Video Lectures

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Section 0: Introduction

- Welcome (6:50)
- Theme (7:28)
- Roadmap (6:35)
- Setting up the VM (9:25)
- Getting Started with Lab 0 (4:50)

Section 1: Memory, Data, and Addressing

- Preliminaries (9:13)
- Memory Organization (8:45)
- Addresses and Data Representations (9:27)
- Data and C (9:58)
- Arrays (14:09)
- Boolean Algebra (13:03)

Section 2: Integer and Floating Point Numbers

Section 3: Basics of Architecture, Machine Code

- Instruction Set Architectures (14:51)
- Machine Programming (21:50)

Section 4: x86 Assembly

- Moving Data (17:38)
- x86 vs. x86-64 (05:54)
- Memory Addressing Modes (14:22)
- Conditionals and Control Flow (09:57)
- More about Conditionals (09:49)
- Loops (09:11)
- Switch Statements (09:44)
- Tutorial: GDB (10:35)

Section 5: Procedures and Stacks

- Stacks in Memory and Stack Operations (10:00)
- Procedure Calls and Returns (13:27)
- Stack-Based Languages (09:14)

Section 6: Arrays and Structs

- Array Allocation/Accesses (16:17)
- Nested Arrays (16:45)
- Multi-Level Arrays (11:07)
- Structures (07:04)
- Structures and Alignment (10:53)
- Tutorial: Buffer Overflows (22:48)

Section 7: Memory and Caches

- Cache Basics (08:01)
- Principle of Locality (06:15)
- Memory Hierarchies (07:58)
- Cache Organization (18:24)
- Cache Organization [cont.] (14:43)
- Cache-Friendly Code (12:19)

Section 8: Processes

- Exceptional Control (13:31)
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Section 9: Virtual Memory

- Virtual Memory Overview (06:41)
- Indirection (10:38)
- Virtual Memory Caches (22:49)
- Address Translation (11:17)
- Sample Memory System (15:43)

Section 10: Memory Allocation

- Dynamic Memory Allocation (07:54)
- Performance and Fragmentation (09:45)
- Implicit Free Lists (13:12)
- Explicit Free Lists (10:36)
- Garbage Collection (09:51)
- Memory-Related Perils and Pitfalls (13:38)
- Tutorial: Lab 5 (06:10)

Section 11: Java vs. C

- Data in Java (13:06)

Final Week

Final Video