UNIX and Windows 2000 Interoperability

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What is UNIX®?

- A registered trademark of The Open Group
- In reality: any variant, derivative, or clone of the operating system developed by AT&T in the 1970s
  - HP-UX
  - AIX
  - Solaris
  - UnixWare
  - Tru64
  - Linux

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In the Beginning

- 1969 – Ken Thompson and Dennis Ritchie
- 1974 – Expansion into academia
- 1978 – Berkeley Software Distribution
- 1980s – The advent of vendors: Microsoft, HP, IBM, Sun Microsystems
- 1993 – AT&T sold UNIX to Novell
- 1995 – Novell sells UNIX to SCO, passes trademark to X/Open, now The Open Group

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UNIX and Open Source Software

- 1983 – Richard Stallman announces GNU
- Gnu's not UNIX – No AT&T source code
- 1985 – Free Software Foundation
- 1991 – Linus Torvalds begins writing kernel capable of running GNU tools
- Linux is *not* UNIX; it's a UNIX clone

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Elements of UNIX

- The kernel
- The shell
- Terminal emulators
- Flat file administration
- File systems: HFS, UFS, NFS, JFS
- Multi-user capability
- TCP/IP networking
- System management tools

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What is Windows 2000?

- High-end, multi-tasking, multi-user operating system
- Not a PC operating, though it runs on hardware associated with PCs and is backwardly compatible with DOS and Windows applications
- Heir to Windows NT

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Windows 2000 History

- 1988 – Dave Cutler begins work on NT
- 1993 – Windows NT 3.1 and Windows NT Advanced Server 3.1
- 1994 – NT 3.5
- 1995 – NT 3.51
- 1996 – NT 4.0
- February 2000 – Windows 2000 Professional, Server, and Advanced Server
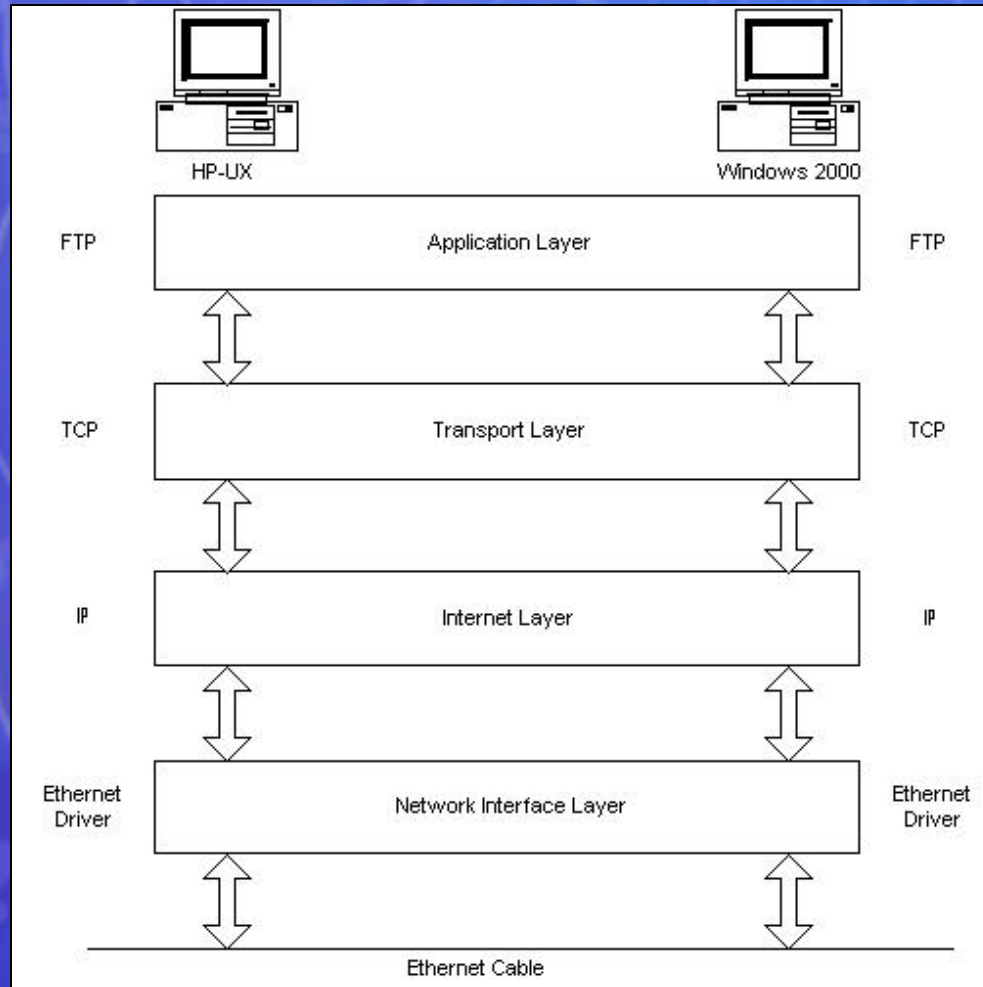- September 2000 – Windows 2000 Datacenter Server

