Project 2
~Pokemon RPG~

CSC-17C-44049
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Introduction

Title: Pokemon RPG

In the world of Pokemon, one must level up their Pokemon in order to be the strongest trainer!
Leveling up Pokemon, however, requires battling other Pokemon and foes!
You can also catch Pokemon to expand your library of available fighters (from weak to strong).
Fighting monsters will make your Pokemon unhealthy and hurt, but using items can restore their health! Buy items at the Hospital or find them lying around!

First time players: press 'h' to bring up a legend and help menu!

Quitting the game or dying in-game will make you lose your progress, so be careful!

I chose this style of project because it contains a lot of logic and features. This helped me decide what concepts to use, and where, easier.

Summary

Program size: ~1760 lines (Excluded the header [file, author, date, purpose] and huge comments, then rounded to the nearest 10^{th} place)
Number of major variables: ~39
Number of constructs: ~49

It was fairly challenging to do. I had the most problems with buffer overflows caused by linked lists, displaying linked lists the way I wanted them to, making up how the project requirements would fit into a game, and thinking up what to do for the project in general. I also had no idea what to use a queue for (feels like it would be a repeat of something already in-game).
For Project 2, the tree gave me buffer overflows and crashes. I wanted, at first, to implement a personal computer the user could use to store notes or text files in; but that didn't happen.

Project 2 took me about 10 hours to do overall; most of the time being used to figure out how to implement the new concepts for this type of game.
I had many challenges and features I would have loved to add, but sadly, time does not allow it at the moment. Also, for the last few concepts, I had something better in mind, but I was unable to implement them.
I had fun making this project (although I admit some times were frustrating) and at the same time learned so much on how to use a few of the STL algorithms, containers, and iterators. I also learned the use of hashing in password protection and trees to easily and efficiently store data.

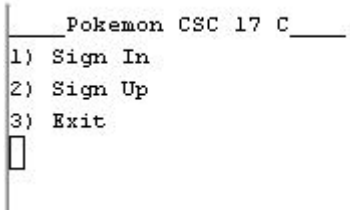
Other aspects that I used that have not been covered in this course are using allocators for sets. I used an allocator to sort the set based on string length, istream iterators and the STL's count function for counting the number of lines in a file. Everything else I haven't really seen before was a requirement, so I don't think it counts.

Description

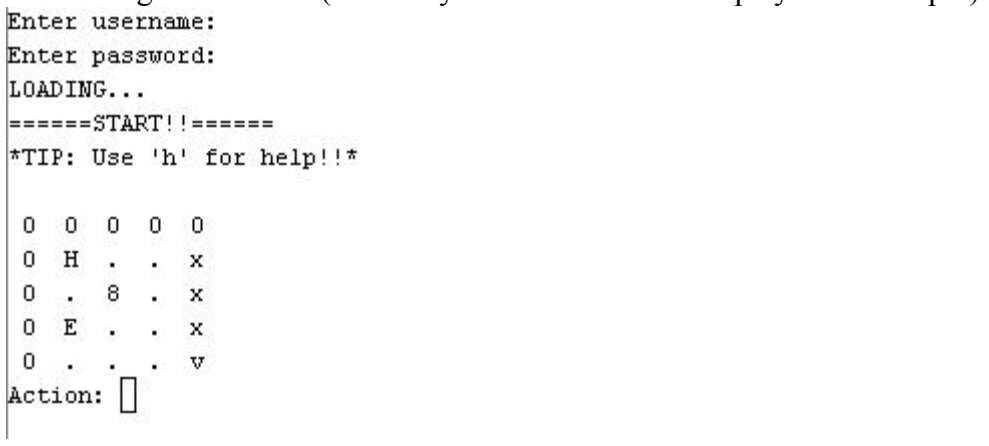
At first, I tried to make a dice game of chance, but it was way too short and not enough to include all the concepts necessary. On the side I tried to make a map-panning program using pure ASCII characters and C++, which, in turn, gave me the idea to mix the two and this eventually led to a Pokemon-style game. Oddly enough, using a sheet of paper to solve problems I had helped a whole lot! Other than that, looking at documentation and redoing concepts on a separate program helped me get through my problems.

Sample Input/Output

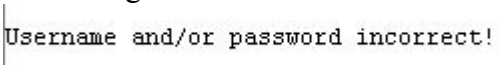
Starting the program



Sign In Success (Note: My NetBeans doesn't display console input)



Sign In Fail



Sign Up

```
Enter a new username:
Enter password for User:

Signup Success!!
```

Pressing ‘h’ brings up a help menu

```
Action: Legend
 '8' PLAYER
 '~' WATER (water types found here)
 'x' CONCRETE (rock types found here)
 'v' TALL GRASS (grass types found here)
 '.' NORMAL TILE (Items found here)
 'H' HOSPITAL (Buy medicine here)
 'E' EVOLUTION TREE (See the world evolution tree)

Actions
 In world
    w move up
    s move down
    a move left
    d move right
    p PokeDex menu
    h brings up this menu
    m displays a world map with shortest distances from your current location
    q quits the game
    --dying also stops the game
 In battle
    1 attacks rival Pokemon
    2 attempts to catch Pokemon
    3 runs from battle
    4 uses health potion for your Pokemon
Casually walking around gives chance of finding items!
```

Pressing ‘q’ quits the game (output varies)

```
SHUTTING DOWN...

Your attack log:

Sorted log to count number of times an action was used

Attacks used: 0
Catches used: 0
Times Ran:    0
Times Healed: 0
```

Pressing ‘p’ displays the “PokeDex”

```
=======PokeDex========
These are all the Pokemon found in this world
Weak Rock
Weak Grass
Weak Water
Strong Rock
Strong Grass
Strong Water
Intermediate Rock
Intermediate Grass
Intermediate Water

=======Nontindo=======
```

Pressing ‘m’ displays a world map

```
Amaranth -> Eburnean 476
Amaranth -> Xanadu    136
Amaranth -> Wenge    5376
Amaranth -> Mikado   1835

Eburnean -> Amaranth   476
Eburnean -> Xanadu    1847
Eburnean -> Glaucous  1463
Eburnean -> Sarcoline 4062

Xanadu -> Amaranth  136
Xanadu -> Eburnean 1847
Xanadu -> Wenge     741
Xanadu -> Glaucous  801

Wenge -> Amaranth 5376
Wenge -> Xanadu    741
Wenge -> Mikado   1091

Glaucous -> Eburnean  1463
Glaucous -> Xanadu     801
Glaucous -> Mikado    1122
Glaucous -> Sarcoline 1337

Mikado -> Amaranth  1835
Mikado -> Wenge     1091
Mikado -> Glaucous  1122
Mikado -> Sarcoline 2341

Sarcoline -> Eburnean 4062
Sarcoline -> Glaucous 1337
Sarcoline -> Mikado   2341
```

```
Location      Shortest distance from you (Amaranth Town)
Eburnean                   476
Xanadu                     136
Wenge                      877
Glaucous                   937
Mikado                    1835
Sarcoline                 2274
```

Pressing ‘w’ moves the player (‘8’) upward (camera also moves accordingly)

```
 0  0  0  0  0
 0  H  8  .  x
 0  .  .  .  x
 0  E  .  .  x
 0  .  .  .  v
Action:
```

Pressing ‘s’ moves the player (‘8’) downward (camera also moves accordingly)

```
 0  H  .  .  x
 0  .  8  .  x
 0  E  .  .  x
 0  .  .  .  v
 0  .  .  .  v
Action:
```

Pressing ‘d’ moves the player (‘8’) right (camera also moves accordingly)

```
 H  .  .  x  x
 .  .  8  x  x
 E  .  .  x  x
 .  .  .  v  v
 .  .  .  v  v
Action:
```

Pressing ‘a’ moves the player (‘8’) left (camera also moves accordingly)

```
 0  H  .  .  x
 0  8  .  .  x
 0  E  .  .  x
 0  .  .  .  v
 0  .  .  .  v
Action:
```

Walking on ‘H’ takes you to the hospital

```
Shop? (NOT YET IMPLEMENTED)
***Items in stock***
forwards: Full Half Small

backwards:Small Half Full
```

Walking on ‘E’ displays the ‘Evolution Tree’

```
EVOLUTION TREE
THE ROOT OF ALL IS A MYSTERY!
 Weak Grass Intermediate Grass Weak Rock Intermediate Rock Strong Rock Strong Grass Weak Water Interm
ediate Water Strong Water
```

Walking on ‘.’ tiles has a chance of finding a heal potion (output varies)

```
 Found half heal!!

 O  .  .  .  x
 O  .  .  .  v
 O  8  .  .  v
 O  ~  ~  ~  v
 O  O  O  O  O
Action:
```

Walking on ‘~’ tiles has a chance of a Water-type Pokemon attacking (Pokemon strength varies)

```
A Weak Water Level 2 Appeared!!

Your Pokemon at hand: Weak Grass Level 3

Your Pokemon's Health: 10
Weak Water's Health: 8

What do you do?
1) Attack
2) Catch
3) Run
4) Use Heal
Action:
```

