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Final Project -- Advance programming

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User Manual

Configuration

The user must have gcc installed in the terminal, otherwise it can be installed with the following command: **sudo apt install gcc**

Once the installation is finished, you must open the program directory, use the cd command "the path of the file". Example: cd /Code/C/Pokemon.

Make the Program

If already in the folder containing the file program, the user must run the make command, this will generate a player and server exec file.

Run The Program

The program is divided in two parts, server and player.

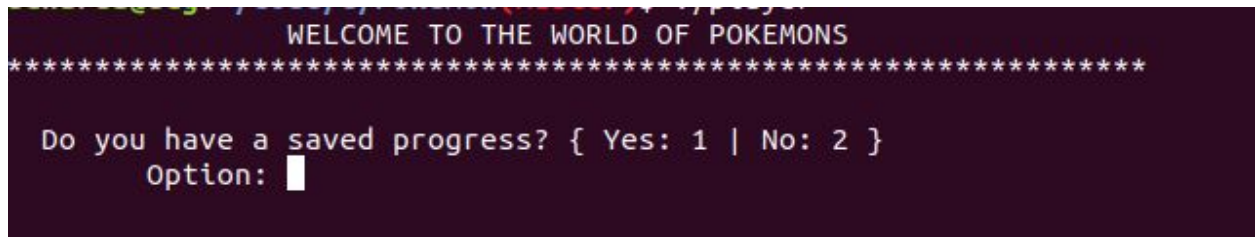
Player

The player is the main file for the game, it has an offline story and online battle with another player, managed by the server.

To run the game the user must be in root folder of the game and use the ./player command.

Offline mode

The following screen will appear



If it's the first time you must select 2.

```

*****
WELCOME TO THE WORLD OF POKEMONS
*****

Do you have a saved progress? { Yes: 1 | No: 2 }
Option: 2

Hello my name is Profesor Elm...
What is your name?
Name: Daniel

Well Daniel first things first, what gender do you want to be?

      8888888888888      8888888
      88      88      888888888888
      88      88      888888888888888
      888      8888      888888888888888888
      8      8888888888888      8888888888888888888
      8888      8888888888888      8      88888888888888888
      8 0 8      88      8 0      8888888888      8
      8      88      8      88      8888888      888
      8      88      8      8      888888888888
      8      8      8      8      88      8888888888
      8      888|8      8      88      888888888
      888888888|||8      888888888      8888
      888      8||8      888      88
      888      8||8      8888      888
      88      888888      888      8888888
      88      88      8888888888888888888
      88888      88888

      MALE: 1      FEMALE: 2

Chose an option : 1

```

```

Perfect then, you will be him:

      8888888888888
    88              88
      88              88
    888              8888
  8      8888888888888
8888      888888888888
  8 0 8      88
  8          88
  8_         8
  8          888|8
    88888888|||8
      888  8||8
      888  8||8
    88  888888
    88      88
      88888

    Daniel

And now we are going to give you a new pokémon...

You have different options pick wich one you prefer

1.-Pikachu | 2.-Charizard | 3.-Gengar | 4.-Zapdos | 5.-Mew
Option: █

```

```
-----
Welcome to the main menu Daniel, please choose one of the options below.

1. Go to the Map and main story
2. Check whats your backpack
3. Check your pokemon stats
4. Play Online
5. Save game
0. Quit the game

Select a option : 
```

- 1- Is the main offline game, you must compete in 4 stages to beat the best pokemons and become the pokemon master.
- 2.- Is to view the content of your backpack.
- 3.- Is to check the status of your pokemon
- 4.- Is to play online with another player using a server
- 5.- Is to save your progress
- 0.- Is to exit the game

```
-----
Gengar HP: 120/120 *****

      8\          /8
      8 8    /\  /\  /\   8 8
      8 8 0  0  0  0  8 8
      8 0              0 8
      88 0            0 88
      88 0    \        /   0 88
      88 0      \      /   0 88
      88 0    ^^^^^^    0 88
      8 0      ^^^^     0 8
      8      000000000  8
      8      8      8  8
      88888      88888

Mew HP: 270/270 *****

      888
      8 8
      8 8 8888888
      8 8      888
      8 8      888
      88 8 8      8888
      88      8 8      88
      88      8 8      88
      88      8 8      88
      88      8 8      88
      88      8 8      88
      88      8 8      88

      1. Psychic       | 2. Ancient Power
      3. Backpack      | 0. Exit Battle
-----
```

