



DELIVERING SCALABLE CLOUD-GAMING

Supermicro Systems with Intel® Data Center GPU Flex Series



SYS-620C-TN12R



SYS-210GT-HNC8F



SYS-210GP-DNR



SYS-420GP-TNR

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SUPERMICRO

As a global leader in high performance, high efficiency server technology and innovation, we develop and provide end-to-end green computing solutions to the data center, cloud computing, enterprise IT, big data, HPC, and embedded markets. Our Building Block Solutions® approach allows us to provide a broad range of SKUs and enables us to build and deliver application-optimized solutions based upon your requirements.

Executive Summary

Cloud gaming is changing how people play computer games by directly streaming games onto players’ devices without game download or software purchase. New services are emerging to address novel needs, such as live, low latency, video streaming of games to millions of online spectators. Cloud gaming brings new opportunities to service providers and game developers.

Cloud gaming services increase value to players and game developers. Players can immediately access more sophisticated games using computers, mobile, Android devices, and proprietary consoles without paying for the latest hardware. In addition, game developers could reach more potential players on cloud platforms by easily supporting more devices. With advancements and democratization in networking, visual cloud, and artificial intelligence technologies, the gaming market has a CAGR of 13%¹ from 2021 to 2028.

Supermicro offers all the system components for cloud service providers to build green, cost-effective, and profitable cloud gaming infrastructure. This paper describes the requirements, systems, and architecture to build cloud gaming infrastructure.

SUPERMICRO X12 WITH INTEL® DATA CENTER GPU FLEX SERIES

SYS-620C-TN12R
 2U Rackmount
 Dual Intel® CPU
 Up to 6 GPUs



SYS-210GP-DNR
 2U, 2 server nodes
 Single Intel® CPU / node
 Up to 3 GPUs per node



SYS-210GT-HNTF
 2U, 4 server nodes
 Single Intel® CPU
 Up to 1 GPU per node



SYS-220BT-DNTR
 2U, 2 server nodes
 Dual Intel® CPU
 Up to 4 GPUs per node



SYS-420GP-TNR
 4U Rackmount
 Dual Intel® CPU
 up to 10 GPUs



SBE-610P Series
 6U, 10 Blade servers
 Single Intel® CPU / blade
 Up to 2 x GPU per blade



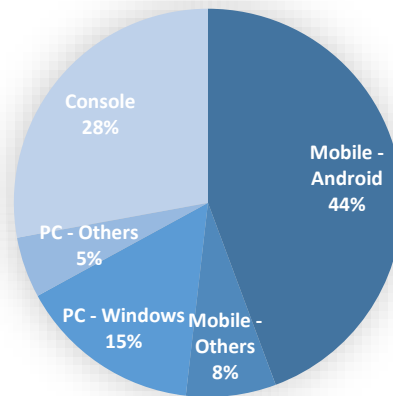
Cloud Gaming Market

Cloud Gaming is a fast-growing technology segment with rapid technology changes, adoption, and increasing business opportunities for service providers and game publishers.

Cloud gaming infrastructure serves a myriad of gaming devices - desktops, laptops, mobile tablets, mobile phones, and dedicated game consoles. Soon, virtual reality (VR), augmented reality (AR), and mixed reality (MR) will also be supported by the cloud gaming infrastructure, driven by technological advancements in data center servers and human-computer interfaces in client devices.

A particular fast-growing segment of cloud gaming is Multiplayer Online Games (MMOG), which account for 28% of the global market share in 2019². Centralized servers in the cloud are needed to coordinate MMOG. Another significant segment is mobile games, which account for 52% of the gaming³ market.

2021 Global Games Market \$180B

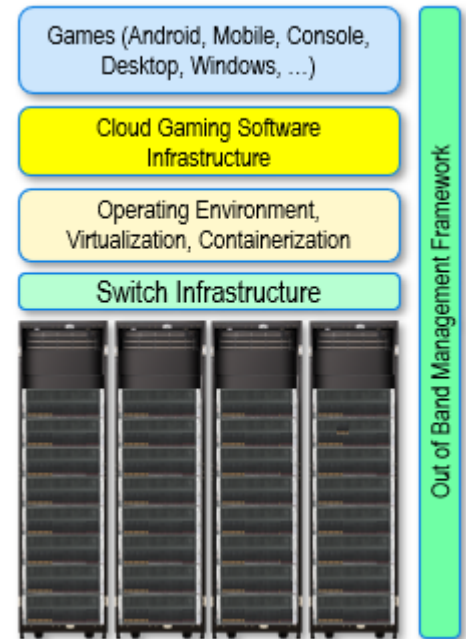


Cloud Gaming Economics

CUSTOMERS & REVENUE	NON-RECURRING COSTS	OPERATING COSTS
Streaming quality, Number of streams supported, Low Latency	Systems with the latest technologies	Hosting, network access
Number of games, New games	Latest accelerators	Licenses, royalty fees

