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Puzzle Generator System Requirements Document

Team Prometheus

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1 Introduction

Puzzles have been a hobby of many people over the centuries, coming in various forms which have various ways of solving. Puzzles have played a role in people's problem solving skills. Puzzle generators have allowed for more puzzles to be created, using various techniques to create interesting and challenging puzzles.

The system involves the creation of 3-Dimensional puzzles (manually and from the use of AI), testing of puzzles, sharing and rating of puzzles by other users,

as well as the ability of downloading 3D printable files. Team Prometheus believes that the business need of this system is there - to automate the process of creating puzzles.

2 User Characteristics

We classified our users according to the following categories:

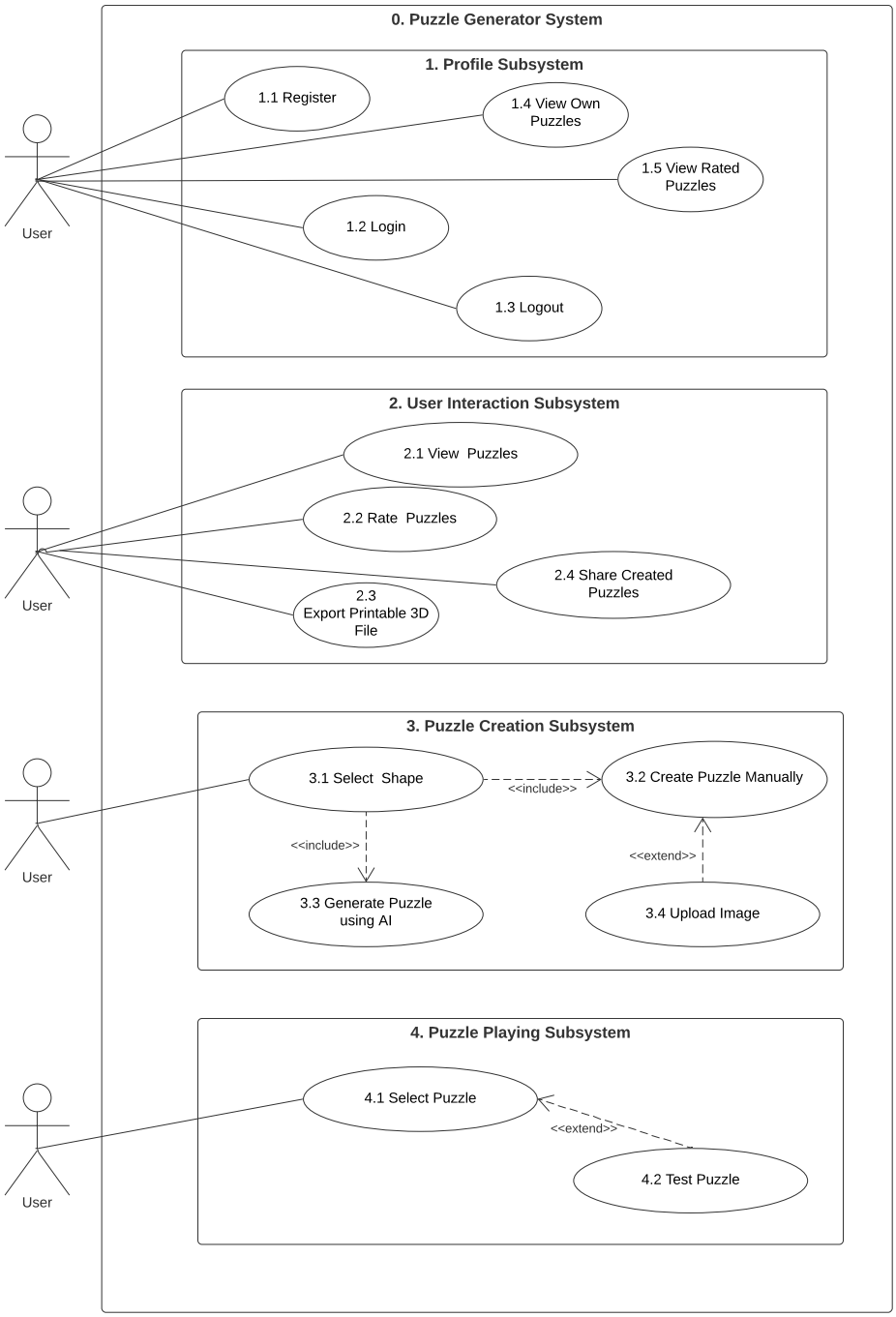
- Puzzle Enthusiasts - these can be users of any age, be it little kids, teenagers or adults who like playing with puzzles.
- Parents - some parents may want to make puzzles for their children to play with.
- Educational Users - these can be teachers who want to teach children with conditions like autism, motor skills.

3 Functional Requirements

3.1 Use Cases

- UC1: Register
- UC2: Login
- UC3: Logout
- UC4: View Own Puzzles
- UC5: View Rated Puzzles
- UC6: View Puzzles
- UC7: Rate Puzzles
- UC8: Export Printable 3D File
- UC9: Share Created Puzzles
- UC10: Select Shape
- UC11: Manually Create Puzzle
- UC12: Generate Puzzle Using AI
- UC13: Upload Image
- UC14: Select Puzzle
- UC15: Test Puzzle

3.1.1 Use Case Diagram



3.1.2 Use Case Diagram Description

Profile Subsystem
A user can use the register use case to create a new account, login as a registered user, and logout of his/her account. Once the user has a profile, the user can view a list of the puzzles that s/he has created and rated.

