THE FELLOW KNIGHT DOCUMENTATION

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The Fellow Knight

Introduction

The fellow knight has similar movement of character like snake game; however, the objective of the game is completely different. You have to overcome the enemy waves and kill the boss to win the game.

Player's Character

This game has 5 different characters, each with unique different weapons. At the beginning of the game, you will spawn with all of these 5 characters.

Bomber : Throw bomb which deal heavy damage and can explode in 3x3 square units. But it has a slow cooldown time.

Archer : Shoots an arrow which deals small damage, but it has far range and fast cooldown.

Knight : Attack enemy with sword which deals heavy damage and has fast cooldown. But only can attack the enemy in front of him at close range.

Executioner : Throw an axe to an enemy which deals medium damage. He also has medium cooldown.

Wizard : Fire iceball to an enemy which deals medium damage. He also has medium cooldown.

Enemy's Character

There are also 4 types of enemies in this game. The enemy will move toward the ally at front, but the enemy has much slower movement speed.

Bat : Can not attack

Spider: Attack with their web in long range but low damage

Sorcerer: Attacks the ally with a fireball which deals heavy damage.

Boss: Attacks the ally with poison, which has a splash range of 3x3 square units. He also has a big amount of Hp.

Gameplay

After the player starts the game, the objective is to overcome all the enemy waves and defeat the boss. In each wave, players have to kill all enemies to proceed to the next wave. As the number of waves increase, the enemies will become stronger. The final enemy wave will contain the boss. Defeating him to win the game. However, if you run into yourselves, crashing into an enemy or going out of bound will result in a defeat.

Controlling

To control your fellow unit, Press the keyboard button to change the moving direction. Press "W" for going up, "A" for going left, "D" for going right and "S" for going down. Once the enemy is within range, your troop will automatically attack the enemy. Also, defeating enemies may drop medkits, which can heal all of your allies. There are 2 types of medkit as following :

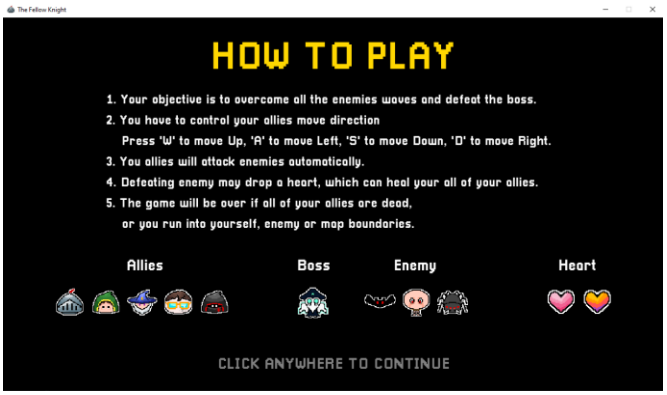
Normal Medkit: 25% drop chance after defeating enemy which heal all of your allies for 25% of their max Hp.

Special Medkit: 8% drop chance after defeating enemy which heal all of your allies for 50% of their max Hp and increase their max Hp by 15%.

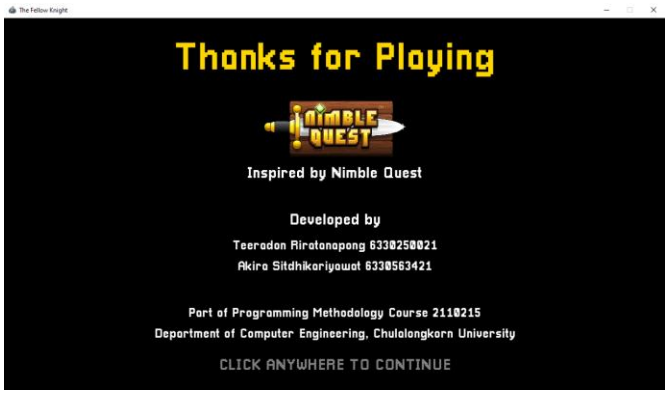
Example

Once the player starts the application, it will go directly to the main menu. The main menu has 4 buttons.

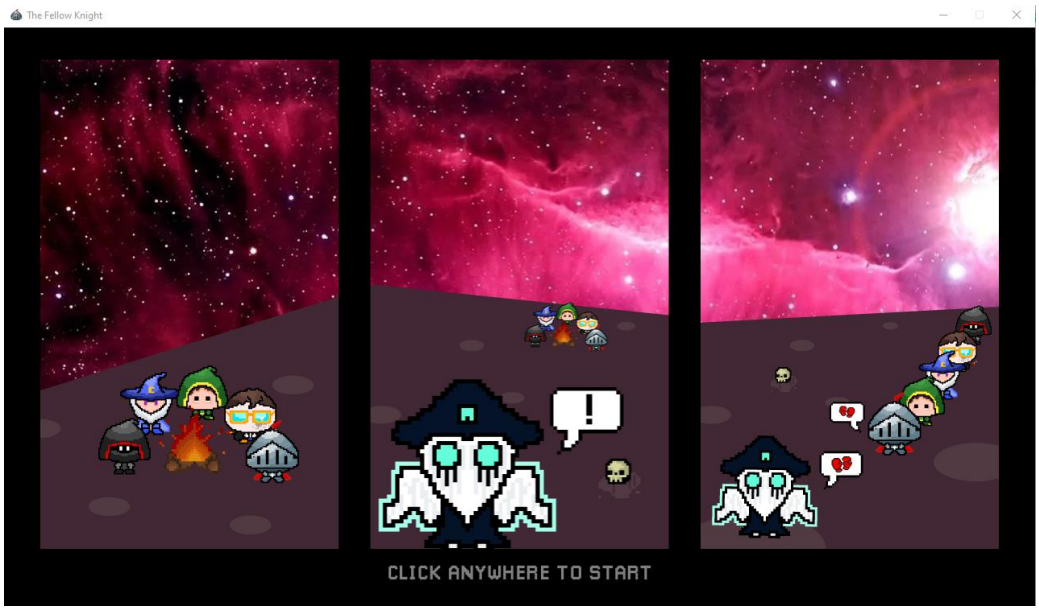
Pressing the how to play button or credit button will switch to a different scene, the exit button will exit the application, while the start button will take you into the pregame mini story.



