Early History of Counting Systems

Raisa, Ben, Halsey
Origins of Counting

- First evidence of counting was found on the Ishango Bone, which is believed to be more than 20,000 years old and has sets of what appear to be tally marks that scientists estimate to be keeping track of something
- Found in Central Africa
- There are many theories to what this bone represents - some say the marks are tally marks, others say the marks go beyond that and are a deeper understanding of math. And some scientists believe the marks were only there to provide better grip on the bone for holding
Counting as a system of Measurement

- 4000 BC: Sumer (located in modern day Iraq) was one of the first times in mankind where there were so many people and livestock in one place that the city needed a way to keep track of everything.
- Citizens were given tokens to account for their property. If a man had 5 chickens, he was given 5 tokens. If he killed or sold one of those chickens, he had a token taken away, and suddenly arithmetic was created.
- Egyptian civilizations in 3000 BC were the first to use numbers as a method of distance measurement, and that is what they used to build the pyramids.
The Idea of Numbers and Writing Them Down

- Pythagoras (from Greece) studied the Egyptian ways of dealing with numbers, and started a school of arithmetic in Greece. He was the first to distinguish the difference between odd and even numbers.
- Back in Egypt, a way of writing down numbers was being used that we still use today.  
  - $1 = \mid$ and $10 = \wedge$ and they are read right to left. Therefore, 23 would be written as $\\\\wedge\wedge$, look familiar?
The Abacus

- Humanity's most basic counting machine
- Originated as simple furrows drawn on the ground and had pebbles placed into them, which was used as early as 1,000 BC by the Babylonians and the Phoenicians
- It is now portable and more of a relic than an actual tool
Hindu-Arabic Numeral System

- Positional decimal numeral system
- Most common system for the symbolic representation of numbers in the world
- Invented between the 1\textsuperscript{st} and 4\textsuperscript{th} centuries by Indian mathematicians
- Later adopted by Persian and Arab mathematicians
- Nine character number system developed from the Brahmi numerals, each of which evolved based on location of use
- Mohammed ibn Ahmed - contributed greatly to the mathematically system used in the Indian subcontinent
- Later introduced to Europe and East Asia
- The positional decimal numeral system was not used for algebra and more complex mathematics until about the 7\textsuperscript{th} century
# Numeral Systems: Hindu-Arabic vs European

<table>
<thead>
<tr>
<th>European (descended from the West Arabic)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
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<th>7</th>
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<th>9</th>
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<tr>
<td>Arabic-Indic</td>
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<tr>
<td>Eastern Arabic-Indic (Persian and Urdu)</td>
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<tr>
<td>Devanagari (Hindi)</td>
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<td>Tamil</td>
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</tbody>
</table>

History of the Binary Number System

- Gottfried Wilhelm Leibniz recorded the modern Binary System in 1703 in *Explication de l'Arithmétique Binaire*.
- Actual date of creation unknown as similar system date back to between 1st and 4th century BC.
- I Ching used hexagrams to represent a system almost identical to the binary system.
Binary Counting

- The only two digits are 0 and 1
- Each extra position added gives two possible values 0 or $2^{(n-1)}$
- The value of all the ones in the binary number are added together

Some examples:

0=0, 1=1, 10=2, 11=3, 100=4
Counting on Your Fingers in Binary
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- https://books.google.com/books?hl=en&lr=&id=V-LaZRS0FggC&oi=fnd&pg=PP1&dq=history+hindu+arabic+numeral+system&ots=XiZYjeeP2b&sig=_S8THeDQQCMYacl0fXZFykJCuOhU#v=onepage&q&f=false
- http://www.unc.edu/~rowlett/units/roman.html
- https://www.mathsisfun.com/numbers/binary-count-fingers.html
Digitization of Information

By: Chung Nguyen, Colin Esperson, Kevin Sun
What is digitization of information?

