**PROJECT TITLE: FLIGHT MONITORS SYSTEMS:**

**Overviews:**

A flight monitor system is an advanced device designed to replicate the experience of fling an aircraft or spacecraft for training, research or development purpose. It provides an environment where pilots and crew members can interact with the cockpit controls and system while simulating various flight conditions and scenarios.

**ERD Diagrams:**

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| --- | --- | --- | --- | --- |
| **Pilot** |  | **Aircraft** |  | **Flight** |
| PilotID (PK)  Name  LicenseNumber  ExperienceLevel | AircraftID (PK)  Model  Manufacturer  Capacity | FlightID (PK)  FlightNumber  DepartureTime  ArriveTime |

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**Logical Data Model (LDM)**

The **LDM** defines the structure of the data without considering any specific database technology. It focuses on relationships, data types, and keys.

**Key Assumptions**:

* All **primary keys** are unique identifiers for each table.
* **Foreign keys** connect related tables.
* **Relationships** include 1-to-many or 1-to-1 as defined in the system.

**Entities and Relationships:**

1. **Aircraft**
   * **Primary Key**: AircraftID
   * **Foreign Key**: None
   * Relationships:
     + A **Flight** is associated with one **Aircraft**.
2. **Pilot**
   * **Primary Key**: PilotID
   * **Foreign Key**: None
   * Relationships:
     + A **Flight** is associated with one **Pilot**.
3. **Flight**
   * **Primary Key**: FlightID
   * **Foreign Key**: AircraftID, PilotID, FlightPlanID, WeatherID, ControlSystemID, SimulationSettingsID, FlightPerformanceID
   * Relationships:
     + Each **Flight** has one associated **Aircraft**, **Pilot**, **Flight Plan**, **Weather**, **Control System**, **Simulation Settings**, and **Flight Performance**.

**Physical Data Model (PDM)**

The **PDM** provides the actual SQL schema based on the Logical Data Model. The PDM includes the data types for each field and defines the physical structure of the database tables, indexes, and constraints.

**SQL Schema Example**

CREATE TABLE Aircraft (AircraftID INT PRIMARY KEY, Model VARCHAR (50), Manufacturer VARCHAR (50), YearManufactured INT, Capacity INT); CREATE TABLE Flight (FlightID INT PRIMARY KEY, AircraftID INT, PilotID INT, FlightDate DATE, DepartureTime TIME, ArrivalTime TIME,

FOREIGN KEY (AircraftID) REFERENCES Aircrafts (AircraftID),

FOREIGN KEY (PilotID) REFERENCES Pilots (PilotID),);

**Data Dictionary for Flight Simulator System**

A Data Dictionary describes each element of a database in detail, including the table names, columns, data types, constraints, and relationships.

**Tables & Data Dictionary Descriptions:**

**1. Aircraft Table:**

* **Table Name**: Aircraft
* **Description**: Contains information about the aircraft used in the flight simulator system.

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| --- | --- | --- | --- |
| **Field Name** | **Data Type** | **Description** | **Constraints** |
| AircraftID | INT | Unique identifier for each aircraft. | PRIMARY KEY, AUTO\_INCREMENT |
| Model | VARCHAR (100) | Model name/number of the aircraft. | NOT NULL |
| Manufacturer | VARCHAR (100) | The manufacturer of the aircraft. | NOT NULL |
| YearManufactured | INT | The year the aircraft was manufactured. | NOT NULL |
| Capacity | INT | Maximum capacity of passengers. | NOT NULL |

**2. Pilot Table:**

* **Table Name**: Pilot
* **Description**: Stores information about the pilots using the flight simulator.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Data Type** | **Description** | **Constraints** |
| PilotID | INT | Unique identifier for each pilot. | PRIMARY KEY, AUTO\_INCREMENT |
| Name | VARCHAR (150) | Name of the pilot. | NOT NULL |
| LicenseNumber | VARCHAR (50) | Pilot's license number. | NOT NULL |
| ExperienceLevel | VARCHAR (50) | Level of experience (e.g., Beginner, Intermediate, Expert). | NOT NULL |

**3. Flight Table:**

* **Table Name**: Flight
* **Description**: Records each individual flight or simulation session.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Data Type** | **Description** | **Constraints** |
| FlightID | INT | Unique identifier for each flight. | PRIMARY KEY, AUTO\_INCREMENT |
| AircraftID | INT | Foreign key to Aircraft table. | FOREIGN KEY |
| PilotID | INT | Foreign key to Pilot table. | FOREIGN KEY |
| FlightDate | DATE | The date of the flight. | NOT NULL |
| DepartureTime | TIME | The time of departure. | NOT NULL |
| ArrivalTime | TIME | The time of arrival. | NOT NULL |