

Wizard Land

Software Engineering Homework

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1 DESCRIPTION OF THE TASK

On Wizard Land wizards are wandering about. Their goal is to learn as many spells as they can. The text of each spell is written on the wall of a cave. If a wizard wants to learn a spell, he must go into the corresponding cave and read the text of the spell. When a wizard wants to cast a spell, he must have the required amount of manna for the spell. Manna is produced over time by the body of the wizard. However, the maximum amount of manna a wizard can accumulate is limited. If the manna amount reaches this limit, the manna production stops, and is restarted only when the manna amount falls below the limit. A wizard can cast a spell to himself. A wizard can cast a spell to another wizard, but only if they meet and the wizard can see the other wizard. A spell is effective only for a limited time. After this time the spell is removed. There are many kinds of spells. There is a spell that makes somebody invisible. There is a spell that lets the wizard see invisible things. There is a spell that prevents other wizards casting spell on its wearer. There is a spell that paralyzes somebody so that he cannot do anything. Wizards can also collect relics. Relics are hidden in forests. A wizard can acquire a relic if he goes into the corresponding forest and finds it. Relics affect only the wizard who wears them. Relics perform their function as long as the wizard owns them: relics do not need manna for their operation. There are many kinds of relics. There is a robe that makes the wizard invisible. There is a ring that doubles the manna production speed of the wizard. There is a dagger that doubles the attack force of the wizard. Wizards can meet with each other during their journeys. When wizards meet, they can walk by each other, or they can cast a spell on themselves or on the other wizard, if they see the other. They can also choose to attack the other wizard, but only if they see him. An attack does not require manna, but the wizard who is attacked will lose some amount of his manna. If the amount of manna of a wizard reaches zero, the wizard becomes paralyzed for a time, and he cannot do anything. After this time the manna production resumes, and the wizard can start to wander again. While a wizard is paralyzed, a single relic can be taken from him. This relic is typically acquired by the wizard who won their battle, but if other wizards are quick enough, they have the chance to collect the relic for themselves. The game is won by the wizard who is the first to learn all the spells. The game is played on a two-dimensional grid, and the wizards can move on the fields (free area, cave, or forest) of this grid.

2 FUNCTIONAL REQUIREMENTS

2.1 PRIMARY REQUIREMENTS

Identifier	Description	Use case
R01	The player controls Wizard and wander through a field.	Wander Field
R02	Wizard has to go cave to learn spells.	Go to cave
R03	Wizard has to fulfill manna cost to learn spell.	Learn Spell
R04	Wizard has to read spell to learn spell	Read Spell
R05	Wizard can go to the forest.	Go to forest
R06	Wizards can collect relics by going to the forest.	Collect relics
R07	Wizard can see the field.	View fields
R08	Wizard can lose relics when they are paralyzed.	Paralyze Wizard
R09	Wizard can see another wizards if they are visible.	See another wizard

Alternate scenario	1.A When the wizard reached cave, Wizard has to learn the spell.
Alternate scenario	1.A.1 If wizard tries to learn the spell, he has to read.
Alternate scenario	1.A.1.A.1 If all spells are learnt by wizard, player wins.
Alternate scenario	1.B If all spells are learnt by wizard, player wins.
Alternate scenario	2. Wizard goes to the forest.
Alternate scenario	2.A If wizard reached forest, wizard can collect relics.
Alternate scenario	3. Wizard goes to the free area.

Title	Win
Description	Player wins when the controlling wizard learnt all of the spells from cave.
Actors	Player
Main success scenario	Player wins by learning all of the spells.
Alternate scenario	1. Wizard wanders field.
Alternate scenario	1.A If wizard wanders the field, Wizard goes to the cave.
Alternate scenario	1.A.1 When the wizard reached cave, Wizard has to learn the spell.
Alternate scenario	1.A.1.A.1 If wizard tries to learn the spell, he has to read.
Alternate scenario	1.B If all spells are learnt by wizard, player wins.

