2IO23 DBL Project – Assignment II (variant B)

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Introduction This is the second assignment which you will do in the DBL project. From the first assignment you should have gained a feeling for the roles of clients and producers, which are also an important aspect of this second assignment.

The second assignment is to develop a game that satisfies the following requirements:

- The game can be played by any number of players (students or other humans) between two and six.
- The graphics should have pleasing three-dimensional aspects. This does not necessarily mean that objects in the game should really 'be' three-dimensional and able to move in three-dimensional space, but they should at least look three-dimensional.
- The game runs on multiple computers (one for each player) and lacks a centralised game server; that is, the game is truly distributed, and all computers involved in the game communicate with each other on an equal footing. Only at the start of the game, it is allowed to use a centralised server to set up the communication between the computers involved. Therefore, a challenge for the producer will be to make sure that after that, the current state of the game remains consistent across multiple computers.
- After the initialisation phase, communication between computers should be implemented as point-to-point communication: each message is sent by one machine to one other machine. Broadcast communication, where a message is sent to many other computers at once, is only permitted in the initialisation phase. For network communication, protocols such as TCP/IP or UDP/IP can be used. It should be avoided that users have to enter their IP addresses manually at the start of the game.[1]
- It is possible that, during game play, one of the computers becomes unreachable, for example, because the operating system stalls or because a network cable becomes unplugged. It is not required that the game can continue when this happens.

Below, you will find a rough outline of the game that you, as a client, should have developed by another team, acting as a producer. Your first task as a client is to extend this rough outline into an informal description of a game. This informal description should include the requirements as described in this document and your own ideas about what the game should be like, what the rules of the game should be, what it should look like etc. The purpose of this informal description is that you can give it to the producer, so that the producer can develop the description into a formal specification, and, eventually, an actual working implementation. You should make sure that the complexity of the informally described game is such that its implementation is indeed within reach of the DBL project.

[1] The UDP protocol allows broadcast messages, which can be used in the initialisation phase to set up the communication between computers—see the advise on group initialisation that it is available from the course website.

Some things you may want to consider in your informal description:

- What kind of actions should be available to the players, and what are the results of these actions?
- What is the goal of the game and how do you determine if this goal has been achieved? (Counting points? How? When does the game end?)
- What do you want the game 'world' to look like? Do all players get the same view, or does each player get a different view of the game, depending on, for example, his/her location?
- The producer's time is limited, so it may not be possible to make the game equally advanced in all aspects. For example, more advanced graphics may mean less advanced interaction and vice versa. Therefore you should decide what aspects of the game are most important to you, and try to keep it realistic. Distinguish between features that you consider essential and which the producer should realize strictly as required, and features that you consider desirable and which can be added in a later stage, and/or where you may want to give the producer the freedom to choose any solution that has a similar effect. A simple game that works (remember Tetris?) is more fun than a great idea for which you can only get some screen shots but no fully operational implementation.

Assignment Specifics

For this assignment you will come up with a multi-player strategy game in which players are in control of robots. The objective is to move these robots to their home base; the locations thereof may not be known upfront. You, as a client, may use your full imagination to specify this further and create a set of coherent rules of the game. Think, for example, about the following questions:

- What more can be said about the goal of the game? Is there a reward system? Are there time limits? How do the robots move? Can you hinder other players?
- What is the setting of the game? Indoor, outdoor, or something abstract? Are there extra obstacles in the game? Are there hidden gadgets, such as teleporters and elevators in the game?
- Can there be more actors in the game? What is their role?
- What may happen in the game as a result of the advancement of time? For example, is the game arena changing over time?
- How do players interact with each other and with the game board? What happens if players meet?

You may change the setting, if so desired, that is, robots could also be replaced by other more-or-less autonomous moving objects that have to be guided to their home base. Provide a number of necessary, desirable and if-need-be features of the game. Pay attention to the difficulty of formally specifying and implementing your game: it should be possible to do so within the time set for this project within reason.