

MTC True Tech



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ConstellationGame

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Goal and Objectives

The goal of the project is to create a service that allows users to improve their skills in the astronomical game "Constellations" against an artificial intelligence opponent.

Objectives:

- Create a resource for learning this unique educational game and promoting it
- Make the game playable without an opponent or organizer present
- Offer players different difficulty levels for a comfortable learning pace

Functional Requirements

The game consists of three stages.

1. Game creation:

The user selects the difficulty and other game settings (number of lives, hints, input method). The system creates a game with random starting and target constellations.

2. Gameplay:

The player sees the starting, target, and current constellation. They enter a constellation to make a move.

Move validation:

- whether the constellation exists
- whether it borders the current one
- whether it has already been visited



Functional Requirements

Next, the neural network's move is generated, and the turn passes back to the player.

3. Game completion:

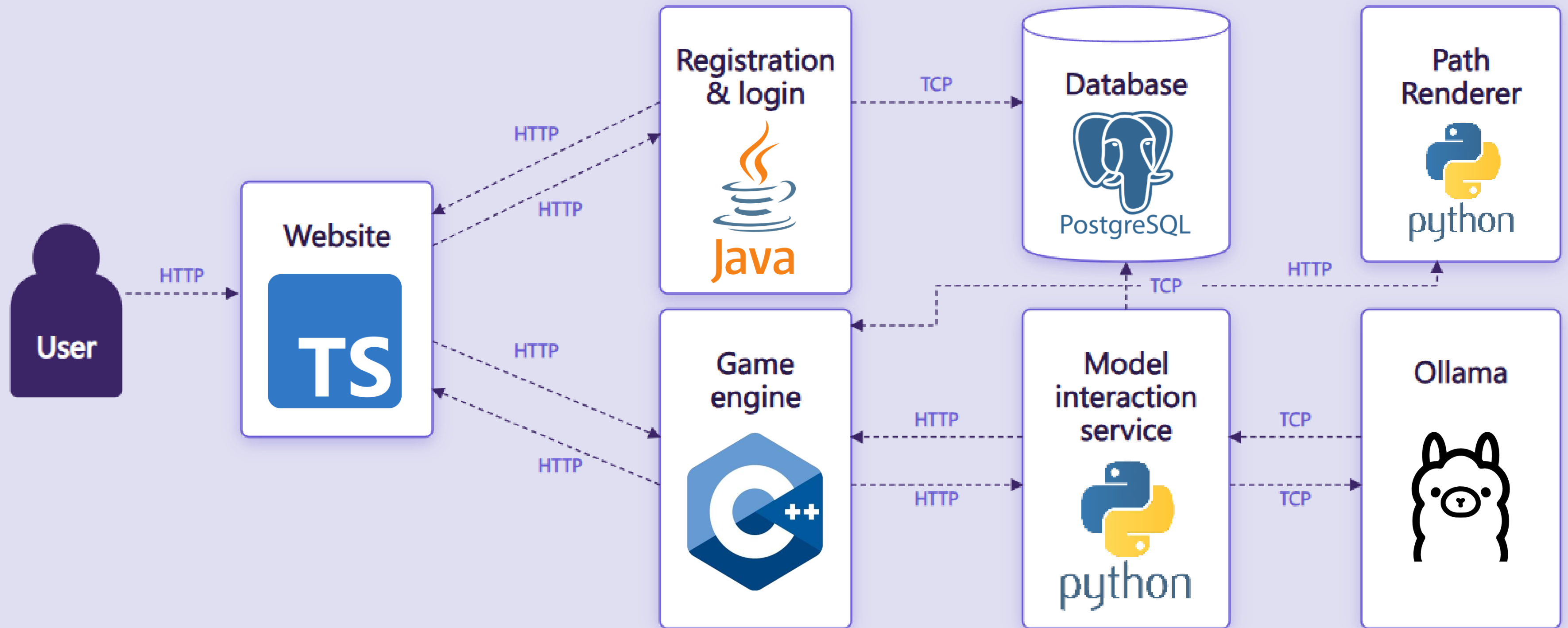
Win — if the goal is reached or the model reaches a dead end.

Loss — if the player runs out of lives or the model leads the player into a dead end.

The results page displays a map of the path taken and information about the game.



