

CSCI5220 Term Project – Part 1

Given: Feb 16, 2016

Due: Mar 17, 2016

Deliverables:

- astah file and the report (Word document) dropped in the dropbox
- Create a repository in BitBucket (<https://bitbucket.org/>) and use Git to upload your project to the repository. Give roachj@etsu.edu read access to the project.
- Name the repository: CSCI5220 <your username> GridWar e.g. CSCI5220 roachj GridWar

Please identify the **model** (there is no user interface) classes for Grid War below and then create a detailed UML class diagram in astah (<http://astah.net/>). Create a Visual Studio 2015 solution with two class library projects: one to implement the model classes and the other is the unit testing project. The unit testing project must use NUnit. The test cases must use the constraint-based assert model.

1. For each method that you identify, write the post-conditions and then write the associated unit tests. The post-conditions are to be written in the report. Ensure that they are clearly identified.
2. Select at least one of the more complex methods from each class and then use **control flow testing** and **data flow testing** to derive a set of test cases and then write the associated unit tests. The report should show the process you used to develop the test data. Include in the report, a comparison of the unit tests before and after using control flow and data flow testing to derive the test cases.

Grid War

A warrior_has the following attributes:

- *Hit points* – this represents the amount of damage a warrior can take, when hit points reaches zero the warrior is vanquished. Each warrior starts with 100 hit points.
- *Melee power* – this represents the power of melee attacks (1 to 20).
- *Magic power* – this represents the power of magic attacks (1 to 15).
- *Defense percentage* – this mitigates the damage taken from an opponent warrior (0% to 100%).

There are two types of warriors: melee warrior and magic warrior. All warriors start with a defense of 0%. Melee warriors start with melee power in the range of 5 to 10 and magic power in the range of 1 to 3. When within melee range, these warriors have an 80% chance

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of attacking with melee, a 10% chance of attacking with magic and a 10% chance of missing. When within magic range, they have a 60% chance of attacking with magic and a 40% chance of missing.

Magic warriors start with magic power in the range of 3 to 8 and melee power in the range of 1 to 3. When within magic range, these warriors have a 90% chance of attacking with magic and a 10% chance of missing. When within melee range, these warriors have an 80% chance of attacking with magic, a 10% chance of attacking with melee, and a 10% chance of missing.

Melee attacks can only be executed adjacent to the opponent while magic attacks can be executed from a distance.

One melee warrior from each army is allowed a sword. A sword has a *melee power* in the range of 3 to 6. A warrior's melee power is increased by the sword's melee power when that warrior has a sword. If that warrior is vanquished, the sword falls to the ground. Any melee warrior that moves to that cell will automatically pick up the sword if the warrior does not currently have a sword.

One magic warrior from each army is allowed a staff. A staff has a *magic power* in the range of 2 to 4. A warrior's magic power is increased by the staff's magic power when that warrior has a staff. If that warrior is vanquished, the staff falls to the ground. Any magic warrior that moves to that cell will automatically pick up that staff if the warrior does not currently have a staff.

Damage to an opponent is calculated with:

- $\text{Melee damage} = \text{melee power} - (\text{opponent's defense percentage} * \text{melee power})$
- $\text{Magic damage} = \text{magic power} - (\text{opponent's defense percentage} * \text{magic power})$

After a warrior vanquishes an opponent, the various powers increase by a factor. Defense percentage increases by 1%. In melee warriors, melee power increases by 1 and magic power increases by .25. In magic warriors, magic power increases by 1 and melee power increases by .25.

After a warrior attacks an opponent, the attack powers of the attacker increase by a factor. In melee warriors, melee power increases by .5 and magic power increases by .125. In magic warriors, magic power increases by .5 and melee power increases by .125.

