

## Essential Commands

<code>gdb program [core]</code>	debug <i>program</i> [using <code>coredump core</code> ]
<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 <code>coredump core</code> 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 <code>EOF</code> (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

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

## 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 x</code>	break at C++ handler for exception <i>x</i>

<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
<code>ignore n count</code>	ignore breakpoint <i>n</i> , <i>count</i> times

<code>commands n</code>	execute GDB <i>command-list</i> every time breakpoint <i>n</i> is reached. [silent
<code>[silent] command-list</code>	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 frame; <b>all-reg</b> includes floating point
<code>info all-reg [rn]</code>	
<code>info catch</code>	exception handlers active in selected frame

## 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 <b>print</b> but does not display <b>void</b>
<code>x [f/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 <b>print</b> 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

## Expressions

<i>expr</i>	an expression in C, C++, or Modula-2 (including function calls), or:
<i>addr@len</i>	an array of <i>len</i> elements beginning at <i>addr</i>
<i>file::nm</i>	a variable or function <i>nm</i> defined in <i>file</i>
{ <i>type</i> } <i>addr</i>	read memory at <i>addr</i> as specified <i>type</i>
\$	most recent displayed value
\$ <i>n</i>	<i>n</i> th displayed value
\$\$	displayed value previous to \$
\$\$ <i>n</i>	<i>n</i> th displayed value back from \$
\$_	last address examined with x
\$_-	value at address \$_
\$ <i>var</i>	convenience variable; assign any value

**show values** [*n*] show last 10 values [or surrounding \$*n*]  
**show conv** display all convenience variables

## Symbol Table

<b>info address</b> <i>s</i>	show where symbol <i>s</i> is stored
<b>info func</b> [ <i>regex</i> ]	show names, types of defined functions (all, or matching <i>regex</i> )
<b>info var</b> [ <i>regex</i> ]	show names, types of global variables (all, or matching <i>regex</i> )
<b>whatis</b> [ <i>expr</i> ]	show data type of <i>expr</i> [or \$] without evaluating; <b>ptype</b> gives more detail
<b>ptype</b> [ <i>expr</i> ]	describe type, struct, union, or enum

## GDB Scripts

<b>source</b> <i>script</i>	read, execute GDB commands from file <i>script</i>
<b>define</b> <i>cmd</i> <i>command-list</i>	create new GDB command <i>cmd</i> ; execute <i>script</i> defined by <i>command-list</i>
<b>end</b>	end of <i>command-list</i>
<b>document</b> <i>cmd</i> <i>help-text</i>	create online documentation for new GDB command <i>cmd</i>
<b>end</b>	end of <i>help-text</i>

## Signals

<b>handle</b> <i>signal act</i>	specify GDB actions for <i>signal</i> :
<b>print</b>	announce signal
<b>noprint</b>	be silent for signal
<b>stop</b>	halt execution on signal
<b>nostop</b>	do not halt execution
<b>pass</b>	allow your program to handle signal
<b>nopass</b>	do not allow your program to see signal
<b>info signals</b>	show table of signals, GDB action for each

## Debugging Targets

<b>target</b> <i>type param</i>	connect to target machine, process, or file
<b>help target</b>	display available targets
<b>attach</b> <i>param</i>	connect to another process
<b>detach</b>	release target from GDB control

## Controlling GDB

<b>set</b> <i>param value</i>	set one of GDB's internal parameters
<b>show</b> <i>param</i>	display current setting of parameter

