GIGABYTE Position in ARM Server Market
- Leading Pioneer

Akira Hoshino
Head of Product Strategy and Planning at GIGABYTE
2019/1/14
# Executive Summary

<table>
<thead>
<tr>
<th>Founded</th>
<th>April 1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPO</td>
<td>Listed on TSE since Sept. 24, 1998 (Taiwan)</td>
</tr>
<tr>
<td>Capital</td>
<td>US$ 197.61 million (NT$ 6.29 billion)</td>
</tr>
<tr>
<td>Gross Revenue</td>
<td>US$ 1,624.54 million (NT$ 52.3 billion @ 32.22)</td>
</tr>
<tr>
<td>Mfg. Capacity</td>
<td>Motherboard 1,730 K/M, Graphics Card 520 K/M, System Products 200 K/M, Laptop 55 K/M, Server Solution 100 K/M, Embedded and IoT 40 K/M</td>
</tr>
<tr>
<td>Purchasing</td>
<td>Direct account of Intel, AMD, Nvidia &amp; major ASIC</td>
</tr>
<tr>
<td>Technology</td>
<td>Key vendor's alpha &amp; beta site: Intel, AMD, Microsoft……</td>
</tr>
<tr>
<td>RD Expenditure</td>
<td>3% of revenue per year (= 25% of net profit)</td>
</tr>
<tr>
<td>Patents</td>
<td>Filed: 3,626; Approved: 2,271</td>
</tr>
</tbody>
</table>
Executive Team

Dandy Yeh / Chairman & President
Mitchell Liu / Executive Vice President

President Office

Justine Chen
Vice General Manager
Group Resource Mgmt. Center

Michael Lin / A.V.P.
Jeff Chen / Senior Division Director
Customer Service Center

Nill Bai
Chief Operating Officer
Operation Mgmt. Center

Mitchell Liu
Executive Vice President & G.M
Channel Solution B.U.

Etay Lee
General Manager
Network & Comm. B.U.

Jimmy Tseng
Senior Vice President
Kevin Meng / G.M.
Manufacturing B.U.

Johnson Lin
Senior Vice President & G.M.
Mobility Product Business Center

Johnson Lin
Senior Vice President & G.M.
Laptop
[ G-Style Ltd. ]

Etay Lee
Chairman
Industrial PC
[ GIGAIPC Ltd. ]
## Manufacturing Capacity

### Site Location
- Ning-Bo, China
- Nan-Ping, Taiwan
- Dong-Guan, China

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Ning-Bo</th>
<th>Dong-Guan</th>
<th>Nan-Ping</th>
<th>Total / Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motherboards</td>
<td>650 K</td>
<td>680 K</td>
<td>400 K</td>
<td>1,730 K</td>
</tr>
<tr>
<td>Graphics Cards</td>
<td>100 K</td>
<td>320 K</td>
<td>100 K</td>
<td>520 K</td>
</tr>
<tr>
<td>Desktops PC &amp; Peripherals</td>
<td>100 K</td>
<td>95 K</td>
<td>5 K</td>
<td>200 K</td>
</tr>
<tr>
<td>Laptops</td>
<td>45 K</td>
<td>-</td>
<td>10 K</td>
<td>55 K</td>
</tr>
<tr>
<td>Server</td>
<td>30 K</td>
<td>20 K</td>
<td>50 K</td>
<td>100 K</td>
</tr>
<tr>
<td>Embedded and IoT</td>
<td>-</td>
<td>-</td>
<td>40 K</td>
<td>40 K</td>
</tr>
<tr>
<td>Floor Space</td>
<td>60,000 M²</td>
<td>38,000 M²</td>
<td>45,000 M²</td>
<td></td>
</tr>
</tbody>
</table>
Global Operation & Support Centers

Europe
- Germany
- UK
- Holland
- Spain
- Turkey
- Russia
- Ukraine
- Poland
- Saudi Arabia
- South Africa

Middle East & Africa
- Algeria
- Bangladesh
- Hong Kong
- India
- Indonesia
- Japan

Asia & Oceania
- Korea
- Malaysia
- Philippines
- Singapore
- Sri Lanka
- Thailand
- Vietnam

