แก้ไขครั้งล่าสุดเมื่อวันที่ 8 สิงหาคม 2567

ปีการศึกษา 2567/ภาคการศึกษาต้น

ทวิภาค

2301371 OPER SYS

ระบบปฏิบัติการ

OPERATING SYSTEMS

คณะวิทยาศาสตร์ (ภาควิชาคณิตศาสตร์และวิทยาการคอมพิวเตอร์)

3.0 **CREDIT HOURS =** LECT 3.0 CR

(LECT 3.0 HR)

เงื่อนไขรายวิชา : PRER (2301263 OR 2301265) AND 2301274

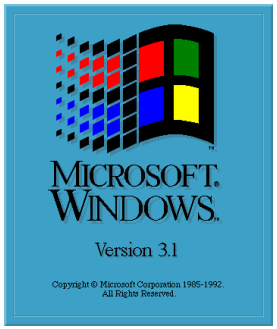
วันสอบกลางภาค : 26 ก.ย. 2567 เวลา 13:00-16:00 น. **วันสอบปลายภาค :** 26 พ.ย. 2567 เวลา 13:00-16:00 น.

ตอนเรียน	วิธีสอน	วัน-เวลาเรียน	อาคาร	ห้อง	ผู้สอน	หมายเหตุ	จำนวนนิสิต Regis/Max
1	LECT	MO 9:00-10:00	TAB	222	CAW		66/100
	LECT	TH 8:00-10:00	TAB	220	CAW		

2301263 DATA STRUCTURES AND FUNDAMENTAL ALGORITHMS
2301265 DATA STRUCTURES ALGORITHM DESIGNS AND ANALYSIS
2301274 COMPUTER SYSTEMS


xp


Windows 10


MICROSOFT WINDOWS
Version 3.1
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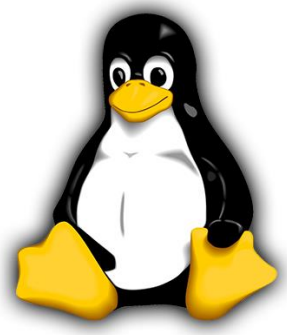
solaris


Mac OS X
Leopard


Windows Vista


MS
DOS



Linux

KVM

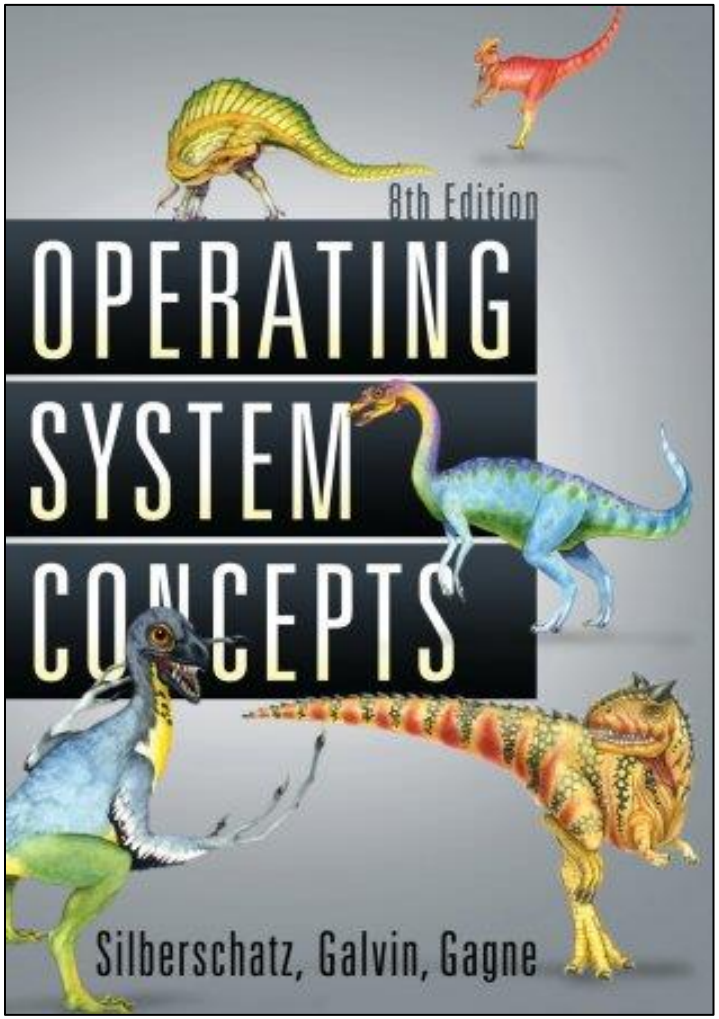
PROXMOX

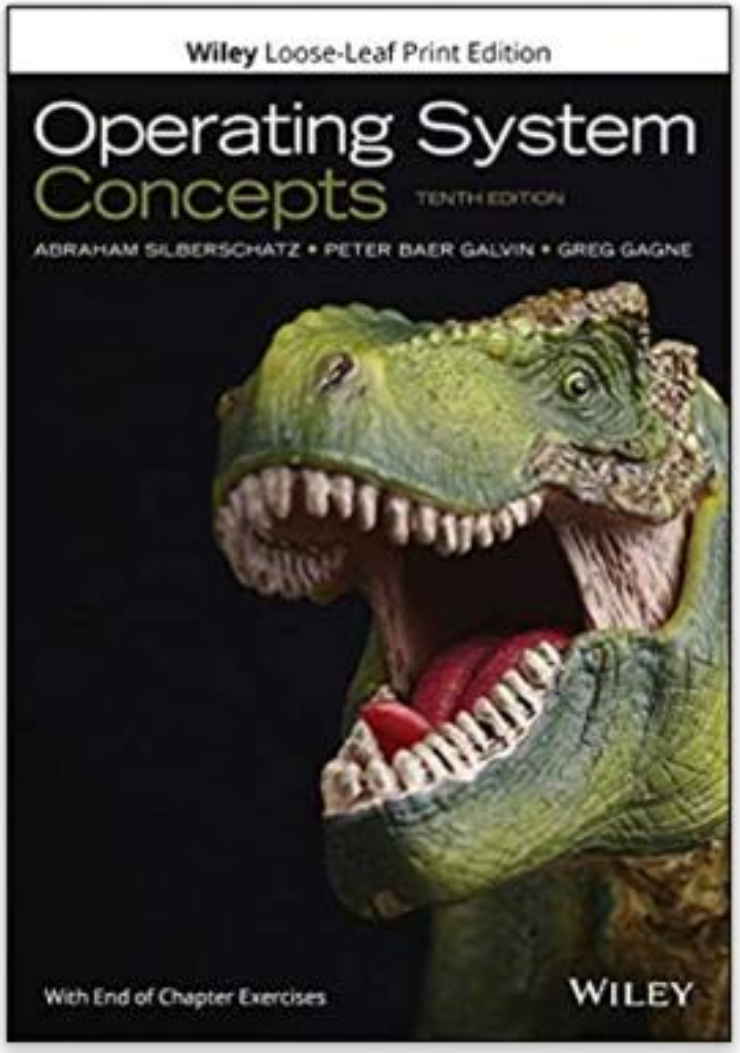
Microsoft
Hyper-V


iOS


android

Textbooks


8th Edition
OPERATING
SYSTEM
CONCEPTS
Silberschatz, Galvin, Gagne


Wiley Loose-Leaf Print Edition
Operating System Concepts
TENTH EDITION
ABRAHAM SILBERSCHATZ • PETER BAER GALVIN • GREG GAGNE
With End of Chapter Exercises
WILEY