How to play UI

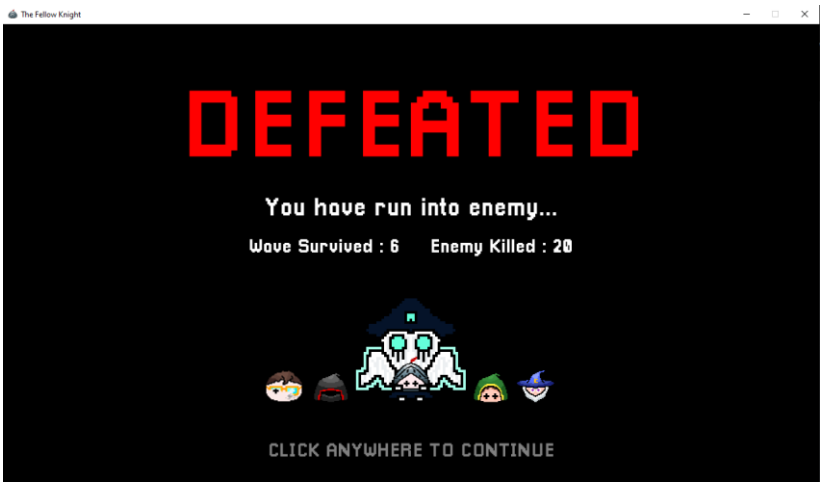


Credit UI

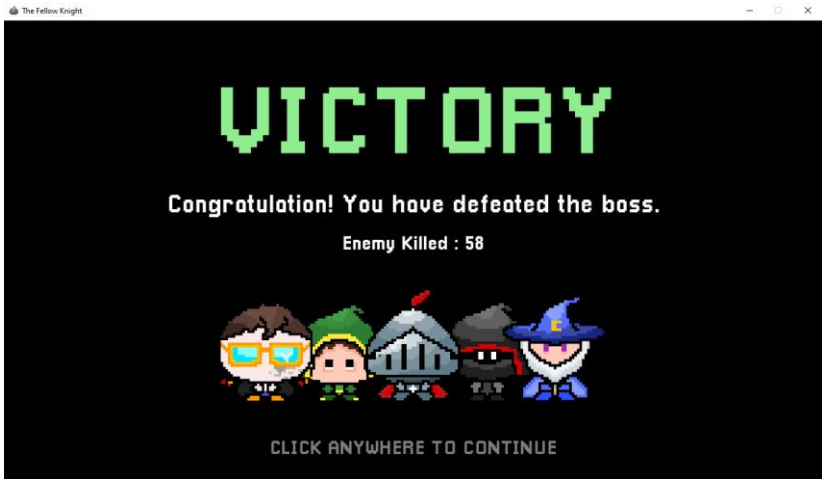


After clicking anywhere on the screen, the game will start and you will have to control your fellow allies. Try to go through all the enemy waves until you win!

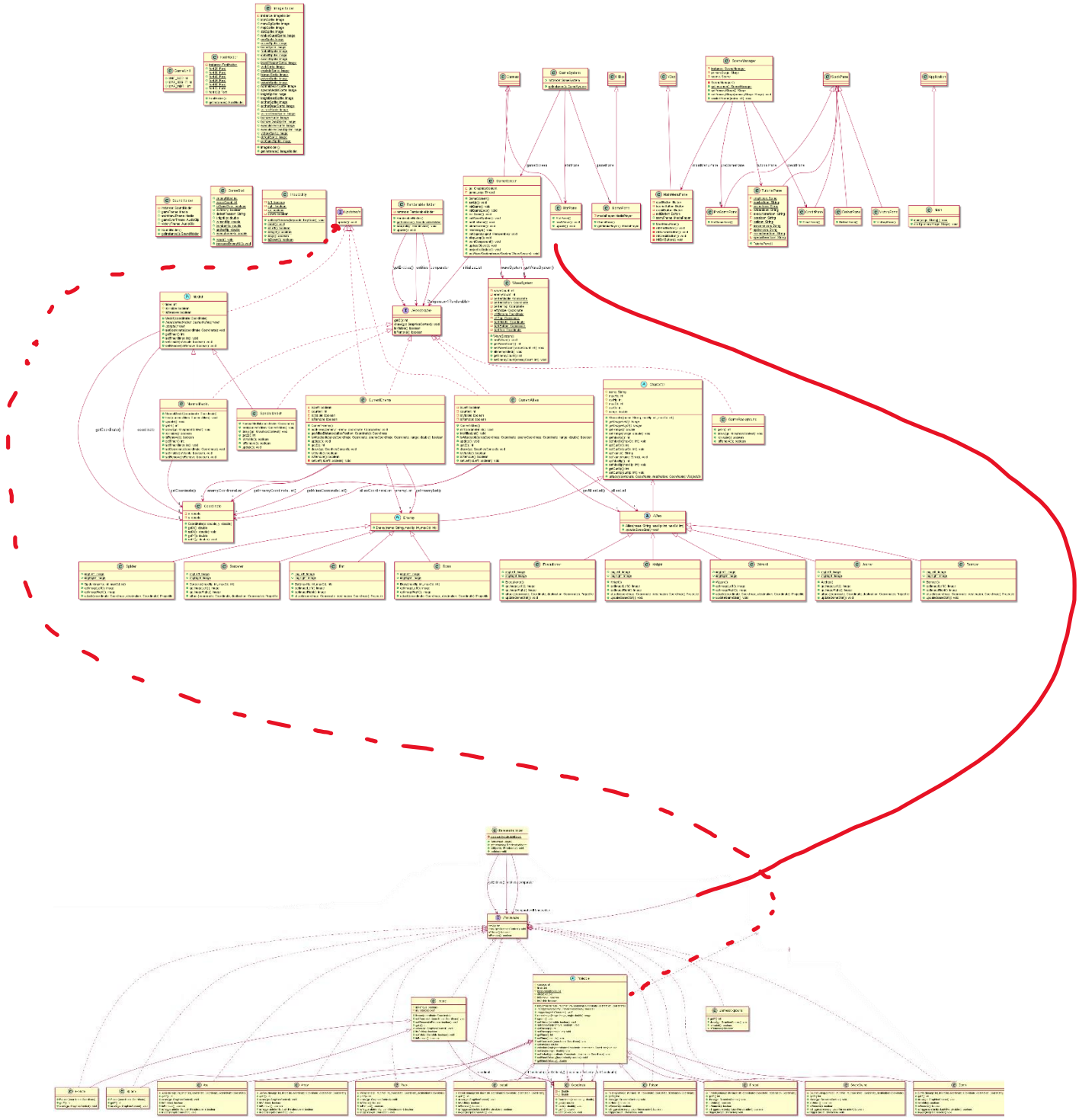
If defeated, the defeat scene will pop up with the reason why you were defeated, as well as showing the number of waves and enemy kills you go through. You can always try again by starting the game once again.



