



FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY
(F.C.I.T)



SOFTWARE DESIGN SPECIFICATION



Software Design Specifications



<i>Project Code</i>	<i>Rentment Application</i>
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1 Introduction

1.1 Purpose of Document

A Software Design Specification (SDS) document for a rental mobile application that provides products for rent along with pre- and post-product verification and NIC (National Identity Card) certification could serve several important purposes. The SDS document outlines the detailed design and functionality of the software, ensuring clarity for developers, testers, and other stakeholders.

1.2 Intended Audience

The intended audience for the Software Design Specification (SDS) document for the rental mobile application includes various stakeholders involved in different aspects of the project. Here is a breakdown of the intended audience:

- **Development Team**

Software engineers, programmers, and developers who will be involved in building the rental mobile application. The SDS document provides them with detailed information on the architecture, design, and implementation details.

- **Testing Team**

Quality assurance professionals and testers who need to understand the application's functionality, features, and expected behavior. The document guides them in creating test plans and test cases.

- **Project Managers**

Individuals responsible for overseeing the project, managing resources, and ensuring that the development aligns with the project goals. The SDS document helps them understand the scope, timelines, and technical aspects of the project.

- **UX/UI Designers**

Designers are responsible for creating the user interface and user experience. The SDS document helps them understand the user flow and interface design requirements.

- **Security Analysts**

Individuals focused on ensuring the security of the application. The SDS document provides information on security measures, data protection, and compliance with regulations.

- **Stakeholders and Decision-Makers**

High-level stakeholders, executives, and decision-makers need a broad understanding of the technical aspects of the project. The SDS document helps them make informed decisions and align the project with organizational goals.

1.3 Document Convention

1 Naming Conventions

- **File Naming**

- Use descriptive names for documents, indicating their content (e.g., ProductVerificationProcess.md, NICCertificationGuidelines.md).
- Use camelCase or underscores for multi-word file names.

- **Section Headings**

- Use title case for section headings in documents.
- For consistency, adopt a standard set of headings (e.g., Introduction, Product Verification, NIC Certification, User Documentation).

2 File Organization

- **Directory Structure**

- Maintain a clear and logical directory structure for different types of documents (e.g., /docs, /user-guides, /technical-specs).
- Group related documents together in appropriate folders.

➤ Document Sections

- Organize documents into sections such as Introduction, Requirements, Design, Testing, and Maintenance.

➤ Document Templates

- Provide templates for key documents, such as:
- Software Design Specification (SDS)
- User Documentation
- NIC Certification Guidelines

3 Document Content Guidelines

➤ Product Verification

- Clearly outline the process for pre and post-product verification.
- Include flowcharts or diagrams for better visualization.

➤ NIC Certification

- Detail the steps for user and vendor NIC certification.
- Include any legal or compliance considerations.

➤ User Guides

- Provide user-friendly documentation for end-users explaining the rental process, verification steps, and NIC certification.

➤ Vendor Guides

- It provides the work procedure of the documentation of the how vendor their work in Application

1.4 Project Overview

The overview of the described project, a rental mobile application with a focus on product verification and user/vendor NIC (National Identity Card) certification, can be summarized as follows:

Project Name: Rental Mobile Application

Objective: For this reason, the rental mobile application focuses on providing users with a market to rent different products. The main characteristics are a complex product verification procedure, both before and after rental, including NIC certification for users as well as vendors to establish a safe and reliable renting model.

Key Features:

Product Rental:

Through the mobile application, users can search and hire several types of products. The rental process is simple and convenient.

Product Verification:**Pre-Product Verification:**

- Any products before being listed they go through a verification process and ensure that standards of quality and safety are met.
- The criteria for the pre-verification process can include documents, images or whatever else.

Post-Product Verification:

- Following the rental, products are inspected to make sure they come back in a similar shape.
- This ensures that the quality of products in rental stock is maintained.

➤ NIC Certification:**➤ User NIC Certification:**

- In order to establish trust and accountability, users need NIC certification.
- Certification procedures might require identification and conformity to certain standards.

Vendor NIC Certification:

- Vendors that sell rent items also go through NIC certification in order to be considered credible.
- Certification may include checking their background and validating credentials for the business

1.1 Scope

The range of the rental application in Pakistan or any given area is related to local market demands, cultural matters and regulatory concerns. Here's a general overview of the potential scope for a rental application in Pakistan:

- **Product Categories**

Include a broad array of products that will be relevant to the Pakistani market. This may include electronic devices, home furniture, vehicles and so on.

- **NIC Certification**

Faculty of Computing and Information Technology (FCIT), Computing Department

Introduce an effective NIC certification procedure that validates the identities of both users and vendors in accordance with local laws.

- **Localized User Interface**

Make an easy-to-use interface that supports both Urdu and English, given the multilingual composition of Pakistan.

- **Payment Methods**

consider various user preferences by incorporating the popular local payment methods like bank transfers, mobile wallets, and cash on delivery.

- **Delivery and Pickup Services**

Provide delivery and pick-up services options depending on the logistical constraints' nature in different parts of Pakistan.

- **Security Measures**

Highlight strong security procedures to establish confidence among customers, especially in the protection of their personal data and funds.

2 Design Considerations

In the case of planning and designing a rental mobile app with product verification aspect along with NIC certification, it is essential to identify volatile aspects or assumptions and dependencies within these areas. Here's an outline for each:

2.1 Assumptions and Dependencies

2.1.1 User Registration

- **Assumption**

Users should provide the valid credential during the registration process

- **Dependency**

Availability of the user data is necessary for us to identify the users and their NIC verification

2.1.2 NIC Certification Process

- **Assumption**

The NIC certification process involves legal and regulatory compliance.

- **Dependency**

The application relies on external entities for NIC verification, and any changes in the external NIC verification process may impact the application.

2.1.3 Device and Network Connectivity

- **Assumption**

Users have reliable internet connectivity and access to compatible devices.

- **Dependency**

The application's functionality heavily depends on the availability of network connectivity for real-time verification processes.

2.2 Risks and Volatile Areas

2.2.1 Data Security and Privacy

- **Risk**

Risk of data breaches or unauthorized access to user information.

- **Mitigation**

Implement robust security measures, encryption protocols, and regular security audits.

2.1.2 NIC Certification Changes

- **Risk**

Changes in the external NIC certification process might impact the application's workflow.

- **Mitigation**

Maintain clear communication channels with the NIC verification service provider and have a strategy for adapting to changes.

- **Mitigation**

Implement robust security measures, encryption protocols, and regular security audits.

2.1.3 NIC Certification Changes

- **Risk**

Changes in the external NIC certification process might impact the application's workflow.

- **Mitigation**

Maintain clear communication channels with the NIC verification service provider and have a strategy for adapting to changes.

