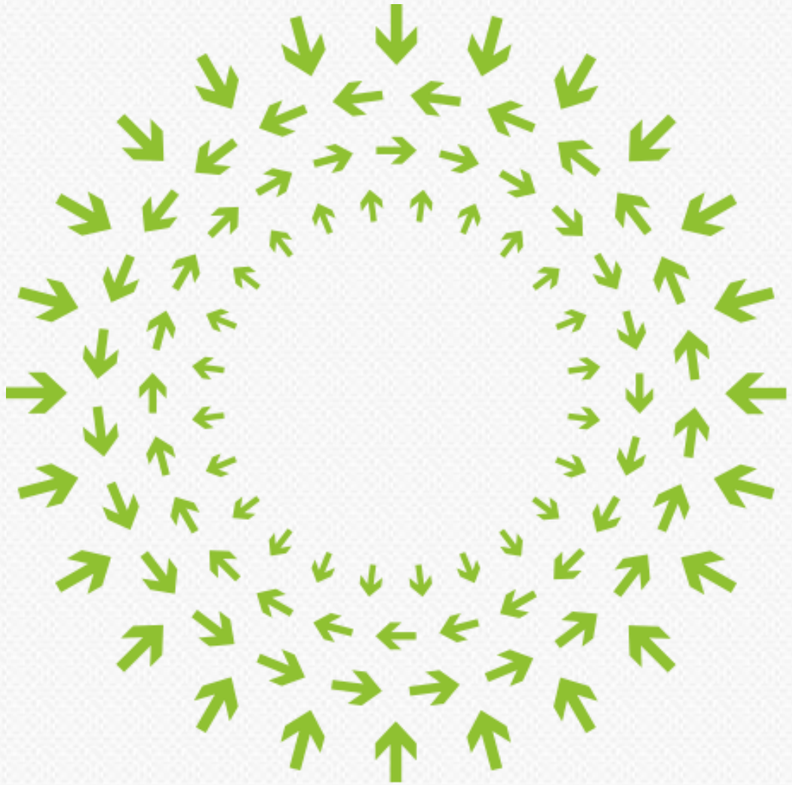

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Compute Engineering Workshop

March 9, 2015

San Jose

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OCS Quad Server System

Preview

Bruce Smith

Microsoft

Principal Hardware Architect

1S Server

New OCP Format for 1S Servers

Facebook & Microsoft Collaboration

Presentation on Wednesday @ 1pm

Specification Under Review - OCP 1S Server Design Specification - 0.3

Quad Server System

Leverage OCP 1S Node Specification

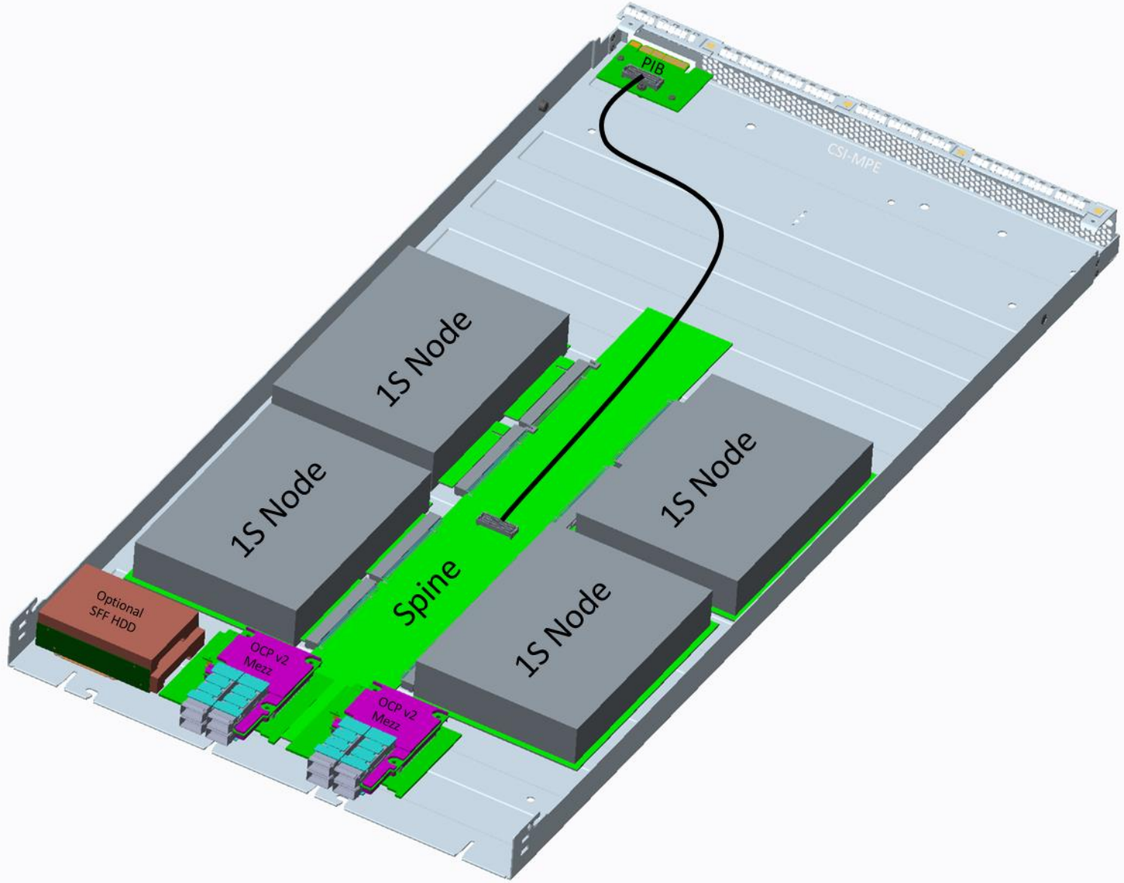
- Four 1S Nodes per OCS Tray
- Robust SoC Support, ~150W Power envelope
- ISA agnostic
- Consistent Node management interface
  - I2C for OOB Management
  - Serial Console

