CS 611 Legends of Valor Fall 2020

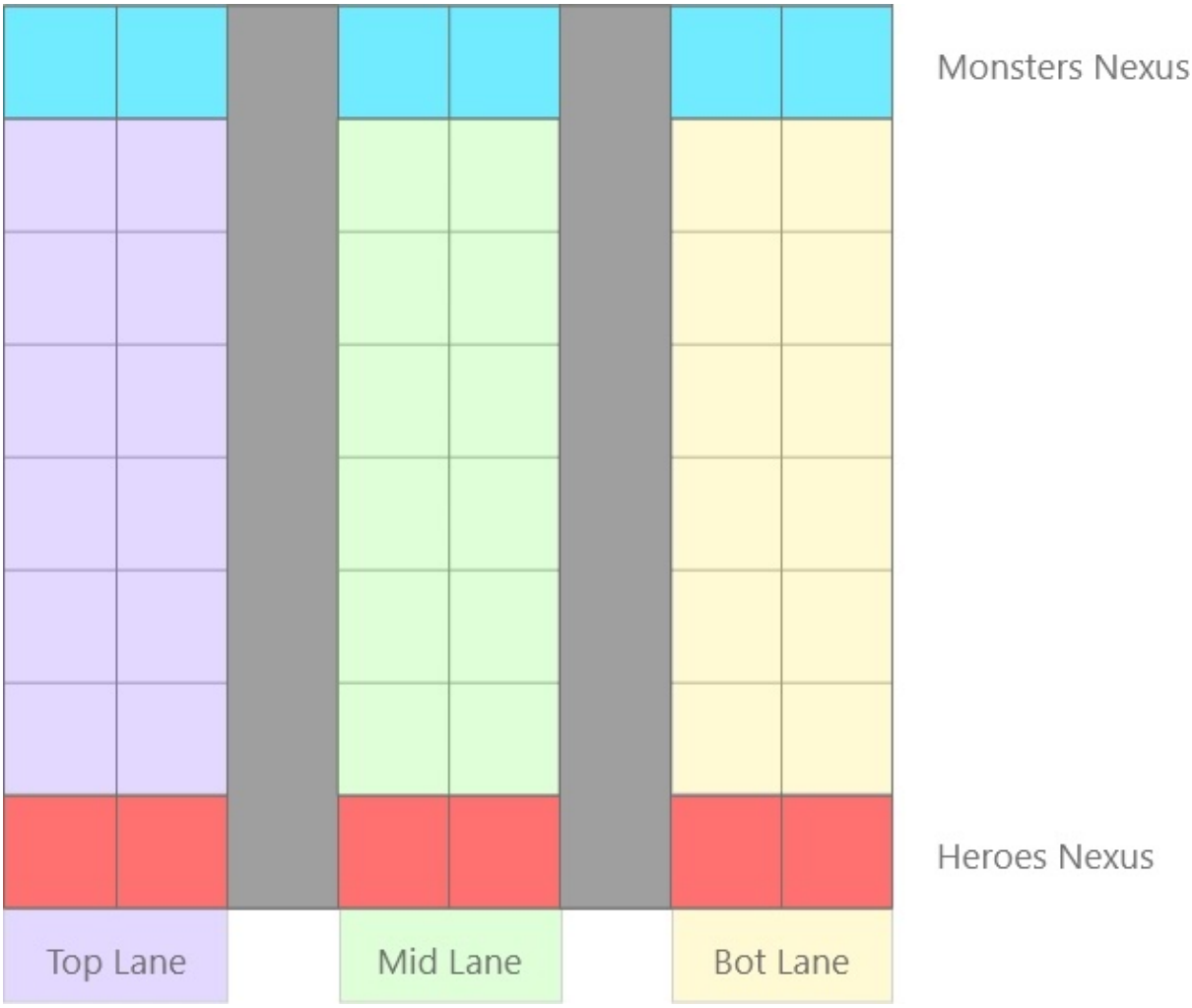
In this assignment you will work in *groups of two* in order to implement an extension of Legends. There are three main goals in this assignment:

1. The first is to get used to effectively developing software in a team (even remotely considering the current situation).
2. The second is to analyze structures and learn from programs that are not your own.
3. Third is to learn how to develop reusable code and how to actually reuse existing codebases.