3 System Architecture

3.1 System Level Architecture

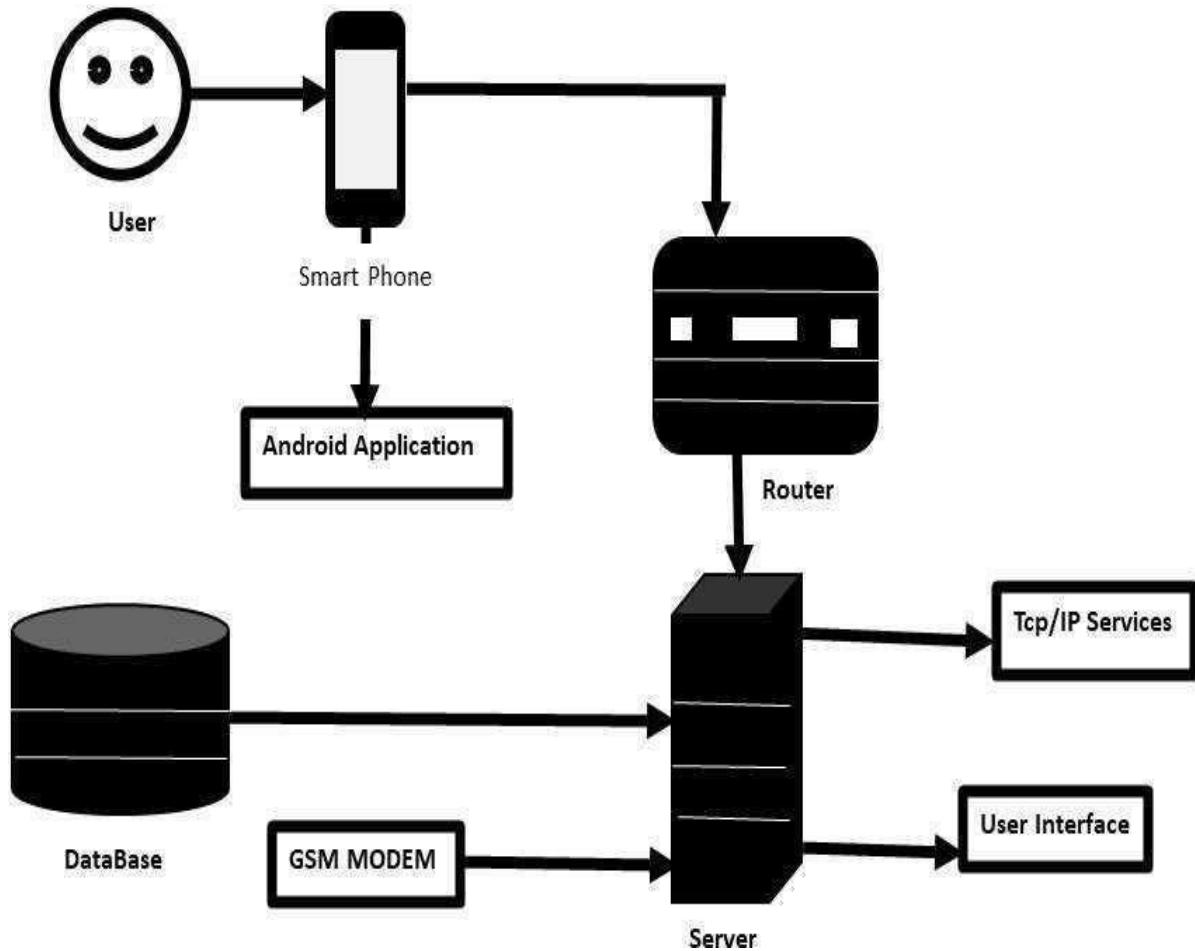


Figure 1: System Level Architecture

In this Figure 1

- How the Application provide the user the data using system level Architecture
- The user can use the Application different network
- Where the user easily get data using the internet to access the Application
- You can also use the GSM Modem to Access the application

3.2 Software Architecture

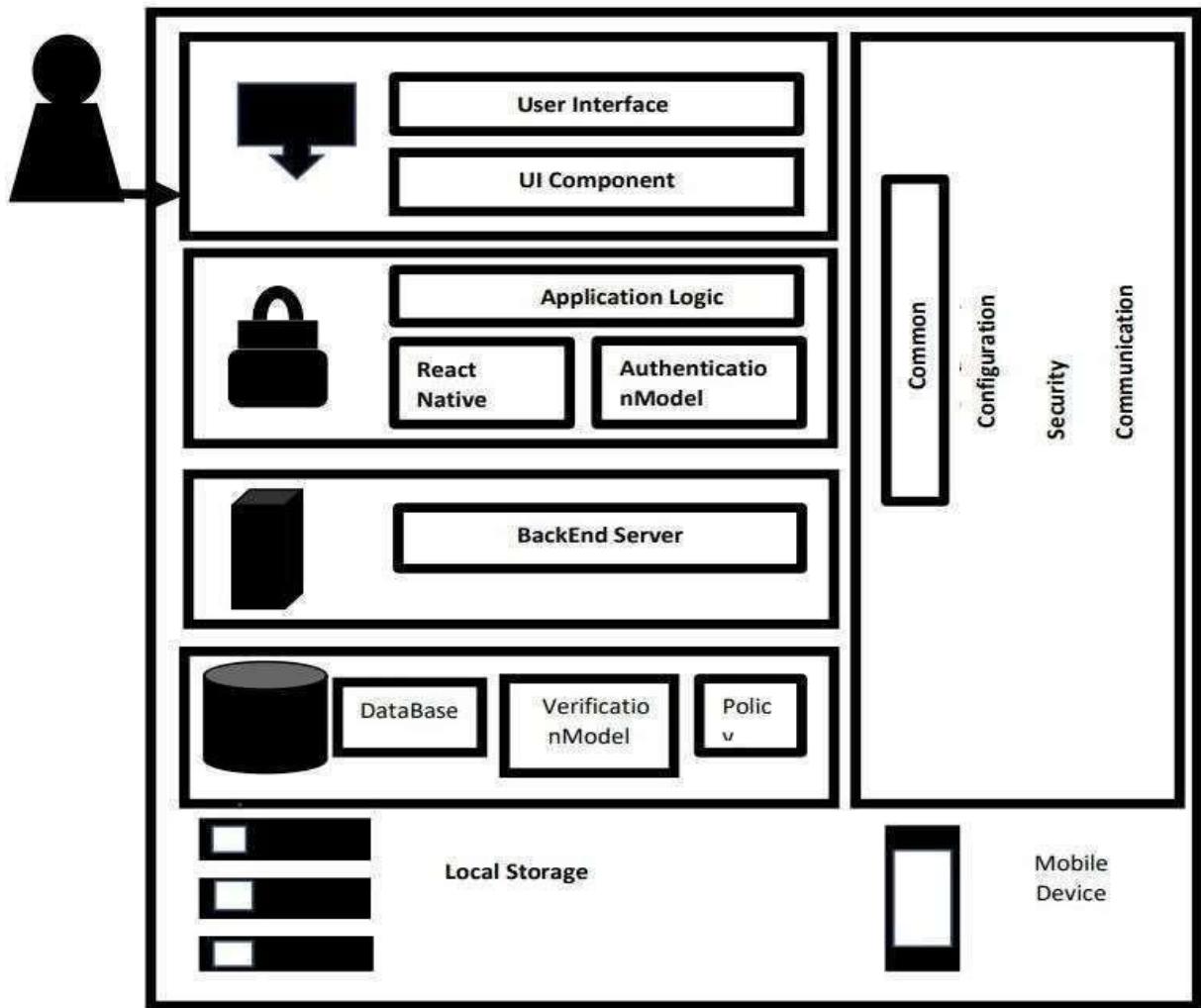


Figure 2: Software Architecture

In these Figure 2

- How user interact with the Application in layer
- Creating the Application logic and the User Authentication using the React native
- Providing the data storage where user can easily store the their data easily in efficient manner
- Provide better facilities to secure your data

4 Design Strategy

Certainly, let's outline design strategies for various aspects of the rental mobile application with a focus on product verification and NIC certification.

Use of a Particular Type of Product

Design Strategy:

- Implement a flexible product classification system that allows for various types of products (e.g., electronics, tools, appliances).
- Use polymorphism in the code structure to handle different product types efficiently.

