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What happened to MINIX?

From

Wikipedia

In this Wikipedia, it descripts what MINIX 3 is. MINIX 3 is a project to create a small, high availability, high functioning Unix-like operating system. The main gold of MINIX is The main goal of the project is to make the system fault-tolerant by detecting and repairing its own faults without user intervention. The main use of the system is conceived as embedded systems and education.

Reflecting the nature of a monolithic kernel system, drivers can break the entire system, and MINIX 3 is designed to create a "reliable, self-healing, multi-server Unix clone" operating system. To achieve this, the code running in the kernel must be minimal, and the file server, process server, and each device driver run as separate user-mode processes. Each driver is carefully monitored by a portion of the system called the reincarnation server. The driver cannot respond to a ping from this server, it will be shut down and replaced with a new copy of the driver. In a single-chip system, errors in the driver can easily cause the entire kernel to crash. This is unlikely to happen in MINIX 3.

I believe MINIX 3 is used in the Intel Management Engine after some research. Intel processors support the ME management engine to manage and coordinate many internal modules. Especially after the traditional chipset integration, the processor has almost become a SoC single-chip system, and a "supervisor" is needed. MINIX is doing this. MINIX has its own CPU core and proprietary firmware inside the processor, completely independent of other parts, and completely invisible, the operating system and users are invisible, and the running permissions are up to Ring-3. In fact, even in sleep or even shutdown state, MINIX is running continuously, because the ME management engine starts to perform management work while the processor is booting, and is also responsible for chip-level security functions. This makes MINIX supreme, and regardless of whether you have Windows, Linux, or MacOS installed on your computer, it runs silently, making it the world's number one system. Of course, this design also has huge security risks. Google research found that the MINIX Ring -3 privilege level has a complete network stack, file system, USB / network and many other drivers, Web servers. This means that MINIX itself is a complete small kingdom independent of the computer system. You can do whatever you want, even set up a networked server when you are turned off! It is conceivable that if such a system is attacked externally, such as by implanting a rootkit malware, the user is 100% in no way, because no one has access to it. Google is working hard to remove MINIX from its own internal server, but it has not been successful.

The presenter Trey Miller was great. His slide were detail and highlighted, and had many interesting information. He Also mentions about the Tanenbaum-Torvalds Debate which we read form home work two. As he said, I agree MINIX 3 filled a market need that was never really there, Windows, Mac, and Linux had already thoroughly established themselves as the OS kings. Tanenbaum is too late to put MINIX in to the market, he should focus on mobile device now.