

# Visualizing Trends in Supercomputing

<http://www.bhaugen.com/vis/top500vis.html>

## Data:

The Top 500 list has been compiled every June & November since 1993. This means that there are 42 lists with 500 computers on each list or 21,000 data points. It shows the growth of supercomputing and many industry trends. (Available at <http://www.top500.org/>) The CPUDb project aims to form a database of many CPUs and their characteristics. (Available at <http://cpudb.stanford.edu/>)

## Visualization:

The visualization allows users to select two plots to view on the main page. The time axis are lined up in order to allow the users to make side by side comparisons of two data sets.

## Technology:

The visualization was implemented in Javascript and makes extensive use of the D3 Javascript library. The molecular dynamics simulation also makes use of CoffeeScript, three.js, and jQuery.

## Components:

**Performance** – This is the plot that shows how the performance of supercomputers has grown over the last 20 years.

**Simulation** – This is a sample supercomputing research problem (to scale) that illustrates the changing computational performance capabilities over the past two decades. The nature of the problem is a physically accurate molecular dynamics simulation.

**Cores** – This plot shows that the number of cores in supercomputers has grown quickly especially since 2004.

**Segments** – This plot shows that not all supercomputers reside at major universities and government-run research labs.

**Country** – There are many countries represented on the Top 500 list. While the United States still leads the way, China has grown very quickly in the last few years.

**Architecture** – This shows how the architecture of supercomputers has gone from single processors and massive vector computers to massively parallel processors and cluster computing.

**CPU Frequency** – The clock frequency of CPUs grew rapidly until 2004 when manufacturers began to design and build multicore CPUs.

**Operating System** – The market for operating systems in the HPC community was very fragmented 20 years ago, but Linux has become a major player in the HPC community.

**Accelerators** – There has been a lot of hype surrounding accelerators but the numbers show that this is a trend that hasn't taken over the supercomputing industry just yet.