Computing: A Brave New World?

January 8, 2013
What is a computer?

Oxford English Dictionary:
“A calculating-machine; especially an automatic electronic device for performing mathematical or logical operations”
What is a computer?

I say:  
“An algorithmic information processor”
Every answer creates more questions …

What does “algorithmic” mean?

What does “information” mean?

What does “processor” mean?
Let’s go back to the beginning … the very beginning …
23,000 BC - The Bone of Ishango

Figure 2.1 The Ishango Bone (Courtesy of Dr J. de Heinzelin).
5000 BC - The Abacus
5000 BC - The Abacus

... still widely used
800 AD - Al-Khwarizmi (c. 780 - c. 850) wrote books about astronomy, geography, algebra.

“algorithm” is derived from his name.
1200 - Leonardo di Pisa
- better known as “Fibonacci”
- brought Al-Kwharizmi’s work to Europe
- algebra slowly replaced the abacus
The Mechanical Age

c. 1600 - John Napier (1550 - 1617)
discovered logarithms
invented Napier’s Bones
1621 - The Slide Rule
- invented
by William Oughtred
- thrived until 1970, when electronic calculators were first sold
1642 - The Pascaline
- invented by Blaise Pascal
- basically a clockwork adding machine
1642 - The Pascaline

- about 50 were built, only 8 survive
- they tended to break down all the time
1673 - The Multiplier
- invented by Leibniz
- improved on Pascal’s design ...
- but they tended to break down all the time
1804 - Programmable Loom
- invented by Jacquard
- used punched cards to raise and lower the threads on the loom
- worked quite well!
1822 - Difference Engine
- invented by Babbage
1822 - Difference Engine
- broke down all the time
Babbage also …

- invented a system to monitor rails
- designed lights for marine communications
- designed an ophthalmoscope
- created a pen for drawing dotted lines
Babbage also …

- designed footwear for walking on water
- designed tugboats and submarines
- designed a diving-bell
- designed an altimeter
- designed a seismograph
Babbage also …

- designed a hydrofoil
- designed a railway decoupler
- designed inter-city speaking tubes
- designed cow-catchers for trains
1887 - Census Machine
- invented by Herman Hollerith
- used punched cards and electricity
- Hollerith founded the company that became IBM in 1924
Electronic Computing

1906 - De Forest invents the vacuum tube
1937 - Turing defines mathematical theory of computing
1938 - Claude Shannon figures out how to do logic with electronic circuits

1941 - Atanasoff and Berry build the ABC - it has a memory!

1943 - Watson (IBM) says “I think there is a world market for maybe five computers”
1943 - Collosus, first programmable electronic computer
- built by a team including Turing
- sole purpose: crack enemy codes
- 10 built, all destroyed after the war
1947 - transistor invented by Bell Labs
1948 - Norbert Weiner coins “cybernetics”
1950 - floppy disk invented by Nakamats
1950 - Turing formulates the “Turing Test”
1951 - Univac, the first general purpose computer
1953 - about 100 computers exist worldwide
1965 - computer mouse invented
    - not popular until 1983
1969 - ARPANET created
1970 - RAM chip invented by Intel
1971 - Microprocessor invented, Intel
1975 - Microsoft founded
1977 - “There is no reason anyone would want a computer in their home” - founder of Digital Electronics Corporation
1981 - “640K ought to be enough for anybody” - Bill Gates

1985 - Windows launched

1989 - WWW created, Berners-Lee

1993 - Individual access to WWW permitted

- use grows 300,000% in ONE YEAR
1994 - Netscape released
1997 - Deep Blue beats Kasparov
2000 - Unbreakable cryptography becomes public
2013 - At least 1,000,000,000 personal computers in use