

Doom 3 BFG Architecture

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What is Doom 3 BFG Edition

- ❖ Science fiction survival horror first-person shooter video game
- ❖ Remastered version of Doom 3
 - ❖ Better audio with more horror effects
 - ❖ Enhanced graphics
 - ❖ Checkpoint save system
 - ❖ Steam Integration
- ❖ Developed by id software
- ❖ Published by Bethesda softworks
- ❖ Features single and online multiplayer

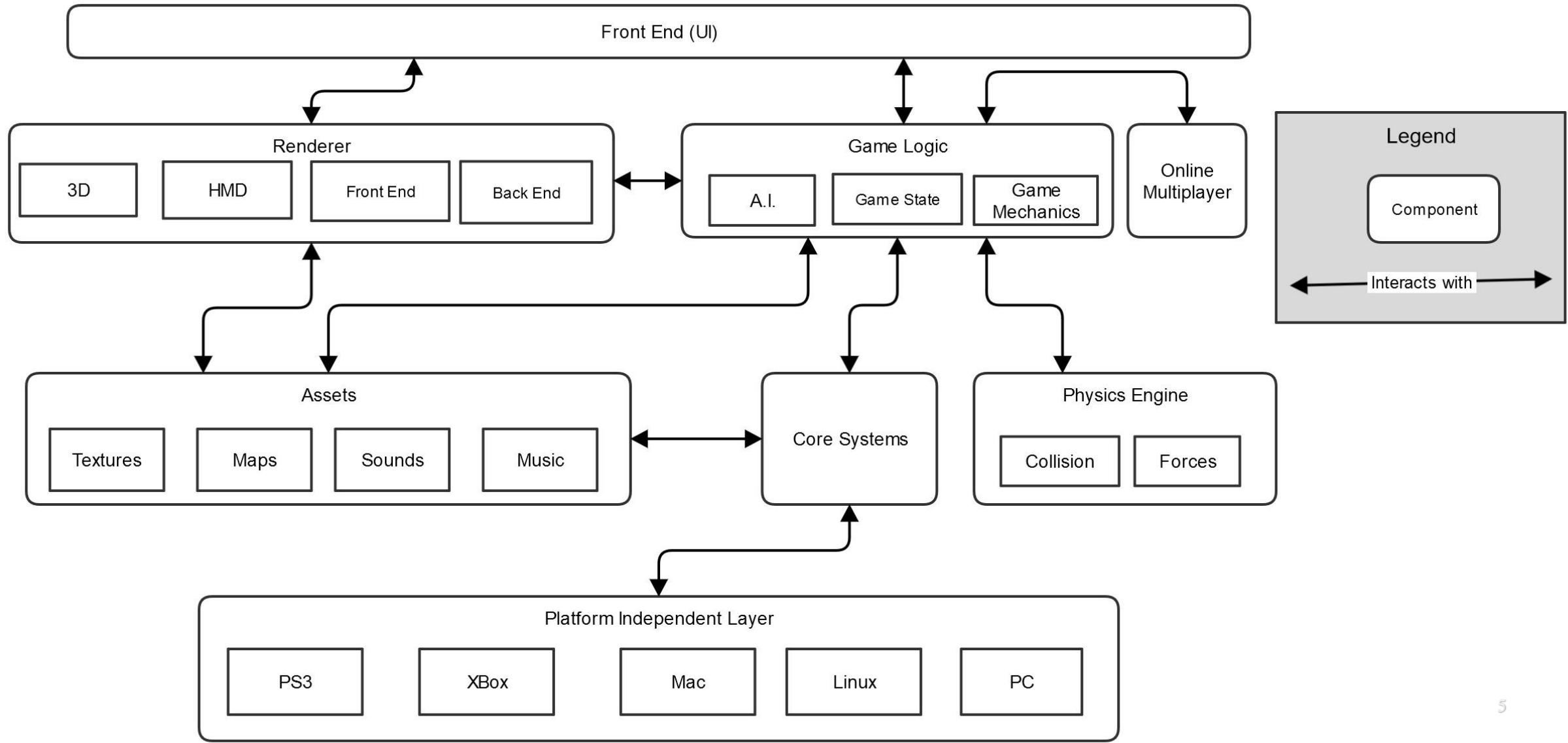
Derivation Process

- ❖ Game Engine Architecture Textbook
- ❖ Source Code review from Fabien Sanglard's website
- ❖ Identify components present in Doom 3
- ❖ Identify dependencies between components

