My Institution　　　**Courses**　　　BERKE BERKTAY　　　Help

SOFTWARE ENGINEERING-01 COMP302-Fall22-01-CE　　　Course Content　　Project　　Project Info

Project Info

Project Phase I

ESCAPE FROM KOÇ

Brief Introduction

Escape from KOÇ is an easy-to-play game that combines fun and challenge. The game space takes place on the KOÇ university campus where a student is trying to find a sequence of keys in the campus buildings. The game starts when the player enters one of the buildings and starts looking for a key in different rooms. During that journey, aliens may show up and try to catch the player, who should try to escape or distract them. The player is aiming at finding the key before the timeout. To accomplish that, some hints show up here and there. Once the key is found, the building will be marked as complete and the player can choose the next open building, which is basically the next level. Some promotions can be offered, like adding more time. The game is over If the player fails to find the key within the time limit. If he manages to find all the keys, then he wins the game.

1. Gameplay:

1.1: Player actions:

The player walks around using **the arrow keys**. He/she can go to the east, west, north and south but cannot pass through walls. He/she can only open the exit door of a building if he/she finds the key. The game starts from the Student Center. Finding the keys one by one, the player's aim is to travel to these buildings in the given order: CASE building, SOS building, SCI building, ENG building and SNA building. Once the player finds the exit key from the SNA building, the game ends and the player wins. To find the keys, the player uses a **left click** on the objects with the mouse and if the key is there, it appears for a second and then, the door is opened. However, to click the objects, the player should be next to the objects. Player has a bag to collect the power ups and keep them for later use. The details of power-ups are explained in section 2.2. While collecting power-ups and trying to find keys, the player also needs to escape from the aliens. The details of the aliens are explained in section 2.1.

2.   Game objects:

2.1: Aliens

While walking around, the player faces some aliens who try to kill the player or prevent her/him from finding the keys. All of the aliens appear randomly in the buildings every 10 seconds and the type of the appearing aliens are again selected randomly. The alien stays in the building and cannot go to the next building. So, when the player finds the key and goes to the next building, the alien does not follow him/her.

- Shooter alien: This type of alien appears in a random location in the building and shoots a bullet every second. Think of the building map as a grid. If the player is close to the shooter alien less than 4 squares, then he/she will lose a life. The player has three lives at the beginning of the game. He/she can collect some extra lives during the game (see Section 2.2., extra life power-up). Also, if the player wears a protection vest, then he/she can get close to the shooter alien without losing a life.

- Blind alien: This type of alien also tries to kill the player. However, in order to kill him/her, the alien must be right next to the player. The thing is that the alien is blind. So it cannot see the player. He randomly walks around. However, this alien is sensitive to the voices. When the player has the plastic bottle power-up, if she/he throws the bottle, he/she can fool the alien. For example, if the player throws the bottle to the opposite direction where he/she will go, then the alien will go in the bottle's direction. The protection vest does not protect the player from the bliend alien because it comes closer and chokes the player.

- **Time-wasting alien:** This type of alien does not kill the player but it changes the location of the key randomly every 5 seconds. This type of alien has some magical abilities. It does not walk around but just resides wherever it appears and the player cannot see how it changes the location of the key.

Note that if the player loses all her/his lives, the game is over. The aliens should appear in the empty locations of the building.

2.2: Power-ups

Power-ups help the player escape from the aliens and find the keys easily. Each power-up appears randomly every 12 seconds in the random locations. They disappear if the player does not collect them in 6 seconds. To collect the power-ups, the player needs to **right click with the mouse** to the power-ups. However, unlike clicking the regular objects, the player is not required to be next to a power-up to collect it. Except the extra time and extra life power-ups, once collected, they can be stored in the player's bag for later use. Extra time power-up automatically adds some extra time to the player's timer.

- **Extra time power-up:** The game starts with a building mode where the player designs inside of the buildings. In each building, there are minimum criteria to fulfill (See section 3.1.). The time limit in each building is 5 seconds for each object present in the building. For instance, if there are 5 objects in a building where the key can be hidden under, then the time limit for that building is 5x5=25 seconds. When the user collects an extra time power-up extra 5 seconds are added to the player's timer.
- **Hint:** This power-up gives a hint about the location of the key to the player. Once collected, it goes to the player's bag. The player can use it as soon as he/she has it or can save it for the next levels. To use this power up, the player hits the **H** button on the keyboard. Then, a rectangle of 4x4 is highlighted/bordered where the key is hidden. In other words, the hint shows a small region containing the key. The highlight/border appears for 10 seconds and then disappears.
- **Protection vest:** This power-up protects the player from being shot by the shooter alien. To use this power up, the player clicks the **P** button on the keyboard. Like hint, the player can use this power-up as soon as he/she has it or can save it for later use. When the player wears it, its protection lasts for 20 seconds.

