

History and Mission of IA

CSH5 Chapter 1
with supplementary information

“Brief History and Mission of
Information System Security”

Seymour Bosworth &
Robert V. Jacobson

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Topics in CSH5 Chapter 1

- Basic concepts
 - Security
 - Risks
 - Risk management
- History
 - Why bother with history
 - Chronology

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Security

- What do you think of when someone talks about security?
 - What is special about *information* security?
- What are the threats to security?
 - What are the special threats to information security?

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Risks

- Probabilities
 - Injury
 - Damage
 - Loss
- Can we achieve perfect security? Why or why not?

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Risk management

- What are the goals of risk management?
- Steps of risk management
 - ❑ Identification of risks
 - ❑ Mitigation
 - ❑ Evaluation / validation
- Can risk management achieve perfection?
Why or why not?

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Why Bother with History?

- Puts security into perspective
- Think about changing requirements
 - ❑ Different threats and vulnerabilities
- Themes:
 - ❑ Increasing accessibility to unauthorized people
 - ❑ Increasing flexibility for automated attacks
 - ❑ Information security assurance is a *process*, not a *state*

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Pre-computer INFOSEC

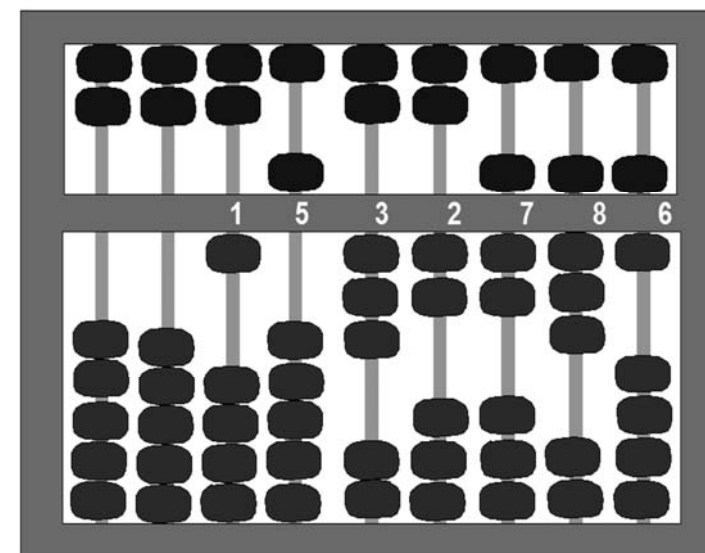
What was the focus of INFOSEC in . . .

- Babylon, 500 BCE: abacus
- England, 1614 CE: logarithms
- 1620: Oughtred's slide rule
- 1642: Pascal's adding machine
- 1671: Leibniz' Stepped Reckoner for multiplications
- 1801: Jacquard loom (programmable)

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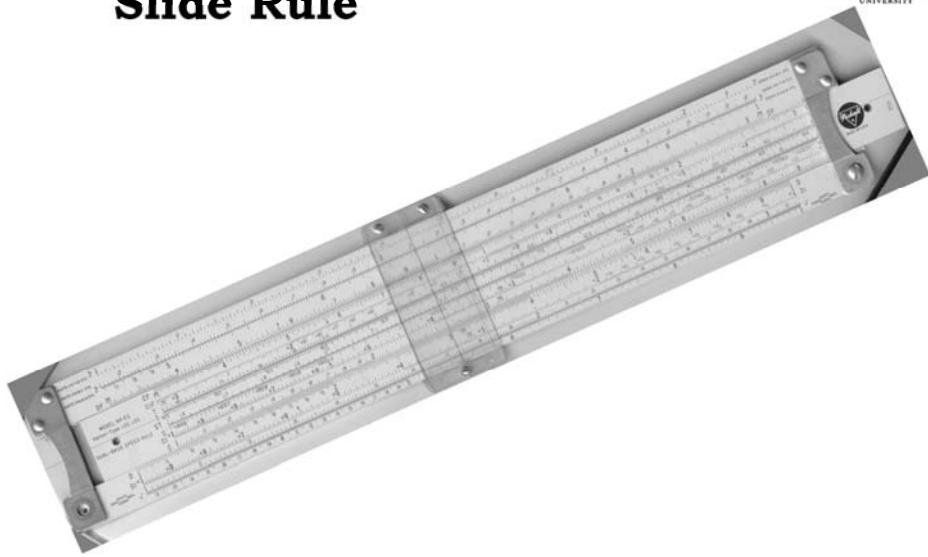
Abacus



