

## Essential Commands

<code>gdb program [core]</code>	debug <i>program</i> [using coredump <i>core</i> ]
<code>b [file:]function</code>	set breakpoint at <i>function</i> [in <i>file</i> ]
<code>run [arglist]</code>	start your program [with <i>arglist</i> ]
<code>bt</code>	backtrace: display program stack
<code>p expr</code>	display the value of an expression
<code>c</code>	continue running your program
<code>n</code>	next line, stepping over function calls
<code>s</code>	next line, stepping into function calls

## Starting GDB

<code>gdb</code>	start GDB, with no debugging files
<code>gdb program</code>	begin debugging <i>program</i>
<code>gdb program core</code>	debug coredump <i>core</i> produced by <i>program</i>
<code>gdb --help</code>	describe command line options

## Stopping GDB

<code>quit</code>	exit GDB; also <code>q</code> or EOF (eg <code>C-d</code> )
<code>INTERRUPT</code>	(eg <code>C-c</code> ) terminate current command, or send to running process

## Getting Help

<code>help</code>	list classes of commands
<code>help class</code>	one-line descriptions for commands in <i>class</i>
<code>help command</code>	describe <i>command</i>

## Executing your Program

<code>run arglist</code>	start your program with <i>arglist</i>
<code>run</code>	start your program with current argument list
<code>run ... &lt;inf &gt;outf</code>	start your program with input, output redirected
<code>kill</code>	kill running program

<code>tty dev</code>	use <i>dev</i> as stdin and stdout for next <code>run</code>
<code>set args arglist</code>	specify <i>arglist</i> for next <code>run</code>
<code>set args</code>	specify empty argument list
<code>show args</code>	display argument list

<code>show env</code>	show all environment variables
<code>show env var</code>	show value of environment variable <i>var</i>
<code>set env var string</code>	set environment variable <i>var</i>
<code>unset env var</code>	remove <i>var</i> from environment

## Shell Commands

<code>cd dir</code>	change working directory to <i>dir</i>
<code>pwd</code>	Print working directory
<code>make ...</code>	call "make"
<code>shell cmd</code>	execute arbitrary shell command string

## Breakpoints and Watchpoints

<code>break [file:]line</code>	set breakpoint at <i>line</i> number [in <i>file</i> ]
<code>b [file:]line</code>	eg: <code>break main.c:37</code>
<code>break [file:]func</code>	set breakpoint at <i>func</i> [in <i>file</i> ]
<code>break +offset</code>	set break at <i>offset</i> lines from current stop
<code>break -offset</code>	
<code>break *addr</code>	set breakpoint at address <i>addr</i>
<code>break</code>	set breakpoint at next instruction
<code>break ... if expr</code>	break conditionally on nonzero <i>expr</i>
<code>cond n [expr]</code>	new conditional expression on breakpoint <i>n</i> ; make unconditional if no <i>expr</i>
<code>tbreak ...</code>	temporary break; disable when reached
<code>rbreak regex</code>	break on all functions matching <i>regex</i>
<code>watch expr</code>	set a watchpoint for expression <i>expr</i>
<code>catch event</code>	break at <i>event</i> , which may be <code>catch</code> , <code>throw</code> , <code>exec</code> , <code>fork</code> , <code>vfork</code> , <code>load</code> , or <code>unload</code> .
<code>info break</code>	show defined breakpoints
<code>info watch</code>	show defined watchpoints

<code>clear</code>	delete breakpoints at next instruction
<code>clear [file:]fun</code>	delete breakpoints at entry to <i>fun</i> ()
<code>clear [file:]line</code>	delete breakpoints on source line
<code>delete [n]</code>	delete breakpoints [or breakpoint <i>n</i> ]

<code>disable [n]</code>	disable breakpoints [or breakpoint <i>n</i> ]
<code>enable [n]</code>	enable breakpoints [or breakpoint <i>n</i> ]
<code>enable once [n]</code>	enable breakpoints [or breakpoint <i>n</i> ]; disable again when reached
<code>enable del [n]</code>	enable breakpoints [or breakpoint <i>n</i> ]; delete when reached

`ignore n count` ignore breakpoint *n*, *count* times

<code>commands n</code>	execute GDB <i>command-list</i> every time breakpoint <i>n</i> is reached. [silent suppresses default display]
<code>end</code>	end of <i>command-list</i>

