Practical Project of Basic Programming Course
Autumn 1402

Project Objectives:

1. Familiarity with implementing the game "COVID 2030".

2. Proper utilization of data structures in C++ programming language.

3. Efforts toward providing an appropriate and optimized algorithm for solving problems.

Introduction:
This challenge involves game development using C language and is aimed at learning and implementing concepts related to basic programming such as object-oriented programming, classes, working with variables, arrays, pointers, functions, etc.
The main goal of creating and presenting this game project is to practice and make a proper presentation of our class work. It also introduces us to game development in C language and the ideation process for a game.
The reason for choosing this game is that we are currently in the COVID-19 era, and recently NASA's rover landed on Mars. ☺

Game Story:
In 2030, the global COVID-19 pandemic reached its peak and brought humanity to the brink of extinction. In addition to the loss of life due to the disease, there were horrific wars over vaccine production resources, which set the world back to the state it was about a century ago. Many countries were destroyed and became part of history. The number of safe zones on Earth was fewer than the fingers on one hand.
During this period, what was left of the United Nations held a secret meeting, and the last hope for human survival was presented as follows:
"Remaining scientists, who still hope to create a definitive vaccine, must urgently travel to the Mars International Space Station (ISSM) to work safely on producing the vaccine."
Thus, on March 1, 2030, a shuttle carrying 2000 scientists from around the world took off for Mars. On November 5 of the same year, a top-secret message from the ISSM was transmitted to Earth:
"The definitive corona vaccine has been created. The first shipment will land on Earth in three days at the Baikonur Station in Russia."
However, this message never came true. Based on satellite images, no spacecraft left Mars during that time. The United Nations sent the last shuttle with the best search and rescue team.
Upon arrival, the team found the ISSM intact, but none of the 2000 scientists were there. After settling at ISSM and reviewing the remaining documents, it was discovered that the corona vaccine had indeed been created but was buried in specific locations on Mars due to special storage conditions. These points were marked with the letter "V" on the ISSM radar and rovers.
It was also revealed that due to an error by one of the scientists, some of the vaccine had transformed into a much more dangerous virus, turning humans into zombies. Consequently, all the scientists turned into zombies within a very short time and scattered across the Martian surface.
Fortunately, this virus could be tracked by the radar, and the locations of infected zombies were marked with the letter "Z" on the ISSM radar and rovers.
According to the captain's orders, the top priority is to collect all the vaccines and send them to Earth.

Thus, the team members were armed with 40mm shotguns with a 3-bullet capacity, enough to kill zombies, and set out to collect the vaccines at the locations marked on the radar.

To minimize the chance of zombies gathering in one spot, each person had to move alone.

The player's location is marked by the letter "P" on the radar.

Due to the vast distance, communication between the ISSM radars and individuals is very difficult. Therefore, each map sent to the person's intelligent system contains a connection point (marked with "D"), which, once reached, provides the player with information about the new area.

Because the 40mm ammo is very heavy and carrying a lot is impossible, engineers on the team used advanced Teleport technology to send ammo packets (each containing one bullet) to specific points on the Martian surface, marked with the letter "A" on the radar.

Of course, humans are defenseless against the supernatural strength of zombies, and if a zombie is close enough, it will easily kill and eat the player. However, the team doctors developed a healing potion that rapidly restores eaten limbs and revives the person. Each player initially receives only two doses of this potion, meaning they have three lives.

During the operation, while team members are hunting zombies and collecting vaccines, the captain orders the doctors and engineers to work on increasing the production of healing potions and also improving the shotgun's magazine capacity, ammo weight, and shooting range. However, since there are not enough enhanced guns and potions for everyone, it was decided that based on the individual's credibility, which is earned by killing zombies and collecting vaccines, they will either receive an upgraded gun or additional potions.

Thus, each individual's main tasks are to collect all vaccines, avoid zombies as much as possible or kill them, collect enough ammo, and reach the "D" connection point.

Game Operations, Input, and Output:

Main Menu:
1 – New Game
2 – Settings
3 – Credits
4 – Help
5 – Exit

Input: The number of the selected option. If the input is not a valid option number, the user will be redirected to the main menu (in all parts of the game, the main menu will be printed, and input will be requested).

New Game: Redirects to the game page (description follows).
Settings: In this section, the number of levels and the sound status (enabled/disabled) will be displayed, and the user can change the sound settings. If sound functionality is not implemented, this section should be omitted.
Credits: Displays the names of the game creators and then redirects to the main menu.
Help: Provides instructions on how to play, such as valid input for movement, shooting, and game rules.
Exit: Prints "Are you sure you want to exit the game?" and takes input of 'n' or 'y':

- 'n': Redirects to the main menu.

- **'y': Prints "Good Bye!" and ends the program.**

Game Page:
The game page shows the level number, the number of vaccines collected, the round number, and the player's credibility.

- **Ammo and health status will be displayed.**

- **Zombies and items (vaccines, ammo) are scattered randomly, ensuring that no two items overlap.**

- **Movement, shooting, and reload operations are handled via specific key inputs (e.g., 'w', 'a', 's', 'd' for movement, 't', 'f', 'g', 'h' for shooting).**

Zombie Movement Algorithm:
Zombies move only on even rounds and will always try to move toward the player based on their relative position.

- **If the player is directly to the left or right, zombies move horizontally.**

- **If the player is directly above or below, zombies move vertically.**

Input Handling:
Valid inputs include movement directions (w, a, s, d), shooting directions (t, f, g, h), reload (r), exit (e), upgrade (u), and menu (m). Invalid inputs are ignored, but zombies will still move.

Reloading:

- **If no ammo is available, it shows "No Ammo!".**

- **If the magazine is full, it shows "The gun is already Charged."**

- **If reloading is successful, the game prints "Reloaded!" and updates the game status.**

Shooting:

- **If the player tries to shoot with no ammo, it shows "No charged ammo!"**

- **If the shot kills a zombie, the player's credit is updated, and the number of zombies killed is printed.**

Upgrade Menu:
Players can upgrade their weapon capacity, shotgun range, or health, with specific credit requirements for each upgrade.