Reuse of Existing Software Components

Design Strategy

- Identify common functionalities such as user authentication, payment processing, and notification systems.
- Leverage existing libraries or frameworks for these functionalities to promote code reuse and reduce development time.

Future System Extension or Enhancement

Design Strategy

- Adopt a modular architecture that allows for easy integration of new features or enhancements.
- Implement an extensible data model to accommodate additional attributes or entities in the future.

User Interface Paradigms:

Design Strategy:

- Follow a responsive design approach for the mobile application to ensure a consistent user experience across different devices.
- Prioritize an intuitive and user-friendly interface, with clear navigation and minimalistic design.

Error Detection and Recovery

Design Strategy

- Implement robust error handling mechanisms throughout the application.
- Provide meaningful error messages to users and log detailed information for debugging purposes.
- Use transactional processes to ensure data consistency and integrity.

Data Management

Design Strategy

- Employ a relational database management system (RDBMS) to store structured data efficiently.
- Normalize the database schema to reduce redundancy and improve data consistency.
- Implement data caching for frequently accessed information to enhance application performance.

Concurrency and Synchronization:

Design Strategy:

- Use optimistic concurrency control mechanisms to handle data conflicts during simultaneous updates.
- Implement locking strategies judiciously to prevent data corruption in scenarios of concurrent access.
- Employ asynchronous processing for non-blocking operations to enhance system responsiveness

5 Database Design

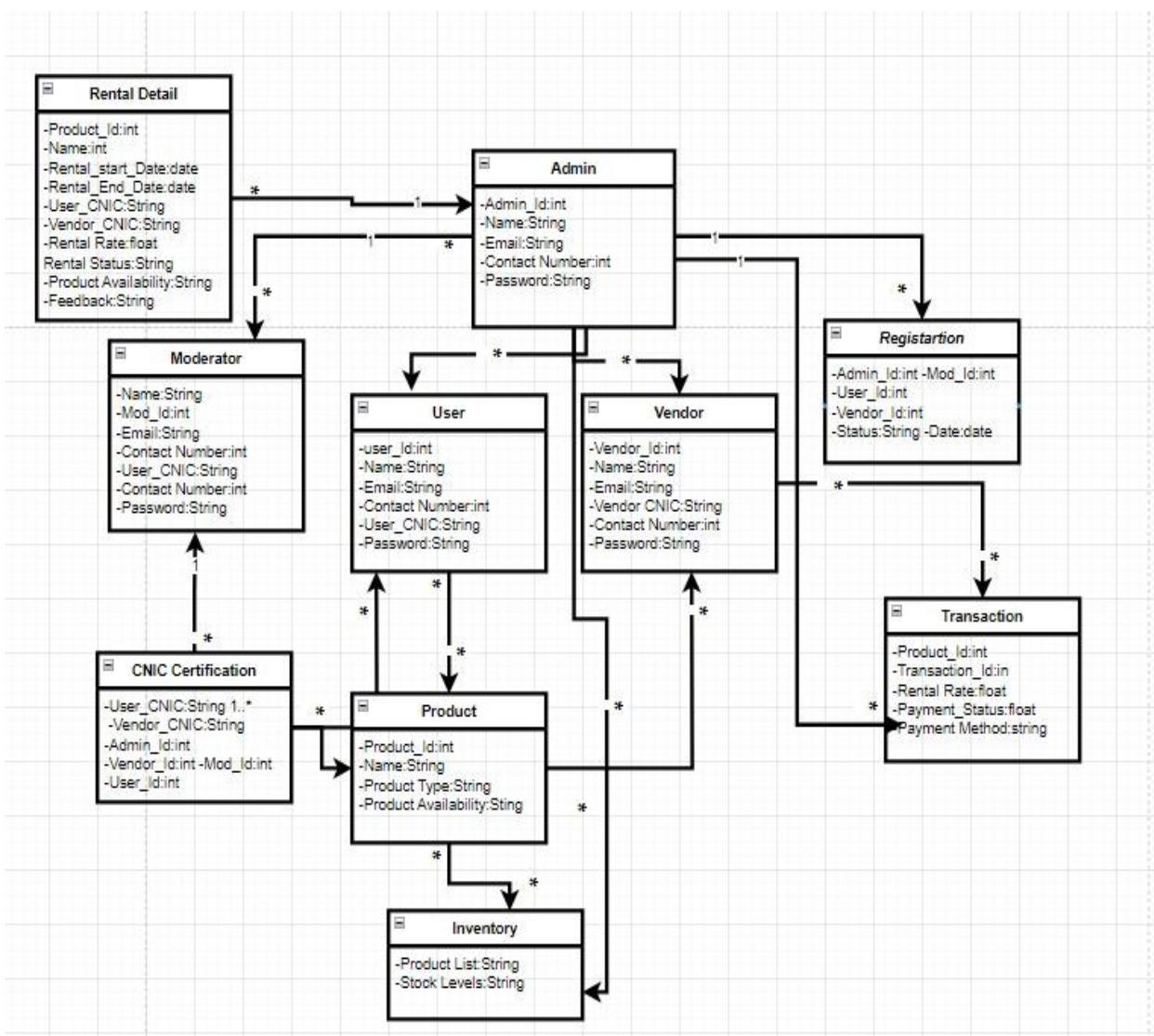


Figure 3: Database Design

In this Figure 3 Rentment Database Design have following characteristic

- They have Entities like (Admin, Transaction, User, Vendor, Product)
- The Admin have relationship to vendor, product, user, transaction)
- Each Entities have required attributes according to their need

