Unix Background

Brief Unix History

- ◆ In 1969, Ken Thompson at AT&T Bell Labs began developing Unix.
  - First done in assembly language.
  - Ran on DEC PDP-7 with 8K words of memory.
- ◆ In 1974, Unix was rewritten in C.
  - By writing C compilers, Unix can be ported to other computers.
- ◆ BSD UNIX
  - BSD: Berkeley Software Distribution
  - UCB put the Internet Protocols (IP) into UNIX
  - 4.4BSD (Berkeley): 1994

Brief Unix History

◆ System V
 – AT&T System V (1984)
 – SVR4: System V Release 4 (1988, current version)

◆ POSIX (IEEE Computer Society):
 – Portable Operating System Interface for Computer Environments (1988)
 – Most Unix systems try to conform with POSIX to a certain extent

◆ SunOS was BSD-based and Solaris is SVR4-based (cs department used to have many Sun stations).
 – Most of the things you will learn in this course work in different Unix/Linux systems with small differences

The Unix Philosophy

◆ Unix was not meant to be a user-friendly operating system
  – Instead, meant to be "user-helpful" and **very** powerful

◆ The Unix operating system protects users from other users but not necessarily from themselves

◆ It provides the necessary tools then gets out of your way

The Unix Philosophy
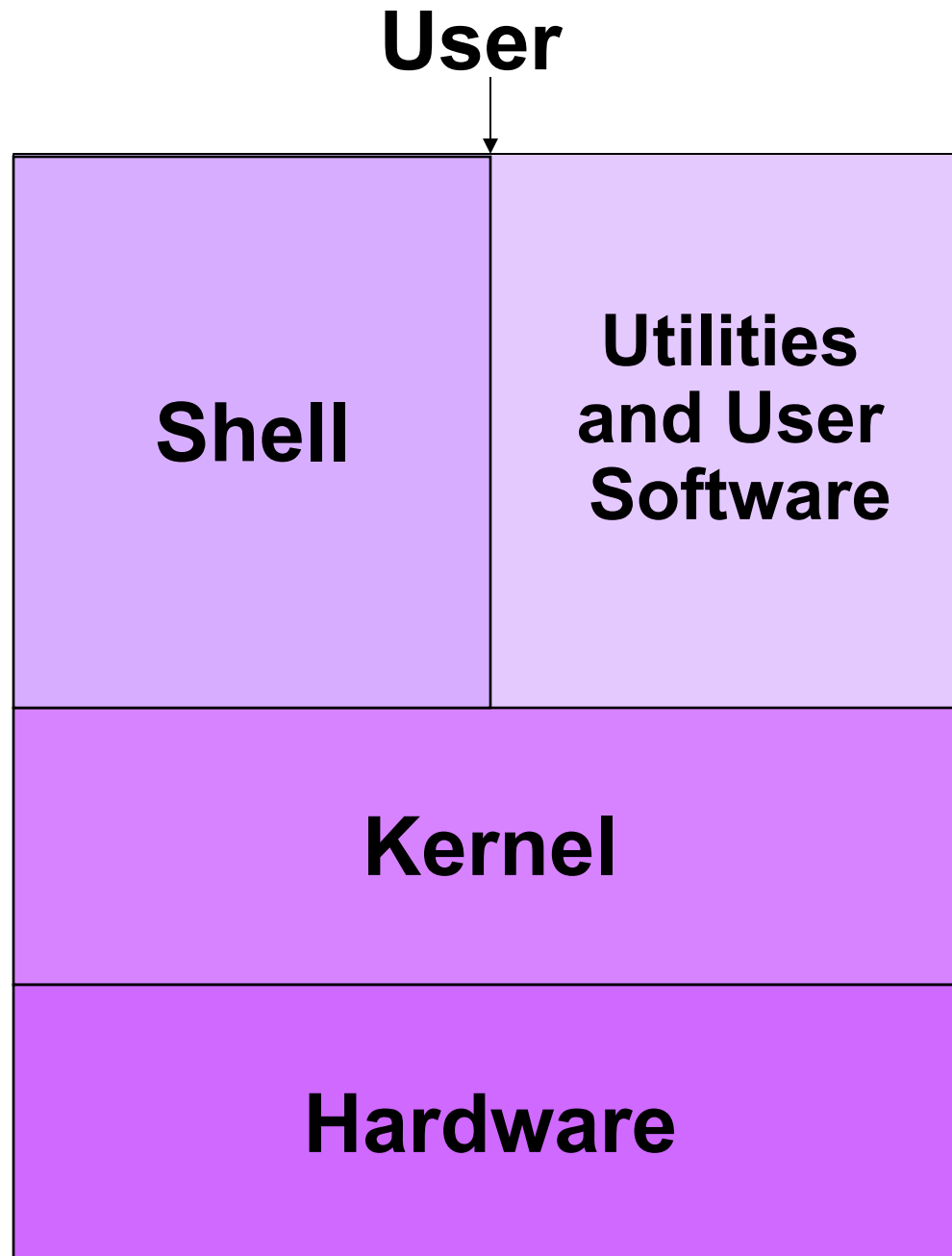
◆ **The Unix Tools**

