INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY

HYDERABAD

Software Systems Development 2023

Team

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Machine Learning Lab

Research Interests: Machine Learning, Deep Learning (Geometric)

Instructors:

Soumitra Ghosh (PhD research scholar)

Teaching Assistants

- TAs
  - Soumitra Ghosh
  - Yash Singhal
  - Yash Pathak
  - Krati Agrawal
  - Priyanshu Bansal
  - Yash Maheshwari
  - Anurag Ghosh

Course Details

- The overall goal of this course is to provide a working knowledge of tools to build software systems.
- **Course Structure:** 2 Classes per week (1 hour 25 min per class), Lab Work – 1 every week (3 hrs per week), Tutorial- 1 every week (as and when required)
- **Grading Criteria:** Assignments, Project – 45%; Quizzes, Exam – 40%, Lab/class Activities – 15%
- **Course Notes:** Reference Material and relevant notes will be made available on Moodle. Students are expected to read the notes, put on effort, work towards raising your problem-solving skills and **learn things by doing**.
- **Facilitators:** Instructors and Teaching Assistants.
- **Time:** Honor Time and Come with learning mindset. Ensure that you record your queries and discuss them offline when we run out of time.
- **Lab Work:** Linux Commands, Shell Scripting, HTML, CSS, JavaScript, Python, DB, System Design

Course topics

Topic	Description
Introduction	Course Overview
Basics of OS and Commands	Basic Bash Commands
Shell Class 2	Advanced Linux Commands including file management and schedulers
Shell Class 3	Conditional Operators, Other commands
DB	Basics of DB
DB	Basics of SQL, Syntax, Coding Styles
HTML, CSS	HTML/CSS Basis
Javascript	Javascript Intro, DataTypes, Variables, Operators, If-Else, Functions, Loops, Scopes
Javascript	DataStructures, Arrow-functions, Promise, Callbacks, Async and Wait
Javascript	JavaScript Frameworks - Projects Explanation
Javascript	MongoDB
Javascript	ReactJS
Python	Introduction Functions, Exceptions and Error Handling, Sequences, falsy values, scoping rules
Python	closures, high order functions, mutability, object model
Python	modules and packages, variable args, decorators
Python	File Operations and usage of libraries
Python	Classes, Inheritance, SOAP, REST
Python	Flask, Simple flask based server
System Design	Fundamentals, Horizontal & Vertial Scaling, Microservices, Proxy Servers, CAP Theorem, Redundancy & Replication
System Design	Storage - Block, File, Object, RAID, Relational, Non-Relational. Distributed Systems - MapReduce, Stateless, Stateful
System Design	File System - Google File System, HDFS, FTP, SFTP, SMTP. Message Queues - RabbitMQ, Kafka

Academic Ethics

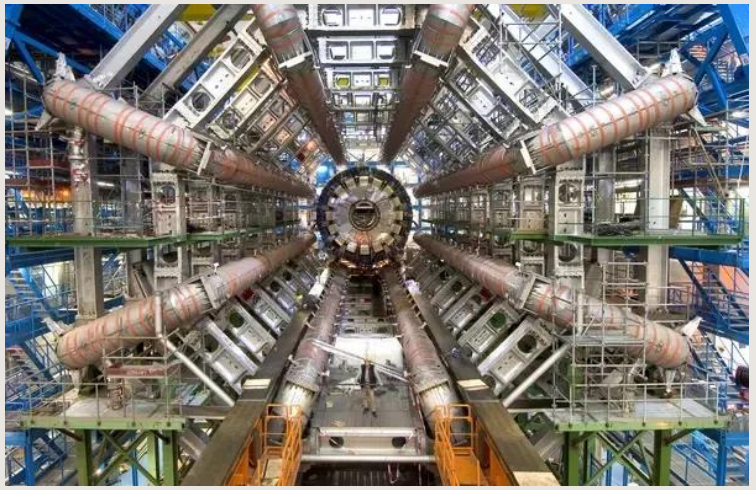
An analysis of what constitutes
CHEATING AND PLAGIARISM
and the related consequences

Academic Honesty

- A helps B in task X
  - B doesn't get opportunity to do task X
  - B doesn't learn the skill to do task X
  - B gets spoilt, dependent and unfit for jobs requiring skills of X
  - You may think it is okay to do it only once and not repeat it. But when a thing is done once, it gets wired into the brain as being "okay"; and unless there is a strong reason, it *will* repeat.
- If you want to help, help to learn.

What are these?

- Large systems, complex machines
- Tunnel Boring Maching: bore through the earth and place interlocking concrete bricks that form the tunnel walls
- Large Hadron Collider: particle accelerator
- Saturn V Rocket
- What do they have inside?

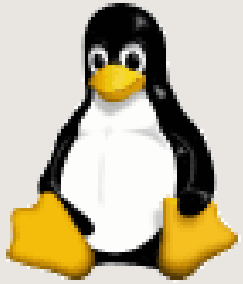


What is a system?

