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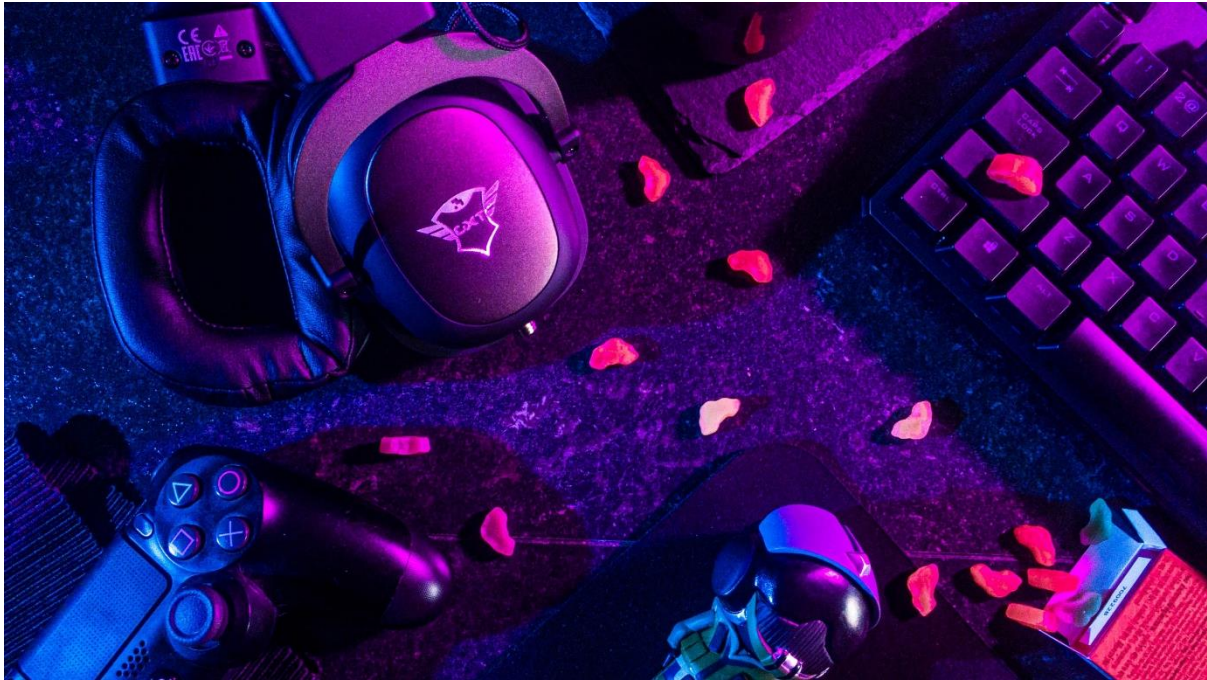
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Topic : Cloud Gaming

Traditional Gaming:

- Traditional gaming refers to games that are played on physical gaming consoles or devices such as personal computers, gaming consoles like Xbox, PlayStation, and Nintendo, or handheld gaming devices like Game Boy. Traditional gaming typically involves playing games that are stored on a physical disc or cartridge, or downloaded and installed onto the device.
- Traditional gaming usually requires the player to purchase the gaming console or device and the games separately. The player then needs to install or insert the game into the console or device to play it. Traditional gaming can be played by single players or multiple players, with some games allowing for online multiplayer options.
- Traditional gaming can be both offline and online. Offline traditional gaming involves playing games by oneself or with others locally, either on the same console or device or through local area networks (LANs). Online traditional gaming involves playing games with others over the internet, often through dedicated servers or matchmaking systems provided by the game developers.
- Traditional gaming has been popular for decades and has evolved significantly over time, with advancements in technology improving graphics, sound, and gameplay mechanics. Despite the rise of mobile gaming, traditional gaming remains a popular pastime for many gamers

