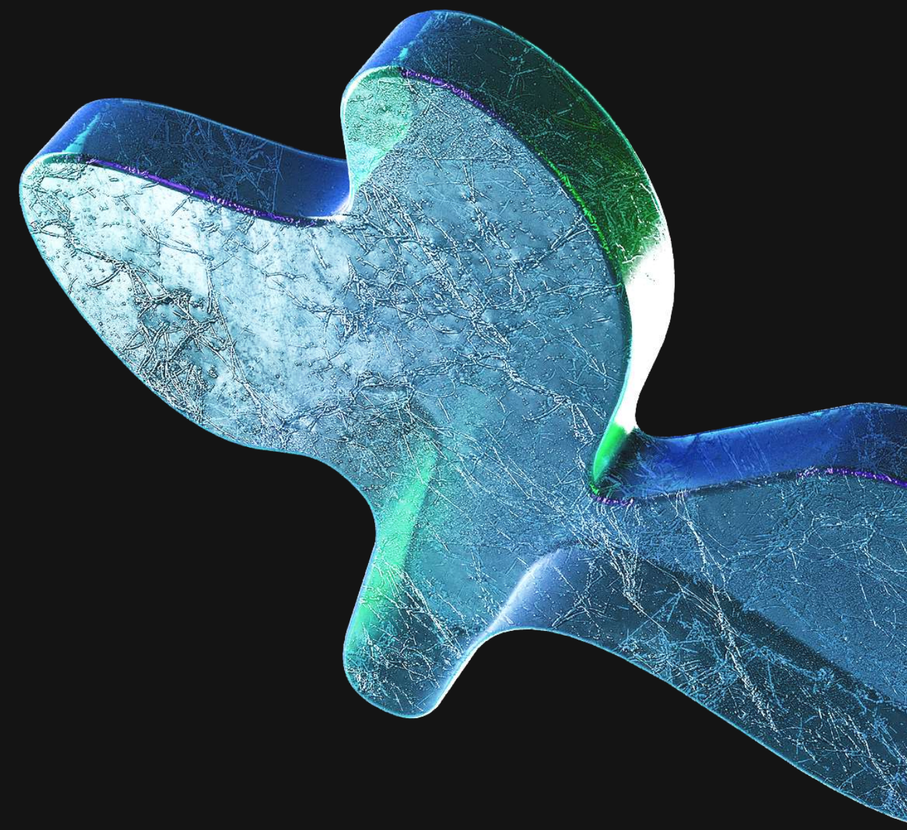
CLOUD GAMING

Architecture and Performance



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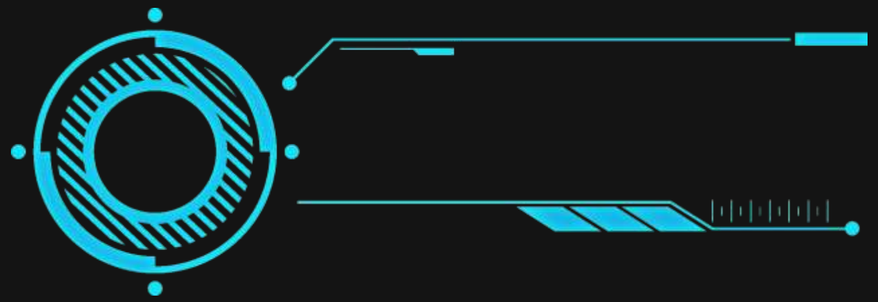
What you need to know



What is Cloud Gaming?

Cloud gaming, aka gaming on demand or gaming-as-a-service (GaaS), is a form of online gaming that allows users to stream video games from remote servers directly to their devices via the internet, rather than running them on local hardware such as a personal computer, gaming console, or mobile device. This means that players can access and play high-quality video games without the need for powerful hardware, as the heavy lifting is done on the servers.

Pre Cloud Gaming

- Hardware Dependency
- Storage limitations
- Manual Updates and Patches
- Performance was limited by the capabilities of the gaming hardware.

