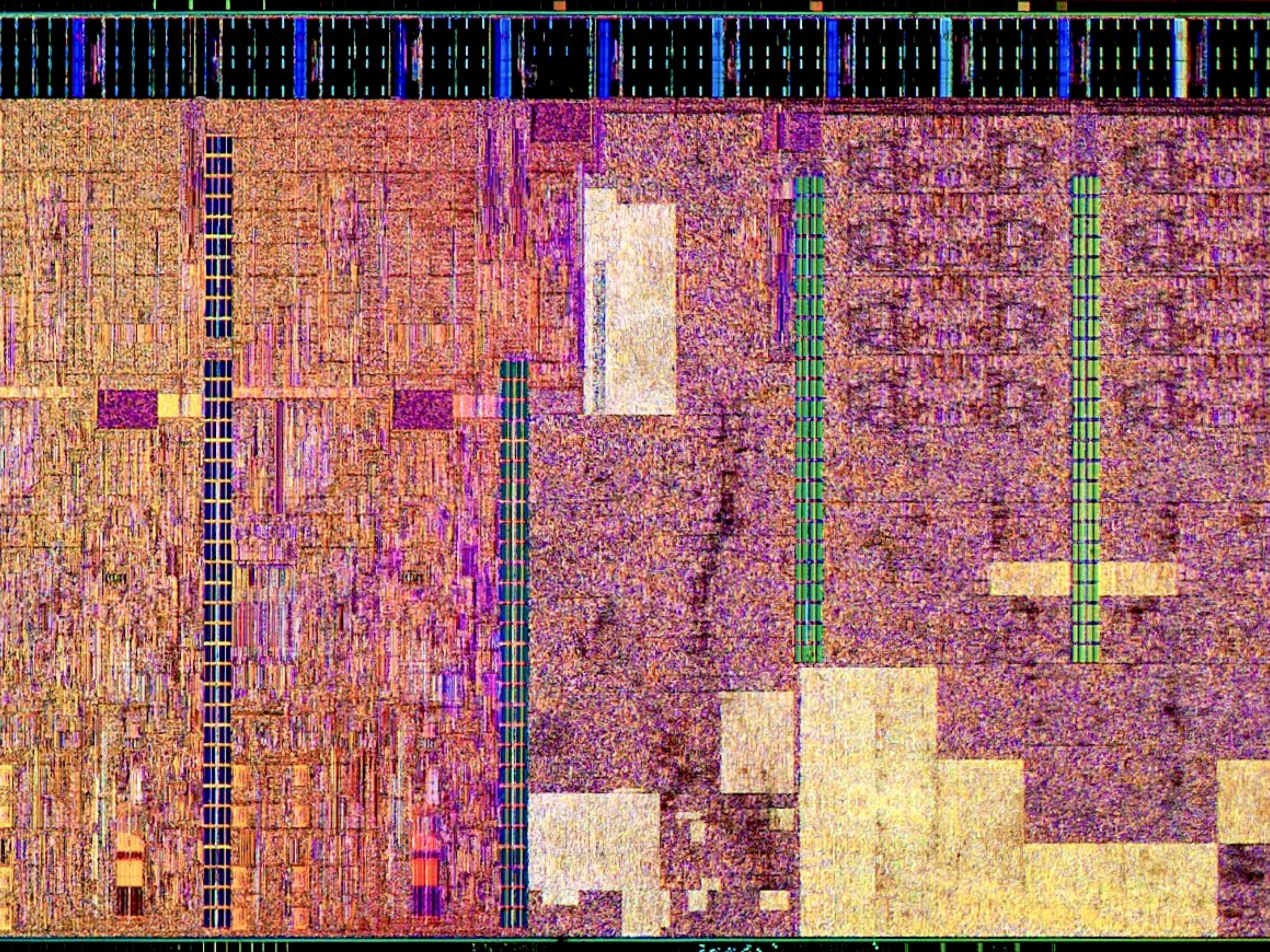


Introduction

Operating Systems





Hardware is nothing
without software.

Software Types

system programs
application programs

The most fundamental system program is the operating system.

An operating system manages all the computer's resources and provide a base upon which the application programs can be written.