Content

Chapter 1: Introduction
Chapter 2: Operating-System Structures
Chapter 3: Processes
Chapter 4: Threads & Concurrency
Chapter 5: CPU Scheduling
Chapter 6(w6): Synchronization Tools
Chapter 7(w6): Synchronization Examples
Chapter 8(w7): Deadlocks

Midterm ออกข้อสอบแค่นี้

Chapter 9(w8): Main Memory
Chapter 10(w9): Virtual Memory
Chapter 11(w10): Mass-Storage Structure
Chapter 12(w11): I/O Systems
Chapter 13(w12): File-System Interface
Chapter 14(w13): File-System Implementation
Chapter 15(w13): File-System Internals
Chapter 16(w14): Security
Chapter 17(w15): Protection

https://line.me/R/ti/g/xEk9qD0Zsk

Website

http://pioneer.netserv.chula.ac.th/~achatcha
https://cache111.com

Courses

2301171 Introduction to Computer and Programming Techniques
2301232 Discrete Mathematics And Its Applications
2301263 Data Structures and Fundamental Algorithms
2301365 Algorithm Designs and Analysis
2301271 Programming Techniques
2301274 Computer Systems
2301370 Computer Network Programming
2301369 Data Communication I
2301371 Operating Systems
2301399 Project Proposal
2301466 Introduction to Mobile Computing
2301475 Logic and Functional Programming
2301490 Seminar
2301499 Senior Project
2301681 Design and Analysis of Algorithms
2301445 Quantum Computation

สัดส่วนคะแนน

คะแนนเก็บครึ่งเทอมแรก	25% (Activities)
คะแนนสอบกลางภาค	25%
คะแนนเก็บครึ่งเทอมหลัง	25% (Labs)
คะแนนสอบปลายภาค	25%

การประเมินผลการศึกษา

≥ 85 ได้ A

ที่เหลือ ตัดเกรดแบบอิงกลุ่ม

Activities

#1: Linux commands
#2: Fork
#3: Client/server
#4: Error diffusion
#5: Race condition

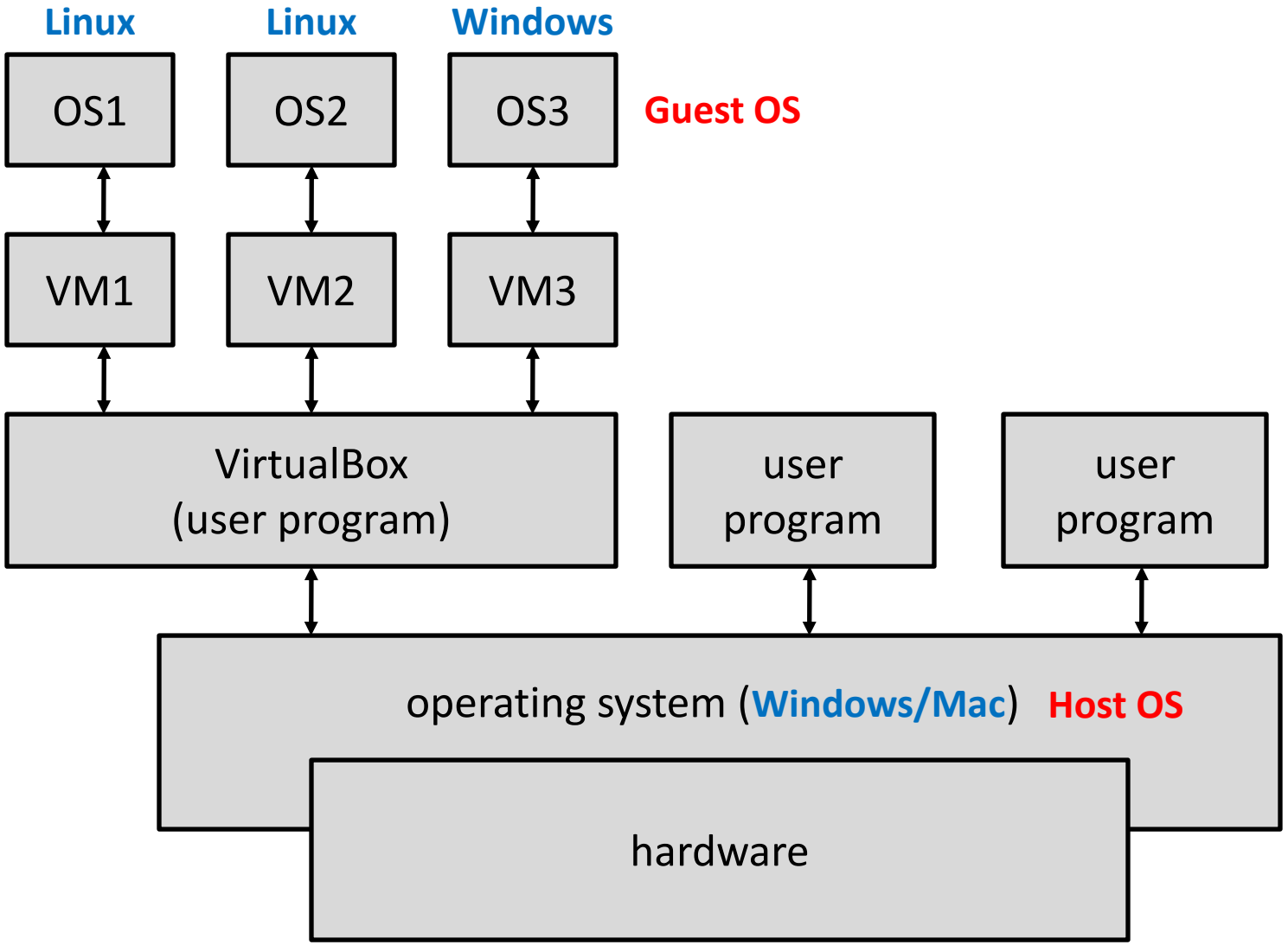
Labs

#1: Introduction to AWS IAM
#2: Build your VPC and Launch a Web Server
#3: Introduction to Amazon EC2
#4: Working with EBS
#5: Building a database server
#6: Scale and Load Balance Your Architecture
#7: AWS Lambda

