27 The GDB/MI Interface

Function and Purpose

GDB/MI is a line based machine oriented text interface to GDB and is activated by specifying using the '`--interpreter`' command line option (see ⟨undefined⟩ [Mode Options], page ⟨undefined⟩). It is specifically intended to support the development of systems which use the debugger as just one small component of a larger system.

This chapter is a specification of the GDB/MI interface. It is written in the form of a reference manual.

Note that GDB/MI is still under construction, so some of the features described below are incomplete and subject to change (see ⟨undefined⟩ [GDB/MI Development and Front Ends], page ⟨undefined⟩).

Notation and Terminology

This chapter uses the following notation:

- `|` separates two alternatives.
- `[` *`something`* `]` indicates that *something* is optional: it may or may not be given.
- `(` *`group`* `)*` means that *group* inside the parentheses may repeat zero or more times.
- `(` *`group`* `)+` means that *group* inside the parentheses may repeat one or more times.
- `"`*`string`*`"` means a literal *string*.

27.1 GDB/MI General Design

Interaction of a GDB/MI frontend with GDB involves three parts—commands sent to GDB, responses to those commands and notifications. Each command results in exactly one response, indicating either successful completion of the command, or an error. For the commands that do not resume the target, the response contains the requested information. For the commands that resume the target, the response only indicates whether the target was successfully resumed. Notifications is the mechanism for reporting changes in the state of the target, or in GDB state, that cannot conveniently be associated with a command and reported as part of that command response.

The important examples of notifications are:

- Exec notifications. These are used to report changes in target state—when a target is resumed, or stopped. It would not be feasible to include this information in response of resuming commands, because one resume commands can result in multiple events in different threads. Also, quite some time may pass before any event happens in the target, while a frontend needs to know whether the resuming command itself was successfully executed.

- Console output, and status notifications. Console output notifications are used to report output of CLI commands, as well as diagnostics for other commands. Status notifications are used to report the progress of a long-running operation. Naturally, including this information in command response would mean no output is produced until the command is finished, which is undesirable.
- General notifications. Commands may have various side effects on the GDB or target state beyond their official purpose. For example, a command may change the selected thread. Although such changes can be included in command response, using notification allows for more orthogonal frontend design.

There's no guarantee that whenever an MI command reports an error, GDB or the target are in any specific state, and especially, the state is not reverted to the state before the MI command was processed. Therefore, whenever an MI command results in an error, we recommend that the frontend refreshes all the information shown in the user interface.

27.1.1 Context management

In most cases when GDB accesses the target, this access is done in context of a specific thread and frame (see ⟨undefined⟩ [Frames], page ⟨undefined⟩). Often, even when accessing global data, the target requires that a thread be specified. The CLI interface maintains the selected thread and frame, and supplies them to target on each command. This is convenient, because a command line user would not want to specify that information explicitly on each command, and because user interacts with GDB via a single terminal, so no confusion is possible as to what thread and frame are the current ones.

In the case of MI, the concept of selected thread and frame is less useful. First, a frontend can easily remember this information itself. Second, a graphical frontend can have more than one window, each one used for debugging a different thread, and the frontend might want to access additional threads for internal purposes. This increases the risk that by relying on implicitly selected thread, the frontend may be operating on a wrong one. Therefore, each MI command should explicitly specify which thread and frame to operate on. To make it possible, each MI command accepts the '`--thread`' and '`--frame`' options, the value to each is GDB identifier for thread and frame to operate on.

Usually, each top-level window in a frontend allows the user to select a thread and a frame, and remembers the user selection for further operations. However, in some cases GDB may suggest that the current thread be changed. For example, when stopping on a breakpoint it is reasonable to switch to the thread where breakpoint is hit. For another example, if the user issues the CLI '`thread`' command via the frontend, it is desirable to change the frontend's selected thread to the one specified by user. GDB communicates the suggestion to change current thread using the '`=thread-selected`' notification. No such notification is available for the selected frame at the moment.

Note that historically, MI shares the selected thread with CLI, so frontends used the `-thread-select` to execute commands in the right context. However, getting this to work right is cumbersome. The simplest way is for frontend to emit `-thread-select` command before every command. This doubles the number of commands that need to be sent. The alternative approach is to suppress `-thread-select` if the selected thread in GDB is supposed to be identical to the thread the frontend wants to operate on. However, getting this

optimization right can be tricky. In particular, if the frontend sends several commands to GDB, and one of the commands changes the selected thread, then the behaviour of subsequent commands will change. So, a frontend should either wait for response from such problematic commands, or explicitly add `-thread-select` for all subsequent commands. No frontend is known to do this exactly right, so it is suggested to just always pass the '`--thread`' and '`--frame`' options.

27.1.2 Asynchronous command execution and non-stop mode

On some targets, GDB is capable of processing MI commands even while the target is running. This is called *asynchronous command execution* (see ⟨undefined⟩ [Background Execution], page ⟨undefined⟩). The frontend may specify a preferrence for asynchronous execution using the `-gdb-set target-async 1` command, which should be emitted before either running the executable or attaching to the target. After the frontend has started the executable or attached to the target, it can find if asynchronous execution is enabled using the `-list-target-features` command.

Even if GDB can accept a command while target is running, many commands that access the target do not work when the target is running. Therefore, asynchronous command execution is most useful when combined with non-stop mode (see ⟨undefined⟩ [Non-Stop Mode], page ⟨undefined⟩). Then, it is possible to examine the state of one thread, while other threads are running.

When a given thread is running, MI commands that try to access the target in the context of that thread may not work, or may work only on some targets. In particular, commands that try to operate on thread's stack will not work, on any target. Commands that read memory, or modify breakpoints, may work or not work, depending on the target. Note that even commands that operate on global state, such as `print`, `set`, and breakpoint commands, still access the target in the context of a specific thread, so frontend should try to find a stopped thread and perform the operation on that thread (using the '`--thread`' option).

Which commands will work in the context of a running thread is highly target dependent. However, the two commands `-exec-interrupt`, to stop a thread, and `-thread-info`, to find the state of a thread, will always work.

27.1.3 Thread groups

GDB may be used to debug several processes at the same time. On some platfroms, GDB may support debugging of several hardware systems, each one having several cores with several different processes running on each core. This section describes the MI mechanism to support such debugging scenarios.

The key observation is that regardless of the structure of the target, MI can have a global list of threads, because most commands that accept the '`--thread`' option do not need to know what process that thread belongs to. Therefore, it is not necessary to introduce neither additional '`--process`' option, nor an notion of the current process in the MI interface. The only strictly new feature that is required is the ability to find how the threads are grouped into processes.

To allow the user to discover such grouping, and to support arbitrary hierarchy of machines/cores/processes, MI introduces the concept of a *thread group*. Thread group is a collection of threads and other thread groups. A thread group always has a string identifier, a type, and may have additional attributes specific to the type. A new command, `-list-thread-groups`, returns the list of top-level thread groups, which correspond to processes that GDB is debugging at the moment. By passing an identifier of a thread group to the `-list-thread-groups` command, it is possible to obtain the members of specific thread group.

To allow the user to easily discover processes, and other objects, he wishes to debug, a concept of *available thread group* is introduced. Available thread group is an thread group that GDB is not debugging, but that can be attached to, using the `-target-attach` command. The list of available top-level thread groups can be obtained using '`-list-thread-groups --available`'. In general, the content of a thread group may be only retrieved only after attaching to that thread group.

Thread groups are related to inferiors (see ⟨undefined⟩ [Inferiors and Programs], page ⟨undefined⟩). Each inferior corresponds to a thread group of a special type '`process`', and some additional operations are permitted on such thread groups.

27.2 GDB/MI Command Syntax

27.2.1 GDB/MI Input Syntax

command ↦
: *cli-command* | *mi-command*

cli-command ↦
: [*token*] *cli-command nl*, where *cli-command* is any existing GDB CLI command.

mi-command ↦
: [*token*] "-" *operation* (" " *option*)* [" --"] (" " *parameter*)* *nl*

token ↦ "any sequence of digits"

option ↦
: "-" *parameter* [" " *parameter*]

parameter ↦
: *non-blank-sequence* | *c-string*

operation ↦
: *any of the operations described in this chapter*

non-blank-sequence ↦
: *anything, provided it doesn't contain special characters such as* "-", *nl,* """ *and of course* " "

c-string ↦
: """ *seven-bit-iso-c-string-content* """

nl ↦ CR | CR-LF

Notes:

- The CLI commands are still handled by the MI interpreter; their output is described below.
- The *token*, when present, is passed back when the command finishes.
- Some MI commands accept optional arguments as part of the parameter list. Each option is identified by a leading '-' (dash) and may be followed by an optional argument parameter. Options occur first in the parameter list and can be delimited from normal parameters using '--' (this is useful when some parameters begin with a dash).

Pragmatics:

- We want easy access to the existing CLI syntax (for debugging).
- We want it to be easy to spot a MI operation.

27.2.2 GDB/MI Output Syntax

The output from GDB/MI consists of zero or more out-of-band records followed, optionally, by a single result record. This result record is for the most recent command. The sequence of output records is terminated by '(gdb)'.

If an input command was prefixed with a *token* then the corresponding output for that command will also be prefixed by that same *token*.

output ↦
(*out-of-band-record*)* [*result-record*] "(gdb)" *nl*

result-record ↦
[*token*] "^" *result-class* ("," *result*)* *nl*

out-of-band-record ↦
async-record | *stream-record*

async-record ↦
exec-async-output | *status-async-output* | *notify-async-output*

exec-async-output ↦
[*token*] "*" *async-output*

status-async-output ↦
[*token*] "+" *async-output*

notify-async-output ↦
[*token*] "=" *async-output*

async-output ↦
async-class ("," *result*)* *nl*

result-class ↦
"done" | "running" | "connected" | "error" | "exit"

async-class ↦
"stopped" | *others* (where *others* will be added depending on the needs—this is still in development).

```
result ↦
          variable "=" value

variable ↦
          string

value ↦   const | tuple | list

const ↦   c-string

tuple ↦   "{}" | "{" result ( "," result )* "}"

list ↦    "[]" | "[" value ( "," value )* "]" | "[" result ( "," result )* "]"

stream-record ↦
          console-stream-output | target-stream-output | log-stream-output

console-stream-output ↦
          "~" c-string

target-stream-output ↦
          "@" c-string

log-stream-output ↦
          "&" c-string

nl ↦      CR | CR-LF

token ↦   any sequence of digits.
```

Notes:

- All output sequences end in a single line containing a period.
- The *token* is from the corresponding request. Note that for all async output, while the token is allowed by the grammar and may be output by future versions of GDB for select async output messages, it is generally omitted. Frontends should treat all async output as reporting general changes in the state of the target and there should be no need to associate async output to any prior command.
- *status-async-output* contains on-going status information about the progress of a slow operation. It can be discarded. All status output is prefixed by '`+`'.
- *exec-async-output* contains asynchronous state change on the target (stopped, started, disappeared). All async output is prefixed by '`*`'.
- *notify-async-output* contains supplementary information that the client should handle (e.g., a new breakpoint information). All notify output is prefixed by '`=`'.
- *console-stream-output* is output that should be displayed as is in the console. It is the textual response to a CLI command. All the console output is prefixed by '`~`'.
- *target-stream-output* is the output produced by the target program. All the target output is prefixed by '`@`'.
- *log-stream-output* is output text coming from GDB's internals, for instance messages that should be displayed as part of an error log. All the log output is prefixed by '`&`'.
- New GDB/MI commands should only output *lists* containing *values*.

See ⟨undefined⟩ [GDB/MI Stream Records], page ⟨undefined⟩, for more details about the various output records.

27.3 GDB/MI Compatibility with CLI

For the developers convenience CLI commands can be entered directly, but there may be some unexpected behaviour. For example, commands that query the user will behave as if the user replied yes, breakpoint command lists are not executed and some CLI commands, such as `if`, `when` and `define`, prompt for further input with '`>`', which is not valid MI output.

This feature may be removed at some stage in the future and it is recommended that front ends use the `-interpreter-exec` command (see ⟨undefined⟩ [-interpreter-exec], page ⟨undefined⟩).

27.4 GDB/MI Development and Front Ends

The application which takes the MI output and presents the state of the program being debugged to the user is called a *front end*.

Although GDB/MI is still incomplete, it is currently being used by a variety of front ends to GDB. This makes it difficult to introduce new functionality without breaking existing usage. This section tries to minimize the problems by describing how the protocol might change.

Some changes in MI need not break a carefully designed front end, and for these the MI version will remain unchanged. The following is a list of changes that may occur within one level, so front ends should parse MI output in a way that can handle them:

- New MI commands may be added.
- New fields may be added to the output of any MI command.
- The range of values for fields with specified values, e.g., `in_scope` (see ⟨undefined⟩ [-var-update], page ⟨undefined⟩) may be extended.

If the changes are likely to break front ends, the MI version level will be increased by one. This will allow the front end to parse the output according to the MI version. Apart from mi0, new versions of GDB will not support old versions of MI and it will be the responsibility of the front end to work with the new one.

The best way to avoid unexpected changes in MI that might break your front end is to make your project known to GDB developers and follow development on `gdb@sourceware.org` and `gdb-patches@sourceware.org`.

27.5 GDB/MI Output Records

27.5.1 GDB/MI Result Records

In addition to a number of out-of-band notifications, the response to a GDB/MI command includes one of the following result indications:

`"^done" [ "," *results* ]`
: The synchronous operation was successful, ***results*** are the return values.

`"^running"`
: This result record is equivalent to '`^done`'. Historically, it was output instead of '`^done`' if the command has resumed the target. This behaviour is maintained for backward compatibility, but all frontends should treat '`^done`' and '`^running`' identically and rely on the '`*running`' output record to determine which threads are resumed.

`"^connected"`
: GDB has connected to a remote target.

`"^error" "," c-string`
: The operation failed. The *c-string* contains the corresponding error message.

`"^exit"` GDB has terminated.

27.5.2 GDB/MI Stream Records

GDB internally maintains a number of output streams: the console, the target, and the log. The output intended for each of these streams is funneled through the GDB/MI interface using *stream records*.

Each stream record begins with a unique *prefix character* which identifies its stream (see ⟨undefined⟩ [GDB/MI Output Syntax], page ⟨undefined⟩). In addition to the prefix, each stream record contains a *string-output*. This is either raw text (with an implicit new line) or a quoted C string (which does not contain an implicit newline).

`"~" string-output`
: The console output stream contains text that should be displayed in the CLI console window. It contains the textual responses to CLI commands.

