

# GAMES AND FRAMES: A STRANGE TALE OF QoE STUDIES

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Open-Minded

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## Motivation

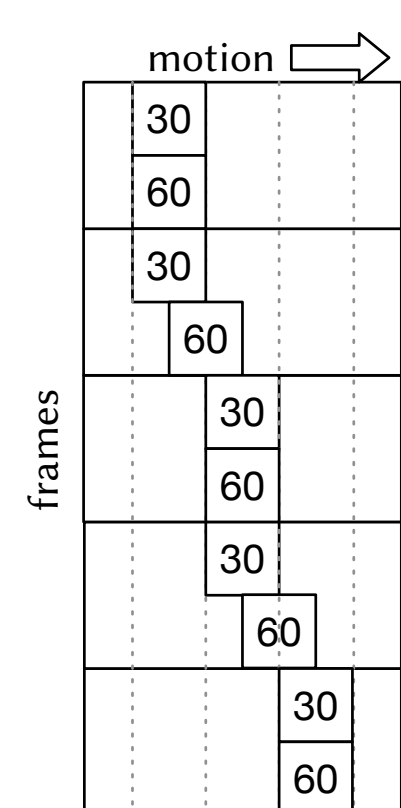
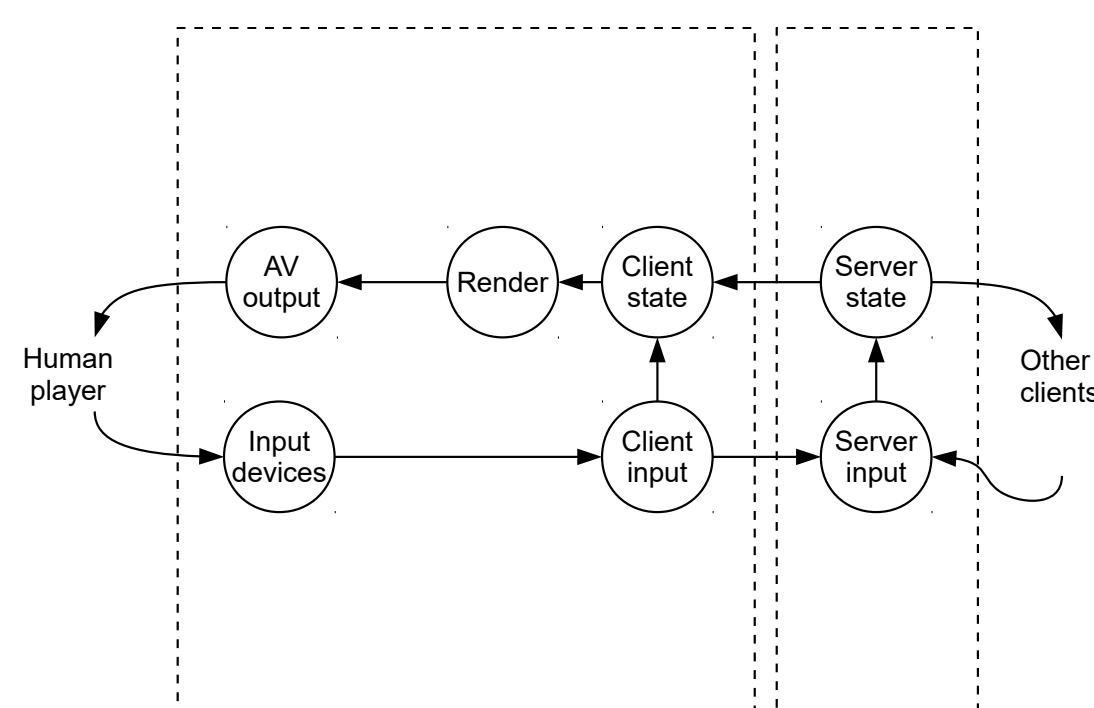
- Increasing research interest for video game QoS and QoE
- Past approaches treated video games similar to video streaming
- Studies only focus on network delay
- Many interlocked mechanics in play
- Need for a better theoretical understanding of these mechanics

