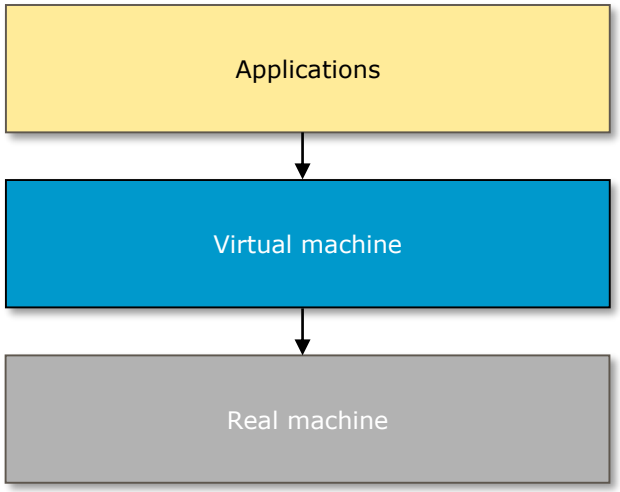
Overview

- Organization
- Model
- Components
- CPU Modes
- System processes
- Services processes
- Users processes
- Subsystems processes
- System services

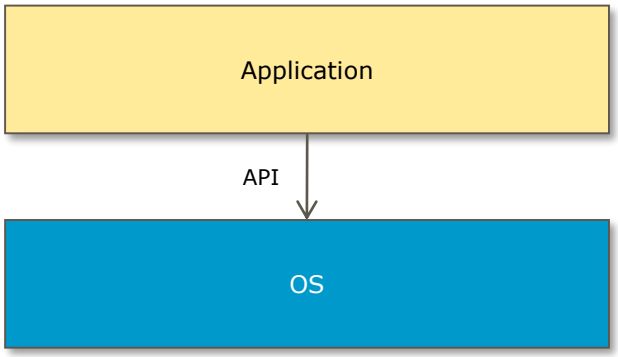
OS Organization

- Access to hardware is not allowed
- Access to hardware is made via system services

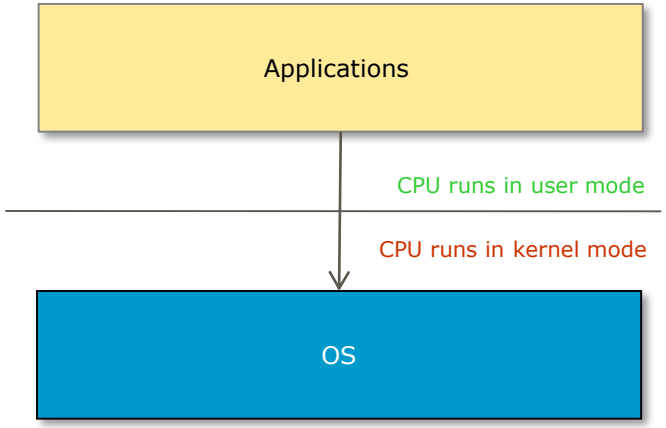


OS Model

- Applications access the OS via one defined Application Program Interface (API)

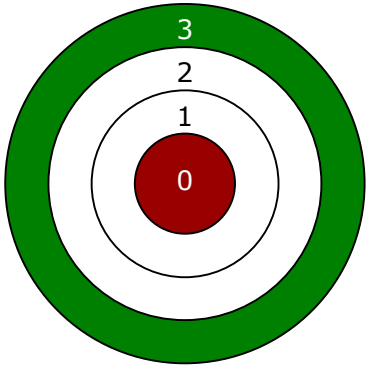


OS Contexts


Applications
CPU runs in user mode
CPU runs in kernel mode
OS

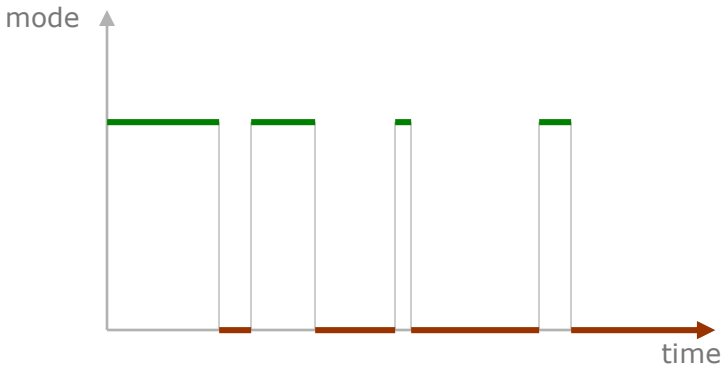
CPU Modes

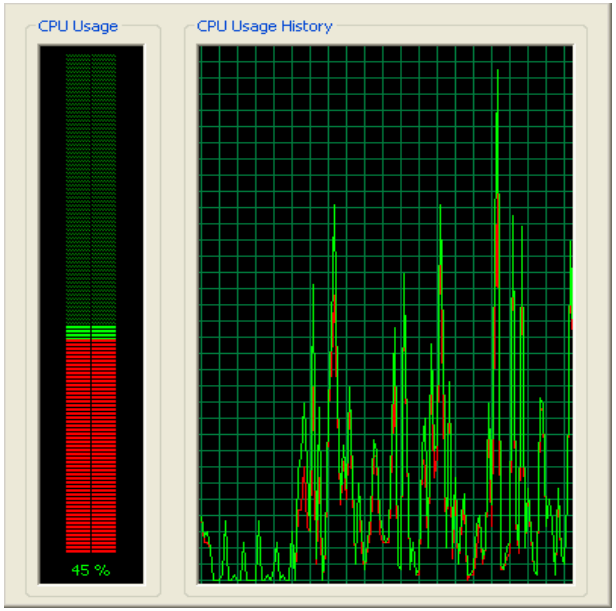
- Protect critical system data from user applications
  - User mode
  - Kernel mode