6 Class Diagram

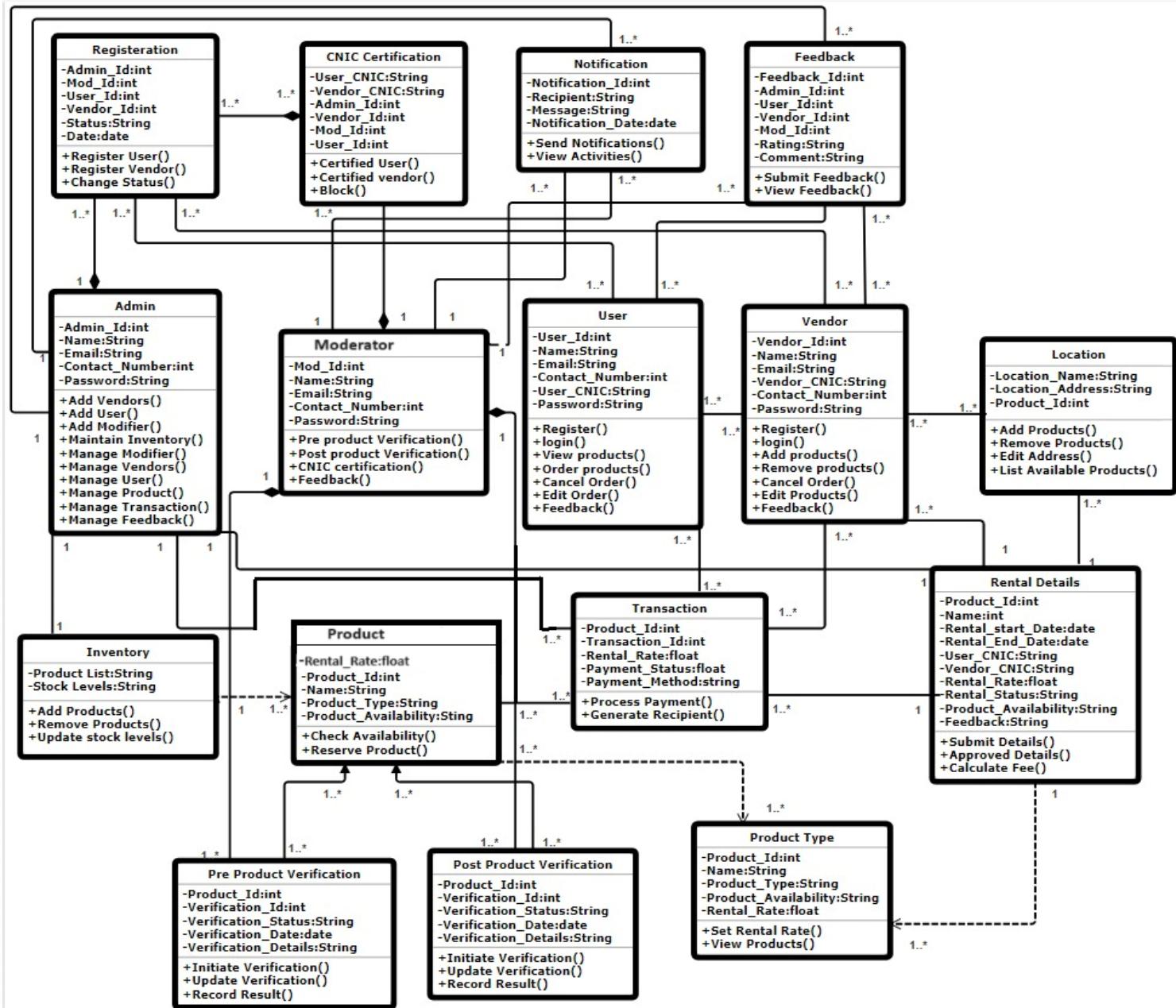


Figure 4 : Class Diagram

In this Figure 4 of Rentment Application illustrate the

- The different classes that we are created the user, vendor, Admin, Location, Feedback.
 - Each class are associated with the their required attributes
 - Each class have the different methods for data manipulation.

7 Rentment ER Diagram

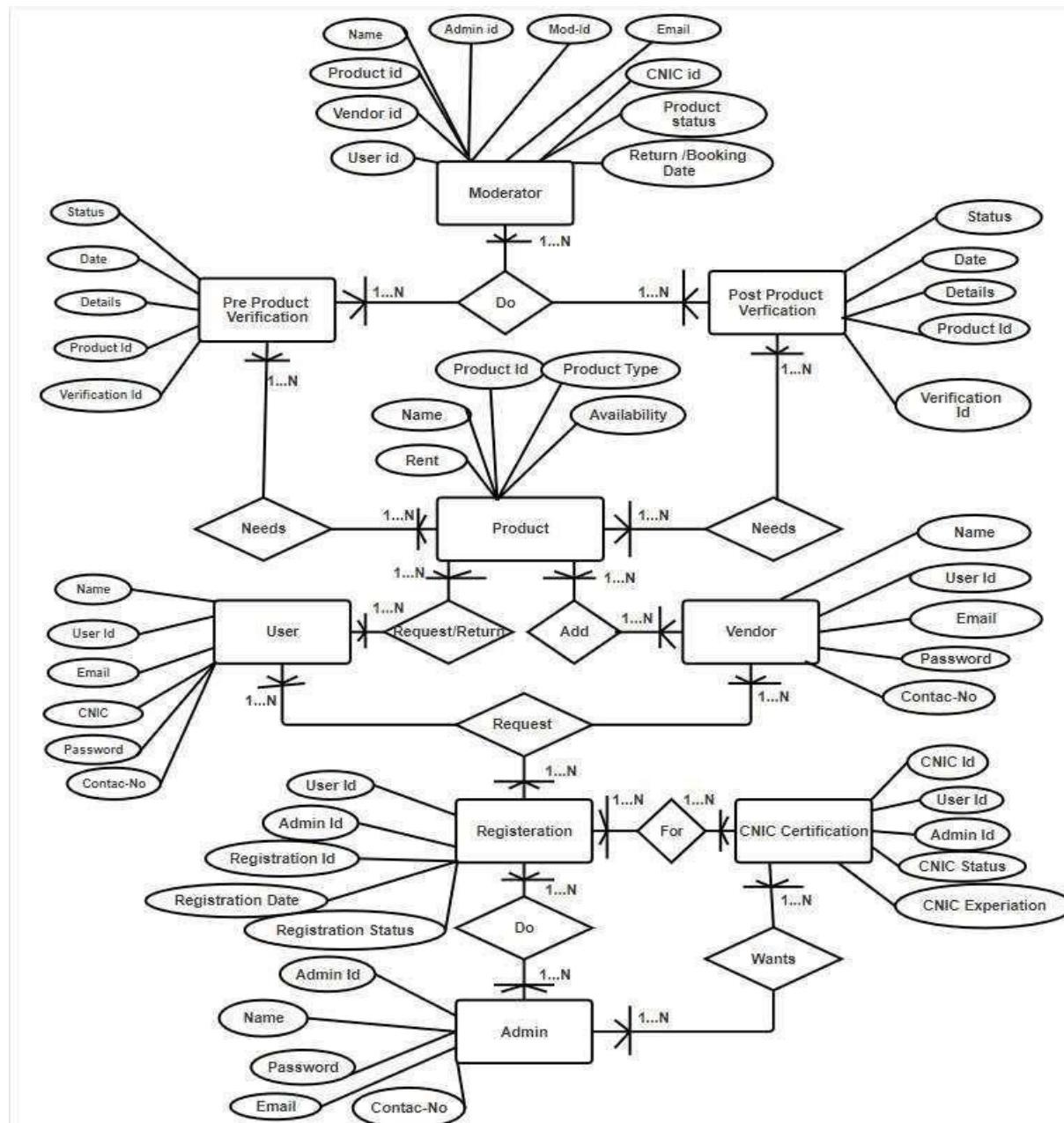


Figure 5: ER diagram

In this Figure 5 Rentment Application ER Diagram have the following properties

- There are the 9 Entities associated with Our Application utilization
- The pre and post product verification are handled by the moderator
- The user and Vendor Entity have one many relations with the Product

