

STATEMENT

MEMBERS:

Gabriel Suarez -A00368589SIS

Alejandro Varela -A00369019TEL & SIS

Luis Alfonso Murcia Hernández-A00369008 TEL

TEACHER:

Anibal Sosa Aguirre

ALGORITHMS AND DATA STRUCTURE

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In theory, **labyrinths** are a construction made with one or more paths that deceive those who walk through it to make it difficult to find the only way out and throughout our lives it has been shown that this type of game entertains people to such an extent allow enough time to be spent trying to solve them. And speaking of its origins, we can know two presentations:

In Greek mythology, **The Minotaur Labyrinth or Cretan Labyrinth** was built by Daedalus to contain the Minotaur, son of the Cretan queen Pasiphae and a white bull.

The myth tells that King Minos, husband of Pasiphae and son of Zeus, does not fulfill his promise to sacrifice the white bull that Poseidon had made emerge from the water to be the tribute that would ensure the victory desired by Minos himself.

King Minos was punished with the possession of Pasiphae for an uncontrollable attraction for the white bull from whose relationship the Minotaur is born, who only fed on humans.



In the Minotaur's labyrinth, fourteen young men from the city's noble families were offered annually as food for the monster.

On the other hand, **The Labyrinth of the Cathedral of Chartres**, located in France, was built in the main nave of the cathedral in 1220. The identified labyrinth is one of the most famous, and one of the few that lasted with the passage of the time, visited and admired by pilgrims and historians.

In the third century, Christians in Europe used to make pilgrimage to the Holy Land. Due to the difficulties of the time of the Crusades, the labyrinth emerged as a symbolic and mystical resource in some cathedrals, whose route replaced the pilgrimage.

Finally, Theseus decides to offer himself as a tribute one year to kill the Minotaur and end



this punishment. Before leaving, Theseus and the daughter of King Minos, Ariadne fall in love. Ariadne, knowing that one of the challenges of the labyrinth is the meeting of the exit, gives Theseus a ball of gold thread that will help him in that task after having killed the monster with

the head of a bull and the body of a human.

Unfortunately, the labyrinths have lost their innovation over time and although they change the way of going through them, they still have the same meaning, to find the exit.

In order to keep the game alive, the **ICESI University** launched 3 students from the Telematics and Systems careers, to devise an application to be able to observe a game with different characteristics, using qualities that any Icesista must have for the correct development of the software.

For that reason, it was decided to propose a series of **requirements** that the application was going to have, as well as some rules of the game for the user.

The program must have a graphical interface that allows the visualization of most of the functionalities with which the application will have. In the first instance, it must allow the user to choose an avatar which will be the one that will be known from his arrival until his completion, apart from that, he will be able to choose the mode in which he wants to play, so that he himself is the selector of his own destiny.

After choosing a mode, the application will generate a world, with a number of random doors and rooms, the treasure in one room and the key in another (Only in normal and hard mode), which will be the one needed to open it, and finally the required tokens of the user.

It must allow to visualize the number of doors that are available as the game progresses, to update the user on how they are doing during the game and in addition to that, allow the visualization of the lives (tokens) that each have left. user in real time.

It must also be able to show the best possible path to the treasure after finishing the game, either by losing or having won, this in order to show the users the decisions they should make, if they wanted to arrive with the fewer doors possible.

Here are the **rules of the game** so that the instance within the application is the best.

Rules of the game:

1. Each user will be able to choose between three different game modes, easy, normal, and difficult.
 - **Easy mode:** There is a world with a number of randomly generated rooms and with the sole purpose of finding the treasure that will be in a specific room (**randomly generated**).
 - **Normal mode:** There is a world, with a number of rooms slightly greater than the easy mode, with the difference that a necessary key is generated to open the treasure, as you advance to get to it, there will be infernal doors that you must go through and when you pass over there, they will make you lose tokens.
 - **Difficult mode:** There is a world, with a much greater number of rooms than the easy mode, with the difference that a necessary **key is generated** to open the treasure, as you advance to get to it, there will be **infernal doors** that when passing through there will make you lose chips, but with the advantage that there are **golden doors** that will make you win them. It should be considered that to get to the key there will be at least one infernal door to go through and also that there are **enchanted rooms** that give you a **clue** when you enter them.
2. At the start of the game, each participant will be given a certain number of 'tokens' that will depend on the difficulty of the path to the treasure.
3. When the tokens reach 0, the game is over instantly, and you lose tokens depending on the game mode:
 - **Easy mode:** There are **only silver doors**, when you go through a door, you lose a token.
 - **Normal Mode:** There are **silver doors** and **infernal doors**, when you go through a silver door, you lose a token, if you cross an infernal door, you lose from two to five tokens.

- **Difficult mode:** There are **silver doors**, **infernal doors**, and **golden doors**, when you go through a silver gate, you lose one token, if you cross a hell gate, you lose two and if you go through a gold gate, you win one to three tokens.
4. The player who manages to find the treasure without having spent all his tokens wins.
 5. At the end of the game, either due to lack of tokens or having obtained the treasure, the best possible path will be shown to complete the game with the given number of tokens.