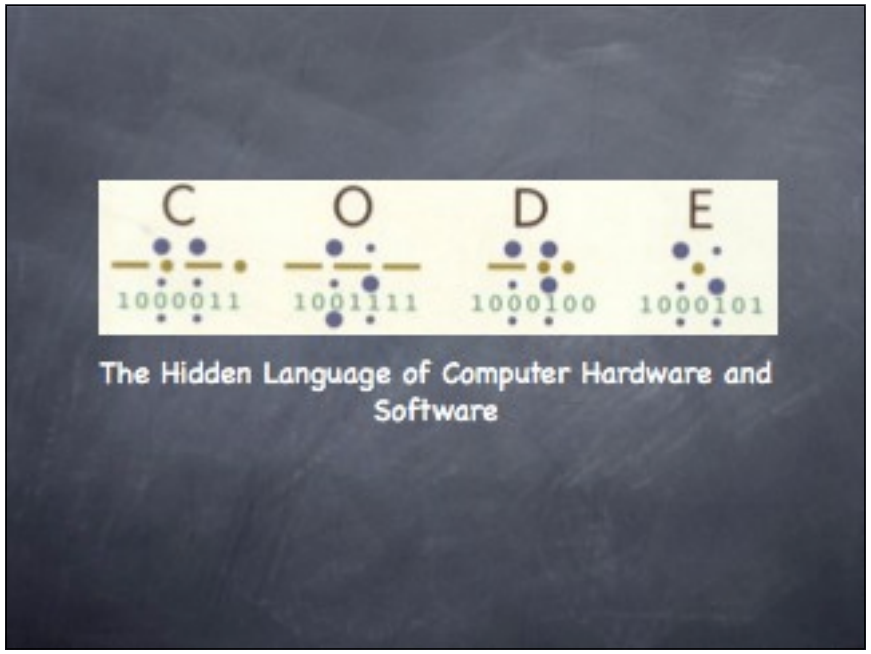
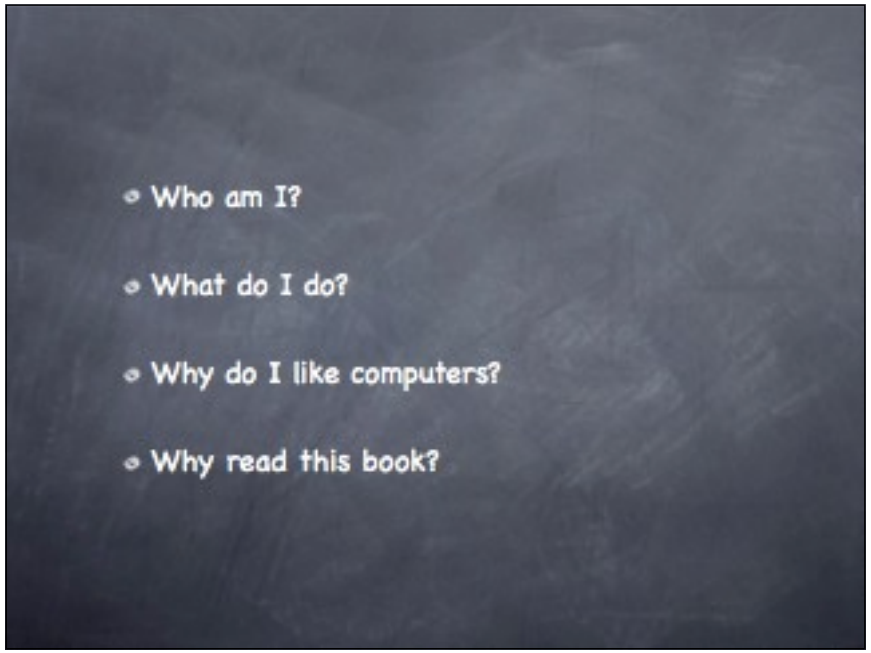


How may time is the word “CODE” shown on this slide?



What is a Computer Systems Engineer?
AutoCAD and rendering
Skim the preface to Code
"Code is a book about how computers work."
As I feared, the reactions weren't favorable. "Oh, I have a book like that," some people would say, to which my immediate response was, "No, no, no, you don't have a book like this one." I still think that's true. Code is not like other how computers work books. It

First a little history...

Two types of computers (A/D)
The very first computers (A)
Why did people build the first computers?

Made about 100 to 87 B.C.

