SFU SIMON FRASER UNIVERSITY
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CMPT 125 - Introduction to Computing Science and Programming II - Fall 2021

Lab 2.
September 22

Outline

- What is the make file how to use it
- HW1
- Practice examples

Make File

Why it is needed?

- **Provide a way for separate compilation**
- **Describe the dependencies among project file**
    - Manage Several source files and compile them quickly with a single Command Line.
- **Make compilation time shorter:**
    - Make checks timestamps to see what has changed and re-builds just what you need, without wasting time re-building other files.

Make File

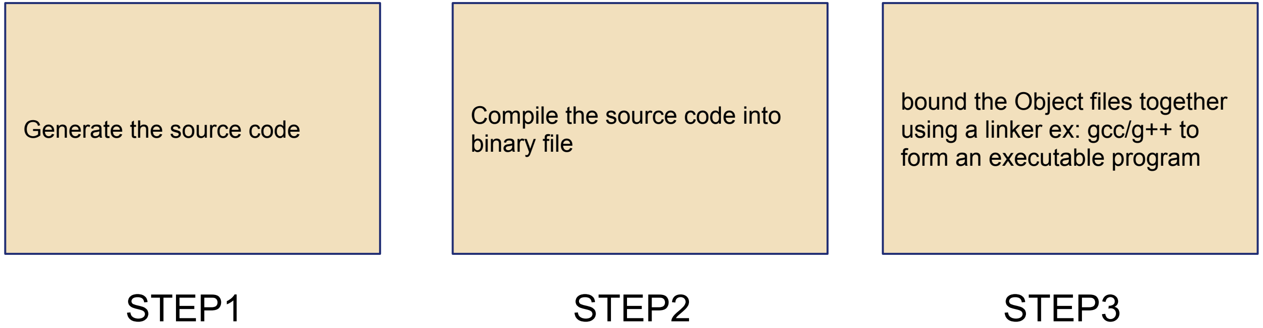
For running “make file”

- **Naming:**
  - **makefile or Makefile are standard**
  - **other name can be also used**
- **Running:**
  - **make : This will find the make file in the directory and build first target it finds there.**
  - **make -f mymakefile : will run make files called “mymakefile”. in the other word if you have several**

    makefiles you can run the one you want with make -f name-of-that-file

Make File

How Does makefile Work



Generate the source code

STEP1

Compile the source code into binary file

STEP2

bound the Object files together using a linker ex: gcc/g++ to form an executable program

