COURSEWORK: GROUP ASSIGNMENT

HOTEL MANAGEMENT SYSTEM ANALYSIS

Course : CN7039 - Software Engineering

University of East London

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1.Company Background

1.1 Company Selection and Description

XYZ Hotel is a Bed and Breakfast (BNB) Hotel situated in Brighton, UK. The Hotel has a prime location with close proximity to some of the most famous tourist attractions in the area which include; Brighton Pier (400 meters away from the pier) and the Sea life center. This Bed and Breakfast prides itself on its lavish and yet quirky rooms, as each room is given its theme. The BNB also boasts a listed building grading, which dates back to the early 19th century, making it very popular with UK tourists.

1.2 Background and Strategic Plan

Most recently the company is now owned by an elderly couple, who have a love and appreciation for maintaining the upkeep of both the interior and exterior of the hotel, however struggle to modernize and upgrade their business processes, and IT apparatuses. This comes down to two main reasons:

1) Already spending a large portion of their budget on hotel maintenance and marketing
2) Ignorance of the benefits that investing in automation can bring, as they themselves are not familiar with advanced IT.

The owners set aside time once a quarter to discuss with the team which consists of 4 employees of what their strategic goals are for the next year. They also periodically observe their staff to see if they can examine themselves and what could be holding the business back from achieving their goals(Malekpour et al., 2020).

Their main goals for the next two years are to:

-To maximize their revenue in the summer months, as it is not unusual for the BnB hotel to be closed months on end from November till May.

In order to reach this goal they will need everyone to be more time efficient with menial operational tasks that do not do much to grow the companies' bottom line. The couple have identified two areas which could do with some improvement,

1.3 Non-Computerized Processes or Systems

1) Since they advertise and sell rooms on their website, as well as through external parties such as booking.com, Tripadvisor, and Expedia- the staff themselves have to check on these external sites to see which rooms have been sold, and then manually close these rooms

on their website. Sometimes someone may forget to check these external parties to see which rooms have already been sold, and they may get a client from their website, resulting in an overbooked hotel. This leads to disgruntled customers, poor reviews, and thus fewer people who will want to come in the future, which will lead them further away from their goal of increasing revenue. Another casualty of this lack of automation is that it means daily room closure reports can sometimes be inaccurate. Inaccurate data means future analysis of the data will not lead to poorer forecasting and decision-making (Alrawadieh, Alrawadieh and Cetin, 2020).

2) All of their documents are held as physical documents. Documents of all types including but not limited to sign-in sheets for external parties such as their catering suppliers, down to accounting documents.

During their latest strategic check-in for the last quarter, held October 22nd, 2023 a younger person on their team who is more adept at dealing with technology, suggested that they should automate a lot of these processes, to see the biggest impact on turnover. The elderly couple are now more open to seeing if this will work and have decided to look into their options.

2.System Analysis

2.1 Investigation of the Process

We think that the most influential factors impeding our progress towards achieving business objectives (Yang, 2013) are related to these two important processes.

PROBLEM 1:

The first process identified is the absence of **automated links** between rooms sold on external platforms and our website, as well as our reliance on **manual data storage**. The significance of the first process lies in its direct impact on our business, as room sales are integral to our operations. Additionally, the lack of automation in managing bookings increases the risk of **overbooked rooms**, further exacerbating the challenges we face.

PROBLEM 2:

The significance of the second process lies in its **legal implications**. **Documentation** is essential for various purposes such as sign-ons, ensuring compliance with health and safety

regulations, and facilitating accounting practices for **tax obligations** at the end of the financial year. These documents not only fulfil regulatory requirements but also serve as a foundation for generating reports later on. Having comprehensive documentation allows us to analyze **sales data**, make **informed decisions** for the upcoming year, and identify opportunities to enhance **cost-effectiveness**. In essence, the impact of maintaining these documents extends beyond mere compliance, providing valuable insights for strategic planning and **business optimization**.

2.2. Task and Process

To identify and define the problems with the current system, we have chosen observation and interviews as our means of requirement collection techniques. This is because the staff at the hotel have an open dialogue and very good communication between them. As the team at the hotel does not have much technical knowledge, we have decided that we will be choosing brainstorming as our method for developing the new system (Salminen et al., 2020). As an elderly couple, they are not aware of technology. As a system analyst, we choose the popular choice of purchasing software (outsourcing ways) to address the issue identified.

SOLUTION 1:

An appropriate system to address the challenge of lacking automated links between rooms sold on external platforms such as Expedia, consider implementing a web-based Channel Manager. This system is specifically designed to manage the distribution of room inventory across various online channels. It ensures that room availability and rates are consistently updated on all connected platforms. It simplifies the management of bookings, sales, and availability at a reasonable price. The collected data will pertain to room availability on specific dates, and the Channel Manager will promptly update your company's website when these rooms are sold through external channels.

SOLUTION 2:

The proposed solution for the lack of digital documentation is a database management system (DBMS) to store our data and to access it. Automating this process necessitates custom software, and to control expenses, we intend to collaborate with freelance software developers. By leveraging their expertise through online platforms, we can tailor the solution to our specific needs and negotiate costs effectively.

The new digital sign-in system, built with a user-friendly Python/Django interface, will capture essential details such as the person's name, ID , entry and exit times. This system ensures more accurate tracking of individuals within the building, crucial for health and safety compliance. It addresses observed issues where busy receptionists may overlook manual sign-ins for external suppliers.

2.2.1 Software and Hardware Requirements

Software Requirements

Process 1: Channel Manager

Suggested providers:

1. HotelMinder - The cheapest one gives a lot of discount
2. Smoobu - It has a 14-day free trial and the best price in the market.
3. Cloudbeds - It is highly rated software and medium price.

Process 2 : DBMS

Software Interfaces that will need to be installed include:

- OS (Windows)
- Django(Python Framework) - user interface
- MySql- database

Hardware Requirements

-The only hardware requirement for this software is a PC, which the Hotel has two.

2.2.2. User Roles in System Development and Usage

Table 1 : User Roles and their responsibilities

User Role	Responsibilities
System Analyst	Identify and define problems in the current system through observation and interviews. - Recommend suitable solutions, such as a web-based Channel Manager and DBMS. - Decide to outsource development to freelance developers (Khan et al., 2022).
Hotel Staff	Actively participate in interviews and discussions with the system analyst. - Contribute insights through brainstorming sessions, shaping the design of the new system.
Freelance Developers	Develop custom software solutions, including the DBMS and Python/Django interface. - Collaborate with the system analyst to understand specific requirements and tailor solutions.
End Users (Hotel Employees)	Interact with the web-based Channel Manager for managing bookings. - Utilize the digital sign-in system to record entry and exit times.
IT Support (if applicable)	Assist in the installation and configuration of software interfaces, such as the OS, Python/Django, and MySQL database.
Management	Participate in decision-making regarding the adoption of proposed solutions. - Oversee the implementation process for alignment with business objectives and legal compliance.

2.3 Use case Diagram Modelling

Table 2 : Use Case problem 1 Explanation(Weerasinghe et al., 2022)

Use case 01	Booking room system
Actors	Guest, Hotel receptionist, Manager
Description	Making bookings via the hotel website.
Basic flow	The guest accesses the Hotel booking website and requests a room. After the Hotel receptionist reviews booking, the guest chooses which room he/she would like from choosing the size of room, the viewing and even the theme, then updates the check-in/out details. The receptionist checks the status for availability then creates a booking and sends booking confirmation after the accepted booking is approved by the manager, who also checks payment was done by guest, assuming paid by card or voucher.
Problem flow	The manager updated the Excel sheet to block the room.

