# CS5010 Milestone3 Preliminary Design

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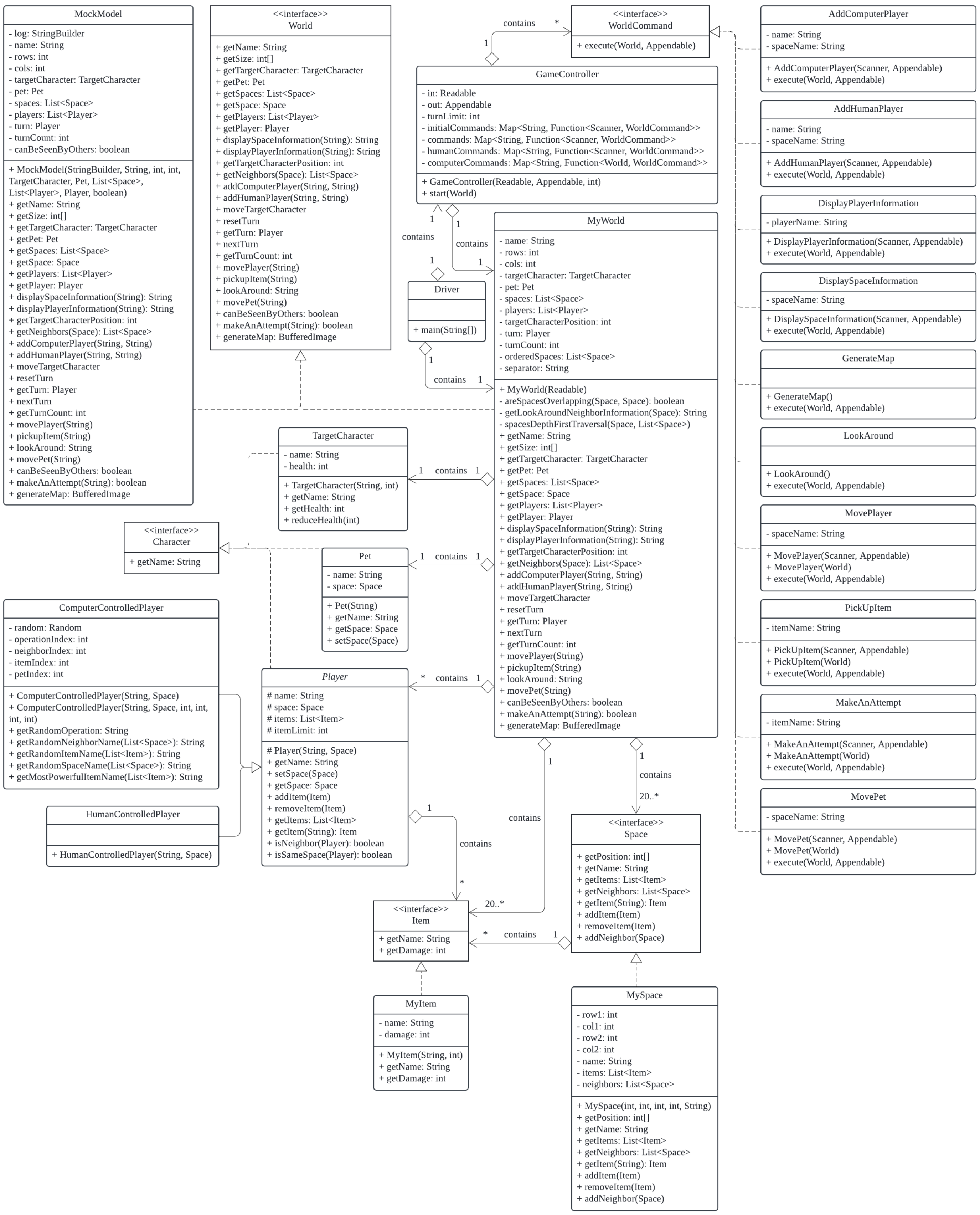
## UML Diagram


