Latency Can Kill: Precision and Deadline in Online Games

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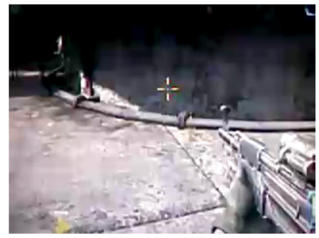
Is It Latency or Do You Just Suck?

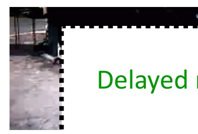


http://www.youtube.com/watch?v=r6PwHkhEAkU

Is It Latency or Do You Just Suck?

http://www.youtube.com/watch?v=Bn1nBR5jOx8

Is It Latency or Do You Just Suck?

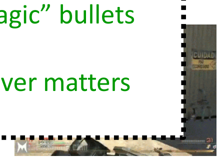


http://ww

Delayed response

"Magic" bullets

Server matters

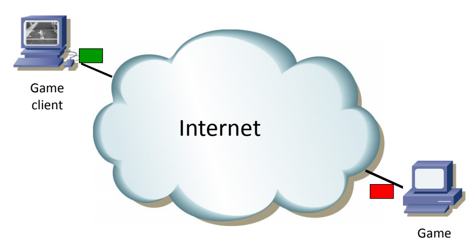


http://www.youtube.com/watch?v=Bn1nBR5jOx8

Outline

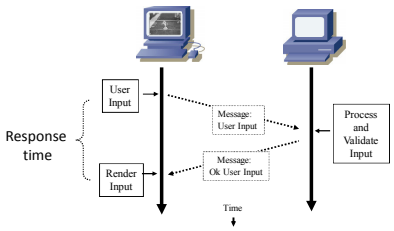
- Introduction (done)
- What is latency for games? (next)
- Why does it matter?
- How much does it matter?
- Do you have evidence?

What is Network Latency?



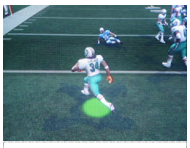
- *Latency* - time to get from source to destination
  - There and back (*round-trip time*)

Why Does Latency Matter?

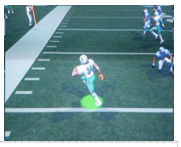


Affects *responsiveness*

Example of Unresponsiveness



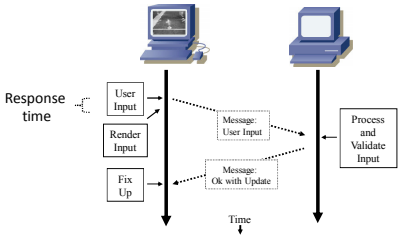
Player is pressing left



Player is pressing up

Running back goes out of bounds! Player curses

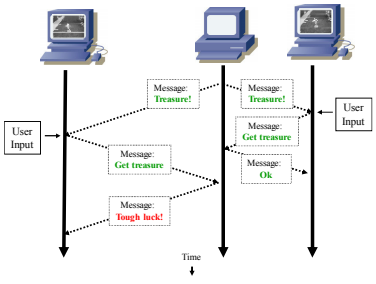
Why Does Latency Matter?



Affects *consistency*

Example of State Inconsistency

Why Does Latency Matter?

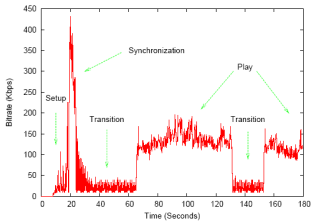


Affects *fairness*

Outline

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

Depends Upon Game Phase

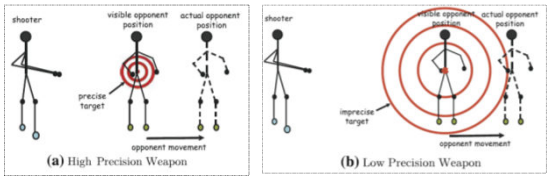


(Name that game?)

