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IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY
Special Issue on Visual Computing in the Cloud: Cloud Gaming and Virtualization
Part of Visual Computing in the Cloud Special Issue Series

Online gaming systems, which mix various multimedia such as image, video, audio, and graphics to enable players to interact with each other over the Internet, are now widely used not just for entertainment, but also for socializing, business, commerce, scientific experimentation, and many other practical purposes. Gaming is now a multi-billion dollar industry all over the world, having already surpassed the much longer-established film and music industries, and generating more revenue than each of cinema and DVD/BlueRay industries. **Cloud gaming**, the newest entry in the online gaming world, leverages the well-known concept of cloud computing to provide online gaming services to players. The idea in cloud gaming is to process the game events in the cloud and to stream the game to the players. Since it uses the cloud, scalability, server bottlenecks, and server failures are alleviated to a great extent, helping it become more popular in both research and industry, with companies such as OnLive, StreamMyGame, Gaikai, G-Cluster, OTOY, Spoon, CiiNOW, with Sony and Microsoft having joined in 2014.

Cloud gaming can be done with graphics steaming, where game objects are represented by 3D models and textures and are streamed to players' end devices which then do the rendering of the game, or with video streaming, where the cloud not only executes the game logic, but also the game rendering, and streams the resulting game scene to the players' end devices as video. It is also possible to use a hybrid approach and to simultaneously mix graphics streaming with video streaming, as is done in CiiNO, for example. Each of these methods has its strengths and weaknesses, balancing bandwidth and delay limitations with wider accessibility and possibility to run the game on thin clients. In addition, due to the mobility of today's players and the heterogeneity of their' devices, the server has to adapt the game content to the characteristics and limitations of both the underlying network and the end devices. These include variations in the available network bandwidth, or player devices' limitations in processing power, memory, display size, battery life, or download limits. Finally, there is the challenge of configuration, deployment, and maintenance of the game in the cloud. The virtualization of screen rendering in the cloud is still an understudied area. An even less addressed area is how to leverage the virtual screen in the cloud and combine it with local rendering capabilities to give the same or even better user experiences across different devices. Breakthroughs may come with the introduction of a new application interface model for cloud computing, with which developers never have to worry about where data storage, program execution and screen rendering actually occur, since cloud services will adaptively and optimally distribute storage, execution and rendering among the cloud and clients.

Potential topics of interest include, but are not limited to:

- Adaptive video/graphics streaming according to network/player's limitations
- Methods to speed up video coding and video/graphics streaming at the cloud side
- Methods to decrease video/graphics bandwidth while maintaining gameplay quality
- Energy-efficient cloud computing for game rendering and video coding at the server side
- Quality of Experience (QoE) studies and improvements for cloud gaming: player-cloud and player-player interactions, effects of delay and visual quality limitations on gameplay, and methods to improve them
- Efficient capturing, processing, and streaming of Kinect-like, Wii-like, gesture, touch, and similar gaming interface data to the cloud
- Game as a Service (GaaS)
- Optimizing cloud infrastructure and server distribution to efficiently support globally distributed players
- Cloud gaming traffic measurement, modeling, benchmarking, and performance evaluation
- Resource allocation and load balancing in the cloud for optimized game play
- Network routing, software defined networking (SDN), virtualization, and on-demand dynamic control of the cloud infrastructure
- Hybrid video/graphics data format and standard for game virtualization and streaming
- Virtualization of large volume user inputs (e.g., depth sensor video) in the cloud
- Novel architectures and designs of using Cloud Gaming services for applications such as Massively Multiplayer Online Games (MMOG), Serious Games, Mobile Games, etc.

We especially encourage experience papers describing lessons learned from built systems, including working approaches, unexpected results, common abstractions, and metrics for evaluating and improving cloud gaming systems.

Important Dates

Initial Paper Submission:	September 21, 2014
Initial Paper Decision:	December 1, 2014
Revised Paper Submission:	February 1, 2015
Revised Paper Decision:	May 1, 2015
Final Paper Submission:	July 1, 2015
Final Paper Decision:	September 1, 2015
Publication Date:	December 2015

Manuscript submissions and reviewing process

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