However, if you win, you will have a different ending scene.



Class Diagram



1.Package application

(1.1) Class Main extends Application

(1.1.1) Methods

+ void start(Stage primaryStage) throws Exception	- Switch scene to MainMenuPane - Set size to scene -Set resizable to false - Add Knight icon to primaryStage -Set title to "The Fellow Knight" - Show the stage
+ void main(String[] args)	Launch an application

2.Package constant

(2.1) Class GameUnit

(2.1.1) Fields

+ final int UNIT_SIZE	A constant game unit size is 40
+ final int MAP_HEIGHT	A constant height of map is 720

+ final int MAP_WIDTH	A constant width of map is 1280

(2.2) Class ImageHolder

(2.2.1) Fields

- final ImageHolder instance	Instance of ImageHolder
	All images of icon, character, background ,projectile and item.

(2.2.2) Constructor

+ ImageHolder()	Load and initialize all images.

(2.2.3) Methods

+ ImageHolder getInstance()	Get an instance of ImageHolder

(2.3) Class SoundHolder

(2.3.1) Fields

+ final SoundHolder instance	Instance of SoundHolder
	All sound including background music, effects, and projectile trigger sound.

(2.3.2) Constructor

+ SoundHolder()	Load and initialize all sound.

(2.3.3) Methods

+ SoundHolder getInstance()	Get an instance of SoundHolder

(2.4) Class FontHolder

(2.4.1) Fields

+ final FontHolder instance	Instance of FontHolder
	Font of size 25,30,40,45,50,75,100,150

(2.4.2) Constructor

+ FontHolder()	Load font "Pixellari" with font size 25,30,40,45,50,75,100,150

(2.4.3) Methods

+ FontHolder getInstance()	Get an instance of FontHolder

3. Package character.base

(3.1) Abstract class Character

(3.1.1) Fields

# String name	Character's Name
# maxHp	Character's Maximum lifepoint
# curHp	Character's Current lifepoint
# maxCd	Character's Maximum Cooldown
# curCd	Character's Current Cooldown
# range	Character's attack range

(3.1.2) Constructor

+ Character (String name, int maxHp, int maxCd)	-Set all fields to given parameters -Set CurHp to maxHp -Set curCd to 0

(3.1.3) Methods

+ abstract Projectile attack(Coordinate coordinate, Coordinate destination);	return projectile weapon of character (depends on character)
+ abstract Image getImageLeft()	Getter for character's left image
+ abstract Image getImageRight()	Getter for character's right image
+ void setCurCd(int curCd)	Set Character's Current cooldown. If curCd<0, set to 0. If curCd>maxCd, set to maxCd.
+setCurHp(int curHp)	Set Character's Current lifepoint. If curHp<0, set to 0. If curHp>maxHp, set to maxHp.
+ getter/setter for remaining fields	

(3.2) Abstract class Allies extends Character

(3.2.1) Constructor

+ Allies(String name ,int maxHp ,int maxCd)	Call constructor from superclass

(3.2.2) Methods

+ abstract void updateGameStat()	Update allies lifepoint in class GameStat

(3.3) Abstract class Enemy extends Character

(3.3.1) Constructor

+ Enemy(String name, int maxHp, int maxCd)	Call constructor from superclass

4. Package character.allies

(4.1) Class Archer extends Allies

(4.1.1) Fields

+ final Image imgLeft	Archer image for walk left leg

+ final Image imgRight	Archer image for walk right leg

(4.1.2) Constructor

+ Archer()	-Set name to "Archer" -Set maximum lifepoint to 80 -Set maximum cooldown to 6 -Set attack range to 6

(4.1.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return Arrow with damage 20, fire from Archer's position to target position
+ public void updateGameStat()	Update Archer's lifepoint in class GameStat
getter for imgLeft and imgRight	

(4.2) Class Bomber extends Allies

(4.2.1) Fields

+ final Image imgLeft	Bomber image for walk left leg
+ final Image imgRight	Bomber image for walk right leg

(4.2.2) Constructor

+ Bomber()	-Set name to "Bomber" -Set maximum lifepoint to 70 -Set maximum cooldown to 12 -Set attack range to 4

(4.2.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return Bomb with damage 75, fire from Bomber's position to target position
+ public void updateGameStat()	Update Bomber's lifepoint in class GameStat
getter for imgLeft and imgRight	

(4.3) Class Executioner extends Allies

(4.3.1) Fields

+ final Image imgLeft	Executioner image for walk left leg
+ final Image imgRight	Executioner image for walk right leg

(4.3.2) Constructor

+ Executioner()	-Set name to "Executioner" -Set maximum lifepoint to 100 -Set maximum cooldown to 12 -Set attack range to 5

(4.3.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return Axe with damage 50, fire from Executioner's position to target position
+ public void updateGameStat()	Update Executioner's lifepoint in class GameStat

getter for imgLeft and imgRight	

(4.3) Class Executioner extends Allies

(4.3.1) Fields

+ final Image imgLeft	Executioner image for walk left leg
+ final Image imgRight	Executioner image for walk right leg

(4.3.2) Constructor

+ Executioner()	-Set name to "Executioner" -Set maximum lifepoint to 100 -Set maximum cooldown to 12 -Set attack range to 5

(4.3.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return Axe with damage 50, throw from Executioner's position to target position

+ public void updateGameStat()	Update Executioner's lifepoint in class GameStat
getter for imgLeft and imgRight	

(4.4) Class Knight extends Allies

(4.4.1) Fields

+ final Image imgLeft	Knight image for walk left leg
+ final Image imgRight	Knight image for walk right leg

(4.4.2) Constructor

+ Knight()	-Set name to "Knight" -Set maximum lifepoint to 100 -Set maximum cooldown to 4 -Set attack range to 2

