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CMPS 111 - 01
Week 2 Note

Note:

Professor Long showed up this week(Wednesday, January 18th 2017). There was no class on Monday due to national holiday.

Professor came into the class and could not figure out how to use projection system so he asked students if Prof. Karim told everyone how to use it. Nobody in the class knew.

Professor Long mentioned that the Operating System class is hard. He said, "I am training computer scientists" and "Computer Scientists should be adaptive" because we, as computer scientists, should be adaptive to new programming languages and new technologies that are introduced at least every year. He described when Cobol was popular back in old days and now nobody uses it since more popular programming languages were introduced since then.

Next assignment will be writing a shell program on our freeBSD operating system.
Prof. Long shared a tip on writing a shell program:
Think it through. Use a pencil and a piece of paper to write pseudo-code and then work on it.

Continuation of Last week's lecture

What is an Operating System?
It is the most complicated architect ever created.
There are more than 100 million lines of code on Windows 10.

Professor Long said that an OS provides a **pleasant illusion** to a programmer. It has a protection mechanism to a programmer. He continued and said that '95% of Windows OS crash because of device drivers, which were written in Eastern Europe.

Linux was introduced in this class to talk about micro kernels and kernels. The first Linux OS was called 'Version 6' and it was able to run pleasantly and comfortably on 64K of memory. However, nowadays we use more than 64KB of memory. The founder of Microsoft, Bill Gates, said that people would not need more 1600KB (?) of memory for the rest of their lives. **WRONG!**

Dijkstra was mentioned in this class. 'Dijkstra was a pioneer of Computer Science industry' said Professor Long. However, Dijkstra did not really like computers. We do not know the reason why, but he had introduced many theories to support his algorithms on computers such as 'Short path algorithm'. Core routines hide backward compatibility. (Dijkstra's idea).

Fathers of UNIX:

Dennis Ritchie
Ken Thompson

MULTEX was so ambiguous.

Microkernels:
Things got big and messy so people figured it out. There should be exclusive access and put things together. (In short, people wanted organization of their microkernels)

Processes (clients and OS servers) do not share memory
    Communication via messaging-passing
    Separation reduces risk of "byzantine" failures.

Kernel boundary crosses.

Linux, Android, macOS were mentioned to talk about the boundary of Kernels.

1960's
Virtual Machines
First widely used in VM/370 with CMS.

- Available today in VMware and VirtualBox.
    - Allows users to run away x86-based OS on top of Linux, Windows, macOS.

- "Guest" OS can crash without harming underlying OS.
    - Only virtual machine fails - rest of underlying OS is fine.

- "Guest" OS can even use raw hardware.
    - Virtual machine keeps things separated.

Different kinds of VM's
Type 1 hypervisor
    Runs on bare hardware.
    Manages resources between guest operating system
    Many provide some simple OS-like services (FS, scheduling)

Type 2 hypervisor
    Runs as a process in the "host" OS.
    May use host OS services (file system, etc)

Why use virtual machines
Virtual machines encapsulate all of a computer's state in a single file.
Easy to store and relocate "computers" when packaged as virtual machines.
Keeps your environment in the cloud.
Put it on any convenient computer.
Make systems more reliable: use any computer to run your environment.

Virtual machines allow users low-level access to "hardware".
    Shared hardware with the illusion of having your own computer.
    Is there a difference between a VM manager and an OS?

We will discuss about it next week.