STEP3

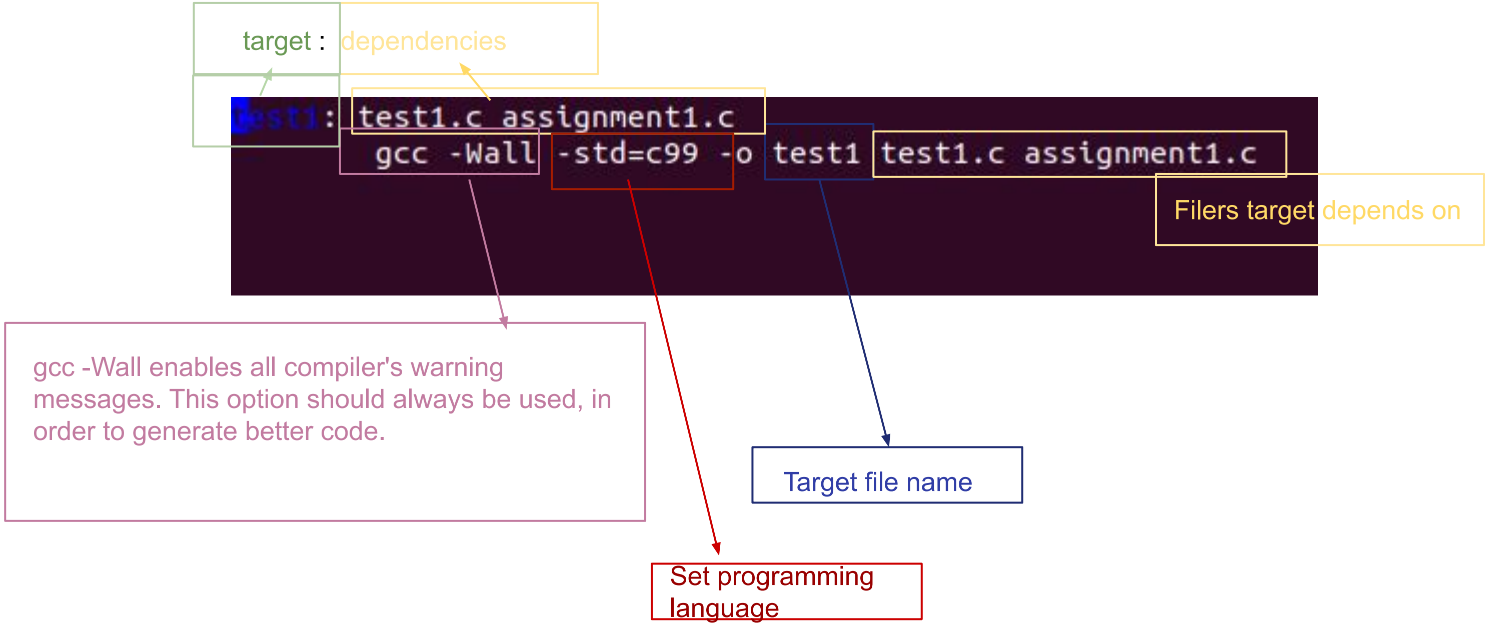
Make File

What is in makefile:

- rules : implicit, explicit
- variables (macros)
- directives (conditionals)
- # sign – comments everything till the end of the line
- \ sign - to separate one command line on two rows

Make File

Simple makefile



target : dependencies

```
test1: test1.c assignment1.c
   gcc -Wall -std=c99 -o test1 test1.c assignment1.c
```

Filers target depends on

gcc -Wall enables all compiler's warning messages. This option should always be used, in order to generate better code.

Target file name

Set programming language

HW1

What is .h file (header files):

- Header file included at the top of any C program. as #include <file> and they end with “.h”

HW1

Some useful system header files:

- **<stdio.h> :** have many standard library functions for file input and output
- **<math.h> :** support are mathematical related functions in c
- **<time.h>:** interact with system time
- **<string.h>:** support string handling function

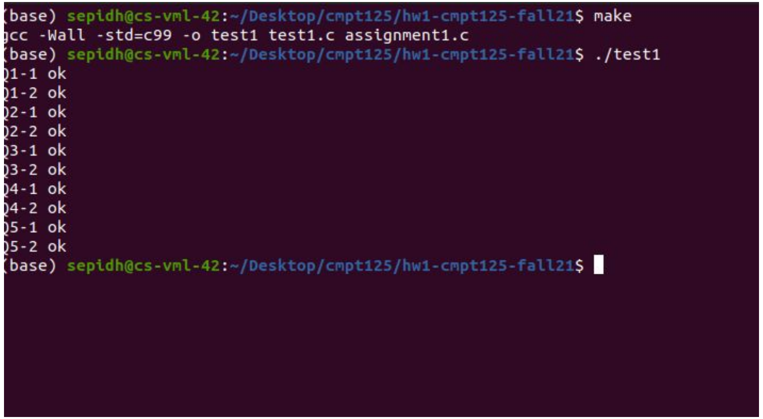
HW1

Why do we use .h file?

- When dealing with larger projects, it’s advisable to divide your code into separate files based on their purpose (function sets)
- You can use these self-made libraries to quickly add desired functionality to your code typically used files

assignment1.h – header file, typically contains function prototypes, macros, [classes,] structures
assignment1.c – Code that implements the functions declared in the header file

To run and check your assignment.
you need to first: change and implement your functions/methods in **assignment1.c.**
then using terminal go to the directory that your assignment has been saved.
use command **make** to make executable **test1**.
Then use command **./test1** to run test1 and check test case.



```
(base) sepidh@cs-vml-42:~/Desktop/cmpt125/hw1-cmpt125-fall21$ make
gcc -Wall -std=c99 -o test1 test1.c assignment1.c
(base) sepidh@cs-vml-42:~/Desktop/cmpt125/hw1-cmpt125-fall21$ ./test1
Q1-1 ok
Q1-2 ok
Q2-1 ok
Q2-2 ok
Q3-1 ok
Q3-2 ok
Q4-1 ok
Q4-2 ok
Q5-1 ok
Q5-2 ok
(base) sepidh@cs-vml-42:~/Desktop/cmpt125/hw1-cmpt125-fall21$
```

