# Algoritmos y Programación II

# Identificación del problema y análisis de requerimientos

| Cliente | Company Snake and Ladders Inc |
| --- | --- |
| User | Player |
| Requerimientos funcionales | **R1- Register players:** In the game, there can only be 3 players, each of them has a sign assigned to them, they can choose it, and would be represented with it.  **R2- Create game grid:** When the player is about to start playing, they will be asked to enter the number of rows and columns of the board to be generated.  **R3 - Assignment of ladders and snakes:** Snakes are represented by letters such as A, they connect a square with a lower square. Ladders are represented by numbers such as 1, they connect a square with a higher square.  **R4- Feature: throw the dice:** Randomly the player throws the dice and N squares forward. If it lands on a snake, the player moves backwards along the board. If it lands on a ladder, the player moves forward. If it lands on a normal square, the player stays on that square.  **R5- Feature: see ladders and snakes:** When it is the turn of a player, this one can choose the option of seeing where the snakes and ladders are located, and the grid is displayed in the console.  **R6- Use of ladders and snakes:** If the player falls on the square containing a ladder, he will proceed to move forward in squares, i.e. on the other square of the ladder, if he falls on a snake, he will proceed to move backwards until he falls on the tail of the snake.  **R7- Move players:** Each player is going to throw the dice. The dice, randomly, will give the number of squares the player advances. If the player lands in the head of a snake it will go down to another square, but if it lands in a stair it’ll go up to another square. And if it lands in a normal square, the player will stay there.  **R8- Game over:** The game ends when a player reaches the last square. The player gets a score that can be calculated from the following formula:  Score = (600 - t) / 6. Where t is the time in seconds elapsed between the start of the game and when one of the players reaches the goal. After 10 minutes, the score becomes negative.  **R9- Final score:** The final score of each player will be displayed after they cross the goal, it will be shown as an ordered list of the highest score to the lowest score and it will be stored in a binary search tree. |
| Contexto del problema | The company Snakes and Ladders Inc. wants to develop a program that allows players to play and also simulate the game Snakes and Ladders. Three players can play the game, all of them starting in the first square, represented with different signs such as \* ! O X % $ # + &. The three gamers in their turn can choose between throwing the dice or choosing to see where the snakes and ladders are, at the final of the game there would be an ordered list of the highest score to the lowest score. |
| Requerimientos no funcionales | -Use of programming language “Java”. |

| Nombre o identificador | **R1- Register players:** In the game, there can only be 3 players, each of them has a sign assigned to them, they can choose it, and would be represented with it. | | |
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| Resumen | The three players can choose a sign to be represented, and with this, they would play. They can choose between these signs: \* ! O X % $ # + &. Each player has to have a different sign. | | |
| Entradas | **Nombre entrada** | **Tipo de dato** | **Condición de selección o repetición** |
| player1Sign | String |  |
| player2Sign | String |  |
| player3Sign | String |  |
| Actividades generales necesarias para obtener los resultados | * Each player has to choose a sign. * The sign cannot repeat. | | |
| Resultado o Postcondición | The players are assigned each one with a sign that is going to represent them in the game. | | |
| Salidas | **Nombre salida** | **Tipo de dato** | **Condición de selección o repetición** |
| playersAssigned | String |  |

| Nombre o identificador | **R2- Create game grid:** The player sets the parameters of rows and columns. | | |
| --- | --- | --- | --- |
| Resumen | When the player is about to start playing, they will be asked to enter the number of rows and columns of the board to be generated. | | |
| Entradas | **Nombre entrada** | **Tipo de dato** | **Condición de selección o repetición** |
| numOfRows | int |  |
| numOfColumns | int |  |
| Actividades generales necesarias para obtener los resultados | * One player has to write the number of rows and columns, to create the grid. | | |
| Resultado o Postcondición | The game grid will be created according to the parameters of rows and columns set by the player. | | |
| Salidas | **Nombre salida** | **Tipo de dato** | **Condición de selección o repetición** |
| generatedGrid | String |  |

| Nombre o identificador | **R3 - Assignment of ladders and snakes:** Snakes are represented by letters such as A, they connect a square with a lower square. Ladders are represented by numbers such as 1, they connect a square with a higher square. | | |
| --- | --- | --- | --- |
| Resumen | Snakes will take the player down to a lower square if they land on it. On the other hand, the ladders will take the player up to a higher square if they land on it. A snake cannot be in the goal square, and a ladder cannot be in the starter square. When the players choose to play, they would be asked to write how many snakes and ladders are going to be in the game. | | |
| Entradas | **Nombre entrada** | **Tipo de dato** | **Condición de selección o repetición** |
| snakesInGame | int |  |
| laddersInGame | int |  |
| Actividades generales necesarias para obtener los resultados | * The players have to input the amount of snakes and ladders. | | |
| Resultado o Postcondición | The snakes and ladders are assigned randomly inside the grid. | | |
| Salidas | **Nombre salida** | **Tipo de dato** | **Condición de selección o repetición** |
| snakesAndLaddersAssigned | String |  |