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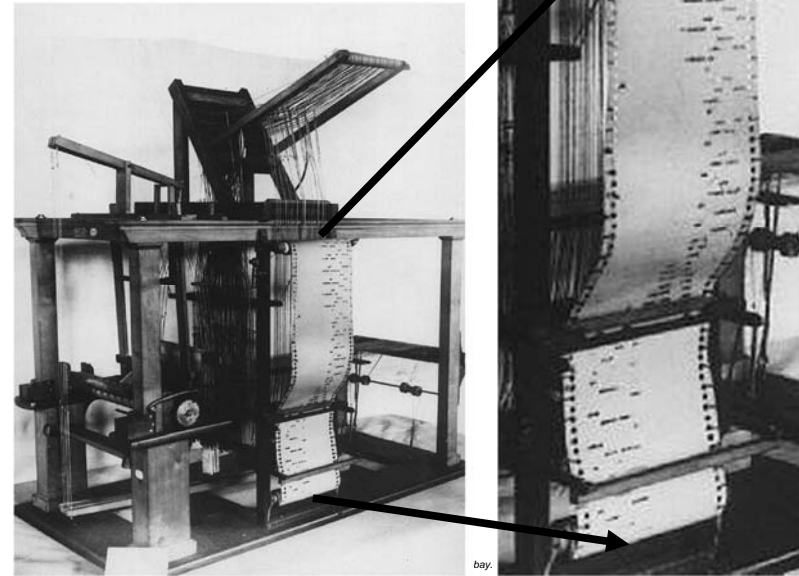
Slide Rule



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Jacquard Loom



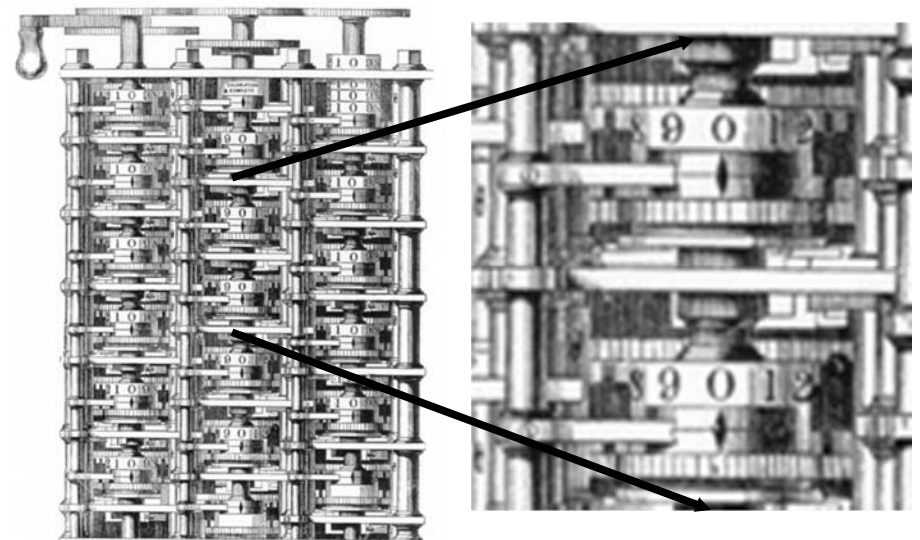
Mechanical Computers

- General Purpose Programmable Calculators)
- 1832: Babbage prototype Difference Engine
- 1834: Babbage designs Analytical Engine
- 1889: Felt's printing desk calculator
- 1890: First use of Hollerith's punched cards and tabulating machines
- 1896: Hollerith founds Tabulating Machine Company (later IBM)

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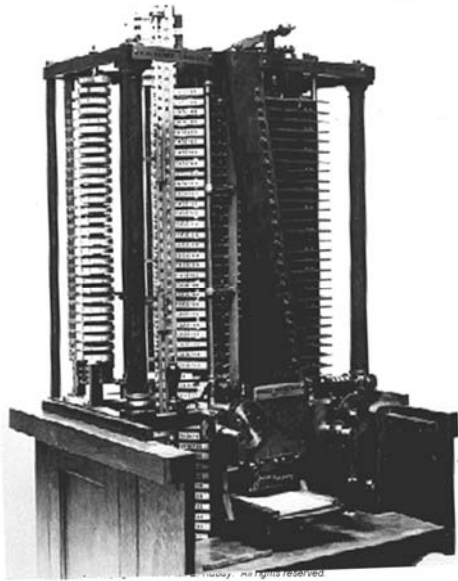
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Difference Engine (1832)



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Analytical Engine (1934)



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Adding Machine (1889)



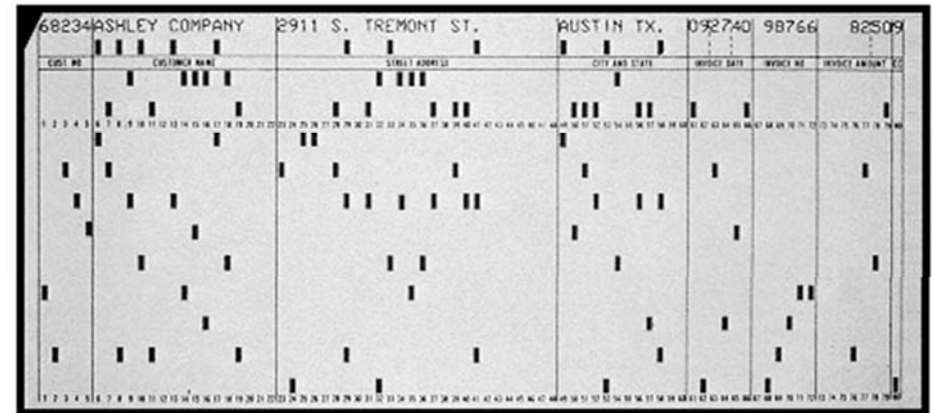
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Hollerith Tabulator (1890)



