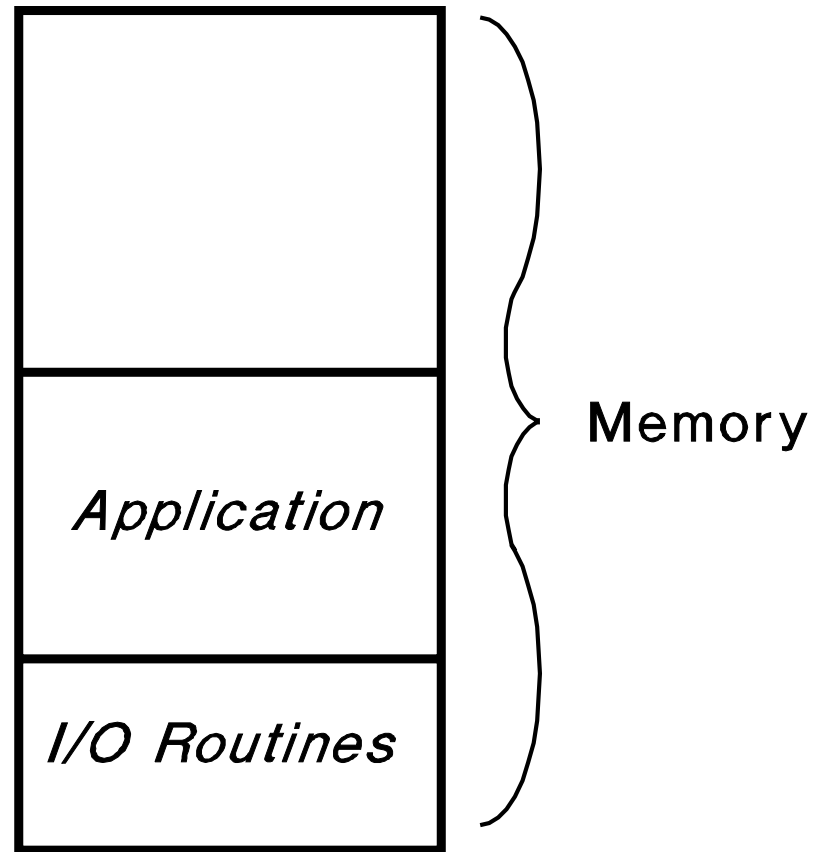


Operating System

- Different concepts
 - single user
 - multiprogramming
 - multi-user

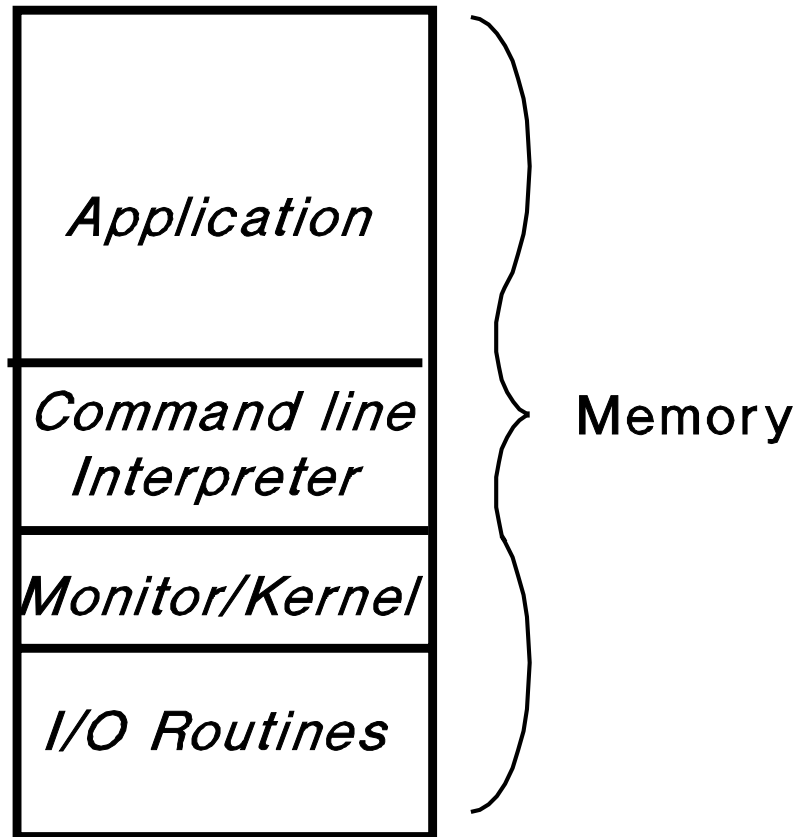
Operating System Evolution

Basic Input Output



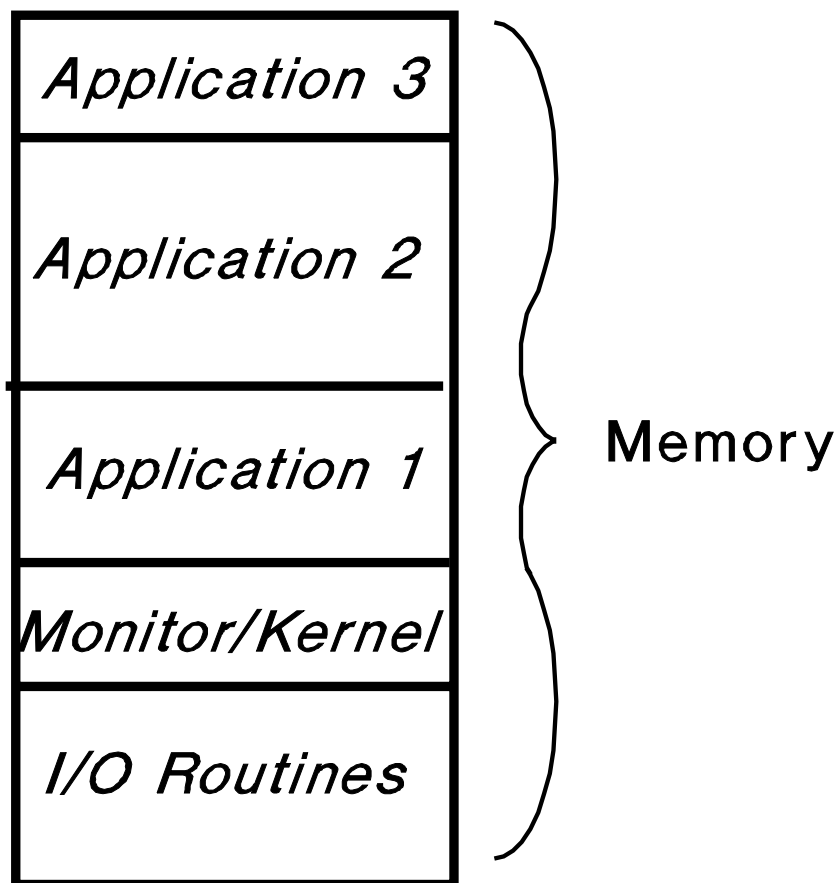
Operating System Evolution

Single User



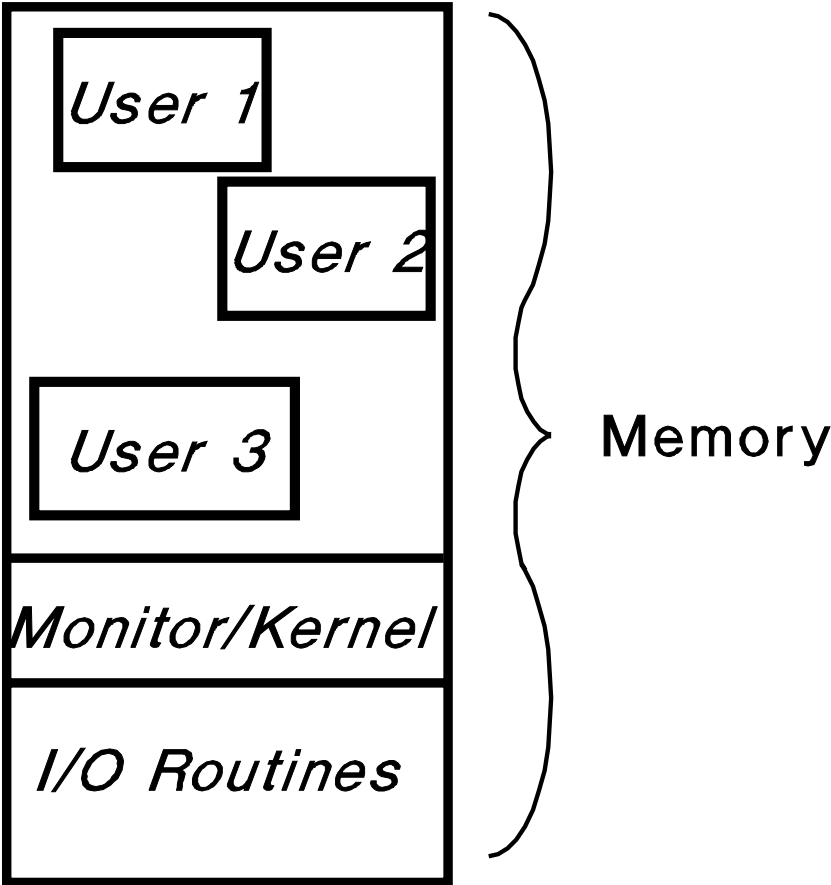
Operating System Evolution

Multiprogramming



Operating System Evolution

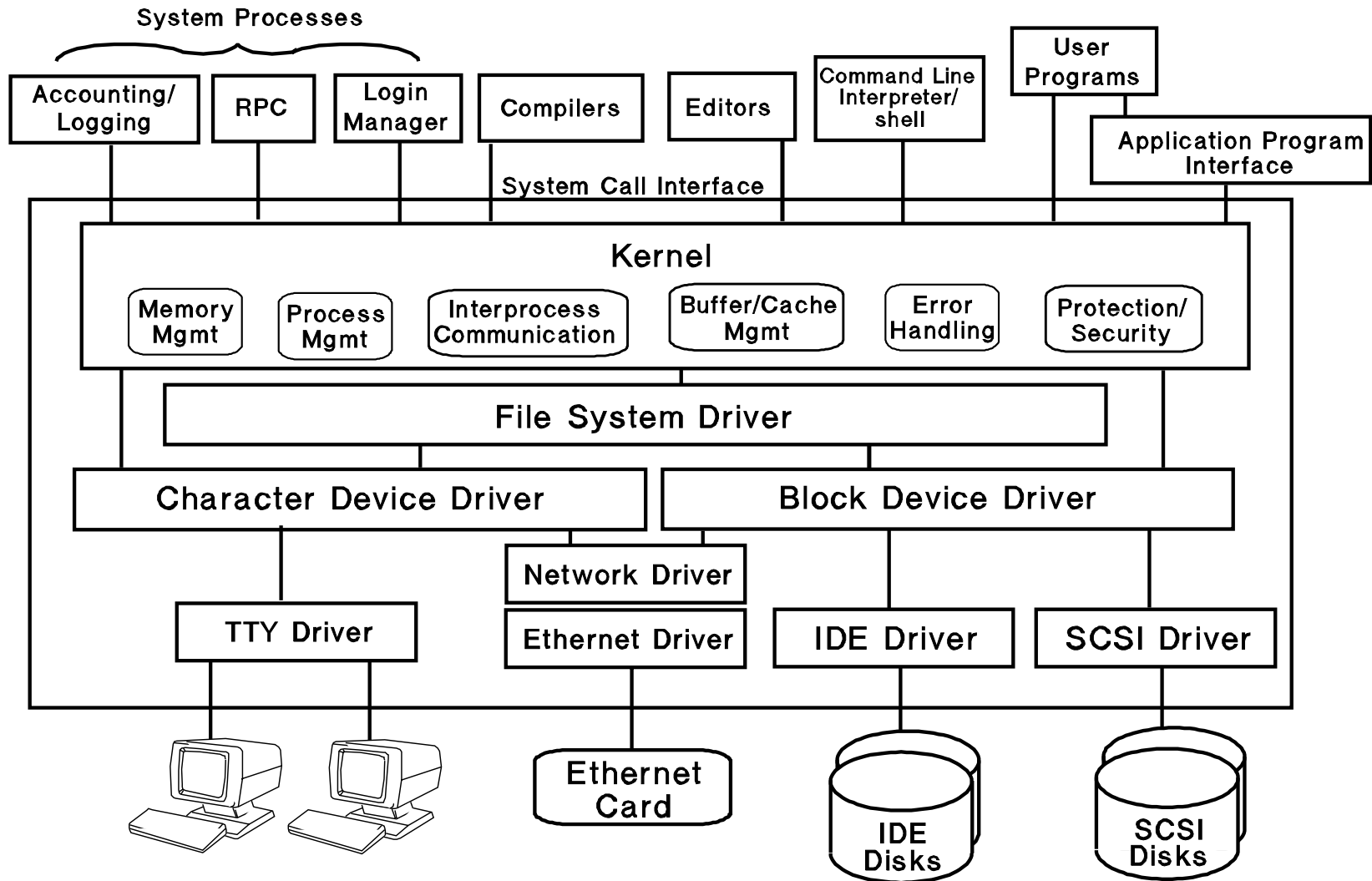
Multi-User



Operating System Functions

- *Process Management*
- *Main Memory Management*
- *File Management*
- *I/O System Management*
- *Secondary Storage Management*
- *Networking*
- *Protection*
- *Accounting/Logging*
- *Command Interpreter/GUI*