HW1

For Assignment 1:

- you need fill assignment1.c, do not touch assignment1.h
- your code must be compilable in csil systems using make ful.
- do not write too much explanation for your code, please have a clean readable code.
- Use comments, not too much but enough
- **If your code does not compile you will automatically receive 0.**

Practice examples:

- Implement a program that get array of integers and print the max:

```c
#include <stdio.h>
int main()
{
int array[10];

// getting array element using scanf

for ( int c = 0; c < 10; c++)
  {printf("enter a number: ");
  scanf("%d", &array[c]); }
int max_temp=0;

//*****************************//
// write down a for loop that find the max value here
//*****************************//

printf("Maximum element is %d.\n", max_temp);
return 0;
}
```

Practice examples:

- **ANSWER:**

```
#include <stdio.h>
int main()
{
int array[10];

// getting array element using scanf

for ( int c = 0; c < 10; c++)
  {printf("enter a number: ");
  scanf("%d", &array[c]); }
int max_temp=0;

//*****************************
for (int c = 0; c < 10 ; c++)
  if (array[c] > max_temp)
    max_temp = array[c];
//*****************************

printf("Maximum element is %d.\n", max_temp);
return 0;
}
```

Practice examples:

- Implement a program that **get an array of ints and increase each value by 1 and print the array:**

```c
#include <stdio.h>
int main()
{
int array[10];
// getting array element using scanf
for ( int c = 0; c < 10; c++)
  {printf("enter a number: ");
  scanf("%d", &array[c]); }

//*****************************
//  implement a for loop that add 1 to each entry in array
 //*****************************

// printing out array
for (int c = 0; c < 10 ; c++)
printf("%d ",array[c]);
return 0;
}
```

Practice examples:

- **Answer:**

```
#include <stdio.h>
int main()
{
int array[10];
// getting array element using scanf
for ( int c = 0; c < 10; c++)
  {printf("enter a number: ");
  scanf("%d", &array[c]); }

//*****************************
for (int c = 0; c < 10 ; c++)
     array[c]++;
   //*****************************

// printing out array
for (int c = 0; c < 10 ; c++)
printf("%d ",array[c]);
return 0;
}
```

Practice examples:

- Implement swap of two numbers (using pointers)

```
#include <stdio.h>
int main()
{

  int x, y, *a, *b, tmp;
  printf("Enter the value for x:\n");
  scanf("%d", &x)  ;
   printf("Enter the value for y:\n");
  scanf("%d",  &y);

  //*******************************
// implement the  part that swap two numbers using pointer
//********************************



  printf("After: \n \”x\” = %d\n \”y\” = %d :\n", x, y);
  return 0;
}
```

Practice examples:

- **Answer**

```c
#include <stdio.h>
int main()
{

  int x, y, *a, *b, tmp;
  printf("Enter the value for x:\n");
  scanf("%d", &x)  ;
   printf("Enter the value for y:\n");
  scanf("%d",   &y);

  //*******************************
  a = &x;
  b = &y;
  tmp = *b;
  *b = *a;
  *a = tmp;

  //********************************
  printf("After: \n \″x\″ = %d\n \″y\″ = %d :\n", x, y);
  return 0;
}
```

Practice examples:

- **Compute length of a string**

```
#include <stdio.h>
int main() {


   char* s = "Programming is FUN!!";
   int i=0;

   //******************
// while loop that change i value as the length of
   //******************

   printf("Length of the string: %d", i);
   return 0;
}
```

Practice examples:

- **Answer**

```
#include <stdio.h>
int main() {


   char* s = "Programming is FUN!!";
   int i=0;

   //******************
   while(s[i] != '\0')
       i++;
   //******************

   printf("Length of the string: %d", i);
   return 0;
}
```

Practice examples:

- playing with header files and finding min and max.
    - Downloads ex5 files.
    - run it using vs code. same as video provided:
        - video link: https://drive.google.com/file/d/183hdDdlqfNe7cqjBmoMUOF-lAleSYgAm/view?usp=sharing (in this video you can learn how to run multiple .c and .h file together using vs code.)
    - now change the program in the way that it receives three numbers and return min and max.
        - you need to change declarations in minmax.h file
        - you need to change modification in minmax.c file
        - you need to change the way functions being called in main.c file
        - you can find the correct answer as ex5_answer.