VirtualBox

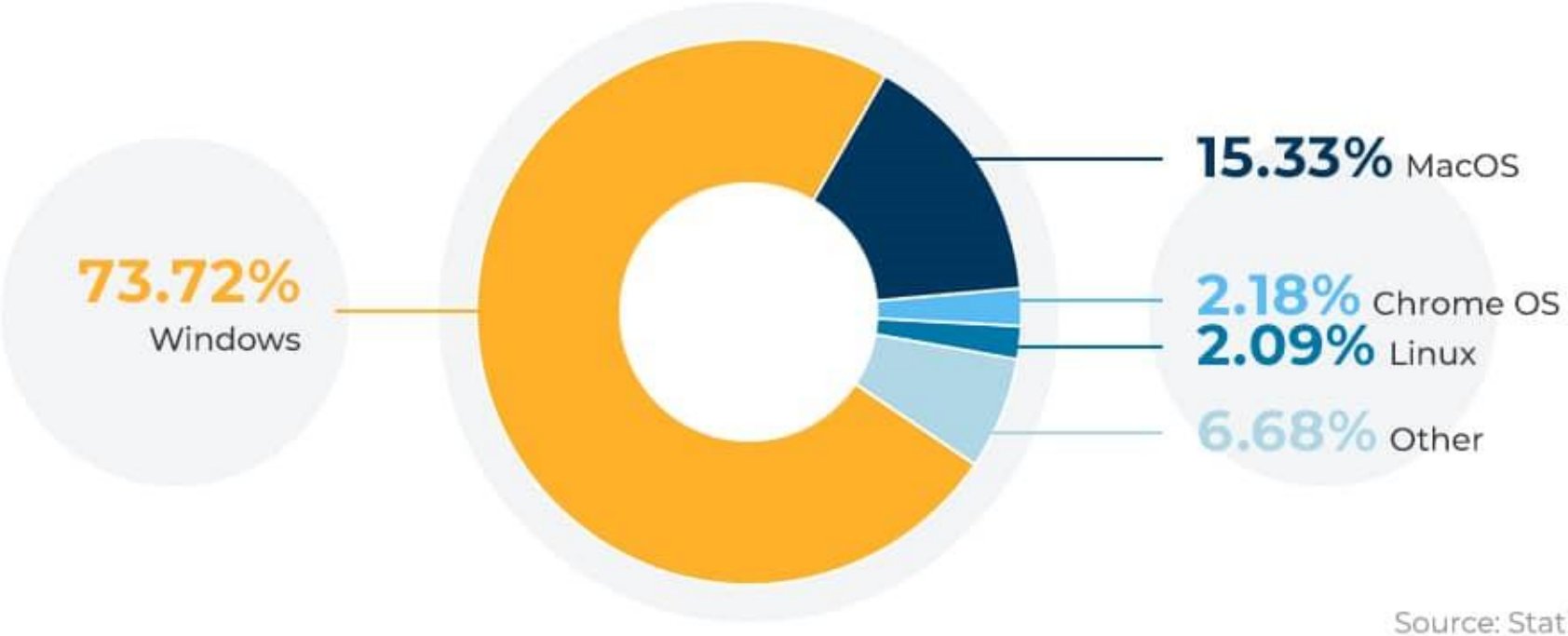
ทางเลือกอื่น ๆ ถ้าไม่ติดตั้ง VirtualBox

- Windows Linux Subsystem (WLS)
- Virtual machines for Mac (UTM)



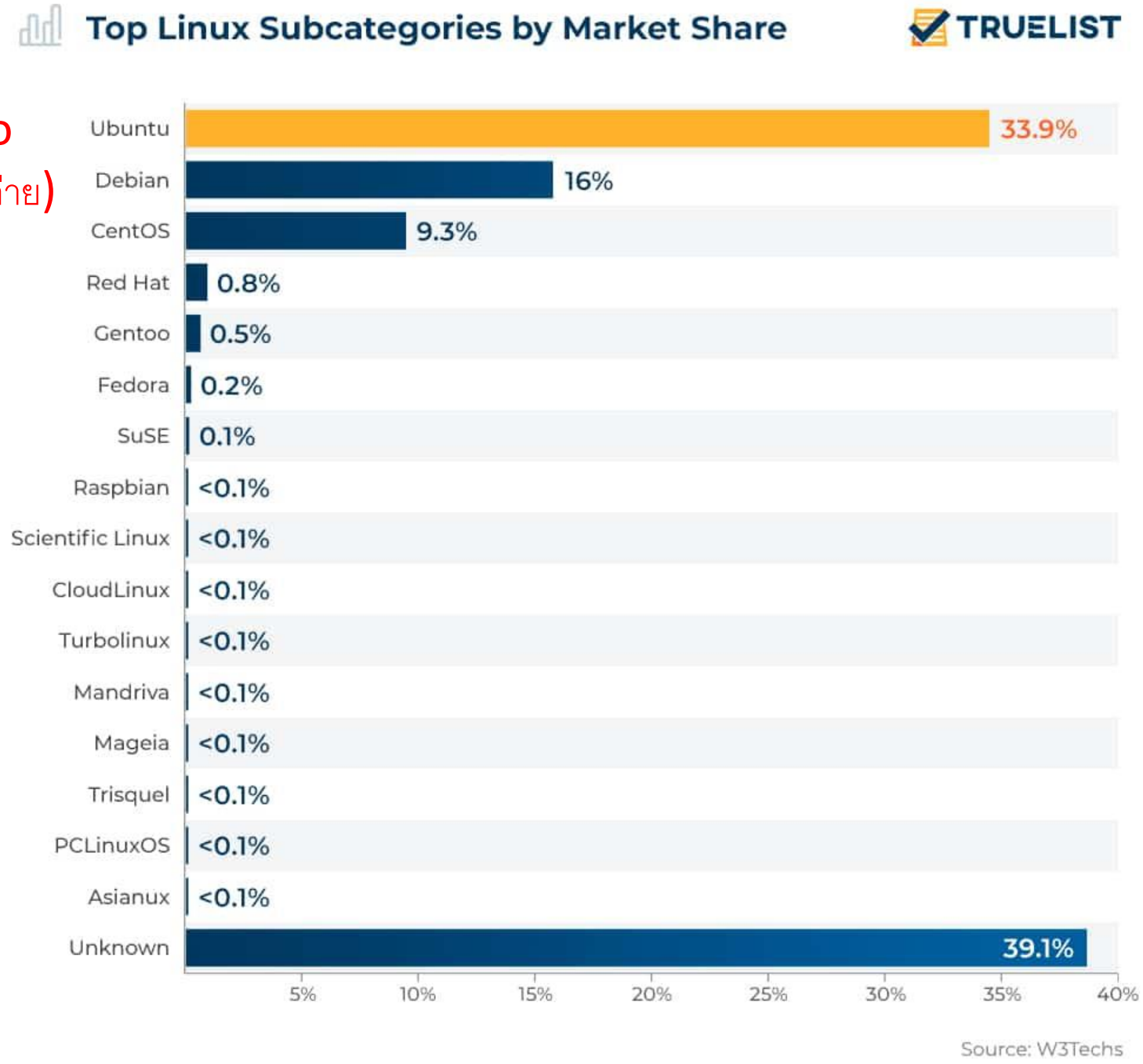
Leading Desktop Operating Systems Worldwide by Market Share

