Mobile Computing
Lecture 29
Windows CE 1

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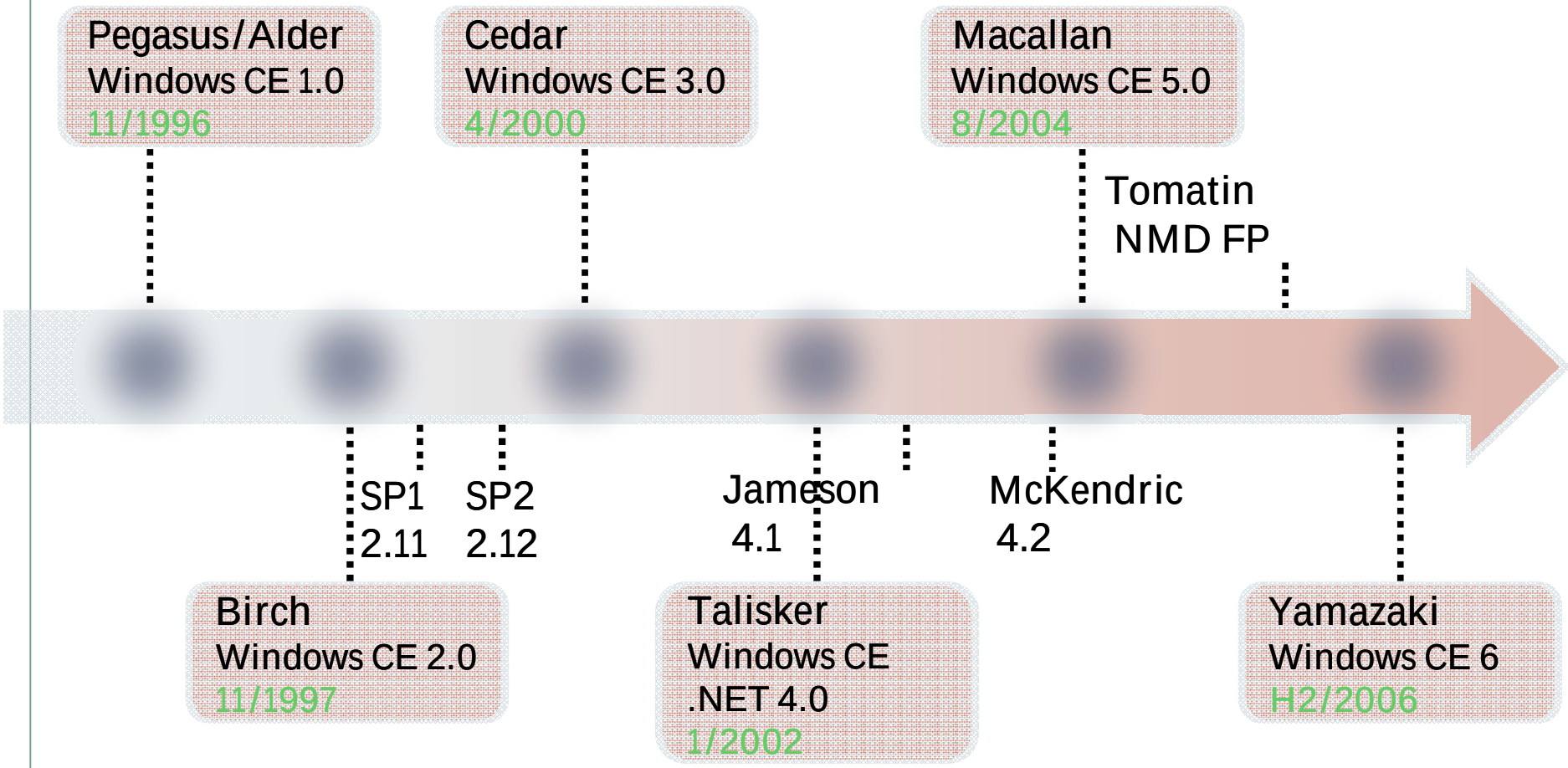
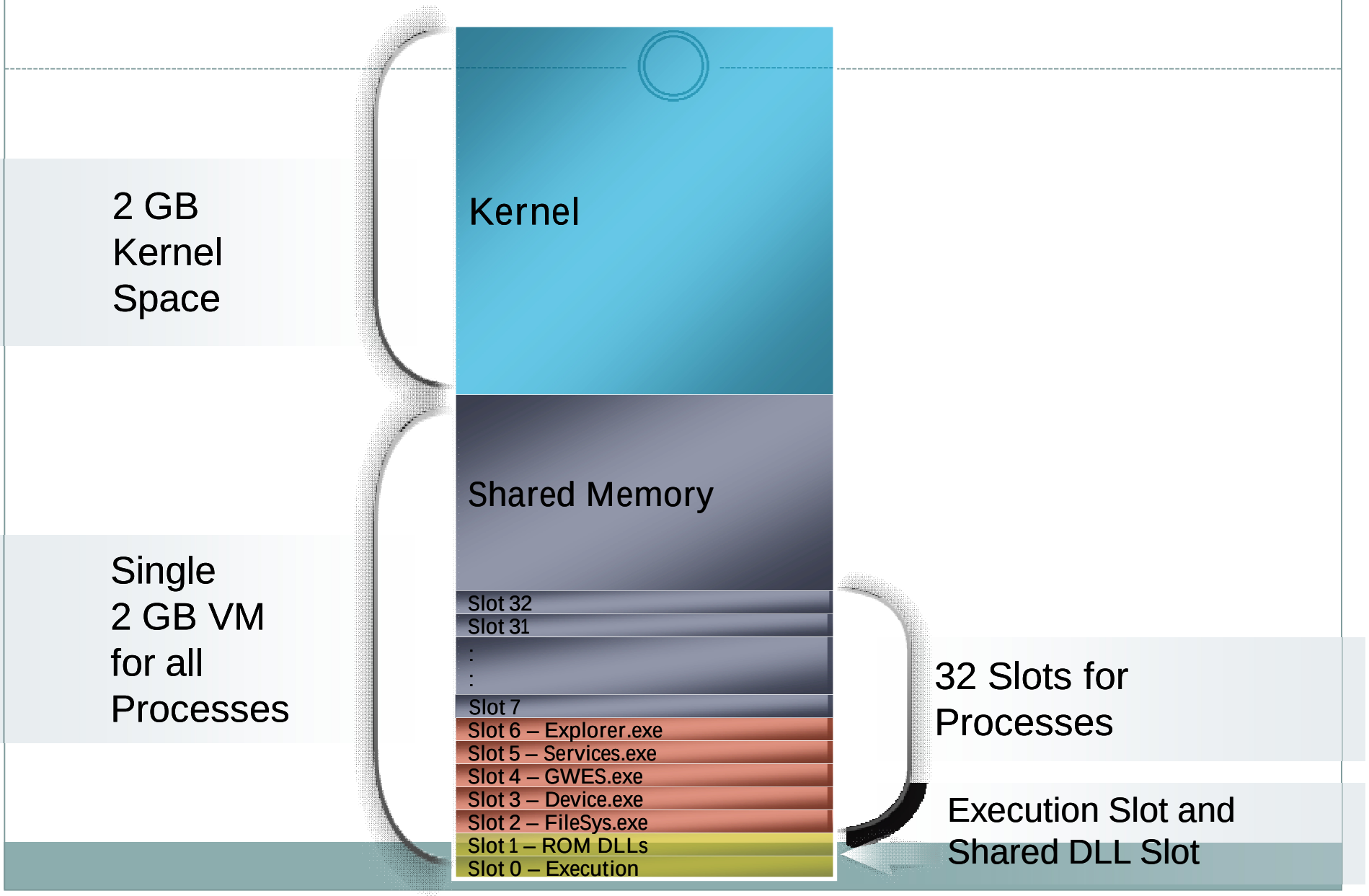
Brief History