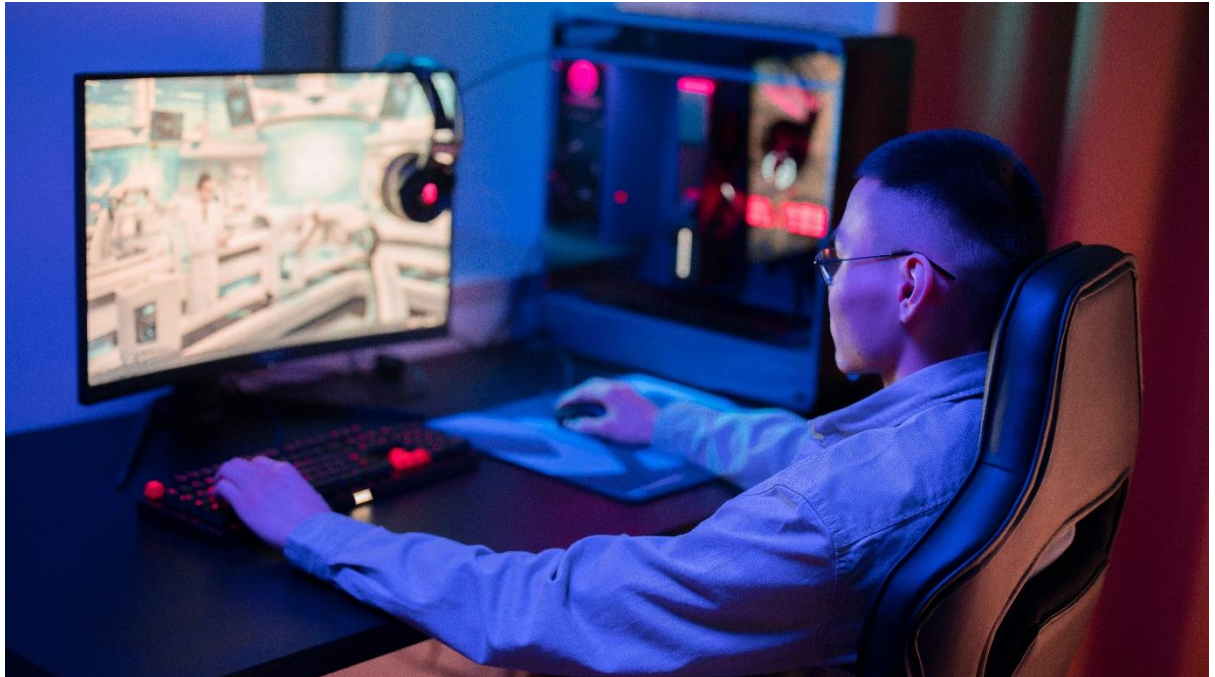
Components in gaming devices.



Video game consoles are embedded systems, comprising of many components all serving a specific function, allowing the system to take input from the player by game pads and other devices and relay the outputs on a screen display. Present-day video game console systems generally consist of these embedded components:

- CPU and GPU
- RAM
- Operating System and storage medium
- Video Output via display monitor
- Gamepads and joystick controller 🎮 / Keyboard for input.

Disadvantages of traditional gaming



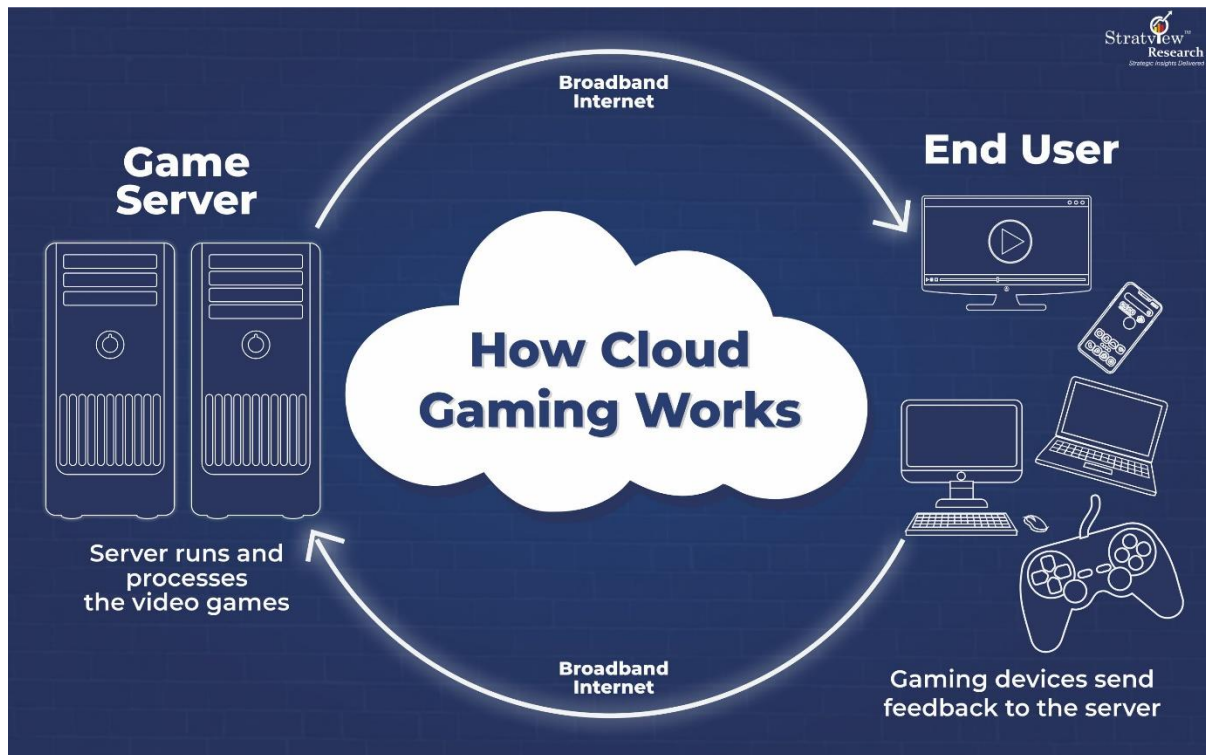
- Limited by storage
- Expensive hardware components
- Limited to particular platforms.
- Very poor and costly repairability
- Higher Power Consumption and lower playtime
- Short period of relevance
- Very expensive for customization

