Paper Review

"TOSS-2020: A Commodity Software Stack for HPC"

1. Summary

TOSS is a commodity software stack for HPC. It is verified and a package for RedHat Operating System, a Linux distribution. TOSS contains software such as slurm, mpi, and Mellanox IB driver. Some RedHat packages were rebuilt, and some were optimized (such as the Linux kernel). The essential advantage is that it can use technologies of modern operating systems for HPC applications. From the benchmark authors did, including mpi, CPU cores utilization, and system noise, TOSS can slightly advantage over IBM customization systems. The advantage is slight from my perspective that no order of magnitude advantage except OpenMPI to Spectrum MPI.

The TOSS to other applications is as Ubuntu Kylin to Ubuntu. HPCs usually use a specific version of packages from it was built and seldom upgrade. It has advantages in using the latest driver, patches, and kernels with insurance by TOSS verification. Like stability verification done by Ubuntu Kylin, TOSS can ensure that these software packages work fine with optimization. Related projects can either not be supported by RedHat, which loses system stability, or runs on specific platforms. TOSS can enjoy advantages from both free software and commodity insurance.

The latest and stable software packages are essential in HPC works. Security patches and Glibc patches are essential for HPC applications to run. Modern software can provide efficiency for the programmer. Moreover, the latest driver can use peripheral equipment such as GPU and IB cards since they can provide optimization and a new interface. Our HPC now runs Ubuntu 20.04 server, whose stability was guaranteed by canonical, and added the latest package source from Nvidia and Mellanox.

2. Advantages

+ Using the latest software packages and Linux kernels in HPC systems are modern and efficient. Modern Linux is good, so TOSS is good too.
+ Provide visual performance compared to old and original HPC systems.
+ Easy to use with proper Software Use Agreement and migrate on RedHat.
+ TOSS did complete tests for packages, which in my opinion, is its main contribution since the improvement was brought by software packages instead of TOSS itself.

3. Disadvantages

– RedHat and packages source did
– Most work, and TOSS was doing more jobs as copying.
– TOSS was tied with RedHat, a relatively close Linux distribution.
– I think the patches and optimization of each generation of Linux kernel will meet problems when applying to a new generation of Linux kernel. Google once modified its kernel on Linux and package sources, later found a tough job merging these changes when a new Linux kernel was published.

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