MockModel
- log: StringBuilder
- name: String
- rows: int
- cols: int
- targetCharacter: TargetCharacter
- pet: Pet
- spaces: List<Space>
- players: List<Player>
- turn: Player
- turnCount: int
- canBeSeenByOthers: boolean
+ MockModel(StringBuilder, String, int, int, TargetCharacter, Pet, List<Space>, List<Player>, Player, boolean)
+ getName: String
+ getSize: int[]
+ getTargetCharacter: TargetCharacter
+ getPet: Pet
+ getSpaces: List<Space>
+ getSpace: Space
+ getPlayers: List<Player>
+ getPlayer: Player
+ displaySpaceInformation(String): String
+ displayPlayerInformation(String): String
+ getTargetCharacterPosition: int
+ getNeighbors(Space): List<Space>
+ addComputerPlayer(String, String)
+ addHumanPlayer(String, String)
+ moveTargetCharacter
+ resetTurn
+ getTurn: Player
+ nextTurn
+ getTurnCount: int
+ movePlayer(String)
+ pickupItem(String)
+ lookAround: String
+ movePet(String)
+ canBeSeenByOthers: boolean
+ makeAnAttempt(String): boolean
+ generateMap: BufferedImage
<<interface>> World
+ getName: String
+ getSize: int[]
+ getTargetCharacter: TargetCharacter
+ getPet: Pet
+ getSpaces: List<Space>
+ getSpace: Space
+ getPlayers: List<Player>
+ getPlayer: Player
+ displaySpaceInformation(String): String
+ displayPlayerInformation(String): String
+ getTargetCharacterPosition: int
+ getNeighbors(Space): List<Space>
+ addComputerPlayer(String, String)
+ addHumanPlayer(String, String)
+ moveTargetCharacter
+ resetTurn
+ getTurn: Player
+ nextTurn
+ getTurnCount: int
+ movePlayer(String)
+ pickupItem(String)
+ lookAround: String
+ movePet(String)
+ canBeSeenByOthers: boolean
+ makeAnAttempt(String): boolean
+ generateMap: BufferedImage
contains
*
1
<<interface>> WorldCommand
+ execute(World, Appendable)
GameController
- in: Readable
- out: Appendable
- turnLimit: int
- initialCommands: Map<String, Function<Scanner, WorldCommand>>
- commands: Map<String, Function<Scanner, WorldCommand>>
- humanCommands: Map<String, Function<Scanner, WorldCommand>>
- computerCommands: Map<String, Function<World, WorldCommand>>
+ GameController(Readable, Appendable, int)
+ start(World)
contains
1
1
contains
1
1
Driver
+ main(String[])
1
contains
1
MyWorld
- name: String
- rows: int
- cols: int
- targetCharacter: TargetCharacter
- pet: Pet
- spaces: List<Space>
- players: List<Player>
- targetCharacterPosition: int
- turn: Player
- turnCount: int
- orderedSpaces: List<Space>
- separator: String
+ MyWorld(Readable)
- areSpacesOverlapping(Space, Space): boolean
- getLookAroundNeighborInformation(Space): String
- spacesDepthFirstTraversal(Space, List<Space>)
+ getName: String
+ getSize: int[]
+ getTargetCharacter: TargetCharacter
+ getPet: Pet
+ getSpaces: List<Space>
+ getSpace: Space
+ getPlayers: List<Player>
+ getPlayer: Player
+ displaySpaceInformation(String): String
+ displayPlayerInformation(String): String
+ getTargetCharacterPosition: int
+ getNeighbors(Space): List<Space>
+ addComputerPlayer(String, String)
+ addHumanPlayer(String, String)
+ moveTargetCharacter
+ resetTurn
+ getTurn: Player
+ nextTurn
