


Latency Can Kill: Precision and Deadline in Online Games

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Is It Latency or Do You Just Suck?



Is It Latency or Do You Just Suck?

Delayed response


“Magic” bullets

Server matters

Outline

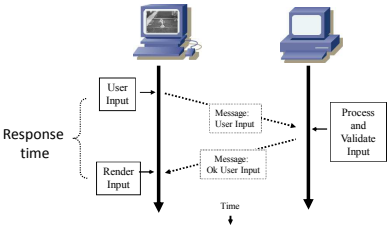
- Introduction (done)
- What is latency for games? (next)
- Why does it matter?
- How much does it matter?
- Do you have evidence?

What is Network Latency?



- Latency - time to get from source to destination
 - There and back (round-trip time)

Why Does Latency Matter?



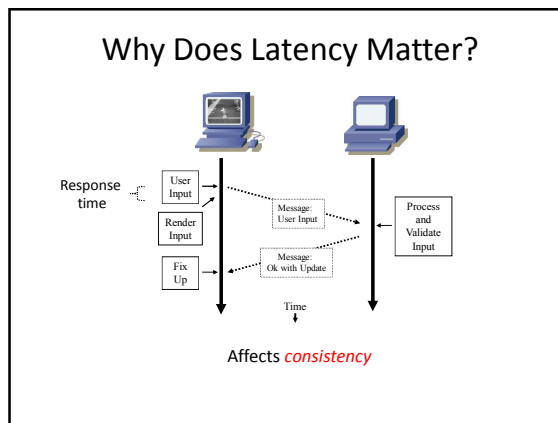
Affects *responsiveness*

Example of Unresponsiveness

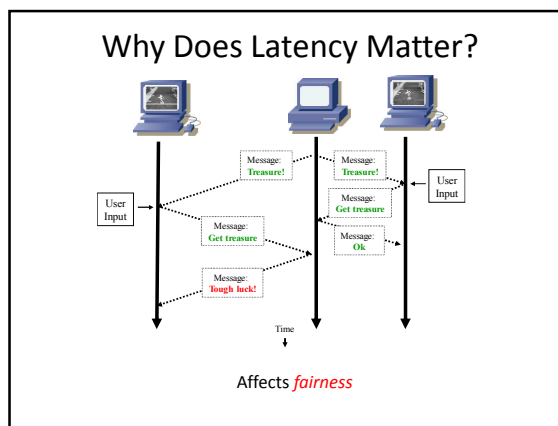
Player is pressing left

Player is pressing up

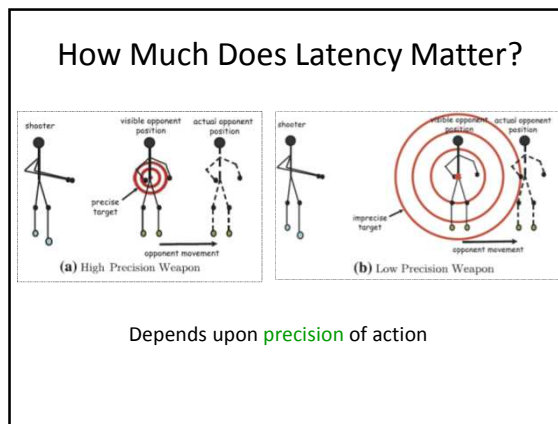
Running back goes out of bounds! Player curses