- Plastic bottle: This power up is used to fool the blind alien. To use it, the player clicks the **B** button and then one of the following buttons **A, D, W**, or **X** to decide on the bottle's direction. A: west, D: east, W: north, X:south.
- Extra life: This power-up adds one extra life to the player's lives. Like extra time power-up, the addition of the extra life is automatic.

3. Game view structure:
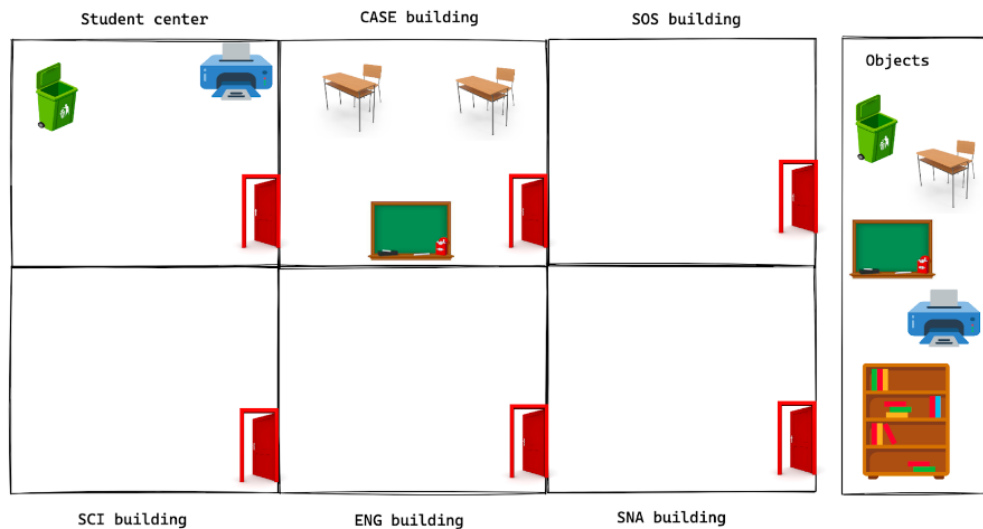
3.1: Building Mode:
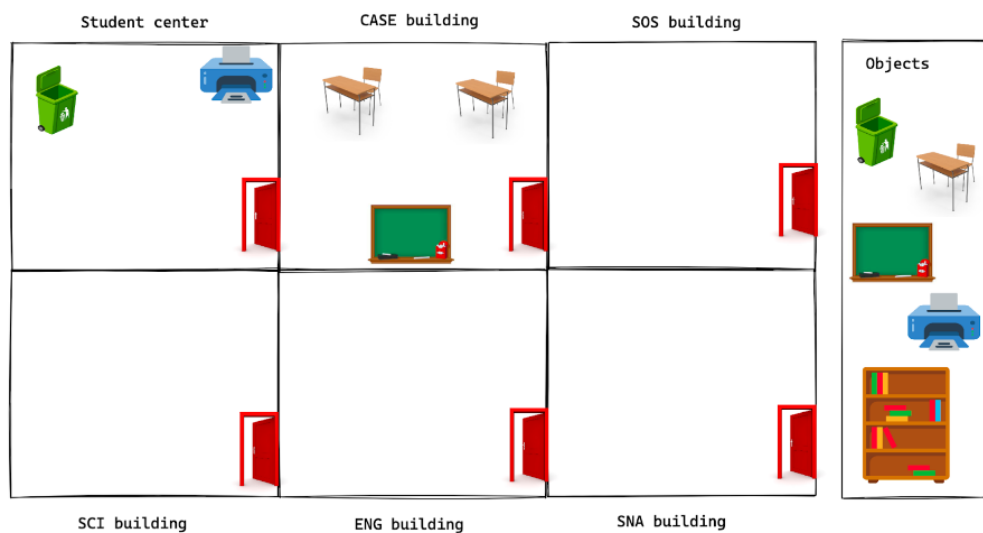
As mentioned above, the game starts with the building mode. In building mode, the player designs the inside of the buildings by placing the objects. The minimum criteria for each building is as follows:

- There must be at least 5 objects in the Student Center.
- There must be at least 7 objects in the CASE building.
- There must be at least 10 objects in the SOS building.
- There must be at least 14 objects in the SCI building.
- There must be at least 19 objects in the ENG building.
- There must be at least 25 objects in the SNA building.