With Cloud Gaming

- No Need for High-End Hardware
- eliminates the need to purchase individual games, offering a more flexible and cost-effective approach
- Instant Access and Portability
- Lower Upfront Costs
- Continuous Updates and Scalability
- Cross-Platform Compatibility

The Future of Gaming is here...

Never run out of space:

Say goodbye to limited storage space on your devices, as cloud gaming lets you access games from anywhere.

Play on any device:

Whether it’s your phone, tablet or laptop, cloud gaming lets you play your favorite games on any device with a stable internet connection. Your progress is saved in the cloud. So even if you switch devices, you can pick up where you left off.

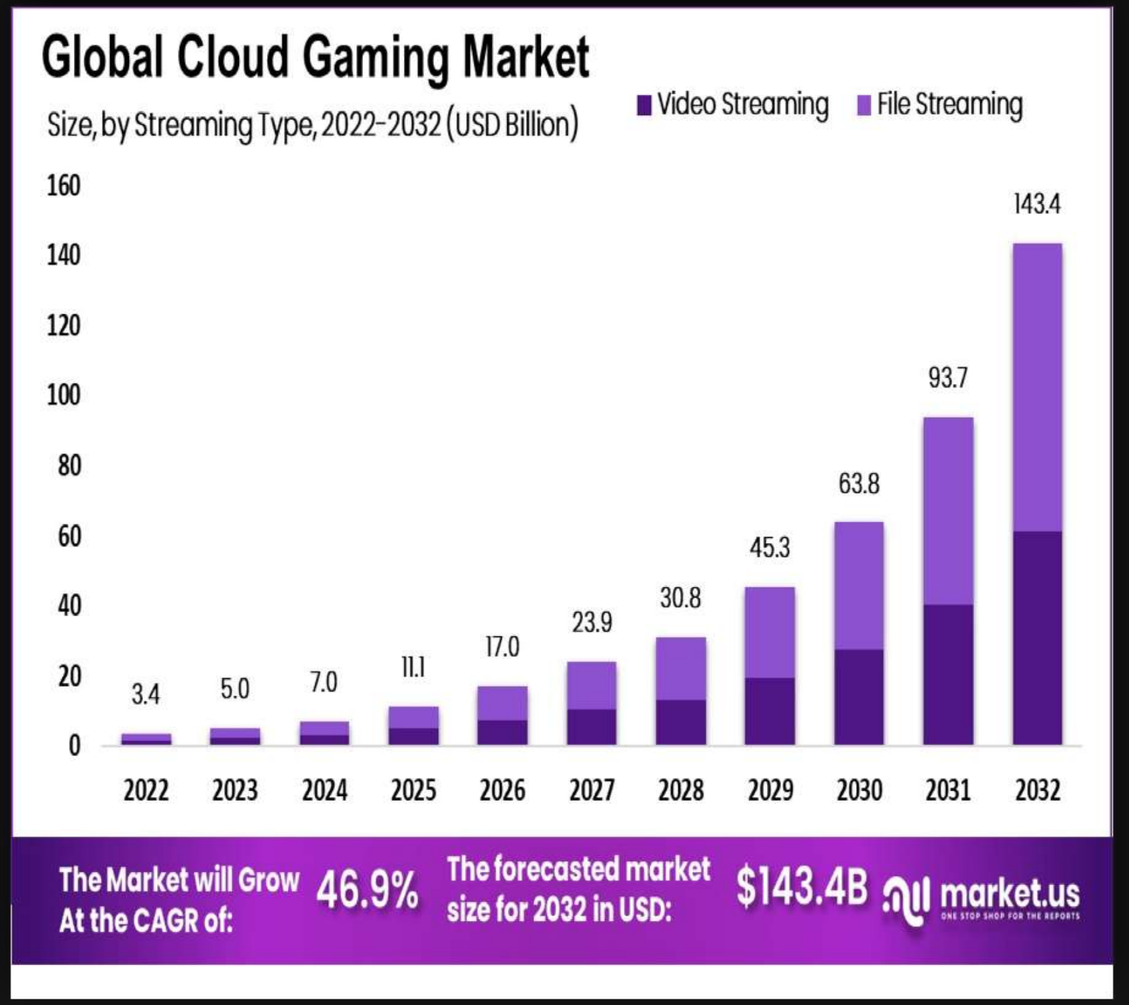
Instant Access:

Forget waiting for downloads and installations, simply log in to your cloud gaming account and start playing. This is becoming more accessible to people with the introduction of 5G

The Global Cloud Gaming Market size is expected to be worth around USD 143.4 Billion by 2032 from USD 5.0 Billion in 2023, growing at a CAGR of 46.9% during the forecast period from 2023 to 2032.