Walking on ‘v’ tiles has a chance of a Grass-type Pokemon attacking (Pokemon strength varies)

```
A Weak Grass Level 2 Appeared!!

Your Pokemon at hand: Weak Grass Level 3

Your Pokemon's Health: 9
Weak Grass's Health: 5

What do you do?
1) Attack
2) Catch
3) Run
4) Use Heal
Action:
```

Walking on ‘x’ tiles has a chance of a Rock-type Pokemon attacking (Pokemon strength varies)

```
A Intermediate Rock Level 6 Appeared!!

Your Pokemon at hand: Weak Grass Level 3

Your Pokemon's Health: 9
Intermediate Rock's Health: 14

What do you do?
1) Attack
2) Catch
3) Run
4) Use Heal
Action:
```

Selecting ‘1) Attack’ during battle

```
Your Attacks
Tackle  Power: 1

Your Weak Grass used Defend!

Weak Water used Defend!

Your Pokemon's Health: 8
Weak Water's Health: 7

What do you do?
1) Attack
2) Catch
3) Run
4) Use Heal
Action:
```

Selecting ‘1) Attack’ during battle if the attacker failed to attack

```
Your Attacks
Tackle  Power: 1

Your Weak Grass used Defend!

Intermediate Grass failed to attack!

Your Pokemon's Health: 9
Intermediate Grass's Health: 9

What do you do?
1) Attack
2) Catch
3) Run
4) Use Heal
Action:
```

Selecting ‘1) Attack’ and winning (Pokemon type and level up varies)

```
Intermediate Grass killed!
Your Weak Grass leveled up 2!
```

Selecting ‘1) Attack’ and losing. ‘CIN ERROR’ displayed because I used arrow keys for the purpose of displaying ‘CIN ERROR’ on the log (output varies greatly)

```
====Your Pokemon died!====
====Game Over====

Your Pokemon

Weak Grass
Weak Grass


Your attack log:
  MOVE: 1  USED: RUN
  MOVE: 2  USED: CIN ERROR
  MOVE: 3  USED: ATTACK
  MOVE: 4  USED: ATTACK
  MOVE: 5  USED: ATTACK
  MOVE: 6  USED: ATTACK
  MOVE: 7  USED: ATTACK
  MOVE: 8  USED: ATTACK
  MOVE: 9  USED: ATTACK
  MOVE: 10  USED: ATTACK
  MOVE: 11  USED: CIN ERROR
  MOVE: 12  USED: CIN ERROR
  MOVE: 13  USED: CIN ERROR
  MOVE: 14  USED: ATTACK
  MOVE: 15  USED: ATTACK
Sorted log to count number of times an action was used
ATTACK
ATTACK
ATTACK
ATTACK
ATTACK
ATTACK
ATTACK
ATTACK
ATTACK
ATTACK
CIN ERROR
CIN ERROR
CIN ERROR
CIN ERROR
RUN

Attacks used: 10
Catches used: 10
Times Ran:    10
Times Healed: 10


====Your Pokemon died!====
====Game Over====

Press any key to quit
```

Selecting ‘2) Catch’ success (swaps your monster)

```
Action: Successfully caught a Weak Grass!
```

Selecting ‘2) Catch’ fail (does nothing, attacker attacks or misses)

```
Action: Failed to catch Weak Grass
```

Selecting ‘3) Run’ flees from battle

```
Got Away Safely
```

Selecting ‘4) Use Heal’ uses a found or bought health potion (output varies)

```
Used small heal!

Your Pokemon now has 10 health points!
```

Selecting ‘4) Use Heal’ without items

```
NO ITEMS!
```

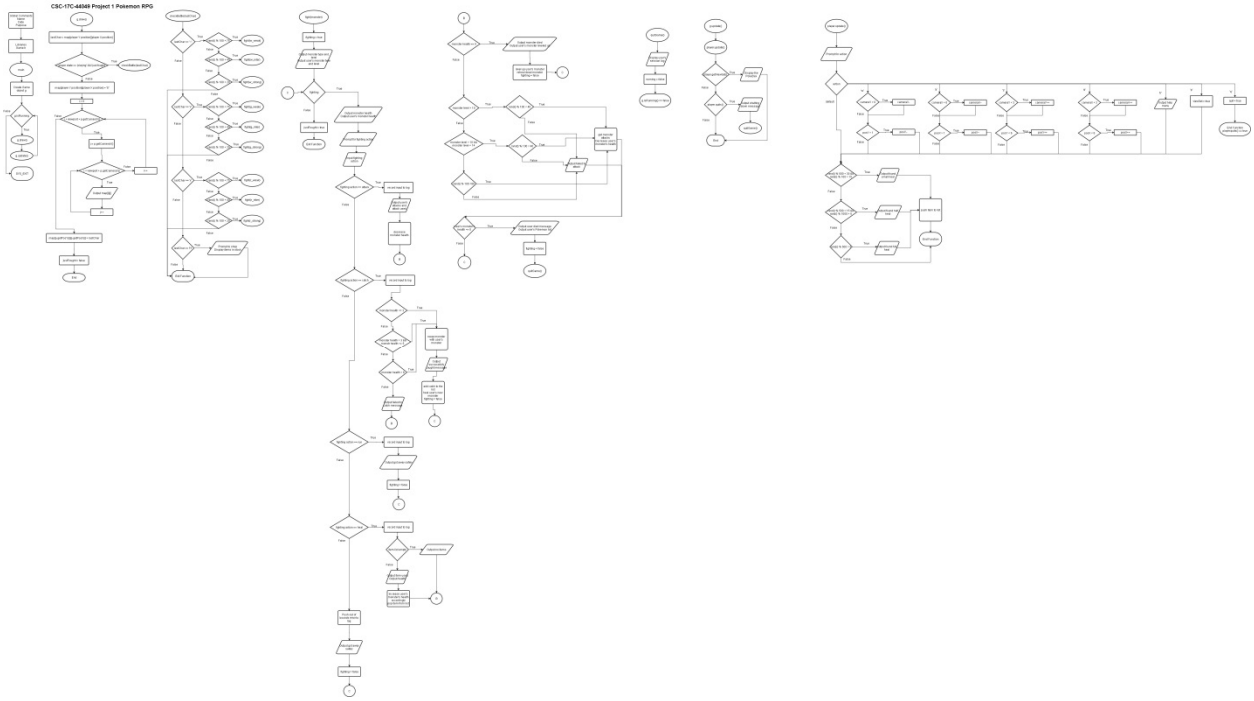
Hashing (External Text File) (varies)

```
2566729182
13448772
3379058244
3146257350
2739899042
```

Recursive Sorting (External Text File) (varies) (broken)

```
0
0
0
6978616
2739899042
```

Flowchart



Pseudocode

```
output login menu
if (choice == 1)
        signIn()
if (choice == 2)
        signUp()
else
        exit

signIn()
        Prompt for username and password
        hash and check database
        if (hash == input)
                game.isRunning() = true
        else
                output error
                output login menu
signUp()
        Prompt for username and password
        hash and send result to database
        output login menu

while game.isRunning() do
```

```
        game.draw()
        game.update()
exit

game.draw()
        lastChar = map[playerPosY][playerPosX]

        if player is playing and !justFought do
                checkBattle(lastChar)

        i = playerCameraY
        for i < viewport + playerCameraY do
                j = playerCameraX
                for j < viewport + playerCameraX do
                        output map[i][j]
                        j++
                i++
        justFought = false

checkBattle(lastChar)
        check lastChar
                if (water or grass or rock) do
                        if (chance) do
                                fight(monster)
                if (hospital) do
                        output items available to buy
                if (evolutionTree) do
                        output evolution tree

fight(monster)
        fighting = true
        output who is fighting

        while (fighting) do
                output health of both monsters
                prompt for fighting action

                if (attack) do
                        log the action
                        output available attacks
                        attack the monster and decrease its health
                if (catching) do
                        log the action
                        check health of monster
                                if (chance) do
                                        swap monsters
```

```
                                        add newly caught monster to list
                                        heal the monster
                                        fighting = false
                                else do
                                        output failed to catch message
                        if (run from battle) do
                                log the action
                                fighting = false
                        if (healing) do
                                log the action
                                if (empty items list) do
                                        output no items message
                                else do
                                        output item used
                                        heal accordingly
                                        pop item from list of items
                        else do
                                log the action
                                fighting = false

                        if (monster health == 0) do
                                level up user's monster
                                full heal dead monster
                                fighting = false

                        check monster's level
                                if (chance) do
                                        reduce user's monster's health accordingly
                                else do
                                        output monster missed or failed to attack message

                        if (user's monster's health <= 0) do
                                output monster died message
                                output user's  monster list
                                fighting = false
                                quitGame()

        quitGame()
                display player's action log
                running = false

        game.update()
                player.update()
                if (player.getViewSet()) do
                        display set or "PokeDex"
                if (player.quits()) do
```

```
                quitGame()

        player.update()
                prompt for action
                if (action == 'w' or 'a' or 's' or 'd') do
                        move player and camera accordingly
                if (action == 'h') do
                        output a help menu
                if (action == 'p') do
                        viewSet = true
                if (action == 'm')
                        display world map
                if (action == 'q') do
                        quit = true
                default do nothing

                if (chance) do
                        output found item
                        push item to item list
                else do nothing
```