Introduction to Cloud Gaming



Cloud gaming is a revolutionary technology that allows gamers to stream games over the internet without the need for expensive hardware. Instead of relying on a powerful console or PC, cloud gaming services use remote servers to run games and stream them directly to the player's device. One of the biggest advantages of cloud gaming is its accessibility. With cloud gaming, players can enjoy high-quality games on almost any device with an internet connection, including smartphones, tablets, and laptops.

How Cloud Gaming Works



- Cloud gaming works by using powerful servers to run games remotely. When a player launches a game, their inputs are sent to the server, which processes them and streams the game back to the player's device. This process is known as game streaming.
- To ensure a smooth gaming experience, cloud gaming services rely on high-speed internet connections and low-latency networks. This means that players need a stable internet connection with low latency to enjoy cloud gaming without lag or interruptions.

Components and terms related to Cloud Gaming:

- **Game Servers:** Cloud gaming requires game servers that run the games and process the user's inputs. These servers are hosted in data-centers and are equipped with powerful processors, graphics cards, and other hardware to ensure smooth gameplay
- **User Devices:** Users can access the games on the game servers through their devices, such as smartphones, tablets, laptops, or desktop computers
- **Streaming Technology:** Cloud gaming uses streaming technology to send the video and audio output of the game from the game server to the user's device. The game server captures the game's video and audio output and sends it to the user's device in real-time over the internet.
- **Input Lag:** Input lag, or the delay between the user's input and the game's response, is a critical issue in cloud gaming. However, cloud gaming providers use various techniques, such as reducing the distance between the user and the game server, optimizing the network connections, and using high-speed data centers to minimize input lag. Easily Customizable.
- **Subscription Model:** Most cloud gaming services follow a subscription model, where users pay a monthly or yearly fee to access the game library or individual games. Users can choose the games they want to play and stream them over the internet without having to purchase and install them on their devices.
- **Network latency:** It is the delay in network communication. It shows the time that data takes to transfer across the network. Networks with a longer delay or lag have high latency, while those with fast response times have low latency.

