_view	Generates and saves an HTML version of the Heap Status Source View Report.
	save_memory_debugging_file	Generates and saves a memory debugging file.
	save_text_heap_status_source_view	Generates and saves a text version of the Heap Status Source View Report.

Action Type	Action	Definition
Source code debugging actions	**display_backtrace** [**-level** *level-num* **]** **[** *num_levels* **]** **[** *options* **]**	Writes the current stack backtrace into the log file. **-level** *level-num* sets the level at which information starts being logged. *num_levels* restricts output to this number of levels in the call stack. If you do not set a level, **tvscript** displays all levels in the call stack. *options* is one or more of the following: **-[no]show_arguments** **-[no]show_f**p **-[no]show_fp_registers** **-[no]show_image** **-[no]show_locals** **-[no]show_pc** **-[no]show_registers**
	print [**-slice** {*slice_exp*}**]** {*variable* | *exp*}	Writes the value of a variable or an expression into the log file. If the variable is an array, the **-slice** option limits the amount of data defined by slice_exp. A slice expression is a way to define the slice, such as **var[100:130]** in C and C++. (This displays all values from **var[100]** to **var[130]**.) To display every fourth value, add an additional argument; for example, **var[100:130:4]**. For additional information, see *"Examining Arrays"*.

-display_specifiers "*display_specifiers_list*"

By default, **tvscript** writes all of the information in the following table to the log file. You can exclude information by using one of the following specifiers:

Type of Specifier	Specifier	Display ...
General display specifiers	**noshow_fp**	Does not show the frame pointer (FP)
	noshow_image	Does not show the process/library in backtrace
	noshow_pc	Does not show the program counter (PC)
	noshow_pid	Does not show the system process ID with process information
	noshow_rank	Does not show the rank of a process, which is shown only for a parallel process
	noshow_tid	Does not show the thread ID with process information
Memory debug-ging display specifiers	**noshow_allocator**	Does not show the allocator for the address space
	noshow_backtrace	Does not show the backtraces for memory blocks
	noshow_backtrace_id	Does not show the backtrace ID for memory blocks
	noshow_block_address	Does not show the memory block start and end addresses
	noshow_flags	Does not show the memory block flags
	noshow_guard_id	Does not show the guard ID for memory blocks
	noshow_guard_settings	Does not show the guard settings for memory blocks
	noshow_leak_stats	Does not show the leaked memory block statistics
	noshow_owner	Does not show the owner of the allocation
	noshow_red_zones_settings	Does not show the Red Zone entries for allocations (and deallocations) for the address space

-memory_debugging

Enables memory debugging and memory event notification. This option is required with any option that begins with **-mem**. These options are TotalView command line options, as they can be invoked directly by TotalView.

-mem_detect_leaks

Performs leak detection before generating memory information.

-mem_detect_use_after_free

Tests for use after memory is freed.

-mem_guard_blocks

Adds guard blocks to an allocated memory block.

-mem_hoard_freed_memory

Holds onto freed memory rather than returning it to the heap.

-mem_hoard_low_memory_threshold nnnn

Sets the low memory threshold amount. When memory falls below this amount, an event is fired.

-mem_paint_all

Paints memory blocks with a bit pattern when a memory is allocated or deallocated.

-mem_paint_on_alloc

Paints memory blocks with a bit pattern when a memory block is allocated.

-mem_paint_on_dealloc

Paints memory blocks with a bit pattern when a memory block is deallocated.

-mem_red_zones_overruns

Turns on testing for Red Zone overruns.

-mem_red_zones_size_ranges min:max,min:max,...

Defines the memory allocations ranges for which Red Zones are in effect. Ranges can be specified as follows:

x:y allocations from x to y

:y allocations from 1 to y

x: allocations of x and higher

x allocation of x

-mem_red_zones_underruns

Turns on testing for Red Zone underruns.

-maxruntime "*hh:mm:ss*"

Specifies how long the script can run.

-script_file *script_file*

Names a file containing **tvscript** API calls and Tcl callback procedures that you create.

-script_log_filename *logFilename*

Overrides the name of the TVScript log file.

WARNING: Previous log files of the same name are overwritten.

-script_summary_log_filename *summaryLogFilename*

Overrides the name of the TVScript summary log file.

WARNING: Previous summary log files with the same name are overwritten.

tvscript Example:

The following example is similar to that shown in "Batch Debugging Using tvscript" on page 234.

```
tvscript \
  -create_actionpoint "method1=>display_backtrace -show_arguments" \
  -create_actionpoint "method2#37=>display_backtrace \
```

```
  -show_locals -level 1" \
-event_action "error=>display_backtrace -show_arguments \
  -show_locals" \
-display_specifiers "noshow_pid,noshow_tid" \
-maxruntime "00:00:30" \
  filterapp -a 20
```

This script performs the following actions:

- Creates an action point at the beginning of **method1**. When **tvscript** reaches that breakpoint, it logs a backtrace and the method's arguments.
- Creates an action point at line 37 of **method2**. When **tvscript** reaches this line, it logs a backtrace and the local variables. The backtrace information starts at level 1.
- Logs the backtrace, the current routine's arguments, and its local variables when an error event occurs.
- Excludes the process ID and thread ID from the information that **tvscript** logs.
- Limits **tvscript** execution time to 30 seconds.
- Names the program being debugged and passes a value of 20 to the application.

tvscript External Script Files

The section tvscript Command Syntax discussed the command-line options used when invoking the **tvscript** command. You can also place commands in a file and provide them to **tvscript** using the **-script_file** command-line option. Using a script file supports the use of Tcl to create more complex actions when events occur. The following sections describe the functions that you can use within a CLI file.

Logging Functions API

tvscript_log *msg*

Logs a message to the log file set up by **tvscript**.

tvscript_slog *msg*

Logs a message to the summary log file set up by **tvscript**.

Process Functions API

tvscript_get_process_property *process_id property*

Gets the value of a property about the process.

The properties you can name are the same as those used with the **TV::process** command. See process on page 196 for more information.

Thread Functions API

tvscript_get_thread_property *thread_id property*

Gets the value of a property about the thread.

The properties you can name are the same as those used with the **TV::thread** command. See thread on page 218 for more information.

Action Point API

tvscript_add_actionpoint_handler *actionpoint_id actionpoint_handler*

Registers a procedure handler to call when the action point associated with *actionpoint_id* is hit. This *actionpoint_id* is the value returned from the **tvscript_create_actionpoint** routine. The value of *actionpoint_handler* is the string naming the procedure.

When **tvscript** calls an action point handler procedure, it passes one argument. This argument contains a list that you must convert into an array. The array indices are as follows:

event—The event that occurred, which is the action point

process_id—The ID of the process that hit the action point

thread_id—The ID of the thread that hit the action point

actionpoint_id—The ID of the action point that was hit

actionpoint_source_loc_expr—The initial source location expression used to create the action point

tvscript_create_actionpoint *source_loc_expr*

Creates an action point using a source location expression.

This procedure returns an action point ID that you can use in a **tvscript_add_actionpoint_handler** procedure.

source_loc_expr

Sets a breakpoint at the line specified by *source_loc_expr* or an absolute address. For example:

- **[[##image#]filename#]line_number**

  Indicates all addresses at this line number.

- A function signature; this can be a partial signature.

Indicates all addresses that are the addresses of functions matching *signature*. If parts of a function signature are missing, this expression can match more than one signature. For example, "**f**" matches "**f(void)**" and "**A::f(int)**". You cannot specify a return type in a signature.

You can also enter a source location expression with sets of addresses using the class and virtual keywords. For example:

class *class_name*

Names a set containing the addresses of all member functions of class *class_name*.

virtual *class*::*signature*

Names the set of addresses of all virtual member functions that match *signature*, and that are in the classes or derived from the class.

If the expression evaluates to a function that has multiple overloaded implementations, TotalView sets a barrier on each of the overloaded functions.

Event API

tvscript_add_event_handler *event event_handler*

Registers a procedure handler to call when the named event occurs. The event is either **error** or **actionpoint**.

When **tvscript** calls an event handler procedure, it passes one argument to it. This argument contains a list that you must convert into an array.

error

When any error occurs, the array has the following indices:

event—The event, which is set to **error**

process_id— The ID of the process that hit the action point

thread_id—The ID of the thread that hit the action point

error_message—A message describing the error that occurred

actionpoint

When any action point is hit, the array has the following indices:

event—The event, which is set to **actionpoint**

process_id—The ID of the process that hit the action point

thread_id—The ID of the thread that hit the action point

actionpoint_id—The ID of the action point that was hit

actionpoint_source_loc_expr—The initial source location expression used to create the action point

Example tvscript Script File

The following information is passed to **tvscript** as follows:

tvscript -script_file *script_file*

This script installs an error handler and an action point handler. When an error is encountered during execution, **tvscript** passes an array of information to the error handler. Similarly, when an action point is hit, it passes an array of information to the action point handler. These arrays are described in "Event API" on page 246.

```
# Get the process so we have some information about it
tvscript_log "PID: \
              [tvscript_get_process_property 1 "syspid"]";
tvscript_log "Status:  \
              [tvscript_get_process_property 1 "state"]";
tvscript_log "Executable:  \
              [tvscript_get_process_property 1 "executable"]";

################################################################
  proc error_handler {error_data} {
     tvscript_log "Inside error_handle: $error_data"

     # Change the incoming list into an array.
     # It contains the following indices:
     #    process_id
     #    thread_id
     #    error_message
     array set error_data_array $error_data

     # Get the process so we have some information about it
     temp = [tvscript_get_process_property \
```

```
                    $error_data_array(process_id) "syspid"];
    tvscript_log "             Process ID: $temp";

    temp = [tvscript_get_thread_property \
                    $error_data_array(thread_id) "systid"];
     tvscript_log "            Thread ID: $temp";

     temp = $error_data_array(error_message);
     tvscript_log "            Error Message: $temp";

  }

#################################################################
# Action point handlers

proc l1_actionpoint_handler {event_data} {
    tvscript_log "Inside l1_actionpnt_handler:  $event_data"
    tvscript_slog "Inside l1_actionpnt_handler:  $event_data"

  # Change the incoming list into an array.
  # It contains the following indices:
  #   actionpoint_id
  #   actionpoint_source_loc_expr
  #   event
  #   process_id
  #   thread_id
    array set event_data_array $event_data

  # Get the process so we have some information about it
  temp = [tvscript_get_process_property \
  $event_data_array(process_id) "syspid"];
  tvscript_log "           Process ID: $temp";

  temp = [tvscript_get_thread_property \
  $event_data_array(thread_id) "systid"];
  tvscript_log "            Thread ID: $temp";

  temp = [tvscript_get_process_property \
  $event_data_array(process_id) "state"];
  tvscript_log "               Status: $temp";

  temp = [tvscript_get_process_property \
  $event_data_array(process_id) "executable"]
  tvscript_log "           Executable: $temp";

  temp = $event_data_array(actionpoint_source_loc_expr)
  tvscript_log "Action point Expression: $temp"
```

```
  tvscript_log "Value of i:"
  set output [capture "dprint i"]
  tvscript_log $output
}

#########################################################
# Event handlers

proc generic_actionpoint_event_handler {actionpoint_data} {
  tvscript_log \
  "Inside generic_actionpoint_event_handler: "
  tvscript_log $actionpoint_data
  tvscript_slog "Inside generic_actionpoint_event_handler: "
  tvscript_slog $actionpoint_data

  # Change the incoming list into an array.
  # It contains the following indices:
  #   actionpoint_id
  #   actionpoint_source_loc_expr
  #   event
  #   process_id
  #   thread_id
  array set actionpnt_data_array $actionpoint_data

  temp = $actionpnt_data_array(process_id)
  tvscript_log "           Process ID: $temp"

  temp = $actionpnt_data_array(thread_id)
  tvscript_log "           Thread ID: $temp"

  temp = $actionpnt_data_array(actionpoint_id)
  tvscript_log "       Action Point ID: $temp"

  temp = $actionpnt_data_array(actionpoint_source_loc_expr)
  tvscript_log "Action Point Expression: "
}

#############################################################
# Add event handlers

# Setup action points and action point handlers
set actionpoint_id [tvscript_create_actionpoint "l1"]
tvscript_add_actionpoint_handler $actionpoint_id \   "l1_actionpoint_handler"

# Setup a generic actionpoint handler
tvscript_add_event_handler "actionpoint" \   "generic_actionpoint_event_handler"

#########################################################
```

```
# Add error handler
tvscript_add_event_handler "error" "error_handler"
```

Chapter 5

TotalView Variables

Overview

This chapter contains a list of all CLI and TotalView variables, organized into sections that each correspond to a CLI namespace:

- Top-Level (::) Namespace
- TV:: Namespace
- TV::MEMDEBUG:: Namespace
- TV::GUI:: Namespace

Top-Level (::) Namespace

ARGS(*dpmid*)

Contains the arguments to be passed the next time the process starts, with TotalView ID *dpid*.

Permitted Values: A string

Default: None

ARGS_DEFAULT

Contains the argument passed to a new process when no **ARGS(*dpid*)** variable is defined.

Permitted Values: A string

Default: None

BARRIER_STOP_ALL

Contains the value for the "stop_when_done" property for newly created action points. This property defines additional elements to stop when a barrier point is satisfied or a thread encounters this action point. You can also set this value using the **When barrier hit, stop** value in the **Action Points** Page of the **File > Preferences** dialog box. The values are:

group

Stops all processes in a thread's control group when a thread reaches a barrier created using this default.

process

Stops the process in which the thread is running when a thread reaches a barrier created using this default.

none

Stops only the thread that hit a barrier created using this default.

This variable is the same as the **TV::barrier_stop_all** variable.

Permitted Values: **group**, **process**, or **thread**

Default: **group**

BARRIER_STOP_WHEN_DONE

Contains the default value used when a barrier point is satisfied. You can also set this value using the **-stop_when_done** command-line option or the **When barrier done, stop** value in the **Action Points** Page of the **File > Preferences** dialog box. The values are:

group

When a barrier is satisfied, stops all processes in the control group.

process

When a barrier is satisfied, stops the processes in the satisfaction set.

none

Stops only the threads in the satisfaction set; other threads are not affected. For process barriers, there is no difference between **process** and **none**.

In all cases, TotalView releases the satisfaction set when the barrier is satisfied.

This variable is the same as the **TV::barrier_stop_when_done** variable.

Permitted Values: **group**, **process**, or **thread**

Default: **group**

CGROUP(*dpid*)

Contains the control group for the process with the TotalView ID *dpid*. Setting this variable moves process *dpid* into a different control group. For example, the following command moves process 3 into the same group as process 1:

```
dset CGROUP(3) $CGROUP(1)
```

Permitted Values: A number

Default: None

COMMAND_EDITING

Enables some Emacs-like commands for use when editing text in the CLI. These editing commands are always available in the CLI window of the TotalView GUI. However, they are available only in the stand-alone CLI if the terminal in which it is running supports cursor positioning and clear-to-end-of-line. The commands you can use are:

^A: Moves the cursor to the beginning of the line

^B: Moves the cursor one character backward

^D: Deletes the character to the right of cursor

^E: Moves the cursor to the end of the line

^F: Moves the cursor one character forward

^K: Deletes all text to the end of line

^N: Retrieves the next entered command (only works after **^P**)

^P: Retrieves the previously entered command

^R or **^L**: Redraws the line

^U: Deletes all text from the cursor to the beginning of the line

Rubout or **Backspace**: Deletes the character to the left of the cursor

Permitted Values: **true** or **false**

Default: **false**

EXECUTABLE_PATH

Contains a colon-separated list of the directories searched for source and executable files.

Permitted Values: Any directory or directory path. To include the current setting, use **$EXECUTABLE_PATH**.

Default: **.** (dot)

EXECUTABLE_SEARCH_MAPPINGS

Contains pairs of regular expressions and replacement and replacement strings—these replacements are called mappings—separated by colons. TotalView applies these mappings to the search paths before it looks for source, object, and program files.

The syntax for mapping strings is:

+regular_exp+=+replacement+ :+regular_exp+=+replacement+

This example shows two pairs, each delimited by a colon ("**:**"). Each element within a pair is delimited by any character except a colon. The first character entered is the delimiter. This example uses a "**+**" as a delimiter. (Traditionally, forward slashes are used as delimiters but are not used here, as a forward slash is also used to separate components of a pathname. For example, **/home/my_dir** contains forward slashes.)

Be aware that special characters must follow standard Tcl rules and conventions, for example:

```
dset EXECUTABLE_SEARCH_MAPPINGS  {+^/nfs/compiled/u2/(.*)$+ = +/nfs/host/u2/\1+ }
```

This expression applies a mapping so that a directory named **/nfs/compiled/u2/project/src1** in the expanded search path becomes **/nfs/host/u2/project/src1**.

Default: {}

EXECUTABLE_SEARCH_PATH

Contains a list of paths, separated by a colon, to search for executables. For information, see "Setting Search Paths Using TotalView for HPC Variables" in the TotalView for HPC in-product help.

Permitted Values: Any directory or directory path.

Default: **${EXECUTABLE_PATH};${$PATH}:.**

GROUP(*gid*)

Contains a list of the TotalView IDs for all members in group *gid*.

The first element indicates the type of group:

control

The group of all processes in a program

lockstep

A group of threads that share the same PC

process

A user-created process group

share

The group of processes in one program that share the same executable image

thread

A user-created thread group

workers

The group of worker threads in a program

Elements that follow are either *pid*s (for process groups) or *pid*.*tid* pairs (for thread groups).

The *gid* is a simple number for most groups. In contrast, a lockstep group's ID number is of the form *pid*.*tid*. Thus, **GROUP(2.3)** contains the lockstep group for thread 3 in process 2. Note, however, that the CLI does not display lockstep groups when you use **dset** with no arguments because they are hidden variables.

The **GROUP(***id***)** variable is read-only.

Permitted Values: A Tcl array of lists indexed by the group ID. Each entry contains the members of one group.

Default: None

GROUPS

Contains a list of all TotalView groups IDs. Lockstep groups are not contained in this list. This is a read-only value and cannot be set.

Permitted Values: A Tcl list of IDs.

LINES_PER_SCREEN

Defines the number of lines shown before the CLI stops printing information and displays its **more** prompt. The following values have special meaning:

0

No more processing occurs, and the printing does not stop when the screen fills with data.

NONE

A synonym for 0

AUTO

The CLI uses the tty settings to determine the number of lines to display. This may not work in all cases. For example, Emacs sets the **tty** value to 0. If **AUTO** works improperly, you need to explicitly set a value.

Permitted Values: A positive integer, or the **AUTO** or **NONE** strings

Default: **Auto**

MAX_LEVELS

Defines the maximum number of levels that the dwhere command displays.

Permitted Values: A positive integer

Default: 512

MAX_LIST

Defines the number of lines that the dlist command displays.

Permitted Values: A positive integer

Default: 20

OBJECT_SEARCH_MAPPINGS

Contains pairs of regular expressions and replacement and replacement strings (called mappings) separated by colons. TotalView applies these mappings to the search paths when searching for source, object, and program files. For more information, see EXECUTABLE_SEARCH_MAPPINGS.

Default: {}

OBJECT_SEARCH_PATH

Contains a list of paths separated by a colon to search for your program's object files. For information, see "Search Path Variables That You Can Set" in the TotalView for HPC in-product help.

Permitted Values: Any directory or directory path.

Default: **${COMPILATION_DIRECTORY): ${EXECUTABLE_PATH}: ${EXECUTABLE_DIRECTORY}: $links{${EXECUTABLE_DIRECTORY}}: .:${TOTALVIEW_SRC}**

PROCESS(*dpid*)

Contains a list of information associated with a *dpid*. This is a read-only value and cannot be set.

Permitted Values: An integer

Default: None

PROMPT

Defines the CLI prompt. Any information within brackets (**[ ]**) is assumed to be a Tcl command, so therefore evaluated before the prompt string is created.

Permitted Values: Any string. To access the value of **PTSET**, place the variable within brackets; that is, **[dset PTSET]**.

Default: **{[dfocus]> }**

PTSET

Contains the current focus. This is a read-only value and cannot be set.

Permitted Values: A string

Default: **d1.<**

SGROUP(*pid*)

Contains the group ID of the share group for process *pid*. The share group is determined by the control group for the process and the executable associated with this process. You cannot directly modify this group.

Permitted Values: A number

Default: None

SHARE_ACTION_POINT

Indicates the scope for newly created action points. In the CLI, this is the dbarrier, dbreak, and dwatch commands. If this boolean value is **true**, newly created action point are shared across the group; if **false**, a newly created action point is active only in the process in which it is set.

As an alternative to setting this variable, you can select the **Plant in share group** check box in the **Action Points** Page in the **File > Preferences** dialog box. To override this value in the GUI, use the **Plant in share group** checkbox in the **Action Point > Properties** dialog box.

Permitted Values: **true** or **false**

Default: **true**

SHARED_LIBRARY_SEARCH_MAPPINGS

Contains pairs of regular expressions and replacement strings (mappings), separated by colons. TotalView applies these mappings to the search paths before it looks for shared library files.

Default: {}

SHARED_LIBRARY_SEARCH_PATH

Contains a list of paths, each separated by a colon, to search for your program's shared library files.

Permitted Values: Any directory or directory path.

Default: **${EXECUTABLE_PATH}:**

SOURCE_SEARCH_MAPPINGS

Contains pairs of regular expressions and replacement strings (mappings) separated by colons. TotalView applies these mappings to the search paths before it looks for source, object, and program files. For more information, see EXECUTABLE_SEARCH_MAPPINGS.

Default: {}

SOURCE_SEARCH_PATH

Contains a list of paths, separated by a colon, to search for your program's source files. For information, see "Search Path Variables That You Can Set" in the TotalView for HPC in-product help.

Permitted Values: Any directory or directory path.

Default: **${COMPILATION_DIRECTORY}: ${EXECUTABLE_PATH}: ${EXECUTABLE_DIRECTORY}: ${links{${EXECUTABLE_DIRECTORY}): .:${TOTALVIEW_SRC}**

STOP_ALL

Indicates a default property for newly created action points, defining additional elements to stop when this action point is encountered

group

Stops the entire control group when the action point is hit

process

Stops the entire process when the action point is hit

thread

Stops only the thread that hit the action point. Note that **none** is a synonym for **thread**

Permitted Values: **group**, **process**, or **thread**

Default: **process**

TAB_WIDTH

Indicates the number of spaces used to simulate a tab character when the CLI displays information.

Permitted Values: A positive number. A value of -1 indicates that the CLI does not simulate tab expansion.

Default: 8

THREADS(*pid*)

Contains a list of all threads in the process *pid*, in the form **{pid.1 pid.2 ...}**. This is a read-only variable and cannot be set.

Permitted Values: A Tcl list

Default: None

TOTALVIEW_ROOT_PATH

Names the directory containing the TotalView executable. This is a read-only variable and cannot be set. This variable is exported as **TVROOT**, and can be used in launch strings.

Permitted Values: The location of the TotalView installation directory

TOTALVIEW_TCLLIB_PATH

Contains a list of the directories in which the CLI searches for TCL library components.

Permitted Values: Any valid directory or directory path. To include the current setting, use **$TOTALVIEW_TCLLIB_PATH**.

Default: The directory containing the CLI's Tcl libraries

TOTALVIEW_VERSION

Contains the version number and the type of computer architecture upon which TotalView is executing. This is a read-only variable and cannot be set.

Permitted Values: A string containing the platform and version number

Default: Platform-specific

VERBOSE

Sets the error message information displayed by the CLI:

info

Prints errors, warnings, and informational messages. Informational messages include data on dynamic libraries and symbols.

warning

Prints only errors and warnings.

error

Prints only error messages.

silent

Does not print error, warning, and informational messages. This also shuts off printing results from CLI commands. This should be used only when the CLI is run in batch mode.

Permitted Values: **info**, **warning**, **error**, and **silent**

Default: **info**

WGROUP(*pid*)

The group ID of the thread group of worker threads associated with the process *pid*. This variable is read-only.

Permitted Values: A number

Default: None

WGROUP(*pid.tid*)

Contains one of the following:

- The group ID of the workers group in which thread *pid.tid* is a member
- 0 (zero), which indicates that thread *pid.tid* is not a worker thread

Storing a nonzero value in this variable marks a thread as a worker. In this case, the returned value is the ID of the workers group associated with the control group, regardless of the actual nonzero value assigned to it.

Permitted Values: A number representing the *pid.tid*

Default: None

TV:: Namespace

TV::aix_use_fast_ccw

This variable is defined only on AIX, and is a synonym for the platform-independent variable **TV::use_fast_wp**, providing TotalView script backward compatibility. See TV::use_fast_wp for more information.

TV::aix_use_fast_trap

This variable is defined only on AIX, and is a synonym for the platform-independent variable **TV::use_fast_trap**, for TotalView script backward compatibility. See TV::use_fast_trap for more information.

TV::ask_on_cell_spu_image_load

If **true**, TotalView might ask whether to stop the process when a Cell SPU image is loaded. If **false**, TotalView does not stop execution when a Cell SPU image is loaded.

Permitted Values: **true** or **false**

Default: **true**

TV::ask_on_dlopen

If **true**, TotalView asks about stopping processes that use the **dlopen** or **load** (AIX only) system calls dynamically load a new shared library.

If **false**, TotalView does not ask about stopping a process that dynamically loads a shared library.

Permitted Values: **true** or **false**

Default: **true**

TV::auto_array_cast_bounds

Indicates the number of array elements to display when the **TV::auto_array_cast_enabled** variable is **true**. This is the variable set by the **Bounds** field of the **Pointer Dive** Page in the **File > Preferences** dialog box.

Permitted Values: An array specification

Default: **[10]**

TV::auto_array_cast_enabled

When **true**, TotalView automatically dereferences a pointer into an array. The number of array elements is indicated in the **TV::auto_array_cast_bounds** variable. This is the variable set by the **Cast to array with bounds** checkbox of the **Pointer Dive** Page in the **File > Preferences** dialog box.

Permitted Values: **true** or **false**

Default: **false**

TV::auto_deref_in_all_c

Defines if and how to dereference C and C++ pointers when performing a **View > Dive in All** operation, as follows:

yes_dont_push

While automatic dereferencing will occur, does not allow use of the **Undive** command to see the underefer-enced value when performing a **Dive in All** operation.

yes

Allows use of the **Undive** control to see undereferenced values.

no

Does not automatically dereference values when performing a **Dive in All** operation.

This is the variable set when you select the **Dive in All** element in the **Pointer Dive** Page of the **File > Prefer-ences** dialog box.

Permitted Values: **no**, **yes**, or **yes_dont_push**

Default: **no**

TV::auto_deref_in_all_fortran

Tells TotalView if and how it should dereference Fortran pointers when you perform a **Dive in All** operation, as follows:

yes_dont_push

While automatic dereferencing will occur, does not allow use of the **Undive** command to see the underefer-enced value when performing a **Dive in All** operation.

yes

Allows use of the **Undive** control to see undereference values.

no

Does not automatically dereference values when performing a **Dive in All** operation.

This is the variable set when you select the **Dive in All** element in the **Pointer Dive** Page of the **File > Prefer-ences** dialog box.

Permitted Values: **no**, **yes**, or **yes_dont_push**

Default: **no**

TV::auto_deref_initial_c

Tells TotalView if and how it should dereference C pointers when they are displayed, as follows:

yes_dont_push

While automatic dereferencing will occur, does not allow use of the **Undive** command to see the underefer-enced value.

yes

Allows use of the **Undive** control to see undeferenced values.

no

Does not automatically dereference values.

This is the variable set when you select the **initially** element in the **Pointer Dive** Page of the **File > Preferences** dialog box.

Permitted Values: **no**, **yes**, or **yes_dont_push**

Default: **no**

TV::auto_deref_initial_fortran

Defines if and how to dereference Fortran pointers when they are displayed, as follows:

yes_dont_push

While automatic dereferencing will occur, does not allow use of the **Undive** command to see the underefer-enced value.

yes

Allows use of the **Undive** control to see undeferenced values.

no

Does not automatically dereference values.

This is the variable set when you select the **initially** element in the **Pointer Dive** Page of the **File > Preferences** dialog box.

Permitted Values: **no**, **yes**, or **yes_dont_push**

Default: **no**

TV::auto_deref_nested_c

Tells TotalView if and how it should dereference C pointers when you dive on structure elements:

yes_dont_push

While automatic dereferencing will occur, you can't use the **Undive** command to see the undereferenced value.

yes

You will be able to use the **Undive** control to see undeferenced values.

no

Do not automatically dereference values.

This is the variable set when you select the **from an aggregate** element in the **Pointer Dive** Page of the **File > Preferences** dialog box.

Permitted Values: **no**, **yes**, or **yes_dont_push**

Default: **yes_dont_push**

TV::auto_deref_nested_fortran

Defines if and how to dereference Fortran pointers when they are displayed:

yes_dont_push

While automatic dereferencing will occur, does not allow use of the **Undive** command to see the underefer-enced value.

yes

Allows use of the **Undive** control to see undeferenced values.

no

Does not automatically dereference values.

This is the variable set when you select the **from an aggregate** element in the **Pointer Dive** Page of the **File > Preferences** dialog box.

Permitted Values: **no**, **yes**, or **yes_dont_push**

Default: **yes_dont_push**

TV::auto_load_breakpoints

If **true**, TotalView automatically loads action points from the file named *filename***.TVD.v3breakpoints** where *filename* is the name of the file being debugged. If **false**, breakpoints are not automatically loaded. If you set this to **false**, you can still load breakpoints using the **Action Point > Load All** or the **dactions -load** command.

Permitted Values: **true** or **false**

Default: **true**

TV::auto_read_symbols_at_stop

If **false**, TotalView does not automatically read symbols if execution stops when the program counter is in a library whose symbols were not read. If **true**, TotalView reads in loader and debugging symbols. You would set it to **false** if you have prevented symbol reading using either the **TV::dll_read_loader_symbols_only** or **TV::dll_read_no_symbols** variables (or the preference within the GUI) and reading these symbols is both unnecessary and would affect performance.

Permitted Values: **true** or **false**

Default: **true**

TV::auto_save_breakpoints

If **true**, TotalView automatically writes information about breakpoints to a file named *filename***.TVD.v3breakpoints**, where *filename* is the name of the file being debugged. Information about watchpoints is not saved.

TotalView writes this information when you exit from TotalView. If you set this variable to **false**, you can explicitly save this information by using the **Action Point > Save All** or the **dactions -save** command.

Permitted Values: **true** or **false**

Default: **false**

TV::barrier_stop_all

Contains the value of the "stop_all" property for newly created action points. This property defines additional elements to stop when a thread encounters this action point. You can also set this value using the **-stop_all** command-line option or the **When barrier hit, stop** value in the **Action Points** page of the **File > Preferences** dialog box. The values that you can use are as follows:

group

Stops all processes in a thread's control group when a thread reaches a barrier created using this as a default.

process

Stops the process in which the thread is running when a thread reaches a barrier created using this default.

thread

Stops only the thread that hit a barrier created using this default.

This variable is the same as the **BARRIER_STOP_ALL** variable.

Permitted Values: **group**, **process**, or **thread**

Default: **group**

TV::barrier_stop_when_done

Contains the value for the "stop_when_done" property for newly created action points. This property defines additional elements to stop when a barrier point is satisfied. You can also set this value using the **-stop_when_done** command-line option or the **When barrier done, stop** value in the **Action Points** page of the **File > Preferences** dialog box. The values you can use are:

group

When a barrier is satisfied, stops all processes in the control group.

process

When a barrier is satisfied, stops the processes in the satisfaction set.

thread

Stops only the threads in the satisfaction set; other threads are not affected. For process barriers, there is no difference between **process** and **none**.

In all cases, TotalView releases the satisfaction set when the barrier is satisfied.

This variable is the same as the **BARRIER_STOP_WHEN_DONE** variable.

Permitted Values: **group**, **process**, or **thread**

Default: **group**

Default:

TV::bluegene_io_interface

If the Bluegene front-end cannot resolve the network name, you must initialize this variable (or set it as a command-line option). By default, TotalView assumes that it can resolve the address as follows:

front_end_hostname-**io**

For example, if the front-end hostname is fred, TotalView assumes that the servers are connecting to **fred-io**.

Permitted Values: A string

Default: none

Default:

TV::bluegene_server_launch_string

Defines the launch string used when launching **tvdsvr** processes on I/O nodes.

Permitted Values: A string

Default: **-callback %L -set_pw %P -verbosity %V %F**

TV::bluegene__launch_timeout

Specifies the number of seconds to wait to hear back from the TotalView Debugger Server (**tvdsvr**) after its launch.