`"@" string-output`
: The target output stream contains any textual output from the running target. This is only present when GDB's event loop is truly asynchronous, which is currently only the case for remote targets.

`"&" string-output`
: The log stream contains debugging messages being produced by GDB's internals.

27.5.3 GDB/MI Async Records

Async records are used to notify the GDB/MI client of additional changes that have occurred. Those changes can either be a consequence of GDB/MI commands (e.g., a breakpoint modified) or a result of target activity (e.g., target stopped).

The following is the list of possible async records:

`*running,thread-id="thread"`
: The target is now running. The *thread* field tells which specific thread is now running, and can be '`all`' if all threads are running. The frontend should assume that no interaction with a running thread is possible after this notification is produced. The frontend should not assume that this notification is output only once for any command. GDB may emit this notification several times, either for

different threads, because it cannot resume all threads together, or even for a single thread, if the thread must be stepped though some code before letting it run freely.

`*stopped,reason="`*reason*`",thread-id="`*id*`",stopped-threads="`*stopped*`",core="`*core*`"`
The target has stopped. The *reason* field can have one of the following values:

`breakpoint-hit`
A breakpoint was reached.

`watchpoint-trigger`
A watchpoint was triggered.

`read-watchpoint-trigger`
A read watchpoint was triggered.

`access-watchpoint-trigger`
An access watchpoint was triggered.

`function-finished`
An -exec-finish or similar CLI command was accomplished.

`location-reached`
An -exec-until or similar CLI command was accomplished.

`watchpoint-scope`
A watchpoint has gone out of scope.

`end-stepping-range`
An -exec-next, -exec-next-instruction, -exec-step, -exec-step-instruction or similar CLI command was accomplished.

`exited-signalled`
The inferior exited because of a signal.

`exited` The inferior exited.

`exited-normally`
The inferior exited normally.

`signal-received`
A signal was received by the inferior.

The *id* field identifies the thread that directly caused the stop – for example by hitting a breakpoint. Depending on whether all-stop mode is in effect (see ⟨undefined⟩ [All-Stop Mode], page ⟨undefined⟩), GDB may either stop all threads, or only the thread that directly triggered the stop. If all threads are stopped, the *stopped* field will have the value of `"all"`. Otherwise, the value of the *stopped* field will be a list of thread identifiers. Presently, this list will always include a single thread, but frontend should be prepared to see several threads in the list. The *core* field reports the processor core on which the stop event has happened. This field may be absent if such information is not available.

`=thread-group-added,id="`*id*`"`
`=thread-group-removed,id="`*id*`"`
A thread group was either added or removed. The *id* field contains the GDB identifier of the thread group. When a thread group is added, it generally might

not be associated with a running process. When a thread group is removed, its id becomes invalid and cannot be used in any way.

`=thread-group-started,id="`*id*`",pid="`*pid*`"`
A thread group became associated with a running program, either because the program was just started or the thread group was attached to a program. The *id* field contains the GDB identifier of the thread group. The *pid* field contains process identifier, specific to the operating system.

`=thread-group-exited,id="`*id*`"`
A thread group is no longer associated with a running program, either because the program has exited, or because it was detached from. The *id* field contains the GDB identifier of the thread group.

`=thread-created,id="`*id*`",group-id="`*gid*`"`
`=thread-exited,id="`*id*`",group-id="`*gid*`"`
A thread either was created, or has exited. The *id* field contains the GDB identifier of the thread. The *gid* field identifies the thread group this thread belongs to.

`=thread-selected,id="`*id*`"`
Informs that the selected thread was changed as result of the last command. This notification is not emitted as result of `-thread-select` command but is emitted whenever an MI command that is not documented to change the selected thread actually changes it. In particular, invoking, directly or indirectly (via user-defined command), the CLI `thread` command, will generate this notification.

We suggest that in response to this notification, front ends highlight the selected thread and cause subsequent commands to apply to that thread.

`=library-loaded,...`
Reports that a new library file was loaded by the program. This notification has 4 fields—*id*, *target-name*, *host-name*, and *symbols-loaded*. The *id* field is an opaque identifier of the library. For remote debugging case, *target-name* and *host-name* fields give the name of the library file on the target, and on the host respectively. For native debugging, both those fields have the same value. The *symbols-loaded* field reports if the debug symbols for this library are loaded. The *thread-group* field, if present, specifies the id of the thread group in whose context the library was loaded. If the field is absent, it means the library was loaded in the context of all present thread groups.

`=library-unloaded,...`
Reports that a library was unloaded by the program. This notification has 3 fields—*id*, *target-name* and *host-name* with the same meaning as for the `=library-loaded` notification. The *thread-group* field, if present, specifies the id of the thread group in whose context the library was unloaded. If the field is absent, it means the library was unloaded in the context of all present thread groups.

27.5.4 GDB/MI Frame Information

Response from many MI commands includes an information about stack frame. This information is a tuple that may have the following fields:

`level` The level of the stack frame. The innermost frame has the level of zero. This field is always present.

`func` The name of the function corresponding to the frame. This field may be absent if GDB is unable to determine the function name.

`addr` The code address for the frame. This field is always present.

`file` The name of the source files that correspond to the frame's code address. This field may be absent.

`line` The source line corresponding to the frames' code address. This field may be absent.

`from` The name of the binary file (either executable or shared library) the corresponds to the frame's code address. This field may be absent.

27.5.5 GDB/MI Thread Information

Whenever GDB has to report an information about a thread, it uses a tuple with the following fields:

`id` The numeric id assigned to the thread by GDB. This field is always present.

`target-id` Target-specific string identifying the thread. This field is always present.

`details` Additional information about the thread provided by the target. It is supposed to be human-readable and not interpreted by the frontend. This field is optional.

`state` Either '`stopped`' or '`running`', depending on whether the thread is presently running. This field is always present.

`core` The value of this field is an integer number of the processor core the thread was last seen on. This field is optional.

27.6 Simple Examples of GDB/MI Interaction

This subsection presents several simple examples of interaction using the GDB/MI interface. In these examples, '`->`' means that the following line is passed to GDB/MI as input, while '`<-`' means the output received from GDB/MI.

Note the line breaks shown in the examples are here only for readability, they don't appear in the real output.

Setting a Breakpoint

Setting a breakpoint generates synchronous output which contains detailed information of the breakpoint.

```
-> -break-insert main
<- ^done,bkpt={number="1",type="breakpoint",disp="keep",
    enabled="y",addr="0x08048564",func="main",file="myprog.c",
    fullname="/home/nickrob/myprog.c",line="68",times="0"}
<- (gdb)
```

Program Execution

Program execution generates asynchronous records and MI gives the reason that execution stopped.

```
-> -exec-run
<- ^running
<- (gdb)
<- *stopped,reason="breakpoint-hit",disp="keep",bkptno="1",thread-id="0",
   frame={addr="0x08048564",func="main",
   args=[{name="argc",value="1"},{name="argv",value="0xbfc4d4d4"}],
   file="myprog.c",fullname="/home/nickrob/myprog.c",line="68"}
<- (gdb)
-> -exec-continue
<- ^running
<- (gdb)
<- *stopped,reason="exited-normally"
<- (gdb)
```

Quitting GDB

Quitting GDB just prints the result class '`^exit`'.

```
-> (gdb)
<- -gdb-exit
<- ^exit
```

Please note that '`^exit`' is printed immediately, but it might take some time for GDB to actually exit. During that time, GDB performs necessary cleanups, including killing programs being debugged or disconnecting from debug hardware, so the frontend should wait till GDB exits and should only forcibly kill GDB if it fails to exit in reasonable time.

A Bad Command

Here's what happens if you pass a non-existent command:

```
-> -rubbish
<- ^error,msg="Undefined MI command: rubbish"
<- (gdb)
```

27.7 GDB/MI Command Description Format

The remaining sections describe blocks of commands. Each block of commands is laid out in a fashion similar to this section.

Motivation

The motivation for this collection of commands.

Introduction

A brief introduction to this collection of commands as a whole.

Commands

For each command in the block, the following is described:

Synopsis

```
-command args...
```

Result

GDB Command

The corresponding GDB CLI command(s), if any.

Example

Example(s) formatted for readability. Some of the described commands have not been implemented yet and these are labeled N.A. (not available).

27.8 GDB/MI Breakpoint Commands

This section documents GDB/MI commands for manipulating breakpoints.

The `-break-after` Command

Synopsis

```
-break-after number count
```

The breakpoint number *number* is not in effect until it has been hit *count* times. To see how this is reflected in the output of the '`-break-list`' command, see the description of the '`-break-list`' command below.

GDB Command

The corresponding GDB command is '`ignore`'.

Example

```
(gdb)
-break-insert main
^done,bkpt={number="1",type="breakpoint",disp="keep",
enabled="y",addr="0x000100d0",func="main",file="hello.c",
fullname="/home/foo/hello.c",line="5",times="0"}
(gdb)
-break-after 1 3
~
^done
(gdb)
-break-list
^done,BreakpointTable={nr_rows="1",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[bkpt={number="1",type="breakpoint",disp="keep",enabled="y",
addr="0x000100d0",func="main",file="hello.c",fullname="/home/foo/hello.c",
line="5",times="0",ignore="3"}]}
(gdb)
```

The `-break-commands` Command

Synopsis

```
-break-commands number [ command1 ... commandN ]
```

Specifies the CLI commands that should be executed when breakpoint *number* is hit. The parameters *command1* to *commandN* are the commands. If no command is specified, any previously-set commands are cleared. See ⟨undefined⟩ [Break Commands], page ⟨undefined⟩. Typical use of this functionality is tracing a program, that is, printing of values of some variables whenever breakpoint is hit and then continuing.

GDB Command

The corresponding GDB command is '`commands`'.

Example

```
(gdb)
-break-insert main
^done,bkpt={number="1",type="breakpoint",disp="keep",
enabled="y",addr="0x000100d0",func="main",file="hello.c",
fullname="/home/foo/hello.c",line="5",times="0"}
(gdb)
-break-commands 1 "print v" "continue"
^done
(gdb)
```

The -break-condition Command

Synopsis

```
-break-condition number expr
```

Breakpoint *number* will stop the program only if the condition in *expr* is true. The condition becomes part of the '`-break-list`' output (see the description of the '`-break-list`' command below).

GDB Command

The corresponding GDB command is '`condition`'.

Example

```
(gdb)
-break-condition 1 1
^done
(gdb)
-break-list
^done,BreakpointTable={nr_rows="1",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[bkpt={number="1",type="breakpoint",disp="keep",enabled="y",
addr="0x000100d0",func="main",file="hello.c",fullname="/home/foo/hello.c",
line="5",cond="1",times="0",ignore="3"}]}
(gdb)
```

The -break-delete Command

Synopsis

```
-break-delete ( breakpoint )+
```

Delete the breakpoint(s) whose number(s) are specified in the argument list. This is obviously reflected in the breakpoint list.

GDB Command

The corresponding GDB command is '`delete`'.

Example

```
(gdb)
-break-delete 1
```

```
^done
(gdb)
-break-list
^done,BreakpointTable={nr_rows="0",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[]}
(gdb)
```

The `-break-disable` Command

Synopsis

```
-break-disable ( breakpoint )+
```

Disable the named *breakpoint*(s). The field '`enabled`' in the break list is now set to '`n`' for the named *breakpoint*(s).

GDB Command

The corresponding GDB command is '`disable`'.

Example

```
(gdb)
-break-disable 2
^done
(gdb)
-break-list
^done,BreakpointTable={nr_rows="1",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[bkpt={number="2",type="breakpoint",disp="keep",enabled="n",
addr="0x000100d0",func="main",file="hello.c",fullname="/home/foo/hello.c",
line="5",times="0"}]}
(gdb)
```

The `-break-enable` Command

Synopsis

```
-break-enable ( breakpoint )+
```

Enable (previously disabled) *breakpoint*(s).

GDB Command

The corresponding GDB command is '`enable`'.

Example

```
(gdb)
-break-enable 2
^done
(gdb)
-break-list
^done,BreakpointTable={nr_rows="1",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[bkpt={number="2",type="breakpoint",disp="keep",enabled="y",
addr="0x000100d0",func="main",file="hello.c",fullname="/home/foo/hello.c",
line="5",times="0"}]}
(gdb)
```

The `-break-info` Command

Synopsis

```
-break-info breakpoint
```

Get information about a single breakpoint.

GDB Command

The corresponding GDB command is '`info break` *`breakpoint`*'.

Example

N.A.

The `-break-insert` Command

Synopsis

```
-break-insert [ -t ] [ -h ] [ -f ] [ -d ] [ -a ]
   [ -c condition ] [ -i ignore-count ]
   [ -p thread ] [ location ]
```

If specified, *location*, can be one of:

- function

- filename:linenum
- filename:function
- *address

The possible optional parameters of this command are:

'`-t`' Insert a temporary breakpoint.

'`-h`' Insert a hardware breakpoint.

'`-c` *condition*'
Make the breakpoint conditional on *condition*.

'`-i` *ignore-count*'
Initialize the *ignore-count*.

'`-f`' If *location* cannot be parsed (for example if it refers to unknown files or functions), create a pending breakpoint. Without this flag, GDB will report an error, and won't create a breakpoint, if *location* cannot be parsed.

'`-d`' Create a disabled breakpoint.

'`-a`' Create a tracepoint. See ⟨undefined⟩ [Tracepoints], page ⟨undefined⟩. When this parameter is used together with '`-h`', a fast tracepoint is created.

Result

The result is in the form:

```
^done,bkpt={number="number",type="type",disp="del"|"keep",
enabled="y"|"n",addr="hex",func="funcname",file="filename",
fullname="full_filename",line="lineno",[thread="threadno",]
times="times"}
```

where *number* is the GDB number for this breakpoint, *funcname* is the name of the function where the breakpoint was inserted, *filename* is the name of the source file which contains this function, *lineno* is the source line number within that file and *times* the number of times that the breakpoint has been hit (always 0 for -break-insert but may be greater for -break-info or -break-list which use the same output).

Note: this format is open to change.

GDB Command

The corresponding GDB commands are '`break`', '`tbreak`', '`hbreak`', '`thbreak`', and '`rbreak`'.

