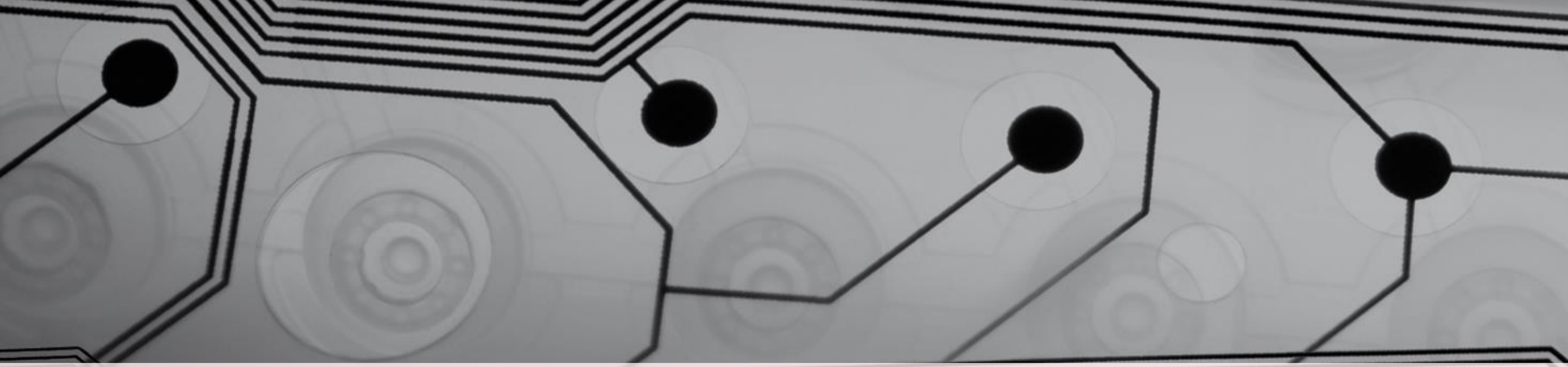


Course Overview

2023-24 COMP3230B
Principles of Operating Systems

Course Info.

- **Subclass B** of Principles of Operating Systems

- Instructor
  - Dr. Anthony TAM
  - Email: atctam @ cs.hku.hk
  - Office: Rm 305, Chow Yei Ching Building
  - Office hours:
    - Tuesday & Thursday: 14:00 – 15:30
    - Or by appointment

Tutors

- Mr. Kevin LAM
  - Email: yklam2@cs.hku.hk
  - Office: CB319
  - Office hours:
    - Wed: 13:00-16:00
      by appointment

- Mr. Yu TIAN
  - Email: u3010278@connect.hku.hk
  - Office:
  - Office hours:
    - Tue & Thu: 15:30-17:00
      by appointment

