University of
South Australia

INFS 2044

Workshop 1b Answers

Preparation Already Done

- Bring a copy of the workshop instructions (this document) to the workshop

Where We Are At

- Revisited good requirements practices
- Validated domain model and use cases

Learning Objectives

- Refine use case narratives into implementable scenarios
- Identify variability in system requirements
- Document system environment using System Context Diagrams
- Assess the impact of changes in system designs

Task 1. Use Case Completion (30 min)

- Review the use case narrative for *Make Booking*.
- Identify any relevant alternate flows that need to be considered.
- Identify any external systems that may be relevant for this use case.
- Is there any other information that has been missed?
- Is there enough information that you could write code based on what is given in the narrative?

Use Case UC01: Make Booking

1. *User enters date range.*
2. *System presents available rooms, their descriptions, and daily rates.*
3. *User selects room.*
4. *System presents total price.*
5. *User enters contact details and payment details.*
6. *System verifies payment, records payment confirmation, and issues booking confirmation.*

UC01: Make Booking Clarifications

1. *User enters date range.*
2. *System presents available rooms, their descriptions, and daily rates. What if no rooms are available?*
3. *User selects room. What if the user does not continue?*
4. *System presents total price. How to calculate the total price?*
5. *User enters contact details and payment details. What if the user does not continue?*
6. *System verifies payment, records payment confirmation, and issues booking confirmation. What if the room is no longer available? When is the booking created? How is payment verified? What if that fails? In what ways could verification fail? What information is in a payment confirmation and a booking confirmation? How is the booking confirmation delivered?*

UC01: Revised Main Scenario

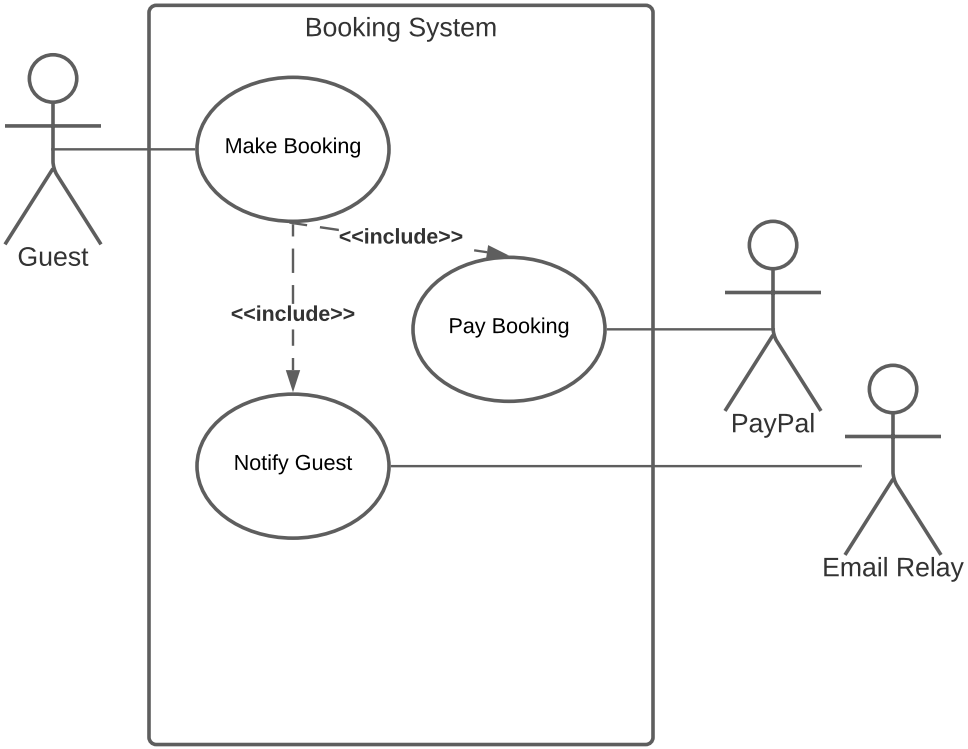
1. *User enters date range.*
2. *System presents available rooms, their descriptions, and daily rates.*
3. *User selects room.*
4. *System presents total price.*
5. *User enters contact details and payment details.*
6. *System verifies that **room is available for the period, creates booking for the room and associates booking with guest**, verifies payment, records payment confirmation, and issues booking confirmation.*