Title	View Fields
Description	Player checks the visibility of the field.
Actors	Player
Main success scenario	Player finds the visible wizard.
Alternate scenario	1. Player views the fields.
Alternate scenario	1.A.1 Player/wizard finds another visible wizard by seeing him.
Alternate scenario	1.A.1.A.1 If they have seen each others they can wander together.
Alternate scenario	1.B.1 If player has seen another wizard, player can attack the wizard.

Title	End game
Description	System ends the game.
Actors	System
Main success scenario	When the first wizard learnt every spells and wins the game system finishes the game.

Title	Paralyze wizard
Description	System paralyzes wizard.
Actors	System
Main success scenario	When the manna of the wizard decreased to zero, the wizard is paralyzed for while.
Alternate scenario	1. If the player cast spell on another wizard, system can paralyze the wizard.
Alternate scenario	2. If the player/wizard attacks or attacked by others and manna reduced to zero, system paralyzes wizard.
Alternate scenario	3. If the wizard was wearing a relic when before paralyze, wizard loses his/her relic after paralyzed.

4 STRUCTURAL DESCRIPTION

4.1 DESCRIPTION OF THE CLASSES

4.1.1 Wizard

Responsibilities

The Wizard class contains information about the Wizard. Wizard needs to wander and learn spell from the cave until game is finished. Wizard can collect relic by reaching forest. Also, Wizard can attack and cast spell to another wizard or wander with another wizard.

Attributes

-manna: int	Manna indicator of the wizard.
-attack: int	Attack amount indicator of the wizard.
-directionX: int	Indicates the X-Axis position of the wizard.
-directionY: int	Indicates the Y-Axis position of the wizard.
-wearingRelic: boolean	Boolean value that indicates if wizard is wearing a relic.
-isVisible: boolean	Boolean value that indicates if wizard is visible to the other wizards.
-isParalyzed: Boolean	Boolean value that indicates if wizard is paralyzed.
-relic: Relics	Indicates the relics.
-spell: Spell[]	Indicates the spells.
+LearntSpells: boolean	Boolean value that indicates if wizard has learnt all of the spells.

Methods

+Move(x,y : int)	Allows the wizard to move around.
+ViewField(x,y : int)	Allows player to view the field.
+Attack()	Allows player to attack another wizard.
+LearnSpell()	Allows wizard to learn spell.
+CastSpell()	Allows wizard to cast spell on himself or another.
+Attackedby(o: Wizard)	Action to do when the wizard attacked by another wizard.
+LoseManna(m: int)	Indicates and returns the amount of lost manna by attacked by another wizard.
+SeeWizard(v: string)	Action to meet another wizard.
+WanderTogether(w: Wizard)	Action to do after meeting another wizard.
+Paralyzed()	Paralyze the wizard for a few second. (Wizard cannot do anything for a while)
+MannaProduction()	Product the manna until the manna of the wizard is full.
+CollectRelic(r: Relics)	Action to pick up and wear a relic.
+LoseRelic(r: Relics)	Action to lose relic when the wizard is paralyzed.

4.1.2 System

Responsibilities

System is responsible for starting the game, finishing the game, paralyzing the wizard, and removing the relic.

Attributes

+Players: Wizard[]	Contains wizards/players.
+Field: Field	Contains playground fields.

Methods

+Paralyze()	Paralyzes wizard when wizards manna reduced to zero.
+RemoveRelic()	Removes relic from the wizard after the wizard paralyzed.
+StartGame()	Starts the game.
+EndGame()	Finishes the game.

4.1.3 Field

Responsibilities

Field class is responsible for initializing the field playground.

Attributes

-Playground: Place[][]	Defines the field.
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Methods

+Field()	Constructs the field.
+GetPlace(x, y : int)	Returns the position of the place from cave, forest, or free area.
+setPlayground(p: Place)	Sets the place in the playground.

4.1.4 Place

Responsibilities

It is the parent class of the cave, forest and the freeArea classes. It contains the name of the place.

Attributes

+name: String	Contains the name of the place.
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Methods

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4.1.5 FreeArea

Responsibilities

It is the one of the children class of Place class. It contains the name of the FreeArea class.

