Welcome to CS 101!
Introduction to Programming

CS101 Lecture #1

2016-09-26
Steps for enrolling in the course web:

Step 1. Click the “Sign in” button near the top of the course web.

Step 2. Click the second button “Sign in using your email”.

Step 3. Enter your Zhejiang University email address in the Email input box, and then click the “Send sign-in email”.

Step 4. Click the URL included in the email titled “Your RELATE sign-in link” (sent to you) to sign in.

Step 5. Change the browser’s URL to be https://relate.cs.illinois.edu/course/zuics101fa16/

Step 6. Click the “Enroll” button near the top.
Grading

- 20% Homework
- 25% Labs
- 10% Lecture Participation
- 20% Midterms
- 25% Final Exam
Required Supplies

CodeLab account

Instructions in hw01
Homework Policies

No late homework submissions.
No late homework submissions.
All machine-generated grades are final.
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Late registrants should keep up with work.

Corollary: No extensions or exceptions for late registration.
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Get help at Blackboard forum.
Be civil to staff and peers.
All posts containing solutions should be marked as private.
Lab #1 this Friday!
Modern calculation

https://en.wikipedia.org/wiki/Church%E2%80%93Turing_thesis

https://www.bigquestionsonline.com/2013/04/30/

what-did-turing-establish-about-limits-computers-nature-mathematics/

http://www.alanturing.net/turing_archive/pages/reference%20articles/Bio%20of%20Alan%20Turing.html
Modern calculation

https://en.wikipedia.org/wiki/Enigma_machine
Modern calculation

https://en.wikipedia.org/wiki/ENIAC
Modern calculation

https://en.wikipedia.org/wiki/ILLIAC
Math calculation

http://v.baidu.com/v?word=2%E5%8A%A01%E7%AD%89%E4%BA%8EOK+
&ct=301989888&rn=20&pn=0&db=0&s=0&fbl=800&ie=utf-8
Algorithms
Welcome to CS 101!
Welcome to CS 101!
add $t0, $t1, $t2

\[ x = y + z \]
depth * area = volume
depth * area = volume

volume of rain / volume per raindrop
    = number of raindrops
depth \times \text{area} = \text{volume}

\frac{\text{volume of rain}}{\text{volume per raindrop}} = \text{number of raindrops}

\text{volume}_{\text{rain}} = \text{area} \times \text{depth}
depth * area = volume

volume of rain / volume per raindrop
   = number of raindrops

volume_rain = area * depth

n_raindrops = volume_rain / volume_raindrop
What is a program?

A set of instructions a computer executes to achieve a goal.
What is a program?

A set of instructions a computer executes to achieve a goal.
What is data?

Information stored in a computer. All data is stored in binary.
What is data?

Information stored in a computer.
What is data?

Information stored in a computer.
All data is stored in binary.
What is data?

Binary data must be interpreted:

instruction
What is data?

Binary data must be interpreted:
  instruction
  value (number, character)
What is data?

Binary data must be interpreted:

- instruction
- value (number, character)
- memory location
What is data?

Binary data must be interpreted:

- instruction
- value (number, character)
- memory location
What is a program?

Programs are data!
Instructions are encoded in binary.
What is a program?

Programs are data!
What is a program?

Programs are data!

Instructions are encoded in binary.

\[
\begin{array}{cccc}
\text{add } & \text{t0, t1, t2} \\
\text{x = y + z}
\end{array}
\]
Computational Thinking

Computational thinking is a fundamental skill for everyone, not just for computer scientists. To reading, writing, and arithmetic, we should add computational thinking to every child’s analytical ability. Just as the printing press facilitated the spread of the three Rs, what is appropriately incestuous about this vision is that computing and computers facilitate the spread of computational thinking.
Four engineers traveling in a car an the car breaks down ...

**Mechanical engineer**: “Sounds to me as if the pistons have seized. We’ll have to strip down the engine before we can get the car working again”

**Chemical engineer**: “it sounded to me as if the fuel might be contaminated. I think we should clear out the fuel system.”

**Electrical engineer**: “I thought it might be an grounding problem or maybe a faulty plug lead.”

**Software/computer engineer**: “Ummm perhaps if we all get out of the car and get back in again?”
Reality in Industry: Engineering Thinking

Researchers working on a robot arm for assembling pens. They face challenges, e.g., lacking sufficient accuracy. Any directions for solving the problem?
https://relate.cs.illinois.edu/course/zuics101fa16/