

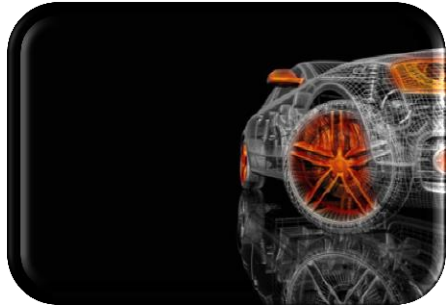


# GIGABYTE™

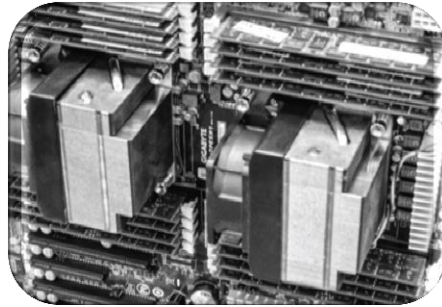
## Server Solutions

2015.July

# Gigabyte Network & Communication BU



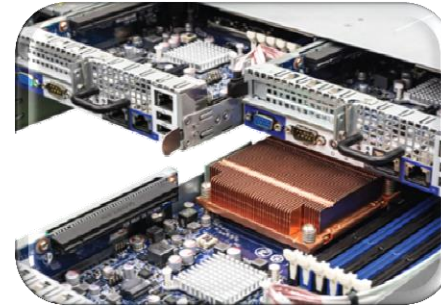
Workstation Board



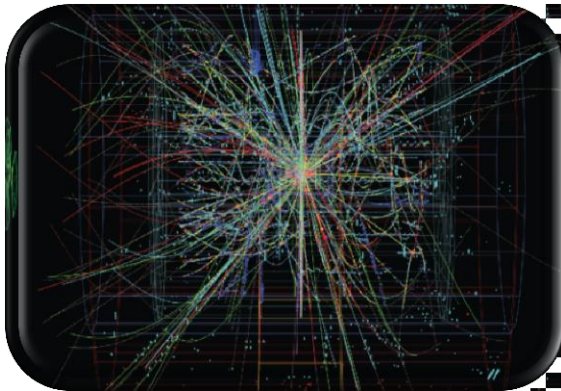
Server Board



Server Rackmounts



High Density Servers



High Performance Computing



ARM Base Server



Data Center

# OUR SERVER LINE

WORKSTATION  
BOARDS



SERVER  
BOARDS



SERVER  
RACKMOUNTS



HIGH  
DENSITY  
RACKMOUNTS



HPC  
RACKMOUNTS



NETWORK  
SECURITY



DATACENTER  
SYSTEMS





# SERVER BOARDS

We put our three decades of know-how in motherboard design at the service of cutting-edge server motherboards. Always built with the best and most durable components, we make products suitable for both tower and rackmount servers with features for the largest number of professional applications:

- **Standard Web, Storage, Database Servers, etc.**
- **High Performance Computing**
- **Parallel Computing**
- **Virtual RAM Drives**
- **Mass Storage**
- **Virtualized Applications**

# M Series Product Outline

Grantley Platform

## Intel Workstation

MW70-3S0  
Grantley E5  
EATX  
3way SLI; Vpro



MW50-SV0  
Grantley E5  
ATX  
3way SLI; L Mezz; Vpro



GA-6LASL/H  
Denlow E3  
uATX



GA-6LXSL/G  
Denlow E3  
ATX  
Mavell



MD60-SC0  
Grantley E5  
EATX  
40G QSFP+(OP) & 10G SFP+; T Mezz



**(Research)**  
MD30-RS0  
Grantley E5  
ATX Like;  
T Mezz



MD70-HB0  
Grantley E5  
EATX  
10GbE



MD50-LS0  
Grantley E5  
EATX  
6 x PCIe Slot; Competitive Price; T Mezz



GA-6LISL  
Denlow E3  
M-ITX



GA-6LXSV  
Denlow E3  
ATX



MD80-TM0  
Grantley E5  
EATX  
HPC; 10GbE; SAS



MD90-FS0  
Grantley E5  
Proprietary  
For Flag ship  
1U & 2U; H  
Mezz



## Intel Xeon E5 UP

MU70-SU0  
Grantley E5  
ATX  
Marvell; 2way SLI; L Mezz



## Intel Xeon E5

GA-6LXGL/H  
Denlow E3  
ATX  
10G SFP+



## Intel Xeon E3

# Intel E3 SPEC & Evolution

## Denlow / Haswell



## Greenlow / Skylake

GA-6LXGL/H UP ATX (L/H Diff : AST 2400-VB / 2300)

•LGA 1150 •C224 •4 x DDR3 •1 x 10G SFP+ & 2 x 1GbE •no/w BMC  
•4 x PCIe & 3 x PCI •4 x SATA III & 2 x SATA II •6 x USB



GA-6LXSV UP ATX

•LGA 1150 •C224 •4 x DDR3 •4 x 1GbE •BMC  
•4 x PCIe & 3 x PCI •4 x SATA III & 2 x SATA II •6 x USB



GA-6LISL UP M-ITX

•LGA 1150 •C226 •2 x DDR3 •2 x 1GbE •BMC  
•1 x PCIe •5 x SATA III •2 x USB



**MX31-BS0** UP uATX

ES: 03'15 QS: 06'15 PD: 09'15

**M.2;**

•LGA 1151 •C232 •4 x DDR4 •2 x 1GbE •BMC  
•2 x PCIe •6 x SATA III •4 x USB •Audio

**MX11-PC0** UP M-ITX

ES: 04'15 QS: 06'15 PD: 09'15

**NVMe;**

•LGA 1151 •C232 •4 x DDR4 •2 x 1GbE •BMC  
•1 x PCIe •4 x SATA III •2 x USB

# Intel Workstation SPEC & Evolution

## Grantley & Denlow / Haswell



## Purley & Greenlow / Skylake

### MW70-3S0 DP EATX

ES: - QS: - PD: 03'15

#### 3 Way SLI & Vpro

•LGA 2011 •C612 •16 x DDR4 •2 x 1GbE  
•6 x PCIe •10 x SATA III & 2 x Mini-HD •6 x USB •Audio



### MW50-SV0 UP ATX

#### Marvell & Vpro; Type L Mezzanine

•LGA 2011 •C612 •8 x DDR4 •3 x 1GbE  
•3 x PCIe •13 x SATA III & 1 x mSATA •8 x USB •Audio



### GA-6LXSL/G UP ATX (L/G Diff: Realtek LAN / Intel LAN)

•LGA 1150 •H87 •4 x DDR3 •4 x 1GbE(Realtek)  
•2 x PCIe & 2 x PCI •10 x SATA III •6 x USB •Audio



### GA-6LASL/H UP uATX (L/H Diff: AST 1300 / 2300; None / Audio)

•LGA 1150 •C222 •4 x DDR3 •2 x 1GbE •BMC  
•3 x PCIe •2 x SATA III & 4 x SATA II •4 x USB •no/w Audio



### MW31-SP0 UP ATX

ES: 05'15 QS: 07'15 PD: 09'15

#### 2 x PCIe x 16 (Gen 3 x16); M.2; Marvell for 4 SATAIII

•LGA 1151 •C236 •4 x DDR4 •2 x 1GbE •No BMC  
•3 x PCIe & 2 x PCI •8+4 x SATA III •6 x USB •Audio

### MW21-SE0 UP uATX

ES: 05'15 QS: 07'15 PD: 09'15

#### Super Economic;

•LGA 1151 •C232 •4 x DDR4 •1 x 1GbE •No BMC  
•4 x PCIe •6 x SATA III •4 x USB •Audio

# Intel SoC SPEC & Evolution

## Grangeville / Broadwell-DE

**MB10-DS0** UP M-ITX

ES: 03'15 Q5: 05'15 PD: 09'15

**Broadwell-DE**

-XXXX -SoC -4x DDR4 -2x 10GbE SPF+ & 2x 1GbE  
-1x PCIe -6x SATA III -2x USB



**GA-9SISL** UP M-ITX

**Avoton C2750**

-C2750 -SoC -4x DDR3 -4x 1G -BMC  
-1x PCIe -2x SATA III & 4x SATA II -2x USB





# Intel ARM SPEC & Evolution

## **MT70-HD0** DP Half-width

ES: 06'15 QS: - PD: 09'15

### **Cavium ARM & QSFP+**

-Thunder -SOC -16 x DDR4 -2 x 40G QSFP+ -BMC  
-1 x PCIe -4 x SATA III -2 x USB



## **MT60-SC0** DP EATX

ES: 06'15 QS: - PD: 09'15

### **Cavium ARM & QSFP+**

-Thunder -SOC -16 x DDR4 -3 x 40G QSFP+ & 4 x 10G SFP+ -BMC  
-5 x PCIe -4 x SATA III (SW to 24 x SATA III w/ PCIe) -2 x USB

## **MT30-GS0** UP uATX

ES: 06'15 QS: - PD: 09'15

### **Cavium ARM & QSFP+**

-Thunder -SOC -8 x DDR4 -2 x 40G QSFP+ -BMC  
-2 x PCIe -4 x SATA III -2 x USB

## **MP30-AR0** UP uATX

ES: - QS: - PD: 06'15

### **APM ARM & 10G SFP+ Uboot only**

-X-Gene -SOC -8 x DDR3 -2 x 10G SFP+ & 2 x 1GbE -BMC  
-2 x PCIe -4 x SATA III -2 x USB



## **ML00-AR0** UP Proprietary

ES: - QS: 03'15 PD: 05'15

### **Annapurna ARM**

-Alpine -SOC -1 x DDR3 -2 x 10G SFP+ -No BMC  
-No PCIe -16 x SATAIII -No USB



# SERVER RACKMOUNTS

GIGABYTE offers rack-mounted solutions based on its server boards. Equipped with the best power supplies and cooling fans, they are ready-to-integrate solutions combining a high level of performance, energy efficiency, and overall reliability for the most demanding server applications:

- **Web Hosting**
- **Mass Storage**
- **Virtualized Infrastructures**
- **Databases & Analytics**



# R Series Product Outline



R1 Family



R180-F34 / F28  
(MB=MD90-FS0)  
2 x FHHL & 1 x Universal I/O



R2 Family



R280-F38 / F3C / F28 / F2G / F2O  
(MB=MD90-FS0)  
2 x FHHL & 6 x FHFL  
& 1 x Universal I/O  
Support 3 GPGPUs

Intel 1U&2U Mainstream



N270-L82  
(MB=MN70-N20)  
8 x LAN Controller Card Trays

Intel Networking



G210-H4G  
(MB=GA-6LISL) E3  
PCIe x16 (@Gen 3 x16) for 4 GPGPU (4 Node)



G250-S88  
(MB=MG50-G20) E5  
4 Riser Cards provide 8 x PCIe x16 (@Gen 3 x16) for 8 GPGPU  
1 x Low-profile & 1 x Mezzanine Card

Intel GPGPU



H270-F4G  
(MB=MH70-HD0)  
16 DIMMs; Dual 10GbE LAN Intel 82599(Option 1 x 40GbE QSFP+ with Fortville)

Intel High-density

# Grantley 1U Rack Mount Server

## Rack Mount Model

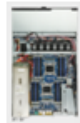
1U - 2 Socket



- **R12P4E/P8E**
  - 7PESH3
- Intel Xeon E5-2600V2
  - 12x DIMM Slot
  - 4 x GbE LAN (i350)
- 8x2.5" / 4x3.5"HDD
  - 1 X 500W PSU
  - 2 X PCIe x 16 slots
  - 8 x PCIe x8 slots



- **R12PE1**
  - 7PPSH 2
- Intel Xeon E5-2600 V2
  - 24 x DIMM slots
- 2 x GbE LAN ports
  - 4x3.5" HDD
- 2 x 650W Redundant



- **R12PE**
  - 7PPSH
- Intel Xeon E5-2600 V2
  - 24 x DIMM slots
- 2 x 10GbE LAN ports
  - 4x3.5" HDD
- 2 x 650W Redundant



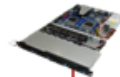
- **R12P4S**
  - 7PCSL
- Intel Xeon E5-2400V2
  - 8 X DIMM Slot
  - 2 GbE LAN ports
- 1 x 500W Single Gold PSU
  - 4 x 3.5" HDD



- **R12P4G/P8G**
  - 7PESH4 M/B
- Intel Xeon E5-2600 V2
  - 16 x DIMM slots
- 4 x GbE LAN ports
  - 4x3.5" / 8x2.5" HDD
- 1 x 600W PSU



- **R180-F28/F34**
  - MD80/MD90 M/B
- Intel Xeon E5-2600V3
  - 24x DIMM Slot
  - 2 x GbE LAN (i350)
- 8x2.5" / 4x3.5"HDD
  - 2 x 800W redundant
  - 10 x SATA III 6Gb/s ports



- **R160-S34/R34**
  - MD50 M/B
- Intel Xeon E3-1200V3
  - 8 X DIMM Slot
  - 4 GbE LAN ports
- 2 x 650W redundant
  - 1 x 650W Single
  - 4 x 3.5" HDD

1U - 1 Socket



- **GA-R11U4S)**
  - Intel E3-1200 V2
    - 4x DIMMs
  - 2 X GbE LAN Ports
- 1 x 350W Bronze PSU
  - 1 x full-height full length slot
  - 4 x 3.5" HDD

14Q1

14Q2

14Q3

14Q4

# Grantley 2U Rack Mount Server

Rack Mount Model

2U - 2 Socket



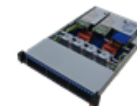
- R22PFL
- 7PPSLX
- Intel Xeon E5-2400V2
  - 12 X DIMM Slot
  - 2 GbE LAN ports
  - 24 x 2.5" HDD
- 2 x 750W Redundant
- LSI SAS2008 on board RAID



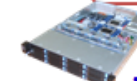
- R22PE1
- 7PPSH
- Intel Xeon E5-2600V2
  - 24x DIMM Slot
  - 2 x 10GbE LAN (i350)
  - 12 x 3.5" HDD
- 4 x 2.5" Internal HDD
- 2 X 650W Redundant
- LSI SAS2008 on board



- R22PE
- 7PPSH2
- Intel Xeon E5-2400V2
  - 24 X DIMM Slot
  - 2 GbE LAN ports
  - 12 x 3.5" HDD
- 4 x 2.5" Internal HDD
- 2 x 750W Redundant



