Today

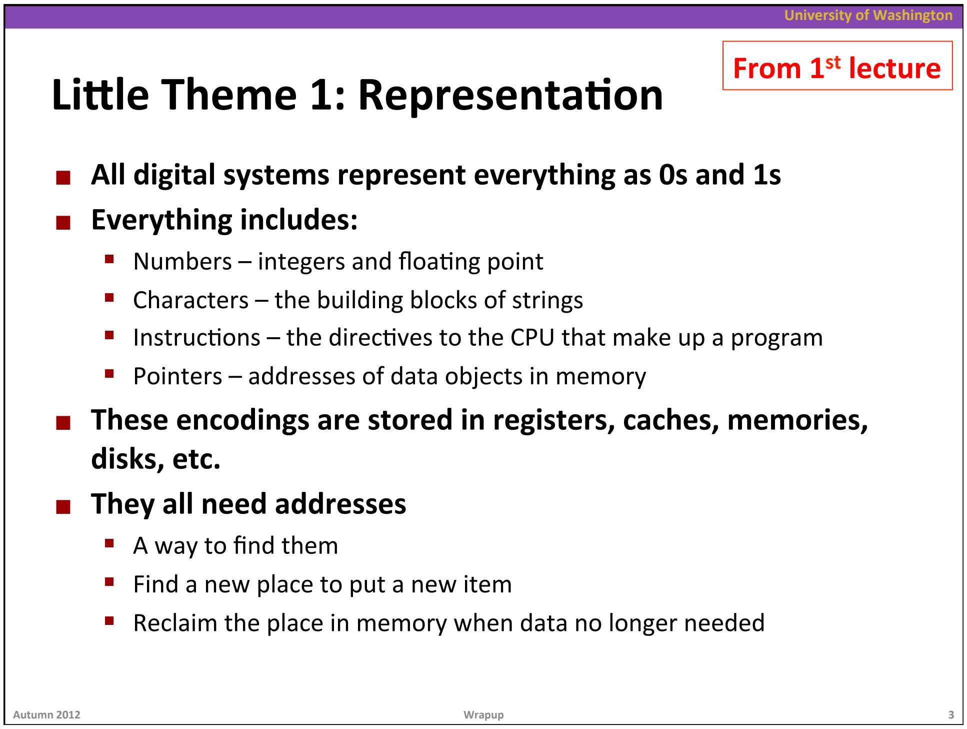
- **What have we accomplished this quarter?**
- **How does CSE351 fit into the curriculum?**
- **What about 400-level courses?**

- **Evaluation of the course**
  - Help us make the CSE351 better in the future
  - How did it help you?
  - What could have been done better?

From 1st lecture

The Big Theme

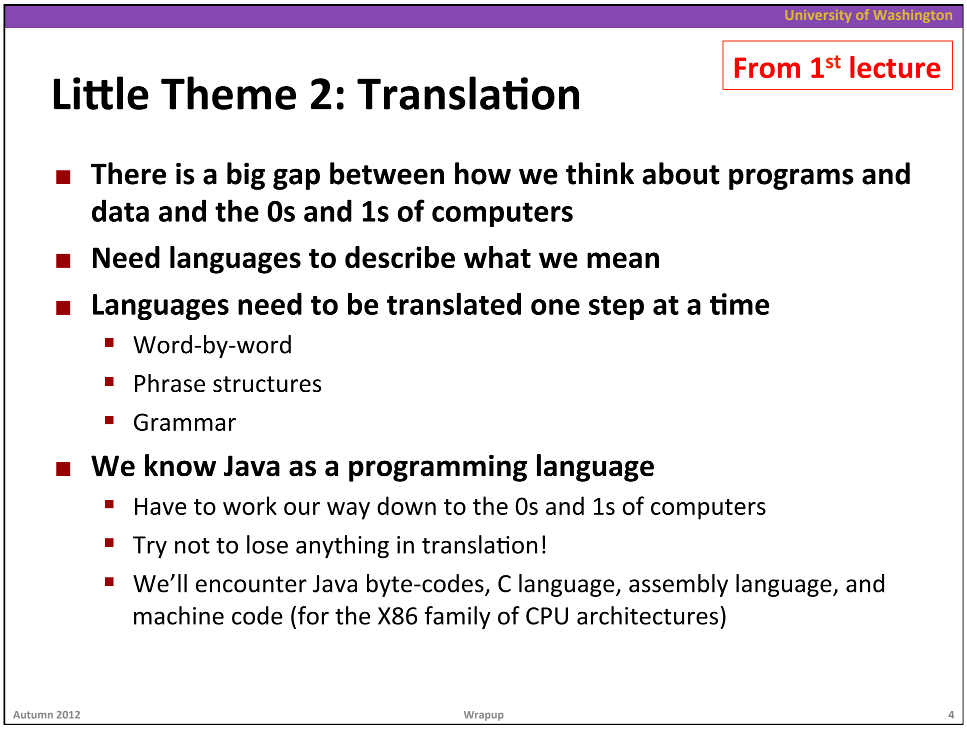
- **THE HARDWARE/SOFTWARE INTERFACE**
- **How does the hardware (0s and 1s, processor executing instructions) relate to the software (Java programs)?**
- **Computing is about abstractions (but don't forget reality)**
- **What are the abstractions that we use?**
- **What do YOU need to know about them?**
  - When do they break down and you have to peek under the hood?
  - What assumptions are being made that may or may not hold in a new context or for a new technology?
  - What bugs can they cause and how do you find them?
- **Become a better programmer and begin to understand the thought processes that go into building computer systems**