Permitted Values: An integer from 1 to 3600 (1 hour)

Default: 240

TV::bulk_launch_base_timeout

Defines the base timeout period used to execute a bulk launch.

Permitted Values: A number from 1 to 3600 (1 hour)

Default: 20

TV::bulk_launch_enabled

If **true**, uses bulk launch features when automatically launching the TotalView Debugger Server (**tvdsvr**) for remote processes.

Permitted Values: **true** or **false**

Default: **false**

TV::bulk_launch_incr_timeout

Defines the incremental timeout period to wait for a process to launch when automatically launching theTotal-View Debugger Server (**tvdsvr**) using the bulk server feature.

Permitted Values: A number from 1 to 3600 (1 hour)

Default: 10

TV::bulk_launch_tmpfile1_header_line

Defines the header line used in the first temporary file for a bulk server launch operation.

Permitted Values: A string

Default: None

TV::bulk_launch_tmpfile1_host_lines

Defines the host line used in the first temporary file when performing a bulk server launch operation.

Permitted Values: A string

Default: **%R**

TV::bulk_launch_tmpfile1_trailer_line

Defines the trailer line used in the first temporary file when performing a bulk server launch operation.

Permitted Values: A string

Default: None

TV::bulk_launch_tmpfile2_header_line

Defines the header line used in the second temporary file when performing a bulk server launch operation.

Permitted Values: A string

Default: None

TV::bulk_launch_tmpfile2_host_lines

Defines the host line used in the second temporary file when performing a bulk server launch operation.

Permitted Values: A string

Default: **{tvdsvr -working_directory %D -callback %L -set_pw %P -verbosity %V}**

TV::bulk_launch_tmpfile2_trailer_line

Defines the trailer line used in the second temporary file when performing a bulk server launch operation.

Permitted Values: A string

Default: None

TV::c_type_strings

If **true**, uses C type string extensions to display character arrays; when **false**, uses string type extensions.

Permitted Values: **true** or **false**

Default: **true**

TV::cell_spu_image_ignore_regexp

If set to a non-empty string, and **TV::ask_on_cell_spu_image_load** is **true**, TotalView matches the SPU image's name with the regular expression. For a match, TotalView does not ask to stop the process but allows the process to continue running after loading the SPU image.

If the image name does *not* match this regular expression or the regular expression contained within **TV::cell_spu_images_stop_regexp**, TotalView asks if it should stop the process, unless you've answered the stop to set breakpoint question by pressing **No** (or the equivalent from within the CLI).

Permitted Values: A regular expression

Default: **{}**

TV::cell_spu_images_stop_regexp

If set to a non-empty string and **TV::ask_on_cell_spu_image_load** is **true**, TotalView matches the SPU image's name with the regular expression. For a match, TotalView asks whether to stop the process.

If the image name does not match this regular expression or the regular expression contained within **TV::cell_spu_images_ignore_regexp**, TotalView asks if it should stop the process, unless you've answered the stop to set breakpoint question by pressing **No** (or the equivalent from within the CLI).

Permitted Values: A regular expression

Default: **{}**

TV::cell_spurs_jm_name

A string that names the file containing the symbols for the "jm" SPURS job policy module. When TotalView detects an embedded SPURS kernel image being loaded into an SPU context, it extracts the GUIDs of the policy modules from the kernel, and searches for either the default SPU ELF image file, which is **spurs_jm.elf** or the file named by this variable.

Permitted Values: An ELF file name

Default: **spurs_jm.elf**

TV::cell_spurs_kernel_dll_regexp

Defines a regular expression that matches the image path component name of the SPURS kernel SPU ELF image embedded in the **libspurs.so** DLL.

When TotalView sees a new image loaded into an SPU thread by **libspe** or **libspe2**, it checks if the image path component name matches this variable. If so, TotalView handles the SPURS kernel library in a different way. You may need to change this regular expression to match the name of your SPURS kernel if it is embedded in a shared library other than **libspurs.so** or if the name of the SPURS kernel is different than **spurs_kernel.elf**.

Permitted Values: A regular expression

Default: **{/libspurs\.so\(spurs_kernel\.elf@[0-9]+\)$}**

TV::cell_spurs_ss_name

A string that names the file containing the symbols for the "ss" SPURS system service policy module. When TotalView detects an embedded SPURS kernel image being loaded into an SPU context, it extracts the GUIDs of the policy modules from the kernel, and searches for either the default SPU ELF image file, which is **spurs_tss.elf** or the file named by this variable.

Permitted Values: An ELF file name

Default: **spurs_ss.elf**

TV::cell_spurs_tm_name

A string that names the file containing the symbols for the "tm" SPURS task policy module. When TotalView detects an embedded SPURS kernel image being loaded into an SPU context, it extracts the GUIDs of the policy modules from the kernel, and searches for either the default SPU ELF image file, which is **spurs_tm.elf** or the file named by this variable.

Permitted Values: An ELF file name

Default: **spurs_tm.elf**

TV::checksum_libraries

Permitted Values:

Default: **auto**

TV::comline_patch_area_base

Allocates the patch space dynamically at the given *address*. See "Allocating Patch Space for Compiled Expressions" in the *TotalView for HPC Users Guide*.

Permitted Values: A hexadecimal value indicating space accessible to TotalView

Default: **0xffffffffffffffff**

TV::comline_patch_area_length

Sets the length of the dynamically allocated patch space to the specified *length*. See "Allocating Patch Space for Compiled Expressions" in the *TotalView for HPC Users Guide*.

Permitted Values: A positive number

Default: 0

TV::command_editing

Enables some Emacs-like commands for use while editing text in the CLI. These editing commands are always available in the CLI window of TotalView UI. However, they are available only within the stand-alone CLI if the terminal in which it is running supports cursor positioning and clear-to-end-of-line. The commands that you can use are:

^A: Moves the cursor to the beginning of the line.

^B: Moves the cursor one character backward.

^D: Deletes the character to the right of cursor.

^E: Moves the cursor to the end of the line.

^F: Moves the cursor one character forward.

^K: Deletes all text to the end of line.

^N: Retrieves the next entered command (only works after **^P**).

^P: Retrieves the previously entered command.

^R or **^L**: Redraws the line.

^U: Deletes all text from the cursor to the beginning of the line.

Rubout or **Backspace**: Deletes the character to the left of the cursor.

Permitted Values: **true** or **false**

Default: **false**

TV::compile_expressions

When **true**, TotalView enables compiled expressions. If **false**, TotalView interprets your expression.

On an IBM AIX system, you can use the **-aix_use_fast_trap** command line option to speed up the performance of compiled expressions. Check the *TotalView for HPC Release Notes* to determine if your version of the operating system supports this feature.

Permitted Values: **true** or **false**

Default: **false**

TV::compiler_vars

(SGI only) When **true**, TotalView shows variables created by your Fortran compiler as well as the variables in your program. When **false** (which is the default), TotalView does not show the variables created by your compiler.

SGI 7.2 Fortran compilers write debugging information that describes variables the compiler created to assist in some operations. For example, it could create a variable used to pass the length of **character*(*)** variables. You might want to set this variable to **true** if you are looking for a corrupted runtime descriptor.

You can override the value set to this variable in a startup file with these command-line options:

-compiler_vars: sets this variable to **true**

-no_compiler_vars: sets this variable to **false**

Permitted Values: **true** or **false**

Default: **false**

TV::control_c_quick_shutdown

When **true**, TotalView kills attached processes and exits. When **false**, TotalView can sometimes better manage the way it kills parallel jobs when it works with management systems. This has been tested only with SLURM and may not work with other systems.

If you set the **TV::ignore_control_c** variable to **true**, TotalView ignores this variable.

Permitted Values: **true** or **false**

Default: **true**

TV::copyright_string

A read-only string containing the copyright information displayed when you start the CLI and TotalView.

TV::cppview

If **true**, the C++View facility allows the formatting of program data in a more useful or meaningful form than the concrete representation visible by default when you inspect data in a running program. For more information on using C++View, see "C++View" on page 317.

Permitted Values: **true** or **false**

Default: **true**

TV::cuda_debugger

Indicates whether cuda debugging is currently enabled. This is a read-only variable.

Permitted Values: **true** or **false**

Default: **true**

TV::current_cplus_demangler

Setting this variable overrides the C++ demangler used by default. Note that this value is ignored unless you also set the value of the TV::force_default_cplus_demangler variable. The following values are supported:

- **gnu**: GNU C++ on Linux Alpha
- **gnu_dot**: GNU C++ Linux x86
- **gnu_v3**: GNU C++ Linux x86
- **kai**: KAI C++
- **kai3_n**: KAI C++ version 3.n
- **kai_4_0**: KAI C++
- **spro**: SunPro C++ 4.0 or 5.2
- **spro5**: SunPro C++ 5.0 or later
- **sun**: Sun CFRONT C++
- **xlc**: IBM XLC/VAC++ compilers

Permitted Values: A string naming the compiler

Default: Derived from your platform and information within your program

TV::current_fortran_demangler

Setting this variable overrides the Fortran demangler used by default. Note that this value is ignored unless you also set the value of the TV::force_default_f9x_demangler variable. The following values are supported:

- **xlf90**: IBM Fortran
- **fujitsu_f9x**: Fujitsu Fortran 9x
- **intel**: Intel Fortran 9x
- **sunpro_f9x_4**: Sun ProFortran 4
- **sunpro_f9x_5**: Sun ProFortran 5

Permitted Values: A string naming the compiler

Default: Derived from your platform and information within your program

TV::data_format_double

Defines the format to use when displaying double-precision values. This is one of a series of variables that define how to display data. The format of each is similar:

{presentation format-1 format-2 format 3}

presentation

Selects which format to use when displaying -information. Note that you can display floating point information using **dec**, **hex**, and **oct** formats. You can display integers using **auto**, **dec**, and **sci** formats.

auto

Equivalent to the C language's **printf()** function's **%g** specifier. You can use this with integer and floating-point numbers. This format is either **hexdec** or **dechex**, depending upon the programming language being used.

dec

Equivalent to the **printf()** function's **%d** specifier. You can use this with integer and floating-point numbers.

dechex

Displays information using the **dec** and **hex** formats. You can use this with integers.

hex

Equivalent to the **printf()** function's **%x** specifier. You can use this with integer and floating-point numbers.

hexdec

Displays information using the **hex** and **dec** formats. You can use this with integer numbers.

oct

Equivalent to the **printf()** function's **%o** specifier. You can use this with integer and floating-point numbers.

sci

Equivalent to the **printf()** function's **%e** specifier. You can use this with floating-point numbers.

format

For integers, *format*-1 defines the decimal format, *format*-2 defines the hexadecimal format, and *format*-3 defines the octal format.

For floating point numbers, *format*-1 defines the fixed point display format, *format*-2 defines the scientific format, and format-3 defines the auto (**printf()**'s **%g**) format.

The format string is a combination of the following specifiers:

%

A signal indicating the beginning of a format.

width

A positive integer. This is the same width specifier used in the **printf()** function.

. (period)

A punctuation mark separating the width from the precision.

precision

A positive integer. This is the same precision specifier used in the **printf()** function.

(pound)

Displays a 0x prefix for hexadecimal and 0 for octal formats. This isn't used within floating-point formats.

0 (zero)

Pads a value with zeros. This is ignored if the number is left-justified. If you omit this character, TotalView pads the value with spaces.

- (hyphen)

Left-justifies the value within the field's width.

Permitted Values: A value in the described format

Default: {**auto %-1.15 %-1.15 %-20.2}**

TV::data_format_ext

Defines the format to use when displaying extended floating point values such as long doubles.For a description of the contents of this variable, see TV::data_format_double.

Permitted Values: A value in the described format

Default: **{auto %-1.15 %-1.15 %-1.15}**

TV::data_format_int8

Defines the format to use when displaying 8-bit integer values. For a description of the contents of this variable, see TV::data_format_double.

Permitted Values: A value in the described format

Default: **{auto %1.1 %#4.2 %#4.3}**

TV::data_format_int16

Defines the format to use when displaying 16-bit integer values. For a description of the contents of this variable, see TV::data_format_double.

Permitted Values: A value in the described format

Default: **{auto %1.1 %#6.4 %#7.6}**

TV::data_format_int32

Defines the format to use when displaying 32-bit integer values. For a description of the contents of this variable, see TV::data_format_double.

Permitted Values: A value in the described format

Default: **{auto %1.1 %#10.8 %#12.11}**

TV::data_format_int64

Defines the format to use when displaying 64-bit integer values. For a description of the contents of this variable, see TV::data_format_double.

Permitted Values: A value in the described format

Default: **{auto %1.1 %#18.16 %#23.22}**

TV::data_format_int128

Defines the format to use when displaying 128-bit integer values. For a description of the contents of this variable, see TV::data_format_double.

Permitted Values: A value of the described format.

Default: **{auto %1.1 %#34.32 %#44.43}**

TV::data_format_long_stringlen

Defines the number of characters allowed in a long string.

Permitted Values: A positive integer number

Default: **8000**

TV::data_format_single

Defines the format to use when displaying single precision, floating-point values. For a description of the contents of this variable, see TV::data_format_double.

Permitted Values: A value in the described format

Default: **{auto %-1.6 %-1.6 %-1.6}**

TV::data_format_stringlen

Defines the maximum number of characters displayed for a string.

Permitted Values: A positive integer number

Default: 100

TV::dbfork

When **true**, TotalView catches the **fork()**, **vfork(),** and **execve()** system calls if your executable is linked with the **dbfork** library. See "Linking with the dbfork Library" on page 367..

Permitted Values: **true** or **false**

Default: **true**

TV::default_launch_command

Names the compiled-in launch command appropriate for the platform.

Permitted Values: A string indicating the default compiled-in launch command value.

Default: Sun SPARC: **rsh**All other platforms: **ssh -x**

TV::default_parallel_attach_subset

Names the default subset specification listing MPI ranks to attach to when an MPI job is created or attached to.

Permitted Values: A string indicating the default subset specification.

Default: Initialized to the value specified with the **-default_parallel_attach_subset** command line option.

TV::default_stderr_append

When **true**, TotalView appends the target program's **stderr** information to the file set in the GUI, by the **-stderr** command-line option, or in the **TV::default_stderr_filename** variable. If no pathname is set, the value of this variable is ignored. If the file does not exist, TotalView creates it.

Permitted Values: **true** or **false**

Default: **false**

TV::default_stderr_filename

Names the file to which to write the target program's **stderr** information. If the file exists, TotalView overwrites it. If the file does not exist, TotalView creates it.

Permitted Values: A string indicating a pathname

Default: None

TV::default_stderr_is_stdout

When **true**, TotalView writes the target program's **stderr** information to the same location as **stdout**.

Permitted Values: **true** or **false**

Default: **false**

TV::default_stdin_filename

Names the file from which the target program reads **stdin** information.

Permitted Values: A string indicating a pathname

Default: None

TV::default_stdout_append

When **true**, TotalView appends the target program's **stdout** information to the file set in the GUI, by the **-stdout** command-line option, or in the **TV::default_stdout_filename** variable. If no pathname is set, the value of this variable is ignored. If the file does not exist, TotalView creates it.

Permitted Values: **true** or **false**

Default: **false**

TV::default_stdout_filename

Names the file to which to write the target program's **stdout** information. If the file exists, TotalView overwrites it. If the file does not exist, TotalView creates it.

Permitted Values: A string indicating a pathname

Default: None

TV::display_assembler_symbolically

When **true**, TotalView displays assembler locations as **label+offset**. When **false**, these locations are displayed as hexadecimal addresses.

Permitted Values: **true** or **false**

Default: **false**

TV::dll_ignore_prefix

Defines a list of library files that will not result in a query to stop the process when loaded. This list contains a colon-separated list of prefixes. Also, TotalView will not ask if you would like to stop a process if:

- You also set the **TV::ask_on_dlopen** variable to **true**.
- The suffix of the library being loaded does *not* match a suffix contained in the **TV::dll_stop_suffix** variable.
- One or more of the prefixes in this list match the name of the library being loaded.

Permitted Values: A list of path names, each item of which is separated from another by a colon

Default: **/lib/:/usr/lib/:/usr/lpp/:/usr/ccs/lib/:/usr/dt/lib/:/tmp/**

TV::dll_read_all_symbols

Always reads loader and debugging symbols of libraries named within this variable.

This variable is set to a colon-separated list of library names. A name can contain the * (asterisk) and ? (question mark) wildcard characters, which have their usual meaning:

- ***: zero or more characters.

- **?**: a single character.

Because this is the default behavior, include only library names here that would be excluded because they are selected by a wildcard match within the **TV:dll_read_loader_symbols_only** and **TV::dll_read_no_symbols** variables.

Permitted Values: One or more library names separated by colons

Default: None

TV::dll_read_loader_symbols_only

When TotalView loads libraries named in this variable, it reads only loader symbols. Because TotalView checks and processes the names in **TV::dll_read_all_symbols** list before it processes this list, it ignores names that are in that list and in this one.

This variable is set to a colon-separated list of strings. Any string can contain the * (asterisk) and ? (question mark) wildcard characters, which have their usual meaning:

- *****: zero or more characters.
- **?**: a single character.

If you do not need to debug most of your shared libraries, set this variable to * and then put the names of any libraries you wish to debug on the **TV::dll_read_all_symbols** list.

Permitted Values: One or more library names separated by colons

Default: None

TV::dll_read_no_symbols

When TotalView loads libraries named in this variable, it does not read in either loader or debugging symbols. Because TotalView checks and processes the names in the **TV::dll_read_loader_symbols_only** lists before it processes this list, it ignores names that are in those lists and in this one.

This variable is set to a colon-separated list of strings. Any string can contain the * (asterisk) and ? (question mark) wildcard characters having their usual meaning:

- *****, which means zero or more characters
- **?**, which means a single character.

Because information about subroutines, variables, and file names are not known for these libraries, stack backtraces may be truncated. However, if your program uses large shared libraries and it's time consuming to read even their loader symbols, you may want to put those libraries on this list.

Permitted Values: One or more library names separated by colons

Default: None

TV::dll_stop_suffix

Contains a colon-separated list of suffixes that stop the current process when it loads a library file with this suffix.

You must confirm that you want to stop the process:

- If **TV::ask_on_dlopen variable** is set to **true**
- If one or more of the suffixes in this list match the name of the library being loaded.

Permitted Values: A Tcl list of suffixes

Default: None

TV::dlopen_always_recalculate

When **false**, enables **dlopen** event filtering (see "dlopen Options for Scalability" on page 381).

TV::dlopen_always_recalculate is **true** by default, meaning that breakpoint specifications are reevaluated on *every* **dlopen** call. This is referred to as *Slow Mode*.

A value of **false** enables **dlopen** event filtering, deferring the reevaluation of breakpoint specifications until after the **dlopen** event and thus reducing the number of events per process that TotalView evaluates. This is useful in improving performance when a process loads large numbers of libraries. Depending on the setting of TV::dlopen_recalculate_on_match, performance can be improved with the *Medium* or *Fast* modes of **dlopen** event filtering.

Permitted Values: **true** or **false**

Default: **true**

TV::dlopen_recalculate_on_match

Contains a colon-separated list of *simple glob patterns* (a glob list) containing library names. If TV::dlopen_always_recalculate is set to **true**, the value of this variable is ignored.

glob patterns specify sets of filenames with wildcard characters. A *simple glob pattern* is a string, optionally ending with an asterisk character (*).

If TV::dlopen_always_recalculate is **false** and a **dlopen** event occurs, the name of the library associated with the event is matched against the list of glob patterns. If the *glob-list* is empty (default) or the name of the *dlopened* library does not match any patterns in the *glob-list*, then breakpoint reevaluation is deferred until the process stops for some other reason (e.g., the process hits a breakpoint, the user stops the process, the process encounters a signal, etc.). If the library name matches a pattern, the breakpoints are reevaluated immediately. A *glob-list* that contains the empty string results in *Fast* mode, since all the *dlopened* libraries will have their breakpoint reevaluation deferred. *Medium* mode is when select libraries are to have their breakpoints reevaluated immediately.

The matching rules are:

- If the simple glob pattern does not end in an asterisk, then the tail of the loaded library name must match the string. For example, the string "**libfoo.so**" matches library name "**/dir/path/libfoo.so**", but does not match "**/dir/path/libfoo.so.1.0**".
- If the simple glob pattern ends in an asterisk, then the asterisk is removed from the string, and the remaining portion of the string matches any substring found in the library name. For example, the string "**libfoo.so***" matches "**/dir/path/libfoo.so**" or "**/dir/path/libfoo.so.1.0**", and the string "**/path/***" matches "**/dir/path/libfoo.so**" or "**/dir/path/libbar.so**".

For a more complete explanation of **dlopen** event filtering, including use-case examples, please refer to "dlopen Options for Scalability" on page 381.

Permitted Values: String

Default: **""**, the empty string

TV::dlopen_read_libraries_in_parallel

When **false**, (the default), TotalView handles **dlopen** events in the target application serially. (Note that for parallel applications, handling **dlopen** events serially can degrade debugger performance.)

When **true**, TotalView attempts to handle **dlopen** events in parallel.

On non-MRNet platforms, or if MRNet is not enabled, then the value of this variable is ignored. For more information, see "Handling dlopen Events in Parallel" in the *TotalView for HPC User Guide*.

Permitted Values: **true** or **false**

Default: **false**

TV::dump_core

When **true**, a core file is created when an internal TotalView error occurs. This is used only when debugging TotalView problems. You can override this variable's value by using the following command-line options:

-dump_core sets this variable to **true**

-no_dumpcore sets this variable to **false**

Permitted Values: **true** or **false**

Default: **false**

TV::dwhere_qualification_level

Controls the amount of information displayed when you use the **dwhere** command. Here are three examples:

```
dset TV::dwhere_qualification_level +overload_list
dset TV::dwhere_qualification_level -class_name
dset TV::dwhere_qualification_level -parent_function
```

You could combine these arguments into one command. For example:

```
dset TV::dwhere_qualification_level +overload_list \ -class_name -parent_function
```

In these examples "**+**" means that the information should be displayed and "**-**" means the information should not be displayed.

The arguments to this command are:

- **all**
- **class_name**
- **file_directory**
- **hint**
- **image_directory**
- **loader_directory**
- **member**
- **module**
- **node**
- **overload_list**
- **parent_function**
- **template_args**
- **type_name**

The **all** argument is often used as follows:

```
dset TV::dwhere_qualification_level all-parent_function
```

This states that all elements are displayed except for a parent function. For more information on these arguments, see "symbol" on page 205.

Permitted Values: One or more of the arguments listed above.

Default: **class_name+template_args+module+ parent_function+member+node**

TV::dynamic

When **true**, TotalView loads symbols from shared libraries. This variable is available on all platforms supported by Rogue Wave Software. (This may not be true for platforms ported by others. For example, this feature is not available for Hitachi computers.) Setting this value to **false** can cause the **dbfork** library to fail because TotalView might not find the **fork(), vfork()**, and **execve()** system calls.

Permitted Values: **true** or **false**

Default: **true**

TV::editor_launch_string

Defines the editor launch string command. The launch string substitution characters you can use are:

%E: The editor

%F: The display font

%N: The line number

%S: The source file

Permitted Values: Any string value—as this is a Tcl variable, you'll need to enclose the string within **{}** (braces) if the string contains spaces

Default: **{xterm -e %E +%N %S}**

TV::env

Names a variable that is already contained within your program's environment. This is a read-only variable and is set by using the **-env** command-line option. For more information, see **-env** *variable=value* on page 342.

To set this variable from within TotalView, use the **File > New Program** or **Process > Startup** dialog boxes.

Permitted Values: None. The variable is read-only.

Default: None

TV::follow_clone

When a value greater than 0, allows TotalView to pickup threads created using the **clone()** system call. The supported values are:

0: TotalView does not follow **clone()** calls. This is most often used if problems occur.

1: TotalView follows **clone()** calls until the first **pthread_create()** call is made. This value is then set to 0.

2: TotalView follows **clone()** calls whenever they occur. Calls to **clone()** and **pthread_create()** can be interleaved. This may affect performance if the program has many threads.

3: (default) Like 2, TotalView follows **clone()** calls whenever they occur. However, TotalView uses a feature available on newer Linux systems to reduce the overhead.

NOTE >> Linux threads are not affected by this variable. This variable should be left set at 3 unless you have reason to believe it is malfunctioning on your system.

Permitted Values: 0, 1, 2, or 3

Default: 3

TV::force_default_cplus_demangler

When **true**, TotalView uses the demangler set in the TV::current_cplus_demangler variable. Set this variable only if TotalView uses the wrong demangler which may occur if you are using an unsupported compiler, an unsupported language preprocessor, or if your vendor has made changes to your compiler.

Permitted Values: **true** or **false**

Default: **false**

TV::force_default_f9x_demangler

When **true**, TotalView uses the demangler set in the TV::current_fortran_demangler variable. Set this variable only if TotalView uses the wrong demangler which may occur if you are using an unsupported compiler, an unsupported language preprocessor, or if your vendor has made changes to your compiler.

Permitted Values: **true** or **false**

Default: **false**

TV::global_typenames

When **true**, TotalView assumes that type names are globally unique within a program and that all type definitions with the same name are identical. This must be true for standard-conforming C++ compilers.

If you set this option to **true**, TotalView attempts to replace an opaque type (**struct foo *p;**) declared in one module with an identically named defined type (**struct foo { ... };**) in a different module.

If TotalView has read the symbols for the module containing the non-opaque type definition, it automatically displays the variable by using the non-opaque type definition when displaying variables declared with the opaque type.

If **false**, TotalView does *not* assume that type names are globally unique within a program. Use this variable only if your code has different definitions of the same named type, since TotalView can pick the wrong definition when it substitutes for an opaque type in this case.

Permitted Values: **true** or **false**

Default: **true**

TV::gnu_debuglink

When **true**, TotalView checks for a **.gnu_debuglink** section within your process. If it is found, it looks for the file named in this section. If **false**, TotalView ignores the contents of this section. This means that a gnu_debuglink file will not be loaded. For more information, see "Using gnu_debuglink Files" on page 365.

Permitted Values: **true** or **false**

Default: **true**

TV::gnu_debuglink_checksum

When **true**, TotalView compares the checksum of the gnu_debuglink file against the checksum contained within the **.gnu_debuglink** section. TotalView will only load the information from the gnu_debuglink file when the checksums match. For more information, see "Using gnu_debuglink Files" on page 365.

Permitted Values: **true** or **false**

Default: **true**

TV::gnu_debuglink_global_directory

Names the directory to store gnu_debuglink files. For more information, see "Using gnu_debuglink Files" on page 365.

Permitted Values: A pathname within your file system. While this path can be relative, it is usually a full pathname.

Default: **/usr/lib/debug**

TV::gnu_debuglink_global_search_path

Defines the search path to use when searching for **.gnu_debuglink** files. You can use two substituting variables when assigning values:

- **%D**: The directory containing the .**gnu_debuglink** file.
- **%G**: The contents of the **TV::gnu_debuglink_global_directory** variable.
- **%/**: The target directory delimiter; for example "**/**".

For more information, see "Using gnu_debuglink Files" on page 365. .

Permitted Values: A string containing directory paths.

Default: **%D:%D.debug:%G%/%D**

TV::hia_local_dir

This variable affects only those cases where TotalView preloads the agent. It names the directory in which TotalView will look for the **hia** for a local job. The default is the value of **TV::hia_local_installation_dir**. Change this variable if you want TotalView to look for the agent in a different directory.

TV::hia_local_installation_dir

A read-only variable that names the directory where the **hia** distributed with the executing instance of TotalView is found.

TV::hia_remote_dir

This variable affects only those cases where TotalView preloads the agent. It names the directory on a remote host where TotalView will look for the **hia** that is to be used by the remote job. If the variable is not set, the server uses its default, which is the same as the default value of the server's **TV::hia_local_dir** but is interpreted in the remote file system.

TV::hpf

Deprecated.

TV::hpf_node

Deprecated.

TV::host_platform

A read-only value that returns the architecture upon which TotalView is running.

TV::ignore_control_c

When **true**, TotalView ignores Ctrl+C. This prevents you from inadvertently terminating the TotalView process. You would set this option to **true** when your program catches the Ctrl+C (**SIGINT**) signal. You may want to set **File > Signals** so that TotalView resends the **SIGINT** signal, instead of just stopping the program.

Permitted Values: **true** or **false**

Default: **false**

TV::image_load_callbacks

Contains a Tcl list of procedure names. TotalView invokes the procedures named in this list whenever it loads a new program. This could occur when:

- A user invokes a command such as **dload**.
- TotalView resolves dynamic library dependencies.
- User code uses **dlopen()** to load a new image.

TotalView invokes the functions in order, beginning at the first function in this list.

Permitted Values: A Tcl list of procedure names

Default: **{::TV::S2S::handle_image_load}**

TV::in_setup

Contains a **true** value if called while TotalView is being initialized. Your procedures would read the value of this variable so that code can be conditionally executed based on whether TotalView is being initialized. In most cases, this is used for code that should be invoked only while TotalView is being initialized. This is a read-only variable.

Permitted Values: **true** or **false**

Default: **false**

TV::ipv6_support

When **true**, ipv6 support is enabled. If **false**, ipv6 support is disabled.

Permitted Values: **true** or **false**

Default: **false**

TV::jnibridge

Internal use only.

TV::kcc_classes

When **true**, TotalView converts structure definitions created by the KCC compiler into classes that show base classes and virtual base classes in the same way as other C++ compilers. When **false**, TotalView does not perform this conversion. In this case, TotalView displays virtual bases as pointers rather than as the data.

TotalView converts structure definitions by matching the names given to structure members. This means that TotalView may not convert definitions correctly if your structure component names look like KCC processed classes. However, TotalView never converts these definitions unless it believes that the code was compiled with KCC. (It does this when it sees one of the tag strings that KCC outputs, or when you use the KCC name demangler.) Because all recognized structure component names start with "_ _" and the C standard forbids this use, your code should not contain names with this prefix.

Under some circumstances, TotalView may not be able to convert the original type names because type definition are not available. For example, it may not be able to convert "**struct __SO_foo**" to "**struct foo**". In this case, TotalView shows the "**__SO_foo**" type. This is just a cosmetic problem. (The "**__SO__**" prefix denotes a type definition for the nonvirtual components of a class with virtual bases).

Since KCC output does not contain information on the accessibility of base classes (**private**, **protected**, or **public**), TotalView cannot provide this information.

Permitted Values: **true** or **false**

Default: **true**

TV::kernel_launch_string

This is not currently used.

TV::kill_callbacks

Names a Tcl function to run before TotalView kills a process. The contents of this variable is a list of pairs. For example:

```
dset TV::kill_callbacks {
   {^srun$        TV::destroy_srun}
}
```

The first element in the pair is a regular expression, and the second is the name of a Tcl function. If the process's name matches the regular expression, TotalView runs the Tcl procedure, giving it the DPID of the process as its argument. This procedure can do anything that needs to be done for orderly process termination.

If your Tcl procedure returns **false**, TotalView kills your process as you would expect. If the procedure returns **true**, TotalView takes no further action to terminate the process.

Any slave processes are killed before the master process is killed. If there is a **kill_callback** for the master process, it is called after the slave processes are killed. If there are **kill_callbacks** for the slave processes, they will be called before the slave is killed.

Permitted Values: List of one or more list of pairs

Default: **{}**

TV::library_cache_directory

Specifies the directory to write library cache data.

Permitted Values: A string indicating a path

Default: **$USERNAME/.totalview/lib_cache**

TV::launch_command

Specifies the launch command.

Permitted Values: A string indicating the launch command

Default: The value of **TVDSVRLAUNCHCMD** if set, otherwise the value of **default_launch_command**. Note: changing the value of **TVDSVRLAUNCHCMD** in the environment after starting TotalView does not affect this variable or how **%C** is expanded.

TV::local_interface

Sets the interface name that the server uses when it makes a callback. For example, on an IBM PS2 machine, you would set this to css0. However, you can use any legal **inet** interface name. (You can obtain a list of the interfaces if you use the **netstat -i** command.)

Permitted Values: A string

Default: **{}**

TV::local_server

(Sun only) This variable tells TotalView which local server it should launch. By default, TotalView finds the local server in the same place as the remote server. On Sun platforms, TotalView can launch a 32- and 64-bit version.

Permitted Values: A file or path name to the local server

Default: **tvdsvr**

TV::local_server_launch_string

(Sun only) If TotalView will not be using the server contained in the same working directory as the TotalView executable, the contents of this string indicate the shell command that TotalView uses to launch this alternate server.

