Chapter 18 Paging: Introduction

- Paging chops up space into fixed size pieces.
  - Each fixed size piece is called a page.
  - Physical memory is an array of fixed sized slots called a page frames.

18.1 Overview

- Paging has advantages over previous approaches.
  - flexibility
    - with fully developed paging the system will be able to support an address space effectively.
    - There is no assumption about the stack and heap or the direction of growth.
  - Simplicity
    - When placing a process in memory the OS simply grabs the first free pages required to fit the address space.
    - To record where each virtual page of the address space is stored the OS keeps a per-process page table.
      - The page table provides address translation.
    - Page tables are per process data structures.

18.2 Page Table Storage

- Page tables can get large.
  - much larger than segment tables or base/bound pairs.
- The page table for each process is stored in memory.

18.3 Whats in The Page Table

- The page is a data structure that is used to map virtual addresses to physical addresses.
- Linear page tables are just arrays.
  - The OS indexes the array by the virtual page number (VPN)
  - Looks up the page table entry (PTE) to find the physical fram number (PFN)
- Contents of the PTE
  - There are a number of different bits to understand:
    - Valid bit - indicates if a translation is valid.
    - Protection bit - indicates if the page can be read, written, or executed from.
    - Present bit - indicates if the page is in physical memory or on disk.
    - Dirty bit - indicates if a page has been modified since being brought into memory.
    - Reference bit - indicates if the page has been accessed.
      - used during page replacement.

18.4 Paging: Also too Slow

- Pages tables can slow things down.