**Airport Management System**

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| --- | --- | --- | --- | --- | --- |
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# **OVERVIEW**

An airport management system is a software solution used to manage and coordinate the various functions and operations of an airport. These systems typically include modules for managing flight schedules, gate assignments, baggage handling, and passenger check-in and boarding. Some systems also include modules for managing ground services such as fueling, de-icing, and maintenance. The system can also include a component for managing the airport's resources such as personnel, equipment, and facilities. The goal of an airport management system is to improve the efficiency and effectiveness of airport operations, while also providing valuable data and insights for airport management and decision-making.

# **PROBLEM STATEMENT**

To implement an airport management system, which simulates various functions of an airport. This system is designed used to manage and coordinate the various functions and operations of an airport. Our system is designed to manage flight schedules, gate assignments, baggage handling, and passenger check-in and boarding.

# **OBJECTIVES**

1. Design flight ticketing system.
2. Allow passengers to book flights
3. Track number of arriving and departing flights.
4. Monitor shifts of various airport and airline staff.
5. Assigning gates for passengers.
6. Robust billing process.
7. Control the everyday functioning of an airport.

# **ENTITY RELATIONSHIP DIAGRAM**

When it comes to designing a database, Entity Relationship (ER) diagrams play a big role. Based on the business idea, we have drafted a representation of the ER model containing tables with relations.

Visible Screenshot of your ERD Diagram.  
If it's too big you can submit it separately as well.

Diagram

Description automatically generated

# **BUSINESS RULES**

With the help of the AMS (Airport Management System)

1. The System is used to manage only a single airport.
2. Each passenger can purchase tickets individually or as a group and each booking is uniquely identified by a order\_id.
3. Only the passenger traveling can book the ticket.
4. Tickets are assigned to passengers and uniquely identified by a combination of order\_id and ticket\_id.
5. Each ticket is associated with 1 or more baggage and each piece of baggage is uniquely identifiable by a baggage\_id.
6. All flights to and from the airport are tracked with each flight having a unique flight ID, source, and destination.
7. Flights are operated by airlines with specific airline\_id and route numbers to track their corridors.
8. The airport is managed by airline staff who can be tracked by their staff\_id. Their basic details like first name, last name, and email address must be given.
9. All the cities connected to the airport are managed by the airport\_code to track which airport the flight is arriving from.

# **TABLES**

Based on the business, we have created an idea of how many tables this system will consist of. These tables will define the database through column name, data type, constraints, and the description of those entities.

1. Table 1 – FLIGHT: This table will store all the details of the flights taking off and landing in the airport

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** | **Description of Attributes** |
| flight\_id | NUMBER | PK | Tracking each flight Uniquely |
| duration | NUMBER |  | Flight time from source to destination |
| flight\_type | VARCHAR() |  | The makes of the flight |
| departure\_time | DATETIME |  | Time the flight departs the source airport |
| arrival\_time | DATETIME |  | Time the flight arrives at the destination |
| destination | VARCHAR2(100) | FK | Location the flight is travelling to |
| source | VARCHAR2(100) | FK | Location the flight is taking off from |
| status | VARCHAR2(10) |  | This attribute is used the signify the operational standing of the flight |
| no\_pax | NUMBER |  | Maximum capacity allowed on the flight. |
| airline\_id | NUMBER | FK | UID or callsign for the aircraft in the fleet |

1. Table 2 – PASSENGER: The passenger details will be stored in this table

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** | **Description of Attributes** |
| passenger\_id | NUMBER | PK | Tracking each passenger with a UID |
| age | NUMBER |  | The legal standing of the passenger |
| address | VARCHAR2(100) |  | The particulars of the place where someone lives or an organization is situated. |
| sex | VARCHAR2(10) |  | The gender of the passenger |
| govt\_id\_nos | VARCHAR2(10) |  | The unique passport number of the passenger |
| first\_name | VARCHAR2(20) |  | Basic details required for booking the ticket |
| last\_name | VARCHAR2(20) |  | Basic details required for booking the ticket |
| dob | DATETIME |  | Date of Birth - Basic details required for booking the ticket |
| contact\_number | NUMBER |  | Mobile number of the passenger. |
| email | VARCHAR2(20) |  | Basic details required for booking the ticket |

1. Table 3 – TICKET: All the contents and data points associated with the passenger and the flight details is mentioned in this table

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** | **Description of Attributes** |
| ticket\_id | NUMBER | PK | UID to track each ticket purchased by a passenger |
| order\_id | VARCHAR2 | FK | A UID to track the passengers travel |
| flight\_id | NUMBER | FK | Tracking each flight Uniquely |
| seat\_no | VARCHAR2 |  | Identify the seat no of the passenger |
| meal\_preferences | VARCHAR2(20) |  | Meal preferences of the passenger |
| source | VARCHAR2 | FK | Location the ticket has been booked from |
| destination | VARCHAR2 | FK | Location to which the ticket has been booked |
| date\_of\_travel | DATETIME |  | Exact day the ticket has been booked for travelling |
| class | VARCHAR2 |  | The section of seating the person has booked. |
| meal\_preferences | VARCHAR2 |  | The type of meal the passenger has opted for. |
| payment\_type | VARCHAR2(20) |  | The type of payment made during transaction |
| Member\_id | NUMBER |  | Member ID of the passenger for a particular airline |
| Transaction\_amount | FLOAT |  | The amount for journey. |