– Keep each tool simple

– Have each tool do one thing, and do that one thing really well

– Keep tools terse and not too talkative

– More complex tasks can be accomplished by combining tools together in scripts or pipelines

– Originally, input and output to workstations were slow and tedious, and this approach made things faster and more efficient.

Structure of a Unix System

User

Shell	Utilities and User Software
Kernel	
Hardware	

Parts of a Unix Operating System

◆ **Kernel**
  – Manages the processes and resources
  – Controls and hides the hardware

◆ **Shell**
  – An interface between users and the kernel
  – A command line interpreter (CLI)

◆ **Utilities are standard tools/applications**
  – They are used so often that they become a part of Unix
  – "ls" and "vi" are Unix utilities, for example

A Word on Linux (GNU/Linux)

- **In 1991, Linus Torvalds wrote the Linux kernel**
  - When he was an undergraduate in University of Helsinki.
  - Wanted a version of UNIX that he could run on the old computer he owned…

- **Numerous programmers have worked on it**
  - It's a popular Unix-like operating system now
    - Started with hobbyists and at universities
    - Growing popularity in corporations and elsewhere
  - Occupies a large percentage of PC server market

- **Achieved its goal of POSIX compliance**

A Word on Linux

◆ Now available for many architectures
  – x86, PowerPC, SPARC, SGI Indy, HP PA-RISC, DEC Alpha, IA64 …

◆ Growing software base
  – Office suites, desktops, server software, games, ...

◆ Has become a popular Unix in the microcomputer world
  – Much more popular than Free/Open/NetBSD, Solaris x86, ...

◆ Still a "free" operating system
  – Mostly under GNU General Public License (GPL or "Copyleft")
  – Many companies create and sell distributions (Redhat, SUSE, and many others)
  – Check it out at: http://www.linux.org

◆ Big servers are using Linux now

◆ The only OS used on top 500 supercomputers since Nov. 2017

Apple's macOS

- ◆ macOS, previously OS X and Mac OS X, is a series of Unix-based graphical interface operating system developed, marketed, and sold by Apple Inc.
- ◆ It is designed to run exclusively on Mac computers, having been pre-loaded on all Macs since 2002.
- ◆ It was also the first (2007 Max OS X Leopard) BSD-based OS to receive UNIX 03 certification.
- ◆ Has become popular in desktop and laptop computer world.
- ◆ iOS is also based on Unix.

Google's Android

- Android is a mobile operating system based on Linux kernel and currently developed by Google.

- Designed primarily for touchscreen mobile devices such as smartphones and tablet computers.

- It uses touch inputs that loosely correspond to real-world action like swiping, tapping, and pinching to manipulate on-screen objects, and a virtual keyboard.

- Android is the most widely used mobile OS as of 2013, and the largest installed base for any operating system since May 2017.

- Android source code is released by Google under open source licenses.