The Antikythera (anti-kit-er-a) mechanism
http://en.wikipedia.org/wiki/Antikythera_mechanism

Virtual Reconstruction of the Antikythera Mechanism (by M. Wright & M. Vicentini)
http://www.youtube.com/watch?v=MqhuAnySPZ0

Lego Antikythera Mechanism
http://www.youtube.com/watch?v=RLPVCJjTNgk

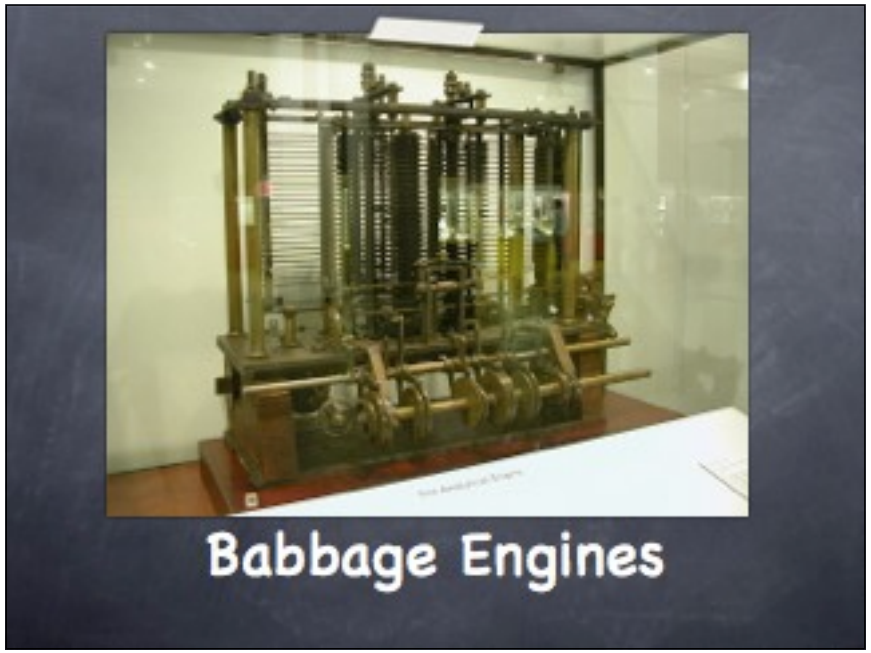
Behind the Scenes: Lego Antikythera Mechanism
http://blog.smallmammal.com/post/2156532687/behind-the-scenes-lego-antikythera-mechanism

Building Complex Machines Using LEGO® - A working hand-

1801
The Jacquard loom is a mechanical loom, invented by Joseph Marie Jacquard, first demonstrated in 1801, that simplifies the process of manufacturing textileswith complex patterns such as brocade, damask and matelasse.[4][5] The loom was controlled by a "chain of cards", a number of punched cards, laced together into a continuous sequence.[6] Multiple rows of holes were punched on each card, with one complete card corresponding to one row of the design.

http://en.wikipedia.org/wiki/History_of_computing_hardware

http://en.wikipedia.org/wiki/Jacquard_loom
http://www.metmuseum.org/toah/works-of-art/31.124



1837
Babbage engines
http://en.wikipedia.org/wiki/Analytical_engine

If the Analytical Engine had been built, it would have been digital, programmable and Turing-complete. However, it would have been very slow. Ada Lovelace reported in her notes on the Analytical Engine: "Mr. Babbage believes he can, by his engine, form the product of two numbers, each containing twenty figures, in three minutes". By comparison the Harvard Mark I could perform the same task in just six seconds. A modern PC can do the same thing in well under a millionth of a second.
There was to be a store (that is, a memory) capable of holding 1,000 numbers of 40 decimal digits each (ca. 16.7 kB).

Building Complex Machines Using LEGO® - A working hand-cranked Difference Engine made using LEGO® pieces

1842

Ada Lovelace
http://en.wikipedia.org/wiki/Ada_Lovelace

Augusta Ada King, Countess of Lovelace (10 December 1815 – 27 November 1852), born Augusta Ada Byron and now commonly known as Ada Lovelace, was an English mathematician and writer chiefly known for her work on Charles Babbage's early mechanical general-purpose computer, theAnalytical Engine. Her notes on the engine include what is recognised as the first algorithm intended to be carried out by a machine. Because of this, she is often described as the world's first computer programmer.

http://en.wikipedia.org/wiki/File:Representation_of_computer_program_for_analytical_engine.png

1890
http://en.wikipedia.org/wiki/Tabulating_machine

The 1880 census had taken five years to tabulate, and by the time the figures were available, they were clearly obsolete. Due to rapid growth of the U.S. population from 1880 to 1890, primarily because of immigration, it was estimated that the 1890 census would take approximately 13 years to complete

