International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 5, Issue 12, pp 84-86, December-2021

https://doi.org/10.47001/IRJIET/2021.512016

Future of Cloud Gaming

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***Abstract* - Cloud gaming has grown too much in last few years cloud gaming is technology where the gamers can experience high quality gaming experience without experiencing lag issues caused by slow machine. Cloud gaming is service where the game will run on the powerful server and gamer just have to install software which will link the device to server so gamer can control the game from their average device Cloud gaming is now evolving very fast because of a huge leap in speeds of internet The readers will gain the overview of cloud gaming research and get familiar with the recent developments in this area.**

Keywords: Cloud, Gaming, technology, Play Station.

I. INTRODUCTION

Google Stadia, Xbox Game Pass, and PlayStation Now have introduced a gaming term that would've been completely foreign a decade ago: Cloud gaming. The premise is simple. Instead of buying a console and a disc, you can stream a game to any display you own, a bit like Netflix. Cloud gaming is a method of playing video games using remote servers in data centers. There's no need to download and install games on a PC or console. Instead, streaming services require a reliable internet connection to send gaming information to an app or browser installed on the recipient device. The game is rendered and played on the remote server, but you see and interact with everything locally on your device.

How does cloud gaming work?

The cloud gaming platform runs computer game programs that can constitute as shown in below fig 1.

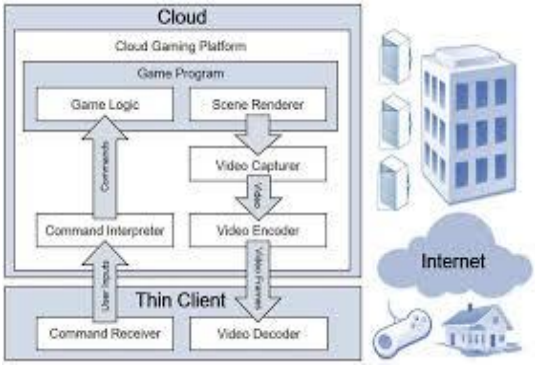

Figure 1

(I) Game logic it has a responsibility to convert the gamer commands into in-game interactions.

(II) Game scenes are generated from scene renderer. The command interpreter where the game commands comes and through the video capture where scenes are captured, and these scenes are compressed by encoder as we can see from the figure 1 the arrow marks at the bottom of the figure, through thin client's user inputs can be received for the gaming platform the gaming platform can send video frames to thin clients.

In thin clients two components are necessary:

a) Video decoder

The video decoder it can be thought of as inexpensive decoder chips that are produced.

b) Command receiver

Command receiver is the connection made to the game controller for example keyboard, mouse's joysticks etc.

II. LITERATURE SURVEY

Early attempts

The first demonstrated approach of cloud gaming technology was by startup G-Cluster (short for Gaming Cluster), which introduced its product at the 2000 E3, and released around 2003. In their initial model around 2005, G-Cluster provided modified games that ran on their servers, using video-on-demand service providers, set-top box manufacturers, and middleware software providers to help provide their service to network operators, and then offered the games through portals to end users

Recent advances

Nvidia first announced its cloud gaming service, Nvidia Grid (later rebranded as GeForce Now), as a combination of hardware using its graphics processing units and software in May 2012, initially intending to partner with Gaikai for games on the service. Ubitus Game Cloud was also introduced alongside Nvidia's Grid. Game Cloud was designed as white-

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label service based on Nvidia's Grid that other provider could use to offer game streaming to their customers.

In May 2018, Electronic Arts acquired cloud gaming assets and talent from Game Fly for an undisclosed amount. EA subsequently announced "Project Atlas", a project to explore the integration of artificial intelligence, machine learning, and Frostbite engine technology to create a "unified" platform to "remotely process and stream blockbuster, multiplayer HD games with the lowest possible latency, and also to unlock even more possibilities for dynamic social and cross-platform play." That month, Google and Microsoft also announced cloud gaming initiatives, with Google beginning to pilot "Project Stream" (including a closed beta featuring Assassin's Creed Odyssey running via a client in the Google Chrome web browser, and Microsoft announced the upcoming Project xCloud, leveraging Microsoft Azure technology.

At the Game Developers Conference in 2019, Google officially announced its cloud gaming service Stadia, which officially launched on November 19 of that year. In May, Sony announced a partnership with Microsoft to co-develop cloud solutions between divisions, including gaming.

III. A BREAKDOWN AND CLASSIFICATION OF CLOUD GAMING

In the current article, we survey the cloud gaming literature. We first collect representative cloud gaming papers, and grouped them into several classifications. We emphasize that only a selective set of papers are surveyed, in order to give our readers better understanding on the landscape of the cloud gaming research.