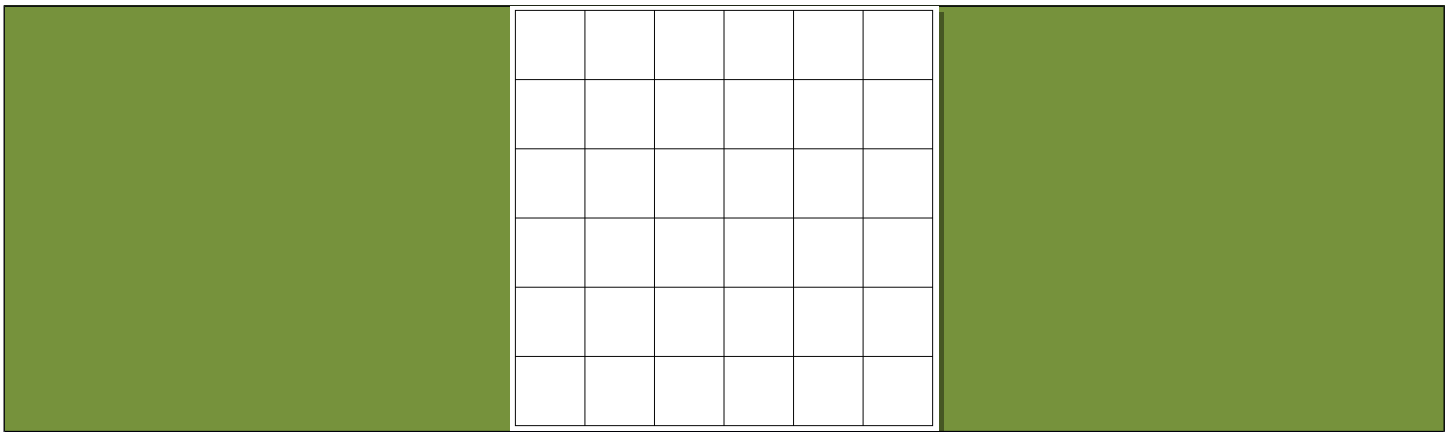
After a warrior gets attacked, defense percentage of the attacked warrior increases by .25% (the warrior learns to defend). After a warrior moves, defense power increases by .125% (the warrior learns to evade).

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THE GAME

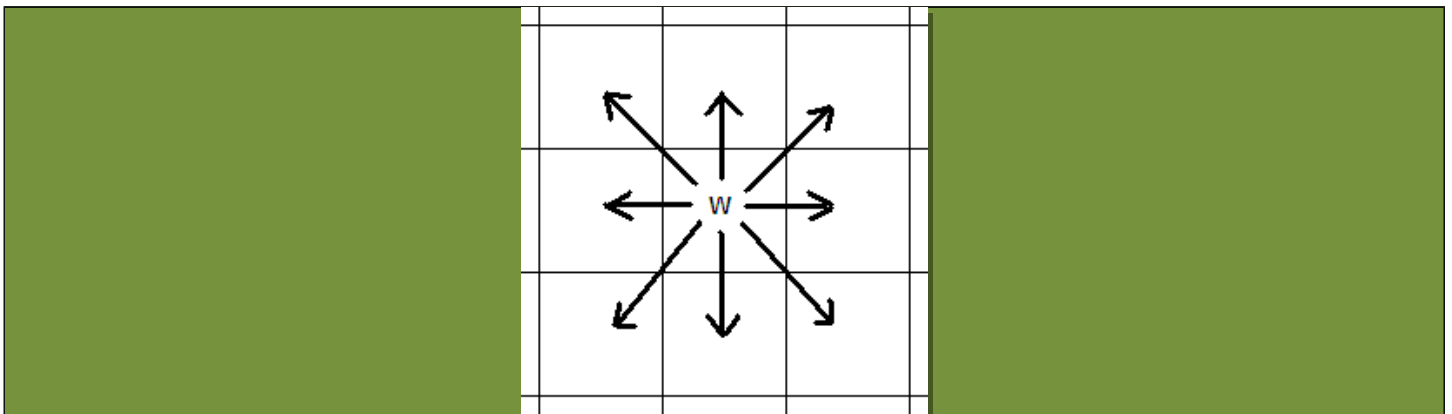
There are two players. The game is played on a 6x6 battlefield. Each player controls an army of 6 warriors. The player decides how many of each warrior type he/she will need. At the start of the game each player takes turns positioning her/his warriors at opposite ends of the field. The warriors can be placed in any configuration, at any position, in the top 2 rows or the bottom two rows. After the warriors are positioned, the players take turns moving and attacking with their warriors. Each player has two moves per turn: move-move, move-attack, attack-move, or attack-attack. At each move, a player may “look at statistics,” “move,” “attack,” or “surrender.”