Table 3 : Use Case Problem 2 explanation

Use case 02	Data Entries Management System
Actors	External supplier, Employee and Hotel receptionist
Description	Entries are made in sign-in sheets and invoices are stored in a file.
Basic flow	The external supplier and the Staff enter the building showing their badges to the receptionist who checks the badges against the approved list of vendors. Then the supplier and Staff enter their names and times on the sign-in sheet .The supplier, after adding their organization details on the sign-in sheet, delivers the products services whose quality of products has been checked by the receptionist and keeps the invoices which were produced as well in file. After they finish they enter exit time again in the sign-in sheet.
Problem flow	The receptionist updates entries in the entry sheet and keeps it in office cabinet

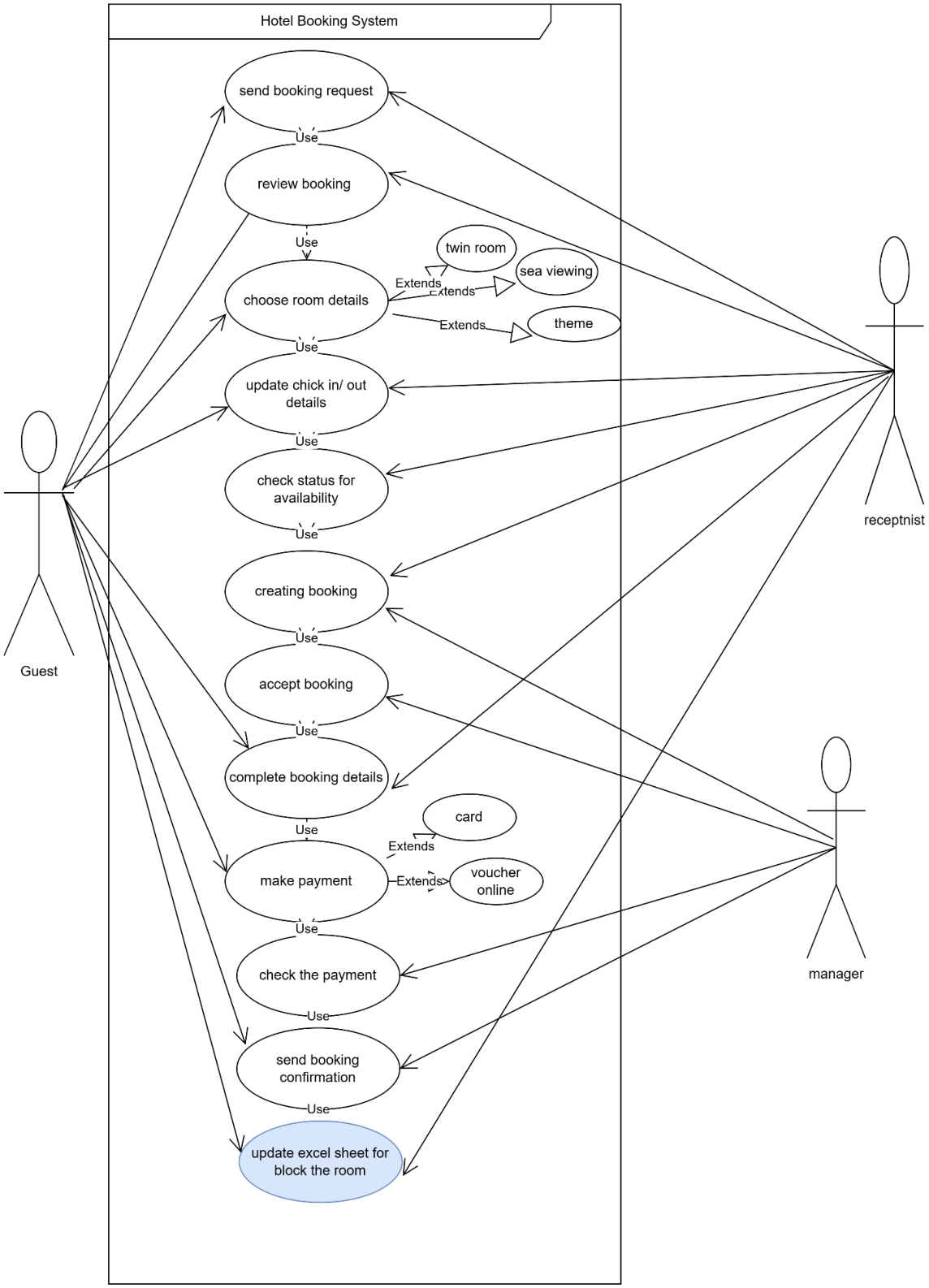


Fig 1.Use Case Diagram Problem 1

Fig 2.Use Case Diagram Problem 2

2.4 . E-R Diagram Modeling

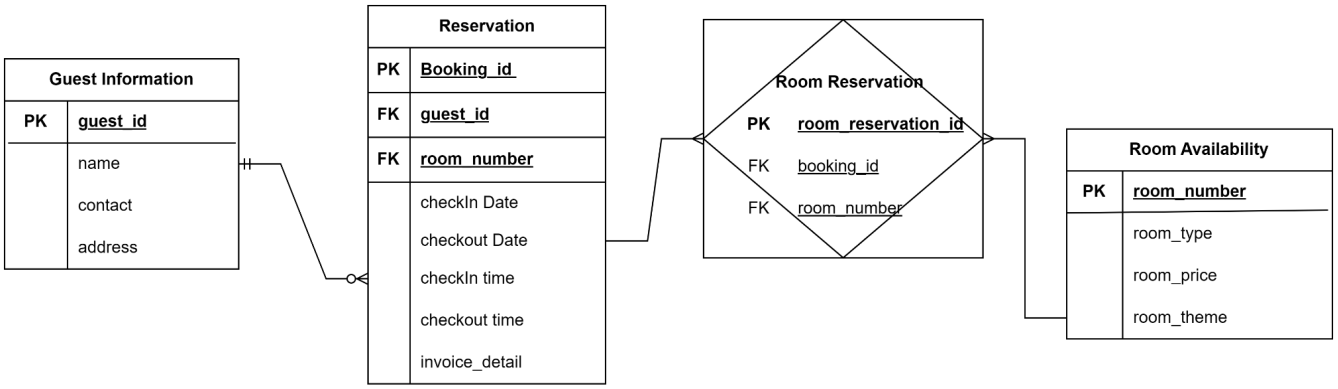


Fig 3.Entity Relationship Diagram-1

- A guest can have **zero to many** reservations.
- A reservation is booked by **one to one** guest at a time.
- A room is reserved by **one to many** guests as this room has multiple beds which can be reserved individually .
- A reservation can be made for **one to many** rooms.