- R280 Series
- MD90 M/B
- Intel Xeon E5-2600V3
  - 24 x DIMM slots
  - 2 x GbE LAN slots
- 8x3.5" / 24x2.5" HDD
- 2 x 800W Redundant



- R270 Series
- MD60 / MD70 M/B
- Intel Xeon E5-2600V3
- 16 / 12 x DIMM slots
- 1 x QSFP+LAN ports(6)
- 4 x GbE LAN (MD70)
  - 12x3.5" HDD
- 2 x 750W Redundant



- R260 Series
- MD50 M/B
- Intel Xeon E5-2600V3
  - 8 x DIMM slots
  - 4 x GbE LAN ports
- 4x3.5" / 8x2.5" HDD
- 2 x 750W Redundant

14Q1

14Q2

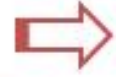
14Q3

14Q4

# R280 NVMe Feature in Q3, 2015



## Grantley / Haswell



## Purley / Skylake

### R18N-F2A 1U

ES: - QS: 05'15 PD: 09'15

#### Flagship 1U DP & 2 x NVMe Support

- 43.5 x 430 x 710 mm -MB=MD90-FS0 -No ODD
- 10 x 2.5" Hot-swap HDD -2 x Full Height Half Length & Universal I/O
- Redundant 800W 80+ Platinum (Sin-OP) -Fixed Rear I/O
- 4056 & 4028 Mixed Fan Wall -SAS/SATA HDD Backplane














### MD90-FS0 DP Proprietary

#### Top Spec for Flagship 1U & 2U

- LGA 2011 -C612 -24 x DDR4 -2 x 1GbE -BMC
- 3 x PCIe -2 x Mini-SAS & 2 x SATA III -4 x USB



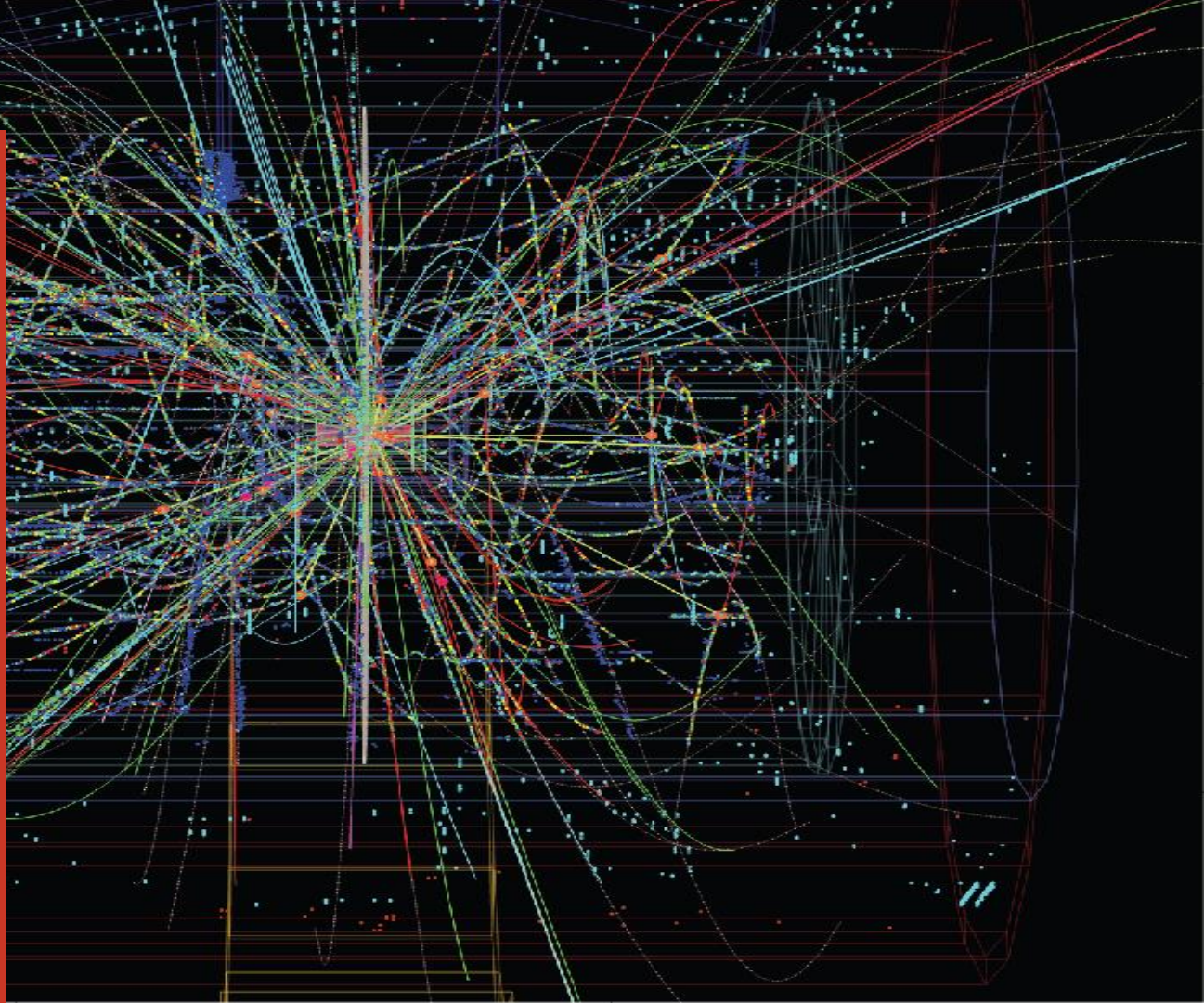
# C Series Product Outline

	PCIe Type	OCP Type	Mezzanine F Type	Mezzanine H Type	Mezzanine L Type	Mezzanine T Type
LAN Card						
RAID Card						
SAS Card						
M.2 Card						
Thunderbolt						

# HIGH PERFORMANCE COMPUTING

In today's top scientific research world, the computing acceleration with GPUs and MIC cards is now a must. While combining regular CPUs with several GPUs in a same enclosure designed to unleash the full computing power of its components, GIGABYTE still delivers high density, power efficiency, and excellent cooling performance with its innovating solution designed for:

- **Scientific Analysis & Simulation**
- **Computational Finance**
- **Weather & Climate Forecasting**
- **Oil & Gas Simulation**





# GPGPU / HPC Series Products



## High Performance Computing

### G250-S88 2U

ES: 05'14, QS: 08'14 PD: 11'14

#### 8 GPGPU & 2 Mezzanine Card

- 87.5 x 448 x 800 mm • Proprietary MB
- 8 x GPGPU Card (By 4 Riser Card) & 8 x 2.5" Hot-swap HD



### G190-B10 1U

#### 4 GPGPU & 2 Mezzanine Card

- 87.5 x 448 x 800 mm • Half-width MB
- 4x GPGPU Card (By 4 Riser Card) & 2 x 2.5" Hot-swap HD

## General Purpose

### R280-G20 2U

#### Flag Ship 2U DP & GBT Universal I/O & Support 3 GPGPU or 2 GPU

- 87 x 430 x 710 mm • MB=MD90-F50 • ODD (OPT)
- 16 x 2.5" HDD, • 2 x FHHL & 6 x FHFL & Universal I/O

X86 &  
ARM64

#### G220-XXX 2U with Standard Form Factor MB Value 2U DP/UP Support 2 GPU / GPGPU

- 87 x 430 x 710 mm • MB= uATX/ATX/EATX x86 or ARM64 MB
- 16 x 2.5" HDD, 2 x FHHL & other I/O depends on MB selected

### G120-XXX 1U

#### 1U DP/UP Support 2 GPU / GPGPU

- 87 x 430 x 710 mm • MB : TBD

## GRID Computing

### G210-H4G 2U4N

#### 2U 4 Node & 1 x GPGPU/GPU per Node

- 87.2 x 447 x 780 mm • M-ITX MB, 4 Node
- MB & GPGPU & 4 x 2.5" HDD per node • 1 x PCIe x16 for GPU Card/node



X86 &  
ARM64

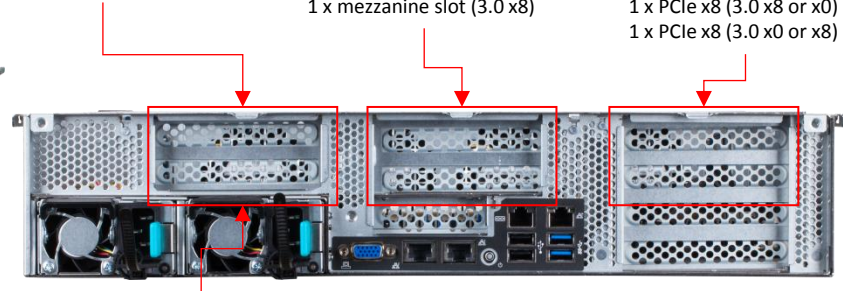
# R280 – G20 Diversified Usage Model



1 x PCIe x8 (3.0 x0 or x8)  
1 x PCIe x16 (3.0 x16 or x8)

1 x PCIe x16 (3.0 x16 or x8)  
1 x PCIe x8 (3.0 x0 or x8)  
1 x mezzanine slot (3.0 x8)

1 x PCIe x16 (3.0 x16 or x8)  
1 x PCIe x8 (3.0 x0 or x8)  
1 x PCIe x8 (3.0 x8 or x0)  
1 x PCIe x8 (3.0 x0 or x8)



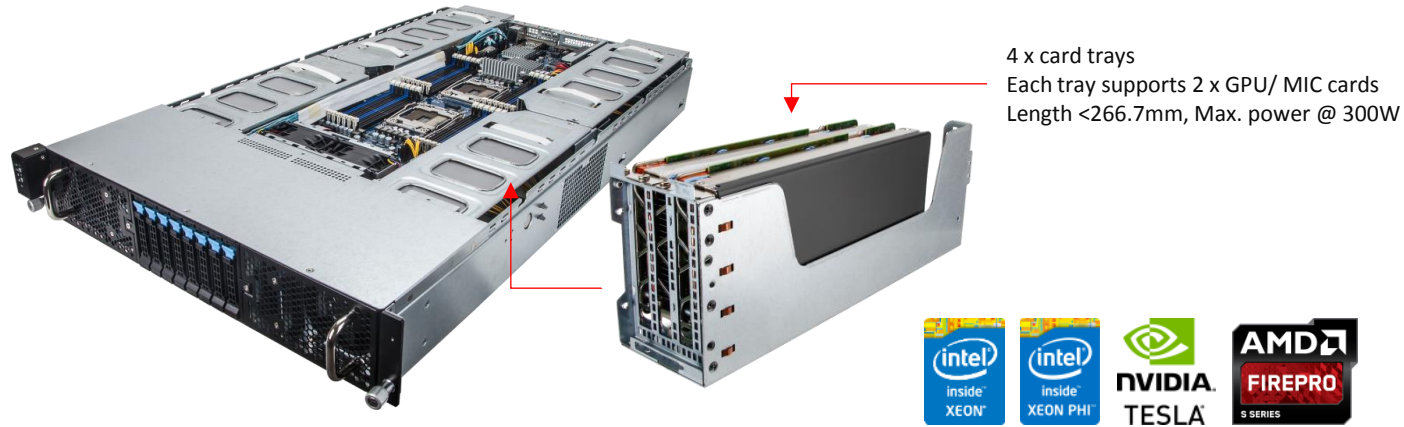
Able to support 3 x double-slot GPU/ MIC cards  
Length <266.7mm, Max. power @ 300W



- Support 3 x Double-Slot GPU/ MIC Cards
- Intel Xeon E5-2600 V3 Processors
- Support 24 x 2.5" HDD
- Top Efficiency 80+ Platinum Power Supply

Selected from GIGABYTE generic server product. The R280-G20 is designed for general purpose and mission critical environment. Inside the limited 2U space, total ?? PCIe lanes couple with the PLX controller and properly designed to nine expansion slots which is able to support a maximum of 3 x double-slot GPU/ MIC cards. The R280-G20 offers vast gains in processing time for the most computing intensive applications, from cutting-edge rendering farms to the latest simulations in leading scientific research.

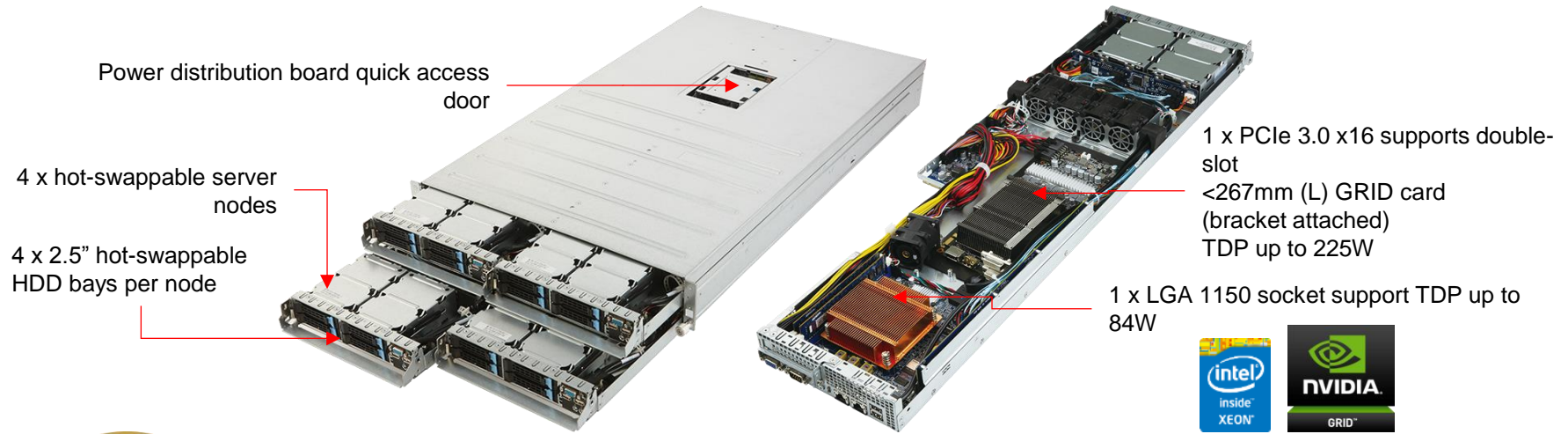
# G250 – S88 Diversified Usage Model



- **Support 8 x Double-Slot GPU/ MIC Cards**
- **Intel Xeon E5-2600 V3 Processors**
- **Dual 10Gb/s SFP+**
- **8 x SATA 6Gb/s 2.5” Storage Support**
- **Top Efficiency 80+ Platinum Power Supply**

Designed and optimized for computing accelerators such as the Intel Xeon Phi, NVIDIA Tesla, and AMD FirePro cards, the G250-S88 offers nothing less than the support of 8 double slot GPU/MIC cards when similar products on the market support 6 cards at best in a 2U chassis. With so much computing power potential gathered into a single node, this system is able to offer vast gains in processing time for the most computing intensive applications, from cutting-edge rendering farms to the latest simulations in leading scientific research.