Windows CE Limits

- From Windows CE 1 to Windows CE 5, Windows CE has always had limits
  - 32 processes at any one time
  - 32 MB Virtual Memory per process

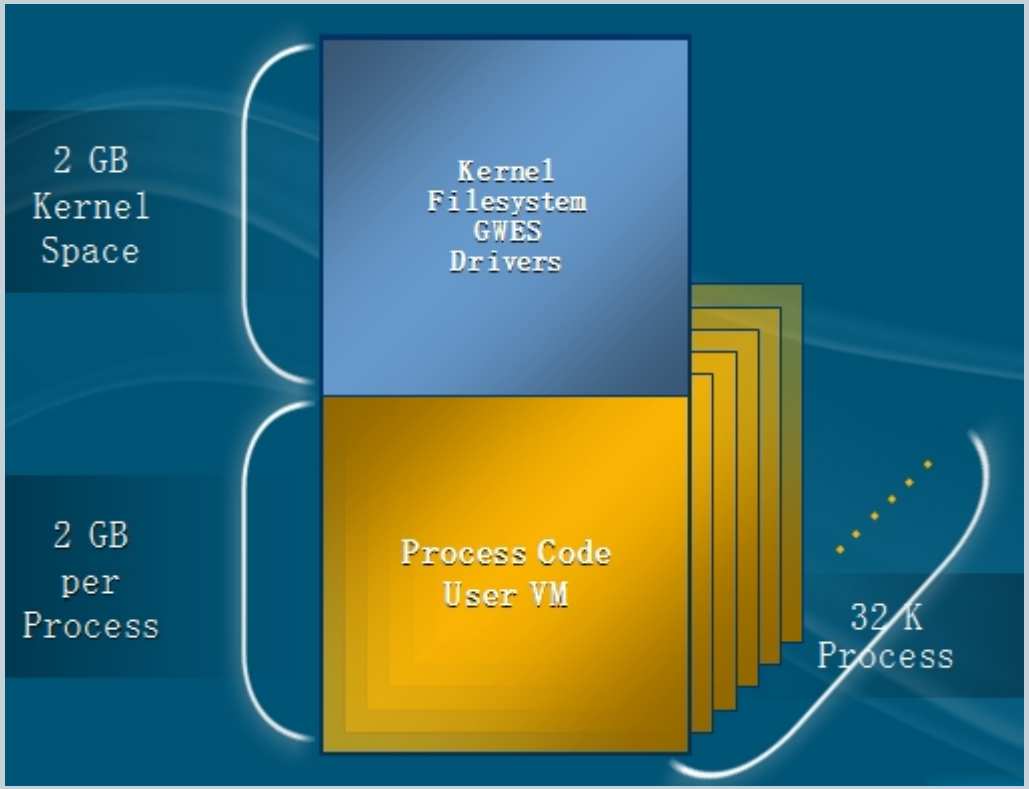
Windows CE 5.0 Memory Model



Windows CE 5.0 Memory Model

- Virtual Memory Map
  - 2 GB for Kernel
  - Single 2 GB mapping for all processes
    - Divided up into 32 MB “slots”
- 32 Process Limit
  - Each process has one 32 MB slot
  - 32 slots for processes
- Shared memory
  - Upper half of user space is shared memory
  - Read / Write by all processes

