CLOUD COMPUTING SYSTEM FOR GAMING

Authors Name Barve Rutu

Department of **Computer Engineering**

K. C College of Engineering and Management Studies

Mumbai 400 603

Email Id – barve.rutu@gmail.com

I. ABSTRACT

Cloud for Gaming refers to the use of cloud computing technologies to build large-scale gaminginfrastructures, with the goal of improving scalability and responsiveness, improve the user'sexperience and enable new business models.Cloud computing is a service model where the provider offers computation and storage resources to customers on a "pay as you go" basis. The essential features of a cloud computing environment are:

On-demand self-service: the ability to provide computing capabilities (e.g., CPU time, networkstorage) dynamically, as needed, without human intervention;Broad network access: resources can be accessed through the network by client platforms usingstandard mechanisms and protocols;Resource pooling: virtual and physical resources can be pooled and assigned dynamically toconsumers, according to their demand, using a multi-tenant model;Elasticity: from the customer's point of view, the provider offers unlimited resources that can bepurchased in any quantity at any time; Measured service: cloud resource and service usages are optimized through a pay-per-use business model, and are monitored, controlled and reported transparently to both their customer and provider.The typical interaction between cloud provider and customer works as follows: the customer connects to a "cloud marketplace" through a Web interface, and selects the type and amount of the resources she needs (e.g., some virtual servers with given number of CPU cores, memory and disk space). The resources are allocated from a large pool that is physically hosted on some big data center managed by the cloud provider. Once instantiated, the resources are accessed by the customer through the network. Additional resources can be acquired at a later time, e.g., to cope with an increase of the workload, and released when no longer needed.

II. INTRODUCTION

Cloud gaming, sometimes called gaming on demand or gaming-as-a-service, is a type of online gaming that runs video games on remote servers and streams them directly to a user's device, or more colloquially, playing a game remotely from a cloud. It contrasts with traditionalmeans of gaming, wherein a game runs locally on a user's video game console, personal computer, or mobile device. Cloud gaming refers to a new way to deliver the experience of gaming to the users, where the computationally complex games are executed on powerful cloud servers, then the rendered game scenes are streamed over the internet to gamers on their devices, and the control events from input devices are sent back to the cloud servers for interactions. Figure 1 represents how cloud gaming services work. In cloud gaming platform program run basically on two major components:

i. Game logic that is responsible to convert gamer commands into in-game interactions
ii. Screen renderer that generates game scenes in real-time.

The gamer's commands come from the command interpreter, and the game scenes are captured by video capturer into the videos, which are then compressed by a video encoder. The command interpreter, video capturer, and video encoder are all implemented as parts of the cloud gaming platform. As shown in this Figure, the cloud gaming platform sends the video frames to and receives user inputs from thin clients used by gamers for playing games. It is a thin client because only two low-complexity components are required:

i. command receiver, which connects to the game controllers, such as gamepads, joysticks, keyboards, and mouses.
ii. Video decoder, which can be realized using massively produced (inexpensive) decoder chips.

The communications between the cloud game platform and thin clients are over the best effort Internet, which in turn makes supporting real-time computer games quite challenging.

III. SCOPE AND CLASSIFICATION

The gaming industry embraced the cloud computing paradigm by implementing the Gaming as a Service (GaaS) model.

Different instances of the GaaS paradigm have been proposed:

i. Remote rendering GaaS

In the remote rendering GaaS (RR-GaaS) model the cloud infrastructure hosts one instance of the game engine for each player. An encoder module running on the cloud is responsible for rendering every frame of the game scene, and compressing the video stream so that it can be transmitted to the user's terminal where the stream is decoded and displayed. User inputs are acquired from the terminal and sent back to the game engine that takes care of updating the game state accordingly.