Variables

Variable	Type	Location
pokeDex	set<string, SortOrder>	Game.h:74 Game.cpp:105 – 115, 140, 506
log	list<string>	Game.h:76 Game.cpp:262, 276, 299, 365, 373, 395, 520, 537, 540
mList	MonList, linked list	Game.h:79 Game.cpp: 64, 65, 143, 146 – 149, 240, 309, 328, 347, 415, 419, 483
sList_H	Shop, doubly linked list	Game.h:80 Game.cpp:76, 222
sList_T	Shop, doubly linked list	Game.h:81 Game.cpp:77, 223
mIt	map<string, int>::iterator	Game.h:100 Game.cpp:280 – 282, 289, 291, 294, 435, 437, 449, 451, 463
sIt	set<string>::iterator	Game.h:101 Game.cpp:506, 507
lIt	list<string>::iterator	Game.h:102 Game.cpp:520, 524, 540, 541, 545 - 548
items	stack<string>	Player.h:21, 26, 40, 55 Player.cpp:91, 96, 101
attacks	map<string, int>	Pokemon.h:40, 41, 45 – 47, 51 – 54, 59,

		60, 64 – 66, 70 – 74, 78, 79, 83 – 85, 89 – 92, 99, 144, 153
hash	unsigned int	Login.cpp: 46 – 78, 81 – 112

Concepts

Variable	Type	Location
swap	Algorithm	Game.cpp:305, 324, 343,
sort	Algorithm	Game.cpp:537
count	Algorithm	Login.cpp:23
mIt	Iterator	Game.h:100 Game.cpp:280 – 282, 289, 291, 294, 435, 437, 449, 451, 463
sIt	Iterator	Game.h:101 Game.cpp:506, 507
lIt	Iterator	Game.h:102 Game.cpp:520, 524, 540, 541, 545 - 548
pokeDex	Container	Game.h:74 Game.cpp:105 – 115, 140, 506
log	Container	Game.h:76 Game.cpp:262, 276, 299, 365, 373, 395, 520, 537, 540
mList	Container	Game.h:79 Game.cpp: 64, 65, 143, 146 – 149, 240, 309, 328, 347, 415, 419, 483
sList_H	Container	Game.h:80 Game.cpp:76, 222
sList_T	Container	Game.h:81 Game.cpp:77, 223
items	Container	Player.h:21, 26, 40, 55 Player.cpp:91, 96, 101
attacks	Container	Pokemon.h:40, 41, 45 – 47, 51 – 54, 59, 60, 64 – 66, 70 – 74, 78, 79, 83 – 85, 89 – 92, 99, 144, 153
hash	Hashing	Login.cpp: 125 – 127
heapsort, heapify	Recursive Sorting	Login.cpp: 177 – 204
root	Tree	EvolTree.h: 68, 31 – 43, 46 – 56, 59 – 63
graph	2D Array for weighted graph	World.h: 27 World.cpp: 23, 25, 31, 44 –

		75, 82, 83, 94 – 125, Dijkstral's Algorithm: 144 – 195

References

- Previous homework
- Gaddis book
- Explains advanced C++ concepts
  https://www.youtube.com/channel/UCcDGsN3JxMavDkM9INRLGFA
  https://www.youtube.com/user/CodingMadeEasy
- Used to learn about libraries (documentation)
  http://www.cplusplus.com/reference/
- NetBeans' autocorrect feature with man pages
- Weighted Graphs
  http://www.geeksforgeeks.org/greedy-algorithms-set-6-dijkstras-shortest-path-algorithm/
- Hashing Functions
  http://www.partow.net/programming/hashfunctions/index.html
- Trees
  http://www.geeksforgeeks.org/tree-traversals-inorder-preorder-and-postorder/

Program

main.cpp

```
/*
 * File: main.cpp
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Main game loop for Project 1 - Pokemon
 */

// User Libraries
#include "Game.h"

// Start method main handles game loop
int main(int argc, char** argv) {
    // Declare Objects
```

```
    Game g;

    // After game has been initialized
    while (g.isRunning()){
        g.draw();   // Draw our game at default settings
        g.update(); // Update our game
    }

    // SYS_EXIT
    return 0;
}// End method main
```

EvolTree.h

```
/*
 * File: EvolTree.h
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Tree to hold evolution tree
 */

#ifndef EVOLTREE_H
#define EVOLTREE_H

// System Libraries
#include <iostream>
#include <stdio.h>
#include <stdlib.h>
#include <string>

struct node {
    std::string data;
    struct node* left;
    struct node* right;
};

// Start class EvolTree
class EvolTree{
    // Constructor and Destructor
    public:
        EvolTree(){fill();} // Fill the tree
        ~EvolTree(){}

        // Function Prototypes
        void print(){print(root);} // Prints tree
    private:
        // Start method fill
```

```
    void fill(){
       // Add Pokemon to the tree
       root = newNode("THE ROOT OF ALL IS A MYSTERY!\n");

       root->left = newNode("Weak Grass");
       root->left->left = newNode("Intermediate Grass");
       root->left->right = newNode("Strong Grass");

       root->right = newNode("Weak Water");
       root->right->left = newNode("Intermediate Water");
       root->right->right = newNode("Strong Water\n");

       root->left->left->right= newNode("Weak Rock");
       root->left->left->right->left= newNode("Intermediate Rock");
       root->left->left->right->right= newNode("Strong Rock");
    } // End method fill

    // Start method print
    void print(struct node* node){
       if (node == NULL)
         return;

       /* first print data of node */
       std::cout << node->data << " ";

       /* then recur on left subtree */
       print(node->left);

       /* now recur on right subtree */
       print(node->right);
    } // End method print

    // Start method newNode
    struct node* newNode(std::string data){
       struct node* node = new struct node;

       node->data = data;
       node->left = NULL;
       node->right = NULL;

       return (node);
    } // End method newNode

    // Declare Objects
    node *root;
}; // End class EvolTree
```

```
#endif /* EVOLTREE_H */
```

Game.h

```
/*
 * File: Game.h
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: The game's main logic and drawing
 */

#ifndef GAME_H
#define GAME_H

// System Libraries
#include <map>
#include <set>
#include <list>

// User Libraries
#include "Login.h"
#include "Player.h"
#include "Pokemon.h"
#include "MonsterList.h"
#include "ShopList.h"
#include "EvolTree.h"

// Sorts the pokeDex set by string length
struct SortOrder {
   // Operator overload
   bool operator()(const string &first, const string &second){
      // Get the length of strings
      int length1 = first.length();
      int length2 = second.length();

      // If same length, return alphabetical order
      if (length1 == length2)
         return (first < second);
      return (length1 < length2);
   }
};

// Start class Game
class Game{
   public:
      // Constructor & Destructor
```

```
    Game();
    ~Game();

    // Function Prototypes
    bool isRunning(){return running;} // Should our game run
    void update();                  // Update logic
    void draw();                    // Draw based on updated logic
    void quitGame();                // Quits the game
    void checkBattle(char);         // Check if we are in a battle state
    void fight(Pokemon *);          // Actual fighting state
    void dispSet();                 // Displays the set, or PokeDex
    void dispLog();                 // Displays the list, or program log
    Shop *stockShop(char);          // Fills doubly linked list with items
    void printShop_F(Shop *);       // Print shop in a forward fashion
    void printShop_B(Shop *);       // Print shop in a backward fashion

    // -Link List Functions
    void addBefore(MonList *, string, string);
    void prntList(MonList *);

private:
    // Declare Variables
    bool running;    // is/should the game (be) running
    bool justFought; // Did the player just fight
    int fAction;     // Holds fighting action player has provided

    char map[8][8];  // Map/World container
                     // Was dynamic and read from a file, but
                     // that caused too much seg_fault errors
                     // and delimiter errors
    int viewport;    // How much of the world to display on camera

    // Declare Objects
    std::set<string, SortOrder>pokeDex; // Holds all pokemon names
                                        // in the current world
    std::list<string>log;               // Holds log of player input

    Login login;    // Login object
    Player p;       // Player
    MonList *mList; // List of Pokemon the player has
    Shop *sList_H;  // List of item in shop (holds the Head)
    Shop *sList_T;  // List of item in shop (holds the Tail)
    EvolTree evTree; // List of monsters and their evolutions

    // -Pokemon Objects
    Pokemon *starter;  // Starter, or default, Pokemon
```

```
        Pokemon *current;  // Holds current Pokemon our player is using

        Pokemon *w_weak;   // Weak Water
        Pokemon *w_inter;  // Intermediate Water
        Pokemon *w_strong; // Strong Water

        Pokemon *g_weak;   // Weak Grass
        Pokemon *g_inter;  // Intermediate Grass
        Pokemon *g_strong; // Strong Grass

        Pokemon *r_weak;   // Weak Rock
        Pokemon *r_inter;  // Intermediate Rock
        Pokemon *r_strong; // Strong Rock

        // Declare iterators
        std::map<string, int>::iterator mIt; // Loops through Pokemon attacks
        std::set<string>::iterator sIt;      // Loops through PokeDex
        std::list<string>::iterator lIt;     // Loops through log

};// End class Game

#endif /* GAME_H */
```