In 2024, the global cloud gaming market is expected to witness significant user engagement, with total users worldwide reaching approximately 29.8 million

With the never ending advancements happening in technology, the latency caused in cloud information travel is being reduced day by day. This will make cloud gaming more real-time and its comparison with other on-device game play will reduce.



Pros and Cons

How Cloud Gaming is Better and How it is not

The Pros

High quality graphics and audio

Cloud gaming offers stunning visuals, immersive audio and high-quality performance on any device.

Multiplayer from anywhere

Play your favorite multiplayer games with friends and family, no matter where they are in the world

Access to exclusive Titles

Cloud gaming platforms give you access to exclusive games that wouldn't be available on traditional gaming devices.

The Cons

Bad Weather

Cloud gaming requires a stable internet connection; poor weather conditions can cause slow buffering and laggy gameplay.

Technical Issues

Technical problems are frustrating. Network errors or subscription issues can prevent you from accessing your games.

Expensive

Cloud gaming can be expensive, requiring a pricey subscription fee, or costly equipment, such as VR headsets.

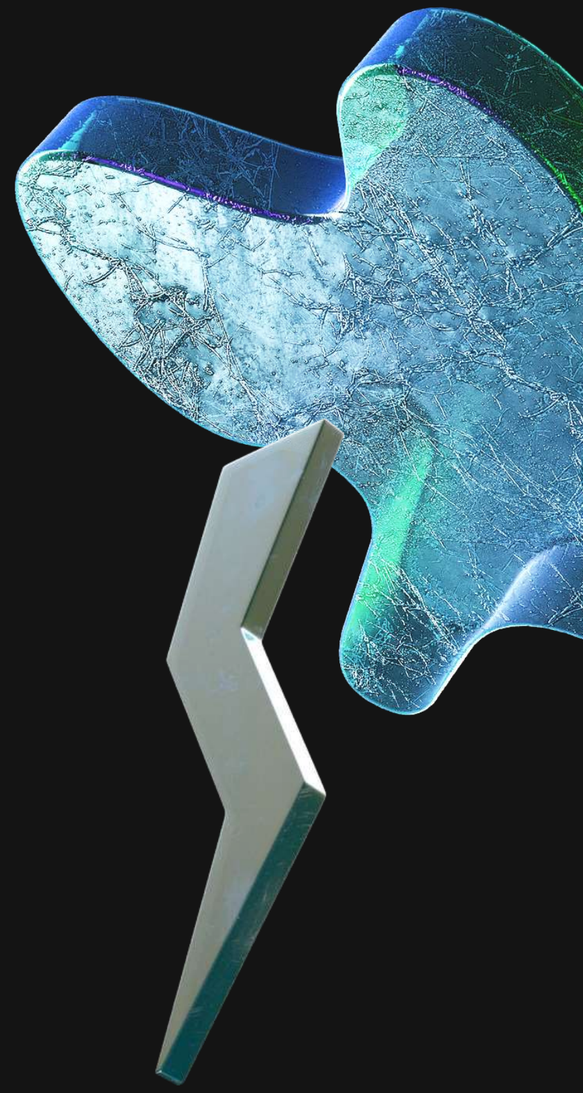
Popular Cloud Gaming Platforms

Google Streaming Service “STADIA” offers high-quality graphics and ease of access through laptops, smartphones, and televisions.

Amazon’s cloud gaming service “luna” offers access to exclusive games and allows for multiplayer gameplay and Twitch integration.

