Cybermedia Center

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SC16 BOOTH 1437

Hi-IaaS : High Performance Computing Infrastructure as a Service

Hi-IaaS

Software defined HPC platform covering applications of IoT/BigData and Science
Providing diversity of HPC Platform dynamically
Hardware (GPU/FPGA, Cluster) Software (SPARK, MPI)

Back Ground

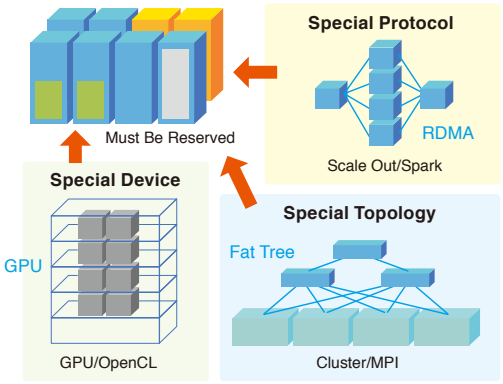
HPC computing platform going into cloud. however HPC computing platform needs application specific configuration
Ex. #GPU, #FPGA, InfiniBand, FatTree

Features

Job-resource cross management system
Job management over Accelerators(GPU/FPGA)
Shared NVM+PCIe fabric based scalable High-speed storage
PCIe device level reconfiguration

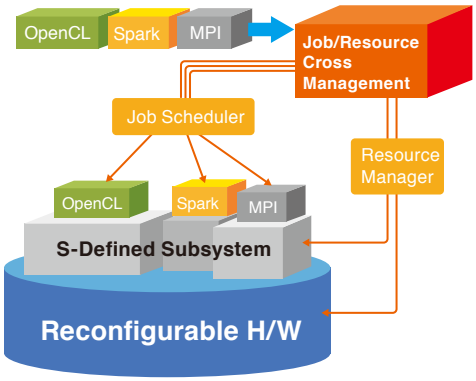
Today : Special/Static

Expensive, not fit, low utility

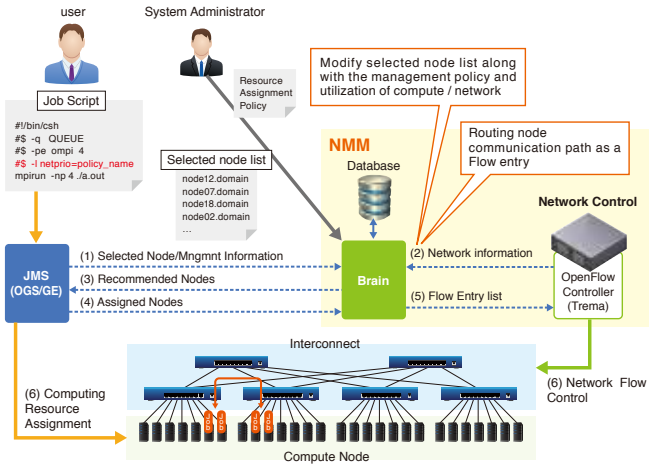


Proposal : Open/Dynamic

Reasonable, scale up, high utility

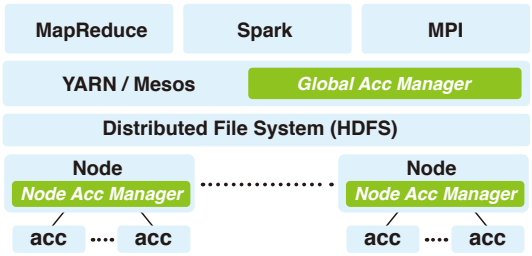


SDN-Enhanced Job Management System with Nara Institute of Science and Technology (NAIST)



Job / Accelerator Management with UCLA and Falcon Computing Solutions

Global Accelerator Manager : Global resource allocation within a cluster to optimize system throughput and accelerator utilization
Node Accelerator Manager : Accelerator sharing/isolation across applications using accelerator-as-a-service



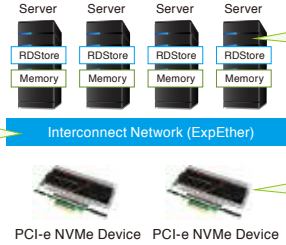
Resource Disaggregated data Store (RDStore) with NEC

Scalable Key-Value store (NOSQL) on Resource Disaggregated Architecture

- Communication among servers degrades performance such as storage capsyty and access latency.
- Proposal:
  - Light-weight software defined storage system with technologies enhancing data access and management
  - Sharing NVMe storage devices among server nodes at interconnection level (ExpEther)

2. Data distribution and redundancy technology

- Apply distributed system technology to the resource disaggregated architecture
- Enhancing performance, scalability and availability



1. Data base (KVS) technology

- Decrease data access to the disaggregated storage devices by using hash data base technology
- Decrease usage of memory by making server stateless

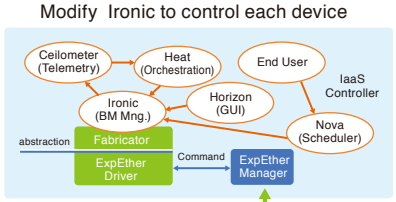
3. New Non Volatile Memory

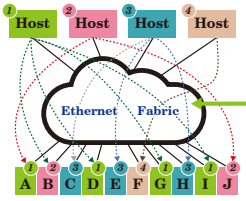
- Implement compare and write function along with NVMe Rev1.1 specification.
- Decrease exclusive communications between servers

OpenStack based Resource Management of Disaggregated Platform

Modify Ironic (Bare metal control) to device level.

Modify Ironic to control each device





GUI on modified Horizon

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