Motherboard Goals

Optimized for Microsoft Partners
- One motherboard for all platforms
- Enable flexibility for future technologies
- Optimize for data center support

Optimized for OCP Partners
- Incorporate feedback from OCP partners
- Enable OCP technology

Cost Reduction across full lifecycle
- Lower solution costs
Server Assembly

- Blind mate to PMDU
- (6) N+2 Fans (non hot-swap)
- Up to 2 SATA Devices
- Optional Remote Heatsink for high wattage CPUs
- Up to (8) M.2 NVMe SSDs
- Dual 3Φ PSU with Battery
- DDR4 DIMMs
- Next Gen CPUs
- Up to (3) FHHL PCIe x16 Cards
- Universal Motherboard
- 50G Networking
- 945 mm
- 441 mm
Server and Motherboard Dimensions

- 945mm
- 441mm
- 431mm
- 404mm

Latch features can be obtained from 3D model. Latch features must keep the blade engaged to the PMDU through all environmental requirements.

T-nut geometry can be obtained from 3D model. Pull out force >50lbs required, per nut.

PSU mounting features and location can be obtained from 3D model. PSU-blade interface is critical to blind mate to PMDU.
Front Panel

- PCIe Slot #5
- PCIe Slot #4
- USB3.0
- PCIe Slot #3
- Latch
- VGA
- Management 1GbE
- Pwr Status
- UID
- Attention
- Latch
Rear Panel

FANs 1-6

Perforation for PSU Fans

PSU FCI Connector
OCP Support

Changes driven by OCP Feedback from March 2016 Summit
• Management support for VGA and NCSI via BOM population changes
  • ASPEED BMC AST2400 with PCIe x1
  • VGA and NCSI cable connectors
  • Support verified and consistent with Facebook servers
• Creation of NIC Mezz Adapter with NCSI cable header

OCP Collaboration – Quad M.2 Carrier
• Supports 4 M.2s (per carrier)
• Enables configuration with up to 16 M.2s in 1U
  • 16TB NVMe flash today, soon 32TB or more

https://github.com/opencomputeproject/Project_Olympus
System Block Diagram

Processors
- Up to 2 CPUs

Memory
- Up to 32 DIMMs
SATA Storage

Support for up to 12 SATA Storage Devices
- 4 x 1 SATA Connectors
- 8 SATA via 2 x 4 Mini-SAS HD Connectors

Typical Use Case
- 2 or less SATA storage devices in 1U
- 2U Expansion for up to 12 devices
- x8 Expansion (SATA/PCIe)
PCIE

Slots 1/2
- Supports PCIe x8 M.2 Riser (passive)
- Leveraged PCIe standard pinout
- Electrically supports standard PCIe x8

Slots 3/4/5
- Supports passive PCIe x16 Riser
- Full-Height, Half-Length in 1U (FHHL)
- Slot 4 targeted for SmartNIC FPGA Card support

Oculink x8
- Supports Slot #4 SmartNIC FPGA Card
M.2 Support

Support for up to 16 M.2 Modules

M.2 Riser (2 x 2)

- Custom passive riser
- Supports 2 M.2’s
- PCIe x8 form factor
- x8 Expansion (SATA/PCIe)

Onboard (4)

- Up to 4 M.2’s with connectors directly soldered to motherboard

OCP M.2 Expansion Module (2 x 4)

- PCIe FHHL
- Supports 4 M.2 Modules
Motherboard Layout

Spread-core Design
- Dual CPUs, over 200W

Typical Use Cases
- Front I/O, front-to-back airflow
- 1U Server
- 2U Server with upper 1U supporting up to 12 HDDs
- 2U Server with upper 1U supporting PCIe expansion such as GPUs or M.2 Flash
Management Ethernet

1GbE (OOB)
- BMC supports out of band GbE
- Front cabled

Alternate In-Band
- Uses PCIe OCP Mezz Carrier
- Enables use of OCP NIC Mezz
- Cabled NCSI
Management

BMC
- ASPEED 1250/2400
- 2GbDDR3
- 32MB Boot Flash (Dual)
- 32MB BIOS Flash
- KVM (USB+VGA)
- 1GbE Mgmt Network

Fan Control
- Six zones, 12 fans
- Based on sensor temps

Security
- TPM 2.0
OCP Mezz Adapter

Enables In-Band Management Ethernet

- FHHL PCIe Adapter
- Supports OCP Nic Mezzanine
- Meets PCIe Mechanical Spec with Mezz installed
- Supports cabled NCSI
Primary Telemetry Monitoring

- M.2’s
- PCIe Slots
- PSU (1U + 2U)
- Onboard Temp Sensors
- Voltage Regulators
- Hot Swap Controllers
Management

**JTAG MASTER IN BMC**
- Support for local CPLD
- Support for PCIe Slot #4
  - FPGA CArd
Power Management / Rack Interface

PSU
- Dual AC 3Φ Input
- 208V, 400V, 415V
- Internal Feed Selector
- PMBus support
- Status LEDs

Management Pass-thru
- PRESENT#
- PWR_EN#
- THROTTLE
- SLOT ID

Cabled for portability to other platforms
Power Throttling

Enables more servers per rack, higher data center efficiency
- Data Center circuit breaker protection
- Protection against PSU faults

External Sources
- Rack Manager (Rack Level)
- PSU Alerts

Internal Sources
- 12V Over-current Monitor
- HSC Alerts
Supportability

Front Panel
- 2 USB 3.0 - KVM
- 10GbE
- LEDs

Internal
- Processor Debug
- 1 USB 3.0
- I2C Headers
- Standard Jumpers
- Debug LEDs (visible through front panel)

PLD Update/Recover
- BMC JTAG Host
LEDs

Front Panel
• UID – Blue LED indicating blade to be serviced
• Power Status LED – Indicates status of system and standby power
• Attention LED – Indicates server error has occurred
• GbE Activity – Indicates Management (GbE) network activity

Internal
• POST Code LEDs – Indicates boot state
• Catastrophic Error LED – Indicates catastrophic error
• BMC Heartbeat – Indicates BMC is running
• PSU Status LEDs
• SATA LED – Indicates SATA storage activity
Project Olympus OCP contribution

Mechanical CAD

Schematics & Board Files

Specifications

Source Code

/// Gets Fan speed in RPM
/// <param name="fanId">target fan Id</param>
/// <returns>Fan speed in RPM</returns>
internal FanSpeedResponse GetFanSpeed(byte fanId)

Available on OCP Github page

https://github.com/opencomputeproject/Project_Olympus