



1990 Worldwide Developers Conference

A/UX[®] 2.0:
The best of both worlds



Rob Smith
John Sovereign

A/UX Product Development



Building A/UX Device Drivers

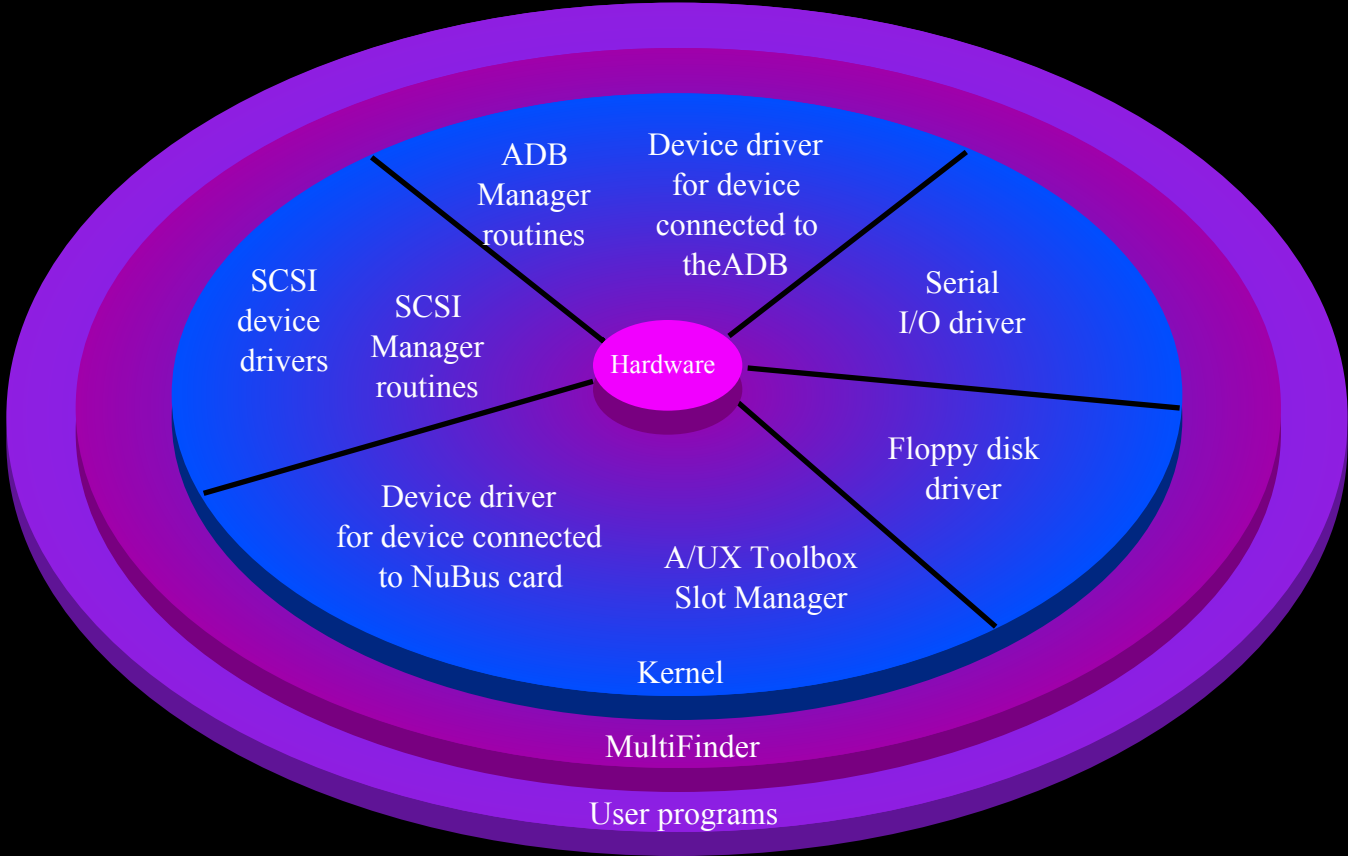
When to Build A/UX Device Drivers

- UNIX device drivers for your hardware
 - SCSI devices
 - ADB devices
 - NuBus and PDS devices (except video)

