Selene

Ranked 9th in Top 500 Super Computer in June 2023

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Assignment1
Parallel Processing
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Selene was manufactured by the technology giant Nvidia. It comprises of 555,520 crores, pulsating with computatonal energy. Its core lies the AMD EPYC 7742 processor, a true powerhouse featuring 64 cores, each of which is clocked at 2.25GHz.

A super highway of data is created and interconnected using the Mellanox HDR infiniband which is harnessed by Selene Using this interconnect, a very rapid and seamless communication is enabled between Selene's vast array of computing cores and hence enables seamless collaboration of its components.

The real wonder of Selene lies in its performance. With a Linpack Performance(Rmax) of 63.46 PFlop/s, it gas the ability to perform billions and billions of calculations per second. It has a Theoretical Peak(Rpeak) of 79.22 PFlop/s demonstrating its huge processing power that can be achieved if tested under optimal conditions. It also has flexed its compuptaional muscles in the High-performance conjugate gradients(HPCG) benchmark, achieving a remarkable 1.622.51 TPlops/s.

If Selene is allowed to operate in its full capacity then it can consume up to 2,646.00 kilowatts of power. So for such a machine requires equivalent energy supply. Therefore its consumption

is carefully managed and optimized so that a balance is maintained between it performance and environment impact.

Selene is operated on the robut Ubuntu 20.04.1 LTS operating system. Its software stack includes the NVIDIA NVCC and Intel Composer 2020.0.1666 compilers that enables efficient programming and optimization. Its Math library comprises of NVIDIA CUDA V11.0.148 and Intel MKL 2020.1.1666 which offers such a rich set of mathematical functions. The MPI framework of Selene is supported by OpenMPI 4.0.3 and it facilitates parallel computing and inter-process communication.

After its installation in the year 2020, its impressive performance has gone unnoticed and it continues to compete with the world most powerful supercomputers. In the June 2023 top 500 list, it was able to have its place in the 9th rank, showcasing its exceptional computation power and consistency in its ranking delivers the unwavering power of reliability of Selene.

Selene, being a part of NVIDIA DGX SuperPOD, is a massive infrastructure which is designed for artificial Intelligence research and development. Selene contains several NVIDiA A100 GPUs. It is specifically optimized so that it can handle complex deep learning workloads. This allows Selene to handle complex neural network training and inference tasks a high speed and scalability. It also severs as research and development platform for NVIDIA and provides a testing ground for exploring new technologies, software optimizations, and algorithms to advance the field of AI and high performance Computing.

Due to the advancement of the technology, Selene is likely to undergo updates and improvements. NVIDIA remains at the forefront of AI and HPC innovations, and in future Selene may incoperate newer processors, interconnected technologies, and software optimizations so that the performance and capabilities of supercomputer can be enhanced.