- It is the process of converting information to digital format
- In this format, everything is stored in binary
- Datas are stored in bits and bytes (8 bits)
Pascaline

- It is the first mechanical calculator
- Invented by Blaise Pascal in the early 17th century
- Initially called Arithmetic Machine
- Can only do addition and subtraction, however multiplication can be done with repeated additions.
- Input numbers by moving the dials
- It was first invented for business purposes, for his father, tax collector
- It was a conversation piece rather than for office use
- Only 50 were built
- Sets stage for future computing machines
How a Pascaline works

http://therese.eveilleau.pagesperso-orange.fr/pages/truc_mat/textes/pascaline.htm#haut
Esto probavit Instrumenti Symbolum

Blasius Papal. aureanus

Inuentor

20 May 1652
Analytical Machine

- Charles Babbage aka Father of Computers who invented it in 1833
- First general-purpose, fully program-controlled, automatic mechanical digital computer. (A number of computing concepts)
- Four parts: the mill (calculating unit, like CPU), the store, the reader, and the printer.
- It was used to compute the value of pi but it wasn’t successful.
- It was capable of holding as much as 1000 digits!
Punch cards

- A piece of stiff paper, containing information represented by the presence and absence of holes in predefined positions
- First used for Jacquard’s looms, then the idea for data processing came.
- Standard punch card was invented by Herman Hollerith in the late 19th century.
- Primary medium for computer program / data input, output, and storage.
Z(1) = Y + W(1)
Tabulating Machine

- Back in 1880, the US census took 8 years to finish
- Herman Hollerith invented this machine in 1889
- Use punch cards to input data like gender, age, name,... by punching holes.
- Census of 1890 only took 1 year to do.
First Big Computers

By Derek, Megan, and Li
Major Facts

- Very early computers were very big taking up the size of warehouses.
- The first big computers came as a result of World War II.
  - Used for code decryption and encryption.
- Many were not fully digital—had control switches, gears, and rotating shafts to run computer functions.
  - Known as analog computers.
- After World War II, the first fully electrical or digital computers came out.
- These were made of wires, input and output switches, and vacuum tubes (more on next slide).
Enigma Vs. Bombe Analog Computers

- Type in a message, then used scramblers & rotating gears
- Enigma, created by German engineer Arthur Scherbius
- To counter Enigma, Bombe was created to decipher German messages
  - Bombe was created by mathematician Alan Turing
- *Imitation Game* shows how he created the Bombe
Z3

- Designed by Konrad Zuse in Berlin in 1941.
- World's first working programmable
- Program code\(^3\) and constant data were stored on punched film.
- The success of Z3 is often attributed to its use of the simple binary system.
Harvard Mark I

- (Length: 51 feet. Height: eight feet. Weight: nearly five tons)
- Built for the US Navy Bureau.
  - One of the first programs to run was Manhattan project.
- Room-sized, relay-based calculator.
  - It used 765,000 components and hundreds of miles of wire
- Mathematical Tables
- The Mark I read its instructions from a 24-channel punched paper tape.
Eniac

- Electronic Numerical Integrator And Computer
- 1946 United States Army's Ballistic Research Laboratory.
- But the first test problem it ran was for the hydrogen bomb.
- had a speed on the order of one thousand \((10^3)\) times faster than that of electro-mechanical machines (than any previous computers)
A function table from the ENIAC
ENIAC

stands for “Electronic Numerical Integrator And Computer”

first introduced in 1946
ENIAC contd.

Photo of ENIAC’s portable function tables

Photo of plugboard wiring

http://www.columbia.edu/cu/computinghistory/eniac3.jpg
FORTRAN

Stands for “FORmula TRANslating system” and was designed for scientific computing. Developed in 1957, the first “high-level programing language” (The History of FORTRAN)
COBOL stands for COmmon Business-Oriented Language

first developed in 1960 by the CODASYL (COnference on DAta SYstems Languages) Commitee

designed for business practices such as file-oriented tasks

https://en.wikipedia.org/wiki/File:COBOL_Report_Apr60.djvu
C Language

- invented in early 1970s by Dennis Ritchie
- Ritchie started writing C in order to fix what the B language was missing
  - He wanted to implement data types and “structures” because B couldn’t use either one
- one purpose of C was to rewrite programs that were initially written in assembly code
C Language

C was used to code the kernel of the early Windows, Mac, and Linux operating systems as well as the UNIX operating system and Android and IOS devices’ kernel.

