# CS2013 Systems Programming

## (Lab 1) Overview and Administrative information

Department of CSE, IIT Palakkad

IIT Palakkad

July 31, 2025

# Quiz 1 (15 minutes)

1. What is the output of the following python code ?

```
>>> 0.1 + 0.2
```

2. Following python function checks if input is a multiple of 3. Complete it.

```
def isMultOfThree(n):
    # Write code
```

3. Following python function checks if input is a power of 3. Complete it.

```
def isPowerOfThree(n):
    # Write code
```

**Do not copy the question**

# Course details

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- Course title - **Systems Programming**

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- What is this course about ?
- What will be covered ?
- Why is it core course ?

# Locations, staying updated and the Team

- Location: A01-109, Computer Lab, Academic Building, Sahyadri Campus, IIT Palakkad
- Time: 2.00 PM to 6.00 PM
- **Slides will be available in moodle**

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## Teaching team

- Instructor - Dinesh (`kdinesh@iitpkd.ac.in`)
- TAs - Anna Merry (SoCD) and Kiran Babu (Direct PhD)

# Session plan

- Lecture part . . .
- . . . followed by hands-on session

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- Each lab session is 1 theory session + 3 x 1 hr lab sessions
  - 2.00 – 2.15 : Quiz
  - 2.15 – 3.00 : Lecture + Lab
  - 3.00 – 4.00 : Lab
  - 4.00 – 5.00 : Lecture + Lab
  - 5.00 – 6.00 : Lab (Eval)
- Internet cut during the session

# Evaluation policy

| Evaluation (#) | Activity | Weight | When |
|---|---|---|---|
| Cont. (13) | In-lab assessment | 25% | |
| | Weekly lab quiz | 5% | 15 minutes @ start |
| Term (3) | Lab test 1 | 15% | Likely on Sep 11 |
| | Lab test 2 | 15% | Likely on Oct 16 |
| | End exam | 40% | Likely on Nov 15 - 17 |

- References – Web articles and links. See Moodle / Mailing list
- Textbook - **Computer Systems** – A programmer's perspective (Bryant, O'Hallaron)
- Copies available in Sahyadri library

# Expectations

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- Check mailing list (cs2013-2025@googlegroups) !
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- Mental model: how computer works
- Help explain behaviour of a computer
- Connects to . . .
  - Data Structures and Algorithms
  - Compilers
  - Computer Architecture
  - Databases, Networking
  - . . . and so on
- **Related course** - FoCS (for BTech CS)

# Outcomes of the course

- Automate boring tasks: scripting
- Maintaining code bases, versioning
- C / C++ programming
- Comfortable with Unix environment
- Testing, Debugging and Profiling
- Unix Philosophy and Hacker mindset
- **Engineer vs Technician**

# Tentative Schedule

| # | Day | Topic |
|---|---|---|
| 01 | July 31 | Overview; Using `ssh`; Basic shell scripting |
| 02 | **Aug 02** | Advanced shell scripting; Version control `git` |
| 03 | Aug 07 | Basics of C programming; Pointers |
| | Aug 14 | Solving problems via C programming - I |
| 04 | Aug 21 | Solving problems via C programming - II |
| 05 | Aug 28 | Advanced C programming |
| **06** | Sep 04 | Functions; Calling conventions; Recursion |
| **08** | Sep 18 | User defined types and its use |
| 09 | Sep 25 | Debugging (`gdb`) and handling memory leaks (`valgrind`) |
| **10** | Oct 09 | Coding across multiple files; Makefile |
| **12** | Oct 23 | Coding across multiple files; Testing |
| 13 | Oct 30 | Basics of C++ ; OOP ; Overloading |
| 14 | Nov 06 | Templates; STL in C++ |
| 15 | Nov 13 | Multithreading in C; Profilers (`gprof`) / Buffer session |

# Mental model of how computer works

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- Open-source (FOSS)

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  - . . . which uses Linux Kernel
- Unix - Operating systems developed by AT&T Bell labs (early 70s).
- Open-source (FOSS)
  - Freedom 0 - . . . to run for any purpose
  - Freedom 1 - . . . to study how the program runs and change it
  - Freedom 2 - . . . to distribute copies
  - Freedom 3 - . . . to distribute modified version to other
- Operating Systems - Windows, Mac, Linux
- Kernel - Linux kernel, Mach kernel
- Distributions - Fedora, Ubuntu, Nix, Debian, Arch
- GNU - FOSS collection