Game.cpp

```
/*
 * File: Game.cpp
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Main Game container
 *          Builds and draws map,
 *          Creates objects,
 *          Handles Game state: fighting, menu/pause
 */

// User Libraries
#include "Game.h"

// System Libraries
#include <iostream>
#include <iomanip>   // setw()
#include <cstdlib>   // rand()
#include <ctime>     // time()
#include <set>
#include <typeinfo>  // typeid()
#include <algorithm> // sort()
```

```
using namespace std;

// Start  constructor Game
Game::Game(){
    // Login before starting game
    login.menu();

    cout << "\nLOADING...\n";
    // Set random number seed
    srand(time(0));

    // Initialize variables
    viewport = 5;       // View up to 5 elements on X and Y
                        // Changing this could cause seg_fault
                        // If change is wanted, however, must also
                        // change the Player object's "if (camera_ < [int]) camera_++;"
                        // where '_' means 'X' or 'Y' and [int] means any integer value
                        // Its all trial and error and depends on the 'map' array size!!

    justFought = false; // Checks if player just fought a monster
                        // to prevent a fight loop on the same tile

    // Create our Pokemon
    // Format (type, health, level, power)
    // -Starter
    starter = new Pokemon("Weak Grass", 10, 3, 3);
    current = starter; // Our current Pokemon

    // -Water
    w_weak = new Pokemon("Weak Water", 8, 2, 2);
    w_inter = new Pokemon("Intermediate Water", 12, 5, 4);
    w_strong = new Pokemon("Strong Water", 18, 9, 6);

    // -Grass
    g_weak = new Pokemon("Weak Grass", 5, 2, 1);
    g_inter = new Pokemon("Intermediate Grass", 10, 5, 3);
    g_strong = new Pokemon("Strong Grass", 14, 9, 5);

    // -Rock
    r_weak = new Pokemon("Weak Rock", 6, 2, 2);
    r_inter = new Pokemon("Intermediate Rock", 14, 6, 6);
    r_strong = new Pokemon("Strong Rock", 20, 9, 8);

    // Fill our list with the starter
    mList = new MonList;
    MonList *prev = mList;
```

```
prev->data = starter->getType();
prev->linkPtr = NULL;
MonList *end=new MonList;
end->data=starter->getType();
end->linkPtr=NULL;
prev->linkPtr=end;
prev=end;
// End fill list

// Fill our shop list
sList_H = stockShop('h');
sList_T = stockShop('t');

// Create the map
for (int i = 0; i < 8; i++){
   for (int j = 0; j < 8; j++){
      // Create Border
      if (i == 0 || j == 0 ||
         j == 7 || i == 7)
         map[i][j] = '0';
      // Tall Grass
      else if (i >= 4 && j >= 4 && map[i][j] != '0')
         map[i][j] = 'v';
      // Concrete
      else if (i <= 4 && j >= 4 && map[i][j] != '0')
         map[i][j] = 'x';
      // Water
      else if (i == 6 && map[i][j] != 'x')
         map[i][j] = '~';
      // Hospital
      else if (i == 1 && j == 1)
         map[i][j] = 'H';
      // Evolution Tree
      else if (i == 3 && j == 1)
         map[i][j] = 'E';
      // Floor
      else map[i][j] = '.';
   }
}
// End creating map

// Create our pokedex
pokeDex.insert("Weak Grass");
pokeDex.insert("Weak Water");
pokeDex.insert("Weak Rock");
```

```
    pokeDex.insert("Intermediate Grass");
    pokeDex.insert("Intermediate Water");
    pokeDex.insert("Intermediate Rock");

    pokeDex.insert("Strong Grass");
    pokeDex.insert("Strong Water");
    pokeDex.insert("Strong Rock");

    p.setViewSet(false);

    // If successfully logged in, start loop
    if (login.loginSuccess()){
        // Start our loop once elements successfully initialized
        cout << "======START!!======\n";
        cout << "*TIP: Use 'h' for help!!*\n\n";
        running = true;
    }
    // Else leave game
    else {
        running = false;
    }
}// End constructor Game

// Start destructor Game
Game::~Game(){
    // Destroy our Pokemon objects
    delete w_weak;
    delete w_inter;
    delete w_strong;
    delete g_weak;
    delete g_inter;
    delete g_strong;
    delete r_weak;
    delete r_inter;
    delete r_strong;

    // Delete the set just in case
    // No pointers so we can just clear it
    pokeDex.clear();

    // Destroy MonList if it contains elements
    if (mList==NULL) ;
    else{
        do{
            MonList *temp=mList->linkPtr;
            delete mList;
```

```
            mList = temp;
        }while (mList!=NULL);
    }
}// End destructor Game

// Start method update
void Game::update(){
    p.update(); // Update our player

    // If player wants to see PokeDex, display
    if (p.getViewSet())dispSet();

    // If player quits, end game
    if (p.quits()){
        cout << "\nSHUTTING DOWN...\n";
        quitGame();
    }
}// End method update

// Start method checkBattle
// Checks if our player will fight
void Game::checkBattle(char lastCh){
    // Check water types
    if (lastCh == '~'){
        // 50% chance of a weak pokemon
        if (rand() % 100 < 75){
            fight(w_weak);
        }
        // 40 % chance of an intermediate pokemon
        else if (rand() % 100 < 40){
            fight(w_inter);
        }
        // 20% chance of a strong pokemon
        else if (rand() % 100 < 20){
            fight(w_strong);
        }
    }

    // Check grass type
    if (lastCh == 'v'){
        // 50% chance of a weak pokemon
        if (rand() % 100 < 50){
            fight(g_weak);
        }
        // 40 % chance of an intermediate pokemon
        else if (rand() % 100 < 30){
```

```
            fight(g_inter);
        }
        // 20% chance of a strong pokemon
        else if (rand() % 100 < 20){
            fight(g_strong);
        }
    }

    // Check rock type
    if (lastCh == 'x'){
        // 50% chance of a weak pokemon
        if (rand() % 100 < 75){
            fight(r_weak);
        }
        // 40 % chance of an intermediate pokemon
        else if (rand() % 100 < 40){
            fight(r_inter);
        }
        // 20% chance of a strong pokemon
        else if (rand() % 100 < 20){
            fight(r_strong);
        }
    }

    // Check if in hospital
    if (lastCh == 'H'){
        cout << "\nShop? (NOT YET IMPLEMENTED)\n";
        cout << "***Items in stock***\n";
        cout << "forwards: ";printShop_F(sList_H);
        cout << "\nbackwards:";printShop_B(sList_T);
        cout << endl;
    }

    // Check if in evolution tree
    if (lastCh == 'E'){
        cout <<"\nEVOLUTION TREE\n";
        evTree.print();
    }
}// End method checkBattle

// Start method fight
// Puts our game into a fighting state
void Game::fight(Pokemon *monster){
    // Declare Variables
    bool fighting = true; // Loops our fighting state
```

```
//log.push_back(monster->getType()); UGLY OTUPUT

// Output who approached us
cout << "\nA " << monster->getType()
    << " Level " << monster->getLevel() << " Appeared!!\n";
// Output our Pokemon's current state
cout << "\nYour Pokemon at hand: " << mList->data
    << " Level " << current->getLevel() << endl;

// The fighting loop
while (fighting){
   // Output health of both
   cout << "\nYour Pokemon's Health: " << current->getHealth() << endl;
   cout << monster->getType() << "'s Health: " << monster->getHealth() << endl;

   // Prompt for player fighting action
   cout << "\nWhat do you do?\n";
   cout << "1) Attack " << endl
       << "2) Catch  " << endl
       << "3) Run    " << endl
       << "4) Use Heal" << endl
       << "Action: ";

   cin >> fAction;

   // If bad input, just leave
   if (cin.fail()) {
      // Log cin fail as 999
      log.push_back("CIN ERROR");
      cout << "\nGot Away Safely\n";
      cin.ignore();
      cin.clear();
      fighting = false;
      return;
   }

   // Static cast to prevent wrong type errors
   fAction = static_cast<int>(fAction);

   // Chose to attack
   if (fAction == 1){
      // Insert to log
      log.push_back("ATTACK");
      // Outputs user's available attacks
      cout << "\nYour Attacks\n";
```

```
    for (mIt = current->getAttacks().begin();
            mIt != current->getAttacks().end(); mIt++){
        cout << mIt->first << " " << " Power: " << mIt->second;
        cout << endl;
    }

    // Prompt for attack (SOON)

    // Output attack used
    mIt = current->getAttacks().begin();
    cout << "\nYour " << current->getType() << " used "
         << mIt->first << "!" << endl;

    // Decrease offending monster's attack
    monster->hit(mIt->second);
}
// Chose to catch
else if (fAction  == 2){
    // Insert to log
    log.push_back("CATCH");

    // Dying health = easier catch (80%)
    if (monster->getHealth() <= 3){
        if (rand() % 100 < 80){
            // Swap algorithm changes player's monster
            std::swap(current, monster);
            cout << "Successfully caught a " << current->getType()
                 << "!" << endl;
            // Add catch to our list
            addBefore(mList, monster->getType(), current->getType());
            // Fully heal new Pokemon
            current->heal("full");
            // Leave the fighting state
            fighting = false;
            return ;
        }
        else {
            cout << "Failed to catch " << monster->getType() << endl;
        }
    }
    // Sick health = decent chance (50%)
    else if (monster->getHealth() > 3 && monster->getHealth() <=5){
        if (rand() % 100 < 50){
            // Swap algorithm changes player's monster
            std::swap(current, monster);
            cout << "Successfully caught a " << current->getType()
```

```
                << "!" << endl;
            // Add catch to our list
            addBefore(mList, monster->getType(), current->getType());
            // Fully heal new Pokemon
            current->heal("full");
            // Leave the fighting state
            fighting = false;
            return ;
        }
        else {
            cout << "Failed to catch " << monster->getType() << endl;
        }
    }
    // Healthy = small chance (2%)
    else if (monster->getHealth() > 6){
        if (rand() % 100 < 2){
            // Swap algorithm changes player's monster
            std::swap(current, monster);