Permitted Values: A string enclosed with **{}** (braces) if it has embedded spaces

Default: **{%M -working_directory %D -local %U -set_pw %P -verbosity %V}**

TV::message_queue

When **true**, TotalView displays MPI message queues when you are debugging an MPI program. When **false**, these queues are not displayed. Disable these queues only if something is overwriting the message queues, thereby confusing TotalView.

Permitted Values: **true** or **false**

Default: **true**

TV::mrnet_enabled

When **true**, TotalView enables MRNet on platforms where it is supported (Linux-x86_64, Linux-Power, Blue Gene/Q, and Cray). To disable the MRNet infrastructure when debugging an MPI job, set this variable to **false**.

Permitted Values: **true** or **false**

Default: **true**

TV::mrnet_port_base

The start of the port range that MRNet attempts to use for listening sockets on Cray systems. This string is passed to MRNet instead of using the **MRNET_PORT_BASE** environment variable. This value is only used when TotalView uses MRNet on Cray systems.

Permitted Values: a port number

Default: {}

TV::native_platform

A read-only state variable that identifies the native (host) platform on which the TotalView client (GUI or CLI) is running. This variable's value is the same as the value of **TV::platform**.

Permitted Values: a string indicating a platform

Default: platform-specific

TV::nptl_threads

When set to **auto**, TotalView determines which threads package your program is using. A value of **true** identifies use of NPTL threads, while **false** means that the program is not using this package.

Permitted Values: **true**, **false**, or **auto**

Default: **auto**

TV::open_cli_window_callback

Contains the string that the CLI executes after you open the CLI by selecting the **Tools > Command Line** command. It is ignored when you open the CLI from the command line.

This variable is most commonly used to set the terminal characteristics of the (pseudo) tty that the CLI is using, since these are inherited from the tty on which TotalView was started. Therefore, if you start TotalView from a shell running inside an Emacs buffer, the CLI uses the raw terminal modes that Emacs is using. You can change your terminal mode by adding the following command to your .**tvdrc** file:

```
dset TV::open_cli_window_callback "stty sane"
```

Permitted Values: A string representing a Tcl or CLI command

Default: Null

TV::parallel

When **true**, enables TotalView support for parallel program runtime libraries such as MPI, PE, and UPC. You might set this to **false** if you need to debug a parallel program as if it were a single-process program.

Permitted Values: **true** or **false**

Default: **true**

TV::parallel_attach

automatically attaches to processes. Your choices are:

- **yes**: Attach to all started processes.
- **no**: Do not attach to any started processes.
- **ask**: Display a dialog box listing the processes to which TotalView can attach, and let the user decide to which ones TotalView should attach.

Permitted Values: **yes**, **no**, or **ask**

Default: **yes**

TV::parallel_stop

Tells TotalView if it should automatically run processes when your program launches them. Your choices are:

- **yes**: Stop the processes before they begin executing.
- **no**: Do not interfere with the processes; that is, let them run.
- **ask**: Display a question box asking if it should stop before executing.

Permitted Values: **yes**, **no**, or **ask**

Default: **ask**

TV::platform

Indicates the platform on which you are running TotalView. This is a read-only variable.

Permitted Values: A string indicating a platform, such as **alpha** or **sun5**

Default: Platform-specific

TV::process_load_callbacks

Names the procedures that TotalView runs after it loads or attaches to a program and just before it runs the program. TotalView executes these procedures after it invokes the procedures in the **TV::image_load_callbacks** list.

The procedures in this list are called at most once per process load or attach, even though your executable may use many shared libraries. After attaching to the processes in a parallel job, the callback procedures listed in **TV::process_load_callbacks** are invoked on one representative process in each share group, and only when the share group is first created. If the parallel job is restarted, the callback procedures are not invoked because the share groups are not recreated. All processes in a parallel job are attached before calling the procedures. The calls to the procedures are queued and executed at a later time, and are not guaranteed to be during the lifetime of the processes.

Permitted Values: A list of Tcl procedures

Default: **TV::**source_process_startup. The default procedure looks for a file with the same name as the newly loaded process's executable image that has a **.tvd** suffix appended to it. If it exists, TotalView executes the commands contained within it. This function is passed an argument that is the ID for the newly created process.

TV::recurse_subroutines:

Determines whether a data window displaying the subroutines associated with a source file initially displays just the subroutine names, or also the data values in the subroutine scopes. This situation most commonly occurs in the **Program Browser**.

- **true**: Displays both the subroutine names and the data in their scope.
- **false**: Displays only the subroutine names.

For complex applications, determining the state of the data values in the scope of all subroutines can significantly slow down TotalView. If set to **false** so only the subroutine names appear, data values for a particular subroutine can still be viewed by explicitly diving into the subroutine.

Permitted Values: **true** or **false**

Default: **true**

TV::replay_history_mode

Controls how ReplayEngine handles the history buffer when it is full, as follows:

- **1**: Discards the oldest history and continue.
- 2: Stops the process.

Permitted Values: 1 or 2

Default: 1

TV::replay_history_size

Specifies the size of ReplayEngine's buffer for recorded history, in either bytes, kilobytes (K) or megabytes (M). To specify kilobytes or megabytes, append a K or M to the number, as follows: 10000K or 1024M

Permitted Values: An integer or an integer followed by K or M

Default: 0 (Limited only by available memory)

TV::restart_threshold

When killing a multi-threaded or multiprocess program, specifies the number of threads or processes that must be running before a prompt launches confirming that you wish to kill the program. By default, this prompt appears if there is more than one thread or process running.

Permitted Values: a positive integer

Default: 1

TV::save_global_dialog_defaults

Obsolete.

TV::save_search_path

Obsolete.

TV::save_window_pipe_or_filename

Names the file to which TotalView writes or pipes the contents of the current window or pane when you select the **File > Save Pane** command.

Permitted Values: A string naming a file or pipe

Default: None, until something is saved. Afterward, the saved string is the default.

TV::search_case_sensitive

When **true**, text searches are case-sensitive, succeeding only for an exact match for the entry in the **Edit > Find** dialog box. For example, searching **Foo** won't find **foo** if this variable is set to **true**. It will be found if this variable is set to **false**.

Permitted Values: **true** or **false**

Default: **false**

TV::server_launch_enabled

When **true**, TotalView uses its single-process server launch procedure when launching remote **tvdsvr** processes. When **false**, **tvdsvr** is not automatically launched.

Permitted Values: **true** or **false**

Default: **true**

TV::server_launch_timeout

Specifies the number of seconds to wait for a response from the TotalView Debugger Server (**tvdsvr**) that it has launched.

Permitted Values: An integer from 1 to 3600 (1 hour)

Default: 30

TV::server_response_wait_timeout

Specifies how long to wait for a response from the TotalView Debugger Server (**tvdsvr**). Using a higher value may help avoid server timeouts if you are debugging across multiple nodes that are heavily loaded.

Permitted Values: An integer from 1 to 3600 (1 hour)

Default: 30

TV::share_action_point

Indicates the scope in which TotalView places newly created action points. In the CLI, this is the dbarrier, dbreak, and dwatch commands. If **true**, newly created action points are shared across the group. If **false**, a newly created action point is active only in the process in which it is set.

As an alternative to setting this variable, you can select the **Plant in share group** check box in the **Action Points** Page in the **File > Preferences** dialog box. You can override this value in the GUI by selecting the **Plant in share group** checkbox in the **Action Point > Properties** dialog box.

Permitted Values: **true** or **false**

Default: **true**

TV::signal_handling_mode

A list that modifies the way in which TotalView handles signals. This list consists of a list of *signal_action* descriptions, separated by spaces:

```
signal_action[signal_action] ...
```

A *signal_action* description consists of an action, an equal sign (=), and a list of signals:

```
action=signal_list
```

An *action* can be one of the following: **Error**, **Stop**, **Resend**, or **Discard**.

A *signal_list* is a list of one or more signal specifiers, separated by commas:

```
signal_specifier[,signal_specifier] ...
```

A *signal_specifier* can be a signal name (such as **SIGSEGV**), a signal number (such as **11**), or a star (*****), which specifies all signals. We recommend using the signal name rather than the number because number assignments vary across UNIX versions.

The following rules apply when you are specifying an *action_list*:

- If you specify an action for a signal in an *action_list*, TotalView changes the default action for that signal.
- If you do not specify a signal in the *action_list*, TotalView does not change its default action for the signal.
- If you specify a signal that does not exist for the platform, TotalView ignores it.
- If you specify an action for a signal twice, TotalView uses the last action specified. In other words, TotalView applies the actions from left to right.

If you need to revert the settings for signal handling to built-in defaults, use the **Defaults** button in the **File > Signals** dialog box.

For example, to set the default action for the **SIGTERM** signal to *Resend*, you specify the following action list:

```
{Resend=SIGTERM}
```

As another example, to set the action for **SIGSEGV** and **SIGBUS** to *Error*, the action for **SIGHUP** and **SIGTERM** to *Resend*, and all remaining signals to *Stop*, you specify the following action list:

```
{Stop=* Error=SIGSEGV,SIGBUS Resend=SIGHUP,SIGTERM}
```

This action list shows how TotalView applies the actions from left to right.

1. Sets the action for all signals to *Stop*.
2. Changes the action for **SIGSEGV** and **SIGBUS** from *Stop* to *Error*.
3. Changes the action for **SIGHUP** and **SIGTERM** from *Stop* to *Resend*.

Permitted Values: A list of signals, as was just described

Default: This differs from platform to platform; type **dset TV::signal_handling_mode** to see what a platform's default values are

TV::source_pane_tab_width

Sets the width of the tab character that is displayed in the Process Window's Source Pane. You may want to set this value to the same value as you use in your text editor.

Permitted Values: An integer

Default: 8

TV::spell_correction

When you use the **View > Lookup Function** or **View > Lookup Variable** commands in the Process Window or edit a type string in a Variable Window, TotalView checks the spelling of your entries. By default (**verbose**), TotalView displays a dialog box before it corrects spelling. You can set this resource to **brief** to run the spelling corrector silently. (TotalView makes the spelling correction without displaying it in a dialog box first.) You can also set this resource to **none** to disable the spelling corrector.

Permitted Values: **verbose**, **brief**, or **none**

Default: **verbose**

TV::stack_trace_qualification_level

Controls the amount of information displayed in stack traces. For more information, see TV::dwhere_qualification_level.

Permitted Values: One or more of the following arguments: **all**, **class_name**, **file_directory**, **hint**, **image_-directory**, **loader_directory**, **member**, **module**, **node**, **overload_list**, **parent_function**, **template_args**, **type_name**.

Default: **class_name+template_args+module+ parent_function+member+node**

TV::stop_all

Indicates a default property for newly created action points. This property tells TotalView what else it should stop when it encounters this action point. The values you can set are:

group

Stops the entire control group when the action point is hit.

process

Stops the entire process when the action point is hit.

thread

Only stops the thread that hit the action point. Note that **none** is a synonym for **thread**.

Permitted Values: **group**, **process**, or **thread**

Default: **group**

TV::stop_relatives_on_proc_error

When **true**, TotalView stops the control group when an error signal is raised. This is the variable used by the **Stop control group on error signal** option in the **Options** Page of the **File > Preferences** dialog box.

Permitted Values: **true** or **false**

Default: **true**

TV::suffixes

Use a space separated list of items to identify the contents of a file. Each item on this list has the form: **suffix:lang[:include]**. You can set more than suffix for an item. If you want to remove an item from the default list, set its value to **unknown**.

Permitted Values: A list identifying how suffixes are used

Default: **{:c:include s:asm S:asm c:c h:c:include lex:c:include y:c:include bmap:c:include f:f77 F:f77 f90:f9x F90:f9x hpf:hpf HPF:hpf cxx:c++ cpp:c++ cc:c++ c++:c++ C:c++ C++:c++ hxx:c++:include hpp:c++:include hh:c++:include h++:c++:include HXX:c++:include HPP:c++:include HH:c++:include H:c++:include ih:c++:include th:c++}**

TV::target_platform

A read-only variable that displays a list of the platforms on which you can debug from the native (host) platform, usually in the format *os-cpu*. For example, from a native platform of Linux-x86, the list is "**linux-power linux-x86_64 linux-x86 catamount-x86_64 catamount-x86**." The platform names may be listed differently than in **TV::platform and TV::native_platform**. For example, for AIX, **TV::target_platform** is "**aix-power**" but **TV::platform** and **TV::native_platform** are "**rs6000**."

Permitted Values: A list of platform names

Default: Platform-dependent

TV::ttf

When **true**, TotalView uses registered type transformations to change the appearance of data types that have been registered using the **TV::type_transformation** command.

Permitted Values: **true** or **false**

Default: **true**

TV::ttf_max_length

When transforming STL structures, TotalView must chase through pointers to obtain values. This number indicates how many of these pointers it should follow.

Permitted Values: an integer number

Default: 10000

TV::use_fast_trap

Controls TotalView's use of the target operating system's support of the fast trap mechanism for compiled conditional breakpoints, also known as EVAL points. You cannot interactively use this variable. Instead, you must set it within a TotalView startup file; for example, set its value with a **.tvdrc** file.

Your operating system may not be configured correctly to support this option. See the *TotalView for HPC Release Notes* on our web site for more information.

Permitted Values: **true** or **false**

Default: **true**

TV::use_fast_wp

Controls TotalView's use of the target operating system's support of the fast trap mechanism for compiled conditional watchpoints, also known as CDWP points. You cannot interactively use this variable. Instead, you must set it within a TotalView startup file; for example, set its value with a **.tvdrc** file.

Your operating system may not be configured correctly to support this option. See the *TotalView for HPC Release Notes* on our web site for more information.

Permitted Values: **true** or **false**

Default: **false**

TV::use_interface

This variable is a synonym for TV::local_interface.

TV::user_threads

When **true**, it enables TotalView support for handling user-level (M:N) thread packages on systems that support two-level (kernel and user) thread scheduling.

Permitted Values: **true** or **false**

Default: **true**

TV::version

Indicates the current TotalView version. This is a read-only variable.

Permitted Values: A string

Default: Varies from release to release

TV::visualizer_launch_enabled

When **true**, TotalView automatically launches the Visualizer when you first visualize something. If you set this variable to **false**, TotalView disables visualization. This is most often used to stop evaluation points containing a **$visualize** directive from invoking the Visualizer.

Permitted Values: **true** or **false**

Default: **true**

TV::visualizer_launch_string

Specifies the command string that TotalView uses when it launches a visualizer. Because the text is actually used as a shell command, you can use a shell redirection command to write visualization datasets to a file (for example, "**cat >** *your_file*").

Permitted Values: A string

Default: **%B/visualize**

TV::visualizer_max_rank

Specifies the default value used in the **Maximum permissible rank** field in the **Launch Strings** Page of the **File > Preferences** dialog box. This field sets the maximum rank of the array that TotalView will export to a visualizer. The Visualizer cannot visualize arrays of rank greater than 2. If you are using another visualizer or just dumping binary data, you can set this value to a larger number.

Permitted Values: An integer

Default: 2

TV::warn_step_throw

If this is set to **true** and your program throws an exception during a single-step operation, TotalView asks if you wish to stop the step operation. The process will be left stopped at the C++ run-time library's "throw" routine. If this is set to **false**, TotalView will not catch C++ exception throws during single-step operations. Setting it to **false** may mean that TotalView will lose control of the process, and you may not be able to control the program.

Permitted Values: **true** or **false**

Default: **true**

TV::wrap_on_search

When **true**, TotalView will continue searching from either the beginning (if **Down** is also selected in the **Edit > Find** dialog box) or the end (if **Up** is also selected) if it doesn't find what you're looking for. For example, you search for **foo** and select the **Down** button. If TotalView doesn't find it in the text between the current position and the end of the file, TotalView will continue searching from the beginning of the file if you set this option.

Permitted Values: **true** or **false**

Default: **true**

TV::xplat_remcmd

A command that needs to be executed before executing a process on a remote host, e.g., **runauth**. This string is passed to MRNet instead of using the **XPLAT_REMCMD** environment variable. This value is only used when TotalView uses MRNet.

Permitted Values: a command

Default: {}

TV::xplat_rsh

An rsh command that is passed to MRNet instead of using the **XPLAT_RSH** environment variable. This command is used to launch remote processes. If this variable isn't explicitly set and the **XPLAT_RSH** environment variable is empty, TotalView uses the value of **TV::launch_command**. This value is used only when TotalView uses MRNet.

Permitted Values: a remote launch command

Default: {}

TV::xplat_rsh_args

A list of arguments that need to be given to the remote launch command. This string is passed to MRNet instead of using the **XPLAT_RSH_ARGS** environment variable. This value is only used when TotalView uses MRNet.

Permitted Values: a space-separated list of remote launch arguments

Default: {}

TV::xterm_name

The name of the program that TotalView should use when spawning the CLI. In most cases, you will set this using the **-xterm_name** command-line option.

Permitted Values: a string

Default: **xterm**

TV::MEMDEBUG:: Namespace

TV::MEMDEBUG::default_snippet_extent

Defines the number of code lines above and below point of allocation that the Memory Debugger saves when it is adding code snippets to saved output.

You can also set this value using a Memory Debugger preference.

Permitted Values: A positive integer number

Default: 5

TV::MEMDEBUG::do_not_apply_hia_defaults

If set to **true**, tells the Memory Debugger that it should use settings it finds in a default **.hiarc** file. Otherwise, the Memory Debuggers sets all options to off.

You can also set this value using a Memory Debugger preference.

Permitted Values: **true** or **false**

Default: **false**

TV::MEMDEBUG::hia_allow_ibm_poe

Tells the Memory Debugger if you can enable memory debugging on poe. As the default value is **false**, set this variable if you want memory debugging to be on by default. This variable is hardly ever used.

Permitted Values: **true** or **false**

Default: **false**

TV::MEMDEBUG::ignore_snippets

When **true**, the Memory Debugger ignores code snippets that it saved and instead locates the information from your program's files.

You can also set this value using Memory Debugger preference.

Permitted Values: **true** or **false**

Default: **false**

TV::MEMDEBUG::leak_check_interior_pointers

When **true**, the Memory Debugger considers a block as being referenced if a pointer is pointing anywhere within the block instead of just at the block's starting location. In most programs, the code should be keeping track of the block's boundary. However, if your C++ program is using multiple inheritance, you may be pointing into the middle of the block without knowing it.

Permitted Values: **true** or **false**

Default: **true**

TV::MEMDEBUG::leak_detection_alignment

Specifies the alignment and stride TotalView uses as it steps through memory looking for pointers during leak detection. If 0 (the default value), then TotalView defaults to using the size of a pointer, which varies according to platform and programming model. In normal circumstances you should not need to adjust the alignment.

Permitted Values: A non-negative integer number

Default: **0**

TV::MEMDEBUG::leak_max_cache

Sets the size of the Memory Debugger's cache. We urge you not to change this value unless your program is exceptionally large or are asked to make the change by someone on the TotalView support team.

Permitted Values: A positive integer number

Default: 4194304

TV::MEMDEBUG::leak_max_chunk

Tells the Memory Debugger how much memory it should obtain when it obtains memory from your operating system. You shouldn't change this value unless asked to by someone on the TotalView support team.

Permitted Values: A positive integer number

Default: 4194304

TV::MEMDEBUG::shared_data_filters

Names a filter definition file that is not located in the default directory. (The default directory is the **lib** subdirectory within the TotalView installation directory.) The contents of this variable are read when TotalView begins executing. Consequently, TotalView ignores any changes you make during the debugging session. The following example names the directory in which the filter file resides. This example assumes that filter has the default name, which is **tv_filters.tvd**.

dset TV::MEMDEBUG::shared_data_filters {/home/projects/filters/}

Use brackets so that Tcl doesn't interpret the "/" as a mathematical operator. If you wish to use a specific file, just use its name in this command. For example:

dset TV::MEMDEBUG::shared_data_filters \ {/home/projects/filters/filter.tvd}

The file must have a **.tvd** extension.

Permitted Values: A string naming the path to the filter directory.

Default: none

TV::GUI:: Namespace

NOTE >> The variables in this section have meaning (and in some cases, a value) only when you are using the TotalView GUI.

TV::GUI::chase_mouse

When this variable is set to **true**, TotalView displays dialog boxes at the location of the mouse cursor. If this is set to **false**, TotalView displays them centered in the upper third of the screen.

Permitted Values: **true** or **false**

Default: **true**

TV::GUI::display_bytes_kb_mb

When **true**, the Memory Debugger displays memory block sizes in megabytes. If set to **false**, it displays memory blocks sizes in kilobytes.

Permitted Values: **true** or **false**

Default: **true**

TV::GUI::display_font_dpi

Indicates the video monitor DPI (dots per inch) at which fonts are displayed.

Permitted Values: An integer

Default: 75

TV::GUI::enabled

When **true**, you invoked the CLI from the GUI or a startup script. Otherwise, this read-only value is **false**.

Permitted Values: **true** or **false**

Default: **true** if you are running the GUI even though you are seeing this in a CLI window; **false** if you are only running the CLI

TV::GUI::fixed_font

Indicates the specific font TotalView uses when displaying program information such as source code in the Process Window or data in the Variable Window. This variable contains the value set when you select a **Code and Data Font** entry in the **Fonts** Page of the **File > Preferences** dialog box.

This is a read-only variable.

Permitted Values: A string naming a fixed font residing on your system

Default: While this is platform specific, here is a representative value:**-adobe-courier-medium-r-normal--12-120-75-75-m-70-iso8859-1**

TV::GUI::fixed_font_family

Indicates the specific font TotalView uses when displaying program information such as source code in the Process Window or data in the Variable Window. This variable contains the value set when you select a **Code and Data Font** entry of the **Fonts** Page of the **File > Preferences** dialog box.

Permitted Values: A string representing an installed font family

Default: **fixed**

TV::GUI::fixed_font_size

Indicates the point size at which TotalView displays fixed font text. This is only useful if you have set a fixed font family because if you set a fixed font, the value entered contains the point size.

Font sizes are indicated using printer points.

Permitted Values: An integer

Default: 12

TV::GUI::font

Indicates the specific font used when TotalView writes information as the text in dialog boxes and in menu bars. This variable contains the information set when you select a **Select by full name** entry in the **Fonts** Page of the **File > Preferences** dialog box.

Permitted Values: A string naming a fixed font residing on your system. While this is platform specific, here is a representative value:**-adobe-helvetica-medium-r-normal--12-120-75-75-p-67-iso8859-1**

Default: **helvetica**

TV::GUI::force_window_positions

Setting this variable to **true** tells TotalView that it should use the version 4 window layout algorithm. This algorithm tells the window manager where to set the window. It also cascades windows from a base location for each window type. If this is not set, which is the default, newer window managers such as **kwm** or **Enlightenment** can use their smart placement modes.

Dialog boxes still chase the pointer as needed and are unaffected by this setting.

Permitted Values: **true** or **false**

Default: **false**

TV::GUI::frame_offset_x

Not implemented.

TV::GUI::frame_offset_y

Not implemented.

TV::GUI::geometry_call_tree

Specifies the position at which TotalView displays the **Tools > Call Tree** Window. This position is set using a list containing four values: the window's **x** and **y** coordinates. These are followed by two more values specifying the window's width and height.

If you set any of these values to 0 (zero), TotalView uses its default value. This means, however, you cannot place a window at **x**, **y** coordinates of 0, 0. Instead, you'll need to place the window at 1, 1.

If you specify negative **x** and **y** coordinates, TotalView aligns the window to the opposite edge of the screen.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_cli

Specifies the position at which TotalView displays the **Tools > CLI** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_expressions

Specifies the position at which TotalView displays the **Tools > Expression List** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_globals

Specifies the position at which TotalView displays the **Tools > Program Browser** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_help

Specifies the position at which TotalView displays the **Help** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_memory_stats

Specifies the position at which TotalView displays the **Tools > Memory Statistics** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinate's and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_message_queue

Specifies the position at which TotalView displays the **Tools > Message Queue** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_message_queue_graph

Specifies the position at which TotalView displays the **Tools > Message Queue Graph** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_modules

Specifies the position at which TotalView displays the **Tools > Fortran Modules** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height.

Default: **{0 0 0 0}**

TV::GUI::geometry_process

Specifies the position at which TotalView displays the Process Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_ptset

No longer used.

TV::GUI::geometry_root

Specifies the position at which TotalView displays the Root Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_thread_objects

Specifies the position at which TotalView displays the **Tools > Thread Objects** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_variable

Specifies the position at which TotalView displays the Variable Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::geometry_variable_stats

Specifies the position at which TotalView displays the **Tools > Statistics** Window.

See TV::GUI::geometry_call_tree for information on setting this list.

Permitted Values: A list containing four integers indicating the window's **x** and **y** coordinates and the window's width and height

Default: **{0 0 0 0}**

TV::GUI::hand_cursor_enabled

Specifies whether the cursor should change to a hand cursor when hovering over an element you can dive into in the source pane of the process window.

Permitted Values: **true** or **false**

Default: **true**

TV::GUI::heap_summary_refresh

Not user settable.

TV::GUI::inverse_video

Not implemented.

TV::GUI::keep_expressions

Deprecated.

TV::GUI::keep_search_dialog

When **true**, TotalView doesn't remove the **Edit > Find** dialog box after you select that dialog box's **Find** button. If you select this option, you will need to select the **Close** button to dismiss the **Edit > Find** box.

Permitted Values: **true** or **false**

Default: **true**

TV::GUI::old_root_window

When **true**, TotalView replaces the Root Window with the Root Window used in versions prior to TotalView for HPC 8.15. You can override this value using the following command-line options:

- **-oldroot** sets this variable to **true**
- **-newroot** sets this variable to **false**

NOTE >> Using the previous-version Root Window may affect performance of applications containing thousands of threads/processes.

Permitted Values: **true** or **false**

Default: **false**

TV::GUI::pop_at_breakpoint

When **true**, TotalView sets the **Open (or raise) process window at breakpoint** check box to be selected by default. If this variable is set to **false**, it sets that check box to be deselected by default.

Permitted Values: **true** or **false**

Default: **false**

TV::GUI::pop_on_error

When **true**, TotalView sets the **Open process window on error signal** check box in the **File > Preferences**'s **Option** Page to be selected by default. If you set this to **false**, TotalView sets that check box to be deselected by default.

Permitted Values: **true** or **false**

Default: **true**

TV::GUI::process_grid_wanted

When **true**, TotalView enables the Processes/Ranks Tab in the Process Window. Enabling this tab can significantly affect performance, particularly for large, massively parallel applications.

Permitted Values: **true** or **false**

Default: **false**

TV::GUI::show_startup_parameters

Setting this value to true tells TotalView to display that it should display the Process > Startup dialog box when you use a program name as an argument to the TotalView command.

Permitted Values: **true** or **false**

Default: **true**

TV:GUI:show_sys_thread_id

Setting this value to true tells TotalView to display the current thread's system thread ID within the TotalView GUI.

Permitted Values: **true** or **false**

Default: **true**

TV::GUI::single_click_dive_enabled

When set, you can perform dive operations using the middle mouse button. Diving using a left-double-click still works. If you are editing a field, clicking the middle mouse performs a paste operation.

Permitted Values: **true** or **false**

Default: **true**

TV::GUI::toolbar_style

This value set defines toolbar display.

Permitted Values: **icons_above_text**, **icons_besides_text**, **icons**, or **text**

Default: **icons_above_text**

TV::GUI::tooltips_enabled

When **true**, variable tooltips are displayed in the Process Window Source Pane.

Permitted Values: **true** or **false**

Default: **true**

TV::GUI::ui_font

Indicates the specific font used when TotalView writes information as the text in dialog boxes and in menu bars. This variable contains the information set when you select a **Select by full name** entry in the **Fonts** Page of the **File > Preferences** dialog box.

Permitted Values: While this is platform specific, here is a representative value:**-adobe-helvetica-medium-r-normal--12-120-75-75-p-67-iso8859-1**

Default: **helvetica**

TV::GUI::ui_font_family

Indicates the family of fonts that TotalView uses when displaying such information as the text in dialog boxes and menu bars. This variable contains the information set when you select a **Family** in the **Fonts** Page of the **File > Preferences** dialog box.

Permitted Values: A string

Default: **helvetica**

TV::GUI::ui_font_size

Indicates the point size at which TotalView writes the font used for displaying such information as the text in dialog boxes and menu bars. This variable contains the information set when you select a User Interface **Size** in the **Fonts** Page of the **File > Preferences** dialog box.

Permitted Values: An integer

Default: **12**

TV::GUI::using_color

Not implemented.

TV::GUI::using_text_color

Not implemented.

TV::GUI::using_title_color

Not implemented.

TV::GUI::version

This number indicates which version of the TotalView GUI is being displayed. This is a read-only variable.

Permitted Values: A number

Chapter 6

Creating Type Transformations

Overview

The Type Transformation Facility (TTF) lets you define the way TotalView displays aggregate data. *Aggregate data* is simply a collection of data elements from within one class or structure. These elements can also be other aggregated elements. In most cases, you will create transformations that model data that your program stores in an array- or list-like way. You can also transform arrays of structures.

This chapter describes the TTF. It presents information on how you create your own. Creating transformations can be quite complicated. This chapter looks at transformations for which TotalView can automatically create an addressing expression.

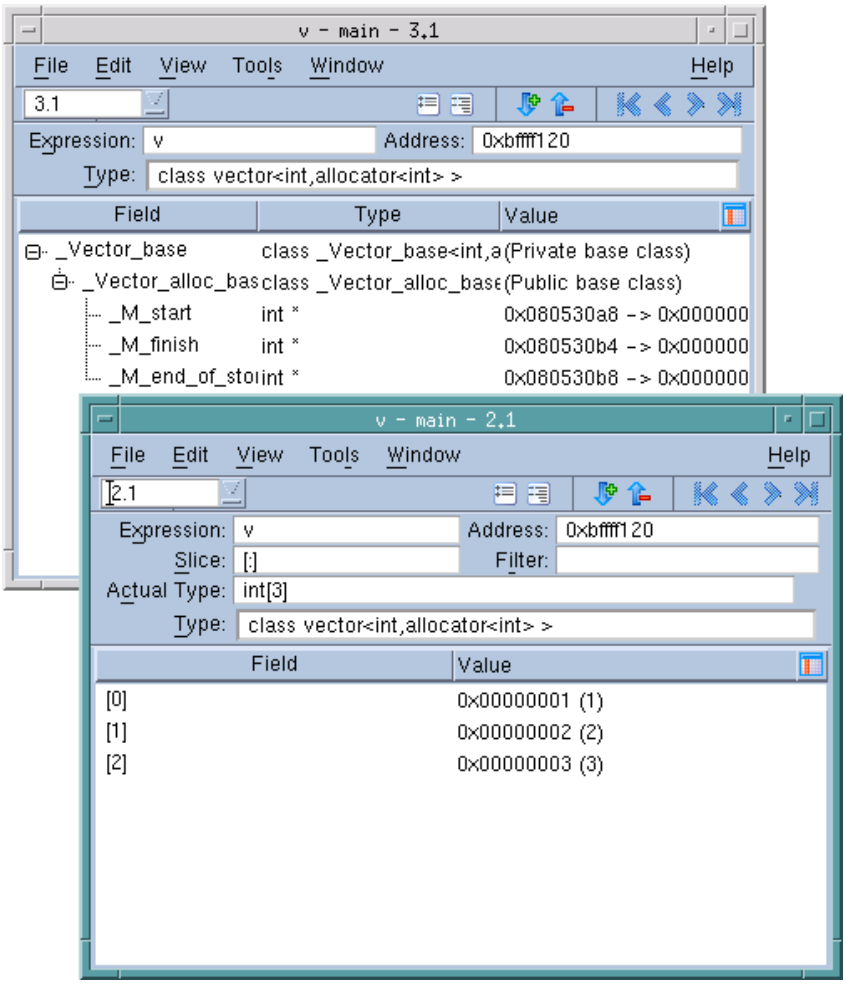
The chapter also describes C++View (CV), a facility that allows you to format program data in a more useful or meaningful form than the concrete representation that you see in TotalView when you inspect data in a running program.

Topics in this chapter are:

Why Type Transformations

Modern programming languages allow you to use abstractions such as structures, class, and STL data types such as lists, maps, multimaps, sets, multisets, and vectors to model the data that your program uses. For example, the STL (Standard Template Library) allows you to create vectors of the data contained within a class. These abstractions simplify the way in which you think of and manipulate program's data. These abstractions can also complicate the way in which you debug your program because it may be nearly impossible or very inconvenient to examine your program's data. For example, Figure 6 shows a vector transformation.

Figure 6 – A Vector Transformation



The upper left window shows untransformed information. In this example, TotalView displays the complete structure of this GNU C++ STL structure. This means that you are seeing the data exactly as your compiler created it.