Attributes

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Methods

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4.1.6 Cave

Responsibilities

Special field which contains a spells. Wizard can learn spell by coming to the cave. It contains the name of Cave.

Attributes

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Methods

+addSpells(s: Spell)	Action to add the spells in the cave.
+removeSpells(s: Spell)	Action to remove spells or blocks to learn the same spell again.

4.1.7 Spell

Responsibilities

Special ability with effects. It requires manna cost from the Wizard.

Attributes

+spellName: string	Name of the spells.
+mannaCost: int	Costs of the manna to learn or cast.

Methods

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4.1.8 Forest

Responsibilities

Forest is the special field of the game which contains relics.

Attributes

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Methods

+addRelics(r: Relics)	Placing relics in the forest field.
+removeRelics(r: Relics)	Removing relics from the forest field.

4.1.9 Relics

Responsibilities

Parent calss of the Robe, Ring, and Dagger classes.

Attributes

-relicName: string	Name of the relics.
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Methods

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4.1.10 Robe

Responsibilities

It is a special item or relic which can give abilities to become invisible. It can be dropped when the wizard is paralyzed.

Attributes

-name: string	Name of the relic which is robe.
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Methods

+makeInvisible()	Action to make wizard invisible when wearing robe.
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4.1.11 Dagger

Responsibilities

It is a special item or relic which can give abilities to attack two times stronger. It can be dropped when the wizard is paralyzed.

Attributes

-name: string	Name of the relic which is dagger.
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Methods

+getAttack(a: int)	Gets the attack amount of wizard.
+doubleAttack(da: int)	Doubles the attack amount of wizard when the wizard having a dagger

4.1.12 Ring

Responsibilities

It is a special item or relic which can give abilities to fasten your manna production two times. It can be dropped when the wizard is paralyzed.