Architecture



Backend



C++:

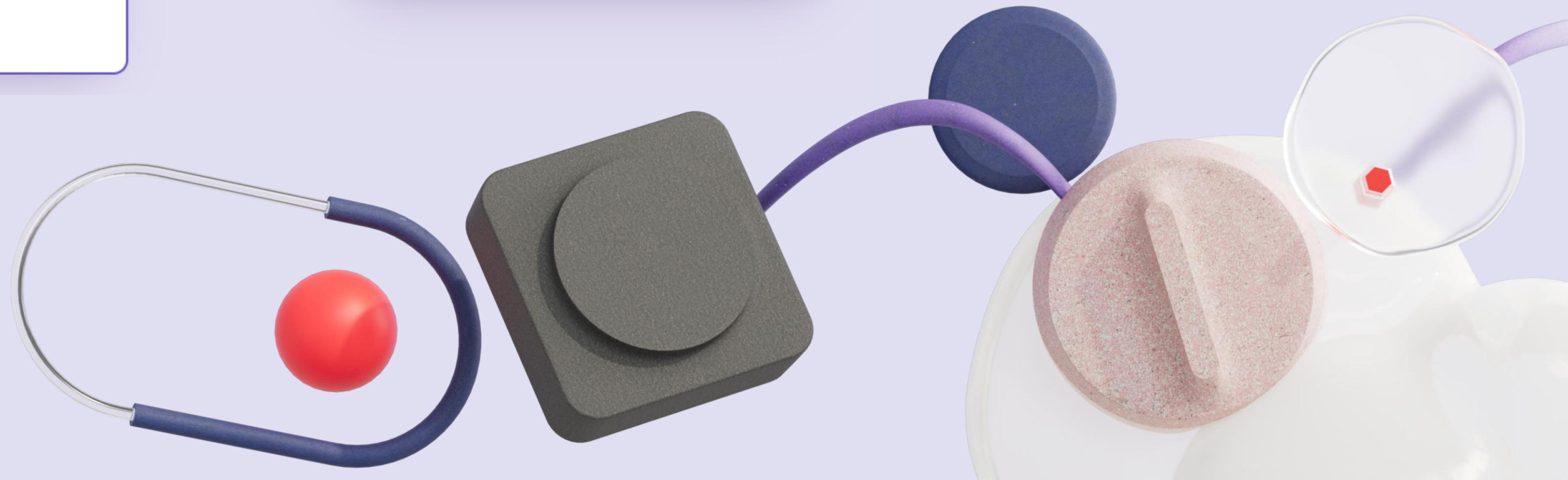
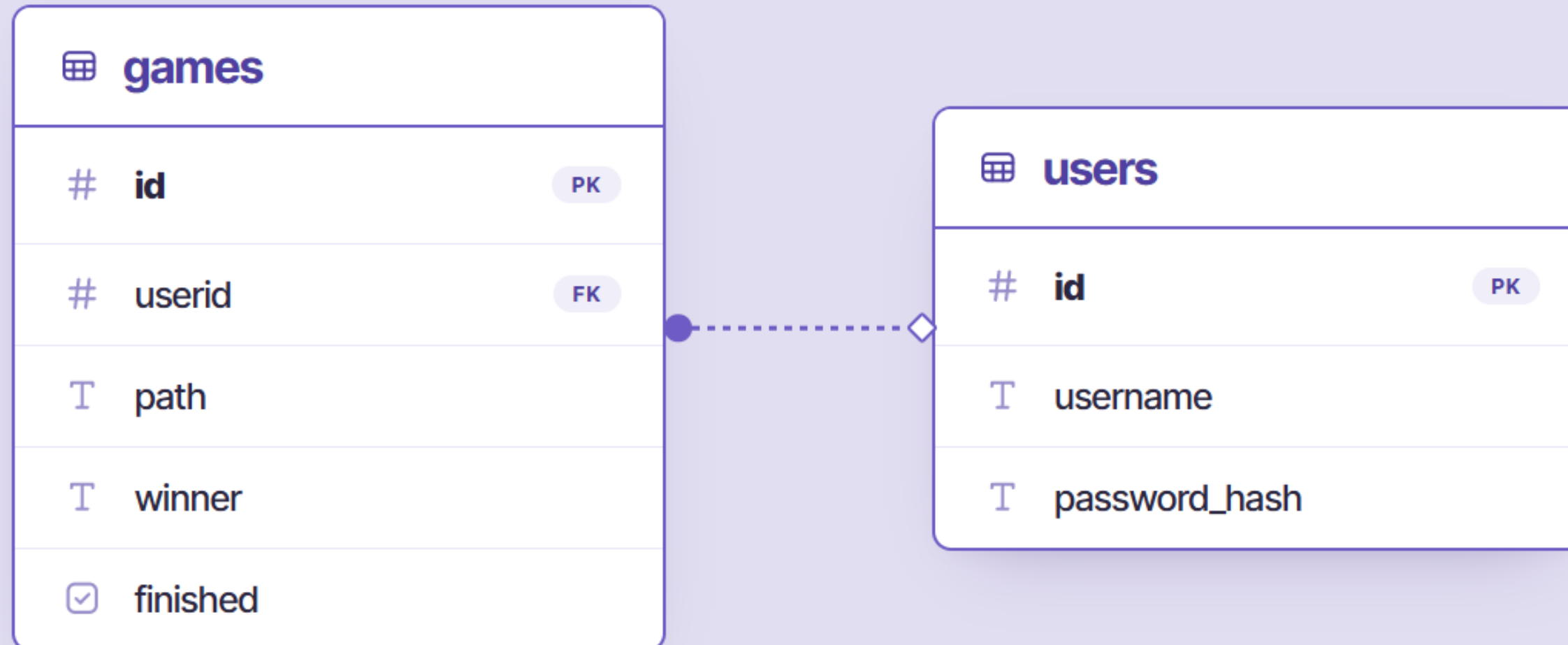
Multiplayer mode is implemented. When loading games, the HTTP server selects only the current user's sessions.