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Windows 2000 Architecture
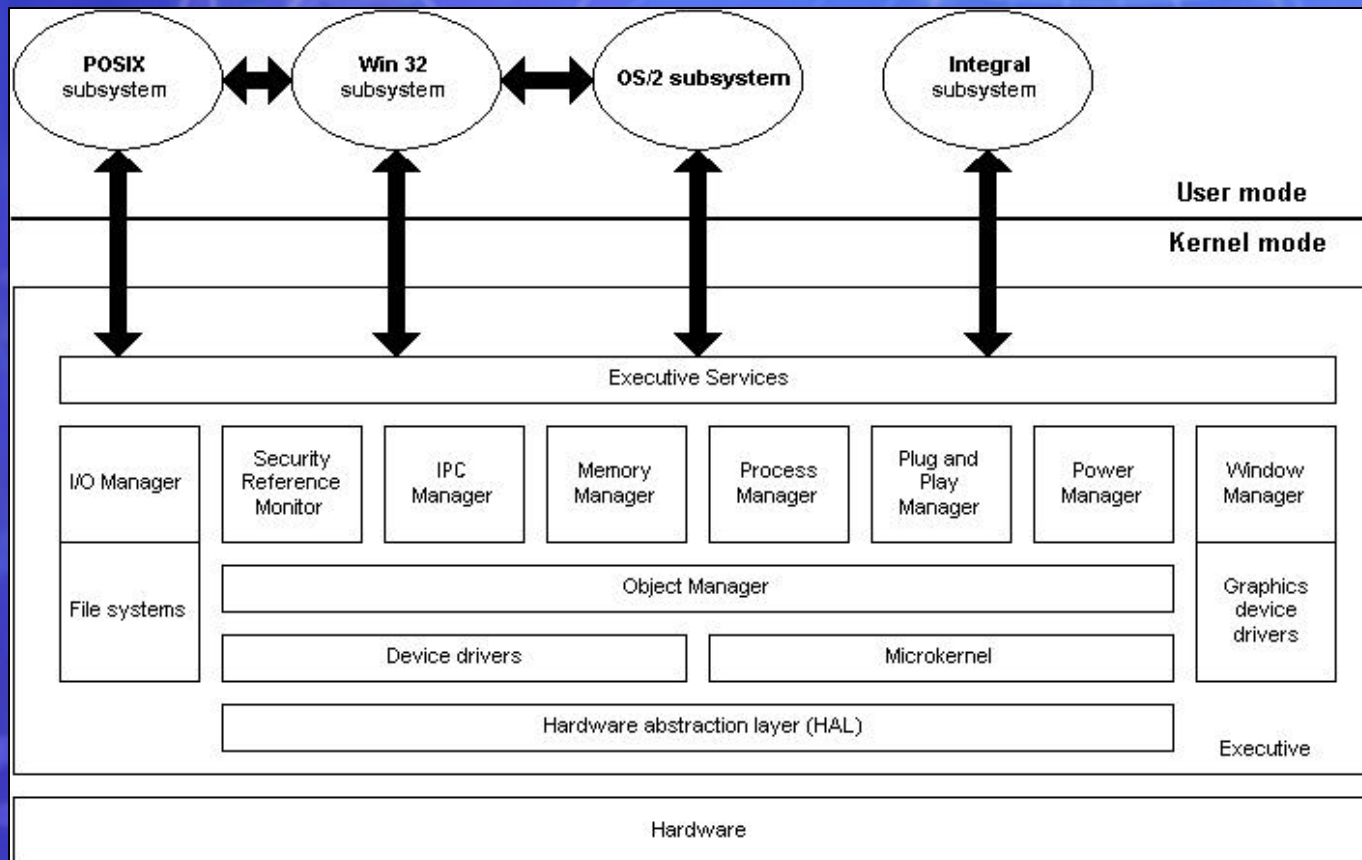
Windows 2000 Elements

