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| **International School**  Đồ Án CDIO  **CMU-CS 447**    PROJECT PROPOSAL  Version 1.0  Date: 05- April - 2025  Airline Reservation System  Submitted by  Nguyen Pham Anh Huong  Cao Minh  Le Minh Hieu  Nguyen Thi Thanh Huong  **Approved by**  **Capstone Project 1 - Mentor:**  Name Signature Date  Tinh, Le Van \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_04 - April- 2025 |

Table Contents

**[PROJECT INFORMATION 1](#_Toc19264)**

**[DOCUMENT INFORMATION 2](#_Toc25012)**

**[REVISION HISTORY 3](#_Toc10508)**

**[1. INTRODUCTION 4](#_Toc14105)**

[1.1. PURPOSE 4](#_Toc5153)

[1.2. DOCUMENT OBJECTIVES 4](#_Toc3377)

[1.3. INTENDED AUDIENCE 4](#_Toc16507)

[1.4. SCOPE, APPROACH AND METHODS 4](#_Toc7772)

[1.5. SYSTEM OVERVIEW 4](#_Toc25579)

[1.6. ACRONYMS AND ABBREVIATIONS 5](#_Toc25172)

**[2. ASSUMPTIONS, CONSTRAINTS AND DEPENDENCIES 5](#_Toc29640)**

[2.1. ASSUMPTIONS 5](#_Toc27536)

[2.2. CONSTRAINTS 5](#_Toc18751)

**[3. SYSTEM OVERVIEW 5](#_Toc17617)**

[3.1. DATABASE MANAGEMENT SYSTEM CONFIGURATION 5](#_Toc10537)

[3.2. DATABASE SOFTWARE UTILITIES 5](#_Toc30760)

[3.3. SUPPORT SOFTWARE 6](#_Toc21389)

**[4. ARCHITECTURE 6](#_Toc29411)**

[4.1. HARDWARE & SOFTWARE ARCHITECTURE 6](#_Toc8253)

[4.2. DATASTORES 6](#_Toc22097)

**[5. DATABASE-WIDE DESIGN DECISIONS 6](#_Toc6432)**

[5.1. KEY FACTORS INFLUENCING DESIGN 6](#_Toc830)

[5.2. PERFORMANCE AND AVAILABILITY DECISIONS 6](#_Toc18487)

**[6. DATABASE ADMINISTRATIVE FUNCTIONS 7](#_Toc24198)**

[6.1. RESPONSIBILITY 7](#_Toc24155)

[6.2. PHYSICAL DESIGN 7](#_Toc32580)

[6.3. ENTITY MAPPING 8](#_Toc16702)

**[7. REFERENCES 8](#_Toc15198)**

# PROJECT INFORMATION

Table 1 - Project Information

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| **PROJECT INFORMATION** | | | |
| **Project Acronym** | ARS | | |
| **Project Title** | Airline Reservation System | | |
| **Project Web URL** |  | | |
| **Start Date** | 5-Apr - 2025 | | |
| **End Date:** | 24 - May - 2025 | | |
| **Lead Institution** | International School, Duy Tan University | | |
| **Project Mentor** | M.Sc Tinh, Le Van | | |
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# DOCUMENT INFORMATION

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| --- | --- | --- | --- |
| **DOCUMENT INFORMATION** | | | |
| **Document Title** | Project Proposal | | |
| **Author(s)** | Group 3 | | |
| **Role** | Proposal\_v1.0 | | |
| **Date** | 5-Apr - 2025 | File name | Proposal\_v1.0 |
| **URL** | https://github.com/nnkq/myproject.git | | |
| **Access** | Project and CMU Program | | |

Table 2 - Document Information

# REVISION HISTORY

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Version** | **Person(s)** | **Date** | **Description** | **Approval** |
| Draft |  | 5-Apr - 2025 | Initiate proposal | x |
| 1.0 | All members | 12-Apr - 2025 | Finish content of proposal | x |
| 1.1 | All members | 19-Apr - 2025 | Update content & format | x |
| 1.2 | All members | 26-Apr - 2025 | Update Tasks schedule | x |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Table 3 - Revision History

# INTRODUCTION

The Database Design maps the logical data model to the target database management system with consideration to the system’s performance requirements. The Database Design converts logical or conceptual data constructs to physical data constructs (e.g tables,...) of the target Database Management System.