Taiwan
- Taipei
- Hsinchent
- Taoyuan
- Taichung
- Tainan
- Kaoshiung

North America
- USA
- Mexico

South America
- Brazil
- Peru
- Argentina

China
- Baotou
- Beijing
- Canton
- Changchun
- Changzhou
- Chengdu
- Chongqing
- Dalian
- Dongguan
- Fuzhou
- Guiyang
- Hangzhou
- Harbin
- Hefei
- Jinan
- Jiangsu
- Kunming
- Lanbin
- Lhasa
- Longyan
- Nanchang
- Nanjing

- Nanning
- Ningbo
- Harbin
- Oce
- Qingdao
- Quanzhou
- Seaport
- Shanghai
- Shantou
- Shenyang
- Shenzhen
- Shijiazhuang
- Suzhou
- Taiyuan
- Urumqi
- Wenzhou
- Wuhan
- Wuxi
- Xi'an
- Xiamen
- Xuzhou
- Zhengzhou
- Zhongshan
- Zuhai
NCBU Milestone

1998

1999

2000

Commenced operations

2001

Won ODM contract for Hitachi’s Xeon DP server line-up

2002

Design-in supplier to Google’s greenfield DC

2003

Awarded Gold in Taiwan Excellence Awards 2006

2004

Merged with MCE BU

2005

Close co-operation with Microsoft

2006

Merged with PC-ODM BU, leading to volume production & price control economies of scale

2007

Established a separate portal at b2b.gigabyte.com

2008

2009

Released the first 2U HPC server supporting 8 computing cards

2010

Released AMD EPYC server to market

2011

Released Cavium ThunderX server to market

2012

Enlisted as an industrial member of the OCP and Openstack Taiwan

2013

Announced world wide first ARM64 server MB with Applied Micro ARM64 and new server family based on Cavium’s ARM-based SoCs

2014

2015

2016

Established a separate portal at b2b.gigabyte.com

2017

Released HXT StarDragon 4800 server to market

2018

2019

Future

Released AMD EPYC server to market

2020

Release HXT StarDragon 4800 server to market

(Plan)
Milestone of GIGABYTE ARM64 Server
APM X-Gene Worldwide First ARM64 Server

X-Gene WW First Real Server
2013-2014
Cavium ThunderX & ThunderX2 CRB

Cavium ThunderX CRB (Reference Board) 2014-2015

Cavium ThunderX 2 CRB (Reference Board) 2016-2017
19th July 2016 ThunderX World Premiere in Shanghai
Linaro Partnership and 96 Board

96Boards Developerbox (SynQuacer)

- Latest Tianocore EFI
- RPK Linux Kernel (4.14 / 4.16)
- SynQuacer SC2A11, 24x A53
- Up to 64GB DDR4
- GT-710 GFX

Linaro provided architecture guidance and review to the SoC vendor Socionext, and to the board ODM Gigabyte. This architecture guidance and review included board specifications, board layout, schematics review, in addition to identification of silicon errata fixes. An example of the breadth and depth provided in the following slide.
「悟空 Wukong」Project with Qualcomm/HXT

Qualcomm/HXT Most Optimized 19 Inch Traditional Server (2017-2018)
27th Nov 2018 StarDragon 4800 Lunch in Beijing

来自台湾的技嘉科技股份有限公司董事兼网通事业群总经理Etay Lee称，针对大陆推出的“悟空一号”，是2U双节点单路服务器，基于华芯通昇龙4800芯片，适用于国密，可以很快量产。
Advantage of GIGABYTE ARM Server Development
GIGABYTE Product Portfolio

R-Series
Affordable and expandable rackmount servers, offering ease-of-use, low power consumption and quiet operation

H-Series
Compact and scalable systems providing higher density computing power in a smaller footprint for cloud and other scale-out computing applications

G-Series
Versatile and scalable high performance computing with leading efficiency and performance. Ideal for datacenters

S-Series
Storage optimized servers that offer a high data density design, configuration flexibility, and HA and reliability features for data integrity

W-Series
A range of tower servers suitable for an office environment, from entry level to high end computing and HPC

N-Series
A new range of networking servers, gateway devices and edge computing devices

RACKLUTION
A datacenter solution simple in design, but also highly efficient in power consumption, computing power and configuration
GIGABYTE ARM64 Line-up

1U (R)

2U (R)

High-Density (H)

GPU (G)

Storage (S)

