BUSINESS PROCESS ENGINEERING

ASSIGNMENT # 02

OCTOBER 24, 2025

RAJA FATASH ABBASI
SP22-BSE-127

Assignment: Business Process Identification and Modeling

Project Title: *Treasure Hunt Adventure – AR-Based Game*
Student Name: Raja Fatash Abbasi
Course: Business Process Identification and Modeling

---

1. Project Overview

Treasure Hunt Adventure is an Augmented Reality (AR) based mobile game where players explore their surroundings using their smartphone camera to discover hidden treasures. The game combines puzzles, location-based challenges, and AR interactions to provide an engaging and immersive experience.

As part of the digitization process, certain **core business processes** of the game need to be modeled to ensure smooth operations, user experience, and data flow across systems.

---

2. Selected Business Processes

No.	Business Process	Description
1	**User Registration and Authentication**	Players register and log into the game via email or social media.
2	**Treasure Hunt and Puzzle Flow**	Players locate treasures, solve AR puzzles, and collect rewards.
3	**Reward Management System**	Handles user progress tracking, leaderboard updates, and reward distribution.

---

3. Process Modeling

3.1 Functional Perspective (Using BPMN)

Process 1: User Registration and Authentication

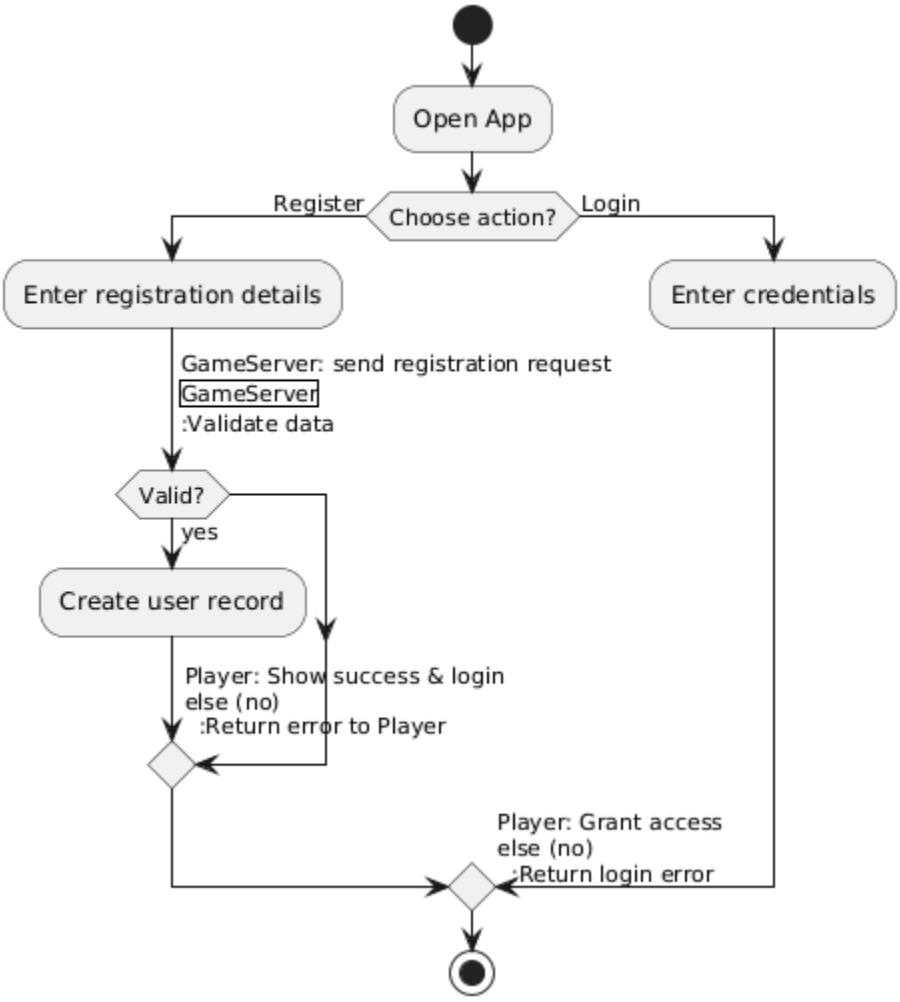
Actors: Player, Game Server, Database

Description:
A player creates a new account or logs in. The system verifies credentials, fetches the user profile, and grants access.