UC01: Alternate Flows

Alternate flows:
**a) at any time, if user does not continue within 10 minutes: System notifies user and use case aborts*
2a) No rooms available: use case aborts
6a) Room unavailable: System notifies user and use case resumes from step 3
6b) Payment rejected: System resumes from step 5
6c) Payment system does not respond within 1 minute: System notifies user and use case aborts

UC01 Make Booking Step 6

- The system does **a lot** in step 6.
- Could break this up in smaller “subfunction” use cases that we could invoke from *UC01 Make Booking.*



UC01: Other Improvements

- Record the contents of Payment Confirmation and booking confirmation in a Glossary
- Record the method of calculating total price in a business rule document or as an addendum to UC01
  - Taxes? Booking fees? How can they vary?

Task 2: Identify Variability (20 min)

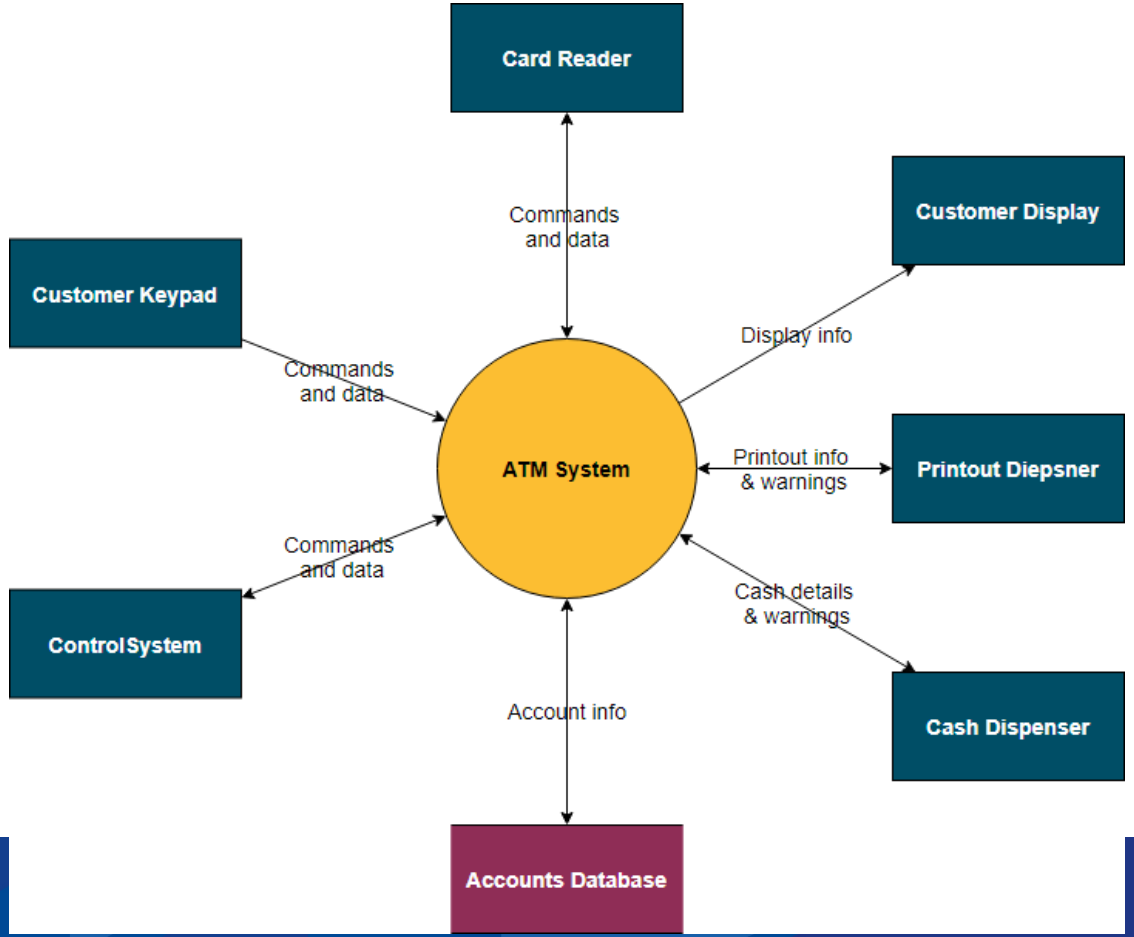
- *Identify possible variations in UC01 Make Booking*
- *What processes and technical variations could be relevant for the Booking System?*

Booking System: Potential Variability

- Users (guests, hotel managers, administrators, …)
- Notification methods (on screen, email, text, …)
- Payment providers (Paypal, Stripe, home-grown, …)
- Data stores (relational, distributed, noSQL, ...)
- Access channels (Web app, Dedicated client app, API, …)
- Pricing policies (taxes, discounts, fees, …)
- User enrolment & authentication (built-in, single sign on, external services)

Task 3: Context Diagram (20 min)

- A Context Diagram shows the flow of information between the system and external entities.