The logical model that is the reason for using an STL vector is buried within this information. Neither TotalView nor your compiler has this information. This is where type transformations come in. They give TotalView knowledge of how the data is structured and how it can access data elements. The bottom Variable Window shows how TotalView reorganizes this information.

NOTE >> By default, TotalView transforms STL strings, vectors, lists, maps, multimaps, sets, and multisets. The unordered STL types, unordered_map, unordered_multimap, unordered_set and unordered_multiset, are transformed for recent g++ compilers. If you do not want TotalView to transform your information, select the Options Tab within the File > Preferences Dialog Box and remove the check mark from View simplified STL containers (and user-defined transformations).

Creating Structure and Class Transformations

The procedure for transforming a structure or a class requires that create a mapping between the elements of the structure or class and the way in which you want this information to appear.

This section contains the following topics:

Transforming Structures

The following small program contains a structure and the statements necessary to initialize it:

```
#include <stdio.h>

int main () {
   struct stuff {
       int month;
       int day;
       int year;
       char * pName;
       char * pStreet;
       char CityState[30];
   };

   struct stuff info;
   char my_name[]   = "John Smith";
   char my_street[] = "24 Prime Parkway, Suite 106";
   char my_CityState[] = "Natick, MA 01760";

   info.month = 6;
   info.day   = 20;
   info.year  = 2004;
   info.pName = my_name;
   info.pStreet  = my_street;
   strcpy(info.CityState, my_CityState);

   printf("The year is %d\n", info.year);
}
```

Suppose that you do not want to see the **month** and **day** components. You can do this by creating a transformation that names just the elements you want to include:

```
::TV::TTF::RTF::build_struct_transform {
   name   {^struct stuff$}
   members {
          { year     { year      } }
          { pName    { * pName   } }
          { pStreet  { * pStreet } }
   }
}
```

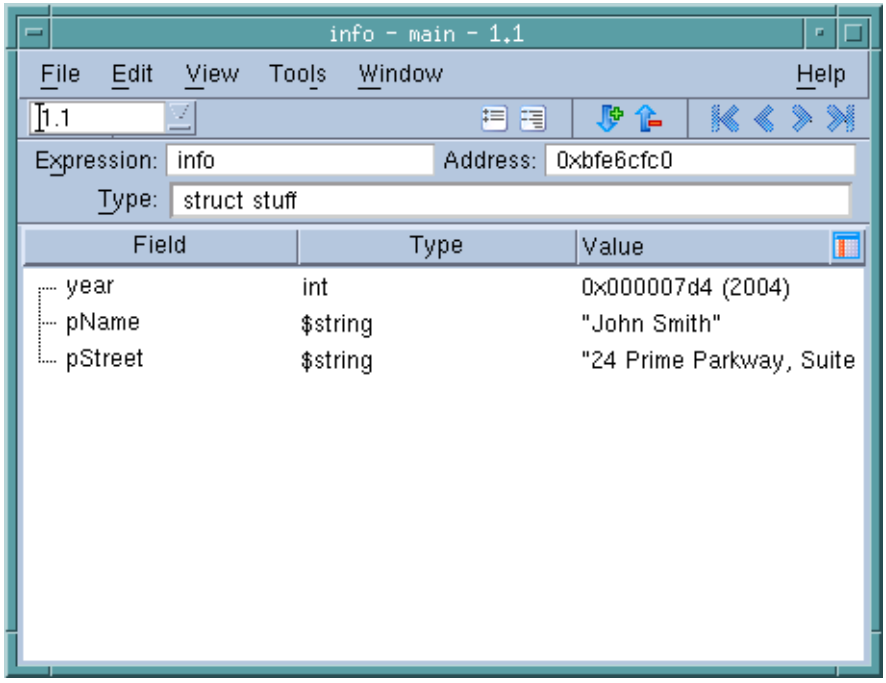
You can apply this transformation to your data in the following ways:

- After opening the program, use the **Tools > Command Line** command to open a CLI Window. Next, type this function call.
- If you write the function call into a file, use the Tcl **source** command. If the name of the file is **stuff.tvd**, enter the following command into a CLI Window:

  source stuff.tvd
- You can place the transformation source file into the same directory as the executable, giving it the same root name as the executable. If the executable file has the name **stuff**, TotalView will automatically execute all commands within a file named **stuff.tvd** when it loads your executable.

After TotalView processes your transformation, it displays the Variable Window when you dive on the **info** structure:

Figure 7 – Transforming a Structure



build_struct_transform Function

The **build_struct_transform** routine used in the example in the previous section is a Tcl helper function that builds the callbacks and addressing expressions that TotalView needs when it transforms data. It has two required arguments: **name** and **members**.

name Argument

The **name** argument contains a regular expression that identifies the structure or class. In this example, **struct** is part of the identifier's name. It does not mean that you are creating a structure. In contrast, if **stuff** is class, you would type:

```
name  {^class stuff$}
```

If you use a wildcard such as asterisk ()* or question mark (?), TotalView can match more than one thing. In some cases, this is what you want. If it isn't, you need to be more precise in your wildcard.

members Argument

The **members** argument names the elements that TotalView will include in the information it will display. This argument contains one or more lists. The example in the previous section contained three lists: **year**, **pName**, and **pStreet**. Here again is the **pName** list:

```
{ pName   { * pName  } }
```

The first element in the list is the display name. In most cases, this is the name that exists in the structure or class. However, you can use another name. For example, since the transformation dereferences the pointer, you might want to change its name to **Name**:

```
{ Name    { * pName   } }
```

The sublist within the list defines a type transformation expression. These expressions are discussed in the next section.

Type Transformation Expressions

The list that defines a member has a name component and sublist within the list. This sublist defines a *type transformation expression.* This expression tells TotalView what it needs to know to locate the member. The example in the previous section used two of the six possible expressions. The following list describes these expressions:

{member}

No transformation occurs. The structure or class member that TotalView displays is the same as it displays if you hadn't used a transformation. This is most often used for simple data types such as ints and floats.

{* expr}

Dereferences a pointer. If the data element is a pointer to an element, this expression tells TotalView to dereference the pointer and display the dereferenced information.

{expr . expr}

Names a subelement of a structure. This is used in the same way as the dot operator that exists in C and C++. You must type a space before and after the dot operator.

{expr + offset}

Use the data whose location is an offset away from `expr`. This behaves just like pointer arithmetic in C and C++. The result is calculated based on the size of the type that `expr` points to:

```
result = expr + sizeof(*expr) * offset
```

{expr -> expr}

Names a subelement in a structure accessed using a pointer. This is used in the same way as the `->` operator in C and C++. You must type a space before and after the `->` operator.

{datatype cast expr}

Casts a data type. For example:

{double cast national_debt}

{N upcast expr}

Converts the current class type into one of its base classes. For example:

{base_class upcast expr }

You can nest expressions within expressions. For example, here is the list for adding an int member that is defined as **int **pfoo**:

{foo { * {* pfoo}}

Example

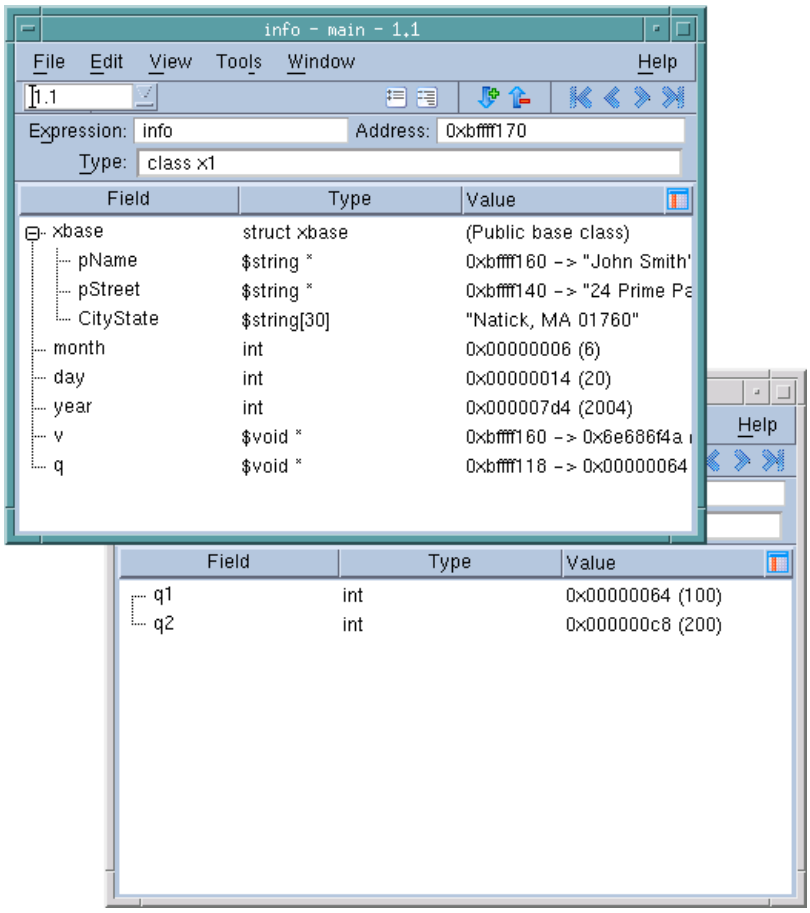
The example in this section changes the structure elements of the example in the previous section so that they are now class members. In addition, this example contains a class that is derived from a second class:

```
#include <stdio.h>
#include <string.h>

class xbase
{
   public:
      char * pName;
      char * pStreet;
      char CityState[30];
};

class x1 : public xbase
{
   public:
      int month;
      int day;
      int year;
      void *v;
```

```
      void *q;
};

class x2
{
   public:
      int q1;
      int q2;
};

int main () {
   class x1 info;
   char my_name[]   = “John Smith”;
   char my_street[] = “24 Prime Parkway, Suite 106”;
   char my_CityState[] = “Natick, MA 01760”;

   info.month = 6;
   info.day   = 20;
   info.year  = 2004;
   info.pName = my_name;
   info.pStreet  = my_street;
   info.v  = (void *) my_name;
   strcpy(info.CityState, my_CityState);

   class x2 x;
   x.q1 = 100;
   x.q2 = 200;
   info.q = (void *) &x;

   printf(“The year is %d\n”, info.year);
}
```

Figure 8 shows the Variables Windows that TotalView displays for the **info** class and the **x** struct.

Figure 8 – Untransformed Data

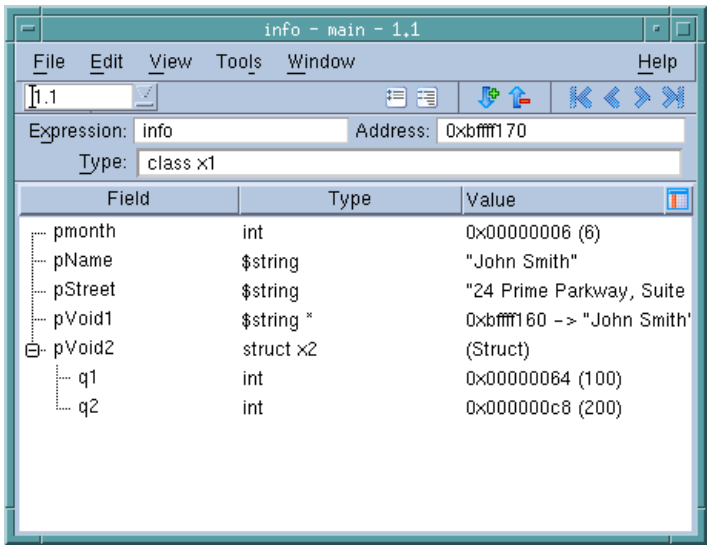


The following transformation remaps this information:

```
::TV::TTF::RTF::build_struct_transform {
   name   {^(class|struct) x1$}
   members {
      { pmonth   { month } }
      { pName    { xbase upcast { * pName   } } }
      { pStreet  { xbase upcast { * pStreet } } }
      { pVoid1   { "$string *"  cast v     } }
      { pVoid2   { * { "class x2 *"  cast q } } }
   }
}
```

After you remap the information, TotalView displays the **x1** class.

Figure 9 – Transformed Class



The members of this transformation are as follows:

- **pmonth**: The **month** member is added to the transformed structure without making any changes to the way TotalView displays its data. This member, however, changes the display name of the data element. That is, the name that TotalView uses to display a member within the remapped structure does not have to be the same as it is in the actual structure.
- **pName**: The **pName** member is added. The transformation contains two operations. The first dereferences the pointer. In addition, as **x1** is derived from **xbase**, you need to upcast the variable when you want to include it.

Notice that one expression is nested within another.

- **pStreet**: The **pStreet** member is added. The operations that are performed are the same as for **pName**.
- **pVoid1**: The **v** member is added. Because the application's definition of the data is **void ***, casting tells TotalView how it should interpret the information. In this example, the data is being cast into a pointer to a string.
- **pVoid2**: The **q** member is added. The transformation contains two operations. The first casts **q** into a pointer to the **x2** class. The second dereferences the pointer.

Using Type Transformations

When TotalView begins executing, it loads its built-in transformations. To locate the directory in which these files are stored, use the following CLI command:

```
dset TOTALVIEW_TCLLIB_PATH
```

Type transformations are always loaded. By default, they are turned on. From the GUI, you can control whether transformations are turned on or off by going to the **Options** Page of the **File > Preferences** Dialog Box and changing the **View simplified STL containers (and user-defined transformations)** item. For example, the following turns on type transformations:

```
dset TV::ttf true
```

C++View

C++View (CV) is a facility that allows you to format program data in a more useful or meaningful form than the concrete representation that you see in TotalView when you inspect data in a running program. To use C++View, you must write a function for each type whose format you would like to control.

This section contains the following topics:

Writing a Data Display Function

The frame of reference in describing this is C++.

In order for C++View to work correctly, the code you write and TotalView must cooperate. There are two key issues here. The first is registering your function so that TotalView can find it when it needs to format data for display. This is straightforward: all you need to do is to define your function to have the right name and prototype. When TotalView needs to format the data of type T, it will look for a function with this signature:

```
int TV_ttf_display_type ( const T * );
```

The **const** is deliberate to remind you that changes should not be made to the object being formatted for display. Many real-world applications are not entirely **const**-correct, and in cases where you must cast away the **const**, extreme caution is advised.

You will need to define a **TV_ttf_display_type** function for each type you want to format. A **TV_ttf_display_type** function may be at global scope, or it may be a class (static) method. It cannot be a member function.

The second issue concerns how the **TV_ttf_display_type** function which you will write communicates with TotalView. The API you will need to use is given in the header file **tv_data_display.h** included with your TotalView distribution in the **<***totalview-installation***>/src** directory.

Your **TV_ttf_display_type** will use the provided function **TV_ttf_add_row** to tell TotalView what information should be displayed. Its prototype is:

```
int TV_ttf_add_row ( const char *field_name,
                     const char *type_name,
                     const char *address );
```

The **field_name** parameter is the descriptive name of the data field being computed. It will be shown by TotalView in a form similar to that of the name of a structure's field. The **type_name** parameter is the type of the data to be displayed. It must be the name of a legal type name in the program, or one of TotalView's types.

As a convenience, the header file provides these symbols for you:

TV_ttf_type_ascii_string

This tells TotalView to format a character array as a string (i.e., left to right) instead of an array (top to bottom).

TV_ttf_type_int

This is an alias for TotalView integer type **$int.**

The third parameter, **address**, is the address in your program's address space of the object to be displayed.

TV_ttf_add_row should be called only as a result of TotalView invoking your **TV_ttf_display_type** function. It may be called by a **TV_ttf_display_type** called by TotalView, or by one of the descendant callees of that **TV_ttf_display_type**.

Example

Here are the definitions of a couple of classes:

```
class A {
    int   i;
    char *s;
};

class B {
    A     a;
    double d;
};
```

We can define the display callback functions as follows:

```
int TV_ttf_display_type ( const A *a )
{
 /* NOTE: error checking of value returned from TV ttf add_row \
    omitted */
 (void) TV_ttf_add_row ( "i", TV_ttf_type_int, &(a->i) );
 (void) TV_ttf_add_row ( "s", TV_ttf_type_ascii_string, a->s );

 /* indicate success to TotalView */
 TV_ttf_format_ok;
}

int TV_ttf_display_type ( const B *b )
{
 /* NOTE: error checking of value returned from TV ttf add_row \
    omitted */
 (void) TV_ttf_add_row ( "a", "A", &(b->a) );
 (void) TV_ttf_add_row ( "d", "double", &(b->d) );

 /* indicate success to TotalView */
 return TV_ttf_format_ok;
}
```

For brevity and clarity, we have omitted all error checking of the value returned from **TV_ttf_add_row.** We will discuss the possible values that a **TV_ttf_display_type** may return later.

For now, we just return a simple success.

We could have made one or both of the display callbacks a class method:

```
class A {
 int    i;
 char  *s;
public:
 static int TV_ttf_display_type ( const A *a );
};
```

```
int A::TV_ttf_display_type ( const A *a )
{
 /* as before */
}
```

and similarly for class B.

Templates

C++View can also be used with template classes. Consider this container class:

```
template <class T> class BoundsCheckedArray {
private:
 int size;
 T   *array;

public:
 typedef T value_type;

 T ( int s ) { ... }
 ...
};
```

Writing a collection of overloaded display functions for each instantiated **BoundsCheckedArray** can rapidly become an overwhelming maintenance burden. Instead, consider whether you can write a template function.

One potential difficulty is getting the name of the type parameter to pass to **TV_ttf_add_row**. Here we follow the convention used by the container classes in the standard library which typedefs the template type parameter to the standard name **value_type**.

We can construct our template function like this:

```
template <class T>
int TV_ttf_display_type ( const BoundsCheckedArray<T> *a )
{
 char type [ 4096 ];

 snprintf ( type, sizeof ( type ), "value_type[%d]",        \
            a->get_size () );

 TV_ttf_add_row ( "array_values", type, a->get_array () );
 return TV_ttf_format_ok;
}
```

What we've done here is constructed the type of a fixed-sized array of the type named by the template type parameter. (In some cases you may need to use the compiler's demangler to get the name of the type. See also "Tips and Tricks" on page 326.)

This one definition can be used for any instance of the template class. In some cases, however, you may want a specialized implementation of the display function. As an illustration, consider this:

```
int TV_ttf_display_type ( const BoundsCheckedArray<char> *s )
{
 TV_ttf_add_row ( "string", TV_ttf_type_ascii_string,        \
                  s->get_array () );
    return TV_ttf_format_ok;
  }
```

Here we want to tell TotalView to display the array horizontally as a string instead of vertically as an array. For this reason, we want to pass **TV_ttf_type_ascii_string** to **TV_ttf_add_row** as the name of the type instead of the name constructed by the implementation of the general template display function. We therefore define a special version of the display function to handle **BoundsCheckedArray<char>**.

One remaining issue relating to templates is arranging for the various template display function instances to be instantiated. It is unlikely that display functions will be called directly by your program. (Indeed, we mentioned earlier that **TV_ttf_add_row** should not be called other than as a result of a call initiated by TotalView.) Consequently, the template functions may well not be generated automatically. You can either arrange for functions to be referenced, such as by calling them in a controlled manner, or by explicit template instantiation:

```
template int TV_ttf_display_type                          \
        ( const BoundsCheckedArray<int> * );
template int TV_ttf_display_type                          \
        ( const BoundsCheckedArray<double> * );
.
.
```

Precedence - Searching for TV_ttf_display_type

Only one call to a **TV_ttf_display_type** will be attempted per object to be displayed, even if multiple candidates are defined. For a type **T**, TotalView will look for the function in this order:

1. A class-qualified class (static) function returning **int** and taking a single **const T *** as its only argument.
2. A function at file scope, returning **int** and taking a single **const T *** as its only argument.
3. A global function, returning **int** and taking a single **const T *** as its only argument.
4. A TCL transformation

Namespace qualifications are not directly considered.

TV_ttf_add_row

TV_ttf_add_row will return one of the following values defined in the enum **TV_ttf_error_codes** given in the file **tv_data_display.h,** located in the **<***totalview-installation***>/include** directory in your distribution of TotalView.

The values returned by **TV_ttf_add_row** are:

TV_ttf_ec_ok

Indicates that the operation succeeded.

TV_ttf_ec_not_ active

Indicates that TV_ttf_add_row was called when the type formatting facility is not active. This is most likely to occur if **TV_ttf_add_row** is called other than as a result of a call to a **TV_ttf_display_type** initiated by TotalView.

TV_ttf_ec_invalid_characters

Indicates that either the field name or the type name contained illegal characters, such as **newline** or **tab**.

TV_ttf_ec_buffer_exhausted

Indicates that the internal buffer used by **TV_ttf_add_row** to marshal your formatted data for onward transmission to TotalView is full. See "Tips and Tricks" on page 326 for suggestions for reducing the number of calls to **TV_ttf_add_row**.

Return values from TV_ttf_display_type

The set of values your **TV_ttf_display_function** may return to TotalView is defined in the enum **TV_ttf_format_result** given in the file **tv_data_display.h** included with your distribution of TotalView. These values are:

TV_ttf_format_ok

Your function should return this value if it has successfully formatted the data and successfully registered its output using **TV_ttf_add_row**.

TV_ttf_format_ok_elide

As **TV_ttf_format_ok** but indicates that the output may be subject to type elision (see below).

TV_ttf_format_ failed

Return this if your function was unable to format the data. When displaying the data, TotalView will indicate that an error occurred.

TV_ttf_format_ raw

Use this to have your function tell TotalView to display the raw data as it would normally do, that is, as if there were no **TV_ttf_display_type** present for that type.

TV_ttf_format_ never

As **TV_ttf_format_raw.** In addition, this value tells TotalView never to call the display function again.

Elision

Elision is a feature that allows you to simplify how your data are presented. Consider the **BoundsCheckedArray<char>** class and the specialized **TV_ttf_display_type** function we defined earlier:

```
int TV_ttf_display_type ( const BoundsCheckedArray<char> *s )
{
 (void) TV_ttf_add_row ( "string", TV_ttf_type_ascii_string,  \
                              s->get_array () );
 return TV_ttf_format_ok;
}
```

We used **TV_ttf_type_ascii_string** so that the array of characters is presented horizontally as a string, rather than vertically as an array. If our program declares a variable **BoundsCheckedArray<char> var1**, we will see output like this in the CLI:

```
d1.<> dprint var1
 var1 = {
  string = "Hello World!"
}
d1.<>
```

Note, however, that the variable **var1** is still presented as an aggregate or class. Conceptually this is unnecessary, and in this arrangement an extra dive may be necessary to examine the data. Additionally, more screen space is needed than is necessary.

You can use elision to promote the member of a class out one level. With elision, we will get output that looks like this:

```
d1.<> dprint var1
 string = "Hello World!"
d1.<>
```

TotalView will engage elision if your **TV_ttf_display_type** function returns **TV_ttf_format_ok_elide** (in place of **TV_ttf_format_ok**). In addition, for elision to occur, the object being presented must have only one field.

Other Constraints

An aggregate type cannot contain itself. (An attempt to do so would result in an infinite sized aggregate.) When generating a field of an aggregate **T** using **TV_ttf_add_row**, the named type may not be **T**, or anything which directly or indirectly contains a **T** as a member. If you do need to do something like that, use a pointer or reference.

As an illustration, consider this:

```
class A { ... };
class B { A a; ... };

int TV_ttf_display_type ( const A *a )
{
  (void) TV_ttf_add_row ( ... );
  return TV_ttf_format_ok;
}
int TV_ttf_display_type ( const B *b )
{
  (void) TV_ttf_add_row ( ... );
  (void) TV_ttf_add_row ( "a", "A", &(b->a) );
  return TV_ttf_format_ok;
}
```

Note the following:

- **TV_ttf_display_type (const A *a)** may not add an object of type **A** (direct inclusion) nor one of type **B** (indirect inclusion).
- When viewing an object of type **B**, TotalView will invoke **TV_ttf_add_row (const B *)**, and then **TV_ttf_add_row (const *A)**.

Safety

When you stop your program to inspect data, objects might not be in a fully consistent state. This may happen in a number of circumstances, such as:

- Stopping in a the middle of a constructor or destructor.
- Displaying an object in scope, but before its constructor has been called.
- Viewing a dangling pointer to an object, that is, a pointer to an object in memory that has been released by the program. This may be stack memory, but also heap memory. (If the target is running with memory debugging enabled, then TotalView does check that the object to be displayed does not lie in a deallocated region. If it does, then it does not call your **TV_ttf_display_type**, and will display the data in their raw form You should not, however, rely on this check.)

In the absence of C++View, this is not a problem, as displaying the data is just a matter of reading memory. However, with C++View, displaying data now involves executing functions in the target code. Your functions should be careful to check that the object to be displayed is in a consistent state. If you can't establish that with certainty, then it should not attempt to format the data, and instead it should return **TV_ttf_format_failed**.

Otherwise, your target program may crash when you attempt to display an object at an inappropriate time. As with any function call made from TotalView (expression list, evaluation window, etc.), TotalView recovers from this in a limited manner by posting an error message and restoring the stack to its original state. However, the target code may be left in an inconsistent or corrupted state, and further progress may not be possible or useful.

You may not place a breakpoint in a **TV_ttf_display_type** function. If you do, the callback will be aborted similarly, and TotalView will display an error.

Memory Management

You must make sure that the formatted data you want displayed by TotalView (the data whose address you supply as the third parameter to **TV_ttf_add_row)** remains allocated after the call to your **TV_ttf_display_type** returns. In practice this means that you shouldn't allocate these data on the stack. Your **TV_ttf_display_type** function may be called at anytime, including when your target program may be in the memory manager. For this reason it is inadvisable to allocate or deallocate dynamic memory in your **TV_ttf_display_type** functions. If the formatted data are manufactured, that is, generated by **TV_ttf_display_type** rather than already existing, then the memory for those data should be allocated during the target's normal course of execution.

You may find it convenient to have your program format data as part of its normal operations.That way there are no side-effects to worry about when TotalView calls your **TV_ttf_display_type** callback function.

The **field_name** and **type_name** string parameters to **TV_ttf_add_row** do not need to remain allocated after the call to TV_ttf_add_row.

Multithreading

Accessing shared data in multithreaded environments will usually need some sort of access control mechanism to protect its consistency and correctness. Your **TV_ttf_display_type** functions must be coded carefully if they need to access data that are usually protected by a lock or mutex. Attempting to take the lock or mutex may result in deadlock if the mutex is already locked.

Usually the threads in the program will have been stopped when TotalView calls the **TV_ttf_display_type** function. If the mutex is locked before TotalView calls **TV_ttf_display_type**, then an attempt by **TV_ttf_display_type** to lock the mutex will result in deadlock.

If you are designing a **TV_ttf_display_type** that needs to access data usually protected by a lock or mutex, consider whether you are able to determine whether the data are in a consistent state without having to take the lock. It might be enough to be able to determine whether the mutex is locked. If the data cannot be accessed safely, have the **TV_ttf_display_type** return **TV_ttf_format_failed** or **TV_ttf_format_raw** according to what fits best with your requirements.

Tips and Tricks

Consider constructing the type name on-the-fly. This can save time and memory. As an example, consider the **TV_ttf_display_type** for **BoundsCheckedArray<T>** we discussed earlier:

```
template <class T>
int TV_ttf_display_type ( const BoundsCheckedArray<T> *a )
{
  char type [ 4096 ];

  snprintf ( type, sizeof ( type ), "value_type[%d]", a->get_size () );

  (void) TV_ttf_add_row ( "array_values", type, a->get_array () );
  return TV_ttf_format_ok;
}
```

Note how we constructed an array type. The alternative would be to iterate **a->get_size ()** times calling **TV_ttf_add_row ()**. Depending on the number of elements, this could exhaust the API's buffer. In addition, there is a time penalty since TotalView will need to handle each line added by **TV_ttf_add_row** separately.

Constructing the array type as we did not only eliminates these disadvantages, it also provides other advantages. For example, as TotalView now knows that what is being presented is really an array, all the normal operations on arrays such as sorting, filtering, etc. are available.

Core Files

Because C++View needs to call a function in your program, C++View does not work with core files.

Using C++View with ReplayEngine

In general, C++View can be used with ReplayEngine just as with normal TotalView debugging. However, there are some differences you should be aware of. In both record mode and replay mode, TotalView switches your process into ReplayEngine's *volatile* mode before calling your `TV_ttf_display_type` function. When the call finishes, TotalView switches the process out of volatile mode. On entering volatile mode, ReplayEngine saves the state of the process, and on exiting volatile mode, ReplayEngine restores the saved status.

In most cases, executing `TV_ttf_display_type` in volatile mode behaves as you would expect. However, because ReplayEngine restores the earlier process state when it leaves volatile mode, any changes to process memory, such as writing to a variable, made while in volatile mode are lost.

This fact has implications for your program if your `TV_ttf_display_type` function modifies global or static data upon which either the function or the program relies. If `TV_ttf_display_type` does not change any global state, you will see no change in behavior when you engage ReplayEngine. However, if you generate synthetic values, such as the average, maximum or minimum values in an array, you cannot compute these in your `TV_ttf_display_type` function as the results will be lost when the function call terminates. Instead, consider generating them as a by-product of the program's normal execution as described in the section on Memory Management.

For more information on ReplayEngine, see *Getting Started with ReplayEngine*.

The behavior of C++View transformations under ReplayEngine is similar to TotalView for HPC's behavior when evaluating expressions with ReplayEngine enabled. For a discussion of this, see "Expression Evaluation with ReplayEngine" in the *TotalView for HPC User Guide*.

The following code demonstrates how engaging ReplayEngine might affect calls to `TV_ttf_display_type`. This example is shipped with the ReplayEngine example files as `cppview_example_5.cc`.

```
/* Example program demonstrating TotalView's C++View with ReplayEngine. */
/* Run with (in both record and replay modes) and without ReplayEngine. */
/* Note how c in main is displayed in the various cases. */

#include <stdio.h>
#include "tv_data_display.h"

static int counter;

class C {
  public:
    int   value;

    C () : value ( 0 ) {};
}; /* C */

int
TV_ttf_display_type(const C *c)
{
  int  ret_val = TV_ttf_format_ok;
  int  err;

  // if Replay is engaged, this write to the global is lost because
  // the ttf function is evaluated in volatile mode
  counter++;
```

```
  // error checking omitted for brevity
  (void) TV_ttf_add_row ( "value", "int", &(c->value) );

  // show how many times we've been called.  Will always be zero
  // with Replay engaged because the update is lost when the
  // call to TV_ttf_display_type returns.
  (void) TV_ttf_add_row ( "number_of_times_called", "int", &counter );

  return ret_val ;
} /* TV_ttf_display_type */

int main(int argc, char *argv[])
{
  C c;

  c.value = 1;

  c.value++;      // should be 1  **before**  this line is executed

  c.value++;      // should be 2  **before**  this line is executed

  /* c.value should be 3 */

  return 0;
} /* main */
```

Compile and link the program with `tv_data_display.c` (see Compiling and linking tv_data_display.c). Follow this procedure:

1. Start the program under TotalView and enter the function `main`.
2. Dive on the local variable `c`, and note how the synthetic member `number_of_times_called` changes as you step through the program.
3. Restart, but this time with ReplayEngine engaged.
4. Notice the changes to the `value` member as you move forwards and backwards, and that the synthetic member `number_of_times_called` remains 0 because the increment in `TV_ttf_display_type` is lost when the function returns.

C

Although primarily intended for C++, C++View may be usable with C. C does not allow overloading so there may be at most one **TV_ttf_display_type** function with external linkage present. If you are interested in formatting only one type, then this restriction will not be constraining.

You may be able to work around this problem by defining separate **TV_ttf_display_type** functions as before, but placing each in a different file, and defining them to be static. Since the visibility of each definition is limited to the translation unit in which it appears, multiple functions can coexist.

This work-around, however, depends on the nature of the debug information emitted by the compiler. Some compilers do not place static functions in an indexable section in the debug information, or may try to optimize them out. If TotalView cannot find the function, it will not be called. TotalView cannot traverse the entire resolved symbol table to find these functions, as it would incur significant performance problems.

Fortran

Fortran variables don't readily lend themselves to transformation by C++View, but in some cases, such as when using a common block with Cray pointer variables, it is possible to set up a corresponding C structure and then use that type to push the transformation.

Example

Consider this test case using Cray pointers in a common block, including three parts:

- The Fortran code
- A common block defined in an include file
- The C code containing the C++View code

The Fortran Code

Here, the Fortran code sets up a common block with a few variables and then assigns them some values.

```
program pointerp

call stuff

end

subroutine stuff

include 'foop.cmn'

foo = 42
ix = 11
iy = 12
iz = 13

call doit(ix)

call readit
```

```
return
end

subroutine doit(ix_x)

include 'foop.cmn'

ipxp = malloc(8*ix_x*foo)
ipyp = malloc(8*iy*iz)

xp = 3
yp = 5

return
end

subroutine readit

include 'foop.cmn'
xp = 4

return
end
```

The include File

The Fortran include file **foop.cmn** sets up a common block **foo1** that corresponds to the C structure extern **foo1_**, both in bold below.

