Phase III – Logical Model Design

Project Title: university resource management system

Entities and Attributes

This phase presents a fully normalized **Logical Data Model** designed to support all core functionalities identified in Phases I and II. The model defines entities, their relationships, constraints, and normalization principles.

1.1. User

Attribute	Data Type	Description
UserID	INT (Primary Key, Auto Increment)	Unique identifier for each user.
UserName	VARCHAR(100)	Full name of the user.
Email	VARCHAR(100)	User's email address (used for login).
Password	VARCHAR(255)	Encrypted password for login.
Role	ENUM('Admin', 'Faculty', 'Student', 'Manager')	User's role in the system.
DepartmentID	INT (Foreign Key)	References the user's department.

1.2. Department Entity

Attribute	Data Type	Description
DepartmentID	INT (Primary Key)	Unique ID for each department.
Name	VARCHAR(100)	Department name (e.g., Computer Science).
Head	VARCHAR(100)	Name of the department head.

1.3. Resource Entity

Attribute	Data Type	Description
ResourceID	INT (Primary Key)	Unique identifier for each resource.
Name	VARCHAR(100)	Name of the resource (e.g., Room 101).
Type	ENUM('Classroom', 'Lab', 'Equipment', 'Book')	Type of resource.
Location	VARCHAR(100)	Physical location of the resource.
Status	ENUM('Available', 'Booked', 'Maintenance')	Current status.
Description	TEXT	Additional details about the resource.
DepartmentID	INT (Foreign Key)	Department to which the resource belongs.

Attribute	Data Type	Description
BookingID	INT (Primary Key)	Unique ID for each booking.
UserID	INT (Foreign Key)	User who made the booking.
ResourceID	INT (Foreign Key)	Resource being booked.
StartTime	DATETIME	Start time of the booking.
EndTime	DATETIME	End time of the booking.
Status	ENUM('Pending', 'Approved', 'Rejected', 'Cancelled')	Booking status.
Purpose	VARCHAR(255)	Reason or purpose of the booking.

1.5.Maintenance Entity

Attribute	Data Type	Description
MaintenanceID	INT (Primary Key)	Unique ID for maintenance record.
ResourceID	INT (Foreign Key)	Resource under maintenance.
ReportedBy	INT (Foreign Key)	User who reported the issue.
Description	TEXT	Description of the maintenance issue.
StartDate	DATE	Maintenance start date.
EndDate	DATE	Maintenance end date.
Status	ENUM('Ongoing', 'Completed')	Current status of the maintenance.

1.6.Feedback Entity

Attribute	Data Type	Description
FeedbackID	INT (Primary Key)	Unique feedback entry.
UserID	INT (Foreign Key)	User giving feedback.
ResourceID	INT (Foreign Key)	Resource being rated.
Rating	INT (1 to 5)	Star rating provided by the user.
Comment	TEXT	Optional comment about the resource.
Date	DATE	Date of feedback submission.

1.7.Notification Entity

Attribute	Data Type	Description
NotificationID	INT (Primary Key)	Unique ID for each notification.
UserID	INT (Foreign Key)	User who receives the notification.
Message	TEXT	Notification message content.
Timestamp	DATETIME	When the notification was generated.
Type	ENUM('Booking', 'Maintenance', 'General')	Type of notification.
Status	ENUM('Read', 'Unread')	Whether the user has seen it.