            cout << "Successfully caught a " << current->getType()
                 << "!" << endl;
            // Add catch to our list
            addBefore(mList, monster->getType(), current->getType());
            // Fully heal new Pokemon
            current->heal("full");
            // Leave the fighting state
            fighting = false;
            return ;
        }
        else {
            cout << "Failed to catch " << monster->getType() << endl;
        }
    }
    // Other, output failed to catch message
    else { cout << "Failed to catch " << monster->getType() << endl; }

}
// Chose to run
else if (fAction == 3){
    // Insert to log
    log.push_back("RUN");
    cout << "\nGot Away Safely\n";
    fighting = false;
    return;
}
// Choose to heal player's monster
else if (fAction == 4){
```

```
    // Log this event
    log.push_back("HEAL");

    // If no items, leave
    if (p.getItems().empty()){
        cout << "\nNO ITEMS!" << endl;
    }
    // If item, heal Pokemon accordingly
    else {
        cout << "\nUsed " << p.getItems().top() << " heal!" << endl;
        current->heal(p.getItems().top());

        cout << "\nYour Pokemon now has " << current->getHealth()
             << " health points!" << endl;

        // Remove item from list
        p.popItems();
    }

}
// If error, just leave
else {
    // Insert to log
    log.push_back("OUT OF BOUNDS ERROR");
    cout << "\nGot Away Safely\n";
    fighting = false;
    return;
}

        /*** Monster Action Handler ***/

// Check if monster is dead before attacking
// BUG SINCE I'M USING LINKED LIST FOR DISPLAYING POKEMON TYPE!!
if (monster->getHealth() == 0){
    cout << "\n" << monster->getType() << " killed!" << endl;
    cout << "Your " << current->getType() << " leveled up "
         << monster->getLevel() / 2 << "!" << endl;

    // Level up our monster
    current->lvlUp(monster->getLevel() / 2);

    // Change type if level is high
    if (current->getLevel() >= 5 && current->getLevel() <= 13 ){
        addBefore(mList, current->getType(), "Intermediate Grass"); // Add to list first!
        current->setType("Intermediate Grass"); // Should split 'type' & 'element'
    }
```

```
    else if (current->getLevel() >= 14 && current->getType() != "Strong Grass"){
        addBefore(mList, current->getType(), "Intermediate Grass"); // Add to list first!
        current->setType("Strong Grass");       // Should split 'type' & 'element'
    }

    // Reset attacker's health to prevent infinite level up
    monster->heal("full");

    // Leave fighting state
    fighting = false;
    return ;
}

// Low level 40% chance of attacking
if (monster->getLevel() < 10){
    if (rand() % 100 < 40){
        // Outputs attack used
        mIt = monster->getAttacks().begin();
        cout << endl << monster->getType()
             << " used "  << mIt->first << "!\n";

        current->hit(monster->getPower()); // Decrease player health
    }
    else {
        cout << endl << monster->getType() << " failed to attack!\n";
    }
}
// Intermediate 60% chance of attacking
else if (monster->getLevel() > 10 && monster->getLevel() < 14){
    if (rand() % 100 < 60){
        // Outputs attack used
        mIt = monster->getAttacks().begin();
        cout << endl << monster->getType()
             << " used "  << mIt->first << "!\n";

        current->hit(monster->getPower()); // Decrease player health
    }
    else {
        cout << endl << monster->getType() << " failed to attack!\n";
    }
}
// High levels 80% attack
else {
    if (rand() % 100 < 80){
        // Outputs attack used
        mIt = monster->getAttacks().begin();
```

```
            cout << endl << monster->getType()
                << " used "  << mIt->first << "!\n";

            current->hit(monster->getPower()); // Decrease player health
         }
         else {
            cout << endl << monster->getType() << " failed to attack!\n";
         }
      }
      // End monster attack handler

      // If our Pokemon's health has dropped to or below 0
      // End game
      if (current->getHealth() <= 0){
         // Output game over message
         cout << "\n====Your Pokemon died!====\n";
         cout << "====Game Over====\n";

         // Print the list of Pokemon the player had
         prntList(mList);

         // Leave this loop
         fighting = false;

         // Leave the game
         quitGame();
         cout << "\n====Your Pokemon died!====\n";
         cout << "====Game Over====\n";
         cout << "\nPress any key to quit\n\n";
      }

   }// End fighting loop

   // Gives 1 step delay before Pokemon appear
   justFought = true;
}// End method fight

// Start method dispSet
void Game::dispSet(){
   cout << "\n=======PokeDex========\n";
   cout << "These are all the Pokemon found in this world\n";
   // Go through PokeDex set and output
   for (sIt = pokeDex.begin(); sIt != pokeDex.end(); sIt++)
      cout << *sIt << endl;
   cout << "\n=======Nontindo=======\n";
   p.setViewSet(false);
```

```
}// End method dispSet

// Start method dispLog displays the log
// Log contains user actions
void Game::dispLog(){
   // Declare Variables
   int i = 0; // Move counter
   cout << "\nYour attack log:\n";

   // Loop through log
   for (lIt = log.begin(); lIt != log.end(); lIt++){
      i++; // Increment move counter
      // Output move number and what user used against monster
      cout << setw(8) << "MOVE: " << i
           << setw(5) << "  USED: " << *lIt << endl;
   }// End for loop

   cout << "\nSorted log to count number of times "
        << "an action was used\n";

   // Declare counter variables
   int numAttack = 0;
   int numCatch  = 0;
   int numRun    = 0;
   int numHeal   = 0;

   // Sort algorithm
   log.sort();

   // Output and count
   for (lIt = log.begin(); lIt != log.end(); lIt++){
      cout << *lIt << endl;
      // BUG: DOESN'T COUNT FOR EACH
      // ONLY COUNTS FOR ONE ("ATTACK")!!
      // DEBUGGER'S CONSOLE DOESNT COOPERATE!!
      if (*lIt == "ATTACK")     numAttack++;
      else if (*lIt == "CATCH") numCatch++;
      else if (*lIt == "RUN")   numRun++;
      else if (*lIt == "HEAL")  numHeal++;
   }

   // Output count results
   cout << endl;
   cout << "Attacks used: " << numAttack << endl;
   cout << "Catches used: " << numAttack << endl;
   cout << "Times Ran:    " << numAttack << endl;
```

```
    cout << "Times Healed: " << numAttack << endl;
    cout << endl;
}// End method dispLog

// Start method quitGame
void Game::quitGame(){
    dispLog();       // Display the log
    running = false; // Quit our game loop
}// End method quitGame

// Start method draw
// Draws our game elements
void Game::draw(){
    // Get the last tile our player stepped on to overwrite it
    char lastChar = map[p.getPosY()][p.getPosX()];

    // Check if a Pokemon has approached us
    // If our player just fought, skip this
    if (p.getState() == 'p' && !justFought)checkBattle(lastChar);

    // Place our player in the world
    map[p.getPosY()][p.getPosX()] = '8';

    // Draw our map/world
    for (int i = p.getCameraY(); i < viewport + p.getCameraY(); i++){
        for (int j = p.getCameraX(); j < viewport + p.getCameraX(); j++){
            cout << setw(2) << map[i][j] << " ";
        }
        cout << endl;
    }

    // Overwrite the last character
    map[p.getPosY()][p.getPosX()] = lastChar;

    // We did not just fight
    justFought = false;

}// End method draw


        /*** Link List Functions ***/

// Start method addBefore
// BUG ADDS MORE THAN ONE!!
void Game::addBefore(MonList *front, string before, string val){
    MonList *next = front;          // Keeps track of next node
```

```
    MonList *prev = new MonList;     // Stores previous node
    MonList *newNode  = new MonList; // Creates new node for next value

    newNode->data = val; // Store value in newNode's data

    // Go through list until it hits position wanted
    while (next->linkPtr != NULL && next->data != before){
       // Clone everything before 'before'
       prev = next;
       next = next->linkPtr;
    }

    // Store newNode into the linked list
    prev->linkPtr = newNode;
    newNode->linkPtr = next;
}// End method addBefore

// Start method printList prints our Pokemon all game
void Game::prntList(MonList *front){
    cout << "\nYour Pokemon\n";
    MonList *next=front; //Start at the front of the list
    cout<<endl;          //Put the beginning on a new line
    do{
       cout<<setw(4)<<next->data<<" "; //Print the link
       next=next->linkPtr;             //Go to the next link
       cout << endl;
    }while(next!=NULL);                //Stop when your at the end
    cout<<endl;

}// End method printList

// Start method stockShop
// Takes in char 'h' for returning the HEAD
// Takes in char 't' for returning the TAIL
// else return HEAD
Shop *Game::stockShop(char loc){
    Shop *head; // Head
    Shop *tail; // End
    Shop *n;    // Next

    // Full heal
    n = new Shop;
    n->data = "Full";
    n->prev = NULL;   // First node has no previous
    head = n;
    tail = n;
```

```
    // Half heal
    n = new Shop;
    n->data = "Half";
    n->prev = tail;
    tail->next = n;
    tail = n;

    // Small heal
    n = new Shop;
    n->data = "Small";
    n->prev = tail;
    tail->next = n;
    tail = n;

    // Close list
    tail->next = NULL;

    // Check the argument for proper return
    if (loc == 't' || loc == 'T') return tail;
    else return head;
}// End method stockShop

// Start method printShop_F
void Game::printShop_F(Shop *head){
    Shop *temp = head; // Points to front of list

    // Print while data
    do {
        cout << temp->data << " ";
        temp = temp->next; // Point to next node
    }while(temp != NULL);
    cout << endl;
}// End method printShop_F

// Start method printShop_B
void Game::printShop_B(Shop *tail){
    Shop *temp = tail; // Points to end of list

    // Print while data
    do {
        cout << temp->data << " ";
        temp = temp->prev; // Point to previous node
    }while(temp != NULL);
    cout << endl;
```

```
}// End method printShop_B
```

