

Essential Commands

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

Starting GDB

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

Stopping GDB

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

Getting Help

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

Executing your Program

run <i>arglist</i>	start your program with <i>arglist</i>
run	start your program with current argument list
run ... < <i>inf</i> > <i>outf</i>	start your program with input, output redirected
kill	kill running program
tty <i>dev</i>	use <i>dev</i> as stdin and stdout for next run
set <i>args</i> <i>arglist</i>	specify <i>arglist</i> for next run
set <i>args</i>	specify empty argument list
show <i>args</i>	display argument list

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

Shell Commands

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

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

Breakpoints and Watchpoints

break [<i>file:</i>] <i>line</i>	set breakpoint at <i>line</i> number [in <i>file</i>]
b [<i>file:</i>] <i>line</i>	eg: break main.c:37
break [<i>file:</i>] <i>func</i>	set breakpoint at <i>func</i> [in <i>file</i>]
break + <i>offset</i>	set break at <i>offset</i> lines from current stop
break - <i>offset</i>	
break * <i>addr</i>	set breakpoint at address <i>addr</i>
break	set breakpoint at next instruction
break ... if <i>expr</i>	break conditionally on nonzero <i>expr</i>
cond <i>n</i> [<i>expr</i>]	new conditional expression on breakpoint <i>n</i> ; make unconditional if no <i>expr</i>
tbreak ...	temporary break; disable when reached
rbreak <i>regex</i>	break on all functions matching <i>regex</i>
watch <i>expr</i>	set a watchpoint for expression <i>expr</i>
catch <i>x</i>	break at C++ handler for exception <i>x</i>
info break	show defined breakpoints
info watch	show defined watchpoints
clear	delete breakpoints at next instruction
clear [<i>file:</i>] <i>fun</i>	delete breakpoints at entry to <i>fun</i> ()
clear [<i>file:</i>] <i>line</i>	delete breakpoints on source line
delete [<i>n</i>]	delete breakpoints [or breakpoint <i>n</i>]
disable [<i>n</i>]	disable breakpoints [or breakpoint <i>n</i>]
enable [<i>n</i>]	enable breakpoints [or breakpoint <i>n</i>]
enable once [<i>n</i>]	enable breakpoints [or breakpoint <i>n</i>]; disable again when reached
enable del [<i>n</i>]	enable breakpoints [or breakpoint <i>n</i>]; delete when reached
ignore <i>n</i> <i>count</i>	ignore breakpoint <i>n</i> , <i>count</i> times
commands <i>n</i>	execute GDB <i>command-list</i> every time breakpoint <i>n</i> is reached. [silent suppresses default display]
end	end of <i>command-list</i>

Program Stack

backtrace [<i>n</i>]	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
bt [<i>n</i>]	
frame [<i>n</i>]	select frame number <i>n</i> or frame at address <i>n</i> ; if no <i>n</i> , display current frame
up <i>n</i>	select frame <i>n</i> frames up
down <i>n</i>	select frame <i>n</i> frames down
info frame [<i>addr</i>]	describe selected frame, or frame at <i>addr</i>
info args	arguments of selected frame
info locals	local variables of selected frame
info reg [<i>rn</i>]...	register values [for regs <i>rn</i>] in selected frame; all-reg includes floating point
info all-reg [<i>rn</i>]	
info catch	exception handlers active in selected frame

Execution Control

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

Display

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

Automatic Display

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

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*)

what is [*expr*] show data type of *expr* [or \$] without evaluating; **ptype** gives more detail

ptype [*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**)

listsizes *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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