C used a lot less lines was its structure was far more logical and concise.

UNIX is basically a simple operating system, but you have to be a genius to understand the simplicity.

— Dennis Ritchie —
Java (1995)

- Familiar C(++)-like syntax
- (Almost fully) Object-oriented and class-based
  - Class, Object, Method, Message Passing
- The same code could be executed on multiple operating systems
- Compilers compile Java bytecode “halfway” to Bytecode → VM
  - “Write once, Run anywhere” quickly became standard web browser applet
- Configurable security
Links used for research

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C
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https://www.codingunit.com/the-history-of-the-c-language
http://www.azquotes.com/author/12384-Dennis_Ritchie

Java
Analog v Digital
Switches—Electromechanical Relay

OPEN SWITCH

CLOSED SWITCH
Use of Relays

Constructed between 1939 and 1944, the Harvard Mark 1 was a giant electro-mechanical computer with over 750,000 individual components.

But electro-mechanical relays can only switch a number of times a second and the Harvard Mark 1 took six seconds to multiply two numbers together.

Soo, what could be faster than the relay. . .
Vacuum Tubes

Diode

Electron flow from Cathode to Anode

Only one way
In 1904 John Fleming used the ‘Edison effect’ to create the first vacuum tube, a diode, which had two electrodes.

In 1906 Lee de Forest introduced a third electrode, creating the triode, which could be used as an amplifier and switch.

Between 1943 and 1946 the University of Pennsylvania constructed ENIAC which had 18,000 vacuum tubes, but could perform 14 multiplications or 5000 additions a second.

Still kind of slow, sooo . . .
Transistors—Solid State Devices

Made of semiconductors.

At the end of WWII, research with semiconductors exploded as many possible uses were imagined.

In 1947 William Shockley, Walter Brattain, and John Bardeen succeeded in creating the first germanium transistor.
But what is a transistor?
Moore’s Law

In 1965, Gordon Moore, co-founder of Intel, realized that every 18 months memory devices doubled in their capacity. Not a law, just an observation of a trend.

This later applied to say that the number of transistors that can be constructed in a certain area of silicon doubles, the price per transistor halves, and the performance of microprocessors doubles every 18 months.

Trend may be reaching physical limits. In 2008 a UK team announced they had made transistors 1 atom thick and 10 atoms wide.
Wikipedia

What Is an Integrated Circuit?

An Integrated Circuit is a semiconductor wafer where a large amount of tiny resistors, capacitors, and transistors are fabricated.

IC functions as amplifiers, oscillators, timers, counters, computer memories, or microprocessors.
German physicist and engineer Werner Jacobi developed and patented the first known integrated transistor amplifier in 1949 and the British radio engineer Geoffrey Dummer proposed to integrate a variety of standard electronic components in a monolithic semiconductor crystal in 1952. A year later, Harwick Johnson filed a patent for a prototype integrated circuit.

Jack Kilby produced prototype IC and commercialized it. (1958)

Kurt Lehovec invented a way to electrically isolate components on a semiconductor crystal.

Robert Noyce invented a way to connect the IC components and proposed an improved version of insulation based on the planar technology.
Why are Integrated Conductors So Good?

They are very small (100 times smaller than discrete circuits).
They weigh less where a large number of components can be packed into a single chip.
It costs less because of mass production
Because there is no soldered connection, interconnections and small temperature rise
failure rate is low
Requires less power
Easy to replace
What are Some Stuff We Use Nowadays With ICs

Cars (Automotive controls)
Televisions
Computers
Microwaves
Laptops
MP3
Your Phone
Gaming Devices (Xbox, Playstation, etc.)
Cameras
Airplanes
Spacecrafts
AND MANY MORE
Future of Integrated Circuits

In Science Daily, an article mentions that Integrated Circuits are getting smaller and smaller using computer aided designs. When they used the vacuum tubes, the computer was very large. Then they invented transistors, but many things were still complicated with some wires. And when integrated circuits came out, you could create a laptop that had thousand times more power than the first computer ENIAC.
What are Transistors?

