MIDDLE EAST TECHNICAL UNIVERSITY
NORTHERN CYPRUS CAMPUS

CNG 495

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Capstone Project Proposal

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Project Title: University Sports Center Reservation System

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Contents

1 Project Description

This project proposes a cloud-based reservation platform for the University Sports Center. Students and staff can browse facilities (Football Pitch, Tennis Court, volleyball / Basketball court outdoor, Table Tennis), view available time slots, and create/cancel reservations. Authorized personnel can define working hours, capacities, maintenance windows, and policies (e.g., per-week booking limits).

The system will provide real-time availability, double-booking prevention. The web application will be implemented with a modern front-end and a serverless backend on Firebase. Data will be stored in a cloud database with transactional safeguards to ensure consistency during peak demand.

2 Cloud Delivery Models

2.1 SaaS (Software as a Service)

Users access the reservation web app to sign in, view facilities/slots, and create/cancel reservations. Staff use an admin dashboard to manage facilities, capacities, and policies.

2.2 PaaS (Platform as a Service)

- **Firebase Authentication** for secure login (email/school account).
- **Cloud Functions** to enforce these rules on the server side:
  - Check availability and prevent double booking.
  - Enforce policies (per-user weekly limits(if applicable), cancellation window).
  - Send e-mail notifications when enabled.

2.3 IaaS (Infrastructure as a Service)

Cloud Firestore will be my realtime database for storing facilities, slots, and reservations. Managed, scalable, and fault-tolerant infrastructure.

3 Diagrams

3.1 Use Case Diagram

Here you can see the use case diagram in Figure 1.

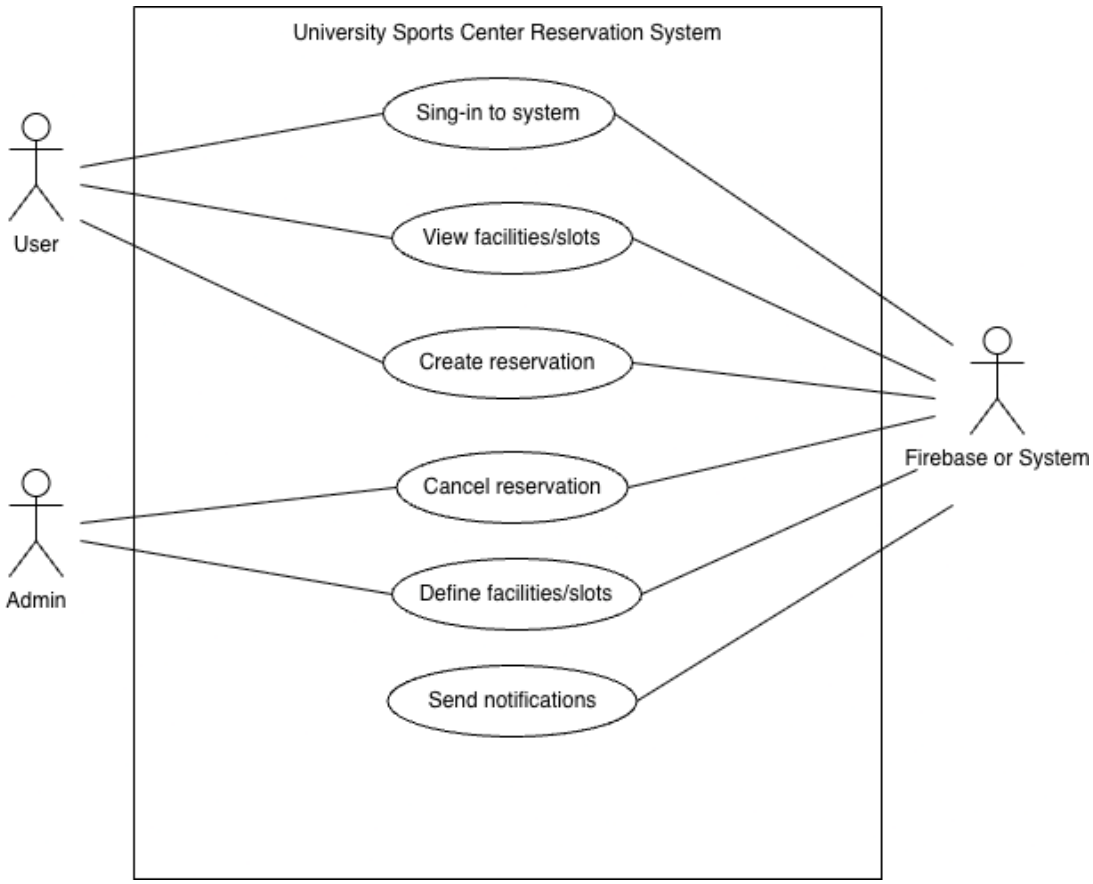

Figure 1: Use case diagram.

3.2 Data Flow Diagram

Here you can see the data flow diagrams in Figure 2 and Figure 3.

