CS 451/551 - User Interface Design

Fall 2021

Assignment 4

To be demonstrated on Dec 08, 2021 (Monday)

In this assignment, you will implement a temporal system with animation. Temporal constraints are indicated in **green** in the description below. An animal center playfully designed a novel structure for keeping the animals in a maze, instead of locking them in cages. A sample of such a maze is shown in figure 1.

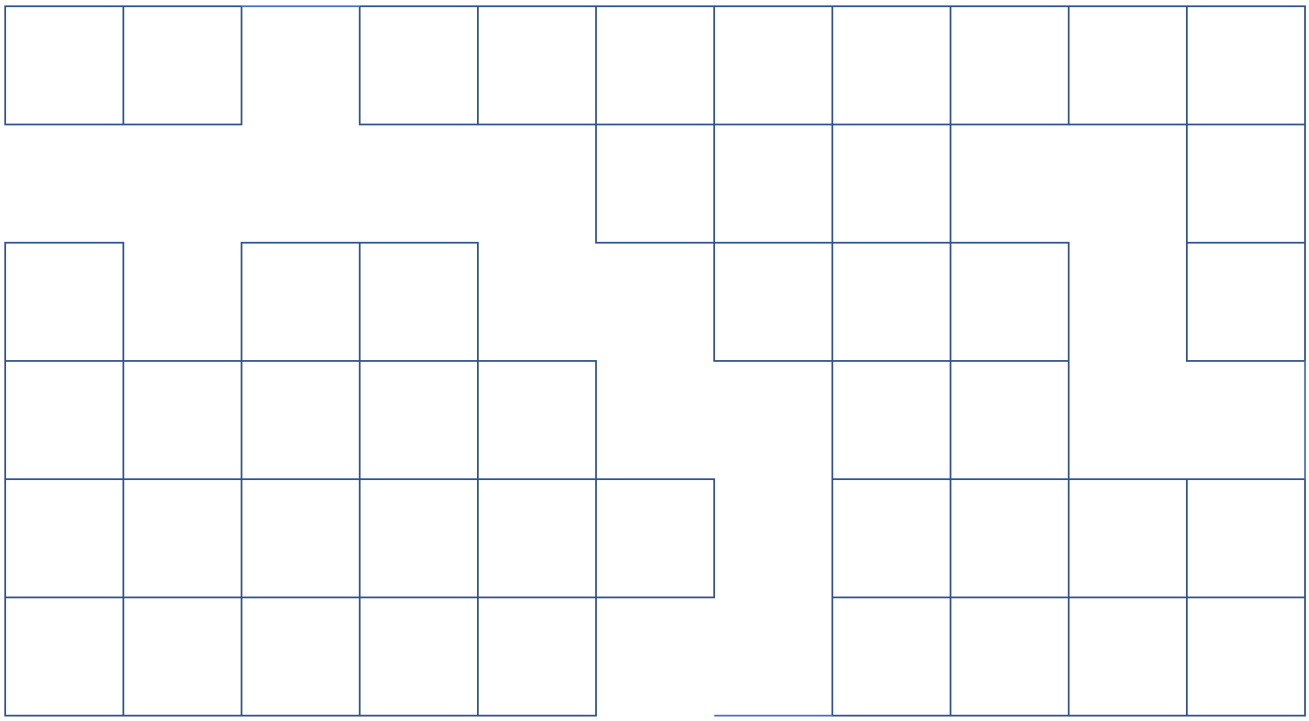

Figure 1: A Sample Maze for the Animal Center

An animal placed in one of the squares of the maze may move as long as it sees that there is an opening to go to an adjacent square. If the path it takes leads to an exit, the animal can escape from the maze. However, not all paths lead to an exit. There can be more than one exit.

The implementation must satisfy the following properties:

- An animal may move to an adjacent square only if there an opening between the current square and the adjacent square. It may go back to the same square from where it came in the previous step.
- An animal can move to an adjacent square either horizontally or vertically.
- It should take one second for an animal to move to the next square. The animal must rest at that square for **at least** one second (it may eat or drink while in that square!!)
- If an animal reaches an exit square, it gets out of the maze at its next move. At that time, a message must be displayed on how long it took for this animal to escape, starting from its initial location.
- An animal is placed at a random location every time the program starts.

- To start with, there must be more than one animal in the maze.
  - Each animal must have a unique identifier. You need this identifier to report and display when the animal escapes from the maze.
  - All animals must move at the same time, and must take rest for **at least** one second before they move again.
  - More than one animal may stay on the same square at the same time. But they do not fight with or eat each other (these are friendly animals!!)
- There must be a clock displayed on the screen to verify the timing constraints. It should display time change in every second, preferably in HH:MM:SS format.
- Accelerator
  - The user must be able to select an acceleration mode (may be using a button or slider or something). The accelerated mode will be used to complete the run faster.
  - In the accelerated mode, each animal must move in 0.5 second to an adjacent square and must rest for at least 0.5 second in each square.

Demonstration

- The maze must have a minimum size of 15 X 15. For the convenience, you can have a fixed maze all the time.
- Both normal mode and accelerator mode must be demonstrated.
- Demonstration must include more than one animal at the beginning.
- The resting time of an animal must vary in each square (for a minimum of one second in normal model and for a minimum of 0.5 second in accelerated mode). It should not be the same all the time.
- Animals must be placed at random squares when the program starts. This means that you must demonstrate the program at least twice to show that the initial placements of animals are at random.
- All elements (the maze, the accelerator mechanism, the clock and the message when an animal escapes) must be visible on one screen only.

How to make the GUI more attractive?

- You can have different mazes. Each can be selected manually or randomly.
- Animals could be represented with nice icons making them more realistic.
- Sound can be incorporated for each animal or for some animals.
- A voice message, along with a text message, can be echoed when an animal escapes.
- You may have a mechanism to introduce the number of animals at the beginning.

As before, you will be assigned an evaluator, and you will be evaluating another group. The evaluation forms must be submitted right after the demo, before the end of the day. The order of evaluations and the presenter-evaluator table will be posted later.

In addition to the standard evaluation by another group, everyone will be asked to rank all the demonstrations. There will be three awards this time. The first ranked group will get 10% bonus, second ranked group will get 5% bonus and the third ranked group will get 3% bonus for this assignment.