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Hollerith Card (1890)



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Early Electric and Electronic Computers: Unique Systems

- USA, 1930: Vannevar Bush's differential analyzer
- 1935: IBM 601 punch-card calculator achieves 1 multiplication per second
- 1940: Bell Labs' Complex Number Calculator
- 1943: Colossus (2000 vacuum tubes)
- 1944: Harvard Mark I
 - 51 feet long
 - 3 numbers added per second
- 1946: ENIAC (Electronic Numerical Integrator and Calculator) – filled entire room

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Differential Analyzer (1930)



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Harvard Mark I (1944)



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ENIAC (1946)



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Late 1940s: Stored Programs, Peripherals

- 1949:
 - ❑ Cambridge University's EDSAC stores programs on paper tape
 - ❑ EDVAC uses magnetic tape for program storage
 - ❑ *Popular Mechanics* predicts, "Computers in the future may weigh no more than 1.5 tons."
- 1950:
 - ❑ Imperial University Tokyo – invention of floppy disk
 - ❑ Turing Test postulated

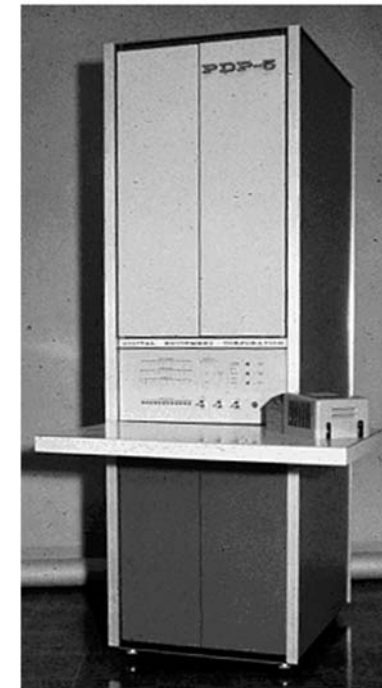
Early 1950s: Software and Hardware Become Accessible

- 1951:
 - ❑ Adm. Grace Hopper invents the macro assembler computer language (2GL)
 - ❑ US Air Defense System receives Whirlwind real-time computer
 - ❑ UNIVAC-1 – 1st general-purpose electronic computer; delivered to US Bureau of Census
- 1953:
 - ❑ At most 100 computers exist on the planet
 - ❑ No data communications in existence
 - ❑ Magnetic core memory invented

Languages, I/O, Integrated Circuits, Mainframes, Minis

- 1954: FORTRAN I
- 1957: 1st dot-matrix printer (IBM)
- 1958: LISP
- 1959: COBOL
- 1960: ALGOL
- 1961: APL
- 1964:
 - ❑ PL/I
 - ❑ IBM 360 series released – mass-produced, compatible upgrade paths – 1000s built
 - ❑ DEC PDP-8 – first major mini-computer

PDP-5 (1962)



Late 1960s: More 3GLs, Hardware, Networking

- 1965:
 - ❑ BASIC (Thomas Kurtz*, John Kemeny – Dartmouth College)
 - ❑ Mouse (Douglas Englebart)
 - ❑ CDC CD6600 supercomputer
- 1967-71: PASCAL (Wirth)
- 1968:
 - ❑ Intel Corp founded
 - ❑ LOGO
- 1969:
 - ❑ ARPANET (US DoD)
 - ❑ RFC0001 *Host Software*. S. Crocker.

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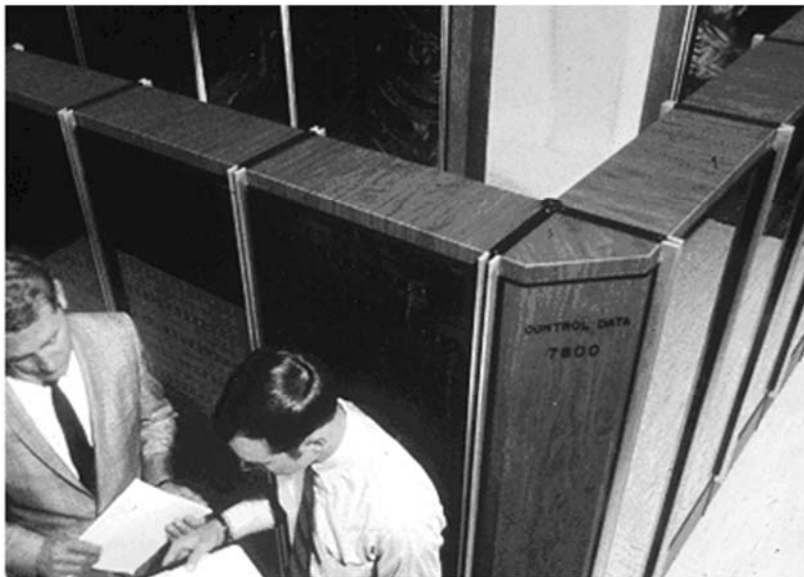
Early 1970s: Mainframes, Glass House, Chips