Login.h

```
/*
 * File: Login.h
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Login screen to implement hashing algorithms
 */

#ifndef LOGIN_H
#define LOGIN_H

// Start class Login
// Bug: when you sign up and try to sign in using
//      the new login info, it throws 'login unsuccessful,'
//      after signing in, press '3' (exit) and you're in
class Login{
   public:
      Login(){leave = false; loggedIn = false; size = 0;}
      ~Login(){delete [] loginHolder;}

      bool loginSuccess(){ return loggedIn; }

      void menu(); // Shows log in menu

      void signIn(); // Checks fake database for username + password
      void signUp(); // Creates an entry for new username + password

   private:
      bool loggedIn;    // Checks if log in success
      bool leave;       // Tells game to exit
      unsigned int *loginHolder; // Array to hold hashed login info
      int size;         // Holds size for allocating memory

      unsigned int BKDRHash(const std::string&);

      // Private Functions
      void scan(); // Counts contents in database
      void heapSort(unsigned int *, unsigned int); // Sorts database
      void heapify(unsigned int *, unsigned int, unsigned int); // Rearrange the heap
}; // End class Login

#endif /* LOGIN_H */
```

Login.cpp

```
/*
 * File: Login.cpp
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Login screen to implement hashing algorithms
 */

// System Libraries
#include <iostream>
#include <string>
#include <fstream>
#include <algorithm>
using namespace std;

// User Libraries
#include "Login.h"

// Start method scan
void Login::scan(){
   ifstream inFile("users.pokeDB"); // File object

   // Count lines in file
   size = count(istreambuf_iterator<char>(inFile),
        istreambuf_iterator<char>(), '\n');

   // Allocate memory
   // One size larger just in case
   loginHolder = new unsigned int[size + 1];

   // Bug: output differs, but using unsigned ints
   // causes stuck on an infinite loop
   if (loginHolder != nullptr){
      ifstream inDB;
      unsigned int getHashes = 0;
      int i = 0;

      // Assign every array index to a hashed value
      inDB.open("users.pokeDB");
      // Different numbers
      while (inDB >> getHashes)
         loginHolder[i] = reinterpret_cast<unsigned int>(getHashes);
      inDB.close();
   }

   // Recursive sort
   // Either fails or succeeds
```

```
    heapSort(loginHolder, size);

    // Output sorted array to a file
    // Delete file to see results
    ofstream ofSorted;

    ofSorted.open("sorted_users.pokeDB", ios::app);
        // Go through sorted array and output to file
        for (int i = 0; i < size; i++)
            ofSorted << loginHolder[i] << endl;
    ofSorted.close();
}// End method scan

// Start method menu
void Login::menu(){
    scan(); // Scan the database for sorting

    int choice = 0; // Holds menu choice

    // Prompt for choice
    cout << "____Pokemon CSC 17 C____" << std::endl;
    cout << "1) Sign In\n2) Sign Up\n3) Exit\n";
    cin >> choice;

    // Check choice
    switch (choice){
        case 1:
            signIn();
            break;
        case 2:
            signUp();
            break;
        default:
            /*
             *  Bug if sign in fail
             *  Repeats sign in error message
             */
            cout << "Exiting...\n";
            leave = true;
            break;
    }
}// End method menu

// Start method signIn
void Login::signIn(){
    /*
```

```
     * Default login
     * user & pass = admin : password
     */
    ifstream inDB;

    string user = "";
    string pass = "";
    unsigned int dbHash = 0;
    unsigned int hash = 0;

    // Prompt for username and password
    cout << "Enter username: ";
    cin >> user;
    cout << "\nEnter password: ";
    cin >> pass;

    // Check database for hashed values
    // Bad Practice: could be cracked by key generator
    hash = BKDRHash(user + pass);
    inDB.open("users.pokeDB");
        while (inDB >> dbHash){
            if (hash == dbHash){
                loggedIn = true;
                break;
            }
            else {
                cout << "\n\nUsername and/or password incorrect!\n\n";
                menu();
            }
        }
    inDB.close();
}// End method signIn

// Start method signUp
void Login::signUp(){
    /*
     * Bug: after sign up, new username and password
     * fail, but exiting lets user through
     * First time users must make account!
     */
    ofstream outDB; // Stream object for database storage

    string user = "";
    string pass = "";
    unsigned int hash = 0;
```

```
    // Prompt for username and password
    cout << "Enter a new username: ";
    cin >> user;
    cout << "\nEnter password for " << user << ": ";
    cin >> pass;

    // Hash info
    hash = BKDRHash(user + pass);

    // Open our database
    outDB.open("users.pokeDB", ios::app);
        // Write to database
        outDB << hash << endl;
        cout << "\n\nSignup Success!!\n\n";
    outDB.close();

    // Reload the menu
    menu();

}// End method signUp

// Start method BKDRHash
/*
 * Taken from "GeneralHashFunctions.cpp" assignment
 * http://www.partow.net/programming/hashfunctions/index.html
 */
unsigned int Login::BKDRHash(const std::string& str){
    // Declare Variables
    unsigned int seed = 131;
    unsigned int hash = 0;

    // Go through each character and encrypt
    for (std::size_t i = 0; i < str.length(); i++){
        hash = (hash * seed) + str[i];
    }

    // Return encrypted string as UINT
    return hash;
}// End method BKDRHash

// Start method heapify
void Login::heapify(unsigned int *a, unsigned int n, unsigned int i){
    // Declare and Initialize Variables
    unsigned int largest = i;       // Holds largest index
    unsigned int left = 2 * i + 1;  // Left side
    unsigned int right = 2 * i + 2; // Right side
```

```
    // Check largest index
    if (left < n && a[left] > a[largest])
        largest = left;

    if (right < n && a[right] > a[largest])
        largest = right;

    if (largest != i){
        swap(a[i], a[largest]);
        heapify(a, n, largest);
    }
}// End method heapify

// Start method heapSort
void Login::heapSort(unsigned int *a, unsigned int n){
    for (int i=n/2-1; i>=0;i--)
        heapify(a, n, i);
    for (int i=n-1; i>=0; i--){
        swap(a[0], a[i]);
        heapify(a, i, 0);
    }
}// End method heapsort
```

MonsterList.h

```
/*
 * File: MonsterList.h
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Holds a list of monsters the player has caught
 */

#ifndef MONSTERLIST_H
#define MONSTERLIST_H

// System Libraries
#include <string>

//Start structure MonList
struct MonList {
    string data;      // Holds Pokemon's type
    MonList *linkPtr; // Pointer to next data
};// End structure MonList

#endif /* MONSTERLIST_H */
```

