Level 1: Charles Babbage & Ada Lovelace

1. Who was Charles Babbage?
   1. December 26, 1791, [London, United Kingdom](https://www.google.com/search?safe=strict&rlz=1C1GGRV_enCA819CA819&q=London&stick=H4sIAAAAAAAAAOPgE-LQz9U3MCzMrVICs0yyCnK0xLKTrfQLUvMLclKBVFFxfp5VUn5RHgBrmkgpLgAAAA&sa=X&ved=2ahUKEwichvK306ffAhWq7oMKHTTnBpUQmxMoATAfegQIBhAH)
   2. He create the difference machine, so like the first ‘super computer’, It was used to solve problems, by changing dial numbers and turning a crank.
2. What is the “Difference Engine” proposed by Charles Babbage?
   1. The difference engine is an automatic mechanical calculator designed to tabulate polynomial functions.
   2. The difference engine calculates the answer by repeated addition. The function is F(x) = x^2 + 4.
   3. It is similar to modern computers because it takes in two numbers firstly, then calculates the solution using repeated addition, modern computers works with 1s and 0s or High and Lows, in which ever sequence means to add / subtract it would change to 1/0. Basically it’s the same concept from a mechanical machine to a digital machine.
3. Who was Ada Lovelace?
   1. December 10, 1815, London, United Kingdom
   2. She worked on Charles Babbage’s difference engine which proposed mechanical general-purpose computer, the Analytical Engine.
   3. The programming language was called Ada
4. What is the “Analytical Engine” worked on by Ada Lovelace?
   1. The Analytic Engine incorporated an arithmetic logic unit, control flow in the form of conditional branching and loops, and integrated memory (en.wikipedia.org).
   2. The machine would take in a cards with specific instructions on them. On Wikipedia an example for a factorial program would be written as:
      1. N0 6  
         N1 1  
         N2 1  
         ×  
         L1  
         L0  
         S1  
         -  
         L0  
         L2  
         S0  
         L2  
         L0  
         CB?11
   3. It relates to modern computers because it was pretty much the first computer to integrate the idea of having arithmetic logic, conditional branching loops and even integrated memory, these key ideas would later be incorporated into modern computers.

Level 2: Alan Turing

1. Who was Alan Turing?
   1. He was born on June 23, 1912 in Maida Vale
   2. He created a computer that managed to crack the Enigma code.
   3. He created the Turing test, this would test the intelligence of a computer, to see whether or not a person can tell they are talking to a computer or not.
2. What is the “Enigma” that Alan Turing worked on during World War II?
   1. The Enigma code was a typewriter style box that has plugs of which when changed upon typing a letter, it would chose a difference letter / number than you pick. There are 150, 738, 274, 937, 250 possible states.
   2. Britain was on the verge of being overrun by the Germans, it they managed to crack the code they would be able to intercept the german messages to know what they are planning without them even knowing, allowing them to prepare accordingly.
   3. The use of the Bombe computer, designed by Alan Turing and Bletchley Park was used to help decipher the German Enigma-machine.
   4. It had to be kept top secret because of the fact that if the Germans found out, either by spies or other means, they would immediately change the way they were communicating and if the British had let the secret out, the entire outcome of World War II would probably ended with the Germans winning.
3. Many people call Alan Turing the “Greatest Unknown Hero of World War II”. Provide examples of the impact of his work that would support this claim.
   1. The entire operation to design a machine to crack the enigma code was kept so secret it wasn’t until around the 90s that information about Alan Turing and his machine was released to the public.
   2. He suggested the that AI will become advanced enough to have a conversation like a human without someone noticing. The test is called the Turing Test.
4. How did being gay affect Alan Turing’s life and work as a computer scientist?
   1. Being gay at the time wasn’t necessarily considered not a problem like it is today, so he had to keep it a secret for the most part on top of working on a top secret project building the machine to crack the enigma code.
   2. Since he was gay, the government didn’t approve of this at the time, while the one branch of government that he was working for to crack the enigma code knew about his work and his importance, all of that was kept a secret for years without even the other governments knowing.
   3. He commited suicide.
5. Many people call Alan Turing the “Father of Computer Science”. Provide some examples of the impact of his work that would support this claim.
   1. He formed the concept of the algorithms and computations with one of his inventions, the Turing Machine.
   2. He wrote about the idea of how computers could think like a human, commonly known today as Artificial Intelligence.

Level 3: Other Great Contributors

1. Who was John von Neumann?
   1. Born December 28, 1903 in Budapest, Austria Hungary
   2. He was part of a serial exodus of hungarians who fled to America, I think around 1937 ish.
   3. He published “Theory of Games and Economic Behavior” in 1944 which detailed a groundbreaking mathematical theory of economic and social organization, based on a theory of games of strategy (famousscientist.org)
   4. The von Neumann architecture is a design model for a stored-program digital computer that uses a processing unit and a single separate storage structure to hold both instructions and data (computerhistory.org.uk)
2. What was the "ENIAC" computer and the "von Neumann Machine"?
   1. It was the earliest electronic general-purpose computer. It was designed to be used to calculate artillery firing tables for the US army's ballistic research lab. The first program was to study the feasibility of the thermonuclear weapon.
   2. Can be programmed to perform complex sequences of operations, including loops, branches, and subroutines like computers like today, but was hardcoded with functions unlike the various software made today for PCs
   3. It so that programs that are made can be edited and not hardcoded, because before they were hardcoded and could not be changed. But the idea proposed that you should be able to write a program that is encoded and can be read by the machine.
3. Who was Grace Hopper?
   1. December 9, 1906, New York City, New York, United States
   2. Most known for the invention of the compiler, the intermediate program that translate English language instructions into the language of the target computer.
4. What was the COBOL computer language that Hopper helped to develop?
   1. It was the first user friendly business computer software program, later added validation procedures to bring about the international standardization of computer languages.
   2. Yes, because it is primarily used in business, finance and administrative systems for companies and governments. COBOL is still used widely in legacy applications deployed on mainframe computers.
5. Who is Tim Berners-Lee?
   1. June 8, 1955, London, United Kingdom
   2. He was knighted in recognition for his “services to the global development of the internet” through his invention of the world wide web.
   3. He made the the WWW
6. How my live would be different without the world wide web:
   1. No YouTube
   2. No Instagram
   3. No Apps / Email
   4. No online ordering.
   5. Soo much more things.