Object Oriented Programming

Week 9

ASSIGNMENT 3-1

Assignment 3-1

- Implement the program that simulates and shows the results of the battle between 5 villagers (instances of human camp) and 5 monsters (instances of monster camp), until there are no more instances in any camps. Five villagers consist of one Peasant Army, two Sword Master, one Archer, and one Warlock.

Peasant Soldier

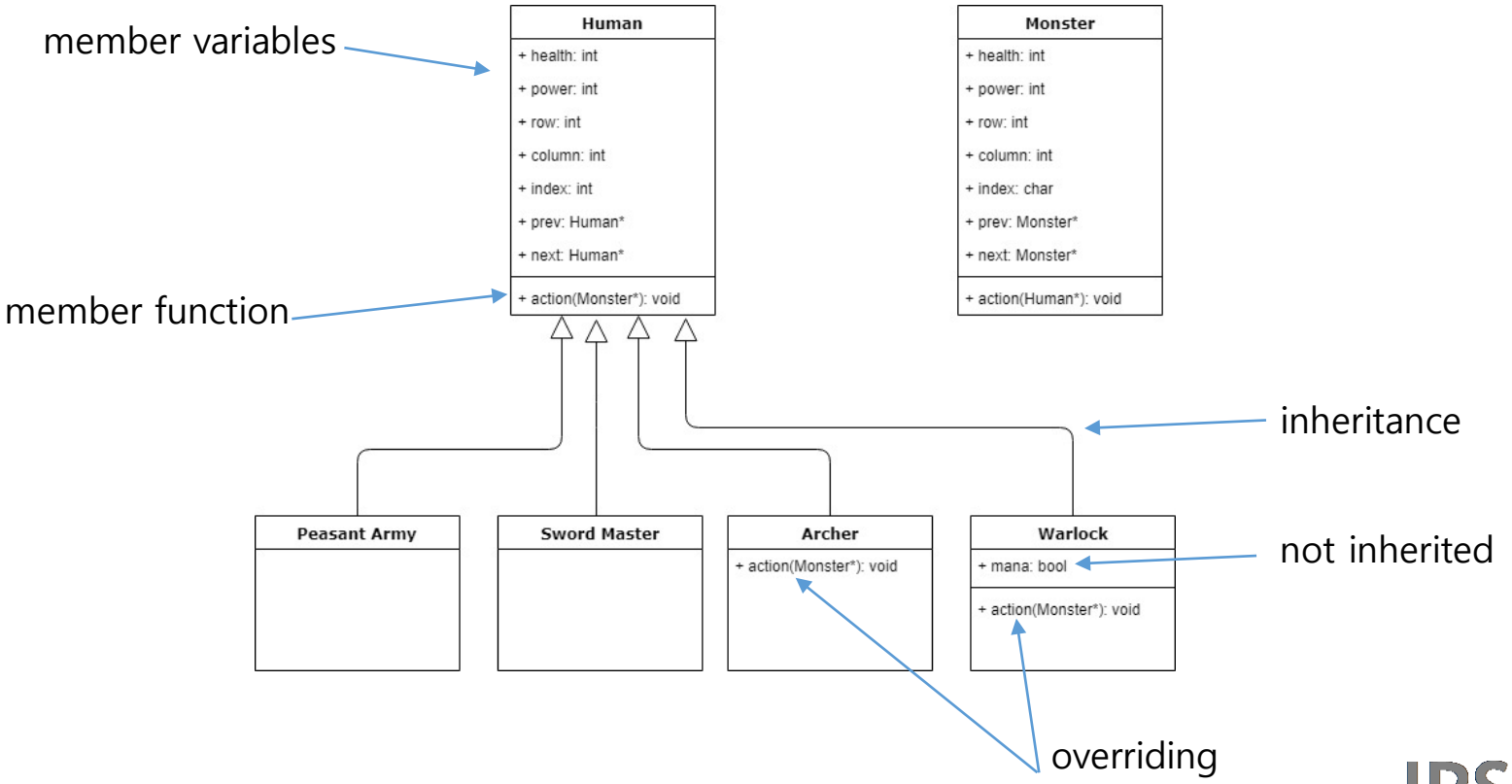
Sword Master

Archer

Warlock

Assignment 3-1

- Follow the class inheritance structure as Figure 1
  - Abilities like health, power, and coordinates will be inherited
  - Attack function need to be overridden for different actions



Assignment 3-1

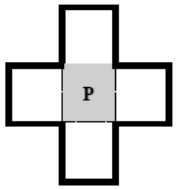
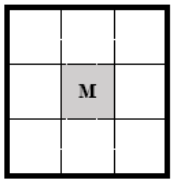
Human	Monster
Health	Health: 20
Power	Power: 7
Coordinates: Row Column	**Coordinates:** Row Column
Index	Index
Human* prev	Monster* prev
Human* next	Monster* next
Action(Monster*) If there are any opponent instances in the attack range, attack that instance. If not, move toward the closest opponent instance This function will reduce the health of the target instance as much as its own power The shape of the attack range is like below 	Action(Human*) If there are any opponent instances in the attack range, attack that instance. If not, move toward the closest opponent instance This function will reduce the health of the target instance as much as its own power The shape of the attack range is like below 