TRUELIST



Source: Statista

Distro (ผู้แจกจ่าย)

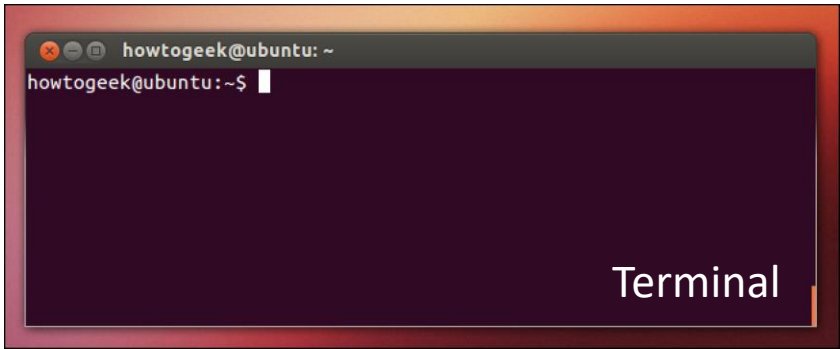


กิจกรรม #1 Linux commands (สุ่มทำและจับเวลา)

Quiz: process management

Show Linux distro (distributor, description, release, codename)
Show kernel version
Show kernel (file) and its size.
Show CPU information.
Run a process with lowest priority (least favorable).
Run a process (> 60 sec), pause, and resume.
Run a process (> 60 sec) in background, and terminate.
Run three processes in background, and bring the second to the front.
Run three processes in background, and terminate the first.
Run two processes and connect them using a pipe.
เช่น ใช้คำสั่ง cat และ grep เพื่อ print ไฟล์ /etc/passwd โดยกรองเฉพาะบรรทัดที่มีคำว่า home
Show uptime (elapsed time since booting).

สร้าง process โดยใช้โปรแกรมที่มีชื่อว่า sleep



Quiz: memory management

Show memory information.
Show amount of free and used memory in the system.

Quiz: Storage management

Create a file, rename, and delete.
Create a folder, rename, and delete.
Create a file and change permission so that only the owner can read.
Create a file and change both owner and group to "root".
Create a folder and a symbolic link to the folder.
Show disk space usage in human-readable format.
Show file space (~~size~~) usage of /usr/share/dict/american-english in human-readable format. ถ้าไม่มีไฟล์นี้ต้องติดตั้ง package ชื่อ wamerican ก่อน
Check and repair file system on harddisk.
Search for a given filename.

Quiz: User management

Change password.
Show on-line users.
Show current users on the system and what they are doing.
Enable administrator (root or superuser) account.
Add a new user and remove.

Quiz: Network management

Remote login to Linux (ใช้คำสั่ง ssh หรือใช้โปรแกรมที่มี GUI เช่น PuTTY).
Transfer a file to Linux (ใช้คำสั่ง ftp หรือใช้โปรแกรมที่มี GUI เช่น FileZilla).
Show IP address of your computer.
Show IP address of google.com.
Show MAC address of your computer.
Show connection speed to google.com.
Download a file (https://cache111.com/test.zip) at 3.00AM tomorrow.

```
csti@learningportal: ~
csti@learningportal:~$ ftp -p ftp.broadinstitute.org
Connected to ftp01.broadinstitute.org.
220 FTP Server ready.
Name (ftp.broadinstitute.org:csti): gsapubftp-anonymous
331 Anonymous login ok, send your complete email address as your password
Password:
230 Anonymous access granted, restrictions apply
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd bundle
250 CWD command successful
ftp> cd hg38
250 CWD command successful
ftp> bi
200 Type set to I
ftp> prompt
Interactive mode off.
ftp> get Homo_sapiens_assembly38.dict
local: Homo_sapiens_assembly38.dict remote: Homo_sapiens_assembly38.dict
227 Entering Passive Mode (69,173,70,223,253,106).
150 Opening BINARY mode data connection for Homo_sapiens_assembly38.dict (581712 bytes)
226 Transfer complete
581712 bytes received in 1.33 secs (427.9105 kB/s)
ftp> bye
221 Goodbye.
csti@learningportal:~$
```

bi ย่อมาจาก binary จะพิมพ์ binary เต็ม ๆ ก็ได้

ftp ทำตามในรูปนะครับ ใส่ password เป็นอีเมล ปกติใส่แค่ a@ ก็ใช้ได้ละ

server: ftp.broadinstitute.org

user: gsapubftp-anonymous

pass: a@

download file: /distribution/seq/references/ Homo_sapiens_assembly19.dict

เอาแค่ดาวน์โหลดพอนะ อัปโหลดไม่มี server ให้ทดสอบ

ใช้คำสั่ง ftp -p นะครับ (-p คือ passive mode เนื่องจาก server นี้มันตั้งค่าไว้แบบนี้)