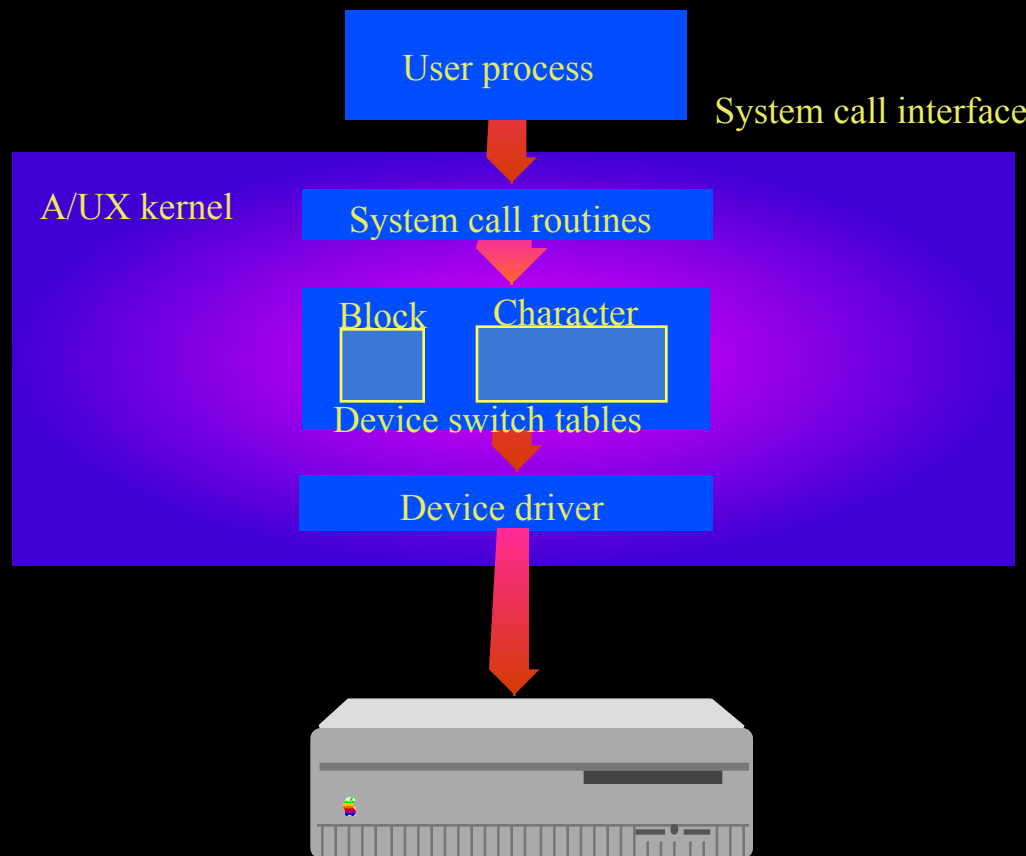
How to Build UNIX Device Drivers

- A/UX system overview
- Application access to kernel drivers
- Device driver and kernel routines
- Device driver tools