- 1970:
 - ❑ 1st RAM chip (Intel) 1024 bits
 - ❑ UNIX development starts (Thomson & Ritchie)
 - ❑ FORTH
- 1971: Intel 4004 microprocessor – the 1st ever
- 1972:
 - ❑ PONG video game (Atari)
 - ❑ Large Scale Integration (LSI) 500 components per chip
 - ❑ C
- 1973: HP releases its first minicomputer, CX

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CDC 7600 Supercomputer



Cray I (1976) – 75 MHz

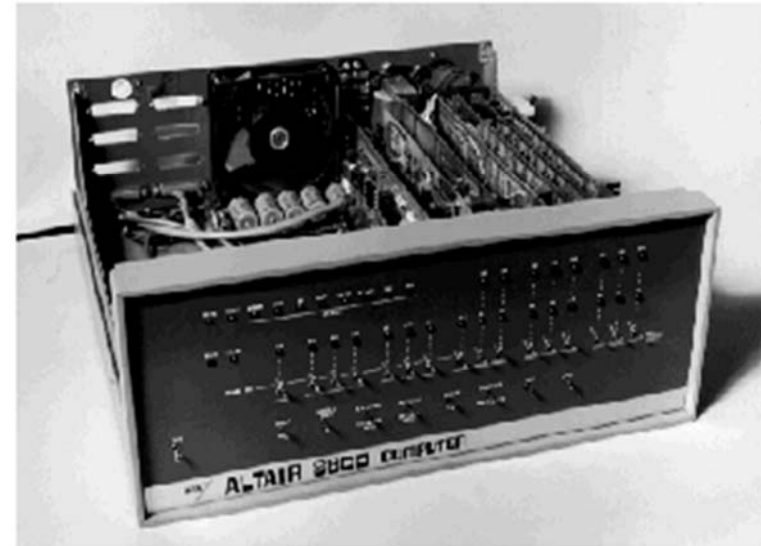


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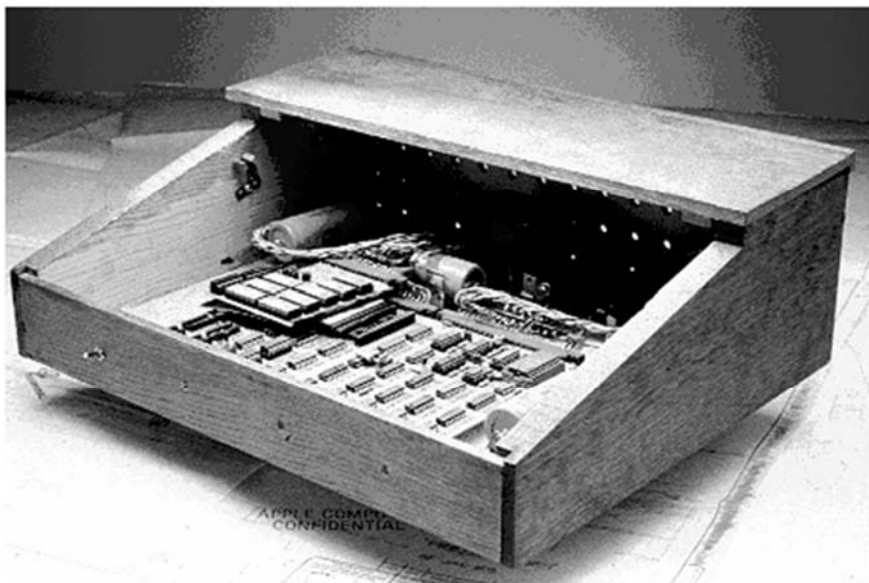
Mid 1970s: Databases, Personal Computers

- 1974: MITS Altair 8800 – 1st personal computer
 - ❑ \$397
 - ❑ 256 bytes of RAM
 - ❑ I/O – lights and switches only
- 1975: Bill Gates and Paul Allen form Microsoft, create BASIC for Altair 8800
- 1976:
 - ❑ Stephen Wozniak & Stephen Jobs design Apple I computer
 - ❑ 1st IBM laser printer – size of an SUV
 - ❑ Cray I supercomputer 150 Mflops

Altair Kit (1974)



Apple I Prototype (1976)



