

T-637-GEDE Game Engine Architecture

Problem Set 1- Due Friday February 1st, 2013

Problem 1 – Engine Design (25%)

Imagine that you are developing a game engine that you want to use with your own game but also license to other developers. At some point you have to implement an **in-game inventory system**, where the player can bring up a decorative window that contains a visual representation of all held objects, which he can then equip/use, combine, drop or examine. How much of this inventory system would you implement as part of your game engine and how much would be game specific? How does this depend on what genre of games your engine should support? What other game engine components would you be relying on? What possible platform specific things might you have to consider?

Problem 2 – Applying Math to 3D Game Problem (25%)

A guard in a stealth game has a vision cone that extends both 85 degrees to the left and to the right of the direction he faces in (giving him a 170 degree field of vision). He is standing on a clear floor at location $P_G = (1,0,5)$ and faces a television standing at location $P_T = (2,0,1)$. The player enters the room at location $P_P = (8,0,6)$. If we assume that the player is infinitely thin (casting no shadow into the room and occupying only one point) and no objects occlude her from the guard, will she enter the guard's vision? First visualize this on paper (and perhaps guessing the solution!) and then solve this using a dot product of two vectors. Make sure to show each step of your calculation.

Problem 3 – Game Loop and Object Update (25%)

You are creating a game where a boat is sailing at 80 km/h in the Northwest direction (north is along the negative z axis and west along the negative x axis in your world). Your game loop is running at 40 FPS. Calculate the 3D vector that you have to add to the current 3D position of the boat in a cartesian coordinate system, each time the object is updated (given that you update it once during each pass of the game loop).

Problem 4 – High Resolution Timer (25%)

When considering whether a 32 bit register would be enough to hold a high resolution timer you must consider the clock rate of the CPU. How much time would it take a 32 bit register to wrap around (start again at 0) on a 2 GHz CPU. Show your calculations.