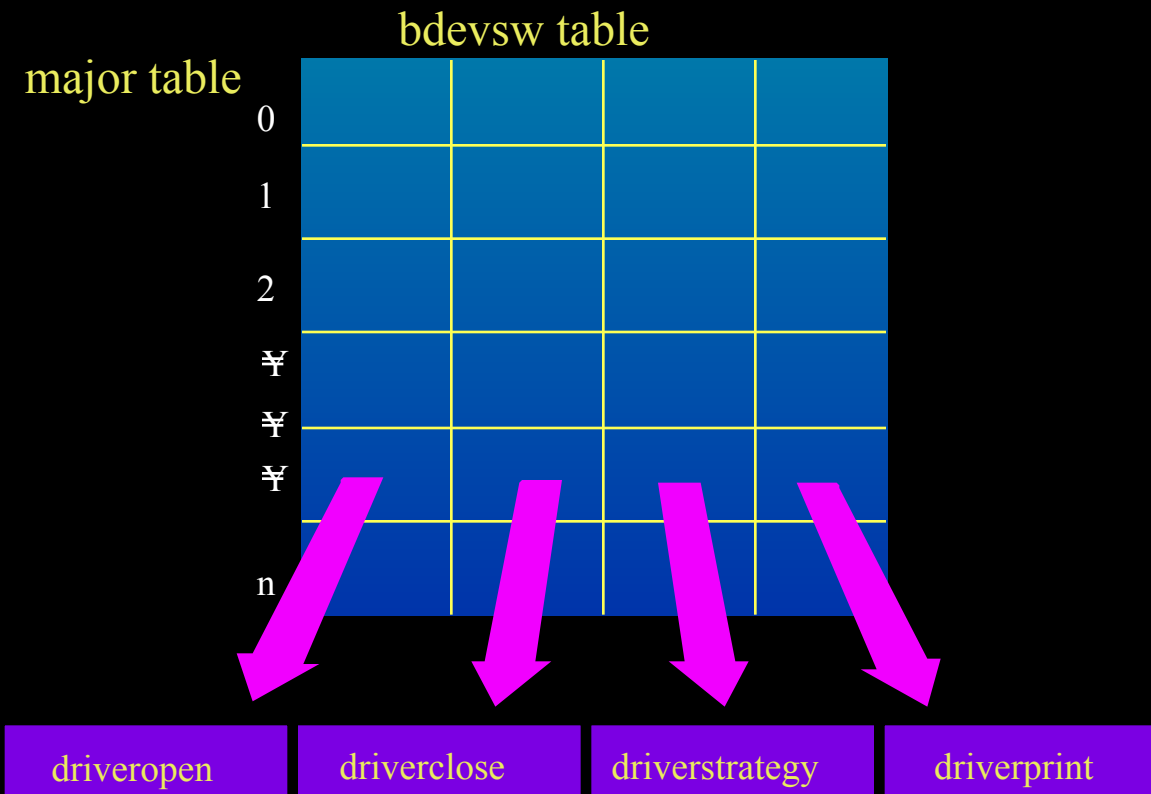
A/UX System Overview



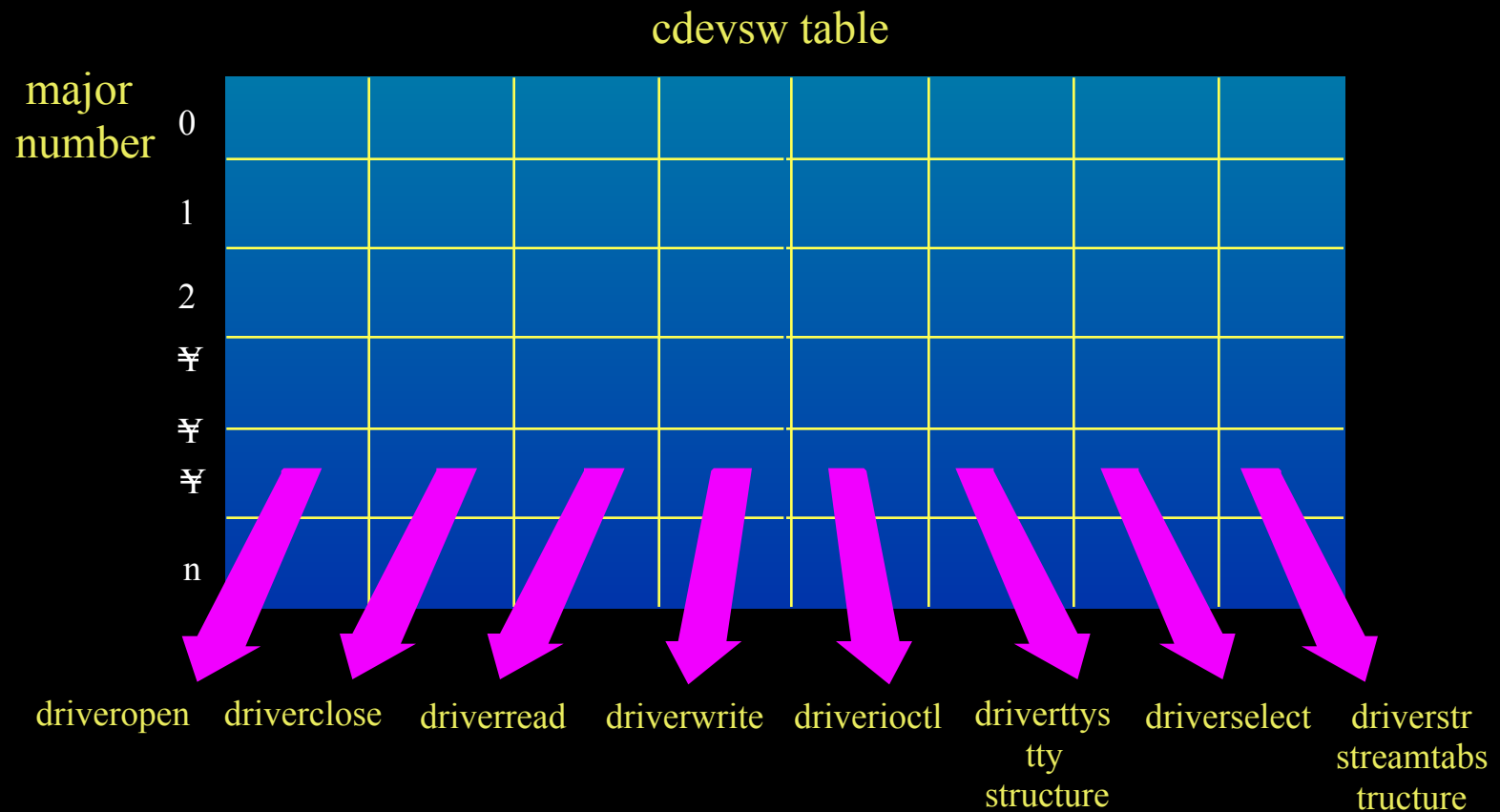
Application Access to Drivers



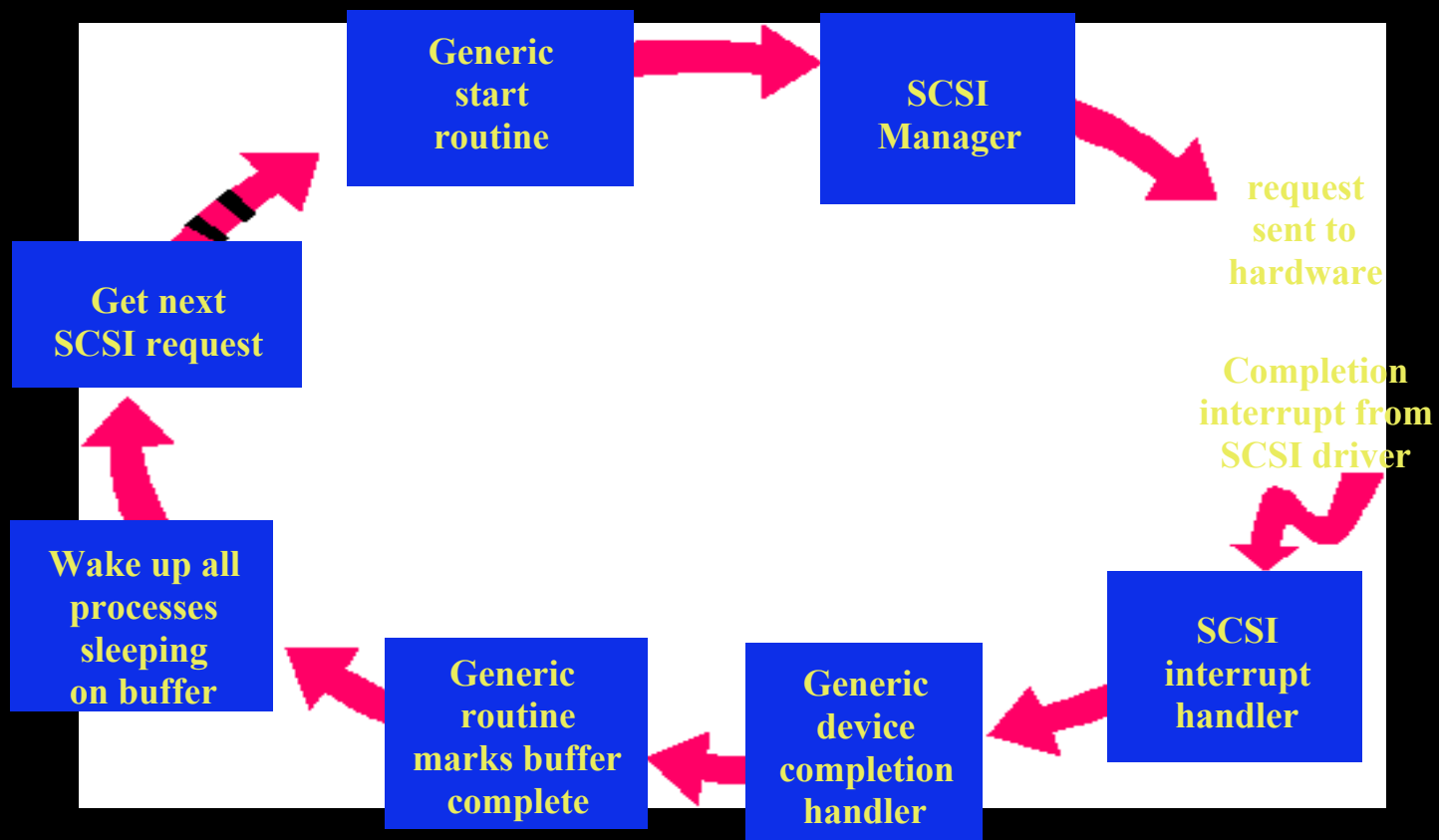
Block Device Switch Table



Character Device Switch Table



Disk Driver Service



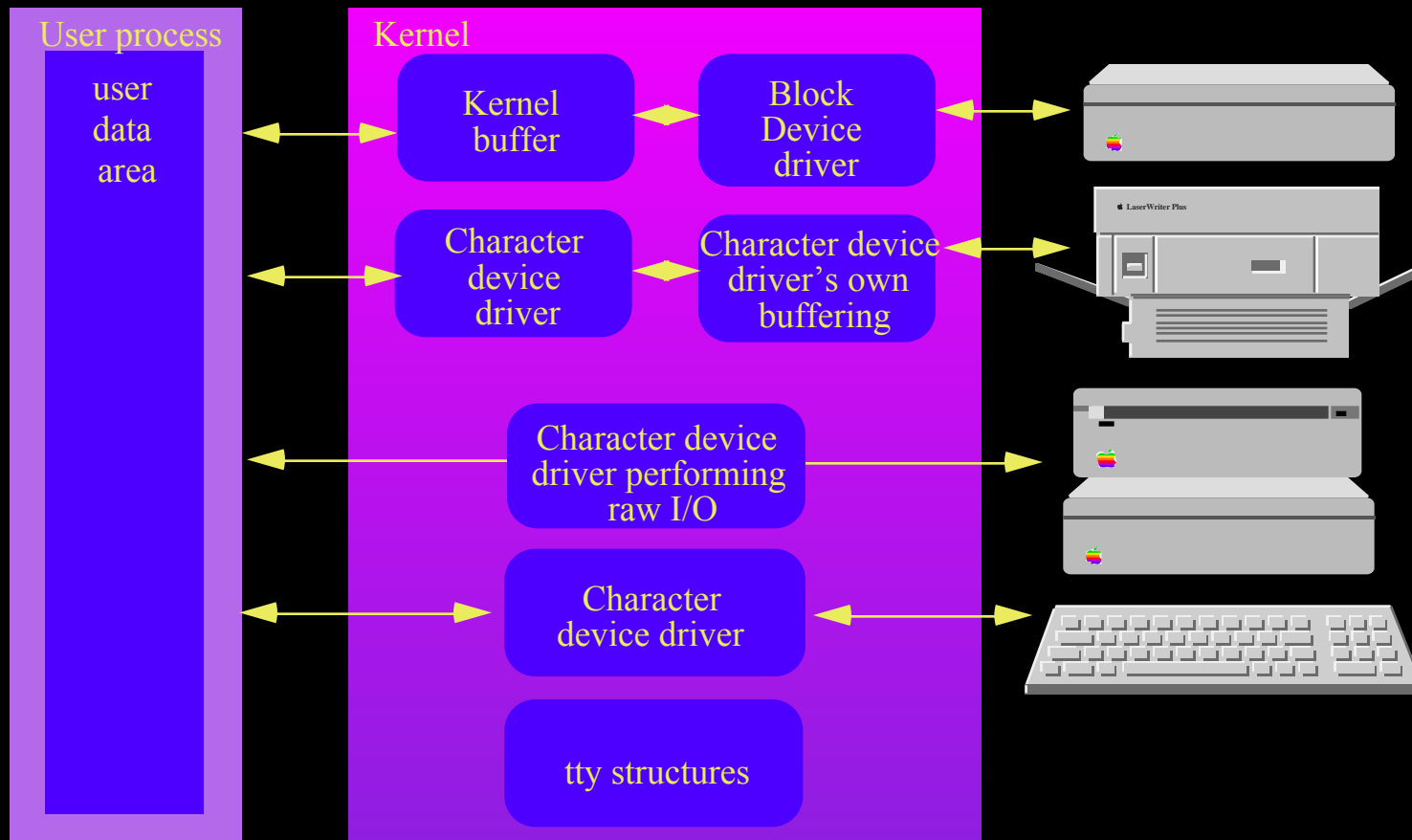
Ways to Wait On I/O

- Sleep() on an address
 - Removes process from run queue
 - Sleeps at a priority level
 - All process sleeping on same address are restarted by wakeup()