- **Amplify** or **Switch** electronic signals and electrical power
- Make our electronic world go around
- If you imagine Computer as your Brain, Transistors are Brain Cells
How are Transistors made?

- Made from silicon (Semi-Conductor)
  - Electrons can flow easily
- Has Three layers
  - n-type Collector
  - p-type Base
  - n-type Emitter
How do Transistors Work?

- Attach small positive voltage to the base
- Electron flow
  - Emitter $\rightarrow$ Base $\rightarrow$ Collector
  - Transistor switches to “on” state (**SWITCH FUNCTION**)
- Small Current on the Base makes a Big Current flow between the Emitter and the Collector
  - Small Input $\rightarrow$ Large Input (**AMPLIFIER FUNCTION**)
History of Transistor

• First conceived by Julius Lilienfeld in 1926
• Implemented by Bardeen, Brattain and Shockley in 1947
• New way to make smaller and cheaper Radios, Calculators and Computers
Importance

• One of the most invention of the 20\textsuperscript{th} century

• Without Transistors, our laptops would be size of Star Trek

• Transistor changed Society.
  • Making electronics became way more efficient and cheaper.
  • Able to Mass-produce
Integrated Circuits (IC)

- Also called as Chip or Microchip
- Thousands or millions tiny resistors, capacitors and transistors fabricated together
Functions of IC

- Amplifier
- Timer
- Counter
- Computer Memory
- Microprocessor
History of IC

- Jack Kilby and Robert Noyce (founder of Intel) invented IC
- Kilby and Noyce came up with the idea independently, more or less exactly at the same time.
- They both realized that there needs to be a better way of connecting transistors in large quantities.
- Fought for the patent rights but at the end, they collaborated
Transistor vs. IC

- Transistors used much less power, and were far more reliable.
- But, there was still the problem of linking all those Transistors.
- Even after Transistors were invented, Computers were still a tangle mass of wires.
- Integrated Circuits changed everything.
- Microscopically Connected multiple Transistors on a piece of silicon.
- Now, Rockets and Satellite navigation
Thank You!
Sources

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- http://whatis.techtarget.com/definition/integrated-circuit-IC
- https://learn.sparkfun.com/tutorials/transistors
- http://hyperphysics.phy-astr.gsu.edu/hbase/solids/trans.html
According to the Computer History Museum, it is the world’s first personal computer.

Invented by John Blankenbaker in the 1970s.

Only 50 were built and 40 of them were sold.

Pricing was $750 US dollars.

Less than 14 exist today.

Used small-scale-integration TTL chips.

8-bit machine with 256 bytes of memory.

To use the machine, you had to program it first with series of buttons and switches.

Output was a series of lights.
Datapoint 2200

- Created in 1967
- Had keyboard, display and emulated different types of terminals in software
- The operating system was called Datapoint O/S
- Planned to use a microprocessor
- Manufacturing difficulties
- Abandoned by Computer Terminal Corporation (CTC)
- Had financial difficulties in 1980s and failed to become popular again
Micral N was earliest commercial, non-kit personal computer based on microprocessor.

Intended to be used for farming purposes.

Was proclaimed to be “the first of a new generation of mini-computer whose principal feature is its very low cost.”

A man worked 18hrs/day to deliver in time.

Used Intel 8008 microprocessor.

