

Slide 1:

Hello! My name is Ashwin. Today I will be speaking to you about the Harvard Mark II and the world's first computer bug. [next slide]

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According to [National Geographic](#), The Aiken Relay Calculator, also known as the Harvard Mark II was built and programmed in 1947 by Howard Aiken and Grace Hopper. The Mark II was an electro-mechanical computer. This means that it used a series of switches and relays rather than the digital logic that we are used to nowadays. The Mark II was used for ballistic calculations and funded by the US Navy. This means that it was used to calculate trajectories of different ammunitions and account for bullet drop and weather conditions. This image [point] is an example of some more recent ballistic calculator software comparing 2 different types of bullets. [next slide]

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The Harvard Mark II was not a “stored-program” computer. Instead, the computer used the “Harvard Architecture”. This means that it used a series of tapes and read one instruction at a time. Instructions meant different things based on when they were executed in the program. And because of the sheer size of the computer, the Mark II was divided into a set of relays. These were separate mechanisms designed to work together. Now imagine that you are watching the computer whirr to life, hearing the light flutter of the tapes and the clicking of the switches and relays. AND THEN **ZAP!** [Next slide]

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According to [Business Insider](#), this is exactly what happened on the day of September 9th, 1947. Due to the Mark II's open air design, a moth was able to make its way into Relay #70, Panel F, cementing itself in our history books. As a result, the program that was running got interrupted and some data was lost.

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Unfortunately there are no videos of the Mark II and the machine was disassembled. However, I still think that it would be beneficial to have a visual representation of how relay computers work and sound like. This is a japanese computer that is similar to the harvard Mark II with the exception of the method of input (harvard uses tape and this one has keys). [play at 1x speed.] [next slide]

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As part of the program, the technicians took a detailed log of what they were currently working on or testing. This is the log book entry where the Harvard engineers stored the moth, “the first actual case of a bug being found”. [next slide]

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The mistakes of the Mark II were rectified with the Mark III and IV. Because they were a combination of electronic and electro-mechanical computing, they were not as susceptible to mechanical failure. For example, because the Mark III and Mark IV use vacuum tubes and transistors respectively, a moth entering the system would not cause the program to be interrupted and would not cause any major damage. [next slide]

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For example, this is an image of a gecko inside a modern computer. This would not damage the computer unless the lizard starts to chew on the cables. And it is unlikely that any data would be lost from the computer. [next slide]

Slide 9:

Thank you for listening to my presentation and I hope you have a nice day!