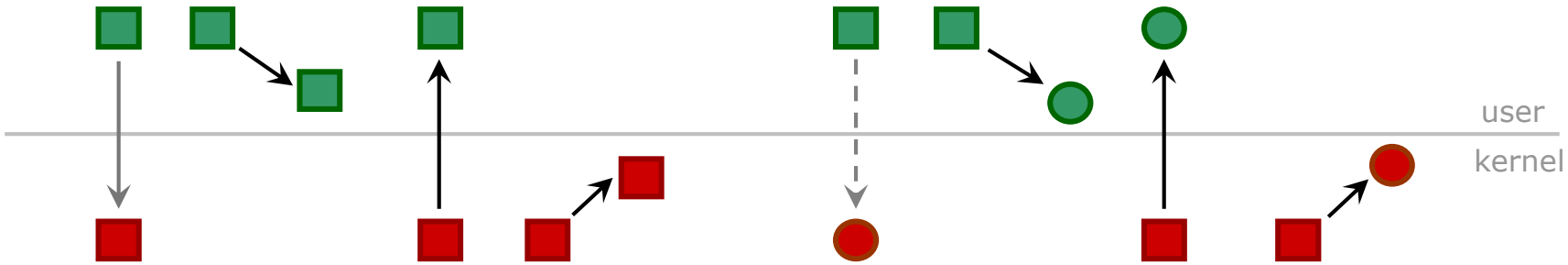
CPU Modes - mechanism

- User programs typically run in both modes
- CPU mode switch <> CPU context switch



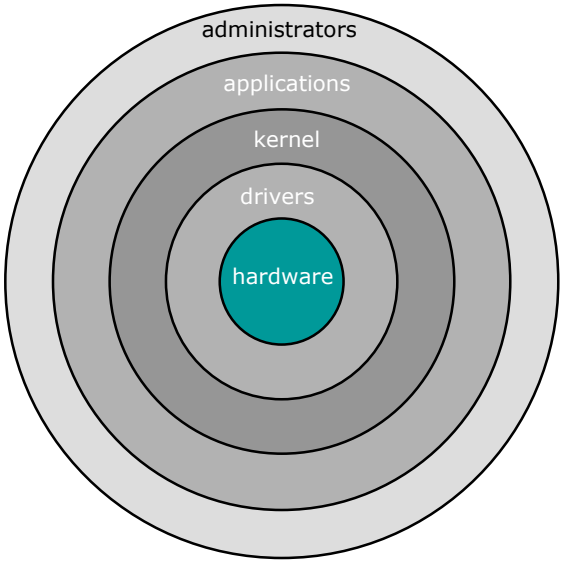


CPU Modes - scenarios



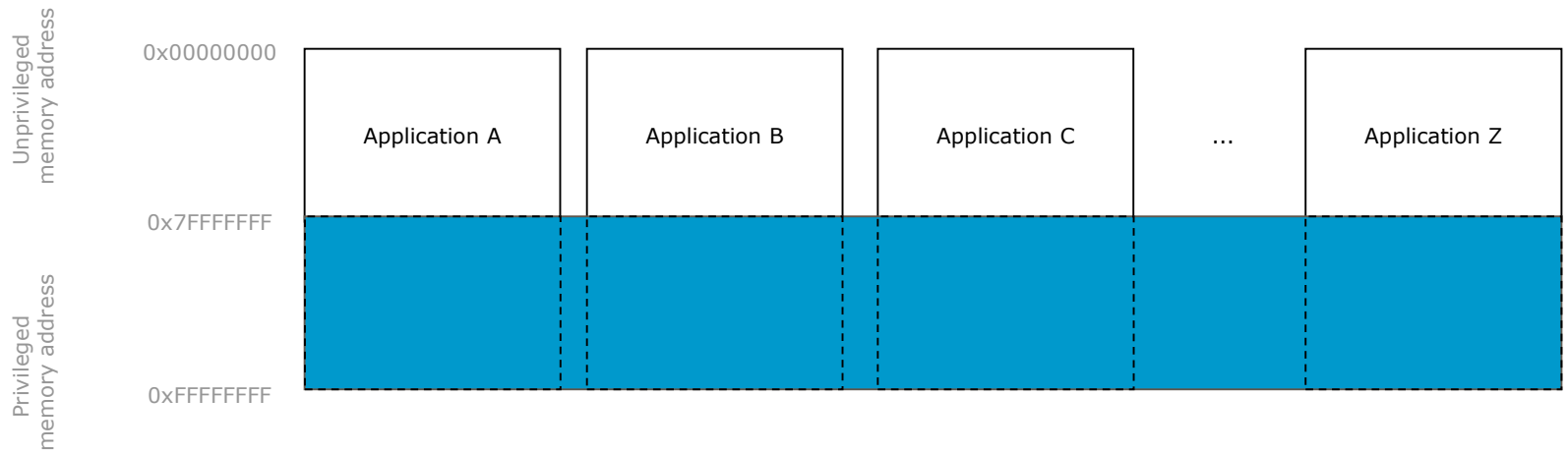
TCB

- Context
  - No CPU restriction in kernel
  - No memory restriction in kernel
  - No security check in kernel
- Definition
  - Portions of the system trusted to enforce the security
- Components
  - Most hardware
  - All kernel code
  - Some user code (SeTcbPrivilege)
  - Administrators

