COSC1112/1114: Operating Systems Principles

Tutorial 07 (week 08)

1. **Explain the difference between internal and external fragmentation.**

2. **Consider a logical address space of 256 pages with a 4-KB page size, mapped onto a physical memory of 64 frames.**
   a) **How many bits are required in the logical address?**
   b) **How many bits are required in the physical address?**

3. **Compare the memory organization schemes of contiguous memory allocation, and pure paging with respect to the following issues:**
   a) **External fragmentation**
   b) **Internal fragmentation**
   c) **Ability to share code across processes**

4. **Assuming a 1-KB page size, what are the page numbers and offsets for the following address references (provided as decimal numbers):**
   a) **3085**
   b) **42095**
   c) **215201**
   d) **650000**
   e) **2000001**

5. **What is the purpose of paging the page tables?**

6. **Consider a system that uses pure demand paging:**
   a. **When a process first starts execution, how would you characterize the page fault rate?**
   b. **Once the working set for a process is loaded into memory, how would you characterize the page fault rate?**

7. **A certain computer provides its users with a virtual-memory space of 2^{32} bytes. The computer has 2^{18} bytes of physical memory. The virtual memory is implemented by paging, and the page size is 4096 bytes. A user process generates the virtual address 11123456. Explain how the system establishes the corresponding physical location. Distinguish between software and hardware operations.**