The Nvidia Grid, now known as Nvidia GeForce cloud gaming platform lets you play on a multitude of devices and is also compatible with VR headsets.

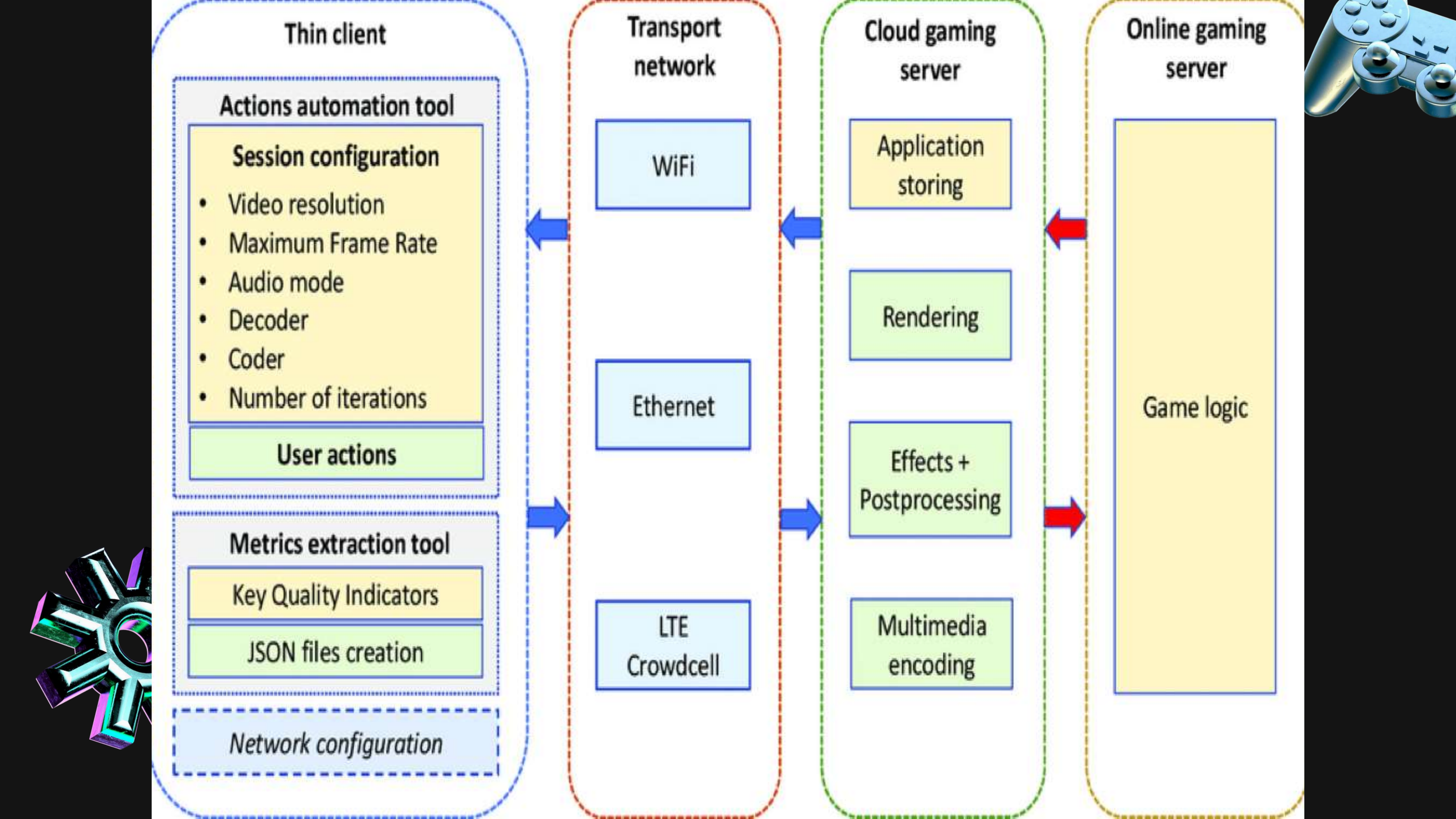
Cloud Gaming Workflow



In Cloud Gaming, games are stored and executed remotely on a provider's dedicated hardware, and streamed as video to a player's device via client software.