+ getTurnCount: int
+ movePlayer(String)
+ pickupItem(String)
+ lookAround: String
+ movePet(String)
+ canBeSeenByOthers: boolean
+ makeAnAttempt(String): boolean
+ generateMap: BufferedImage
AddComputerPlayer
- name: String
- spaceName: String
+ AddComputerPlayer(Scanner, Appendable)
+ execute(World, Appendable)
AddHumanPlayer
- name: String
- spaceName: String
+ AddHumanPlayer(Scanner, Appendable)
+ execute(World, Appendable)
DisplayPlayerInformation
- playerName: String
+ DisplayPlayerInformation(Scanner, Appendable)
+ execute(World, Appendable)
DisplaySpaceInformation
- spaceName: String
+ DisplaySpaceInformation(Scanner, Appendable)
+ execute(World, Appendable)
GenerateMap
+ GenerateMap()
+ execute(World, Appendable)
LookAround
+ LookAround()
+ execute(World, Appendable)
MovePlayer
- spaceName: String
+ MovePlayer(Scanner, Appendable)
+ MovePlayer(World)
+ execute(World, Appendable)
PickUpItem
- itemName: String
+ PickUpItem(Scanner, Appendable)
+ PickUpItem(World)
+ execute(World, Appendable)
MakeAnAttempt
- itemName: String
+ MakeAnAttempt(Scanner, Appendable)
+ MakeAnAttempt(World)
+ execute(World, Appendable)
MovePet
- spaceName: String
+ MovePet(Scanner, Appendable)
+ MovePet(World)
+ execute(World, Appendable)
TargetCharacter
- name: String
- health: int
+ TargetCharacter(String, int)
+ getName: String
+ getHealth: int
+ reduceHealth(int)
1 contains 1
<<interface>> Character
+ getName: String
Pet
- name: String
- space: Space
+ Pet(String)
+ getName: String
+ getSpace: Space
+ setSpace(Space)
1 contains 1
ComputerControlledPlayer
- random: Random
- operationIndex: int
- neighborIndex: int
- itemIndex: int
- petIndex: int
+ ComputerControlledPlayer(String, Space)
+ ComputerControlledPlayer(String, Space, int, int, int, int)
+ getRandomOperation: String
+ getRandomNeighborName(List<Space>): String
+ getRandomItemName(List<Item>): String
+ getRandomSpaceName(List<Space>): String
+ getMostPowerfulItemName(List<Item>): String
HumanControlledPlayer
+ HumanControlledPlayer(String, Space)
Player
# name: String
# space: Space
# items: List<Item>
# itemLimit: int
# Player(String, Space)
+ getName: String
+ setSpace(Space)
+ getSpace: Space
+ addItem(Item)
+ removeItem(Item)
+ getItems: List<Item>
+ getItem(String): Item
+ isNeighbor(Player): boolean
+ isSameSpace(Player): boolean
* contains 1
1
contains
*
1
contains
20..*
1
contains
20..*
<<interface>> Space
+ getPosition: int[]
+ getName: String
+ getItems: List<Item>
+ getNeighbors: List<Space>
+ getItem(String): Item
+ addItem(Item)
+ removeItem(Item)
+ addNeighbor(Space)
<<interface>> Item
+ getName: String
+ getDamage: int
* contains 1
MyItem
- name: String
- damage: int
+ MyItem(String, int)
+ getName: String
+ getDamage: int
MySpace
- row1: int
- col1: int
- row2: int
- col2: int
- name: String
- items: List<Item>
- neighbors: List<Space>
+ MySpace(int, int, int, int, String)
+ getPosition: int[]
+ getName: String
+ getItems: List<Item>
+ getNeighbors: List<Space>
+ getItem(String): Item
+ addItem(Item)
+ removeItem(Item)
+ addNeighbor(Space)