## Program Stack

<code>backtrace [n]</code>	print trace of all frames in stack; or of <i>n</i> frames—innermost if <i>n</i> >0, outermost if <i>n</i> <0
<code>bt [n]</code>	
<code>frame [n]</code>	select frame number <i>n</i> or frame at address <i>n</i> ; if no <i>n</i> , display current frame
<code>up n</code>	select frame <i>n</i> frames up
<code>down n</code>	select frame <i>n</i> frames down
<code>info frame [addr]</code>	describe selected frame, or frame at <i>addr</i>
<code>info args</code>	arguments of selected frame
<code>info locals</code>	local variables of selected frame
<code>info reg [rn]...</code>	register values [for regs <i>rn</i> ] in selected
<code>info all-reg [rn]</code>	frame; <code>all-reg</code> includes floating point

## Execution Control

<code>continue [count]</code>	continue running; if <i>count</i> specified, ignore this breakpoint next <i>count</i> times
<code>c [count]</code>	
<code>step [count]</code>	execute until another line reached; repeat <i>count</i> times if specified
<code>s [count]</code>	
<code>stepi [count]</code>	step by machine instructions rather than source lines
<code>si [count]</code>	
<code>next [count]</code>	execute next line, including any function calls
<code>n [count]</code>	
<code>nexti [count]</code>	next machine instruction rather than source line
<code>ni [count]</code>	
<code>until [location]</code>	run until next instruction (or <i>location</i> )
<code>finish</code>	run until selected stack frame returns
<code>return [expr]</code>	pop selected stack frame without executing [setting return value]
<code>signal num</code>	resume execution with signal <i>s</i> (none if 0)
<code>jump line</code>	resume execution at specified <i>line</i> number
<code>jump *address</code>	or <i>address</i>
<code>set var=expr</code>	evaluate <i>expr</i> without displaying it; use for altering program variables

## Display

<code>print [f] [expr]</code>	show value of <i>expr</i> [or last value \$] according to format <i>f</i> :
<code>p [f] [expr]</code>	
<code>x</code>	hexadecimal
<code>d</code>	signed decimal
<code>u</code>	unsigned decimal
<code>o</code>	octal
<code>t</code>	binary
<code>a</code>	address, absolute and relative
<code>c</code>	character
<code>f</code>	floating point
<code>call [f] expr</code>	like <code>print</code> but does not display <code>void</code>
<code>x [Nuf] expr</code>	examine memory at address <i>expr</i> ; optional format spec follows slash
<code>N</code>	count of how many units to display
<code>u</code>	unit size; one of
<code>b</code>	individual bytes
<code>h</code>	halfwords (two bytes)
<code>w</code>	words (four bytes)
<code>g</code>	giant words (eight bytes)
<code>f</code>	printing format. Any <code>print</code> format, or
<code>s</code>	null-terminated string
<code>i</code>	machine instructions
<code>disassem [addr]</code>	display memory as machine instructions

## Automatic Display

<code>display [f] expr</code>	show value of <i>expr</i> each time program stops [according to format <i>f</i> ]
<code>display</code>	display all enabled expressions on list
<code>undisplay n</code>	remove number(s) <i>n</i> from list of automatically displayed expressions
<code>disable disp n</code>	disable display for expression(s) number <i>n</i>
<code>enable disp n</code>	enable display for expression(s) number <i>n</i>
<code>info display</code>	numbered list of display expressions

[ ] surround optional arguments ... show one or more arguments

## Expressions

*expr* an expression in C, C++, or Modula-2 (including function calls), or:

*addr@len* an array of *len* elements beginning at *addr*

*file::nm* a variable or function *nm* defined in *file*

{*type*}*addr* read memory at *addr* as specified *type*

\$ most recent displayed value

\$*n* *n*th displayed value

\$\$ displayed value previous to \$

\$\$*n* *n*th displayed value back from \$

\$\_ last address examined with **x**

\$\_ value at address \$\_

\$*var* convenience variable; assign any value

**show values** [*n*] show last 10 values [or surrounding \$*n*]

**show conv** display all convenience variables

## Symbol Table

**info address** *s* show where symbol *s* is stored

**info func** [*regex*] show names, types of defined functions (all, or matching *regex*)

**info var** [*regex*] show names, types of global variables (all, or matching *regex*)

**whatis** [*expr*] show data type of *expr* [or \$] without evaluating; **p***type* gives more detail

**p***type* [*expr*] describe type, struct, union, or enum

## GDB Scripts

**source** *script* read, execute GDB commands from file *script*

**define** *cmd* create new GDB command *cmd*; execute *script* defined by *command-list*

**end** end of *command-list*

**document** *cmd* create online documentation for new GDB command *cmd*

**end** end of *help-text*

## Signals

**handle** *signal act* specify GDB actions for *signal*:

**print** announce signal

**noprint** be silent for signal

**stop** halt execution on signal

**nostop** do not halt execution

**pass** allow your program to handle signal

**nopass** do not allow your program to see signal

**info signals** show table of signals, GDB action for each

## Debugging Targets

**target** *type param* connect to target machine, process, or file

**help target** display available targets

**attach** *param* connect to another process

**detach** release target from GDB control

## Controlling GDB

**set** *param value* set one of GDB's internal parameters

**show** *param* display current setting of parameter

Parameters understood by **set** and **show**:

**complaint** *limit* number of messages on unusual symbols

**confirm** *on/off* enable or disable cautionary queries

**editing** *on/off* control **readline** command-line editing

**height** *lpp* number of lines before pause in display

**language** *lang* Language for GDB expressions (**auto**, **c** or **modula-2**)

**listsize** *n* number of lines shown by **list**

**prompt** *str* use *str* as GDB prompt

**radix** *base* octal, decimal, or hex number representation

**verbose** *on/off* control messages when loading symbols

**width** *cpl* number of characters before line folded

**write** *on/off* Allow or forbid patching binary, core files (when reopened with **exec** or **core**)

**history** ... groups with the following options:

**h** ...

**h exp** *off/on* disable/enable **readline** history expansion

**h file** *filename* file for recording GDB command history

**h size** *size* number of commands kept in history list

**h save** *off/on* control use of external file for command history

**print** ... groups with the following options:

**p** ...

**p address** *on/off* print memory addresses in stacks, values

**p array** *off/on* compact or attractive format for arrays

**p demangl** *on/off* source (demangled) or internal form for C++ symbols

**p asm-dem** *on/off* demangle C++ symbols in machine-instruction output

**p elements** *limit* number of array elements to display

**p object** *on/off* print C++ derived types for objects

**p pretty** *off/on* struct display: compact or indented

**p union** *on/off* display of union members

**p vtbl** *off/on* display of C++ virtual function tables

**show commands** show last 10 commands

**show commands** *n* show 10 commands around number *n*

**show commands** + show next 10 commands

## Working Files

**file** [*file*] use *file* for both symbols and executable; with no arg, discard both

**core** [*file*] read *file* as coredump; or discard

**exec** [*file*] use *file* as executable only; or discard

**symbol** [*file*] use symbol table from *file*; or discard

**load** *file* dynamically link *file* and add its symbols

**add-sym** *file addr* read additional symbols from *file*, dynamically loaded at *addr*

**info files** display working files and targets in use

**path** *dirs* add *dirs* to front of path searched for executable and symbol files

**show path** display executable and symbol file path

**info share** list names of shared libraries currently loaded

## Source Files

**dir** *names* add directory *names* to front of source path

**dir** clear source path

**show dir** show current source path

**list** show next ten lines of source

**list -** show previous ten lines

**list** *lines* display source surrounding *lines*, specified as:

[*file:*]*num* line number [in named file]

[*file:*]*function* beginning of function [in named file]

+*off* *off* lines after last printed

-*off* *off* lines previous to last printed

\**address* line containing *address*

**list** *f,l* from line *f* to line *l*

**info line** *num* show starting, ending addresses of compiled code for source line *num*

**info source** show name of current source file

**info sources** list all source files in use

**forw** *regex* search following source lines for *regex*

**rev** *regex* search preceding source lines for *regex*

## GDB under GNU Emacs

**M-x gdb** run GDB under Emacs

**C-h m** describe GDB mode

**M-s** step one line (**step**)

**M-n** next line (**next**)

**M-i** step one instruction (**stepi**)

**C-c C-f** finish current stack frame (**finish**)

**M-c** continue (**cont**)

**M-u** up *arg* frames (**up**)

**M-d** down *arg* frames (**down**)

**C-x &** copy number from point, insert at end

**C-x SPC** (in source file) set break at point

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