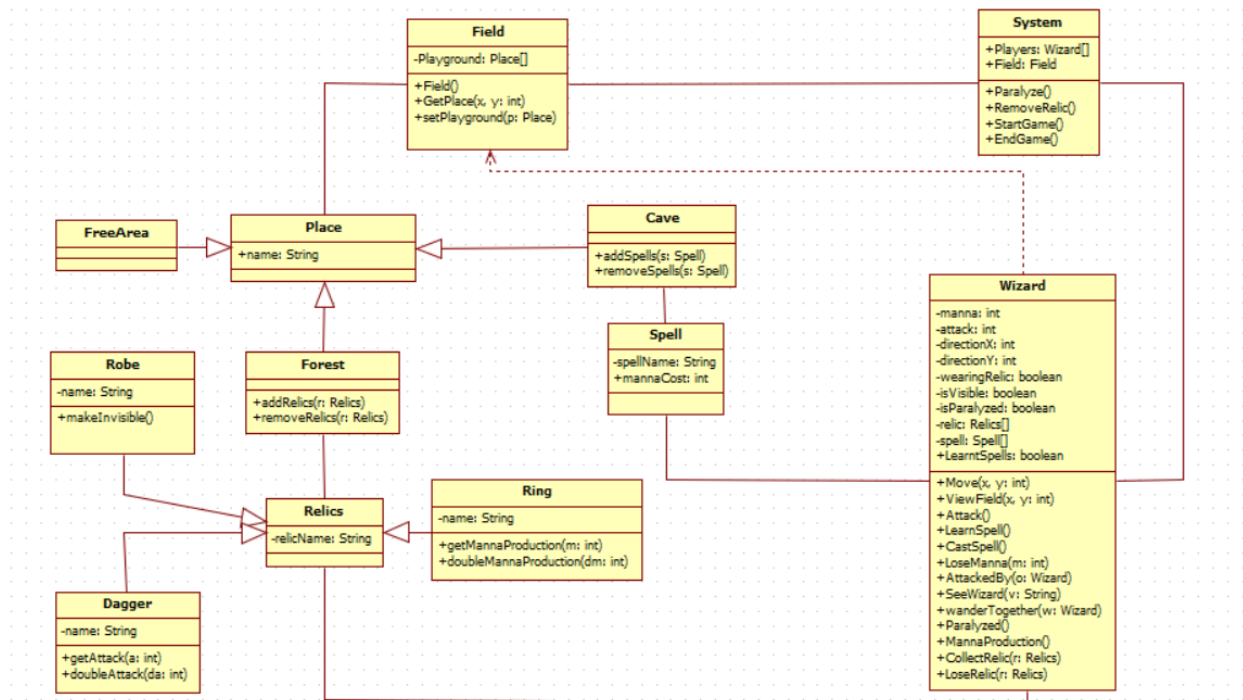
Attributes

-name: string	Name of the relic which is ring.	<description>
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Methods

+getMannaProduction(m: int)	Gets the manna production duration.
+doubleMannaProduction(dm: int)	Double the manna production duration when the wizard having a ring.

