You just released the advanced tasks of this project. Have fun!

0x1C. C - Makefiles

C

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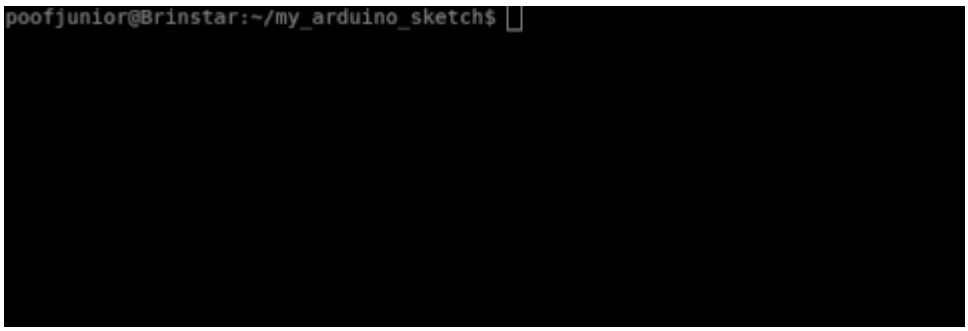
Weight: 1

Project will start Feb 22, 2023 6:00 AM, must end by Feb 25, 2023 6:00 AM

Checker was released at Feb 23, 2023 12:00 AM

An auto review will be launched at the deadline



Resources

Read or watch:

- Makefile (/rltoken/moIpBFMN3sJcVMNn5VIFlA)
- Installing the make utility (/rltoken/1AUviCUw3TrznESzWbrKAQ)
- make-official documentation (/rltoken/vQFeXLq1izNua2z2dVl5Yg)

Learning Objectives

At the end of this project, you are expected to be able to explain to anyone (/rltoken/u_RzOFqA4lSt5AdGRAfQ_w), **without the help of Google**:

General

- What are `make`, Makefiles
- When, why and how to use Makefiles
- What are rules and how to set and use them
- What are explicit and implicit rules
- What are the most common / useful rules
- What are variables and how to set and use them

Copyright - Plagiarism

- You are tasked to come up with solutions for the tasks below yourself to meet with the above learning objectives.
- You will not be able to meet the objectives of this or any following project by copying and pasting someone else's work.
- You are not allowed to publish any content of this project.
- Any form of plagiarism is strictly forbidden and will result in removal from the program.

Requirements

General

- Allowed editors: `vi`, `vim`, `emacs`
- OS: Ubuntu 20.04 LTS
- Version of `gcc`: 9.3.0
- Version of `make`: GNU Make 4.2.1
- All your files should end with a new line
- A `README.md` file, at the root of the folder of the project, is mandatory

More Info

Files

In the following tasks, we are going to use these files (https://github.com/holbertonschool/0x1B.c). We want to compile these only.

Tasks

0. make -f 0-Makefile

mandatory

Create your first Makefile.

Requirements:

- name of the executable: `school`

- rules: `all`
  - The `all` rule builds your executable
- variables: none

```
julien@ubuntu:~/0x1C. Makefiles$ make -f 0-Makefile
gcc main.c school.c -o school
julien@ubuntu:~/0x1C. Makefiles$ ./school
j#00000000000000000000000000000000000000
j#000000000000000000@Q**g00000000000000
j#0000000000000000*]++]4000000000000000
j#000000000000000k]++]++*N#000000000000
j#0000000000000*C+++]++]++]J*0000000000
j#00000000000@+]++qwwwp=]++++]*00000000
j#0000000000*+++]q#0000k+]+]++]4#000000
j#00000000*C+]+]w#0000*]+++]+]++0000000
j#0000we+]wW000***C++]++]+]++++40000000
j#000000000*C+]+]]+]++]++]++]+q#0000000
j#0000000*]+]+++++++]++]+++]+++J0000000
j#000000C++]=]+]+]+]++]++]+]+]+]=000000
j#00000k+]++]+++]+]++qwW0000000AgW00000
j#00000k++]++]+]+++qW#00000000000000000
j#00000A]++]++]++]++J**0000000000000000
j#000000e]++]+++]++]++]J000000000000000
j#0000000A]++]+]++]++]++000000000000000
j#000000000w]++]+]++]+qW#00000000000000
j#00000000000w]++++]*0##000000000000000
j#0000000000000Ag]+]++*0000000000000000
j#00000000000000000we]+]Q00000000000000
j#0000000000000@@+wgdA]+J00000000000000
j#0000000000000k?qwgdC=]4#0000000000000
j#00000000000000w]+]++qw#00000000000000
"!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
julien@ubuntu:~/0x1C. Makefiles$
```

Repo:

- GitHub repository: `alx-low_level_programming`
- Directory: `0x1C-makefiles`
- File: `0-Makefile`

Done! | Help | Check your code | >_ Get a sandbox

1. make -f 1-Makefile

mandatory

Requirements:

- name of the executable: `school`

- rules: `all`
  - The `all` rule builds your executable
- variables: `CC`, `SRC`
  - `CC` : the compiler to be used
  - `SRC` : the `.c` files

```
julien@ubuntu:~/0x1C. Makefiles$ make -f 1-Makefile
gcc main.c school.c -o school
julien@ubuntu:~/0x1C. Makefiles$ make -f 1-Makefile
gcc main.c school.c -o school
julien@ubuntu:~/0x1C. Makefiles$
```

Repo:

- GitHub repository: `alx-low_level_programming`
- Directory: `0x1C-makefiles`
- File: `1-Makefile`

Done! | Help | Check your code | >_ Get a sandbox

2. make -f 2-Makefile

mandatory

Create your first useful Makefile.

Requirements:

- name of the executable: `school`
- rules: `all`
  - The `all` rule builds your executable
- variables: `CC`, `SRC`, `OBJ`, `NAME`
  - `CC` : the compiler to be used
  - `SRC` : the `.c` files
  - `OBJ` : the `.o` files
  - `NAME` : the name of the executable
- The `all` rule should recompile only the updated source files
- You are not allowed to have a list of all the `.o` files

```
julien@ubuntu:~/0x1C. Makefiles$ make -f 2-Makefile
gcc    -c -o main.o main.c
gcc    -c -o school.o school.c
gcc main.o school.o -o school
julien@ubuntu:~/0x1C. Makefiles$ make -f 2-Makefile
gcc main.o school.o -o school
julien@ubuntu:~/0x1C. Makefiles$ echo "/* School */" >> main.c
julien@ubuntu:~/0x1C. Makefiles$ make -f 2-Makefile
gcc    -c -o main.o main.c
gcc main.o school.o -o school
julien@ubuntu:~/0x1C. Makefiles$
```

Repo:

- GitHub repository: `alx-low_level_programming`
- Directory: `0x1C-makefiles`
- File: `2-Makefile`

Done! | Help | Check your code | >_ Get a sandbox

3. make -f 3-Makefile

mandatory

Requirements:

- name of the executable: `school`
- rules: `all`, `clean`, `oclean`, `fclean`, `re`
  - `all` : builds your executable
  - `clean` : deletes all Emacs and Vim temporary files along with the executable
  - `oclean` : deletes the object files
  - `fclean` : deletes all Emacs and Vim temporary files, the executable, and the object files
  - `re` : forces recompilation of all source files
- variables: `CC`, `SRC`, `OBJ`, `NAME`, `RM`
  - `CC` : the compiler to be used
  - `SRC` : the `.c` files
  - `OBJ` : the `.o` files
  - `NAME` : the name of the executable
  - `RM` : the program to delete files
- The `all` rule should recompile only the updated source files
- The `clean`, `oclean`, `fclean`, `re` rules should never fail
- You are not allowed to have a list of all the `.o` files

```
julien@ubuntu:~//0x1C. Makefiles$ ls -1
0-Makefile
1-Makefile
2-Makefile
3-Makefile
school.c
main.c
main.c~
m.h
julien@ubuntu:~/0x1C. Makefiles$ make -f 3-Makefile
gcc    -c -o main.o main.c
gcc    -c -o school.o school.c
gcc main.o school.o -o school
julien@ubuntu:~/0x1C. Makefiles$ make all -f 3-Makefile
gcc main.o school.o -o school
julien@ubuntu:~/0x1C. Makefiles$ ls -1
0-Makefile
1-Makefile
2-Makefile
3-Makefile
school
school.c
school.o
main.c
main.c~
main.o
m.h
julien@ubuntu:~/0x1C. Makefiles$ make clean -f 3-Makefile
rm -f *~ school
julien@ubuntu:~/0x1C. Makefiles$ make oclean -f 3-Makefile
rm -f main.o school.o
julien@ubuntu:~/0x1C. Makefiles$ make fclean -f 3-Makefile
rm -f *~ school
rm -f main.o school.o
julien@ubuntu:~/0x1C. Makefiles$ make all -f 3-Makefile
gcc    -c -o main.o main.c
gcc    -c -o school.o school.c
gcc main.o school.o -o school
julien@ubuntu:~/0x1C. Makefiles$ make all -f 3-Makefile
gcc main.o school.o -o school
julien@ubuntu:~/0x1C. Makefiles$ make re -f 3-Makefile
rm -f main.o school.o
gcc    -c -o main.o main.c
gcc    -c -o school.o school.c
gcc main.o school.o -o school
julien@ubuntu:~/0x1C. Makefiles$
```

Repo:

- GitHub repository: `alx-low_level_programming`
- Directory: `0x1C-makefiles`
- File: `3-Makefile`

(/)

Done! Help Check your code >_ Get a sandbox

4. A complete Makefile

mandatory

Requirements:

- name of the executable: `school`
- rules: `all`, `clean`, `fclean`, `oclean`, `re`
  - `all` : builds your executable
  - `clean` : deletes all Emacs and Vim temporary files along with the executable
  - `oclean` : deletes the object files
  - `fclean` : deletes all Emacs and Vim temporary files, the executable, and the object files
  - `re` : forces recompilation of all source files
- variables: `CC`, `SRC`, `OBJ`, `NAME`, `RM`, `CFLAGS`
  - `CC` : the compiler to be used
  - `SRC` : the `.c` files
  - `OBJ` : the `.o` files
  - `NAME` : the name of the executable
  - `RM` : the program to delete files
  - `CFLAGS` : your favorite compiler flags: `-Wall -Werror -Wextra -pedantic`
- The `all` rule should recompile only the updated source files
- The `clean`, `oclean`, `fclean`, `re` rules should never fail
- You are not allowed to have a list of all the `.o` files

```
julien@ubuntu:~/0x1C. Makefiles$ make all -f 4-Makefile
gcc -Wall -Werror -Wextra -pedantic   -c -o main.o main.c
gcc -Wall -Werror -Wextra -pedantic   -c -o school.o school.c
gcc main.o school.o -o school
julien@ubuntu:~/0x1C. Makefiles$
```

Repo:

- GitHub repository: `alx-low_level_programming`
- Directory: `0x1C-makefiles`
- File: `4-Makefile`

Done! Help Check your code >_ Get a sandbox

5. Island Perimeter

mandatory

Technical interview preparation:

(/)

- You are not allowed to google anything
- Whiteboard first

Create a function `def island_perimeter(grid):` that returns the perimeter of the island described in `grid`:

- `grid` is a list of list of integers:
  - 0 represents a water zone
  - 1 represents a land zone
  - One cell is a square with side length 1
  - Grid cells are connected horizontally/vertically (not diagonally).
  - Grid is rectangular, width and height don't exceed 100
- Grid is completely surrounded by water, and there is one island (or nothing).
- The island doesn't have "lakes" (water inside that isn't connected to the water around the island).

Requirements:

- First line contains `#!/usr/bin/python3`
- You are not allowed to import any module
- Module and function must be documented

```
guillaume@ubuntu:~/0x1C$ cat 5-main.py
#!/usr/bin/python3
"""
5-main
"""
island_perimeter = __import__('5-island_perimeter').island_perimeter

if __name__ == "__main__":
    grid = [
        [0, 0, 0, 0, 0, 0],
        [0, 1, 0, 0, 0, 0],
        [0, 1, 0, 0, 0, 0],
        [0, 1, 1, 1, 0, 0],
        [0, 0, 0, 0, 0, 0]
    ]
    print(island_perimeter(grid))

guillaume@ubuntu:~/0x1C$
guillaume@ubuntu:~/0x1C$ ./5-main.py
12
guillaume@ubuntu:~/0x1C$
```

Repo:

- GitHub repository: `alx-low_level_programming`
- Directory: `0x1C-makefiles`
- File: `5-island_perimeter.py`

Done! Help Check your code >_ Get a sandbox

6. make -f 100-Makefile

#advanced

Requirements:

- name of the executable: `school`
- rules: `all`, `clean`, `fclean`, `oclean`, `re`
  - `all` : builds your executable
  - `clean` : deletes all Emacs and Vim temporary files along with the executable
  - `oclean` : deletes the object files
  - `fclean` : deletes all Emacs and Vim temporary files, the executable, and the object files
  - `re` : forces recompilation of all source files
- variables: `CC`, `SRC`, `OBJ`, `NAME`, `RM`, `CFLAGS`
  - `CC` : the compiler to be used
  - `SRC` : the `.c` files
  - `OBJ` : the `.o` files
  - `NAME` : the name of the executable
  - `RM` : the program to delete files
  - `CFLAGS` : your favorite compiler flags: `-Wall -Werror -Wextra -pedantic`
- The `all` rule should recompile only the updated source files
- The `clean`, `oclean`, `fclean`, `re` rules should never fail
- You are not allowed to have a list of all the `.o` files
- You have to use `$(RM)` for the cleaning up rules, but you are not allowed to set the `RM` variable
- You are not allowed to use the string `$(CC)` more than once in your Makefile
- You are only allowed to use the string `$(RM)` twice in your Makefile
- You are not allowed to use the string `$(CFLAGS)` (but the compiler should still use the flags you set in this variable)
- You are not allowed to have an `$(OBJ)` rule
- You are not allowed to use the `%.o: %.c` rule
- Your Makefile should work even if there is a file in the folder that has the same name as one of your rule
- Your Makefile should not compile if the header file `m.h` is missing

Repo:

- GitHub repository: `alx-low_level_programming`
- Directory: `0x1C-makefiles`
- File: `100-Makefile`

Done! Help Check your code >_ Get a sandbox