From 1st lecture

Little Theme 1: Representation

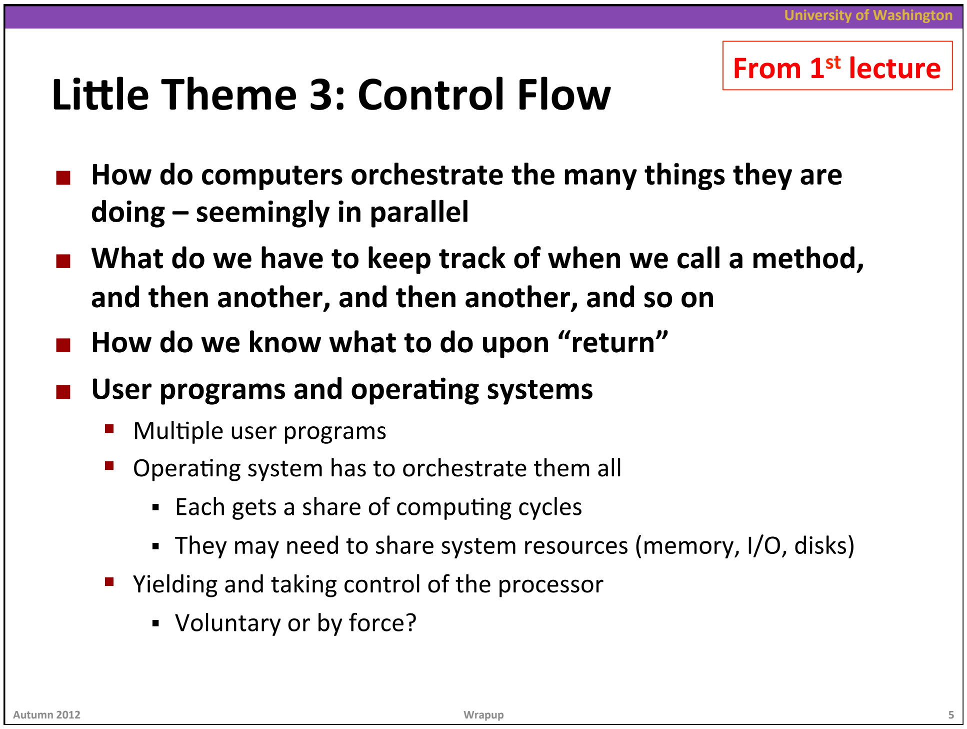
- **All digital systems represent everything as 0s and 1s**
- **Everything includes:**
  - Numbers – integers and floating point
  - Characters – the building blocks of strings
  - Instructions – the directives to the CPU that make up a program
  - Pointers – addresses of data objects in memory
- **These encodings are stored in registers, caches, memories, disks, etc.**
- **They all need addresses**
  - A way to find them
  - Find a new place to put a new item
  - Reclaim the place in memory when data no longer needed



