University of Illinois at Urbana-Champaign
Dept. of Electrical and Computer Engineering

ECE 220: Computer Systems & Programming

I/O in Unix and C

File Descriptors Used for All I/O in Unix and C

Unix (and **C**) supports
◦ a **unified notion of I/O**
◦ known as **file descriptors**.

Programs can use file descriptors to...
◦ read from the keyboard,
◦ write to the display (virtual or physical),
◦ read and write files,
◦ communicate with devices (such as printers),
◦ communicate over network connections, and
◦ communicate with other programs.

Programs Can Be Oblivious to "Type" of File Descriptor

For the most part,
◦ **programs do not need to know**
◦ **what "kind" of communication happens**
  with a file descriptor.

For example,
◦ most of the original Internet services
◦ were written and debugged
  using keyboard and display
◦ then simply attached to Internet connections*
◦ without modifying the programs.

  *`inetd` accepted the incoming network connections
  and launched programs with a network connection
  replacing the keyboard and display.

File Descriptors are Small Integers

How does it work?

Remember that **access to any device is** usually a **privileged** operation.

OS maintains information
◦ **about each I/O channel.**
◦ For a given program,
◦ the information is kept **in an array**.

What's a file descriptor?

An **index into the array—a small integer**.