Example

```
(gdb)
-break-insert main
^done,bkpt={number="1",addr="0x0001072c",file="recursive2.c",
fullname="/home/foo/recursive2.c,line="4",times="0"}
(gdb)
-break-insert -t foo
```

```
^done,bkpt={number="2",addr="0x00010774",file="recursive2.c",
fullname="/home/foo/recursive2.c,line="11",times="0"}
(gdb)
-break-list
^done,BreakpointTable={nr_rows="2",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[bkpt={number="1",type="breakpoint",disp="keep",enabled="y",
addr="0x0001072c", func="main",file="recursive2.c",
fullname="/home/foo/recursive2.c,"line="4",times="0"},
bkpt={number="2",type="breakpoint",disp="del",enabled="y",
addr="0x00010774",func="foo",file="recursive2.c",
fullname="/home/foo/recursive2.c",line="11",times="0"}]}
(gdb)
-break-insert -r foo.*
~int foo(int, int);
^done,bkpt={number="3",addr="0x00010774",file="recursive2.c,
"fullname="/home/foo/recursive2.c",line="11",times="0"}
(gdb)
```

The `-break-list` Command

Synopsis

```
-break-list
```

Displays the list of inserted breakpoints, showing the following fields:

'`Number`' number of the breakpoint

'`Type`' type of the breakpoint: '`breakpoint`' or '`watchpoint`'

'`Disposition`'
should the breakpoint be deleted or disabled when it is hit: '`keep`' or '`nokeep`'

'`Enabled`' is the breakpoint enabled or no: '`y`' or '`n`'

'`Address`' memory location at which the breakpoint is set

'`What`' logical location of the breakpoint, expressed by function name, file name, line number

'`Times`' number of times the breakpoint has been hit

If there are no breakpoints or watchpoints, the `BreakpointTable` `body` field is an empty list.

GDB Command

The corresponding GDB command is '`info break`'.

Example

```
(gdb)
-break-list
^done,BreakpointTable={nr_rows="2",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[bkpt={number="1",type="breakpoint",disp="keep",enabled="y",
addr="0x000100d0",func="main",file="hello.c",line="5",times="0"},
bkpt={number="2",type="breakpoint",disp="keep",enabled="y",
addr="0x00010114",func="foo",file="hello.c",fullname="/home/foo/hello.c",
line="13",times="0"}]}
(gdb)
```

Here's an example of the result when there are no breakpoints:

```
(gdb)
-break-list
^done,BreakpointTable={nr_rows="0",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[]}
(gdb)
```

The `-break-passcount` Command

Synopsis

```
-break-passcount tracepoint-number passcount
```

Set the passcount for tracepoint *tracepoint-number* to *passcount*. If the breakpoint referred to by *tracepoint-number* is not a tracepoint, error is emitted. This corresponds to CLI command '`passcount`'.

The `-break-watch` Command

Synopsis

```
-break-watch [ -a | -r ]
```

Create a watchpoint. With the '`-a`' option it will create an *access* watchpoint, i.e., a watchpoint that triggers either on a read from or on a write to the memory location. With the '`-r`' option, the watchpoint created is a *read* watchpoint, i.e., it will trigger only when the memory location is accessed for reading. Without either of the options, the watchpoint created is a regular watchpoint, i.e., it will trigger when the memory location is accessed for writing. See ⟨undefined⟩ [Setting Watchpoints], page ⟨undefined⟩.

Note that '`-break-list`' will report a single list of watchpoints and breakpoints inserted.

GDB Command

The corresponding GDB commands are '`watch`', '`awatch`', and '`rwatch`'.

Example

Setting a watchpoint on a variable in the `main` function:

```
(gdb)
-break-watch x
^done,wpt={number="2",exp="x"}
(gdb)
-exec-continue
^running
(gdb)
*stopped,reason="watchpoint-trigger",wpt={number="2",exp="x"},
value={old="-268439212",new="55"},
frame={func="main",args=[],file="recursive2.c",
fullname="/home/foo/bar/recursive2.c",line="5"}
(gdb)
```

Setting a watchpoint on a variable local to a function. GDB will stop the program execution twice: first for the variable changing value, then for the watchpoint going out of scope.

```
(gdb)
-break-watch C
^done,wpt={number="5",exp="C"}
(gdb)
-exec-continue
^running
(gdb)
*stopped,reason="watchpoint-trigger",
wpt={number="5",exp="C"},value={old="-276895068",new="3"},
frame={func="callee4",args=[],
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="13"}
(gdb)
-exec-continue
^running
(gdb)
*stopped,reason="watchpoint-scope",wpnum="5",
frame={func="callee3",args=[{name="strarg",
value="0x11940 \"A string argument.\""}],
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="18"}
(gdb)
```

Listing breakpoints and watchpoints, at different points in the program execution. Note that once the watchpoint goes out of scope, it is deleted.

```
(gdb)
-break-watch C
^done,wpt={number="2",exp="C"}
(gdb)
-break-list
```

```
^done,BreakpointTable={nr_rows="2",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[bkpt={number="1",type="breakpoint",disp="keep",enabled="y",
addr="0x00010734",func="callee4",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/devo/gdb/testsuite/gdb.mi/basics.c"line="8",times="1"},
bkpt={number="2",type="watchpoint",disp="keep",
enabled="y",addr="",what="C",times="0"}]}
(gdb)
-exec-continue
^running
(gdb)
*stopped,reason="watchpoint-trigger",wpt={number="2",exp="C"},
value={old="-276895068",new="3"},
frame={func="callee4",args=[],
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="13"}
(gdb)
-break-list
^done,BreakpointTable={nr_rows="2",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[bkpt={number="1",type="breakpoint",disp="keep",enabled="y",
addr="0x00010734",func="callee4",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/devo/gdb/testsuite/gdb.mi/basics.c",line="8",times="1"},
bkpt={number="2",type="watchpoint",disp="keep",
enabled="y",addr="",what="C",times="-5"}]}
(gdb)
-exec-continue
^running
^done,reason="watchpoint-scope",wpnum="2",
frame={func="callee3",args=[{name="strarg",
value="0x11940 \"A string argument.\""}],
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="18"}
(gdb)
-break-list
^done,BreakpointTable={nr_rows="1",nr_cols="6",
hdr=[{width="3",alignment="-1",col_name="number",colhdr="Num"},
{width="14",alignment="-1",col_name="type",colhdr="Type"},
{width="4",alignment="-1",col_name="disp",colhdr="Disp"},
{width="3",alignment="-1",col_name="enabled",colhdr="Enb"},
{width="10",alignment="-1",col_name="addr",colhdr="Address"},
{width="40",alignment="2",col_name="what",colhdr="What"}],
body=[bkpt={number="1",type="breakpoint",disp="keep",enabled="y",
addr="0x00010734",func="callee4",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/devo/gdb/testsuite/gdb.mi/basics.c",line="8",
```

```
times="1"}]}
(gdb)
```

27.9 GDB/MI Program Context

The -exec-arguments Command

Synopsis

```
-exec-arguments args
```

Set the inferior program arguments, to be used in the next '`-exec-run`'.

GDB Command

The corresponding GDB command is '`set args`'.

Example

```
(gdb)
-exec-arguments -v word
^done
(gdb)
```

The -environment-cd Command

Synopsis

```
-environment-cd pathdir
```

Set GDB's working directory.

GDB Command

The corresponding GDB command is '`cd`'.

Example

```
(gdb)
-environment-cd /kwikemart/marge/ezannoni/flathead-dev/devo/gdb
^done
(gdb)
```

The -environment-directory Command

Synopsis

```
-environment-directory [ -r ] [ pathdir ]+
```

Add directories *pathdir* to beginning of search path for source files. If the '`-r`' option is used, the search path is reset to the default search path. If directories *pathdir* are supplied in addition to the '`-r`' option, the search path is first reset and then addition occurs as normal. Multiple directories may be specified, separated by blanks. Specifying multiple directories in a single command results in the directories added to the beginning of the search path in the same order they were presented in the command. If blanks are needed as part of a directory name, double-quotes should be used around the name. In the command output, the path will show up separated by the system directory-separator character. The directory-separator character must not be used in any directory name. If no directories are specified, the current search path is displayed.

GDB Command

The corresponding GDB command is '`dir`'.

Example

```
(gdb)
-environment-directory /kwikemart/marge/ezannoni/flathead-dev/devo/gdb
^done,source-path="/kwikemart/marge/ezannoni/flathead-dev/devo/gdb:$cdir:$cwd"
(gdb)
-environment-directory ""
^done,source-path="/kwikemart/marge/ezannoni/flathead-dev/devo/gdb:$cdir:$cwd"
(gdb)
-environment-directory -r /home/jjohnstn/src/gdb /usr/src
^done,source-path="/home/jjohnstn/src/gdb:/usr/src:$cdir:$cwd"
(gdb)
-environment-directory -r
^done,source-path="$cdir:$cwd"
(gdb)
```

The `-environment-path` Command

Synopsis

```
-environment-path [ -r ] [ pathdir ]+
```

Add directories *pathdir* to beginning of search path for object files. If the '`-r`' option is used, the search path is reset to the original search path that existed at gdb start-up. If directories *pathdir* are supplied in addition to the '`-r`' option, the search path is first reset and then addition occurs as normal. Multiple directories may be specified, separated by blanks. Specifying multiple directories in a single command results in the directories added to the beginning of the search path in the same order they were presented in the command. If blanks are needed as part of a directory name, double-quotes should be used around the name. In the command output, the path will show up separated by the system directory-separator character. The directory-separator character must not be used in any directory name. If no directories are specified, the current path is displayed.

GDB Command

The corresponding GDB command is '`path`'.

Example

```
(gdb)
-environment-path
^done,path="/usr/bin"
(gdb)
-environment-path /kwikemart/marge/ezannoni/flathead-dev/ppc-eabi/gdb /bin
^done,path="/kwikemart/marge/ezannoni/flathead-dev/ppc-eabi/gdb:/bin:/usr/bin"
(gdb)
-environment-path -r /usr/local/bin
^done,path="/usr/local/bin:/usr/bin"
(gdb)
```

The `-environment-pwd` Command

Synopsis

```
-environment-pwd
```

Show the current working directory.

GDB Command

The corresponding GDB command is '`pwd`'.

Example

```
(gdb)
-environment-pwd
^done,cwd="/kwikemart/marge/ezannoni/flathead-dev/devo/gdb"
(gdb)
```

27.10 GDB/MI Thread Commands

The `-thread-info` Command

Synopsis

```
-thread-info [ thread-id ]
```

Reports information about either a specific thread, if the *thread-id* parameter is present, or about all threads. When printing information about all threads, also reports the current thread.

GDB Command

The '`info thread`' command prints the same information about all threads.

Example

```
-thread-info
^done,threads=[
{id="2",target-id="Thread 0xb7e14b90 (LWP 21257)",
   frame={level="0",addr="0xffffe410",func="__kernel_vsyscall",args=[]},state="running"},
{id="1",target-id="Thread 0xb7e156b0 (LWP 21254)",
   frame={level="0",addr="0x0804891f",func="foo",args=[{name="i",value="10"}],
          file="/tmp/a.c",fullname="/tmp/a.c",line="158"},state="running"}],
current-thread-id="1"
(gdb)
```

The '`state`' field may have the following values:

`stopped` The thread is stopped. Frame information is available for stopped threads.

`running` The thread is running. There's no frame information for running threads.

The `-thread-list-ids` Command

Synopsis

```
-thread-list-ids
```

Produces a list of the currently known GDB thread ids. At the end of the list it also prints the total number of such threads.

This command is retained for historical reasons, the `-thread-info` command should be used instead.

GDB Command

Part of '`info threads`' supplies the same information.

Example

```
(gdb)
-thread-list-ids
^done,thread-ids={thread-id="3",thread-id="2",thread-id="1"},
current-thread-id="1",number-of-threads="3"
(gdb)
```

The `-thread-select` Command

Synopsis

```
-thread-select threadnum
```

Make *threadnum* the current thread. It prints the number of the new current thread, and the topmost frame for that thread.

This command is deprecated in favor of explicitly using the '`--thread`' option to each command.

GDB Command

The corresponding GDB command is '`thread`'.

Example

```
(gdb)
-exec-next
^running
(gdb)
*stopped,reason="end-stepping-range",thread-id="2",line="187",
file="../../../devo/gdb/testsuite/gdb.threads/linux-dp.c"
(gdb)
-thread-list-ids
^done,
thread-ids={thread-id="3",thread-id="2",thread-id="1"},
number-of-threads="3"
(gdb)
-thread-select 3
^done,new-thread-id="3",
frame={level="0",func="vprintf",
args=[{name="format",value="0x8048e9c \"%*s%c %d %c\\n\""},
{name="arg",value="0x2"}],file="vprintf.c",line="31"}
(gdb)
```

27.11 GDB/MI Program Execution

These are the asynchronous commands which generate the out-of-band record '`*stopped`'. Currently GDB only really executes asynchronously with remote targets and this interaction is mimicked in other cases.

The `-exec-continue` Command

Synopsis

```
-exec-continue [--reverse] [--all|--thread-group N]
```

Resumes the execution of the inferior program, which will continue to execute until it reaches a debugger stop event. If the '`--reverse`' option is specified, execution resumes in reverse until it reaches a stop event. Stop events may include

- breakpoints or watchpoints

- signals or exceptions
- the end of the process (or its beginning under '`--reverse`')
- the end or beginning of a replay log if one is being used.

In all-stop mode (see ⟨undefined⟩ [All-Stop Mode], page ⟨undefined⟩), may resume only one thread, or all threads, depending on the value of the '`scheduler-locking`' variable. If '`--all`' is specified, all threads (in all inferiors) will be resumed. The '`--all`' option is ignored in all-stop mode. If the '`--thread-group`' options is specified, then all threads in that thread group are resumed.

GDB Command

The corresponding GDB corresponding is '`continue`'.

Example

```
-exec-continue
^running
(gdb)
@Hello world
*stopped,reason="breakpoint-hit",disp="keep",bkptno="2",frame={
func="foo",args=[],file="hello.c",fullname="/home/foo/bar/hello.c",
line="13"}
(gdb)
```

The `-exec-finish` Command

Synopsis

```
-exec-finish [--reverse]
```

Resumes the execution of the inferior program until the current function is exited. Displays the results returned by the function. If the '`--reverse`' option is specified, resumes the reverse execution of the inferior program until the point where current function was called.

GDB Command

The corresponding GDB command is '`finish`'.

Example

Function returning `void`.

```
-exec-finish
^running
(gdb)
@hello from foo
*stopped,reason="function-finished",frame={func="main",args=[],
file="hello.c",fullname="/home/foo/bar/hello.c",line="7"}
```

```
(gdb)
```

Function returning other than `void`. The name of the internal GDB variable storing the result is printed, together with the value itself.

```
-exec-finish
^running
(gdb)
*stopped,reason="function-finished",frame={addr="0x000107b0",func="foo",
args=[{name="a",value="1"],{name="b",value="9"}},
file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
gdb-result-var="$1",return-value="0"
(gdb)
```

The `-exec-interrupt` Command

Synopsis

```
-exec-interrupt [--all|--thread-group N]
```

Interrupts the background execution of the target. Note how the token associated with the stop message is the one for the execution command that has been interrupted. The token for the interrupt itself only appears in the '`^done`' output. If the user is trying to interrupt a non-running program, an error message will be printed.