The include file, **foop.cmn**:

```
integer :: foo, ix, iy, iz
real(kind=8) :: xp, yp
pointer (ipxp, xp(foo,ix))
pointer (ipyp, yp(iy,iz))
common /foo1/ ix, iy, iz, foo, ipxp, ipyp
```

The C Code

The C code **fortranTV.c** defines structure extern **foo1_**, aligned to the Fortran common block **foo1**. Then, in the **TV_ttf_display_type** routine for the struct **foo**, the calls to **TV_ttf_add_row** follow the layout of the data in the common block, allowing us to view the data as we want to see it

The C code, **fortranTV.c**:

```
#include <stdio.h>

#include "tv_data_display.h"
```

```
#ifdef __cplusplus
extern "C" {
#endif

extern struct foo { int x ; } foo1_ ;

#ifdef __cplusplus
}
#endif

// Routine data display declaration
int TV_ttf_display_type(const struct foo *parameter)
{
  // Assign 'data' to the start of the common block
  int *data = (int *)parameter ;

  // Pick up the Cray pointer
  double **ptr = (double **) &data[4] ;
  char typeName[64] ;

  TV_ttf_add_row("ix", "int", &data[0]) ;
  TV_ttf_add_row("iy", "int", &data[1]) ;
  TV_ttf_add_row("iz", "int", &data[2]) ;
  TV_ttf_add_row("foo", "int", &data[3]) ;

  sprintf(typeName, "double[%d]", data[0]*data[3]) ;
  TV_ttf_add_row("ipxp", typeName, ptr[0]) ;

  sprintf(typeName, "double[%d]", data[1]*data[2]) ;
  TV_ttf_add_row("ipyp", typeName, ptr[1]) ;

  return TV_ttf_format_ok ;
}
```

Compiling and Linking

First compile the TotalView **tv_data_display.c** routine, as described in "Compiling and linking tv_data_display.c" on page 333.

Build the program and the C program to add in the C++View transform:

```
ifort -g -c pointerp.f

ifort -g -c fortranTV.c -I$TVINCLUDE
```

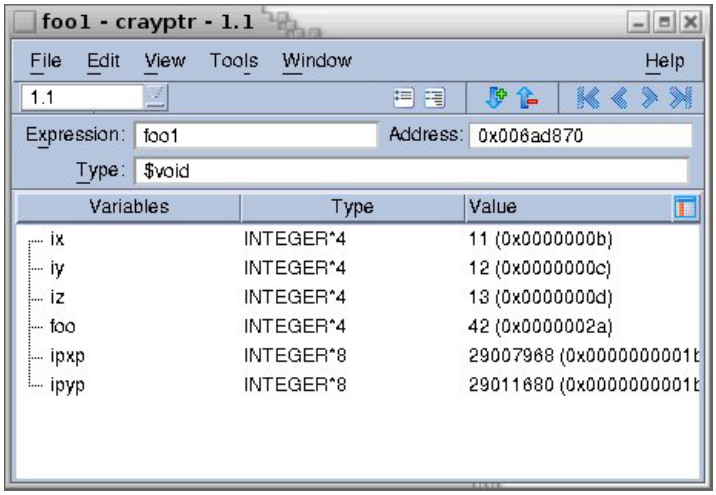
Finally, link the program:

```
ifort -g -o crayptr pointerp.o tv_data_display.o fortranTV.o
```

Debugging

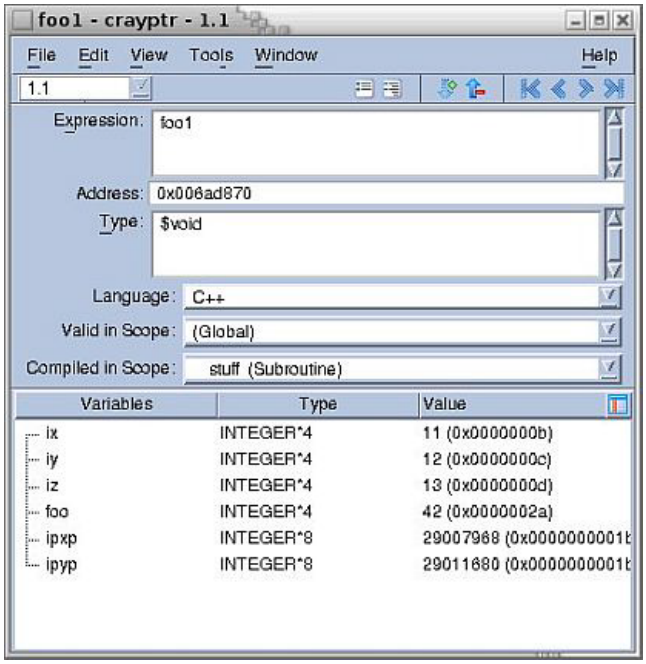
When you debug, set a breakpoint on the return statement on line 20, in subroutine **doit**. Run to the breakpoint and then dive on the common block **foo1**.

Figure 10 – Using C++ View with Fortran, diving on the Fortran pointer data



To see the data transformed more clearly, expand the type information (downward arrow with the + sign) and change the language to C or C++.

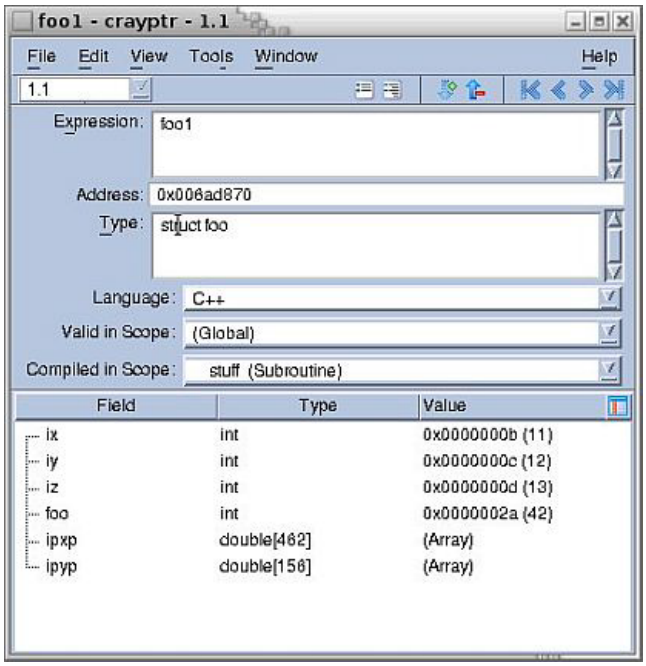
Figure 11 – Using C++ View with Fortran, changing language to C++



Then change the type from **$void** to **foo**, Figure 12.

Note that, while the original display of the common block shows the Cray pointers as integers (because a Cray pointer is actually an integer that holds only a memory address), the final, transformed display shows the data *referenced* by the pointers, or the arrays of doubles.

Figure 12 – Using C++ View with Fortran, transform the type



Compiling and linking tv_data_display.c

Your distribution includes the file **tv_data_display.c**. in the **<***totalview-installation***>/src** directory. This file contains the implementation of the interface between your **TV_ttf_display_type** functions and TotalView. This is distributed as source. You will need to compile this file and link it with your application.

You should take care to ensure that there is only one instance of **tv_data_display.c** present in your running application. One way in which multiple instances could creep in is if you link separate copies of the **tv_data_display.c** into independent shared libraries that your program uses. To avoid this type of problem, we strongly suggest that you build **tv_data_display.c** into its own separate shared library that can be shared by all the libraries your application uses. For example:

setenv TVSOURCE /usr/local/toolworks/totalview**.8.9.0-2/src**

setenv TVINCLUDE /usr/local/toolworks/totalview**.8.9.0-2/include**

**gcc -g -Wall -fPIC -c $TVSOURCE/tv_data_display.c -I$TVINCLUDE gcc -g **

-shared -Wl,-soname,libtv_data_display.so -o libtv_data_display.so tv_data_display.o

Some compilers or linkers will perform a type of garbage collection step and eliminate code or data that your application does not use. This affects C++View in two ways:

1. Your **TV_ttf_display_type** functions are unlikely to be called by your program.
2. Leading on from this, some of the entities in **tv_data_display.c** may not be reachable from your program.

As a result, the compiler or linker may identify your **TV_ttf_display_type** or **tv_data_display.c** as candidates for garbage collection and elimination. You can try to work around this problem by trying to create references to the **TV_ttf_display_type** functions.

Better still, we suggest identifying the flags for your compiler or linker that disable garbage collection. On AIX, for example, the linker flag **-bkeepfile:<filename>** tells the linker not to perform garbage collection in the file named **<filename>**.

C++View Example Files

Your TotalView distribution includes an examples directory, **<*totalview-installation*>/examples**, which includes the following C++View example files:

NOTE >> Some compilers, such as some versions of gcc, do not emit debug information for typedefs in class scopes, and therefore TotalView cannot find the type underlying **value_type** so C++View may not work with those compilers.

cppview_example_1

A simple example showing two **TV_ttf_display_type** functions, one a function at global scope, the other a class function. It also demonstrates elision.

cppview_example_2

A simple example using templates, showing how the type named in the template can be passed to **TV_ttf_add_row**.

cppview_example_3

A more complex example using templates, showing how a **TV_ttf_display_type** function can be either generic or specialized for a particular instantiation of a template class. It also demonstrates elision.

cppview_example_4

A more complex example showing the use of STL container classes, elision, and the different values that **TV_ttf_display_type** can return.

cppview_example_5

This example adds a synthetic member to a class, and can be used to explore how C++View behaves under ReplayEngine.

Limitations

With the exception of Sun, compilers that emit STABS debug information do not handle C++ namespaces. This affects TotalView in general and C++View in particular, in that references to entities in namespaces are not always resolved.

Licensing

The C++View API library is distributed as two files. The first is **tv_data_display.c**, an ANSI C file that contains the implementation of the API used by your **TV_ttf_display_type** functions. The other is **tv_data_display.h**, which is a matching header file.

These files are licensed so as to permit unlimited embedding and redistribution.

PART II

Running TotalView

This section of the *TotalView for HPC Reference Guide* contains information about command-line options you use when starting TotalView and the TotalView Debugger Server.

Chapter 7

TotalView Command Syntax

Overview

This chapter describes the syntax of the **totalview** command. Topics in this chapter are:

- Command-Line Syntax
- Command-Line Options

Command-Line Syntax

Format

totalview [*options* **] [** *executable* **[** *core-file* | *recording-file* **]] [** *-a* **[***args* **]]**

or

totalview [*options* **] -args** *executable* **[** *args* **]**

Arguments

options

TotalView options.

executable

Specifies the path name of the executable being debugged. This can be an absolute or relative path name. The executable must be compiled with debugging symbols turned on, normally the **-g** compiler option. Any multi-process programs that call **fork()**, **vfork()**, or **execve()** should be linked with the **dbfork** library.

core-file

Specifies the name of a core file. Use this argument in addition to *executable* when you want to examine a core file with TotalView.

recording-file

Specifies the name of a saved replay recording session file. Use this argument in addition to *executable* when you want to replay the recording session with TotalView.

args

Default target program arguments.

Description

TotalView is a source-level debugger with a motif-based graphic user interface and features for debugging distributed programs, multiprocess programs, and multithreaded programs. TotalView is available on a number of different platforms.

If you specify mutually exclusive options on the same command line (for example, -**--dynamic** and **-no_dynamic**), the last option listed is used.

Command-Line Options

-a *args*

Pass all subsequent arguments (specified by *args*) to the program specified by *filename*. This option must be the last one on the command line.

-aix_use_fast_ccw

Defined only on AIX, a synonym for the platform-independent **-use_fast_wp**, for TotalView script backward compatibility . See **-use_fast_wp** for more information.You must set this option on the command line; you cannot set it interactively using the CLI.

-aix_use_fast_trap

Defined only on AIX, a synonym for the platform-independent **-use_fast_trap**, for TotalView script backward compatibility. See **-use_fast_trap** for more information. You must set this option on the command line; you cannot set it interactively using the CLI.

-args *filename* [*args*]

Specifies *filename* as the executable to debug, with *args* as optional arguments to pass to your program. This option must be listed last on the command line. You can also use **--args** instead of **-args**, for compatibility with other debuggers.

-background *color*

Sets the general background color to *color*.

-bg *color*

Same as **-background**.

Default: **light blue**

-bluegene_q_user_threads

Enables handling of user-level (M:N) thread packages on BlueGene/Q systems.

-no_bluegene_q_user_threads

(Default) Disables handling of user-level (M:N) thread packages, improving startup performance at high scale. There is usually a 1:1 correspondence between user-level threads and kernel-level threads on BlueGene/Q systems.

-compiler_vars

(Alpha, HP, and SGI only.) Shows variables created by the Fortran compiler, as well as those in the user's program.

Some Fortran compilers (HP f90/f77, HP f90, SGI 7.2 compilers) output debugging information that describes variables the compiler itself has invented for purposes such as passing the length of character*(*) variables. By default, TotalView suppresses the display of these compiler-generated variables.

However, you can specify the **-compiler_vars** option to display these variables. This is useful when you are looking for a corruption of a run-time descriptor or are writing a -compiler.

-no_compiler_vars

(Default) Tells TotalView that it should not show variables created by the Fortran compiler.

-control_c_quick_shutdown-ccq

(Default) Tells TotalView to kills attached processes and exits.

-no_control_c_quick_shutdown -nccq

Invokes code that sometimes allows TotalView to better manage the way it kills parallel jobs when it works with management systems. This has only been tested with SLURM. It may not work with other systems.

-cuda

(Default) Enables CUDA debugging with TotalView.

-no_cuda

Disables CUDA debugging. Any CUDA kernels launched on a GPU device are not seen by the debugger, so the debugger can only debug the host code. **-nocuda** is the identical command.

-dbfork

(Default) Catches the **fork()**, **vfork()**, and **execve()** system calls if your executable is linked with the **dbfork** library.

-no_dbfork

Tells TotalView that it should not catch **fork()**, **vfork()**, and **execve()** system calls even if your executable is linked with the **dbfork** library.

-debug_file *console_outputfile*

Redirects TotalView console output to a file named *console_outputfile*.

If *consoleoutputfile* is the string **UNIQUE**, the filename **tv_dump.***hostname***.***pid* is used. If *console_outputfile* contains the string **'$$'** (note the escaping single quotes), *hostname***.***pid* is substituted. **UNIQUE** and **'$$'** are useful for separating the console output when running multiple **tvdsvr** processes.

All TotalView console output is written to **stderr**.

-default_parallel_attach_subset *subset_specification*

Specifies a set of MPI ranks to be attached to when an MPI job is created or attached to. The *subset_specification* is a space-separated list, the elements of which can be in one of these forms:

rank: that rank only

rank1-ranks2: all ranks between rank1 and rank2 inclusive

rank1-rank2:stride: every stride*th* rank between rank1 and rank2

A rank must be either a positive decimal integer or **max** (the last rank in the MPI job).

A *subset_specification* that is the empty string (**""**) is equivalent to **0-max**.

The **default_parallel_attach_subset** is used to initialize the **-parallel_attach_subset** property of an MPI starter process, which can be `get` or `set` in the CLI using:

`TV::process get` *dpid* `parallel_attach_subset`

`TV::process set` *dpid* `parallel_attach_subset -`*subset_specification*

The CLI dattach and dload **-parallel_attach_subset** *-subset_specification* overrides the **default_parallel_attach_subset** and sets the **parallel_attach_subset** property of the process being attached or loaded.

-demangler=*compiler*

Overrides the demangler and mangler TotalView uses by default. The following indicate override options.

-demangler=compaq: HP cxx on Linux (alpha)

-demangler=gnu: GNU C++ on Linux Alpha

-demangler=gnu_dot: GNU C++ on Linux x86

-demangler=gnu_v3:GNU C++ Linux x86

-demangler=kai: KAI C++

-demangler=kai3_n: KAI C++ version 3.n

-demangler=kai_4_0:KAI C++

-demangler=spro: SunPro C++ 4.0 or 4.2

-demangler=spro5: SunPro C++ 5.0 or later

-demangler=sun: Sun CFRONT C++

-demangler=xlc: IBM XLC/VAC++ compilers

-display *displayname*

Set the name of the X Windows display to *displayname*. For example, **-display vinnie:0.0** will display TotalView on the machine named "vinnie."

Default: The value of your DISPLAY environment variable.

-dll_ignore_prefix *list*

The colon-separated argument to this option tells TotalView that it should ignore files having this prefix when making a decision to ask about stopping the process when it *dlopens* a dynamic library. If the DLL being opened has any of the entries on this list as a prefix, the question is not asked.

-dll_stop_suffix *list*

The colon-separated argument to this option tells TotalView that if the library being opened has any of the entries on this list as a suffix, it should ask if it should open the library.

-dlopen_always_recalculate

(Default). Reevaluates breakpoint specifications on every **dlopen** call.

-no_dlopen_always_recalculate

Enables **dlopen** event filtering, deferring the reevaluation of breakpoint specifications until after the **dlopen** event. The point at which the breakpoint specifications are reevaluated depends on the value of the **TV::dlopen_recalculate_on_match** variable (see **-dlopen_recalculate_on_match** *glob-list*).

This setting impacts scalability in HPC computing environments. For details, see "Filtering dlopen Events" on page 381.

-dlopen_recalculate_on_match *glob-list*

Default: "" (the empty string)

This option's argument is a colon-separated list of simple glob patterns used to compare and match the *dlopened* library. A simple glob pattern is a string, optionally ending with asterisk character ('*****'). For information on the semantics of glob pattern matching, see TV::dlopen_recalculate_on_match.

Used with **-no_dlopen_always_recalculate**, when a **dlopen** event occurs, the name of the *dlopened* library is matched against the list of glob patterns; if the *glob-list* is empty (the default) or the name of the *dlopened* library does not match the *glob-list*, then breakpoint reevaluation is deferred until the process stops for some other reason (e.g., the process hits a breakpoint, the user stops the process, the process encounters a signal, etc.).

If the library name matches a pattern, the breakpoints are reevaluated immediately.

-dlopen_read_libraries_in_parallel

Enables **dlopen** events to be handled in parallel, reducing client/server communication overhead by using MRNet to fetch the library information.

-no_dlopen_read_libraries_in_parallel

(Default). Disables handling *dlopened* events in parallel.

This setting impacts scalability in HPC computing environments. For details, see "Handling dlopen Events in Parallel" on page 383.

-dump_core

Allows TotalView to dump a core file of itself when an internal error occurs. This is used to help Rogue Wave Software debug problems.

-e *commands*

Tells TotalView to immediately execute the CLI commands named within this argument. All information you enter here is sent directly to the CLI's Tcl interpreter. For example, the following writes a string to **stdout**:

```
cli -e 'puts hello'
```

You can have more than one **-e** option on a command line.

-ent

Tells TotalView that it should only use an Enterprise license.

-no_ent

Tells TotalView that it should not use an Enterprise license. You may combine this with **-no_team** or **--noteamplus.**

-env *variable=value*

Tells TotalView to add an environment variable to the environment variables passed to your program by the shell. If the variable already exists, it effectively replaces the previous value. You need to use this command for each variable being added; that is, you cannot add more than one variable with an **env** command.

-foreground *color*

Sets the general foreground color (that is, the text color) to *color*.

-fg *color*

Same as **-foreground**.

Default: **black**

-f9x_demangler=*compiler*

Overrides the Fortran demangler and mangler TotalView uses by default. The following indicate override options.

-demangler=spro_f9x_4: SunPro Fortran, 4.0 or later

-demangler=xlf: IBM Fortran

-global_types

(Default) Lets TotalView assume that type names are globally unique within a program and that all type definitions with the same name are identical. The C++ standard asserts that this must be true for standard-conforming code.

If this option is set, TotalView will attempt to replace an opaque type (**struct foo *p;**) declared in one module, with an identically named defined type in a different module.

If TotalView has read the symbols for the module containing the non-opaque type definition, then when displaying variables declared with the opaque type, TotalView will automatically display the variable by using the non-opaque type definition.

-no_global_types

Specifies that TotalView *cannot* assume that type names are globally unique in a program. You should specify this option if your code has multiple different definitions of the same named type, since otherwise TotalView can use the wrong definition for an opaque type.

-gnu_debuglink

Tells TotalView that if a program or library has a **.gnu_debug_link** section, it should look for a **gnu_debug_link** file. If found, TotalView reads the debugging information from this file.

-no_gnu_debuglink

Do not load information from a **gnu_debug_link** file even if the file has a **.gnu_debug_link** section.

-gnu_debuglink_checksum

Tells TotalView that it should validate the **gnu_debug_link** file's checksum against the checksum contained in the process's **.gnu_debuglink** section.

-no_gnu_debuglink_checksum

Do not compare checksums. Only do this if you are absolutely certain that the debug file matches.

-ipv6_support

Directs TotalView to support IPv6 addresses.

-no_ipv6_support

(Default) Do not support IPv6 addresses.

-kcc_classes

(Default) Converts structure definitions output by the KCC compiler into classes that show base classes and virtual base classes in the same way as other C++ compilers. See the description of the **TV::kcc_classes** variable for a description of the conversions that TotalView performs.

-no_kcc_classes

Specifies that TotalView will not convert structure definitions output by the KCC compiler into classes. Virtual bases will show up as pointers, rather than as data.

-lb

(Default) Loads action points automatically from the *filename*.**TVD.v3breakpoints** file, providing the file exists.

-nlb

Tells TotalView that it should not automatically load action points from an action points file.

-load_session *session_name*

Loads into TotalView the session named in *session_name*. If the preference "Show Startup Parameters when TotalView starts" is set, this option launches the Session Manager's Program Session screen where you can edit the session's properties and then launch the session; otherwise, the option immediately loads the session into TotalView, launching the Root and Process windows. Session names with spaces must be enclosed in quotes, for example, "my debug session". Sessions that attach to an existing process cannot be loaded using this option; rather, use the **-pid** option instead.

-local_interface *string*

Sets the interface name that the server uses when it makes a callback. For example, on an IBM PS2 machine, you would set this to css0. However, you can use any legal **inet** interface name. (You can obtain a list of the interfaces if you use the **netstat -i** command.)

-memory_debugging

Enables memory debugging. By adding the following suboptions, you enable that particular feature using its the feature's default configuration. In most cases, you will want to use one or more of the following sub-options.

-mem_detect_use_after_free

Tests for memory use after memory is freed.

-mem_detect_use_after_free

Tests for memory use after memory is freed.

-mem_guard_blocks

Surrounds allocated memory blocks with guard blocks.

-mem_hoard_freed_memory

Tells the Memory Debugger to hoard memory blocks instead of releasing them when a **free()** routine is called.

-mem_hoard_low_memory_threshold nnnn

Sets the low memory threshold amount. When memory falls below this amount an event will be fired.

-mem_notify_events

Turns on memory event notification.

-no_mem_notify_events turns event notification off.

-mem_paint_all

Paint both allocated and deallocated blocks with a bit pattern.

-mem_paint_on_alloc

Paint memory blocks with a bit pattern when they are allocated.

-mem_paint_on_dealloc

Paint memory blocks with a bit pattern when they are freed.

-mem_red_zones_overruns

Turn on testing for Red Zones overruns.

-mem_red_zones_size_ranges min:max,min:max,...

Defines the memory allocations ranges for which Red Zones are in effect. Ranges can be specified as follows: x:y allocations from x to y.

:y	allocations from 1 to y
x:	allocations of x and higher
x	allocation of x

-mem_red_zones_underruns

Turn on testing for Red Zones underruns.

-message_queue

(Default) Enables the display of MPI message queues when debugging an MPI program.

-mqd

Same as **-message_queue**.

-mqd

Same as **-message_queue**.

-no_message_queue

Disables the display of MPI message queues when you are debugging an MPI program. This might be useful if something is overwriting the message queues and causing TotalView to become confused.

-no_mqd

Same as **-no_message_queue**.

-mpi *starter*

Names the MPI that your program requires. The list of starter names that you enter are those that appear in the **Parallel system** pull down list contained within the **New Program**'s Parallel tab. If the starter name has more than one word (for example, **Open MPI**), enclose the name in quotes. For example:

```
-mpi "Open MPI"
```

-newUI

Launches the NextGen TotalView for HPC UI rather than TotalView's traditional interface.

-nodes

Specifies the number of nodes upon which the MPI job will run.

-no_startup_scripts

Tells TotalView not to reference any initialization files during startup. Note that this negates *all* settings in *all* initialization files. Aliases are `-nostartupscripts` and `-nss`.

-nohand_cursor

By default, the cursor in the source pane of the process window turns into a hand cursor when hovering over an element you can dive on (a red box is also drawn around the applicable code). Specify this option to override this behavior and retain the usual arrow cursor.

-np

Specifies how many tasks that TotalView should launch for the job. This argument usually follows a **-mpi** command-line option.

-nptl_threads

Tells TotalView that your application is using NPTL threads. You only need use this option if default cannot determine that you are using this threads package.

-no_nptl_threads

Tells TotalView that you are not using the NPTL threads package. Use this option if TotalView thinks your application is using it and it isn't.

-oldroot

Displays the Root Window used in versions prior to TotalView 8.15.0. Using **--oldroot** or -**-newroot** overrides the **TV::GUI::old_root_window** value.

-newroot

(Default) Displays the new Root Window. This is useful when **TV::GUI::-old_root_window** is set to **true** in the **.tvdrc** file and you wish to use the new Root Window.

-parallel

(Default) Enables handling of parallel program run-time libraries such as MPI, PE, and UPC.

-no_parallel

Disables handling of parallel program run-time libraries such as MPI, PE, and UPC. This is useful for debugging parallel programs as if they were single-process programs.

-parallel_attach *option*

Sets the action that TotalView takes when starting a parallel program. Possible options are:

yes (default) Attaches to all processes in a parallel program, unless the process being launched or attached to has a non-empty **parallel_attach_subset** property. In this case, only the subset of processes specified in the **parallel_attach_subset** are attached.

no: Attaches to no processes in a parallel program.

ask Asks which processes to attach to by posting the subset attach dialog box if the debugger GUI is open.

This option works in concert with the **parallel_attach_subset** property (see -default_parallel_attach_subset) of an MPI starter process, which specifies a set of MPI tasks to attach to when the debugger launches or attaches to an MPI job.

Modifying this setting does not affect the **parallel_attach_subset** property itself.

-patch_area_base *address*

Allocates the patch space dynamically at *address*. See "*Allocating Patch Space for Compiled Expressions*" in the *TotalView for HPC User Guide*.

-patch_area_length *length*

Sets the length of the dynamically allocated patch space to this *length*. See "*Allocating Patch Space for Compiled Expressions*" in the *TotalView for HPC User Guide*.

-pid *pid filename*

Attaches to process *pid* for executable *filename* when TotalView starts executing.

-procs

Specifies how many tasks that TotalView should launch for the job. This argument usually follows a **-mpi** command-line option.

-processgrid

Displays the Processes/Ranks Tab in the Process Window. Note that enabling this tab can significantly affect performance, particularly for large, massively parallel applications.

-noprocessgrid (default)

Does not display the Processes/Ranks Tab in the Process Window. This command qualifier is helpful when you wish to disable the Processes/Ranks Tab for a debug session and you have **TV::GUI::process_grid_wanted** set to **true** in your `.tvdrc` file.

-remote *hostname*[:*portnumber*]

Debugs an executable that is not running on the same machine as TotalView. For *hostname*, you can specify a TCP/IP host name (such as **vinnie**) or a TCP/IP address (such as **128.89.0.16**). Optionally, you can specify a TCP/IP port number for *portnumber*, such as **:4174**. When you specify a port number, you disable the autolaunch feature. For more information on the autolaunch feature, see "*Setting Single Process Server Launch*" in the *TotalView for HPC User Guide*.

-r *hostname*[:*portnumber*]

Same as **-remote**.

-replay

Enables the ReplayEngine when TotalView begins. This command-line option is ignored if you do not have a license for ReplayEngine.

-s *pathname*

Specifies the path name of a startup file that will be loaded and executed. This path name can be either an absolute or relative name.

You can add more than one **-s** option on a command line.

-serial *device*[:*options*]

Debugs an executable that is not running on the same machine as TotalView. For *device*, specify the device name of a serial line, such as **/dev/com1**. Currently, the only *option* you are allowed to specify is the baud rate, which defaults to **38400**. For more information on debugging over a serial line, see "*Debugging Over a Serial Line*" in the *TotalView for HPC Users Guide*.

-search_path *pathlist*

Specify a colon-separated list of directories that TotalView will search when it looks for source files. For example:

totalview -search_path proj/bin:proj/util

-signal_handling_mode "*action_list***"**

Modifies the way in which TotalView handles signals. You must enclose the *action_list* string in quotation marks to protect it from the shell.

An *action_list* consists of a list of *signal_action* descriptions separated by spaces:

signal_action[*signal_action*] ...

A signal action description consists of an action, an equal sign (=), and a list of signals:

action=signal_list

An *action* can be one of the following: **Error**, **Stop**, **Resend**, or **Discard**, For more information on the meaning of each action, see Chapter 3 of the *TotalView for HPC User Guide*.

A *signal_specifier* can be a signal name (such as **SIGSEGV**), a signal number (such as 11), or a star (*), which specifies all signals. We recommend that you use the signal name rather than the number because number assignments vary across UNIX sessions.

The following rules apply when you are specifying an *action_list*:

(1) If you specify an action for a signal in an *action_list*, TotalView changes the default action for that signal.

(2) If you do not specify a signal in the *action_list*, TotalView does not change its default action for the signal.

(3) If you specify a signal that does not exist for the platform, TotalView ignores it.

(4) If you specify an action for a signal more than once, TotalView uses the last action specified.

If you need to revert the settings for signal handling to built-in defaults, use the **Defaults** button in the **File > Signals** dialog box.

For example, here's how to set the default action for the **SIGTERM** signal to resend:

```
"Resend=SIGTERM"
```

Here's how to set the action for **SIGSEGV** and **SIGBUS** to error, the action for **SIGHUP** to resend, and all remaining signals to stop:

```
"Stop=* Error=SIGSEGV,SIGBUS Resend=SIGHUP"
```

-shm "*action_list***"**

Same as **-signal_handling_mode**.

-starter_args "*arguments***"**

Tells TotalView to pass ***arguments*** to the starter program. You can omit the quotation marks if ***arguments*** is just one string without any embedded spaces.

-stderr *pathname*

Names the file to which TotalView writes the target program's **stderr** information while executing within TotalView. If the file exists, TotalView overwrites it. If the file does not exist, TotalView creates it.

-stderr_append

Tells TotalView to append the target program's **stderr** information to the file named in the **-stderr** command, specified in the GUI, or in the TotalView **TV::default_stderr_filename** variable. If the file does not exist, TotalView creates it.

-stderr_is_stdout

Tells TotalView to redirect the target program's **stderr** to **stdout**.

-stdin *pathname*

Names the file from which the target program reads information while executing within TotalView.

-stdout *pathname*

Names the file to which TotalView writes the target program's **stdout** information while executing within TotalView. If the file exists, TotalView overwrites it. If the file does not exist, TotalView creates it.

-stdout_append

Tells TotalView to append the target program's **stdout** information to the file named in the **-stdout** command, specified in the GUI, or in the TotalView **TV::default_stdout_filename** variable. If the file does not exist, TotalView creates it.

-tasks

Specifies how many tasks that TotalView should launch for the job. This argument usually follows a **-mpi** command-line option.

-team

Tells TotalView that it should only use a Team license.

-no_team

Tells TotalView that it should not use an Enterprise license. You may combine this with **-no_ent** or **-noteamplus.**

-teamplus

Tells TotalView that it should only use a Team Plus license.

-no_teamplus

Tells TotalView that it should not use a Team PLus license. You may combine this with **-no_ent** or **-noteam.**

-tvhome *pathname*

The directory from which TotalView reads preferences and other related information and the directory to which it writes this information.

-use_fast_trap

Controls TotalView's use of the target operating system's support of the fast trap mechanism for compiled conditional breakpoints, also known as EVAL points. As of TotalView 8.7, when this was introduced, only AIX supported the fast trap mechanism for breakpoints, but we anticipate other operating systems adding support. You must set this option on the command line; you cannot set it interactively using the CLI.

Your operating system may not be configured correctly to support this option. See the *TotalView for HPC Release Notes* on our web site for more information.