4.3 billion characters of data in this storage facility. (4GB)
http://en.wikipedia.org/wiki/File:IBM_card_storage.NARA.jpg

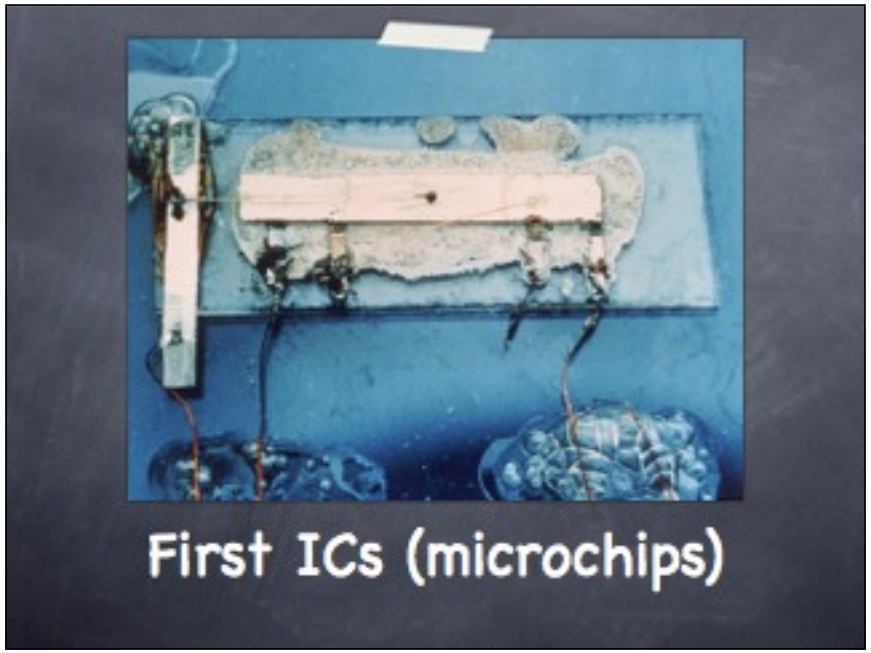
"Storage of IBM record cards at the Federal records center in Alexandria, Virginia, November 1959. Between 1950 and 1966 the records centers received millions of cubic feet of records, saving the federal government more than the total spent for the entire operation of the

Analog mechanical computers used from ~1912 to the 1980s for laying the main guns and later the secondary guns of battleships.

6 inch gun transmitting station on HMS Belfast. THe main object is the "computer" for calculating elevation & bearing.
http://en.wikipedia.org/wiki/File:HMS_Belfast_-_6inch_transmitting_station_1.jpg

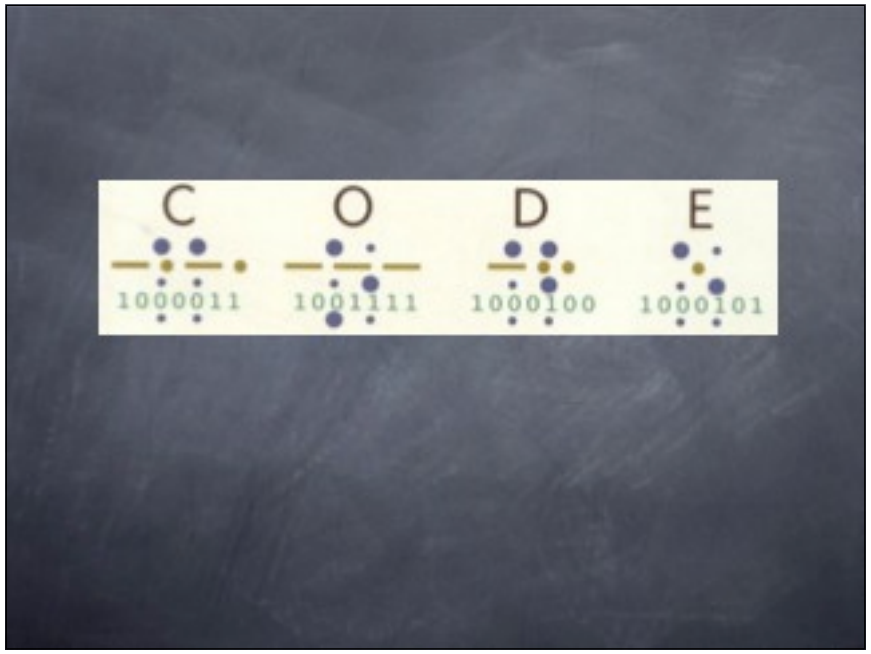
Mk 1: December 1943;
Mk 2: 1 June 1944
http://en.wikipedia.org/wiki/Colossus_computer

