

Programming languages concepts

C++

- Data Encapsulation
- Polymorphism
- Object oriented paradigm - Class/Objects
- Static typing - basic datatypes, const
- Virtual functions
- Pointers
- References
- Templates

Python

- Discussed dynamic typing
- Interpreted vs. compiled languages
- Many ideas are borrowed from other languages, e.g., object-orientation from C++/Simula
- Better scripting, string manipulation, library support
- Dynamic typing makes it easier to code

Systems

Processes, forks, pipes

- What is a process
- Memory layout of a process
- forks, pipes, signals and their uses

Graph

- C++ code for a graph data structure
- Breadth-First Search

Control-hijack Attacks

- Basic buffer overflow, integer overflow, and string format attacks
- Return-oriented programming
- Basic protection mechanisms, including canaries, NX bit, address space layout randomization (ASLR)

Regular Expressions

- Definition
- Expressing languages via regexes
- Given a language description, provide a regex
- Given a regex, provide a language description

Resources

- Slides and lecture videos
- <https://www.geeksforgeeks.org/>
- stackoverflow.com