User Interaction Subsystem
This subsystem aims to highlight how the user interacts with created puzzles on the website. The user can view created puzzles, rate these puzzles, share their own puzzle creations and export puzzles to printable 3D files.

Puzzle Creation Subsystem
The user can uses this subsystem during puzzle creation. The user selects a desired shape from which they can decide to create the puzzle manually or use the AI to generate the puzzle. If a user decides on manual puzzle creation, they may upload an image for the puzzle

Puzzle Playing Subsystem
The user interacts with this subsystem when playing a puzzle. The user selects a desired puzzle and tests it (plays it).

3.2 Requirements

- R1: The System must allow the user to register, and login to, a user profile.
- R2: The system must allow the user to rate puzzles.
- R3: The system must allow the user to view or play puzzles.
- R4: The system must allow the user to create a puzzle.
- R5: The system must be able to generate a puzzle through the use of Artificial Intelligence.
- R6: The system must be hosted on a web server.
- R7: The system must be able to export a puzzle to a 3-dimensional printable file.
- R8:The system must be able to store puzzles that have been created.
- R9: The system must be allow the user to choose the initial shape of the puzzle.
- R10: The puzzle must be able to upload an image to create a puzzle from.
- R11: The system must be able to store user profiles.

3.3 Subsystems

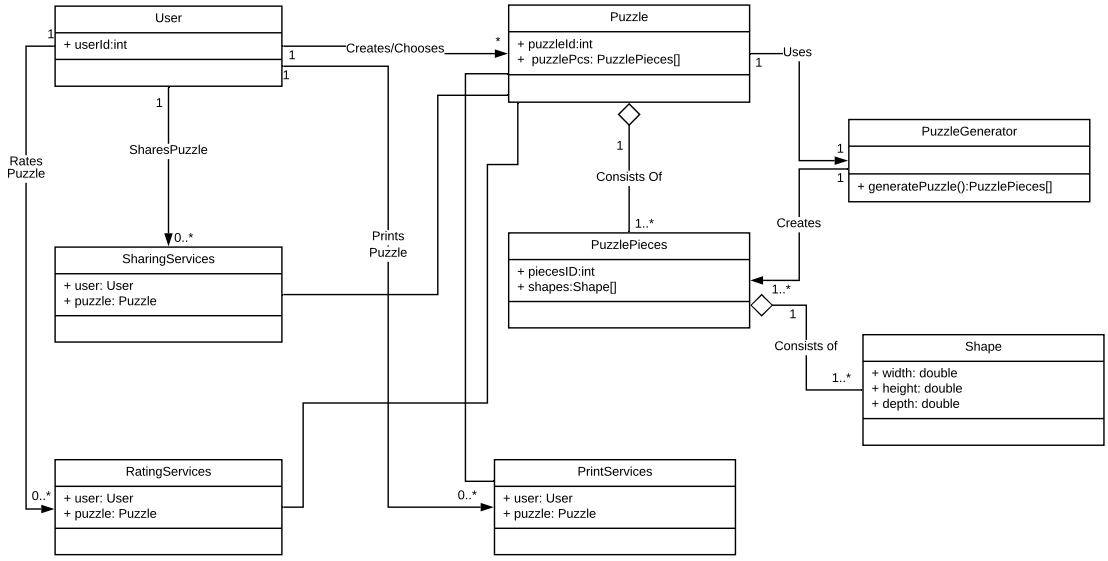
3.4 Trace-ability Matrix

Requirement	Priority	UC1	UC2	UC3	UC4	UC5	UC6	UC7	UC8	UC9	UC10	UC11	UC12	UC13	UC14	UC15
1	4	X	X	X												
2	2					X		X								
3	1						X									X
4	1											X				
5	1												X			
6	3															
7	2								X							
8	5									X						
9	5														X	
10	2										X			X		
11	3				X											
	UC Priority	5	5	5	4	3	2	2	2	5	5	1	1	2	5	1

3.5 User Stories

4 Domain Model

Below is our domain model. The PuzzleGenerator class will make use of pattern recognition in AI.



4.1 Description of classes

4.1.1 User

The User class will be used for user management. Each user can create and choose as many puzzles as they want. Each user can also rate, share and print as many puzzles as they want hence the link between the User class and SharingServices, RatingServices and PrintServices classes.

4.1.2 Puzzle

The Puzzle class is used to maintain the different puzzles. The puzzle consists of 1 to many different puzzle pieces. When AI is used, i.e. the puzzle is not generated manually, the puzzle class makes use of the puzzle generator class which in turn uses pattern recognition to create the different puzzle pieces. The puzzle class is linked to the user class as the user interacts with the puzzle and each puzzle is owned by a user. The Puzzle class is also linked to the SharingServices, RatingServices and PrintServices classes as each of these services is linked to a certain puzzle.

4.1.3 PuzzleGenerator

The PuzzleGenerator will use AI in specific pattern recognition to generate the puzzle pieces for the Puzzle class.

4.1.4 Shape

The Shape class is used to get the specific shape of the puzzle pieces. Each puzzle piece can be made up of one to many different shapes.

4.1.5 SharingServices

The SharingServices class is responsible for sharing puzzles. The SharingServices class is linked to the user and puzzle classes as this is needed when using the service.

4.1.6 RatingServices

The RatingServices class is responsible for rating puzzles. The RatingServices class is linked to the user and puzzle classes as this is needed when using the service.

4.1.7 PrintServices

The PrintServices class is responsible for printing puzzles. The PrintServices class is linked to the user and puzzle classes as this is needed when using the service.

5 Quality Requirements

We found these quality requirements to be the most ideal for the project

5.1 Usability

5.2 Performance

5.3 Reliability

5.4 Availability

5.5 Cost