Moodle Course Site

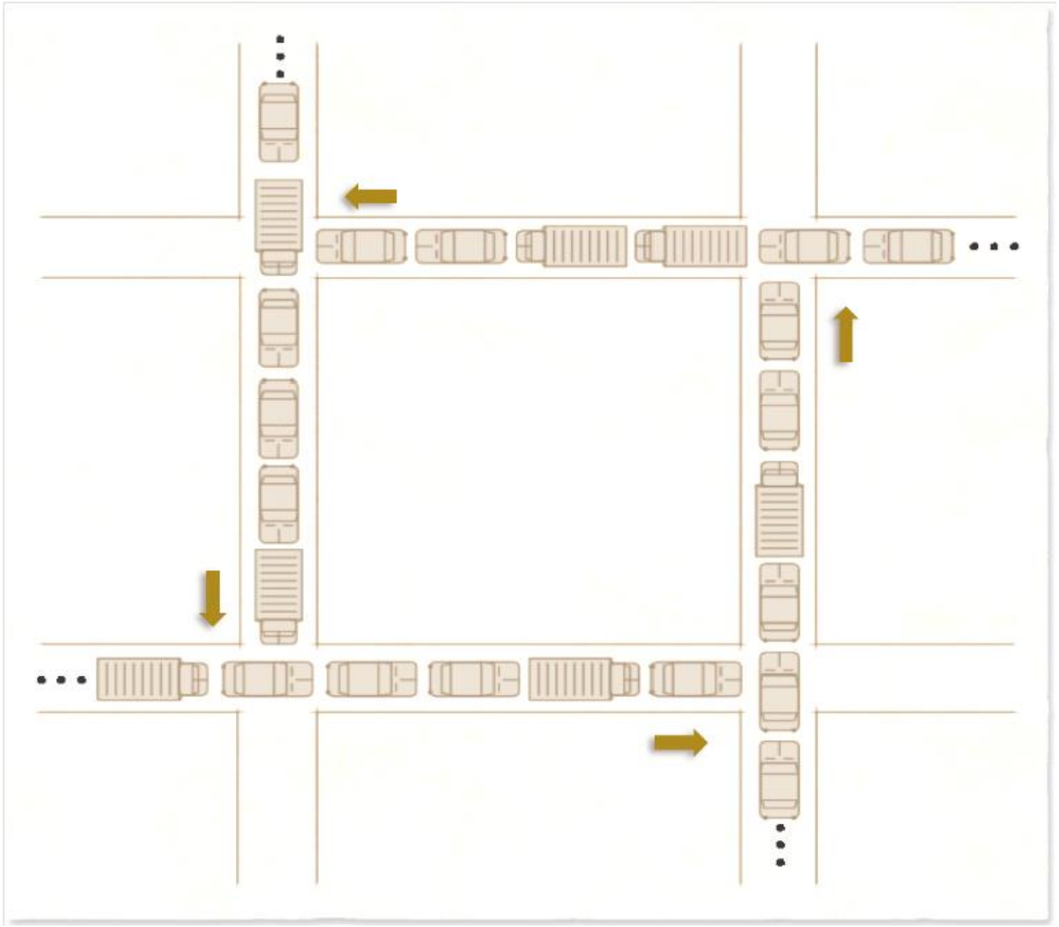
- Homepage
  - Moodle course ID COMP3230_1B_2023
  - https://moodle.hku.hk/course/view.php?id=106509

  - Course Information
  - Teaching plan
  - Reading List
  - Lecture Notes
  - Assignments' information and **submission of assignments**
  - Announcements and Updates
  - Web references
  - Discussion Forum
    - Peer-to-peer discussions & asking questions

Course Objectives

- To present the fundamentals of operating systems, to study the **details of the operations and principles** behind the design of various components of an operating system
  - Understand the **major components** that constitute the modern operating systems
  - Learn the **underlying mechanisms and policies** of the operating systems and the implications of resulting **design choices**

Problem in real life



Problem in real life

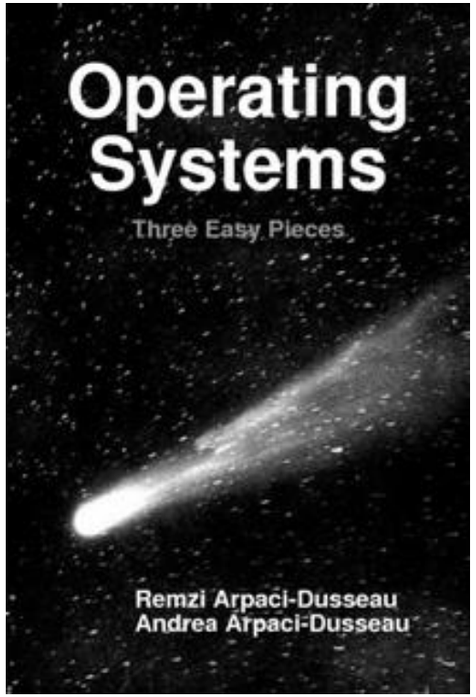
Intended Learning Outcomes

- On successful completion of the course, students should be able to:
  - **[ILO1 – Fundamentals]** discuss the characteristics of **different structures** of the Operating Systems (such as microkernel, layered, virtualization, etc.) and identify the **core functions** of the Operating Systems.
  - **[ILO2 – Principles]** explain the **principles behind** the core functions and **compare the algorithms** on which the core functions of the Operating Systems are built on.
    - **ILO 2a** – managing processes/threads and sharing of CPU resource
    - **ILO 2b** – managing and allocating memory resource effectively
    - **ILO 2c** – how to support concurrency and synchronization control between processes/threads
    - **ILO 2d** – managing and allocating persistent data storage

Intended Learning Outcomes

- students should be able to:
  - **[ILO3 – Performance]** analyze and evaluate the algorithms of the core functions of the Operating Systems and explain the major performance issues with regard to the core functions.
  - **[ILO4 – Practicability]** demonstrate knowledge in applying system software and tools available in modern operating system (such as threads, system calls, semaphores, etc.) for software development.

