Reading Discussion

Blown to Bits

Chapter 1

Digital Explosion

Why it is happening and what is at stake

Notes for CSC 100 - The Beauty and Joy of Computing
The University of North Carolina at Greensboro

Question 1....

Describe the heart of the chapter in two words

Question 2...

What is a bit?

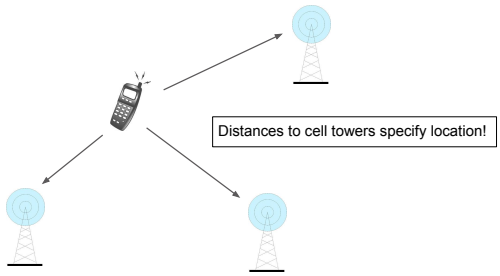
A few points about bits

1. A "bit" is a unit of information (or data... see below) - it doesn't "grow" or "shrink", but the *number of bits* collected or available can grow or shrink.

2. "Information" is not the same thing as "Data"
   - Software can translate data into something we understand
   - Could have a lot of data, but little information!
   - Information Theory really studies this (Claude Shannon)

Cell Towers and Cell Phones

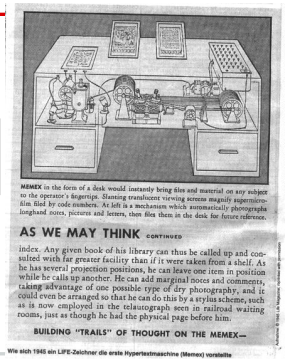
Cell phone locations can be determined *without GPS*!



Distances to cell towers specify location!

Ubiquitous information access
- A new idea?

Article at right is by Vannevar Bush in *1945*.



MEMEX in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm. filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference.

AS WE MAY THINK CONTINUED

index. Any given book of his library can thus be called up and consulted with far greater facility than if it were taken from a shelf. As he has several projection positions, he can leave one item in position while he calls up another. He can add marginal notes and comments, taking advantage of one possible type of dry photography, and it could even be arranged so that he can do this by a stylus scheme, such as is now employed in the telautograph seen in railroad waiting rooms, just as though he had the physical page before him.

BUILDING "TRAILS" OF THOUGHT ON THE MEMEX—

Wie sich 1945 ein LIFE-Zeichner die erste Hypertextmaschine (Memex) vorstellte

Moore's Law and Exponential Growth

Variants of Moore's Law (from 1965)

- Density of transistors on chip doubles every 2 years
- Computing speed doubles every 1.5 years
- Hard drive storage doubles every two years

The power of doubling:

First a fact: A ream of paper (500 sheets) is 2 inches thick

Folding a stack of paper over doubles the thickness in "number of sheets stacked"

If you could fold a piece of paper over 50 times, how thick would it be?

2^{50} = 1125899906842624 "sheets thick"

1125899906842624 / 250 (sheets per inch) / 12 (inches per foot) / 5280 ft per mile

... gives: 71 million miles (distance to sun is about 93 million miles)

Some Examples of Computer Speed

Back in 1986 I started running the same program (selection sort on 20,000 integers) on every new computer I got access to. Excerpts:

Original IBM PC (1982 machine): 30,601 seconds (8.5 hours)

Sun 3/80 (1987 - my main grad school machine): 289.6 seconds

PC with Intel 486/66: 56.7 seconds

"Connection Machine" (CM5 - a $1.4 million computer in 1991): 3.8 sec

Intel Core2 Duo E7400 (measured in 2009): 0.124 seconds

More From Your Reading Reflections

Confusing points:

- Moore's Law: Speed no longer increasing? Yes it is, but not per processor.
- "Data warehouse" - not a single collection point, but many private ones
- Laws - what is current for cyberbullying and privacy?
  - Cyberbullying: Varies state-by-state ; most states now address this
  - Privacy: Very little legal protections. Good resource is EPIC (Electronic Privacy Information Center): http://epic.org

Connections and other points

- Several people mentioned NSA/government monitoring stories
  - What about Bradley Manning and Wikileaks
- Cyber war - "Syrian Electronic Army" in the news lately - how much disruption could they cause?
- Targeted ads - what do you think?
- Storage/Processing limits: Are we reaching the end of growth?
  - Storage cost: See http://www.jcmit.com/diskprice.htm

Koans of Bits

1. It's All Just Bits
2. Perfection is Normal
3. There Is Want in the Midst of Plenty
4. Processing is Power
5. More of the Same Can Be a Whole New Thing
6. Nothing Goes Away
7. Bits Move Faster Than Thought

Final Thoughts?

Technologies - good or bad?

- Tor (anonymous communication)
- BitCoin (anonymous financial transactions)
- Trusted Computing Technology (security vs personal control)