From 1st lecture

Little Theme 2: Translation

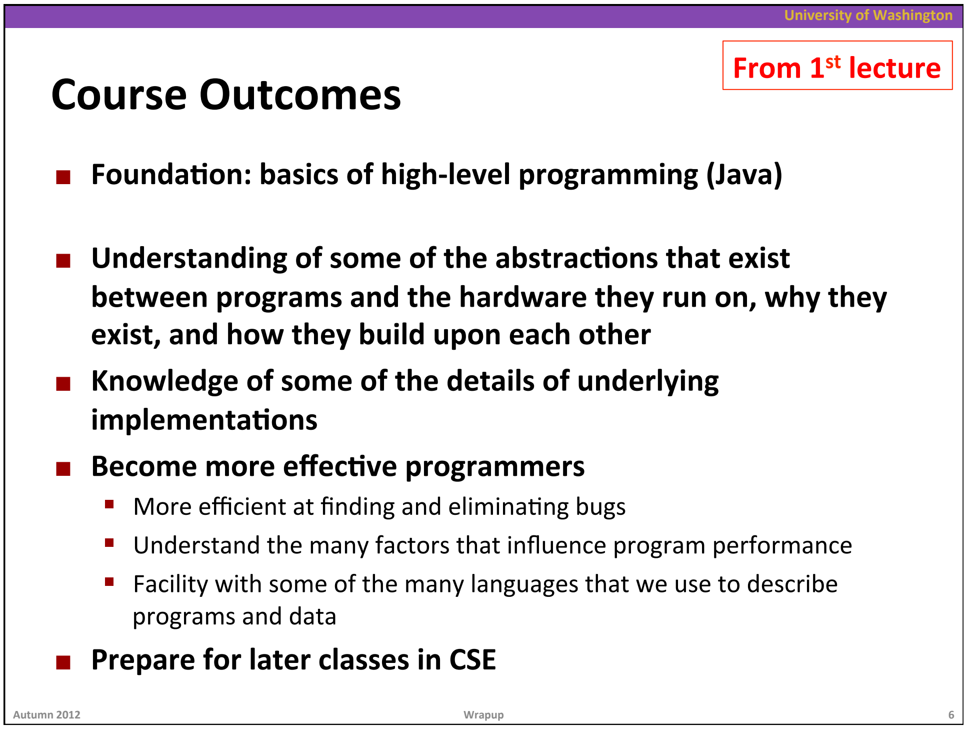
- **There is a big gap between how we think about programs and data and the 0s and 1s of computers**
- **Need languages to describe what we mean**
- **Languages need to be translated one step at a time**
  - Word-by-word
  - Phrase structures
  - Grammar
- **We know Java as a programming language**
  - Have to work our way down to the 0s and 1s of computers
  - Try not to lose anything in translation!
  - We'll encounter Java byte-codes, C language, assembly language, and machine code (for the X86 family of CPU architectures)