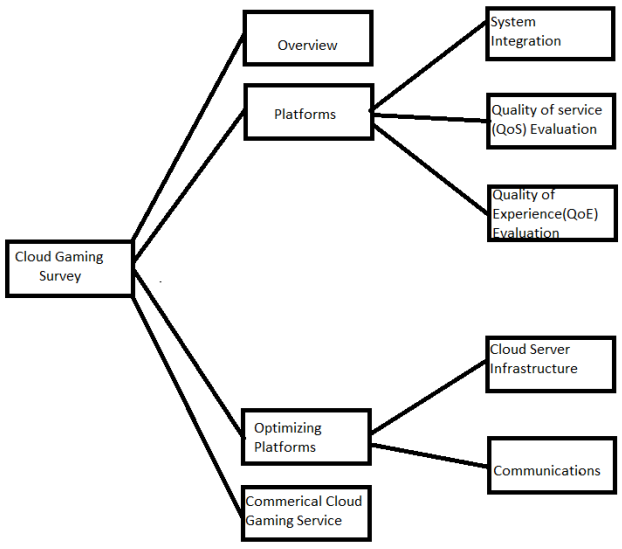

Figure 2

1) Cloud Gaming Overview

We survey the overview, introductory, and positioning papers on either general cloud gaming, or specialized topics, such as mobile cloud gaming and Game-as-a-Service (GaAs).

2) Cloud Gaming Platforms

We consider papers that construct basic cloud gaming platforms, which support different performance evaluation methodologies. These studies can be further categorized into three groups: system integration, QoS evaluations, and QoE evaluations.

2a) System Integration

The fundamental step of cloud gaming research, like many other systems areas, is to put up basic platforms, based on existing tools. We summarize such system integration efforts, which serve as cornerstones of related research.

2b) Quality of Service Evaluations

We survey the studies on objective metric evaluations, which algorithmically quantify the system performance, i.e., without subject assessments. Existing papers focus on two types of objective metrics, Energy Consumption and Network Metrics. The energy consumption is critical to mobile cloud gaming clients, in order to prolong the precious battery life. There are several network metrics affecting the gamer experience, and interaction latency is a representative network metric. The interaction latency refers to the time difference between a gamer input and the corresponding game scene update on the client computer. Because gamers are highly sensitive to interaction latency, its measurement methodologies draw a lot of attentions in the literature.

2c) Quality of Experience Evaluations

We discuss the papers on subjective metric evaluations, which are based on user studies, where subject gamers give opinion scores to their cloud gaming experience. Conducting user studies is inherently expensive and tedious, and thus most QoE studies attempt to analyze the relationship between the QoS and QoE metrics. The resulting models may in turn be used to optimize cloud gaming platforms.

3) Optimizing Cloud Gaming Platforms

We consider papers that optimize cloud gaming platforms from specific aspects; usually each work focuses on optimizing one or a few components. Such studies can be further categorized into two groups: cloud server infrastructure and communications.

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3a) Cloud Server Infrastructure

The existing studies on optimizing cloud server infrastructure are surveyed. Several papers study the Resource Allocation problem of server and network resources among multiple data centers, server nodes, and game clients to optimize the overall cloud gaming experience, where diverse criteria are considered. Other papers optimize the Distributed Architectures of cloud gaming platforms, e.g., using Peer-to-Peer (P2P) overlays or multi-tier clouds for better performance and scalability.

3b) Communications

We survey the existing work on optimizing the efficiency of content streaming over the dynamic and hetero-genius communication channels. These studies are further classified into two groups. First, several papers consider the problem of Data Compression, e.g., layered coding and graphics compression are proposed, which may outperform the conventional 2D image compression in certain environments. Second, there are papers on Adaptive Transmission, which cope with the network dynamics by continuously changing various parameters, such as encoding bit rate, frame rate, and image resolution. The same adaptive transmissions may also be used to absorb the negative impacts due to insufficient resources on cloud servers and game clients.

IV. CONCLUSION

Cloud gaming is a rapidly evolving technology, with many exciting possibilities. One frequently mentioned is to bring advanced 3D content to relatively weaker devices such as smart phones and tablets. This observation is made even more relevant by the fact that both Gaikai and on live are actively working on Android apps to bring their services to these mobile platforms. However, recent large-scale research indicates that it is not uncommon to find cellular network connections that have network latencies in excess of 200 MS, which alone may already cause the interaction delay to become too high for many games. Seamless integration between cellular data connection and lower latency WIFI connection is expected, and switching to Long Term Evolution (LTE) may help alleviate the problem. Other potential advancements involve intelligent thin clients that can perform a portion of the game rendering and logic locally to hide some of the issues associated with interaction delay, or distributed game execution across multiple specialized virtual machines. This will likely require creating games specifically optimized for cloud platforms.

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Citation of this Article:

Akash Gohil, Neel Kapadia, Neha more, "Future of Cloud Gaming" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 5, Issue 12, pp 84-86, December 2021. Article DOI https://doi.org/10.47001/IRJIET/2021.512016

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