Late 1970s: Networking, Microprocessors

- 1977:
 - ❑ TCP (Transmission Control Protocol) replaces NCP (Network Control Protocol) in ARPANET
 - ❑ Apple II computer introduced
- 1978:
 - ❑ Intel releases 8086 16-bit microprocessor
- 1979:
 - ❑ Commodore PET 1MHz clock, 8 KB RAM
 - ❑ Motorola releases 68000 microprocessor

Early 1980s: Minis, Datacomm, EDI

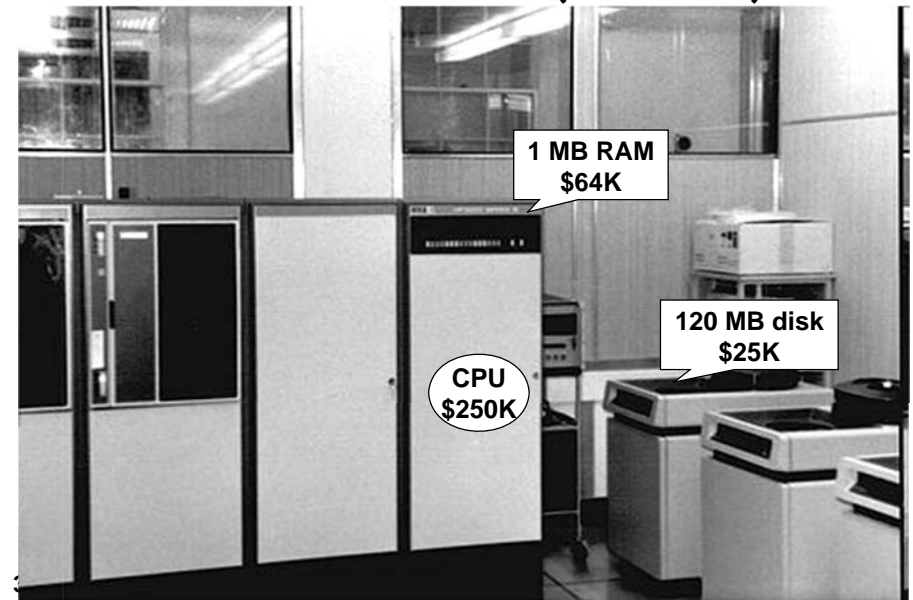


- 1980:
 - ❑ Microsoft begins work on MS-DOS
 - ❑ HP 3000 minicomputer supports 128 users
 - ✓ Refrigerator-sized
 - ✓ 1 MB RAM max
 - ✓ HP7925 disk drives = 120 MB
- 1981:
 - ❑ Xerox 8010 computer uses WIMP (Windows, Icons, Menus, Pointing Devices) GUI
 - ❑ IBM releases 1st PC @ \$2880 w/ 64 KB RAM, monochrome display, optional cassette drive & 160 KB floppies
- 1982: *The Internet* defined as internetwork using TCP/IP
- 1984: DNS invented; Internet has 1000 hosts

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HP3000 Series III (c. 1979)



Mid-1980s: LANs, WANs, MANs, PCs, Viruses



- 1982-1988: LANs explode
- 1983: Fred Cohen defines computer viruses
- 1985:
 - ❑ Intel 80386 chip released with 20 MHz (max 33 MHz) clock
 - ❑ MS-Windows 1 released
- 1986: Lehigh University hit by virus on floppies
- 1988:
 - ❑ IBM releases optical WORM drives (“CDs”)
 - ❑ Morris Worm downs 9000 Internet hosts
- 1989: Tim Berners-Lee invents the WWW

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Early 1990s: UNIX, Internet, Web, Microsoft Dominance



- 1991: Linus Torvalds begins writing LINUX
- 1993: Internet explodes with opening of .COM
- 1994:
 - ❑ First major spam explosion (Canter & Siegel)
 - ❑ Intel Pentium runs 100 MHz clock
 - ❑ Netscape browser 1.0
- 1995:
 - ❑ Windows 95
 - ❑ First *macro concept virus* released

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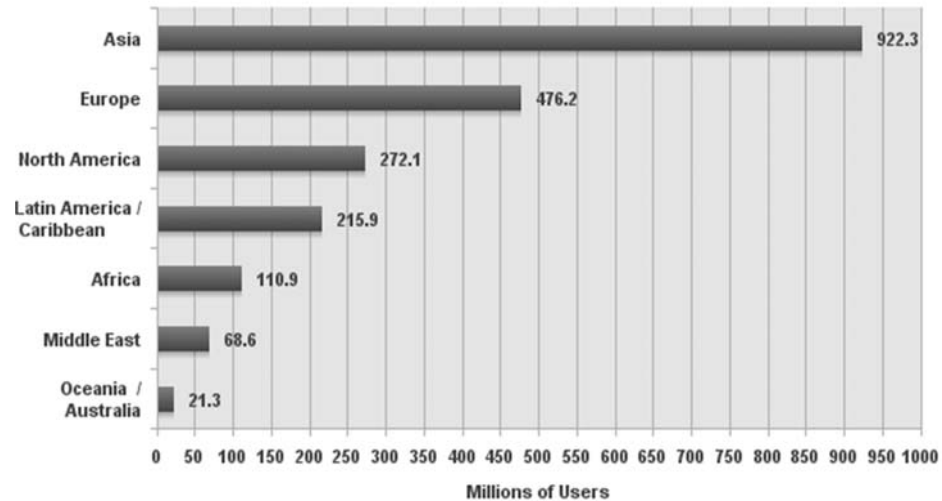
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Internet Users in the World Growth 1995 - 2010