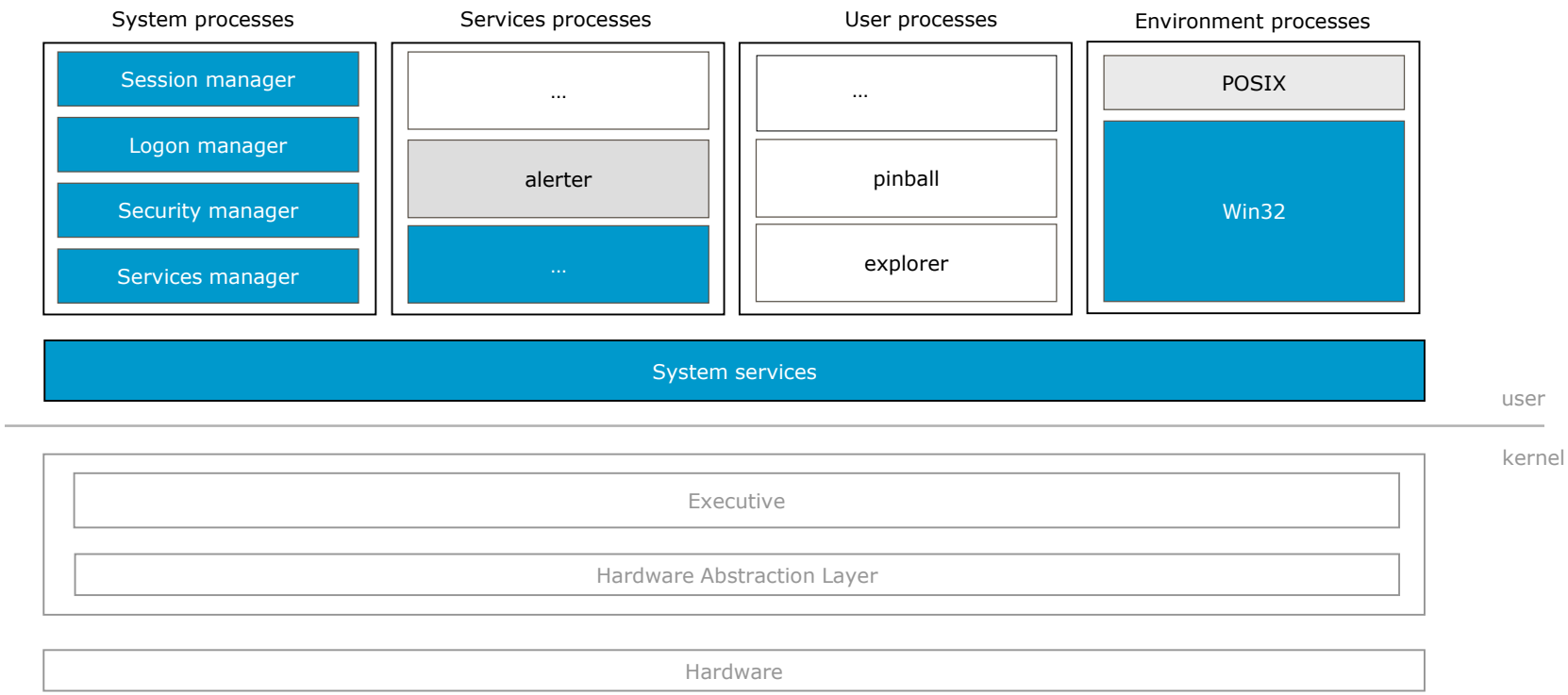


Memory Layout

- Each application occupies 4 GB of address space
- All applications share system memory space