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

<b>complaint</b> <i>limit</i>	number of messages on unusual symbols
<b>confirm</b> <i>on/off</i>	enable or disable cautionary queries
<b>editing</b> <i>on/off</i>	control <b>readline</b> command-line editing
<b>height</b> <i>lpp</i>	number of lines before pause in display
<b>language</b> <i>lang</i>	Language for GDB expressions ( <b>auto</b> , <b>c</b> or <b>modula-2</b> )
<b>listsize</b> <i>n</i>	number of lines shown by <b>list</b>
<b>prompt</b> <i>str</i>	use <i>str</i> as GDB prompt
<b>radix</b> <i>base</i>	octal, decimal, or hex number representation
<b>verbose</b> <i>on/off</i>	control messages when loading symbols
<b>width</b> <i>cpl</i>	number of characters before line folded
<b>write</b> <i>on/off</i>	Allow or forbid patching binary, core files (when reopened with <b>exec</b> or <b>core</b> )
<b>history</b> ...	groups with the following options:
<b>h</b> ...	
<b>h exp</b> <i>off/on</i>	disable/enable <b>readline</b> history expansion
<b>h file</b> <i>filename</i>	file for recording GDB command history
<b>h size</b> <i>size</i>	number of commands kept in history list
<b>h save</b> <i>off/on</i>	control use of external file for command history
<b>print</b> ...	groups with the following options:
<b>p</b> ...	
<b>p address</b> <i>on/off</i>	print memory addresses in stacks, values
<b>p array</b> <i>off/on</i>	compact or attractive format for arrays
<b>p demangl</b> <i>on/off</i>	source (demangled) or internal form for C++ symbols
<b>p asm-dem</b> <i>on/off</i>	demangle C++ symbols in machine-instruction output
<b>p elements</b> <i>limit</i>	number of array elements to display
<b>p object</b> <i>on/off</i>	print C++ derived types for objects
<b>p pretty</b> <i>off/on</i>	struct display: compact or indented
<b>p union</b> <i>on/off</i>	display of union members
<b>p vtbl</b> <i>off/on</i>	display of C++ virtual function tables
<b>show commands</b>	show last 10 commands
<b>show commands</b> <i>n</i>	show 10 commands around number <i>n</i>
<b>show commands</b> +	show next 10 commands

## Working Files

<b>file</b> [ <i>file</i> ]	use <i>file</i> for both symbols and executable; with no arg, discard both
<b>core</b> [ <i>file</i> ]	read <i>file</i> as coredump; or discard
<b>exec</b> [ <i>file</i> ]	use <i>file</i> as executable only; or discard
<b>symbol</b> [ <i>file</i> ]	use symbol table from <i>file</i> ; or discard
<b>load</b> <i>file</i>	dynamically link <i>file</i> and add its symbols
<b>add-sym</b> <i>file addr</i>	read additional symbols from <i>file</i> , dynamically loaded at <i>addr</i>
<b>info files</b>	display working files and targets in use
<b>path</b> <i>dirs</i>	add <i>dirs</i> to front of path searched for executable and symbol files
<b>show path</b>	display executable and symbol file path
<b>info share</b>	list names of shared libraries currently loaded

## Source Files

<b>dir</b> <i>names</i>	add directory <i>names</i> to front of source path
<b>dir</b>	clear source path
<b>show dir</b>	show current source path
<b>list</b>	show next ten lines of source
<b>list -</b>	show previous ten lines
<b>list lines</b>	display source surrounding <i>lines</i> , specified as: [ <i>file</i> :] <i>num</i> line number [in named file] [ <i>file</i> :] <i>function</i> beginning of function [in named file] + <i>off</i> <i>off</i> lines after last printed - <i>off</i> <i>off</i> lines previous to last printed * <i>address</i> line containing <i>address</i>
<b>list</b> <i>f,l</i>	from line <i>f</i> to line <i>l</i>
<b>info line</b> <i>num</i>	show starting, ending addresses of compiled code for source line <i>num</i>
<b>info source</b>	show name of current source file
<b>info sources</b>	list all source files in use
<b>forw</b> <i>regex</i>	search following source lines for <i>regex</i>
<b>rev</b> <i>regex</i>	search preceding source lines for <i>regex</i>

## GDB under GNU Emacs

<b>M-x gdb</b>	run GDB under Emacs
<b>C-h m</b>	describe GDB mode
<b>M-s</b>	step one line ( <b>step</b> )
<b>M-n</b>	next line ( <b>next</b> )
<b>M-i</b>	step one instruction ( <b>stepi</b> )
<b>C-c C-f</b>	finish current stack frame ( <b>finish</b> )
<b>M-c</b>	continue ( <b>cont</b> )
<b>M-u</b>	up <i>arg</i> frames ( <b>up</b> )
<b>M-d</b>	down <i>arg</i> frames ( <b>down</b> )
<b>C-x &amp;</b>	copy number from point, insert at end
<b>C-x SPC</b>	(in source file) set break at point

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