

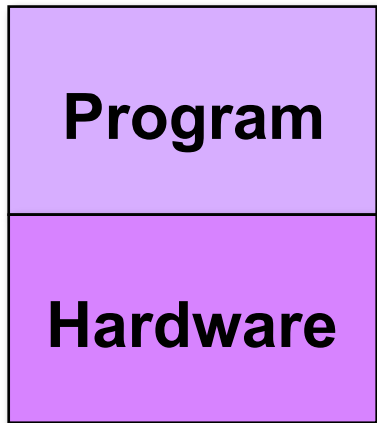


What Is an Operating System?

Before Operating Systems

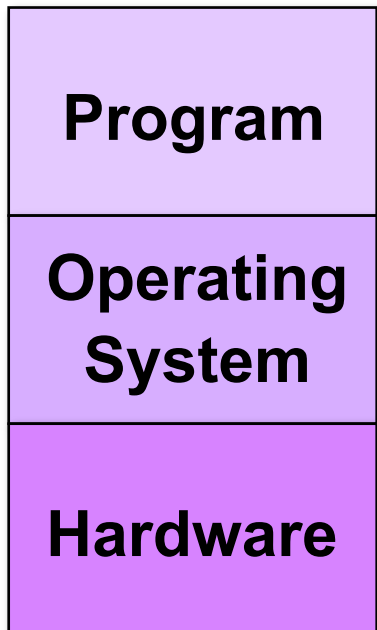
- ◆ A computer is a machine designed to run machine instructions on its hardware.
- ◆ What do you do with just computer hardware?
 - If someone gives you a computer with no software whatsoever, how do you get it to do anything?
 - You write a program that runs on the hardware
- ◆ In the early days, that was the way it worked ...
 - You started with just the bare hardware
 - You wrote a program that did everything:
 - ❖ Including managing all aspects of the hardware
 - ❖ Including solving your particular problem
 - Your program was all the computer did!

Without an Operating System



- ◆ Each program runs directly on the hardware
- ◆ Each program must do everything
- ◆ Each program needs to know the details of the hardware and how to use it
- ◆ If the hardware changes, the program must change as well
- ◆ The hardware supports only one program at a time - each user must wait until the previous program is done to “share” the hardware with other users.
- ◆ Writing programs is incredibly complex and expensive

With an Operating System



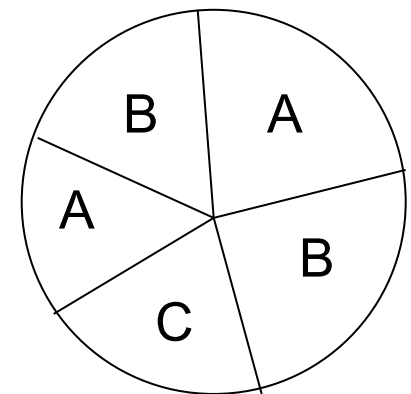
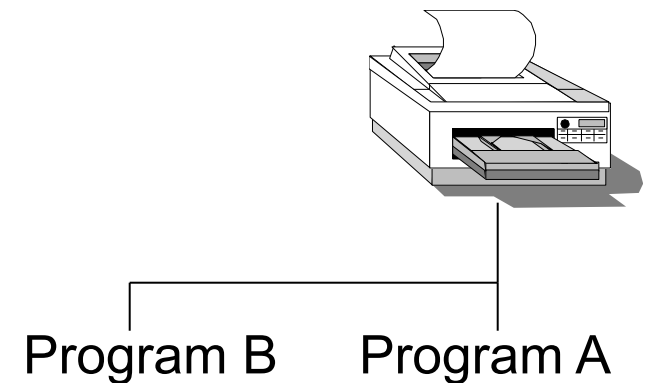
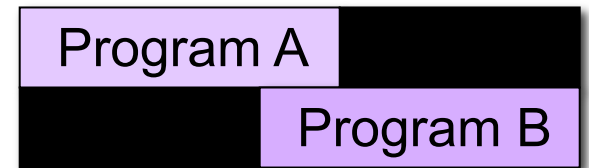
- ◆ Operating system runs directly on the hardware
- ◆ Operating system is in charge of managing the hardware
- ◆ Operating system hides the details of hardware from software - provides a much simpler interface for programs
- ◆ If hardware changes, software does not - operating system must handle it
- ◆ By carefully managing hardware resources, several programs can run at once
- ◆ Software becomes much easier and cheaper to develop

So, What Are the Benefits of an OS?

- ◆ An operating system manages the computer
 - Programming is easier
 - Using a computer is easier - you no longer need to be an expert to use it
- ◆ An operating system hides the hardware
 - Programs are portable
 - Programs are hardware-independent
- ◆ An operating system facilitates resource sharing
 - Several users can run several programs at once
 - Saves time and money