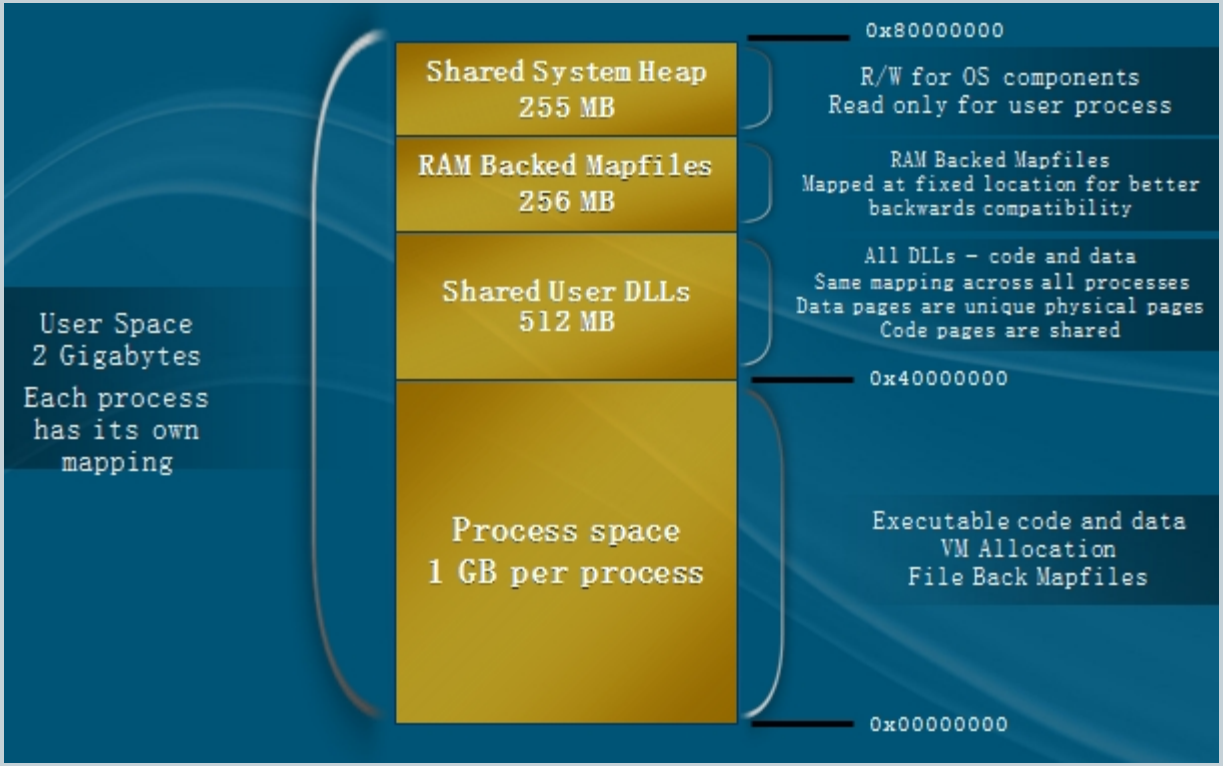
Windows CE 6.0 Memory Model



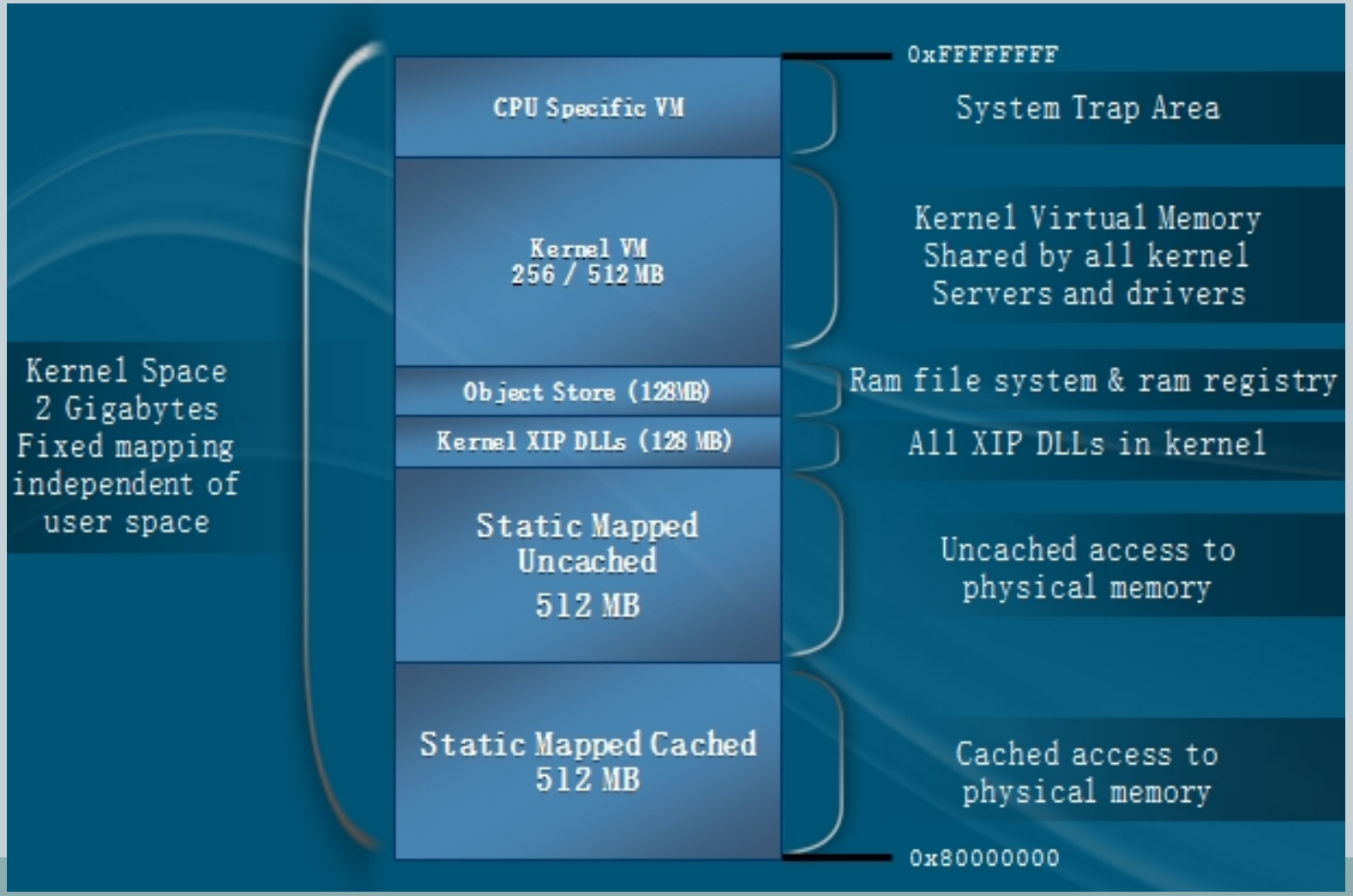
Introducing the New Kernel

- 2 GB of Virtual Memory per process
- 32,000 processes
- Unified Kernel
  - Critical OS components moved into kernel space
- Improved system performance
- Increased security and robustness
- High degree of backwards compatibility