CAVIUM THUNDERX2

CAVIUM THUNDERX

CAVIUM THUNDERX

Sample

HUA×IN TONG 华芯通 StarDragon 4800

Available to GPU

StarDragon 4800

Sample

HUA×IN TONG 华芯通 4800

GIGABYTE ARM64 Line-up

2019/1/11
GIGABYTE Standard Server “Building Block”

- Mechanical Architecture
- Electric Bone
- Accessory

- HDD Tray
- Chassis
- Thermal Solution
- PSU
- MB
- Assembly Board
- LAN
- Storage

Hoshino NCBU 2019 Product
Minimized Investment, Most Diversities (1U&2U)

Common Design

R181 Series

GIGABYTE

R281 Series
Minimized Investment, Most Diversities (2U4N)
Flexible Sales & Partner Strategy

GIGABYTE™

- Distributors
- E-tailers / Resellers
- System Integrators
- Freelance IT Specialists
- OEM
- CSP
- Data Center
- Enterprise
- SMB & SOHO
Key ARM Product of 2019
MT91-FS1 Mother Board

ThunderX2 Dual Processor (CN9975-2000BG4077-Y21-G)

24 x DDR4 Conn.

2 x SATA III 6Gb/s

2 Slimline Conn. Speed: 12Gb/s For 8 SAS III 12Gb/s w/ LSI 3008

PCI-e x16 (@Gen3 x16 Signals) slot4

Proprietary PCI-e (@Gen3 x24 Signals) slot3

OCP1

Proprietary PCI-e (@Gen3 x24 Signals) slot2 (x16 S/W)

OCP2

Qlogic QL41102

AST2500 BMC

Proprietary PCI-e (@Gen3 x16 Signals) slot1 Share with slot2

VGA

Dual 10G USB (RJ45)

SFP+ 3.0

COM

MLAN

ID Button/LED

GIGABYTE™ Hoshino NCBU 2019 Product

2019/1/11
Mainstream 1U Dual Socket server R181-T90

- ARM
- 10 x 2.5" Hot-swap HDD
- MT91-FS1 Mother Board
- 3 x Low-profile Slot & 2 x OCP
- Redundant 1200W 80+ Platinum PSU
- DDR4 2667
- Gigabit LAN
- 12G SASS
Mainstream 2U Dual Socket server R281-T91

6 x Full Height Half Length & 2 x Low-profile & 2 x OCP

MT91-FS1 Mother Board

24 x 2.5” Hot-swap HDD

Redundant 1200W 80+ Platinum PSU

Rear 2 x 2.5” Hot-swap HDD
MT61-HD0 Mother Board

- ThunderX2 Dual Processor (CN9975-2000BG4077-Y21-G)
- 16 x DDR4 Conn.
- PCIe Gen3 x16 for Riser
- ASPEED AST2500 (Bottom Side)
- PCIe Gen3 x16 for Riser
- OCP (Gen3 x16)
- 1 x Slimline for 4 x SATAIII
- Qlogic QL41202 2 x 25G

Other features:
- Dual USB 3.0
- VGA
- Dual 25G MLAN
- 16 x DDR
- 4 Conn.
- PCIe Gen3 x16 for Riser
- Qlogic QL41202 2 x 25G
- 25G OCP (Gen3 x16)
H261-T61 2U4Node Rear-access High Density Server

16 x 2.5" Hot-swap HDD & 8 x Dummy cover (4 x HDD & 2 x Dummy cover; Default 4 x SATA3 per Node)

8 x 8038 Fan

Redundant 2200W 80+ Platinum

4 Node Rear-access with MT61-HD0
8 x ThunderX2 CN9975-2000BG4077-Y21-G Dual Processor (BGA)
Wukong Project Sku1 (H221-Q20) Spec

**GIGABYTE**
**H221-Q20**

- 2U2Node UP Server
- Support StarDragon 4800
- 750mm High End Chassis
- 12 x 3.5”/ 2.5” HDD
- Platinum Redundant PSU
Wukong Project Sku2 (H221-Q21) Spec

GIGABYTE
H221-Q21

- 2U2Node UP Server
- Support StarDragon 4800
- 720mm High End Chassis
- 24 x 2.5”HDD / SSD
- Support 16 x U.2 SSD
- Platinum Redundant PSU
Core Member of ARM Server Market
ARM Server Ready & Certification

Partners

AMPERE™
Femrice
Huaxin Tong
GIGABYTE™
Qualcomm
UiT
M A R V E L L™

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