# Testing Plan

## Testing design for TargetCharacter

| **Testing construction** | **Input** | **Expected Value** |
|---|---|---|
| Constructor disallows null name | TargetCharacter(null, 50) | IllegalArgumentException |
| Constructor disallows empty name | TargetCharacter("", 50) | IllegalArgumentException |
| Constructor disallows non-positive health | TargetCharacter("doctor", 0) | IllegalArgumentException |

| **Testing getName()** | **Input** | **Expected Value** |
|---|---|---|
| TargetCharacter with normal name | TargetCharacter("Leo", 50) | "Leo" |

| **Testing getHealth()** | **Input** | **Expected Value** |
|---|---|---|
| TargetCharacter with positive health | TargetCharacter("Leo", 50) | 50 |

| **Testing reduceHealth(int damage)** | **Input** | **Parameter** | **Actual Testing** |
|---|---|---|---|
| Reduce positive health value | TargetCharacter("Leo", 50) | 3 | assertEquals(getHealth(), 47) |
| Test invalid damage | TargetCharacter("Leo", 50) | -3 | IllegalArgumentException |

## Testing design for Pet

| **Testing construction** | **Input** | **Expected Value** |
|---|---|---|
| Constructor disallows null name | Pet(null) | IllegalArgumentException |
| Constructor disallows empty name | Pet("") | IllegalArgumentException |

| **Testing getName()** | **Input** | **Expected Value** |
|---|---|---|
| Pet with normal name | Pet("cat") | "cat" |

| **Testing setSpace(Space space) and getSpace()** | **Input** | **Expected Value** |
|---|---|---|
| Set a normal space and get it | setSpace(new MySpace(0, 0, 3, 3, “Kitchen”)); getSpace(); | new MySpace(0, 0, 3, 3, “Kitchen”) |
| Disallow set a null space | setSpace(null); | IllegalArgumentException |

## Testing design for Player

| **Testing construction** | **Input** | **Expected Value** |
|---|---|---|
| Test Computer Constructor With Null Name | ComputerControlledPlayer (null, new MySpace(0, 0, 3, 3, “Kitchen”)) | IllegalArgumentException |
| Test Human Constructor With Null Name | HumanControlledPlayer (null, new MySpace(0, 0, 3, 3, “Kitchen”)) | IllegalArgumentException |
| Test Computer Constructor With Empty Name | ComputerControlledPlayer (“”, new MySpace(0, 0, 3, 3, “Kitchen”)) | IllegalArgumentException |
| Test Human Constructor With Empty Name | HumanControlledPlayer (“”, new MySpace(0, 0, 3, 3, “Kitchen”)) | IllegalArgumentException |
| Test Computer Constructor With Null Space | ComputerControlledPlayer (“Leo”, null) | IllegalArgumentException |
| Test Human Constructor With Null Space | HumanControlledPlayer (“Leo”, null) | IllegalArgumentException |

| **Testing getName()** | **Input** | **Expected Value** |
|---|---|---|
| HumanControlledPlayer with normal name | HumanControlledPlayer (“Leo”, new MySpace(0, 0, 3, 3, “Kitchen”)) | “Leo” |
| ComputerControlledPlayer with normal name | ComputerControlledPlayer (“Leo”, new MySpace(0, 0, 3, 3, “Kitchen”)) | “Leo” |

| **Testing addItem(Item item), getItem(String itemName), and getItems()** | **Input** | **Expected Value** |
|---|---|---|
| Add and get an item | addItem(new MyItem(“Revolver”, 3)); | new MyItem(“Revolver”, 3) |

|  |  |  |
|---|---|---|
|  | getItems().get(0);<br>getItem("Revolver") |  |

| **Testing removeItem(Item item)** | **Input** | **Expected Value** |
|---|---|---|
| Remove an item | Item = new MyItem("Revolver", 3)<br>addItem(item);<br>getItems().size();<br>removeItem(item);<br>getItems().size(); | 1;<br>0; |

| **Testing setSpace(Space space) and getSpace()** | **Operation** | **Expected Value** |
|---|---|---|
| Set and get a space | setSpace(new MySpace(0, 0, 3, 3, "Kitchen"));<br>getSpace() | MySpace(0, 0, 3, 3, "Kitchen") |

| **Testing isNeighbor ()** | **Testing ideas** |
|---|---|
| Determine whether a player is the neighbor of current player | Add a player to the neighbor space of current player, then test if the new added player is current player's neighbor. |

| **Testing isSameSpace ()** | **Testing ideas** |
|---|---|
| Determine whether a player is in the same space of current player | Add a player to the current space of current player, then test if the new added player is in the same space of current player. |

| **Testing getMostPowerfulItemName ()** | **Input** | **Expected Value** |
|---|---|---|
| Get the most powerful item name | addItem(new MyItem("Revolver", 3))<br>addItem(new MyItem("Knife", 2)) | "Revolver" |