Power Interface Board

- Distributes +12V from 6 x 1600W OCS Power Supplies
- Provides Tray to Chassis Manager connection

OCPv2 Communications Mezzanine card support

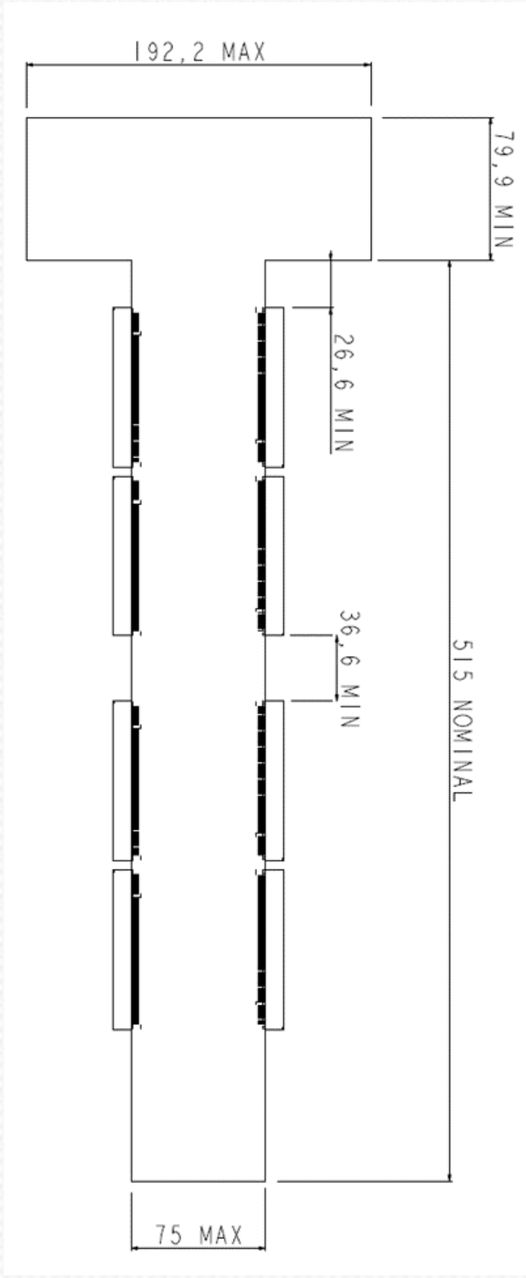
Spine ties the 1S Nodes, PIB & Mezz Cards together