- The Registry
- Active Directory
- GUI Interface
- The MMC
- Filesystems: FAT16, FAT32, NTFS
- Networking: TCP/IP, NetBT, Direct Hosting, SMB

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Four-layer TCP/IP Model

Network Interface Layer

- Ethernet
- Fibre Channel
- Multiple Protocols
  - UNIX protected memory model
  - Windows 2000 NDIS wrapper
- NIC drivers, kernels
- Logical interfaces

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Internet Layer

- Standardizing on TCP/IP
- HP-UX/Windows 2000 differences
  - ARP
  - IP configuration
  - Routing
  - MTU and Path MTU
  - Ping

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Transport Layer

- TCP
  - Maximum Segment Size and Path MTU Discovery
  - Receive Window Size
  - Keep-alive messages
  - TIME-WAIT delay
- UDP
- Network APIs
  - Windows Sockets, NetBIOS
  - Berkeley Sockets, STREAMS

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Windows 2000 Name Resolution

- Computer names and host names
- DNS suffixes
- Lookup process
- Resolver
- DNS name registration
- NetBIOS name resolution
- Nslookup

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HP-UX Name Resolution

- Host names
- Lookup process
- Name Service Switch
- BIND resolver
- Nslookup
- Dynamic DNS

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DHCP and DNS

- Windows 2000
  - DHCP client updates A record with DDNS
  - DHCP server updates PTR record for client
  - Option 81, Client FQDN
  - DHCP server can update both records
- HP-UX
  - Does not support Option 81
  - Future versions will support Option 12, Host Name
  - Windows DHCP servers can use Option 12 to register with DDNS

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DHCP/DNS Interoperability

- HP-UX 11 DHCP client works with Windows 2000 DHCP server.
    - Windows 2000 DHCP server could not update DDNS for HP-UX client.

- Windows 2000 DHCP client works with HP-UX 11 DNS server.

- HP-UX DDNS starts with BIND 8.1.2

- Security problems unless you have BIND 8.2.2 patch level 5 or higher.

- For Active Directory, the primary DNS server must support the service location resource record (SRV RR).

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User Authentication

- Windows 2000: NTLM and Kerberos
- NTLM still supported for mixed Windows environments
- Kerberos compatible between Windows and HP-UX
- HP-UX basic authentication includes /etc/passwd and NIS
- Pluggable Authentication Modules extend HP-UX authentication and mesh well with Windows 2000
  - PAM NTLM
  - PAM Kerberos

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Basic TCP/IP Utilities

- Finger
- FTP
  - New version with HP-UX 11

- Windows 2000 FTP server part of Internet Information Services
- TFTP
- Rsh (remsh) and Rcp
- Rexec
- Telnet

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Windows Services for UNIX

- Telnet Client and Server
- Server for NIS
- Password Synchronization
- Korn Shell and UNIX Utilities
- Server for NFS
- Client for NFS
- Gateway for NFS
- User Name Mapping Service

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Windows 2000 Telnet Server

- Plaintext Authentication
- NTLM Authentication
- UNIX Telnet clients and Windows 2000 Telnet Server
  – AIX

  – Solaris

  – HP-UX Telnet client has trouble if Windows 2000 Telnet Server uses NTLM authentication

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Server for NIS

- Integrates with Active Directory
- Migration tool to move from UNIX-based NIS servers to Windows 2000
- Name Service Switch configuration very important
  - Especially if you do not use maps for things like /etc/protocols

- Issues with migration
  - UIDs, passwords, home directories, map management

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NFS File Sharing

- Issues
  - Local file systems and NFS
  - User authentication and authorization
  - User name mapping
- Windows Client for NFS/HP-UX NFS Server
- Windows Server for NFS/HP-UX NFS Client

CIFS File Sharing

- CIFS v. NFS
- The case for CIFS
- CIFS implementations
- CIFS/9000 Server in a Windows 2000 domain
- CIFS/9000 Client in a Windows 2000 domain
- PAM and the CIFS/9000 Client

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Miscellaneous Topics

- Network-attached Storage
- X Window
- LPR printing

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