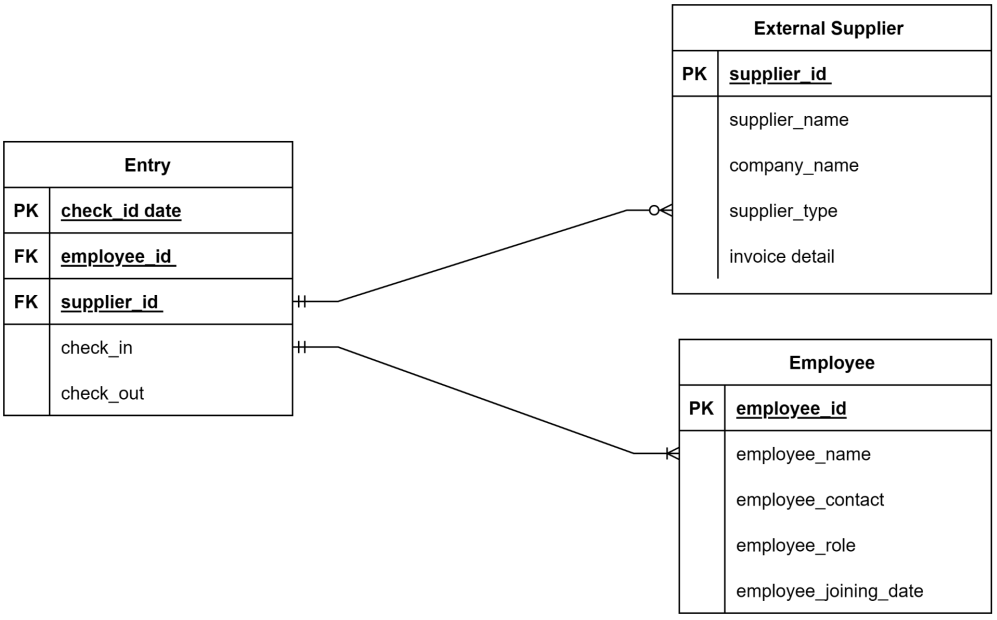


Fig 3.Entity Relationship Diagram-2

- An entry can made by **zero to many** supplier eg.Catering, laundry
- An entry can be made by at least **one to many** employees.
- An external supplier or employee can make **only one** entry.

2.5. Risk Assessment

Table 4 : Risk Assessment with mitigation strategy

(DuHadway, Carnovale and Hazen, 2017)

Risk	**Likelihood**	**Impact**	**Mitigation Strategy**
Technical Complexity	Medium	high	Provide extensive training, use user-friendly software
Security Concerns	Medium	high	Strict access controls, encryption
User Acceptance	Medium	high	Involve staff in decision-making, comprehensive training
Cost Overruns	Medium	high	Detailed economic feasibility study, transparent budgeting
Communication Challenges	Low	high	Establish clear communication channels
Technical failures	Medium	high	Regular maintenance and upgrades. Backup systems in place
Inaccurate Estimation	Low	high	Elaborate only the work has immediate priority. Allocation factor of the stimulation
Scope variations	Low	high	Analyzing customer expectation around how scope variation can impact the original estimation.Using agile methods can eradicate.
Poor quality code and technical debt	Low	high	Prioritize code quality, conduct regular code reviews, invest in proper documentation
Poor productivity	Medium	high	Set achievable timeframe find project manager who is directly involved and collaborates with team
End-user-engagement	Low	high	Listen to the users by testing and surveys, do focus group frequent release and testing

3.Design Phase

3.1 Proposed Solution Use Case Diagram

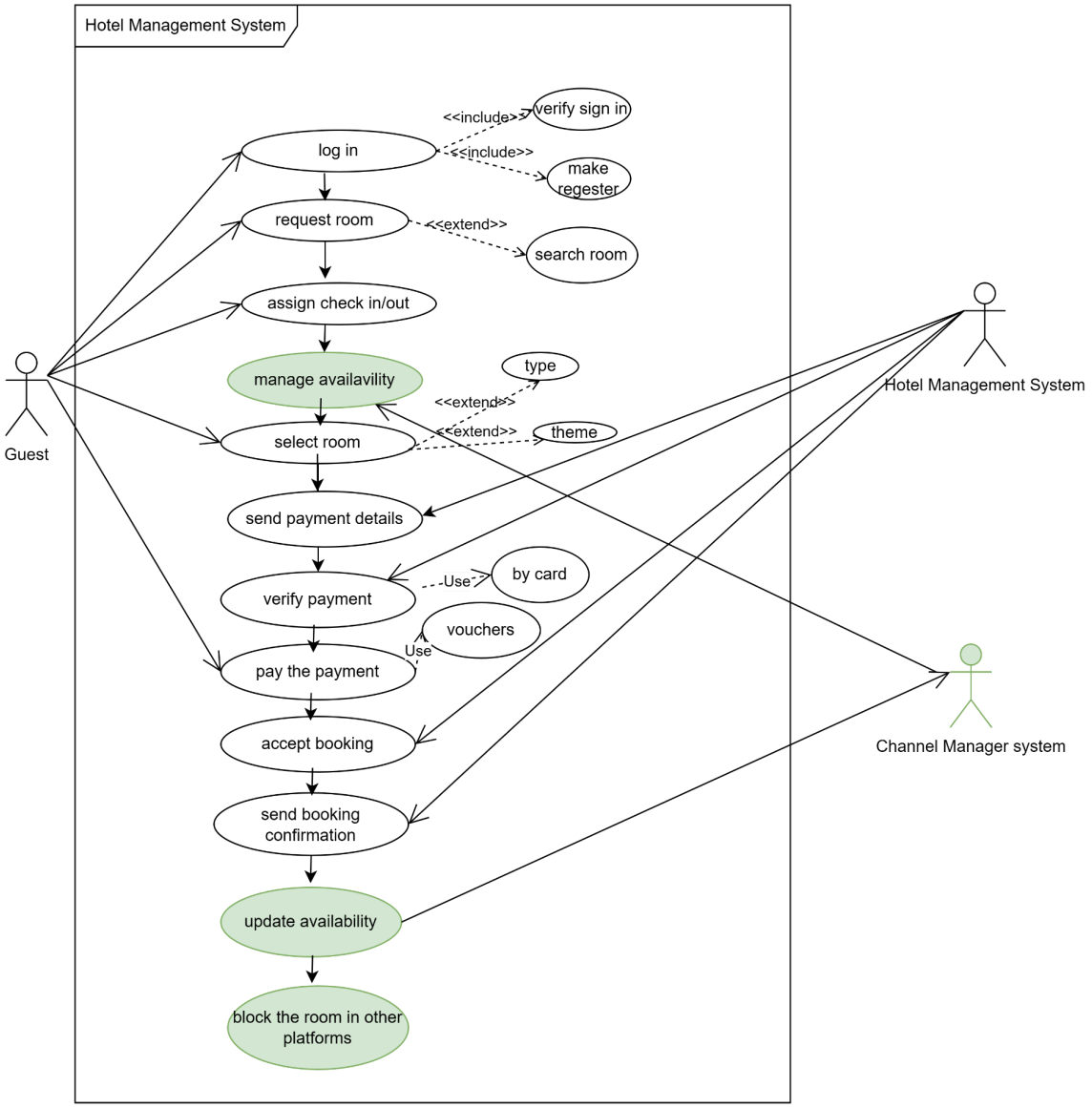


Fig 4.Use Case Diagram Solution 1

The shaded use cases represented the solution for the first problem.

