

Essential Commands

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|---------------------------------|-----------------------------------------------------|
| <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

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|-------------------------------|-------------------------------------------------------|
| <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

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|------------------------|------------------------------------------------------------------------------|
| <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

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|---------------------------|----------------------------------------------------|
| <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

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|---------------------------------------|--------------------------------------------------------------|
| <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 <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

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|------------------------|----------------------------------------|
| <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

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|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <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 [file:]regex</code> | break on all functions matching <i>regex</i> [in <i>file</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 |
| <code>ignore n count</code> | ignore breakpoint <i>n</i> , <i>count</i> times |
| <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

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|--------------------------------|--------------------------------------------------------------------------------------------------------------|
| <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; all-reg includes floating point |
| <code>info all-reg [rn]</code> | |

Execution Control

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|-------------------------------|---------------------------------------------------------------------------------------------|
| <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 \$] |
| <code>p [/f] [expr]</code> | according to format <i>f</i> : |
| <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 print 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

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|-------------------------------|----------------------------------------------------------------------|
| <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 } addr</i> | read memory at <i>addr</i> as specified <i>type</i> |
| <i>\$</i> | most recent displayed value |
| <i>\$n</i> | <i>nth</i> displayed value |
| <i>\$\$</i> | displayed value previous to <i>\$</i> |
| <i>\$\$\$n</i> | <i>nth</i> displayed value back from <i>\$</i> |
| <i>\$_</i> | last address examined with x |
| <i>\$--</i> | value at address <i>\$_</i> |
| <i>\$var</i> | convenience variable; assign any value |
| | |
| show values <i>[n]</i> | show last 10 values [or surrounding <i>\$n</i>] |
| show conv | display all convenience variables |

Symbol Table

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

GDB Scripts

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

Signals

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

Controlling GDB

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

Working Files

| | |
|---------------------------------|------------------------------------------------------------------------------|
| file <i>[file]</i> | use <i>file</i> for both symbols and executable; with no arg, discard both |
| | |
| core <i>[file]</i> | read <i>file</i> as coredump; or discard |
| exec <i>[file]</i> | use <i>file</i> as executable only; or discard |
| | |
| symbol <i>[file]</i> | use symbol table from <i>file</i> ; or discard |
| load <i>file</i> | dynamically link <i>file</i> and add its symbols |
| add-sym <i>file addr</i> | read additional symbols from <i>file</i> , dynamically loaded at <i>addr</i> |
| | |
| info files | display working files and targets in use |
| path <i>dirs</i> | 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 <i>names</i> | 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 <i>lines</i> | display source surrounding <i>lines</i> , specified as: |
| <i>[file:]num</i> | line number [in named file] |
| <i>[file:]function</i> | 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 <i>f,l</i> | from line <i>f</i> to line <i>l</i> |
| info line <i>num</i> | 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 <i>regex</i> | search following source lines for <i>regex</i> |
| rev <i>regex</i> | 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 |

GDB License

| | |
|----------------------|-------------------------------------------------------------------|
| show copying | Display GNU General Public License |
| show warranty | There is NO WARRANTY for GDB. Display full no-warranty statement. |

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