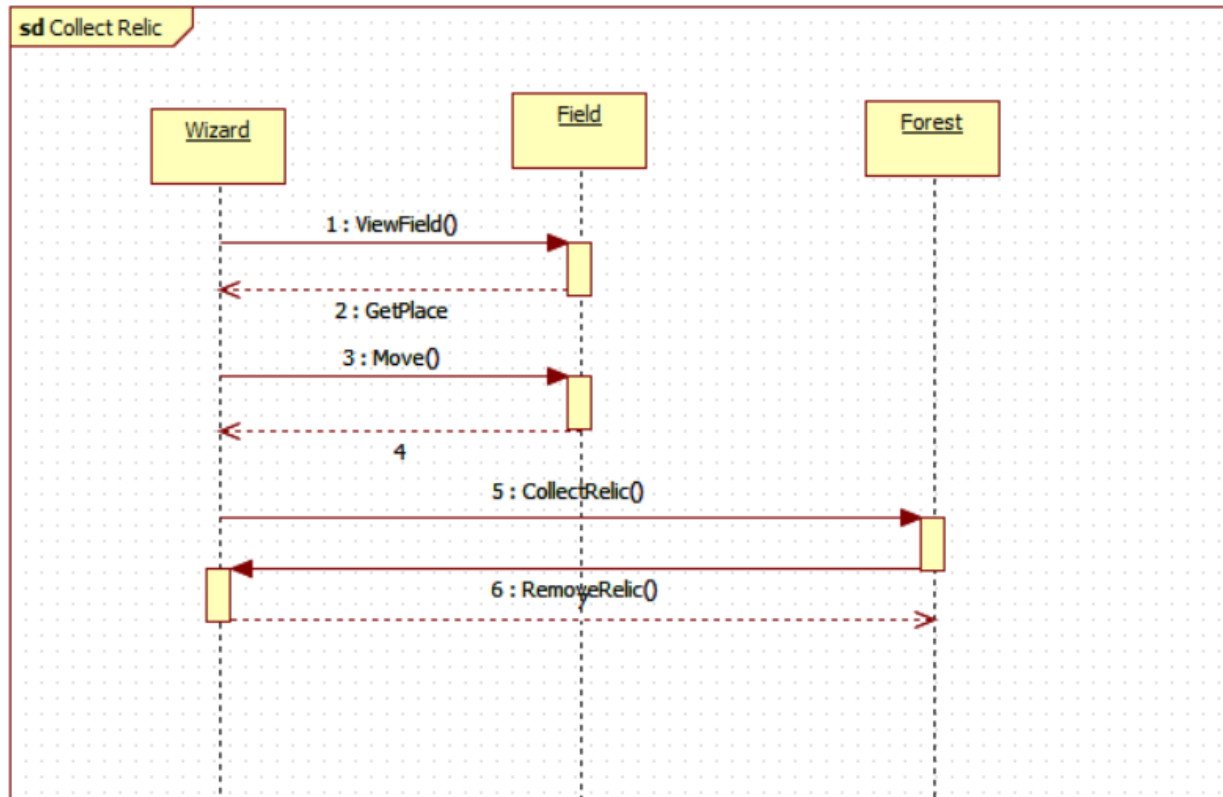
4.2 CLASS DIAGRAM



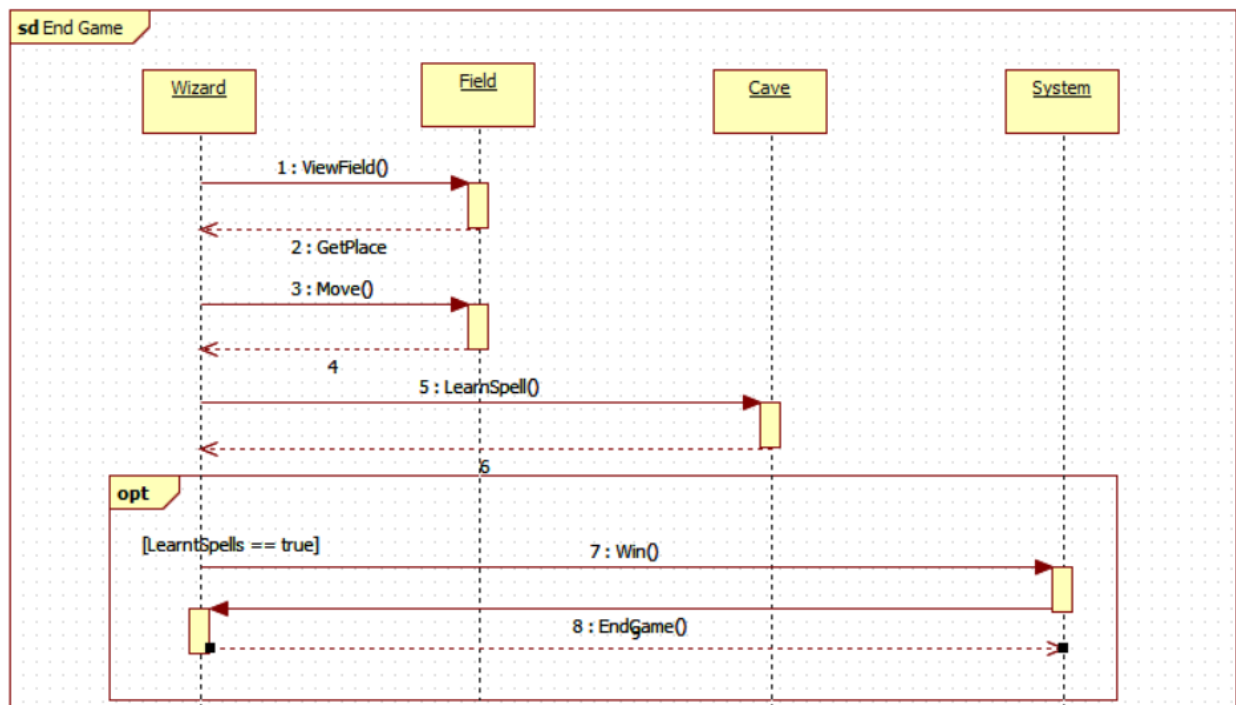
5 BEHAVIORAL DESCRIPTION