Figure 2 Class table

Assignment 3-1

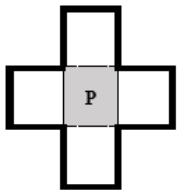
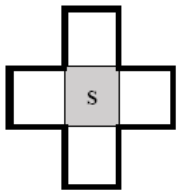
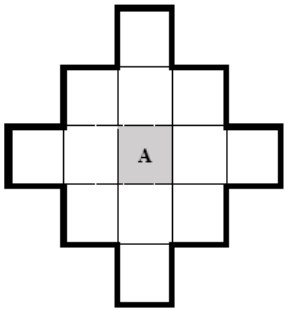
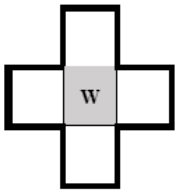
Peasant Army	Sword Master	Archer	Warlock
Health: 5	Health: 10	Health: 7	Health: 3
Power: 5	Power: 10	Power: 10	Power: 10
			Mana: True This value will be inverted after each turn It means Warlock can attack once for two turns
Action(Monster*) The shape of the attack range is like below 	Action(Monster*) The shape of the attack range is like below 	Action(Monster*) **Ranged attack** The shape of the attack range is like below Can attack any monster in the attack range 	Action(Monster*) **Wide-area attack** The shape of the attack range is like below Can attack up to 4 monsters at the same time 

Figure 3 Class table of Human

Assignment 3-1

- Each camp (human and monster) has 5 instances.
  - Instances for each camp are handled with double linked lists (Each camp has their own list)
  - Do not use libraries related to double linked list
  - The dead instance should be deleted from the list
  - Each instance has its own index for displaying the result of the battle

Index	Instance
1	Peasant Army
2	Sword Master
3	Sword Master
4	Archer
5	Warlock

Index	Instance
A	Monster
B	Monster
C	Monster
D	Monster
E	Monster

Figure 4 List for Each camp

Assignment 3-1

- The battlefield is 5 x 5 array
  - Each instance has its own coordinates for the battlefield (Figure 5)
  - Multiple instances can have the same coordinates
  - Instances are placed like Figure 6 at the beginning

cell (0,0)	(0,1)	(0,2)	(0,3)	(0,4)	Row0
(1,0)	(1,1)	(1,2)	(1,3)	(1,4)	Row1
(2,0)	(2,1)	(2,2)	(2,3)	(2,4)	Row2
(3,0)	(3,1)	(3,2)	(3,3)	(3,4)	Row3
(4,0)	(4,1)	(4,2)	(4,3)	(4,4)	Row4
Column0	Column1	Column2	Column3	Column4	

Figure 5 Coordinates

Human 1				Monster A
Human 2				Monster B
Human 3				Monster C
Human 4				Monster D
Human 5				Monster E

Figure 6 Initial State

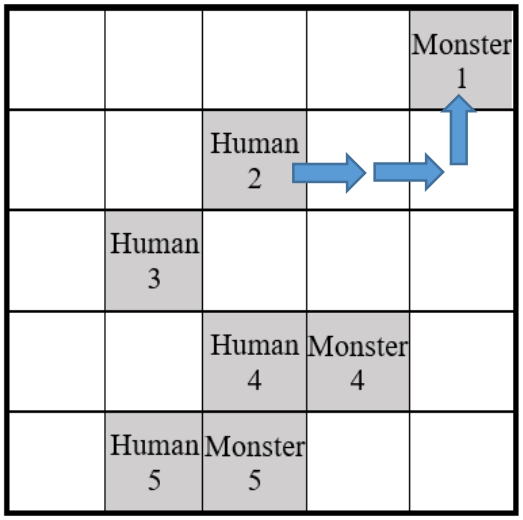
Assignment 3-1

- Each camp is given a turn to attack or move
  - After the end of one camp's turn, the other camp takes a turn
  - All instances of each camp can attack (or move) in their turn
  - For example, on Human camp's turn, every human instance can attack or move
  - An instance whose health is lower than 0 will die (Should be deleted from the list of each camp)

- Battle will end when there are no instances in any camps

Assignment 3-1

- Attack & Movement Rule for instance
  - If there are any opponents in the attack range, instance attacks that opponents (attack priority is distance order)
  - If not, move toward the closest opponent cell by cell (move horizontally first)
  - If there are more than 1 instances to attack or move toward, choose the instance which has lower index



In case of Human 2,

- Cannot attack any monster instance, so it should move toward the closest opponent Monster 1 (, not Monster 4)
- Moves horizontally first rather than move vertically
- Will move along in the order shown on the left figure (2 horizontal moves and 1 vertical move)

Assignment 3-1

- The result screen must be like below format (the result can be differ from this)

```
#### Result of round 1 ####
<Human>
1
2
3
4
5
<Monster>
A
B
C
D
E

#### Result of round 2 ####
<Human>
2
4
<Monster>
A
B
C
D
E
Human 1 has died
Human 3 has died
Human 5 has died

#### Result of round 3 ####
<Human>
4
<Monster>
A
B
C
E
Human 2 has died
Monster D has died

#### Result of round 4 ####
<Human>
4
<Monster>
A
B
C
E

#### Result of round 5 ####
<Human>
<Monster>
A
B
C
Human 4 has died
Monster E has died

#### Final result of battle ####
Human has been defeated
```

END OF PRESENTATION

Q&A