

Here is a summary of the directives GNU make recognizes:

```
define variable
endif
    Define a multi-line, recursively-expanded variable.
ifndef variable
ifndef variable
ifeq (a,b)
ifeq "a" "b"
ifeq 'a' 'b'
ifneq (a,b)
ifneq "a" "b"
ifneq 'a' 'b'
else
endif

    Conditionally evaluate part of the makefile.
include file
-include file
sinclude file
    Include another makefile.
override variable = value
override variable := value
override variable += value
override variable ?= value
override define variable
endif
    Define a variable, overriding any previous definition, even
    one from the command line.
export
    Tell make to export all variables to child processes by
    default.
export variable
export variable = value
export variable := value
export variable += value
export variable ?= value
unexport variable
    Tell make whether or not to export a particular variable to
    child processes.
vpath pattern path
    Specify a search path for files matching a '%' pattern.
vpath pattern
    Remove all search paths previously specified for pattern.
vpath
    Remove all search paths previously specified in any
    vpath directive.
```

Here is a summary of the built-in functions:

```
$(subst from,to,text)
    Replace from with to in text.
$(patsubst pattern,replacement,text)
    Replace words matching pattern with replacement in text.
$(strip string)
    Remove excess whitespace characters from string.
$(findstring find,text)
    Locate find in text.
$(filter pattern... ,text)
    Select words in text that match one of the pattern words.
$(filter-out pattern... ,text)
    Select words in text that do not match any of the pattern
    words.
$(sort list)
    Sort the words in list lexicographically, removing
    duplicates.
$(word n,text)
    Extract the nth word (one-origin) of text.
$(words text)
    Count the number of words in text.
$(wordlist s,e,text)
    Returns the list of words in text from s to e.
$(firstword names...)
    Extract the first word of names.
$(lastword names...)
    Extract the last word of names.
$(dir names...)
    Extract the directory part of each file name.
$(notdir names...)
    Extract the non-directory part of each file name.
$(suffix names...)
    Extract the suffix (the last '.' and following characters) of
    each file name.
$(basename names...)
    Extract the base name (name without suffix) of each file
    name.
$(addsuffix suffix,names...)
    Append suffix to each word in names.
$(addprefix prefix,names...)
    Prepend prefix to each word in names.
$(join list1,list2)
    Join two parallel lists of words.
$(wildcard pattern...)
    Find file names matching a shell file name pattern (not a
    '%' pattern).
$(realpath names...)
    For each file name in names, expand to an absolute name
    that does not contain any ., .., nor symlinks.
$(abspath names...)
    For each file name in names, expand to an absolute name
    that does not contain any . or .. components, but
    preserves symlinks.
```

```
$(error text...)
    When this function is evaluated, make generates a fatal
    error with the message text.
$(warning text...)
    When this function is evaluated, make generates a
    warning with the message text.
$(shell command)
    Execute a shell command and return its output.
$(origin variable)
    Return a string describing how the make variable variable
    was defined.
$(flavor variable)
    Return a string describing the flavor of the make variable
variable.
$(foreach var,words,text)
    Evaluate text with var bound to each word in words, and
    concatenate the results.
$(call var,param,...)
    Evaluate the variable var replacing any references to
    $(1), $(2) with the first, second, etc. param values.
$(eval text)
    Evaluate text then read the results as makefile commands.
    Expands to the empty string.
$(value var)
    Evaluates to the contents of the variable var, with no
    expansion performed on it.
```

Here is a summary of the automatic variables.

`$$` The file name of the target.

`$$%` The target member name, when the target is an archive member.

`$(<)` The name of the first prerequisite.

`$(?)` The names of all the prerequisites that are newer than the target, with spaces between them. For prerequisites which are archive members, only the member named is used.

`$(^)`
`$(+)` The names of all the prerequisites, with spaces between them. For prerequisites which are archive members, only the member named is used. The value of `$(^)` omits duplicate prerequisites, while `$(+)` retains them and preserves their order.

`$(*)` The stem with which an implicit rule matches.

`$(@D)`
`$(@F)` The directory part and the file-within-directory part of `$(@)`.

`$(*D)`
`$(*F)` The directory part and the file-within-directory part of `$(*)`.

`$(%D)`
`$(%F)` The directory part and the file-within-directory part of `$(%)`.

`$(<D)`
`$(<F)` The directory part and the file-within-directory part of `$(<)`.

`$(^D)`
`$(^F)` The directory part and the file-within-directory part of `$(^)`.

`$(+D)`
`$(+F)` The directory part and the file-within-directory part of `$(+)`.

`$(?D)`
`$(?F)` The directory part and the file-within-directory part of `$(?)`.

These variables are used specially by GNU `make`:

`MAKEFILES`
Makefiles to be read on every invocation of `make`.

`VPATH`
Directory search path for files not found in the current directory.

`SHELL`
The name of the system default command interpreter, usually `/bin/sh`. You can set `SHELL` in the makefile to change the shell used to run commands. The `SHELL` variable is handled specially when importing from and exporting to the environment.

`MAKE_SHELL`
On MS-DOS only, the name of the command interpreter that is to be used by `make`. This value takes precedence over the value of `SHELL`.

`MAKE`
The name with which `make` was invoked. Using this variable in commands has special meaning.

`MAKELEVEL`
The number of levels of recursion (sub-makes).

`MAKEFLAGS`
The flags given to `make`. You can set this in the environment or a makefile to set flags.

It is *never* appropriate to use `MAKEFLAGS` directly on a command line: its contents may not be quoted correctly for use in the shell. Always allow recursive `make`'s to obtain these values through the environment from its parent.

`MAKECMDGOALS`
The targets given to `make` on the command line. Setting this variable has no effect on the operation of `make`.

`CURDIR`
Set to the pathname of the current working directory (after all `-C` options are processed, if any). Setting this variable has no effect on the operation of `make`.

`SUFFIXES`
The default list of suffixes before `make` reads any makefiles.

`.LIBPATTERNS`
Defines the naming of the libraries `make` searches for, and their order.

Appendix A

GNU Make Quick Reference

This is Edition 0.70, last updated 1 April 2006, of *The GNU Make Manual*, for GNU `make` version 3.81.

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