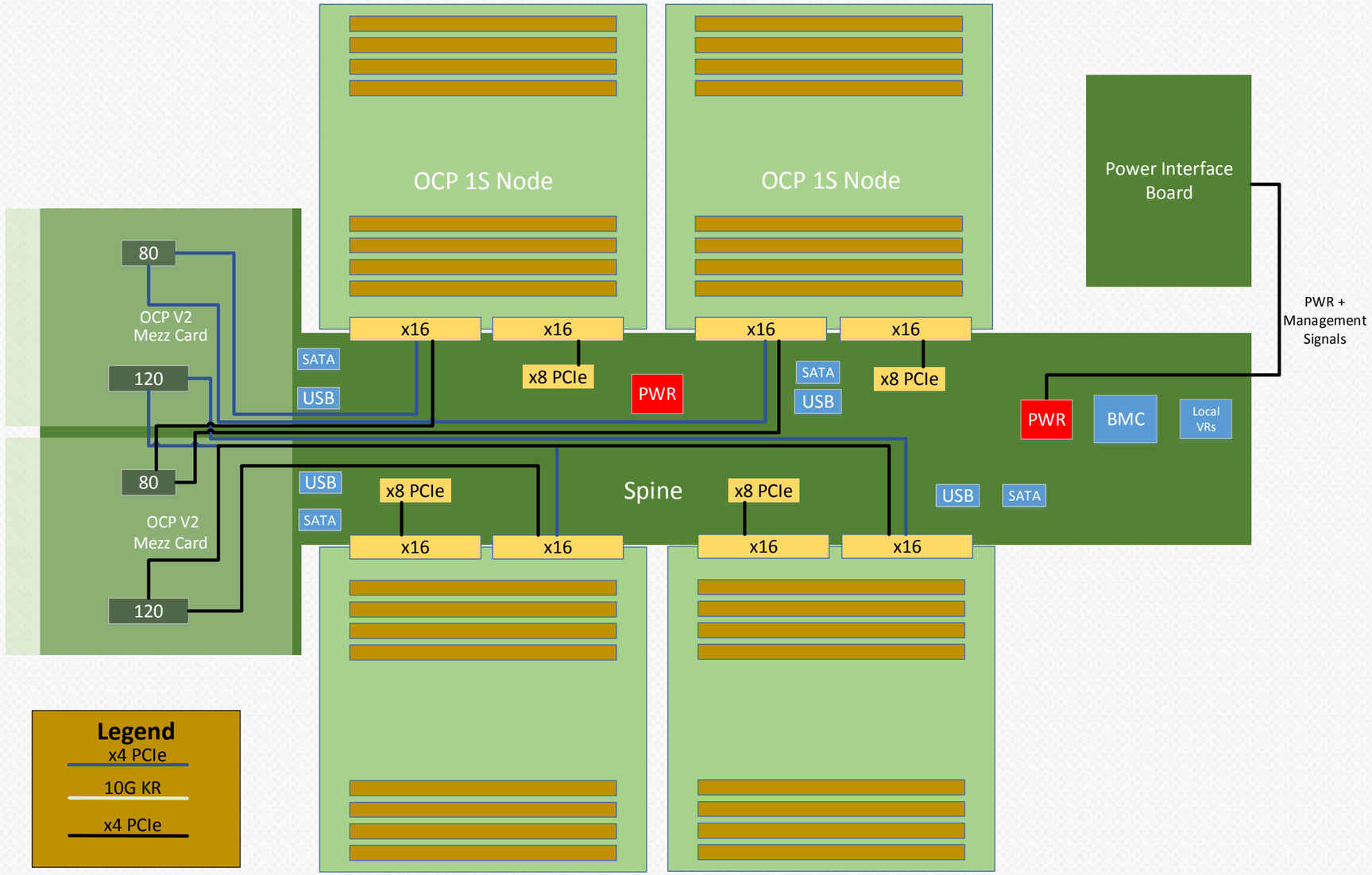
Spine Features

Quad Server Tray Component Interconnect Board

- Supports four 1S Nodes per OCS Tray
- Supports two OCPv2 Mezzanine cards for external connectivity
- Supports a PCIe Gen3 x8 connector per Node
  - Production use of up to two Cloud SSDs per Node
- Additional Connectors per 1S Node for Debug – USB & SATA
- Tray BMC
  - Manages Nodes – I2C, Serial Console & Controls
  - Ensures Nodes and I/O Match via ID/Capability bit comparisons
  - Monitors ambient temperature
  - Provides LED indicators for health @ a glance
  - Monitors Tray and 1S Node level power consumption
    - Enforces 1S Node Power Capping
  - Communicates with Chassis Manager via established OCS protocols