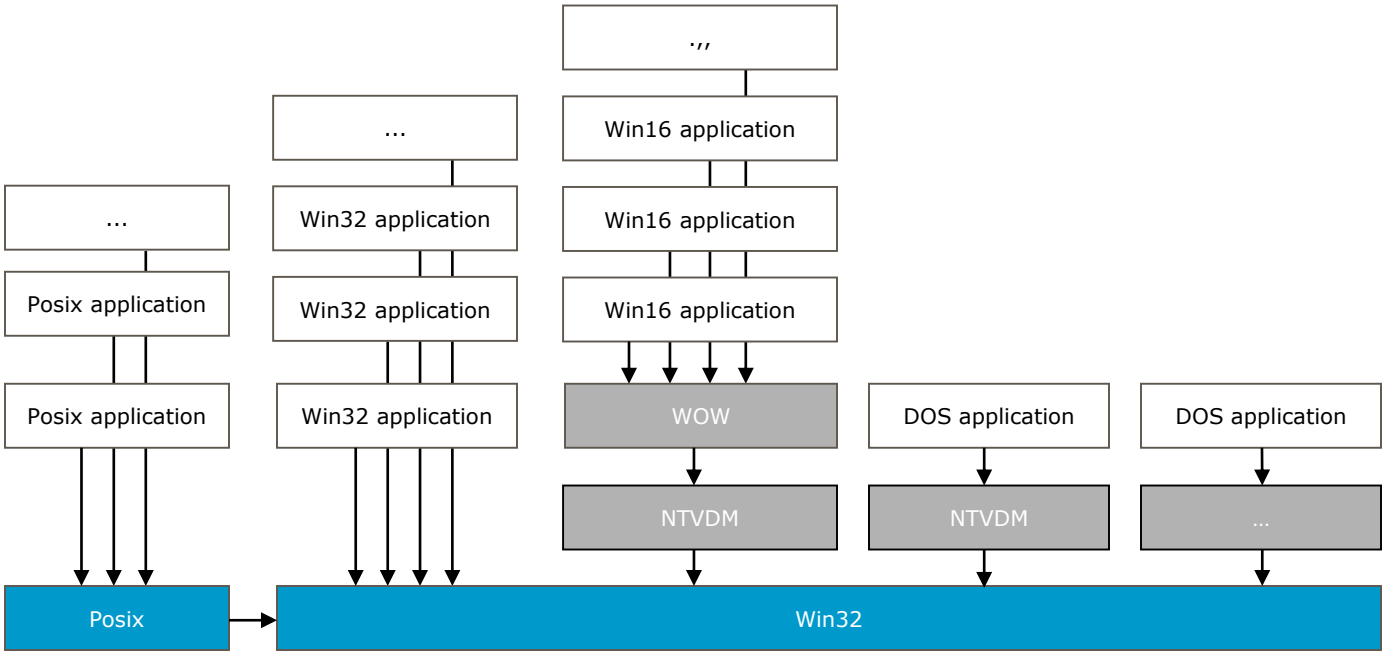


OS Major Components



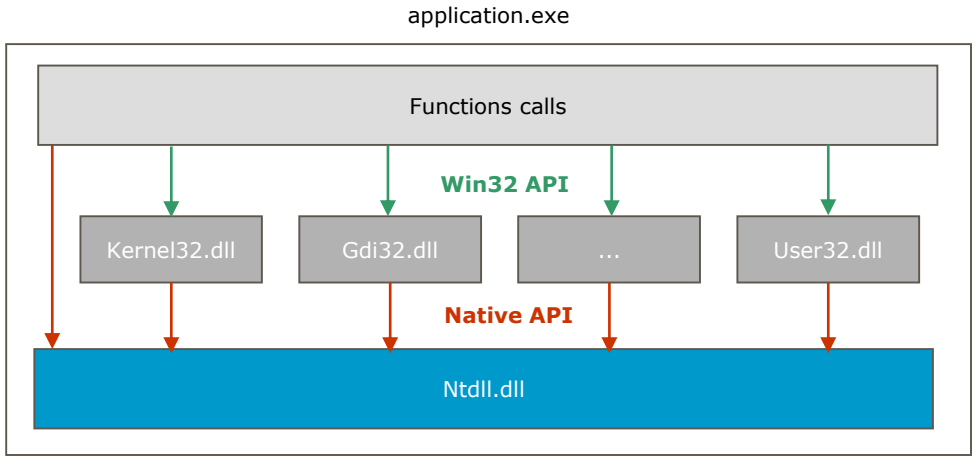
Environment Subsystems

- Definition
- Role
- Types

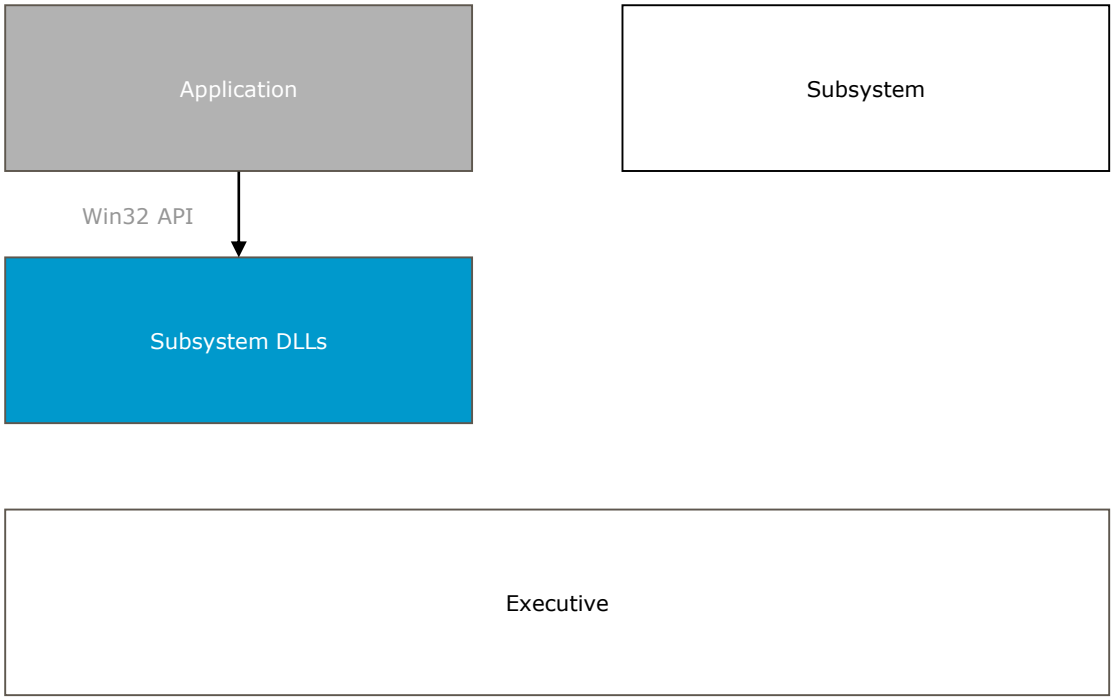


Environment Subsystems - interfaces