← Play

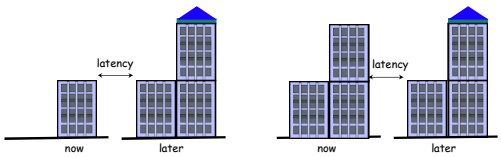
Latency matters most in "Play" phase

How Much Does Latency Matter?



Depends upon precision of action

How Much Does Latency Matter?



(tight deadline) (loose deadline)

Depends upon deadline of action

Game Perspectives

First Person Linear

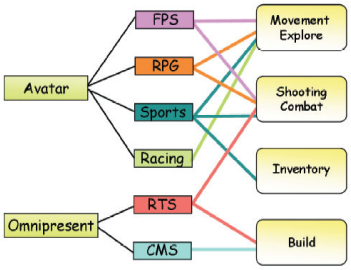
Third Person Linear

Omnipresent

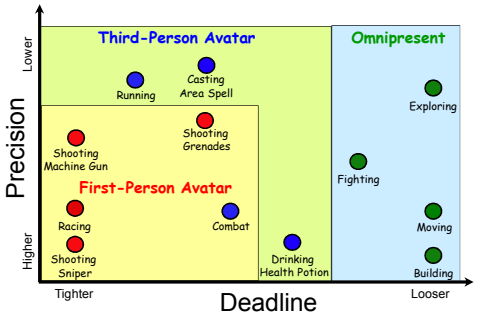
Third Person Isometric

(Name those games? Newer examples?)

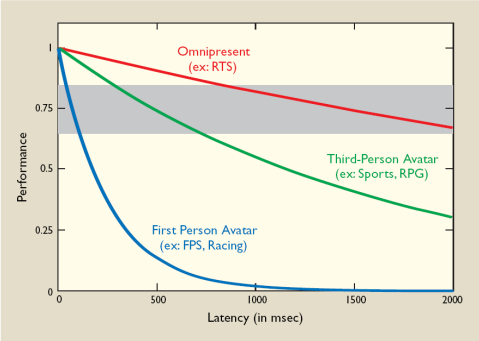
Categorization of Player Actions



Precision and Deadline



Player Performance vs. Latency



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

http://www.youtube.com/watch?v=xMYkw56t1Gg

Methodology (2 of 3)

- Varying precision – tank size
  - *Larger tanks equal lower precision*
- Varying deadline – bullet speed
  - *Slower bullets equal looser deadline*

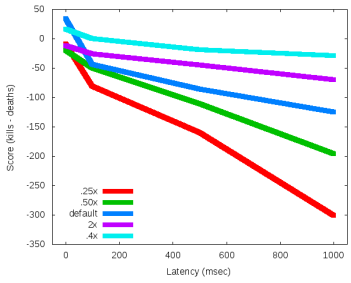
- Steps:
  1. Made changes
  2. Verify and validate
  3. Determined game length, number of iterations
  4. Ran experiments
  5. Analysis

Methodology (3 of 3)

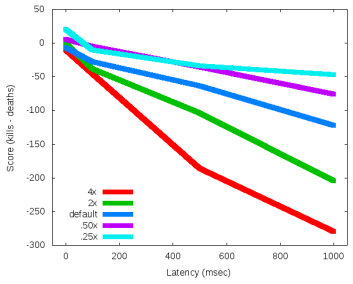
- 8 computer-controlled tanks (bots)
- 2 hour runs

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)



Results for Deadline (Bullet Speed)



Results for Precision and Deadline

(Lagged tank – 1000 ms)

Bullet Speed (deadline)	Tank Size (precision) 0.25x	4x
0.25x	-71	-51
4x	-201	-161

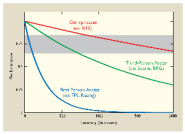
Actions w/higher precision and tighter deadline (bottom left) have lower score for the lagged player than actions w/lower precision and looser deadline (top right).

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

Future Work?

Future Work



- 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)