Used lights and switches.
1977 Commodore PET

- Featured two built-in cassette drives
- Up to 8 kilobytes of memory
- First PC available to retail consumers
- A keyboard including a separate numeric pad (almost completely unheard of at the time, even as an option)
- An operating system that was burned onto ROM and loaded on boot
Apple II

• Had a printed circuit motherboard, “good graphics,” game paddles
• Had “good graphics”
• Gaming paddles
• Computer game – Breakout
• In 1981 IBM fueled the fast growth of the personal computer market with the IBM 5150
• Used Intel 8008 microprocessor
• Used Microsoft’s MS-DOS operating system

• In the same year, Adam Osborne unveiled the Osborne I
  (24 pounds, $1795, 5 inch display, two floppy disk drives, 64 Kilobytes of memory)
Commodore 64

- Started becoming popular in 1977
- Top selling in US and Canada
- Lasted 11 years
- Sold 17 million units
- Earned spot in Guinness Book of World Records (Best-selling computer of all time)
- Priced at $595
- Relatively cheap.
Apple Lisa

- Introduced in 1983, first PC with graphical user interface
- NASA was a customer of the product
- Cost $10,000
- Had reputation for slowness which contributed to its commercial failure

Soon after, Compaq released the first PC clone
It was based off the same software as one of IBMs PC
Apple’s Macintosh

- 1984 – Apple launched the first successful computer with a graphical user interface
- They made an ad for the Super Bowl with an Orwellian theme cast
- This is when Apple started to become a problem for IBM
IBM PCjr & PC-AT

IBM's response was the PCjr & PC-AT

- $4000 (60% more than Mac)
- Boasted better storage capacity & performance and RAM than previous IBM PCs
Compaq DeskPro 386

- Compaq bested IBM in 1986 with Deskpro 386
- First desktop to use Intel’s latest chip
- PC had as much power as some of the older mainframes/minicomputers

1987, IBM released OS/2 operating system
- Enabled the use of a mouse with IBM machines
Compaq LTE & LTE 260

- Late 1980s, more of these “thin laptops” or notebooks started becoming popular
- Compaq started a revolution with this concept
- Built-in hard disk & floppy disk drives
- Performance similar to desktop models
Microsoft Windows

- 1985, Windows came out – Lacked popularity until version 3.0
- Later versions came out with Microsoft Word, Excel, and powerpoint
- Microsoft become the PC market’s dominant software vendor
PC & The Web

- American Online - AOL service – debuting in 1991
- Made the internet more accessible to millions of customers

Netscape’s Navigator Web browser – 1994
Helped gain appeal towards the Internet
Web surfing speeds were becoming faster
1998 – Microsoft sold Internet Explorer with Windows together
Apple Unveils Power Mac G4

- Had code names for specific components like “Yikes!” & “Sawtooth”
- Featured DVD-ROM
- Slots for up to 2GB of RAM
- First PC to include gigabit Ethernet as standard
- Zip drives were an option
Apple’s First iMac

- Steve Jobs made a huge comeback with Apple
- 1998 unveiled the iMac
- Blue casing
- Ethernet & USB connectivity
- Released a new operating system
- Helped get Apple running again in the market
Competition

The amount of PCs that started to come out after the 2000s were too fast to keep track of and now all companies fight to sway consumers towards their product, whether that be through specs, ads, flashy stores, or methods like discounts/pricing.
THE INTERNET AND WORLD WIDE WEB

Javaria Yousuf, Sally Li, Lorenn Fields, Sana Choudhary
What is the difference between Internet and World Wide Web?

- Internet is a network of networks
  - Examples: computer network at school, the network on your phone to access safari

- The world wide web is the system we use to access the internet
  - Examples of how to access world wide web: safari, chrome, firefox
  - Examples of ways to access internet without using WWB: text, email

- In summary: “So another way to think about it is to say the Internet is composed of the machines, hardware and data; and the World Wide Web is what brings this technology to life.” (computer.howstuffworks.com)
Vannevar Bush

- Tufts College to study engineering
- Was not directly involved w/ creation of internet
- 1945 essay “As We May Think”
  
  Creation of “memex”, theoretical machine which enhanced memory of user by storing data
- Many pay homage to him for creating the idea
J.C.R. Licklider

- Received three bachelor's degrees in physics, math, and psychology.
- Also had ideas, not inventions
- Idea of networked computers that were user friendly
- “His ideas foretold of graphical computing, point-and-click interfaces, digital libraries, e-commerce, online banking, and software that would exist on a network and migrate to wherever it was needed”

We need to substitute for the book a device that will make it easy to transmit information without transporting material.