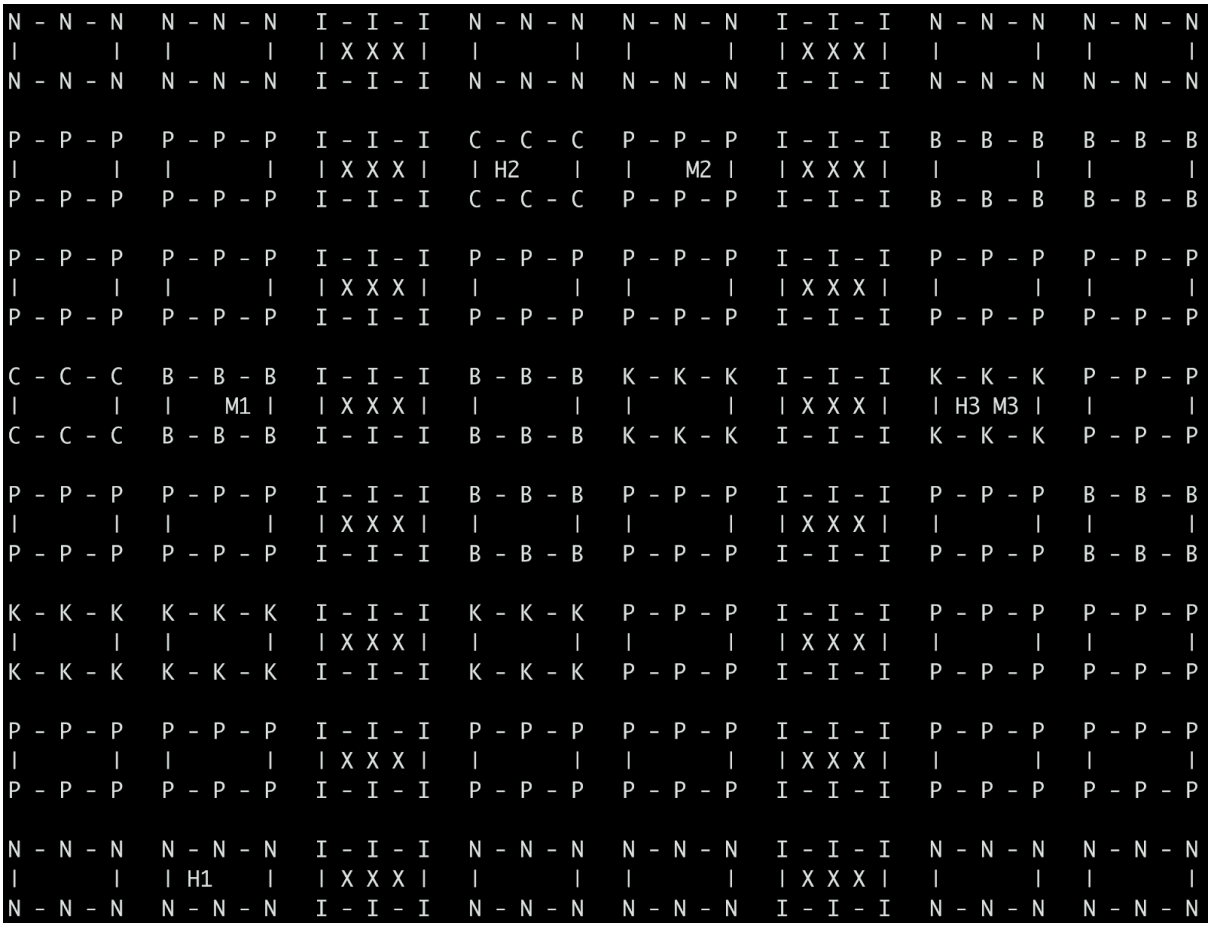
In order to focus more on the aforementioned goals, most of the requirements of this assignment will remain the same as the previous (Legends: Heroes and Monsters) assignment. This means that you can assume that everything that was mentioned in the previous assignment (and you have hopefully implemented already) remains the same. However, there are some changes to be made which are described below.

The Basics

Legends of Valor is played in a **8x8** grid. The grid is divided in *three lanes* as illustrated below. Each lane has a width of two cells. Each cell itself has a width of two. More specifically, this means that in every cell there can be either no one, one hero, one monster, or one hero and one monster, but never two heroes or two monsters. The first two columns of the grid will represent the first (called also top) lane, the third column will represent a non-accessible border between the first and the second lane. The fourth and the fifth columns will be the second (called also middle) lane, the sixth column will be again a non-accessible border and the seventh and eighth columns will be the third (called also bottom) lane. The first and the last row will represent a Nexus. The first row will be the Nexus for monsters while the last will be the Nexus for heroes. A Nexus can be thought of as the headquarters of a team. See sample grid below:



Sample Grid



Sample suggested terminal visual representation
Code for this may be provided on request.

Notice that the terminal visual representation contains different character denotations. This is because cell types differ between this world and the previous assignment. More specifically, in this assignment there exists the following types of cells: Nexus, Inaccessible, Plain, Bush, Cave, Koulou.

