C.5 Supercomputers

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About

A **Supercomputer**[1] is a computer performing at or near the current highest operational rate for computers. Traditionally, supercomputers have been used for scientific and engineering applications: to handle very large databases, or to do a great amount of computation, or both. Although advances such as Multi-core Processor and General-Purpose Graphics Processing Unit (GPGPU) have enabled powerful machines for personal use (see: desktop supercomputer, GPU supercomputer), by definition, a supercomputer is exceptional in terms of performance.

According to Rouse[2], at any given time, there are a few well-publicized supercomputers that operate at extremely high speeds relative to all other computers. The term is also sometimes applied to far slower (but still impressively fast) computers. The largest, most powerful supercomputers are really multiple computers that perform Parallel Processing. In general, there are two parallel processing approaches: Symmetric Multiprocessing (SMP) and Massively Parallel Processing (MPP).

Rouse[3] reports that as of June 2016, the fastest supercomputer in the world was the Sunway TaihuLight, in the city of Wixu in China. A few statistics on TaihuLight:

- 40,960 64-bit, RISC processors with 260 cores each.
- Peak performance of 125 petaflops (quadrillion floating point operations per second).
- 32GB DDR3 memory per computer node, 1.3 PB memory in total.
- Linux-based Sunway Raise Operating System (OS).

Some of the uses for supercomputers are[4]:

- Recreating the Big Bang
- Understanding Earthquakes
- Folding proteins
- Mapping the blood stream
- Modeling swine flu
- Testing nuclear weapons
- Forecasting hurricanes
- Building Brains

More recently, supercomputers have been used to model how the Coronavirus spreads.[5]

DIDO Specifics

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To be added/expanded in future revisions of the DIDO RA

[1] [2] [3]
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Rouse, Margret; Definition of supercomputer, WhatIs.com, Accessed 8 December 2020, https://whatis.techtarget.com/definition/supercomputer

[4]
Pappas, Stephanie; 9 Super-Cool Uses for Supercomputers, livescience.com, 30 April 2010, Accessed 8 November 2020, https://www.livescience.com/6392-9-super-cool-supercomputers.html

[5]
Kelleher, Suzanne Rowan; Japanese Supercomputer Shows How Coronavirus Spreads In A Dining Setting, Forbes, 19 October 2020, Accessed 8 December 2020, https://www.forbes.com/sites/suzannerowankelleher/2020/10/19/viral-video-japanese-supercomputer-shows-how-coronavirus-spreads-in-a-dining-setting/?sh=57971027333f