THE BATTLEFIELD



MOVING

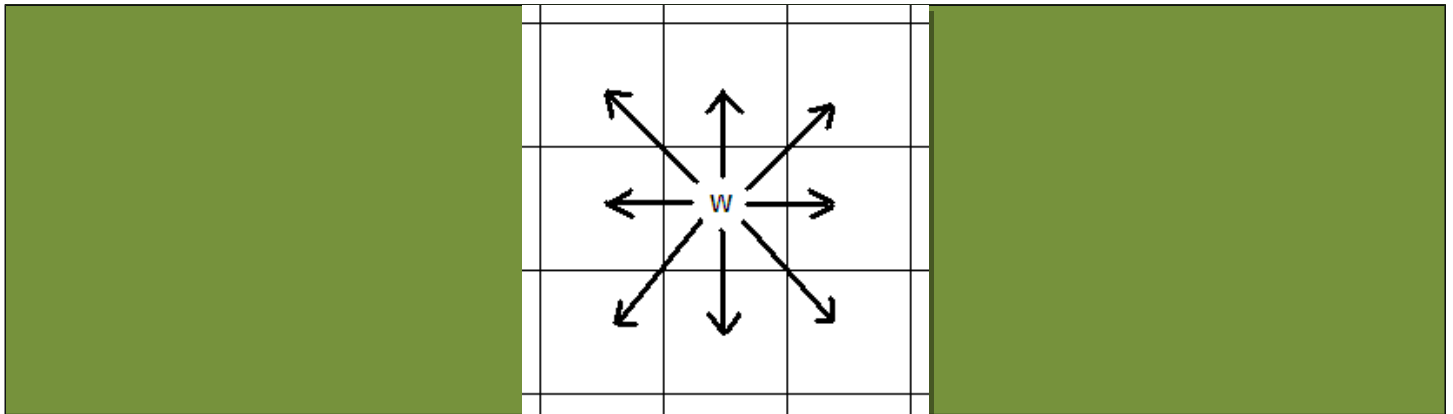
Warriors may move to an unoccupied cell in any direction. The battlefield is enclosed so they cannot move off it.



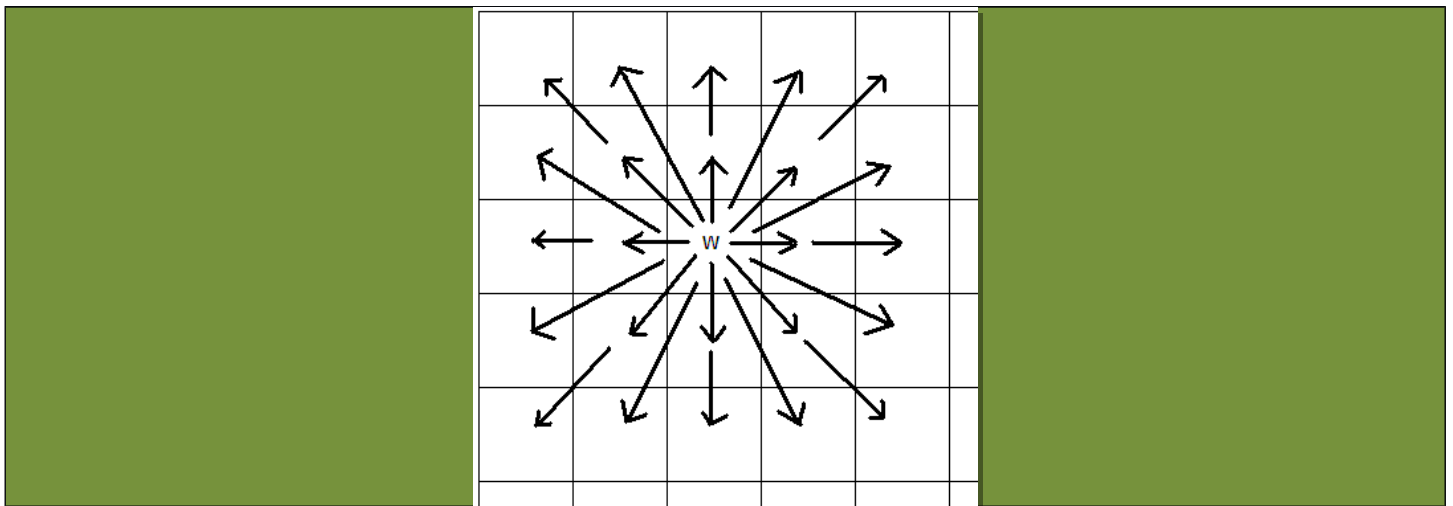
ATTACKING

Melee attacks only affect a warrior in an adjacent cell.

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Magic attacks affect warriors in an adjacent cell or two cells away. If the target is two cells away and there is a warrior in the way, that warrior is not affected. A player may attack any cell inclusive of the cell of the attacking warrior. Warriors may vanquish their own warriors inclusive of themselves.



WINNING

The winner of the game is the player with at least one warrior left on the field. If all warriors cannot be vanquished then the player with the most warriors is the winner, a tie otherwise. A player also wins if the other player "surrenders."