## PURPOSE

The purpose of this document is to outline the database design for the Flight Booking Management System (FMS), ensuring that all database transactions meet performance requirements and support the system's functionality.

## DOCUMENT OBJECTIVES

The Database Design Document has the following objectives:

* Describe the design of the database, including tables, relationships, and constraints.
* Serve as a basis for implementing the database and related software units.

## INTENDED AUDIENCE

Technical developers, architects, designers, and quality assurance personnel involved in the project.

## SCOPE, APPROACH AND METHODS

The Database Design for the ARS is composed of definitions for database objects derived by mapping entities to tables, attributes to columns, unique identifiers to unique keys and relationships to foreign keys.

## SYSTEM OVERVIEW

|  |  |
| --- | --- |
| **System Overview** | **Details** |
| **System Name** | Airline Reservation System |
| **System type** | Web application |
| **Operational status** | In development |

## ACRONYMS AND ABBREVIATIONS

|  |  |
| --- | --- |
| **Acronym/Abbreviation** | **Meaning** |
| ARS | **Airline Reservation System** |
| FMS | Flight Management System |
| RDBMS | Relational Database Management System |
| DBMS | Database Management System |

# ASSUMPTIONS, CONSTRAINTS AND DEPENDENCIES

## ASSUMPTIONS

* Users can book flights, manage reservations, and view flight details.
* The system will integrate with payment gateways for transactions.

## CONSTRAINTS

* Users can only book flights available in the system.
* Payment must be completed to confirm a booking.

# SYSTEM OVERVIEW

## DATABASE MANAGEMENT SYSTEM CONFIGURATION

* System: PostgreSQL
* Vendor: PostgreSQL Global Development Group
* Services Enabled: Relational data storage, transaction management.

## DATABASE SOFTWARE UTILITIES

|  |  |  |  |
| --- | --- | --- | --- |
| **Vendor** | **Product** | **Version** | **Comments** |
| pgAdmin | PGAdmin | 4.0.0 | Manage PostgreSQL database |

## SUPPORT SOFTWARE

|  |  |  |
| --- | --- | --- |
| **Product** | **Version** | **Purpose** |
| DBeaver | 7.2.0 | Database management and visualization |

# ARCHITECTURE

## HARDWARE & SOFTWARE ARCHITECTURE

* PostgreSQL database hosted on a cloud-based Linux VM.
* Backup and replication for high availability.

## DATASTORES

* Primary database for transactional data.
* Staging tables for data imports.

# DATABASE-WIDE DESIGN DECISIONS

## KEY FACTORS INFLUENCING DESIGN

* Normalized schema for data integrity.
* Star schema for reporting and analytics.

## PERFORMANCE AND AVAILABILITY DECISIONS

* Indexes on frequently queried columns.
* Regular backups and replication.

# DATABASE ADMINISTRATIVE FUNCTIONS

## RESPONSIBILITY

|  |  |
| --- | --- |
| **Role** | **Name** |
| System Administrator | All member |
| Database Administrator | All member |

## PHYSICAL DESIGN

### FACT-TABLES

* fact\_booking: Stores booking details (booking ID, flight ID, passenger ID, payment ID, etc.).
* fact\_payment: Stores payment details (payment ID, amount, status, etc.).

### DIMENSION TABLES

* dim\_flight: Flight details (flight ID, departure, arrival, etc.).
* dim\_passenger: Passenger details (passenger ID, name, contact, etc.).
* dim\_time: Time dimensions for reporting (year, month, day).

### STAGING TABLES

* flight\_source\_staging: Temporary storage for flight data imports.
* passenger\_source\_staging: Temporary storage for passenger data imports.

## ENTITY MAPPING

### Entity Mapping Diagram

Diagram illustrating relationships between tables (e.g., bookings linked to flights and passengers).

### Flight

dim\_flight: Includes flight number, departure/arrival times, and route details.

### Passenger

dim\_passenger: Includes passenger name, contact information, and frequent flyer details.

### Booking

**fact\_booking**: Links passengers to flights and includes booking status.

### Payment

fact\_payment: Records payment amounts, methods, and confirmation status.

# REFERENCES

* PostgreSQL Documentation: https://www.postgresql.org/docs/
* Database Design Best Practices: https://www.databasejournal.com