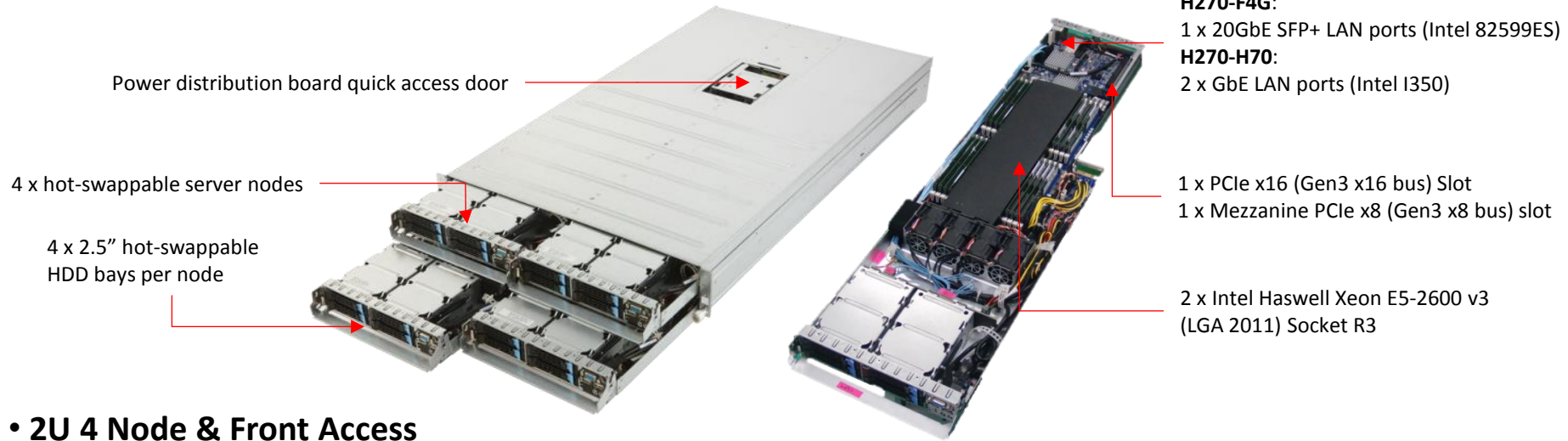
# G210 – H4G Diversified Usage Model



Excellences Techniques 2015  
by PC Expert

- Supports 4 x Double-Slot GRID / GPU Cards
- Intel Xeon E3-1200 V3 Processors
- Dual GbE Connection per Node
- 4 x SATA 6Gb/s 2.5" Storage Support
- Top Efficiency 80+ Platinum Power Supply

# H270 – F4G/H70 High Density Server



- **2U 4 Node & Front Access**
- **Node for 4 MB**  
(16DIMM & 1 x 20G LAN per MB or 2 x GbE LAN per MB)
- **- 4 x 2.5" Hot-swap HDD per node**
- **- 1 x Low Profile or 1 x Mezzanine Card per node**
- **- Redundant 1600W PSU**

# G150 – B10 Diversified Usage Model

## Grangeville / Broadwell-DE

### G150-B10 1U

ES: - Q5: 05'15 PD: 09'15

#### 1 GPGPU; SoC

- 43.5 x 430 x 625 mm -MB=MB10-DS0 -ODD (OPT)
- 4 x 3.5"/2.5" Hot-swap HDD -2 x Full Height Full Length for GPU
- Single 600W 80+ Gold -Modular Rear I/O
- 1 x 4028 & 4 x 4056 Fan -SAS/SATA HDD Backplane



### MB10-DS0 UP M-ITX

ES: 03'15 Q5: 05'15 PD: 09'15

#### Broadwell-DE

- XXXX -SoC -4 x DDR4 -2 x 10GbE SPF+ & 2 x 1GbE
- 1 x PCIe -6 x SATA III -2 x USB



# G190 – H44 Diversified Usage Model

**Grantley / Haswell**



**Purley / Skylake**

## G190-H44 1U

ES: - QS: 05'15 PD: 08'15

### **4 GPGPU**

- 43.5 x 430 x 900 mm -MB=MG30-G10
- 4 x GPGPU Card (By 4 Riser Card) & 2 x 2.5" Hot-swap HD
- 1 x Low Profile & 1 x Mezzanine
- Redundant 2000W 80+ Titanium PSU -Fixed Rear I/O
- 8 x 8cm Fan



## MG30-G10 DP Proprietary

ES: - QS: 04'15 PD: 09'15

### **4 x GPGPU**

- LGA 2011 -C612 -16 x DDR4 -2 x 1G -BMC
- 5 x PCIe -4 x SATA III -2 x USB



# G210 – H4G Diversified Usage Model

## Denlow / Haswell



## Greenlow / Skylake

### G210-H4G 2U4N

2U 4 Node & 1 x GPGPU/GPU per Node

- 87.2 x 447 x 780 mm -MB=GA-6L1SL
- 4 Node for 4 MB & GPGPU & 4 x 2.5" Hot-swap HD per node (Total 16 HD)
- 1 x PCIe x16 for GPU Card per node
- Redundant 1600W 80+ Platinum PSU(Sin-OP)
- Fixed Rear I/O
- 4 x 4056 & 1 x 3848 Dual Rotor Fan -4 x SAS/SATA HDD Backplane



### GA-6L1SL UP M-ITX

Small but PCIe Gen3 x 16

- LGA 1150 -C226 -2 x DDR3 -2 x 1GbE -BMC
- 1 x PCIe -5 x SATA III -2 x USB



### G211-H4G 2U4N

ES: 05'15 QS: 08'15 PD: 11'15

2U 4 Node & 1 x GPGPU/GPU per Node

- 87.2 x 447 x 780 mm -MB=MX11-PC0
- 4 Node for 4 MB & GPGPU & 4 x 2.5" Hot-swap HD per node (Total 16 HD)
- 1 x PCIe x16 for GPU Card per node
- Redundant 2000W 80+ Titanium PSU
- Fixed Rear I/O
- 4 x 4056 & 1 x 3848 Dual Rotor Fan -4 x SAS/SATA HDD Backplane



### MX11-PC0 UP M-ITX

ES: 04'15 QS: 06'15 PD: 11'15

NVMe;

- LGA 1151 -C232 -4 x DDR4 -2 x 1GbE -BMC
- 1 x PCIe -4 x SATA III -2 x USB



# G250 NVMe Feature in Q3, 2015

**Grantley / Haswell**



**Purley / Skylake**

## **G25N-G51/G52 2U**

ES: - QS: 05'15 PD: 09'15

### **8 GPGPU & 2 x NVMe Support**

- 87.5 x 448 x 800 mm
- (G51) MB=MG50-G20 (G52)MB=MG50-G21
- 8 x GPGPU Card (By 4 Riser Card) & 8 x 2.5" Hot-swap HD
- 1 x Low Profile
- (G51&G52)Redundant 2000W 80+ Platinum PSU(Sin-OP)
- Fixed Rear I/O -8 x 8cm Fan



## **MG50-G20/G21 DP Proprietary**

### **8 x GPGPU & SFP+; Type H Mezzanine**

- LGA 2011 -C612 -24 x DDR4
- (G20) 2 x 10G SFP+ (G21)2 x 1G
- BMC -5 x PCIe -10 x SATA III -2 x USB

# H270 NVMe Feature in Q3, 2015

**Grantley / Haswell**



**Purley / Skylake**

## **H27N-H70 2U4N**

ES: - QS: 05'15 PD: 09'15

### **2U 4 Node & Front Access & 8 x NVMe Support**

- 87.2 x 447 x 780 mm -MB=MH70-HD1
- 4 Node for 4 MB & 4 x 2.5" Hot-swap HDD per node (Total 16 HDD)
- 1 x Low Profile Card per node
- Redundant 1600W 80+ Platinum -Fixed Rear I/O
- 4 x 4056 Dual Rotor Fan per node -4 x SAS/SATA HDD Backplane



## **MH70-HD1 DP Half-width**

### **Type H Mezzanine**

- LGA 2011 -C612 -16 x DDR4 -2 x 1G -BMC
- 1 x PCIe -6 x SATA III -2 x USB



# ARM based Appliance

Based on the ARM based Structure, GIGABYTE designs solutions for eco-system, 48-core 1U system, and design for cold storage as future Application in various industrial field.

Following this Structure, GIGABYTE has created an innovative solution based on:

- **Emergence of new H/W players**
- **Migration away from pure performance to perf/watt/\$ as key metric**
- **Adoption of open source and end user-owned SW libraries**

ARM®

VS

GIGABYTE®



# ARM Solution Project



## Applied Micro X-Gene 1

- World's First ARMv8 64-bit Server on a Chip Solution
- 8 cores with up to 2.4 GHz specifically designed for cloud servers

MP : 2015. May



## Annapurna Labs Alpine

- Up to four 32-bit ARM® Cortex®-A15 cores integrating 2 MB L2 cache and ARM® NEON™ v2 for floating point and video processing
- Integrating the latest in compute, storage, and networking technologies/interfaces on one chip

1U MP : 2015. May  
2U MP : 2015. Oct



## Cavium Thunder CN88XX

- Scales from 24 to 48 cores with up to 2.5GHz frequency
- The best in class 64-bit ARMv8 Data Center & Cloud Processors

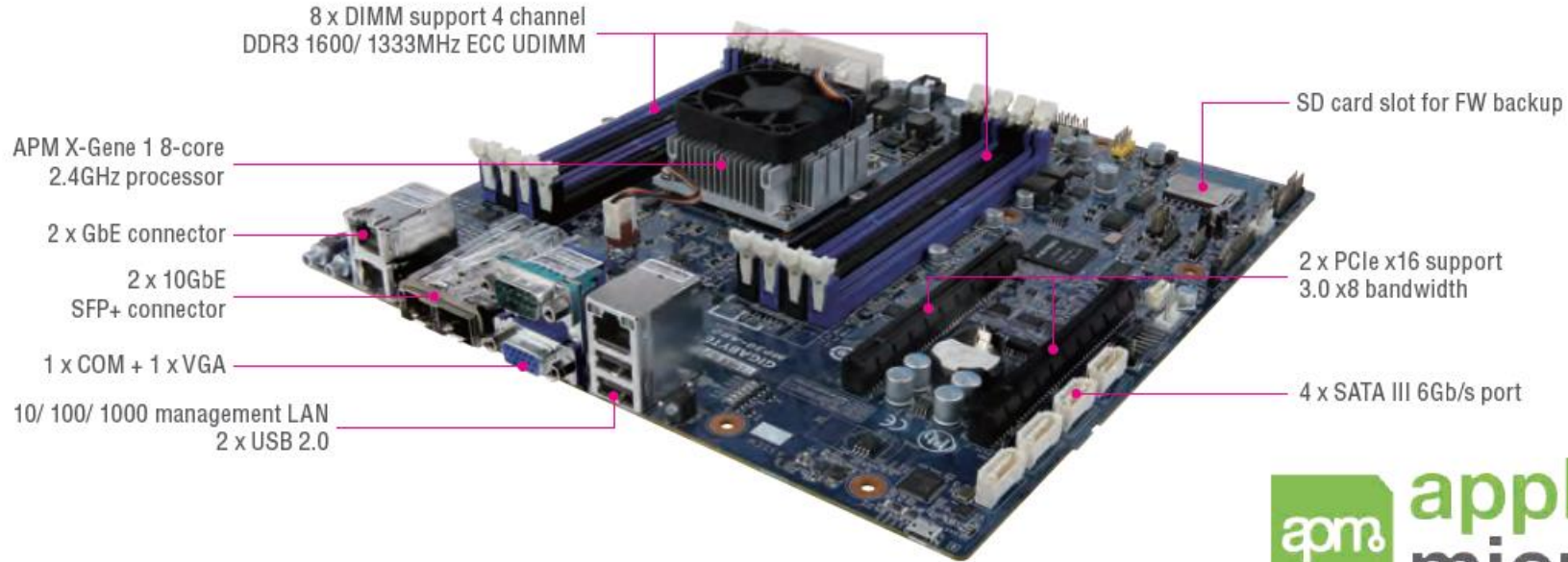
UP MP : 2015. Aug  
DP MP : 2015 Dec



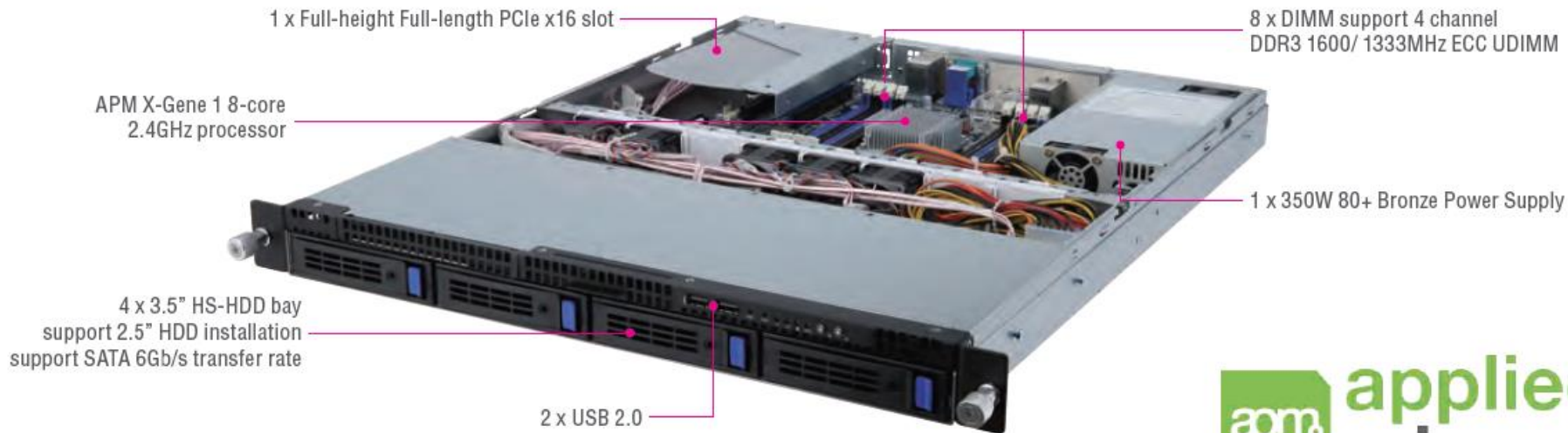
# ***APM Server (w/ Applied Micro)***



# MP30-AR0 REDEFINING THE POSSIBLE



# R120-P30 REDEFINING THE POSSIBLE





# ***Cold Storage Server (w/Annapurna Labs )***





# D120-S3G REDEFINING THE POSSIBLE

## Best Density, Connectivity, & TB Cost Storage System

### A High Density Storage

- 1U with 16 x 3.5" swappable HDD bays, 2.5" HDD optional
- Backplane : SATA III 6Gb/s
- Up to 100TB capacity