Examples of RR-GaaS implementations are :
i. GamingAnywhere
ii. Nvidia Grid.

ii. Local rendering GaaS

In the local rendering GaaS model, the video stream is encoded on the cloud as a sequence of high-level rendering instructions that are streamed to the player terminal, the terminal decodes and executes the instructions to draw each frame.Since encoding of each frame as a sequence of drawing instructions is often more space efficient than compressing the resulting bitmap, the LR-GaaS model may require less network bandwidth than RR-GaaS, and therefore eliminate the need for real-time video transmission capability. This comes at the cost of requiring a more powerful terminal with an adequate graphics.

iii. Cognitive resource allocation GaaS

In the cognitive resource allocation GaaS model, the game engine is logically partitioned into a set of modules that can be upload and executed at the client side. As the game evolves, the terminal receives and executes the appropriate modules, and may keep or discard the unused ones.The CRA-GaaS model shifts the computation back to the client terminal, therefore reducing the load on the cloud.However, the client resources are used efficiently, since at any time only the needed components are stored locally.

IV.OPTIMIZING CLOUD GAMING PLATFORMS

The gaming industry is looking up to a future where the requirement for complex hardware will no longer be necessary. Cloud gaming is here and it's going to change the way we interact with our devices. No longer will there be need for high-end, processing-power hungry hardware which keeps evolving every month. You can literally play any high-end gaming title with just a basic machine.

All you need is a stable internet connection with certain minimum bandwidth requirement. The concept is catching up in developed countries where high-speed internet connectivity is a norm, as people are liking the idea of gaming on the go.

The cloud gaming market is expected to be worth 3,107 million in 2024 with smartphone gaming getting the biggest bump in years to come. Also, it is predicted that casual gamers are going to make up the major chunk of this market in the future.

V.HOW ARE CLOUD GAMING SERVICES PREFORMING NOW?

Cloud gaming is reliant on remote servers which comprise high-end hardware to process the game. Basically, the service has machines running the game at peak settings, and you are streaming the video feed of that gaming title in real-time. The control inputs are synced in such a way that there is very low latency from the time you hit the key to the time it is actually provides input for the game.

A user doesn't need to buy or constantly keep upgrading hardware in order to play new game titles which at times require latest processors and graphics cards. Cloud gaming allows a user to play any title on any device, anytime. Since the game data is saved on the cloud, cross platform integration eliminates the worry about saving the game data locally.

Since the data is stored on ultra-secure servers and transferred via secure connections, the chances of hacking or loss of data are virtually zero. The cloud gaming service providers put security at the fore-front, giving you one less thing to worry about. For game publishers cloud gaming means an end to piracy. Everything is maintained at the service provider's end, which prevents any chances of piracy. This gives publishers more reasons to adopt the next gaming revolution.

Streaming over the internet means that cloud gaming is solely dependent on a stable connection. Losing the internet connectivity even for a few seconds can hamper the gameplay. Imagine this happening when you have fought your way to an important gaming championship and lose it all due to a disrupted internet connection.

Latency is another issue, cloud gaming services need to look at. A slight delay in the input at users end to the actual game input at the server end is one issue that can hamper the in-game experience. For example, a cloud gaming service offering, 20ms total latency could be totally unplayable at 40ms due to number of issues ranging from connectivity to server end delays.

VI.WHEN IS CLOUD COMPUTING WORTH MAKING THE SWITCH?