The client software handles the player's inputs, which are sent back to the server and executed in-game.

For transferring information between user and server, a method known as UDP is used to establish connection between client’s device and gaming server.

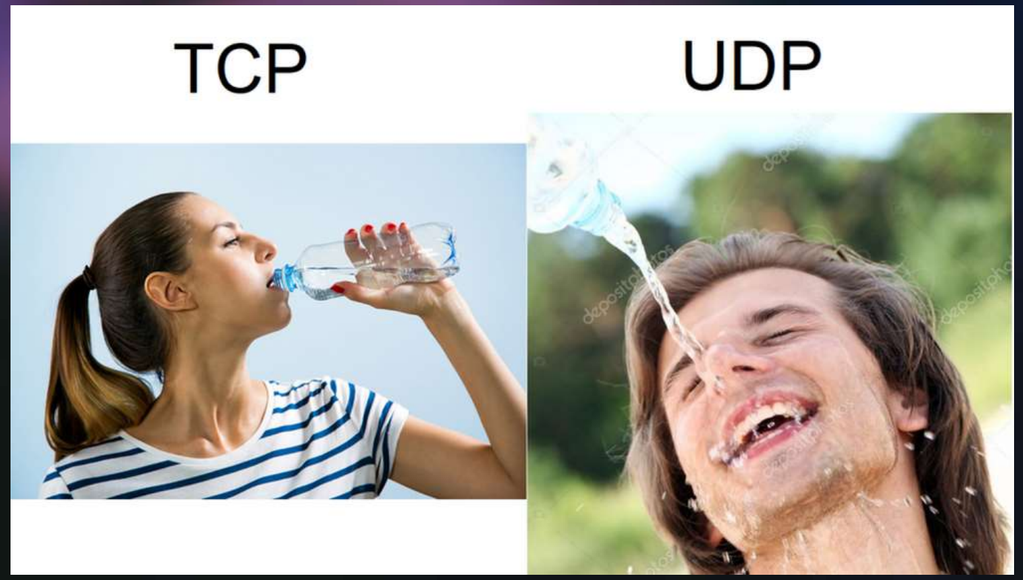

Thin client
Actions automation tool
Session configuration
• Video resolution
• Maximum Frame Rate
• Audio mode
• Decoder
• Coder
• Number of iterations
User actions
Metrics extraction tool
Key Quality Indicators
JSON files creation
Network configuration
Transport network
WiFi
Ethernet
LTE Crowdcell
Cloud gaming server
Application storing
Rendering
Effects + Postprocessing
Multimedia encoding
Online gaming server
Game logic

UDP and TCP

UDP (User Datagram Protocol) is a core protocol of the Internet protocol suite. Unlike TCP, UDP does not establish a connection between devices. Instead, it sends data as small, discrete packets, This makes UDP more suitable for real-time applications, such as real-time multiplayer gaming or streaming.

TCP is commonly used for tasks that require accuracy and guaranteed delivery, whereas UDP ports are faster and prioritize speed over reliability.

Many online games utilize a combination of TCP and UDP ports to handle different types of data transmission. For example, TCP may be used for initial authentication, downloading game content, and chat functionality, while UDP may be utilized for gameplay data, including player movements, actions, positions, and audio data.



Edge Computing

Edge computing is a distributed computing paradigm that brings computation and data storage closer to the user’s location, to improve response times and save bandwidth.

It involves .processing data at or near the physical location of either the user or the source of the data. This approach reduces latency, providing faster, more reliable services.

Advantages of Edge Computing

Reduced latency

Without edge computing, data packets have to travel a long distance from the user’s device to the cloud server for processing and then back to the user’s device. This round trip can introduce significant latency, which can degrade the gaming experience.

