COMPUTING LIFECYCLE

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MAINFRAMES – THE BEGINNING

- Huge, expensive machines that required extensive resources to maintain and operate
- Run at IBM facilities and used by companies on a time-share basis
- Over time, very large corporations, F100s, purchased their own mainframe computers and hired massive IT staffs to manage them
- The role of computers changed from research machines to business operations running financials, inventory, and human resources
- The primary tool used for mathematical calculations, which then advanced all other areas of science

MINICOMPUTERS

- Far simpler computers than mainframes and required far less expertise to operate
- Much lower cost and purchased by large to small corporations, F500 and F2000
- Rapidly expanded the role and use of computers
- Much easier to develop and maintain your own applications

PERSONAL COMPUTERS

- The introduction of the microprocessor allowed computers to be sold to anyone and everyone
- Used not only by companies but by individuals
- Computers had been democratized
- Applications were also much simpler and easier to install and operate
- Personal applications from word processors, to spread sheets, to utility apps spread by the hundreds

INTERNET

- With millions of computers around the world, the obvious next step was to connect them together with the motto “the network is the computer”
- Communication, collaboration, real-time interaction, and a new class of applications running on the Internet as shared services were developed by the thousands
- The speed and availability of the Internet became ubiquitous
- Applications no longer had to be purchased to be consumed
- Data becomes not just storage but a source of knowledge
- We have about 10 zettabyte of data and doubling every year
- To visualize a zettabyte of data, it would be equivalent to a stack of books on their side from the surface of the earth to Saturn

MOBILE COMPUTING

- Cellular phones moved from analog to digital technology
- Cell phones transformed from voice communications devices to handheld computers
- The concept of anywhere, anytime computing became the norm
- Several analytics firms have reported that there are more cell phones in the world than toothbrushes
- 9 billion cell phones and growing

CLOUD COMPUTING

- This was the shift away from local, on-site computing, to moving back to the mainframe model where computers were centralized, shared resources
- The complexity of the environment has expanded so quickly that operating and maintaining computers has become too complex and too expensive
- Large corporations, who were spending billions of dollars to maintain their own computers, realized that having a centralized computing environment allowed the sharing of expensive resources, which dramatically reduced their cost

CYBER SECURITY

- For many years cyber security was a nuisance, but not overwhelming
- Through the use of firewalls, most companies felt they could protect their environment from the occasional attempted hack
- Then hacking moved from individuals to corporations and countries, with China today being the largest worldwide hacker
- Attacks on businesses accelerated from a few a day to thousands a day
- Successful breaches transformed from a nuisance to both billions in losses and outright modern warfare
- This is the largest driver for businesses moving to the Cloud today

INTERNET OF THINGS

- The world has some three plus billion computers in use today
- The latest technology has reduced the size, cost, and power requirements of computers to the point they are now microchips, being built into every device from refrigerators, to thermostats, to jackets and shoes
- It is estimated there will be 30 billion connected, computing devices in use by 2020 – The Internet of Things
- These devices will double the amount of data being captured and stored per year

AI COMPUTING

- Artificial Intelligence has been around for fifty years
- However, it requires massive amounts of computing power and massive amounts of data that we did not have to support the concept
- The world today has more than 20 zettabytes of data and should exceed 160 Zettabytes of data by 2025
- The world today has computers with massive amounts of computational power
- Some computers have thousands of microprocessors
- AI is now a reality

AI COMPUTING

- More than $15 billion has already been invested in AI
- More than 2000 new AI companies have been started
- More than 1000 AI patents have been filed
- Google alone has more than 1000 internal AI projects underway
- AI is changing every aspect of life from business, to medicine, to science, to communications, to cars
- AI is being used to develop new operating systems and applications
- AI computers that have been connected together have developed their own language and in some cases have locked the engineers out, requiring them to be unplugged

QUANTUM COMPUTERS

- One quantum computer today in production can execute 2^{2000} processes per second, or more than there are atoms in the universe
- More computing operations per second than all the other computers in the world today
- Must operate at -459 degrees
- Far too complex of an operating environment to run on site, much like mainframes in the beginning, but at a much greater complexity level
- The operating system will be developed and updated by AI not engineers
- Quantum computing will take the AI we have today and advance it beyond our imaginations!

COMPUTING LIFECYCLE

Complexity

1944

Ubiquity

2022