-use_fast_wp

Controls TotalView's use of the target operating system's support of the fast trap mechanism for compiled conditional watchpoints, also known as CDWP points. As of TotalView 8.7, when this was introduced, only AIX supported the fast trap mechanism for watchpoints, but we anticipate other operating systems adding support. You must set this option on the command line; you cannot set it interactively using the CLI.

Your operating system may not be configured correctly to support this option. See the *TotalView for HPC Release Notes* on our web site for more information.

-user_threads

(Default) Enables handling of user-level (M:N) thread packages on systems where two-level (kernel and user) thread scheduling is supported. (**Note**: This option does not apply to -BlueGene/Q systems; instead, see **-bluegene_q_user_threads**.)

-no_user_threads

Disables handling of user-level (M:N) thread packages. This option may be useful in situations where you need to debug kernel-level threads, but in most cases, this option is of little use on systems where two-level thread scheduling is used.

-verbosity *level*

Sets the verbosity level of TotalView messages to *level*, which may be one of **silent**, **error**, **warning**, or **info**.

Default: **info**

-xterm_name *pathname*

Sets the name of the program used when TotalView needs to create a the CLI. If you do not use this command or have not set the **TV::xterm_name** variable, TotalView will attempt to create an **xterm** window.

Chapter 8

TotalView Debugger Server Command Syntax

Overview

This chapter summarizes the syntax of the TotalView Debugger Server command, **tvdsvr**, which is used for remote debugging. Remote debugging occurs when you explicitly call for it or when you are using disciplines like MPI that startup processes on remote servers. For more information on remote debugging, refer to *Setting Up Remote Debugging Sessions"* in the *TotalView for HPC Users Guide*.

Topics in this chapter are:

The tvdsvr Command and Its Options

tvdsvr {**-server** | **-callback** *hostname*:*port* | **-serial** *device*} [other options]

Description

tvdsvr allows TotalView to control and debug a program on a remote machine. To accomplish this, the **tvdsvr** program must run on the remote machine, and it must have access to the executables being debugged. These executables must have the same absolute path name as the executable that TotalView is debugging, or the **PATH** environment variable for **tvdsvr** must include the directories containing the executables.

You must specify a **-server**, **-callback**, or **-serial** option with the **tvdsvr** command. By default, TotalView automatically launches **tvdsvr** using the **-callback** option, and the server establishes a connection with TotalView. (Automatically launching the server is called autolaunching.)

If you prefer not to automatically launch the server, you can start **tvdsvr** manually and specify the **-server** option. Be sure to note the password that **tvdsvr** prints out with the message:

pw = *hexnumhigh*:*hexnumlow*

TotalView will prompt you for *hexnumhigh*:*hexnumlow* later. By default, **tvdsvr** automatically generates a password that it uses when establishing connections. If desired, you can set your own password by using the **-set_pw** option.

To connect to the **tvdsvr** from TotalView, you use the **File > New Program** Dialog Box and must specify the host name and TCP/IP port number, *hostname*:*portnumber* on which **tvdsvr** is running. Then, TotalView prompts you for the password for **tvdsvr**.

Options

The following options name the port numbers and passwords that TotalView uses to connect with **tvdsvr**.

-callback *hostname*:*port*

(Autolaunch feature only) Immediately establishes a connection with a TotalView process running on *hostname* and listening on *port*, where *hostname* is either a host name or TCP/IP address. If **tvdsvr** cannot connect with TotalView, it exits.

If you use the **-port, -search_port**, or **-server** options with this option, **tvdsvr** ignores them.

-callback_host *hostname*

Names the host upon which the callback is made. The *hostname* argument indicates the machine upon which TotalView is running. This option is most often used with a bulk launch.

-callback_ports *port-list*

Names the ports on the host machines that are used for callbacks. The *port-list* argument contains a comma-separated list of the host names and TCP/IP port numbers (*hostname*:*port*,*hostname*:*port*...) on which TotalView is listening for connections from **tvdsvr**. This option is most often used with a bulk launch.

For more information, see "*Setting Up Remote Debugging Sessions*" in the *TotalView for HPC Users Guide*.

-debug_file *console_outputfile*

Redirects TotalView Debugger Server console output to a file named *console_outputfile*.

If *console_outputfile* is the string **UNIQUE**, the filename **tv_dump.***hostname***.***pid* is used. If *console_outputfile* contains the string **'$$'** (note the escaping single quotes), *hostname***.***pid* is substituted. **UNIQUE** and **'$$'** are useful for separating the console output when running multiple **tvdsvr** processes.

D*efault*: All console output is written to **stderr**.

-nodes_allowed *num*

Explicitly tells tvdsvr how many nodes the server supports and how many licenses it needs. This is only used for the Cray XT3.

-port *number*

Sets the TCP/IP port number on which **tvdsvr** should communicate with TotalView. If this port is busy, **tvdsvr** does not select an alternate port number (that is, it won't communicate with anything) unless you also specify **-search_port**.

D*efault*: 4142

-search_port

Searches for an available TCP/IP port number, beginning with the default port (4142) or the port set with the **-port** option and continuing until one is found. When the port number is set, **tvdsvr** displays the chosen port number with the following message:

port = *number*

Be sure that you remember this port number, since you will need it when you are connecting to this server from TotalView.

-serial *device*[**:***options*]

Waits for a serial line connection from TotalView. For *device*, specifies the device name of a serial line, such as **/dev/com1**. The only *option* you can specify is the baud rate, which defaults to **38400**. For more information on debugging over a serial line, see *"Debugging Over a Serial Line"* in the *TotalView for HPC Users Guide*.

-server

Listens for and accepts network connections on port 4142 (default).

Using **-server** can be a security problem. Consequently, you must explicitly enable this feature by placing an empty file named **tvdsvr.conf** in your **/etc** directory. This file must be owned by user ID 0 (root). When **tvdsvr** encounters this option, it checks if this file exists. This file's contents are ignored.

You can use a different port by using one of the following options: **-search_port** or **-port**. To stop **tvdsvr** from listening and accepting network connections, you must terminate it by pressing Ctrl+C in the terminal window from which it was started or by using the **kill** command.

-set_pw *hexnumhigh*:*hexnumlow*

Sets the password to the 64-bit number specified by the *hexnumhigh* and *hexnumlow* 32-bit numbers. When a connection is established between **tvdsvr** and TotalView, the 64-bit password passed by TotalView must match this password set with this option. **tvdsvr** displays the selected number in the following message:

pw = *hexnumhigh*:*hexnumlow*

We recommend using this option to avoid connections by other users.

If necessary, you can disable password checking by specifying the "-set_pw 0:0" option with the tvdsvr command. Disabling password checking is dangerous; it allows anyone to connect to your server and start programs, including shell commands, using your UID. Therefore, we do not recommend disabling password checking.

-set_pws *password-list*

Sets 64-bit passwords. TotalView must supply these passwords when **tvdsvr** establishes the connection with it. The argument to this command is a comma-separated list of passwords that TotalView automatically generates. This option is most often used with a bulk launch.

For more information, see *Setting Up Remote Debugging Sessions"* in the *TotalView for HPC Users Guide*.

-verbosity *level*

Sets the verbosity level of TotalView Debugger Server-generated messages to *level*, which may be one of **silent**, **error**, **warning**, or **info**.

D*efault*: **info**

-working_directory *directory*

Makes *directory* the directory to which TotalView connects.

Note that the command assumes that the host machine and the target machine mount identical file systems. That is, the path name of the directory to which TotalView is connected must be identical on both the host and target machines.

After performing this operation, the TotalView Debugger Server is started.

Replacement Characters

When placing a **tvdsvr** command in a **Server Launch** or **Bulk Launch** string (see the **File > Preferences** command within the online Help for more information), you will need to use special replacement characters. When your program needs to launch a remote process, TotalView replaces these command characters with what they represent. Here are the replacement characters:

%A

Expands to the ALPS Application ID (`apid`), which is a unique identifier for an application started using ALPS `aprun` on Cray XT, XE, and XK. The token is used to construct server path references copied onto the compute nodes' ramdisk under the `/var/spool/alps/apid` directory by the ALPS Tool Helper library.

%B

Expands to the bin directory where **tvdsvr** is installed.

%C

Is replaced by the name of the server launch command being used. On most platforms, this is **ssh -x**. On Sun SPARC, this command is **rsh**. If the **TVDSVRLAUNCHCMD** environment variable exists, TotalView will use its value instead of its platform-specific value.

%D

Is replaced by the absolute path name of the directory to which TotalView will be connected.

%F

Contains the "tracer configuration flags" that need to be sent to **tvdsvr** processes. These are system-specific startup options that the **tvdsvr** process needs.

%H

Expands to the host name of the machine upon which TotalView is running. (This replacement character is most often used in bulk server launch commands. However, it can be used in a regular server launch and within a **tvdsvr** command contained within a temporary file.)

%I

Expands to the **pid** of the MPI starter process. For example, it can contain **mpirun**, **aprun**, etc. It can also be the process to which you manually attach. If no **pid** is available, **%I** expands to 0.

%J

Expands to the job ID. For MPICH or poe jobs, is the contents of the **totalview_jobid** variable contained either in the starter or first process. If that variable does not exist, it is set to zero ("0"). If it is not appropriate for the kind of job being launched, its value is -1.

%K

Expands to the `tvdsvr` platform suffix string in situations where a different server must be used. On Blue Gene/L and Blue Gene/P, the `%K` expansion includes `_bgl`, on Blue Gene/Q it includes `_bgq`, and on Cray XT3 Catamount (RedStorm) it includes `_rs`.

When MRNet is being used as the debugger infra-structure, `_mrnet` is appended to the normal `%K` expansion. On Cray XT with MRNet enabled the `%K` token is expanded to `_mrnet`, while on Blue Gene/L or Blue Gene/P with MRNet enabled the `%K` token is expanded to `_bgl_mrnet`. This convention allows MRNet-specific debugger servers to be launched only when MRNet is being used as the debugger infrastructure.

%L

If TotalView is launching one process, this is replaced by the host name and TCP/IP port number (*hostname*:*port*) on which TotalView is listening for connections from **tvdsvr**.

If a bulk launch is being performed, TotalView replaces this with a comma-separated list of the host names and TCP/IP port numbers (*hostname*:*port*,*hostname*:*port*...) on which TotalView is listening for connections from **tvdsvr**.

For more information, see *Setting Up Remote Debugging Sessions"* in the *TotalView for HPC Users Guide*.

%M

(Sun) Expands to the command name used for a local server launch.

%N

Is replaced by the number of servers that TotalView will launch. This is only used in a bulk server launch command.

%P

If TotalView is launching one process, this is replaced by the password that it automatically generated.

If a bulk launch is being performed, TotalView replaces this with a comma-separated list of 64-bit passwords.

%R

Is replaced by the host name of the remote machine specified in the **File > New Program** command. When performing a bulk launch, this is replaced by a comma-separated list of the names of the hosts upon which TotalView will launch **tvdsvr** processes.

%S

If TotalView is launching one process, it replaces this symbol with the port number on the machine upon which TotalView is -running.

If a bulk server launch is being performed, TotalView replaces this with a comma-separated list of port numbers.

%t1 and **%t2**

Is replaced by files that TotalView creates containing information it generates. This is only available in a bulk launch.

These temporary files have the following structure:

(1) An optional header line containing initialization commands required by your system.

(2) One line for each host being connected to, containing host-specific information.

(3) An optional trailer line containing information needed by your system to terminate the temporary file.

The **File > Preferences Bulk Server** Page allows you to define templates for the contents of temporary files. These files may use these replacement characters. The **%N**, **%t1**, and **%t2** replacement characters can only be used within header and trailer lines of temporary files. All other characters can be used in header or trailer lines

or within a host line defining the command that initiates a single-process server launch. In header or trailer lines, they behave as defined for a bulk launch within the host line. Otherwise, they behave as defined for a single-server launch.

%U

(Sun) Expands to the local socket ID.

%V

Is replaced by the current TotalView verbosity setting.

%Z

Expands to the job ID. For MPICH or poe jobs, is the contents of the **totalview_jobid** variable contained either in the starter or first process. If that variable does not exist, it is set to zero ("0"). If it is not appropriate for the kind of job being launched, its value is -1.

PART III

Platforms and Operating Systems

The three chapters in this part of the Reference Guide describe information that is unique to the computers, operating systems, and environments in which TotalView runs.

Chapter 9

Platforms and Compilers

Overview

This chapter describes the compilers and parallel runtime environments used on platforms supported by TotalView. You must refer to the *TotalView for HPC Platforms and Systems Requirement Guide* for information on the specific compiler and runtime environments that TotalView supports.

For information on supported operating systems, please refer to Chapter 10, "Operating Systems," on page 370.

Topics in this chapter are:

Compiling with Debugging Symbols

You need to compile programs with the **-g** option and possibly other compiler options so that debugging symbols are included. This section shows the specific compiler commands to use for each compiler that TotalView supports.

NOTE >> Please refer to the release notes in your TotalView distribution for the latest information about supported versions of the compilers and parallel runtime environments listed here.

Apple Running Mac OS X

On Mac OS, in all cases use the standard compiler invocation, just being sure to include the **-g** option.

Compiler	Compiler Command Line
Absoft Fortran 77	**f77 -g** *program* **.f f77 -g** *program*.**for**
Absoft Fortran 90	**f90 -g** *program*.**f90**
GCC C	**gcc -g** *program*.**c**
GCC C++	**g++ -g** *program*.**cxx**
GCC Fortran	**g77 -g** *program*.**f**
IBM xlc C	**xlc -g** *program*.**c**
IBM xlC C++	**xlC -g** *program*.**cxx**
IBM xlf Fortran 77	**xlf -g** *program*.**f**
IBM xlf90 Fortran 90	**xlf90 -g** *program*.**f90**

On Mac OS X, you can create 64-bit applications using GCC 4 by adding the **-m64** command-line option.

IBM AIX on RS/6000 Systems

The following table lists the procedures to compile programs on IBM RS/6000 systems running AIX.

Compiler	Compiler Command Line
GCC C	**gcc -g** *program*.**c**
GCC C++	**g++ -g** *program*.**cxx**
IBM xlc C	**xlc -g** *program*.**c**

Compiler	Compiler Command Line
IBM xlC C++	**xlC -g** *program*.**cxx**
IBM xlf Fortran 77	**xlf -g** *program*.**f**
IBM xlf90 Fortran 90	**xlf90 -g** *program*.**f90**

You can set up to seven variables when debugging threaded applications. Here's how you might set six of these variables within a C shell:

```
setenv AIXTHREAD_MNRATIO"1:1"
setenv AIXTHREAD_SLPRATIO"1:1"
setenv AIXTHREAD_SCOPE"S"
setenv AIXTHREAD_COND_DEBUG"ON"
setenv AIXTHREAD_MUTEX_DEBUG"ON"
setenv AIXTHREAD_RWLOCK_DEBUG"ON"
```

The first three variables must be set. Depending upon what you need to examine, you will also need to set one or more of the "DEBUG" variables.

The seventh variable, **AIXTHREAD_DEBUG**, should not be set. If it is, you should unset it before running TotalView

NOTE >> Setting these variables can slow down your application's performance. None of them should be set when you are running non-debugging versions of your program.

When compiling with KCC, you must specify the **-qnofullpath** option; KCC is a preprocessor that passes its output to the IBM xlc C compiler. It will discard **#line** directives necessary for source-level debugging if you do not use the **-qfullpath** option. We also recommend that you use the **+K0** option and not the **-g** option.

When compiling with **guidef77**, the **-WG,-cmpo=i** option may not be required on all versions because **-g** can imply these options.

When compiling Fortran programs with the C preprocessor, pass the **-d** option to the compiler driver. For example: **xlf -d - program.F**

If you will be moving any program compiled with any of the IBM *xl* compilers from its creation directory, or you do not want to set the search directory path during debugging, use the **-qfullpath** compiler option. For example:

```
xlf -qfullpath -g -c program.f
```

IBM Blue Gene

The following table lists the procedures to compile programs on IBM Blue Gene computers.

Compiler	Compiler Command Line
IBM Visual Age C	**xlc -g** *program*.**c**
IBM Visual Age C++	**xlC -g** *program*.**cxx**
IBM Visual Age FORTRAN 77	**xlf -g** *program*.**f**
IBM Visual Age Fortran 90	**xlf90 -g** *program*.**f90**

IBM Power Linux

The following table lists the procedures to compile programs on the IBM Power Linux computer.

Compiler	Compiler Command Line
Absoft Fortran 77	**f77 -g** *program* **.f f77 -g** *program*.**for**
Absoft Fortran 90	**f90 -g** *program*.**f90**
GCC C	**gcc -g** *program*.**c**
GCC C++	**g++ -g** *program*.**cxx**
IBM Visual Age C	**xlc -g** *program*.**c**
IBM Visual Age C++	**xlC -g** *program*.**cxx**
IBM Visual Age FORTRAN 77	**xlf -g** *program*.**f**
IBM Visual Age Fortran 90	**xlf90 -g** *program*.**cc**

Linux Running on an x86 Platform

The following table lists the procedures to compile programs on Linux x86 platforms.

Compiler	Compiler Command Line
Absoft Fortran 77	**f77 -g** *program* **.f f77 -g** *program*.**for**
Absoft Fortran 90	**f90 -g** *program*.**f90**
Absoft Fortran 95	**f95 -g** *program*.**f95**
GCC C	**gcc -g** *program*.**c**

Compiler	Compiler Command Line
GCC C++	**g++ -g** *program*.**cxx**
G77	**g77 -g** *program*.**f**
Intel C++ Compiler	**icc -g** *program*.**cxx**
Intel Fortran Compiler	**ifc -g** *program*.**f**
Lahey/Fujitsu Fortran	**lf95 -g** *program*.**f**
PGI Fortran 77	**pgf77 -g** *program*.**f**
PGI Fortran 90	**pgf90 -g** *program*.**f**

Linux Running on an x86-64 Platform

The following table lists the procedures to compile programs on Linux x86-64 platforms.

Compiler	Compiler Command Line
Absoft Fortran 77	**f77 -g** *program* **.f f77 -g** *program*.**for**
Absoft Fortran 90	**f90 -g** *program*.**f90**
Absoft Fortran 95	**f95 -g** *program*.**f95**
GCC C	**gcc -g** *program*.**c**
GCC C++	**g++ -g** *program*.**cxx**
G77	**g77 -g** *program*.**f**
Intel C++ Compiler	**icc -g** *program*.**cxx**
Intel Fortran Compiler	**ifc -g** *program*.**f**
Pathscale EKO C	**pathcc -g** *program*.**f**
Pathscale EKO C++	**pathCC -g** *program*.**f**
Lahey/Fujitsu Fortran	**lf95 -g** *program*.**f**
PGI C++	**pcCC -g** *program*.**f**
PGI Fortran 77	**pgf77 -g** *program*.**f**
PGI Fortran 90	**pgf90 -g** *program*.**f**

Linux Running on an Itanium Platform

The following table lists the procedures to compile programs running on the Intel Itanium platform.

Compiler	Compiler Command Line
GCC C	**gcc -g** *program*.**c**
GCC C++	**g++ -g** *program*.**cxx**
G77	**g77 -g** *program*.**f**
Intel C++ Compiler	**icc -g** *program*.**cxx**
Intel Fortran Compiler	**ifc -g** *program*.**f**

Sun Solaris

The following table lists the procedures to compile programs on SunOS 5 SPARC.

Compiler	Compiler Command Line
Apogee C	**apcc -g** *program*.**c**
Apogee C++	**apcc -g** *program*.**cxx**
GCC C	**gcc -g** *program*.**c**
GCC C++	**g++ -g** *program*.**cxx**
Sun One Studio C	**cc -g** *program*.**c**
Sun One Studio C++	**CC -g** *program*.**cxx**
Sun One Studio Fortran 77	**f77 -g** *program*.**f**
Sun One Studio Fortran 90	**f90 -g** *program*.**f90**

Using gnu_debuglink Files

Some versions of Linux allow you to place debugging information in a separate file. These files, which can have any name, are called *gnu_debuglink* files. Because this information is stripped from the program's file, it almost always greatly reduces the size of your program. In most cases, you would create gnu_debuglink files for system libraries or other programs for which it is inappropriate to ship versions have debugging information.

After you create an unstripped executable or shared library, you can prepare the gnu_debuglink file as follows:

1. Create a **.debug** copy of the file. This second file will only contain debugging symbol table information. That is, it differs from the original in that it does not contain code or data.

Create this file on Linux systems that support the **- -add-gnu-debuglink** and **- -only-keep-debug** command-line options. If **objcopy -- -help** mentions **- -add-gnu-debuglink**, you should be able to create this file. See **man objcopy** for more details.

1. Create a stripped copy of the image file, and add a **.gnu_debuglink** section to the stripped file that contains the name of the **.debug** file and the checksum of the **.debug** file.
2. Distribute the stripped image and **.debug** files separately. The idea is that the stripped image file will normally take up less space on the disk, and if you want the debug information, you can also install the corresponding **.debug** file.

The following example creates the gnu_debuglink file for a program named **hello**. It also strips the debugging information from **hello**:

```
objcopy --only-keep-debug hello hello.gnu_debuglink.debug
objcopy --strip-all hello hello.gnu_debuglink
objcopy --add-gnu-debuglink=hello.gnu_debuglink.debug \
                hello.gnu_debuglink
```

Total View Command-Line Options and CLI State Variables

The following command line options and CLI variables control how TotalView handles **.gnu_debuglink** files.

- **-gnu_debuglink** and **-no_gnu_debuglink**, **TV::gnu_debuglink**

  Controls Total View processing of the **.gnu_debuglink** section in executables and shared libraries; the default value is true. Setting the variable to false or using the **no_** command-line option prefix saves time when you do not want to process the debug-only files or when you need to avoid other problems associated with the debug-only files.

- **-[no_]gnu_debuglink_checksum** and **TV::gnu_debuglink_checksum**

Tells TotalView if it should validate the checksum of the debug-only files against the checksum stored in the .**gnu_debuglink** section of the executable or shared library; the default is true. Setting the variable to false or using the **no_** command-line option prefix can save time associated with computing the checksum of large files. Do this only if you are absolutely certain that the debug file matches.

- **-gnu_debuglink_global_directory** and **TV::gnu_debuglink_global_directory**

  Specifies the global debug directory; the default value is **/usr/lib/debug**.

Searching for the gnu_debug_link File

If the **TV::gnu_debuglink** variable is true and if the process contains a **.gnu_debug_link** section, TotalView searches for the **gnu_debug_link** file as follows:

1. In the directory containing the program.
2. In the **.debug** subdirectory of the directory containing the program.
3. In a directory named in the **TV::gnu_debuglink_global_directory** variable.

For example, assume that the program's pathname is **/A/B/hello_world** and the debug filename stored in the **.gnu_debuglink** section of this program is **hello_world.debug**. If the **TV::gnu_debuglink_global_directory** variable is set to **/usr/lib/debug**, TotalView searches for the following files:

1. /**A/B/hello_world.debug**
2. **/A/B/.debug/hello_world.debug**
3. **/usr/lib/debug/A/B/hello_world.debug**

Linking with the dbfork Library

If your program uses the **fork()** and **execve()** system calls, and you want to debug the child processes, you need to link programs with the **dbfork** library.

NOTE >> While you must link programs that use **fork()** and **execve()** with the TotalView dbfork library so that TotalView can automatically attach to them when your program creates them, programs that you attach to need not be linked with this library.

dbfork on IBM AIX on RS/6000 Systems

Add either the **-ldbfork** or **-ldbfork_64** argument to the command that you use to link your programs. If you are compiling 32-bit code, use the following arguments:

- **/usr/totalview/lib/libdbfork.a** \ **-bkeepfile:/usr/totalview/rs6000/lib/libdbfork.a**
- **-L/usr/totalview/lib** \ **-ldbfork -bkeepfile:/usr/totalview/rs6000/lib/libdbfork.a**

For example:

```
cc -o program program.c \
            -L/usr/totalview/rs6000/lib/ -ldbfork \
            -bkeepfile:/usr/totalview/rs6000/lib/libdbfork.a
```

If you are compiling 64-bit code, use the following arguments:

- **/usr/totalview/lib/libdbfork_64.a \ -bkeepfile:/usr/totalview/rs6000/lib/libdbfork.a**
- **-L/usr/totalview/lib -ldbfork_64 \ -bkeepfile:/usr/totalviewrs6000//lib/libdbfork.a**

For example:

```
cc -o program program.c \
            -L/usr/totalview/rs6000/lib -ldbfork \
            -bkeepfile:/usr/totalview/rs6000/lib/libdbfork.a
```

When you use **gcc** or **g++**, use the **-Wl,-bkeepfile** option instead of using the **-bkeepfile** option, which will pass the same option to the binder. For example:

```
gcc -o program program.c \
            -L/usr/totalview/rs6000/lib -ldbfork -Wl, \
           -bkeepfile:/usr/totalview/rs6000/lib/libdbfork.a
```

Linking C++ Programs with dbfork

You cannot use the **-bkeepfile** binder option with the IBM xlC C++ compiler. The compiler passes all binder options to an additional pass called **munch**, which will not handle the **-bkeepfile** option.

To work around this problem, we have provided the C++ header file **libdbfork.h**. You must include this file somewhere in your C++ program. This forces the components of the **dbfork** library to be kept in your executable. The file **libdbfork.h** is included only with the RS/6000 version of TotalView. This means that if you are creating a program that will run on more than one platform, you should place the **include** within an **#ifdef** statement's range. For example:

```
#ifdef _AIX
#include "/usr/totalview/include/libdbfork.h"
#endif
int main (int argc, char *argv[])
{
}
```

In this case, you would not use the **-bkeepfile** option and would instead link your program using one of the following options:

- **/usr/totalview/include/libdbfork.a**
- **-L/usr/totalview/include -ldbfork**

Linux or Mac OS X

Add one of the following arguments or command-line options to the command that you use to link your programs:

- **/usr/totalview/***platform***/lib/libdbfork.a**
- **-L/usr/totalview/***platform***/lib -ldbfork** or**-L/usr/totalview/***platform***/lib -ldbfork_64 (**

where *platform* is one of the following: **darwin-power**, **linux-x86**, **linux-x86-64**, or **linux-ia64**.

In general, 32-bit programs use **libdbfork.a** and 64-bit programs use **libdbfork_64.a**. Of course, if your architecture doesn't support 32-bit programs, the option won't work.

For example:

```
cc -o program program.c \
            -L/usr/totalview/linux-x86/lib -ldbfork
```

However, **linux-ia64** uses **libdbfor**k for 64-bit programs.

SunOS 5 SPARC

Add one of the following command line arguments or options to the command that you use to link your programs:

- **/opt/totalview/sun5/lib/libdbfork.a**
- **-L/opt/totalview/sun5/lib -ldbfork**

For example:

```
cc -o program program.c \
            -L/opt/totalview/sun5/lib -ldbfork
```

As an alternative, you can set the **LD_LIBRARY_PATH** environment variable and omit the **-L** option on the command line:

```
setenv LD_LIBRARY_PATH /opt/totalview/sun5/lib
```

Chapter 10

Operating Systems

Operating Systems

This chapter describes the operating system features that can be used with TotalView. This chapter includes the following topics:

- Supported Operating Systems
- Troubleshooting Mac OS X Installations
- Mounting the /proc File System (SunOS 5 only)
- Swap Space
- Shared Libraries
- Debugging Your Program's Dynamically Loaded Libraries
- Remapping Keys (Sun Keyboards only)
- Expression System

Supported Operating Systems

Here is an overview of operating systems and some of the environments supported by TotalView at the time when this book was printed. As this book isn't printed nearly as often as vendors update compilers and operating systems, the compiler and operating system versions mentioned here may be obsolete. For a definitive list, see the most recent platform guide on our website. You can download this document at http://www.roguewave.com/products-services/totalview, and selecting Supported Platforms to download the most recent platform guide.

- Apple Macintosh OS X 10.7, 10.8, and 10.9.
- Cray XT, XE, and XK running the Cray Linux Environment (CLE), version 2.2 or later.
- IBM Blue Gene systems running Linux on the front end nodes.
- IBM RS/6000 and SP systems running AIX versions 5.3L, 6.1, and 7.1.
- Sun x86_64, Solaris 10
- Sun SPARC Solaris 10.
- Linux: see the Platforms Guide.

Troubleshooting Mac OS X Installations

Problem Description

At TotalView startup, the OS checks whether the Mach system call -`task_for_pid()` is working properly. If the call returns an error, no debugging is possible, and TotalView outputs an error message that begins "The Mach system call -task_for_pid() is not working properly." TotalView cannot distinguish the circumstances that can lead to this error, which are varied and depend on the version of OS X. The following sections describe a series of steps to troubleshoot this problem.

For Mac OS X Versions 10.8 (Mountain Lion) or Later

Requirements:

- The TotalView executables must be codesigned.
- The Mac host's system security policy must have `Developer mode` enabled.
- TotalView users must be members of the `_developer` group, and must run TotalView within the context of a login session that has been validated by a password challenge at the OS X console.

For Mac OS X Versions 10.11 (Capitan) or Later

In the Mac OS X El Capitan release, Apple has added a new layer named System Integrity Protection (SIP) to its security model. SIP's protections are not limited to protecting the system from file system changes. There are also system calls that are now restricted in their functionality, which can affect developing and debugging on Mac OS X. For runtime protection the following restrictions exist:

- `task_for_pid()` fails with EPERM if called incorrectly, which may cause TotalView to crash
- **dyld** environment variables are ignore
- DTrace probes are unavailable

However, SIP does not block inspection by the developer of their own applications while they are being developed. TotalView tools will continue to allow applications to be inspected and debugged during the development process.

For more information about SIP, please see Apple's developer documentation.

Remotely Debugging without Console Access

If you want to debug a remote machine to which you do not have console access, you can try the following procedure:

1. Install Xquartz and TotalView on the remote machine, and then perform the following steps on that remote machine:
2. Allow X11 forwarding in the `sshd_config` file (disabled by default).
3. Make sure every user who might need to debug is in the `_developer` group.
4. Type: `DevToolsSecurity -enable`.
5. Type: `sudo security authorizationdb write system.privilege.taskport allow`.

The last step above is necessary to allow the launching of TotalView when not on the console.

Mounting the /proc File System

To debug programs on SunOS 5 with TotalView, you need to mount the **/proc** file system.

If you receive one of the following errors from TotalView, the **/proc** file system might not be mounted:

- `job_t::launch, creating process: process not found`
- `Error launching process while trying to read -dynamic symbols`
- `Creating Process... Process not found Clearing Thrown Flag Operation Attempted on an unbound process object`

To determine whether the **/proc** file system is mounted, enter the appropriate command from the following table.

Operating System	Command
SunOS 5	`% /sbin/mount | grep /proc  /proc on / proc read/write/setuid on ...`

If you receive one of these messages from the **mount** command, the **/proc** file system is mounted.

Mounting /proc with SunOS 5

To make sure that the **/proc** file system is mounted each time your system boots, add the appropriate line from the following table to the appropriate file.

Operating System	Name of File	Line to add
SunOS 5	**/etc/vfstab**	**/proc - /proc proc - no -**

Then, to mount the **/proc** file system, enter the following command:

```
/sbin/mount /proc
```

Swap Space

Debugging large programs can exhaust the swap space on your machine. If you run out of swap space, TotalView exits with a fatal error, such as:

- `Fatal Error: Out of space trying to allocate`

This error indicates that TotalView failed to allocate dynamic memory. It can occur anytime during a debugging session. It can also indicate that the data size limit in the C shell is too small. You can use the C shell's **limit** command to increase the data size limit. For example:

```
limit datasize unlimited
```

- `job_t::launch, creating process: Operation failed`

This error indicates that the **fork()** or **execve()** system call failed while TotalView was creating a process to debug. It can happen when TotalView tries to create a process.

Swap Space on IBM AIX

To find out how much swap space has been allocated and is currently being used, use the **/usr/sbin/pstat -s** command:

To find out how much swap space is in use while you are running TotalView:

1. Start TotalView with a large executable:

   `totalview` *executable*

Press Ctrl+Z to suspend TotalView.

1. Use the following command to see how much swap space TotalView is using:

   `ps u`

For example, in this case the value in the SZ column is 5476 KB:

```
USER    PID %CPU %MEM    SZ  RSS    TTY  ...
smith 15080  0.0 6.0 5476 547  pts/1 ...
```

To add swap space, use the AIX system management tool, **smit**. Use the following path through the **smit** menus:

```
System Storage Management > Logical Volume Manager >
   Paging Space
```

Swap Space on Linux

To find out how much swap space has been allocated and is currently being used, use either the **swapon** or **top** commands on Linux:

You can use the **mkswap**(8) command to create swap space. The **swapon**(8) command tells Linux that it should use this space.