Overall map will be a grid world. You can use a fixed size for your map and the objects or you can make it responsive according to the screen size.You can be creative with the objects. In other words, you can use objects that are not shown in the above figure. The UI is up to your imagination and creativity.

3.2: Running Mode:

When the player finishes building mode, the game starts running. The player's initial location will be random. You need to be sure that the objects, aliens, and the player are not overlapping. Each of the aliens, objects, power-ups and the player must fit in one square in the grid world. The number of lives the player currently has should be shown on the screen with the remaining time which is updated every second. Also, the player's bag containing the power-ups should be visible on the screen. There should be a pause and an exit button. Other than these requirements, you are free to design your own UI.

4. The game features:

The game should contain either menus or small buttons that provide the following features:

- **Pause/resume:** the user should be able to pause the game whenever she/he decides to. And resume it later.
- **Help screen:** there should be a help screen explaining the game objects hand features, and how to play.
- **Login screen:** appears when the game executable is run. Every player should have a unique login name

Project Phase II

Change of time-wasting alien behavior

The existence of aliens is an important feature that makes our game special and differentiates it from traditional escaping games. To make the game more

interesting, we are going to change the behavior of the time-wasting alien. From now on, it decides what to do in a way that makes the game more motivating. The details of this alien behavior are as follows:

1. If less than 30% of the total time remains when this alien appears, the alien will conclude that the player is not in a good situation, and he/she might lose the game. So, it will change the location of the key only once and disappear.
2. If more than 70% of the total time remains, the alien will conclude that the player is doing well. So it will make the situation challenging by changing the location of the key every 3 seconds.
3. If the remaining time is between 30% - 70%, it will get confused and indecisive, so it will stay in the place in which it appears, then disappear after 2 seconds without doing anything.

Please note that, in some scenarios, this alien might dynamically adopt a set of behaviors. For example, if it appears when the remaining time is around 31%, and then it is indecisive but 1 second later, the percentage of the time becomes less than 30%. The alien will decide that the player is not in a good situation now and might lose, so it will change the key location and then disappear. Similarly, it can appear while more than 70% of the time remains, but after 1 second, the time percentage may become less than 70%, so the alien will stay for 2 seconds without doing anything and disappear.

Note: You are asked to use the Strategy pattern to design/implement this behavior of the time-wasting alien.

Saving/Loading Game

When the player clicks on the save button, you must store the complete game in a file or database based on the user's preference. So, if the player turns off the system and logs in again to play the game, the player should be able to play the game exactly from that point. The player's choice determines whether the File or Database option will be used. As a hint, here are some of the variables which you need to store:

- Player's username
- Types of objects and their numbers
- Position (i.e., coordinate of the objects) of the objects
- Player's time
- Number of lives remaining
- Collected power-up types and numbers
- Aliens' numbers and their positions etc

Note: You are asked to use the Adapter pattern to design/implement save/load options.

Save-Load with a File

You have to store the complete game in a file. The choice of file type is up to you. For instance, you can use JSON, XLM, CSV, or a text file.

Save-Load with a Database

A database is an organized collection of structured information, or data, typically stored electronically in a computer system. For instance, all of our social media (Facebook, Twitter, Instagram) information, such as pictures, posts, videos, and even our login information (i.e., username and password), is stored in the database. Similarly, KUSIS and Blackboard also operate in the same way. So, as a software engineer, it is very important to learn about databases.

For this part, you are free to use the database of your choice to save and load the game. You can use a relational or non-relational database. One of the non-relational databases is MongoDB. It is very efficient and easy to learn. Here are a few short tutorials that can help you to understand and learn MongoDB:

- Installation: https://docs.mongodb.com/manual/installation/
- Java MongoDB tutorial: https://www.tutorialspoint.com/mongodb/mongodb_java.htm
- MongoDB vs MySQL: https://www.mongodb.com/compare/mongodb-mysql