The vital question arises, whether you should switch to cloud gaming yet or not? The answer to that query depends on the experience you want out of your gaming sessions and the willingness to go out of the shell. If you are hardcore gamer, little things like latency and the overall experience matters.So, you should give cloud gaming a try only if you're ready to make the odd trade-off in terms of video quality and the gameplay lag. Since, cloud gaming is the future, early adoption also comes with the extra perks in the coming time.As for casual gamers, cloud gaming already sounds like a good option for all the goods it brings to the fore. Cross platform synching is another factor that makes cloud gaming so lucrative for people who want to take a detour from traditional gaming console entertainment.The added advantage of portability – most of the popular cloud gaming services offer support for phones – gives gamers another compelling reason. This support for mobile devices and other platforms is destined to grow which makes cloud gaming the future of seamless entertainment.If you have a high speed internet connection, cloud gaming is as close to console gaming you can get to on your mobile devices. So, trying it out won't let you down, and in way you might even get hooked to it.Cloud gaming is still in its early stages and big names like NVIDIA, Google, Sony and Microsoft want to create an impact in the future with cloud gaming. That said, unheard names like Jump, Vortex and Shadow are giving these multi-billionaire brands some serious competition.Most of these services require a monthly subscription and some special hardware like gaming controllers to get going. This is far cheaper than buying a current-gen gaming console. Let's have a look at the cloud gaming services that you should go for right now.NVIDIA is a name no stranger to the gaming world. The graphics chip company is one of the best you can opt for in the cloud gaming arena. It offers GeForce NOW, a cloud-based service for MacOS, Windows, SHIELD TV and Android mobile devices. The service requires you to buy the gaming titles on offer like the Steam, Uplay or Battle.net. Thereafter, you can enjoy playing the game from any compatible device. Currently, the service offers an impressive list of games including Assassin's Creed Origins, PlayerUnknown's Battlegrounds, Injustice 2 and Sid Meier's Civilization VI.The minimum requirements are an internet connection of 15 Mbps to 25 Mbps. Also, there should be Ethernet or Wi-Fi connectivity using 5GHs router. You should have a MacOS 10.10 (or higher) or Windows 7 (64-bit or later) to run the games. For now, GeForce NOW is free for trial in the beta testing phase and you can enrol for the waiting list right away.Stadia is one cloud gaming service that has passed the beta stage and is now available to a wide range of users. The company has opened enrolment for any phone (Android 6.0 or later) users on its cloud streaming service in experimental phase. That said, the service is supported on OnePlus, Pixel and select Samsung, Razer and Asus phones. Earlier the service required a controller to be paired to use Stadia, but now users can play with the on-screen controls. Google has been very aggressive in the last few weeks with Stadia's push to the masses. Google has added support to a multitude of devices including Chromecast Ultra and even the Chrome Browser. For new users Stadia comes with a one month free-trial followed by a $9.99 per month Pro subscription plan.There are already a number of gaming titles available for the service with the collection growing ever so steadily. These include – Destiny 2, Assassin's Creed Odyssey, Attack of Titan 2: Final Battle and Darksiders: Genesis.

VII.CONCLUSION

In this work, we've collated the current cloud gaming research into three categories
   i. Overview
   ii. Platform
   iii. Optimization

Cloud gaming incurs non-trivial costs to service providers. Minimizing the cost on cloud and networking resources while achieving high gamer experience requires careful optimization like the approaches exploredin this survey. Without these optimizations, service provider cannot consolidate enough cloud gaming users to each physical machine. This in turn leads to much lower profits, and may drive the service provider out of business. We also intend to investigate the feasibility of mobile cloud gaming with foveated streaming and the possibilities ofextending the work towards Virtual Reality.In Cloud Gaming it is far more importantfor players in which direction packet loss occurs than in conventional gaming. Generally, the quality of the video plays an important role. This is especially true for games that rely on impressive visuals. Based on these results we can confirm that

Cloud Gaming is indeed a viable option for the future In summary, the advances of technologies turn playable cloud gaming services into reality;more optimization techniques gradually make cloud gaming services profitable; hence, we believe that we are on the edge of a new era of a whole new cloud gaming ecosystem, which will eventually leads to the next generation cloud gaming services.