From 1st lecture

Little Theme 3: Control Flow

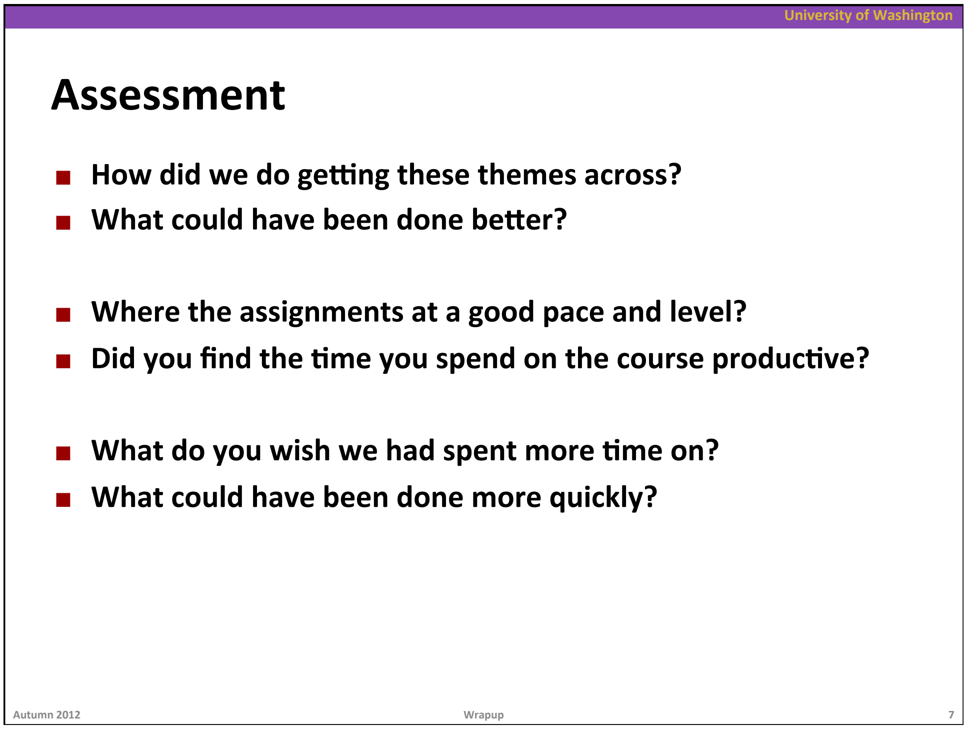
- How do computers orchestrate the many things they are doing – seemingly in parallel
- What do we have to keep track of when we call a method, and then another, and then another, and so on
- How do we know what to do upon “return”
- User programs and operating systems
  - Multiple user programs
  - Operating system has to orchestrate them all
    - Each gets a share of computing cycles
    - They may need to share system resources (memory, I/O, disks)
  - Yielding and taking control of the processor
    - Voluntary or by force?



From 1st lecture

Course Outcomes

- Foundation: basics of high-level programming (Java)
- Understanding of some of the abstractions that exist between programs and the hardware they run on, why they exist, and how they build upon each other
- Knowledge of some of the details of underlying implementations
- Become more effective programmers
  - More efficient at finding and eliminating bugs
  - Understand the many factors that influence program performance
  - Facility with some of the many languages that we use to describe programs and data
- Prepare for later classes in CSE

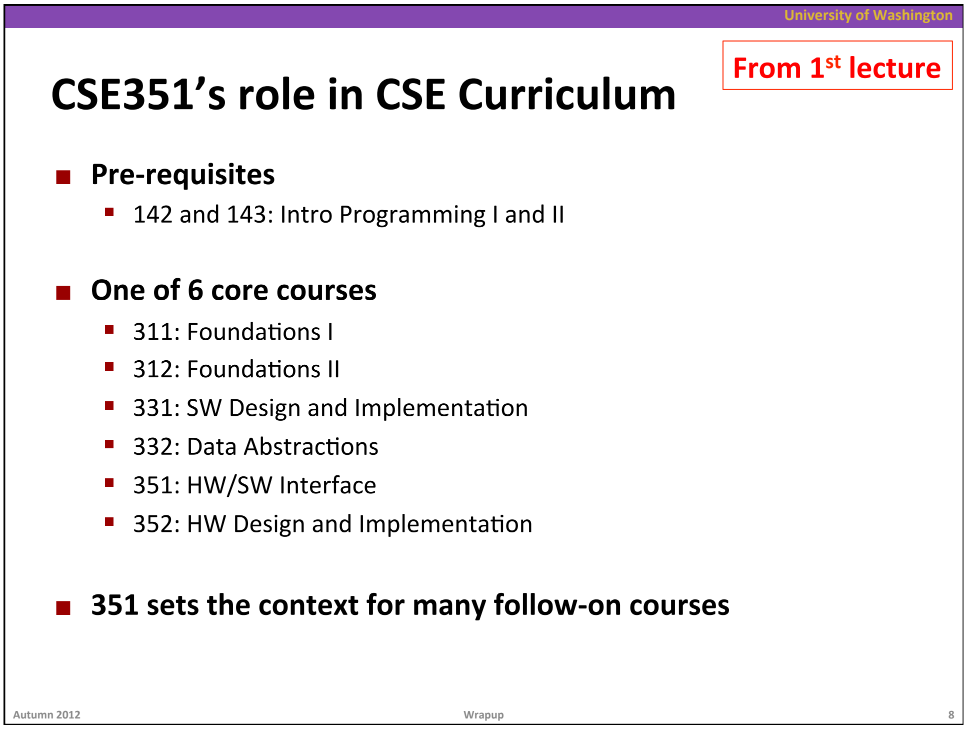


Assessment

- How did we do getting these themes across?
- What could have been done better?