(4.4.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return SwordSwing with damage 75 at position in front of Knight
+ public void updateGameStat()	Update Knight's lifepoint in class GameStat
getter for imgLeft and imgRight	

(4.5) Class Wizard extends Allies

(4.5.1) Fields

+ final Image imgLeft	Wizard image for walk left leg
+ final Image imgRight	Wizard image for walk right leg

(4.5.2) Constructor

+ Wizard()	-Set name to "Wizard" -Set maximum lifepoint to 60 -Set maximum cooldown to 9 -Set attack range to 6

(4.5.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return Iceball with damage 40, fire from Wizard's position to target position
+ public void updateGameStat()	Update Wizard's lifepoint in class GameStat
getter for imgLeft and imgRight	

5. Package character.enemy

(5.1) Class Bat extends Enemy

(5.1.1) Fields

+ final Image imgLeft	Bat image for walk left leg
+ final Image imgRight	Bat image for walk right leg

(5.1.2) Constructor

+ Bat(int maxHp, int maxCd)	-Set name to "Bat" -Set maxHp and maxCd to given parameter -Set attack range to 0

(5.1.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return null (Bat cannot attack)
getter for imgLeft and imgRight	

(5.2) Class Boss extends Enemy

(5.2.1) Fields

+ final Image imgLeft	Boss image for walk left leg
+ final Image imgRight	Boss image for walk right leg

(5.2.2) Constructor

+ Boss(int maxHp, int maxCd)	-Set name to "Boss" -Set maxHp and maxCd to given parameter -Set attack range to 6

(5.2.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return Poison with damage 12, throw from Boss position to target position
getter for imgLeft and imgRight	

(5.3) Class Sorcerer extends Enemy

(5.3.1) Fields

+ final Image imgLeft	Sorcerer image for walk left leg
+ final Image imgRight	Sorcerer image for walk right leg

(5.3.2) Constructor

+ Sorcerer(int maxHp, int maxCd)	-Set name to "Sorcerer" -Set maxHp and maxCd to given parameter -Set attack range to 6

(5.3.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return Fireball with damage 12, fire from Sorcerer position to target position
getter for imgLeft and imgRight	

(5.4) Class Spider extends Enemy

(5.4.1) Fields

+ final Image imgLeft	Spider image for walk left leg
+ final Image imgRight	Spider image for walk right leg

(5.4.2) Constructor

+ Spider(int maxHp, int maxCd)	-Set name to "Spider" -Set maxHp and maxCd to given parameter -Set attack range to 7

(5.4.3) Methods

+ Projectile attack(Coordinate coordinate, Coordinate destination)	return Web with damage 8, throw from Spider position to target position
getter for imgLeft and imgRight	

6. Package projectile

(6.1) Abstract class Projectile implements IRenderable,Updatable

(6.1.1) Fields

# int damage	Projectile's damage
# int timer	Maximum existing time
# double baseVelocity	Velocity

# Coordinate coordinate	X,Y coordinate that projectile exist
# Coordinate velocity	Velocity in X,Y axis
# double angle	Angle for direction of projectile, start from +x axis with counterclockwise direction
# boolean isRemove	check if projectile is remove
# boolean isVisible	check if projectile is visible

(6.1.2) Constructor

+ Projectile(int damage, int timer, Coordinate beginning, Coordinate destination)	-Set all fields to given parameters -Set isRemove to false -Set isVisible to true

(6.1.3) Methods

+ abstract boolean isTriggerable(List<IRenderable> entity	Check if any entity in the list can be triggered (depends on each projectile)
+abstract void trigger(Character target)	Trigger target character (depends on each projectile)

+ Image rotateImage(Image image, double angle)	Rotate image to the given angle
+ void update()	Set a new coordinate that the projectile moves to. Then decrease timer by 1. If its timer is 0 or less, set isRemove to true and set isVisible to false
+double calculateAngle(Coordinate coordinate, Coordinate destination)	Calculate angle that projectile has to move from coordinate to destination
+ void setAngle(double angle)	Set angle that is in range 0-360 degrees from the given angle
+ void setVelocity(Coordinate coordinate, Coordinate destination)	Calculate and set X,Y velocity from baseVelocity in direction to destination
+ void setTimer(int timer)	Set the timer from the given parameter. If timer is less than 0, set to 0
+ getter/setter for remaining fields	

(6.2) Class Arrow extends Projectile implements IRenderable

(6.2.1) Constructor

+ Arrow(int damage, int timer, Coordinate coordinate, Coordinate destination)	-Call superclass constructor. -Set angle from method calculateAngle(coordinate, destination) -Set baseVelocity to 2 -Call setVelocity(coordinate, destination) to set X,Y Velocity

(6.2.2) Methods

+ abstract boolean isTriggerable(List<IRenderable> entity	Check if any entity in the list can be triggered. Then trigger it and show impact. For Arrow, it can trigger any enemy that is in the same unit square with it.
+abstract void trigger(Character target)	Decrease target's lifepoint by damage
+ int getZ()	return 19
+ void draw(GraphicsContext gc)	Draw Arrow that is rotated with angle in its current Coordinate
getter for isVisible and isRemove	

(6.3) Class Axe extends Projectile implements IRenderable

(6.3.1) Constructor

+ Axe(int damage, int timer, Coordinate coordinate, Coordinate destination)	-Call superclass constructor. -Set angle to 0 -Set baseVelocity to 0.8 -Call setVelocity(coordinate, destination) to set X,Y Velocity

(6.3.2) Methods

+ abstract boolean isTriggerable(List<IRenderable> entity	Check if any entity in the list can be triggered. Then trigger it and show impact. For Axe, it can trigger any enemy that is in the same unit square with it.
+abstract void trigger(Character target)	Decrease target's lifepoint by damage
+ int getZ()	return 18
+ void draw(GraphicsContext gc)	Draw Axe that is rotated with angle in its current Coordinate, then set angle to increase by 15 degrees.
getter for isVisible and isRemove	

(6.4) Class Bomb extends Projectile implements IRenderable

(6.4.1) Constructor

+ Bomb(int damage, int timer, Coordinate coordinate, Coordinate destination)	-Call superclass constructor. -Set angle from method calculateAngle(coordinate, destination) -Set baseVelocity to 0.6 -Call setVelocity(coordinate, destination) to set X,Y Velocity