Operating System

User

Applications

Kernel

Hardware



resource management
machine abstraction

Resource Management

cpu

memory

disks

other devices

Machine Abstraction

processes

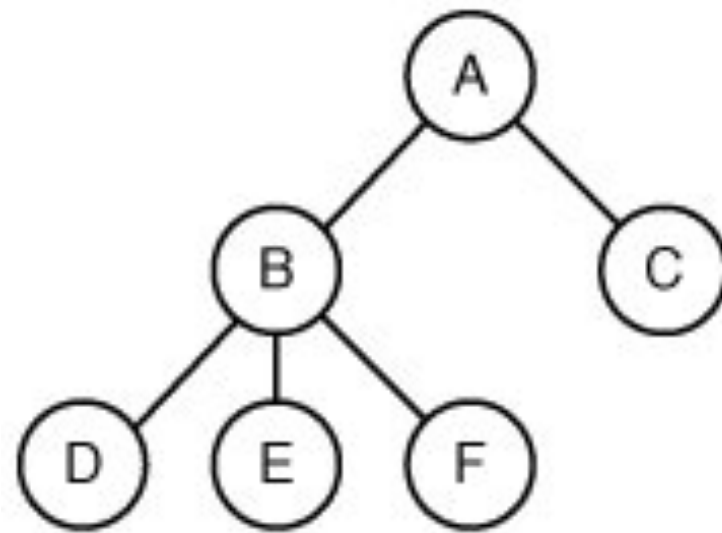
threads

files

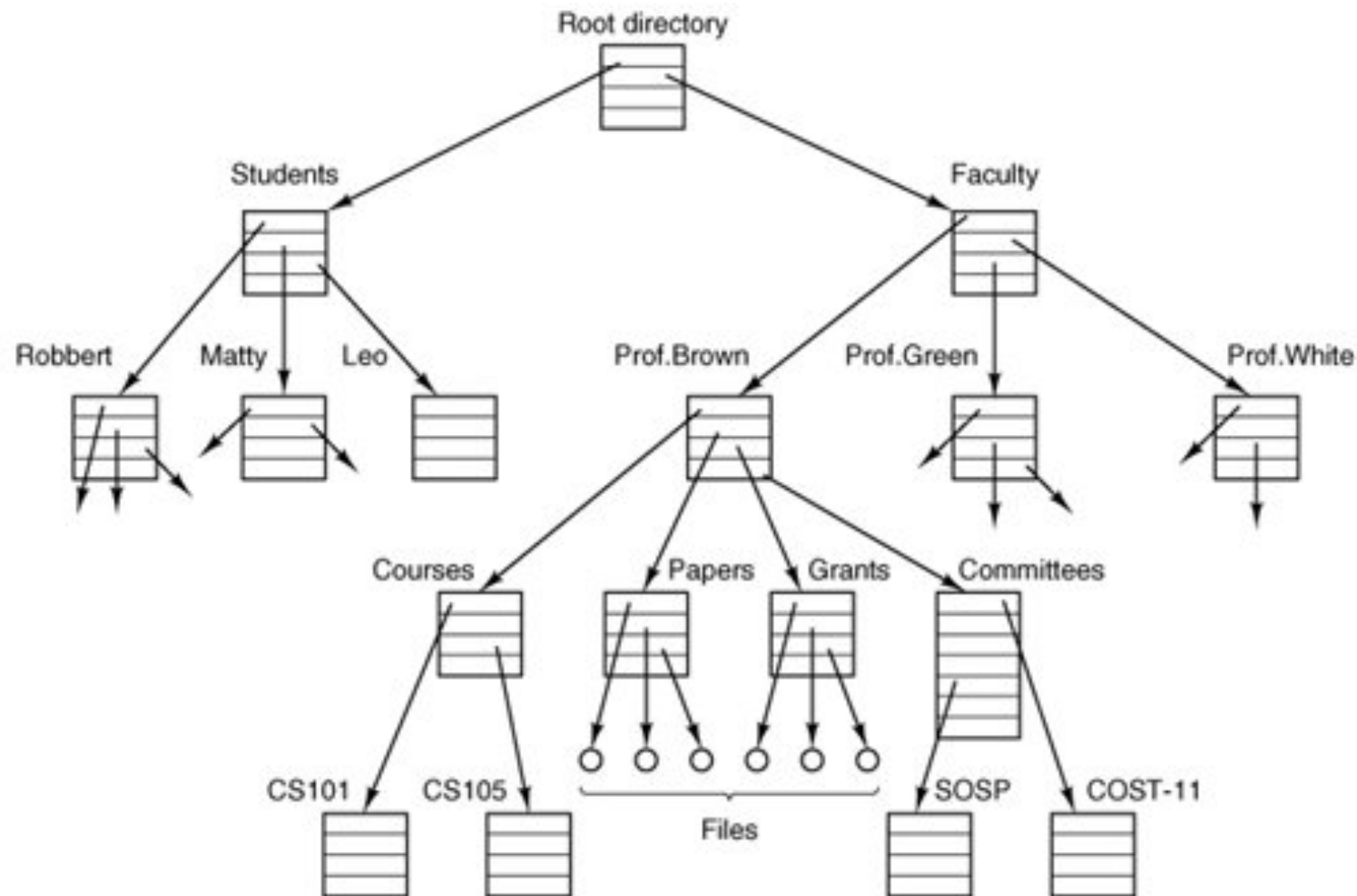
shell

...

