Games and Frames: A Strange Tale of QoE Studies

UNIVERSITÄT DUISBURG ESSEN

Open-Minded

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Motivation

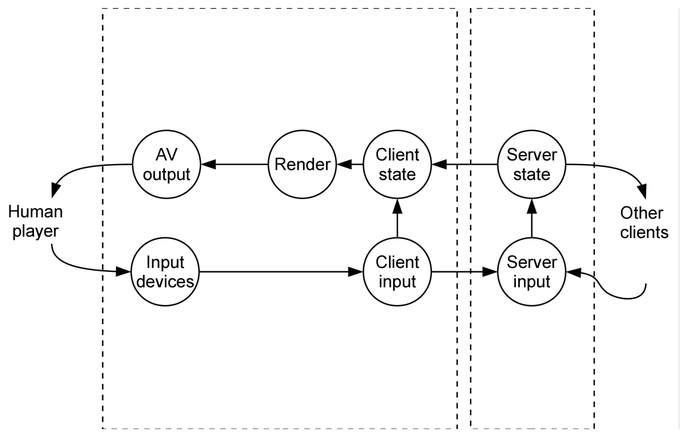
- Increasing research interest for video game QoS and QoE
- Past approaches treated video games similar to video streaming
- Studies focus only on network delay
- Many interlocked mechanics in play
- Need for a better theoretical understanding of these mechanics

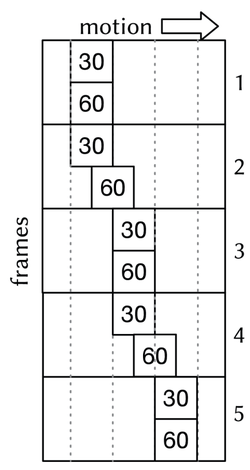
Issues of Past Studies

- **Insufficient framerates** (actual examples: 3, 7, 15Hz)
- Wrong choice of metrics (e.g. timescale-wise)
- Observation periods too short
- No understanding of core gameplay mechanics
- Cannot generalize results from individual games

Frame- and Tickrates

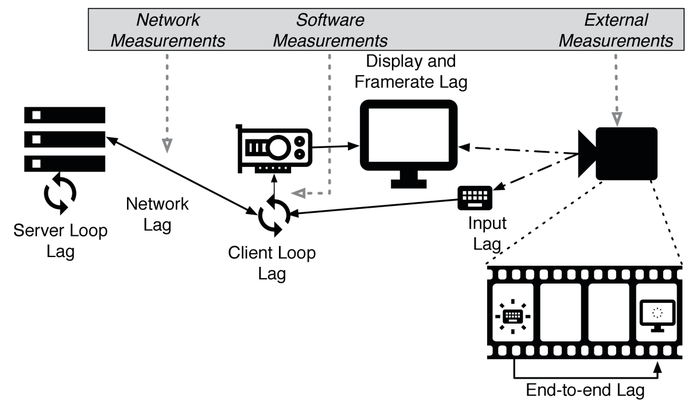
- Framerate and tickrate governing factors in input latency
- Low framerates are a source of lag
- Principle of apparent motion starting at about 16Hz



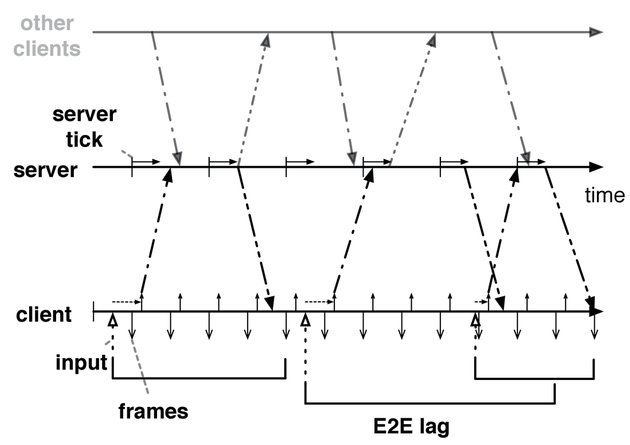


- Common framerates: 30, 60, 120Hz
- Reasoning: display refresh rates coupled with VSYNC or tearing issues

Sources of Lag

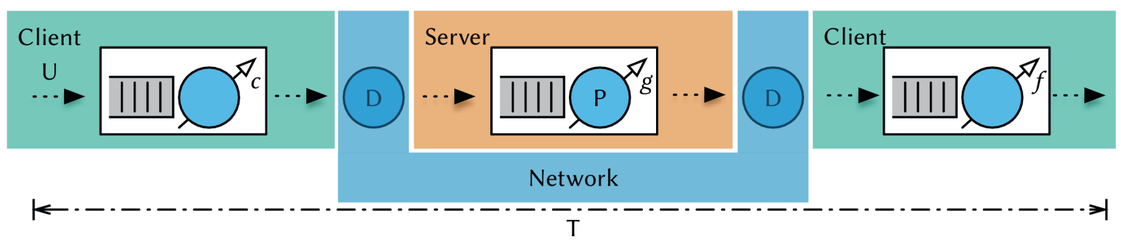


- Lag affects gameplay
- Every game is influenced differently by lag
- Games exhibit distinct lag profiles
- **Different viewpoints to observe lag**
- External capture methods for full lag



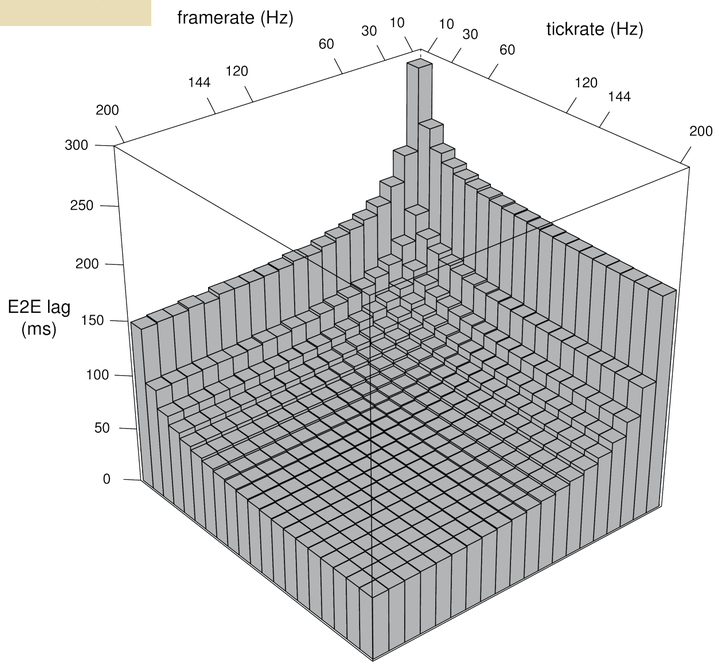
Modeling and Simulating Lag

- End-to-End lag sources modelled as a queuing system
- Goal: investigate alternate sources not directly attributed to lag: frame/tickrate, message rates, input and display devices
- **Interaction of multiple, independently clocked processes**



- Extensible for Cloud Gaming
- Determine correct parametrization of model entities
- Implement model in a R simulation
- Run studies for different game types

Results



Online game at 10-200Hz frame/tickrates, 40ms base network RTT

- **Large influence of frame-/tickrate on E2E lag**
- Negligible network influence at low frame/tickrate
- Guidelines for future user study parametrizations!

Further information, the full paper, all data as well as source code can be found at `https://github.com/mas-ude/onlinegame-lag-sim`, contact `florian.metzger@uni-due.de`, or just scan the QR-code.