This is the battle screen, here you can see your pokemon and opponent HP. Each player is given a turn subsequently to perform an action, you have the option to use one of your two attacks, option 1 and 2, or see your backpack in order to use a potion to increment your pokemon stats. If you chose to attack, The pokemon will try to attack the opponent, but beware, the attack can fail.

```
Your attack has failed
```

To use a potion select option 3 to go into the backpack

```
-----
                        Welcome to your backpack Daniel!

    1. View Map.
    2. View Potions.
    3. Check my pokemon stats.
    0. Exit Backpack.

Enter an option from above: 
```

Then option 2, and select the potion you wish to use

```
Potion 2

    888
  88888
    888      Number of potions: 3
  88888
  8888888    Increases your pokemon's MP by 5 points
  888888888
  88888888888
  8888888888888
  8888888888888888

Potion 3

    888
  88888
    888      Number of potions: 3
  888
  888      Increases your pokemon's Attack% by 5%
  888
  888
  888

Go out : 0
    Which potion do you want Daniel? : 
```

The battle will continue until a pokemon runs out of HP points.

Online mode

To play online select option 4 in the main screen.

```
-----
Welcome to the main menu Joan, please choose one of the options below.

    1. Go to the Map and main story
    2. Check whats your backpack
    3. Check your pokemon stats
    4. Play Online
    5. Save game
    0. Quit the game

Select a option : 4
Give me the server address
127.0.0.1
Now the port please
8989
===== WELCOME TO THE COLISEUM =====
Waiting for player attack
```

Then we need the address and port of the server, in this case localhost and 8989. If a WELCOME TO THE COLISEUM message appears you are online, either waiting for another player, or waiting for player1 attack

Server

The server is in charge of linking the players for online battle.

To run the server the user must be in root folder of the game and use the ./server {port}, where port number is the port the server will use.

Program Structure

Structs

Player struct

The Player struct holds the player information:

Name: player name

Gender: the players gender.

Potions[]: The number of each potion the player has.

Stages[]: The information of the stages the player has won.

Pokemon * struct: A pointer to the struct holding the pokemon information.

Pokemon Struct

The Pokemon struct holds the pokemon information:

Name: The name of the pokemon

HP: The life points

Attack1: The attack points of the first attack

Attack2: The attack points of the second attack

Attack percent: The success percentage of the attacks

Threads

The server uses one thread to listen for new players, and a new thread for each player that connects.

Server - Player information exchange

In the connection thread the player send his information to the server, if he is the first player online, The WAIT code is sent and he must wait until a second player comes online, then the PLAY code is sent to both players.

When both player go online, the first attack turn is given to the first player to connect, player1, and player2 is in defense mode, waiting for the outcome.

Player1 sends the attack code to the server, the server calculates the result of the attack or potion use, and sends the information back to both players.

In the player program the info is used to display the player the outcome of the attack.

Now is player2 attack turn and player1 defense turn, the same protocol is used until one of the players HP points is 0 or less, In this scenario the server sends the END code to both players.

The server can only hold one battle at the time, if more players want to connect they must wait for the battle to end.

Handlers

The handlers are set to listen for an interruption signal in both player and server.

In case of interruption in the player, the data is saved, memory is freed and if he is online a EXIT code is given to the server.

In case of interruption in the server, the EXIT code is given to the both players.

Mutex

Mutex were necessary to ensure that only one player could be in attack mode and other in defense mode.

One mutex locks the attack mode so only one player can receive the TURN code and protects the variables that handle the turn and the attack points.

The second mutex locks the defense mode so only one player can receive the WAIT code.

Poll

The poll is used to listen for new players until a interruption signal is given from the handlers

Challenges

The main challenge of this project was to handle the communication between players and server. To solve this challenge we wrote a clear one by one message interchange between each player and the server.

We used some global variables to ensure that only one player is in attack mode and the second player is in defense mode, we protected this variables with mutex and used while loops to hold players in wait mode.

Links

https://bulbapedia.bulbagarden.net/wiki/Main_Page - Encyclopedia about Pokémon to which anyone can contribute.

<https://stackoverflow.com/questions/> - Source that solve all of our problems while we were programming.

<https://www.geeksforgeeks.org/socket-programming-cc/> - Documentation for sockets in C programming