Java

Registration and authentication are implemented in Java with Spring Boot. It handles account creation and login requests, validates data, and hashes passwords.



Database



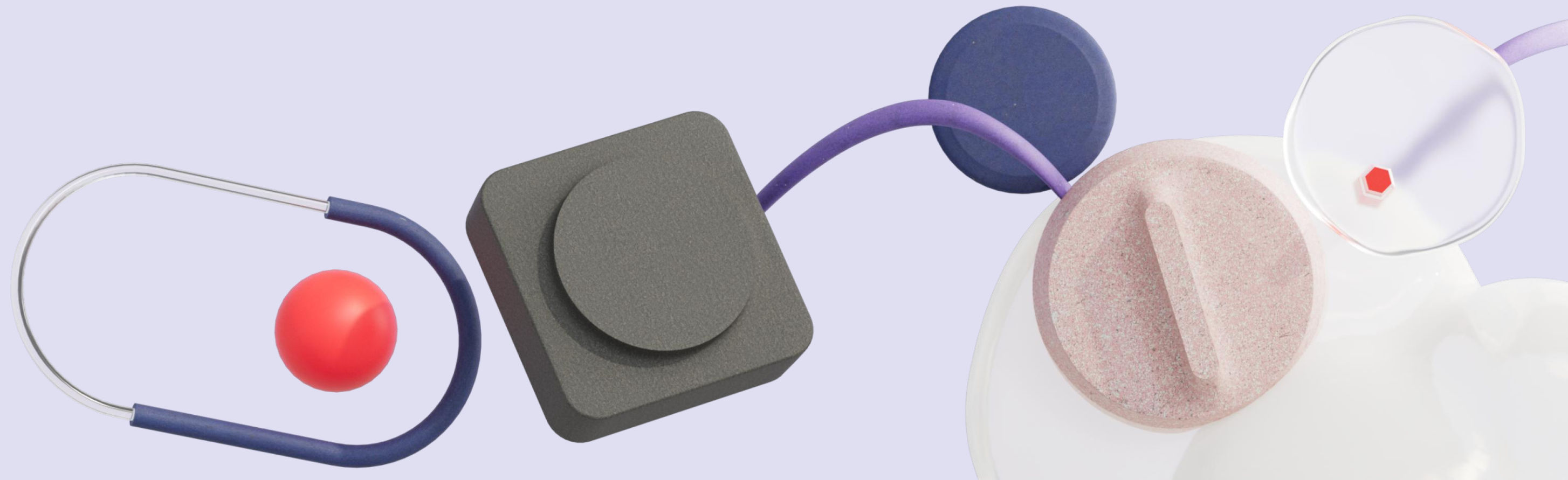
AI model



As an AI opponent in the game, the language model Gemma 3 4B is used.

The choice of this model is due to a number of factors:

- Local deployment.
- Optimal size.
- Instruction-following.
- License.



