Assignment 0.1

Understanding Program Compilation Process

Compilation:

There are four steps of compilation:

1. **Preprocessor**
    - Command: gcc -E hello.c -o hello.i
        i. -E is used to stop the compilation after this step.
        ii. -o is to save the output in hello.i
    - Output:
        i. Comments are removed.
        ii. Code of the header file (in this case, stdio.h) is included.
        iii. Macro expansion takes place
        iv. Rest of the code remains the same.

2. **Compiler**
    - Command: gcc -S hello.i -o hello.s
        i. Takes hello.i and convert it into hello.s
        ii. -S is for stopping the compilation at this step.
        iii. -o is for storing the output in hello.s
    - Output:
        i. The program is converted into assembly language which can be interpreted by the assembler.
        ii. It also checks for errors at this stage.

3. **Assembler**
    - Command: gcc -c hello.s -o hello.o
        i. -c is used to stop the compilation after this step.
        ii. -o is to save the output in hello.i

- Output:
    i. The output is an object code file which is not human readable.
    ii. It contains opcodes for the commands in hello.s

4. Linker

- Command: gcc hello.o -o hello
    i. Compiles the program without breaks.
    ii. -o is to save the output in hello.i.
- Output:
    i. An executable file in binary
    ii. Calls function definitions in the static/ dynamic libraries.