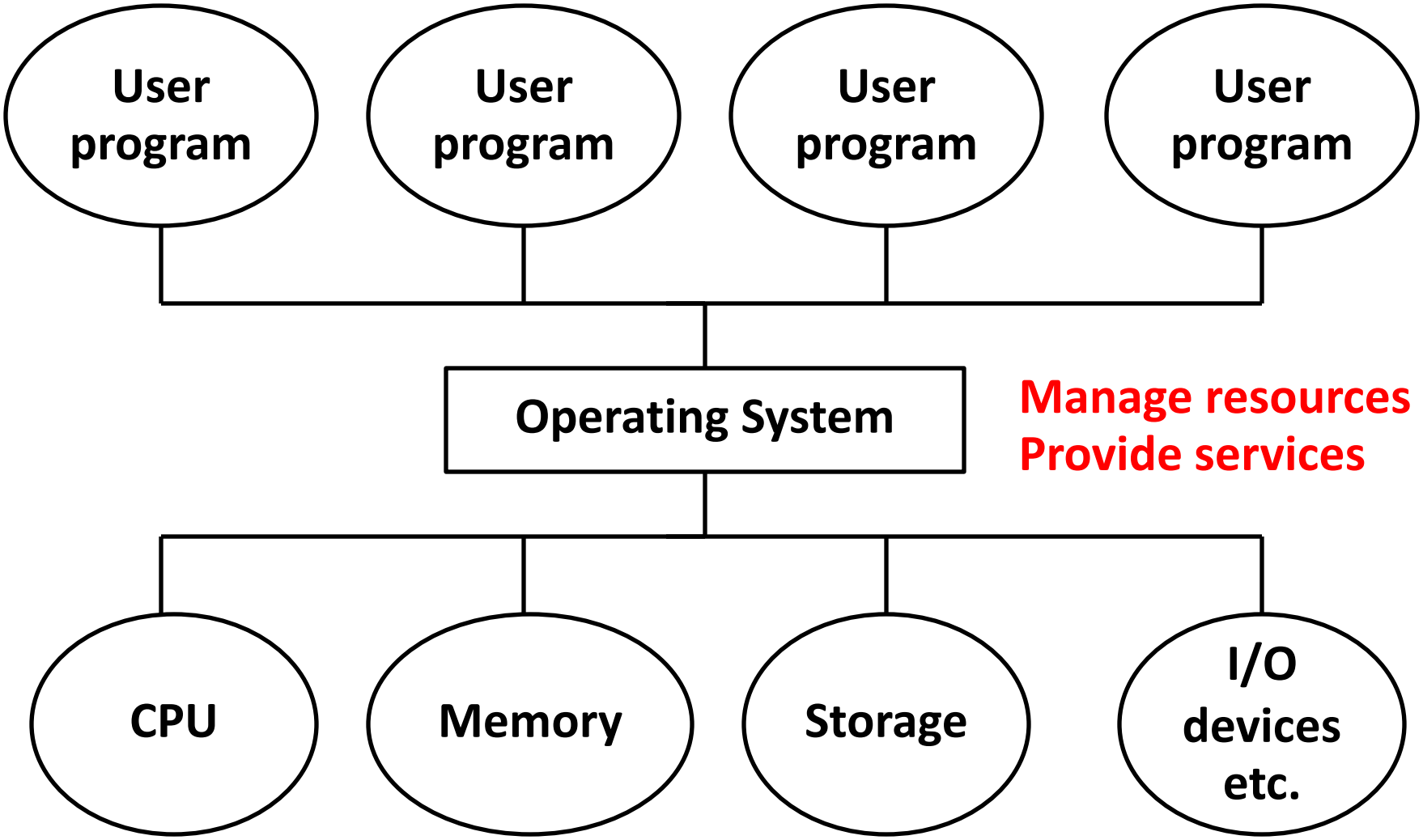
Quiz: Utility (1)

Show the manual page of "man" command.
Show only the first 10 lines of /etc/passwd.
Show only the last 10 lines of /etc/passwd.
Show the first page of /usr/share/dict/american-english and scroll to the next.
Show only the line containing "sys" in /etc/passwd.
Show only the line ending with "land" in /usr/share/dict/american-english.
Count the number of lines in /usr/share/dict/american-english.
Open /usr/share/dict/american-english in a text editor, and search for "microcomputer".
Make a text file, put your firstname, save and display each character sequentially in hex.
Make a text file, put your firstname, encrypt with password protection.
Write a hello-world program in C, compile, and execute.
Run a process that will continue after logout.
Shutdown in the next 10 minutes.
Cancel the shutdown.

Quiz: Utility (2)

Make a folder with a file inside and compress it to "foldername.tar.gz".
Calculate the checksum of foldername.tar.gz.
Make a folder with a file inside and compress it to "foldername.zip".
Calculate the checksum of foldername.zip.
Create two files, concatenate them together using "cat" ">" and ">>".
Split /usr/share/dict/american-english into 10 files (x00, x01, x02, …, x09).
Show only the first column in /etc/passwd.
Show printer queue.
Show current date & time.
Show calendar.

Introduction



Introduction

Types of operating systems

1. No operating systems
2. Batch processing
3. Single-tasking
4. Multi-tasking
5. Time-sharing

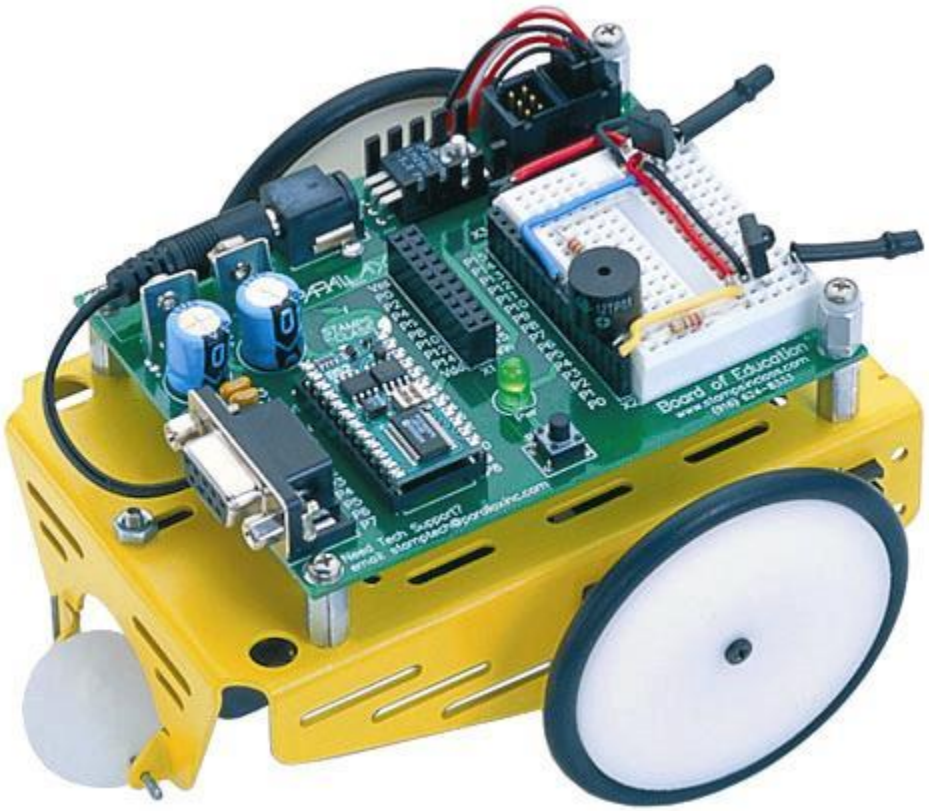
Operating systems on PCs

1. DOS
2. Windows 3.11
3. Windows 95, 98, ME, XP, Vista, 7, 8, 10
4. Unix, Linux (GNU – GNU is Not Unix)

No operating systems

1. **Connect the robot to PC.**
2. **Load a program into robot's memory.**
3. **Set program counter (PC) to start address**
4. **Execute the program.**
5. **Halt.**

