

# Introduction

# Overview

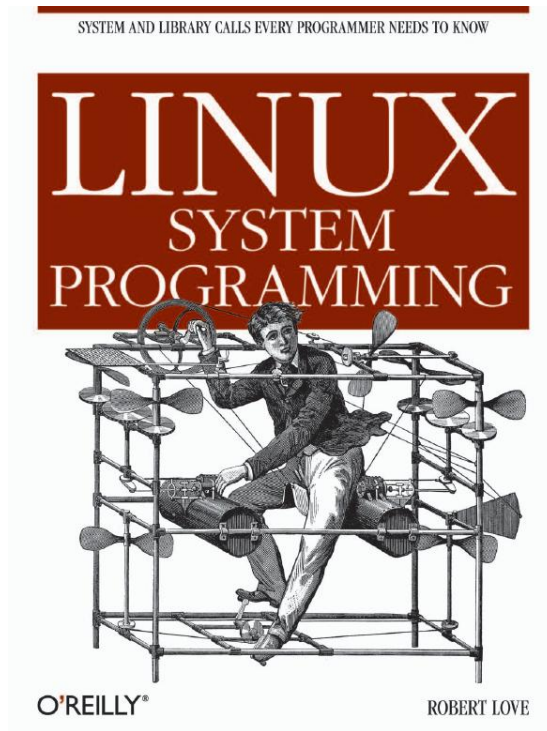
- Системне програмування. Спеціальність 123 - КІ (Луцький національний технічний університет)  
[https://drive.google.com/file/d/1NgvgUhJfyOwQl23iP34xnRgJuM\\_6H0PK/view?usp=drive\\_link](https://drive.google.com/file/d/1NgvgUhJfyOwQl23iP34xnRgJuM_6H0PK/view?usp=drive_link)
- Системне програмування С і С++ (Державний університет інтелектуальних технологій і зв'язку. Одеса) <https://suitt.edu.ua/wp-content/uploads/2024/04/systemne-prohramuvannia-c-i-c.pdf>
- Системне програмування (Факультет електроніки ЛНУ)  
[https://electronics.lnu.edu.ua/wp-content/uploads/2022\\_OK\\_27\\_syl.pdf](https://electronics.lnu.edu.ua/wp-content/uploads/2022_OK_27_syl.pdf)
- Системне програмування. Спеціальність 123 - КІ (Технічний фаховий коледж Луцького національного технічного університету) <https://e-tk.lnu.edu.ua/course/view.php?id=277>

# Overview

- Systems Programming in C++ (Technische Universität München)  
<https://db.in.tum.de/teaching/ss19/c++praktikum/>
- Practical course: Systems Programming (Chair of Distributed Systems & Operating Systems at TU Munich) <https://github.com/ls1-sys-prog-course/docs>
- CS4414: Systems Programming (Computer Science at Cornell University)  
<https://www.cs.cornell.edu/courses/cs4414/2023sp/Schedule.htm>
- CSE 20289: Systems Programming (University of Notre Dame)  
<https://www3.nd.edu/~pbui/teaching/cse.20289.sp17/>

# System Programming

Traditionally speaking, all Unix programming is system-level programming. Historically, Unix systems did not include many higher-level abstractions. Even programming in a development environment such as the X Window System exposed in full view the core Unix system API.



# Системне програмування.

Спеціальність: F5 Комп'ютерна інженерія (НЕФК)

<b>Зміст дисципліни</b>	<p>Змістовий модуль 1. Вступ. Мови системного програмування.</p> <p>Змістовий модуль 2. Програмування в системних оболонках на прикладі Bash.</p> <p>Змістовий модуль 3. Основні засоби, конструкції та принципи програмування мовою Python.</p> <p>Змістовий модуль 4. Візуальне програмування з використанням фреймворку PyQt.</p>
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# About

- What Is System Programming? <https://www.coursera.org/in/articles/system-programming>
- The Programming Language Guide <https://www.youtube.com/watch?v=2IVDktWK-pc>
- Python Vs C++ Vs Java! <https://youtu.be/hnlz0YYCpBU>
- Python vs C/C++ vs Assembly side-by-side comparison <https://www.youtube.com/watch?v=3PclJKd1PKU>