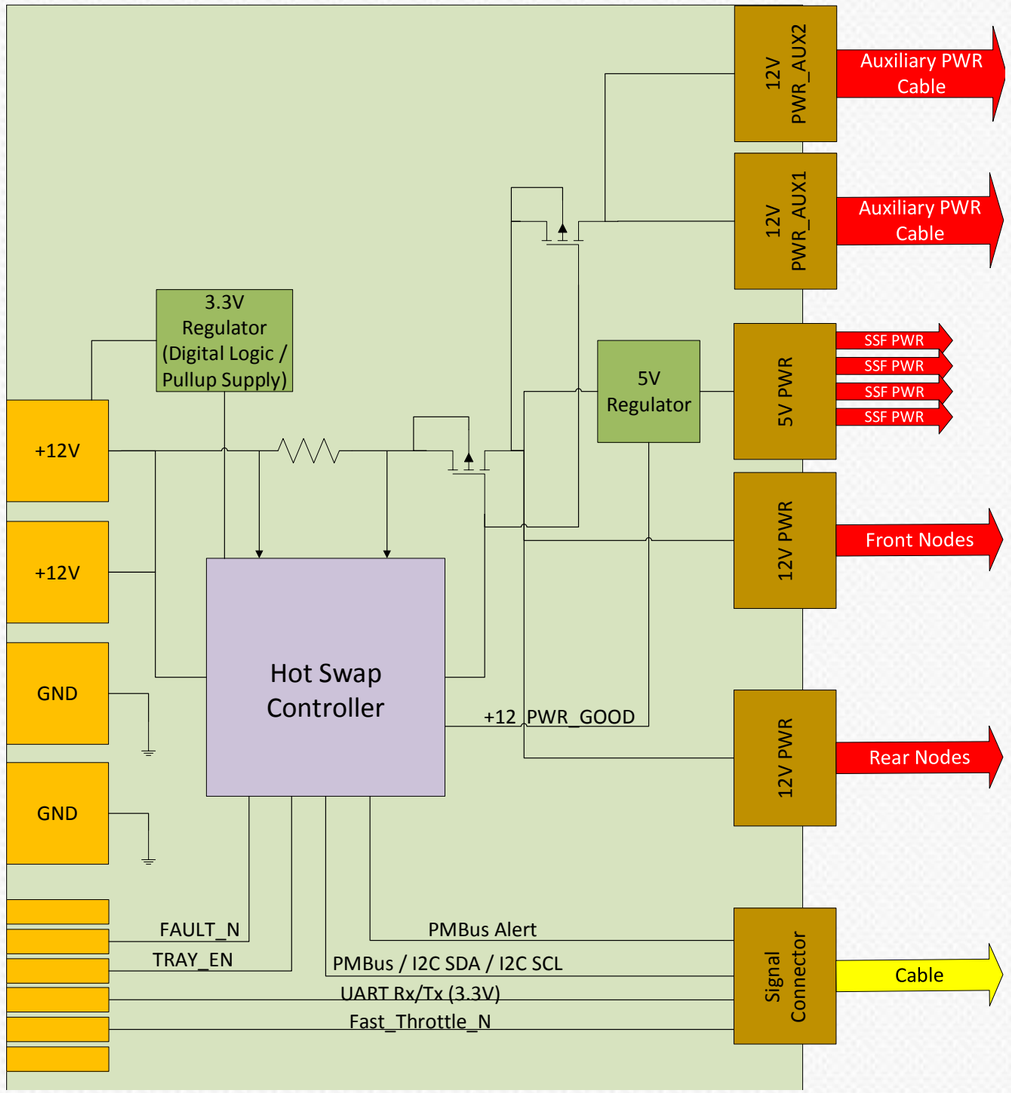
Spine Block Diagram



Power Interface Board

Hot Swap Controller And Power Connectors

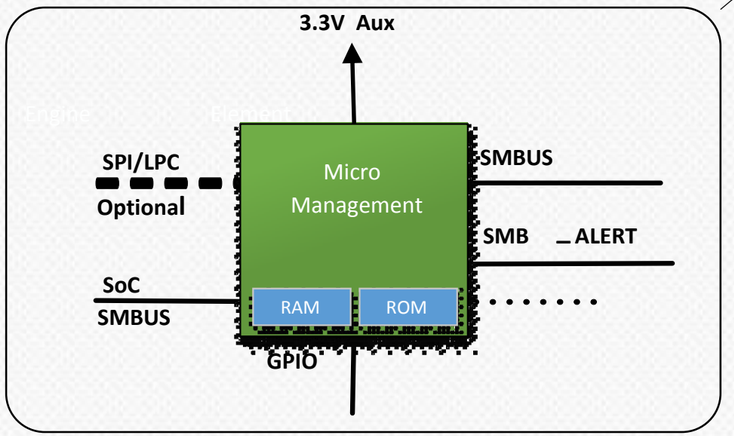
- Supports live insertion/extraction of trays
- Enables Tray level power monitoring and fault detection
- Pass thru for Chassis Manager Controls to Spine
  - On/Off, Serial, Fast Throttle
- Bulk +12V Connectors
  - Pair of connectors for the Spine
  - Additional connectors for I/O or higher wattage 1S Nodes
- Local VR for disk drives, mainly for Dev support

