OS architecture (OS layers) of Unix, Linux and Windows

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1   Introduction

Both Windows and Linux/Unix have similar OS architecture except for a few differences in the design.

2   Linux/Unix Kernel

Linux/Unix are monolithic kernels, which means that they are implemented as a single codebase with you protection between them. The kernel however allows small modularity by loading modules in the kernel. These modules are called Dynamically Loadable Kernel Module (DLKM). Major layers in the Linux/Unix based operating systems are:

1. Applications

    (a) Libraries
    (b) System Daemon
    (c) Shells
    (d) Tools

2. Operating System
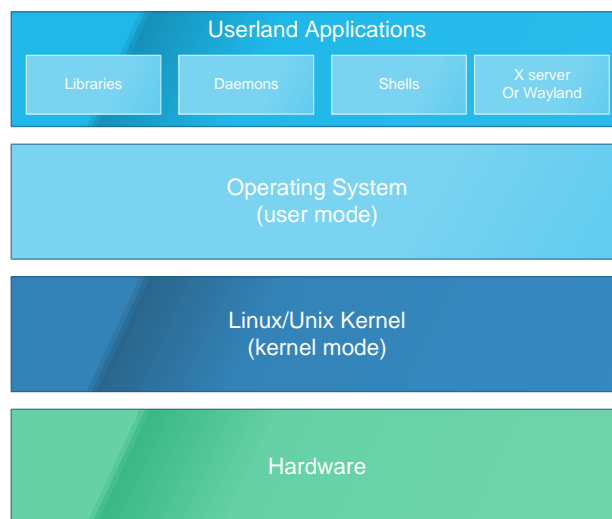
3. Kernel

4. Hardware

Figure 1: Linux layered architecture

2.1 Approach to Windowing

Linux/Unix uses X server in user mode to draw graphics, this allows decoupling graphics subsystem from the kernel. Also, allowing x server to run in user mode prevents X server errors to de-stabilize the complete OS.

3 Windows NT Kernel

1. Applications

   (a) Win32 applications
   (b) POSIX compatibility layer
   (c) OS/2
   (d) Windows Services

2. Operating System

3. Kernel

   (a) Kernel level drivers
   (b) Display system

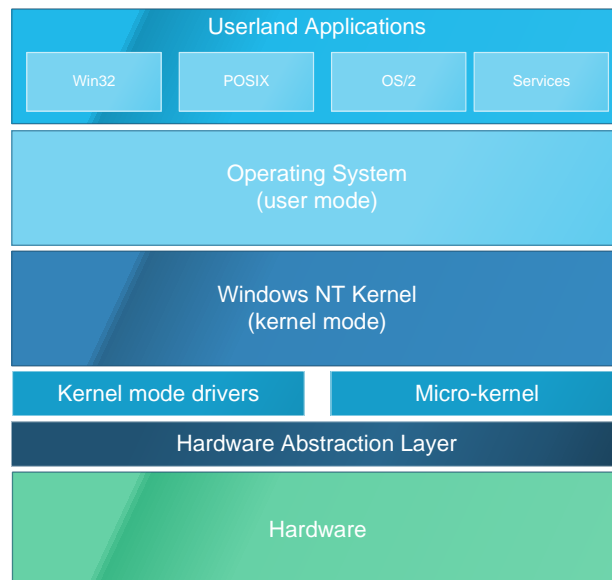4. Hardware abstration layer

5. Hardware

Figure 2: Windows NT layered architecture

3.1 Approach to Windowing

Windows Operating System runs its graphics system in kernel mode, this allows much higher performance then running it in user mode by avoiding several context switches. Running graphics system in kernel mode however poses stability and security risks.