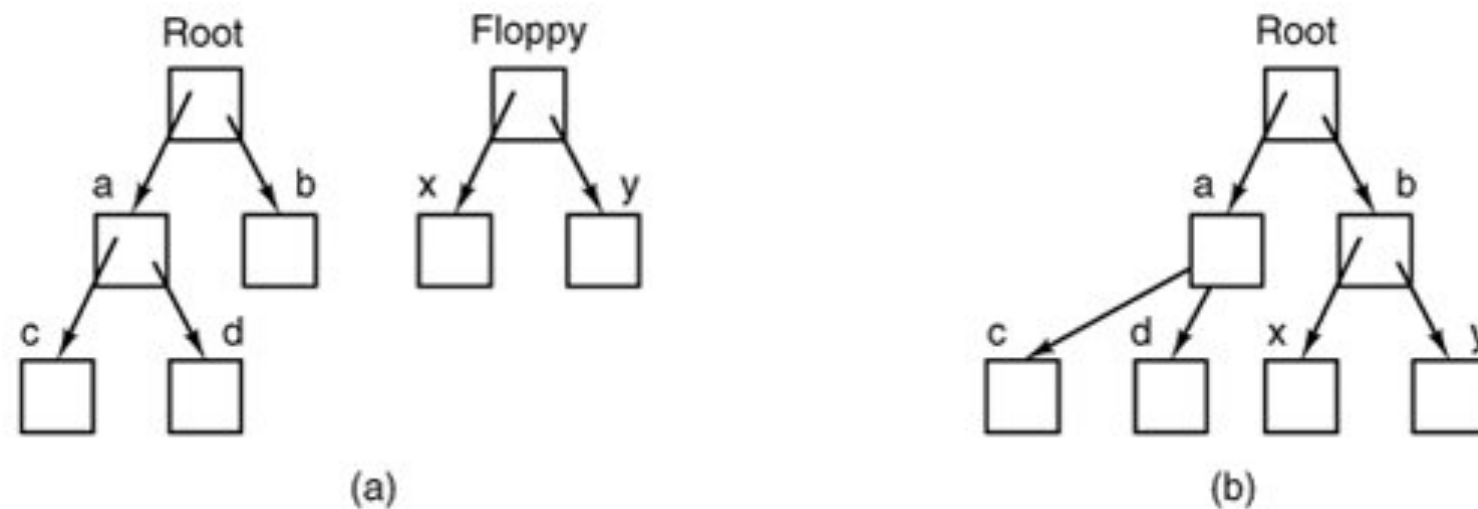
Process Hierarchy



File System



Device Abstraction



Tanenbaum, 2006, Fig. 1-15 (a) Before mounting, the files on the CD-ROM are not accessible
(b) After mounting, they are part of the file hierarchy

Operating systems hide the complexity of the machine through a set of system calls.

fork

exec

brk

open
read
write

getuid
getgid
setuid
setgid

mount
mkdir
rmdir
rename
...

