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# Lectures 6 - OS

Computer Systems Administration  
TE2003



# Lecture overview

- At the end of lecture 6 students can describe and discuss:
  - Post-installation tasks
  - Windows boot process
  - Startup modes
  - Windows Configuration and Management tools
  - Preventive Maintenance
  - Troubleshooting

# Review - OS – Purpose

## 1. Communicate with hardware

- RAM, HD, CPU, keyboard, mouse, ...
- Drivers

## 2. User interface

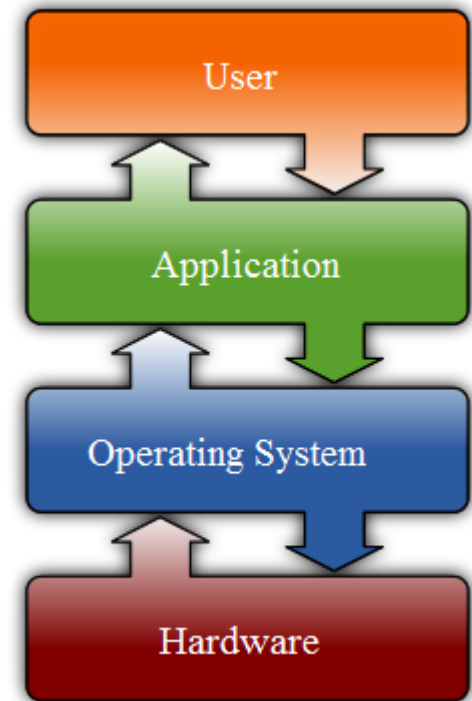
- Visual representation of the computer (GUI and CLI)

## 3. Platform for applications

- Run, use, and shutdown programs

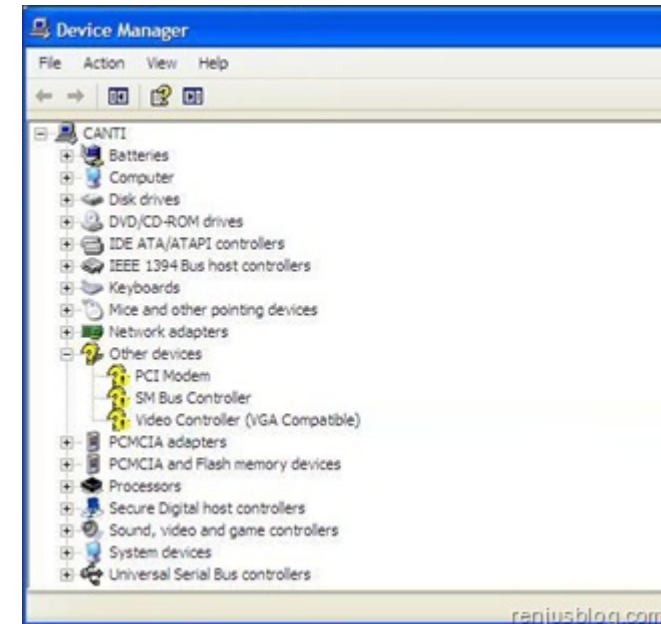
## 4. Organizing and manipulating Programs and Data

- Add, move, and delete files and folders



# OS – Post-Installation Tasks

- Apply fixes for the OS
  - Patches and Service packs
- Upgrade drivers
  - Graphic card, sound card, ...
  - Device manager
- User applications
  - MS Office, Adobe Reader, ...
- Restore user data files
  - Windows Backup or Backup and Restore Center
  - Copy files and folders manually



# OS – Windows XP Boot Process

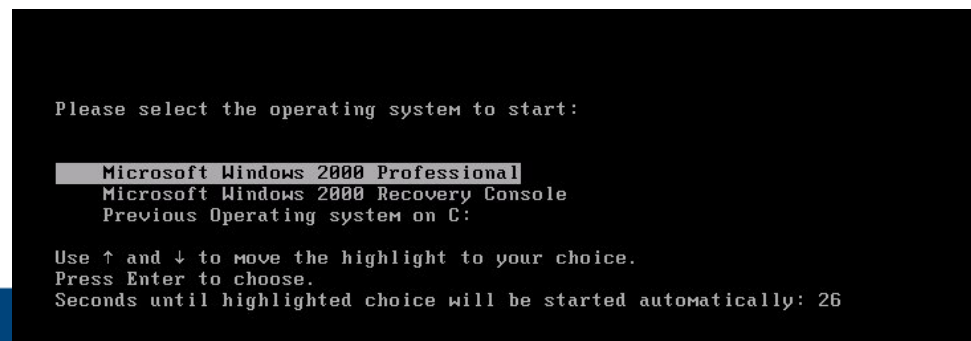
1. Turning on the computer (Cold boot)
2. POST (Power On Self Test)
  - Errors through beep codes. Why?
3. BIOS locates and reads the configuration settings that are stored in the CMOS
  - Boot device priority
4. BIOS locates the Master Boot Record (MBR)
  - MBR points to System files (NTLDR, BOOT.INI, NTDETECT.COM) start the PC and point to boot files
  - NTOSKRNL loads device drivers and starts loading the OS files
5. GUI starts to load

# OS – Windows XP Boot Process

- NT Loader manages the startup process
  - Windows XP system or start-up files that must be in the root directory of the system partition
    - NTLDR (NT Loader)
    - BOOT.INI
    - NTDETECT.COM
    - NTBOOTDD.SYS (only needed for SCSI controllers that don't have their own ROM BIOS)
  - System Partition
    - Active partition (typically C: drive)
  - Boot Partition
    - Where OS files located (C:\Windows on XP by default, but that can be changed during installation)