Note that when asynchronous execution is enabled, this command is asynchronous just like other execution commands. That is, first the '`^done`' response will be printed, and the target stop will be reported after that using the '`*stopped`' notification.

In non-stop mode, only the context thread is interrupted by default. All threads (in all inferiors) will be interrupted if the '`--all`' option is specified. If the '`--thread-group`' option is specified, all threads in that group will be interrupted.

GDB Command

The corresponding GDB command is '`interrupt`'.

Example

```
(gdb)
111-exec-continue
111^running

(gdb)
222-exec-interrupt
222^done
(gdb)
111*stopped,signal-name="SIGINT",signal-meaning="Interrupt",
frame={addr="0x00010140",func="foo",args=[],file="try.c",
fullname="/home/foo/bar/try.c",line="13"}
(gdb)

(gdb)
-exec-interrupt
^error,msg="mi_cmd_exec_interrupt: Inferior not executing."
(gdb)
```

The -exec-jump Command

Synopsis

```
-exec-jump location
```

Resumes execution of the inferior program at the location specified by parameter. See ⟨undefined⟩ [Specify Location], page ⟨undefined⟩, for a description of the different forms of *location*.

GDB Command

The corresponding GDB command is '`jump`'.

Example

```
-exec-jump foo.c:10
*running,thread-id="all"
^running
```

The -exec-next Command

Synopsis

```
-exec-next [--reverse]
```

Resumes execution of the inferior program, stopping when the beginning of the next source line is reached.

If the '`--reverse`' option is specified, resumes reverse execution of the inferior program, stopping at the beginning of the previous source line. If you issue this command on the first line of a function, it will take you back to the caller of that function, to the source line where the function was called.

GDB Command

The corresponding GDB command is '`next`'.

Example

```
-exec-next
^running
(gdb)
*stopped,reason="end-stepping-range",line="8",file="hello.c"
(gdb)
```

The -exec-next-instruction Command

Synopsis

```
-exec-next-instruction [--reverse]
```

Executes one machine instruction. If the instruction is a function call, continues until the function returns. If the program stops at an instruction in the middle of a source line, the address will be printed as well.

If the '`--reverse`' option is specified, resumes reverse execution of the inferior program, stopping at the previous instruction. If the previously executed instruction was a return from another function, it will continue to execute in reverse until the call to that function (from the current stack frame) is reached.

GDB Command

The corresponding GDB command is '`nexti`'.

Example

```
(gdb)
-exec-next-instruction
^running

(gdb)
*stopped,reason="end-stepping-range",
addr="0x000100d4",line="5",file="hello.c"
(gdb)
```

The `-exec-return` Command

Synopsis

```
-exec-return
```

Makes current function return immediately. Doesn't execute the inferior. Displays the new current frame.

GDB Command

The corresponding GDB command is '`return`'.

Example

```
(gdb)
200-break-insert callee4
200^done,bkpt={number="1",addr="0x00010734",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",line="8"}
(gdb)
000-exec-run
000^running
(gdb)
```

```
000*stopped,reason="breakpoint-hit",disp="keep",bkptno="1",
frame={func="callee4",args=[],
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="8"}
(gdb)
205-break-delete
205^done
(gdb)
111-exec-return
111^done,frame={level="0",func="callee3",
args=[{name="strarg",
value="0x11940 \"A string argument.\""}],
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="18"}
(gdb)
```

The `-exec-run` Command

Synopsis

```
-exec-run [--all | --thread-group N]
```

Starts execution of the inferior from the beginning. The inferior executes until either a breakpoint is encountered or the program exits. In the latter case the output will include an exit code, if the program has exited exceptionally.

When no option is specified, the current inferior is started. If the '`--thread-group`' option is specified, it should refer to a thread group of type '`process`', and that thread group will be started. If the '`--all`' option is specified, then all inferiors will be started.

GDB Command

The corresponding GDB command is '`run`'.

Examples

```
(gdb)
-break-insert main
^done,bkpt={number="1",addr="0x0001072c",file="recursive2.c",line="4"}
(gdb)
-exec-run
^running
(gdb)
*stopped,reason="breakpoint-hit",disp="keep",bkptno="1",
frame={func="main",args=[],file="recursive2.c",
fullname="/home/foo/bar/recursive2.c",line="4"}
(gdb)
```

Program exited normally:

```
(gdb)
-exec-run
^running
(gdb)
x = 55
```

```
*stopped,reason="exited-normally"
(gdb)
```

Program exited exceptionally:

```
(gdb)
-exec-run
^running
(gdb)
x = 55
*stopped,reason="exited",exit-code="01"
(gdb)
```

Another way the program can terminate is if it receives a signal such as `SIGINT`. In this case, GDB/MI displays this:

```
(gdb)
*stopped,reason="exited-signalled",signal-name="SIGINT",
signal-meaning="Interrupt"
```

The `-exec-step` Command

Synopsis

```
-exec-step [--reverse]
```

Resumes execution of the inferior program, stopping when the beginning of the next source line is reached, if the next source line is not a function call. If it is, stop at the first instruction of the called function. If the '`--reverse`' option is specified, resumes reverse execution of the inferior program, stopping at the beginning of the previously executed source line.

GDB Command

The corresponding GDB command is '`step`'.

Example

Stepping into a function:

```
-exec-step
^running
(gdb)
*stopped,reason="end-stepping-range",
frame={func="foo",args=[{name="a",value="10"},
{name="b",value="0"}],file="recursive2.c",
fullname="/home/foo/bar/recursive2.c",line="11"}
(gdb)
```

Regular stepping:

```
-exec-step
^running
(gdb)
*stopped,reason="end-stepping-range",line="14",file="recursive2.c"
(gdb)
```

The `-exec-step-instruction` Command

Synopsis

```
-exec-step-instruction [--reverse]
```

Resumes the inferior which executes one machine instruction. If the '`--reverse`' option is specified, resumes reverse execution of the inferior program, stopping at the previously executed instruction. The output, once GDB has stopped, will vary depending on whether we have stopped in the middle of a source line or not. In the former case, the address at which the program stopped will be printed as well.

GDB Command

The corresponding GDB command is '`stepi`'.

Example

```
(gdb)
-exec-step-instruction
^running

(gdb)
*stopped,reason="end-stepping-range",
frame={func="foo",args=[],file="try.c",
fullname="/home/foo/bar/try.c",line="10"}
(gdb)
-exec-step-instruction
^running

(gdb)
*stopped,reason="end-stepping-range",
frame={addr="0x000100f4",func="foo",args=[],file="try.c",
fullname="/home/foo/bar/try.c",line="10"}
(gdb)
```

The `-exec-until` Command

Synopsis

```
-exec-until [ location ]
```

Executes the inferior until the *location* specified in the argument is reached. If there is no argument, the inferior executes until a source line greater than the current one is reached. The reason for stopping in this case will be '`location-reached`'.

GDB Command

The corresponding GDB command is '`until`'.

Example

```
(gdb)
-exec-until recursive2.c:6
^running
(gdb)
x = 55
*stopped,reason="location-reached",frame={func="main",args=[],
file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="6"}
(gdb)
```

27.12 GDB/MI Stack Manipulation Commands

The `-stack-info-frame` Command

Synopsis

```
-stack-info-frame
```

Get info on the selected frame.

GDB Command

The corresponding GDB command is '`info frame`' or '`frame`' (without arguments).

Example

```
(gdb)
-stack-info-frame
^done,frame={level="1",addr="0x0001076c",func="callee3",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="17"}
(gdb)
```

The `-stack-info-depth` Command

Synopsis

```
-stack-info-depth [ max-depth ]
```

Return the depth of the stack. If the integer argument *max-depth* is specified, do not count beyond *max-depth* frames.

GDB Command

There's no equivalent GDB command.

Example

For a stack with frame levels 0 through 11:

```
(gdb)
-stack-info-depth
^done,depth="12"
(gdb)
-stack-info-depth 4
^done,depth="4"
(gdb)
-stack-info-depth 12
^done,depth="12"
(gdb)
-stack-info-depth 11
^done,depth="11"
(gdb)
-stack-info-depth 13
^done,depth="12"
(gdb)
```

The `-stack-list-arguments` Command

Synopsis

```
-stack-list-arguments print-values
   [ low-frame high-frame ]
```

Display a list of the arguments for the frames between *low-frame* and *high-frame* (inclusive). If *low-frame* and *high-frame* are not provided, list the arguments for the whole call stack. If the two arguments are equal, show the single frame at the corresponding level. It is an error if *low-frame* is larger than the actual number of frames. On the other hand, *high-frame* may be larger than the actual number of frames, in which case only existing frames will be returned.

If *print-values* is 0 or `--no-values`, print only the names of the variables; if it is 1 or `--all-values`, print also their values; and if it is 2 or `--simple-values`, print the name, type and value for simple data types, and the name and type for arrays, structures and unions.

Use of this command to obtain arguments in a single frame is deprecated in favor of the '`-stack-list-variables`' command.

GDB Command

GDB does not have an equivalent command. `gdbtk` has a '`gdb_get_args`' command which partially overlaps with the functionality of '`-stack-list-arguments`'.

Example

```
(gdb)
-stack-list-frames
^done,
```

```
stack=[
frame={level="0",addr="0x00010734",func="callee4",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="8"},
frame={level="1",addr="0x0001076c",func="callee3",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="17"},
frame={level="2",addr="0x0001078c",func="callee2",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="22"},
frame={level="3",addr="0x000107b4",func="callee1",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="27"},
frame={level="4",addr="0x000107e0",func="main",
file="../../../devo/gdb/testsuite/gdb.mi/basics.c",
fullname="/home/foo/bar/devo/gdb/testsuite/gdb.mi/basics.c",line="32"}]
(gdb)
-stack-list-arguments 0
^done,
stack-args=[
frame={level="0",args=[]},
frame={level="1",args=[name="strarg"]},
frame={level="2",args=[name="intarg",name="strarg"]},
frame={level="3",args=[name="intarg",name="strarg",name="fltarg"]},
frame={level="4",args=[]}]
(gdb)
-stack-list-arguments 1
^done,
stack-args=[
frame={level="0",args=[]},
frame={level="1",
 args=[{name="strarg",value="0x11940 \"A string argument.\""}]},
frame={level="2",args=[
{name="intarg",value="2"},
{name="strarg",value="0x11940 \"A string argument.\""}]},
{frame={level="3",args=[
{name="intarg",value="2"},
{name="strarg",value="0x11940 \"A string argument.\""},
{name="fltarg",value="3.5"}]},
frame={level="4",args=[]}]
(gdb)
-stack-list-arguments 0 2 2
^done,stack-args=[frame={level="2",args=[name="intarg",name="strarg"]}]
(gdb)
-stack-list-arguments 1 2 2
^done,stack-args=[frame={level="2",
args=[{name="intarg",value="2"},
{name="strarg",value="0x11940 \"A string argument.\""}]}]
(gdb)
```

The `-stack-list-frames` Command

Synopsis

```
-stack-list-frames [ low-frame high-frame ]
```

List the frames currently on the stack. For each frame it displays the following info:

‘*level*’ The frame number, 0 being the topmost frame, i.e., the innermost function.

‘*addr*’ The `$pc` value for that frame.

‘*func*’ Function name.

‘*file*’ File name of the source file where the function lives.

‘*line*’ Line number corresponding to the `$pc`.

If invoked without arguments, this command prints a backtrace for the whole stack. If given two integer arguments, it shows the frames whose levels are between the two arguments (inclusive). If the two arguments are equal, it shows the single frame at the corresponding level. It is an error if *low-frame* is larger than the actual number of frames. On the other hand, *high-frame* may be larger than the actual number of frames, in which case only existing frames will be returned.

GDB Command

The corresponding GDB commands are ‘`backtrace`’ and ‘`where`’.

Example

Full stack backtrace:

```
(gdb)
-stack-list-frames
^done,stack=
[frame={level="0",addr="0x0001076c",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="11"},
frame={level="1",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="2",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="3",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="4",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="5",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="6",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="7",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="8",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="9",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="10",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="11",addr="0x00010738",func="main",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="4"}]
(gdb)
```

Show frames between *low_frame* and *high_frame*:

```
(gdb)
-stack-list-frames 3 5
^done,stack=
[frame={level="3",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="4",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"},
frame={level="5",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"}]
(gdb)
```

Show a single frame:

```
(gdb)
-stack-list-frames 3 3
^done,stack=
[frame={level="3",addr="0x000107a4",func="foo",
  file="recursive2.c",fullname="/home/foo/bar/recursive2.c",line="14"}]
(gdb)
```

The `-stack-list-locals` Command

Synopsis

```
-stack-list-locals print-values
```

Display the local variable names for the selected frame. If *print-values* is 0 or `--no-values`, print only the names of the variables; if it is 1 or `--all-values`, print also their values; and if it is 2 or `--simple-values`, print the name, type and value for simple data types, and the name and type for arrays, structures and unions. In this last case, a frontend can immediately display the value of simple data types and create variable objects for other data types when the user wishes to explore their values in more detail.

This command is deprecated in favor of the '`-stack-list-variables`' command.

GDB Command

'`info locals`' in GDB, '`gdb_get_locals`' in `gdbtk`.

Example

```
(gdb)
-stack-list-locals 0
^done,locals=[name="A",name="B",name="C"]
(gdb)
-stack-list-locals --all-values
^done,locals=[{name="A",value="1"},{name="B",value="2"},
  {name="C",value="{1, 2, 3}"}]
-stack-list-locals --simple-values
^done,locals=[{name="A",type="int",value="1"},
  {name="B",type="int",value="2"},{name="C",type="int [3]"}]
(gdb)
```

The `-stack-list-variables` Command

Synopsis

```
-stack-list-variables print-values
```

Display the names of local variables and function arguments for the selected frame. If *print-values* is 0 or `--no-values`, print only the names of the variables; if it is 1 or `--all-values`, print also their values; and if it is 2 or `--simple-values`, print the name, type and value for simple data types, and the name and type for arrays, structures and unions.

