

Discussion/Midterm Question

- Assume a system with a two level page table. The virtual memory address space is 32 bits and the physical memory address space is 16 bits.

Factors in determining size of page

- Page table fits on one page
- Equal sized L1 and L2 page tables
- Size of a page table entry
 - size of physical memory (16 bit address space)
 - bookkeeping bits

Fitting a page table on one page

(size of page) \geq (size of page table)

(size of page table) = (# of PTEs) * (size of PTE)

– Size of page (2^{offset})

– # of PTE $(2^{(32-\text{offset})/2})$

– Size of PTE (16 bits - offset + bookkeeping \approx 1-4 bytes)

$2^{\text{offset}} \geq 2^{(32-\text{offset})/2}$ (assuming 1 byte PTE)

$\text{offset} \geq 10.667$

Fitting a page table on one page

(size of page) \geq (size of page table)

(size of page table) = (# of PTEs) * (size of PTE)

- Size of page (2^{offset})
- # of PTE $(2^{(32-\text{offset})/2})$
- Size of PTE (16 bits - offset + bookkeeping \approx 1-4 bytes)

$2^{\text{offset}} \geq 2^{(32-\text{offset})/2} * 2^2$ (assuming 4 byte PTE)

offset \geq 12

12 bit offset works under either assumption

Solutions

- Offset = 12
 - 4KB pages
- VPN1 = VPN2 = 10
 - 2^{10} entries per page table