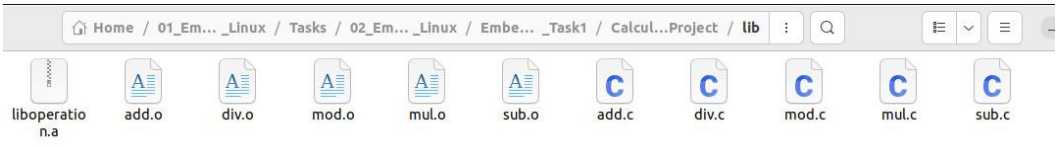
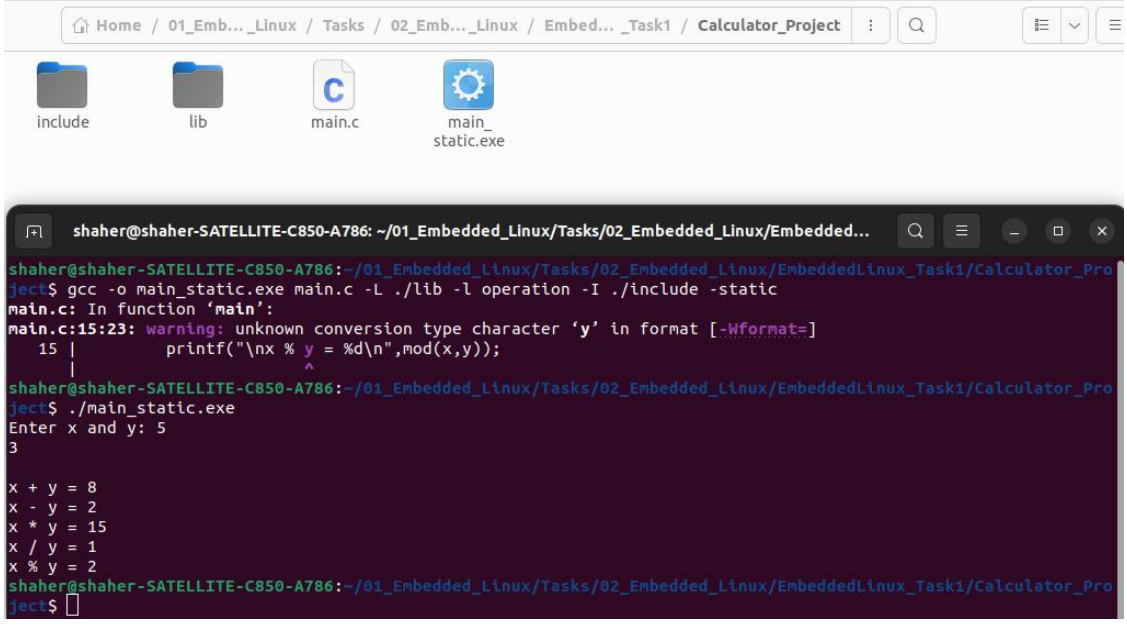
Creating a static library:

First, I created (.o) files for the five functions, then I created “liboperation.a” library statically through “ar -rcs” command