REFERENCES

[1]*Wei Cai · Victor C.M. Leung · Long HuA"Cloudlet Assisted Multiplayer Cloud Gaming System" Published online: 9 November 2013© Springer Science+Business Media New York 2013*

[2] *Wei Cai1, Ryan Shea2, Chun-Ying Huang3, Kuan-Ta Chen4, Jiangchuan Liu2, Victor C. M. Leung1 and Cheng-Hsin Hsu5 "A Survey on Cloud Gaming Future of Computer Games" Date Of Publication August 8, 2016*

[3] *https://en.wikipedia.org/wiki/Cloud_gaming*

[4]*Roy D. Yates WINLAB, ECE Dept. Rutgers University, MehrnazTavan WINLAB, ECE Dept. Rutgers University, Yi Hu Vencore Labs Applied Communication Sciences, DipankarRaychaudhuri WINLAB, ECE Dept. Rutgers University "Timely cloud gaming"*

[5] *"On the Quality of Service of Cloud Gaming Systems" Kuan-Ta Chen, Member, IEEE, Yu-Chun Chang, Hwai-Jung Hsu, Member, IEEE, De-Yu Chen, Chun-Ying Huang, Member, IEEE, and Cheng-Hsin Hsu, Member, IEEEIEEE TRANSACTIONS ON MULTIMEDIA, VOL. 16, NO. 2, FEBRUARY 2014*

[31]Akbarzhon Madaminov, "Recommendation Systems", Engpaper Journal

[32]Aathi oli.S , "REVIEW PAPER ON PHISHING ATTACKS", Engpaper Journal

[33]Rania Fernando, "IoT based – Street Light Controlling System", Engpaper Journal

[34]K. SAI BHARGAV, V. RAJENDRA, "Study on Data Structures for Machine Learning", Engpaper Journal

[35]Brundha P, Guruprasad K N, Amith V Hiremath,Sirisha R, Chandrakanth G Pujari , "Face Detection Based Smart Attendance System Using Haar Cascade Algorithm", Engpaper Journal

[36]Afsana Nadaf , "RFID BASED LIBRARY MANAGEMENT SYSTEM", Engpaper Journal

[37]Mr. Vedant Thube, Neha Thakur, Mr. Siddhesh Balsaraf,Ms. Priyanka Hanchate, Dr. S. D. Sawarkar , "Accident Prevention using Eye Drowsiness & Yawning Detection", Engpaper Journal

[38]Abhishek A Hishobkar, Rutuja Gaonkar, Jagdish Chintamani , "DIGITAL DIARY", Engpaper Journal

[39]Pooman Suryavanshi, Aryan Ghadge, Manali Kharat , "TAXI SERVICE for VISUALLY IMPAIRED", Engpaper Journal

[40]Mr. Pankaj yadav, Shila Jawale, Mr. Ashutosh Mahadik, Ms. Neha Nivalkar, Dr. S. D. Sawarkar , "NEWS ARTICLES CLASSIFICATION", Engpaper Journal

[41]Rahul Chavan, Manvee Bhoir, Gaurav Sapkale, Anita Mhatre, "Smart Tourist Guide System", Engpaper Journal

[42]Rutik Desai, Akash Jadhav,Suraj Sawant ,Neha Thakur , "Accident Detection Using ML and AI Techniques", Engpaper Journal

[43]Anagha Vishe,Akash Shirsath, Sayali Gujar, Neha Thakur , "Student Attendance System using Face Recognition", Engpaper Journal

[44]Ms.Sayali Patekar, Shila jawale, Ms.Pranali Kurhade, Mr.Shubham Khamkar , "Smart Classroom Application", Engpaper Journal

[45]DOSHI SAKSHI, DEVYANI CHAUDHARI, POOJA GAIKWAD, RUTUJA CHABUKSWAR,MRS. SUJATA KOLHE, "TOURISM SIMPLIFIED THROUGH VOICE", Engpaper Journal

[46]Afreen Fathima,Samreen Jameel, Pathan Ahmed khan , "ACCIDENT DETECTION AND ALERTING SYSTEM", Engpaper Journal

[47]Suman Zareen, Tuba Masood, Pathan Ahmed khan, "E-Commerce Web Application with Augmented Reality", Engpaper Journal

[48]Lok Shan CHAN, "Selection of Waterfall and Agile Methodologies in Software Testing", Engpaper Journal