(6.4.2) Methods

+ abstract boolean isTriggerable(List<IRenderable> entity	Check if any entity in the list can be triggered. If yes, then play sound effect and trigger it and show impact with explosion. For Bomb, it can trigger any enemy that is in 3x3 unit squares around it.
+abstract void trigger(Character target)	Decrease target's lifepoint by damage
+ int getZ()	return 17
+ void draw(GraphicsContext gc)	Draw Bomb that is rotated with angle in its current Coordinate, then set angle to increase by 15 degrees.
getter for isVisible and isRemove	

(6.5) Class Iceball extends Projectile implements IRenderable

(6.5.1) Constructor

+ Iceball(int damage, int timer, Coordinate coordinate, Coordinate destination)	-Call superclass constructor. -Set angle from method calculateAngle(coordinate, destination) -Set baseVelocity to 1 -Call setVelocity(coordinate, destination) to set X,Y Velocity

(6.5.2) Methods

+ abstract boolean isTriggerable(List<IRenderable> entity	Check if any entity in the list can be triggered. If yes, then play sound effect and trigger it and show impact. For Iceball, it can trigger any enemy that is in the same unit square with it.
+abstract void trigger(Character target)	Decrease target's lifepoint by damage
+ int getZ()	return 16
+ void draw(GraphicsContext gc)	Draw Iceball that is rotated with angle in its current Coordinate
getter for isVisible and isRemove	

(6.6) Class SwordSwing extends Projectile implements IRenderable

(6.6.1) Constructor

+ SwordSwing(int damage, int timer, Coordinate coordinate, Coordinate destination)	-Call superclass constructor. -Set angle of SwordSwing base on Knight moving direction (SwordSwing is in front of Knight) -Set baseVelocity to 0 -Call setVelocity(coordinate, destination) to set X,Y Velocity

(6.6.2) Methods

+ abstract boolean isTriggerable(List<IRenderable> entity	Check if any entity in the list can be triggered. If yes, then play sound effect and trigger it and show impact. For SwordSwing, it can trigger any enemy that is in front of it (180 degrees) in 2 unit radius.
+abstract void trigger(Character target)	Decrease target's lifepoint by damage
+ int getZ()	return 10
+ void draw(GraphicsContext gc)	Draw SwordSwing that is rotated with angle in front of Knight

getter for isVisible and isRemove	

(6.7) Class Fireball extends Projectile implements IRenderable

(6.7.1) Constructor

+ Fireball(int damage, int timer, Coordinate coordinate, Coordinate destination)	-Call superclass constructor. -Set angle from method calculateAngle(coordinate, destination) -Set baseVelocity to 1 -Call setVelocity(coordinate, destination) to set X,Y Velocity

(6.7.2) Methods

+ abstract boolean isTriggerable(List<IRenderable> entity	Check if any entity in the list can be triggered. If yes, then play sound effect and trigger it and show impact. For Fireball, it can trigger any allies that is in the same unit square with it.
+abstract void trigger(Character target)	Decrease target's lifepoint by damage
+ int getZ()	return 15

+ void draw(GraphicsContext gc)	Draw Fireball that is rotated with angle in its current Coordinate
getter for isVisible and isRemove	

(6.8) Class Web extends Projectile implements IRenderable

(6.8.1) Constructor

+Web(int damage, int timer, Coordinate coordinate, Coordinate destination)	-Call superclass constructor. -Set angle to 0 -Set baseVelocity to 1.2 -Call setVelocity(coordinate, destination) to set X,Y Velocity

(6.8.2) Methods

+ abstract boolean isTriggerable(List<IRenderable> entity	Check if any entity in the list can be triggered. Then trigger it and show impact. For Web, it can trigger any allies that is in the same unit square with it.
+abstract void trigger(Character target)	Decrease target's lifepoint by damage
+ int getZ()	return 14

+ void draw(GraphicsContext gc)	Draw Web that is rotated with angle in its current Coordinate
getter for isVisible and isRemove	

(6.9) Class Poison extends Projectile implements IRenderable

(6.9.1) Constructor

+Poison(int damage, int timer, Coordinate coordinate, Coordinate destination)	-Call superclass constructor. -Set angle from method calculateAngle(coordinate, destination) -Set baseVelocity to 0.8 -Call setVelocity(coordinate, destination) to set X,Y Velocity

(6.9.2) Methods

+ abstract boolean isTriggerable(List<IRenderable> entity	Check if any entity in the list can be triggered. If yes, then play sound effect and trigger it and show impact with green Splash. For Poison, it can trigger any allies that are in 3x3 unit squares around it.
+abstract void trigger(Character target)	Decrease target's lifepoint by damage
+ int getZ()	return 20

+ void draw(GraphicsContext gc)	Draw Poison that is rotated with angle in its current Coordinate, then set angle to increase by 15 degrees.
getter for isVisible and isRemove	

(6.10) Class Impact implements IRenderable

(6.10.1) Fields

# Coordinate coordinate	Coordinate of impact
# isRemove	check if Impact is remove
# isVisible	check if Impact is visible

(6.10.2) Constructor

+ Impact(Coordinate coordinate)	-Set coordinate to given parameter -Set isVisible to true -Set isRemove to false

(6.10.3) Methods

+ int getZ()	return 30

+ void draw(GraphicsContext gc)	Draw Impact at coordinate, then set isVisible to false and set isRemove to true.
+ getters/setters for fields	

(6.11) Class Explode extends Impact implements IRenderable

(6.11.1) Constructor

+ Explode(Coordinate coordinate)	-Set coordinate to given parameter

(6.11.2) Methods

+ int getZ()	return 25
+ void draw(GraphicsContext gc)	Draw Explode at coordinate, then set isVisible to false and set isRemove to true.

(6.12) Class Splash extends Impact implements IRenderable

(6.12.1) Constructor

+ Splash(Coordinate coordinate)	-Set coordinate to given parameter

(6.12.2) Methods

+ int getZ()	return 26
+ void draw(GraphicsContext gc)	Draw Splash at coordinate, then set isVisible to false and set isRemove to true.