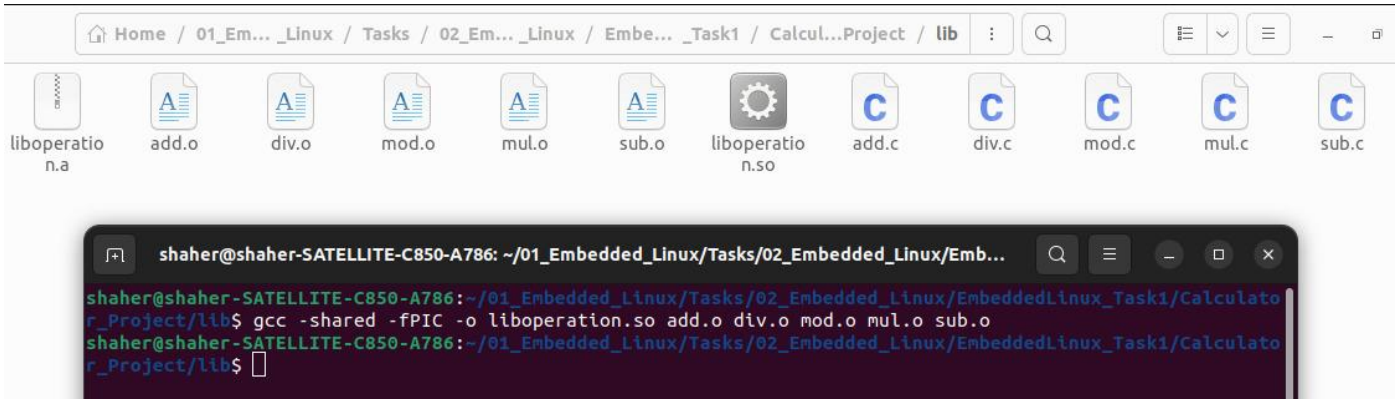


Then I compiled the (main.c) file linking that static library to it. And the I execute the “main_static.exe” file to test and make sure that everything is fine.

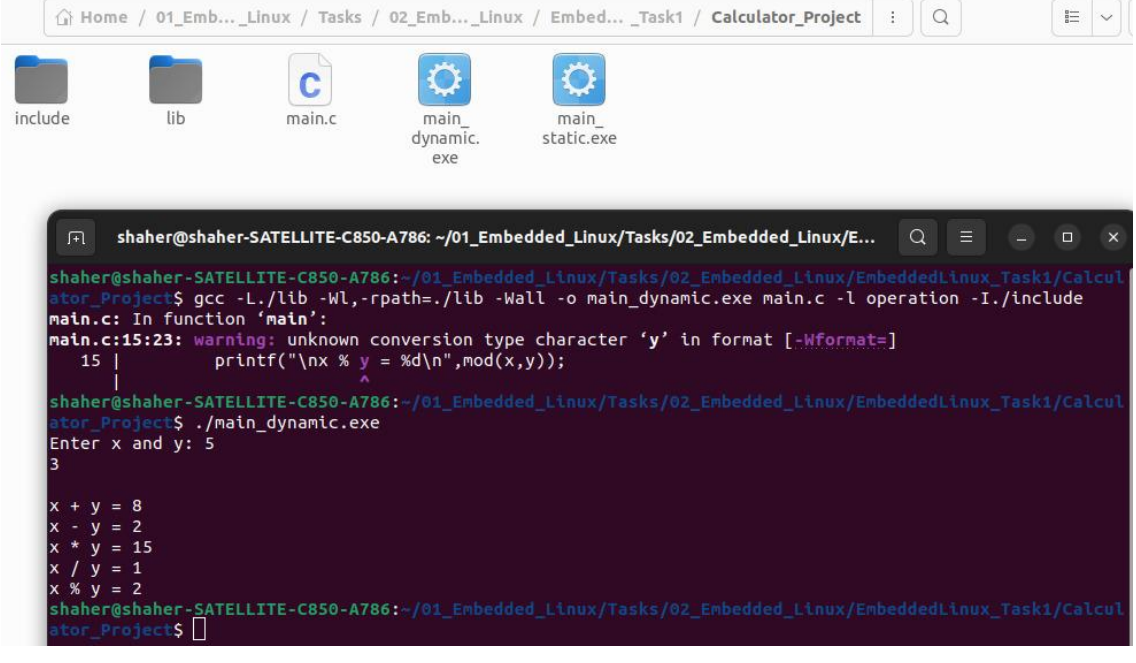


Creating a dynamic library:

First, I created (.o) files for the five functions using -fPIC, then I created “liboperation.so” library dynamically

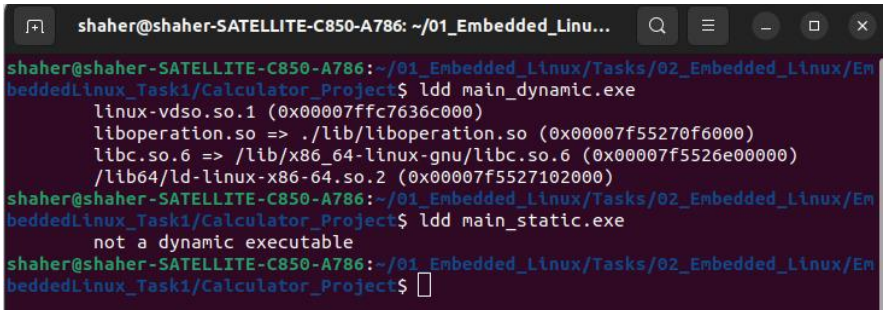


Then I compiled the (main.c) file linking this dynamic library to it. And the I execute the “main_dynamic.exe” file to test and make sure that everything is fine.