BPMN Steps:

1. Player opens app → selects "Register" or "Login"
2. System requests credentials
3. System validates data against database
4. If valid → access granted
5. If invalid → error message displayed

Diagram (Textual Representation):



Process 2: Treasure Hunt and Puzzle Flow

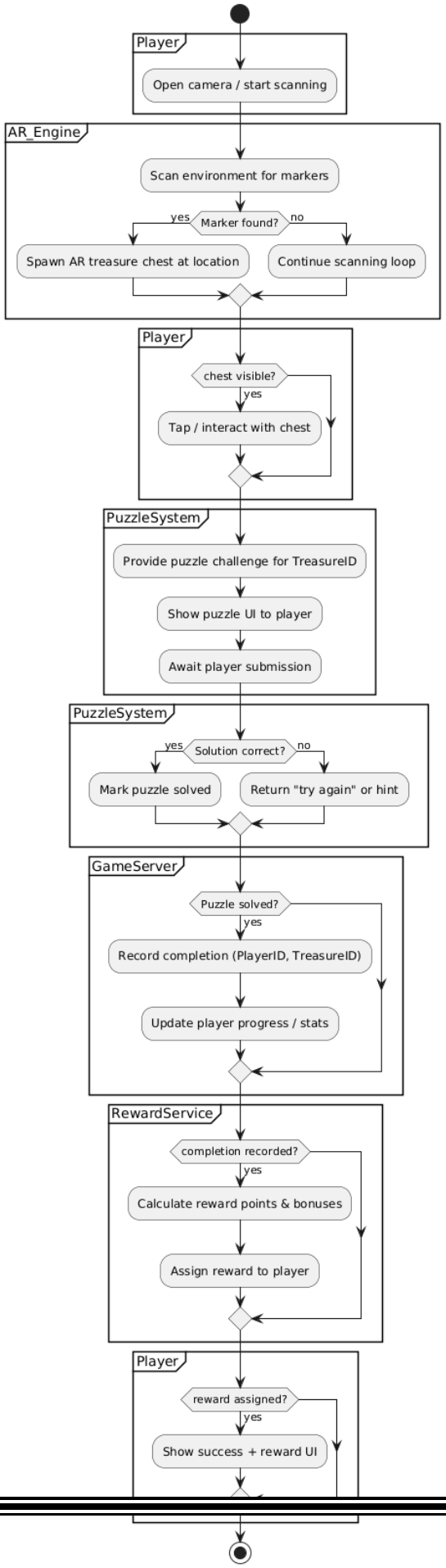
Actors: Player, AR Engine, Puzzle System, Game Server

Description:
When the player explores the AR environment, treasures appear. Upon interacting, the system triggers a puzzle challenge.

Steps:

1. Player scans area with camera
2. AR Engine detects a treasure marker
3. System spawns treasure chest
4. Player interacts → Puzzle triggered
5. Puzzle solved → Server validates
6. Reward unlocked

Diagram:


Player
Open camera / start scanning
AR_Engine
Scan environment for markers
Marker found?
yes
no
Spawn AR treasure chest at location
Continue scanning loop
Player
chest visible?
yes
Tap / interact with chest
PuzzleSystem
Provide puzzle challenge for TreasureID
Show puzzle UI to player
Await player submission
PuzzleSystem
Solution correct?
yes
no
Mark puzzle solved
Return "try again" or hint
GameServer
Puzzle solved?
yes
Record completion (PlayerID, TreasureID)
Update player progress / stats
RewardService
completion recorded?
yes
Calculate reward points & bonuses
Assign reward to player
Player
reward assigned?
yes
Show success + reward UI

Process 3: Reward Management System

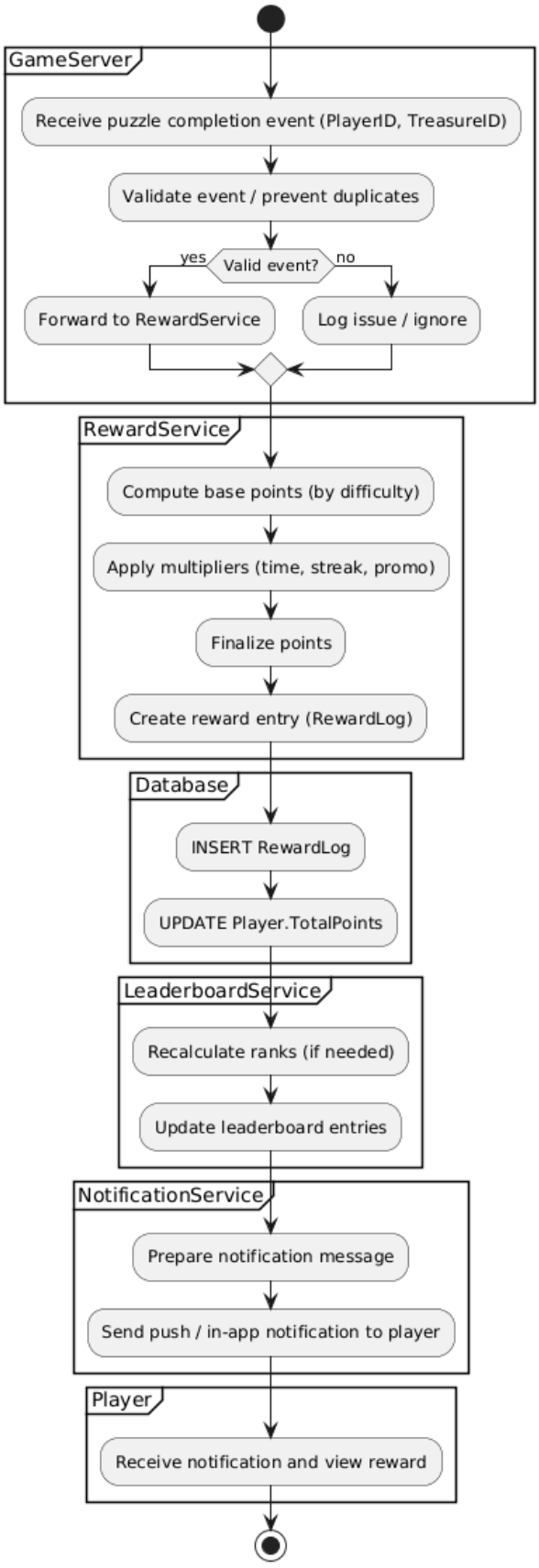
Actors: Game Server, Database, Leaderboard, Player