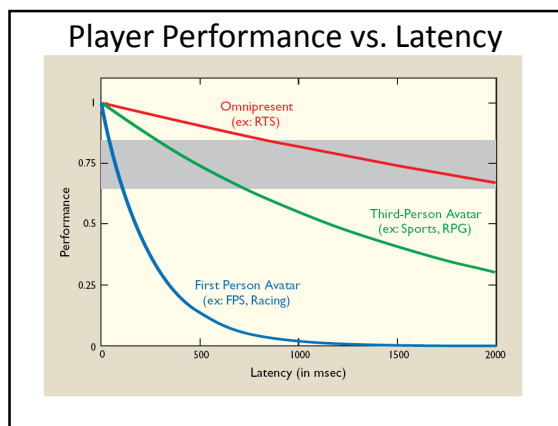
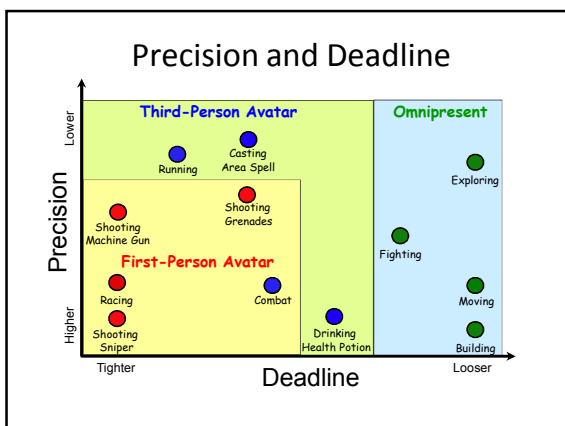
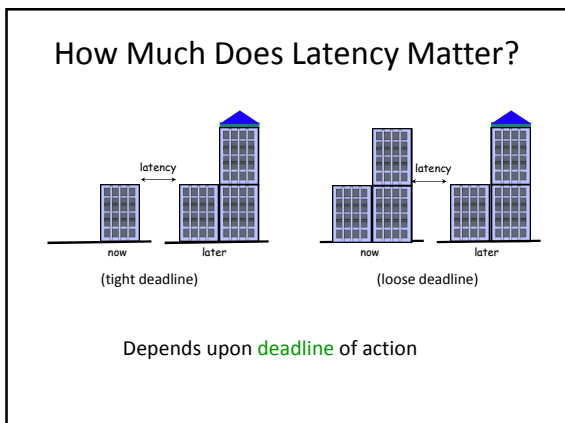


Example of State Inconsistency



- ### Outline
- Introduction (done)
 - What is latency? (done)
 - Why does it matter? (done)
 - How much does it matter? (next)
 - Do you have evidence?





- ### Outline
- Introduction (done)
 - What is latency? (done)
 - Why does it matter? (done)
 - How much does it matter? (done)
 - Do you have evidence? (next)
 - Methodology
 - Results

- ### Methodology (1 of 3)
- Goal:
 - Vary: **precision** & **deadline** of actions
 - Control: **latency**
 - Measure: performance
 - Modify open source game
 - BZ Flag
- BZFlag**
 Free Open Source
 First Person Shooter
 Online Multiplayer Tank
 Battle Game

For Windows, Mac OS X,
 Linux, and more
- <http://www.youtube.com/watch?v=MkKw56t1Gc>

Methodology (2 of 3)

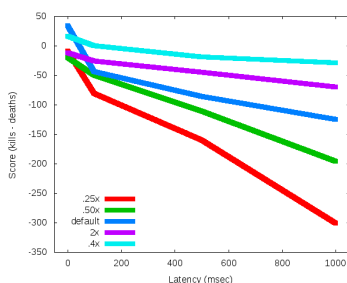
- Varying **precision** – tank size
 - Larger tanks means precision
- Varying **deadline** – bullet speed
 - Slower bullets means looser deadline
- Steps:
 1. Made changes
 2. Verify and validate
 3. Determined game length, number of iterations
 4. Ran experiments
 5. Analysis

Methodology (3 of 3)

- 8 computer-controlled tanks (bots)
- 2 hour runs

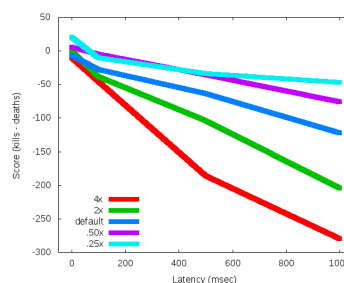
Factor	Value
Tank Size	0.25x, 0.50x, default, 2x, 4x
Bullet Speed	0.25x, 0.50x, default, 2x, 4x
Latency	0 ms, 100ms, 500ms, 1000ms

Results for Precision (Tank Size)



Generally, higher precision affected more by latency

Results for Deadline (Bullet Speed)



Generally, tighter deadline affected more by latency

Summary

- Latency can kill (your fun!)
 - Responsiveness, Consistency, Fairness
- Amount depends upon player action
 - Precision – accuracy required to complete action successfully
 - Deadline – time required to achieve the final outcome of action
- Effects grouped based on perspective
 - First-person avatar
 - Third-person avatar
 - Omnipresent

What to Do About It?

- Network improvements
 - Shift latency “left”
 - But mobile, wireless emerging!
- Server selection
 - Shift latency “left”
 - But limited selection and/or want to play with friends!
 - And want more players (1000 v 1000)!
- Latency compensation techniques - help “deal with it” (so the player doesn’t have to!)
 - Shift curves “up”
 - But often tradeoffs (e.g. consistency and responsiveness)