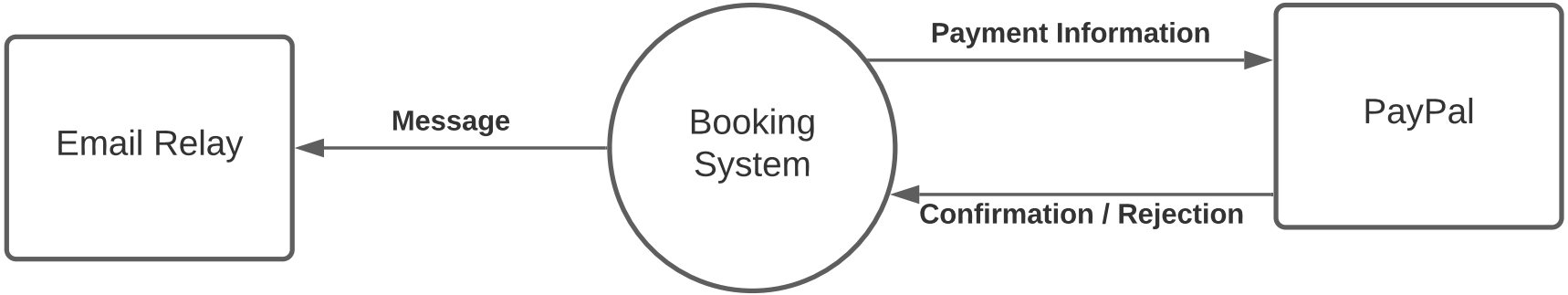


https://online.visual-paradigm.com/knowledge/system-context-diagram/what-is-system-context-diagram/

Draw a Context Diagram

- Suppose payments are processed and verified using an external payment service such as Stripe or PayPal.
- Draw a Context Diagram for the Room Booking System example.
- Consider only *UC01 Make Booking*