8 Rentment Application Design

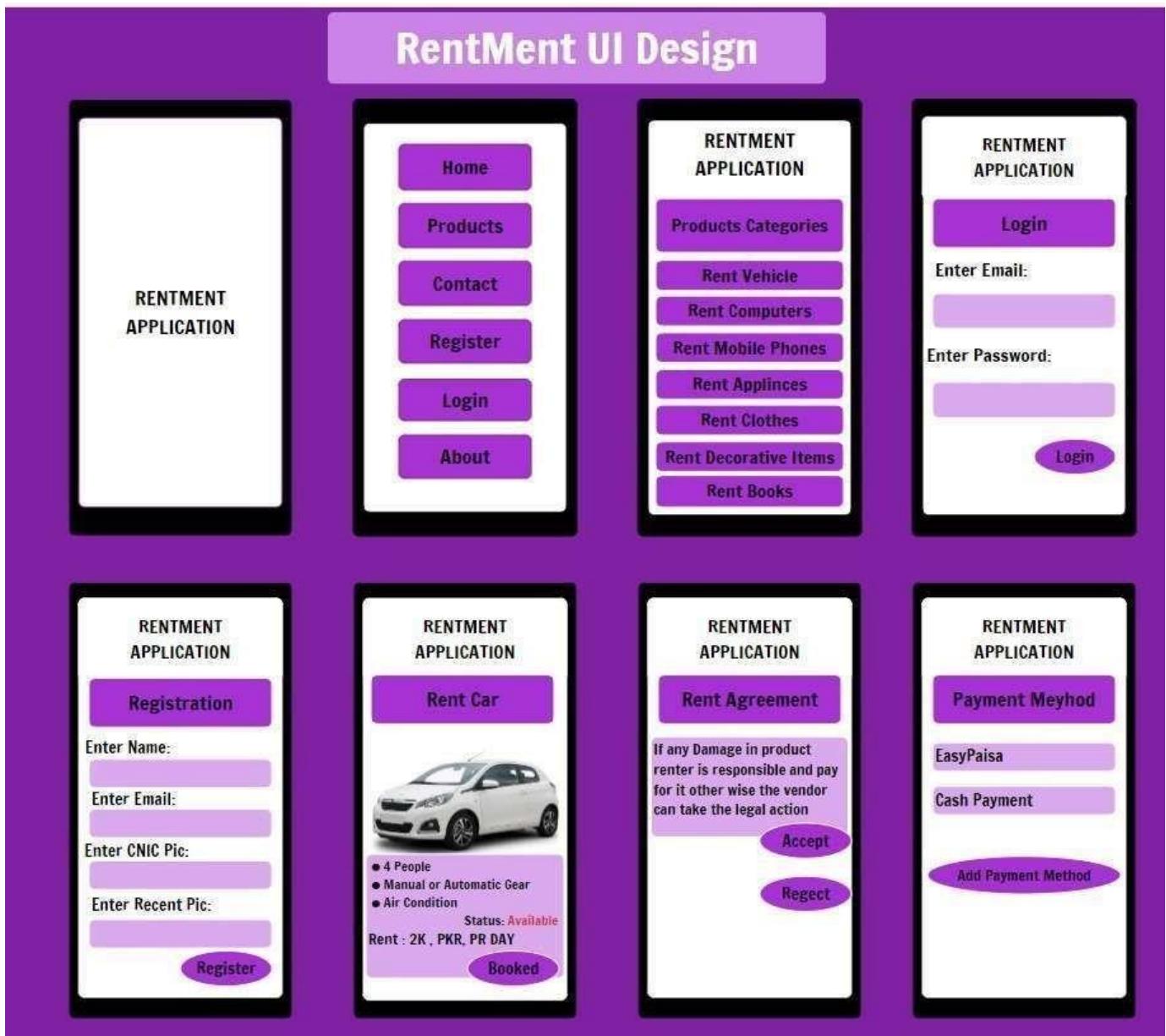


Figure 6: Application Design

In this Figure 6 UI/UX Design diagram are as demonstrate and display below

- The Home Display
- Registration page where user easily Register himself
- Product Description page with associated values

9 Rentment Sequence Diagram

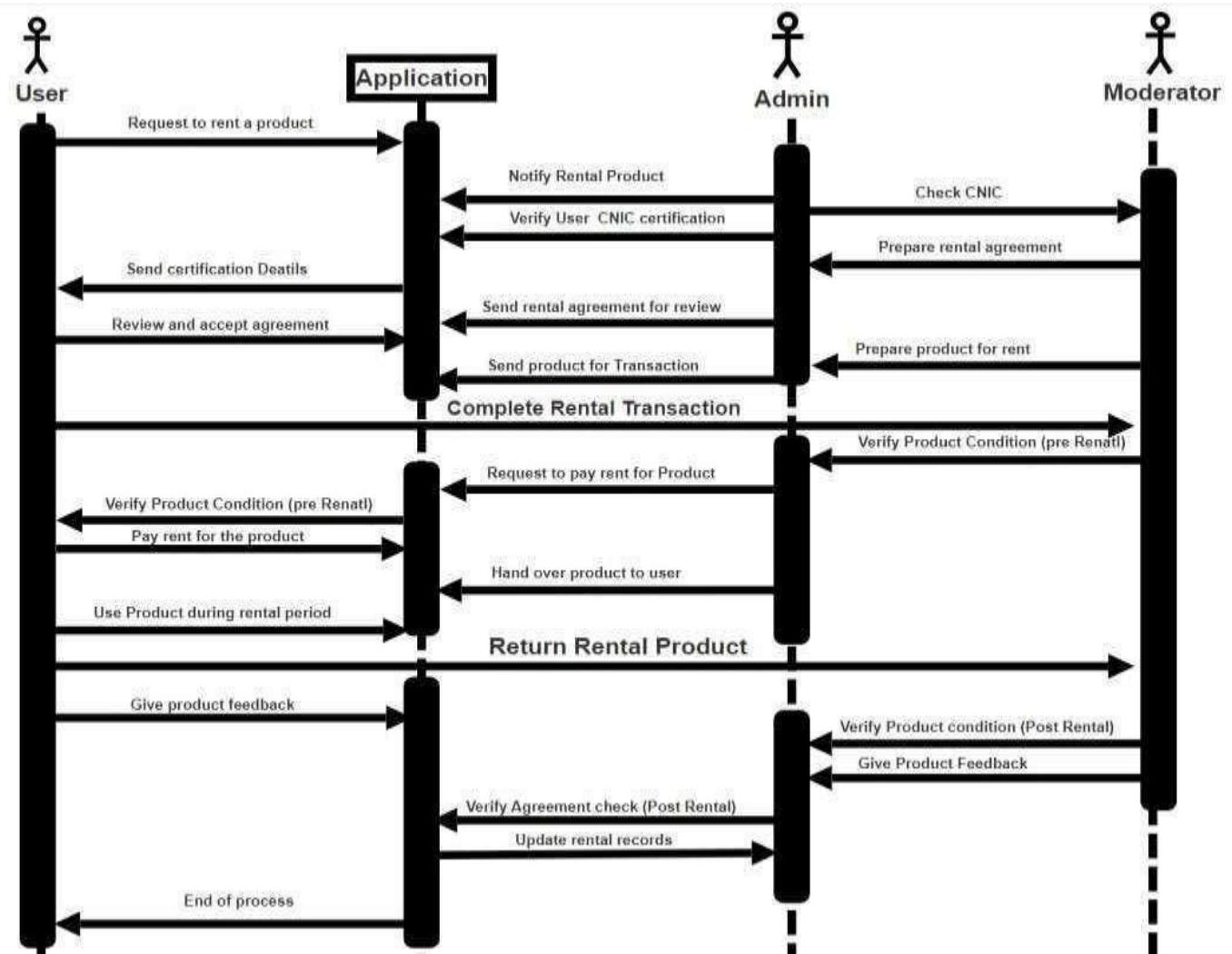


Figure 7.1: Rental Sequence diagram

In this Figure 7.1 Rentment Application Sequence Diagram illustrated that the Data Flow Sequence of each person

- The User Request to the Rent the Produce Sequence diagram in first sequence
- The vendor want provide the Rental product admin accept the request
- The vendor Set Rental Product Detail and the Admin saved the Rental product detail
- The Moderator verify the User (vendor) set the Term and Condition