Swap Space on SunOS 5

To find out how much swap space has been allocated and is currently being used, use the **swap -s** command:

To find out how much swap space is in use while you are running TotalView:

1. Start TotalView with a large executable:
   `totalview` *executable*

Press Ctrl+Z to suspend TotalView.

1. Use the following command to see how much swap space TotalView is using:
   `/bin/ps -l`

To add swap space, use the **mkfile(1M)** and **swap(1M)** commands. You must be **root** to use these commands. For more information, refer to the online manual pages for these commands.

Shared Libraries

TotalView supports dynamically linked executables, that is, executables that are linked with shared libraries.

When you start TotalView with a dynamically linked executable, TotalView loads an additional set of symbols for the shared libraries, as indicated in the shell from which you started TotalView. To accomplish this, TotalView:

1. Runs a sample process and discards it.
2. Reads information from the process.
3. Reads the symbol table for each library.

When you create a process without starting it, and the process does not include shared libraries, the PC points to the entry point of the process, usually the **start** routine. If the process does include shared libraries, TotalView takes the following actions:

- Runs the dynamic loader (SunOS 5: **ld.so**, Linux: **/lib/ld-linux.so.?**).
- Sets the PC to point to the location after the invocation of the dynamic loader but before the invocation of C++ static constructors or the **main()** routine.

When you attach to a process that uses shared libraries, TotalView takes the following actions:

- If you attached to the process after the dynamic loader ran, then TotalView loads the dynamic symbols for the shared library.
- If you attached to the process before it runs the dynamic loader, TotalView allows the process to run the dynamic loader to completion. Then, TotalView loads the dynamic symbols for the shared library.

If desired, you can suppress the recording and use of dynamic symbols for shared libraries by starting TotalView with the **-no_dynamic** option. Refer to Chapter 7, "TotalView Command Syntax," on page 337 for details on this TotalView startup option.

If a shared library has changed since you started a TotalView session, you can use the **Group > Rescan Library** command to reload library symbol tables. Be aware that only some systems such as AIX permit you to reload library information.

Changing Linkage Table Entries and LD_BIND_NOW

If you are executing a dynamically linked program, calls from the executable into a shared library are made using the *Procedure Linkage Table* (PLT). Each function in the dynamic library that is called by the main program has an entry in this table. Normally, the dynamic linker fills the PLT entries with code that calls the dynamic linker. This means that the first time that your code calls a function in a dynamic library, the runtime environment calls the dynamic linker. The linker will then modify the entry so that next time this function is called, it will not be involved.

This is not the behavior you want or expect when debugging a program because TotalView will do one of the following:

- Place you within the dynamic linker (which you don't want to see).
- Step over the function.

And, because the entry is altered, everything appears to work fine the next time you step into this function.

You can correct this problem by setting the **LD_BIND_NOW** environment variable. For example:

```
setenv LD_BIND_NOW 1
```

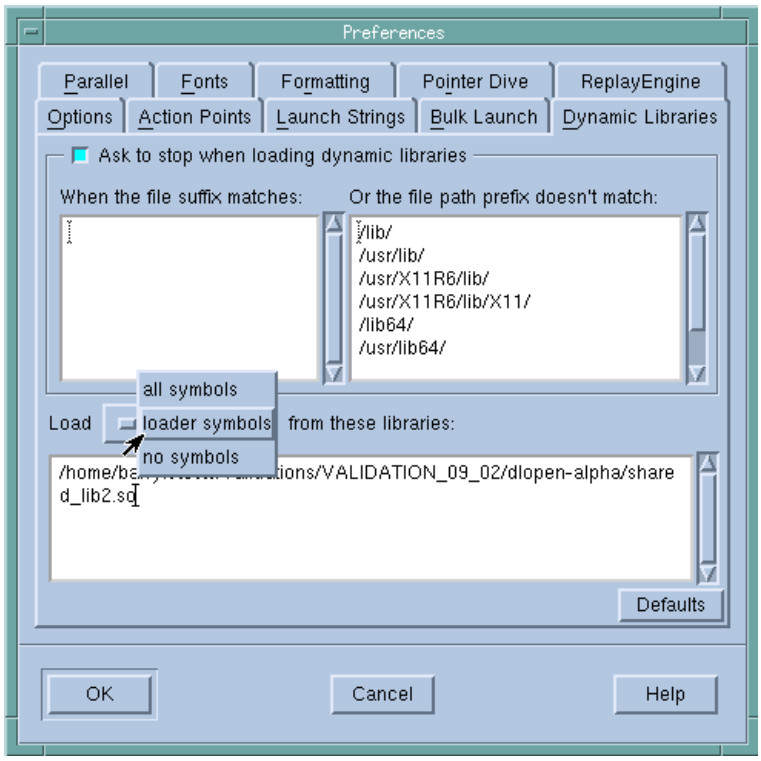
This tells the dynamic linker that it should alter the PLT when the program starts executing rather than doing it when the program calls the function.

Debugging Your Program's Dynamically Loaded Libraries

TotalView automatically reads the symbols of shared libraries that are dynamically loaded into your program at runtime. These libraries are those loaded using **dlopen** (or, on IBM AIX, **load** and **loadbind**).

TotalView automatically detects these calls, and then loads the symbol table from the newly loaded libraries and plants any enabled saved breakpoints for these libraries. TotalView then decides whether to ask you about stopping the process to plant breakpoints. You will set these characteristics by using the **Dynamic Libraries** page in the **File > Preferences** Dialog Box.

Figure 13 – File > Preferences Dialog Box: Dynamic Libraries Page



TotalView decides according to the following rules:

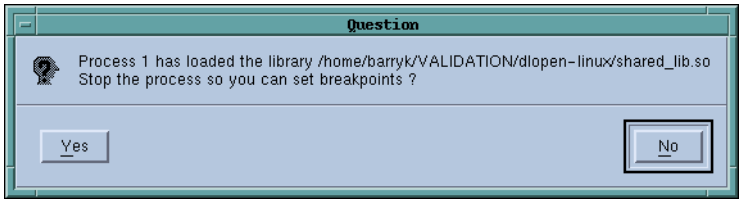
1. If either the **Load symbols from dynamic libraries** or **Ask to stop when loading dynamic libraries** preference is set to **false**, TotalView does not ask you about stopping.
2. If one or more of the strings in the **When the file suffix matches** preference list is a suffix of the full library name (including the path), TotalView asks you about stopping.
3. If one or more of the strings in the **When the file path prefix does not match** list is a prefix of the full library name (including the path), TotalView *does not* ask you about stopping.

4. If the newly loaded libraries have any saved breakpoints, TotalView does not ask you about stopping.
5. If none of the rules above apply, TotalView asks you about stopping.

If TotalView does not ask you about stopping the process, the process is continued.

If TotalView decides to ask you about stopping, it displays a dialog box, asking if it should stop the process so you can set breakpoints. To stop the process, answer **Yes**.

Figure 14 – Stop Process Question Dialog Box



To allow the process to continue executing, answer **No**. Stopping the process allows you to insert breakpoints in the newly loaded shared library.

Do either or both of the following to tell TotalView if it should ask:

- If you can set the **-ask_on_dlopen** command-line option to **true**, or you can set the **-no_ask_on_dlopen** option to false.
- Unset the **Load symbols from dynamic libraries** preference.

The following table lists paths where you are not asked if TotalView should stop the process:

Platform	Value
IBM AIX	**/lib/ /usr/lib/ /usr/lpp/ /usr/ccs/lib/ /usr/dt/lib/ /tmp/**
SUN Solaris 2.x	**/lib//usr/lib/ /usr/ccs/lib/**
Linux x86	**/lib/usr/lib**
Linux Alpha	**/lib/usr/lib**

The values you enter in the TotalView preference should be space-separated lists of the prefixes and suffixes to be used.

After starting TotalView, you can change these lists by using the **When the file suffix matches** and **And the file path prefix does not match** preferences.

dlopen Options for Scalability

When a target process calls `dlopen()`, a **dlopen** event is generated in TotalView. Because handling **dlopen** events impacts startup time for dynamically linked executables, TotalView provides ways to configure **dlopen** for better performance and scalability in HPC computing environments:

- Filtering **dlopen** events to avoid stopping a process for each event.
- Handling **dlopen** events in parallel to reduce client/server communication overhead with MRNet enabled.

Filtering dlopen Events

Two state variables and their related command line options enable you to filter **dlopen** events to plant breakpoints in the *dlopened* libraries only when the process stops for some other reason.

dlopen event filtering is controlled by the settings on two state variables, **TV::dlopen_always_recalculate** and **TV::dlopen_recalculate_on_match**, and their related command line options **dlopen_always_recalculate** and **dlopen_recalculate_on_match**

Three possible **dlopen** filtering modes are made possible by these variables: **Slow**, **Medium** and **Fast**.

In *Fast* mode, the process never stops for a **dlopen** event, not even "null" **dlopen** events. Using this option can result in significant performance gains, but may be impractical for some applications.In *Medium* mode, some libraries can be specified to always reevaluate their breakpoints, rather than all or none.

- **Slow Mode: Reloads libraries on every dlopen event**

  Option:

  ```
  dlopen_always_recalculate==true
  ```

  Reloads libraries on every **dlopen** event, retaining TotalView's traditional breakpoint reevaluation semantics. This mode is compatible with CUDA and is a good choice when your session has pending breakpoints. However, this mode does not perform or scale as well as the other modes, because it requires the TotalView client to handle every (non-null) **dlopen** event for every process.

  If performance is not the primary concern, or the application or runtime environment does not perform many **dlopen** events, then this may be a good choice.

  In this mode, when the target stops with a **dlopen** event, the server reports the event to the client, where the library list is reloaded and checked to see if any additional breakpoint locations need to be planted in the newly loaded libraries

- **Medium Mode: Reports only libraries that match defined patterns on a dlopen event**

  Options:

  ```
  dlopen_always_recalculate==false
  dlopen_recalculate_on_match=="glob-list"
  ```

A *glob-list* is a colon-separated list of simple glob patterns used to compare and match the *dlopened* library. A simple glob pattern is a string, optionally ending with asterisk character ('*') For example:

```
dlopen_recalculate_on_match=="libcuda.so*:libmylib1*:libmylib2.so"
```

This mode strikes a balance between performance and enabling breakpoints to be planted in *dlopened* libraries.

In **Medium** mode, the target process stops on every **dlopen** event (just as in **Slow** mode), but the event is not reported to the client unless one of the newly loaded libraries matches the provided pattern.

This setting requires:

— Adding the names of any *dlopened* libraries to the TV::dlopen_recalculate_on_match list if you want breakpoints planted in the library when the library is loaded.

— Adding "**libcuda.so***" to the match list if you are debugging CUDA; otherwise TotalView will miss CUDA kernel launch events.

- **Fast Mode**: Does not stop for **dlopen** events

  Options:

  ```
  dlopen_always_recalculate==false
  dlopen_recalculate_on_match==""
  ```

  This mode provides the best performance, disallowing planting breakpoints in *dlopened* libraries when the library is loaded. Breakpoints are planted in the *dlopened* libraries only when the process stops for some other reason; however, be aware with this option that an application may have executed past the point at which you want to start debugging inside the *dlopened* library.

  Because the debugger does not plant the **dlopen** breakpoint in the process, the process never stops for a **dlopen** event, not even "null" **dlopen** events. While this mode may be impractical for some applications, the performance gains are significant.

Table 4 summarizes the pros and cons of each mode.

Table 4: dlopen Event Filtering Modes

Mode/ Speed	Option	
Slow	`dlopen_always_recalculate==true`	
	Pros: • Retains TotalView's traditional breakpoint reevaluation semantics. • Works best with pending breakpoints. • Compatible with CUDA.	**Cons**: • Does not perform or scale as well as the other modes because the TotalView client handles every (non-null) **dlopen** event for every process.
Medium	`dlopen_always_recalculate==false` `dlopen_recalculate_on_match=="glob-list"`	

Table 4: dlopen Event Filtering Modes

Mode/ Speed	Option	
	Pros: • Performs better by filtering out **dlopen** events. • Allows the TotalView client to process multiple **dlopen** events at a time. • Compatible with CUDA.	**Cons**: • Process stops at the **dlopen** breakpoint, even for "null" **dlopen** events. • An application may execute past the point at which you want to start debugging inside the *dlopened* library. • Requires adding to the match list any libraries that should have breakpoints planted when the library is loaded. • Requires adding to the match list **libcuda.so*** for CUDA support.
Fast	`dlopen_always_recalculate==false` `dlopen_recalculate_on_match==""`	
	Pros: • Performs best by never stopping the process at **dlopen** events. • Allows the TotalView client to process multiple **dlopen** events at a time.	**Cons**: • Breakpoints cannot be calculated when a particular library is loaded. • Breaks CUDA support.

Handling dlopen Events in Parallel

TotalView's default behavior is to handle dlopened libraries serially, creating multiple, single-cast client-server communications. This can degrade performance, depending on the number of libraries a process dlopens, and the number of processes in the job.

To handle *dlopened* libraries in parallel, use the **TV::dlopen_read_libraries_in_parallel** and its related command line option **-dlopen_read_libraries_in_parallel**.

This sets the state variable to **true**. Placing this **dset** command in the **tvdrc** file ensures that all instances of TotalView launch with this option:

```
dset TV::dlopen_read_libraries_in_parallel true
```

To set this option on an individual instance of TotalView, use the command line option when you start TotalView:

```
totalview -dlopen_read_libraries_in_parallel
```

NOTE >> Enabling this option does not guarantee that dlopen performance will improve on all systems in all scenarios. Be sure to test the impact of this setting on your system and debugging environments.

Remember that MRNet must also be enabled for this to work.

Known Limitations

Dynamic library support has the following known limitations:

- TotalView does not deal correctly with parallel programs that call **dlopen** on different libraries in different processes. TotalView requires that the processes have a uniform address space, including all shared libraries.
- TotalView does not yet fully support unloading libraries (using **dlclose**) and then reloading them at a different address using **dlopen**.

Remapping Keys

On the SunOS 5 keyboard, you may need to remap the page-up and page-down keys to the prior and next **keysym** so that you can scroll TotalView windows with the page-up and page-down keys. To do so, add the following lines to your X Window System startup file:

```
# Remap F29/F35 to PgUp/PgDn
xmodmap -e 'keysym F29 = Prior'
xmodmap -e 'keysym F35 = Next'
```

Expression System

Depending on the target platform, TotalView supports:

- An interpreted expression system only
- Both an interpreted and a compiled expression system

Unless stated otherwise below, TotalView supports interpreted expressions only.

Expression System on IBM AIX-Power and Blue Gene/Q

On IBM AIX and Blue Gene/Q, TotalView supports compiled and interpreted expressions. TotalView also supports assembly language in expressions.

Some program functions called from the TotalView expression system on the Power architecture cannot have floating-point arguments that are passed by value. However, in functions with a variable number of arguments, floating-point arguments *can* be in the varying part of the argument list. For example, you can include floating-point arguments with calls to **printf**:

```
double d = 3.14159;
printf("d = %f\n", d);
```

On Blue Gene/Q, currently TotalView supports only statically allocated patch spaces linked into the base executable. The executable may be statically or dynamically linked. The static patch space must not reside in a shared library. See *Allocating Static Patch Space* in the *TotalView for HPC User Guide*.

Chapter 11

Architectures

Overview

This chapter describes the architectures TotalView supports, including:

AMD and Intel x86-64

This section describes AMD's 64-bit processors and the Intel EM64T processors, including:

The x86-64 can be programmed in either 32- or 64-bit mode. TotalView supports both. In 32-bit mode, the processor is identical to an x86, and the stack frame is identical to the x86. The information within this section describes 64-bit mode.

The AMD x86-64 processor supports the IEEE floating-point format.

x86-64 General Registers

TotalView displays the x86-64 general registers in the Stack Frame Pane of the Process Window. The following table describes how TotalView treats each general register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
RAX	General registers	**$long**	yes	yes	**$rax**
RDX		**$long**	yes	yes	**$rdx**
RCX		**$long**	yes	yes	**$rcx**
RBX		**$long**	yes	yes	**$rbx**
RSI		**$long**	yes	yes	**$rsi**
RDI		**$long**	yes	yes	**$rdi**
RBP		**$long**	yes	yes	**$rbp**
RSP		**$long**	yes	yes	**$rsp**
R8-R15		**$long**	yes	yes	**$r8-$r15**
RA	Selector registers	**$int**	no	no	**$ra**
SS		**$int**	no	no	**$ss**
DS		**$int**	no	no	**$ds**

Register	Description	Data Type	Edit	Dive	Specify in Expression
ES		**$int**	no	no	**$es**
FS		**$int**	no	no	**$fs**
GS		**$int**	no	no	**$gs**
EFLAGS		**$int**	no	no	**$eflags**
RIP	Instruction pointer	**$code[]**	no	yes	**$rip**
FS_BASE		**$long**	yes	yes	**$fs_base**
GS_BASE		**$long**	yes	yes	**$gs_base**
TEMP		**$long**	no	no	**$temp**

x86-64 Floating-Point Registers

TotalView displays the x86-64 floating-point registers in the Stack Frame Pane of the Process Window. The next table describes how TotalView treats each floating-point register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
ST0	ST(0)	**$extended**	yes	yes	**$st0**
ST1	ST(1)	**$extended**	yes	yes	**$st1**
ST2	ST(2)	**$extended**	yes	yes	**$st2**
ST3	ST(3)	**$extended**	yes	yes	**$st3**
ST4	ST(4)	**$extended**	yes	yes	**$st4**
ST5	ST(5)	**$extended**	yes	yes	**$st5**
ST6	ST(6)	**$extended**	yes	yes	**$st6**
ST7	ST(7)	**$extended**	yes	yes	**$st7**
FPCR	Floating-point control register	**$int**	yes	no	**$fpcr**
FPSR	Floating-point status register	**$int**	no	no	**$fpsr**
FPTAG	Tag word	**$int**	no	no	**$fptag**
FPOP	Floating-point operation	**$int**	no	no	**$fpop**
FPI	Instruction address	**$int**	no	no	**$fpi**
FPD	Data address	**$int**	no	no	**$fpd**

Register	Description	Data Type	Edit	Dive	Specify in Expression
MXCSR	SSE status and control	**$int**	yes	no	**$mxcsr**
MXCS-R_MASK	MXCSR mask	**$int**	no	no	**$mxcsr_ mask**
XMM0_L ... XMM7_L	Streaming SIMD - Extension: left half	**$long**	yes	yes	**$xmm0_l ... $xmm7_l**
XMM0_H ... XMM7_H	Streaming SIMD - Extension: right half	**$long**	yes	yes	**$xmm0_h ... $xmm7_h**
XMM8_L ... XMM15_ L	Streaming SIMD - Extension: left half	**$long**	yes	yes	**$xmm8_l ... $xmm15_l**
XMM8_H ... XMM15_ H	Streaming SIMD - Extension: right half	**$long**	yes	yes	**$xmm8_h ... $xmm15_h**

NOTE >> The x86-64 has 16 128-bit registers that are used by SSE and SSE2 instructions. TotalView displays these as 32 64-bit registers. These registers can be used in the following ways: 16 bytes, 8 words, 2 longs, 4 floating point, 2 double, or a single 128-bit value. TotalView shows each of these hardware registers as two $long registers. To change the type, dive and then edit the type in the data window to be an array of the type you wish. For example, cast it to "$char[16]", "$float[4], and so on.

x86-64 FPCR Register

For your convenience, TotalView interprets the bit settings of the FPCR and FPSR registers.

You can edit the value of the FPCR and set it to any of the bit settings outlined in the next table.

Value	Bit Setting	Meaning
RC=RN	0x0000	To nearest rounding mode
RC=R-	0x2000	Toward negative infinity rounding mode
RC=R+	0x4000	Toward positive infinity rounding mode
RC=RZ	0x6000	Toward zero rounding mode

Value	Bit Setting	Meaning
PC=SGL	0x0000	Single-precision rounding
PC=DBL	0x0080	Double-precision rounding
PC=EXT	0x00c0	Extended-precision rounding
EM=PM	0x0020	Precision exception enable
EM=UM	0x0010	Underflow exception enable
EM=OM	0x0008	Overflow exception enable
EM=ZM	0x0004	Zero-divide exception enable
EM=DM	0x0002	Denormalized operand exception enable
EM=IM	0x0001	Invalid operation exception enable

Using the x86-64 FPCR Register

You can change the value of the FPCR within TotalView to customize the exception handling for your program.

For example, if your program inadvertently divides by zero, you can edit the bit setting of the FPCR register in the Stack Frame Pane. In this case, you would change the bit setting for the FPCR to include **0x0004** so that TotalView traps the "divide-by-zero" bit. The string displayed next to the FPCR register should now include **EM=(ZM).** Now, when your program divides by zero, it receives a **SIGFPE** signal, which you can catch with TotalView. See "*Handling Signals*" in Chapter 5 of the *TotalView for HPC Users Guide* for information on handling signals. If you did not set the bit for trapping divide by zero, the processor would ignore the error and set the **EF=(ZE)** bit in the FPSR.

x86-64 FPSR Register

The bit settings of the x86-64 FPSR register are outlined in the following table.

Value	Bit Setting	Meaning
TOP=<*i*>	0x3800	Register <*i*> is top of FPU stack
B	0x8000	FPU busy
C0	0x0100	Condition bit 0
C1	0x0200	Condition bit 1
C2	0x0400	Condition bit 2
C3	0x4000	Condition bit 3
ES	0x0080	Exception summary status
SF	0x0040	Stack fault
EF=PE	0x0020	Precision exception
EF=UE	0x0010	Underflow exception

Value	Bit Setting	Meaning
EF=OE	0x0008	Overflow exception
EF=ZE	0x0004	Zero divide exception
EF=DE	0x0002	Denormalized operand exception
EF=IE	0x0001	Invalid operation exception

x86-64 MXCSR Register

This register contains control and status information for the SSE registers. Some of the bits in this register are editable. You cannot dive in these values.

The bit settings of the x86-64 MXCSR register are outlined in the following table.

Value	Bit Setting	Meaning
FZ	0x8000	Flush to zero
RC=RN	0x0000	To nearest rounding mode
RC=R-	0x2000	Toward negative infinity rounding mode
RC=R+	0x4000	Toward positive infinity rounding mode
RC=RZ	0x6000	Toward zero rounding mode
EM=PM	0x1000	Precision mask
EM=UM	0x0800	Underflow mask
EM=OM	0x0400	Overflow mask
EM=ZM	0x0200	Divide-by-zero mask
EM=DM	0x0100	Denormal mask
EM=IM	0x0080	Invalid operation mask
DAZ	0x0040	Denormals are zeros
EF=PE	0x0020	Precision flag
EF=UE	0x0010	Underflow flag
EF=OE	0x0008	Overflow flag
EF=ZE	0x0004	Divide-by-zero flag
EF=DE	0x0002	Denormal flag
EF=IE	0x0001	Invalid operation flag

Power Architectures

This section contains the following information:

- Power General Registers
- Blue Gene Power Registers
- Power MSR Register
- Power Floating-Point Registers
- Blue Gene/Q QPX Floating-Point Registers
- Power FPSCR Register
- Using the Power FPSCR Register

NOTE >> The Power architecture supports the IEEE floating-point format.

Power General Registers

TotalView displays Power general registers in the Stack Frame Pane of the Process Window. The following table describes how TotalView treats each general register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
R0	General register 0	**$int/$long**	yes	yes	**$r0**
SP	Stack pointer	**$int/$long**	yes	yes	**$sp**
RTOC	TOC pointer	**$int/$long**	yes	yes	**$rtoc**
R3 - R31	General registers 3 - 31	**$int/$long**	yes	yes	**$r3 - $r31**
INUM		**$int/$long**	yes	no	**$inum**
PC	Program counter	**$code[]**	no	yes	**$pc**
SRR1	Machine status save/ restore register	**$int/$long**	yes	no	**$srr1**
LR	Link register	**$code[]**	yes	no	**$lr**
CTR	Counter register	**$int/$long**	yes	no	**$ctr**
CR	Condition register (see below)	**$int/$long**	yes	no	**$cr**

Register	Description	Data Type	Edit	Dive	Specify in Expression
XER	Integer exception register (see below)	**$int/$long**	yes	no	**$xer**
DAR	Data address register	**$int/$long**	yes	no	**$dar**
MQ	MQ register	**$int/$long**	yes	no	**$mq**
MSR	Machine state register	**$int/$long**	yes	no	**$msr**
SEG0 - SEG9	Segment registers 0 - 9	**$int/$long**	yes	no	**$seg0 - $seg9**
SG10 - SG15	Segment registers 10 - 15	**$int/$long**	yes	no	**$sg10 - $sg15**
SCNT	SS_COUNT	**$int/$long**	yes	no	**$scnt**
SAD1	SS_ADDR 1	**$int/$long**	yes	no	**$sad1**
SAD2	SS_ADDR 2	**$int/$long**	yes	no	**$sad2**
SCD1	SS_CODE 1	**$int/$long**	yes	no	**$scd1**
SCD2	SS_CODE 2	**$int/$long**	yes	no	**$scd2**
TID		**$int/$long**	yes	no	

CR Register

TotalView writes information for each of the eight condition sets, appending a a >, <, or = symbol. For example, if the summary overflow (0x1) bit is set, TotalView might display the following:

0x22424444 (574768196) (0=,1=,2>,3=,4>,5>,6>,7>)

XER Register

Depending upon what was set, TotalView can display up to five kinds of information, as follows:

STD:0x%02x

The string terminator character (bits 25-31)

SL:%d

The string length field (bits 16-23)

S0

Displayed if the summary overflow bit is set (bit 0)

OV

Displayed if the overflow bit is set (bit 1)

CA

Displayed if the carry bit is set (bit 2)

For example:

0x20000002 (536870914) (STD:0x00,SL:2,CA)

Blue Gene Power Registers

TotalView displays Blue Gene Power registers in the Stack Frame Pane of the Process Window. The following table describes how TotalView treats each Blue Gene register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
R0	General register 0	**$int/$long**	yes	yes	**$r0**
SP	Stack pointer	**$int/$long**	yes	yes	**$sp**
RTOC	TOC pointer	**$int/$long**	yes	yes	**$rtoc**
R3 - R31	General registers 3 - 31	**$int/$long**	yes	yes	**$r3 - $r31**
LR	Link register	**$code[]**	yes	no	**$lr**
CR	Condition register (see below)	**$int/$long**	yes	no	**$cr**
XER	Integer exception register (see below)	**$int/$long**	yes	no	**$xer**
CTR	Counter register	**$int/$long**	yes	no	**$ctr**
IAR	Program counter	**$code[]**	no	yes	**$pc**
MSR	Machine state register	**$int/$long**	yes	no	**$msr**
DEAR	Data address register	**$int/$long**	yes	no	**$dar**
ESR	Exception status register	**$int/$long**	no	no	**$esr**

Blue Gene/Q QPX Floating-Point Registers

TotalView displays the Blue Gene/Q Quad Processing eXtension to the Power ISA (QPX) registers in the Stack Frame Pane of the Process Window. The architecture provides for 32 256-bit registers that can be used as four doubles, eight floats, four 64-bit integers, or eight 32-bit integers. The next table describes how TotalView treats each floating-point register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
F0 - F31	QPX floating-point registers 0 - 31	**$qpx_req**	yes	yes	**$q0 - $q31**
FPSCR	Floating-point status register	**$long**	yes	no	**$fpscr**

The data type `$qpx_reg` is a TotalView predefined type that is defined as follows:

```
union $qpx_reg {
  $double q4_double[4];
  $float  q8_float[8];
  $int64  q4_int64[4];
  $int32  q8_int32[8];
};
```

The traditional Book 1 Power PC floating point instructions that operate on the FPR register set operate on slot 0 of the corresponding QPX register. Therefore, the Stack Frame Pane of the Process Window shows the double contained in slot 0 (the `q4_double[0]` field of the `$qpx_reg` data type) for each QPX register. Dive on a QPX register to open a Data Pane displaying the full contents of the register.

Power MSR Register

For your convenience, TotalView interprets the bit settings of the Power MSR register. You can edit the value of the MSR and set it to any of the bit settings outlined in the following table.

Value	Bit Setting	Meaning
0x8000000000000000	**SF**	Sixty-four bit mode
0x0000000000040000	**POW**	Power management enable
0x0000000000020000	**TGPR**	Temporary GPR mapping
0x0000000000010000	**ILE**	Exception little-endian mode
0x0000000000008000	**EE**	External interrupt enable
0x0000000000004000	**PR**	Privilege level
0x0000000000002000	**FP**	Floating-point available
0x0000000000001000	**ME**	Machine check enable

Value	Bit Setting	Meaning
0x0000000000000800	**FE0**	Floating-point exception mode 0
0x0000000000000400	**SE**	Single-step trace enable
0x0000000000000200	**BE**	Branch trace enable
0x0000000000000100	**FE1**	Floating-point exception mode 1
0x0000000000000040	**IP**	Exception prefix
0x0000000000000020	**IR**	Instruction address translation
0x0000000000000010	**DR**	Data address translation
0x0000000000000002	**RI**	Recoverable exception
0x0000000000000001	**LE**	Little-endian mode enable

Power Floating-Point Registers

TotalView displays the Power floating-point registers in the Stack Frame Pane of the Process Window. The next table describes how TotalView treats each floating-point register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
F0 - F31	Floating-point registers 0 - 31	**$double**	yes	yes	**$f0 - $f31**
FPSCR	Floating-point status register	**$int**	yes	no	**$fpscr**
FPSCR2	Floating-point status register 2	**$int**	yes	no	**$fpscr2**

Power FPSCR Register

For your convenience, TotalView interprets the bit settings of the Power FPSCR register. You can edit the value of the FPSCR and set it to any of the bit settings outlined in the following table.

Value	Bit Setting	Meaning
0x80000000	**FX**	Floating-point exception summary
0x40000000	**FEX**	Floating-point enabled exception summary
0x20000000	**VX**	Floating-point invalid operation exception summary
0x10000000	**OX**	Floating-point overflow exception
0x08000000	**UX**	Floating-point underflow exception

Value	Bit Setting	Meaning
0x04000000	**ZX**	Floating-point zero divide exception
0x02000000	**XX**	Floating-point inexact exception
0x01000000	**VXSNAN**	Floating-point invalid operation exception for SNaN
0x00800000	**VXISI**	Floating-point invalid operation exception: ¥ - ¥, or infinity-infinity
0x00400000	**VXIDI**	Floating-point invalid operation exception: ¥ / ¥, or infinity divided by infinity
0x00200000	**VXZDZ**	Floating-point invalid operation exception: 0 / 0
0x00100000	**VXIMZ**	Floating-point invalid operation exception: ¥ * ¥, or infinity times infinity
0x00080000	**VXVC**	Floating-point invalid operation exception: invalid compare
0x00040000	**FR**	Floating-point fraction rounded
0x00020000	**FI**	Floating-point fraction inexact
0x00010000	**FPRF=(C)**	Floating-point result class descriptor
0x00008000	**FPRF=(L)**	Floating-point less than or negative
0x00004000	**FPRF=(G)**	Floating-point greater than or positive
0x00002000	**FPRF=(E)**	Floating-point equal or zero
0x00001000	**FPRF=(U)**	Floating-point unordered or NaN
0x00011000	**FPRF=(QNAN)**	Quiet NaN; alias for FPRF=(C+U)
0x00009000	**FPRF=(-INF)**	-Infinity; alias for FPRF=(L+U)
0x00008000	**FPRF=(-NORM)**	-Normalized number; alias for FPRF=(L)
0x00018000	**FPRF=(-DENORM)**	-Denormalized number; alias for FPRF=(C+L)
0x00012000	**FPRF=(-ZERO)**	-Zero; alias for FPRF=(C+E)
0x00002000	**FPRF=(+ZERO)**	+Zero; alias for FPRF=(E)
0x00014000	**FPRF=(+DENORM)**	+Denormalized number; alias for FPRF=(C+G)
0x00004000	**FPRF=(+NORM)**	+Normalized number; alias for FPRF=(G)
0x00005000	**FPRF=(+INF)**	+Infinity; alias for FPRF=(G+U)
0x00000400	**VXSOFT**	Floating-point invalid operation exception: software request
0x00000200	**VXSQRT**	Floating-point invalid operation exception: square root
0x00000100	**VXCVI**	Floating-point invalid operation exception: invalid integer convert
0x00000080	**VE**	Floating-point invalid operation exception enable

Value	Bit Setting	Meaning
0x00000040	**OE**	Floating-point overflow exception enable
0x00000020	**UE**	Floating-point underflow exception enable
0x00000010	**ZE**	Floating-point zero divide exception enable
0x00000008	**XE**	Floating-point inexact exception enable
0x00000004	**NI**	Floating-point non-IEEE mode enable
0x00000000	**RN=NEAR**	Round to nearest
0x00000001	**RN=ZERO**	Round toward zero
0x00000002	**RN=PINF**	Round toward +infinity
0x00000003	**RN=NINF**	Round toward **-**infinity

Using the Power FPSCR Register

On AIX, if you compile your program to catch floating-point exceptions (IBM compiler **-qfltrap** option), you can change the value of the FPSCR within TotalView to customize the exception handling for your program.

