ENGINEERING IN ENTERTAINMENT

Interaction Design in Video Games

Sample Problem:

Delay-based netcode in video games applies a standard delay on both players' inputs to enable perfect synchronization of the game state by accounting for the connection's speed (commonly measured as its "ping"). Delays are commonly indicated in terms of frames, which are the individual discrete moments of the game state that typically transition from one to the next. The rate of these transitions is commonly referred to as "frames per second" (FPS). In ideal conditions for delay-based netcode, both players' inputs are read and communicated to each other's systems over the network, but are not expressed on-screen for either player until the designated number of frames of delay have passed since the players' inputs were registered locally.

In a Track & Field game, Player A executes an input for their character to jump over a hurdle on its 6th frame once registered. Thirty-nine milliseconds ago, in real-time, Player B had executed an input to also jump over a hurdle on its 9th frame. If the game's set delay is a constant 3 frames, what most accurately details what happens on both player's screens? Assume Player B's input to have occurred exactly halfway through the duration of a frame, frames are precisely 16 milliseconds long, and inputs are instantly registered to execute the jumps on a next frame.

A. 49 milliseconds after Player A's input, their character jumps over the hurdle first.
B. 81 milliseconds after Player A's input, their character jumps over the hurdle first.
C. 129 milliseconds after Player A's input, their character jumps over the hurdle first.
D. 145 milliseconds after Player A's input, both characters jump over the hurdle at the exact same time.
E. 145 milliseconds after Player A's input, Player B's character jumps over the hurdle first.