

8.18 - Consider a logical address space of 32 pages with 1,024 words per page, mapped onto a physical memory of 16 frames.

- a) How many bits are required in the logical address?
32 pages $\rightarrow 2^5$
1024 wpp $\rightarrow 2^{10}$
15 bits
- b) How many bits are required in the physical address?
1024 $\rightarrow 2^{10}$
16 frames $\rightarrow 2^4$
14 bits

8.20 – Consider a paging system with the page table stored in memory.

- a) If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?
200 to find + 200 to get
400 nano seconds
- b) If we add TLBs, and 75 percent of all page-table references are found in the TLBs, what is the effective memory reference time? (assume that finding a page-table entry in the TLBs take zero time, if the entry is there.)

$$\text{Time} = .75 * 200 + .25 * 400 = 250$$