CIS 452 02 – Assignment 10 – Gabe Baksa

32-bit Address Space, 4KB Page Size

1. **How many bits are needed for the offset?**

   4 KB=4096 bytes

   $log_2(4096\ bytes) = 12\ bits$

   12 bits

2. **How many pages can be referenced with 20 bits?**

   $2^{20} = 1048576\ pages$

3. **Assuming each page entry is 4 bytes, how large will the page table be?**

   $1,048,576\ pages \times 4\ bytes = 4,194,304\ bytes$

4. **Assuming 50 processes are running and each has their own page table, how much memory will be used for all of the page tables?**

   $4,194,304\ bytes \times 50\ processes = 209,715,200\ bytes$

8-bit Address Space, 16-byte Page Size

1. **How many bits must be used for the offset?**

   $log_2(16\ bytes) = 4\ bits$

   4 bits

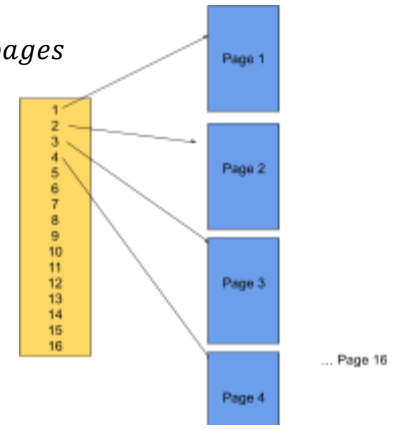
2. **How many bits will be used for the page number?**

   Address space - offset

   $8\ bits - 4\ bits = 4\ bits$

3. **How many total pages can be addressed?**

$2^4 = 16\ pages$



8-bit Address Space, 16-byte Page Size (First 4 Split into Outer/Inner)

1. **How many bits will you use for the first level page table?**

   2 bits

2. **How many bits will you use for the second level?**

   2 bits

3. **How many second-level tables will there be?**

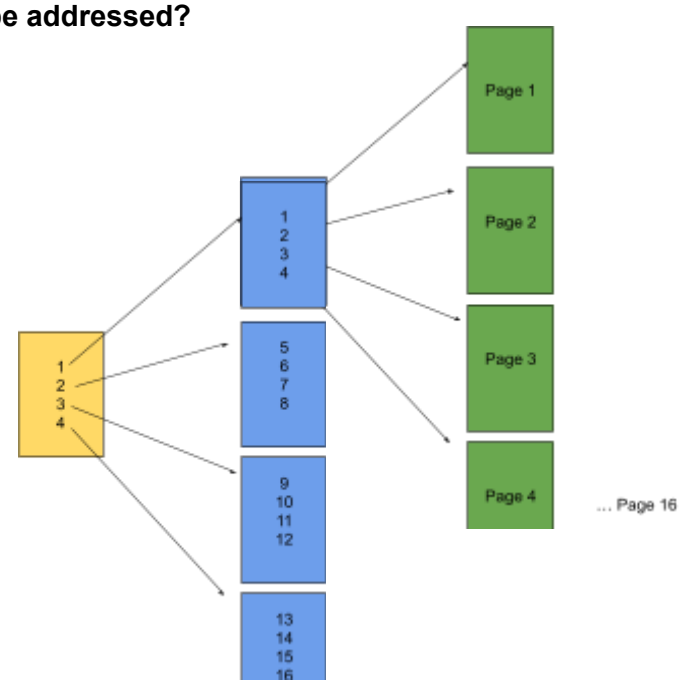
   One table in the second level for each of the entries in the first table

   $2^2 = 4\ tables$

4. **How many total pages can be addressed?**

$2^8 = 256\ bytes$

$\frac{256\ bytes}{16\ bytes\ per\ page} = 16\ pages$



16-bit Address Space, 256-byte Page Size

1. **How many bits must be used for the offset?**

   $log_2(256\ bytes) = 8$

2. **How many bits will be used for the first page table?**

   (Address space - bits used for the offset) / 2

   (16 bits - 8 bits) / 2 = 4 bits

3. **How many bits will be used for the secondary page tables?**

   (16 bits - 8 bits) / 2 = 4 bits

4. **How many total pages can be addressed?**

   $2^{16} = 65536\ bytes$

   $\frac{65536\ bytes}{256\ bytes\ per\ page} = 256\ pages$