Assignment 1

Team number: 12
Team members

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Introduction

Author(s): All members

For our project, we have decided to implement our version of The Cyberpunk 2077 hacking minigame in Java. The system consists of four parts:

1. Code matrix (where players pick tiles)
2. Buffer size (the number of tiles players can pick)
3. Sequences required to upload (a list of possible sequences players can complete)
4. Time (the time remaining for players)

The data (code matrix, buffer size, sequence lists) for the game is implemented as follows:
The player can choose from 40 different puzzles (a set of puzzles from a Git repository). We reuse the set of puzzles instead of generating a code matrix and sequences randomly, as it might be possible that no solution exists in that case. The 40 different puzzles ensure that the system could have different values in the code matrix, buffer, and sequence lists. The time of different puzzles will be different based on a number of sequence lists. The puzzles with one sequence give players 40 seconds to finish. One more sequence will give players 20 seconds more to finish. For example, a puzzle with three sequences gives players 80 seconds to finish the game.

The basic dynamics of the system is shown below:
In the game, there is only one type of user, which is the player. The main goal of the minigame is to complete the sequence lists by using the code matrix in a limited buffer size and time. Initially, the game starts the countdown when the player picks an index in the first row of the matrix. This index will be the first element of the buffer. Then, the orientation changes from horizontal to vertical. The next step is to pick another index in the same column with the first chosen index. As the game continues, the orientation is changed during

every step until the buffer reaches its limit or the time runs out. The game detects the desired sequences as they appear in the buffer which will automatically give the player the reward. There are two ways to lose the game: if no sequences are found within the buffer space or within the time limit, the player loses. The system is able to check the success/failure of the game when the player finishes the game. Since there are multiple solutions to the puzzle, the system does not check every movement of the player. The system will show whether the player wins or loses the game. The system will also count how many sequence lists found by the player, and display them on the result page. If the player wins, the happy cat picture will be shown to the player. Otherwise, the sad cat picture will be shown. The player can undo moves until the game finishes, but the time will continue, as extending the time would make the game too easy and boring. The player cannot undo moves when the game has finished, as they can restart the game.

The system will be implemented as a form of a basic user interface in a game window where the player will interact with the game by clicking only. The system will not be a command-line interface, because it is easier for players to click rather than type for the game. Moreover, the graphic user interface is aesthetic and clear. The game works as follows:

1. The player runs the game and a window is opened.
2. The game name and the user can type a puzzle number to start the game.
3. The game will begin officially after the player enters the number he types.
4. The timer will start the countdown when the player picks the first tile.
5. Each tile picked by the player will be displayed in the buffer, and the player can keep picking tiles until the game ends.
6. The game ends when the buffer size is full(no entry left)l or the time is up, or all sequences found within the buffer size.
7. The system will show the result page to the user when he finishes the game.
8. The player is given three choices: restart the game, return to the puzzles page to pick another puzzle, or exit the game.

External URLs

- Hacking minigame explained in a YouTube video: https://www.youtube.com/watch?v=ROr1BBqnGoo
- A complete description of the rules of the minigame: https://www.rockpapershotgun.com/cyberpunk-2077-hacking-minigame-breach-protocol-explained
- The GitHub repository of the set of puzzles https://github.com/kyle-rader/breach/tree/main/puzzles/txt

Features

Author(s): All members

Functional features

ID	Short name	Description	Champion
F1	Puzzle Choice	The system shall support different values in the tiles, sequences, and buffer in the game. The player is allowed to choose from 40 different puzzles before the game begins. The player can type a number between 1-40 to choose the files in the choosing interface. Format of file: ● The first line contains the buffer size (4-7) ● The matrix size (5x5 or 6x6) ● The sequence lists (1-4)	Ying Ying
F2	User Interface	The user interface is a graphical user interface. The player can type and click on the user interface. There are basically three windows. The puzzle choosing window for the player to type to choose the puzzle. The game playing window for the player to click the tile. The end window to display the result to the player. There are 3 main parts showing when the game begins: code matrix, buffer, Sequence list. Players pick tiles by clicking on the tile. When the tile is picked, the tile value will show on the buffer.	Yasir
F3	Tile Picking	Starting in the first row, the player can pick a tile. Next, the player can pick a tile in the same column as the first tile. The game keeps alternating between rows and columns in a similar fashion until the game is over. When the player chooses a tile, the tile will be updated to the buffer. There will be entries left on the buffer to remind users how many tiles left they can pick. The system disabled the tiles that are not allowed to click on, and the user can only click on tiles that are allowed each turn.	Emre
F4	Timer	The timer starts counting down when the player picks the first tile. When there are only 10 seconds remaining, the color of the timer's colour will change from black to red.	Xiaoxuan