Evolution

- ❖ Doom 3 supported keyboard and mouse
 - ❖ BFG edition support modern OS and consoles (XBOX360, Playstation 3, etc)
- ❖ Doom 3 ran solely on the id Tech 4 engine
 - ❖ Core of the BFG edition runs on the id Tech 4 engine with updated improvements from the id Tech 5 engine
- ❖ Multithreading
- ❖ 3D and Head-mounted Display
- ❖ Steam Integration

Conceptual Architecture



Components

- ❖ Front end(UI)
 - ❖ Allows easy access to controls that will take advantage of other components.
- ❖ Game Logic
 - ❖ Handles Game mechanics and Artificial intelligence
- ❖ Renderer
 - ❖ Responsible for generating graphics onto screen.
- ❖ Online Multiplayer
 - ❖ Handles all network related operations
- ❖ Core Systems
 - ❖ Contain all libraries needed for the operation of the game, like File System accessing, Math Libraries...etc
- ❖ Assets
 - ❖ Controls all assets that need to be fed into the game like textures, maps, audio and models

Components, Cont.

- ❖ Platform Independent Layer
 - ❖ Ensures consistent behaviour across all hardware platforms by wrapping and replacing the library functions used.
- ❖ Physics engine
 - ❖ Resolves collisions and controls physics of game

Concurrency

Three main threads:

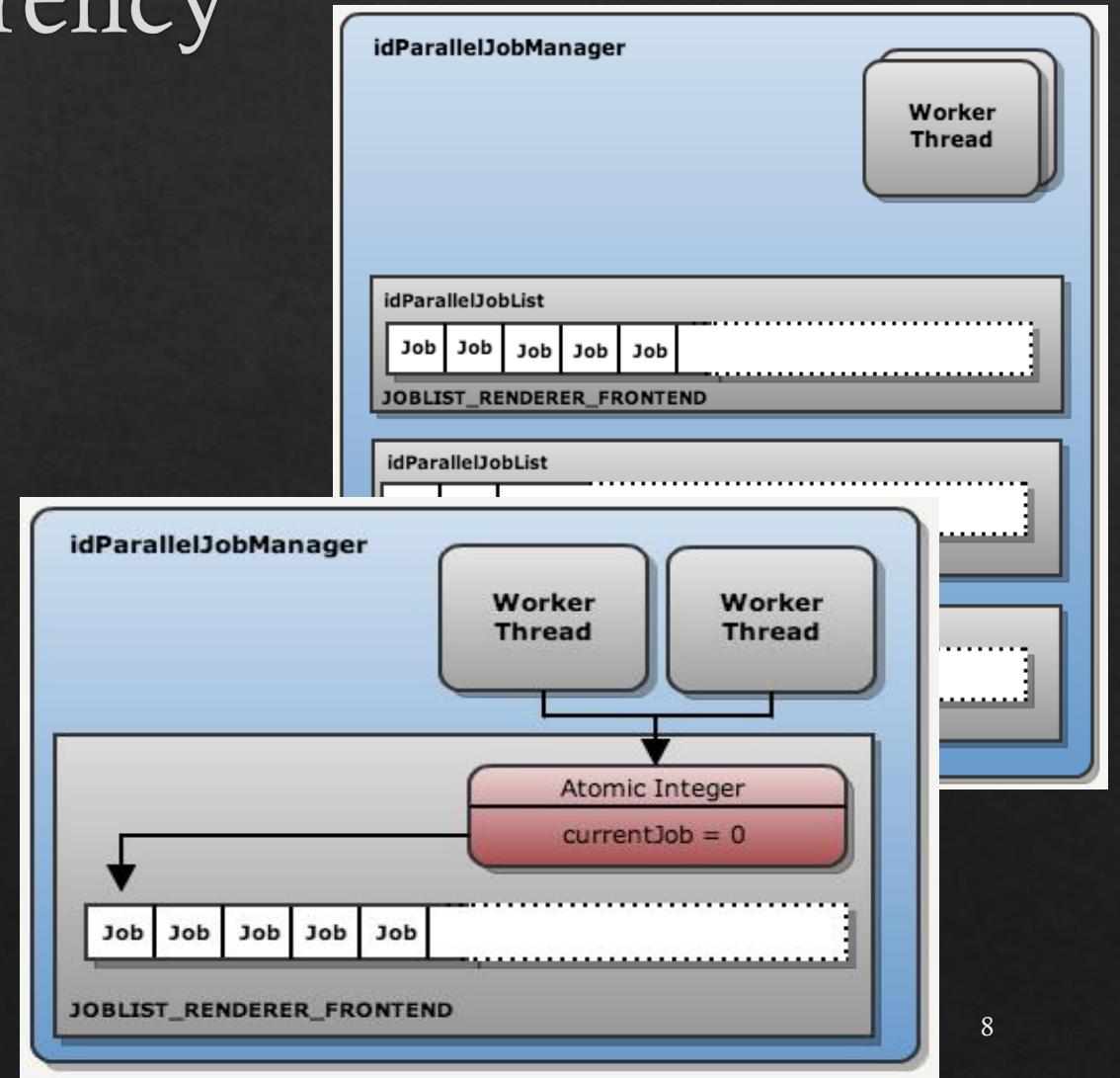
- ◊ Renderer backend
- ◊ Game logic and Renderer backend
- ◊ High frequency joystick input

