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**Department of Computer Science and Engineering**

**CSE2421: Systems I**

**Home Assignment #3: Linking and Relocation**

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**Purpose:**

The purpose of this homework is to demonstrate understanding of the basic operations for linking and relocation in the C and assembly language.

**Part 1: Question and answers from the lecture recording:**

1) What are the linking and relocation processes and why we need them in our programs?

Answer: Linking is the process of collecting and combining various pieces of codes and data into a single file. Relocation is the process of adjusting addresses in object modules. By using linking and relocation, we could build large programs, avoid “dangerous programming errors”, understand language scoping, understand important system concepts, and exploit shared libraries.

2) How the linker determines which symbol to resolve among combination of weak and strong symbols?

Answer: The multiple strong symbols are not allowed by the linker. The linker would choose the strong symbol between a strong symbol and multiple weak symbols. If there are many weak symbol, the linker would choose an arbitrary one.

3) What are the differences between the linking view and the execution view of the object file?

Answer: In the linking view, the program header table is optional, and the section header table is required. In the execution view, the program header table is required and the section header table is optional.

4) What is the differences between static libraries (.a archives) and dynamic libraries (.so object files)?

Answer: The static libraries need duplication in the stored executables, and duplication in the running executables. The dynamic libraries would be object files that contain code and data that are loaded and linked into an application dynamically.

**Part 2: Summary of the lecture:**

The professor explains that the differences between linking and relocation which are two different processes and reason why we need these two processes. We could learn the scope of the codes and files. We could know the reason why we need linkers, and the advantages of linker. Then, we know three kinds of object files which are relocatable object file, executable object file, and shared object file. We would learn the components of the elf object file format. The linker symbols are important. Therefore, we could learn the program symbols which are either strong or weak. We could learn the step of relocation, the way to create static libraries, and the shared libraries.