### Next Gen Connectivity

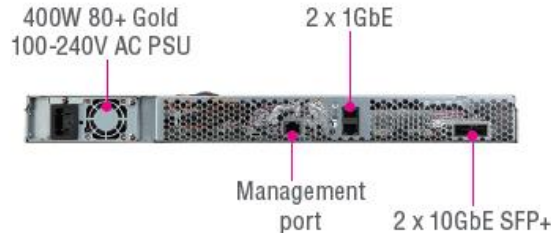
- 20Gb network connectivity

### Data Protection in Hardware

- RAID 5/6
- Erasure code

### Quad Core Linux Machine

- Standard ARM Cortex-A15
- Supports Linux kernel 3.10 & Ubuntu 14.04



Annapurna  
Alpine AL5140  
Quad-Core 1.7GHz

Supports 16 x 3.5"  
swappable HDD  
@ SATA 6Gb/s



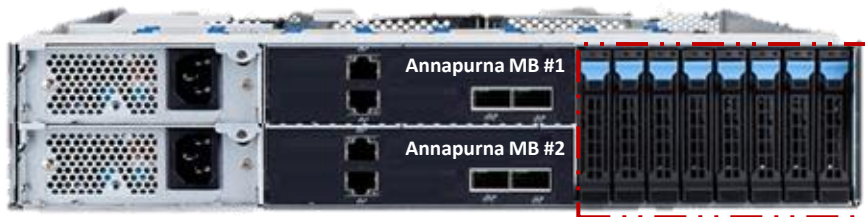
# D220-R2Q REDEFINING THE POSSIBLE

## Front Side View



Support 24 x 2.5" HDDs in the front

## Rear Side View



Support 8 x 2.5" HDDs in the back

**2U : 32 \* 2.5" HDD**

Feature	Specification
Form factor	2U
Chassis Size	710x430x87mm (27.9"x16.9"x3.42")
Storage	Support total 24 HDDs 24 x 2.5" HDD Support Hot Swap Mechanism
FAN	8038 FAN x 4
Rear IO Connector	2x (GLAN x2/ 10G SFP+ x2)
PSU	460W Redundant PSU



***ARM High Performance Computing Server  
(w/ Cavium Thunder X)***



# The Series of Cavium Thunder X



Standard form factor mother boards, chassis, PSU, Rack/Stack



Managed like x86



SBSA & SBBR – Boot & BIOS like x86



Same SW Development environment



Same OS, Hypervisors & Applications

# Commercial Platform SW Partners

## Full Platform Support and Optimization

✓ Development Environment



✓ Operating Systems



✓ Firmware, Boot, Systems Mgt



## Built on a Thriving Open Source Community



# ThunderX v.s. Haswell Performance

## Cloud Workloads

Web Caching, Web Serving, Web Search, Graph Analytics, Data Analytics, Distributed Data bases, Secure Web (https), Cloud Storage, NFV

## Traditional Benchmarks:

SPECInt2006\_rate, SPECjbb2013, Imbench, stream, SPECfp2006\_rate



## Performance Positioning:

Similar performance as E5-2690v3 on traditional benchmarks

Outperforms Xeon on cloud workloads

Integrated network and storage IO

End to End virtualization through virtSoC™

Integrated accelerators

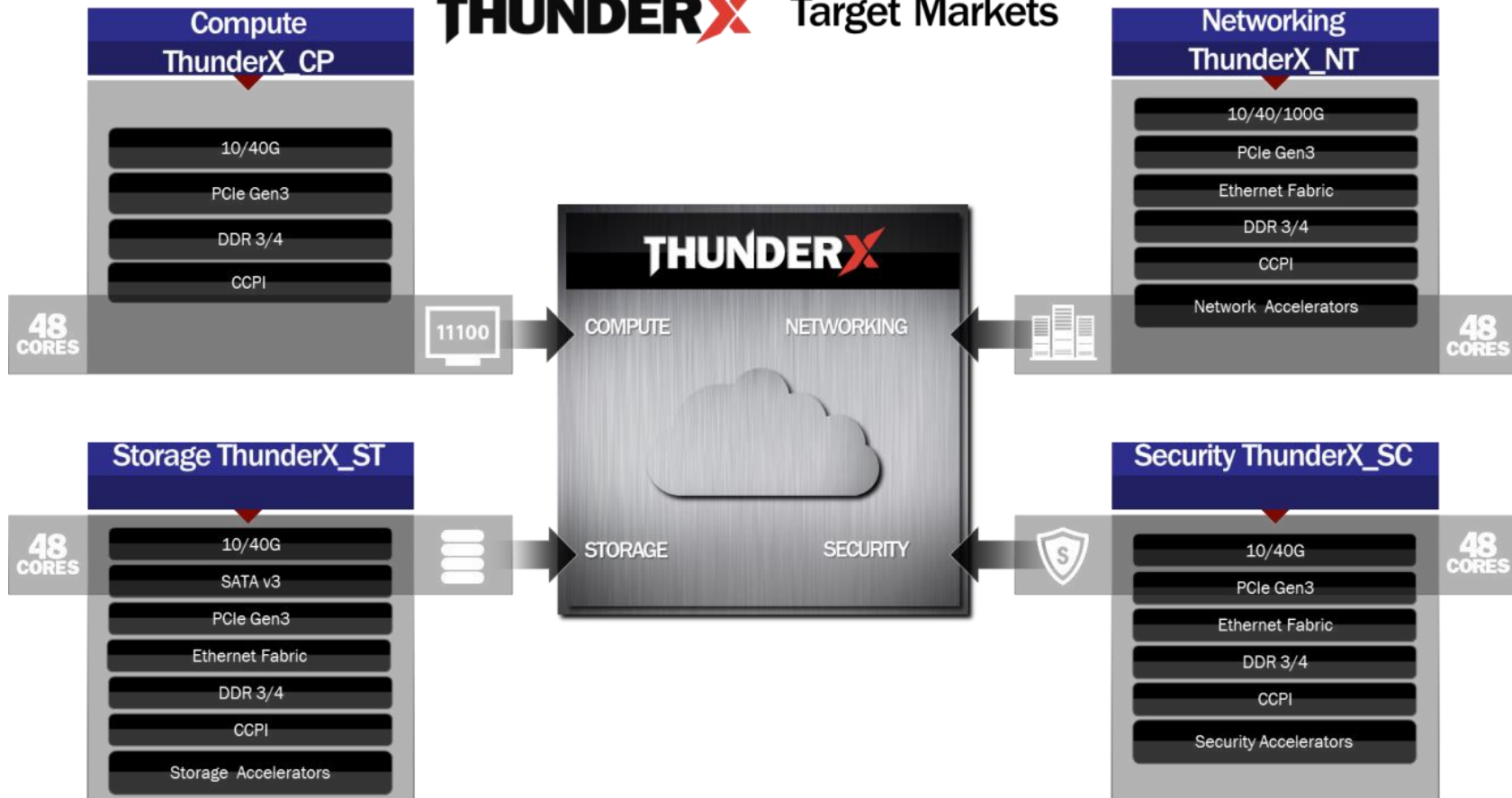
Measured performance relative to Intel E5-2690v3

Compiler: gcc 5.0, Linux kernel: 3.18

Socket level performance comparison

# Thunder X Target Market

## THUNDERX Target Markets



# TCO Comparison for Virtualized Environments

## ⚙️ ThunderX Cost Benefits

- 80% lower cost per VM
- 66% lower power / VM

## ⚙️ Thunder density benefits

- 2.5X density / rack = 2.5X more revenue / rack

## ⚙️ Supports VM security in hardware for Private clouds

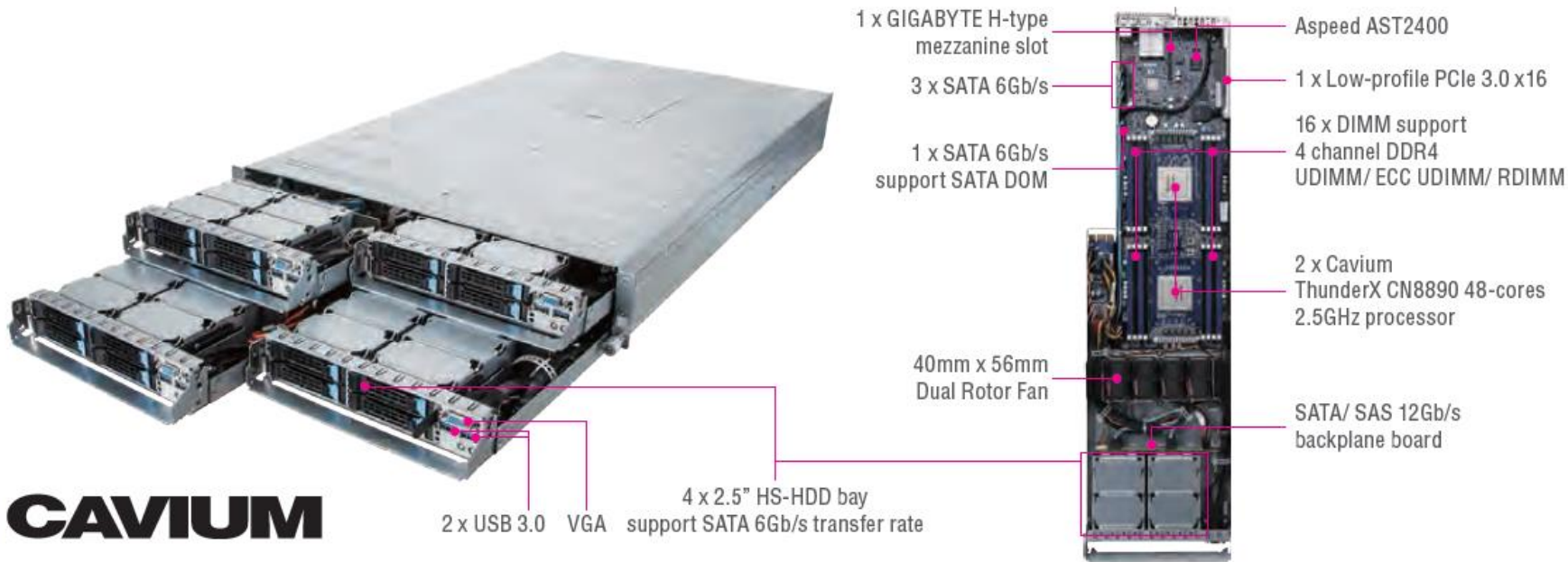
## ⚙️ Built on Standard Open Source and Commercial Software

	ThunderX_CP	E5-2690v3
Processors	2S	2S
Number of cores	96	24
CPU subsystem cost	\$1800	\$4210
CPU subsystem power	190W	310W
VMs / core	1	2
Number of VMs	96	48
IO subsystem	Integrated	External
IO Virtualization	Integrated	External or Software
vNIC to vNIC Switching	Hardware	Software or External
VM Security	Hardware	Software or External



# H270-T70 REDEFINING THE POSSIBLE

The MT70-HD0 server board and its associated 2U rackmount server, the H270-T70 are the first cache-coherent, dual socket ARM-based server platforms to be released to market. These two new models based on the Cavium ThunderXTM ARMv8 processor establish GIGABYTE's recent efforts to bring accomplished ARM-based server products to the market thereby opening new doors for scale-out server workloads.



# MT70 Product Plan Overview



High-density



2U 4 Node Front Access  
H270 Series



2U 4 Node Rear Access  
H260 Series

Open Rack



Racklution-SE



Racklution-EX

# DATACENTER



Based on the Open Rack standard, GIGABYTE designs solutions for datacenters with one of the best energy performance in the industry.

The Open Rack is the first standard that is designed for datacenters, integrating the rack into its infrastructure. It is part of the “grid to gates” approach, which considers the interdependence of everything from the power grid to the gates in the chips of each motherboard.