Operating System Overview



Linux

- a free Unix-type OS
- adheres to the POSIX standard:
Portable Operating System Interface
[for Unix]
- what came before?

MULTICS

- Multics (Multiplexed Information and Computing Service)
- mainframe area
- early OS (late 60s)
- last Multics system shut down in 2000, Canadian Dept. National Defense

UNICS

- Ken Thompson wanted “fast” response OS for “Space Wars” game
 - implemented UNICS (“UNI” versus “MULTI” from Multics)
 - implemented in assembly language for PDP-7

UNIX

- Dennis Ritchie suggested to rewrite the OS using C
 - which he had developed from B
 - initial concern that C would not be fast enough
 - still some assembly code
 - Bell Labs started using this UNIX and utilities like nroff and troff were developed

BSD UNIX

- Improvements made to Unix by UC Berkeley grad students
 - first good memory management system
 - first real networking capability
 - 1970 BSD UNIX was distributed to general public

System III and V

- Breakup of Bell Systems allowed AT&T to start selling UNIX licenses
 - System III and System V (mid 80s)
 - later System V Release 4

Evolution

- No clear winner between System V and BSD Unix. Following are System V based, but incorporate BSD features:
 - Solaris (Sun Microsystems)
 - HP-UX (HP)
 - AIX (IBM)
 - IRIS (Silicon Graphics)

Open Source Software

- Free software?
 - freedom to use, view, and modify
- Early days: Richard Stallman wrote version of Emacs and made available to public
 - he started GNU Project “GNU’s not Unix”
 - GNU C Compiler
- Free Software Foundation <http://www.fsf.org>

Linux

- Linus Torvalds posts message in newsgroup
 - who wants to participate? 1991
 - playing with MINIX he wanted to write “performance code”
 - release of Linux 1.0 (Linux = Linus’ Minix) under GNU GPL (General Public License) in 1994
 - first a few friends - now thousands of volunteer developers
 - 1996 Linux 2.0 became major competitor to other OSs, including commercial Unix

Linux vs Unix

- They are not the same!
 - no shared code
 - but: same POSIX standard
 - look and feel almost the same
 - BUT under the hood they are different!