Example

```
(gdb)
-stack-list-variables --thread 1 --frame 0 --all-values
^done,variables=[{name="x",value="11"},{name="s",value="{a = 1, b = 2}"}]
(gdb)
```

The `-stack-select-frame` Command

Synopsis

```
-stack-select-frame framenum
```

Change the selected frame. Select a different frame *framenum* on the stack.

This command in deprecated in favor of passing the '`--frame`' option to every command.

GDB Command

The corresponding GDB commands are '`frame`', '`up`', '`down`', '`select-frame`', '`up-silent`', and '`down-silent`'.

Example

```
(gdb)
-stack-select-frame 2
^done
(gdb)
```

27.13 GDB/MI Variable Objects

Introduction to Variable Objects

Variable objects are "object-oriented" MI interface for examining and changing values of expressions. Unlike some other MI interfaces that work with expressions, variable objects are specifically designed for simple and efficient presentation in the frontend. A variable object is identified by string name. When a variable object is created, the frontend specifies the expression for that variable object. The expression can be a simple variable, or it can be an arbitrary complex expression, and can even involve CPU registers. After creating a

variable object, the frontend can invoke other variable object operations—for example to obtain or change the value of a variable object, or to change display format.

Variable objects have hierarchical tree structure. Any variable object that corresponds to a composite type, such as structure in C, has a number of child variable objects, for example corresponding to each element of a structure. A child variable object can itself have children, recursively. Recursion ends when we reach leaf variable objects, which always have built-in types. Child variable objects are created only by explicit request, so if a frontend is not interested in the children of a particular variable object, no child will be created.

For a leaf variable object it is possible to obtain its value as a string, or set the value from a string. String value can be also obtained for a non-leaf variable object, but it's generally a string that only indicates the type of the object, and does not list its contents. Assignment to a non-leaf variable object is not allowed.

A frontend does not need to read the values of all variable objects each time the program stops. Instead, MI provides an update command that lists all variable objects whose values has changed since the last update operation. This considerably reduces the amount of data that must be transferred to the frontend. As noted above, children variable objects are created on demand, and only leaf variable objects have a real value. As result, gdb will read target memory only for leaf variables that frontend has created.

The automatic update is not always desirable. For example, a frontend might want to keep a value of some expression for future reference, and never update it. For another example, fetching memory is relatively slow for embedded targets, so a frontend might want to disable automatic update for the variables that are either not visible on the screen, or "closed". This is possible using so called "frozen variable objects". Such variable objects are never implicitly updated.

Variable objects can be either *fixed* or *floating*. For the fixed variable object, the expression is parsed when the variable object is created, including associating identifiers to specific variables. The meaning of expression never changes. For a floating variable object the values of variables whose names appear in the expressions are re-evaluated every time in the context of the current frame. Consider this example:

```
void do_work(...)
{
        struct work_state state;

        if (...)
           do_work(...);
}
```

If a fixed variable object for the `state` variable is created in this function, and we enter the recursive call, the the variable object will report the value of `state` in the top-level `do_work` invocation. On the other hand, a floating variable object will report the value of `state` in the current frame.

If an expression specified when creating a fixed variable object refers to a local variable, the variable object becomes bound to the thread and frame in which the variable object is created. When such variable object is updated, GDB makes sure that the thread/frame combination the variable object is bound to still exists, and re-evaluates the variable object in context of that thread/frame.

The following is the complete set of GDB/MI operations defined to access this functionality:

Operation	Description
`-enable-pretty-printing`	enable Python-based pretty-printing
`-var-create`	create a variable object
`-var-delete`	delete the variable object and/or its children
`-var-set-format`	set the display format of this variable
`-var-show-format`	show the display format of this variable
`-var-info-num-children`	tells how many children this object has
`-var-list-children`	return a list of the object's children
`-var-info-type`	show the type of this variable object
`-var-info-expression`	print parent-relative expression that this variable object represents
`-var-info-path-expression`	print full expression that this variable object represents
`-var-show-attributes`	is this variable editable? does it exist here?
`-var-evaluate-expression`	get the value of this variable
`-var-assign`	set the value of this variable
`-var-update`	update the variable and its children
`-var-set-frozen`	set frozeness attribute
`-var-set-update-range`	set range of children to display on update

In the next subsection we describe each operation in detail and suggest how it can be used.

Description And Use of Operations on Variable Objects

The `-enable-pretty-printing` Command

```
-enable-pretty-printing
```

GDB allows Python-based visualizers to affect the output of the MI variable object commands. However, because there was no way to implement this in a fully backward-compatible way, a front end must request that this functionality be enabled.

Once enabled, this feature cannot be disabled.

Note that if Python support has not been compiled into GDB, this command will still succeed (and do nothing).

This feature is currently (as of GDB 7.0) experimental, and may work differently in future versions of GDB.

The `-var-create` Command

Synopsis

```
-var-create {name | "-"}
   {frame-addr | "*" | "@"} expression
```

This operation creates a variable object, which allows the monitoring of a variable, the result of an expression, a memory cell or a CPU register.

The *name* parameter is the string by which the object can be referenced. It must be unique. If '`-`' is specified, the varobj system will generate a string "varNNNNNN" automatically. It will be unique provided that one does not specify *name* of that format. The command fails if a duplicate name is found.

The frame under which the expression should be evaluated can be specified by *frame-addr*. A '`*`' indicates that the current frame should be used. A '`@`' indicates that a floating variable object must be created.

expression is any expression valid on the current language set (must not begin with a '`*`'), or one of the following:

- '`*addr`', where *addr* is the address of a memory cell
- '`*addr-addr`' — a memory address range (TBD)
- '`$regname`' — a CPU register name

A varobj's contents may be provided by a Python-based pretty-printer. In this case the varobj is known as a *dynamic varobj*. Dynamic varobjs have slightly different semantics in some cases. If the `-enable-pretty-printing` command is not sent, then GDB will never create a dynamic varobj. This ensures backward compatibility for existing clients.

Result

This operation returns attributes of the newly-created varobj. These are:

'`name`' The name of the varobj.

'`numchild`'
The number of children of the varobj. This number is not necessarily reliable for a dynamic varobj. Instead, you must examine the '`has_more`' attribute.

'`value`' The varobj's scalar value. For a varobj whose type is some sort of aggregate (e.g., a `struct`), or for a dynamic varobj, this value will not be interesting.

'`type`' The varobj's type. This is a string representation of the type, as would be printed by the GDB CLI.

'`thread-id`'
If a variable object is bound to a specific thread, then this is the thread's identifier.

'`has_more`'
For a dynamic varobj, this indicates whether there appear to be any children available. For a non-dynamic varobj, this will be 0.

'`dynamic`' This attribute will be present and have the value '`1`' if the varobj is a dynamic varobj. If the varobj is not a dynamic varobj, then this attribute will not be present.

'`displayhint`'
A dynamic varobj can supply a display hint to the front end. The value comes directly from the Python pretty-printer object's `display_hint` method. See ⟨undefined⟩ [Pretty Printing API], page ⟨undefined⟩.

Typical output will look like this:

```
name="name",numchild="N",type="type",thread-id="M",
 has_more="has_more"
```

The -var-delete Command

Synopsis

```
-var-delete [ -c ] name
```

Deletes a previously created variable object and all of its children. With the '`-c`' option, just deletes the children.

Returns an error if the object *name* is not found.

The -var-set-format Command

Synopsis

```
-var-set-format name format-spec
```

Sets the output format for the value of the object *name* to be *format-spec*.

The syntax for the *format-spec* is as follows:

```
format-spec ↦
{binary | decimal | hexadecimal | octal | natural}
```

The natural format is the default format choosen automatically based on the variable type (like decimal for an `int`, hex for pointers, etc.).

For a variable with children, the format is set only on the variable itself, and the children are not affected.

The -var-show-format Command

Synopsis

```
-var-show-format name
```

Returns the format used to display the value of the object *name*.

```
format ↦
format-spec
```

The -var-info-num-children Command

Synopsis

```
-var-info-num-children name
```

Returns the number of children of a variable object *name*:

```
numchild=n
```

Note that this number is not completely reliable for a dynamic varobj. It will return the current number of children, but more children may be available.

The `-var-list-children` Command

Synopsis

```
-var-list-children [print-values] name [from to]
```

Return a list of the children of the specified variable object and create variable objects for them, if they do not already exist. With a single argument or if *print-values* has a value for of 0 or `--no-values`, print only the names of the variables; if *print-values* is 1 or `--all-values`, also print their values; and if it is 2 or `--simple-values` print the name and value for simple data types and just the name for arrays, structures and unions.

from and *to*, if specified, indicate the range of children to report. If *from* or *to* is less than zero, the range is reset and all children will be reported. Otherwise, children starting at *from* (zero-based) and up to and excluding *to* will be reported.

If a child range is requested, it will only affect the current call to `-var-list-children`, but not future calls to `-var-update`. For this, you must instead use `-var-set-update-range`. The intent of this approach is to enable a front end to implement any update approach it likes; for example, scrolling a view may cause the front end to request more children with `-var-list-children`, and then the front end could call `-var-set-update-range` with a different range to ensure that future updates are restricted to just the visible items.

For each child the following results are returned:

name Name of the variable object created for this child.

exp The expression to be shown to the user by the front end to designate this child. For example this may be the name of a structure member.

For a dynamic varobj, this value cannot be used to form an expression. There is no way to do this at all with a dynamic varobj.

For C/C++ structures there are several pseudo children returned to designate access qualifiers. For these pseudo children *exp* is '`public`', '`private`', or '`protected`'. In this case the type and value are not present.

A dynamic varobj will not report the access qualifying pseudo-children, regardless of the language. This information is not available at all with a dynamic varobj.

numchild Number of children this child has. For a dynamic varobj, this will be 0.

type The type of the child.

value If values were requested, this is the value.

thread-id If this variable object is associated with a thread, this is the thread id. Otherwise this result is not present.

frozen If the variable object is frozen, this variable will be present with a value of 1.

The result may have its own attributes:

'`displayhint`'
A dynamic varobj can supply a display hint to the front end. The value comes directly from the Python pretty-printer object's `display_hint` method. See ⟨undefined⟩ [Pretty Printing API], page ⟨undefined⟩.

'`has_more`'
This is an integer attribute which is nonzero if there are children remaining after the end of the selected range.

Example

```
(gdb)
 -var-list-children n
 ^done,numchild=n,children=[child={name=name,exp=exp,
 numchild=n,type=type},(repeats N times)]
(gdb)
 -var-list-children --all-values n
 ^done,numchild=n,children=[child={name=name,exp=exp,
 numchild=n,value=value,type=type},(repeats N times)]
```

The `-var-info-type` Command

Synopsis

```
-var-info-type name
```

Returns the type of the specified variable *name*. The type is returned as a string in the same format as it is output by the GDB CLI:

```
type=typename
```

The `-var-info-expression` Command

Synopsis

```
-var-info-expression name
```

Returns a string that is suitable for presenting this variable object in user interface. The string is generally not valid expression in the current language, and cannot be evaluated.

For example, if `a` is an array, and variable object `A` was created for `a`, then we'll get this output:

```
(gdb) -var-info-expression A.1
^done,lang="C",exp="1"
```

Here, the values of `lang` can be `{"C" | "C++" | "Java"}`.

Note that the output of the `-var-list-children` command also includes those expressions, so the `-var-info-expression` command is of limited use.

The `-var-info-path-expression` Command

Synopsis

```
-var-info-path-expression name
```

Returns an expression that can be evaluated in the current context and will yield the same value that a variable object has. Compare this with the `-var-info-expression` command, which result can be used only for UI presentation. Typical use of the `-var-info-path-expression` command is creating a watchpoint from a variable object.

This command is currently not valid for children of a dynamic varobj, and will give an error when invoked on one.

For example, suppose `C` is a C++ class, derived from class `Base`, and that the `Base` class has a member called `m_size`. Assume a variable `c` is has the type of `C` and a variable object `C` was created for variable `c`. Then, we'll get this output:

```
(gdb) -var-info-path-expression C.Base.public.m_size
^done,path_expr=((Base)c).m_size)
```

The `-var-show-attributes` Command

Synopsis

```
-var-show-attributes name
```

List attributes of the specified variable object *name*:

```
status=attr [ ( ,attr )* ]
```

where *attr* is `{ { editable | noneditable } | TBD }`.

The `-var-evaluate-expression` Command

Synopsis

```
-var-evaluate-expression [-f format-spec] name
```

Evaluates the expression that is represented by the specified variable object and returns its value as a string. The format of the string can be specified with the '`-f`' option. The possible values of this option are the same as for `-var-set-format` (see ⟨undefined⟩ [-var-set-format], page ⟨undefined⟩). If the '`-f`' option is not specified, the current display format will be used. The current display format can be changed using the `-var-set-format` command.

`value=`*value*

Note that one must invoke `-var-list-children` for a variable before the value of a child variable can be evaluated.

The `-var-assign` Command

Synopsis

`-var-assign` *name expression*

Assigns the value of *expression* to the variable object specified by *name*. The object must be '`editable`'. If the variable's value is altered by the assign, the variable will show up in any subsequent `-var-update` list.

Example

```
(gdb)
-var-assign var1 3
^done,value="3"
(gdb)
-var-update *
^done,changelist=[{name="var1",in_scope="true",type_changed="false"}]
(gdb)
```

The `-var-update` Command

Synopsis

`-var-update [`*print-values*`] {`*name* `| "*"}`

Reevaluate the expressions corresponding to the variable object *name* and all its direct and indirect children, and return the list of variable objects whose values have changed; *name* must be a root variable object. Here, "changed" means that the result of `-var-evaluate-expression` before and after the `-var-update` is different. If '`*`' is used as the variable object names, all existing variable objects are updated, except for frozen ones (see ⟨undefined⟩ [-var-set-frozen], page ⟨undefined⟩). The option *print-values* determines whether both names and values, or just names are printed. The possible values of this option are the same as for `-var-list-children` (see ⟨undefined⟩ [-var-list-children], page ⟨undefined⟩). It is recommended to use the '`--all-values`' option, to reduce the number of MI commands needed on each program stop.

With the '`*`' parameter, if a variable object is bound to a currently running thread, it will not be updated, without any diagnostic.

If `-var-set-update-range` was previously used on a varobj, then only the selected range of children will be reported.

`-var-update` reports all the changed varobjs in a tuple named '`changelist`'.

Each item in the change list is itself a tuple holding:

'`name`' The name of the varobj.

‘value’ If values were requested for this update, then this field will be present and will hold the value of the varobj.

‘in_scope’
This field is a string which may take one of three values:

"true" The variable object's current value is valid.

"false" The variable object does not currently hold a valid value but it may hold one in the future if its associated expression comes back into scope.