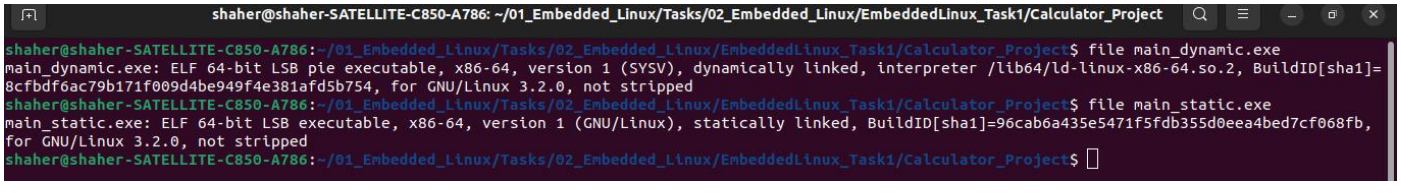
Comparison Steps:

1- Comparing through “ldd” command:



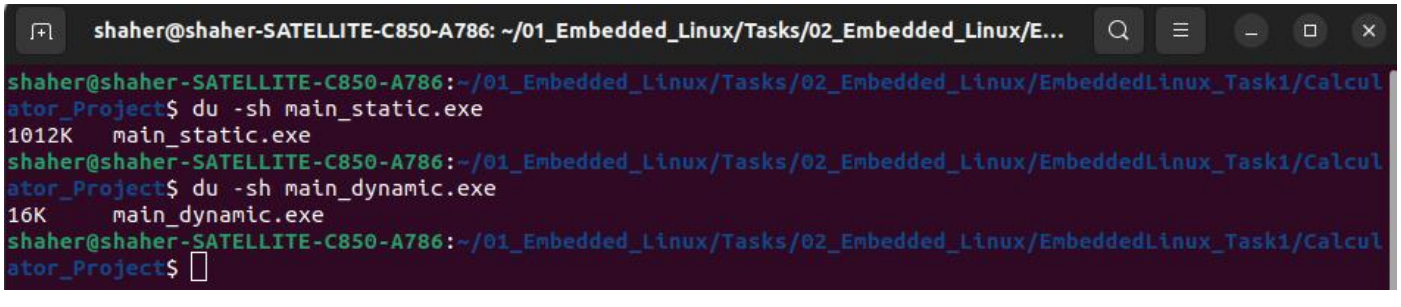
As you see, incase of the dynamically linked file “main_dynamic.exe” the “ldd” command present the library that this file using or needing it. But incase of the statically linked file “main_static.exe” it says that it is not dynamically executable, as the “ldd” command is related to the dynamically linked files.

2- Comparing through “file” command:



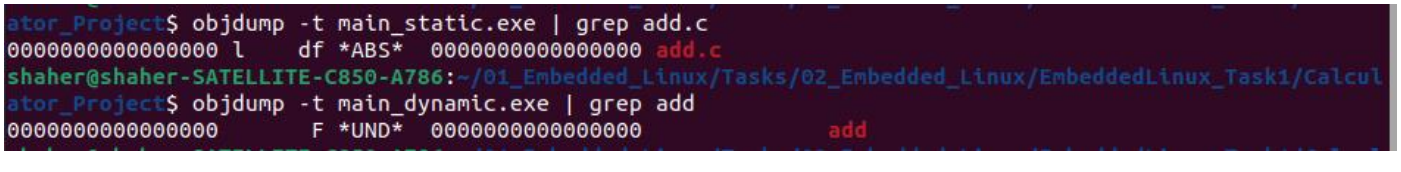
As you see, for the dynamically linked file it states that it is dynamically linked, and for the statically linked file it states that it is statically linked 😐.

3- Comparing through “du” command:



As we know the benefit from the dynamic linking is in the small size.

4- Comparing using “objdump” command:



For the “add” function (as an example), in case of the statically linked file functions or files containing the implementation of the needed function already has “ABS” in front of them.

In contrary, in case of the statically linked file functions or files containing the implementation of the needed function already has “UND” in front of them because these files are linked to the main file during the run-time with the help of the **system loader**.

From the previous comparisons we conclude the following:

- Static libraries work in a way that it is added or “linked” to the executable file during the compiling time, so when we execute the application file it finds it quickly without the need for an aid from the system loader.
- Dynamic libraries work in a way that it is added during the runtime by a help from the system loader.