For example, if your program inadvertently divides by zero, you can edit the bit setting of the FPSCR register in the Stack Frame Pane. In this case, you would change the bit setting for the FPSCR to include **0x10** so that TotalView traps the "divide by zero" exception. The string displayed next to the FPSR register should now include **ZE**. Now, when your program divides by zero, it receives a **SIGTRAP** signal, which will be caught by TotalView. See "*Handling Signals*" in Chapter 5 of the *TotalView for HPC Users Guide* for more information. If you did not set the bit for trapping divide by zero or you did not compile to catch floating-point exceptions, your program would not stop and the processor would set the **ZX** bit.

Intel IA-64

This section contains the following information:

The Cray XT3 front end runs on this chip.

Intel IA-64 General Registers

TotalView displays the IA-64 general registers in the Stack Frame Pane of the Process Window. The following table describes how TotalView treats each general register, and the actions you can take with each.

NOTE >> The descriptions in this section are taken (almost verbatim) from the "Intel Itanium Architecture Software Developer's Manual. Volume 1: Application Architecture". This was revision 2.0, printed in December 2001.

Register	Description	Data Type	Edit	Dive	in expression
r0	register 0	**$long**	N	Y	**$r0**
r1	global pointer	**$long**	N	Y	**$r1**
r2-r31	static general registers	**$long**	Y	Y	**$r2-$r31**
r31-r127	stacked general registers (all may not be valid)	**$long**	Y	Y	**$r32-$r127**
b0-b7	branch registers	**$code[]**	Y	Y	**$b0-$b7**
ip	instruction pointer	**$code[]**	N	Y	**$ip**
cfm	current frame marker	**$long**	Y	Y	**$cfm**
psr	processor status register	**$long**	Y	Y	**$psr**
rsc	register stack configuration register (AR 16)	**$long**	Y	Y	**$rsc**

Register	Description	Data Type	Edit	Dive	in expression
bsp	rse backing store pointer (AR 17)	**$long**	Y	Y	**$bsp**
bspstore	rse backing store pointer for memory stores (AR 18)	**$long**	N	Y	**$bspstore**
rnat	rse NAT collection register (AR 19)	**$long**	Y	Y	**$rnat**
ccv	compare and exchange value register (AR 32)	**$long**	Y	Y	**$ccv**
unat	user NAT collection register (AR 36)	**$long**	Y	Y	**$unat**
fpsr	floating point status register (AR 40)	**$long**	Y	Y	**$fpsr**
pfs	previous function state (AR 64)	**$long**	Y	Y	**$pfs**
lc	loop count register (AR 65)	**$long**	Y	Y	**$lc**
ec	epilog count register (AR 66)	**$long**	Y	Y	**$ec**
pr	predication registers (packed)	**$long**	Y	Y	**$pr**
nat	nat registers (packed)	**$long**	Y	Y	**$nat**

NOTE >> All general registers r32-r127 may not be valid in a given stack frame.

IA-64 Processor Status Register Fields (PSR)

These fields control memory access alignment, byte-ordering, and user-configured performance monitors. It also records the modification state of floating-point registers.

Bit	Field	Meaning
1	**be**	big-endian enable
2	**up**	user performance monitor enable
3	**ac**	alignment check
4	**mfl**	lower (f2-f31) floating point registers written
5	**mfh**	upper (f32-f127) floating point registers written
13	**ic**	interruption collection
14	**i**	interrupt bit
15	**pk**	protection key enable
17	**dt**	data address translation
18	**dfl**	disabled lower floating point register set
19	**dfh**	disabled upper floating point register set

Bit	Field	Meaning
20	**sp**	secure performance monitors
21	**pp**	privileged performance monitor enable
22	**di**	disable instruction set transition
23	**si**	secure interval timer
24	**db**	debug breakpoint fault
25	**lp**	lower privilege transfer trap
26	**tb**	taken branch trap
27	**rt**	register stack translation
33:32	**cpl**	current privilege level
34	**is**	instruction set
35	**mc**	machine check abort mask
36	**it**	instruction address translation
37	**id**	instruction debug fault disable
38	**da**	disable data access and dirty-bit faults
39	**dd**	data debug fault disable
40	**ss**	single step enable
42:41	**ri**	restart instruction
43	**ed**	exception deferral
44	**bn**	register bank
45	**ia**	disable instruction access-bit faults

Current Frame Marker Register Fields (CFM)

Each general register stack frame is associated with a frame marker. The frame maker describes the state of the general register stack. The Current Frame Marker (CFM) holds the state of the current stack frame.

Bit Range	Field	Meaning
6:0	**sof**	Size of frame
13:7	**sol**	Size of locals portion of stack frame
17:14	**sor**	Size of rotating portion of stack frame (number of rotating registers is sor*8
24:18	**rrb.gr**	Register rename base for general registers

Bit Range	Field	Meaning
31:25	**rrb.fr**	Register rename base for float registers
37:32	**rrb.pr**	Register rename base for predicate registers

Register Stack Configuration Register Fields (RSC)

The Register Stack Configuration (RSC) Register is a 64-bit register used to control the operation of the Register Stack Engine (RSE).

Bit Range	Field	Meaning
1:0 00	**mode**	enforced lazy
1:0 01		load intensive
1:0 10		store intensive
1:0 11		eager
3:2	**pl**	RSE privilege level
4	**be**	RSE endian mode (0=little endian, 1=big endian)
29:16	**loadrs**	RSE load distance to tear point

Previous Function State Register Fields (PFS)

The Previous Function State register (PFS) contains multiple fields: Previous Frame Marker (pfm), Previous Epilog Count (pec), and Previous Privilege Level (ppl). These values are copied automatically on a call from the CFM register, Epilog Count Register (EC), and PSR.cpl (Current Privilege Level in the Processor Status Register) to accelerate procedure calling.

Value	Bit Setting	Meaning
37:0	**pfm**	previous frame marker
57:52	**pec**	previous epilog count
63:62	**ppl**	previous privilege level

Floating Point Registers

The IA-64 contains 128 floating-point registers. The first two are read only.

Register	Description	Data Type	Edit	Dive	Specify in Expression
f0	float register 0	**$long**	N	Y	**$f0**
f1	float register 1	**$long**	N	Y	**$f1**
f2-f31	lower float registers	**$long**	Y	Y	**$f2-$f31**
f32-f127	upper float registers	**$long**	Y	Y	**$f32-$f127**

Floating Point Status Register Fields

The Floating-Point Status Register (FPSR) contains the dynamic control and status information for floating-point operations. There is one main set of control and status information and three alternate sets.

Field	Bits	Meaning
traps.vd	0	Invalid Operation Floating-Point Exception fault disabled
traps.dd	1	Denormal/Unnormal Operating Floating-Point Exception fault disabled
traps.zd	2	Zero Divide Floating-Point Exception trap disabled
traps.od	3	Overflow Floating-Point Exception trap disabled
traps.ud	4	Underflow Floating-Point Exception trap disabled
traps.id	5	Inexact Floating-Point Exception trap disabled
sfo	18:6	main status field
sf1	31:19	alternate status field 1
sf2	44:32	alternate status field 2
sf3	57:45	alternate status field 3

Here is a description of the FPSR status field descriptions.

Bits	Field	meaning
0	**ftz**	flush-to-zero mode
1	**wre**	widest range exponent
3:2	**pc**	precision control
5:4	**rc**	rounding control

Bits	Field	meaning
6	**td**	traps disabled
7	**v**	invalid operation
8	**d**	denormal/unnormal operand
9	**z**	zero divide
10	**o**	overflow
11	**u**	underflow
12	**i**	inexact

Intel x86

This section contains the following information:

NOTE >> The Intel x86 processor supports the IEEE floating-point format.

Intel x86 General Registers

TotalView displays the Intel x86 general registers in the Stack Frame Pane of the Process Window. The following table describes how TotalView treats each general register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
EAX	General registers	**$long**	yes	yes	**$eax**
ECX		**$long**	yes	yes	**$ecx**
EDX		**$long**	yes	yes	**$edx**
EBX		**$long**	yes	yes	**$ebx**
EBP		**$long**	yes	yes	**$ebp**
ESP		**$long**	yes	yes	**$esp**
ESI		**$long**	yes	yes	**$esi**
EDI		**$long**	yes	yes	**$edi**
CS	Selector registers	**$int**	no	no	**$cs**
SS		**$int**	no	no	**$ss**
DS		**$int**	no	no	**$ds**
ES		**$int**	no	no	**$es**
FS		**$int**	no	no	**$fs**
GS		**$int**	no	no	**$gs**
EFLAGS		**$int**	no	no	**$eflags**

Register	Description	Data Type	Edit	Dive	Specify in Expression
EIP	Instruction pointer	**$code[]**	no	yes	**$eip**
FAULT		**$long**	no	no	**$fault**
TEMP		**$long**	no	no	**$temp**
INUM		**$long**	no	no	**$inum**
ECODE		**$long**	no	no	**$ecode**

Intel x86 Floating-Point Registers

TotalView displays the x86 floating-point registers in the Stack Frame Pane of the Process Window. The next table describes how TotalView treats each floating-point register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
ST0	ST(0)	**$extended**	yes	yes	**$st0**
ST1	ST(1)	**$extended**	yes	yes	**$st1**
ST2	ST(2)	**$extended**	yes	yes	**$st2**
ST3	ST(3)	**$extended**	yes	yes	**$st3**
ST4	ST(4)	**$extended**	yes	yes	**$st4**
ST5	ST(5)	**$extended**	yes	yes	**$st5**
ST6	ST(6)	**$extended**	yes	yes	**$st6**
ST7	ST(7)	**$extended**	yes	yes	**$st7**
FPCR	Floating-point control register	**$int**	yes	no	**$fpcr**
FPSR	Floating-point status register	**$int**	no	no	**$fpsr**
FPTAG	Tag word	**$int**	no	no	**$fptag**
FPIOFF	Instruction offset	**$int**	no	no	**$fpioff**
FPISEL	Instruction selector	**$int**	no	no	**$fpisel**
FPDOFF	Data offset	**$int**	no	no	**$fpdoff**
FPDSEL	Data selector	**$int**	no	no	**$fpdsel**
MXCSR	SSE status and control	**$int**	yes	no	$mxcsv
MXCS-R_MASK	MXCSR mask	**$int**	no	no	$mxcsr_mask

Register	Description	Data Type	Edit	Dive	Specify in Expression
XMM0_L ... XMM7_L	Streaming SIMD -Extension: left half	**$long long**	yes	yes	**$xmm0_l ... $xmm7_l**
XMM0_H ... XMM7_H	Streaming SIMD -Extension: right half	**$long long**	yes	yes	**$xmm0_h ... $xmm7_h**

NOTE >> The Pentium III and 4 have 8 128-bit registers that are used by SSE and SSE2 instructions. TotalView displays these as 16 64-bit registers. These registers can be used in the following ways: 16 bytes, 8 words, 2 long longs, 4 floating point, 2 double, or a single 128-bit value. TotalView shows each of these hardware registers as two $long long registers. To change the type, dive and then edit the type in the data window to be an array of the type you wish. For example, cast it to "$char[16]", "$float[4], and so on.

Intel x86 FPCR Register

For your convenience, TotalView interprets the bit settings of the FPCR and FPSR registers.

You can edit the value of the FPCR and set it to any of the bit settings outlined in the next table.

Value	Bit Setting	Meaning
RC=RN	0x0000	To nearest rounding mode
RC=R-	0x2000	Toward negative infinity rounding mode
RC=R+	0x4000	Toward positive infinity rounding mode
RC=RZ	0x6000	Toward zero rounding mode
PC=SGL	0x0000	Single-precision rounding
PC=DBL	0x0080	Double-precision rounding
PC=EXT	0x00c0	Extended-precision rounding
EM=PM	0x0020	Precision exception enable
EM=UM	0x0010	Underflow exception enable
EM=OM	0x0008	Overflow exception enable
EM=ZM	0x0004	Zero-divide exception enable
EM=DM	0x0002	Denormalized operand exception enable
EM=IM	0x0001	Invalid operation exception enable

Using the Intel x86 FPCR Register

You can change the value of the FPCR within TotalView to customize the exception handling for your program.

For example, if your program inadvertently divides by zero, you can edit the bit setting of the FPCR register in the Stack Frame Pane. In this case, you would change the bit setting for the FPCR to include **0x0004** so that TotalView traps the "divide-by-zero" bit. The string displayed next to the FPCR register should now include **EM=(ZM).** Now, when your program divides by zero, it receives a **SIGFPE** signal, which you can catch with TotalView. See "*Handling Signals*" in Chapter 5 of the *TotalView for HPC Users Guide* for information on handling signals. If you did not set the bit for trapping divide by zero, the processor would ignore the error and set the **EF=(ZE)** bit in the FPSR.

Intel x86 FPSR Register

The bit settings of the Intel x86 FPSR register are outlined in the following table.

Value	Bit Setting	Meaning
TOP=<*i*>	0x3800	Register <*i*> is top of FPU stack
B	0x8000	FPU busy
C0	0x0100	Condition bit 0
C1	0x0200	Condition bit 1
C2	0x0400	Condition bit 2
C3	0x4000	Condition bit 3
ES	0x0080	Exception summary status
SF	0x0040	Stack fault
EF=PE	0x0020	Precision exception
EF=UE	0x0010	Underflow exception
EF=OE	0x0008	Overflow exception
EF=ZE	0x0004	Zero divide exception
EF=DE	0x0002	Denormalized operand exception
EF=IE	0x0001	Invalid operation exception

Intel x86 MXCSR Register

This register contains control and status information for the SSE registers. Some of the bits in this register are editable. You cannot dive in these values.

The bit settings of the Intel x86 MXCSR register are outlined in the following table.

Value	Bit Setting	Meaning
FZ	0x8000	Flush to zero
RC=RN	0x0000	To nearest rounding mode
RC=R-	0x2000	Toward negative infinity rounding mode
RC=R+	0x4000	Toward positive infinity rounding mode
RC=RZ	0x6000	Toward zero rounding mode
EM=PM	0x1000	Precision mask
EM=UM	0x0800	Underflow mask
EM=OM	0x0400	Overflow mask
EM=ZM	0x0200	Divide-by-zero mask
EM=DM	0x0100	Denormal mask
EM=IM	0x0080	Invalid operation mask
DAZ	0x0040	Denormals are zeros
EF=PE	0x0020	Precision flag
EF=UE	0x0010	Underflow flag
EF=OE	0x0008	Overflow flag
EF=ZE	0x0004	Divide-by-zero flag
EF=DE	0x0002	Denormal flag
EF=IE	0x0001	Invalid operation flag

Sun SPARC

This section has the following information:

- SPARC General Registers
- SPARC PSR Register
- SPARC Floating-Point Registers
- SPARC FPSR Register
- Using the SPARC FPSR Register

NOTE >> The SPARC processor supports the IEEE floating-point format.

SPARC General Registers

TotalView displays the SPARC general registers in the Stack Frame Pane of the Process Window. The following table describes how TotalView treats each general register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
G0	Global zero register	**$int**	no	no	**$g0**
G1 - G7	Global registers	**$int**	yes	yes	**$g1 - $g7**
O0 - O5	Outgoing parameter registers	**$int**	yes	yes	**$o0 - $o5**
SP	Stack pointer	**$int**	yes	yes	**$sp**
O7	Temporary register	**$int**	yes	yes	**$o7**
L0 - L7	Local registers	**$int**	yes	yes	**$l0 - $l7**
I0 - I5	Incoming parameter registers	**$int**	yes	yes	**$i0 - $i5**
FP	Frame pointer	**$int**	yes	yes	**$fp**
I7	Return address	**$int**	yes	yes	**$i7**
PSR	Processor status register	**$int**	yes	no	**$psr**
Y	Y register	**$int**	yes	yes	**$y**
WIM	WIM register	**$int**	no	no	
TBR	TBR register	**$int**	no	no	

Register	Description	Data Type	Edit	Dive	Specify in Expression
PC	Program counter	**$code[]**	no	yes	**$pc**
nPC	Next program counter	**$code[]**	no	yes	**$npc**

SPARC PSR Register

For your convenience, TotalView interprets the bit settings of the SPARC PSR register. You can edit the value of the PSR and set some of the bits outlined in the following table.

Value	Bit Setting	Meaning
ET	0x00000020	Traps enabled
PS	0x00000040	Previous supervisor
S	0x00000080	Supervisor mode
EF	0x00001000	Floating-point unit enabled
EC	0x00002000	Coprocessor enabled
C	0x00100000	Carry condition code
V	0x00200000	Overflow condition code
Z	0x00400000	Zero condition code
N	0x00800000	Negative condition code

SPARC Floating-Point Registers

TotalView displays the SPARC floating-point registers in the Stack Frame Pane of the Process Window. The next table describes how TotalView treats each floating-point register, and the actions you can take with each register.

Register	Description	Data Type	Edit	Dive	Specify in Expression
F0, F1, F0_F1	Floating-point registers (f registers), used singly	**$float**	no	yes	**$f0, $f1, $f0_f1**
F2 - F31	Floating-point registers (f registers), used singly	**$float**	yes	yes	**$f2- $f31**
F0, F1, F0_F1	Floating-point registers (f registers), used as pairs	**$double**	no	yes	**$f0, $f1, $f0_f1**
F0/F1 - F30/F31	Floating-point registers (f registers), used as pairs	**$double**	yes	yes	**$2 - $f30_f31**

Register	Description	Data Type	Edit	Dive	Specify in Expression
FPCR	Floating-point control register	**$int**	no	no	**$fpcr**
FPSR	Floating-point status register	**$int**	yes	no	**$fpsr**

TotalView allows you to use these registers singly or in pairs, depending on how they are used by your program. For example, if you use F1 by itself, its type is **$float**, but if you use the F0/F1 pair, its type is **$double**.

SPARC FPSR Register

For your convenience, TotalView interprets the bit settings of the SPARC FPSR register. You can edit the value of the FPSR and set it to any of the bit settings outlined in the following table.

Value	Bit Setting	Meaning
CEXC=NX	0x00000001	Current inexact exception
CEXC=DZ	0x00000002	Current divide by zero exception
CEXC=UF	0x00000004	Current underflow exception
CEXC=OF	0x00000008	Current overflow exception
CEXC=NV	0x00000010	Current invalid exception
AEXC=NX	0x00000020	Accrued inexact exception
AEXC=DZ	0x00000040	Accrued divide by zero exception
AEXC=UF	0x00000080	Accrued underflow exception
AEXC=OF	0x00000100	Accrued overflow exception
AEXC=NV	0x00000200	Accrued invalid exception
EQ	0x00000000	Floating-point condition =
LT	0x00000400	Floating-point condition <
GT	0x00000800	Floating-point condition >
UN	0x00000c00	Floating-point condition unordered
QNE	0x00002000	Queue not empty
NONE	0x00000000	Floating-point trap type None
IEEE	0x00004000	Floating-point trap type IEEE Exception
UFIN	0x00008000	Floating-point trap type Unfinished FPop
UIMP	0x0000c000	Floating-point trap type Unimplemented FPop
SEQE	0x00010000	Floating-point trap type Sequence Error

Value	Bit Setting	Meaning
NS	0x00400000	Nonstandard floating-point FAST mode
TEM=NX	0x00800000	Trap enable mask - Inexact Trap Mask
TEM=DZ	0x01000000	Trap enable mask - Divide by Zero Trap Mask
TEM=UF	0x02000000	Trap enable mask - Underflow Trap Mask
TEM=OF	0x04000000	Trap enable mask - Overflow Trap Mask
TEM=NV	0x08000000	Trap enable mask - Invalid Operation Trap Mask
EXT	0x00000000	Extended rounding precision - Extended precision
SGL	0x10000000	Extended rounding precision - Single precision
DBL	0x20000000	Extended rounding precision - Double precision
NEAR	0x00000000	Rounding direction - Round to nearest (tie-even)
ZERO	0x40000000	Rounding direction - Round to 0
PINF	0x80000000	Rounding direction - Round to +Infinity
NINF	0xc0000000	Rounding direction - Round to **-**Infinity

Using the SPARC FPSR Register

The SPARC processor does not catch floating-point errors by default. You can change the value of the FPSR within TotalView to customize the exception handling for your program.

For example, if your program inadvertently divides by zero, you can edit the bit setting of the FPSR register in the Stack Frame Pane. In this case, you would change the bit setting for the FPSR to include **0x01000000** so that TotalView traps the "divide by zero" bit. The string displayed next to the FPSR register should now include **TEM=(DZ)**. Now, when your program divides by zero, it receives a **SIGFPE** signal, which you can catch with TotalView. See "*Handling Signals*" in Chapter 5 of the *TotalView for HPC Users Guide* for more information. If you did not set the bit for trapping divide by zero, the processor would ignore the error and set the **AEXC=(DZ)** bit.

PART IV

Appendices

This section contains supplementary information, currently a single appendix, Appendix A, "MPI Startup," on page 416 that provides information on creating startup files for various Message Passing Interface (MPI) implementations.

Appendix A

MPI Startup

Overview

Here you will find information that will allow you to create startup profiles for environments that Rogue Wave Software doesn't define. Any customizations made to your MPI environment will be available for later selection in the Sessions Manager where they will appear in the **File > Debug New Parallel Program** dialog's Parallel System Name list.

Rogue Wave Software products know about different Message Passing Interface (MPI) implementations. Because so many implementations are standard, our products usually do the right thing. Unfortunately, subtle differences in your environment or an implementation can cause difficulties that prevent our products from automatically starting your program. In these cases, you must declare what needs to be done.

Customizing Your Parallel Configuration

The **File > Debug New Parallel Program** dialog box (TotalView for HPC) or the **Add parallel program** screen (MemoryScape) let you select a parallel configuration. If the default configurations that Rogue Wave Software provides do not meet your needs, you can either overwrite these configurations or create new ones.

The default definitions for parallel configurations reside in the **parallel_support.tvd** file, located in your **totalview/lib** installation directory. For TotalView — and MemoryScape when used with TotalView — you can use the variable **TV::parallel_configs** to customize parallel configurations. For standalone -MemoryScape, you need to instead add any new configurations directly to the **parallel_support.tvd** file. Both these methods are discussed here.

TotalView

If you are using TotalView, set the **TV::parallel_configs** variable, either local to your TotalView installation or globally:

- Globally, in your system's **.tvdrc** file. If you set this variable here, everyone using this TotalView version will see the definition.
- Locally, in your **.totalview/tvdrc** file. You will be the only person to see this definition when you start TotalView.

You can also directly edit the **parallel_support.tvd** file, located in the **totalview/lib** installation directory area, but reinstalling TotalView overwrites this file so this is not recommended.

For TotalView, if you are using a locally-installed MPI implementation, you should add it to your PATH variable. By default, both TotalView and MemoryScape use the information in PATH to find the parallel launcher (for example, **mpirun**, **mpiexec**, **poe**, **srun**, **prun**, **dmpirun**, and so on). Generally, if you can run your parallel job from a command line, TotalView can also run it.

If you have multiple installed MPI systems — for example, multiple versions of MPICH installed on a common file server — only one can be in your path. In this case, specify an absolute path to launch it, which means you will need to customize the **TV::parallel_configs** list variable or the **parallel_support.tvd** file contained within your installation directory so that it does not rely on your PATH variable.

The easiest way to create your own startup configuration for TotalView is to copy a similar configuration from the **TV::private::parallel_configs_base** variable (found in the **parallel_support.tvd** file, located in your installation directory at **totalview/lib**) to the **TV::parallel_configs** variable, and then edit it. Save the **TV::parallel_configs** variable in the **tvdrc** file located in the **.totalview** subdirectory in your home directory. For standalone -MemoryScape, please see Standalone MemoryScape.

When you add configurations, they are simply added to a list. This means that if TotalView supplies a definition named **foo** and you create a definition also named **foo**, both exist and your product chooses the first one in the list. Because both are displayed, be careful to give each new definition a unique name.

Standalone MemoryScape

For the standalone MemoryScape product, to customize the way an MPI program starts up, edit the **parallel_-support.tvd** file, located in the **totalview/lib** installation directory area, using its existing syntax and definitions as a model for any new MPI implementations you add.

Note that this file is *overwritten* when you install a new TotalView or MemoryScape release. Be sure to make a backup copy of any customizations you make to this file. See Customizing Your Parallel Configuration for information on how to edit this file.

Make a backup copy of customizations you add to the parallel_support.tvd file, since the file is overwritten if you reinstall TotalView or MemoryScape.

Example Parallel Configuration Definitions

This section provides three examples of customized parallel configurations. See Customizing Your Parallel Configuration on page 417 for information on where to place these definitions.

NOTE >> Any customizations made to your MPI environment will be available for later selection in the Sessions Manager where they will appear in the File > Debug New Parallel Program dialog's Parallel System Name list.

Here are three examples:

```
dset TV::parallel_configs {
        #Argonne MPICH
        name:           MPICH;
        description:    Argonne MPICH;
        starter:        mpirun -tv -ksq %s %p %a;
        style:          setup_script;
        tasks_option:   -np;
        nodes_option:   -nodes;
        env_style:      force;
        pretest:        mpichversion;

        #Argonne MPICH2
        name:           MPICH2;
        description:    Argonne MPICH2;
        starter:        $mpiexec -tvsu %s %p %a;
        style:          manager_process;
        tasks_option:   -n;
        env_option:     -env;
        env_style:      assign_space_repeat;
        comm_world:     0x44000000;
        pretest:        mpich2version

        # AIX POE
        name:           poe - AIX;
        description:    IBM PE - AIX;
        tasks_option:   -procs;
        tasks_env:      MP_PROCS;
        nodes_option:   -nodes;
        starter:        /bin/poe %p %a %s;
        style:          bootstrap;
        env:          NLSPATH=/usr/lib/nls/msg/%L/%N/: \
                        /usr/lib/nls/msg/%L/%N.cat;
        service_tids:   2 3 4;
        comm_world:     0;
        pretest:        test -x /bin/poe
```

```
    msq_lib:        /usr/lpp/ppe.poe/lib/%m
  }
```

All lines (except for comments) end with a semi-colon (;). Add spaces freely to improve the readability of these definitions as TotalView and MemoryScape ignore them.

Notice that the MPICH2 definition contains the **$mpiexec** variable. This variable is defined elsewhere in the **parallel_support.tvd** file as follows:

```
set mpiexec mpiexec;
```

There is no limit to how many definitions you can place within the **parallel_support.tvd** file or within a variable. The definitions you create will appear in the **Parallel** system pulldown list in the **File > New** dialog box (TotalView) or the **Add parallel program** screen (MemoryScape) and can be used as an argument to the **--mpi** option of the CLI's **dload** command.

Note that for MemoryScape, you do not set this variable because the tvdrc file is not read. Rather, directly edit the parallel_support.tvd file.

The fields that you can set are as follows:

comm_world

Only use this option when **style** is set to **bootstrap**. This variable is the definition of MPI_COMM_WORLD in C and C++. MPI_COMM_WORLD is usually a **#define** or **enum** to a special number or a pointer value. If you do not include this field, TotalView and MemoryScape cannot acquire the rank for each MPI process.

description

(optional) A string describing what the configuration is used for. There is no length limit.

env

(optional) Defines environment variables that are placed in the starter program's environment. (Depending on how the starter works, these variables may not make their way into the actual ranked processes.) If you are defining more than one environment variable, define each in its own **env** clause.

The format to use is:

```
variable_name=value
```

env_option

(optional) Names the command-line option that exports environment variables to the tasks started by the launcher program. Use this option along with the **env_style** field.

env_style

(optional) Contains a list of environment variables that are passed to tasks.

assign: The argument to be inserted to the command-line option named in **env_option** is a comma-separated list of environment variable **name=value** pairs; that is,

```
NAME1=VALUE1,NAME2=VALUE2,NAME3=VALUE3
```

This option is ignored if you do not use an **env_option** clause.

assign_space_repeat: The argument after **env_option** is a space-separated name/value pair that is assigned to an environment variable. The command within **env_option** is repeated for each environment variable; that is, suppose you enter:

```
-env NAME1 VALUE1 -env NAME2 VALUE2
-env NAME3 VALUE3
```

This mode is primarily used for the **mpiexec**.py MPICH2 starter program.

excenv

One of the following three strings:

export: The argument to be inserted after the command named in **env_option**. This is a comma-separated list of environment variable names; that is,

```
NAME1,NAME2,NAME3
```

This option is ignored if you do not use the **env_option** clause.

force: Environment variables are forced into the ranked processes using a shell script. TotalView or MemoryScape will generate a script that launches the target program. The script also tells the starter to run that script. This clause requires that your home directory be visible on all remote nodes. In most cases, you will use this option when you need to dynamically link memory debugging into the target. While this option does not work with all MPI implementations, it is the most reliable method for MPICH1.

none: No argument is inserted after **env_option**.

msq_lib

(optional) Names the dynamically loaded library that TotalView and MemoryScape use when it needs to locate message queue information. You can name this file using either a relative or full pathname.

name

A short name describing the configuration. This name shows up in such places as the **File > New** dialog box and in the **Process > Startup Parameter**'s Parallel tab in TotalView and the **Add parallel program** screen in MemoryScape. TotalView and MemoryScape remember which configuration you use when starting a program so that they can automatically reapply the configuration when you restart the program.

Because the configuration is associated with a program's name, renaming or moving the program destroys this association.

nodes_option

Names the command-line option (usually **-nodes**) that sets the number of node upon which your program runs. This statement does not define the value that is the argument to this command-line option.

Only omit this statement if your system doesn't allow you to control the number of nodes from the command line. If you set this value to zero (“0”), this statement is omitted.

pretest

(optional) Names a shell command that is run before the parallel job is launched. This command must run quickly, produce a timely response, and have no side-effects. This is a test, not a setup hook.

TotalView or MemoryScape may kill the test if it takes too long. It may call it more than once to be sure if everything is OK. If the shell command exit is not as expected, TotalView or MemoryScape complains and asks for permission before continuing,

pretext_exit

The expected error code of the pretest command. The default is zero.

service_tids

(optional) The list of thread IDs that TotalView and MemoryScape marks as service threads. When using TotalView, you can use the **View > Display Managers** command to tell TotalView to display them.

A service thread differs from a system manager thread in that it is created by the parallel runtime and are not created by your program. POE for example, often creates three service threads.

starter

Defines a template that TotalView and MemoryScape use to create the command line that starts your program. In most cases, this template describes the relative position of the arguments. However, you can also use it to add extra parameters, commands, or environment variables. Here are the three substation parameters:

%a: Replaced with the command-line arguments passed to rank processes.

%p: Replaced with the absolute pathname of the target program.

%s: Replaced with additional startup arguments. These are parameters to the starter process, not the rank processes.

For example:

```
starter: mpirun -tv -all-local %s %p %a;
```

When the user selects a value for the option indicated by the **nodes_option** and **tasks_options**, the argument and the value are placed within the **%s** parameter. If you enter a value of 0 for either of these, MemoryScape and TotalView omit the parameter. In MemoryScape, 0 is the default.

style

MPI programs are launched in two ways: either by a manager process or by a script. Use this option to name the method, as follows:

manager_process: The parallel system uses a binary manager process to oversee process creation and process lifetime. Our products attach to this process and communicate with it using its debug interface. For example, IBM's poe uses this style.

```
style: manager_process;
```

setup_script: The parallel system uses a script—which is often **mpirun**—to set up the arguments, environment, and temporary files. However, the script does not run as part of the parallel job. This script must understand the **-tv** command-line option and the TOTALVIEW environment variable.

bootstrap: The parallel system attempts to launch an uninstruemented MPI by interposing TotalView or MemoryScape inside the parallel launch sequence in place of the target program. This does not work for MPICH and SGI MPT.

tasks_env

The name of an environment variable whose value is the expected number of parallel tasks. This is consulted when the user does not explicitly specify a task count.

tasks_option

(sometimes required) Lets you define the option (usually -**np** or -**procs**) that controls the total number of tasks or processes.

Only omit this statement if your system doesn't allow you to control the number of tasks from the command line. If you set this to 0, this statement is omitted.

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