[49]Barve Rutu, "CLOUD COMPUTING SYSTEM FOR GAMING", Engpaper Journal

[50]Harshvardhan Singh, "Machine Learning: Fake News Blocking", Engpaper Journal

[51]M.Al Batahari, "SERVERS ROOM MONITORING SYSTEM USING IOT", Engpaper Journal

[52]AYUSHI ANKITA RAKSHIT, "VIRTUAL MASTER USING PYTHON", Engpaper Journal

[53]Baldeep Kaur, "REAL TIME SLEEP DROWSINESS DETECTION USING FACE RECOGNITION", Engpaper Journal

[54]Suchitav Khadanga, "Two Stage CMOS Operational Amplifier From Specification to Design", Engpaper Journal

[55]nidhi sharma, "Introduction to Remote Sensing", Engpaper Journal

[56]Rohith N Reddy, "COVID-19 Detection using SVM Classifier", Engpaper Journal

[57]Swapnil Kole, "COVID-19 Database on Consortium Blockchain", Engpaper Journal

[58]TejalLengare, PallaviSonawane, PrachiGunjal, ShubhamDhire, Prof.Shaikh.J.N , "Accident Detection & Avoidance System in Vehicles", Engpaper Journal

[59]Abhishek Pawshekar, Deepti More, Akash Khade, Pratiksha Wagh, Ganesh Ubale, "Augmented Reality: to converting and placing object into 3D model", Engpaper Journal

[61]Prof.Ubale.G.S, Pranjal Adhav,Pooja Gaikwad, Sushama Nadavade ,Pooja Kale ,

"Iot based Bridge Monitoring System", Engpaper Journal

[62]Divya Deewan, Priyanka Maheshwari, Sanjay Jain, "A REVIEW OF BATTERY-SUPERCAPACITOR HYBRID ENERGY STORAGE SYSTEM SCHEMES FOR POWER SYSTEM APPLICATION", Engpaper Journal

[63]Prof.Ansari.M.B, Pranjal Adhav,Pooja Gaikwad,Sushama Nadavade,Pooja Kale, "Survey on MyHelper IOT based Bridge Monitoring System", Engpaper Journal

[64]Shreyas.S.J, Saddam hussain, Chaithra E, "COMPARATIVE STUDY ON SEISMIC RESPONSE OF MASONRY INFILLED RC FRAME BUILDINGS AND MIVAN BUILDINGS WITH DIFFERENT PERCENTAGE OF WALL OPENINGS", Engpaper Journal

[65]Yusuf Ali Hassan, "Somali Power-Grid Significant Challenges", Engpaper Journal

[66]Ahmed N. Elhefnawy, "Refractive IR Objective Optical Design Operating in LWIR band For Military Observation Applications", Engpaper Journal

[67]S MANJULA, D SELVATHI and SUCHITAV KHADANGA, "Design of low-power CMOS transceiver front end for 2.4-GHz WPAN applications", Engpaper Journal

[68]Suchitav Khadanga, "Fabrication of MEMS Pressure Sensor on thin film membrane", Engpaper Journal

[69]Suchitav Khadanga and Dr. K.R.Suresh Nair, "An Introduction to Bluetooth", Engpaper Journal

[70]Suchitav Khadanga and S. Ahmad, "DESIGN AND FABRICATION OF LOW COST MICROWAVE OSCILLATOR", Engpaper Journal

[71]Ameen Ahmed, Noushad S, Suchitav Khadanga, K.R.Suresh Nair, P.K.Radhakrishnan, "DEVELOPMENT OF LOW PHASE NOISE SMALL FOOT PRINT SURFACE MOUNT VOLTAGE CONTROLLED OSCILLATOR", Engpaper Journal

[72]Suchitav Khadanga , "Synchronous programmable divider design for PLL Using 0.18 um cmos technology", Engpaper Journal

[73]Kavya.G.R, Shivaraju.G.D, Dr. T V Mallesh, S R Ramesh, "PROGRESSIVE COLLAPSE RESISTANCE OF FLAT SLAB BUILDING", Engpaper Journal

https://www.engpaper .com