CSE 322, Fall 2010

Intro

http://www.cs.washington.edu/322

University of Washington
Computer Science & Engineering

CSE 322, Au '10: Introduction to Formal Models in Computer Science

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Note:

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HW #1
Lecture Notes

Lecture: JHN 175 (schematic) MWF 1:30-2:20

		Office Hours	Location	Phone
Instructor:	Larry Ruzzo, ruzzo@cs	M 2:30-3:20	CSE 554	543-6298
TAs:	Leilani Battle, leibatt@cs	Th 4:30-5:30	CSE 216	
	Melanie Jensenworth, meljen@cs	W 4:30-5:30	CSE 218	
	Milda Zizyte, mzizyte@cs	Th 3:30-4:30	CSE 216	

Course Email: csc322a_au10@u.washington.edu. Use this list to ask and/or answer questions about homework, lectures, etc. The instructor is subscribed to this list. All messages are automatically archived. Questions not of general interest may be directed to the instructor and/or TAs collectively (via the "course staff" link at left) or separately (via email addresses above). You can (probably should) change your subscription options.

Catalog Description: Finite automata and regular expressions; context-free grammars and pushdown automata; nondeterminism; Turing machines and the halting problem. Emphasis on understanding models and their applications and on rigorous use of basic techniques of analysis. Induction proofs, simulation, diagonalization, and reduction arguments.

Prerequisite: CSE 321

Credits: 3

Learning Objectives: The main goal of the course is to give students an ability to develop and rigorously reason about abstract formal models of computational devices, and an appreciation for the powers and limitations of such formalisms. An important secondary goal is to teach a body of facts about and techniques for studying ``classical'' models, such as finite automata and context-free grammars, having important applications in a variety of other areas of computer science, e.g., compilers and program specification.

Grading: Homework, Midterm, Final. Homework may include some programing. Overall weights 55%, 15%, 30%, roughly.

Late Policy: Unless otherwise announced, papers and/or electronic turnins are due at the start of class on the due date. 10% off for up to one day late (business day, e.g., Monday for Friday due dates); additional 20% per day thereafter.

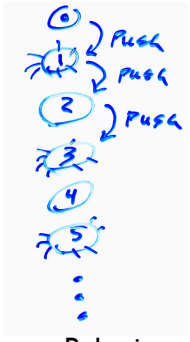
Extra Credit: Assignments may include "extra credit" sections. These will enrich your understanding of the material, but at a low points per hour ratio. Do them for the glory, not the points, and don't start extra credit until the basics are complete.

Collaboration: Homeworks are all individual, not group, exercises. Discussing them with others is fine, even encouraged, but *you must produce your own homework solutions*. Follow the "Gilligan's Island Rule": if you discuss the assignment with someone else, don't keep any notes (paper or electronic) from the discussion, then go watch 30+ minutes of TV (Gilligan's Island reruns especially recommended) before you continue work on the homework by yourself. You may *not* look at other people's written

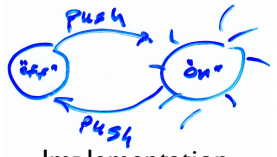
Abstraction & Formality

- Often make simple things hard
- But also make complex things approachable
- We're spend a fair bit of the quarter learning to do this with simple things, so the complex things you see later aren't totally intimidating

Example: Push Button Light Switch



Behavior



Implementation

State: summary of the past sufficient to define future behavior

Symbols 0, 1, a, b, $ ...

alphabet Set of Symbols

Σ $\{0, 1\}$

Strings (1, 1, 0)

110

length $|110| = 3$

empty string ε

$|\varepsilon| = 0$

Σ^* = Set of all finite length strings over Σ

$\{\varepsilon, 0, 1, 00, 01, 10 \ldots\}$

Operations $X = 10$

$Y = 01$

$X \circ Y$ = $XY = 1001$

$YX = 0110$

A Language L is a subset of Σ^*

$L_1 = \{ w \in \Sigma^* \mid \text{length}(w) \text{ is even} \}$

L1 = { epsilon, 00, 01, 10, 11, 0000, 0001, ...}

$L_2 = \{ w \mid$ value of w, interpreted as a binary number is a multiple of 5 $\}$

$L_2 = \{ \varepsilon, 0, 00, \ldots, 101, 0101, 01010, \ldots \}$