## Issues of Past Studies

- Insufficient framerates (e.g.: 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

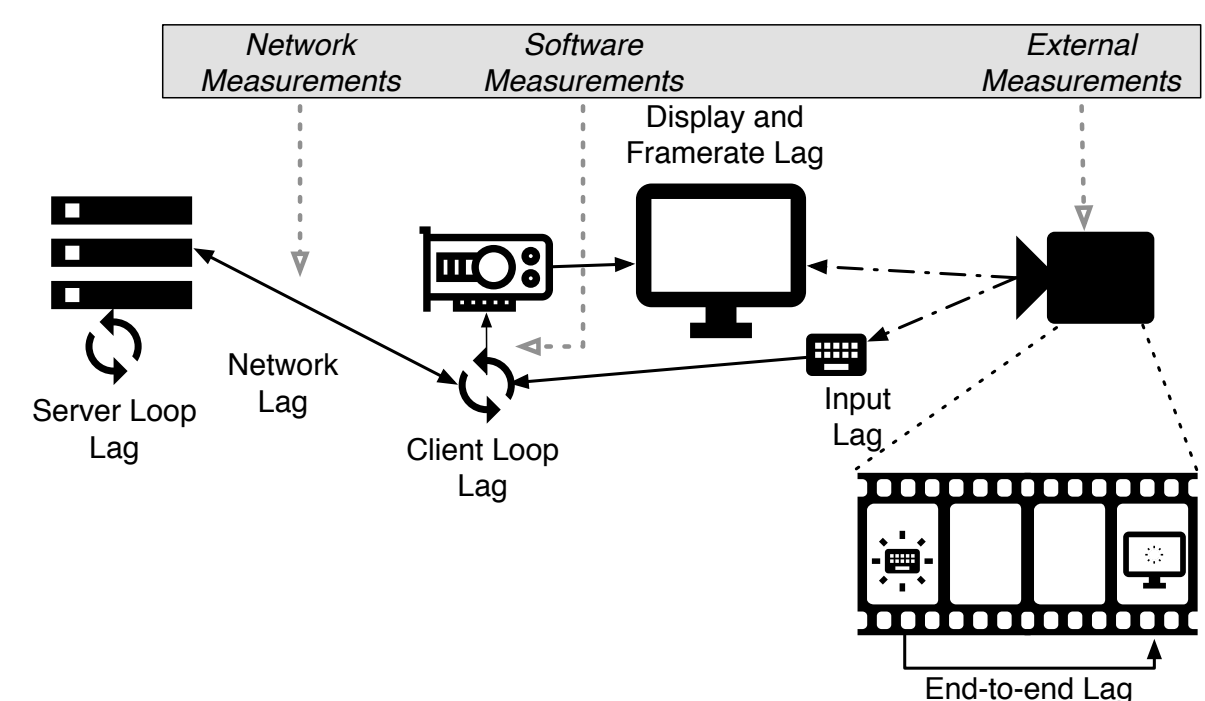
## Frame- and Tickrates

- Framerate and tickrate governing factors in input latency
- Independently clocked processes
- Low framerates are a source of lag