# OS – Windows XP Boot Process

- NTLDR (NT Loader) manages the start-up process until control is handed over to NTOSKRNL (NT kernel)
- To find available operating systems, NTLDR reads the BOOT.INI file
- If multiple OSs are available, a menu shows up



# OS – Windows XP Boot Process

- BOOT.INI

- Text file listing OSs and where to find the OS files in the boot partition

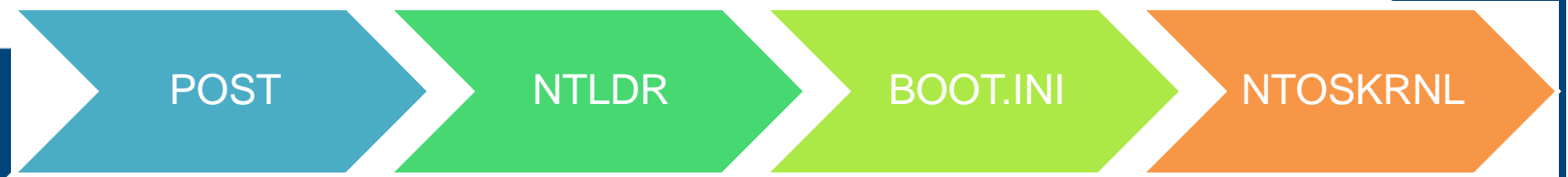
```
[boot loader]
timeout=10
default=multi(0)disk(0)rdisk(0)partition(2)\WINNT
[operating systems]
multi(0)disk(0)rdisk(0)partition(2)\WINNT="Microsoft Windows 2000
Professional" /fastdetect
C:\CMDCONS\BOOTSECT.DAT="Microsoft Windows 2000 Recovery Console"/cmdcons
C:\="Previous Operating System on C:"
```

- Editing BOOT.INI

- System applet | Advanced tab | Startup and Recovery | Settings button | click Edit button in System startup section

# OS – Windows XP Boot Process

- **BOOTSEC.DOS**
  - Is read by NTLDR if it finds a different OS to load
- **NTDETECT.COM**
  - Provides information about installed hardware
- **NTOSKRNL.EXE**
  - This is the kernel, the major component of Windows
- **HAL.DLL**
  - The hardware abstraction layer enables Windows to run on many types of hardware
- **Registry**
  - The Registry is a database that contains information about everything installed, including hardware and software
- **WINLOGON.EXE**
  - Winlogon provides a login prompt or Welcome screen



# OS – Startup modes

- Safe Mode
  - Only loads drivers for basic components, such as the keyboard and display.
- Safe Mode with Networking Support
  - Loads also the drivers for network components
- Safe Mode with Command Prompt
  - Loads loads the CLI instead of the GUI.
- Last Known Good Configuration
  - Load the configuration settings of Windows that were used the last time that Windows started successfully. It does this by accessing a copy of the registry that is created for this purpose.

# OS — Windows Configuration and Management

- **Windows registry**

- Regedit
- HKEY\_CLASSES\_ROOT
  - Contains information that associates file types with programs
- HKEY\_CURRENT\_USER
  - Contains the current user's profile, such as desktop settings, application preferences
- HKEY\_LOCAL\_MACHINE
  - Contains local machine-specific configuration data, such as HW and OS data
- HKEY\_USERS
- HKEY\_CURRENT\_CONFIG
  - Stores configuration data for the current hardware profile

# OS — Windows Configuration and Management

- **System Configuration or MS System Configuration Utility**
  - Msconfig
- **Microsoft Diagnostics**
  - Msinfo32
- **DirectX Diagnostics**
  - DxDiag
- **Windows Task Manager**
  - Taskmgr
- **Device Manager**
  - Devmgmt.msc

# OS — Windows Configuration and Management

- **Performance monitor**
  - Perform.msc
- **Event Viewer**
  - Eventvwr.msc
- **MS Management console**
  - MMC
- **Remote Desktop**
  - Mstsc
- **Task Scheduler**
  - Taskschd.msc

# OS — Windows Configuration and Management

- **Disk management**
  - Disk management utility
    - DISKMGMT.MSC
  - Disk defragmenter
    - DFRG.MSC
  - Complete analysis of disk partition
    - CHKDSK
  - Disk partitioning tool
    - DISKPART

# OS – Preventive Maintenance

- **Avoids problems**
- **Ensure proper system operation**
  - **Hard drive**
    - Backup
    - Defragmentation
    - Error checking
  - **Updates**
    - OS
    - Applications
    - Antivirus

**Set tasks to run  
automatically**

**Task scheduling**

# OS – Preventive Maintenance

- Restore point
  - Installing or updating applications or device drivers can cause problems, such as SW and HW incompatibility issues
  - Restore point is an image of the computer system which can be restored

# OS – Preventive Maintenance

- Data protection
  - Some OSs provide tools to create Emergency Repair Disks (ERD) and the possibility to perform Automated System Recovery (ASR)
  - The OS might provides tool for backup
    - MS backup utility
      - Full or normal backup
      - Copy backup
      - Differential backup
      - Incremental backup

# OS – Troubleshooting

- Similar to HW troubleshooting
- Process
  - Identify the problem
  - Identify the cause
  - Identify solutions
  - Rank causes and solutions
  - Apply solutions
  - Test solutions
  - Document the procedure