- Where the assignments at a good pace and level?
- Did you find the time you spend on the course productive?

- What do you wish we had spent more time on?
- What could have been done more quickly?



From 1st lecture

CSE351's role in CSE Curriculum

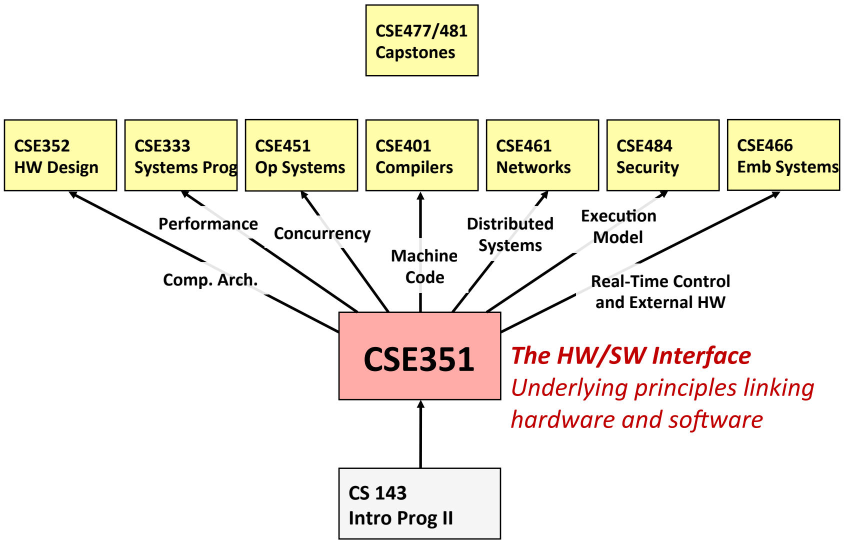
- Pre-requisites
  - 142 and 143: Intro Programming I and II

- One of 6 core courses
  - 311: Foundations I
  - 312: Foundations II
  - 331: SW Design and Implementation
  - 332: Data Abstractions
  - 351: HW/SW Interface
  - 352: HW Design and Implementation

- 351 sets the context for many follow-on courses

From 1st lecture

CSE351's place in new CSE Curriculum



The HW/SW Interface
Underlying principles linking hardware and software

Evaluation

- **Survey Form – standard questions you've seen before**
- **Additional Questions**
  - For ABET accreditation of our Computer Engineering program
  - Specific questions to this course
- **Yellow Sheets**
  - open format, what you really think of what happened this quarter
  - textbook (readability, denseness, problems, cost, …)
  - assignments (utility, time commitment, appeal, …)
  - exams (coverage, fairness, correlation to assignments, …)
  - topics (remove, add, change coverage, …)
  - mix of work (reading, programming, problems, section, …)
  - grading scheme (relative weights of exams, assignments, participation, …)
  - section (lab or section?, interactive exercises, debugging, topics, …)

The Hard Things to Evaluate

- What will you remember in going on to next core courses?
- What will you remember in senior year, for later courses?
- Will this have an impact on ability to get internships/jobs?
- Will this enable deeper participation in a range of research?

- This takes years to assess properly
- Continuation of content with follow-on courses
  - e.g., use of X86/Y86 for implementation in 352, same text!
  - e.g., moving on to more C and C++ in 333 (systems programming)
  - e.g., sufficiency of background from 142/143
  - e.g., 390A (unix tools) as a co-requisite

Acknowledgments

- Thanks for the privilege of being your instructor this quarter
  - You were a fantastic class, great questions, great attitude
- Thanks for your feedback (now and in the future)
  - Your fellow students will appreciate all of your comments/input
- Thanks for the great service of your four TAs
  - Jaylen and Matt (for the sections)
  - Lindsey and Sunjay (for the assignments)
  - And all 4 of this great team for the support they provided to all of you (grading, office hours, sections, discussion board, etc.)