เครื่องใช้ไฟฟ้าง่าย ๆ เช่น ทีวี ตู้เย็น
มีโปรแกรมที่ทำงานเพียงโปรแกรมเดียว
ไม่จำเป็นต้องมี **OS**



Batch processing

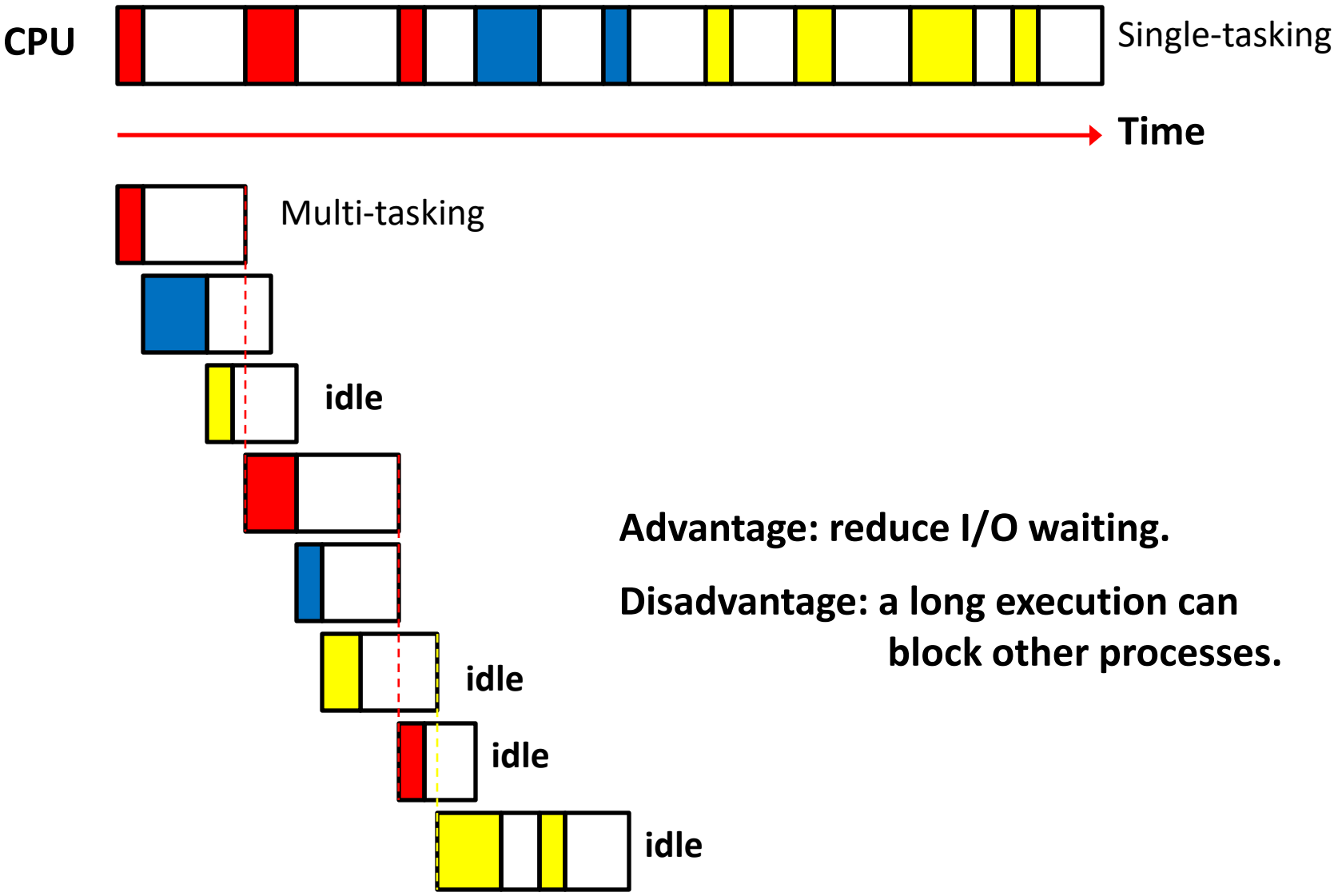
A job

1. input (storage)
2. job control (a file)
   - commands
   - output (storage, printer)

operating system
(job queue)

Hardware
CPU
Memory
Storage
Printer

Cooperative multi-tasking

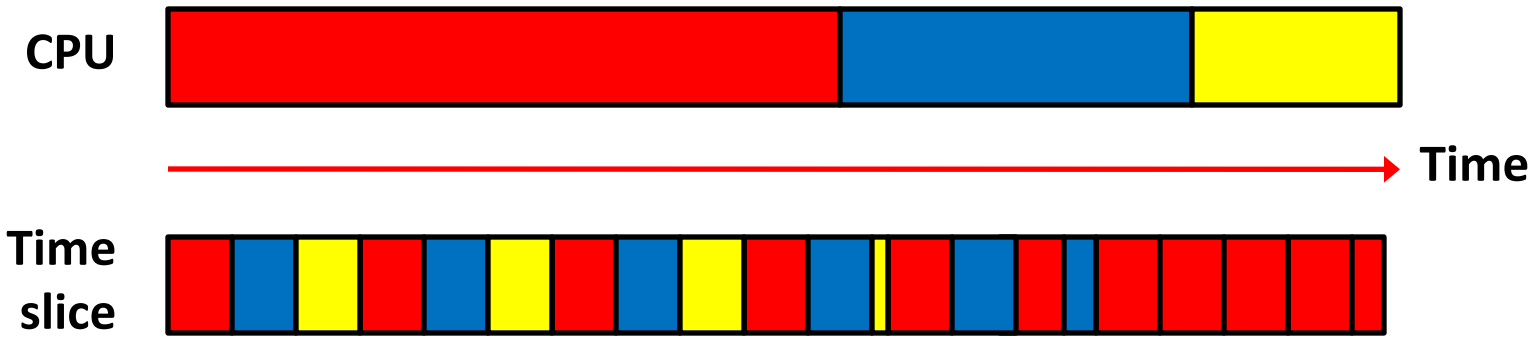


Advantage: reduce I/O waiting.

Disadvantage: a long execution can block other processes.