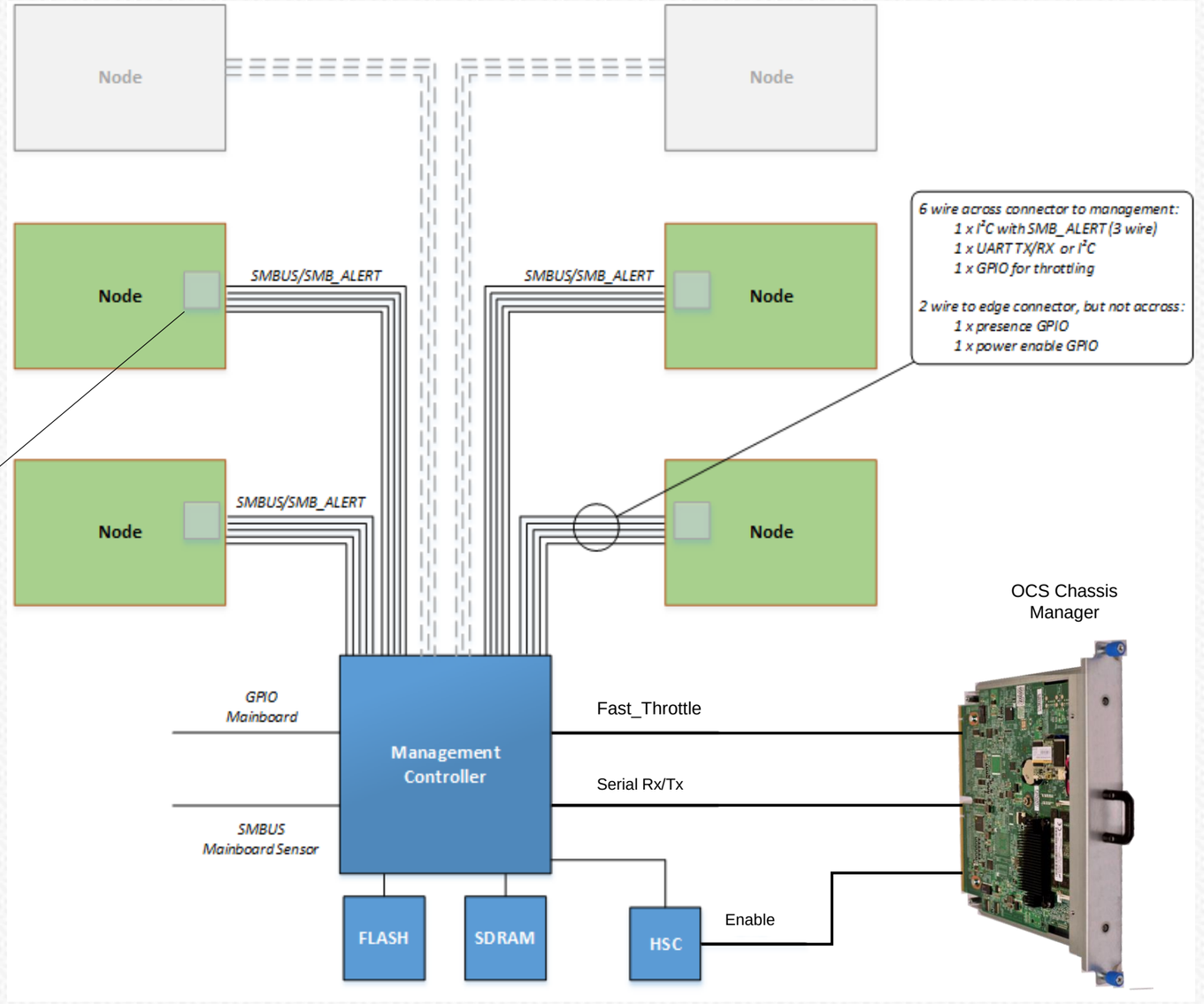


Quad Server Tray Management

OCS Multi Node Software

- Single Management Controller per Tray
- Micro Management Element per Node
- Interface between Tray MC and MME
  - I2C w/Alert
  - Serial Rx/Tx
  - On/Off, Fast Throttle





Typical 1S Node Features

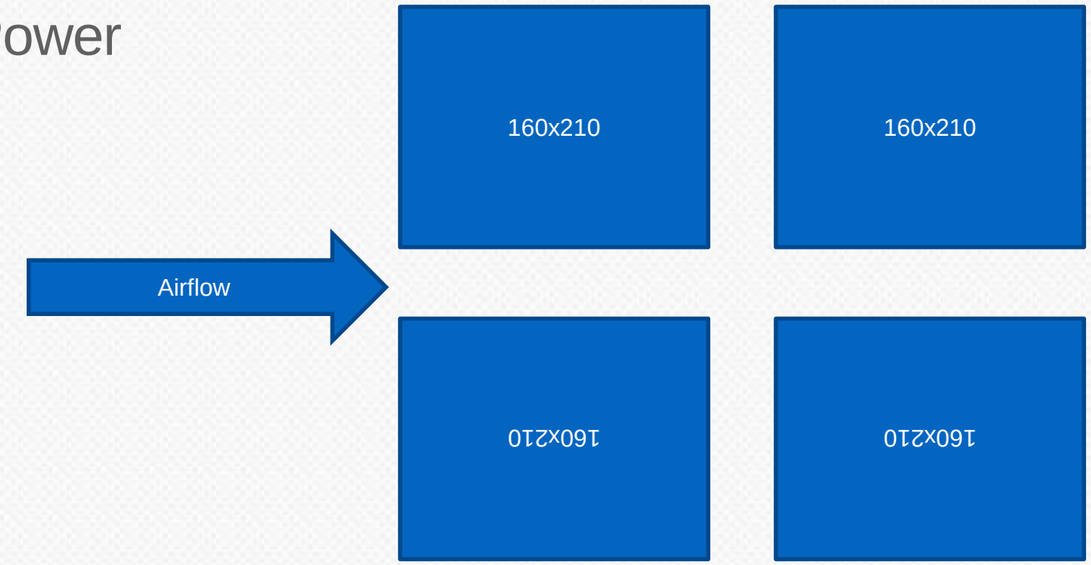
Leverage OCP 1S Node Specification

- Up to 100W TDP SoCs, expect ~150W total node Power
- Local VRs from switched & monitored +12V
  - 5W 3.3V AUX for local BMC/Bridge
- 4 – 8 RDIMMs w/ECC
- 110mm M.2 SSD
  - Common w/OCS Servers
  - Enhanced Temperature Specs
- Support for 4 PCIe Gen3 x4 interfaces
  - Communications via OCPv2 Mezzanine cards
  - Additional M.2s, 2 per 1S Node
  - Supports additional I/O for system debug