Player.h

```
/*
 * File: Player.h
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Contains our Player properties
 *          Also updates movement
 */

#ifndef PLAYER_H
#define PLAYER_H

// System Libraries
#include <stack>
#include <string>

// User Libraries
#include "World.h" // Displays world map

// Start class Player
class Player{
   public:
      // Constructor & Destructor
      Player();
      ~Player(){items.empty();}

      // Function Prototypes
      void update();   // Handle user input
      void outHelp();  // Outputs a help page
      void popItems(){items.pop();} // Uses the stack's 'pop' algorithm

      // Mutator Functions
      void setState(char s){state = s;}     // Sets player's state
      void setViewSet(bool b){viewSet = b;} // Sets if PokeDex set
                                  // should be displyed

      // Accessor Functions
      int getCameraX() const {return cameraX;}   // Get our camera's x position
      int getCameraY() const {return cameraY;}   // Get our camera's y position
      int getPosX()    const {return posX;}      // Get our player's x position
      int getPosY()    const {return posY;}      // Get our player's y position
      char getState()  const {return state;}     // Get our player's state
      bool getViewSet() const { return viewSet;} // View pokeDex set?
      std::stack<std::string> getItems() const {return items; } // Get inventory
      bool quits() const {return quit;};         // Did player just quit
```

```
   private:
      // Declare Variables
      int cameraX;  // Holds camera's x position
      int cameraY;  // Holds camera's y position
      int posX;     // Holds player's x position
      int posY;     // Holds player's y position
      char action;  // Holds player input
      char state;   // Holds player's state
      bool viewSet; // Tells game to display PokeDex set
      bool quit;    // Holds if player decided to quit

      // Declare Objects
      World worldMap;
      std::stack<std::string>items; // Holds all our items
};// End class Player

#endif /* PLAYER_H */
```

Player.cpp

```
/*
 * File: Player.cpp
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Contains our Player properties
 *          Also updates movement
 */

// User Libraries
#include "Player.h"

// System Libraries
#include <iostream>
#include <cstdlib>  // rand()
using namespace std;

// Start constructor Player
Player::Player(){
   // INIT variables
   cameraX = 0;
   cameraY = 0;
   posX = 2;     // Place at center of camera
   posY = 2;     // Place at center of camera
   state = 'p';  // State playing
```

```
    action = ' '; // No action taking place
    quit = false;
}// End constructor Player

// Start method update
void Player::update(){
    // Prompt for action
    cout << "Action: ";
    cin >> action;

    // Action handler
    switch(action){
        // If playing in the world
        // UP
        case 'w':
            // Moves everything UP
           // if (state == 'p'){ /!\ ERROR: makes player freeze
                if (cameraY > 0)cameraY--; // If camera in bounds
                if (posY > 1)posY--;       // If player in bounds
            //}
            break;
        // LEFT
        case 'a':
            // Moves everything LEFT
           // if (state == 'p'){ /!\ ERROR: makes player freeze
            if (cameraX > 0)cameraX--; // If camera in bounds
            if (posX > 1)posX--;//}    // If player in bounds
            break;
        // DOWN
        case 's':
            // Moves everything DOWN
            //if (state == 'p'){ /!\ ERROR: makes player freeze
            if (cameraY < 3)cameraY++; // If camera in bounds
            if (posY < 6)posY++;//}    // If player in bounds
            break;
        // RIGHT
        case 'd':
            // Moves everything RIGHT
            //if (state == 'p'){ /!\ ERROR: makes player freeze
            if (cameraX < 3)cameraX++; // If camera in bounds
            if (posX < 6)posX++;//}    // If player in bounds
            break;
        // HELP
        case 'h':
            // Displays help page
            //if (state == 'p'){ /!\ ERROR: makes player freeze
```

```
            outHelp();//}
            break;
        // MAP
        case 'm':
            worldMap.dispWorld();
            break;
        // PAUSE (just displays PokeDex)
        case 'p':
            viewSet = true;
            break;
        // QUIT
        case'q':
            // Acknowledges game that player quit
            quit = true;
            break;
        // Else do nothing
        default:
            break;
    }// End action handler

    // After every move, check for an item
    // 6% chance to find 'small' heal
    if (rand() % 500 < 30 && rand() % 100 > 15){
        cout << "\n Found small heal!!\n";
        items.push("small");
    }
    // 3% chance to find 'half' heal
    else if (rand() % 500 < 15 && rand() % 1000 > 5){
        cout << "\n Found half heal!!\n";
        items.push("half");
    }
    // 1% chance to find 'full' heal
    else if (rand() % 500 < 5){
        cout << "\n Found full heal!!\n";
        items.push("full");
    }
    // Found nothing!
    else {}

    cout << endl;
}// End method update

// Start method outHelp
void Player::outHelp(){
    // Output help page
    cout << "Legend "<<endl
```

```
        << " '8' PLAYER\n"
        << " '~' WATER (water types found here)\n"
        << " 'x' CONCRETE (rock types found here)\n"
        << " 'v' TALL GRASS (grass types found here)\n"
        << " '.' NORMAL TILE (Items found here)\n"
        << " 'H' HOSPITAL (Buy medicine here)\n"
        << " 'E' EVOLUTION TREE (See the world evolution tree)\n"
        << endl
        << "Actions "<<endl
        << " In world\n"
        << "    w move up\n"
        << "    s move down\n"
        << "    a move left\n"
        << "    d move right\n"
        << "    p PokeDex menu\n"
        << "    h brings up this menu\n"
        << "    m displays a world map with shortest distances from your current location\n"
        << "    q quits the game\n"
        << "    --dying also stops the game\n"
        << " In battle\n"
        << "    1 attacks rival Pokemon\n"
        << "    2 attempts to catch Pokemon\n"
        << "    3 runs from battle\n"
        << "    4 uses health potion for your Pokemon\n"
        << "Casually walking around gives chance of finding items!\n"
        << endl;
}// End method outHelp
```

Pokemon.h

```
/*
 * File: Pokemon.h
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Holds Pokemon properties
 */

#ifndef POKEMON_H
#define POKEMON_H

// System Libraries
#include <map>    // Holds Pokemon's power
#include <string>
using namespace std;

// Start class Pokemon
class Pokemon{
```

```
public:
    // Default constructor
    Pokemon(){
        // INIT everything to 1
        health = 1;
        type = 1;
        level = 1;
    };// End default constructor

    // Constructor
    // Takes in a type, total health, level, power of attacks
    Pokemon(string t, int h, int l, int p){
        health = h;
        maxHealth = h;
        type = t;
        level = l;
        power = p;

        // Check type and assign attacks
        // Map is
        if (type == "Weak Grass"){
            // Weak types only have 2 attacks
            attacks["Tackle"] = 1;
            attacks["Defend"] = 1;
        }
        else if (type == "Intermediate Grass"){
            // Intermediate types have 3 attacks
            attacks["Tackle"] = 1;
            attacks["Whip"] = 3;
            attacks["Absorb"] = 2;
        }
        else if (type == "Strong Grass"){
            // Strong types have all 4 attacks
            attacks["Whip"] = 3;
            attacks["Absorb"] = 2;
            attacks["Photosynthesis"] = 5;
            attacks["Spore"] = 4;
        }

        else if (type == "Weak Water"){
            // Weak types only have 2 attacks
            attacks["Tackle"] = 2;
            attacks["Defend"] = 1;
        }
        else if (type == "Intermediate Water"){
            // Intermediate types have 3 attacks
```

```
        attacks["Tackle"] = 2;
        attacks["Splash"] = 2;
        attacks["Wave"] = 4;
    }
    else if (type == "Strong Water"){
        // Strong types have all 4 attacks
        attacks["Splash"] = 2;
        attacks["Wave"] = 4;
        attacks["Whirlpool"] = 5;
        attacks["Tsunami"] = 6;
    }

    else if (type == "Weak Rock"){
        // Weak types only have 2 attacks
        attacks["Tackle"] = 2;
        attacks["Defend"] = 1;
    }
    else if (type == "Intermediate Rock"){
        // Intermediate types have 3 attacks
        attacks["Tackle"] = 1;
        attacks["Throw"] = 6;
        attacks["Quake"] = 5;
    }
    else if (type == "Strong Rock"){
        // Strong types have all 4 attacks
        attacks["Throw"] = 6;
        attacks["Quake"] = 8;
        attacks["Crush"] = 5;
        attacks["Sandstorm"] = 8;
    }
}; // End Constructor

// Destructor
~Pokemon(){
    // Delete our map just in case
    attacks.clear();
};

// Function Prototypes
void hit(int p){health -= p;}     // Removes health by power of attacker
void lvlUp(int lU){level += lU;} // Levels Pokemon up
void heal(string med){
    // If already at full health, leave
    if (health == maxHealth) return;

    // If given full medicine, fill health
```

```
        // to max health
        if (med == "full"){
            health = maxHealth;
        }
        // If given half medicine, fill health
        // half of max
        else if (med == "half"){
            health += maxHealth / 2;
            // If previous calculation exceeds the max health,
            // health is our maxHealth
            if (health > maxHealth)
                health = maxHealth;
        }
        // If given small dosage, add health by 2
        else if (med == "small"){
            health += 2;
            // If previous calculation exceeds the max health,
            // health is our maxHealth
            if (health > maxHealth)
                health = maxHealth;
        }
        // If some kind of arg error, return
        else { return; }

    }

    // Mutator Functions
    void setType(string t){type = t;}

    // Accessor Functions
    int getHealth() const {return health;}
    string getType() const {return type;}
    int getPower() const {return power;}
    int getLevel() const {return level;}
    map <string, int> getAttacks() const {return attacks;}
private:
    // Declare Variables
    int health;    // Pokemon's total health
    int maxHealth; // Pokemon's maxHealth for healing
    string type;   //Pokemon's type
    int level;     // Pokemon's level
    int power;     // Pokemon's attack power

    map<string, int>attacks; // Holds list of attacks
                             // Keytype (string) = name of attack
                             // Value (int)      = power of attack
```

```
};// End class Pokemon

#endif /* POKEMON_H */
```