Description:
After solving puzzles, players earn rewards that update their profiles and leaderboard position.

Steps:

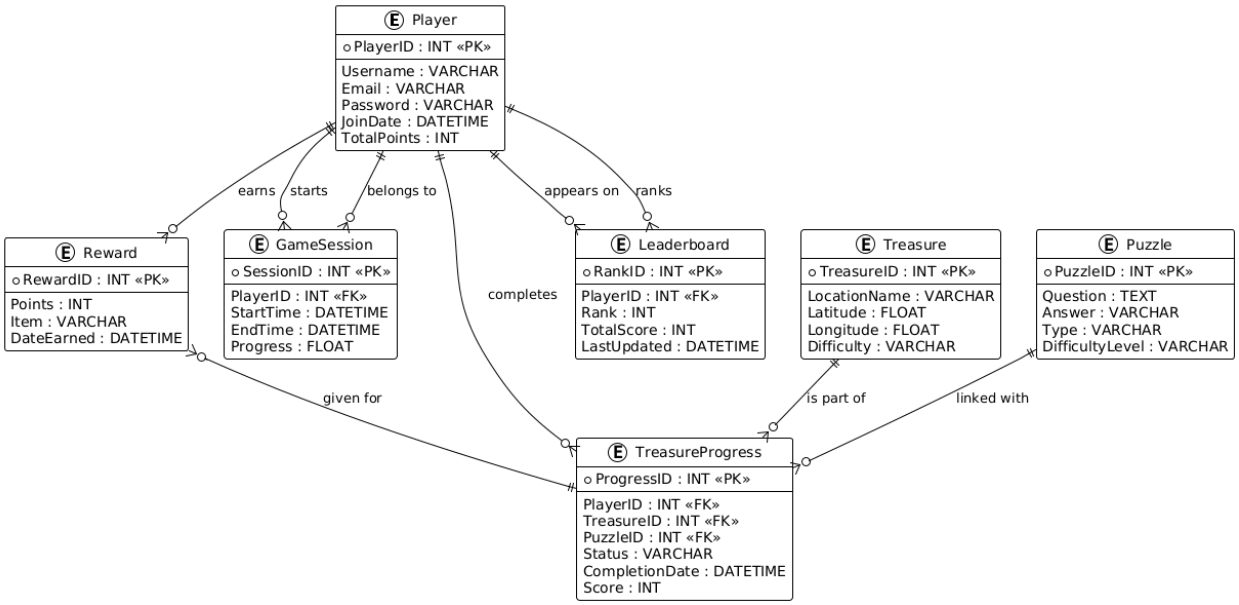
1. Server validates player's success
2. Reward points calculated
3. Player data updated in database
4. Leaderboard refreshed
5. Notification sent to player

Diagram:


GameServer
Receive puzzle completion event (PlayerID, TreasureID)
Validate event / prevent duplicates
Valid event?
yes
no
Forward to RewardService
Log issue / ignore
RewardService
Compute base points (by difficulty)
Apply multipliers (time, streak, promo)
Finalize points
Create reward entry (RewardLog)
Database
INSERT RewardLog
UPDATE Player.TotalPoints
LeaderboardService
Recalculate ranks (if needed)
Update leaderboard entries
NotificationService
Prepare notification message
Send push / in-app notification to player
Player
Receive notification and view reward

4. Data Perspective (Using ERD – Entity Relationship Diagram)

Below is a **conceptual data model** showing how entities interact within the system.



Relationships:

- A **Player** can have multiple **GameSessions**.
- Each **GameSession** can include multiple **Treasures**.
- Each **Treasure** is linked to one **Puzzle**.
- Each **Player** can earn multiple **Rewards**.