CS 241 Using Simple Makefiles

Here is a simple makefile that is used for compiling and linking the queue ADT implementation that is in `/home/cec/class/cs241/lab0`.

```
CCC = CC
CCFLAGS = -g +w

driver: driver.o queue.o
        ${CCC} ${CCFLAGS} -o driver.out driver.o queue.o

driver.o: driver.cc queue.h stdinc.h
        ${CCC} ${CCFLAGS} -c driver.cc

queue.o: queue.cc queue.h stdinc.h
        ${CCC} ${CCFLAGS} -c queue.cc
```

The first line indicates to use `CC` for the compiler. The second line provides the flags for `CC`. To learn about the possibile flags available see the `CC` manpage using "`man CC`". Some useful flags are "`-g`" to add necessary informtion to be used by the debugger, "`+w`" to have the compiler give extra warning messages about questionable constructs, "`-o` *filename*" to provide a filename for the output (versus the default of `a.out`), and "`-c`" to indicate that no linking should be performed (and thus this is used to generate the object files).

The remaining pairs of lines each have the form:

```
 target : prerequisites
        the command that generates the target
```

where the prerequisites are all the files that are used in generating the target. *Note that it is essential that the second line begins with a tab.*

In our example makefile above, the first pair of lines says that to create the executable for driver it will use `driver.o` and `queue.o`. Thus if either of these files have been updated more recently than `driver.out` then the command

```
 CC -g -o driver.out driver.o queue.o
```

should be run. This command links the object files `driver.o` and `queue.o` to create the executable `driver.out`. Then to run the program you can type "`driver.out`" in your unix shell.

The second pair of lines in our example makefile indicate that to create the object file for driver (`driver.o`) it depends on `driver.cc`, `queue.h`, and `stdinc.h`. If any of these files have changed more recently than `driver.o` then the command

```
 CC -g +w -c queue.cc
```

which will recompile `queue.cc` to obtain the new object file `queue.o`.

Finally, to use the makefile simple type "`make driver`". As a default if you just type "`make`" it will make the first target given.

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