F5	End/ Outcome	**End** The game ends when the buffer is completely filled(entires left is 0) or all sequences in the list are found within the buffer size. The number of sequence lists found will be shown to the player when the game ends. **Win** The player will win when he finds at least one sequence list at the end of the game. The system will display a winning message to the player that says “Congratulations”. Moreover, the number of sequence lists found will be displayed to the player. The end screen will also show the player a happy cat picture as a reward. **Loss** The player will lose when he finds no sequence list. The system will display a losing message to the player that says “Game over. You couldn’t find any sequence.” Also the end screen will show the player a sad cat picture to convince him/her to do better next time.	Yasir
F6	Undo/ Restart	**Undo** During the game, the player can undo his picked tiles. The timer will not stop or extend the time. **Restart/Puzzle page/Exit** After the game, the player has three options: 1. Restart the game with the same puzzle. 2. Return to the puzzle picking pages to pick another puzzle. 3. Exit the game.	Omer

Quality requirements

Author(s): All members

The following table contains the quality requirements deemed the most important for a Cyberpunk 2077 hacking minigame. These requirements ensure that the player can enjoy the game without any difficulties unrelated to the gameplay itself.

ID	Short name	Quality attribute	Description

QR1	Pre-game Validation	Reliability	The text file that describes the buffer size, code matrix, and sequence lists shall be read and parsed when the player picks it. The system should display an error message when the file does not adhere to the specified format.
QR2	Extension	Maintainability	The game is not restricted by the predefined set of 40 configurations. In the future, the game can be easily extended to contain more than the original 40 configurations.
QR3	Instantaneous Results	Responsiveness	Once the player makes a move in the hacking game, the result of the move shall be available in the next round. When the player picks one tile, the tile will be on the buffer within 2 seconds.
QR4	Input Validation	Reliability	Any action clicked by the player will be checked whether the player is against the rule. If the player clicked on a tile that breaks the rule, nothing will change on the system. Only if the player clicks a valid tile, the tile will appear on the buffer.

Java libraries

Author(s): Xiaoxuan Lu

JavaFX, Scene Builder for GUI

JavaFX is used to style the user interface of the system. We chose it among others because it can create a beautiful user interface. It can be used with Scene Builder which is simple and convenient to see the interface of the system. We can just drag and drop user interface design.

Apache Commons

Commons IO could be easier for inputting and outputting files. The library could be used as a helper for reading matrix, buffer size, and sequence lists in the text file. We will compare it with Java.io to see which one is easier and better to implement.

Time logs

Group 12	15		
Member	**Activity**	**Week number**	**Hours**
X. Lu (Xiaoxuan)	Write introduction	1	1
A.Y. Uçkun (Yasir)	Write introduction	1	1
Y.Y. Ma (Ying Ying)	Write introduction	1	1
Ö.F. Çakici (Omer Faruk)	Write introduction	1	1
X. Lu (Xiaoxuan)	Define functional features	1	1.5
A.Y. Uçkun (Yasir)	Define functional features	1	1.5
Y.Y. Ma (Ying Ying)	Define functional features	1	1.5
Ö.F. Çakici (Omer Faruk)	Define functional features	1	1.5
X. Lu (Xiaoxuan)	Define quality features	2	1
A.Y. Uçkun (Yasir)	Define quality features	2	1
Y.Y. Ma (Ying Ying)	Define quality features	2	1
Ö.F. Çakici (Omer Faruk)	Define quality features	2	1
X. Lu (Xiaoxuan)	Modify functional features	2	1
X. Lu (Xiaoxuan)	Search Java libraries/impr	2	1
Y.Y. Ma (Ying Ying)	Formatting and rewriting	2	1
		TOTAL	17