1S Node

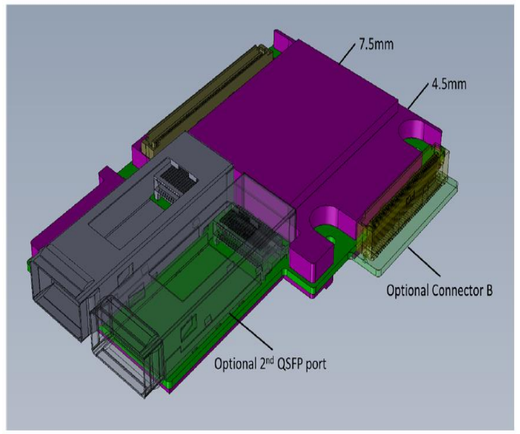
Design Considerations

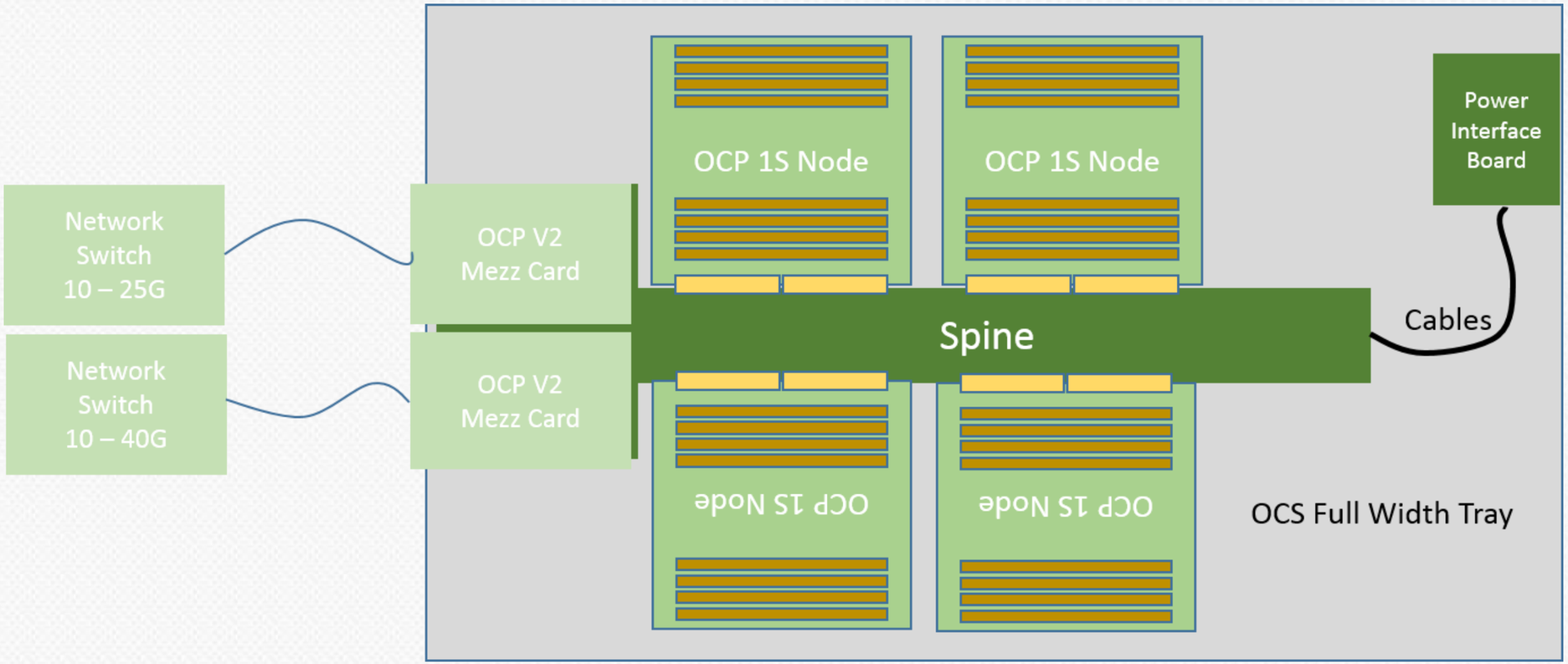
- Up to 100W TDP SoCs, expect ~150W total node Power
- Thermal management
  - ~60CFM/tray
  - 85C Cloud SSDs
  - Air baffle design Assumed
- Power
  - Spine HSC w/On/Off support controlled by Spine BMC
  - +3.3V AUX @5W max for 1S Node BMC …
- Follow mechanical drawing in 1S Node Specification
  - Similar Z restrictions, top & bottom, as a 1U server
- High Speed Routing
  - Rear node to OCPv2 Mezz Card trace length – modeling in progress



