Did you know: High-end computers are actually slower than Apple IIe computers released 30 years ago

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In the technology world, new products are always introduced with superior strength compared to the old generations in terms of clock, multiplier, number of streams . But in a special parameter, our modern computer It is actually slower than the previous generation computer, which is the speed of computer interaction with commands from humans.

Dan Luu, a former computer engineer who worked at Google and Microsoft, said he felt the new devices didn't run as smoothly as the previous products. He tested a series of desktop devices launched in 1977 to recent computers and tablets.

The results show that modern computers have superior computing capabilities than before. For example: Apple IIe with MOS 6502 processor can implement 0.43 MIPS (million instructions per second - every second), Intel i7-7700k can implement 27,000 MIPS.

But in terms of computer response to human interaction, Apple IIe was born more than 30 years ago and is faster than any modern computer.

Luu used two cameras, one with a speed of 240 frames per second, the other one was 1000 frames per second to measure the computer's response time, from pressing a character on the keyboard until it appeared. on the terminal window. The results show that for 1 character to go to the screen, Apple IIe takes 30ms while

PowerSpec g405 with the new Intel i7 processor takes 200ms.

Máy tính	Độ trễ (ms)	Năm	clock	# T
apple 2e	30	1983	1 MHz	3.5k
ti 99/4a	40	1981	3 MHz	8k
custom haswell-e *165Hz*	50	2014	3.5 GHz	2G
commodore pet 4016	60	1977	1 MHz	3.5k
sgi indy	60	1993	.1 GHz	1.2M
custom haswell-e *120Hz*	60	2014	3.5 GHz	2G
thinkpad 13 **chromeos**	70	2017	2.3 GHz	1G
imac g4 **os 9**	70	2002	.8 GHz	11M
custom haswell-e *60Hz*	80	2014	3.5 GHz	2G
mac color classic	90	1993	16 MHz	273k
powerspec g405 **linux** *60Hz*	90	2017	4.2 GHz	2G
macbook pro 2014	100	2014	2.6 GHz	700M
thinkpad 13 **linux chroot**	100	2017	2.3 GHz	1G
lenovo x1 carbon 4g **linux**	110	2016	2.6 GHz	1G
imac g4 **os x**	120	2002	.8 GHz	11M
custom haswell-e *24Hz*	140	2014	3.5 GHz	2G
lenovo x1 carbon 4g **win**	150	2016	2.6 GHz	1G
next cube	150	1988	25 MHz	1.2M
powerspec g405 **linux**	170	2017	4.2 GHz	2G

Luu's test results on different computers.

From his testing, Luu discovered that the operating system and the scanning frequency (refresh rate) of the monitor significantly affected the speed of the computer's response.

For example, the frequency of scanning and displaying characters on the 24Hz screen Haswell-e processor takes 140ms, while on the 165Hz screen is 50ms.

With the operating system, new versions need to take multiple steps to enter a character. For example, with iOS, when pressing a character on the iPad, it needs to go through 11 steps.

Not only in iOS, all operating systems must support a wide range of devices. This makes Android devices Luu tested slower than iOS, and operating systems like Windows or MacOS X later on the same computer compared to Chrome OS, MacOS 9.

Thiết bi	Đô trễ (ms)	Năm
ipad pro 10.5" pencil	30	2017
ipad pro 10.5"	70	2017
iphone 4s	70	2011
iphone 6s	70	2015
iphone 3gs	70	2009
iphone x	80	2017
iphone 8	80	2017
iphone 7	80	2016
iphone 6	80	2014
gameboy color	80	1998
iphone 5	90	2012
blackberry q10	100	2013
huawei honor 8	110	2016
google pixel 2 xl	110	2017
galaxy s7	120	2016
galaxy note 3	120	2016
moto x	120	2013
nexus 5x	120	2015
oneplus 3t	130	2016
blackberry key one	130	2017
moto e (2g)	140	2015
moto g4 play	140	2017
moto g4 plus	140	2016
google pixel	140	2016

Detailed results of Luu's test on mobile devices.
But the latency of modern computers is not a terrible thing, it's a trade-off. Our computers now do more work than a computer 30 years ago even though they have higher latency.

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