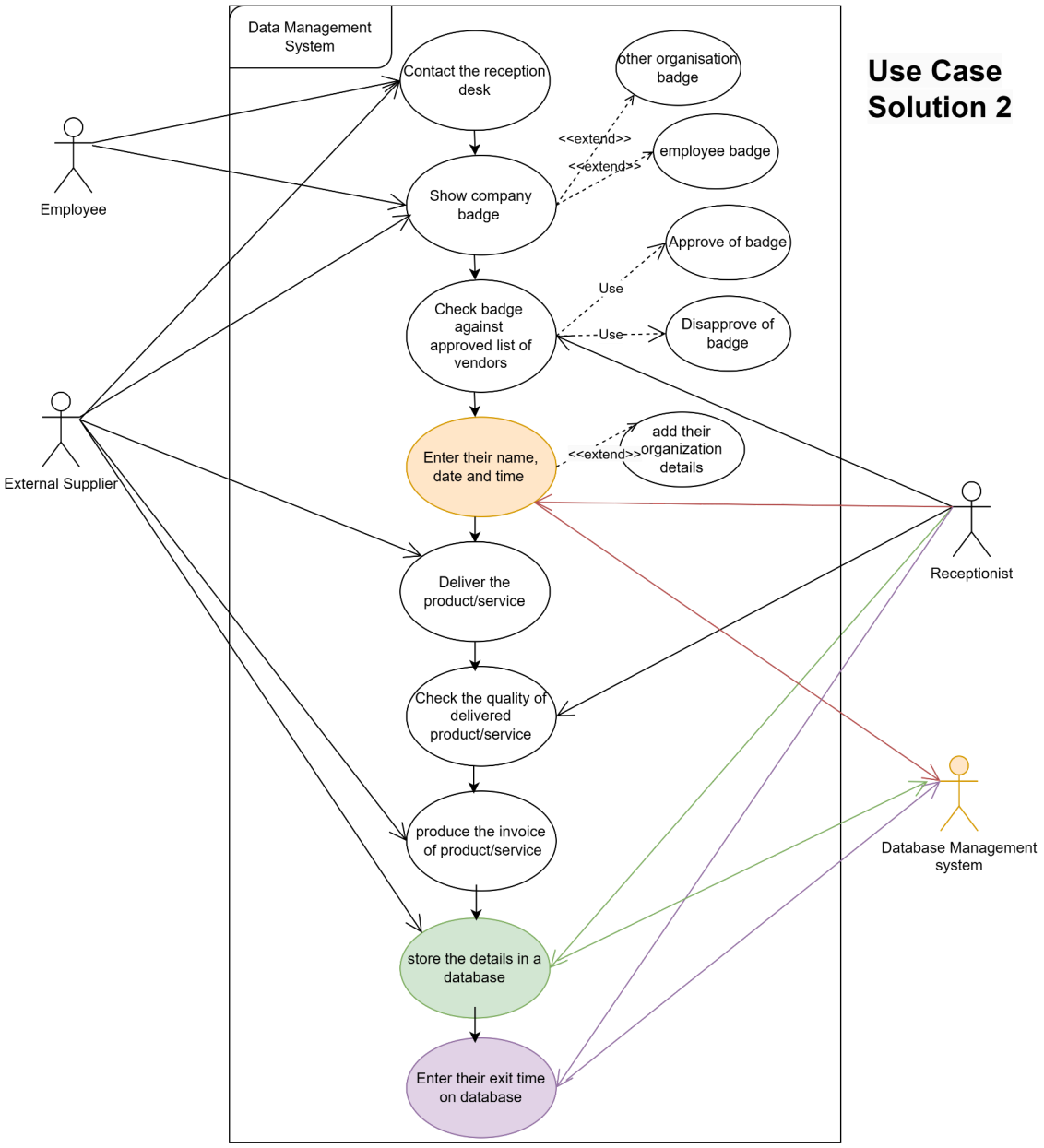
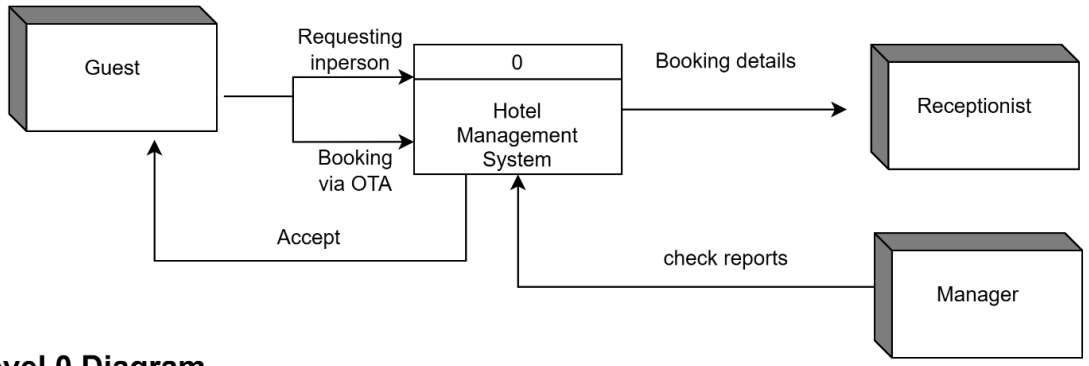


Fig 5. Use Case Diagram Solution 2

The shaded use cases represented the solution for the identified second problem.

3.2 Proposed Data Flow Diagram

Context Level Diagram



Level 0 Diagram

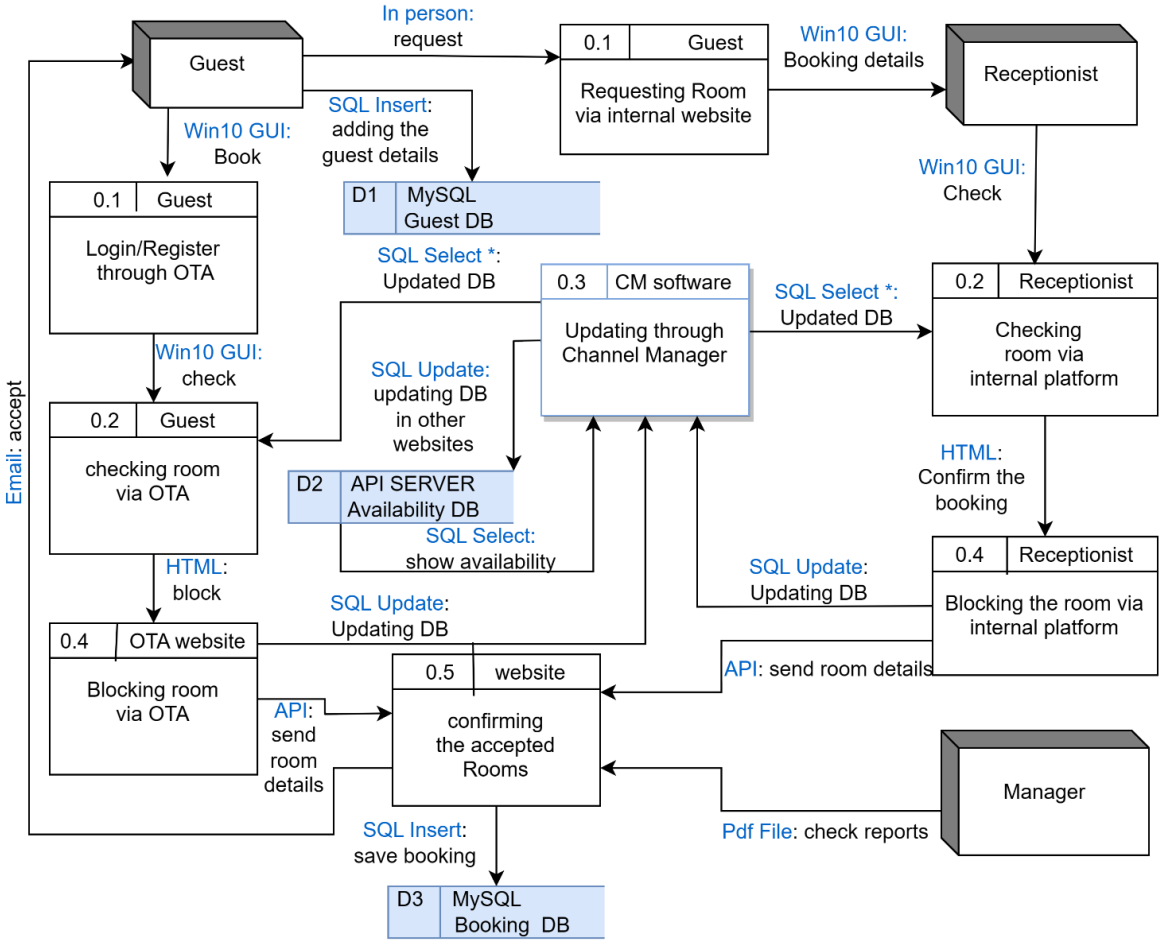
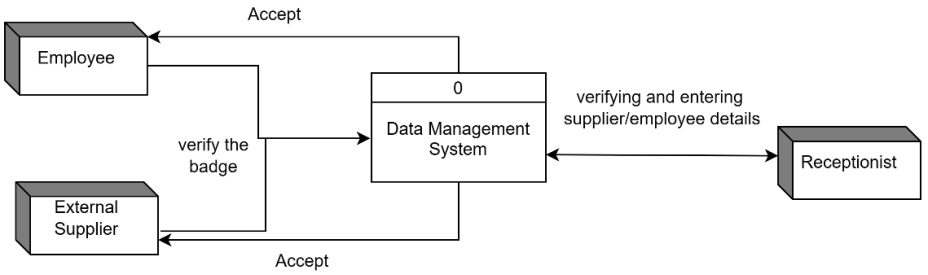


