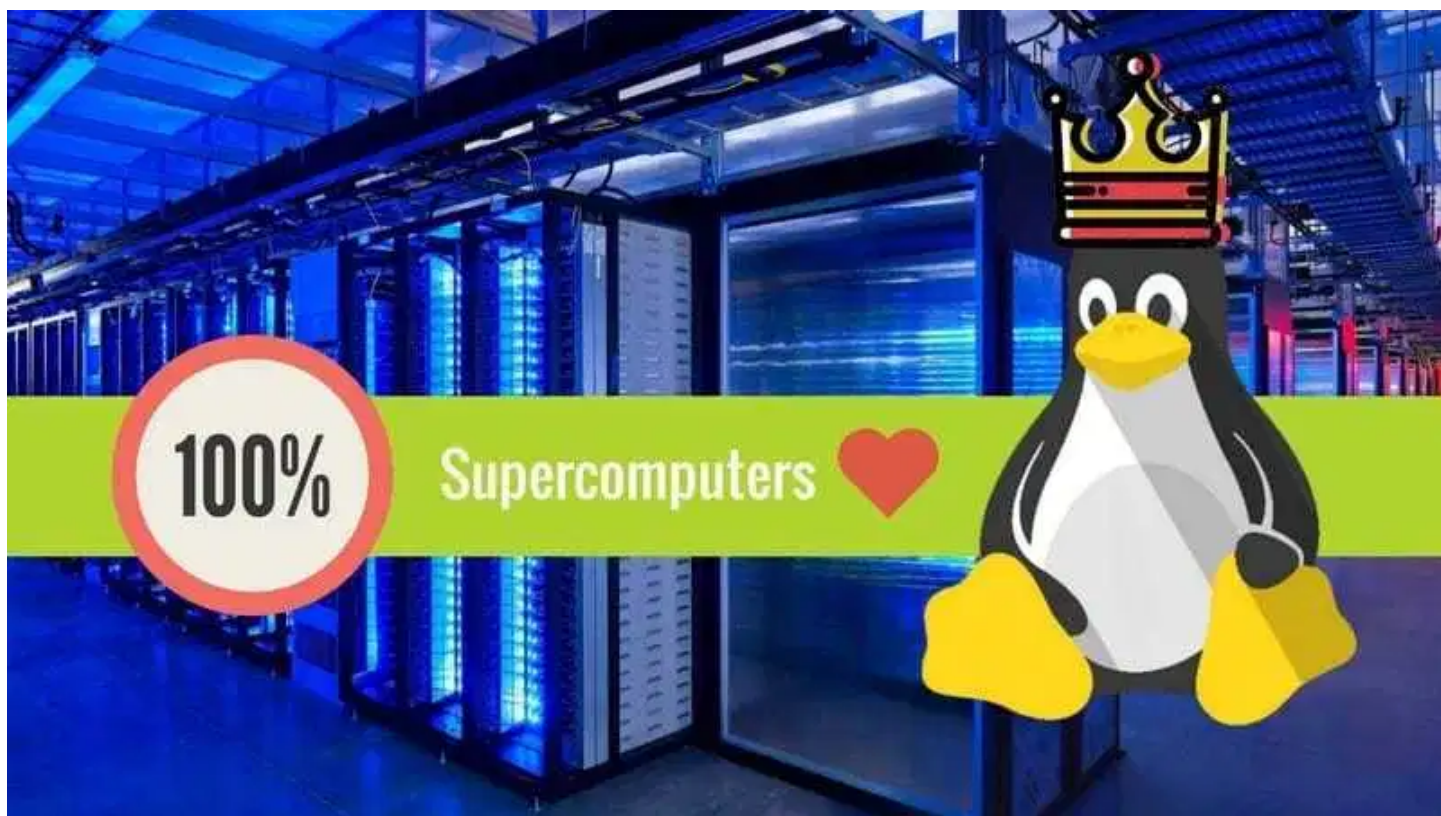


## It's FOSS

# Linux Runs on All of the Top 500 Supercomputers, Again!

Last updated October 1, 2020 By [Abhishek Prakash](https://itsfoss.com/author/abhishek/) (<https://itsfoss.com/author/abhishek/>).

Linux might be struggling for a decent desktop market share but it is definitely ruling the world of supercomputers. Linux is the supercomputer operating system by choice.