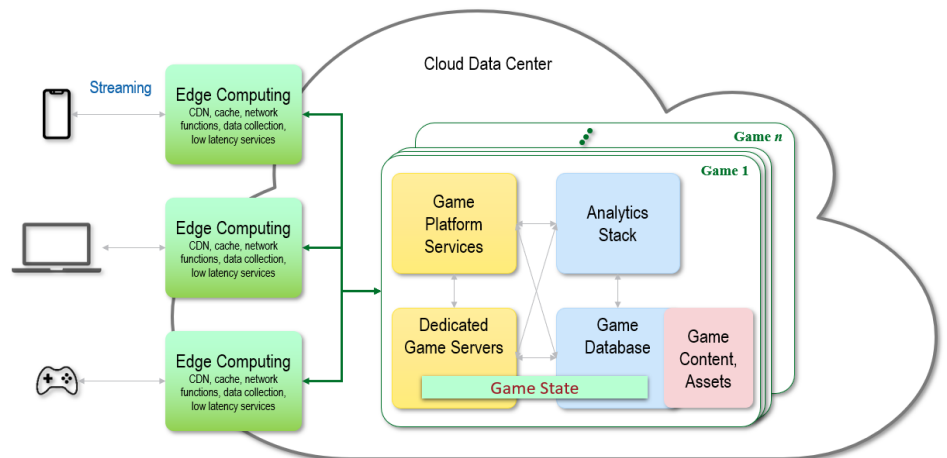
Cloud Gaming Requirements

- **Worldwide Distributed Internet Infrastructure:** Multiple data centers with central gaming platforms that serve numerous games and extensive caching and CDN infrastructure to support low latency content delivery to game users.
- **Reliable and manageable systems:** Systems must be easily manageable and run reliably.
- **Systems options to support multiple architectures:** Cloud gaming infrastructure has the following key software and systems: game platform services supporting game streaming, game servers, analytics, and AI. AIs automatically generate images and respond to game plays.
- **Support for latest Accelerators:** GPU accelerators are crucial to delivering cloud gaming, video streaming, virtual desktop, and AI services. GPU Accelerators can efficiently encode and decode a high number of real-time video streams in high frame rates, using the royalty-free AV1 encoding, which also produces smaller files. By encoding video & graphics content in mainstream codecs, including the latest royalty-free AV1, to lower the bitstream size, network streaming latency and cost can be reduced.
- **Scalable architectures:** Growing demand for new games drives the development of cloud gaming infrastructure, supporting high-speed, latest spine/leave Ethernet network architecture with scalable bandwidth.
- **Software platforms include Linux, Windows, virtualization, and containerization:** Cloud gaming servers run on Linux or Windows, supporting CPU & GPU virtualization, containerization & orchestration.
- **Cloud Gaming Software Infrastructure:** Cloud gaming providers develop and maintain their own gaming infrastructure.
- **Games and associated virtual goods are key to revenue generation and customer retention.** Games are delivered to mobile, computer, and consoles.
- **User Experience:** Low latency, responsiveness, high frame rates, and high visual fidelity graphics. Multiplayer gaming demands real-time response rates and supports multiple game engines.



Cloud Gaming Systems Architecture

- **Gaming Platform in Cloud Data Center** delivers game engines, updates to games, and analytics.
- **Edge Computing** delivers ultra-low latency streaming, high performance rendering, and data collection to improve the platform QoS.
- **Clients** deliver the gaming experience to each person. A client can be an Android device, a computer, or a console.



