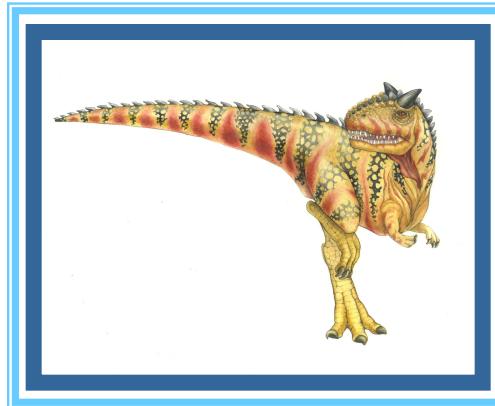


Makefile Brief Introduction





Example files

hellomake.c

```
#include <hellomake.h>
int main() {
// call a function
myPrintHelloMake();

return(0);
}
```

hellofunc.c

```
#include <stdio.h>
#include <hellomake.h>
void
myPrintHelloMake(void) {
printf("Hello makefiles!\n");

return; }
```

hellomake.h

```
/* example include file */
void
myPrintHelloMake(void);
```

- One can compile using:
- gcc -o hellomake hellomake.c hellofunc.c





Makefile

■ Downfalls

- May have to retype the command from scratch
- If you are making changes to one .c file, recompiling all of them every time is also time-consuming, especially for large C files.

■ That's why we use Makefile

- To make it easier for user to compile
- To make it efficient for the compilation process itself





Makefile

```
hellomake: hellomake.c hellofunc.c  
        gcc -o hellomake hellomake.c hellofunc.c
```

- If you put this rule into a file called Makefile and then type make on the command line, it will compile
- By putting the list of files on which the command depends on the first line after the :, make knows that the rule hellomake needs to be executed if any of those files change.
- You can solve problem #1 by not retyping the command; instead just type make.





Makefile

```
CC=gcc
```

```
hellomake: hellomake.o hellofunc.o
    $(CC) -o hellomake hellomake.o hellofunc.o
```

```
hellomake.o: hellomake.c
    $(CC) -c hellomake.c
hellofunc.o: hellofunc.c
    $(CC) -c hellofunc.c
```

- If one object file changes, then we don't need to compile both .c files again. We can just recompile the one that changes.
- **Solve problem #2**





Linux Kernel Makefile

```
obj-m += simple.o
```

```
all:
```

```
    make -C /lib/modules/$(shell uname -r)/build M=$(PWD) modules
```

```
clean:
```

```
    make -C /lib/modules/$(shell uname -r)/build M=$(PWD) clean
```

- generate a kernel module from simple.c
- make clean: removes the object file and needs recompiling





Additional Reading

- Unix Makefile:
 - <https://www.tutorialspoint.com/makefile/>
- Linux kernel Makefile
 - <https://www.kernel.org/doc/Documentation/kbuild/makefiles.txt>