Source: www.internetworldstats.com - January, 2008
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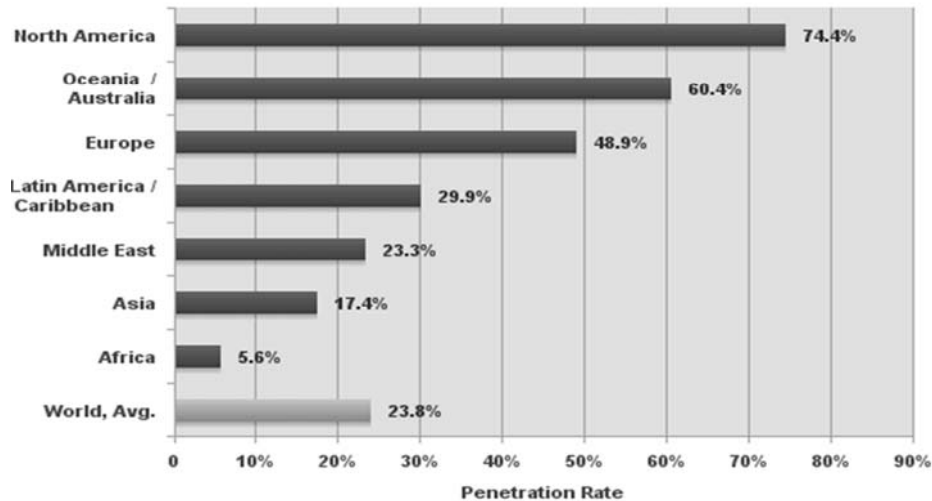
Internet Users in the World by Geographic Regions - 2011



Source: Internet World Stats - www.internetworldstats.com/stats.htm
Estimated Internet users are 2,095,006,005 on March 31, 2011
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2009

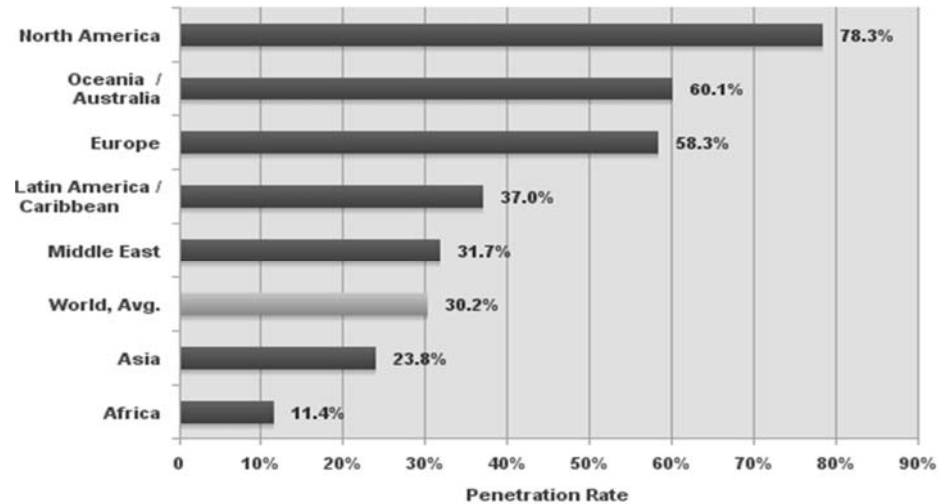
World Internet Penetration Rates by Geographic Regions



Source: Internet World Stats - www.internetworldststs.com/stats.htm
Penetration Rates are based on a world population of 6,710,029,070 and 1,596,270,108 estimated Internet users for March, 2009.
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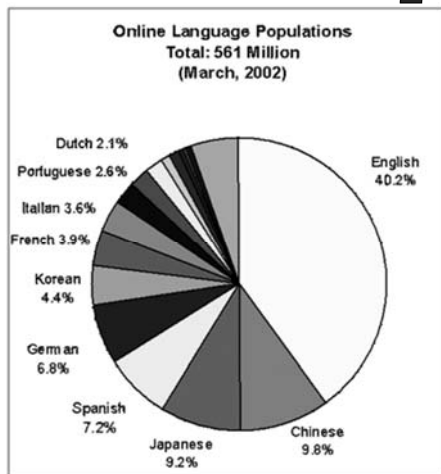
2011

