

Welcome to CS 101!

Introduction to Programming

CS101 Lecture #1

2016-09-26

<https://relate.cs.illinois.edu/course/zuics101fa16/>

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.

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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



David Hilbert

Alan Turing

Kurt Gödel

Alonzo Church

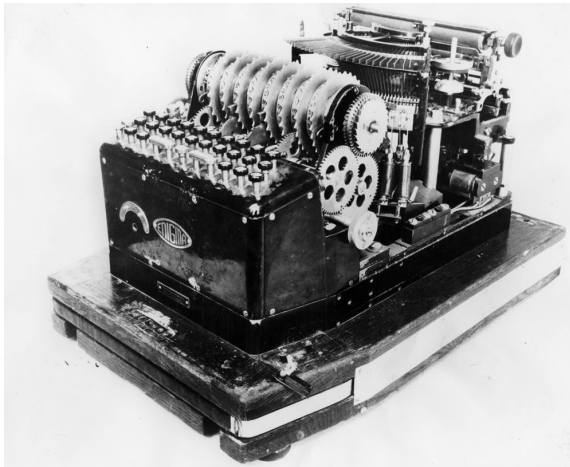
https://en.wikipedia.org/wiki/Church%E2%80%93Turing_thesis

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

[what-did-turing-establish-about-limits-computers-nature-mathematics/](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

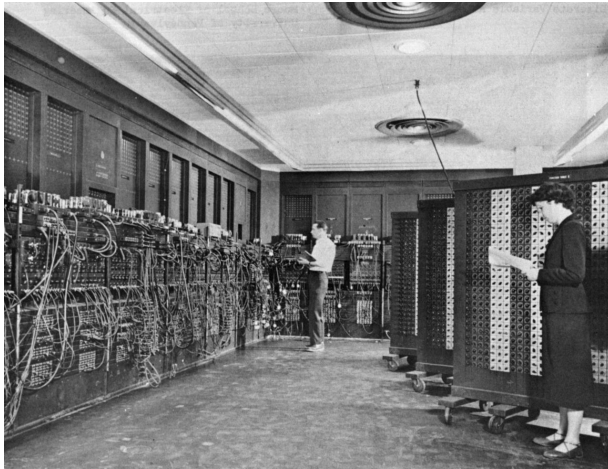
Modern calculation



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

https://en.wikipedia.org/wiki/Cryptanalysis_of_the_Enigma

Modern calculation



<https://en.wikipedia.org/wiki/ENIAC>

Modern calculation



<https://en.wikipedia.org/wiki/ILLIAC>

Math calculation



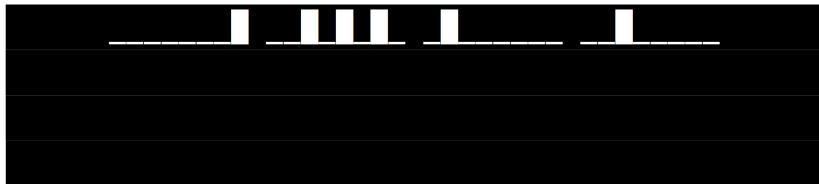
<http://v.baidu.com/v?word=2%E5%8A%A01%E7%AD%89%E4%BA%8EOK+&ct=301989888&rn=20&pn=0&db=0&s=0&fbl=800&ie=utf-8>

Algorithms

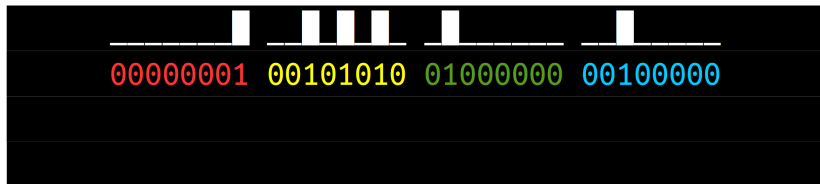
Algorithms



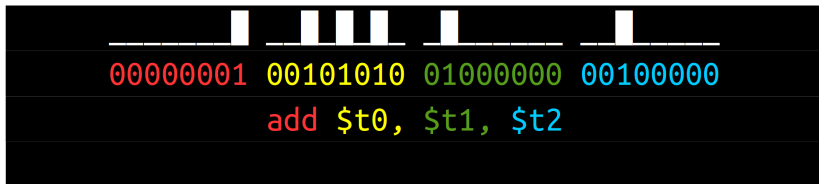
Computing




Computing



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Computing



00000001 00101010 01000000 00100000

add \$t0, \$t1, \$t2

x = y + z

Algorithms



Algorithms

`depth * area = volume`

Algorithms

$\text{depth} * \text{area} = \text{volume}$

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

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$\text{volume_rain} = \text{area} * \text{depth}$

Algorithms

`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?

What is a program?

A set of instructions a computer executes to achieve a goal.

What is data?

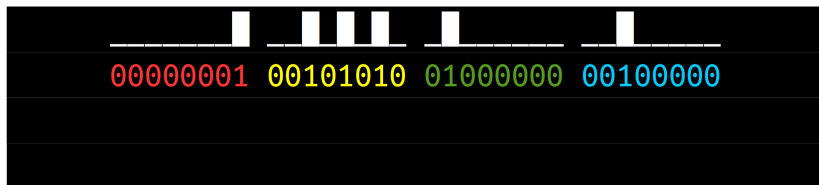
What is data?

Information stored in a computer.

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All data is stored in binary.



What is data?

Binary data must be interpreted:
instruction

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instruction
value (number, character)

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Binary data must be interpreted:

- instruction

- value (number, character)

- memory location

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What is a program?

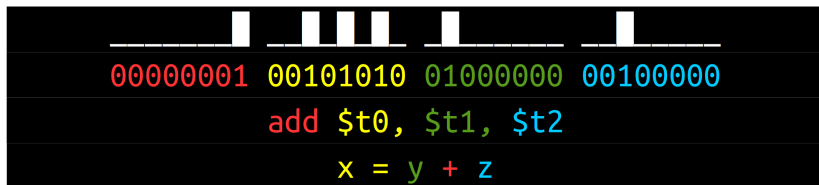
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Programs are data!

What is a program?

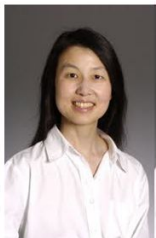
Programs are data!

Instructions are encoded in binary.



Computational Thinking

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.

Engineer Joke: Engineering Thinking

Four engineers traveling in a car and 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?



Reminders

<https://relate.cs.illinois.edu/course/zuics101fa16/>