Project Olympus
3U PCIe Expansion Server
1/23/2019
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Project Olympus HW Building Blocks

- **Motherboards**: Flexible expansion
- **Power Supply**: 1KW three-phase
- **Universal PMDU**: AC power cord adaption
- **Rack**: 19” EIA-310 standard
- **Rack Manager**: Restful API or Redfish via Ethernet
3U PCIe Expansion Server

- Supports 3 x Load Balanced 1kW Project Olympus PSUs
- Power Distribution Board (PDB)
- PSUs Blind mate into Rack PMDU
- 6 x 60mm Dual Rotor Fans (room for 8 Fans)
- 2.5"/3.5" SSD or HDD
- Supports Slide Rails for smoother travel

**AMD® SKU**

- 5 x FHFL, Double-wide 300W x16 PCIe Cards + 1 x FHHL Single-wide 75W x16 PCIe Card

**Intel® SKU**

- 6 x FHFL, Double-wide 300W x16 PCIe Cards + 1 x FHHL Single-wide 75W x16 PCIe Card
- 12 x FHFL, Single-wide 75W x16 PCIe Cards + 1 x FHHL Single-wide 75W x16 PCIe Card

Project Olympus Rack Fully Compatible

Supports Project Olympus motherboards

Supports 3 x Load Balanced 1kW Project Olympus PSUs

Power Distribution Board (PDB)
# ZT Solution: 3U PCIe Expansion Server

(AMD EPYC™ Based)

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<td>3U, 19” EIA310-D Compliant supporting Project Olympus PMDU connections</td>
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<tr>
<td>Motherboard</td>
<td>1</td>
<td>Project Olympus 2-Slot AMD® EPYC™ Motherboard (OCP leveraged)</td>
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<tr>
<td>Processor</td>
<td>2</td>
<td>AMD EPYC 7551 (Naples), 180W, 32C, 2GHz, PS7551BDVIHAFV</td>
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<tr>
<td>Memory</td>
<td>16</td>
<td>32GB DDR4, DR (1DPC), 2667 R-DIMMs; Total System Memory: 512GB (Limited to 2400MT/s based on Signal Integrity)</td>
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<td>PCIe Riser 3 &amp; 5</td>
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<td>2-Slot Active PCIe x16 Riser Cards with 48-lane PCIe Switch</td>
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<td>PCIe Riser 4</td>
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<td>AMD MI25 FHFL, Double-Wide, 300W PCIe x16 Card</td>
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<td>Network Card</td>
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<td>10G Single Port SFP+ PCIe2.0 x8 5GT/s</td>
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<td>HDD/SSD</td>
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<td>M.2 960GB NVMe SSDs, PCIe x4 110mm</td>
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<td>2-Slot M.2 Riser (in PCIe Slot 1)</td>
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<td>TPM2.0 SPI Module</td>
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<td>60mmx56mm Dual Rotor Fans</td>
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<td>Power Supply</td>
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<td>P2010 1020W 3-Phase, non-LES PSUs</td>
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<td>PDB and Cable Harnesses to support 12V Power to MB, Risers, GPUs, and System Fans</td>
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3U PCIe Expansion System Options

ZT Systems XPO200 3U PCIe Expansion System:
Featuring Intel® Purley Platform with 12 x Nvidia® P4 GPU Cards
or 6 x Nvidia® V100 GPU Cards

ZT Systems XPO200 3U PCIe Expansion System:
Featuring AMD® EPYC™ Platform with 5 x AMD®
MI25 GPU Cards
System Block Diagram
Slot Active PCIe x16 Riser Card Layout

- 2 x PCIe x16 slots supporting (Slots #1-2, Bottom to Top):
  - 2 x FHFL Double-Wide PCIe cards
  - Requires PWRBRK_N (pin B30) signal for High Power PCIe Card throttling
- Broadcom® 48-Lane PCIe Gen3 Switch (PEX8747)
  - Switch Bifurcated into 2 x16 Ports (1 x16 Port to each x16 Slot)
  - Switch is located on Backside as required by Chassis Thermals
  - Use of all 48-lanes and requires 15.5W
  - Heatsink is required
- Differential Clock Buffer on board for additional Clock Fanout
- I2C MUX used to avoid Address contention (see I2C block diagram)
- 8 Layer Stackup, Mid-Loss Material (0.062”)
2-Slot Passive PCIe x32 Riser Card Layout

1 x PCIe x16 slot supporting (Slot #1, Bottom):
- 1 x FHHL Single-Wide PCIe card
- Designated for the Network Card
- 1 x FHFL Single-Wide PCIe Card OR
- 1 x FHFL Double-Wide PCIe Card
- All x16 PCIe lanes sourced from PCIe Riser Slot #4 (No Switch Required)
- Requires PWRBRK_N (pin B30) signal for High Power PCIe Card throttling

1 x PCIe x16 slot supporting (Slot #2, Top):
- 1 x FHHL Single-Wide PCIe Card OR
- 1 x FHFL Double-Wide PCIe Card
- All x16 PCIe lanes sourced from PCIe Riser Slot #4 (No Switch Required)
- Requires PWRBRK_N (pin B30) signal for High Power PCIe Card throttling

I2C MUX used to avoid Address contention (see I2C block diagram)
- 8 Layer Stackup, Mid-Loss Material (0.062”)
PCle I2C Block Diagram
PCIe Clock Block Diagram
Power Distribution Board Layout

- PDB supports single 12V Power Domain from 3 x Project Olympus PSUs
  - Uses Passive Droop Sharing
  - No V_Sense or I_Share signals used
- Power Delivery Requirements
  - Hot Swap Controller for Power Monitoring and Isolation
  - 12V Current Sense Ckts used for each branch
  - Supports Power to entire System (MB, Risers, PCIe Cards)
  - Fan Power also comes from PDB (none from MB)
- Provides passthrough of PMDU signals between MB and RM
- 6 Layer Stackup (0.093”), 2oz copper planes
- Different power harnesses can be used for different Cards
PDB Power Distribution Block Diagram

Power Distribution Board

MB

Hot Swap Controller (ADM1278)

P12V_PSU

PSU1 0xB0
2x12

PSU2 0xB0
2x12

PSU3 0xB0
2x12

Note: Motherboard has its own Hot Swap Controller & Switch Ckt.

Hot Swap Controller (ADM1172)

P3V3_CB VR
Gen5 Riser

P3V3_STBY VR

P3V3_RISER4SW

P12V_PSU_SW

1U Fan Power Conn Not Used

1U Fan Power & HDD

PSU1

0xB0

2x12

PSU2

0xB0

2x12

PSU3

0xB0

2x12

Hot Swap Controller (ADM1172)

P3V3_CB VR
Gen5 Riser

P3V3_STBY VR

P3V3_RISER4SW

MB

PWR Conn

HSC/SW

Fan Power (6 x 60mm)

Riser 3 (2-Slot)

2x4

Two 2x4

GPU

Two 2x4

GPU

Riser 4 (2-Slot x32)

2x2

Two 2x4

GPU

Two 2x4

GPU

Riser 5 (2-Slot)

2x6

Two 2x4

GPU

Two 2x4

GPU

Note: Motherboard has its own Hot Swap Controller & Switch Ckt.