CIT 5950 Recitation 6 - Scheduling & Virtual Memory

Welcome back to recitation! We're glad that you're here :)

Exercise 1 - Scheduling

Consider the following set of tasks/processes:

Name	Arrival Time	Running Time
Bert	2	11
Ernie	0	8
Oscar	12	20
Grover	7	15
Elmo	10	4

a) Using the **Round Robin** scheduling algorithm and a time slice of **8**, what is the finishing time for each?

Name	Finishing Time
Bert	
Ernie	
Oscar	
Grover	
Elmo	

b) What is the **average waiting time?**

VM Calculations Cheat Sheet

Address space = 2 ^ (# bits in the address, e.g. 64 for 64-bit machine)

Size of virtual memory = Address space * Addressability (# Bytes in each address)

Number of pages = Size of virtual memory / size of a page

Size of a page = size of a frame

Number of frames = Physical Memory (RAM) space / size of a frame

Number of bits to represent pages or frames = Log_2 (number of pages or frames)

Page number = first N bits of the virtual address, N = number of bits to represent pages or frames

1 KB = 2^10 B   1 MB = 2^20 B   1 GB = 2^30 B

Question #2

Consider a system as follows:
- 32-bit address space
- 16-bit addressable
- 1GB of physical memory
- page sizes of 64kB

a) How many **pages** are there in virtual memory? Express your answer as a power of 2

b) How many **frames** are there in physical memory?

c) How many **bits** are there in each address' page number?

d) Consider the virtual address xABCDEF01. What is its **page number** in hexadecimal?

Question #3

We are working with a byte-addressable system that has a 16-bit address space, 32kB of physical memory, and page sizes of 8kB. Assume the page table is initially empty, and then a process generates the following sequence of virtual addresses:

x3311
x1234
x1255
x3456
xA349
x7777
xB222
x6222

a) If virtual address x5324 is requested next, which page will be evicted if using a First In First Out (FIFO) replacement algorithm? State the page number.

b) Instead of using FIFO, which page will be evicted if using a Least Recently Used (LRU) replacement algorithm? State the page number.

c) Rather than using FIFO or LRU, imagine that the system could look into the future and see that the next four virtual address requests (after x5324) would be as follows:

x1A23
x399A
x7282
x4A32

Knowing this information, which page should be evicted when the request for x5324 generates a page fault?