Operating Systems Class Notes

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0.1 Introduction

1. Definition of an Operating System
   (a) A resource allocator
   (b) A (command and) control program
   (c) A layer between hardware and application programs
2. An implementation of software abstractions
   (a) Process
   (b) Memory
   (c) File
   (d) Device
3. Software layers
   (a) Hardware
   (b) Firmware
   (c) Kernel (lower half of an Operating System)
   (d) System programs (upper half of an Operating System)
   (e) System services (OS specific or OS independent)
   (f) Application programs
   (g) Scripting Languages, Macros, Document formats
4. Hardware
   (a) Memory (various flavors)
      i. Hierarchy: speed, volatility, size
      ii. Access and visibility: direct (linear or flat), mapped, mountable
      iii. Bootstrap/flash, Princeton versus Harvard
      iv. Virtual memory

(b) CPU (one or more)
    i. Uniprocessor. Pipelines, superscalar.
    ii. Symmetric or asymmetric multiple processor (SMP)
    iii. Clustering (and blade) (no longer a hardware architecture)
(c) Buses
    i. local buses
    ii. bridges
    iii. peripheral buses
(d) Device Controllers (drivers)
    i. Drivers, IO subsystems.
    ii. Interrupts and DMA

5. Processes
    (a) Multipgrogramming (no waiting — efficient use of resources)
    (b) Multitasking (time-sharing) (simultaneous processes)
    (c) Scheduling, interrupts, preemption
    (d) Threads
6. Memory
    (a) Virtual and Physical Memory
    (b) Paging and Swapping
7. Storage
    (a) Files
    (b) Caching
    (c) Scheduling
8. Protection
    (a) Traps, exceptions
    (b) Protection modes — kernel and user