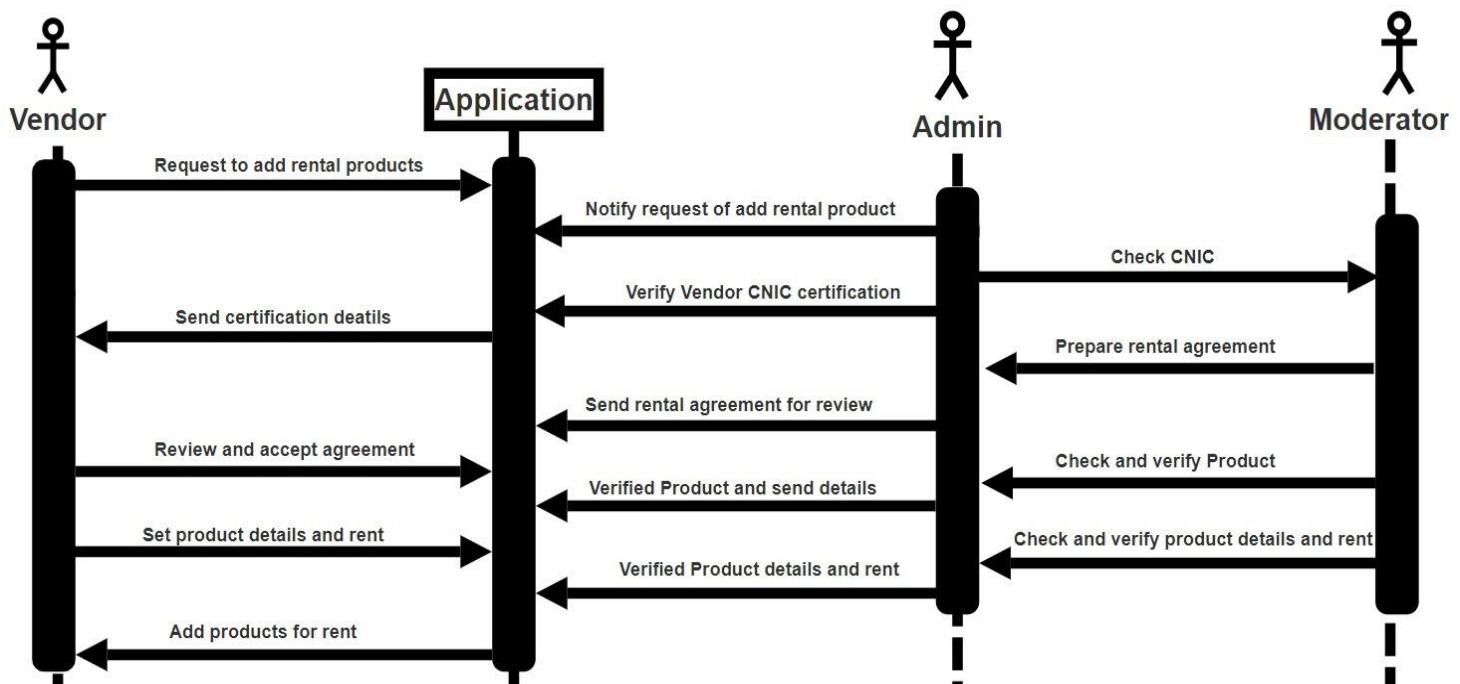


Figure 7.2: Add Product Sequence diagram

In this Figure 7.3 illustrate the Product add by vendor

- Vendor request to Add Product
- Admin notify request and send it to moderator
- Moderator check that CNIC certification is done or not
- The prepare rental agreement and send this to vendor to accept it.
- Then check and verify product and its details
- In the last add product for rent.

10 Rentment DFD Data Flow Diagram

10.1 DFD Level 0

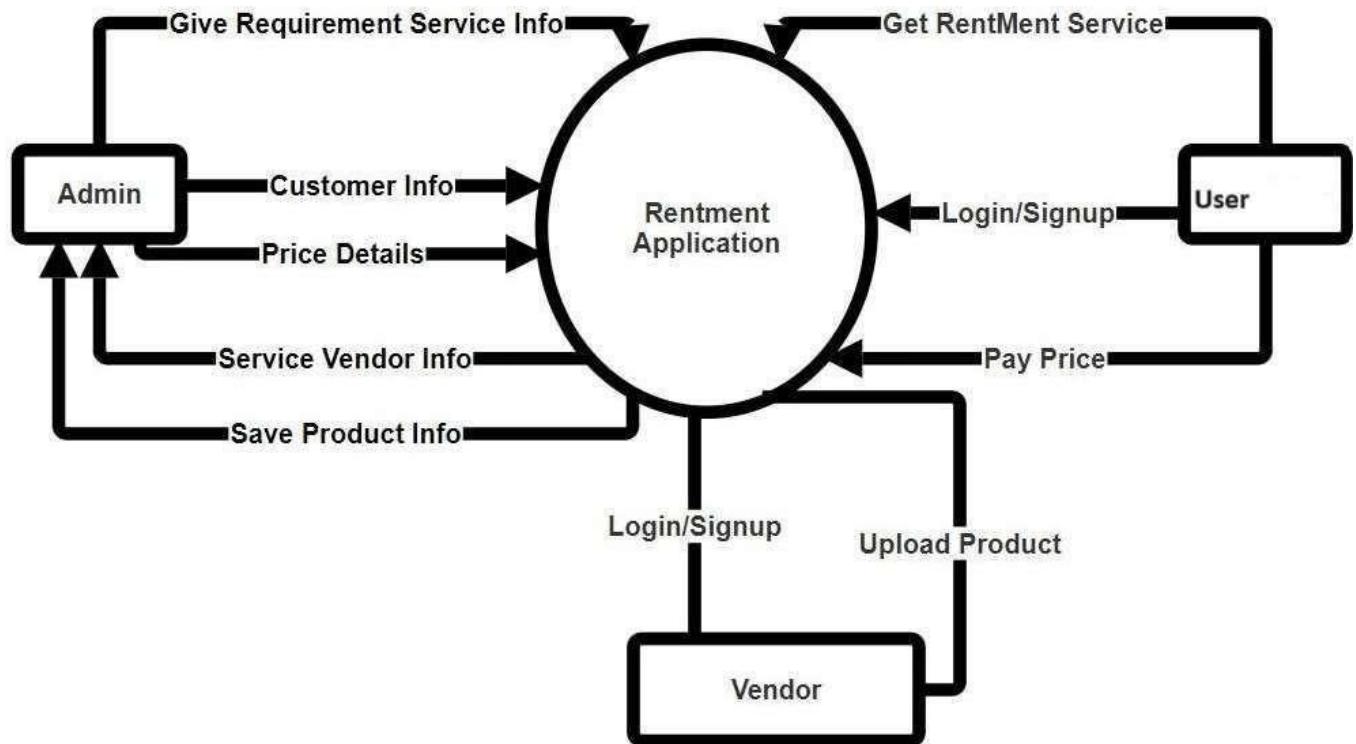


Figure 8: DFD Level 0

In this Figure 8 DFD Level 0 demonstrated the important data that when Application 1st to perform in Application They are the

- User Login/Sign up to the system
- User get the Rentment service that are required
- Vendor have privileges to upload the Rental product and also updated it
- Admin have Authority to control the both the Entity