— J. C. R. Licklider —

AZ QUOTES
Bob Metcalfe

- Flunked Electrical Engineering at Harvard
- He reworked his version of the Alohanet to use cables instead of radio, a new technology he called Ethernet
- This made the internet more easily accessible to the general public
Douglas Englebart

- Went back to school after the war and received his degree in electrical engineering
- First successful implementation of hypertext and the mouse
- Also created user interfaces; a windowing environment and allowed the user to e-mail other
- Word processing options.
Ted Nelson

- he earned a BA in philosophy
- considered to be unreliable and controversial because he started a lot of projects but did not complete them
- attempted a term project creating a writing system similar to a word processor, ultimately evolving hypertext
- recognized because the projects he started were significant, as other scientists ran with them

Ted Nelson:

"Well, by “hypertext” I mean non-sequential writing — text that branches and allows choices to the reader, best read at an interactive screen."
Marc Andreesen

- Pioneered the browser “Mosaic”
  - It was much more sophisticated graphically than other browsers of the time.
  - Was designed to display HTML documents, but new formatting tags like "center" were included.
  - Especially important was the inclusion of the "image" tag which allowed to include images on web pages.
  - User friendly internet for profit
The Present

■ Incompatibilities and tensions

■ From protecting minors to ensuring quality: PICS

■ Security and Ecommerce
Incompatibilities and tensions

- Common standards of URLs, HTTP and HTML have allowed growth of the web.

- Also allowed development resources of companies and universities across the world.

- The rising ability of HTTP to handle arbitrary data formats allows easy expansion.
PICS

- W3C's Platform for Internet Content Selection introduces new protocol elements and data formats to the web architecture.

- The principles involved may apply to future developments.
Security and Ecommerce

- Web allows the exchange of information and money

- A number of proposals exist for specific protocols for security, and for payment

- A fairly large and growing number of protocols and research ideas are around.
The Influence the Internet/Web has had on Society

Relationships: How the Internet/Web has bridged people

Facebook
- Facebook allows people to cast and share their lives with the world. It has grown from a small university based network to a world wide network allowing people to facilitate and culture new relationships based off of preferences.
- Face has grown from 100 million users in the 3rd quarter of 2008, to 1.59 billion active users in the 4th quarter of 2015.
- 83.6% of those active users are from outside the US and Canada

Dating
- The web has even allowed society to meet their significant other. Once something done while one is out and about in the world, can now be done from your living room couch.
- It’s estimated that 54 million Americans are single, and 49 million Americans use Dating Sites, almost equaling the entire US single-person pool.

Education: The internet/web has also been able to simplify and grant access to education to people and areas that once went without it.

Online Schools
- The ability to complete a degree or certificate from the comfort of ones living room and at their own convenience has soared in the past decade.
- It’s been a cost savings for some considering, there isn’t the daily travel, or purchasing of books, and assorted class room fees.
- According to Drexel University, traditional ground based (Brick and Mortar) schools offering online degrees are still favorable to the solely online schools 92% to 42%.

Business: Shopping:
- Online shopping retail sales are predicted to grow steadily to $370 billion in 2017, up from $231 billion in 2012.
- As of Feb 2015, 40% of Consumers still make in-store purchases in-store during the week opposed to 27% online.
- This trend is slowly shifting due to online retailers offering loyalty program discounts on shipping and handling.
The Influence the Internet/Web has had on Society

Communication: How the Internet/Web has replaced our traditional means of contact

Email
- Email allows us to send information to practically anywhere the web reaches out to without the need of a full physical address, specific person, envelope, stamp, or physical post office.
- It’s estimated that over 100 billion emails are sent and received a day. If we were to just take it as 100 billion; that would equate to 365 trillion emails a year in comparison to 141 trillion letters mailed in the year of 2014.

