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Colorado Springs

**CS4950/5950**  
**Homeland Security & Cybersecurity**


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**Technology Trap**

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Cybersecurity


**Lesson 14**  
**Technology Trap**

Rick White, Ph.D.  
University of Colorado, Colorado  
Springs



<sup>1</sup> Esc

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**Critical Infrastructure**

**How did we end up in this  
mess?**



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**Three Words:**

- Better
- Faster
- Cheaper

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**Computer History 101**

- Until 1940s, dictionary definition of “computer” was a “human who performed mathematical calculations”.
- **Thousands of human computers, mostly women, were hired during WWII.**
- Performed tedious calculations required to fill mathematical tables.
- **Human computers were prone to making errors.**



4  
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4



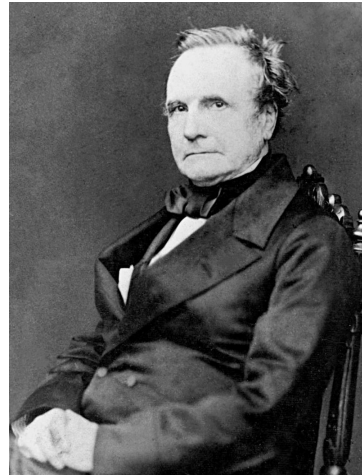
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### Charles Babbage

- **Charles Babbage** designed the “**Difference Engine**” to prevent errors from entering British navigation tables.
- Although never completed, the Difference Engine incorporated many concepts of the modern computer, **making Babbage the “Father of Computing”**.



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### Herman Hollerith

- In 1888, the Census Bureau held a competition to find a more efficient way to tabulate data.
- **Herman Hollerith** won, processing census data in 1/10<sup>th</sup> the time of his competitors.
- His invention used specialized machines to read data punched into holes on a **paper card**.
- Hollerith’s **tabulating machines** were used in the 1890 census.
- His Tabulating Machine Company later merged to become **IBM**.



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### Konrad Zuse

- IBM machines quickly dominated the business data market, but they were special-purpose machines.
- In 1938, **Konrad Zuse** built the first general-purpose computer.
- The Z1 used Boolean logic and floating-point numbers.
- **The Z1, however, was an electric, not an electronic computer.**
- The Z1 used electro-mechanical relays to form its logic and memory circuits.



*Zuse originally named his computer the "V1" for VersuchsModell 1 ("Experimental Model 1"). After WWII, he renamed it "Z1" to differentiate it from the flying bombs that terrorized London and Antwerp during the war.*

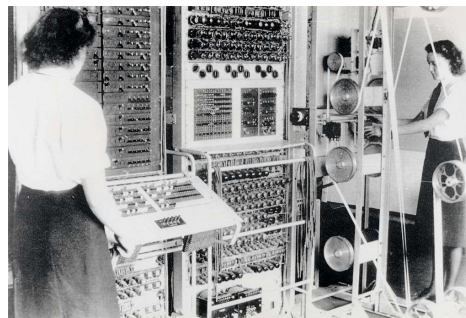
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### Colossus

- In 1943, **Tommy Flowers** designed and built Colossus.
- **Colossus was the first electronic, programmable computer.**
- Electronic computers are much faster than electric computers.
- Colossus broke German codes during WWII, and was kept secret until 30-years after the war.



*Alan Turing didn't design the Colossus. After the war, he helped design the Mark-1 at the Victoria University of Manchester.*

8

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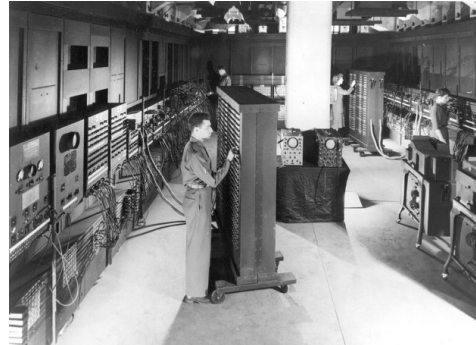
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### ENIAC

- Because Colossus was secret, the **ENIAC** was long credited as the first electronic computer.
- The ENIAC was built by **John Mauchly** and **J. Presper Eckert**.
- The ENIAC was designed to calculate artillery firing tables.
- While observing work on ENIAC, **John Von Neumann** wrote "First Draft Report on the EDVAC" describing what has become the **standard architecture for all modern computers**.