- Commonly used/understood definition
  - Set of inter-related components working together to achieve a common objective
- A system may be “natural” or “Engineered”
  - Solar system (Natural)
  - Telephone network system, power plants, etc. (Engineered)
  - Systems have boundaries – due to various reasons

Course includes...

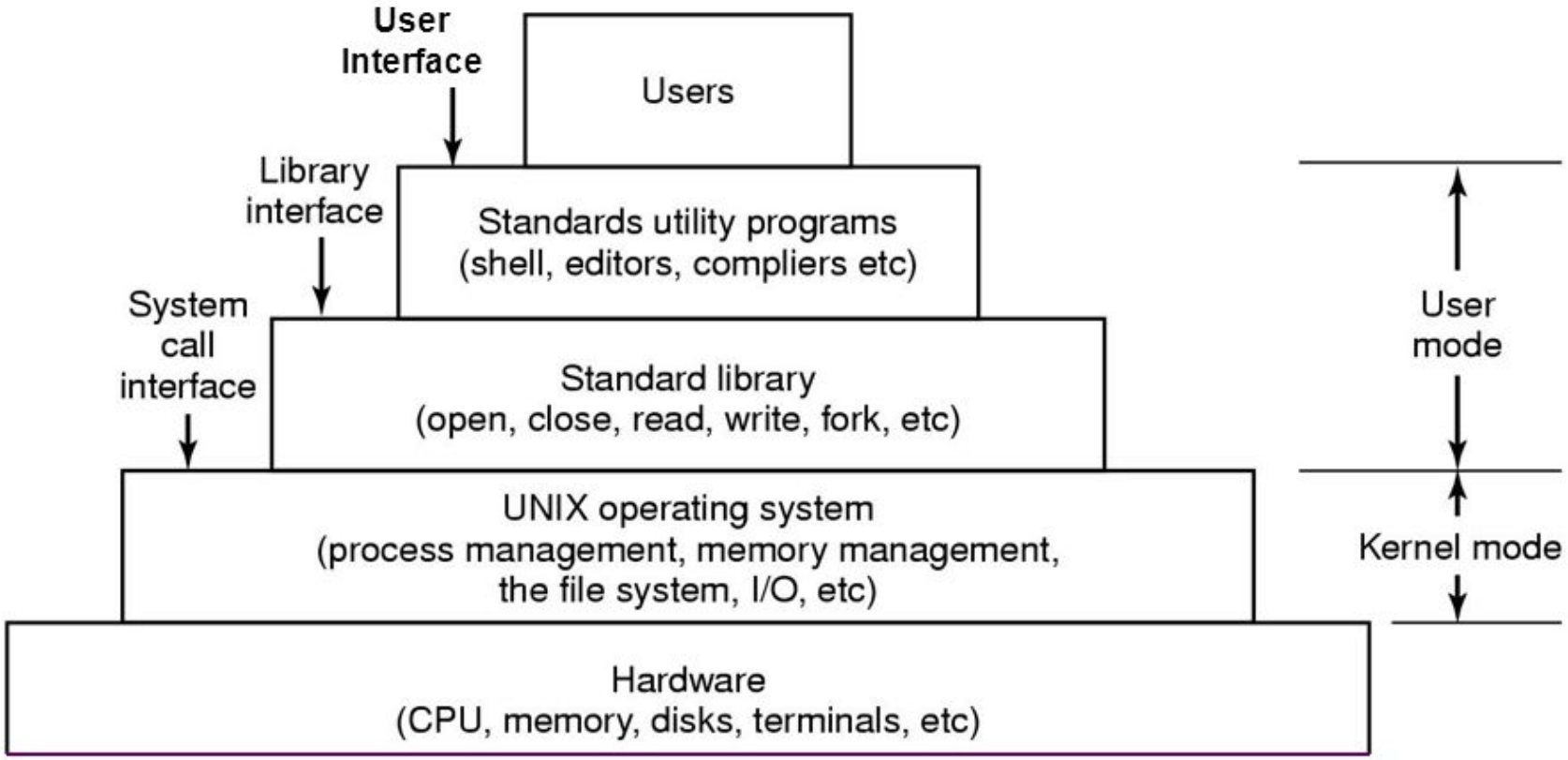
Why Linux



Free
Open-source
Secure
Distributions
Fast Performance

Viruses
Malwares
Slow-downs
Crashes
Costly repairs

The layers of a UNIX system



SHELL

- A Shell is an interface between the user and the system.
- A program or command line interpreter that translates the user command to a language understandable to the system.
- Here, the system refers to the kernel. The kernel is the heart of the Linux OS.
- Types of Shells: Bourne (sh), Bourne again (Bash), C (csh, tcsh), Korn (ksh), Powershell (windows)