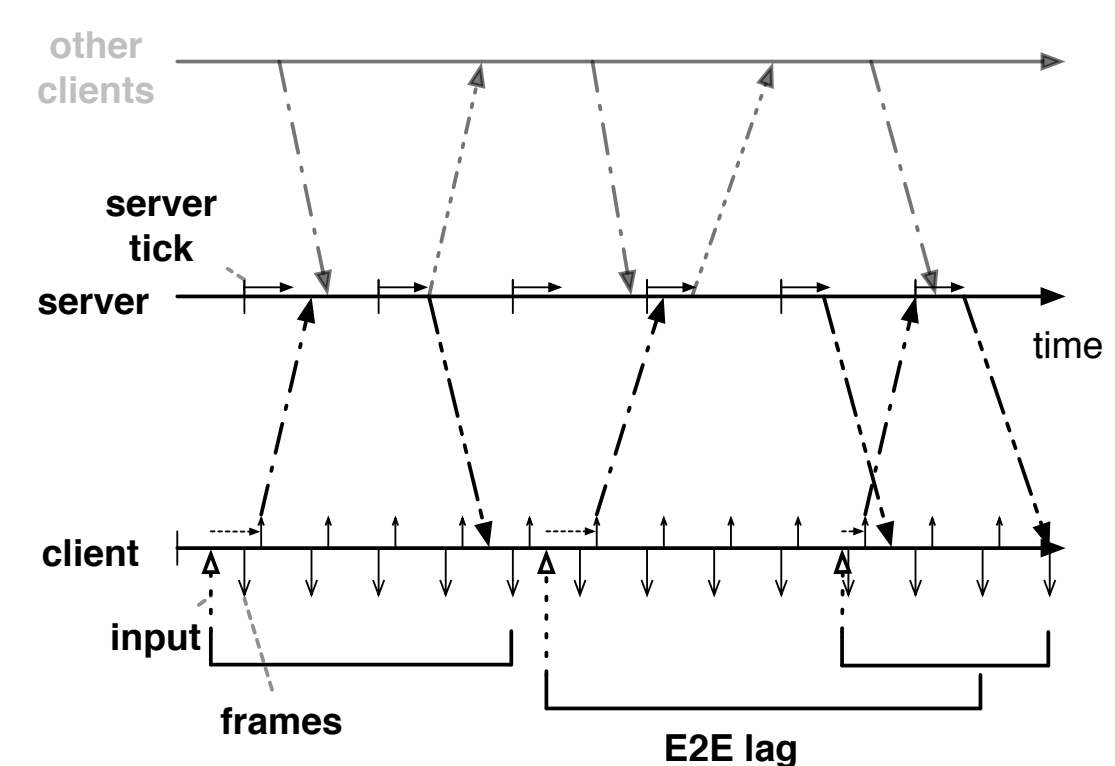


- Based on principle of apparent motion starting at about 16Hz
- Common framerates: 30, 60, 120
- Reasoning: Monitor refresh rates and VSYNC/tearing

## Sources of Lag

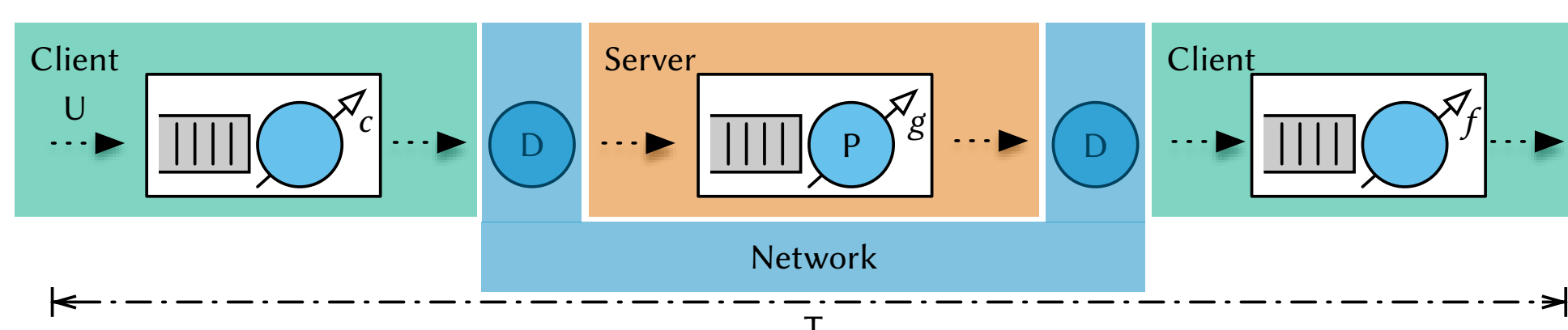


- Lag affects gameplay
- Every game is influenced differently by lag
- Games exhibit distinct lag profiles
- Different vantage points to observe lag
- External capture methods for full lag