Following this standard, GIGABYTE has created an innovative solution based on:

- **Cutting Edge Modular Design**
- **Extreme Power Efficiency**
- **Full Scalability**
- **Easy Assembly & Handling**

# Racklution Series System Map

## Computing

From Single to Multiple Processor , x86/ARM/GPGPU for computing  
Universal Tray for Pure/Mixed Environment for different application needs

### General x86 Computing Node

Easy to Adopt Off-the-shelf standard boards  
uATX/ATX/EATX UP/DP/MP with 3.5"/2.5" HDD

### High Density x86 Computing Node

Ivy Bridge / Grantley / Purley DP Half Width boards,  
Denlow / Greenlow UP mini-ITX Boards  
1U 2-Node computing tray

### High Efficiency ARM based Computing Node

High Density and High Efficiency ARM x64 architecture  
For MicroServer and/or Xeon Grade Applications

### High Performance GPU/GPGPU Computing Node

For GPGPU HPC, VDI & Media application with GPU  
1U 1 or 2 Computing Node computing + 1 to 2 GPGPU / GPU

### JBOD Node

16x 3.5" HDD in 1U / 24, 28 x3.5" HDD in 2U  
Support Cascading and Dual Channel SAS supported for 1U JBOD  
Support Cascading and Single Channel SAS supported for 2U JBOD

### Data Node

Flexible Configuration for Data Node / Scale Out Storages  
With Efficient x86 or ARM based controller + 14 or 16 HDDs in 1U

### Open Rack Switch

From L2 to L3 SDN switch  
48 Port GbE to 4x10GbE QSFP+ switch

### Embedded Switch

L2 Embedded Switch to reduce Cabling  
Hassel Free Cabling and Cost Effective



## Storage

From direct attached to scale out storage  
High Density JBOD and flexible data nodes for cloud and cold storage

## Networking

From L2 to SDN switches  
For better cable management and enable high performance connection

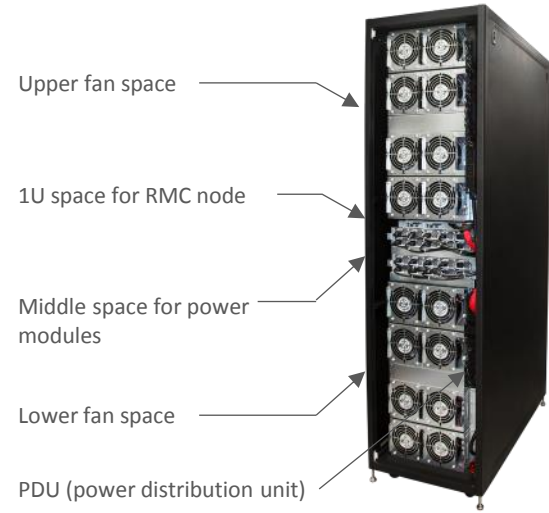
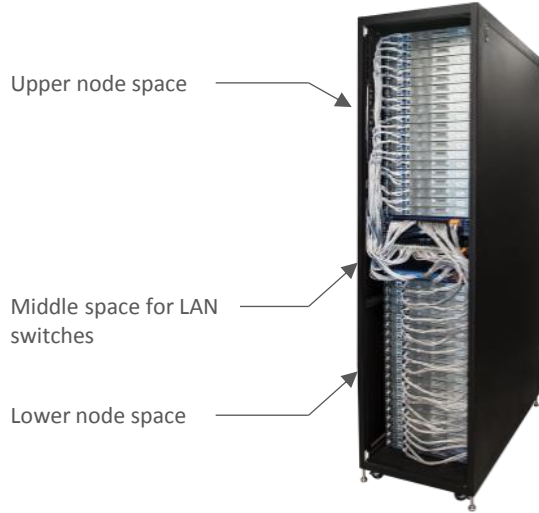
# Racklution Systems

## Open Racks

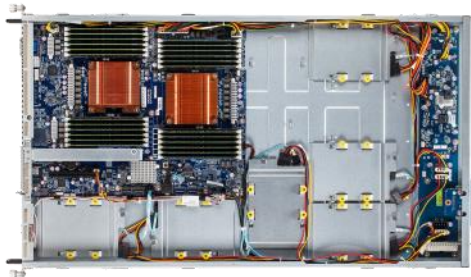
- 42U
- 21U
- Customized dimensions
- Can be optimized for specific applications
- High flexibility, large configuration possibilities
- Top efficiency with consolidated power supply and rack-level power distribution
- Hot-swappable fans, cooling removed from the racks
- Aggregated remote management control
- “Per U” design, simplifying and speeding up the integration



# Racklution Systems

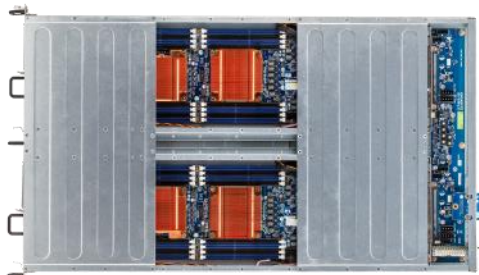


Height	Power Bank (Set/Max Watts)	LAN Switch Space	Main Node Space	Total Number of Nodes (1U/2-Nodes Racks)	Total Number of Nodes (1U/1-Node Racks)
47U	2/32kW	7	20U + 20U	80	40
44U	1/16kW	4	20U + 20U	-	40
25U	1/16kW	5	10U + 10U	40	20
13U	1/16kW	3	10U	20	10



## Single Node Rackmount

<b>Form Factor</b>	1U
<b>Motherboard</b>	GA-7PPSH or GA-7PPSH2
<b>Access</b>	Front
<b>Storage</b>	6 x 3.5" internal fixed bays Mounted on anti-vibration rubber spacers
<b>PCIe Slots</b>	1 x Full-length low-profile slot 1 x PCIe x16 (Gen3 x16 bus) connector
<b>Front I/O</b>	1 x Power button with LED 1 x ID button with LED 2 x LAN activity LEDs 1 x HDD activity LED 1 x System status LED 1 x Reset button



## Dual Node Rackmount

<b>Form Factor</b>	1U - 2 nodes
<b>Motherboard</b>	GA-7PTSH or GA-7PTSV
<b>Access</b>	Front
<b>Storage</b>	2 x 3.5" internal fixed bays Mounted on anti-vibration rubber spacers
<b>PCIe Slots</b>	2 x Half-length low-profile slots 2 x PCIe x16 (Gen3 x16 bus) connectors
<b>Front I/O</b>	-

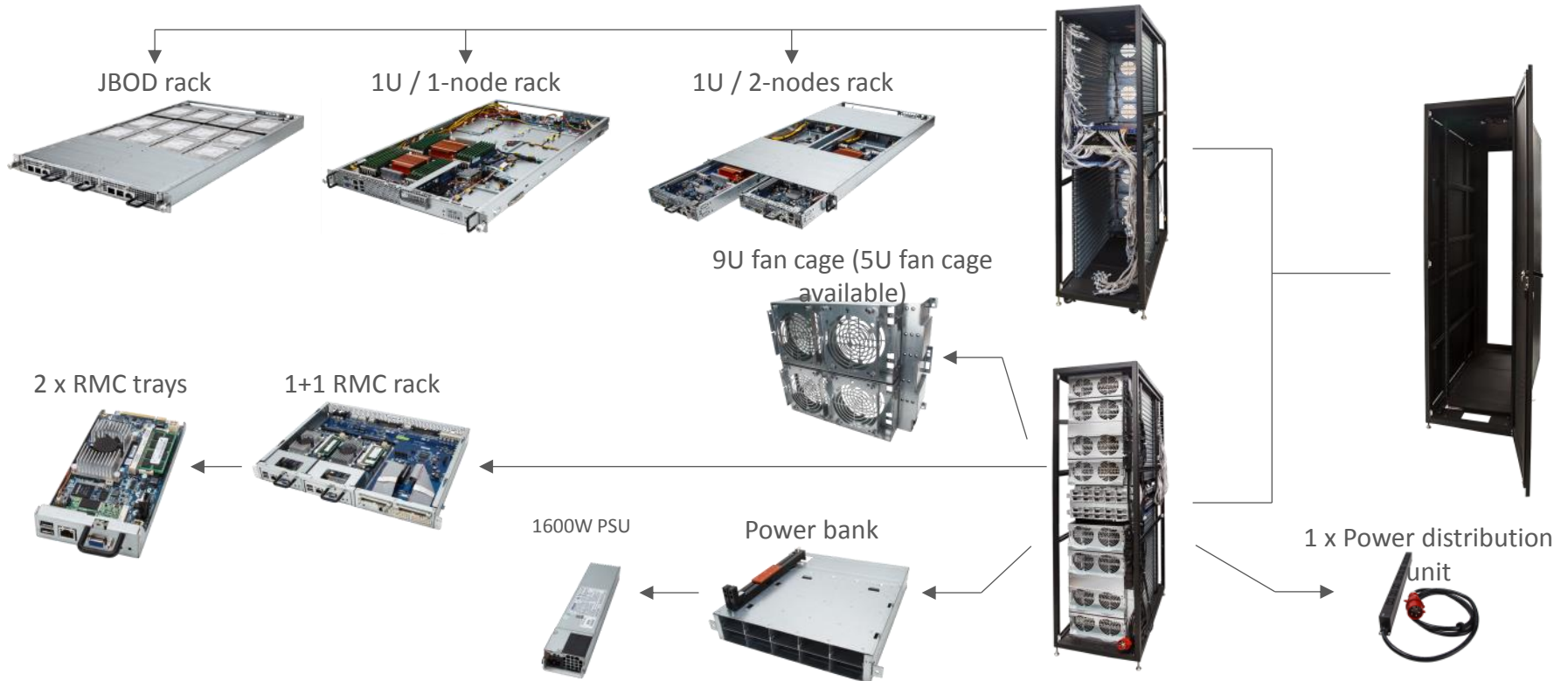


## JBOD Rackmount

<b>Form Factor</b>	1U
<b>Motherboard</b>	-
<b>Access</b>	Front
<b>Storage</b>	16 x 3.5" internal hot-swappable bays Mounted on anti-vibration rubber spacers Retractable drive tray with mobile cable arm
<b>SAS</b>	2 x LSI SAS2X28 expander trays 4 x External SAS 6Gb/s ports for inter-rack connections
<b>Monitoring</b>	1 x Aspeed AST1050 management controller tray Avocent MergePoint IPMI 2.0 web interface 1 x 10/100/1000 management LAN



# Compatible to Industry rack cabinet (1.2M depth), Standard building block and Configuration to order with local rack integration.



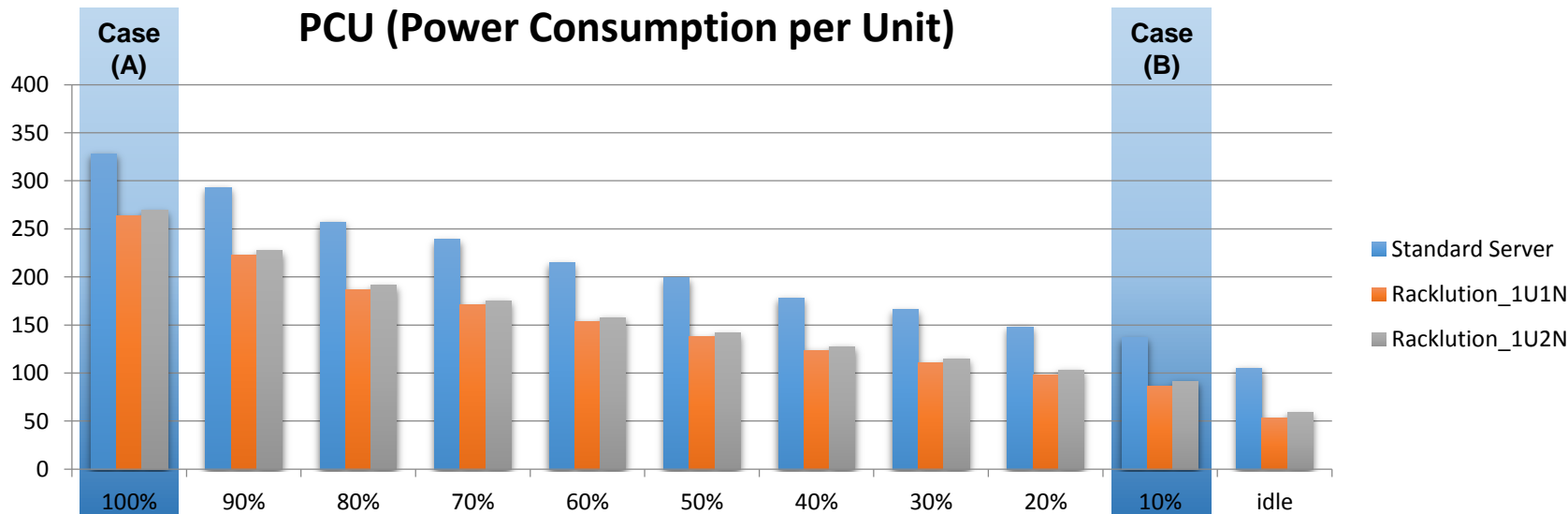


# Advantage on Power Energy Saving

**LESS POWER** required per unit output - **up to 20%~40% save**

**GIGABYTE RACKLUTION** required Less power consumption comparing with standard server.

- Case (A) - Full loading(100%) - Standard server 328w, GIGABYTE Racklution **only 263w**
- Case (B) - Minimum loading(10%) - Standard server 137w, GIGABYTE Racklution **only 86w**

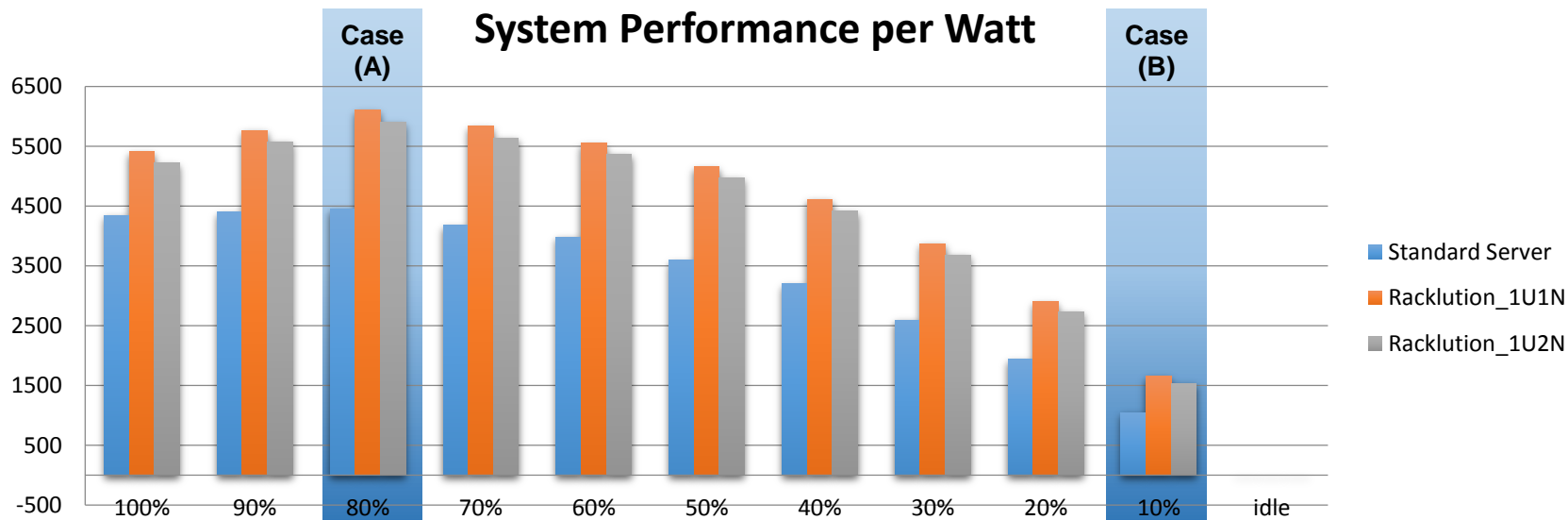


# Advantage on Power Energy Saving

**BETTER PERFORMANCE** per watt - **OPS score up to 1661 higher**

**GIGABYTE RACKLUTION** achieve better performance comparing with standard server.

- Case (A) - Full loading(80%) - Standard server 4443, GIGABYTE Racklution **6104**
- Case (B) - Minimum loading(10%) - Standard server 1040, GIGABYTE Racklution **1650**