7. Package item

(7.1) Class Medkit implements Updatable

(7.1.1) Fields

# Coordinate coordinate	Coordinate of Medkit
# timer	Time for Medkit to be exist in map
# isRemove	check if Medkit is remove
# isVisible	check if Medkit is visible

(7.1.2) Constructor

+ Medkit(Coordinate coordinate)	-Set coordinate to given parameter -Set timer to 60 -Set isRemove to false -Set isVisible to true

(7.1.3) Methods

+ abstract void heal(CurrentAllies currentAllies)	Heal to all allies
+ abstract void update()	update Medkit existence
+ getters/setters for fields	

(7.2) Class NormalMedkit extends Medkit implements IRenderable

(7.2.1) Constructor

+ NormalMedkit(Coordinate coordinate)	-Set coordinate to given parameter

(7.2.2) Methods

+ void heal(CurrentAllies currentAllies)	Heal all allies with 25% of maxHp, then set isVisible to false and set isRemove to true.
+ void update()	Decrease timer by 1. If timer equals 0 ,set isVisible to false and set isRemove to true. If any allies are in the same coordinate with NormalMedkit, heal all allies.
+ int getZ()	return 40
+ void draw(GraphicsContext gc)	Draw NormalMedkit at coordinate
+ getters/setters for fields	

(7.3) Class SpecialMedkit extends Medkit implements IRenderable

(7.3.1) Constructor

+ SpecialMedkit(Coordinate coordinate)	-Set coordinate to given parameter

(7.3.2) Methods

+ void heal(CurrentAllies currentAllies)	Increase maxHp to all allies by 15% and heal all allies with 50% of maxHp, then set isVisible to false and set isRemove to true.
+ void update()	Decrease timer by 1. If timer equals 0 ,set isVisible to false and set isRemove to true. If any allies are in the same coordinate with SpecialMedkit, heal all allies.
+ int getZ()	return 40
+ void draw(GraphicsContext gc)	Draw SpecialMedkit at coordinate
+ getters/setters for fields	

8. Package input

(8.1) Class InputUtility

(8.1.1) Fields

- boolean left	Check if the last keypress is "A"
- boolean right	Check if the last keypress is "D"

- boolean up	Check if the last keypress is "W"
- boolean down	Check if the last keypress is "D"

(8.1.2) Methods

+ void setKeyPressed(KeyCode keycode)	Set last key press in field
+void reset()	Set all field to false
+ getters for fields	

9. Package gui

(9.1) Class SceneManager

(9.1.1) Fields

- SceneManager instance	Instance of SceneManager.
- Stage primaryStage	Stage to show scene.

- Scene scene	Scene to put into stage..
- MainMenuPane mainMenuPane	Pane of MainMenuPane.
- TutorialPane tutorialPane	Pane of TutorialPane.
- CreditPane creditPane	Pane of CreditPane.
- PreGamePane preGamePane	Pane of PreGamePane..

(9.1.2) Constructor

+ SceneManager()	-Initialize field of mainMenuPane, tutorialPane, creditPane and preGamePane, by calling their constructor. -Initialize scene with mainMenuPane.

(9.1.3) Methods

+ SceneManager getInstance()	- Return instance of SceneManager.
+ void switchScene(int index)	- Switch to scene (By setting scene root) of following index : index 0 : switch to main menu GUI (set scene as mainMenuPane).

	index 1: Stop the main menu music, then start the game (set scene as new GamePane()). index 2: switch to tutorial GUI (set scene as tutorialPane). index 3: switch to credit GUI (set scene as mainMenuPane). index 4: switch to pre-game GUI (set scene as preGamePane). index 5: switch to defeat scene (set scene as new defeatPane()). index 6: switch to victory scene (set scene as new victoryPane()).
+ void setPrimaryStage(Stage primaryStage)	- Setter for primaryStage.
+ Stage getPrimaryStage()	- Getter for primaryStage.

(9.2) Class MainMenuPane extends StackPane

(9.2.1) Fields

- Button startButton	Button to start the game.
- Button tutorialButton	Button to go to tutorial UI.
- Button creditButton	Button to go to credit UI.
- Button exitButton	Button to exit game.
+ MediaPlayer menuTheme	Music player in this UI.

(9.2.2) Constructor

+ MainMenuPane()	-Set width and preference width to 1280 -Set height and preference height to 720. -Set background picture. -Create text “The Fellow Knight” with white effect drop shadow. Then add to this pane. -Create start, tutorial, credit and exit button using method initStartButton(), initTutorialButton(), initCreditButton() and initExitButton() and add to this pane. -Set menuTheme music volume to 0.3 and repeatable, then play.

(9.2.3) Methods

- void initStartButton()	-Initialize start button with text "Start" with font40. - Set button effect with white drop shadow effect. - Set button height to 40, width to 300. - Set on click handler to switch to Pre-Story GUI.
- void initTutorialButton()	-Initialize tutorial button with text "How to play" with font40. - Set button effect with white drop shadow effect. - Set button height to 40, width to 300. - Set on click handler to switch to Tutorial GUI.
- void initCreditButton()	-Initialize start button with text "Credit" with font40. - Set button effect with white drop shadow effect. - Set button height to 40, width to 300. - Set on click handler to switch to Credit GUI.
- void initExitButton()	-Initialize start button with text "Exit" with font40. - Set button effect with white drop shadow effect.

	- Set button height to 40, width to 300. - Set on click handler to exit game.

(9.3) Class TutorialPane extends StackPane

(9.3.1) Constructor

+ TutorialPane()	-Set width and preference width to 1280. -Set height and preference height to 720. -Fill background with black color. - Set text alignment to center. - Set text and picture explaining game rules. - Set on click handler to switch back to the main menu GUI.

(9.4) Class CreditPane extends StackPane

(9.4.1) Constructor

+ TutorialPane()	-Set width and preference width to 1280. -Set height and preference height to 720. -Fill background with black color. - Set text alignment to center. - Set text for credits. - Set on click handler to switch back to the main menu GUI.

(9.5) Class PreGamePane extends StackPane

(9.5.1) Constructor

+ PreGamePane()	-Set width and preference width to 1280. -Set height and preference height to 720. -Fill background with black color. - Set pre-game story picture. - Set on click handler to start the game.

(9.6) Class VictoryPane extends StackPane

(9.6.1) Constructor

+ VictoryPane()	-Set width and preference width to 1280. -Set height and preference height to 720. -Fill background with black color. - Set victory text and picture. - Set on click handler to switch back to the main menu GUI. - Play victory sound effect.