1. Table 4 – AIRLINE\_STAFF: Employee details of all flights are stored in this table. This data is used to monitor the number of employees of various flights clocking into work at the airport.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** | **Description of Attributes** |
| staff\_id | NUMBER | PK | UID to track the staff working at the airport |
| airline\_id | NUMBER | FK | UID or callsign for the aircraft in the fleet |
| first\_name | VARCHAR2(20) |  | Basic details required to log details of staff |
| last\_name | VARCHAR2(20) |  | Basic details required to log details of staff |
| address | VARCHAR2(100) |  | Basic details required to log details of staff |
| ssn | VARCHAR2(12) |  | Used to report a person's wages to the government and to determine a person's eligibility for Social Security benefits. |
| email\_id | VARCHAR2(20) |  | Basic details required to communicate details with staff |
| contact\_number | NUMBER |  | Basic details required to communicate details with staff |
| job\_group | VARCHAR2(10) |  | The payscale level of each employee in the airline |
| gender | VARCHAR2(10) |  | Basic details required staff |

1. Table 5 – AIRPORT: A ticket can be associated with many cities, this table is used to store all the cities that the airport issues tickets to.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** | **Description of Attributes** |
| airport\_id | NUMBER | PK | The UID given to each destination. |
| airport\_name | VARCHAR2(20) |  | Name of the airport |
| city | VARCHAR(20) |  | Basic details required to track city |
| state | VARCHAR2(20) |  | Basic details required to track State in which the City is |
| country | VARCHAR2(20) |  | Country of origin of the city |

1. Table 6 –SCHEDULE: The airport gate details and the terminals which they are present in is given here.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constrains** | **Description of Attributes** |
| schedule\_id | NUMBER | PK | The UID for all the gates in the airport |
| flight\_id | NUMBER | FK | Tracking each flight Uniquely. |
| terminal\_id | NUMBER | FK | The UID for tracking all terminals. |
| Arrival\_time | DATETIME |  | Arrival time of the flight |
| Departure\_time | DATETIME |  | Departure time of the flight |

1. Table 7 – TERMINAL: This table stores the details of the terminals in the airport.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constrains** | **Description of Attributes** |
| terminal\_id | NUMBER | PK | The UID for tracking all terminals. |
| terminal\_name | VARCHAR2(5) |  | The name of the terminal |

1. Table 8 – BAGGAGE: Each passenger carrying more than 1 luggage will have to check in their baggage. The number of bags checked in by a passenger is monitored by this table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constrains** | **Description of Attributes** |
| baggage\_id | NUMBER | PK | A UID to track the bagged checked in by the passenger |
| ticket\_id | NUMBER | FK | A UID to track the ticket the passenger has purchased. |
| weight | FLOAT |  | The weight of the bagged checked in by professor |

1. Table 9 – AIRLINE: The details of all the airline fleets operating out of the airports.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constrains** | **Description of Attributes** |
| airline\_id | NUMBER | PK | UID or callsign for the aircraft in the fleet |
| route\_number | NUMBER |  | The UID for the corridor the aircraft is flying in. |
| airline\_code | VARCHAR2(10) |  | A UID for the fleet. |
| airline\_name | VARCHAR2(20) |  | The name of the fleet. |

1. Table 10 – ORDER: The details of all the airline fleets operating out of the airports.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column Name** | **Data Type** | **Constrains** | **Description of Attributes** |
| order\_id | NUMBER | PK | UID or callsign for the aircraft in the fleet |
| passenger\_id | NUMBER | FK | The UID for the corridor the aircraft is flying in. |
| amount | FLOAT |  | The name of the fleet. |
| status | VARCHAR2(20) |  | Status of the payment made during the transaction |

# **Views**

1. Baggage transaction – The number of bags per transaction.
2. Week wise transaction details
3. Number of Bookings
4. Monthly Sale of Tickets
5. Number of cancellations
6. Number of flights between Boston and California
7. Status of Flights
8. Count of passengers travelling through the airport
9. Assigning airline staff to flights

# **Data Flow Diagram**

1. Passenger booking a ticket Data Flow Diagram

Diagram

Description automatically generated

1. Flights added to schedule Data Flow Diagram

Diagram

Description automatically generated

1. Checking the status of flight Data Flow Diagram

Diagram

Description automatically generated

1. Passenger redirections Data Flow Diagram

Graphical user interface, application, Teams

Description automatically generated

# **Roles and Security**

1. Admin - View, Update and Delete all tables
2. Passenger – Only View Access to Airports, Flights, and schedules
3. Analyst – Access to all Tables to generate reports
4. Baggage handler – Access to flights and baggage
5. Accounts department – Access to tickets and order details