Supermicro Solutions for Cloud Gaming

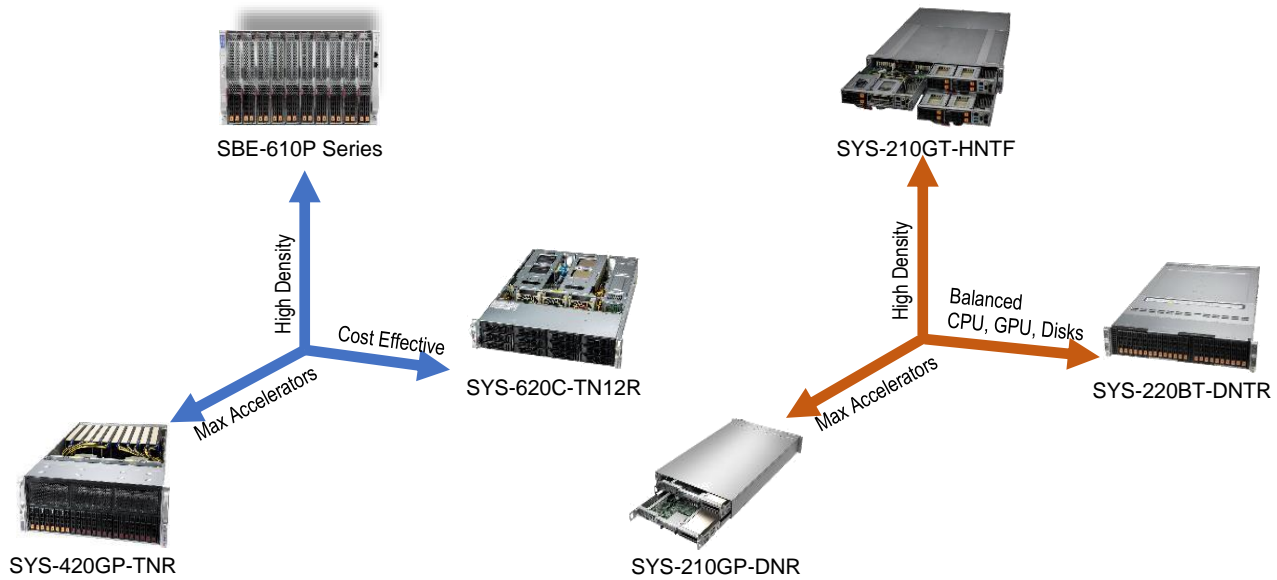
Working with Intel®, Supermicro has identified multiple server solutions that offer the best tradeoffs to provide cloud gaming architecture. These systems support the latest Intel Data Center GPU Flex series accelerators. There are many support choices for SATA and NVMe storage, and support for high-speed networking up from 1 gigabit/s to 200 gigabit/s ethernet networks. Furthermore, these systems have optional TPM 2.0 security and Root-of-Trust hardware security features. With built-in out-of-band management, systems administrators can easily manage these servers with standard IPMI or Redfish interfaces. Support for Ubuntu Linux, Red Hat Linux, open-source Linux, and Windows Servers are available for these servers.

To address the cloud gaming infrastructure, Supermicro offers the following:

Requirements	Supermicro Offering
Reliable and manageable systems	<ul style="list-style-type: none"> • Supermicro systems have proven reliability with built-in redundancies, including power, cooling • Systems come standard with remote manageability, support for IPMI, and Redfish v1.8 • Support for TPM 2.0 and Root-of-trust security
Systems options to support multiple architectures	<ul style="list-style-type: none"> • Choice of recommended systems to build the cloud gaming infrastructure, offering tradeoff for support for the maximum number of accelerators to rack density to cost-effectiveness • Choice of other platforms to run analytics and AI • Selection of different platforms to support database
Support for latest accelerators	<ul style="list-style-type: none"> • Support Intel® Data Center GPU Flex Series Accelerators.
Scalable architectures	<ul style="list-style-type: none"> • Extensive support for latest PCIe GEN4 technologies that support the fastest I/O • Extensive support for networking from 1 gigabit/s to 200 gigabit/s, with support for a large number of network connectivity • Support up to a maximum of 10 Intel Data Center GPU Flex Series cards in SYS 420GP TNR • Supermicro offers support max number of servers in a single rack appropriate to the power and cooling available at the cloud gaming providers • Supermicro can scale the number of racks to support one or more data centers • Supermicro offers networking technologies up to 400 gigabit/s to support full scale spine/leave network architecture
Software Platforms for virtualization and containerization	<ul style="list-style-type: none"> • Supermicro systems are certified to support the Linux and Windows environment, as well as support for virtualization and containerization
Cloud gaming software infrastructure and Games	<ul style="list-style-type: none"> • Supermicro works with Intel, which is growing the ecosystem for cloud gaming software infrastructures and game availability
CPU / GPU Ratio	<ul style="list-style-type: none"> • Gameplay and Content Delivery Networks require CPU processing • Video transcoding, encoding, and graphics display use GPU

