

## Mark Claypool's MQP Projects



Network Games



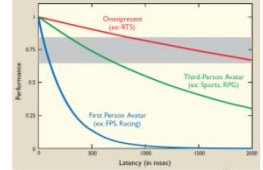
Streaming Media

http://www.cs.wpi.edu/~claypool




## Latency and Games

- Latency affects how players experience online gameplay
- *Latency compensation* techniques to mitigate latency → how effective?
- **Goal:** Test effects of latency on gameplay
- **Methodology:**
  - build/mod game
  - design game maps
  - run user studies
  - analyze data




MQP Projects 2



## Games on Thin Clients

- Server streams game to lightweight ("thin") client
  - Mobile phone, PDA, Sony PSP (remote play)
  - Onlive
- What is the network *turbulence*? Best way to use bandwidth *with low latency*?
- **Goal:** Measure thin client performance for games, propose improvements, implement and evaluate
- **Methodology:**
  - Determine "streaming" game environment
  - Performance evaluation of thin clients (Onlive, Sony, RDP, X, VNC ...)
  - Run experiments
  - Feedback to drive innovation




Co-advisor: Prof. Finkel

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## HTTP Streaming Tracker


- Video streaming is becoming HTTP streaming
  - YouTube over HTTP ~15% of the Internet's global traffic
  - Apple HTTP Live Streaming (HLS)
  - Microsoft Silverlight Smooth Streaming
- Performance of commercial HTTP streaming video?
  - Largely unknown, but important to design better networks
- Build tool and run experiments!
  - Done a *Media Tracker* and *Real Tracker*, now *HTTP Streaming Tracker*
- **Methodology:**
  - Understand players (e.g. YouTube API, Javascript)
  - Write wrapper to control/instrument application
  - Run experiments to evaluate performance



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## Mobile Network Measurements

- New networks deployed promising greatness
  -  versus 
- Actual performance largely marketing
  - What does computer *science* say about performance?
- **Goal:** Measure performance for existing 4G network through experiments
- **Methodology:**
  - Setup end host (network card)
  - Develop measurement software (e.g. bandwidth estimation)
  - Design experiments (location, parameters)
  - Run and analyze → apply to applications

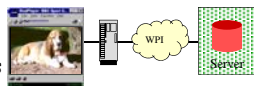


Co-advisor: Prof. Kinicki


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## Video Buffer Sizing

- Client side buffer critical for streaming video
  - Avoid dreaded "rebuffering"
- But how is buffer size chosen?
  - Unknown! But evidence suggests poor (e.g. fixed size)
- We have: method to determine optimal buffer size
  - Includes heuristic to approximate optimal
- **Goal:** Measure existing buffering, compare to optimal
- **Methodology:**
  - Setup testbed
  - Design and Run experiments
  - Analyze data



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## Streaming Media in the Home

- Many options to stream media in the home
  - PCs (Orb)
  - Game consoles (Sony PS3, Xbox 360)
  - Slingbox, LocationFree, Apple TV
- Much of it now wireless (802.11), which affects performance
  - Loss rate, signal strength, other clients...
  - Determines "best" streaming rate for video
- **Goal:** characterize performance (network and application) for home streaming devices
- **Methodology:**
  - Setup laboratory (hardware, software)
  - Design experimental parameters
  - Measure and analyze data
  - Propose and build better streaming devices



## Questions?

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