World Internet Penetration Rates by Geographic Regions - 2011

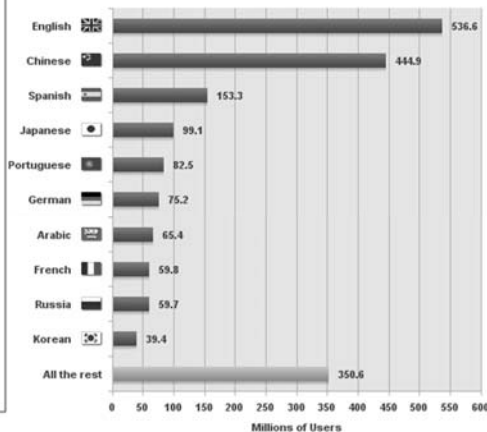


Source: Internet World Stats - www.internetworldststs.com/stats.htm
Penetration Rates are based on a world population of 6,930,055,154 and 2,095,006,005 estimated Internet users on March 31, 2011.
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Language on the 'Net (1)



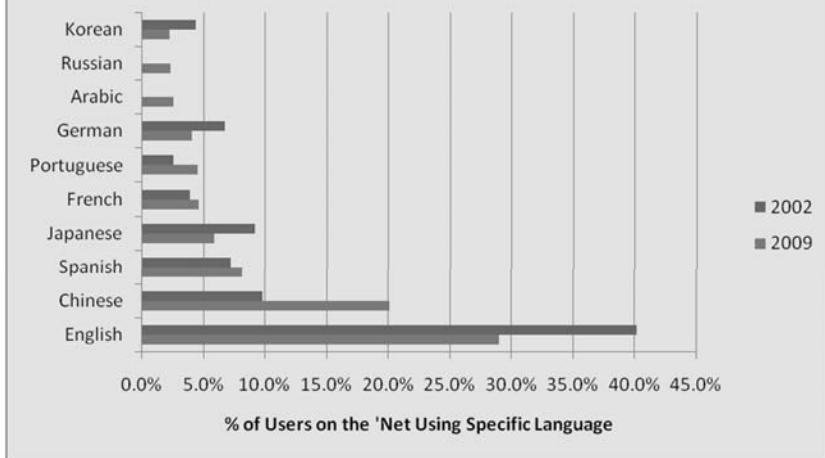
Top Ten Languages in the Internet 2010 - in millions of users



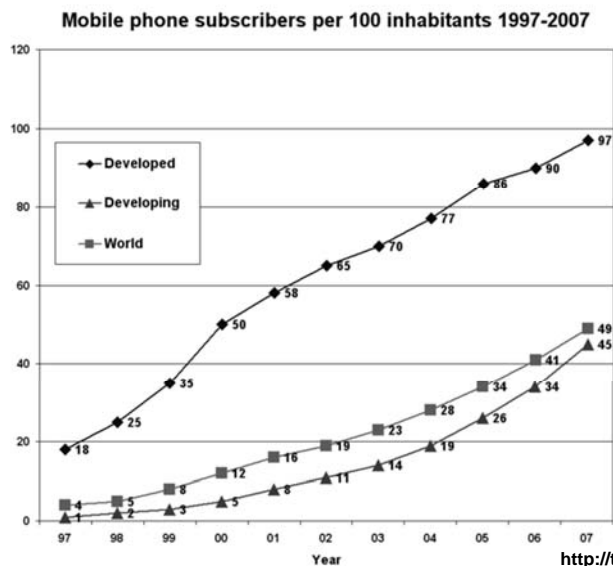
Source: Internet World Stats - www.internetworldstats.com/stats7.htm
 Estimated Internet users are 1,966,514,816 on June 30, 2010
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Language on the 'Net (2)

Changes in Languages on the 'Net 2002-2009



Mobile Phone Usage Growing



<http://tinyurl.com/klf6kc>

Mobile Phone Statistics

	Global	Developed nations	Developing nations	Africa	Arab States	Asia & Pacific	CIS	Europe	The Americas
Mobile cellular subscriptions (millions)	5,282	1,436	3,846	333	282	2,649	364	741	880
Per 100 people	76.2%	116.1%	67.6%	41.4%	79.4%	67.8%	131.5%	120.0%	94.1%
Fixed telephone lines (millions)	1,197	506	691	13	33	549	74	249	262
Per 100 people	17.3%	40.9%	12.1%	1.6%	9.4%	14.0%	26.6%	40.3%	28.1%
Mobile broadband subscriptions (millions)	940	631	309	29	34	278	72	286	226
Per 100 people	13.6%	51.1%	5.4%	3.6%	9.7%	7.1%	25.9%	46.3%	24.2%
Fixed broadband subscriptions (millions)	555	304	251	1	8	223	24	148	145
per 100 people	8.0%	24.6%	4.4%	0.2%	2.3%	5.7%	8.7%	23.9%	15.5%