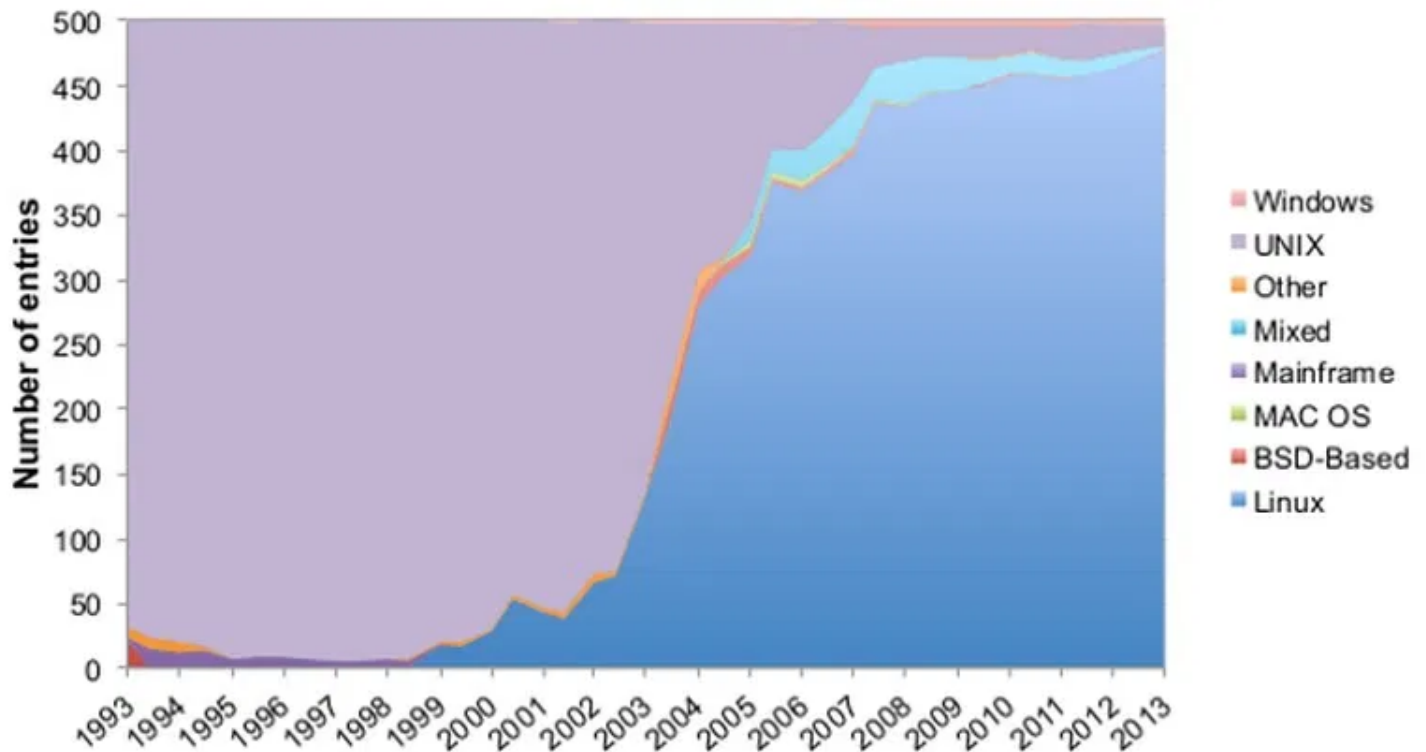
As per the [latest report from Top 500](https://www.top500.org/lists/2019/06/) (<https://www.top500.org/lists/2019/06/>), Linux now runs on all of the fastest 500 supercomputers in the world. The previous number was 498 as remaining two supercomputers ran Unix.

[Top500 \(https://www.top500.org/\)](https://www.top500.org/) is an independent project that was launched in 1993 to benchmark supercomputers. It publishes the details about the top 500 fastest supercomputers known to them, twice a year. You can go the website and [filter out the list \(https://www.top500.org/statistics/sublist/\)](https://www.top500.org/statistics/sublist/) based on various criteria such as country, OS type, vendors etc.

Don't worry. I am going to list some of the most interesting facts from this report. But before let's discuss why Linux is the preferred choice of an operating system for supercomputers.

## Linux rules supercomputers because of its open source nature

20 years back, most of the supercomputers ran Unix. But eventually, Linux took the lead and become the preferred choice of operating system for the supercomputers.