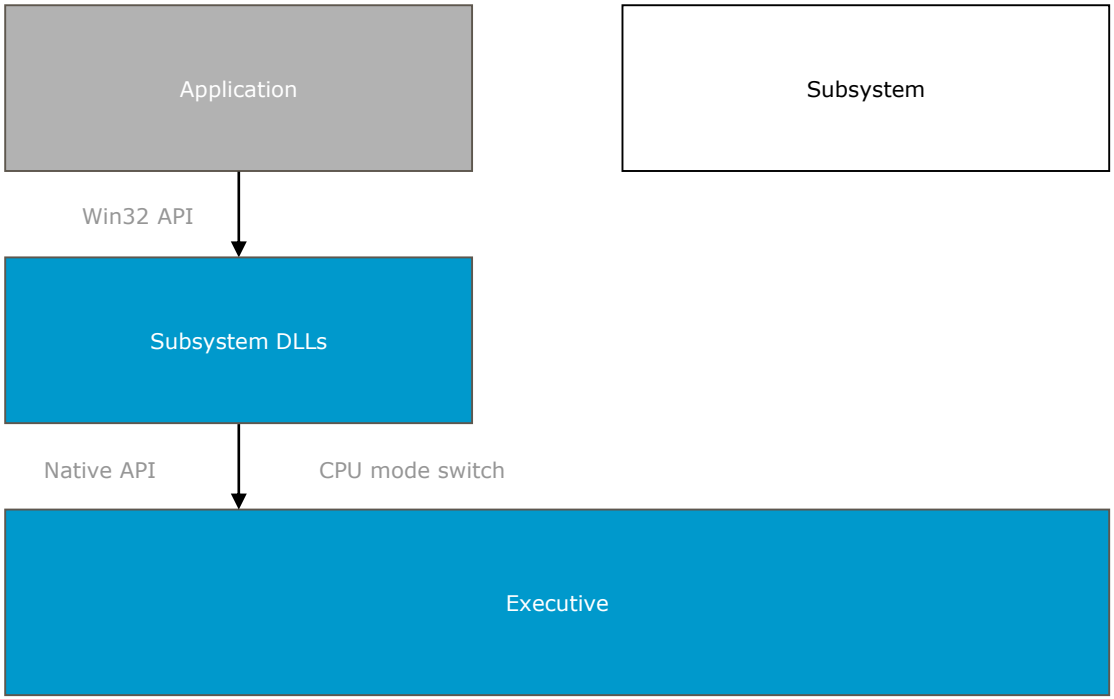
- Subsystem
  - Process runs in a private address space
- Application
  - Sends messages to subsystem
  - Unaware of messages
  - Implicitely linked with systems's interfaces (image = code + metadata)