Application Virtual Memory Space



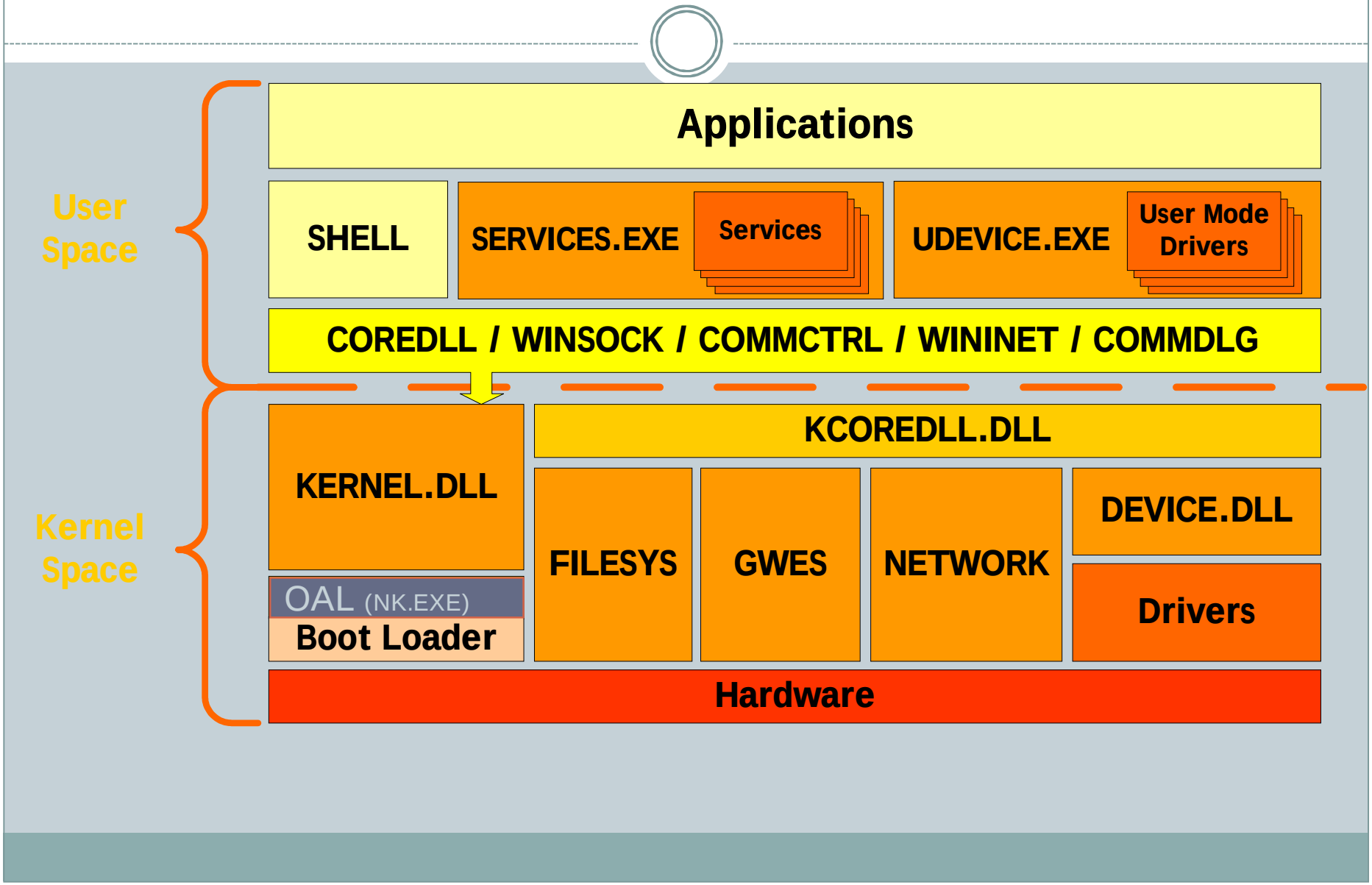
Kernel Virtual Memory Space



New OS Layout

- Moving critical drivers, file system, and graphical window manager into the kernel
  - Kernel version of Coredll.dll
    - Same APIs without the thunks
- Benefit
  - Greatly reduces the overhead of system calls between these components
  - Reduces overhead of all calls from user space to kernel space
  - Increase code sharing between base OS services

