2309 CS341 Course Outline

Subject Code   : CS341
Subject Title   : OPERATING SYSTEMS LABORATORY
Level   : 3
Credits   : 3
Teaching Activity   : Lecture   18 hours
  : Lab   27 hours
Prior Knowledge*   : CS340   Operating Systems
- Process Management
- Process Creation, Process Communications
- File System

Class Schedule   :

Class	Week	Time	Classroom	Date
D1	MON	15:30-16:20	C408	2022/09/04-2022/12/17
D2	FRI	12:30-15:20	C408	2022/09/04-2022/12/17

Instructor   : Ting Lan
Contact Number   : 3017
E-mail Address   : tlan@must.edu.mo
Office   : A307b
Office Hour   : MON   13:00-15:00
  WED   14:30-17:30
  THU   14:30-17:30
  FRI   15:30-17:30

Course Description

  This subject aims to introduce the basic design principles and implementation techniques of Operating Systems to students by offering several small projects. Following the guidance and instructions, students should be able to implement the following fundamental parts of a UNIX system:

1. To design and implement a simple command line shell;
2. To design and implement a simple job (process) scheduler;
3. To design and implement a basic file system.

TEXTBOOK

Required Textbook

1. Book Title: Advanced Programming in the UNIX Environment
   Author/Editor: W. Richard Stevens and Stephen A. Rago
   Edition: 3
   ISBN: 9780321637734
   Publisher: Addison Wesley
   Date: 2013

Reference books

1. Book Title: Modern Operating Systems: Global Edition

   Author/Editor: Andrew S. Tanenbaum, Albert S. Woodhull

   Edition: 5

   ISBN: 9781292459660

   Publisher: Pearson

   Date: 2023

2. Book Title: A Practical Guide to Linux Commands, Editors, and Shell Programming

   Author/Editor: Mark G. Sobell, Matthew Helmke

   Edition: 4

   ISBN: 9780134774602

   Publisher: Addison Wesley

   Date: 2017

INTENDED LEARNING OUTCOMES

Upon successful completion of this subject, students will be able to:
- Understand the fundamental design principles of operating systems;
- Implement programs under the UNIX environment;
- Apply their knowledge on data structures, programming, and algorithms to solve the practical programming problem;
- Compare different process scheduling algorithms and identify the best one;
- Gain hand-on experiences on writing and debugging programs in the UNIX environment.

Weekly Schedule

Week	Topic	Hours	Teaching Method
1	Operating systems and basic design principles	3	lecture
2	Introduction to UNIX systems	3	lecture
3	Basic operations of UNIX systems	3	lab
4	UNIX shell and system call (I)	2	lecture
5	Programming-System calls	3	lab
6	UNIX shell and system call (II)	2	lecture
7	Practice problems-Process, kernel, and signals	3	lab
8	Implement a simple command line shell	3	lab
9	Midterm	3	lab
10	Regular expressions and pipe in UNIX	2	lecture
11	Shell script: Control structures	6	lecture

12	Programming-Shell script	3	lab
13	Implementation of a simple job scheduler/file system	3	lab
14	Project presentation	3	lab
15	Final exam	3	lab

TEACHING AND LEARNING APPROACH

The teaching and learning approach of this subject is to help students in understanding the fundamental design principles of operating systems, gaining experiences in designing and implementing system software and improving their ability to solve practical problems. Students are expected to play an active role in completing the labs, designing and implementing the fundamental parts of operating systems, such as shells, process-scheduler and file system.

Students will be given the lectures about basics of UNIX programming environments, system calls, kernel, process scheduling algorithms, signals, and file systems. Students will complete 5 ~ 6 labs, each of which is quite related to the above lectures. Each lab needs to be done within the class. The midterm presentations will be held.

Students are expected to complete the projects, including (i) a command line shell, (ii) a job scheduler, (iii) a tiny file system. For project, students need to submit a project report, which includes (a) design report and (b) architecture of the whole system.

ASSESSMENT APPROACH

<u>Assessment Method</u>	% weight
1. Class Participation	10%
2. In-Class Lab Exercises	20%
3. Midterm	20%
4. Project	20%
5. Final Exam	30%
Total	100 %

Guideline for Letter Grade:

Marks	Grade
93 - 100	A+
88 - 92	A
83 - 87	A-
78 - 82	B+
72 - 77	B
68 - 71	B-
63 - 67	C+
59 - 62	C
56 - 58	C-
53 - 55	D+
50 - 52	D
49 -	F