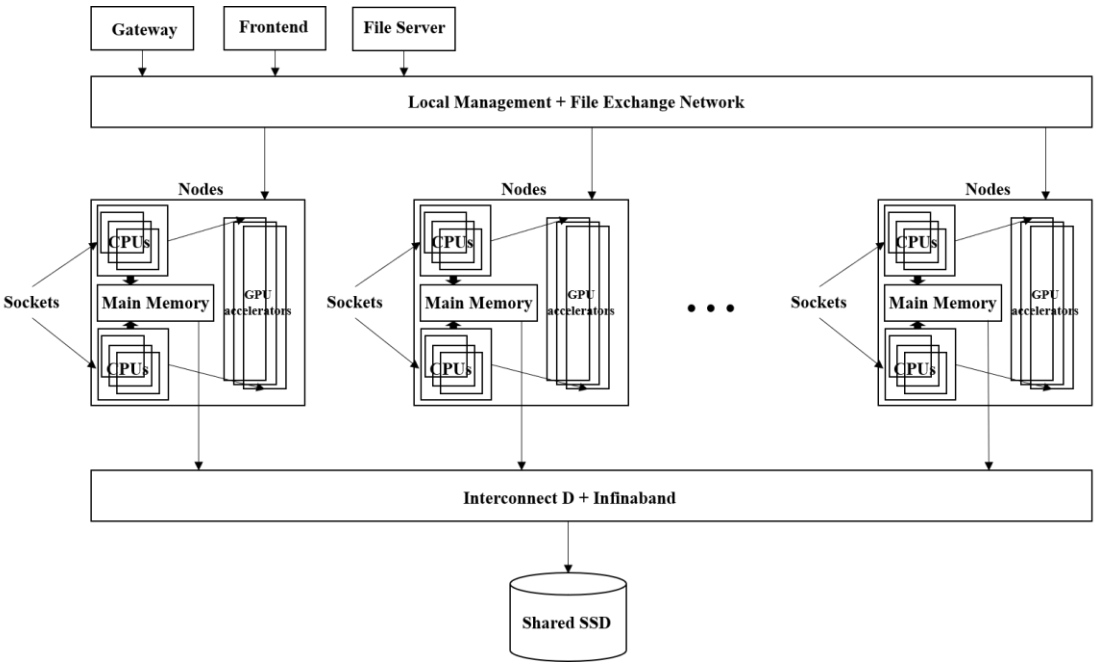
Find the current listing (58th) for the Top500 list for November 2021. Review the system architecture for each of the top 10 systems on the list. Provide a summary of trends that you find and discuss what kind of system you would design in the future so that it could be included in this impressive list. Make sure to provide a diagram of the architecture you would develop, and include details of the CPUs, memory and interconnect used.
*Answers to this question should be included in your homework 1 write-up in pdf format.

Trends: 1) More and more processor cores and number of cores per socket. No.1 Fugaku has 7630848 processor cores, No.2 Summit has 2414592 processor cores, No.4 Sunway TaihuLight and No.7 TH-2 have 10649600 and 4981760 cores respectively. In the list a year ago, there were only a maximum of 28 cores per slot, and now there are eight systems with 32 cores and more on the list. It is known that in the development of supercomputing, it is too difficult to increase the frequency, and the increase in computing power depends mainly on constructing more cores. Multi-core systems are more scalable and can pack more processing power into a slimmer form factor that uses less power and generates less heat for computing power. 2) Intel processors still dominate, but AMD processors begin to display their talent. Fugaku, using several 48-core ARM chips, tops the list, which highlights the potential of ARM architecture in the field of high performance computing. 3) High number of systems with GPU accelerators and more "NVIDIA". Of the 500 systems on this list, there are 102 computing accelerated systems, 85 of which are GPU accelerated, 10 with Intel Xeon Fusion Core acceleration, 2 Intel + GPU accelerated, and 5 others.

System design: In summary, I would follow these above three trends in designing a super-computer system architecture.
CPUs:
1) higher number of multicore AMD CPUs per node.
2) higher number of NVIDIA GPU accelerators per node.
3) Non-Uniform Memory Access.
Memeory:
1) HBM2 32 GiB/node.
2) 2 TB NVMe SSD/16 nodes (L1) 150 PB shared Lustre FS (L2) and Cloud storage services (L3)
Interconnect:
1) High dimensional mesh/torus network
2) Infinaband
3) Interconnect D


Gateway
Frontend
File Server
Local Management + File Exchange Network
Nodes
Nodes
Nodes
Sockets
Sockets
Sockets
CPUs
Main Memory
CPUs
GPU accelerators
CPUs
Main Memory
CPUs
GPU accelerators
CPUs
Main Memory
CPUs
GPU accelerators
Interconnect D + Infinaband
Shared SSD