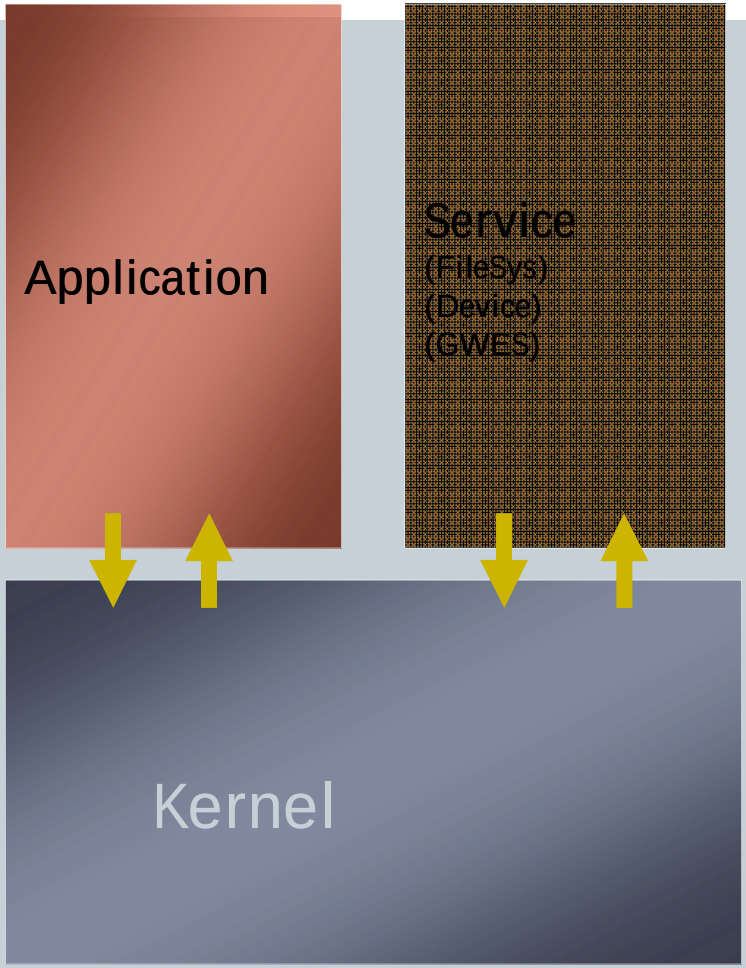
New OS Layout



Performance & Size

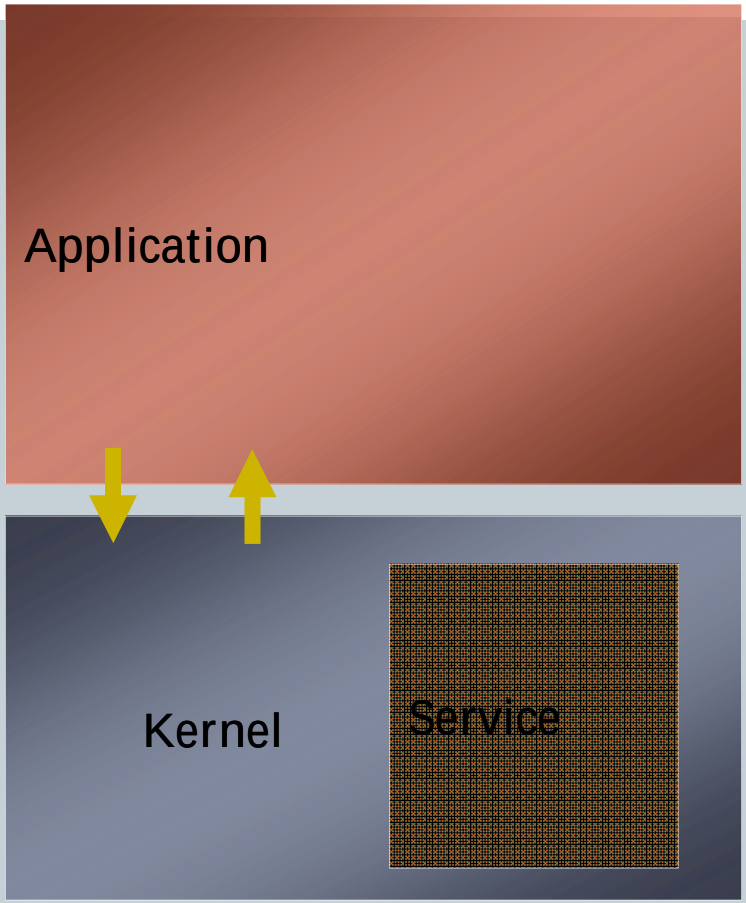
- Improvements expected in process switching
- Same performance
  - Thread Switching
  - Memory Allocation
  - System Calls
- Some slow down with interprocess calls
  - Now involves data marshalling
- Size increase is less then 5%

Windows CE 5.0 System Calls



- Application makes call
  - PSL jump
- Kernel
  - Validates parameters
  - Maps Service into Slot 0
    - Possible Cache Flush
  - Calls into to the service
- Service
  - Runs
  - Returns to Kernel
- Kernel
  - Maps App into Slot 0
    - Possible cache flush
  - Returns to App

Windows CE 6.0 Beta System Calls



- Application makes call
  - Same call to coredll.dll
  - App stays mapped during the call
- Kernel
  - Validates parameters
  - Calls into to the service
- Service
  - Runs
  - Returns directly to the app

New Features

- New Security Model
  - “Trust / Run / No Load” model gone
  - New: “Trust / No Load”
- Prepares operating system for ACL security
  - Windows XP-like Access Control List security to be implemented in the future

New Features

- New File Systems
  - ExFAT
    - Large file support
    - Large volume support
  - UDFS 2.5 read only support

- Large Memory Mapped File Support
  - Support for mapping views into very large files
  - Up to 64-bit files
  - Big benefit for in car navigation and multimedia

New Features

- New driver support
  - USB On-the-go (OTG)
  - New USB Function / Host class drivers
- Enhanced VoIP support
  - VoIP support over wired and WLAN networks
  - Full-featured phone application
  - Updated SIP signaling and Media stack (RTC 1.5)

New Features

- Wireless LAN enhancements
  - Multiple radio support and faster AP-AP roaming
  - Added 802.11i support for WPA2 compliance
  - Added 802.11e support for QoS
- Bluetooth enhancements
  - BT protocol stack performance optimizations
  - Enhanced BT profiles: A2DP, AVRCP