Cloud Gaming Vs Traditional Gaming

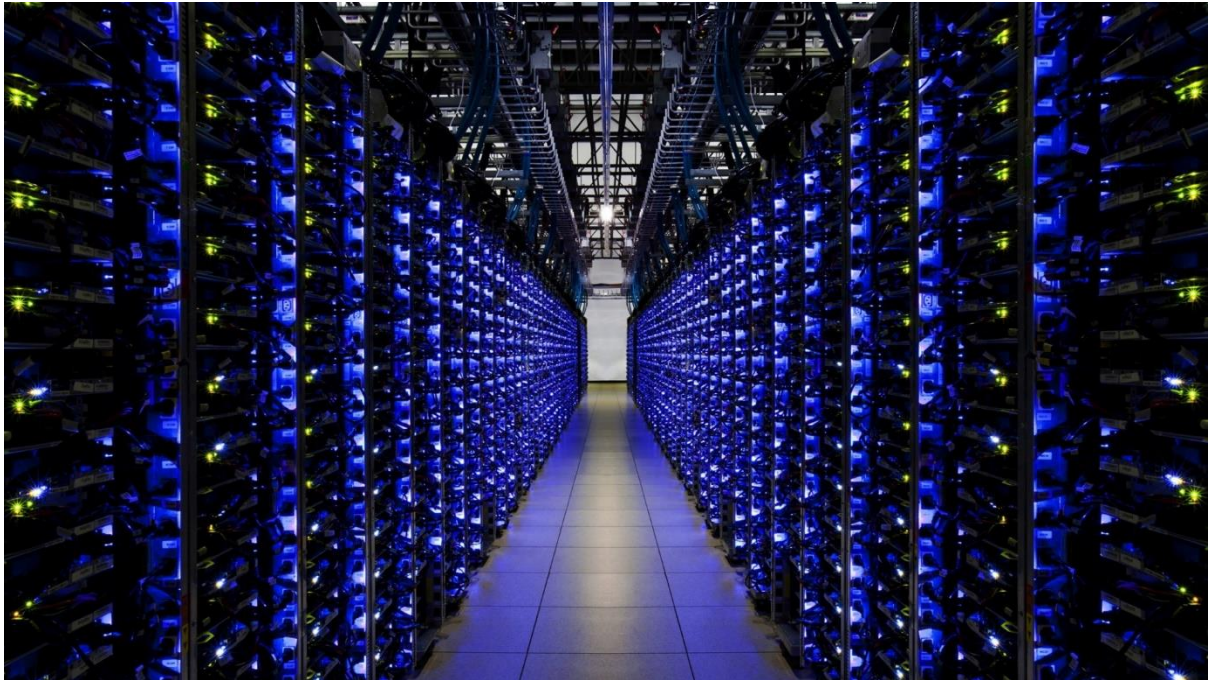
1. Cloud Gaming

- Games are stored on a cloud a server or remote systems.
- Requires good internet connection
- Performance Is dependent on network connection and latency
- No storage limitations
- Cheaper compared to traditional gaming
- Very easy to upgrade and customize
- Wide range of games

2. Traditional Gaming

- Games are stored on the device in which the game will be played.
- Requires better hardware components
- Performance is dependent on hardware specifications.
- Storage is limited
- Very costlier compared to cloud gaming
- Very difficult to upgrade and customize
- Limited games availability

Advantages of cloud gaming:



- Cloud gaming offers several advantages over traditional gaming. One of the biggest advantages is cost savings. Rather than investing in expensive hardware, players can pay a subscription fee to access a library of games through a cloud gaming service. This makes gaming more affordable and accessible to a wider audience.
- Another advantage of cloud gaming is convenience. Players can access their games from almost anywhere with an internet connection, making it easy to play on the go or switch between devices. Additionally, cloud gaming eliminates the need for game downloads and updates, saving players time and storage space.

Other major advantages in Cloud Gaming.



- No limitations of storage
- No need of expensive hardware components.
- Games can be run in all types of devices.
- High Performance and better experience.
- Platform Independent
- On a Pay per use model
- Easily Customizable.
- Wide range and variety of games.

Challenges of Cloud Gaming:



- While cloud gaming offers many benefits, there are also several challenges that must be addressed. One of the biggest challenges is latency. Because cloud gaming relies on internet connectivity, players may experience lag or delays if their internet connection is slow or unstable.
- Another challenge is the quality of graphics and gameplay. While cloud gaming services strive to provide high-quality graphics and smooth gameplay, some players may notice a difference compared to playing on a local console or PC. Additionally, not all games are available on cloud gaming platforms, limiting the selection for some players.

5G role in VR cloud gaming



- 5G technology has the potential to significantly impact the future of cloud gaming by offering faster and more reliable network connectivity. Here are some of the roles of 5G in cloud gaming:
- **Faster Download and Upload Speeds:** 5G offers faster download and upload speeds than 4G networks, which means that games can be downloaded and installed more quickly, and players can upload their gameplay footage to streaming platforms faster. This enables cloud gaming services to provide a smoother and more responsive gaming experience.
- **Reduced Latency:** Latency, or lag, is a significant issue in cloud gaming, and it can affect the overall gaming experience. With 5G, the latency can be reduced, allowing for a more responsive gameplay experience, especially for multiplayer games that require quick reflexes.
- **Improved Network Capacity:** 5G networks have improved capacity, which allows more devices to be connected to the network simultaneously. This can be beneficial for cloud gaming services as it enables them to handle more players simultaneously and support higher-quality streaming.
- **Better Quality Streaming:** With the faster and more reliable network connectivity offered by 5G, cloud gaming services can deliver higher quality streaming, including high-definition graphics, high-quality audio, and more realistic gameplay.

