

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 q or EOF (eg C-d)
<code>INTERRUPT</code>	(eg C-c) 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 ... <inf >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 run
<code>set args arglist</code>	specify <i>arglist</i> for next run
<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: break main.c:37
<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 catch , throw , exec , fork , vfork , load , or unload .
<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
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<code>commands n [silent]</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; all-reg 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 print but does not display void
<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 b individual bytes h halfwords (two bytes) w words (four bytes) g giant words (eight bytes)
<code>f</code>	printing format. Any print format, or s null-terminated string i 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>
{ type } addr	read memory at <i>addr</i> as specified <i>type</i>
\$	most recent displayed value
\$n	<i>nth</i> displayed value
\$\$	displayed value previous to \$
\$\$n	<i>nth</i> 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 <i>s</i> is stored
info func [regex]	show names, types of defined functions (all, or matching <i>regex</i>)
info var [regex]	show names, types of global variables (all, or matching <i>regex</i>)
whatis [expr]	show data type of <i>expr</i> [or \$] without evaluating; ptype gives more detail
ptype [expr]	
ptype type	describe type, struct, union, or enum

GDB Scripts

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

Signals

handle signal act	specify GDB actions for <i>signal</i> :
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 <i>str</i> 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 <i>n</i>
show commands +	show next 10 commands

Working Files

file [file]	use <i>file</i> for both symbols and executable; with no arg, discard both
core [file]	read <i>file</i> as coredump; or discard
exec [file]	use <i>file</i> as executable only; or discard
symbol [file]	use symbol table from <i>file</i> ; or discard
load file	dynamically link <i>file</i> and add its symbols
add-sym file addr	read additional symbols from <i>file</i> , dynamically loaded at <i>addr</i>
info files	display working files and targets in use
path dirs	add <i>dirs</i> 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 <i>names</i> 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 <i>lines</i> , specified as:
[file:]num	line number [in named file]
[file:]function	beginning of function [in named file]
+off	<i>off</i> lines after last printed
-off	<i>off</i> lines previous to last printed
*address	line containing <i>address</i>
list f,l	from line <i>f</i> to line <i>l</i>
info line num	show starting, ending addresses of compiled code for source line <i>num</i>
info source	show name of current source file
info sources	list all source files in use
forw regex	search following source lines for <i>regex</i>
rev regex	search preceding source lines for <i>regex</i>

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 <i>arg</i> frames (up)
M-d	down <i>arg</i> 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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