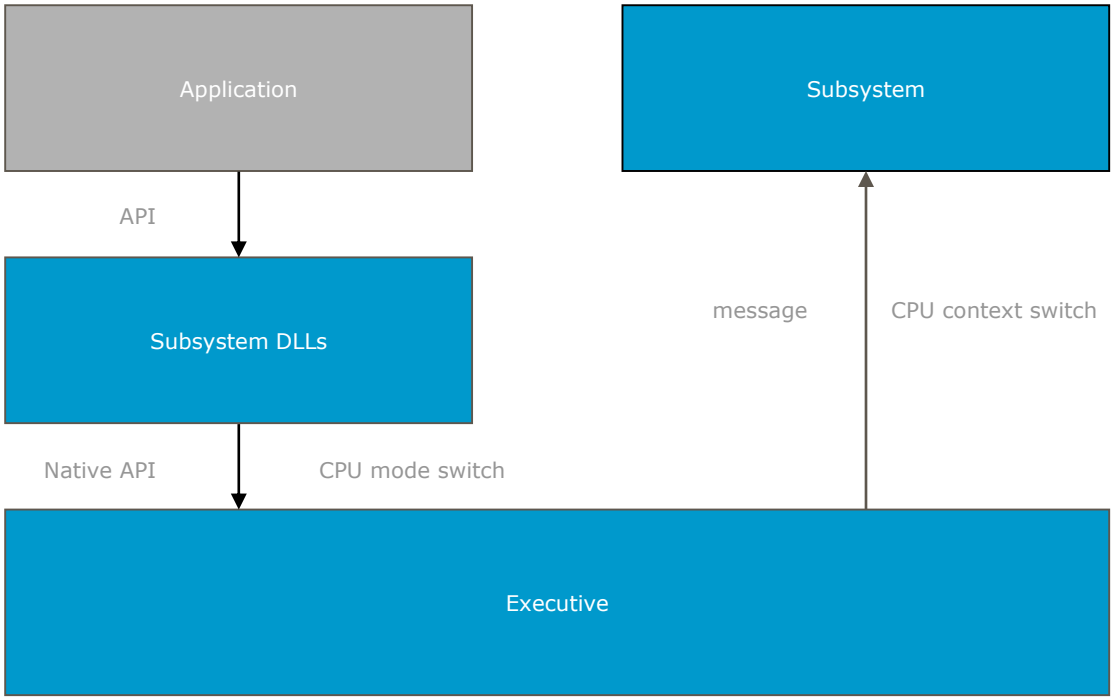
Environment Subsystems - strategy



Environment Subsystems - strategy



Environment Subsystems - strategy

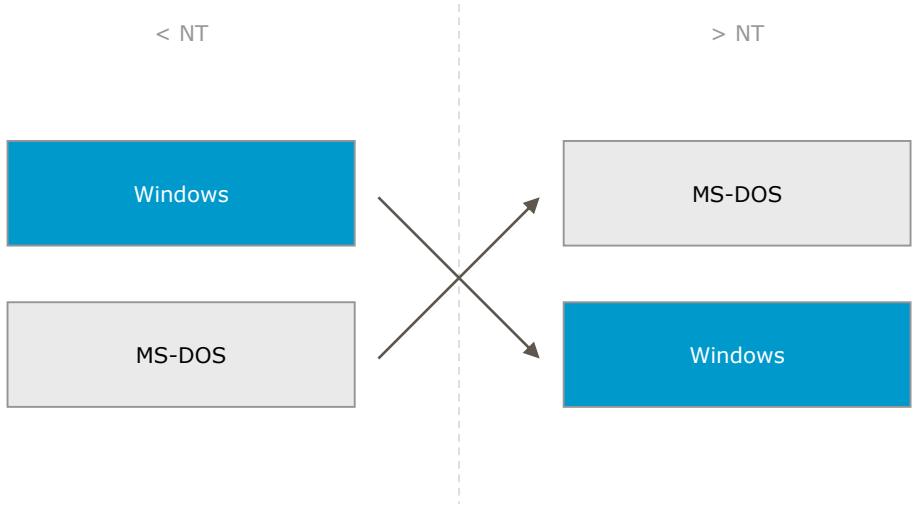


Environment Subsystems - strategy

Service implementation	CPU mode switching	CPU context switching	Message sent
User process	No	No	No
Executive	Yes	No	No
Server	Yes	Yes	Yes

Win16 Support

- MS-DOS applications
  - One-one relation
- Win16 applications
  - Many-one relation



System processes

- Are started by the system
- Are running on every system
- Cannot be stopped

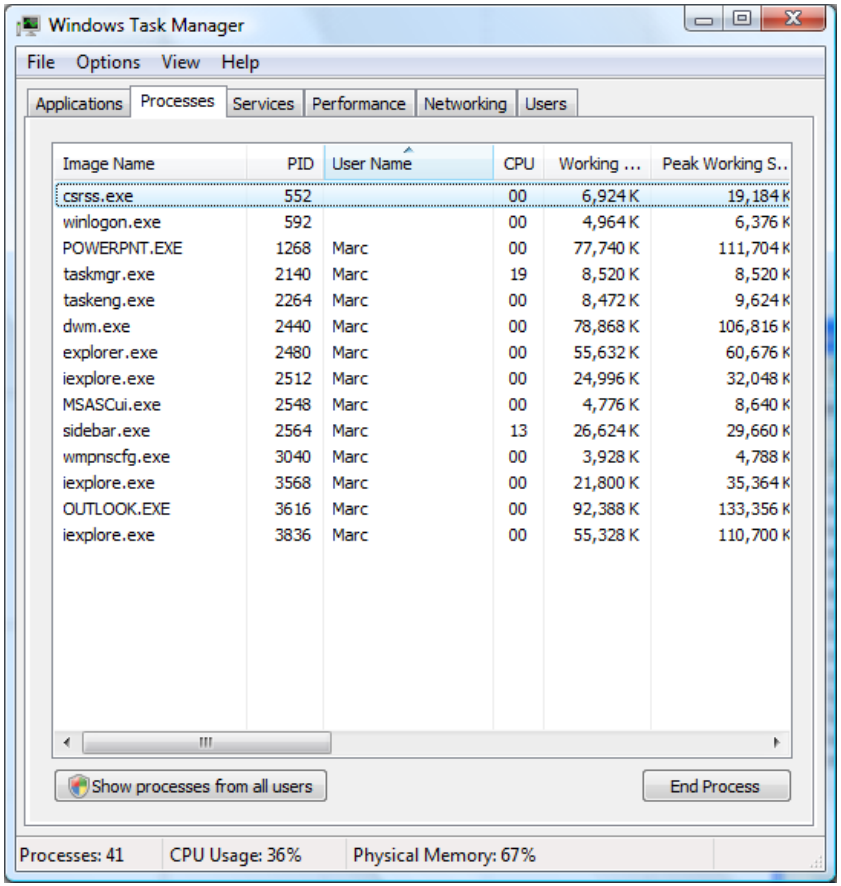
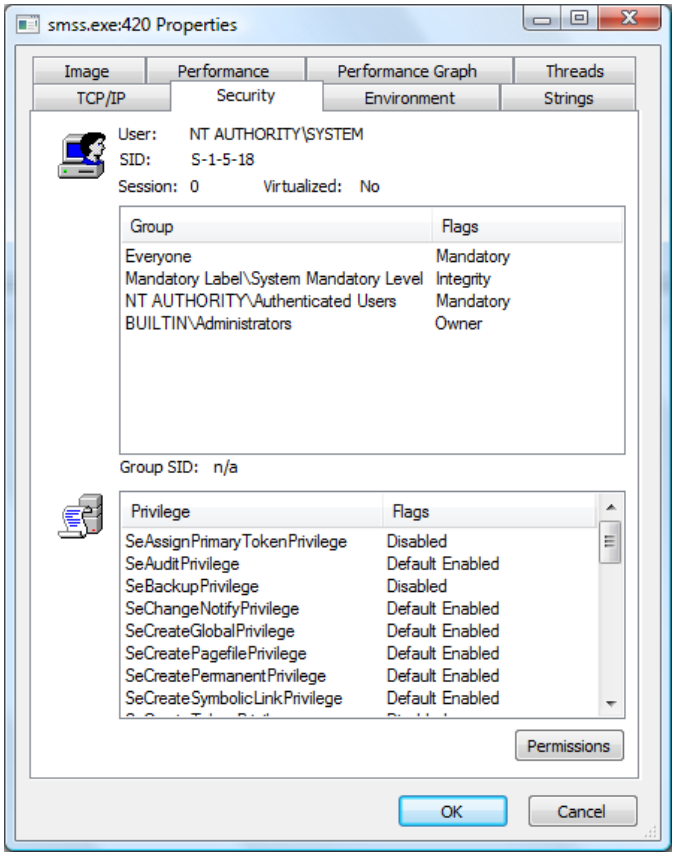