- Call biowait()
 - Used when waiting on i/o buffer
 - Restarted by call to biodone()

Device Driver Data Structures

- Block devices
 - Use the kernel i/o buffer cache
 - Parameters stored in “buf” structure
 - Driver r/w via single “strategy” routine
- Character devices
 - Data not buffered in kernel
 - Parameters stored in “uio” structure
 - Driver contains separate read() and write()

Data Buffering for Drivers



Tools for Kernel Configuration

- Installation of driver modules: *newconfig*
- Kernel reconfiguration: *autoconfig*
 - Detects presence of slot devices
 - Script-driven module linker
- Adjust kernel parameters: *kconfig*

Driver “Pitfalls”

- Compile w/o floating point
- Must be multi-tasking “friendly”
- Beware of the optimizer
- Must be multi-threaded

A/UX 2.0 Compatibility Issues

- Virtual memory model
- Serial manager support
- Header file changes (proc and u-block)
- Newconfig
- POSIX support

Where to Go for Help

- A/UX Device Driver Kit–APDA #M8037
- Several good books on UNIX internals
 - “The Design of the UNIX Operating System”, M. Bach
 - “The Design and Implementation of the 4.3BSD UNIX Operating System”, S.J. Leffler, et al.
- UNIX–friendly DTS

Source Files in the Driver Kit

- Hard disk and diskette drivers
- Serial chip driver
- Apple Ethernet card driver
- SCSI “Manager”
- Apple tape driver
- Apple Desktop Bus driver
- Streams display and keyboard drivers



A/UX: the best of both worlds