(<https://www.zdnet.com/article/20-great-years-of-linux-and-supercomputers/>)

*Growth of Linux on Supercomputers* Image credit: ZDNet

## Growth of Linux on Supercomputers: Image Credit: [primis]

The main reason for this growth is the open source (<https://itsfoss.com/what-is-foss/>) nature of Linux. Supercomputers are specific devices built for specific purposes. This requires a custom operating system optimized for those specific needs.

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Unix, being a closed source and propriety operating system, is an expensive deal when it comes to customization. Linux, on the other hand, is free and easier to customize. Engineering teams can easily customize a Linux-based operating system for each of the supercomputers.

However, I wonder why open source variants such as FreeBSD (<https://www.freebsd.org/>) failed to gain popularity on supercomputers.

To give you a year wise summary of Linux shares on the top 500 supercomputers:

- In 2012: 94%
- In 2013: 95%
- In 2014: 97%
- In 2015: 97.2%
- In 2016: 99.6%
- In 2017: 99.6%
- In 2018: 100%
- In 2019: 100%

United States of America has the top two fastest supercomputers thanks to IBM. China has the most number of supercomputers as it owns 219 out of top 500 supercomputers. The USA falls in second place with 116 entries in the top 500. Japan is in third place with 29, followed by France with 19, UK with 18 and Germany with 14. India and Saudi Arabia have 3 each while Russia has 2 supercomputers. Out of the top 10 fastest supercomputers, USA has 5, China has 2 while Japan, Germany and Switzerland have 1 each.

Rank	System	Cores	Rmax (TFlop/s)	Rpeak (TFlop/s)	Power (kW)
1	<b>Summit</b> - IBM Power System AC922, IBM POWER9 22C 3.07GHz, NVIDIA Volta GV100, Dual-rail Mellanox EDR Infiniband , IBM DOE/SC/Oak Ridge National Laboratory United States	2,414,592	148,600.0	200,794.9	10,096
2	<b>Sierra</b> - IBM Power System S922LC, IBM POWER9 22C 3.1GHz, NVIDIA Volta GV100, Dual-rail Mellanox EDR Infiniband , IBM / NVIDIA / Mellanox DOE/NNSA/LLNL United States	1,572,480	94,640.0	125,712.0	7,438
3	<b>Sunway TaihuLight</b> - Sunway MPP, Sunway SW26010 260C 1.45GHz, Sunway , NRCPC National Supercomputing Center in Wuxi China	10,649,600	93,014.6	125,435.9	15,371
4	<b>Tianhe-2A</b> - TH-IVB-FEP Cluster, Intel Xeon E5-2692v2 12C 2.2GHz, TH Express-2, Matrix-2000 , NUDT National Super Computer Center in Guangzhou China	4,981,760	61,444.5	100,678.7	18,482
5	<b>Frontera</b> - Dell C6420, Xeon Platinum 8280 28C 2.7GHz, Mellanox InfiniBand HDR , Dell EMC Texas Advanced Computing Center/Univ. of Texas United States	448,448	23,516.4	38,745.9	
6	<b>Piz Daint</b> - Cray XC50, Xeon E5-2690v3 12C 2.6GHz, Aries interconnect , NVIDIA Tesla P100 , Cray Inc. Swiss National Supercomputing Centre (CSCS) Switzerland	387,872	21,230.0	27,154.3	2,384
7	<b>Trinity</b> - Cray XC40, Xeon E5-2698v3 16C 2.3GHz, Intel Xeon Phi 7250 68C 1.4GHz, Aries interconnect , Cray Inc. DOE/NNSA/LANL/SNL United States	979,072	20,158.7	41,461.2	7,578
8	<b>AI Bridging Cloud Infrastructure (ABCI)</b> - PRIMERGY CX2570 M4, Xeon Gold 6148 20C 2.4GHz, NVIDIA Tesla V100 SXM2, Infiniband EDR , Fujitsu National Institute of Advanced Industrial Science and Technology (AIST) Japan	391,680	19,880.0	32,576.6	1,649
9	<b>SuperMUC-NG</b> - ThinkSystem SD650, Xeon Platinum 8174 24C 3.1GHz, Intel Omni-Path , Lenovo Leibniz Rechenzentrum Germany	305,856	19,476.6	26,873.9	
10	<b>Lassen</b> - IBM Power System S922LC, IBM POWER9 22C 3.1GHz, Dual-rail Mellanox EDR Infiniband, NVIDIA Tesla V100 , IBM / NVIDIA / Mellanox DOE/NNSA/LLNL United States	288,288	18,200.0	23,047.2	