Nexus cells:

- All the cells of the first and the last row are considered as Nexus cells. This means that from those cells spawn heroes and monsters. Aside from being a hero's homebase, the Nexus of the heroes serves as a Market as well, where heroes can buy/sell all the items that exist in the previous assignment.

Inaccessible cells:

- Same as before. They are just cells on which heroes and monsters cannot move into.

Plain cells:

- Cells with no special attributes in this game.

Bush cells:

- Bush cells increase the dexterity of any hero who is inside them by 10%. This boost persists for each round that the hero stays in this cell.

Cave cells:

- Cave cells boost the agility of any hero who is inside them by 10%, which also persists for each round that the hero stays in this cell.

Koulou cells:

- Koulou cells buff the strength of any hero who is inside them by 10%. This boost persists for each round that the hero stays in this cell.

Note that the distribution of these types is *random* throughout the lanes. A decent baseline would be 20% probability for each type of special cell and 40% Plain. This of course does not change the placement of Nexus and Inaccessible cells, which should stay the same regardless of the distribution. You are encouraged to experiment with ratios you find makes the game interesting as long as the entire board is not special cells and that the distribution is random.

The Rules of Play

The game is played by two teams:

- the team of heroes and
- the team of monsters.

The goal of each team is to have one of their members reach the Nexus of the enemy team.

The following are actions which can be taken by each hero each round and remain the same as in Legends:

- *Change Weapon/Armor*
- *Use a Potion*

The following actions can also be taken, but with a slight variation from Legends:

- ***Attack*** *(applies to both heroes and monsters)* is fundamentally the same as in Legends. However, we must consider whether an enemy is within range to attack. Heroes and monsters can only attack if an enemy is in a neighboring cell. Note that a neighboring cell refers to an entire cell (not just position) above, below, beside, or diagonal of the current cell. If a hero chooses to attack, granted that they meet the conditions of an attack, a hero can only attack one monster once even if multiple are in range, and vice versa.
- ***Cast a Spell*** is also fundamentally the same but with the same conditions as Attack
- ***Move*** *(applies to both heroes and monsters)* is once again controlled by w,a,s,d to move north, west, south, east. The only difference now is that you

are choosing a move for each hero separately instead of the whole team. There is no diagonal movement. A hero cannot move behind a monster without killing it. The opposite applies for monsters as well.

New actions that can be taken:

- ***Teleport*** means that a hero who is currently in one lane can teleport to another lane (in order to help a fellow hero in need). A player may choose to teleport one of the heroes from one lane to another at any time (once in every round – during the action decision phase). However, a hero cannot teleport from a cell of a specific lane to a cell of the same lane. Teleport works only between different lanes. A hero may not teleport to a cell in a lane that is further (higher) than what has been explored previously, and definitely not behind a Monster in its lane.
- ***Back*** - A hero can always go back to their specific Nexus on the next round by using the key “b” – no matter how far they are from the Nexus.

Heroes and Monsters may make one valid move per turn. The process of buying/selling does not count as an action so i.e. a hero can buy two items, sell one and make one move in a single round.

At the start of the game the player chooses the three heroes that will be used and places each one of them in one of the three lanes. On the first round of the game the heroes *spawn* in their Nexus. At the same time, three equally leveled monsters spawn in their respective Nexus. To be consistent with Legends Part 1 (Legends: Heroes and Monsters), you may assume the heroes get the first turn.

The game is played in rounds. In each round, the player who controls the heroes must perform one valid action for each of the heroes. Once all of the heroes have made their move, their turn is over. Then it is the monsters’ turn. At every round each monster either attacks a hero (if they meet the conditions to attack as described) or moves one cell “forward” (towards the heroes’ Nexus). Once all the monsters on the board have acted, the round is over and we move to a new round.

Every eight (feel free to change this value if you see that it leads to a hero-favored or a monster-favored game) rounds three new monsters spawn in the monsters’ Nexus, one for each lane.

At the start of every round, the heroes regain 10% of their hp and 10% of their mana. When a hero dies, they respawn in the Nexus of their lane during the next round.

If during the same round both one hero and one monster reach the opponent's Nexus then we have a tie and you can assume that the heroes win.

Start early and have fun!

Suggestions:

In order to have as much as possible effective communication (which will be proven useful also in your future in the industry) for this assignment we strongly suggest the use of git and Slack. There will be either a quick demo of both tools by the TA or, if you are unfamiliar with them, feel free to ask a TA during OH for help regarding their basic usage.

You may use the helper files that were provided for the previous assignment. However, there is one clarification. They are helper files, not testing files. Their role is to help you understand what approximately each instance should look like from a logistics perspective. They are neither tested thoroughly nor formally proven absolutely correct. You have the freedom of changing their values as you see fit in order to have a more meaningful gaming experience.