Fig 6. Data Flow Diagram Solution 1

CM - Channel Manager OTA -Online Travel Agent DB- Database

Context Level Diagram



Level 0 Diagram

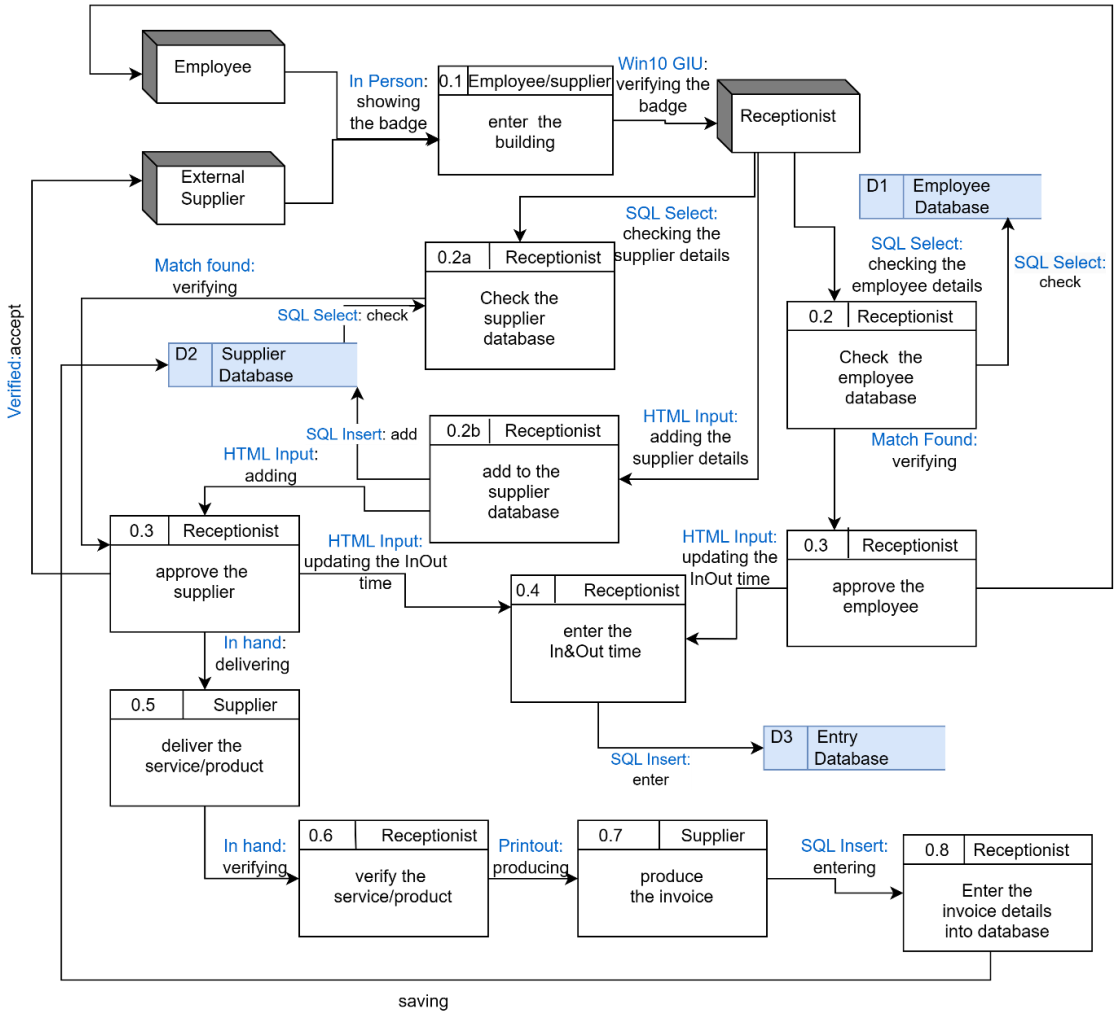
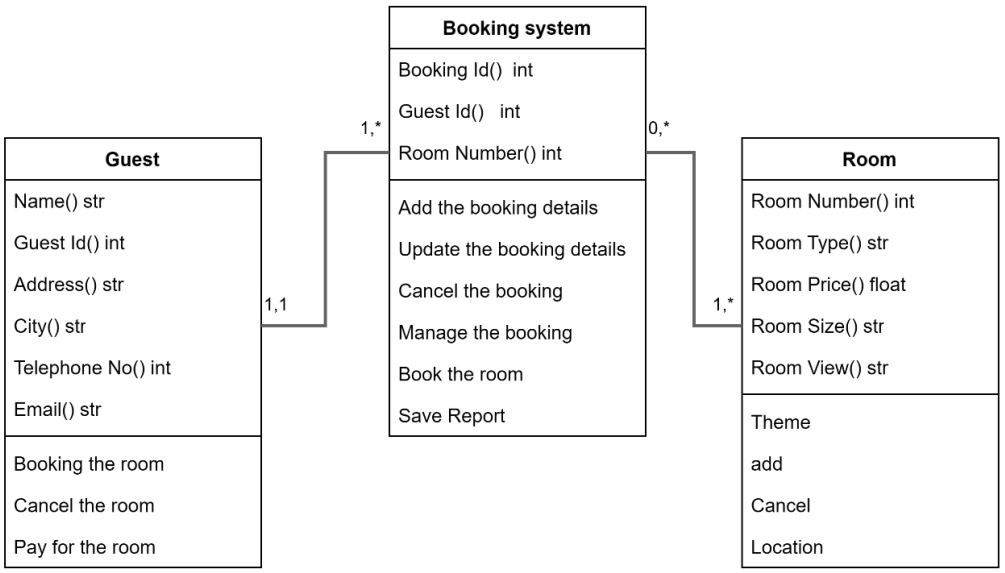