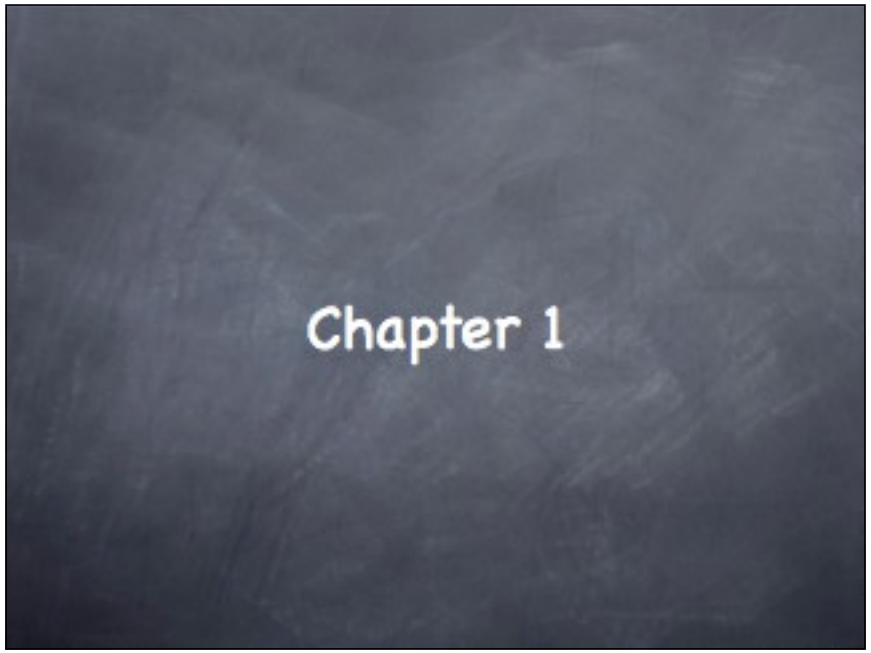
Colossus was the world's first electronic digital computer that was at all programmable. The Colossus computers were developed for British codebreakers during World War II to help in the cryptanalysis of the Lorenz cipher. Without them, the Allies would have

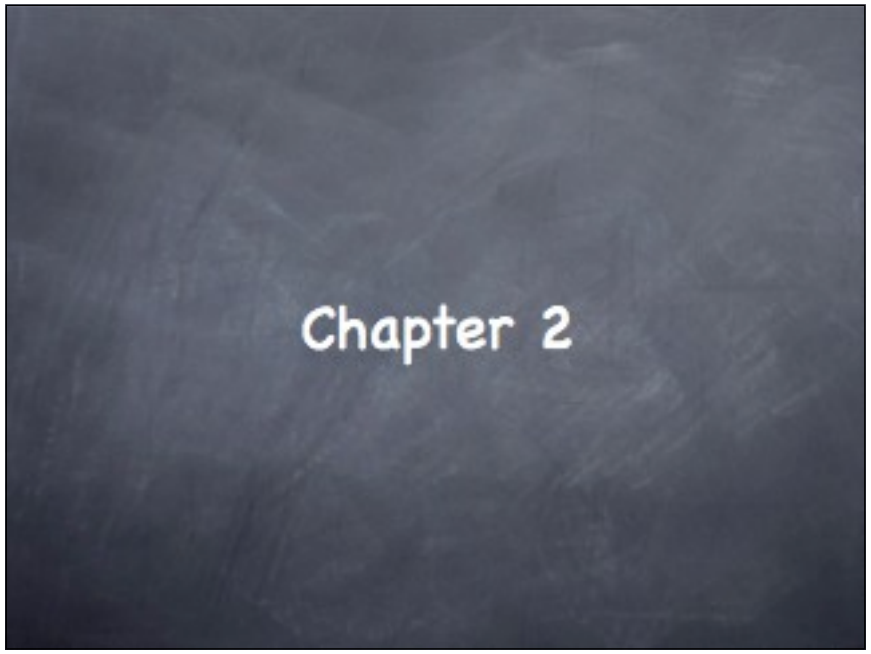


http://en.wikipedia.org/wiki/File:Kilby_solid_circuit.jpg

http://en.wikipedia.org/wiki/Integrated_circuit


C
O
D
E
1000011
1001111
1000100
1000101


Chapter 1


Chapter 2