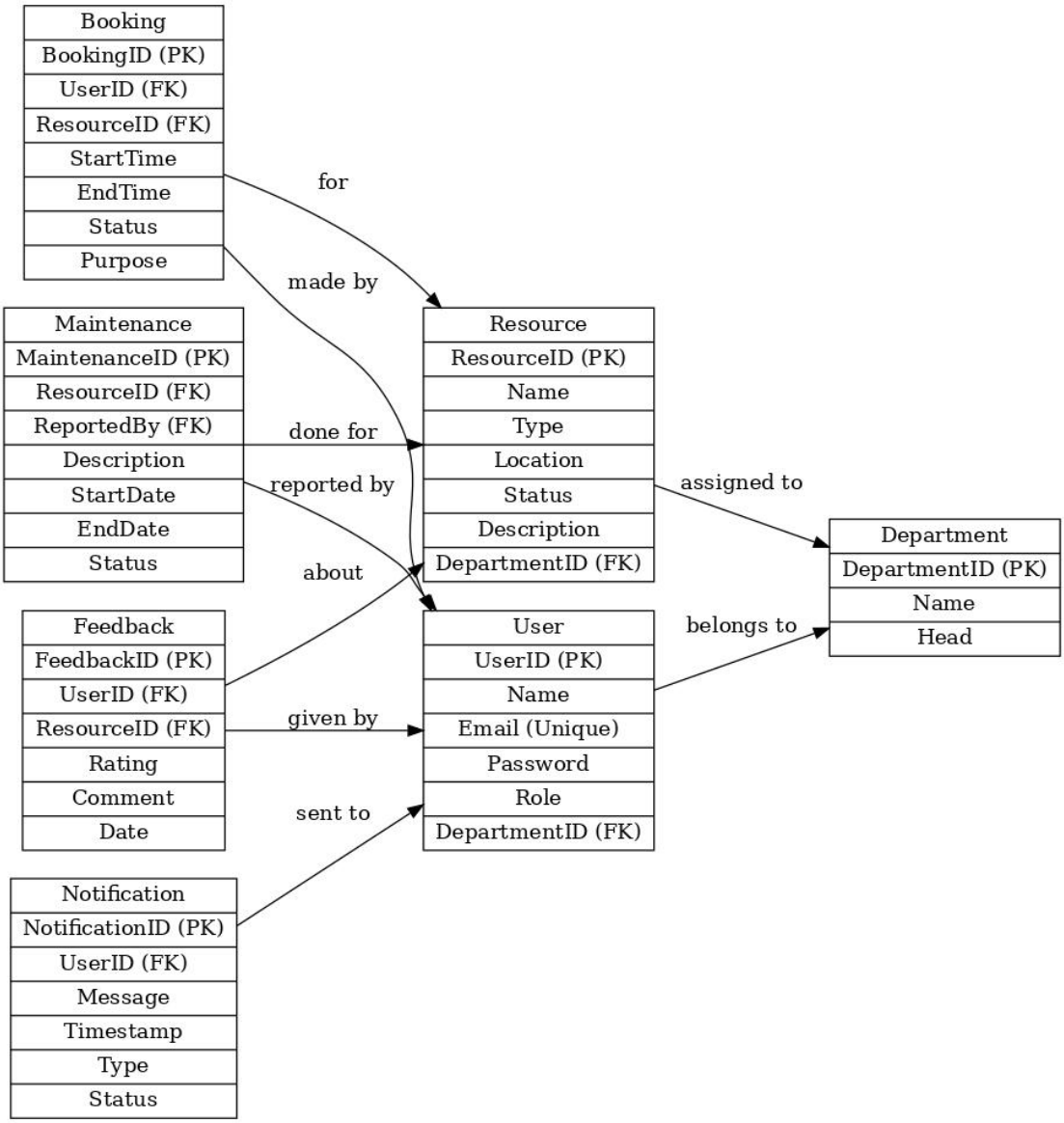
Entity Relationship Table

From Entity	To Entity	Relationship Type	Description
User	Department	Many-to-One	Each user belongs to one department.
Resource	Department	Many-to-One	Each resource is assigned to a department.
Booking	User	Many-to-One	A user can make multiple bookings.
Booking	Resource	Many-to-One	A resource can be booked many times.
Feedback	User	Many-to-One	A user can give multiple feedback entries.
Feedback	Resource	Many-to-One	A resource can receive multiple feedback entries.
Maintenance	Resource	Many-to-One	A resource can have multiple maintenance records.
Maintenance	User (ReportedBy)	Many-to-One	A user can report multiple maintenance issues.
Notification	User	Many-to-One	A user can receive multiple notifications.

3. Constraints

- PRIMARY KEY and FOREIGN KEY constraints on all relational fields
- NOT NULL on essential attributes (e.g., title, email, log_date)
- UNIQUE constraint on email
- CHECK constraints for:
  i) status IN ('active', 'paused', 'completed')
  ii) completion_percentage BETWEEN 0 AND 100
- Use of DEFAULT values where needed (e.g., is_active = TRUE)

4. ERD Diagram


Booking
BookingID (PK)
UserID (FK)
ResourceID (FK)
StartTime
EndTime
Status
Purpose
for
made by
Maintenance
MaintenanceID (PK)
ResourceID (FK)
ReportedBy (FK)
Description
StartDate
EndDate
Status
Resource
ResourceID (PK)
Name
Type
Location
Status
Description
DepartmentID (FK)
done for
reported by
assigned to
Department
DepartmentID (PK)
Name
Head
about
Feedback
FeedbackID (PK)
UserID (FK)
ResourceID (FK)
Rating
Comment
Date
User
UserID (PK)
Name
Email (Unique)
Password
Role
DepartmentID (FK)
belongs to
given by
sent to
Notification
NotificationID (PK)
UserID (FK)
Message
Timestamp
Type
Status