Cloud Data Center

Edge Computing


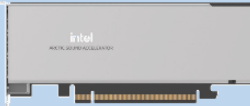


Server Specifications

Supermicro Server	Form Factor, Power	CPU, PCIe	Intel Data Center GPU Flex Series
4U GPU SuperServer SYS-420GP-TNR	4U, Redundant power	Dual 3 rd Gen Intel® Xeon® Scalable, 270W, 10 x PCIe Gen 4 x16 slots	10 x Flex Series 140 or 170
2U 2-Node SYS-210GP-DNR	2U, 2-node, each node 1U Shared redundant power	Per node: Single 3 rd Gen Intel Xeon Scalable processor, 270W 3 x PCIe Gen 4 x16 slots per node	3 x Flex Series 140 or 170 (per node) Total: 6 x GPUs per system
2U CloudDC SYS-620C-TN12R	2U, single or redundant power option	Dual 3 rd Gen Intel® Xeon® Scalable processor, 270W 4 x PCIe Gen 4 x16 slots	6 x Flex Series 140 or 4 x Flex Series 170
2U 4-Node GrandTwin™ SYS-210GT-HNTF	2U, 4-node, redundant power	Per node: Single 3 rd Gen Intel® Xeon® Scalable processor, 2 x PCIe Gen 4 x16 slots	2 x Flex Series 140 (per node) Total: 8 x Flex Series 140 per system
2U 2-Node BigTwin® SYS-220BT-DNTR	2U, 2-node, Redundant power	Per node: Dual 3 rd Gen Intel® Xeon® Scalable processor 4 x PCIe Gen 4 x16 slots	2 x Flex Series 140 or 170 (per node) Total: 4 x GPUs per system
6U Blade Server SBE-610P Series	2U, single or redundant power option	Per blade: Single 3 rd Gen Intel® Xeon® Scalable processor 2 x PCIe Gen 4 x16 slots	2 x Flex Series 140 or 170 (per blade) Total: 20 x GPUs per system

Intel® Data Center GPU Flex Series Specification

Intel® has significantly innovated to develop 2 data center GPU accelerators to provide the best operations and performance for Cloud Gaming and Virtual Desktop Infrastructure. Also, Intel® has added support for the royalty-free AV1 codec. The AV1 codec has been demonstrated to provide lower bandwidth requirements to transmit higher quality streaming graphics. Being royalty-free versus HVEC codecs, the use of Intel Data Center GPUs significantly reduces costs for the Cloud Gaming providers.

Intel Data Center GPU Flex Series	Flex Series 140	Flex Series 170
		
Memory w/ ECC	12GB, 1750 GT/s	16GB, 2250GT/s
Fixed function Media units	4 28 transcode streams H.265 1080p60 1:1	2 14 transcode streams H.265 1080p60 1:1
AV1 Encode/Decode	Implemented in Hardware	
Systolic Arrays (AI Inference)	1x Systolic Array	2.5x Systolic Arrays
Long Life Support	5 years, 80% active at base frequency, 20% idle	5 years, 80% active at base frequency, 20% idle
Operating Systems	Ubuntu Linux, Debian Linux, RHEL, Windows Server 2019, 2022	

Remote Management and Security

Supermicro systems provide out-of-band and in-band monitoring. Using out-of-band IPMI and Redfish management, data center systems administrators efficiently manage the health and operation of each server in the clusters. The servers also come with optional TPM 2.0 and Root of Trust security features.

Conclusion

Supermicro systems with Intel Data Center GPU Flex Series offer comprehensive scalability options. Please contact your Supermicro sales representative for more information.

For More Information, please visit:

<https://www.supermicro.com/en/accelerators/intel>

<https://www.supermicro.com/en/products/rackmount>

<https://www.intel.com/content/www/us/en/products/docs/discrete-gpus/data-center-gpu/flex-series/overview.html>

References

- 1 – [Gaming Market Growth](#)
- 2 – [Global Cloud Gaming Market Share](#)



3 - [Gaming Market Segments](#)