

THE MAKEFILE UTILITY

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make and makefile

The UNIX *make* program is designed to manage large, multi-file projects by keeping track of any changes that are made in the source files. It allows you to modify and recompile one source file without having to recompile the entire program.

Content of makefile

The *make* program looks for its instructions in a file named either *makefile* or *Makefile*. For example, the *Makefile* for the sample program looks like:

```
# makefile for sample
sample: sample.o someclass.o
    CC -o sample sample.o someclass.o
someclass.o: someclass.cpp someclass.h
    CC -c someclass.cpp
sample.o: sample.cpp someclass.h
    CC -c sample.cpp
clean:
    rm -rf *.o SunWS_cache
```

Some of the interesting features of this file:

- # makefile for sample

This is a comment line. *make* ignores anything that follows a pound sign (#).

- sample: sample.o someclass.o

This is called a dependency line. It indicates that the program file *sample* depends on the object files *sample.o* and *someclass.o*. Dependency line must begin in the first column.

- CC -o sample sample.o someclass.o

This is an action line. It follows the dependency line and shows how the file *sample* is created from the files *sample.o* and *someclass.o*. Notice that the “blank space” before *CC* is not blank space but a tab character (The Tab key in the keyboard). Action lines must begin with a tab character.

- someclass.o: someclass.cpp someclass.h

This is another dependency line, showing *someclass.o* depends on the source file *someclass.cpp* and *someclass.h*.

- CC -c someclass.cpp

This is another action line, showing that *someclass.o* is created by compiling *someclass.cpp* using *CC* with *-c* option.

- sample.o: sample.cpp account.h

This is another dependency line, showing *sample.o* depends on the source file *sample.cpp* and *account.h*.

- CC -c sample.cpp

This is another action line, showing that *sample.o* is created by compiling *sample.cpp* using *CC* with *-c* option.

▪ **clean:**

```
rm -rf *.o SunWS_cache
```

`clean` is the name of an action. This action will delete the object files and directory `SunWS_cache`.

make

To use makefile to create an executable file called `sample`, just type:

```
make
```

make then follows the instructions in makefile to compile the program. For the above example, you may see the following messages on the screen:

```
CC -c someclass.cpp
CC -c sample.cpp
CC -o sample sample.o someclass.o
```

Note that the files are not necessarily compiled in exactly the same order as they appear in makefile; instead, *make* figures out which files should be compiled first.

The advantage of using *make* to compile the files becomes apparent when you begin making alterations in any of the source files. When you are finished, all you have to do is type *make*, and *make* will automatically recompile only those files that need it. And if you have not made any changes in the program, *make* will take no action.

Assuming you have not made any changes in the files since last successful compilation, you should see the following message when you type *make*:

```
sample is update to date.
```

To use makefile to delete the object files from the directory, type:

```
make clean
```