

L3/L4 CCS – Game Development Summative Assignment

Coursework Description and Assessment

You should submit your work as a pdf file containing any Machinations or other diagrams required. You should also separately include the .xml files of all required Machinations diagrams in your submission.

Essential background reading

- You should study the notes of lecture 2 and 5 and the materials for the problem class.
- **[Machinations]** www.jorisdormans.nl/machinations/
- **[TRON Game]** <http://www.classicgamesarcade.com/game/21670/tron-game.html>

Assignment

1. Suppose a PACMAN game is implemented by the tile-based game technology.
[Reference: Lecture material, Machinations]
 - a) Explain how **i)** the graphical representation and **ii)** the internal data structure of both the game board and the game characters (i.e. PACMAN and Ghosts) of the PACMAN game can be constructed. Note that discussion of the modeling of animation sequences of game characters is not required. [10 Marks]
 - b) Explain how a game play session of the PACMAN game can be processed and rendered. Your explanation should include the discussion of how you make use of the graphical representation and update the internal data structure of the game. You can assume the PACMAN and the ghosts are moving around in the game board during a game play session. Also, the PACMAN can interact with both the ghosts and different game elements inside the game board. [15 marks]
 - c) Construct a Machinations diagram to represent the game design of ghost movements between the ghost home and the maze. The diagram should comprise a “ghost at home” resource and a “ghost at maze” resource, and use automatic resource convertors to work out the ghost movements between these two resources. Initially, there are 4 ghosts in their home while there is no ghost in the maze. One ghost will go out to the maze for every 5 iterations, while a random number of ghosts will go back home for every 2 iterations. [15 marks]
 - d) Extend your Machinations diagram in part (c) to incorporate the internal economy of “Ghost being eaten”. A ghost can only be eaten by the PACMAN if it is in the maze. After being eaten, the ghost will send back to the ghost home immediately. [10 marks]

2. This question concerns about the development of a TRON game based on the tile-based game technology. A live demonstration of the TRON game is available at: [Reference: TRON Game].

The features of this game include:

- The game comes with a 2D rectangular game board. At the beginning of a game, there are only two players locating somewhere near the central region of the game board and facing towards each other.
 - The two players can move either horizontally or vertically inside the game board. By default, a player will continuously move forward along the current moving direction and cannot stop moving. Therefore, the two players are moving towards each other when a game starts.
 - A player can change its moving direction by pressing the arrow keys or their equivalents on the keyboard. Whenever a player moves, it will leave a trace on the game board. If a player hits a trace (including the player's own trace), he/she will lose the game.
 - To win a game, a player should move and leave a trace in a way to block its opponent from being able to make any further movement.
- a) Construct the internal data structure of the TRON game and justify the choice of such a data structure. In your answer, you should discuss of how the data structure will be initialized before a game play session starts. You should also discuss how the data structure models the players in the game and the traces they produce during game playing. [10 Marks]
- b) By using pseudocode, construct rules for:
- i) Checking and updating a player's intended moving direction (i.e. checking which keyboard keys have been pressed by the player to initiate a new moving direction.);
 - ii) Checking if there exists any obstacles in the game board avoiding a player to move forward;
 - iii) Updating the internal data structure of the game board based on a player's current movement; and
 - iv) Identifying the winner of a game play session.

You are only required to construct rules for one game player in (i) to (iii). Make sure that you have constructed a sufficient number of rules, allowing all possible moving directions to be covered for all checking and updating. [40 marks]