Image Name	PID	User Name	CPU	Working ...	Peak Working S..
csrss.exe	552		00	6,924 K	19,184 K
winlogon.exe	592		00	4,964 K	6,376 K
POWERPNT.EXE	1268	Marc	00	77,740 K	111,704 K
taskmgr.exe	2140	Marc	19	8,520 K	8,520 K
taskeng.exe	2264	Marc	00	8,472 K	9,624 K
dwm.exe	2440	Marc	00	78,868 K	106,816 K
explorer.exe	2480	Marc	00	55,632 K	60,676 K
iexplore.exe	2512	Marc	00	24,996 K	32,048 K
MSASCui.exe	2548	Marc	00	4,776 K	8,640 K
sidebar.exe	2564	Marc	13	26,624 K	29,660 K
wmpnscfg.exe	3040	Marc	00	3,928 K	4,788 K
iexplore.exe	3568	Marc	00	21,800 K	35,364 K
OUTLOOK.EXE	3616	Marc	00	92,388 K	133,356 K
iexplore.exe	3836	Marc	00	55,328 K	110,700 K

Session Manager Subsystem

- Definition
- Role
- Particularities
  - Part of the TCB
  - Native user application



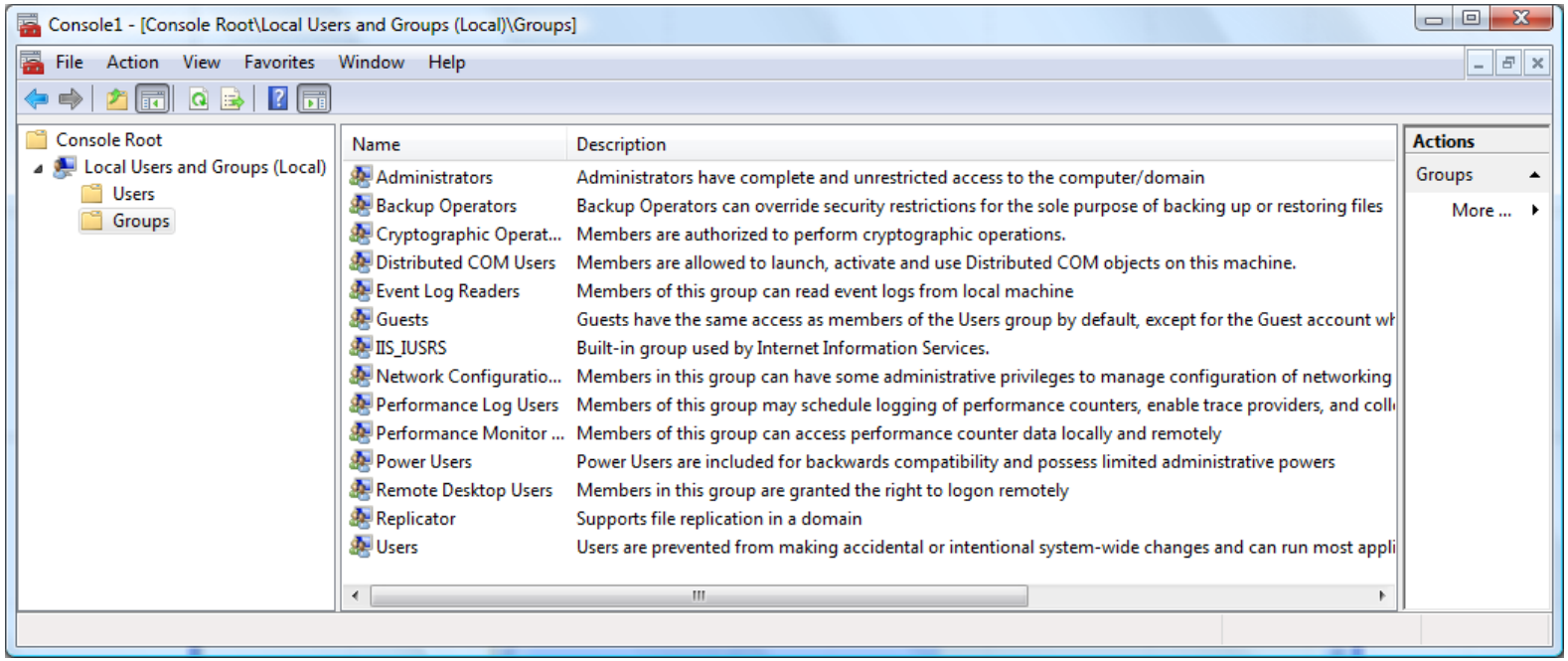
Logon Manager

- Definition
- Role
  - Interactive logon request management
  - Authentication User interface management
  - User profile initialization
  - Shell creation
  - TASKMGR management

Who you are (identification)	
What you know (authentication)	What you are (authentication)