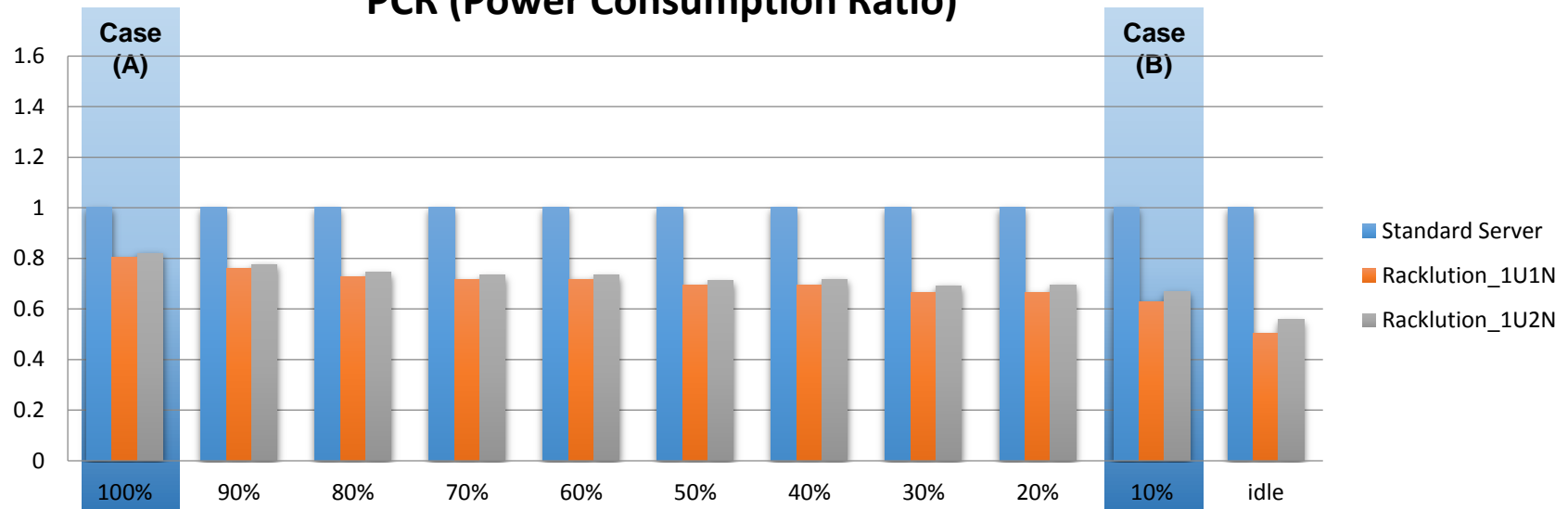
# Advantage on Power Energy Saving

**BEST** in **POWER RATIO** evaluation - up to 20%~40% save

**GIGABYTE RACKLUTION** required Less power consumption comparing with standard server.

- Case (A) - Full loading(100%) - Standard server 1, GIGABYTE Racklution **only 0.8**
- Case (B) - Minimum loading(10%) - Standard server 1 , GIGABYTE Racklution **only 0.6**

**PCR (Power Consumption Ratio)**



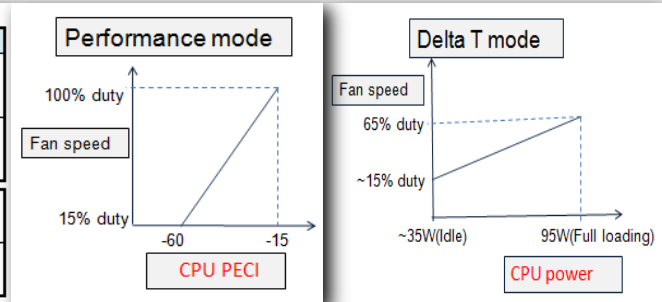
# Advantage on Thermal Treatment Technology

## STRONG CAPABILITY for Thermal trouble-shooting

- **Case study:**
- **Location:** ECO data center in North Europe
- **Average Temp.:** Annual Low +4.5C ~ High +8.3C.
- **Unstable High peak temp.** often appear during summer: up to +35C ~ +37C
- **GIGABYTE Racklution solution:** Combining the results of continues study and experiments, GIGABYTE innovated **Unique Fan policy** on balancing the CPU power and Fan speed control.
- **Results:** **Responding to the constantly or sudden weather change**, GIGABYTE Racklution team is capable of overcoming thermal overheating issues immediately.

Weather (average. Temp. in 2013)

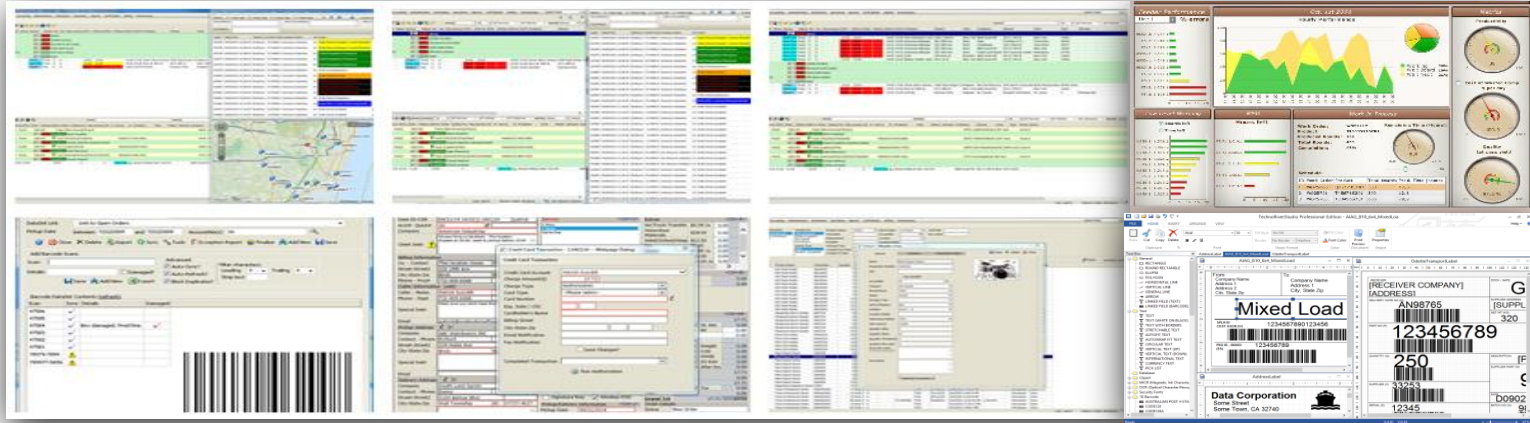
Region	Temp. \ Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
Korea Chuncheon	Average temp.℃ (High)	1.3	4.4	10.8	18.7	23.6	27.4	29.2	29.5	25.1	19.3	10.8	3.7	17
	Average temp.℃ (Low)	-9.7	-7.3	-1.6	4.4	10.4	16.4	20.7	20.5	14.3	6.7	0	-6.3	5.7
North Europe	Average temp.℃ (High)	-4.1	-3.7	0.5	7.2	15.2	20	21.3	19.6	13.9	8.3	2.4	-1.5	8.3
	Average temp.℃ (Low)	-6.9	-6.8	-2.9	2.9	9.9	14.9	16.6	15	10	5.4	0.1	-4.1	4.5



# Advantage on System validation & Inventory Management

## Comprehensive programs for full rack system validation, inventory management and RMA tracking management program

- **SHOP FLOOR** - Factory automation program brings efficiency, accuracy and visibility to all manufacturing processes. Easily captures production and QA data from serial barcode scanners, product changeovers, downtime and other efficiency data.
- **CONAN** - Customized full rack system test and inventory check program for quality insurance on rack, tray, components. Guarantee the correction of customer system hardware configuration.



# Advantage on Rack Overall Management

## Advanced Remote management

### Rack management focus on remote management center (RMC)

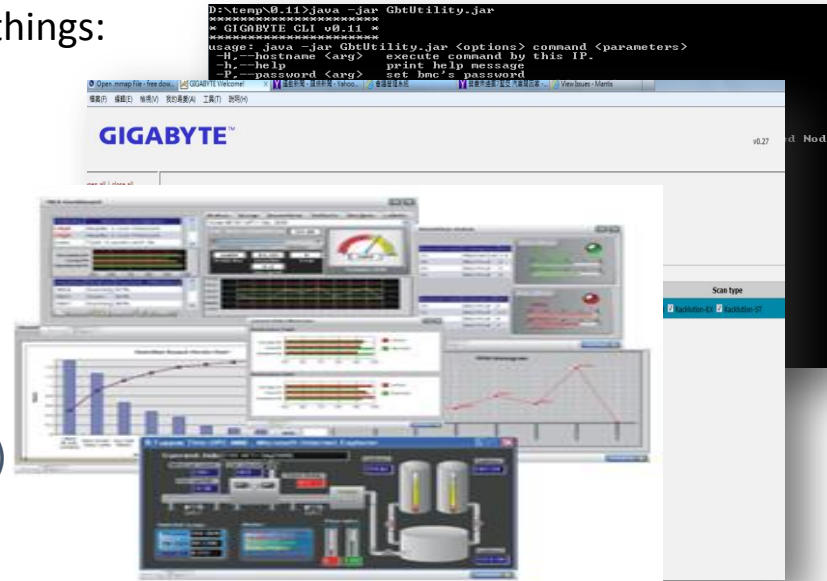
RMC required in each rack and will be connected to all rack components via I2C bus. The tasks performed by the RMC will include, among other things:

#### -System control

- FAN speed control and management
- Compute powered on/off

#### -Information collection

- Compute ID & status at a rack level
- Compute node status event escalation (IPMI 2.0)
- Compute node & rack level power consumption
- FAN speed
- Power bank status



# Gigabyte Racklution Overview

	Racklution-ST	Racklution-EX
Unit height	44.4mm	44.4mm
Unit width	440mm	537mm
Unit depth(Tray depth)	800mm	800mm
Max Nodes in a Rack	20x2x2=80 nodes	21x2x2=84 nodes
Units in a Rack	25U, 44U, Max 48U	Max 48U
Space for switch	6U(S) & 2U(L)	3U(S)/2U(L)
available Units	20Ux2=40U	21Ux2=42U
Rack height	2360mm	2360mm
Rack width	600mm	800mm
Rack depth	1200mm	1200mm
FAN specification	172mm FAN x16	140mm FAN x 30
FAN SPEED control	Central control by RMC	FANs control by 5U/8U I2C BPB
FAN location	Rear Side of Rack	Rear Side of Rack
Environment temp.	+35C *1	+35C
HDD hot swap	No	Yes

# Gigabyte Racklution – System Map

## Computing

From Single to Multiple Processor , x86/ARM/GPGPU for computing  
Universal Tray for Pure/Mixed Environment for different application needs

### General x86 Computing Node

Easy to Adopt Off-the-shelf standard boards  
uATX/ATX/EATX UP/DP/MP with 3.5"/2.5" HDD

### High Density x86 Computing Node

Ivy Bridge / Grantley / Purley DP Half Width boards,  
Denlow / Greenlow UP mini-ITX Boards  
1U 2-Node computing tray

### High Efficiency ARM based Computing Node

High Density and High Efficiency ARM x64 architecture  
For MicroServer and/or Xeon Grade Applications

2015

### High Performance GPU/GPGPU Computing Node

For GPGPU HPC, VDI & Media application with GPU  
1U 1 or 2 Computing Node computing + 1 to 2 GPGPU / GPU

2015

### JBOD Node

16x 3.5" HDD in 1U/ 24, 28 x3.5" HDD in 2U  
Support Cascading and Dual Channel SAS supported for 1U JBOD  
Support Cascading and Single Channel SAS supported for 2U JBOD

### Data Node

Flexible Configuration for Data Node / Scale Out Storages  
With Efficient x86 or ARM based controller + 16 HDDs in 1U

2015

### Open Rack Switch

From L2 to L3 SDN switch  
48 Port GbE to 4x10GbE QSPF+ switch

2015

### Embedded Switch

L2 Embedded Switch to reduce Cabling  
Hassel Free Cabling and Cost Effective

## Storage

From direct attached to scale out storage  
High Density JBOD and flexible data nodes for cloud and cold storage

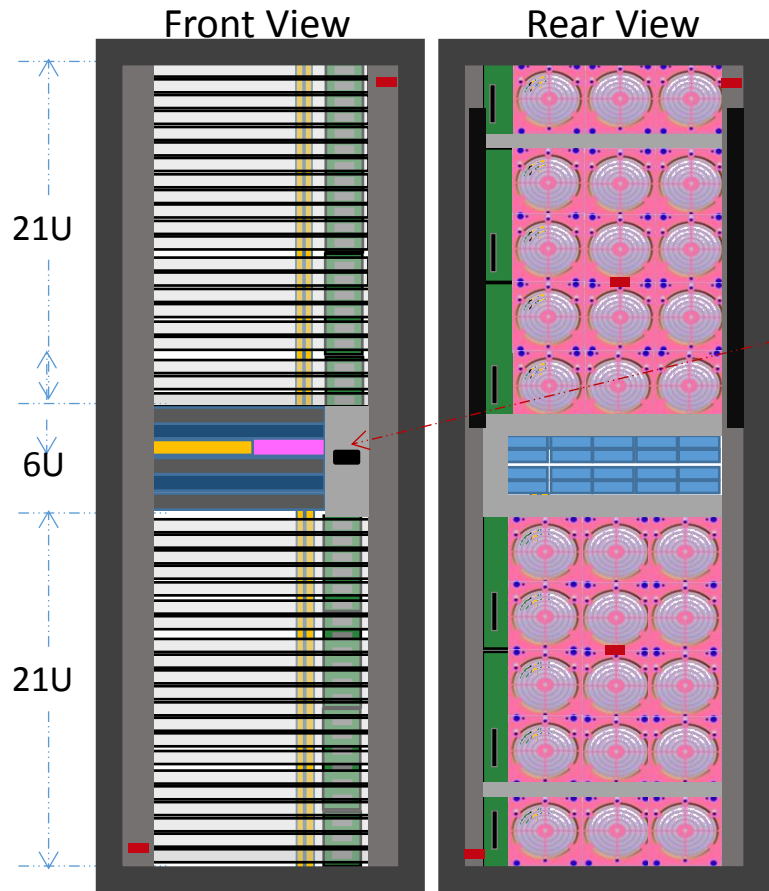
## Networking

From L2 to SDN switches  
For better cable management and enable high performance connection