(9.7) Class DefeatPane extends StackPane

(9.7.1) Constructor

+ DefeatPane()	-Set width and preference width to 1280. -Set height and preference height to 720. -Fill background with black color. - Set defeat text and picture. - Set on click handler to switch back to the main menu GUI. - Play defeat sound effect.

(9.8) Class GamePane extends HBox

(9.8.1) Fields

- MediaPlayer mediaPlayer	-Music for this UI.

(9.8.2) Constructor

+ GamePane()	- Set this to the instance of GameSystem's gamePane field. -Set width and preference width to 1280. -Set height and preference height to 720. -initialize statPane and gameScreen and and these to this. - Set FocusTraversable to true. - Set mediaPlayer music to gameTheme ,change music volume to 0.3 and repeatable, then play.

(9.8.3) Methods

+ MediaPlayer getMediaPlayer()	Getter for mediaPlayer.

(9.9) Class StatPane extends Canvas

(9.9.1) Fields

- MediaPlayer mediaPlayer	-Music for this UI.

(9.9.2) Constructor

+ GamePane()	- Set this to the instance of GameSystem's statPane field. -Set width to 1280. -Set height to 720. -Call method update().

(9.9.3) Methods

+ void nextWave()	-Increase waveCount from instance of GameSystem's waveCount field by 1. - Initialize new thread, to wait 3 seconds then call nextWave() method from instance of GameSystem's waveSystem.
+ void update()	- Update the canvas by drawing image and set Text “The fellow knight” with white drop shadow effect. Also drawing the health bar of each ally, set wave and enemy kill count which are taken from GameStat class.

(9.10) Class GameScreen extends Canvas

(9.10.1) Fields

- GraphicsContext gc	- GraphicsContext of this canvas.
- WaveSystem waveSystem	- waveSystem for this GameScreen
- Thread gameLoop	- Thread for this GameScreen
- Queue<Irenderable> initializeList	- Queue for list of Irenderable object. Used to store objects before adding directly to RenderableHolder.

(9.10.2) Constructor

+ GameScreen()	- Calling method setUp(), initGame() , initGameLoop() and initWaveSystem() in order.

(9.10.3) Methods

+ void setUp	-Set width to GameUnit.MAP_WIDTH and set height to GameUnit.MAP_HEIGHT (Which is 960 and 720 in order) - Set FocusTraverable to true and visible to true. - Calling method addListener()

	- Set gc field to this GraphicsContext - Set this to the instance of GameSystem's gameScreen field. - Initialize waveSystem and initializeList field by calling their constructor.
+void initGame()	Initialize CurrentAllies and game background to this GameScreen by calling method initObject(new CurrentAllies()) and initObject(new GameBackGround()).
+void initGameLoop()	- Initialize gameLoop field by creating a new thread which infinitely loop and update current game action/input from user action. For each loop, they do as following : Checking the gameover condition. If yes then call exitGame(), if not then redraw the object and update each object (Both from user input and game's algorithm) in RenderableHolder.
+ void initWaveSystem()	- Initialize enemy waves by calling nextWave() from the instance of GameSystem's statPane.
+ void addListener	- Add keyboard's on keypress event listener which receives key event then passes to InputUtility to handle.
+ void clearScreen()	- Clear all drawing through GraphicsContext

+ void rearrange()	- Add all object in initializeList (Also remove them from the list) to RenderableHolder.
+ void initObject(IRenderable obj)	- Add an object to initializeList.
+ void stopLoop()	- stop the gameLoop thread.
+ void paintComponent()	- Draw each object in RenderableHolder.
+ void updateObject()	Going through all objects in RenderableHolder, if it is updatable then call update().
+ void projectileUpdate()	Update all projectiles in RenderableHolder, For each projectile, call Update() isTriggerable(). *Require this method since for each loop, we update projectiles 2 times, but only 1 for other objects.
Getter / Setter of waveSystem	- Getter / Setter for waveSystem.

(9.11) Class BackGround implements Irenderable

(9.11.1) Methods

+ int getZ()	returns -999

+ void draw()	Draw background image on canvas, with size of GameUnit.MAP_WIDTH x GameUnit.MAP_HEIGHT (which is 960x720).
+ boolean isVisible()	return true
+ boolean isRemove()	return false

10. Package logic

(10.1) Interface Updatable

(10.1.1) Methods

+ void update()	To update the object

(10.2) Class Coordinate

(10.2.1) Fields

- double x	X position
- double y	Y position

(10.2.2) Constructor

+ Coordinate(double x, double y)	-Set x position to x, and y position to y.

(10.2.3) Methods

Getter/Setters for each field.	-Getter/Setters for each field.

(10.3) Class CurrentAllies implements IRenderable, Updatable

(10.3.1) Fields

- LinkedList<Coordinate> alliesCoordinateList	List of allies coordinate
- ArrayList<Allies> alliesList	List of allies
- boolean isLeft	Current ally's picture side
- int counter	Counter for switching ally's picture side.
- boolean isVisible	Always true
- boolean isRemove	Always false

(10.3.2) Constructor

+ CurrentAllies()	- Set counter to 0. - Called initCoordinateList() and initAlliesList() - Set isLeft to true

(10.3.3) Methods

+ void initCoordinateList()	initialize List of allies coordinate. Then add 5 ally coordinates to the list. (The start position of ally once the game start)
+ void initAlliesList()	initialize List of allies. Add Knight, Archer, Wizard, Bomber and Executioner to the list in order.
+ boolean isAttackable(Coordinate alliesCoordinate, Coordinate enemyCoordinate, double range)	return true if the distance between alliesCoordinate and enemyCoordinate is not greater than range, otherwise return false
+ void update()	Update CurrentAllies as following: -if counter=3 then set isLeft to !isLeft and reset counter back to 0. - Increase the counter by 1 - Check if all allies in the alliesList are dead, if yes then set isGameOver in GameStat to true.