"invalid"
The variable object no longer holds a valid value. This can occur when the executable file being debugged has changed, either through recompilation or by using the GDB `file` command. The front end should normally choose to delete these variable objects.

In the future new values may be added to this list so the front should be prepared for this possibility. See ⟨undefined⟩ [GDB/MI Development and Front Ends], page ⟨undefined⟩.

‘type_changed’
This is only present if the varobj is still valid. If the type changed, then this will be the string ‘`true`’; otherwise it will be ‘`false`’.

‘new_type’
If the varobj's type changed, then this field will be present and will hold the new type.

‘new_num_children’
For a dynamic varobj, if the number of children changed, or if the type changed, this will be the new number of children.

The ‘`numchild`’ field in other varobj responses is generally not valid for a dynamic varobj – it will show the number of children that GDB knows about, but because dynamic varobjs lazily instantiate their children, this will not reflect the number of children which may be available.

The ‘`new_num_children`’ attribute only reports changes to the number of children known by GDB. This is the only way to detect whether an update has removed children (which necessarily can only happen at the end of the update range).

‘displayhint’
The display hint, if any.

‘has_more’
This is an integer value, which will be 1 if there are more children available outside the varobj's update range.

‘dynamic’ This attribute will be present and have the value ‘`1`’ if the varobj is a dynamic varobj. If the varobj is not a dynamic varobj, then this attribute will not be present.

‘new_children’
: If new children were added to a dynamic varobj within the selected update range (as set by `-var-set-update-range`), then they will be listed in this attribute.

Example

```
(gdb)
-var-assign var1 3
^done,value="3"
(gdb)
-var-update --all-values var1
^done,changelist=[{name="var1",value="3",in_scope="true",
type_changed="false"}]
(gdb)
```

The `-var-set-frozen` Command

Synopsis

```
-var-set-frozen name flag
```

Set the frozenness flag on the variable object *name*. The *flag* parameter should be either ‘`1`’ to make the variable frozen or ‘`0`’ to make it unfrozen. If a variable object is frozen, then neither itself, nor any of its children, are implicitly updated by `-var-update` of a parent variable or by `-var-update *`. Only `-var-update` of the variable itself will update its value and values of its children. After a variable object is unfrozen, it is implicitly updated by all subsequent `-var-update` operations. Unfreezing a variable does not update it, only subsequent `-var-update` does.

Example

```
(gdb)
-var-set-frozen V 1
^done
(gdb)
```

The `-var-set-update-range` command

Synopsis

```
-var-set-update-range name from to
```

Set the range of children to be returned by future invocations of `-var-update`.

from and *to* indicate the range of children to report. If *from* or *to* is less than zero, the range is reset and all children will be reported. Otherwise, children starting at *from* (zero-based) and up to and excluding *to* will be reported.

Example

```
(gdb)
-var-set-update-range V 1 2
^done
```

The `-var-set-visualizer` command

Synopsis

```
-var-set-visualizer name visualizer
```

Set a visualizer for the variable object *name*.

visualizer is the visualizer to use. The special value '`None`' means to disable any visualizer in use.

If not '`None`', *visualizer* must be a Python expression. This expression must evaluate to a callable object which accepts a single argument. GDB will call this object with the value of the varobj *name* as an argument (this is done so that the same Python pretty-printing code can be used for both the CLI and MI). When called, this object must return an object which conforms to the pretty-printing interface (see ⟨undefined⟩ [Pretty Printing API], page ⟨undefined⟩).

The pre-defined function `gdb.default_visualizer` may be used to select a visualizer by following the built-in process (see ⟨undefined⟩ [Selecting Pretty-Printers], page ⟨undefined⟩). This is done automatically when a varobj is created, and so ordinarily is not needed.

This feature is only available if Python support is enabled. The MI command `-list-features` (see ⟨undefined⟩ [GDB/MI Miscellaneous Commands], page ⟨undefined⟩) can be used to check this.

Example

Resetting the visualizer:

```
(gdb)
-var-set-visualizer V None
^done
```

Reselecting the default (type-based) visualizer:

```
(gdb)
-var-set-visualizer V gdb.default_visualizer
^done
```

Suppose `SomeClass` is a visualizer class. A lambda expression can be used to instantiate this class for a varobj:

```
(gdb)
-var-set-visualizer V "lambda val: SomeClass()"
^done
```

27.14 GDB/MI Data Manipulation

This section describes the GDB/MI commands that manipulate data: examine memory and registers, evaluate expressions, etc.

The `-data-disassemble` Command

Synopsis

```
-data-disassemble
   [ -s start-addr -e end-addr ]
 | [ -f filename -l linenum [ -n lines ] ]
 -- mode
```

Where:

‘*start-addr*’
: is the beginning address (or `$pc`)

‘*end-addr*’
: is the end address

‘*filename*’
: is the name of the file to disassemble

‘*linenum*’
: is the line number to disassemble around

‘*lines*’
: is the number of disassembly lines to be produced. If it is -1, the whole function will be disassembled, in case no *end-addr* is specified. If *end-addr* is specified as a non-zero value, and *lines* is lower than the number of disassembly lines between *start-addr* and *end-addr*, only *lines* lines are displayed; if *lines* is higher than the number of lines between *start-addr* and *end-addr*, only the lines up to *end-addr* are displayed.

‘*mode*’
: is either 0 (meaning only disassembly) or 1 (meaning mixed source and disassembly).

Result

The output for each instruction is composed of four fields:

- Address
- Func-name
- Offset
- Instruction

Note that whatever included in the instruction field, is not manipulated directly by GDB/MI, i.e., it is not possible to adjust its format.

GDB Command

There’s no direct mapping from this command to the CLI.

Example

Disassemble from the current value of `$pc` to `$pc + 20`:

```
(gdb)
-data-disassemble -s $pc -e "$pc + 20" -- 0
^done,
asm_insns=[
{address="0x000107c0",func-name="main",offset="4",
inst="mov  2, %o0"},
{address="0x000107c4",func-name="main",offset="8",
inst="sethi  %hi(0x11800), %o2"},
{address="0x000107c8",func-name="main",offset="12",
inst="or  %o2, 0x140, %o1\t! 0x11940 <_lib_version+8>"},
{address="0x000107cc",func-name="main",offset="16",
inst="sethi  %hi(0x11800), %o2"},
{address="0x000107d0",func-name="main",offset="20",
inst="or  %o2, 0x168, %o4\t! 0x11968 <_lib_version+48>"}]
(gdb)
```

Disassemble the whole `main` function. Line 32 is part of `main`.

```
-data-disassemble -f basics.c -l 32 -- 0
^done,asm_insns=[
{address="0x000107bc",func-name="main",offset="0",
inst="save  %sp, -112, %sp"},
{address="0x000107c0",func-name="main",offset="4",
inst="mov   2, %o0"},
{address="0x000107c4",func-name="main",offset="8",
inst="sethi %hi(0x11800), %o2"},
[...]
{address="0x0001081c",func-name="main",offset="96",inst="ret "},
{address="0x00010820",func-name="main",offset="100",inst="restore "}]
(gdb)
```

Disassemble 3 instructions from the start of `main`:

```
(gdb)
-data-disassemble -f basics.c -l 32 -n 3 -- 0
^done,asm_insns=[
{address="0x000107bc",func-name="main",offset="0",
inst="save  %sp, -112, %sp"},
{address="0x000107c0",func-name="main",offset="4",
inst="mov  2, %o0"},
{address="0x000107c4",func-name="main",offset="8",
inst="sethi  %hi(0x11800), %o2"}]
(gdb)
```

Disassemble 3 instructions from the start of `main` in mixed mode:

```
(gdb)
-data-disassemble -f basics.c -l 32 -n 3 -- 1
^done,asm_insns=[
src_and_asm_line={line="31",
file="/kwikemart/marge/ezannoni/flathead-dev/devo/gdb/ \
  testsuite/gdb.mi/basics.c",line_asm_insn=[
{address="0x000107bc",func-name="main",offset="0",
inst="save  %sp, -112, %sp"}]},
src_and_asm_line={line="32",
file="/kwikemart/marge/ezannoni/flathead-dev/devo/gdb/ \
  testsuite/gdb.mi/basics.c",line_asm_insn=[
{address="0x000107c0",func-name="main",offset="4",
```

```
inst="mov  2, %o0"},
{address="0x000107c4",func-name="main",offset="8",
inst="sethi  %hi(0x11800), %o2"}]}]
(gdb)
```

The `-data-evaluate-expression` Command

Synopsis

```
-data-evaluate-expression expr
```

Evaluate *expr* as an expression. The expression could contain an inferior function call. The function call will execute synchronously. If the expression contains spaces, it must be enclosed in double quotes.

GDB Command

The corresponding GDB commands are '`print`', '`output`', and '`call`'. In `gdbtk` only, there's a corresponding '`gdb_eval`' command.

Example

In the following example, the numbers that precede the commands are the *tokens* described in ⟨undefined⟩ [GDB/MI Command Syntax], page ⟨undefined⟩. Notice how GDB/MI returns the same tokens in its output.

```
211-data-evaluate-expression A
211^done,value="1"
(gdb)
311-data-evaluate-expression &A
311^done,value="0xefffeb7c"
(gdb)
411-data-evaluate-expression A+3
411^done,value="4"
(gdb)
511-data-evaluate-expression "A + 3"
511^done,value="4"
(gdb)
```

The `-data-list-changed-registers` Command

Synopsis

```
-data-list-changed-registers
```

Display a list of the registers that have changed.

GDB Command

GDB doesn't have a direct analog for this command; `gdbtk` has the corresponding command '`gdb_changed_register_list`'.

Example

On a PPC MBX board:

```
(gdb)
-exec-continue
^running

(gdb)
*stopped,reason="breakpoint-hit",disp="keep",bkptno="1",frame={
func="main",args=[],file="try.c",fullname="/home/foo/bar/try.c",
line="5"}
(gdb)
-data-list-changed-registers
^done,changed-registers=["0","1","2","4","5","6","7","8","9",
"10","11","13","14","15","16","17","18","19","20","21","22","23",
"24","25","26","27","28","30","31","64","65","66","67","69"]
(gdb)
```

The `-data-list-register-names` Command

Synopsis

```
-data-list-register-names [ ( regno )+ ]
```

Show a list of register names for the current target. If no arguments are given, it shows a list of the names of all the registers. If integer numbers are given as arguments, it will print a list of the names of the registers corresponding to the arguments. To ensure consistency between a register name and its number, the output list may include empty register names.

GDB Command

GDB does not have a command which corresponds to '`-data-list-register-names`'. In `gdbtk` there is a corresponding command '`gdb_regnames`'.

Example

For the PPC MBX board:

```
(gdb)
-data-list-register-names
^done,register-names=["r0","r1","r2","r3","r4","r5","r6","r7",
"r8","r9","r10","r11","r12","r13","r14","r15","r16","r17","r18",
"r19","r20","r21","r22","r23","r24","r25","r26","r27","r28","r29",
"r30","r31","f0","f1","f2","f3","f4","f5","f6","f7","f8","f9",
"f10","f11","f12","f13","f14","f15","f16","f17","f18","f19","f20",
"f21","f22","f23","f24","f25","f26","f27","f28","f29","f30","f31",
"", "pc","ps","cr","lr","ctr","xer"]
(gdb)
-data-list-register-names 1 2 3
^done,register-names=["r1","r2","r3"]
(gdb)
```

The `-data-list-register-values` Command

Synopsis

```
-data-list-register-values fmt [ ( regno )*]
```

Display the registers' contents. *fmt* is the format according to which the registers' contents are to be returned, followed by an optional list of numbers specifying the registers to display. A missing list of numbers indicates that the contents of all the registers must be returned.

Allowed formats for *fmt* are:

`x`	Hexadecimal
`o`	Octal
`t`	Binary
`d`	Decimal
`r`	Raw
`N`	Natural

GDB Command

The corresponding GDB commands are '`info reg`', '`info all-reg`', and (in `gdbtk`) '`gdb_fetch_registers`'.

Example

For a PPC MBX board (note: line breaks are for readability only, they don't appear in the actual output):

```
(gdb)
-data-list-register-values r 64 65
^done,register-values=[{number="64",value="0xfe00a300"},
{number="65",value="0x00029002"}]
(gdb)
-data-list-register-values x
^done,register-values=[{number="0",value="0xfe0043c8"},
{number="1",value="0x3fff88"},{number="2",value="0xfffffffe"},
{number="3",value="0x0"},{number="4",value="0xa"},
{number="5",value="0x3fff68"},{number="6",value="0x3fff58"},
{number="7",value="0xfe011e98"},{number="8",value="0x2"},
{number="9",value="0xfa202820"},{number="10",value="0xfa202808"},
{number="11",value="0x1"},{number="12",value="0x0"},
{number="13",value="0x4544"},{number="14",value="0xffdfffff"},
{number="15",value="0xffffffff"},{number="16",value="0xfffffeff"},
{number="17",value="0xefffffed"},{number="18",value="0xfffffffe"},
{number="19",value="0xffffffff"},{number="20",value="0xffffffff"},
{number="21",value="0xffffffff"},{number="22",value="0xfffffff7"},
{number="23",value="0xffffffff"},{number="24",value="0xffffffff"},
{number="25",value="0xffffffff"},{number="26",value="0xfffffffb"},
```

```
{number="27",value="0xffffffff"},{number="28",value="0xf7bfffff"},
{number="29",value="0x0"},{number="30",value="0xfe010000"},
{number="31",value="0x0"},{number="32",value="0x0"},
{number="33",value="0x0"},{number="34",value="0x0"},
{number="35",value="0x0"},{number="36",value="0x0"},
{number="37",value="0x0"},{number="38",value="0x0"},
{number="39",value="0x0"},{number="40",value="0x0"},
{number="41",value="0x0"},{number="42",value="0x0"},
{number="43",value="0x0"},{number="44",value="0x0"},
{number="45",value="0x0"},{number="46",value="0x0"},
{number="47",value="0x0"},{number="48",value="0x0"},
{number="49",value="0x0"},{number="50",value="0x0"},
{number="51",value="0x0"},{number="52",value="0x0"},
{number="53",value="0x0"},{number="54",value="0x0"},
{number="55",value="0x0"},{number="56",value="0x0"},
{number="57",value="0x0"},{number="58",value="0x0"},
{number="59",value="0x0"},{number="60",value="0x0"},
{number="61",value="0x0"},{number="62",value="0x0"},
{number="63",value="0x0"},{number="64",value="0xfe00a300"},
{number="65",value="0x29002"},{number="66",value="0x202f04b5"},
{number="67",value="0xfe0043b0"},{number="68",value="0xfe00b3e4"},
{number="69",value="0x20002b03"}]
(gdb)
```

The `-data-read-memory` Command

Synopsis

```
-data-read-memory [ -o byte-offset ]
  address word-format word-size
  nr-rows nr-cols [ aschar ]
```

where:

‘*address*’ An expression specifying the address of the first memory word to be read. Complex expressions containing embedded white space should be quoted using the C convention.