## Testing design for MyItem

| **Testing construction** | **Input** | **Expected Value** |
|---|---|---|
| Constructor disallows | MyItem("", 3) | IllegalArgumentException |

| | | |
|---|---|---|
| empty name | | |
| Constructor disallows null name | MyItem(null, 3) | IllegalArgumentException |
| Constructor disallows non-positive damage | MyItem(“Revolver”, 0) | IllegalArgumentException |

| **Testing getName()** | **Input** | **Expected Value** |
|---|---|---|
| Item with normal name | MyItem(“Revolver”, 0, 3) | “Revolver” |

| **Testing getDamage()** | **Input** | **Expected Value** |
|---|---|---|
| Item with positive damage | MyItem(“Revolver”, 0, 3) | 3 |

## Testing design for MySpace

| **Testing construction** | **Input** | **Expected Value** |
|---|---|---|
| Constructor disallows negative row1 | MySpace(-1, 0, 3, 3, “Kitchen”) | IllegalArgumentException |
| Constructor disallows negative col1 | MySpace(0, -1, 3, 3, “Kitchen”) | IllegalArgumentException |
| Constructor disallows the value of row2 to be less than the value of row1 | MySpace(0, 0, -3, 3, “Kitchen”) | IllegalArgumentException |
| Constructor disallows the value of col2 to be less than the value of col1 | MySpace(0, 0, 3, -3, “Kitchen”) | IllegalArgumentException |
| Constructor disallows empty name | MySpace(0, 0, 3, 3, “”) | IllegalArgumentException |
| Constructor disallows null name | MySpace(0, 0, 3, 3, null) | IllegalArgumentException |

| **Testing getPosition()** | **Input** | **Expected Value** |
|---|---|---|
| Space with correct position | MySpace(0, 0, 3, 3, “Kitchen”) | new int[]{0, 0, 3, 3} |

| **Testing getName()** | **Input** | **Expected Value** |
|---|---|---|
| Space with normal name | MySpace(0, 0, 3, 3, “Kitchen”) | “Kitchen” |

| **Testing addItem(Item item), removeItem(Item** | **Operation** | **Actual Testing** |
|---|---|---|

| **item), getItem(String itemName), and getItems()** | | |
|---|---|---|
| Test multiple methods | Item item = new Item("Revolver", 0, 3); | addItem(item);<br>assertTrue(getItems().get(0).equals(item));<br>assertEquals(getItem("Revolver", item)<br>removeItem(item);<br>assertEquals(getItems().size, 0); |

| **Testing addNeighbor(Space space) and getNeighbors()** | **Operation** | **Actual Testing** |
|---|---|---|
| Add a neighbor and get the neighbors list | Space space = new MySpace(0, 0, 3, 3, "Kitchen"); | Space newSpace = new MySpace(0, 4, 3, 6, "Parlor");<br>space.addNeighbor(newSpace);<br>assertEquals(getNeighbors ().get(0), newSpace) |

## Testing design for MyWorld (i.e., the model testing design)

| **Testing reading world.txt file** | **Testing ideas** |
|---|---|
| Read the txt file and generate the world | The MyWorld toString() method can print the world's information, so we can compare the printed information with the expected information after generating the MyWorld object. |

| **Testing invalid world description** | **Testing ideas** |
|---|---|
| The txt file has an invalid world size | Set the world size in the txt file to 36 × 0, then read the file. It should throw an IllegalArgumentException |

| **Testing invalid space** | **Testing ideas** |
|---|---|
| The txt file has overlapping sapces | Set two overlapping sapces in the txt file, then read the file. It should throw an IllegalArgumentException |

| **Testing invalid item** | **Testing ideas** |
|---|---|
| The txt file has an item with an | Set an item's space index to an non-existent index |