Gaming experience

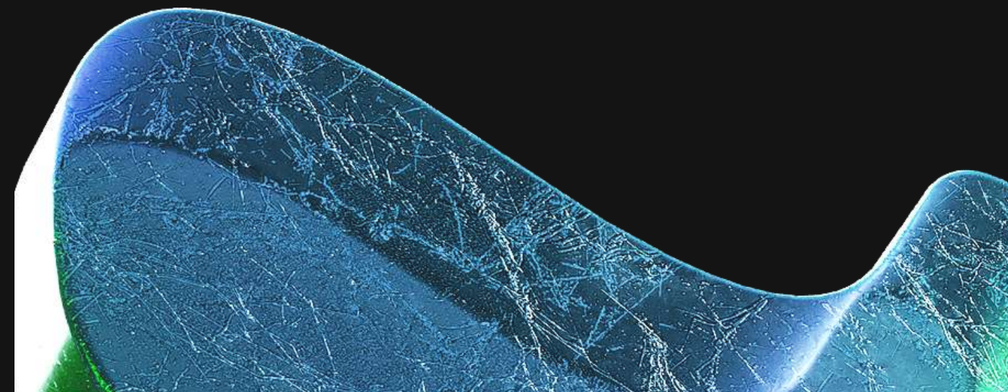
With edge computing, the device doesn't have to send data each time to central server as computing is distributed with local servers, saving the processing power of device.

Scalability

The combination of cloud and edge computing creates a more flexible platform that provides gaming developers and publishers with the ability of scaling up.

Accessibility

Advances in cloud and edge computing can decrease the need for high-end devices to play high-quality, collaborative games, removing an entry barrier to gaming and increasing the number of people who can access gaming from everyday devices.



Big Data in Cloud Gaming

As per the reliable market reports and statistics, a large video game manufacturer has the potential to generate around 50 terabyte of data each day. As the volume of data increasing at an exponentially faster rate, the need for big data is essential to satisfy end-user demand.

As with any organization, 360-degree consumer view is important. Fortunately, gamers leave massive data when they play. A large bunch of data is created based on the customers gameplay and behaviour such as on which level they are, how they interact, how long they play, with whom they play, how they spend money on virtual products and virtual game accessories etc.

These information can be used to recommend players with products according to their levels. It can even be utilized in improving NPCs (Non-Player Characters) of a game to have complex and strategic movements, thereby enhancing the overall game.

Advantages of Big Data

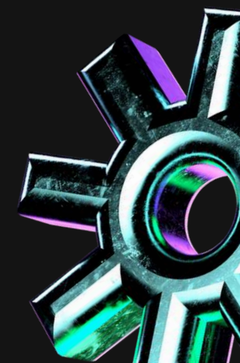
- A Tailored Game design pattern is adapted - If Big Data analysis reveals that players are abandoning at an early stage, then this could signal that early stages are too difficult to master. In this case, companies can take a strategy to dilute the difficulty level at the early stages of the game to encourage playing on. Similarly, data analysis can help game designers which stages of the game should be tuned to make them more challenging.

- Employment growth in gaming industries - It has been a 29% increase in Data scientist over the past years. In fact, there has been a 344% increase since 2013. Unfortunately, those who have the skills set grew at a substantially lower pace, only 14%. This obvious gap between the supply and demand for these professionals has let a lot of money being spent on high salaries and great benefits packages to fill the demand. Of all major industries, the online gambling industry has probably benefited the most.

- Live Streaming - In January 2023, Business Insider reported how Tyler ‘Ninja’ Blevins earns $500,000 each month for streaming games of Fortnite from the comfort of his bedroom. That kind of earning power would have been unthinkable even just a few years ago. In January itself, around 63,700 streamers hosted videos on Twitch and 22,000 people streamed video game content through YouTube. Those streams can focus on any form of gaming. While Fortnite and other trending games may dominate, many streamers venture into retro titles or simulation games.

Big Data Summary:

It is natural that the video game industry would want to use all of the available information in order to improve its products. Data will be created by players’ actions anyway, so it makes sense to log and track patterns to ultimately enhance the gaming experience. With eSports and live streaming propelling the video game industry to new heights, the usage of big data may become even more widespread.



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Thank you!