5.1 SEQUENCE DIAGRAMS

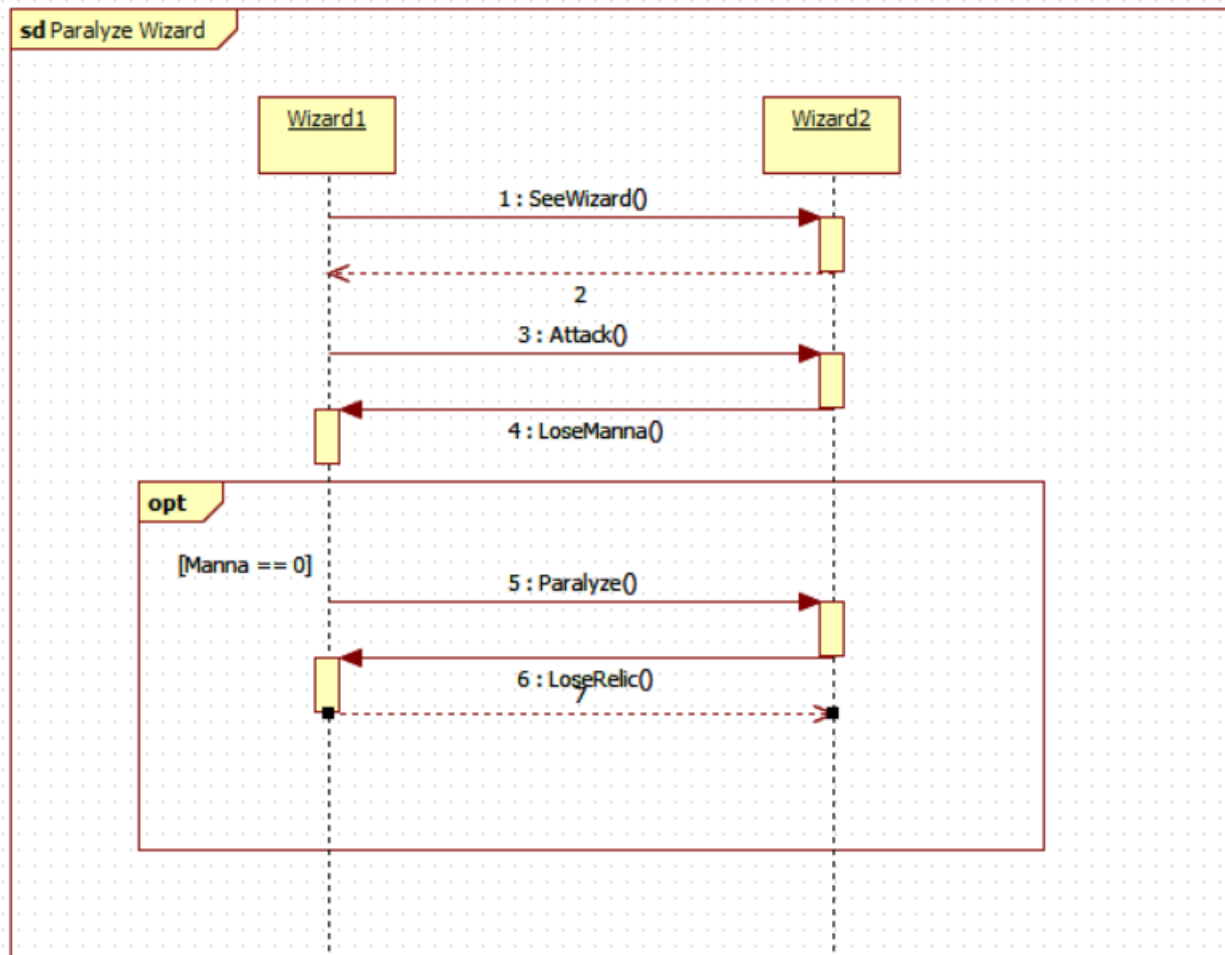
5.1.1 Collect Relic – Sequence Diagram 1