| | |
|---|---|
| space index out of bounds | in the txt file, then read the file. It should throw an IllegalArgumentException |

| **Testing getNeighbors() and displaySpaceInformation() under different neighboring conditions** | **Testing ideas** |
|---|---|
| Test a space with no neighbors | Make one space non adjacent to other spaces in the txt file, then read the file and get that space. Use assertEquals() to check if its getNeighbors() method returns a 0-length list, and check if its displaySpaceInformation() method returns the correct string. |
| Test a space with one neighbor | Find one space with only one neighbor. Use assertEquals() to check if its getNeighbors() method returns a 1-length list, and check if its displaySpaceInformation() method returns the correct string. |
| Test a space with multiple neighbors | Find one space with multiple neighbors. Use assertEquals() to check if its getNeighbors() method returns correct space list, and check if its displaySpaceInformation() method returns the correct string. |

| **Testing displaySpaceInformation() under other conditions** | **Testing ideas** |
|---|---|
| Test a space with no Items | Find one space with no items. Use assertEquals() to check if its displaySpaceInformation() method returns the correct string. |
| Test a space with one item | Find one space with one item. Use assertEquals() to check if its displaySpaceInformation() method returns the correct string. |
| Test a space with players | Add a player to a specified space. Use assertEquals() to check if its displaySpaceInformation() method returns the correct string. |

| **Testing the start space of the target character** | **Testing ideas** |
|---|---|
| The target character should start from space 0. | The target character should start from space 0, so we can just call getTargetCharacterPosition() |

| | |
|---|---|
| | method at the beginning to check if it returns 0. |

| **Testing moving target character** | **Testing ideas** |
|---|---|
| The target character can move from space 0 to space 1. | Call moveTargetCharacter() method once. Check if getTargetCharacterPosition() returns 1. |
| The target character can move multiple times. | Call moveTargetCharacter() method 10 times. Check if getTargetCharacterPosition() returns 11. |
| The target character can move from the last room in the index list to room 0. | Set x equals to the length of the space list. Call moveTargetCharacter() method x times. Check if getTargetCharacterPosition() returns 0. |

| **Testing getting players** | **Testing ideas** |
|---|---|
| Get the wrold's player list | The world should have an empty player list at the beginning, so getPlayers() returns an empty list. |

| **Testing adding players** | **Testing ideas** |
|---|---|
| Add human players | Add 2 human players, then use assertEquals() and assertSame() to test if they are the correct players. |
| Add computer players | Add 2 computer players, then use assertEquals() and assertSame() to test if they are the correct players. |

| **Testing displayPlayerInformation()** | **Testing ideas** |
|---|---|
| Display human player information | Add 1 human player carrying 1 item and another human player carrying 0 item, then use assertEquals() to check if the displayPlayerInformation() method returns the correct strings for both of them. |
| Display computer player information | Add 1 computer player carrying 1 item and another computer player carrying 0 item, then use assertEquals() to check if the displayPlayerInformation() method returns the correct strings for both of them. |

| **Testing taking turns** | **Testing ideas** |
|---|---|
| The players in the player list should take turns to play the game | Add 2 players, and reset the turn. Use assertSame() to check if the getTurn() method returns the first player. Then call nextTurn(), check if getTurn() |

| | |
|---|---|
| | method returns the second player. |

| Testing player moving around | Testing ideas |
|---|---|
| The players can move to neighboring spaces | Add 1 human player and 1 computer player, then move them to one of their neighboring space, respectively. Use assertSame() to check if they are in the expected spaces. |
| The players cannot move to non-neighboring spaces | Move a player to a non-neighboring space. It should throw an IllegalArgumentException. |

| Testing player picking up item | Testing ideas |
|---|---|
| The players can pick up item in current space when their item number doesn't reach the limit. | Add a player to a space with 2 items, then make the player pick up the 2 items. Use assertSame() to check if the player carry the expected items. |
| The players cannot pick up items that doesn't exist in current space | Make a player pick up a non-exist item. It should throw an IllegalArgumentException. |
| The players cannot pick up items when they have already carried enough items | Make a player pick up an item after their item number reached the limit. It should throw an UnsupportedOperationException. |

