Lab Outline
CSE 321: Operating Systems
Semester: Fall 2025

Course Description:

The laboratory lectures and assessments will include familiarization with LINUX terminal, C programming, process management, concepts and management of threads, thread synchronization, the xv6 OS codebase, creating user programs in the OS level using xv6, system call implementation in xv6, working mechanisms of preemptive process scheduling in xv6, and inter-process communication. Experiments on services of operating systems through implementation.

Lab Activity Plan:

Class	Week	Time Allocation	Topic	Description	Objectives
0	1-2	**7 Oct - 16 Oct**	Basic Shell Commands, Basic C Programming	Online tutorial(s) provided in the buX of basic Linux shell/bash commands and the fundamentals of the C programming language.	Familiarization of students with basic shell commands, and C programming language to orient them with future lab activities.
1	3	**18 Oct - 23 Oct**	System Calls	Lecture on system calls in C: process manipulation, file/file descriptor manipulation, performance profiling, system call tracing.	Create the fundamentals of system calls for students to apply them in xv6 and further labs.
2	4	**25 Oct - 30 Oct**	Linux Shell Scripting	Lecture on shell/bash scripting	Introduces students to Linux shell scripting fundamentals. Students will learn to automate system tasks, handle user input, and work with command-line arguments.
3	5	**1 Nov - 6 Nov**	Assessment 1	Assessment on basic shell commands and basics of C programming which were learnt by self-study from the online tutorials of buX.	
4	6	**8 Nov - 13 Nov**	Threads and Synchronization	Lecture on creation and management of pthreads and thread synchronization mechanisms using mutex and semaphore.	Learning how to create and manage multiple threads using pthreads and solving race condition problems within multiple threads using mutex

					and semaphore.
	7 - 8	**15 Nov - 23 Nov**	Mid-Week - No Lab		
5	8 - 9	**25 Nov - 1 Dec**	IPC	Lecture on IPC mechanisms such as pipes, shared memory and message passing.	Learning and implementing various techniques of Inter-Process Communications such as pipes, shared memory and message passing in order to establish communication among multiple processes.
6	9 - 10	**2 Dec - 8 Dec**	Assessment 2	Assessment on system calls and threads and synchronization which were covered in lab classes 1 and 4.	
7	10 - 11	**9 Dec - 15 Dec**	xv6 - Introduction	Introductory lecture on xv6: introduction, xv6 installation tutorial, booting process (?), kernel vs user space, file system hierarchy.	Teach students what xv6 is, how to run it on their own devices, explain the xv6 codebase, create user programs.
8	11 - 12	**17 Dec - 23 Dec**	xv6 - Features	In-depth explanation: system call implementation and tracing, process structure, context switching, scheduler control.	Build on syscall fundamentals to teach implementation in xv6, teach how preemptive process scheduling works in xv6.
9	12	**24 Dec**	Review		
10	13	**27 Dec - 31 Dec**	Review		
11	14	**3 Jan - 7 Jan**			

Honor Code

Any form of cheating, plagiarism, and/or academic dishonesty will result in an "F" grade in the lab.

Grading and Policies:

Lab Assignments:

The summation of weighted n assignments will be counted. If plagiarism is detected, no marks will be assigned to the lab assignments. For each day of late submission, **1 mark** will be deducted. **Assignment submissions will be taken through Google Form.**

Lab Assessments:

The average of n lab assessments will be counted. If plagiarism or any kind of academic dishonesty is detected during the lab assessment, it will cause for getting 0 in the assessments. **No make-ups are applicable for the lab assessments.**

Term Project:

One lab term project will be given this semester which will be a group project. The project will be published centrally for all the sections in the **announcement channel** of slack and **the deadline will remain the same for all sections**. Therefore, it's a central assessment. Separate marks will be allocated for the implementation of the project and viva. **Term project submissions will be taken through Google Form. No late submissions and make-up vivas are applicable for the term project .**

Attendance Policy:

In order to attend the final exam, 90% attendance in lab classes is required.

Lab Assessments:

Assessment No.	Assessment Criteria	Week	Marks
1	Basic C Programming and Bash Commands	5	7
2	System Calls and Threads and Synchronization	9-10	7

Assignment Submission:

Assignment no.	Topic	Marks	Week	Tentative Deadline
1	Threads and Synchronization	3	6	1 week
2	xv6 process scheduling	5	11-12	1 week
	Total	8		

Term Project Submission:

Term Project no.	Topic	Marks	Week	Tentative Deadline
1	TBA	10	TBA	2 weeks

Marks Distribution:

Criteria	Marks
1. Assignment (Summation of weighted n assignments)	8
2. Lab Assessment (Avg. of n)	7
3. Term Project	10
Total	**25**

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