‘*word-format*’
The format to be used to print the memory words. The notation is the same as for GDB’s `print` command (see ⟨undefined⟩ [Output Formats], page ⟨undefined⟩).

‘*word-size*’
The size of each memory word in bytes.

‘*nr-rows*’ The number of rows in the output table.

‘*nr-cols*’ The number of columns in the output table.

‘*aschar*’ If present, indicates that each row should include an ASCII dump. The value of *aschar* is used as a padding character when a byte is not a member of the printable ASCII character set (printable ASCII characters are those whose code is between 32 and 126, inclusively).

‘*byte-offset*’
: An offset to add to the *address* before fetching memory.

This command displays memory contents as a table of *nr-rows* by *nr-cols* words, each word being *word-size* bytes. In total, *nr-rows* * *nr-cols* * *word-size* bytes are read (returned as ‘`total-bytes`’). Should less than the requested number of bytes be returned by the target, the missing words are identified using ‘`N/A`’. The number of bytes read from the target is returned in ‘`nr-bytes`’ and the starting address used to read memory in ‘`addr`’.

The address of the next/previous row or page is available in ‘`next-row`’ and ‘`prev-row`’, ‘`next-page`’ and ‘`prev-page`’.

GDB Command

The corresponding GDB command is ‘`x`’. `gdbtk` has ‘`gdb_get_mem`’ memory read command.

Example

Read six bytes of memory starting at `bytes+6` but then offset by `-6` bytes. Format as three rows of two columns. One byte per word. Display each word in hex.

```
(gdb)
9-data-read-memory -o -6 -- bytes+6 x 1 3 2
9^done,addr="0x00001390",nr-bytes="6",total-bytes="6",
next-row="0x00001396",prev-row="0x0000138e",next-page="0x00001396",
prev-page="0x0000138a",memory=[
{addr="0x00001390",data=["0x00","0x01"]},
{addr="0x00001392",data=["0x02","0x03"]},
{addr="0x00001394",data=["0x04","0x05"]}]
(gdb)
```

Read two bytes of memory starting at address `shorts + 64` and display as a single word formatted in decimal.

```
(gdb)
5-data-read-memory shorts+64 d 2 1 1
5^done,addr="0x00001510",nr-bytes="2",total-bytes="2",
next-row="0x00001512",prev-row="0x0000150e",
next-page="0x00001512",prev-page="0x0000150e",memory=[
{addr="0x00001510",data=["128"]}]
(gdb)
```

Read thirty two bytes of memory starting at `bytes+16` and format as eight rows of four columns. Include a string encoding with ‘`x`’ used as the non-printable character.

```
(gdb)
4-data-read-memory bytes+16 x 1 8 4 x
4^done,addr="0x000013a0",nr-bytes="32",total-bytes="32",
next-row="0x000013c0",prev-row="0x0000139c",
next-page="0x000013c0",prev-page="0x00001380",memory=[
{addr="0x000013a0",data=["0x10","0x11","0x12","0x13"],ascii="xxxx"},
{addr="0x000013a4",data=["0x14","0x15","0x16","0x17"],ascii="xxxx"},
{addr="0x000013a8",data=["0x18","0x19","0x1a","0x1b"],ascii="xxxx"},
{addr="0x000013ac",data=["0x1c","0x1d","0x1e","0x1f"],ascii="xxxx"},
{addr="0x000013b0",data=["0x20","0x21","0x22","0x23"],ascii=" !\"#"},
{addr="0x000013b4",data=["0x24","0x25","0x26","0x27"],ascii="$%&'"},
```

```
{addr="0x000013b8",data=["0x28","0x29","0x2a","0x2b"],ascii="()*+"},
{addr="0x000013bc",data=["0x2c","0x2d","0x2e","0x2f"],ascii=",-./"}]
(gdb)
```

27.15 GDB/MI Tracepoint Commands

The commands defined in this section implement MI support for tracepoints. For detailed introduction, see ⟨undefined⟩ [Tracepoints], page ⟨undefined⟩.

The `-trace-find` Command

Synopsis

```
-trace-find mode [parameters...]
```

Find a trace frame using criteria defined by *mode* and *parameters*. The following table lists permissible modes and their parameters. For details of operation, see ⟨undefined⟩ [tfind], page ⟨undefined⟩.

‘`none`’ No parameters are required. Stops examining trace frames.

‘`frame-number`’
An integer is required as parameter. Selects tracepoint frame with that index.

‘`tracepoint-number`’
An integer is required as parameter. Finds next trace frame that corresponds to tracepoint with the specified number.

‘`pc`’ An address is required as parameter. Finds next trace frame that corresponds to any tracepoint at the specified address.

‘`pc-inside-range`’
Two addresses are required as parameters. Finds next trace frame that corresponds to a tracepoint at an address inside the specified range. Both bounds are considered to be inside the range.

‘`pc-outside-range`’
Two addresses are required as parameters. Finds next trace frame that corresponds to a tracepoint at an address outside the specified range. Both bounds are considered to be inside the range.

‘`line`’ Line specification is required as parameter. See ⟨undefined⟩ [Specify Location], page ⟨undefined⟩. Finds next trace frame that corresponds to a tracepoint at the specified location.

If ‘`none`’ was passed as *mode*, the response does not have fields. Otherwise, the response may have the following fields:

‘`found`’ This field has either ‘`0`’ or ‘`1`’ as the value, depending on whether a matching tracepoint was found.

‘traceframe’
: The index of the found traceframe. This field is present iff the ‘found’ field has value of ‘1’.

‘tracepoint’
: The index of the found tracepoint. This field is present iff the ‘found’ field has value of ‘1’.

‘frame’
: The information about the frame corresponding to the found trace frame. This field is present only if a trace frame was found. See ⟨undefined⟩ [GDB/MI Frame Information], page ⟨undefined⟩, for description of this field.

GDB Command

The corresponding GDB command is ‘tfind’.

-trace-define-variable

Synopsis

```
-trace-define-variable name [ value ]
```

Create trace variable *name* if it does not exist. If *value* is specified, sets the initial value of the specified trace variable to that value. Note that the *name* should start with the ‘$’ character.

GDB Command

The corresponding GDB command is ‘tvariable’.

-trace-list-variables

Synopsis

```
-trace-list-variables
```

Return a table of all defined trace variables. Each element of the table has the following fields:

‘name’
: The name of the trace variable. This field is always present.

‘initial’
: The initial value. This is a 64-bit signed integer. This field is always present.

‘current’
: The value the trace variable has at the moment. This is a 64-bit signed integer. This field is absent iff current value is not defined, for example if the trace was never run, or is presently running.

GDB Command

The corresponding GDB command is ‘tvariables’.

Example

```
(gdb)
-trace-list-variables
^done,trace-variables={nr_rows="1",nr_cols="3",
hdr=[{width="15",alignment="-1",col_name="name",colhdr="Name"},
     {width="11",alignment="-1",col_name="initial",colhdr="Initial"},
     {width="11",alignment="-1",col_name="current",colhdr="Current"}],
body=[variable={name="$trace_timestamp",initial="0"}
      variable={name="$foo",initial="10",current="15"}]}
(gdb)
```

-trace-save

Synopsis

```
-trace-save [-r ] filename
```

Saves the collected trace data to *filename*. Without the '`-r`' option, the data is downloaded from the target and saved in a local file. With the '`-r`' option the target is asked to perform the save.

GDB Command

The corresponding GDB command is '`tsave`'.

-trace-start

Synopsis

```
-trace-start
```

Starts a tracing experiments. The result of this command does not have any fields.

GDB Command

The corresponding GDB command is '`tstart`'.

-trace-status

Synopsis

```
-trace-status
```

Obtains the status of a tracing experiment. The result may include the following fields:

'`supported`'
: May have a value of either '`0`', when no tracing operations are supported, '`1`', when all tracing operations are supported, or '`file`' when examining trace

file. In the latter case, examining of trace frame is possible but new tracing experiement cannot be started. This field is always present.

‘`running`’ May have a value of either ‘`0`’ or ‘`1`’ depending on whether tracing experiement is in progress on target. This field is present if ‘`supported`’ field is not ‘`0`’.

‘`stop-reason`’
Report the reason why the tracing was stopped last time. This field may be absent iff tracing was never stopped on target yet. The value of ‘`request`’ means the tracing was stopped as result of the `-trace-stop` command. The value of ‘`overflow`’ means the tracing buffer is full. The value of ‘`disconnection`’ means tracing was automatically stopped when GDB has disconnected. The value of ‘`passcount`’ means tracing was stopped when a tracepoint was passed a maximal number of times for that tracepoint. This field is present if ‘`supported`’ field is not ‘`0`’.

‘`stopping-tracepoint`’
The number of tracepoint whose passcount as exceeded. This field is present iff the ‘`stop-reason`’ field has the value of ‘`passcount`’.

‘`frames`’
‘`frames-created`’
The ‘`frames`’ field is a count of the total number of trace frames in the trace buffer, while ‘`frames-created`’ is the total created during the run, including ones that were discarded, such as when a circular trace buffer filled up. Both fields are optional.

‘`buffer-size`’
‘`buffer-free`’
These fields tell the current size of the tracing buffer and the remaining space. These fields are optional.

‘`circular`’
The value of the circular trace buffer flag. `1` means that the trace buffer is circular and old trace frames will be discarded if necessary to make room, `0` means that the trace buffer is linear and may fill up.

‘`disconnected`’
The value of the disconnected tracing flag. `1` means that tracing will continue after GDB disconnects, `0` means that the trace run will stop.

GDB Command

The corresponding GDB command is ‘`tstatus`’.

-trace-stop

Synopsis

```
-trace-stop
```

Stops a tracing experiment. The result of this command has the same fields as `-trace-status`, except that the '`supported`' and '`running`' fields are not output.

GDB Command

The corresponding GDB command is '`tstop`'.

27.16 GDB/MI Symbol Query Commands

The `-symbol-list-lines` Command

Synopsis

```
-symbol-list-lines filename
```

Print the list of lines that contain code and their associated program addresses for the given source filename. The entries are sorted in ascending PC order.

GDB Command

There is no corresponding GDB command.

Example

```
(gdb)
-symbol-list-lines basics.c
^done,lines=[{pc="0x08048554",line="7"},{pc="0x0804855a",line="8"}]
(gdb)
```

27.17 GDB/MI File Commands

This section describes the GDB/MI commands to specify executable file names and to read in and obtain symbol table information.

The `-file-exec-and-symbols` Command

Synopsis

```
-file-exec-and-symbols file
```

Specify the executable file to be debugged. This file is the one from which the symbol table is also read. If no file is specified, the command clears the executable and symbol information. If breakpoints are set when using this command with no arguments, GDB will produce error messages. Otherwise, no output is produced, except a completion notification.

GDB Command

The corresponding GDB command is '`file`'.

Example

```
(gdb)
-file-exec-and-symbols /kwikemart/marge/ezannoni/TRUNK/mbx/hello.mbx
^done
(gdb)
```

The `-file-exec-file` Command

Synopsis

```
-file-exec-file file
```

Specify the executable file to be debugged. Unlike '`-file-exec-and-symbols`', the symbol table is *not* read from this file. If used without argument, GDB clears the information about the executable file. No output is produced, except a completion notification.

GDB Command

The corresponding GDB command is '`exec-file`'.

Example

```
(gdb)
-file-exec-file /kwikemart/marge/ezannoni/TRUNK/mbx/hello.mbx
^done
(gdb)
```

The `-file-list-exec-source-file` Command

Synopsis

```
-file-list-exec-source-file
```

List the line number, the current source file, and the absolute path to the current source file for the current executable. The macro information field has a value of '`1`' or '`0`' depending on whether or not the file includes preprocessor macro information.

GDB Command

The GDB equivalent is '`info source`'

Example

```
(gdb)
123-file-list-exec-source-file
123^done,line="1",file="foo.c",fullname="/home/bar/foo.c,macro-info="1"
(gdb)
```

The `-file-list-exec-source-files` Command

Synopsis

```
-file-list-exec-source-files
```

List the source files for the current executable.

It will always output the filename, but only when GDB can find the absolute file name of a source file, will it output the fullname.

GDB Command

The GDB equivalent is '`info sources`'. `gdbtk` has an analogous command '`gdb_listfiles`'.

Example

```
(gdb)
-file-list-exec-source-files
^done,files=[
{file=foo.c,fullname=/home/foo.c},
{file=/home/bar.c,fullname=/home/bar.c},
{file=gdb_could_not_find_fullpath.c}]
(gdb)
```

The `-file-symbol-file` Command

Synopsis

```
-file-symbol-file file
```

Read symbol table info from the specified *file* argument. When used without arguments, clears GDB's symbol table info. No output is produced, except for a completion notification.

GDB Command

The corresponding GDB command is '`symbol-file`'.

Example

```
(gdb)
-file-symbol-file /kwikemart/marge/ezannoni/TRUNK/mbx/hello.mbx
^done
(gdb)
```

27.18 GDB/MI Target Manipulation Commands

The -target-attach Command

Synopsis

```
-target-attach pid | gid | file
```

Attach to a process *pid* or a file *file* outside of GDB, or a thread group *gid*. If attaching to a thread group, the id previously returned by '`-list-thread-groups --available`' must be used.

GDB Command

The corresponding GDB command is '`attach`'.

Example

```
(gdb)
-target-attach 34
=thread-created,id="1"
*stopped,thread-id="1",frame={addr="0xb7f7e410",func="bar",args=[]}
^done
(gdb)
```

The -target-detach Command

Synopsis

```
-target-detach [ pid | gid ]
```

Detach from the remote target which normally resumes its execution. If either *pid* or *gid* is specified, detaches from either the specified process, or specified thread group. There's no output.

GDB Command

The corresponding GDB command is '`detach`'.

Example

```
(gdb)
-target-detach
^done
(gdb)
```

The -target-disconnect Command

Synopsis

```
-target-disconnect
```

Disconnect from the remote target. There's no output and the target is generally not resumed.

GDB Command

The corresponding GDB command is '`disconnect`'.