Source: International Telecommunication Union (October 2010) via: mobiThinking

<http://mobiThinking.com/mobile-marketing-tools/latest-mobile-stats>

Wireless Networking Growing

- Malik, O. (2009). "No Stopping the Mobile Internet Growth." Gigaom (Feb 15, 2009).
- Survey by Nielsen for Tellabs
 - ❑ 50,000 wireless customers in US & 5 major Western European countries
 - ❑ 200 M current mobile data customers

Average Intended Increase in Next 24 Months	US	Europe
Current users	58%	55%
Non-users	27%	28%

Intended Use Among Non-Users	US	Europe
Mobile Internet	49%	34%
MMS	38%	39%
Uploading Photos	34%	27%
Software / App Downloads	30%	30%
E-mail	28%	32%

<http://gigaom.com/2009/02/15/no-stopping-the-mobile-internet/>

Wireless Web Statistics

Percentage of mobile subscribers accessing mobile Web at least monthly			
Country	Percentage	Country	Percentage
Japan	47%	Hong Kong (China)	16%
Urban China	43%	Europe	12%
United States	22%	Urban India	8%
Source: Forrester (June 2011)		via: mobiThinking	

<http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats>

Mobile Networks (2)



Hackers protest SF transit's cell phone jamming

(AP) SAN FRANCISCO - San Francisco's mass transit system prepared for renewed protests Monday, a day after hackers angry over blocked cell phone service at some transit stations broke into a website and posted company contact information for more than 2,000 customers.

The action by a hacker group known as Anonymous was the latest showdown between anarchists angry at perceived attempts to limit free speech and officials trying to control protests that grow out of social networking and have the potential to become violent.

Anonymous posted people's names, phone numbers, and street and email addresses on its own website, while also calling for a disruption of the Bay Area Rapid Transit's evening commute Monday.

BART officials said Sunday that they were working a strategy to try to block any efforts by protesters to try to disrupt the service.

"We have been planning for the protests that are said to be shaping up for tomorrow," BART spokesman Jim Allison said. He did not provide specifics, but said BART police will be staffing stations and trains and that the agency had already contacted San Francisco police.

The transit agency disabled the effected website, myBART.org, Sunday night after it also had been altered by apparent hackers who posted images of the so-called Guy Fawkes masks that anarchists have previously worn when showing up to physical protests.

<http://tinyurl.com/4zrggg>

The cyber attack came in response to the BART's decision to block wireless service in several of its San Francisco stations Thursday night as the agency aimed to thwart a planned protest over a transit police shooting. Officials said the protest had been designed to disrupt the evening commute.

"We are Anonymous, we are your citizens, we are the people, we do not tolerate oppression from any government agency," the hackers wrote on their own website. "BART has proved multiple times that they have no problem exploiting and abusing the people."

Allison described myBART.org as a "satellite site" used for marketing purposes. It's operated by an outside company and sends BART alerts and other information to customers, Allison said.

The names and contact info published by Sunday came from a database of 55,000 subscribers, he said. He did not know if the group had obtained information from all the subscribers, he said, adding that no bank account or credit card information was listed.

The BART computer problem was the latest hack the loosely organized group claimed credit for this year. Last month, the FBI and British and Dutch officials made 21 arrests, many of them related to the group's attacks on internet payment provider PayPal Inc., which has been targeted over its refusal to process donations to WikiLeaks. The group also claims credit for disrupting the websites of Visa and MasterCard in December when the credit card companies stopped processing donations to WikiLeaks and its founder, Julian Assange.

BART's decision to shut down wireless access was criticized by many as heavy handed, and some raised questions about whether the move violated free speech.

The problems began Thursday night when BART officials blocked wireless access to disrupt organization of a demonstration protesting the July 3 shooting death by BART police who said the 45-year-old victim was wedging a knife.

Activists also remain upset by the 2009 death of Oscar Grant, an unnamed black passenger who was shot by a white officer on an Oakland train platform. The officer quit the force and was convicted of involuntary manslaughter after the shooting.

Facing backlash from civil rights advocates and one of its own board members, BART has defended the decision to block cell phone use, with Allison saying the cell phone disruptions were legal because the agency owns the property and infrastructure.

"I'm just shocked that they didn't think about the implications of this. We really don't have the right to be this type of censor," Lynette Sweet, who serves on BART's board of directors, said previously. "In my opinion, we've let the actions of a few people affect everybody. And that's not fair."

Laura Eichman was among those whose email and home phone number were published by the hackers Sunday.

"I think what they (the hackers) did was illegal and wrong. I work in IT myself, and I think that this was not ethical hacking. I think this was completely unjustified," Eichman said.

She said she doesn't blame BART and feels its action earlier in the week of blocking cell phone service was reasonable.

"It doesn't necessarily keep me from taking BART in the future but I will certainly have to review where I set up accounts and what kind of data I'm going to keep online," Eichman said.

Michael Beelman of San Francisco told the AP that he didn't approve of BART's move to cut cell phone service or the Anonymous postings.

DISCUSSION