Fig 7. Data Flow Diagram Solution 2

3.3 Proposed Data Storage Solution using Class Diagram

Class Diagram Solution 1



Class Diagram Solution 2

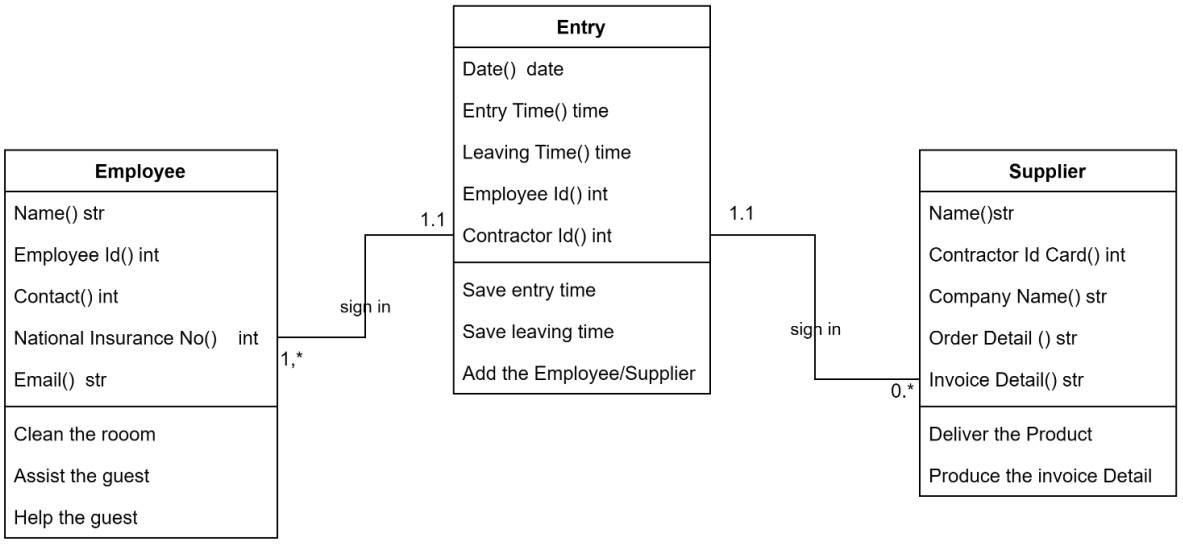
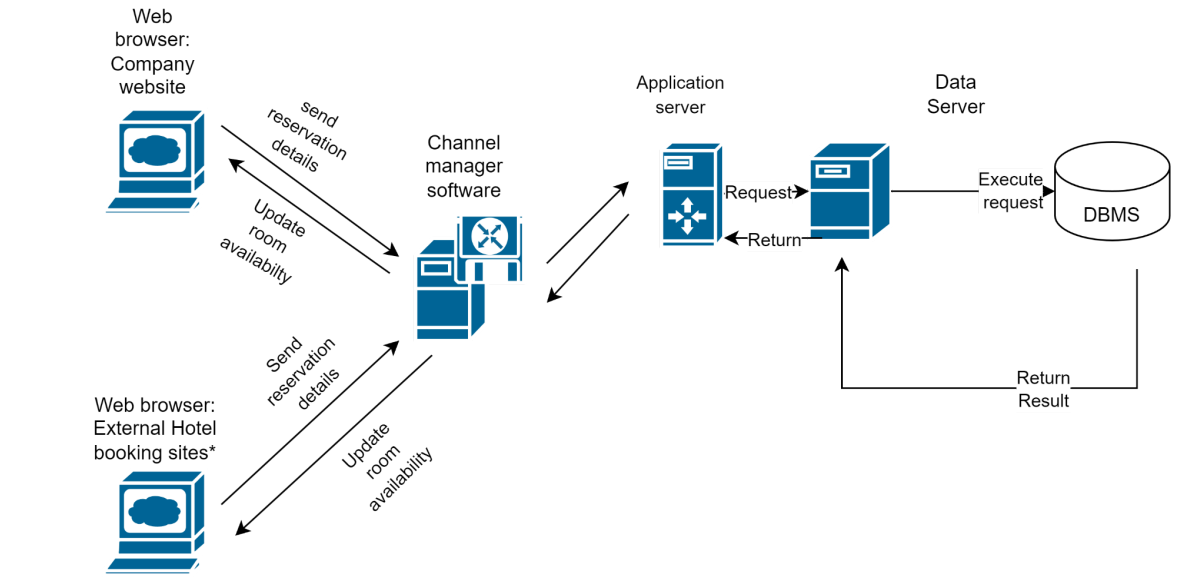


Fig 8. Class Diagram

3.4 System Construction Plan



*

External booking sites includes: Expedia, Booking.com and through other online travel agents (OTA)

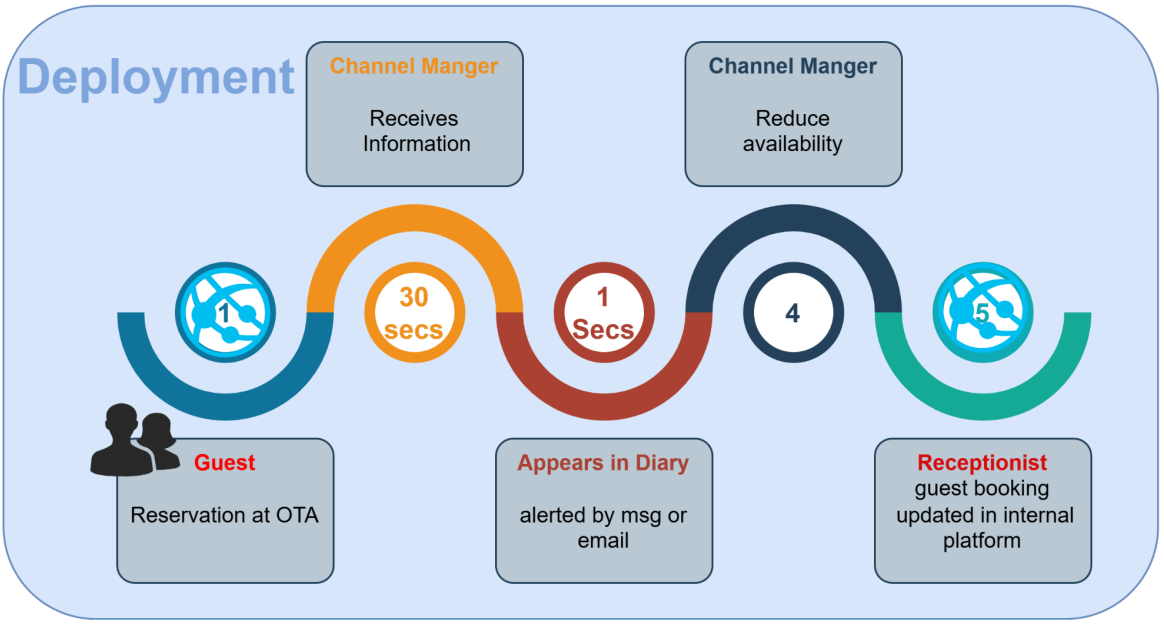
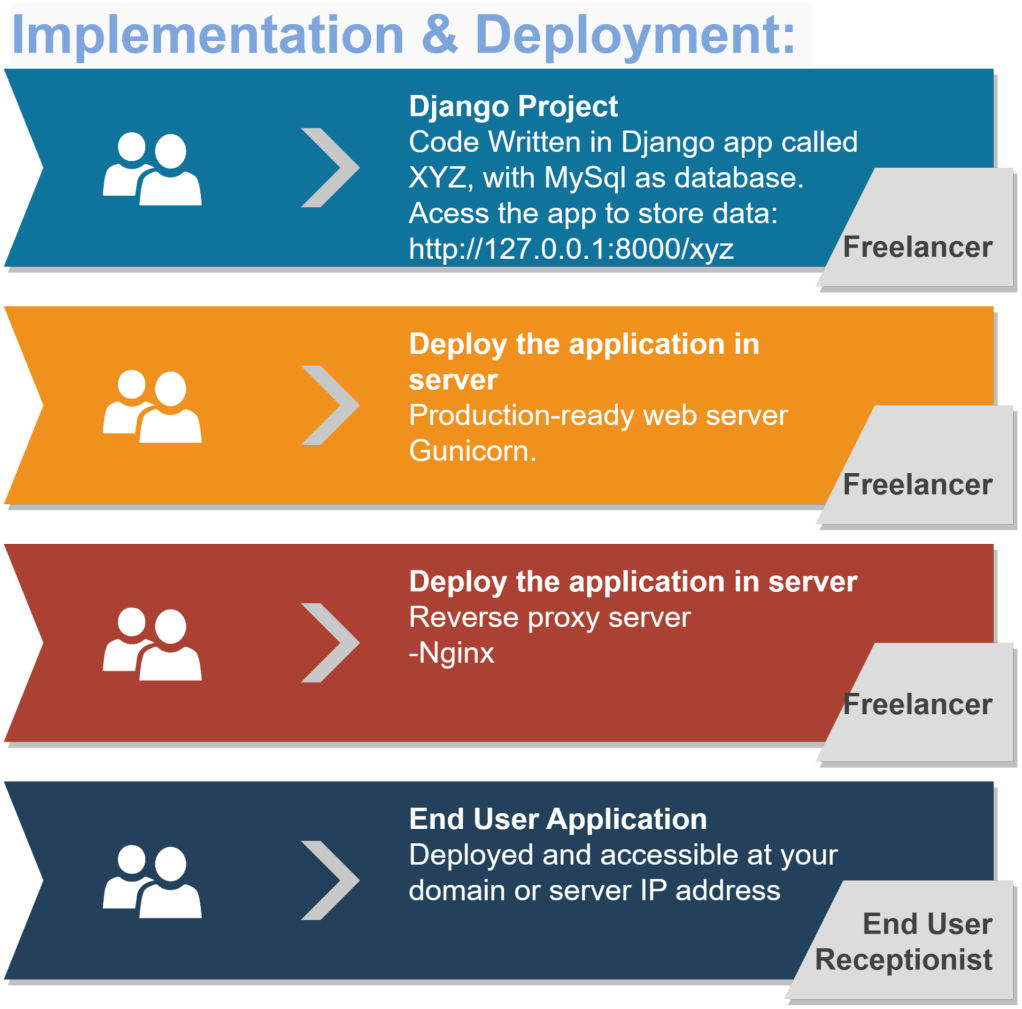