# System software written in Bash

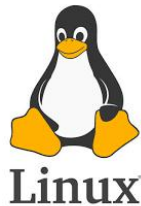
```
sde@thames:~  
File Edit View Search Terminal Help  
[sde@thames ~]$ pass  
Password Store  
├── Bank  
│   ├── BoS  
│   ├── Nationwide  
│   └── Smile  
├── Home  
│   ├── Bank-Vault  
│   ├── Safe2  
│   └── Shopping  
│       ├── Aldi  
│       ├── Amazon  
│       ├── HMV  
│       ├── JohnLewis  
│       ├── Mands  
│       ├── Poundland  
│       └── RiverIsland  
└── Work  
    ├── Client-45  
    ├── Client-46  
    ├── Email  
    ├── google.com  
    └── mobile-phone  
[sde@thames ~]$
```

## Canon LPB-6000B driver installer



[https://github.com/hieplpvip/ubuntu\\_canon\\_printer](https://github.com/hieplpvip/ubuntu_canon_printer)

## Linux init scripts



```
root@ban335a-vm:/etc/rc6.d# ls -lt 0  
Stopping Session c1 of user root.  
Stopping user Manager for USB 0...  
Stopping Save/Restore Sound Card State...  
OK ] Stopped target System Time Synchronized.  
OK ] Closed Load/Save RF Kill Switch Status /dev/rfkill Watch.  
OK ] Stopped target Timers.  
OK ] Stopped daily cleanup of Temporary Directories.  
OK ] Stopped target Multi-User System.  
Stopping Network Name Resolution...  
Stopping Kernel Logging Service...  
Stopping helloworld.service...  
Stopping System Logging Service...  
OK ] Stopped target Local Programs.  
Stopping Getty on tty1...  
Stopping Serial Getty on ttyS0...  
Stopping Serial Getty on ttyS1...  
OK ] Stopped target Suspend/Standby.  
OK ] Stopped System Logging Service.  
OK ] Stopped Kernel Logging Service.  
OK ] Stopped Network Name Resolution.  
OK ] Stopped Serial Getty on ttyS0.  
OK ] Stopped Serial Getty on ttyS1.  
OK ] Stopped Getty on tty1.  
OK ] Stopped user Manager for USB 0...  
Stopping Session c1 of user root.  
OK ] Stopped Save/Restore Sound Card State.  
OK ] Stopped helloworld.service.  
OK ] Stopped user Manager for USB 0...
```

# System software written on Python

The image is a composite of three screenshots illustrating a Python development environment.

**Top Left: Terminal Window**  
The terminal shows a file listing in the `/home/teacher/pt` directory. The files and their sizes are:

File	Size
pt	8
extensions	8
logs	5
saves	7
templates	3
nets	0
PT.conf	4
PT.conf.autosave	0

Below the listing, it shows disk usage: `46.1K sum, 93.7G free 1/9 Top`. The terminal also shows the command `uname -a` and the output: `Linux main 6.5.0-45-generic #45~22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Mon Jul 15 16:40:02 UTC 2 x86_64 x86_64 x86_64 GNU/Linux`. The `spyder` command is also executed, showing the version `5.4.0`.

**Top Right: Web Browser**  
The browser shows the Google homepage. The address bar displays `https://duckduckgo.com/?t=h&https=1&start=16&google.com&is=web`. The page content includes the Google logo, search bar, and links to various services like Gmail, Maps, Drive, Photos, and Translate.

**Bottom: Spyder Python IDE**  
The IDE window shows the file `temp.py` open. The code in the editor is:

```
1 def count_sheeps(sheep):
2     count = 0
3     for sheep in sheep:
4         if sheep:
5             count += 1
6     return count
7 # return len([i for i in s
8 # return sum(filter(lambda
9 # if not sheep:
10 # return 0
```

The right sidebar shows the Variable Explorer, Plots, and Code Analysis tabs. The Console tab at the bottom shows the output: `Python 3.9.19 | packaged by conda-forge | (main, Mar 20 2024, 12:50:21) Type "copyright" or "credits" or "help()" to get more help.`



# Python everywhere

```
linux@alma:~$ sudo dnf install nginx
Last metadata expiration check: 0:43:29 ago on Sun 26 Jun 2022 07:37:31 PM EDT.
Dependencies resolved.

Package      Architecture Version      Repository    Size
Installing:
  nginx       x86_64      1:1.20.1-18.el9.alma  appstream    594 k
Installing dependencies:
  almalinux-logs httpd  noarch      90.5.1-1.1.el9  appstream    38 k
  nginx-filesys  noarch      1:1.20.1-18.el9.alma  appstream    11 k

Transaction Summary
Install 3 Packages

Total download size: 623 k
Installed size: 1.8 M
Is this ok [y/N]: y
```