Quad Server Tray Networking

Flexible options w/OCPv2 Mezz Cards

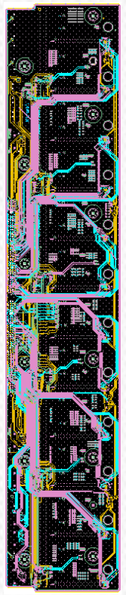




Comprehensive Quad Server Tray Contribution - Target Fall 2015

Open Source Code

Chassis management
Operations Toolkit
Interoperability Toolkit



Board Files & Gerbers

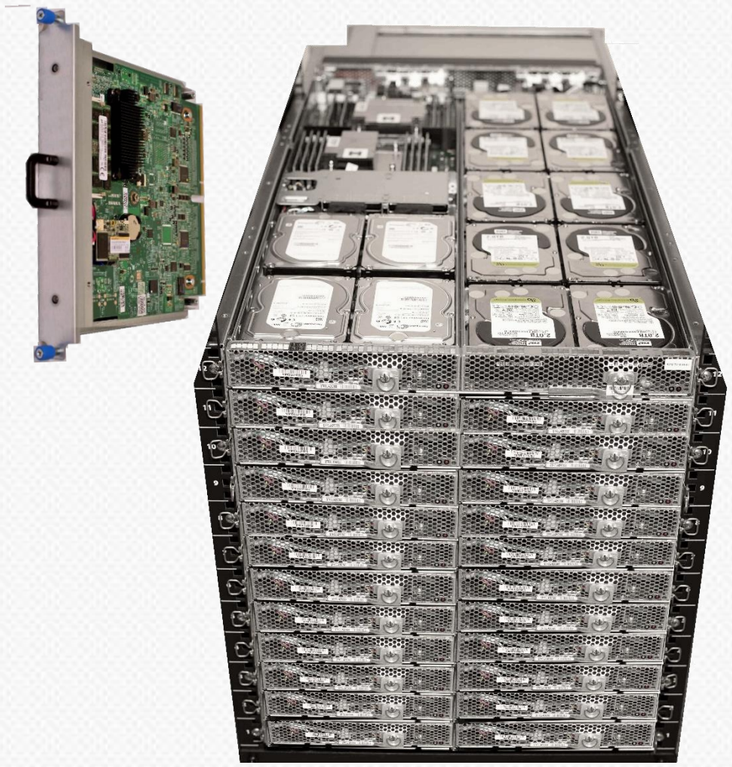
Power Interface Board
Spine

Specifications

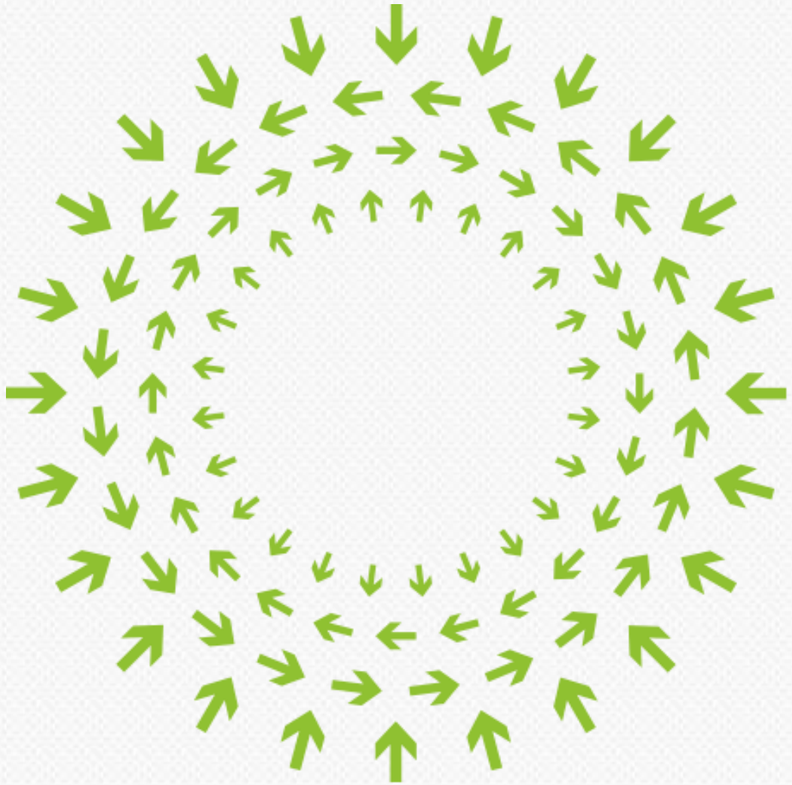
1S Tray & Components
Management APIs
Certification Requirements

Mechanical CAD Models

1S tray, Spine, PIB



Q&A



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