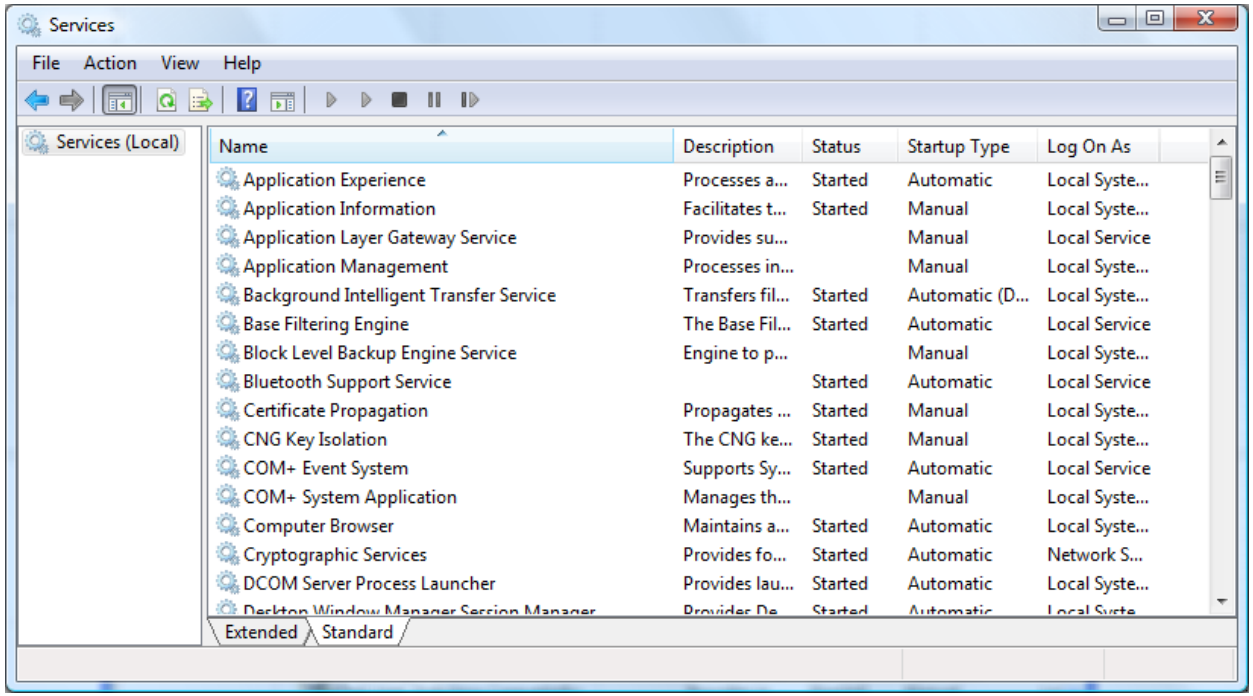
Local Security Authority Subsystem

- Definition
- Role

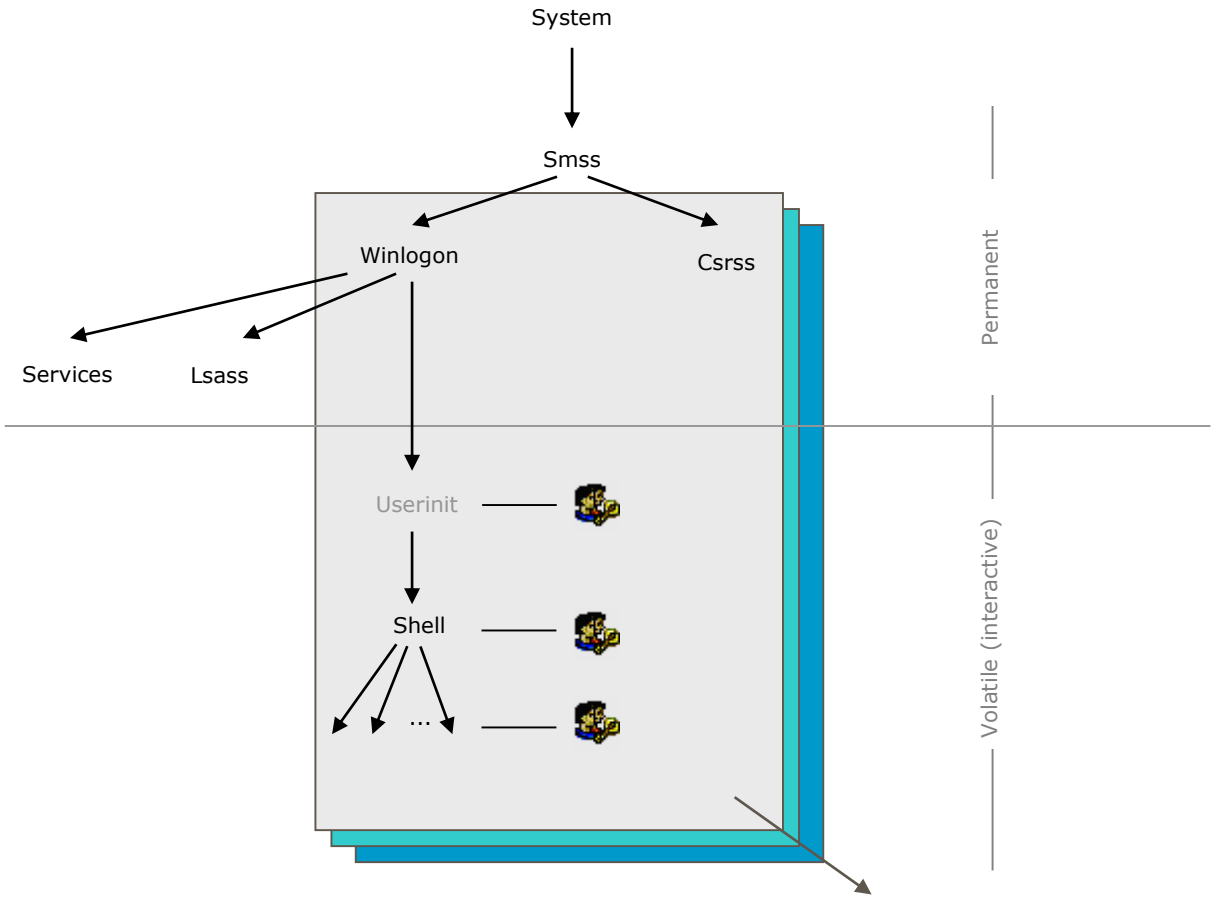


Service Control Manager

- Definition
- Role



User Processes - creation



Thanks!