

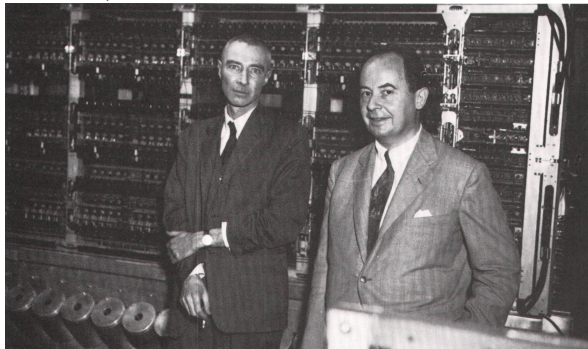
Computational thinking

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Earliest computers

Historically, computers were used for big physics calculations, for instance, atom bomb calculations



Hands-on programming

Very early computers were hardwired



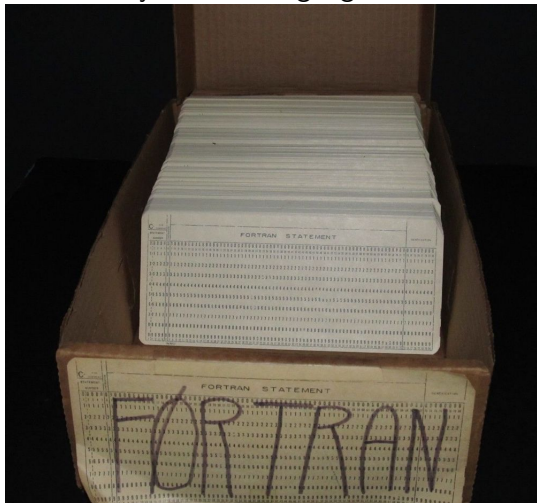
Program entry

Later programs were written on punchcards



The first programming language

Initial programming was about translating the math formulas; after a while they made a language for that: FORmula TRANslation



Programming is everywhere

Programming is used in many different ways these days.

- You can make your own commands in *Microsoft Word*.
- You can make apps for your *smartphone*.
- You can solve the riddles of the universe using big computers.

This course is aimed at people in the last category.

Programming is not simple

Programs can get pretty big



Examples of computational thinking

- Looking up a name in the phone book
 - start on page 1, then try page 2, et cetera
 - or start in the middle, continue with one of the halves.
- Elevator scheduling: someone at ground level presses the button, there are cars on floors 5 and 10; which one do you send down?

Abstraction

- The elevator programmer probably thinks: ‘if the button is pressed’, not ‘if the voltage on that wire is 5 Volt’.
- The Google car programmer probably writes: ‘if the car before me slows down’, not ‘if I see the image of the car growing’.
- ... but probably another programmer had to write that translation.

Data abstraction

What is the structure of the data in your program?

Stack: you can only get at the top item



items get added in the back, processed at the front



Queue:

Do you have to know much about hardware?

Yes, it's there, but we don't think too much about it in this course.

<https://youtu.be/JEpsKnWZrJ8>