Threads are highly interlinked

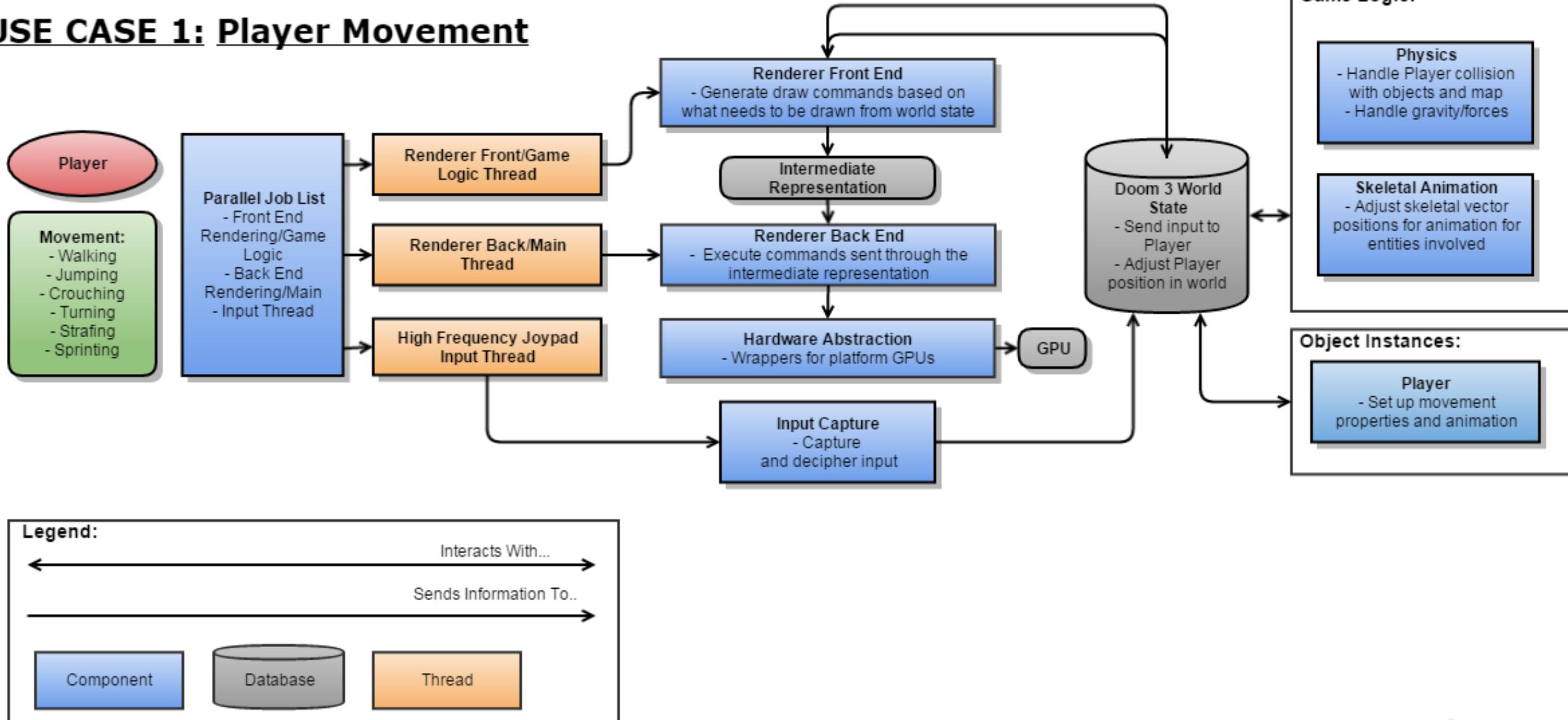
Accompanied by two **worker** threads
(Worker and Worked)