*ENIAC was ambitious for using over 1,000 vacuum tubes. Critics argued that the tubes would constantly burn out, preventing any useful work on ENIAC. The critics were wrong.*

9

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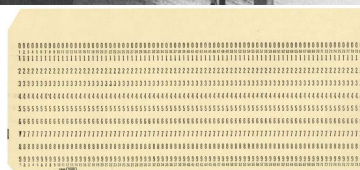
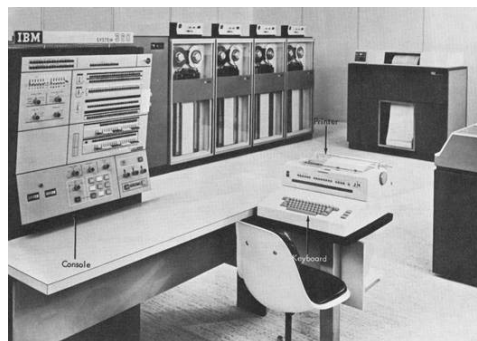
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### Mainframes

- In 1950, Eckert and Mauchly built **UNIVAC**, the first electronic programmable business computer.
- UNIVAC's success got IBM interested in the computer market.
- In the 1960s, IBM introduced the **System 360**, compatible with IBM punch-card equipment.
- IBM quickly overtook the market, leaving behind the BUNCH, Burroughs, Univac, NCR, CDC, and Honeywell.



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## PCs

- Mainframes proliferated to cope with demand for data services.
- In 1974, Intel produced the **8080**, an **8-bit computer on a chip**.
- The 8080 made PCs possible, starting with the **Altair** in 1974.
- The Altair was a PC kit that hobbyists had to assemble.
- In 1977, **Steve Jobs and Steve Wozniak** introduced the **Apple II**, a ready-to-use computer, loaded with one of the hottest arcade games, Space Invaders.



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Esc

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## Changing Tides

- Apple II was a huge success, and **Apple Inc.** became rich.
- Seeing a market opportunity, **IBM** released its own PC in 1981.
- The IBM PC ran on the **Microsoft** DOS operating system.
- Apple released **Macintosh** in 1984, making PCs easier to use.
- Microsoft created **Windows** in 1985; Apple sued and lost in 1994.
- IBM sold its PC division to Lenovo in 2005 and exited the PC market.
- Sales of Windows OS catapulted **Microsoft** ahead of **Apple** and **IBM**.



Click on Picture to Start Video

*Directed by Ridley Scott, this commercial aired only once, during the 1984 Superbowl (Raiders 38 – Redskins 9)*

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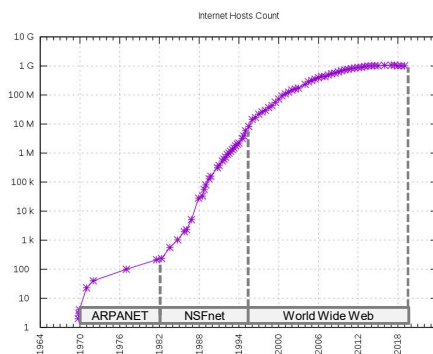
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### World Wide Web

- 1980s PCs were no threat to mainframes, but grew popular for home and office use.
- 1990s **local area networks** made PCs ideal for office productivity.
- In 1990, the **Internet** was opened for private and public use.
- In 1991, **Tim Berners-Lee** released the **World Wide Web**.
- In 1993, the **Mosaic** browser sparked the Internet rush.
- In 1998, **Google** made the web easy to search, and quickly rose above the competition.



By Kopiersperre, Ke4roh - Own work, CC BY-SA 3.0,  
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### Mobile Computing

- 1974 IBM 5100 was first **portable computer**, weighing only 50 lbs.
- 1980s portables were "**luggable**", weighing about half the IBM 5100.
- 1990s **laptops** replaced portables and began to overtake PCs.
- 2000s **Wi-Fi** facilitated web-centric **tablet devices** like the iPad.
- 2007 **iPhone** combined computing and communications in an intuitive and convenient mobile platform.
- 2009 **Facebook** fomented social media revolution, making smart phones essential personal gear.



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### Cloud Computing

- Mobile devices with high-speed Internet access everywhere are radically changing computing.
- No longer do you need to invest in expensive computer hardware and software to do your computing.
- You only need to rent the services you want from **"The Cloud"**.
- Huge data centers, built by the **FAANG, Facebook, Amazon, Apple, Netflix, and Google** now offer customizable computing services over the Internet.



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Esc

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### Why We Flocked to the Internet

- **Better:** Made it easier to produce, access, and share information.
- **Faster:** Transactions processed at electronic speeds.
- **Cheaper:** Eliminated many supporting requirements.

*"Build a better mousetrap and the world will beat path to your door."*

Ralph Waldo Emerson

### 10 Ways The Internet Changed Us

1. Search Engines. Information at our fingertips.
2. E-Commerce. Better selection & pricing.
3. Social Media. More personal interaction.
4. Connected Homes. Security & economy.
5. The Office. Lower administrative overhead.
6. Love. More sober options.
7. Streaming. Movies on demand.
8. Email. Instant & direct communication.
9. Smartphones. Personal digital assistant.
10. Online Banking. No more standing in line.

<https://www.cnn.com/2018/02/09/10-ways-the-web-and-internet-have-transformed-our-lives.html>

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**Internet Caveat**

There's only one problem...  
We can't secure it.



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...And now, we can't live  
without it.



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**Conclusion**

Questions?



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