Booking System: Context Diagram

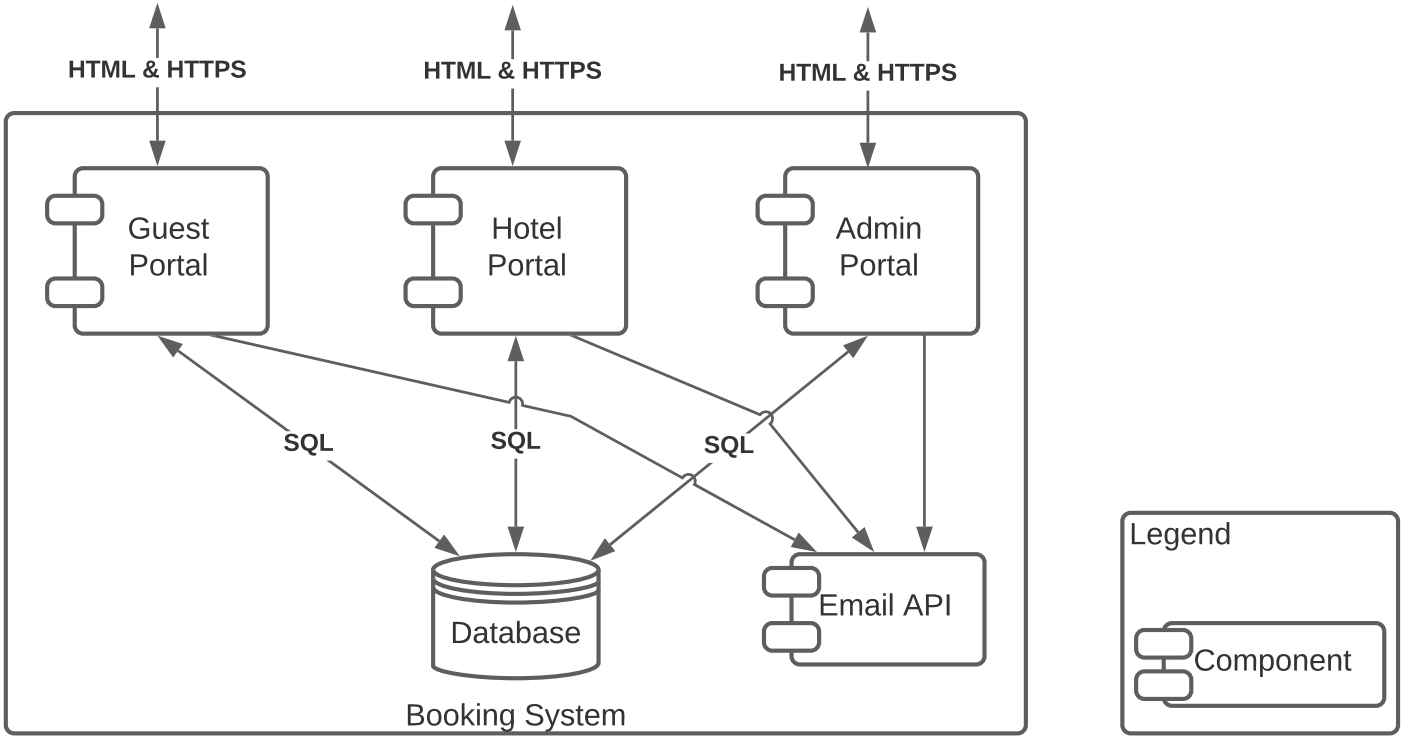


Task 4: Identify Complexity (30 min)

- Design decisions are motivated by minimizing complexity and controlling the impact of changes.

- Identify changes that may be easy or difficult to make in the following system design.
- Why are some changes easy to make and others more difficult?

Booking System: Components



Booking System: Responsibilities

Component	Responsibilities
Guest Portal	Render User Interface for all Guest-accessible functions, Orchestrate Use Case logic, Validate Input, Invoke Payment Verification, Send notifications, Persist data in database
Hotel Portal	Render User Interface for all Hotel-accessible functions, Authenticate and authorize users, Orchestrate Use Case logic, Validate Input, Send notifications, Persist data in database

Booking System: Responsibilities

Component	Responsibilities
Admin Portal	Render User Interface for all Admin-accessible functions, Authenticate and authorize users, Orchestrate Use Case logic, Validate Input, Send notifications, Persist data in database
Database	Persist all data

Impact of Changes

- Are these changes easy or difficult to make in the given design?:
  - Change the database schema or change to a different database management system
  - Change the colour and layout of the Guest portal
  - Authenticate users via single-sign on, Google, and Facebook
  - Create a dedicated desktop application for hotel staff
  - Receive bookings through external booking system such as Booking.com, Wotif, etc

Impact of Changes

- Change the database schema or change to a different database management system [Difficult; all components change]
- Change the colour and layout of the Guest portal [Easy; change is localized]
- Authenticate users via single-sign on, Google, and Facebook [Difficult; all components change]
- Create a dedicated desktop application for hotel staff [Difficult; dedicated backend API must be introduced, duplicates other components]
- Receive bookings through external booking system such as Booking.com, Wotif, etc [Difficult; dedicated backend API must be introduced, duplicates other components]

Impact of Changes

- Are these changes easy or difficult to make in the given design?:
  - Add a portal for booking agents who book on behalf of guests
  - Use a different payment service
  - Notify guests via Signal, WeChat, automated voice call
  - Adapt to different languages, date formats, and currency
  - Show locations using Google maps or Open Streetmap

Impact of Changes

- Add a portal for booking agents who book on behalf of guests [Difficult; Duplicates much of the Guest portal]
- Use a different payment service [Difficult; must modify all components]
- Notify guests via Signal, WeChat, automated voice call [Difficult; must modify all components]
- Adapt to different languages, date formats, and currency [Difficult; must modify all components]
- Show locations using Google Maps or OpenStreetMap [Difficult; must modify all components where maps are shown]

Design Discussion

- Exposing database details to components creates undesirable dependencies
- Repeated functions in the three components causes obscurity (multiple copies of similar code that must all be updated correctly)
- Lack of defined boundaries between presentation, application logic, data storage, security, messaging, and external services creates difficult-to-maintain structures
- **Structuring the software properly is important to avoid such complexity.**

To Know

- Refine use case narratives into implementable scenarios
- Identify variability in system requirements
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Activities this Week

- Complete Quiz 1

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