ShopList.h

```
/*
 * File: ShopList.h
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Doubly linked list used as a shop
 *          so the user could buy items
 */

#ifndef SHOPLIST_H
#define SHOPLIST_H

// System Libraries
#include <string>

struct Shop{
   std::string data;
   Shop *next;
   Shop *prev;
};

#endif /* SHOPLIST_H */
```

World.h

```
/*
 * File: World.h
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Graph that displays the world
 *          and its lengths/path weights
 */

/*
 * Credits: http://www.geeksforgeeks.org/greedy-algorithms-set-6-dijkstras-shortest-path-
algorithm/
 */

#ifndef WORLD_H
#define WORLD_H
```

```
// Start class World
class World {
   public:
      // Constructor and Destructor
      World();
      ~World();

      // Function Prototypes
      void dispWorld(); // Displays world
   private:
      // Declare Variables
      int **graph; // 2D array for holding weights between vertices

      // Function Prototypes
      int findMinDist(int *, bool *); // Find minimum distance between vertexes
      void dispWorld(int *, int);   // Output results

      void dijkstraAlgo(int **, int); // Finds length
}; // End class World

#endif /* WORLD_H */
```

World.cpp

```
/*
 * File: World.cpp
 * Author: Najera Enrique
 * Date Due: 07 June 2017
 * Purpose: Graph that displays the world
 *          and its lengths/path weights
 */

/*
 * Credits: http://www.geeksforgeeks.org/greedy-algorithms-set-6-dijkstras-shortest-path-
algorithm/
 */

// System Libraries
#include <iostream>
using namespace std;

// User Libraries
#include "World.h"

// Start constructor World
World::World(){
```

```
// Allocate memory for 7 vertices
graph = new int *[7];
for (int i = 0; i < 7; ++i)
   graph[i] = new int[7];

// INIT all to 0 to skip hard code initialization
// of unreachable weights or going to itself
for (int i = 0; i < 7; ++i){
   for (int j = 0; j < 7; ++j)
      graph[i][j] = 0;
}

// Fill the array with vertices weight
/*
 * 0 = Amaranth
 * 1 = Eburnean
 * 2 = Xanadu
 * 3 = Wenge
 * 4 = Glaucous
 * 5 = Mikado
 * 6 = Sarcoline
 */
graph[0][1] =  476; // Amaranth -> Eburnean
graph[0][2] =  136; // Amaranth -> Xanadu
graph[0][3] = 5376; // Amaranth -> Wenge
graph[0][5] = 1835; // Amaranth -> Mikado

graph[1][0] =  476; // Eburnean -> Amaranth
graph[1][2] = 1847; // Eburnean -> Xanadu
graph[1][4] = 1463; // Eburnean -> Glaucous
graph[1][6] = 4062; // Eburnean -> Sarcoline

graph[2][0] =  136; // Xanadu -> Amaranth
graph[2][1] = 1847; // Xanadu -> Eburnean
graph[2][3] =  741; // Xanadu -> Wenge
graph[2][4] =  801; // Xanadu -> Glaucous

graph[3][0] = 5376; // Wenge -> Amaranth
graph[3][2] =  741; // Wenge -> Xanadu
graph[3][5] = 1091; // Wenge -> Mikado

graph[4][1] = 1463; // Glaucous -> Eburnean
graph[4][2] =  801; // Glaucous -> Xanadu
graph[4][5] = 1122; // Glaucous -> Mikado
graph[4][6] = 1337; // Glaucous -> Sarcoline
```

```
    graph[5][0] = 1835; // Mikado -> Amaranth
    graph[5][3] = 1091; // Mikado -> Wenge
    graph[5][4] = 1122; // Mikado -> Glaucous
    graph[5][6] = 2341; // Mikado -> Sarcoline

    graph[6][1] = 4062; // Sarcoline -> Eburnean
    graph[6][4] = 1337; // Sarcoline -> Glaucous
    graph[6][5] = 2341; // Sarcoline -> Mikado
} // End constructor World

// Start destructor World
World::~World(){
    // Deallocate memory
    for (int i = 0; i < 7; ++i)
        delete [] graph[i];
    delete [] graph;
} // End destructor World

// Start public method dispResults
void World::dispWorld(){
    dijkstraAlgo(graph, 0);
} // End method dispResults

// Start private method dispResults
void World::dispWorld(int *dist, int n){
    // Output distances
    cout << "\nAmaranth -> Eburnean " << graph[0][1] << endl;
    cout << "Amaranth -> Xanadu    " << graph[0][2] << endl;
    cout << "Amaranth -> Wenge     " << graph[0][3] << endl;
    cout << "Amaranth -> Mikado    " << graph[0][5] << endl;
    cout << endl;
    cout << "Eburnean -> Amaranth   "<< graph[1][0] << endl;
    cout << "Eburnean -> Xanadu     " << graph[1][2] << endl;
    cout << "Eburnean -> Glaucous   " << graph[1][4] << endl;
    cout << "Eburnean -> Sarcoline " << graph[1][6] << endl;
    cout << endl;
    cout << "Xanadu -> Amaranth  " << graph[2][0] << endl;
    cout << "Xanadu -> Eburnean "  << graph[2][1] << endl;
    cout << "Xanadu -> Wenge     " << graph[2][3] << endl;
    cout << "Xanadu -> Glaucous  " << graph[2][4] << endl;
    cout << endl;
    cout << "Wenge -> Amaranth " << graph[3][0] << endl;
    cout << "Wenge -> Xanadu    "<< graph[3][2] << endl;
    cout << "Wenge -> Mikado    " << graph[3][5] << endl;
    cout << endl;
    cout << "Glaucous -> Eburnean  " << graph[4][1] << endl;
```

```
    cout << "Glaucous -> Xanadu     "<< graph[4][2] << endl;
    cout << "Glaucous -> Mikado    " << graph[4][5] << endl;
    cout << "Glaucous -> Sarcoline " << graph[4][6] << endl;
    cout << endl;
    cout << "Mikado -> Amaranth  " << graph[5][0] << endl;
    cout << "Mikado -> Wenge     " << graph[5][3] << endl;
    cout << "Mikado -> Glaucous  " << graph[5][4] << endl;
    cout << "Mikado -> Sarcoline " << graph[5][6] << endl;
    cout << endl;
    cout << "Sarcoline -> Eburnean " << graph[6][1] << endl;
    cout << "Sarcoline -> Glaucous " << graph[6][4] << endl;
    cout << "Sarcoline -> Mikado   " << graph[6][5] << endl;
    cout << endl;

    // Output minimum spanning tree
    cout << "\nLocation     Shortest distance from you (Amaranth Town)\n";
    // Could be done with map -> string vertex : int weight
    for (int i = 0; i < 7; i++){
       if (i == 0) ;
       if (i == 1) cout << "Eburnean  " << "\t\t "  << dist[i] << endl;
       if (i == 2) cout << "Xanadu    " << "\t\t "  << dist[i] << endl;
       if (i == 3) cout << "Wenge     " << "\t\t "  << dist[i] << endl;
       if (i == 4) cout << "Glaucous  " << "\t\t "  << dist[i] << endl;
       if (i == 5) cout << "Mikado    " << "\t\t"   << dist[i] << endl;
       if (i == 6) cout << "Sarcoline " << "\t\t"   << dist[i] << endl;
    }

} // End method dispResults

// Start method findMinDistance
int World::findMinDist(int *dist, bool *set){
    // Declare Variables
    int min = 0x7FFFFFFFL; // Max value of an int
    int minIndex = 0;

    for (int i = 0; i < 7; i++){
       if (set[i] == false && dist[i] <= min)
          min = dist[i], minIndex = i;
    }

    return minIndex;
} // End method findMinDistance

// Start method dijkstraAlgo
void World::dijkstraAlgo(int **graph, int src)
{
```

```
    int dist[7]; // Holds shortest distance

    bool sptSet[7]; // sptSet[i] will true if vertex i is included in shortest
                    // path tree or shortest distance from src to i is finalized

    // Initialize all distances as INFINITE and stpSet[] as false
    for (int i = 0; i < 7; i++)
       dist[i] = 0x7FFFFFFFL, sptSet[i] = false;

    // Distance of source vertex from itself is always 0
    dist[src] = 0;

    // Find shortest path for all vertices
    for (int count = 0; count < 7-1; count++)
    {
      // Pick the minimum distance vertex from the set of vertices not
      // yet processed. u is always equal to src in first iteration.
      int u = findMinDist(dist, sptSet);

      // Mark the picked vertex as processed
      sptSet[u] = true;

      // Update dist value of the adjacent vertices of the picked vertex.
      for (int v = 0; v < 7; v++)

        // Update dist[v] only if is not in sptSet, there is an edge from
        // u to v, and total weight of path from src to  v through u is
        // smaller than current value of dist[v]
        if (!sptSet[v] && graph[u][v] && dist[u] != 0x7FFFFFFFL
                                  && dist[u]+graph[u][v] < dist[v])
          dist[v] = dist[u] + graph[u][v];
    }

    // print the constructed distance array
    dispWorld(dist, 7);
} // End method dijkstraAlgo
```