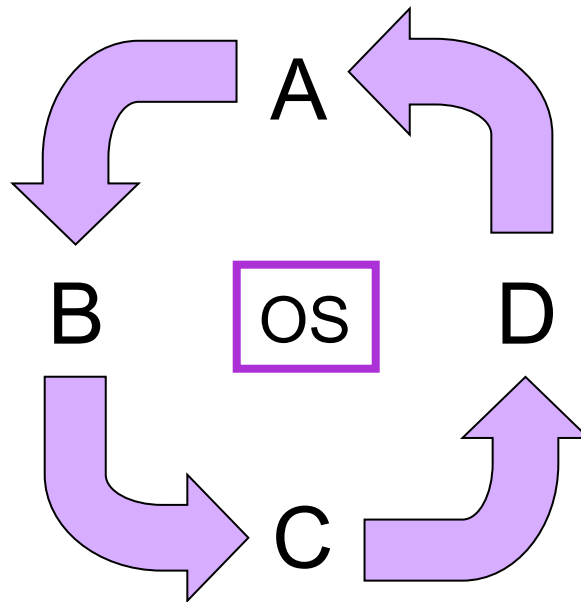
How Hardware Resources Are Shared

- ◆ Memory and disk space
 - programs use different regions
- ◆ Printers (and other peripherals)
 - programs line up and wait
- ◆ CPU
 - programs time share
 - time is split into slices, with each program getting several slices



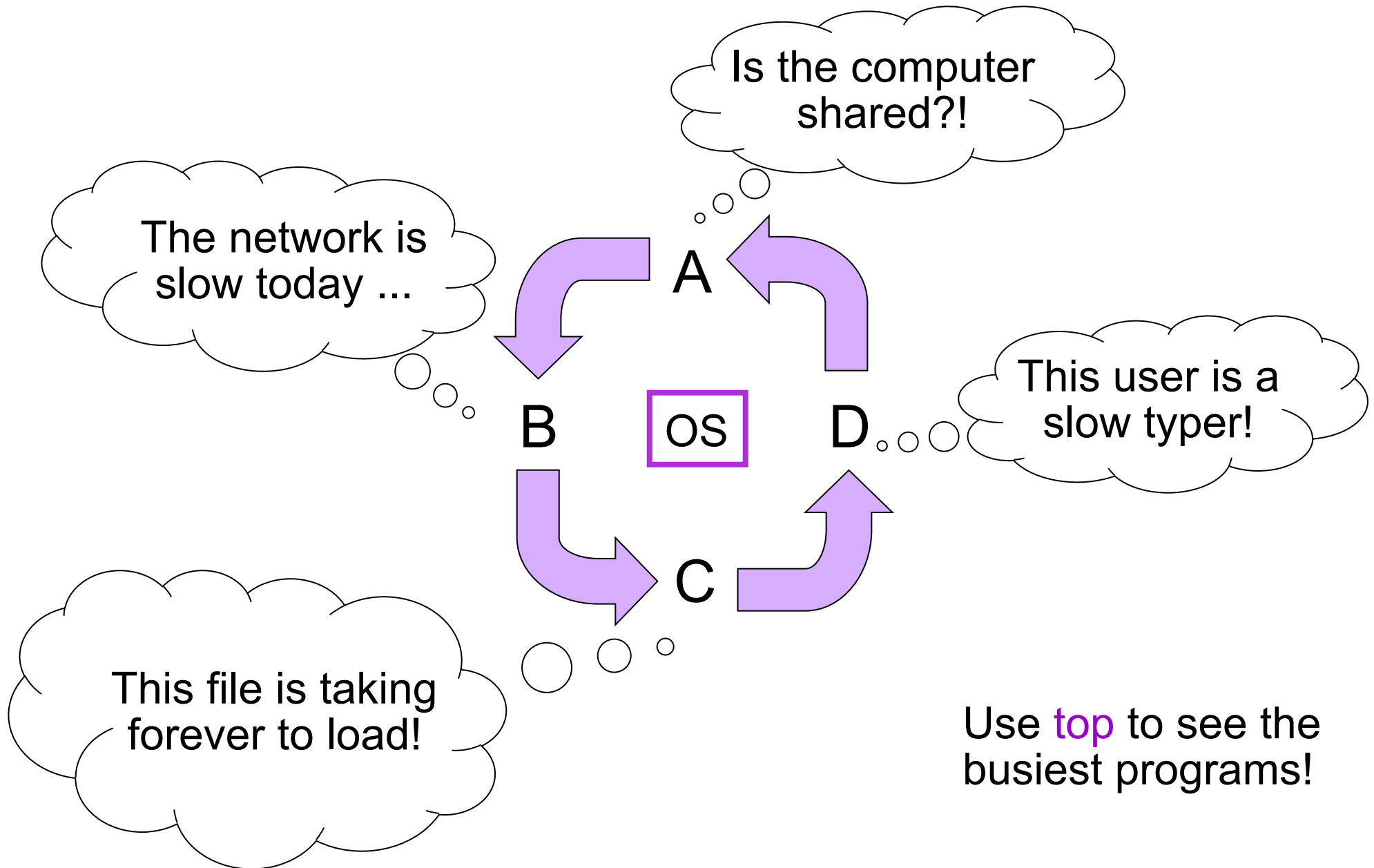
Time Sharing Explained

- ◆ Different processes are run for some small amount of time in turns.



- ◆ Each task believes that it has the whole machine to itself!
- ◆ Slower than being by itself, but quick enough.

Not Really That Slow in Reality



What Is an Operating System?

- ◆ An operating system is system control program for a computer.
- ◆ It manages the computer's hardware and provides a convenient and safe environment.
- ◆ It allocates computer resources.
- ◆ It schedules tasks.
- ◆ It provides an interface to the user.

Exercise

- ◆ Use **who** to see how many users are using the system.
- ◆ Use **top** to see the busiest processes.
 - press q to quit top
- ◆ Use **top -u your_username** to see processes related to you.
- ◆ Use **ps** to see your own processes.