10.2 DFD Level 1

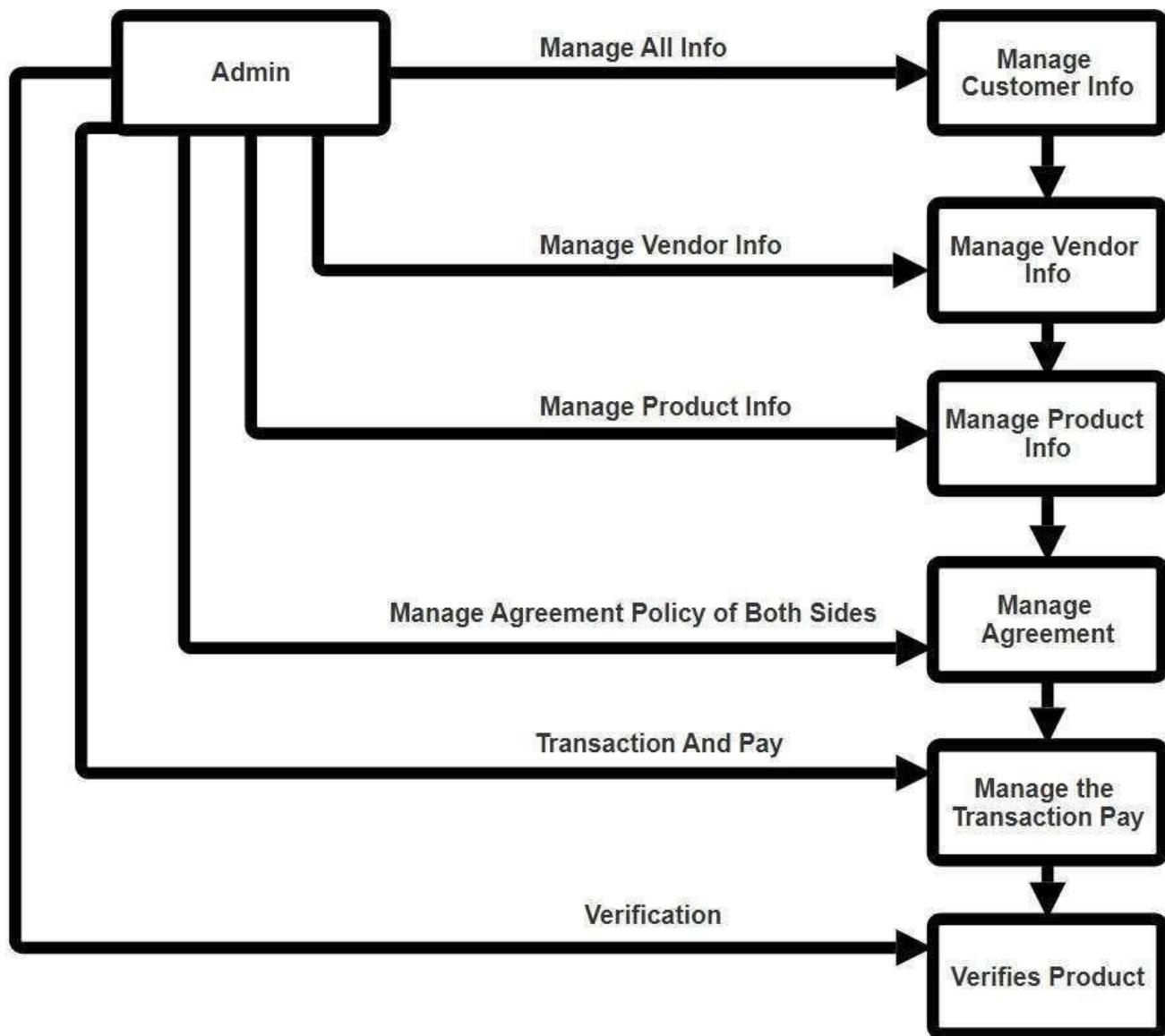


Figure 9.1: DFD Level 1 (Admin)

Admin

In this Figure 9.1

- Manage the all info related to the product ,user,vendor
- Manage the Agreement policy between the user and the vendor
- Manage the transaction process between the both vendors and the entity

10.3 DFD Level 1

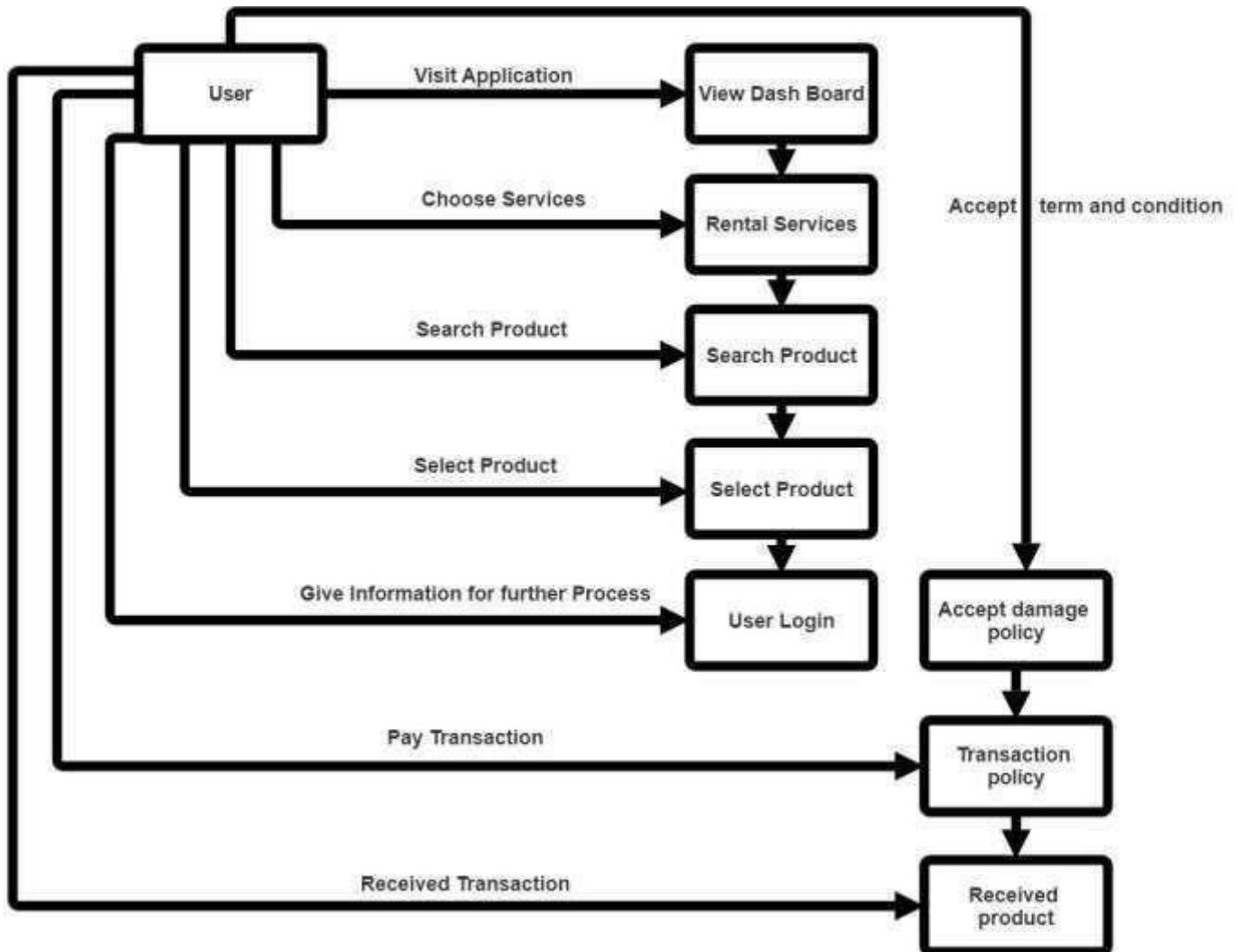


Figure 9.2: DFD Level 1 (user)

User

In this Figure 9.2

- User View the Data of the Websites
- Websites have the data flow activity like the provide the user required data
- User give their data for further processing

