Next Generation Mobile Cloud Gaming

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Introduction and Motivation

- Rapid rise in mobile games downloads.

- Gaming-on-Demand is an emerging trend of the gaming industry to take advantage of cloud computing

- Mobile cloud gaming (MCG) is emerging as a promising form of Gaming as a Service.

- Mobile cloud video gaming (MCVG).
Introduction and Motivation

- Mobile browser gaming (MBG).
- Propose a framework to implement next generation mobile cloud gaming system.
- Analysis of open research issues regarding the different components of the framework.
- Case study for next generation mobile cloud gaming.
Mobile Cloud Video Gaming System

● Application of Gaming-on-Demand model to mobile devices with wireless communication capability is called MCVG.
● MCVG the cloud is primarily an interactive video generator and video streaming server, while the mobile devices are the event controller and video receiver.
● Example : OnLive (Google Play App Market)
Mobile Cloud Video Gaming System

(a) Mobile Cloud Video Gaming System
Mobile Browser Gaming

- Mobile browser games are very popular on social network sites.

- MBG have several characteristics
  - Multi-player Support.
  - Web browsers as client.
  - Always on
  - Single Account.

- Web browser is the gaming container.

- Example: FarmVille
Mobile Cloud Gaming

- **Cloud Gaming** is defined as interactive gaming utilizing mobile devices that access the cloud as an external resource for processing of game scenarios and interactions, and to enable advanced features such as cross-platform operations, battery conservation, and computational capacity improvement.

- **Features of MCG**
  - Thin-Client
  - Unlimited Resources
  - Data Security and Seamless Gaming
  - Battery conservation

- **Drawbacks of MCG**
  - Strong Network Dependency
  - High Bandwidth Consumption
  - Limited resource on Mobile Browser
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- Dynamic Cloud Integration
  - Game engine in the cloud is divided into components like video streamer and others.
  - Components are able to transmit to the mobile devices and execute on the clients as mobile agents.
  - This above procedure is called *onloading*.

(a) Onloading from Cloud to Mobile Client
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- **Augmented-Reality Gaming**
  - With the help of cloud services augmented reality can give a live view of a physical environment.
  - Real world elements are augmented by computer generated sensory inputs like audio, video or GPS data.
  - Google glass can be a good example of next generation MCG device.

- **Multi-Player On-line Gaming**
  - Utilize cloud resource to provide better scalability and gaming scenes.

- **Seamless Cross-Platform Gaming**
  - Provide a seamless experience for real-time games with cross-platform features
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Figure 3. Procedure for Next Generation Mobile Cloud Gaming
Framework for next generation mobile cloud gaming

• The proposed system is able to intelligently switch itself from different modes including MCVG and MBG.

• The framework mainly has five components.
  - Cloud Layer
  - Network Layer
  - Mobile Layer
  - QoSE (Quality of service and experience)
  - Security
Framework for next generation mobile cloud gaming

- Cloud Layer
  - Mainly focuses with the design and implementation of the cloud end.
  - Virtual Machines running in the cloud serve as interfaces for mobile devices
- Network Layer
  - Concerned with efficiently exchanging data packages between mobile devices and the cloud.
  - Multi-path transmission is proposed to enhance the network capacity
- Mobile Layer
  - Concerned with the design of mobile devices and the games running on the device.
- QoSE (Quality of service and experience)
  - Focuses on the service and gaming experience.
- Security
  - Protect the virtual assets.
  - Protect from package forgery.
  - User authentication is done by the cloud.
Framework for next generation mobile cloud gaming
Open Research Issues

- Cloud-End issues
  - VM Design
  - Interactions of VM's

- Game Design Issues
  - Partitioning
  - Client Design
  - Context-Awareness and Augmented-Reality
Open Research Issues

• Connectivity Issues
  – Network Transmission Protocol
  – Mobility Management
  – Multi-Path Network Access
  – Geographical Optimization

• Dynamic Onloading and Offloading Issues
  – QoSE Measurement
  – Device Status Evaluation
  – Objective Function for Onloading and Offloading
Augmented-Reality Cloud Game

Figure 5. Augmented-Reality Cloud Game
Context-Aware Cloud Game

Figure 6. Context-Aware Cloud Game
Conclusion

• MCG is a promising paradigm for gaming delivery.
• Study of two types of cloud based mobile games ie MCVG and MBG
• Advantages of MCG
  – No Need for Expensive Hardware Investments or Upgrades
  – Play Games on Any OS or Device
  – Integrate Gaming Into TVs and Other Devices
  – Instant Playing
• Disadvantages of MCG
  – Video Compression
  – Bandwidth
  – Latency
• Thank You !