| Nombre o identificador | **R4- Feature: throw the dice:** The player will choose the option “Roll dice”, to move through the board. | | |
| --- | --- | --- | --- |
| Resumen | Randomly the player throws the dice and moves N squares forward. If it lands on a snake, the player moves backwards along the board. If it lands on a ladder, the player moves forward. If it lands on a normal square, the player stays on that square. | | |
| Entradas | **Nombre entrada** | **Tipo de dato** | **Condición de selección o repetición** |
|  |  |  |
| Actividades generales necesarias para obtener los resultados | -The player have to choose the option “Roll dice” to be able to move across the board | | |
| Resultado o Postcondición | The player will move to another square on the board, and will have his respective moves depending on whether he falls on a ladder, a snake or a normal square. | | |
| Salidas | **Nombre salida** | **Tipo de dato** | **Condición de selección o repetición** |
| diceNumber | String |  |

| Nombre o identificador | **R5- Feature: see ladders and snakes:** When it is the turn of a player, this one can choose the option of seeing where the snakes and ladders are located, and the grid is displayed in the console. | | |
| --- | --- | --- | --- |
| Resumen | When it is the turn of a player to play they can choose the grid to see where the snakes and ladders are located. | | |
| Entradas | **Nombre entrada** | **Tipo de dato** | **Condición de selección o repetición** |
|  |  |  |
| Actividades generales necesarias para obtener los resultados | * The player chooses the option of seeing the snakes and ladders. | | |
| Resultado o Postcondición | * The player is available to see the grid with the location of the snakes and ladders. | | |
| Salidas | **Nombre salida** | **Tipo de dato** | **Condición de selección o repetición** |
| snakesAndLaddersLocation | String |  |

| Nombre o identificador | **R6- Use of ladders and snakes:** According to the square the player falls, either snake will make them move back in squares, while the ladder will make them move forward in squares. | | |
| --- | --- | --- | --- |
| Resumen | If the player falls on the square containing a ladder, they will proceed to move forward in squares, on the other square of the ladder, if he falls on a snake, he will proceed to move backwards until he falls on the tail of the snake. | | |
| Entradas | **Nombre entrada** | **Tipo de dato** | **Condición de selección o repetición** |
|  |  |  |
| Actividades generales necesarias para obtener los resultados | -The player has to choose the option “Roll dice”, to move through the board.  -The player must land on a snake square to move backwards.  -The player must land on a ladder square to advance.. | | |
| Resultado o Postcondición | The player will move on the board according to the square they fall on. It can be ladders, snakes or normal. | | |
| Salidas | **Nombre salida** | **Tipo de dato** | **Condición de selección o repetición** |
|  |  |  |
|  |  |

| Nombre o identificador | **R7- Move players:** Each player is going to throw the dice. The dice, randomly, will give the number of squares the player advances. If the player lands in the head of a snake it will go down to another square, but if it lands in a stair it’ll go up to another square. And if it lands in a normal square, the player will stay there. | | |
| --- | --- | --- | --- |
| Resumen | The player will move the number that it gets in the dice, if it lands in a ladder they will go up, if it lands in a snake it will go down. But if they land in a normal square, which has no snakes or ladders, it will stay there. | | |
| Entradas | **Nombre entrada** | **Tipo de dato** | **Condición de selección o repetición** |
| diceNumber | int |  |
| Actividades generales necesarias para obtener los resultados | * The player must throw the dice so it can move in the grid. | | |
| Resultado o Postcondición | The player advances in the grid if they land in a normal square or in the bottom of a ladder, or it will move back if they land in the head of a snake. | | |
| Salidas | **Nombre salida** | **Tipo de dato** | **Condición de selección o repetición** |
| gridDisplay | String |  |

| Nombre o identificador | **R8- Game over:** The game ends when the last player reaches the goal. | | |
| --- | --- | --- | --- |
| Resumen | The player gets a score that can be calculated from the following formula:  Score = (600 - t) / 6. Where t is the time in seconds elapsed between the start of the game and when one of the players reaches the goal. After 10 minutes, the score becomes negative. | | |
| Entradas | **Nombre entrada** | **Tipo de dato** | **Condición de selección o repetición** |
|  |  |  |
| Actividades generales necesarias para obtener los resultados | -One of the players must cross the goal of the board. | | |
| Resultado o Postcondición | The formula (600 - t) / 6 will be used to calculate the winning player's score. | | |
| Salidas | **Nombre salida** | **Tipo de dato** | **Condición de selección o repetición** |
|  |  |  |

| Nombre o identificador | **R9- Final score:** The final score of each player will be displayed after they cross the goal, it will be shown as an ordered list of the highest score to the lowest score and it will be stored in a binary search tree. | | |
| --- | --- | --- | --- |
| Resumen | After each player crosses the goal it will be displayed in an ordered list with the highest score to the lowest. The scores will be stored in a binary tree. | | |
| Entradas | **Nombre entrada** | **Tipo de dato** | **Condición de selección o repetición** |
|  |  |  |
| Actividades generales necesarias para obtener los resultados | * At least one player must have crossed the goal to be displayed on the list. | | |
| Resultado o Postcondición | The list is displayed in the console for the players to see. | | |
| Salidas | **Nombre salida** | **Tipo de dato** | **Condición de selección o repetición** |
| orderedList | String |  |