10.4 DFD Level 1

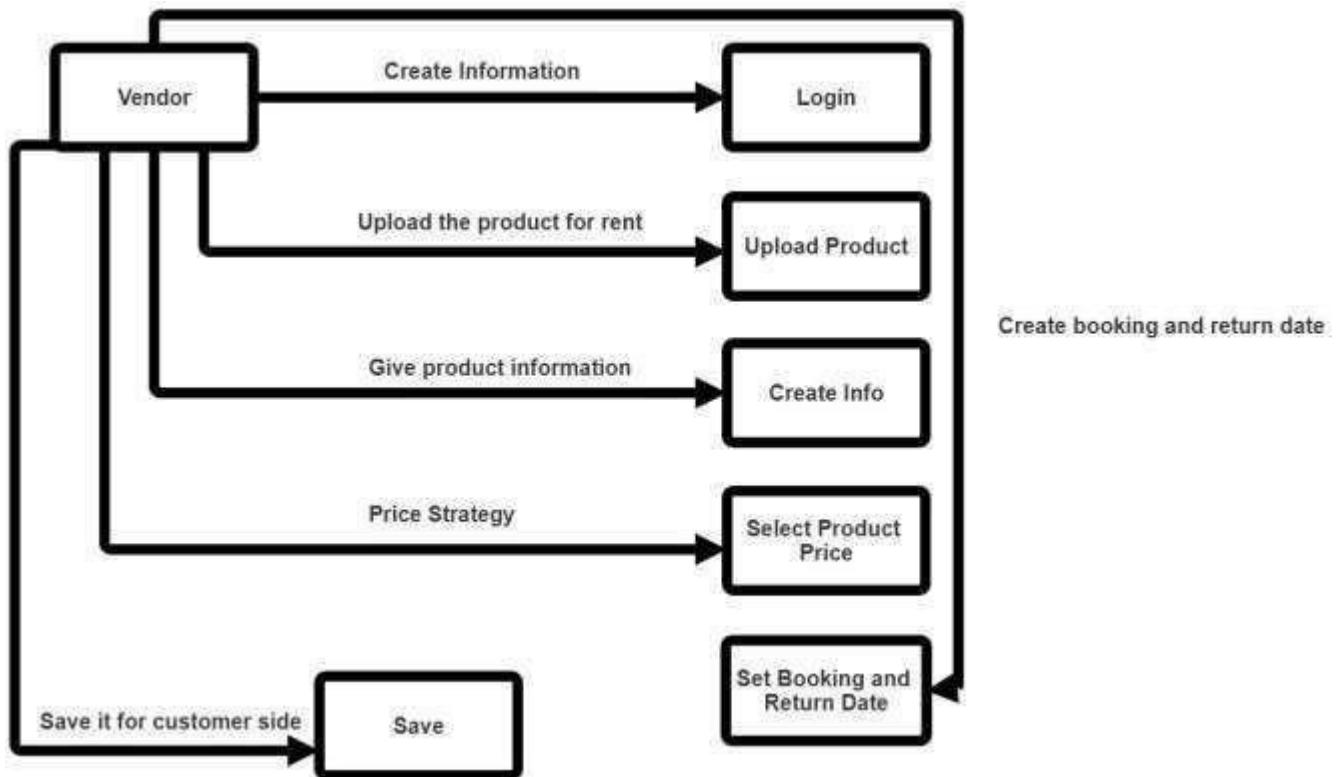


Figure 9.3: DFD Level 1 (vendor)

Vendor

In this Figure 9.3

- Vendor have the privileges to create the data of the product
- Vendor have upload the that they give to the rent
- Vendor create the price strategy according the product

10.5 DFD Level 1

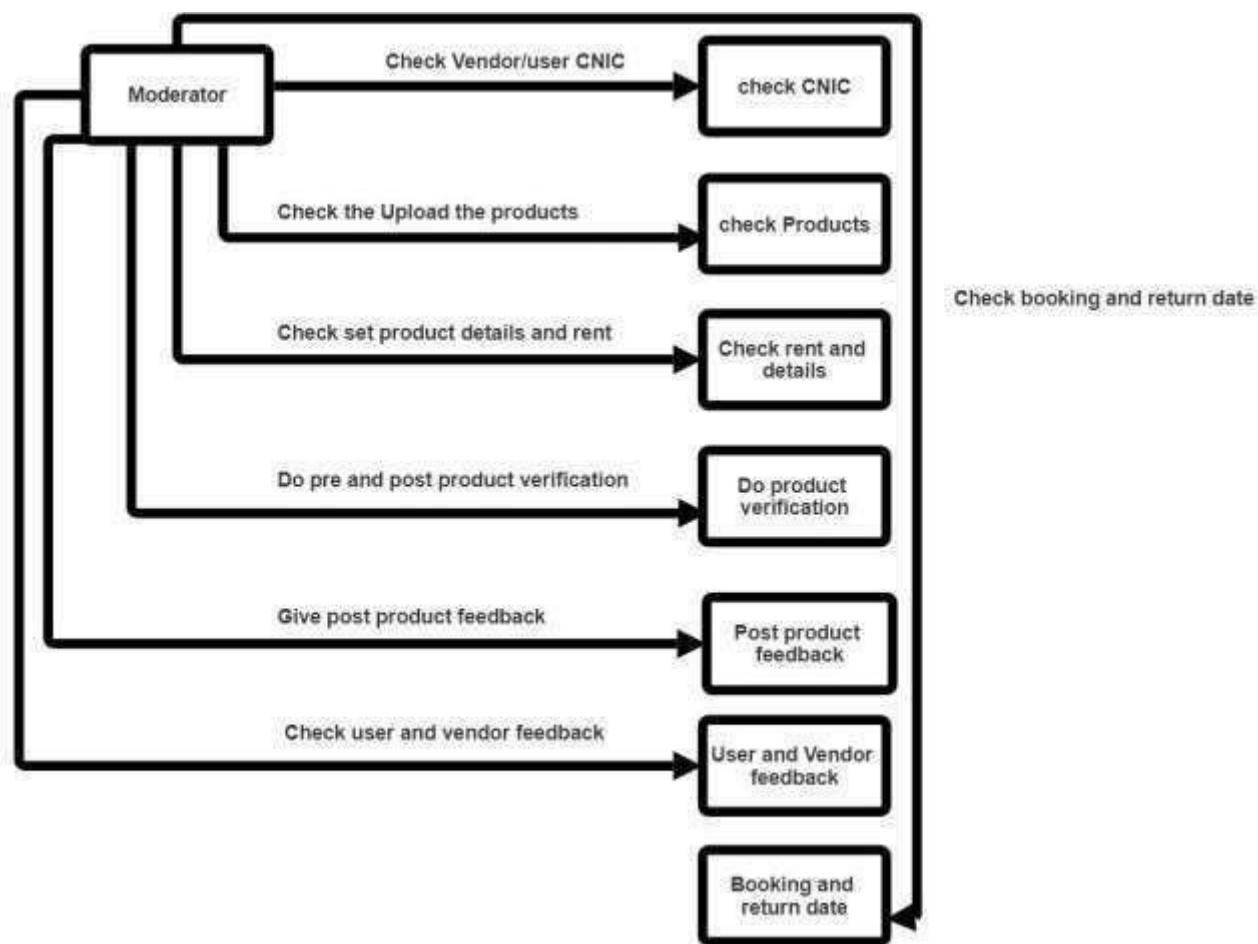


Figure 9.4: DFD Level 1 (Moderator)

Moderator

In this figure 9.4

- Moderate have responsibility to verify the user credentials
- Product availability which user required
- It is also responsible for checking the feedback which help in future for better enhancement

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