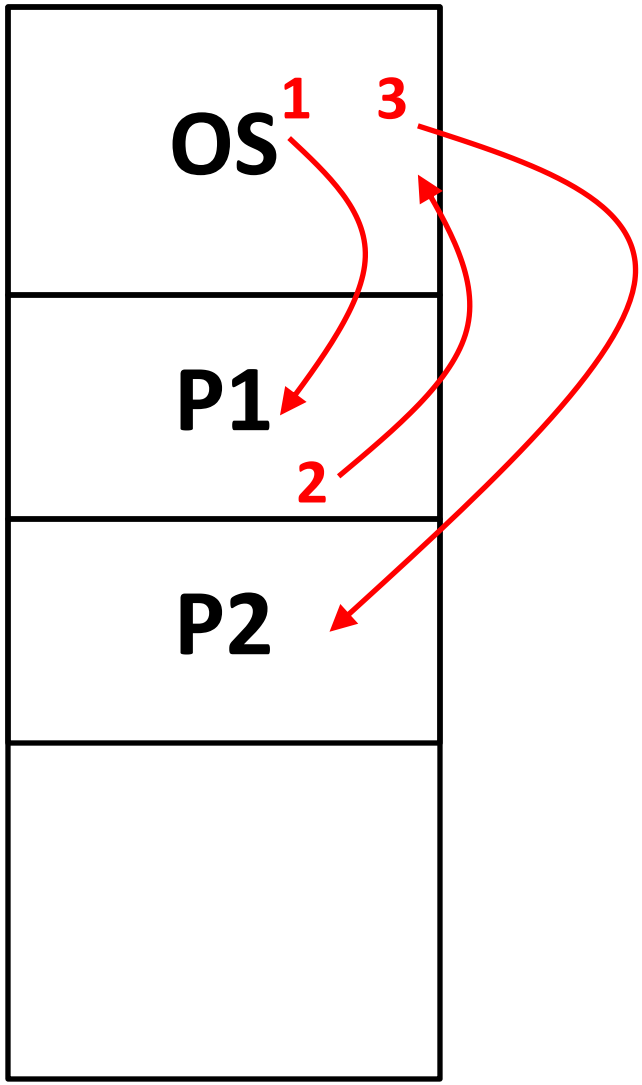
Preemptive multi-tasking (time sharing)

3 jobs (assume no I/O wait) are submitted almost at the same time (first-come, first-serve).



Advantage: quick response for all users/processes.

This can be done by timer interrupt.



1. OS ตั้ง timer interrupt
   แล้วกระโดดไปทำ P1
2. เกิด timer interrupt
   OS ยึด CPU กลับไปคืน
3. OS ตั้ง timer interrupt
   แล้วกระโดดไปทำ P2

CPU ต้องมีฮาร์ดแวร์ที่เป็น timer interrupt
เพื่อสนับสนุน OS ที่ทำงานแบบ time sharing

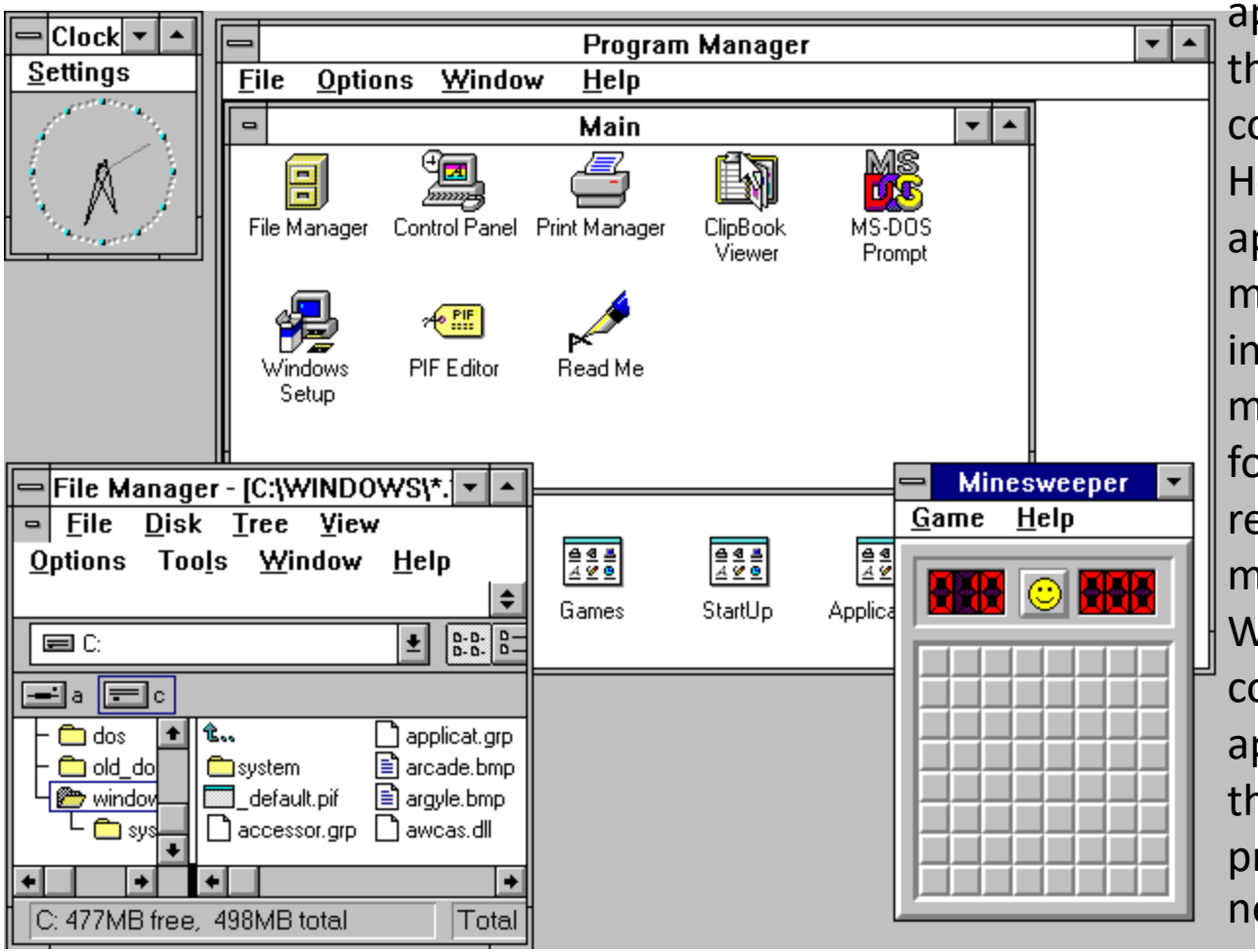
DOS

- single-user, single-task (no multi-tasking)
- only text mode, no GUI

```
Microsoft(R) Windows DOS
(C)Copyright Microsoft Corp 1990-2001.

C:\>mem


    655360 bytes total conventional memory
    655360 bytes available to MS-DOS
    578352 largest executable program size

   4194304 bytes total EMS memory
   4194304 bytes free EMS memory

  19922944 bytes total contiguous extended memory
         0 bytes available contiguous extended memory
  15580160 bytes available XMS memory
           MS-DOS resident in High Memory Area

C:\>
```