Common Types

single-tasking
multi-tasking

single-user
multi-user

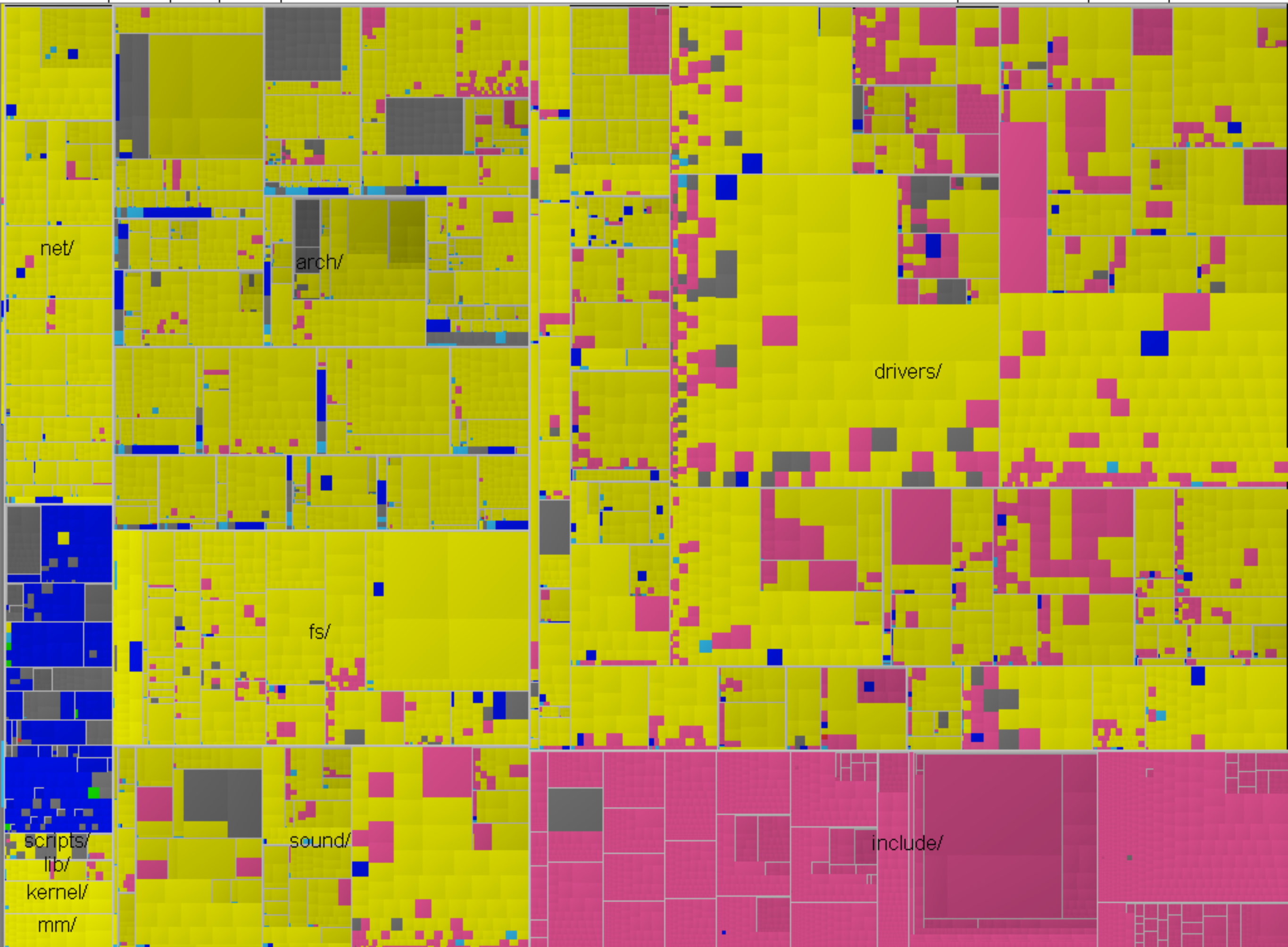
real-time

distributed

embedded

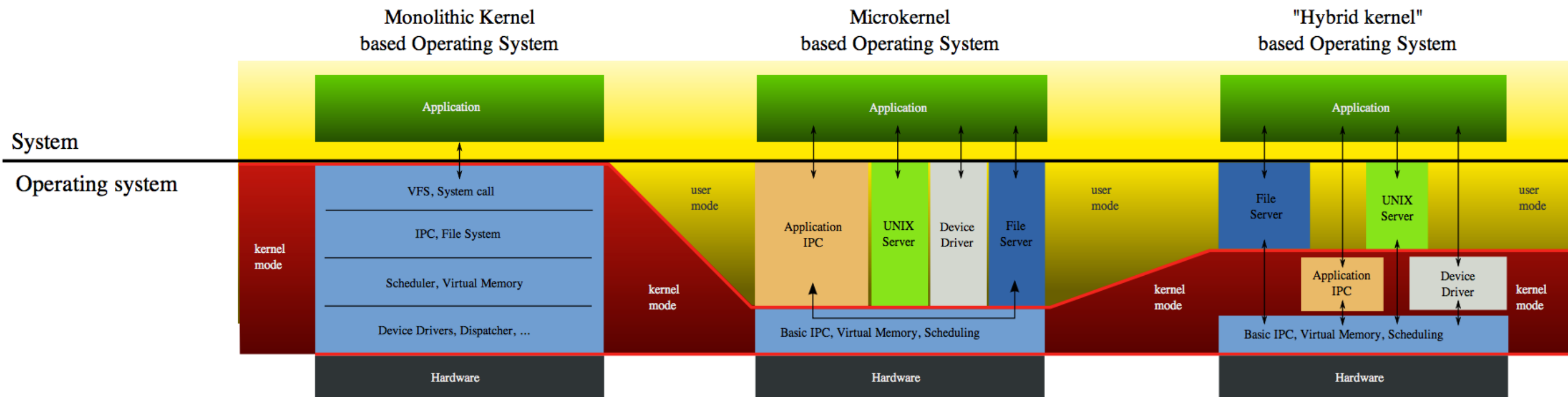
library (unikernels)

Kernel



Kernel Types

microkernel
hybrid
monolithic



Reading

Operating Systems Design and Implementation,
Third Edition by Andrew S. Tanenbaum

Chapter 1