Bevin Tang
CPE 453
8.2, 8.14, 12.4, 12.16

CPE 453 Homework #2:

8.2) Consider a system in which a program can be separated into two parts… Discuss the advantages and disadvantages of this scheme.

Advantages:

- Since the instructions are read-only, the instructions cannot be altered by other processes or users.
- Having separate data registers per program allows each user to use their own data for the same program.

Disadvantages:

- The effort must be made to separate the code and the data, and to make the code read-only.

8.14) On a system with paging, a process cannot access memory that it does not own. Why? How could the operating system allow access to other memory? Why should it or should it not?

- A process cannot access memory that is not its own because the OS manages and assigns the memory that each process gets in a processor's page table. If a process tries to access an area that the processor doesn't allow, the process will find that the section of memory does not exist in their table
- The OS can add the memory sections into the processes' tables, allowing the processes to access those spots in memory.
- This should be used to allow easy memory sharing, but could be dangerous in the face of many race conditions.

12.4) Consider a system that supports the strategies of contiguous, linked, and index allocation. What criteria should be used in deciding which strategy is best utilized for a particular file?

- Contiguous:
  - This should only be used if the files are small to avoid inefficient copying of larger files.
- Linked:
  - This is useful if the files are large and the accessing of these files is sequential.
- Indexed:
  - If random access is essential and if file sizes are large.

12.16) Consider a file system that uses inodes to represent files. Disk blocks are 8KB in size, and a pointer to a disk block requires 4 bytes. This file system has 12 direct disk blocks, as well as single, double, and triple indirect disk blocks. What is the maximum size of a file that can be stored in this file system?

- Each block can have 8KB/4B pointers = 2048.
- The max file size can be found by multiplying the block size by the total number of pointers available = (12 + 2048 + 2048^2 + 2048^3) = 8594130956 pointers available.
- Total size = block size * number of pointers = 8594130956 * 8KB = 68753047648 KB = 64.031 TB.