# Gigabyte Racklution-EX System View



## Front Side

- 21U + 21U = 42U for Node configuration
- 6U : 1U RMC Box, 5U for LAN switch or cable holder
- 1 AC220 power connector on front side for easy maintains by others equipment



- Management LAN port integrate in system for reduce LAN cable in front

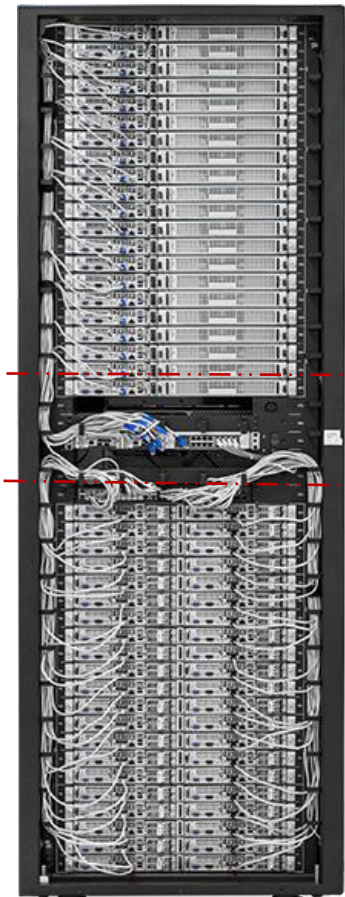
## Rear Side

- Hot swappable FAN module for easy maintains
- Easy swap management box
- Hot swappable PSU
- PDU on both side of power bank for cable management

# Gigabyte Racklution-EX LAN Switch Support

## Worldwide spec. support (Maxima length)

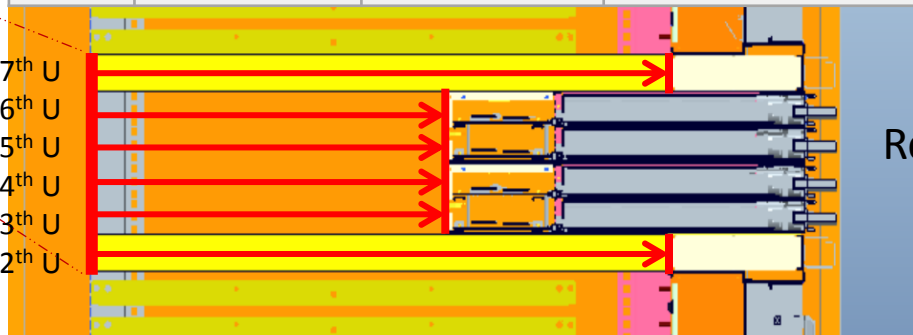
Location	Switch Width Max	Switch Length Max	Power Cable Length Max
27U	450MM	740MM	60MM
26U	Cable management Bracket		
25U	RMC BOX		
24U	450MM	430MM	60MM
23U	Cable management Bracket		
22U	450MM	740MM	60MM



6U

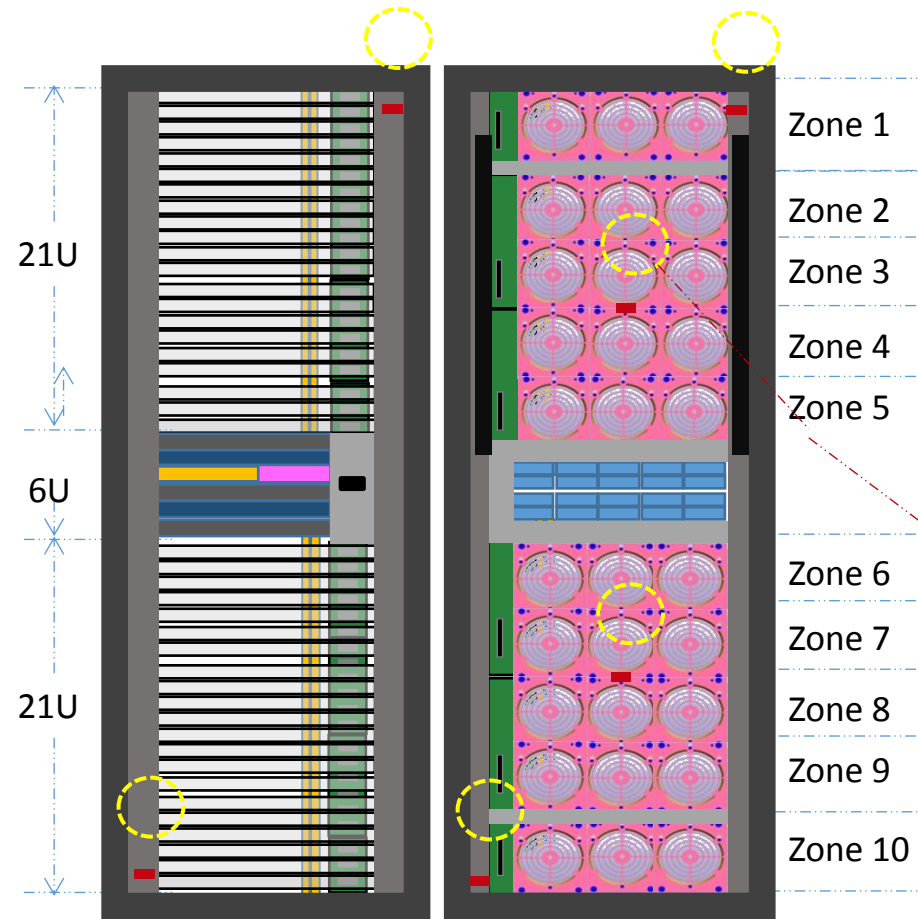
Front

27<sup>th</sup> U  
26<sup>th</sup> U  
25<sup>th</sup> U  
24<sup>th</sup> U  
23<sup>th</sup> U  
22<sup>th</sup> U



Rear

# Racklution-EX - Higher Efficiency on Thermal



- 30 x 140mm FAN on rear side of rack for whole rack cooling
- Rack are divided into **10 individual cooling zones** each cooling zone has it's own FAN speed policy
- **Thermal sensor** connector in front and rear side for best FSC tuning on data center environment ( 2 in front and 4 in rear )

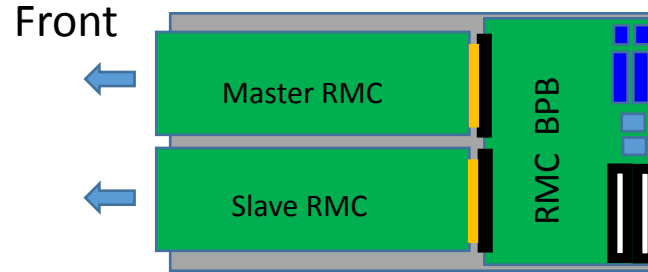
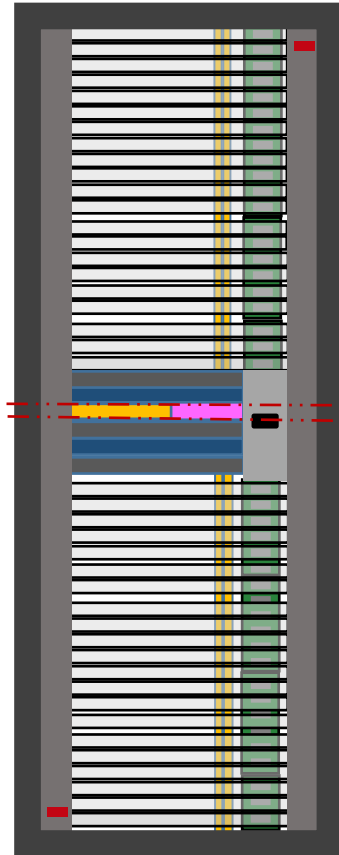


Thermal Sensor Module



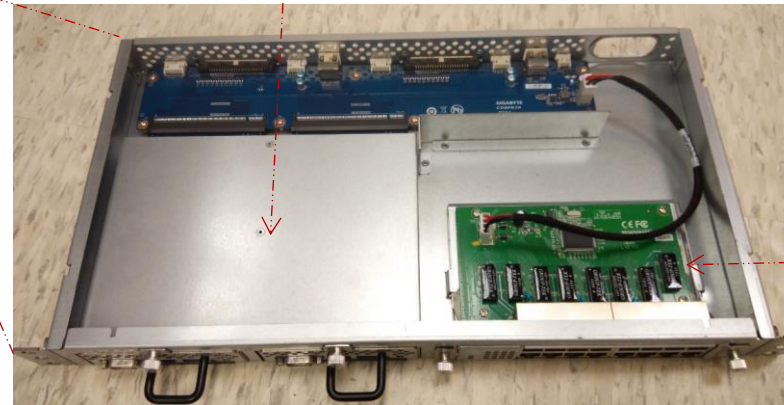
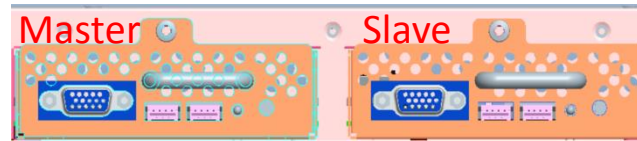
- FAN flapper module for options **ANTI-AIR REFLOW**

# GIGABYTE Racklution-EX - RMC & MLAN Switch



## RMC Box

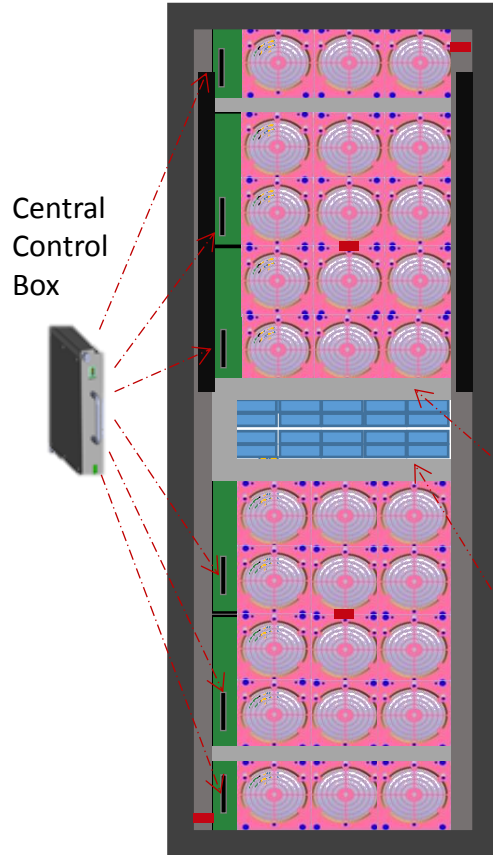
- Redundant mechanism and support hot-plug support



## MLAN Switch

- Integrate 16 ports LAN switch for internal management LAN

# GIGABYTE Racklution-EX -Central Control design



## Central Control Box

- Hot-plug support for easy maintains
- Build in management LAN switch for connect to each node
- FAN speed control for separate cooling zone
- Build in BMC chip for node management

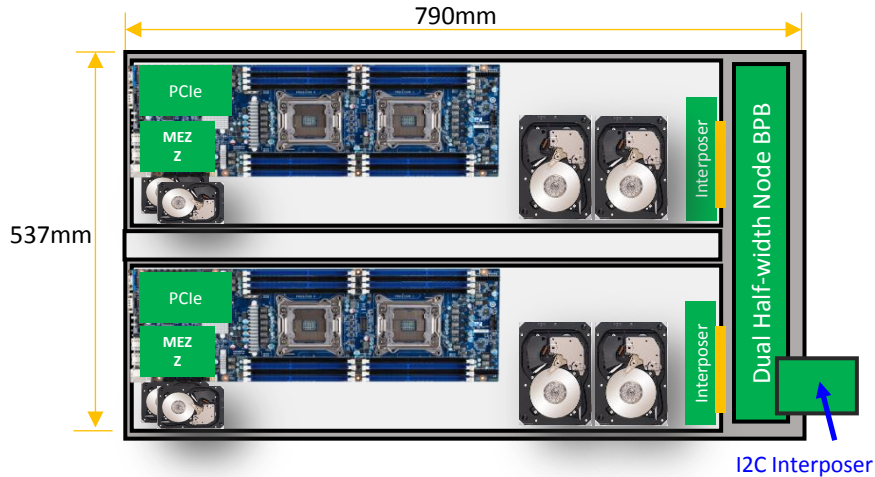
## Power Bank

- Dual power banks for support up to 30KW (20KW & 15KW for option)
- Each power bank support 9+1 power redundancy



- Cable holder kit for PSU cable management

# GIGABYTE Racklution-EX - 1U 2 Computing Nodes



- High density computing tray
- Tray width extend to 21" get more space for thermal optimization & easier cable routing
- Support 2 hot swappable 2.5" HDD on front side & 2 easy swappable 3.5" HDD on rear side
- Each node can be removed without shut down tray power when maintains
- 2 PCIe expansion slots for support more functions (1 standard PCIe MD2 & 1 Mezzanine)

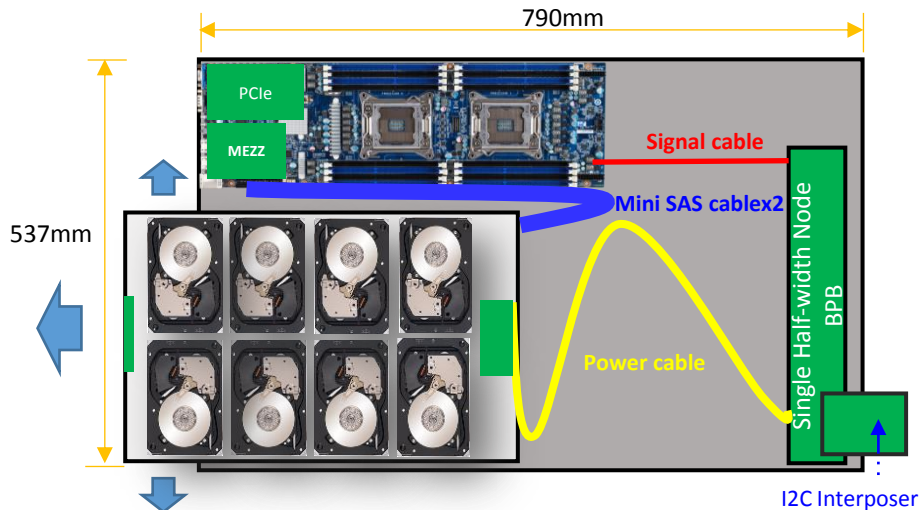
## Specifications

**Form Factor** 1U 2Nodes

**Access** Front

**HDD / SSD Bays** 2 x 2.5" Hot Swappable HDD tray in front  
2 x 3.5" internal fixed trays  
Mounted on anti-vibration rubber spacers