Windows 3.0, 3.1, 3.11

- **Graphical user interface (GUI)**
- **Cooperative multi-tasking**

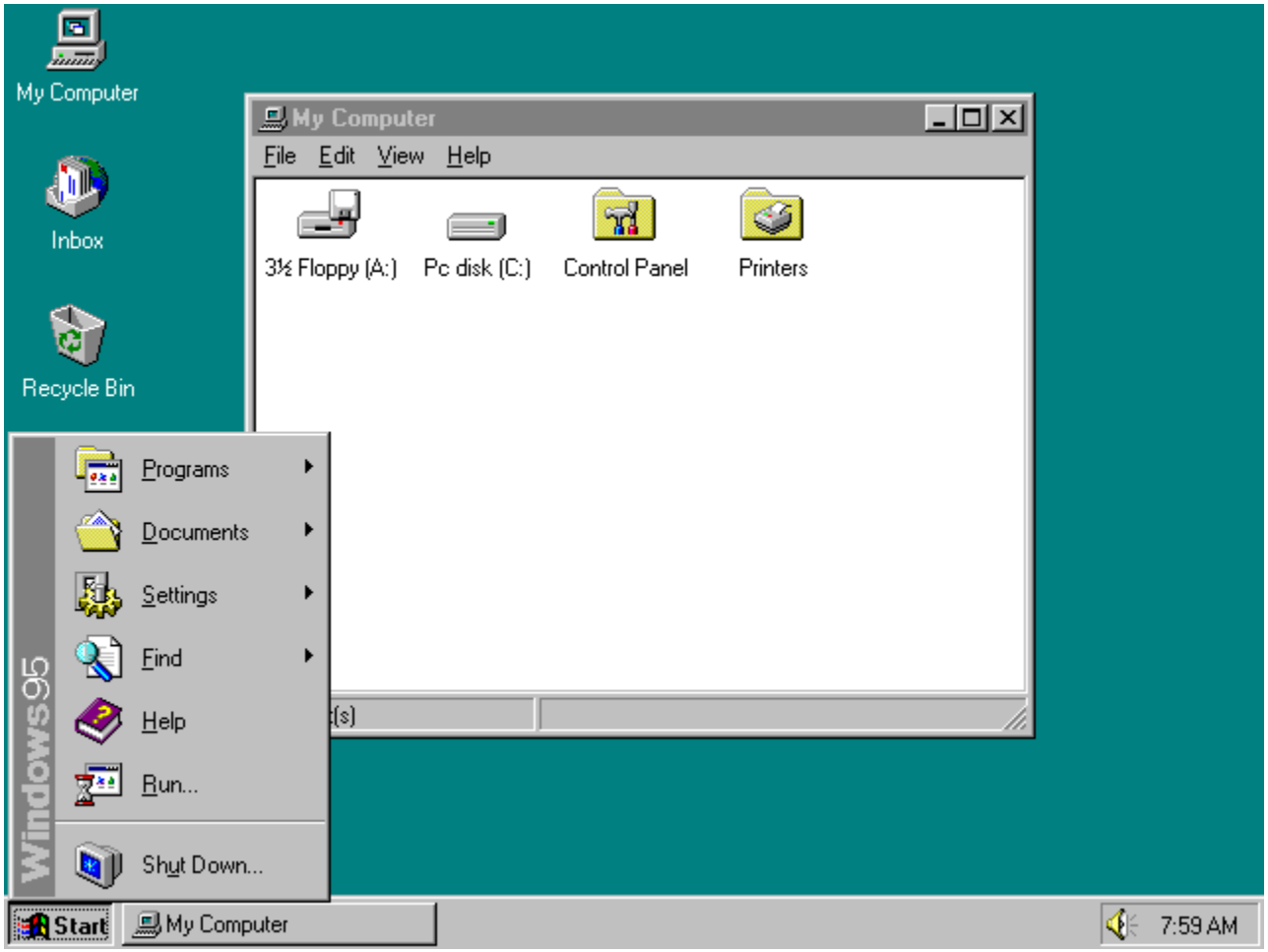


Windows 3.1 uses cooperative multitasking - meaning that each application that is in the process of running is instructed to periodically check a message queue to find out if any other application is asking for use of the CPU and, if so, to yield control to that application. However, many Windows 3.1 applications would check the message queue only infrequently, or not at all, and monopolize control of the CPU for as much time as they required. A preemptive multitasking system like Windows 95 will take CPU control away from a running application and distribute it to those that have a higher priority based on the system's needs.

Windows 95

- **preemptive multi-tasking (time sharing)**

iOS เวอร์ชันแรก ๆ ยังไม่เป็น time-sharing เพลงจะหยุดเล่น เมื่อสลับไปใช้ web browser



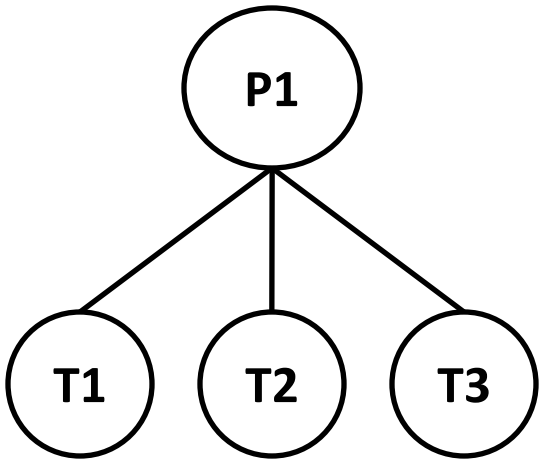
Linux

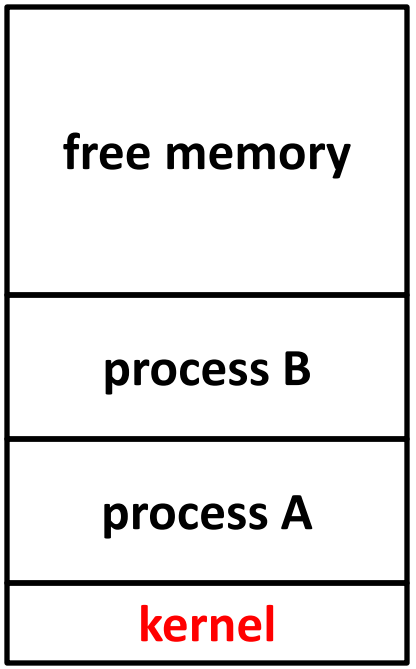
- GUI is optional.
- preemptive multi-tasking (time sharing)

Process & Thread

A process is a program loaded and being executed on computer.

A thread is a light-weight process.
(เหมือนมี main function หลายๆ อัน)





No memory protections among threads under the same process.
A program can produce multiple processes.