| Testing player looking around | Testing ideas |
|---|---|
| The player is in the initial space with the target character and the pet. | Add a player to the initial space. Use assertEquals() to check if the lookAround method returns the expected information (including target character and pet information). |
| The player is in a space which has a neighbor where the pet stays. | Add a player to a space which has a neighbor where the pet stays. Use assertEquals() to check if the lookAround method returns the expected information (the pet-occupied space should not reveal its information). |
| The player is in a space which doesn't have any items. | Add a player to a space which doesn't have any items. Use assertEquals() to check if the lookAround method returns the expected information (the item information should be correct). |

| Testing the start space of the pet | Testing ideas |
|---|---|
| The pet should start from space 0. | The pet should start from space 0, so we can just call assertSame() method to test if it stays in the |

| | |
|---|---|
| | correct space. |

| Testing moving pet | Testing ideas |
|---|---|
| The pet can be moved to a specified space | Move the pet to a specified space. Use assertSame() to check if it is in the expected space. |

| Testing pet wandering | Testing ideas |
|---|---|
| The pet should move with every turn following a depth-first traversal of the spaces in the world. | Let the game go through 4-5 turns. After each turn, check the position of the pet to confirm if it has entered each space according to the depth first rule. |

| Testing if the current player can be seen by others | Testing ideas |
|---|---|
| A player cannot be seen by its neighbor if the pet is in the same space. | Add a player A to the space where the pet stays, then add another player B to its neighbor. Player B shouldn't be able to see player A. |
| A player can be seen by other players in the same space, even if the pet is in the same space. | Add two players to the space where the pet stays. The two players should be able to see each other. |
| A player cannot be seen by others if there is no other player staying in the same space or neighbor spaces. | Add a player to a space which doesn't have any other player as well as neighbor players. The player shouldn't be seen by any others. |

| Testing computer player automatic make an attempt | Testing ideas |
|---|---|
| When a computer player stays with the target character in the same space, the player should automatically make an attempt with the most powerful item if no one can see he/she. | Add a computer player to the space where the target character stays. Make sure the player has some items and cannot be seen by others. The player should then automatically make an attempt with the most powerful item. |

| Testing making an attempt | Testing ideas |
|---|---|
| A computer player makes an attempt with an item successfully. | Add a computer player to the space where the target character stays. Make sure the player has some items and cannot be seen by others. The player should then make an attempt successfully. |
| A human player makes an | Add a human player to the space where the target |

| | |
|---|---|
| attempt with an item successfully. | character stays. Make sure the player has some items and cannot be seen by others. Make the player attack the target character. The player should then make an attempt successfully. |
| A computer player fails to make an attempt because there are other players in the same space. | Add a computer player to the space where the target character stays. Then add another player to the same space. Make the player attack the target character. The player should then fail to make an attempt. |
| A human player fails to make an attempt because there are other players in the same space. | Add a human player to the space where the target character stays. Then add another player to the same space. Make the player attack the target character. The player should then fail to make an attempt. |
| A computer player makes an attempt successfully with pet's help. | Add a computer player to the space where the target character stays. Make sure the player has a neighbor player and the pet is in that neighbor space. Make the player attack the target character. The player should then make an attempt successfully. |
| A human player makes an attempt successfully with pet's help. | Add a human player to the space where the target character stays. Make sure the player has a neighbor player and the pet is in that neighbor space. Make the player attack the target character. The player should then make an attempt successfully. |
| A computer player fails to make an attempt because there are other players in the neighbor space without pet. | Add a computer player to the space where the target character stays. Then add another player to a neighbor space without pet. Make the player attack the target character. The player should then fail to make an attempt. |
| A human player fails to make an attempt because there are other players in the neighbor space without pet. | Add a human player to the space where the target character stays. Then add another player to a neighbor space without pet. Make the player attack the target character. The player should then fail to make an attempt. |
| A computer player makes an attempt without any item successfully. | Add a computer player to the space where the target character stays. Make sure the player has no item and cannot be seen by others. The player should then make an attempt successfully. |
| A human player makes an attempt without any item successfully. | Add a human player to the space where the target character stays. Make sure the player has no item and cannot be seen by others. Make the player attack the target character. The player should then |