# GIGABYTE Racklution-EX – 1U 1 Computing Node



- Half width Motherboard (Grantley Platform)
- Support up to 8 x 3.5" hot swappable HDDs
- HDD tray tool-less design for easy maintains
- 2 PCIe expansion slots for support more functions (1 standard PCIe MD2 & 1 Mezzanine)

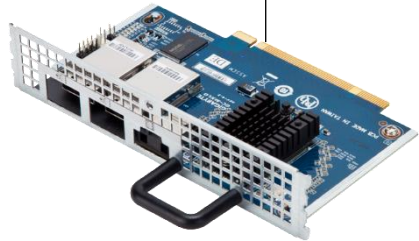


## Specifications

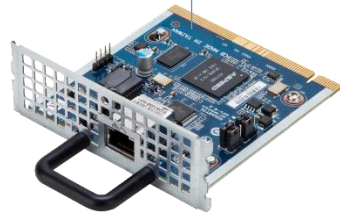
<b>Form Factor</b>	1U
<b>Access</b>	Front
<b>HDD / SSD Bays</b>	8 x 3.5" Hot Swappable Trays

# 1U JBOD Node

JBOD Chassis



LSI SAS Expander Tray



Remote Management  
Controller Tray

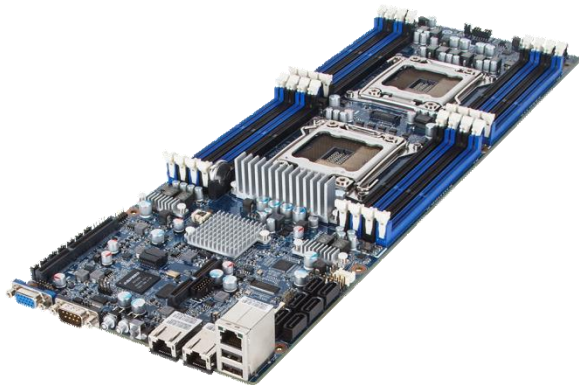
## Specifications

<b>Form Factor</b>	1U
<b>Access</b>	Front
<b>HDD / SSD Bays</b>	16 x 3.5" internal trays Mounted on anti-vibration rubber spacers Retractable drive plane tray supporting drive hot-swap
<b>SAS / SATA</b>	2 x LSI SAS2X28 expander trays 2 x Internal Mini-SAS connectors for JBOD extensions 4 x External SAS 6GB/s ports for inter-rack connections
<b>Server Management</b>	ASPEED AST1050 controller IPMI 2.0 1 x 10/100/1000Mbps management port
<b>PSU Connector</b>	High efficiency copper connectors



# MB Solution for Racklution

# Half Width MB Solution – Grantley Platform



MH70-HD1

	MH70-HD1
<b>Form Factor</b>	Proprietary half-width 165W x 492D mm (6.5" x 19.4")
<b>CPU</b>	Intel Haswell Xeon E5-2600 v3 Single Processor Socket (LGA 2011) Socket R3
<b>Chipset</b>	Intel C610 (Wellsburg)
<b>Memory</b>	16 x DIMM slots support four channel, 1333 MT/s Single Rank or Dual Rank RDIMMs; 1866MT/s (2 DPC), 2133MT/s (1 DPC), 2133 MT/s w/LRDIMM (2 DPC), RDIMM, LRDIMM (3DS w/Broadwell)
<b>LAN</b>	Dual Gigabit Ethernet LAN ports (Intel I350-AM2) 1 x Management LAN
<b>Video</b>	Integrated in ASPEED 1920x1200@60Hz 32bpp
<b>SATA</b>	6 x SATA III 6Gb/s ports
<b>RAID</b>	Intel SW RAID 0/1/5/10
<b>Expansion Slots</b>	1 x Mezzanine I/F PCIe x8 (@Gen3 x8 bus) slot 1 x Low profile PCIe x16 (@Gen3 x16 bus) slot
<b>Rear I/O</b>	2 x USB 2.0, 2 x RJ45, 1 x 10/100 management LAN 1 x Serial, 1 x VGA 1 x Power button, 1 x ID Switch button with LED 1 x NMI button, 1 x BMC reset button, 1 x Power status LED
<b>Server Management</b>	ASPEED IPMI 2.0, iKVM

# MT70 Product Plan Overview



High-density



2U 4 Node Front Access  
H270 Series



2U 4 Node Rear Access  
H260 Series

Open Rack



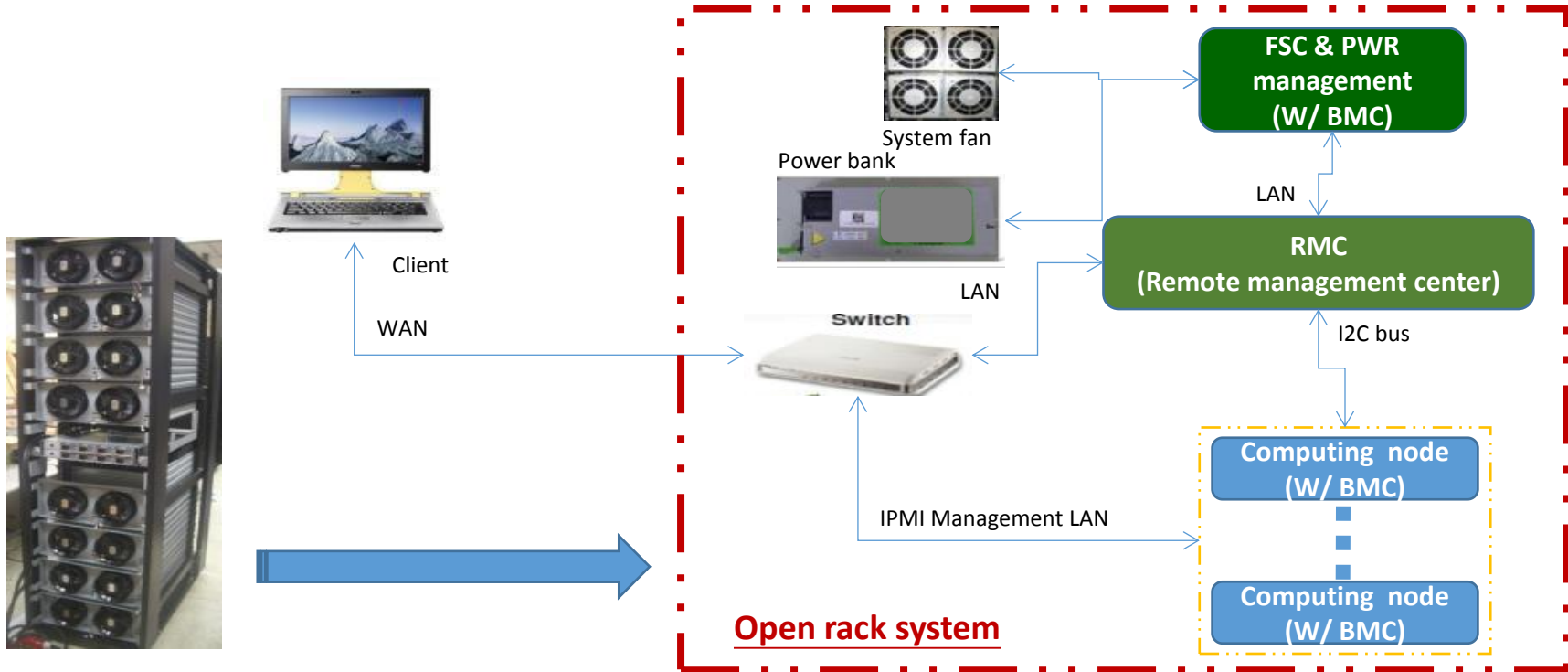
Racklution-SE



Racklution-EX

# More About Open Racks

## Rack Management



# Accessories

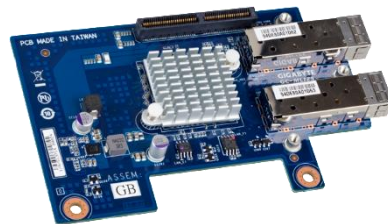
Add-on Card Solution

# Accessories – Network Card

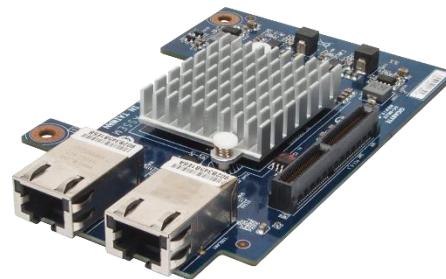
GC-MLBZ1



GC-MLIZS



GC-MLIZ



**Rear I/O**

2 x 10GbE SFP+ ports

2 x 10GbE SFP+ ports

2 x 10GbE BASE-T ports

**Controller**

Broadcom BCM57810S

Intel 82599

Intel X540

**Interface**

PCIe x8 (2.0 x8 bus)

PCIe mezzanine card (2.0 x8 bus)

PCIe mezzanine card (2.0 x8 bus)

**Dimensions**

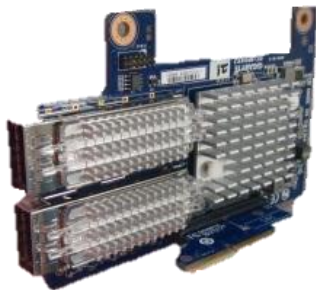
145 x 68.9 mm

76.8 x 98 mm

76.8 x 98 mm

# Accessories – Network Card

GC-MNXE2



**Rear I/O**      Infiniband (FDR) ports

**Controller**      Mellanox

**Interface**      PCIe x8 (3.0 x8 bus)

**Dimensions**    76 x 98 mm

# Accessories – Storage Card

GC-MSLZ1



GC-MSLZ2



GC-MSLZ3



<b>I/O</b>	2 x Internal mini-SAS for 8 x SAS 6GB/s ports	2 x Internal mini-SAS for 8 x SAS 6GB/s ports	2 x External mini-SAS for 8 x SAS 6GB/s ports
<b>Controller</b>	LSI SAS2208	LSI SAS2008	LSI SAS2008
<b>RAID</b>	Hardware RAID RAID 0/1/5/6/10/50/60 RAID 5/6 XOR engine (single pass)	Firmware RAID RAID 0/1/1E/10 No MegaRAID	Firmware RAID RAID 0/1/1E/10/5/50 MegaRAID support
<b>Interface</b>	Mezzanine card (2.0 x8 bus)	PCIe x8 (2.0 x8 bus)	PCIe x8 (2.0 x8 bus)
<b>Dimensions</b>	76.8 x 98 mm	145 x 68.9 mm	145 x 68.9 mm



# Accessories – Storage Card

GC-MSLZ4



GC-RA200-8



GC-RA201-A



<b>I/O</b>	2 x External mini-SAS for 8 x SAS 6GB/s ports	2 x Mini-SAS for 8 x SAS 6GB/s ports	2 x Mini-SAS for 8 x SAS 6GB/s ports
<b>Controller</b>	LSI SAS2008	LSI SAS2308	LSI SAS2208
<b>RAID</b>	Firmware RAID RAID 0/1/1E/10 No MegaRAID	Firmware RAID RAID 0/1/1E/10	Hardware RAID RAID 0/1/5/6/10/50/60
<b>Interface</b>	PCIe x8 (2.0 x8 bus)	PCIe x8 (3.0 x8 bus)	PCIe x8 (3.0 x8 bus)
<b>Dimensions</b>	145 x 68.9 mm	145 x 68.9 mm	165 x 68.9 mm

# Accessories – Storage Card

CRA333-8



CSA4-02G



CSA4-03G



**I/O**

2 x Internal mini-SAS HD for 8 x SAS 12 GB/s ports

4 x Internal Mini-SAS HD for 16 x SAS 12GB/s ports

2 x Internal & 2 x External Mini-SAS for 16 x SAS 12GB/s ports

**Controller**

LSI SAS3008

PMC PM8076

PMC PM8076

**RAID**

Firmware RAID  
RAID 0/1/1E/10  
Support MegaRAID

NBA Non-RAID Function

NBA Non-RAID Function

**Interface**

PCIe x8 (3.0 x8 bus)

PCIe x8 (3.0 x8 bus)

PCIe x8 (3.0 x8 bus)

**Dimensions**

167.64 x 68.9 mm

167.64 x 68.9 mm

167.64 x 68.9 mm

# WORKING WITH US



**Your needs!**

# WHERE WE ARE

## East Europe

- Czech
- Poland
- Romania
- Serbia
- Russia
- Ukraine

## Europe

- France
- Germany
- Holland
- Italy
- Spain
- Turkey
- UK

## North America

- USA
- Mexico

## South America

- Brazil

## Middle East & Africa

- Dubai
- Egypt
- Iraq
- South Africa

## Asia & Oceania

- Australia
- Bangladesh
- Hong kong
- India
- Indonesia
- Japan
- Korea
- Singapore
- Sri Lanka
- Thailand
- Viet Nam

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- Hsinchu
- Hsintien
- Junghe
- Kaoshiung
- Taipei
- Taoyuan
- Taichung
- Tainan

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- Baotou
- Beijing
- Changsha
- Changchun
- Chengdu
- Chungking
- Dalian
- Dongguan
- Foshan
- Fuzhou
- Guangzhou
- Guiyang
- Haikou
- Hangzhou
- Harbin
- Hefei
- Nanchang
- Nanning
- Nanjing
- Ningbo
- Jinan
- Kunming
- Lanzhou
- Liuzhou
- Qingdao
- Shanghai
- Shantou
- Shenyang
- Shenzhen
- Shijiazhuang
- Suzhou
- Taiyuan
- Wenzhou
- Wuhan
- Wulumuqi
- Wuxi
- Xiamen
- Xian
- Xujiahui
- Zhengzhou
- Zhongguancun
- Zhuhai

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*Upgrade Your Life*