FACULTY OF COMPUTER SCIENCE
UNIVERSITAS INDONESIA

Implementation of HPC Resource Management Portal with Load Balancer and Job Scheduler based on High Throughput Condor

Dennis Pratama Kammah, Ari Wibisono, and Heru Suhartanto

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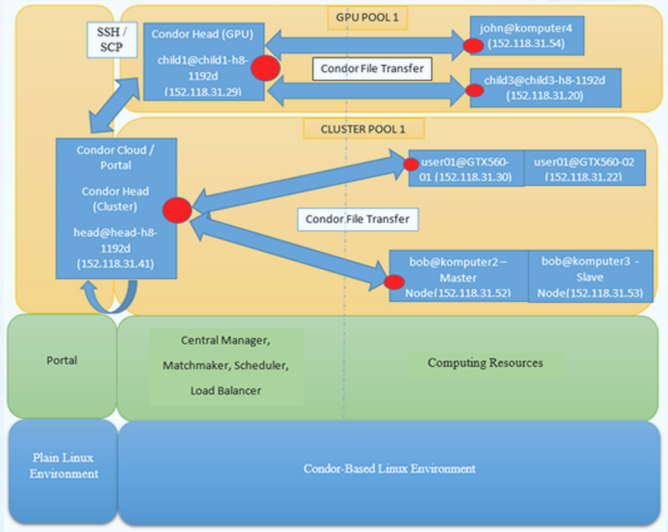
Abstract

This study focuses on providing a portal for setting up a number of HPC machine resources in running multiple experiments. In this case, High Throughput Condor serves act as a load balancer, job scheduler, and center workload manager in organizing and submitting loads and jobs on GPU and cluster machines. The research method starts from the design of the system, implementation of the system, and testing the application. The result of this research is a portal implementation based on HTC which gives ease and convenience to user to do experiment along with job in it. The simulation test resulted that file integrity is maintained, and load balancing feature and job scheduling can manage the workload of the existing resource engine properly and schedule the job efficiently both in cluster and GPU environment.

System Design



Portal and Environments

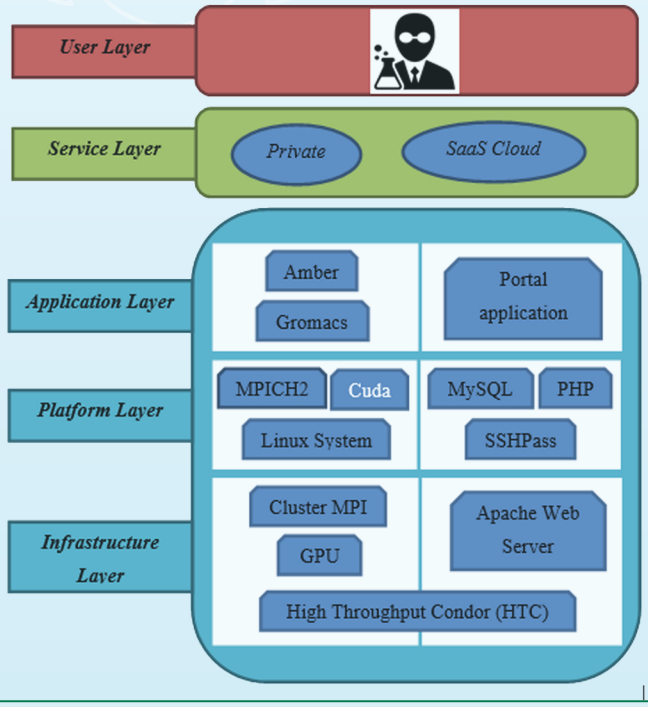
Execution time comparison

Experiment environments	Pool	Number of Jobs	Value of steps	Average Execution time
Portal	GPU	10 *Job*	8000 *nsteps*	0 hours, 8 minutes, 29 seconds
Direct Access to Machine				1 hours, 47 minutes, 32 seconds
Portal	Cluster	7 *Job*	2000 *nsteps*	0 hours, 7 minutes, 14 seconds
Direct Access to Machine				0 hours, 16 minutes, 25 seconds

File integrity evaluation

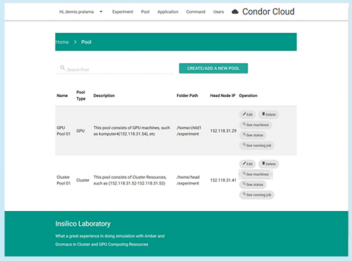
Experiment environments	Pools	*File*	SHA-1 hash file integrity	File size
Portal	GPU	em.tpr	178fa911241bbcdacfa4a704a25a9477b43a9db5	1128784 bytes
Head Node				
Direct access to machine				
Portal		pr.tpr	f8a3ae60602719d5f0190180a02af04afa7919c7	1355340 bytes
Head Node				
Direct access to machine				
Portal	Cluster	em.tpr	fefe48325375498c36421ce163b9a48195e35ca8	1128784 bytes
Head Node				
Direct access to machine				
Portal		pr.tpr	4d52c14193677196e6b06943addecdb876bbd568	1355340 bytes
Head Node				
Direct access to				

System Layers

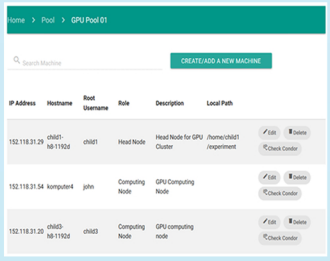


Functionalities

Pools Management



Resources Management



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