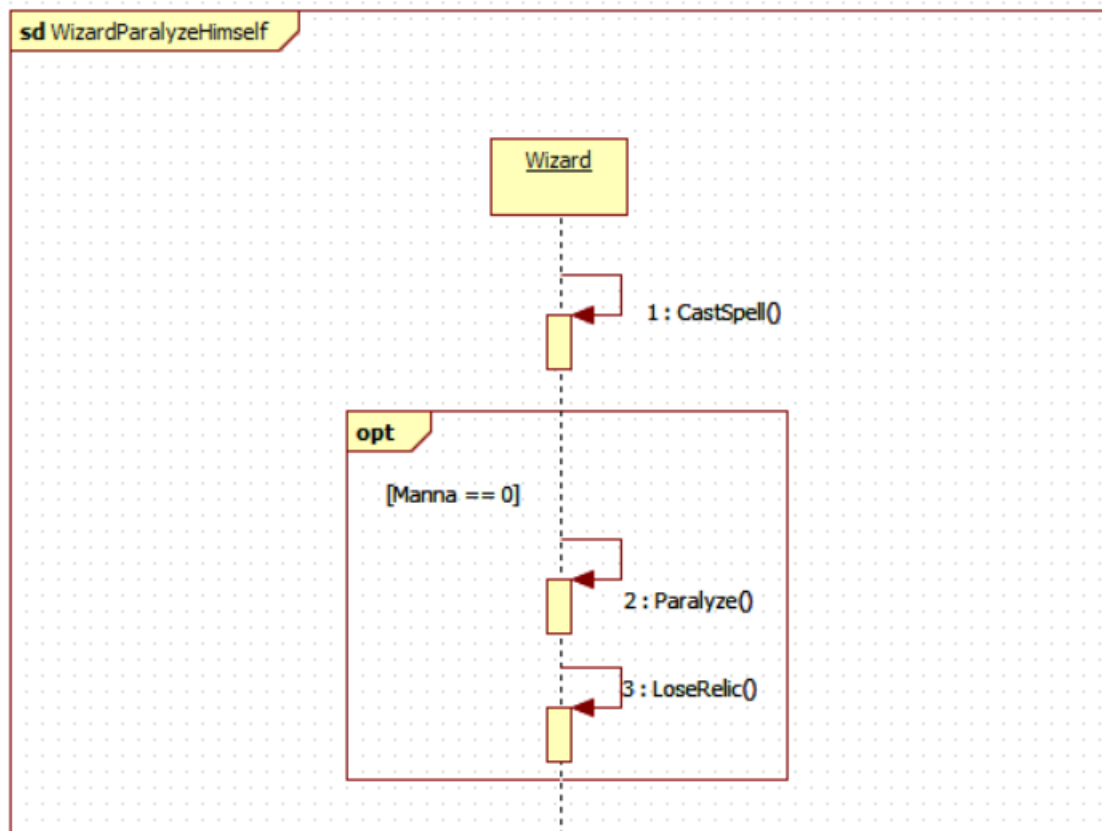
5.1.2 End Game – Sequence Diagram 2



5.1.3 Paralyze Wizard – Sequence Diagram 3

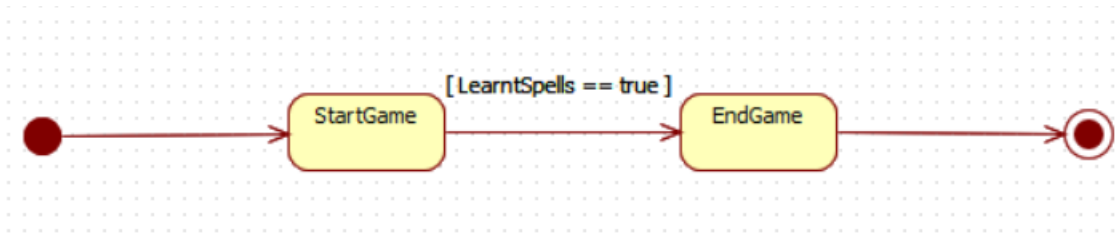


5.1.4 Wizard Paralyze Himself – Sequence Diagram 4



5.2 STATE MACHINE DIAGRAMS

5.2.1 Game Process State Machine



6 WORK ACTIVITY LOG

Start	Duration	Work performed	References
02/11/2021	4 hours	Revising the knowledge.	1-5
04/11/2021	2 hours	Designing the use case diagram.	2, 3
05/11/2021	3 hours	Designing the class diagram	4
06/11/2021	2 hours	Drawing the sequence diagrams.	5
07/11/2021	3 hours	Designing the state machine diagram. Correction to the class and sequence diagrams.	4, 5
08/11/2021	3 hours	Writing the documentation.	1-5

Total work activity: 17 hours

Modeling tool: WhiteStarUML

Other tools: Microsoft Office Word