

Emulation (Abstract)

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In this research paper I write about the topic emulation. Emulation is when a program tries to imitate another program in order to be able to use this program on another platform. A very popular example is the emulation of retro games.

The main distinction between different emulators is if it is a hardware emulator or a software emulator. While rather rare, hardware emulators do exist. Most emulators just emulate a hardware architecture if operating system firmware or software is required for the desired software, it must be provided as well (and may itself be emulated). Both the OS and the software will then be interpreted by the emulator, rather than being run by native hardware. Apart from this interpreter for the emulated binary machine's language, some other hardware (such as input or output devices) must be provided in virtual form as well. For example, if writing to a specific memory location should influence what is displayed on the screen, then this would need to be emulated.

The difficult part about getting emulators to work, is getting all the hardware and software to work. They need to work without bugs, while simultaneously being stable. You have to take individual pieces of hard- and software try to code them so that they work as a single program.

The hardest component to emulate is the CPU. The CPU is one of, if not the most important component of every computer. Almost every other component is linked to the CPU in some way which makes it very hard to emulate. Since not all the CPU's are or work the same, you have to differentiate between them by instruction sets. The instruction set defines how the computer carries out the commands it is given.

The main use of emulators is for them to behave like another software or device. It is software that mimics other software. Popular examples include printers that are not from HP, that emulate HP LaserJet's, since there is a lot of software already out there for those printers. Another example is the hardware card that is installed in some Macintosh computers to run DOS based programs.

Since emulators were around for a long time, the people who develop those got significantly better at developing emulators. Starting with the fifth generation consoles such as the Nintendo 64 or the Sony PlayStation and the sixth generation handhelds, such as the Nintendo Gameboy Advanced, the development of the emulators for those saw significant progress very early on. This caused a lot of the companies to try to shut down those emulator projects, but those had more of the opposite effect. Emulating as it is, is legal in most countries.