| | |
|---|---|
| | make an attempt successfully. |
| A player cannot use pokeEyes if the player has at least 1 item. | Add a player to the space where the target character stays. Make sure the player has at least 1 item and cannot be seen by others. Make the player attack the target character by poking him in the eye. This should throw an IllegalArgumentException. |

## Testing design for GameController

| **Testing start()** | **Testing ideas** |
|---|---|
| Start the game | Use a mock model to test whether the game can successfully complete a run |

| **Testing AddComputerPlayer** | **Testing ideas** |
|---|---|
| Add a computer-controlled player | Use a mock model to test whether a computer controlled player is successfully added to the game after execute() |

| **Testing AddHumanPlayer** | **Testing ideas** |
|---|---|
| Add a humancontrolled player | Use a mock model to test whether a human controlled player is successfully added to the game after execute() |

| **Testing DisplayPlayerInformation** | **Testing ideas** |
|---|---|
| Display a player’s information | Use a mock model to test whether a player’s information is correctly displayed after execute() |

| **Testing DisplaySpaceInformation** | **Testing ideas** |
|---|---|
| Display a space’s information | Use a mock model to test whether a space’s information is correctly displayed after execute() |

| **Testing GenerateMap** | **Testing ideas** |
|---|---|
| Generate the world map | Use a mock model to test whether the map is successfully generated after execute() |

| **Testing LookAround** | **Testing ideas** |
|---|---|
| Display the neighboring information of the space a computer player is currently occupying | Use a mock model to test whether the current computer player’s neighboring information is correctly displayed after execute() |
| Display the neighboring information of the space a human player is currently occupying | Use a mock model to test whether the current human player’s neighboring information is correctly displayed after execute() |

| **Testing MovePlayer** | **Testing ideas** |
|---|---|
| Move a computer player from current space to a neighbor space | Use a mock model to test whether the computer player moves to expected space after execute() |
| Move a human player from current space to a neighbor space | Use a mock model to test whether the human player moves to expected space after execute() |

| **Testing PickUpItem** | **Testing ideas** |
|---|---|
| A computer player pick up an item from current space | Use a mock model to test whether the chosen item is successfully picked up by the computer player after execute() |
| A human player pick up an item from current space | Use a mock model to test whether the chosen item is successfully picked up by the human player after execute() |

| **Testing movePet** | **Testing ideas** |
|---|---|
| A computer player move the pet to a specified space | Use a mock model to test if the pet is in the specified space after execute() |
| A human player move the pet to a specified space | Use a mock model to test if the pet is in the specified space after execute() |

| **Testing makeAnAttempt** | **Testing ideas** |
|---|---|
| Make an attempt on the target character's life successfully | Use a mock model to test if the target character's life is reduced after execute() |
| Fail to make an attempt on the target character's life | Use a mock model to test if the attack fails after execute() |
| A computer player automatically makes an attempt with the most powerful item | Use a mock model to test if the computer player automatically makes an attempt with the most powerful item after execute() |

| **Testing Human player win** | **Testing ideas** |
|---|---|
| A human player kills the target character and win the game | Use a mock model to let a human player kills the target character, and test whether the printed information shows that the human player win |

| **Testing Computer player win** | **Testing ideas** |
|---|---|
| A computer player kills the target character and win the game | Use a mock model to let a computer player kills the target character, and test whether the printed information shows that the computer player win |

| **Testing target character escapes** | **Testing ideas** |
|---|---|
| The maximum number of turns is reached in which case the target character escapes and runs away to live another day and nobody wins | Use a mock model to play the game, and make sure the target character is not killed until the game ends. Test whether the printed information shows that it’s a tie game |