References



- **Required online textbook**
  - Operating Systems: Three Easy Pieces
    - by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau
  - http://pages.cs.wisc.edu/~remzi/OSTEP/

- Other references
  - Deitel et. al, Operating Systems, 3rd Edition, Prentice Hall
  - Silberschatz et. al, Operating System Concepts, 10th Edition, John Wiley
  - William Stallings, Operating Systems: Internals and Design Principles, 9th Edition, Prentice Hall
  - Bovet et. al, Understanding the Linux Kernel, 3rd Edition, O'Reilly
  - Russinovich et. al, Windows Internals, 6th Edition, Microsoft Press
  - Other online references

Assessment Tasks

- Continuous Assessment - total 50%
  - 4 take-home lab exercises – 4%
  - 3 problem-set assignments – 14%
  - Two programming assignments – 22%
  - Midterm (Oct 31, 2023) – 10%

- Slip Days (Late Submission) Policies
  - https://moodle.hku.hk/course/view.php?id=106509&section=4
  - Only apply to the problem-set and programming assignments.

- 3 hours final examination – 50%
  - Open-book examination

Teaching Plan & Schedule

Week	Topics / Activities	Remarks
1	Introduction	install WSL or install docker
2-4	Process Concept and Scheduling	
3, 4	Programming Lab 1 & 2 – for programming # one	
5-6	Thread Concept and Concurrency	Week 5: Problem-set Ass 1 due
7	Programming Lab 3 & 4 – for programming # two	Reading Week: Programming # 1 due Week 7: Problem-set Ass 2 due
8	Midterm (October 31 Tuesday)	
8-10	Virtual Memory Management	Week 10: Programming # 2 due
10-12	File System and Management	Week 12: Problem-set Ass 3 due

Two Programming Assignments

- Ass 1 - Implement a Job Submission program (11%)
  - To have firsthand practice in designing and developing a shell-like Job Submission program
  - Involves execution and management of multiple processes and collection of processes' execution statistics

- Ass 2 - Multithreaded parallel program (11%)
  - To have firsthand practice in designing and developing multithread programs using Pthread library
  - Involves synchronization and coordination between threads

Plagiarism

- Plagiarism is a disciplinary offense. Any student who commits the offense is liable to disciplinary action
- We will make use of software tools to check against your submitted assignments
  - If we identify any suspicious cases, we will invite you to explain to us
- We will follow the departmental guidelines on handling any cases relating to the practice of plagiarism by students

Achieve the Learning Outcomes

- Most topics involve discussion of **mechanisms and policies**. The materials are **quite technical** and include low-level details, which requires dedication of time to comprehend
- You are provided with a reading list.
  - To get the best learning experience and result, have a preview of those chapters before attending the class
- Designate 6 to 7 hours every week for reading the given lecture notes and readings
- Learn by exploring more about the OS systems

Achieve the Learning Outcomes

- **Actively participating** during lectures
  - Raise questions if you think that helps you to understand better
  - Or ask me after the lecture if appropriate
- In the assignments and examination, questions won't always map directly to the examples you have seen before as one of the goals of learning is to able to use the concepts and principles in new/unseen situations
- Always work on the assignments **ASAP**
  - Give yourself enough time to plan for the work
  - Don’t waste your time “spinning your wheels” needlessly; raise your questions if needed
  - Effectively utilize the discussion forum as a means of information sharing

Computing Platform

- Ubuntu 20.04 / 22.04
- Department's Linux Servers
  - academy11 & academy 21 Linux servers
    - For general uses **– don't use them for the programming assignments**
    - Accessible via X2Go, Guacamole, ssh with HKUVPN
  - **workbench2** Linux server
    - **Dedicated for the two OS classes**
    - with 56 (virtual) CPU cores
    - Accessible via Guacamole, ssh with HKUVPN
- Windows Subsystem for Linux version 2 (WSL 2)
- Course's docker Ubuntu image (Windows & Apple)
- For details - https://moodle.hku.hk/course/view.php?id=106509&section=7