- ◊ Decomposes tasks into **jobs** taken sequentially from a queue

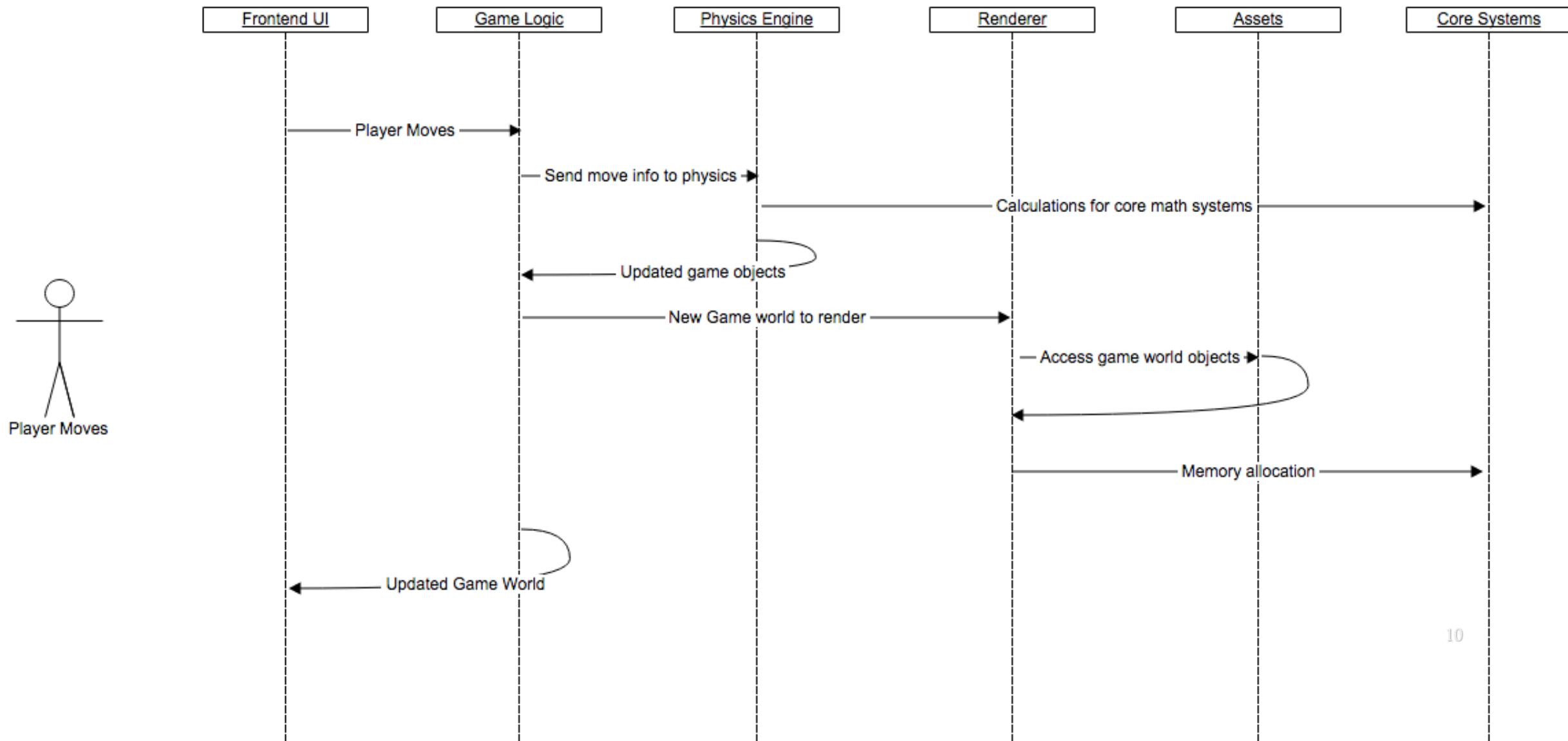
Concurrency is also significant in the **renderer**



USE CASE 1: Player Movement



Player Movement Sequence Diagram



Lessons Learned

- ❖ How to handle multithreading in AAA game.
 - ❖ One single executable instead of multiple files
- ❖ We don't need the source code to come up with the conceptual architecture

Summary

- ❖ Doom 3 BFG uses a Layered Architecture with Object Oriented design.
- ❖ The BFG edition has improved many aspects of the game components:
 - ❖ Enhanced Graphics
 - ❖ Improved Audio
 - ❖ Support for 3D displays and Head-mounted Display (HMD)
- ❖ Doom 3 BFG supports multithreading, a huge upgrade from its previous iteration that support single threading

Resouces

- ❖ Game Engine Architecture, By Jason Gregory
- ❖ [DOOM3 BFG SOURCE CODE REVIEW](#)

Questions?