Context Level:

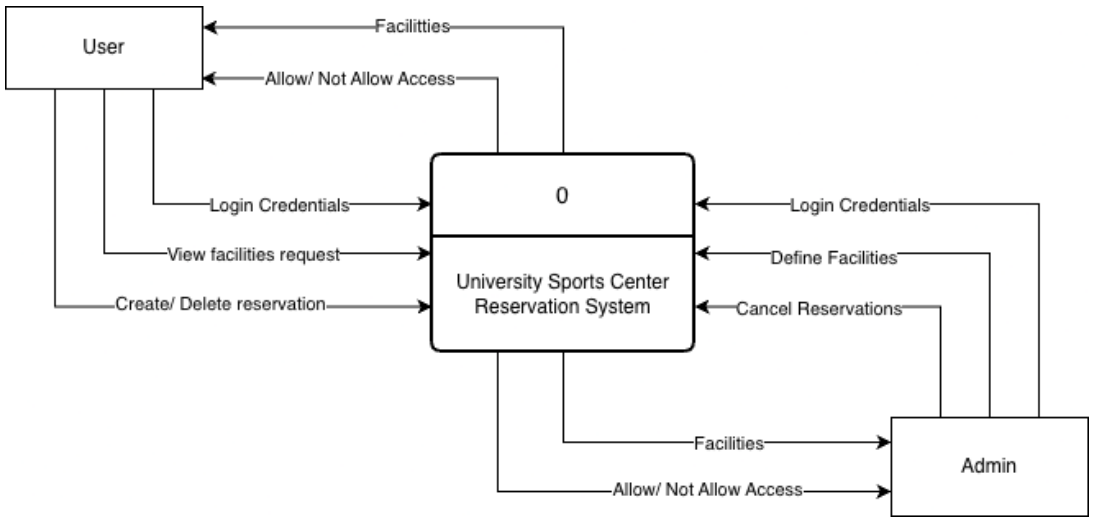

Figure 2: Context Level.

Level 0:

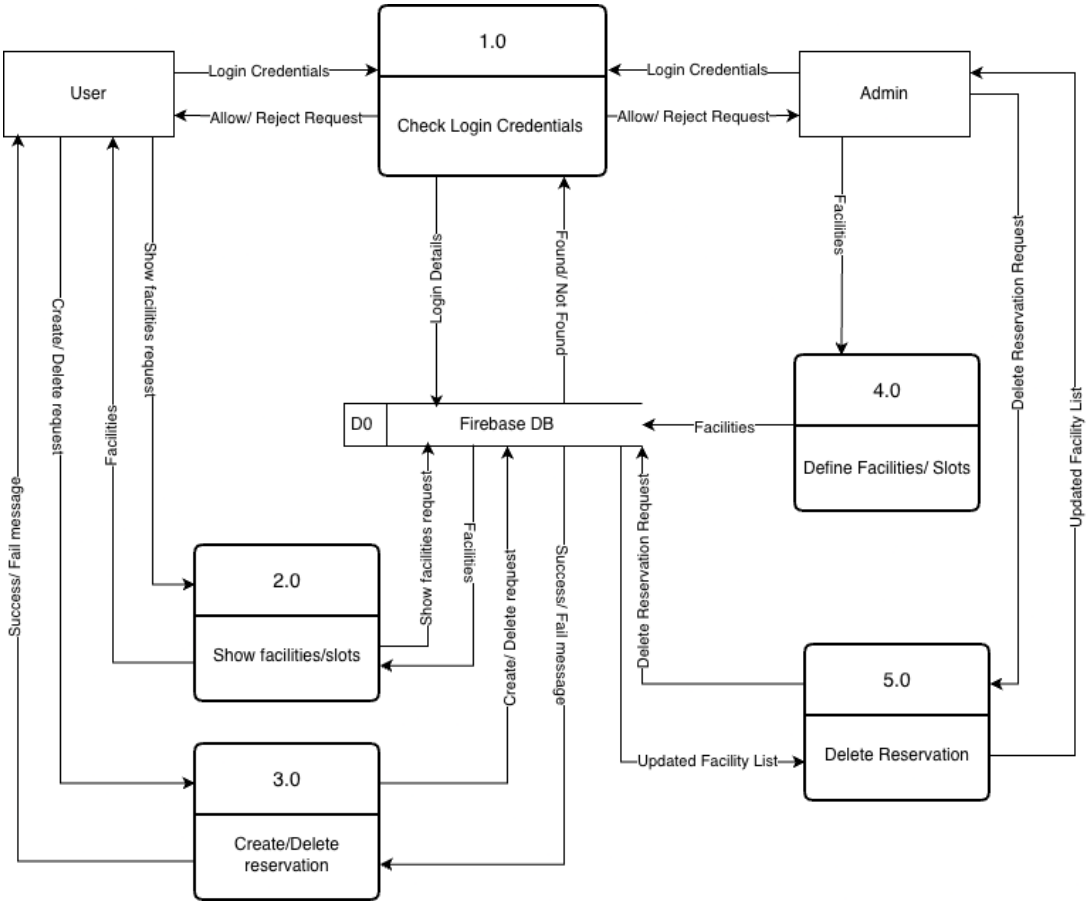

Figure 3: Level 0.

4 Data Types

- **Text:** Facility name, description, role, policy, username/email, reservation ID.
- **Numeric:** Capacity, slot start/end times, cancellation window (minutes/hours).

5 Computation

- **Authentication & Authorization:** Firebase Auth (role-based access).
- **Policy Enforcement:** Weekly per-user limits, cancellation window, no-show flagging.
- **Notifications (optional):** Confirmation/cancellation e-mail or push notification.

6 Expected Contribution

All parts of the project will be done by Nurlan İldırımlı.

7 References

1. Firebase Documentation – Authentication, Firestore, Cloud Functions. https://firebase.google.com/docs

2. Google Cloud Storage – Object Storage Best Practices. https://cloud.google.com/storage/docs/best-practices