Example

```
(gdb)
-target-disconnect
^done
(gdb)
```

The `-target-download` Command

Synopsis

```
-target-download
```

Loads the executable onto the remote target. It prints out an update message every half second, which includes the fields:

'`section`' The name of the section.

'`section-sent`'
The size of what has been sent so far for that section.

'`section-size`'
The size of the section.

'`total-sent`'
The total size of what was sent so far (the current and the previous sections).

'`total-size`'
The size of the overall executable to download.

Each message is sent as status record (see ⟨undefined⟩ [GDB/MI Output Syntax], page ⟨undefined⟩).

In addition, it prints the name and size of the sections, as they are downloaded. These messages include the following fields:

'`section`' The name of the section.

'`section-size`'
The size of the section.

'`total-size`'
The size of the overall executable to download.

At the end, a summary is printed.

GDB Command

The corresponding GDB command is '`load`'.

Example

Note: each status message appears on a single line. Here the messages have been broken down so that they can fit onto a page.

```
(gdb)
-target-download
+download,{section=".text",section-size="6668",total-size="9880"}
+download,{section=".text",section-sent="512",section-size="6668",
total-sent="512",total-size="9880"}
+download,{section=".text",section-sent="1024",section-size="6668",
total-sent="1024",total-size="9880"}
+download,{section=".text",section-sent="1536",section-size="6668",
total-sent="1536",total-size="9880"}
+download,{section=".text",section-sent="2048",section-size="6668",
total-sent="2048",total-size="9880"}
+download,{section=".text",section-sent="2560",section-size="6668",
total-sent="2560",total-size="9880"}
+download,{section=".text",section-sent="3072",section-size="6668",
total-sent="3072",total-size="9880"}
+download,{section=".text",section-sent="3584",section-size="6668",
total-sent="3584",total-size="9880"}
+download,{section=".text",section-sent="4096",section-size="6668",
total-sent="4096",total-size="9880"}
+download,{section=".text",section-sent="4608",section-size="6668",
total-sent="4608",total-size="9880"}
+download,{section=".text",section-sent="5120",section-size="6668",
total-sent="5120",total-size="9880"}
+download,{section=".text",section-sent="5632",section-size="6668",
total-sent="5632",total-size="9880"}
+download,{section=".text",section-sent="6144",section-size="6668",
total-sent="6144",total-size="9880"}
+download,{section=".text",section-sent="6656",section-size="6668",
total-sent="6656",total-size="9880"}
+download,{section=".init",section-size="28",total-size="9880"}
+download,{section=".fini",section-size="28",total-size="9880"}
+download,{section=".data",section-size="3156",total-size="9880"}
+download,{section=".data",section-sent="512",section-size="3156",
total-sent="7236",total-size="9880"}
+download,{section=".data",section-sent="1024",section-size="3156",
total-sent="7748",total-size="9880"}
+download,{section=".data",section-sent="1536",section-size="3156",
total-sent="8260",total-size="9880"}
+download,{section=".data",section-sent="2048",section-size="3156",
total-sent="8772",total-size="9880"}
+download,{section=".data",section-sent="2560",section-size="3156",
total-sent="9284",total-size="9880"}
+download,{section=".data",section-sent="3072",section-size="3156",
total-sent="9796",total-size="9880"}
^done,address="0x10004",load-size="9880",transfer-rate="6586",
write-rate="429"
(gdb)
```

GDB Command

No equivalent.

Example

N.A.

The -target-select Command

Synopsis

```
-target-select type parameters ...
```

Connect GDB to the remote target. This command takes two args:

'*type*' The type of target, for instance '`remote`', etc.

'*parameters*'
Device names, host names and the like. See ⟨undefined⟩ [Commands for Managing Targets], page ⟨undefined⟩, for more details.

The output is a connection notification, followed by the address at which the target program is, in the following form:

```
^connected,addr="address",func="function name",
  args=[arg list]
```

GDB Command

The corresponding GDB command is '`target`'.

Example

```
(gdb)
-target-select remote /dev/ttya
^connected,addr="0xfe00a300",func="??",args=[]
(gdb)
```

27.19 GDB/MI File Transfer Commands

The -target-file-put Command

Synopsis

```
-target-file-put hostfile targetfile
```

Copy file *hostfile* from the host system (the machine running GDB) to *targetfile* on the target system.

GDB Command

The corresponding GDB command is '`remote put`'.

Example

```
(gdb)
-target-file-put localfile remotefile
^done
(gdb)
```

The `-target-file-get` Command

Synopsis

```
-target-file-get targetfile hostfile
```

Copy file *targetfile* from the target system to *hostfile* on the host system.

GDB Command

The corresponding GDB command is '`remote get`'.

Example

```
(gdb)
-target-file-get remotefile localfile
^done
(gdb)
```

The `-target-file-delete` Command

Synopsis

```
-target-file-delete targetfile
```

Delete *targetfile* from the target system.

GDB Command

The corresponding GDB command is '`remote delete`'.

Example

```
(gdb)
-target-file-delete remotefile
^done
(gdb)
```

27.20 Miscellaneous GDB/MI Commands

The -gdb-exit Command

Synopsis

```
-gdb-exit
```

Exit GDB immediately.

GDB Command

Approximately corresponds to ‘quit’.

Example

```
(gdb)
-gdb-exit
^exit
```

The -gdb-set Command

Synopsis

```
-gdb-set
```

Set an internal GDB variable.

GDB Command

The corresponding GDB command is ‘set’.

Example

```
(gdb)
-gdb-set $foo=3
^done
(gdb)
```

The -gdb-show Command

Synopsis

```
-gdb-show
```

Show the current value of a GDB variable.

GDB Command

The corresponding GDB command is '`show`'.

Example

```
(gdb)
-gdb-show annotate
^done,value="0"
(gdb)
```

The `-gdb-version` Command

Synopsis

```
-gdb-version
```

Show version information for GDB. Used mostly in testing.

GDB Command

The GDB equivalent is '`show version`'. GDB by default shows this information when you start an interactive session.

Example

```
(gdb)
-gdb-version
~GNU gdb 5.2.1
~Copyright 2000 Free Software Foundation, Inc.
~GDB is free software, covered by the GNU General Public License, and
~you are welcome to change it and/or distribute copies of it under
~ certain conditions.
~Type "show copying" to see the conditions.
~There is absolutely no warranty for GDB.  Type "show warranty" for
~ details.
~This GDB was configured as
 "--host=sparc-sun-solaris2.5.1 --target=ppc-eabi".
^done
(gdb)
```

The `-list-features` Command

Returns a list of particular features of the MI protocol that this version of gdb implements. A feature can be a command, or a new field in an output of some command, or even an important bugfix. While a frontend can sometimes detect presence of a feature at runtime, it is easier to perform detection at debugger startup.

The command returns a list of strings, with each string naming an available feature. Each returned string is just a name, it does not have any internal structure. The list of possible feature names is given below.

Example output:

```
(gdb) -list-features
^done,result=["feature1","feature2"]
```

The current list of features is:

'`frozen-varobjs`'
: Indicates presence of the `-var-set-frozen` command, as well as possible presense of the `frozen` field in the output of `-varobj-create`.

'`pending-breakpoints`'
: Indicates presence of the '`-f`' option to the `-break-insert` command.

'`python`'
: Indicates presence of Python scripting support, Python-based pretty-printing commands, and possible presence of the '`display_hint`' field in the output of `-var-list-children`

'`thread-info`'
: Indicates presence of the `-thread-info` command.

The `-list-target-features` Command

Returns a list of particular features that are supported by the target. Those features affect the permitted MI commands, but unlike the features reported by the `-list-features` command, the features depend on which target GDB is using at the moment. Whenever a target can change, due to commands such as `-target-select`, `-target-attach` or `-exec-run`, the list of target features may change, and the frontend should obtain it again. Example output:

```
(gdb) -list-features
^done,result=["async"]
```

The current list of features is:

'`async`'
: Indicates that the target is capable of asynchronous command execution, which means that GDB will accept further commands while the target is running.

The `-list-thread-groups` Command

Synopsis

```
-list-thread-groups [ --available ] [ --recurse 1 ] [ group ... ]
```

Lists thread groups (see ⟨undefined⟩ [Thread groups], page ⟨undefined⟩). When a single thread group is passed as the argument, lists the children of that group. When several thread group are passed, lists information about those thread groups. Without any parameters, lists information about all top-level thread groups.

Normally, thread groups that are being debugged are reported. With the '`--available`' option, GDB reports thread groups available on the target.

The output of this command may have either a '`threads`' result or a '`groups`' result. The '`thread`' result has a list of tuples as value, with each tuple describing a thread (see ⟨undefined⟩ [GDB/MI Thread Information], page ⟨undefined⟩). The '`groups`' result has a

list of tuples as value, each tuple describing a thread group. If top-level groups are requested (that is, no parameter is passed), or when several groups are passed, the output always has a '`groups`' result. The format of the '`group`' result is described below.

To reduce the number of roundtrips it's possible to list thread groups together with their children, by passing the '`--recurse`' option and the recursion depth. Presently, only recursion depth of 1 is permitted. If this option is present, then every reported thread group will also include its children, either as '`group`' or '`threads`' field.

In general, any combination of option and parameters is permitted, with the following caveats:

- When a single thread group is passed, the output will typically be the '`threads`' result. Because threads may not contain anything, the '`recurse`' option will be ignored.
- When the '`--available`' option is passed, limited information may be available. In particular, the list of threads of a process might be inaccessible. Further, specifying specific thread groups might not give any performance advantage over listing all thread groups. The frontend should assume that '`-list-thread-groups --available`' is always an expensive operation and cache the results.

The '`groups`' result is a list of tuples, where each tuple may have the following fields:

`id` Identifier of the thread group. This field is always present. The identifier is an opaque string; frontends should not try to convert it to an integer, even though it might look like one.

`type` The type of the thread group. At present, only '`process`' is a valid type.

`pid` The target-specific process identifier. This field is only present for thread groups of type '`process`' and only if the process exists.

`num_children`
The number of children this thread group has. This field may be absent for an available thread group.

`threads` This field has a list of tuples as value, each tuple describing a thread. It may be present if the '`--recurse`' option is specified, and it's actually possible to obtain the threads.

`cores` This field is a list of integers, each identifying a core that one thread of the group is running on. This field may be absent if such information is not available.

`executable`
The name of the executable file that corresponds to this thread group. The field is only present for thread groups of type '`process`', and only if there is a corresponding executable file.

Example

```
gdb
-list-thread-groups
^done,groups=[{id="17",type="process",pid="yyy",num_children="2"}]
-list-thread-groups 17
^done,threads=[{id="2",target-id="Thread 0xb7e14b90 (LWP 21257)",
   frame={level="0",addr="0xffffe410",func="__kernel_vsyscall",args=[]},state="running"},
```

```
{id="1",target-id="Thread 0xb7e156b0 (LWP 21254)",
   frame={level="0",addr="0x0804891f",func="foo",args=[{name="i",value="10"}],
          file="/tmp/a.c",fullname="/tmp/a.c",line="158"},state="running"}]]
-list-thread-groups --available
^done,groups=[{id="17",type="process",pid="yyy",num_children="2",cores=[1,2]}]
-list-thread-groups --available --recurse 1
 ^done,groups=[{id="17", types="process",pid="yyy",num_children="2",cores=[1,2],
                threads=[{id="1",target-id="Thread 0xb7e14b90",cores=[1]},
                         {id="2",target-id="Thread 0xb7e14b90",cores=[2]}]},..]
-list-thread-groups --available --recurse 1 17 18
^done,groups=[{id="17", types="process",pid="yyy",num_children="2",cores=[1,2],
               threads=[{id="1",target-id="Thread 0xb7e14b90",cores=[1]},
                        {id="2",target-id="Thread 0xb7e14b90",cores=[2]}]},...]
```

The `-add-inferior` Command

Synopsis

```
-add-inferior
```

Creates a new inferior (see ⟨undefined⟩ [Inferiors and Programs], page ⟨undefined⟩). The created inferior is not associated with any executable. Such association may be established with the '`-file-exec-and-symbols`' command (see ⟨undefined⟩ [GDB/MI File Commands], page ⟨undefined⟩). The command response has a single field, '`thread-group`', whose value is the identifier of the thread group corresponding to the new inferior.

Example

```
gdb
-add-inferior
^done,thread-group="i3"
```

The `-interpreter-exec` Command

Synopsis

```
-interpreter-exec interpreter command
```

Execute the specified *command* in the given *interpreter*.

GDB Command

The corresponding GDB command is '`interpreter-exec`'.

Example

```
(gdb)
-interpreter-exec console "break main"
&"During symbol reading, couldn't parse type; debugger out of date?.\n"
&"During symbol reading, bad structure-type format.\n"
```

```
~"Breakpoint 1 at 0x8074fc6: file ../../src/gdb/main.c, line 743.\n"
^done
(gdb)
```

The `-inferior-tty-set` Command

Synopsis

```
-inferior-tty-set /dev/pts/1
```

Set terminal for future runs of the program being debugged.

GDB Command

The corresponding GDB command is '`set inferior-tty`' /dev/pts/1.

Example

```
(gdb)
-inferior-tty-set /dev/pts/1
^done
(gdb)
```

The `-inferior-tty-show` Command

Synopsis

```
-inferior-tty-show
```

Show terminal for future runs of program being debugged.

GDB Command

The corresponding GDB command is '`show inferior-tty`'.

Example

```
(gdb)
-inferior-tty-set /dev/pts/1
^done
(gdb)
-inferior-tty-show
^done,inferior_tty_terminal="/dev/pts/1"
(gdb)
```

The `-enable-timings` Command

Synopsis

```
-enable-timings [yes | no]
```

Toggle the printing of the wallclock, user and system times for an MI command as a field in its output. This command is to help frontend developers optimize the performance of their code. No argument is equivalent to '`yes`'.

GDB Command

No equivalent.

Example

```
(gdb)
-enable-timings
^done
(gdb)
-break-insert main
^done,bkpt={number="1",type="breakpoint",disp="keep",enabled="y",
addr="0x080484ed",func="main",file="myprog.c",
fullname="/home/nickrob/myprog.c",line="73",times="0"},
time={wallclock="0.05185",user="0.00800",system="0.00000"}
(gdb)
-enable-timings no
^done
(gdb)
-exec-run
^running
(gdb)
*stopped,reason="breakpoint-hit",disp="keep",bkptno="1",thread-id="0",
frame={addr="0x080484ed",func="main",args=[{name="argc",value="1"},
{name="argv",value="0xbfb60364"}],file="myprog.c",
fullname="/home/nickrob/myprog.c",line="73"}
(gdb)
```