Operating Systems

Laboratory 2

Learning goals:
- **The difference between text and binary files.**
- **How to write simple Makefiles for compiling C programs.**
- **Redirection, permissions and recursive version of cp, mv, rm and chmod.**

Exercise 1

1. Create a directory **os_ex02**.
2. Write a C program **mycat.c** that displays the content of a text file by using I/O ANSI C functions (**fgetc**, **fscanf**, **printf**, **fgets**). The text filename is given as the command line parameter.

3. Write a **Makefile** that contains a single compilation target to generate the executable file for **mycat.c**. Compare the output of your command and the output of the **'cat'** command

4. Is it possible to use your command to copy a text file?

5. What is the behavior of the program if the input file is a binary file? (For instance an executable).

Exercise 2

1. Modify the previous **Makefile** adding a new target named **install**. The target should create a directory named **bin** in the parent directory, and copy the executable file there.

2. Modify the previous **Makefile** adding a new target named **clean** which removes the executable file from the current directory.

3. Modify the previous **Makefile** adding a new target named **distclean**, which acts as **clean** does, but additionally removes the **bin** directory.

Exercise 3

1. Write a C program to copy binary files. Use ANSI C functions **fread** and **fwrite**. Is it possible to use this program to copy text files?

2. Modify the program implemented in step 1 so that it is able to copy binary files using the POSIX functions **open**, **read**, **write** and **close**.

3. Verify that both programs work by copying a binary file and executing the **diff** command on them.

Exercise 4

1. Modify the **Makefile** in such a way that it is able to generate all the executables, each one with a different name. The **install** target must copy all of them into the **bin** directory.
2. Verify that both programs work by copying a binary file and executing **diff** on them.

Exercise 5

Create two text files **file1.txt** and **file2.txt** using your favorite editor.

1. Using redirection, create **file3.txt** that includes **file2.txt** content followed by **file1.txt** content
2. Append the content of **file1.txt** in **file2.txt**

Exercise 6

1. Using the absolute pathname, copy the whole content of **os_ex02** directory, you created in the first exercise, in a new directory **backup_ex_ex2**
2. Remove **os_ex02** directory, and its content
3. Restore **os_ex02** and delete **backup_os_ex2** (hint: use **mv** command)

Exercise 7

1. Check in your home directory which are your permissions for each file and directory.
2. Look for command **umask**. Figure out how it acts on the standard permissions.
3. Using recursive version of **chmod** remove executable permission of all files, directories and subdirectories present in **os_ex2** directory. Try to access to some directory that does not have the executable permissions.
4. Restore the executable permission of all the file, directory and subdirectory present in **os_ex2** directory.