Social Media
- Social Media has allowed us to delve into our friends, celebrities, athletes, and colleague’s lives while sharing ours.
- 90% of adults age 18-29 utilize a social media medium, and surprisingly senior citizens 65 and older have more than tripled their usage since 2010 from 11% to 35%, compared to only 2% in 2005.
- 76% of all internet users are said to utilize at least 1 social media medium

Skype
- Video conferencing or video calls is also a major benefit of the internet/web. It enables us to visually connect with someone or a group clear across the globe, adding some real tangibility to family and friends, especially if travel is an issue.

Access: Access to the Internet/Web

Smartphones
- We all have access to the world wide web via our pocket sized smart phones. Therefore its available almost anywhere.
- According to tech crunch, 6.1 Billion people will own smart phones 4 years from now, in the year 2020. This is estimated to be 70% of the world’s population.

Tablets
- The web has enabled pc hardware manufactures to scale back some of the resources traditionally needed for a full PC to thin portable computing devices via the use of web-based applications opposed to full on program installations.
- With cloud storage growing, battery life and displays being better, added by touch capabilities and portability; tablets are gaining valuable ground on the laptop market.
Future of Internet and WWW

- Accessibility to Internet and Worldwide web with every device
- Infrastructure improvement for a more functional, robust, and efficient available service especially since businesses and finances are online and outages are not acceptable so an adapting system that can configure itself would be useful for data.
- Enhance the web as communication and interaction between people especially in terms of data formats HTML might be eventually displaced since many new data formats that are more powerful and consistent are coming out.
- To allow web to be apart from being a space browsable by humans, to contain data that machines can analyze from the web and promote solutions. Like it could accurately reflect the knowledge and interworkings of people. Then the internet could be used by virtually every business
- Information sharing will be effortless “flowing like electricity” and internet mediaries will be invisible because each device will have a network
- Universal access to all human knowledge by all humans
Future

- With the increasing networking bring increased risks for privacy.
- **Daren C. Brabham**, a professor at the Annenberg School for Communication & Journalism, University of Southern California, predicted, “We will grow accustomed to seeing the world through multiple data layers. This will change a lot of social practices, such as dating, job interviewing and professional networking, and gaming, as well as policing and espionage.”
References

https://www.w3.org/People/Berners-Lee/ppf.html
https://www.w3.org/People/Berners-Lee/1996/ppf.html
http://www.livinginternet.com/i/ii_arpanet.htm
http://www.ibiblio.org/pioneers
http://www.computer.howstuffworks.com
History of Virtual Reality

Wendy & Juan & Masa
What is virtual reality?

Real?
Senses
Computer Tech

Interaction
Stimulation
Early History of VR

1840s
- David Brewster's lenticular stereoscope

1950s
- Morton Heilig's Sensorama

1960s
- Philco Corporation's Headsight
Cold War

Scientific visualization

The US created models that tracked the airflow data of aircrafts

Ivan Sutherland created a light pen

- The pen allowed pictures to be drawn on a computer
- Created the lead-mounted display / ABLE TO MOVE TEXT AROUND
- This led to flight simulators
- 1962 - developed sketchpad

1970's there was a new computer image, which was three dimensional and mobile. It was virtual world that could be realistic or abstract.
Virtual Reality in 21st century

- Medical industry
  - psychiatrists at the University of Louisville

- Gaming
  - Oculus rift

- Tourism
  - The wild within
A new morning..
RESOURCES:

http://www.virtualrealityguide.com/history-of-virtual-reality
http://www.vrs.org.uk/virtual-reality/history.html
http://www.virtualrealityguide.com/what-is-vr

A YouTube video as an example of fun things you can talk about!
https://www.youtube.com/watch?v=xzU28Axv0Uw

Current technology:
A New Morning: https://www.youtube.com/watch?v=GmdXJy_IdNw
https://www.technologyreview.com/s/534971/magic-leap/