Popular Cloud Gaming service provides:



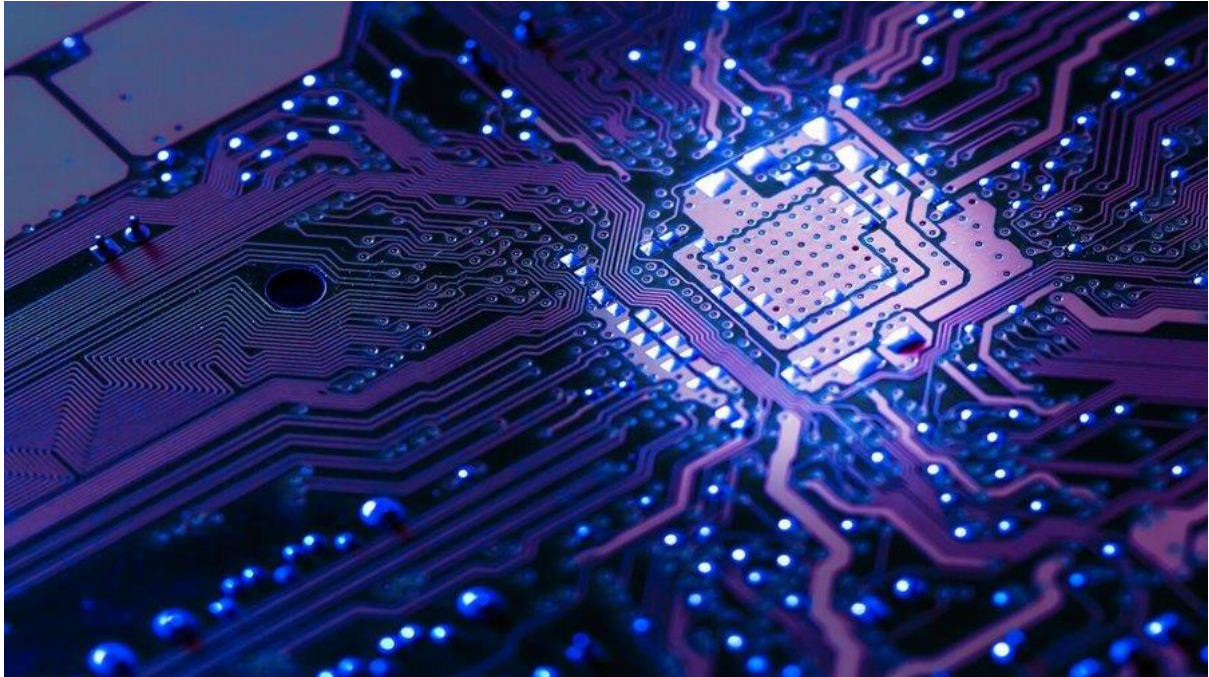
- NVIDIA GeForce Now
- PlayStation Now
- Shadow
- Amazon Luna
- Playkey
- Paperspace
- NetBoom
- Boosteroid

Popular games on Cloud gaming



- Battlefield™ 2042
- Star Wars Jedi: Fallen Order
- Fallout 4
- Among Us
- GTA V
- Halo: The Master Chief Collection
- Forza Horizon 5
- The Elder Scrolls 5
- Halo Infinite
- Ark: Survival Evolved

The Future of Cloud Gaming



- Cloud gaming is still a relatively new technology, but it has already made a significant impact on the gaming industry.
- As internet speeds continue to increase and network infrastructure improves, cloud gaming is expected to become even more popular in the coming years.
- In addition to improving the technology behind cloud gaming, developers are also working to expand the selection of games available on these platforms.
- As more games become available, cloud gaming services will become even more appealing to gamers of all types.

References:

- https://en.wikipedia.org/wiki/Cloud_gaming
- <https://www.fibocom.com/en/iotapps/5g-cloud-game>
- <https://www.youtube.com/>
- <https://shadow.tech/blog/gaming/cloud-gaming-explained>