	- Update allies position from user's input. (Add new coordinate to beginning of the list, then remove the last one) - Decrease attack cooldown of each ally in alliesList by 1 - Check if each ally in alliesList can attack enemy, if yes then add new Projectile to initializeList on gameScreen and set character cooldown to their max cooldown. Also, 1 ally can attack only 1 enemy at a time. - Check if allies are going out of boundary, if yes then set isGameOver in GameStat to true. - Check if allies run into themselves, if yes then set isGameOver in GameStat to true. - Check if allies running into enemy, if yes then set isGameOver in GameStat to true.
+ int getZ()	return 0
+ void draw(GraphicsContext gc)	-Draw ally and their health bar for each ally in alliesList on GraphicsContext with position x,y from their Coordinate position in alliesCoordinateList.
+ boolean isVisible()	return isVisible
+ boolean isRemove()	-For each ally in alliesList, if their curHp = 0 then remove them from the list. -then return isRemove

+ void setLeft(boolean isLeft)	set isLeft to given parameter.
+ ArrayList<Allies> getAlliesList()	return alliesList
+ LinkedList<Coordinate> getAlliesCoordinateList()	return alliesCoordinateList

(10.4) Class CurrentEnemy implements IRenderable,Updatable

(10.4.1) Fields

- LinkedList<Coordinate> enemyCoordinateList	List of enemy coordinates
- ArrayList<Enemy> enemyList	List of enemies
- boolean isLeft	Current ally's picture side
- int counter	Counter for switching enemy's picture side.
- boolean isVisible	Always true
- boolean isRemove	Always false

(10.4.2) Constructor

+ CurrentEnemy()	- Set counter to 0. - Initialize enemyList and enemyCoordinateList -set isLeft to true

(10.4.3) Methods

+ void add(Enemy enemy, Coordinate coordinate)	add enemy into the CurrentEnemy by add enemy to enemyList and add coordinate to enemyCoordinateList.
+ Coordinate getAlliesDistance(Coordinate alliesPosition)	return the distance between the first enemy in enemyList and the given alliesPosition in Coordinate of distance in x axis and y axis.
+ boolean isAttackable(Coordinate alliesCoordinate, Coordinate enemyCoordinate, double range)	return true if the distance between alliesCoordinate and enemyCoordinate is not greater than range, otherwise return false.
+ void update()	Update CurrentEnemy as following: - Increase the counter by 1 -if counter=3 then set isLeft to !isLeft and reset counter back to 0. - if counter=3, update enemy position. The enemy will follow the first ally in alliesList. (Update enemy new position by adding new coordinate to beginning of the list, then remove the last one) - Decrease attack cooldown of each enemy in enemyList by 1 - Check if each enemy in enemyList can attack ally, if yes then add new Projectile to initializeList on gameScreen and set character cooldown to their max cooldown.
+ int getZ()	return 1

+ void draw(GraphicsContext gc)	-Draw enemy and their health bar for each enemy in enemyList on GraphicsContext with position x, y from their Coordinate position in enemyCoordinateList.
+ boolean isVisible()	return isVisible
+ boolean isRemove()	-For each enemy in enemyList, if their curHp = 0, remove the enemy from the enemyList and increase the enemy kill in GameStat. Also, the enemy will have 25% chance of dropping NormalMedkit and 8% chance of dropping SpecialMedkit. If dropped, add them to initializeList on gameScreen. -then return true if enemyList size is 0, otherwise return false.
+ void setLeft(boolean isLeft)	set isLeft to given parameter.
+ LinkedList<Coordinate> getEnemyCoordinateList()	return enemyCoordinateList
+ ArrayList<Enemy> getEnemyList()	return enemyList

(10.5) Class GameSystem

(10.5.1) Fields

+ GameSystem instance	Instance of GameSystem
+ GamePane gamePane	Use to store GamePane of the program.
+ GameScreen gameScreen	Use to store GameScreen of the program.
+ StatPane statPane	Use to store StatPane of the program.

(10.5.2) Methods

+ GameSystem getInstance()	Return the instance of GameSystem.

(10.6) Class GameStat

(10.6.1) Fields

+ int enemyKilled	Number of enemy killed.
+ int waveCount	Number of current waves
+ boolean isGameOver	Track the gameover condition

+ boolean isVictory	Track if the victory condition.
+ String defeatReason	Store the defeat reason if defeated.
+ double knightHp	Track current % Hp of knight.
+ double archerHp	Track current % Hp of archer.
+ double wizardHp	Track current % Hp of wizard.
+ double bomberHp	Track current % Hp of bomber.
+ double executionerHp	Track current % Hp of executioner.

(10.6.2) Methods

+ void reset()	Reset all fields to the starting stage.
+ void increaseEnemyKill()	increase the enemy kill by 1.

(10.7) Class WaveSystem

(10.7.1) Fields

- int waveCount	Current wave number.
- int enemyCount	Current number of enemy's group on the map.
Many Coordinate for spawning enemy	

(10.7.2) Constructor

+ WaveSystem()	- Set waveCount to 0. - Set enemyCount to 0. - Reset the GameStat from reset() method in GameStat.

(10.7.3) Methods

+ void nextWave()	Adding a group of enemies into the game depends on waveCount. (From 1-10). If waveCount is more than 10 then set isVictory and isGameOver in GameStat to true.
+ int getWaveCount()	return waveCount
+ void setWaveCount(int waveCount)	Set waveCount to the given number, also set waveCount on GameStat to match this.

+ void allEnemyKilled()	-Decrease enemyCount by 1 - If enemyCount = 0, then call nextWave() method from instance of GameSystem's statPane.
+ int getEnemyCount()	Return enemyCount.
+ void setEnemyCount(int enemyCount)	-Set enemy count to the given number. But if the given number is less than 0, then set to 0.

11. Package render

(11.1) Interface IRenderable

(11.1.1) Methods

+ int getZ()	Get Z (depth) number
+ void draw(GraphicsContect gc)	Draw object, depends on each object
+ boolean isVisible()	To check if an object visible
+ boolean isRemove()	To check if an object is isRemove

(11.2) Class RenderableHolder

(11.2.1) Fields

- final RenderableHolder instance	Instance of RenderableHolder
-List<IRenderable> entities	List of all entities.
-Comparator<IRenderable> comparator	comparator for sorting entities

(11.2.2) Constructor

+ RenderableHolder()	Initialize arraylist of IRenderable and compare.

(11.2.3) Methods

+ RenderableHolder getInstance()	Get an instance of RenderableHolder
+ void add(IRenderable entity)	Add entities to the list and sort.
+ void update()	Update each entity on the list, if isRemove=true then remove that item from this list.

+ List<IRenderable> getEntities()	getter for list of entities