Moves of AI



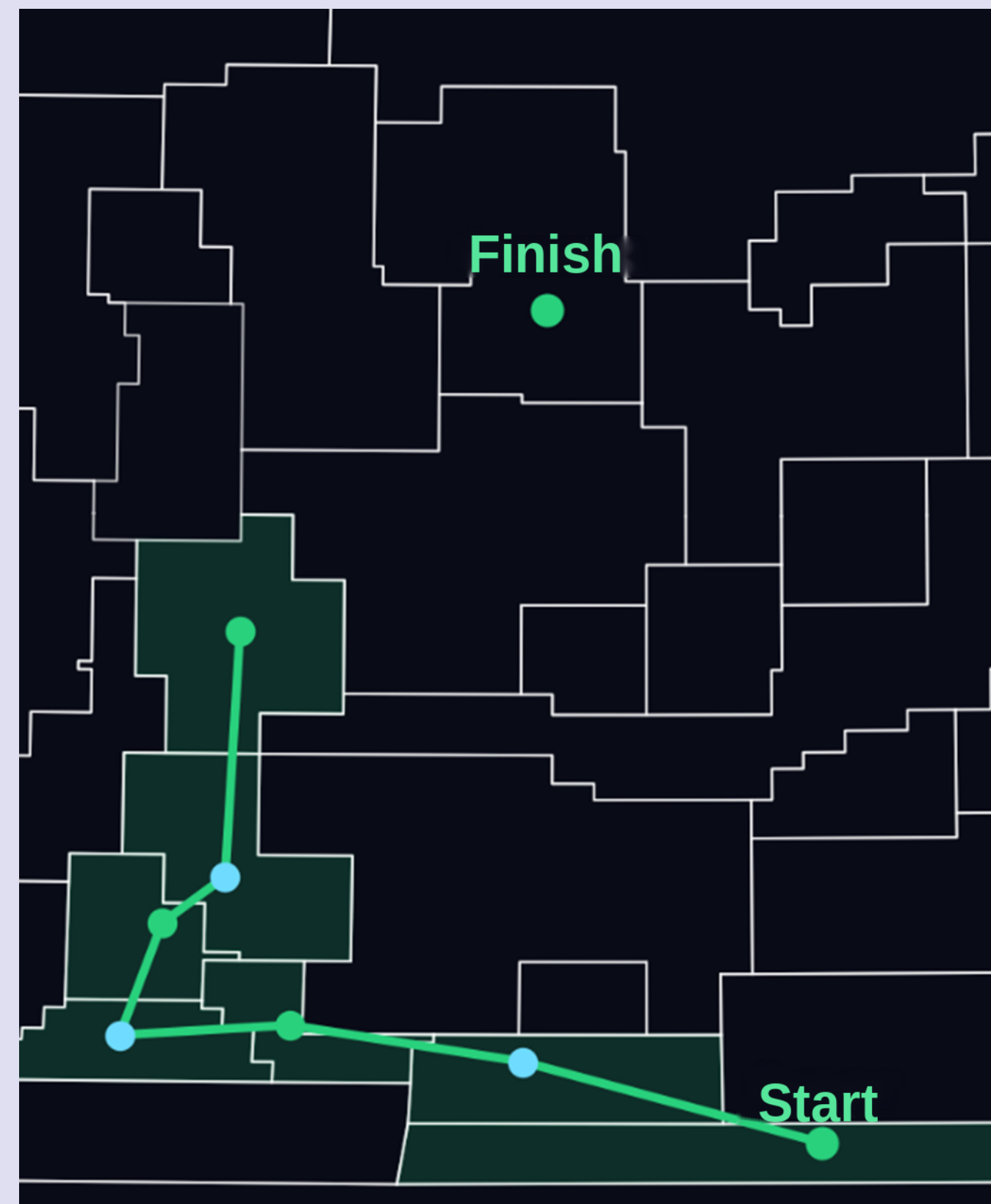
Avoiding constellations bordering the final one



AI model



User



Knows known traps

Demonstration

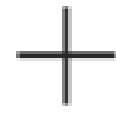


Future Plans

1. Launch of multiplayer game mode
2. Introduction of a training mode with hints from the model, for practicing game tactics
3. Expansion of the set of game settings
4. Implementation of a built-in stereographic projection engine
5. Launch of a leaderboard and advanced analytics of the user's game history



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We're ready to
answer your
questions!

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