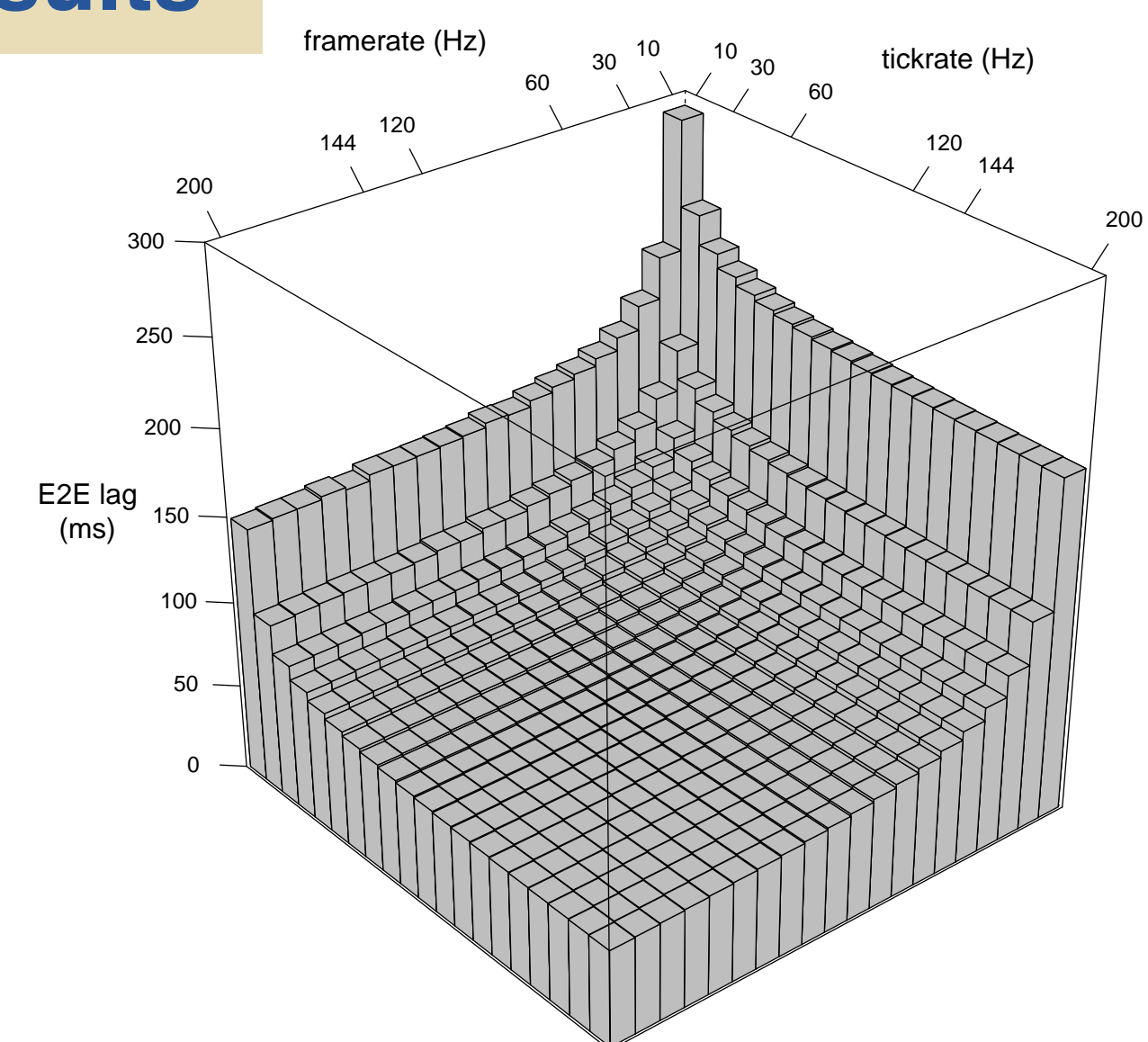
## Modeling and Simulating Lag

- 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](mailto:florian.metzger@uni-due.de), or just scan the QR-code.

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