Fig.9 System Construction Plan Solution 1

SYSTEM CONSTRUCTION PLAN SOLUTION 2 : Django Application with MySQL as backend considered as a three-tier client/server architecture:

1. **Client Tier (Front-end):** Presentation and Presentation logics works with dynamic HTML content of Django which serves as user interface and handles user input.
2. **Application Tier (Middle-tier):** Application logic works as intermediate between client and database, including business logic, data processing and interaction with database.
3. **Data Tier (Back-end):** Database layer where MySQL database present in the backend and Django's ORM assist the interaction between application layer and database.



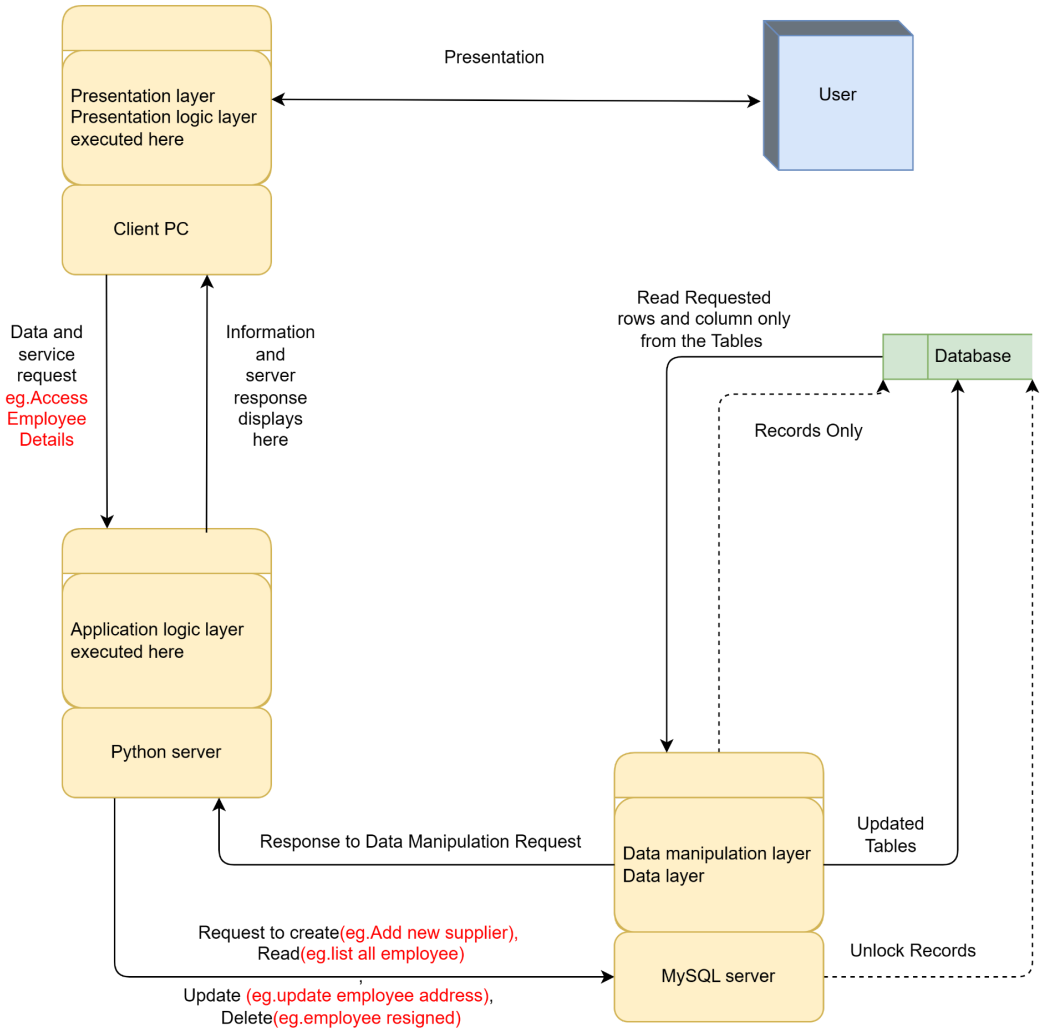


Fig.10 System Construction Plan Solution 2

3.5 Test Plan

According to (Sommerville, 2009), the testing procedure has two objectives. First, validation testing is conducted to show the customer and developer that the system meets all criteria. Finding scenarios where software techniques reveal flaws is the second objective. According to IEEE (Braude and Bernstein, 2016), the term defect is defined as incorrect step, process, or data definition in computer programmes.

Table 5: Testing software system process during Implementation

Test	**Objectives from the test**
Unit PC	The interface easy access and fast, clear
	Connected well with internet
Room availability data set	Verify that room availability and rate changes are reflected across all platforms.
	Ensure room rate
Data exchange mechanism	Validate it between the PMS and connected platform.
Compatibility with various platforms	Test the integrating with a diverse range of connected platforms, including online booking engine channel manager and metasearch engine
Edge cases and exceptions	Evaluate the integrations' ability to handle unexpected scenarios, such as invalid data, network interruption and platform outputs

Source: *Adapted by the authors*

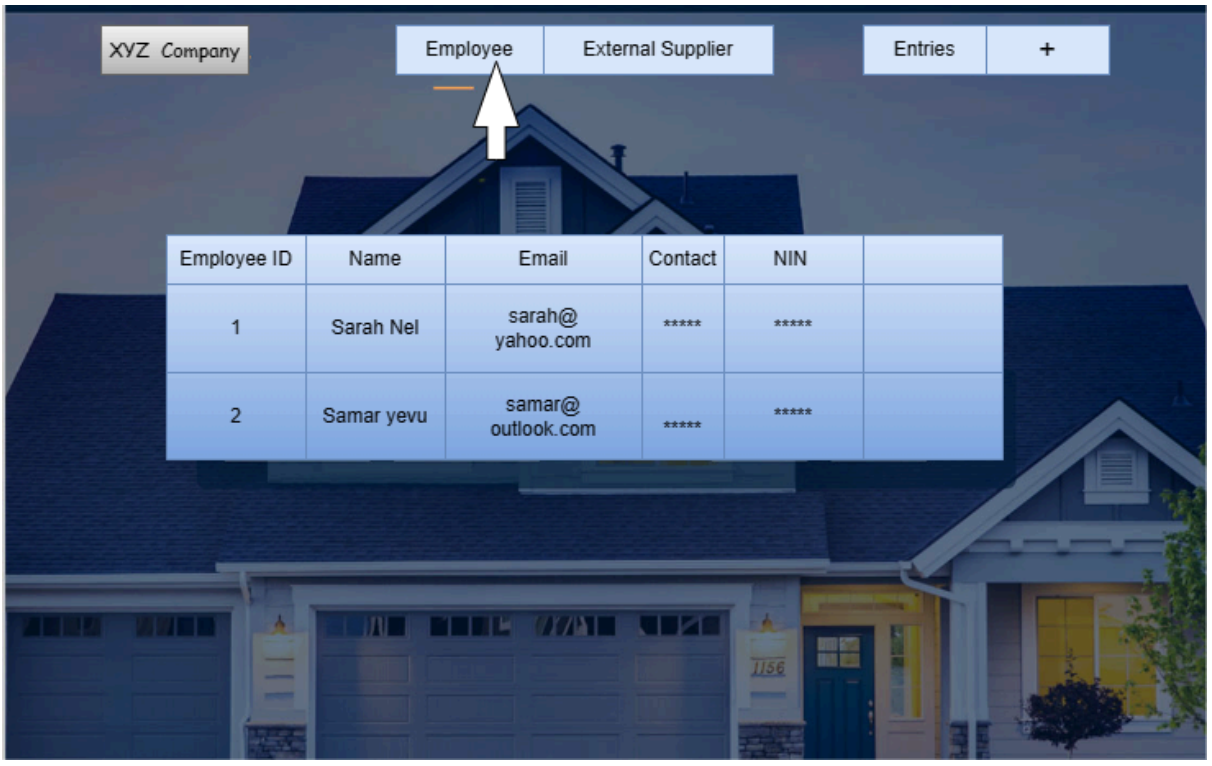
Table 6: Tests and Success Factors after Implementation

Behavior	**Test**	**Successful factor**
User Registration	Test login functionality with invalid and valid credential	Verify user can register successfully
Booking functionality	Test booking process for accuracy and reliability	Confirm users can search for available rooms
Reservation management	Test notification for reservation confirmations and updates.	Validate the ability to modify or cancel reservations
Payment processing	Test various payment methods.	Ensure and accurate payment processing.

User feedback	Test responsiveness across different devices	Evaluate the overall user interface for intuitiveness.
Security	Test for vulnerabilities and unauthorized access.	Verify user data is encrypted.
Compatibility	Test the system on different browsers	Verify compatibility with different devices.
Schedule	Define timeline	System integration on time.
Deliverable	List all documents and reports produced during and after testing.	All documents and reports available.
Approval	Request for approval	Obtained approval from stakeholders.
Test closure	Summarize the testing process and its outcomes.	Submit as a document.

Source: *Adapted by the authors*

3.6. Prototype Model of Database Software:



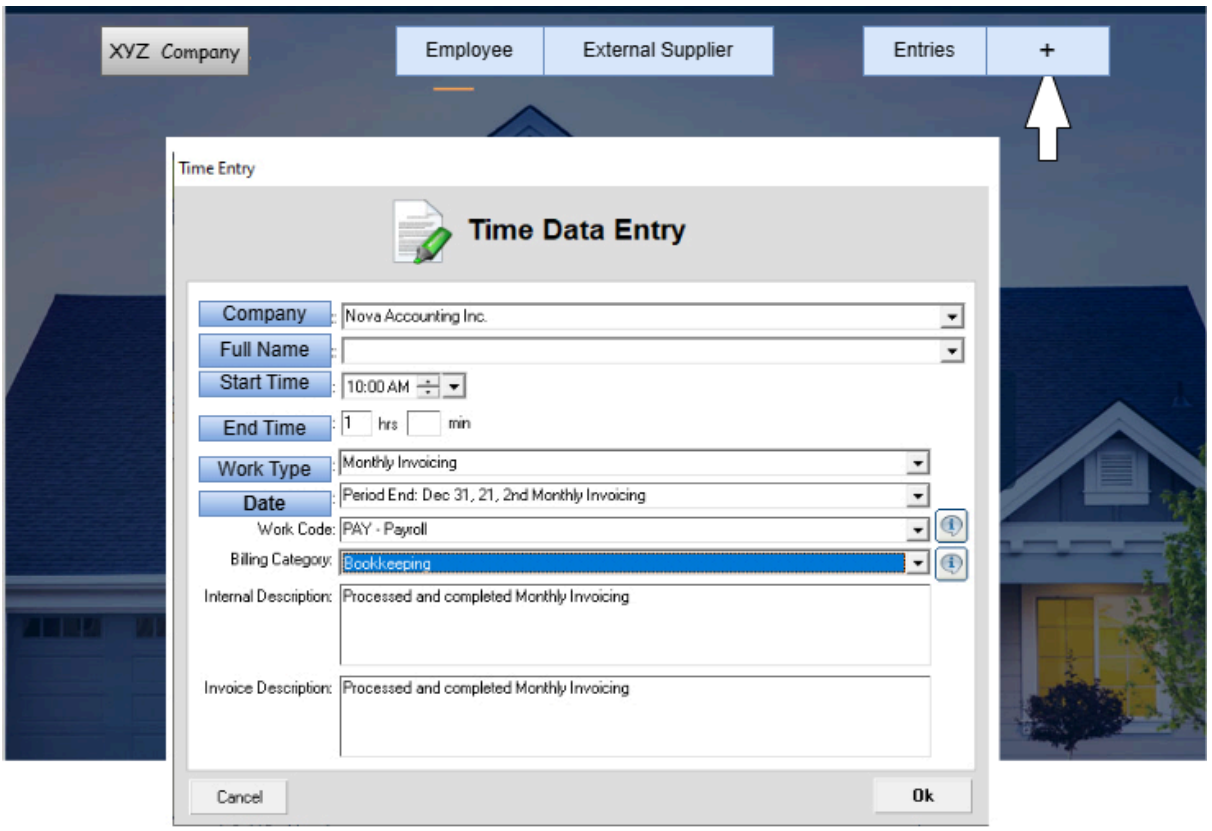


Fig.11.Prototype of Database Software

4. Conclusion

In conclusion, this Hotel Management System analysis outlines the challenges faced by XYZ Hotel, owned by an elderly couple, in modernizing its operations. The identified problems involve manual processes leading to inefficiencies and potential financial losses. Proposed solutions include implementing a web-based Channel Manager for automated room bookings and a Database Management System (DBMS) for digital documentation. The analysis emphasizes the importance of user engagement and comprehensive testing throughout the software development life cycle. This comprehensive approach aims to address current issues and propel XYZ Hotel toward achieving its strategic goals.

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