

UNIVERSITY NAME

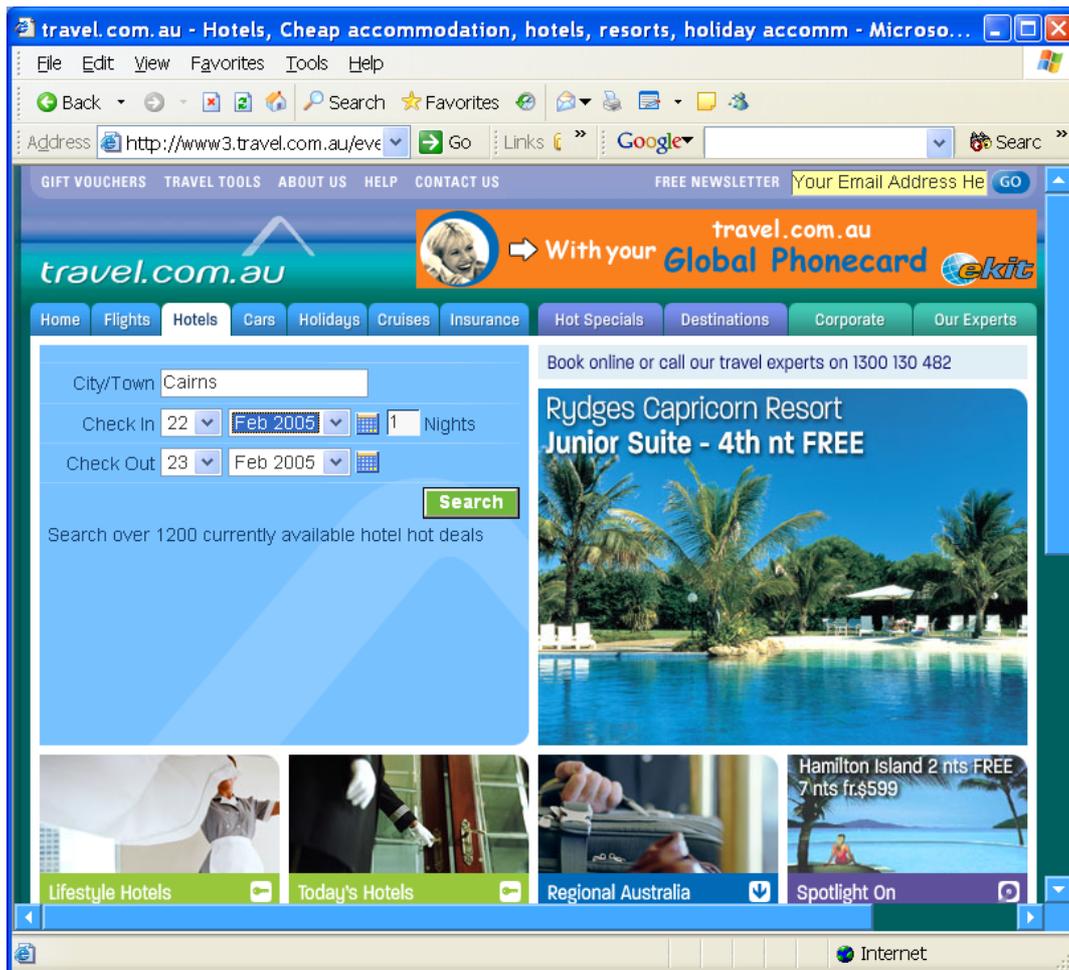
Faculty Name

Department Name**Course Code and Name****Year - Semester****Course website address****Assignment/Project**
Reserve Hotel**Due: Date & Time****Number of marks****Application domain for the assignment**

This is a system modeling assignment, with particular emphasis placed on the database and on the application logic. The problem domain for the assignment is a web application for hotel reservations. The application is called “Reserve Hotel”. The scope of “Reserve Hotel” application is determined from the functionality available in an existing system by travel.com.au – Australia's leading on-line travel company. Students should look at <http://www3.travel.com.au/hotels.html> for details. The next section shows some screenshots taken from the travel.com.au portal. The screenshots are annotated to define functional requirements and constraints for “Reserve Hotel”.

Screenshot 1 demonstrates that “Reserve Hotel” is part of a larger web-based solution for all sorts of travel reservations and arrangements. From the viewpoint of “Reserve Hotel” these should be treated as external functions with no dependencies to “Reserve Hotel”. *Screenshot 1* demonstrates also that the online traveler/customer is asked to type in the destination city, select the check in date and *either* specify the number of nights or select the check out date. The Search button allows to submit the request to the system to find available hotels on the dates specified.

If the City/Town location does not exist in the database, the application offers the traveler to find the location by browsing through the selections, as shown in *Screenshot 2*.



Screenshot 1

Browse from our selections

Capital Cities	Regional Australia	Our Favourites	Rest of World
<ul style="list-style-type: none"> ▶ Sydney ▶ Melbourne ▶ Brisbane ▶ Adelaide ▶ Perth ▶ Canberra ▶ Darwin ▶ Hobart 	<ul style="list-style-type: none"> ▶ NSW Regional ▶ VIC Regional ▶ QLD Regional ▶ SA Regional ▶ WA Regional ▶ NT Regional ▶ TAS Regional 	<ul style="list-style-type: none"> ▶ New Zealand ▶ Hotels Under \$100 ▶ 2 hrs from Sydney ▶ 2 hrs from Melbourne ▶ 2 hrs from Brisbane ▶ Designer Hotels ▶ B&B's ▶ Romantic Escapes ▶ Islands ▶ Tropical North QLD ▶ Gold Coast ▶ Beach Houses ▶ Breakfree Resorts ▶ Pacific Islands 	<ul style="list-style-type: none"> ▶ Bali ▶ Thailand ▶ Hong Kong ▶ Singapore ▶ Malaysia ▶ Asia ▶ USA ▶ United Kingdom ▶ Europe ▶ Worldwide ▶ UK B&B's ▶ Ireland

Screenshot 2

The screenshot shows the travel.com.au website interface. At the top, there is a navigation bar with links for 'Home', 'Flights', 'Hotels', 'Cars', 'Holidays', 'Cruises', 'Insurance', 'Hot Specials', 'Destinations', 'Corporate', and 'Our Experts'. Below this is a search progress indicator: 'Search > choose hotel > choose room type > confirm reservation'. A 'Summary' section displays the search criteria: City: Cairns, Check in: Tue 22 Feb 2005, and Check out: Wed 23 Feb 2005. Below the summary is a 'search again' button and a 'Sort results by:' section with radio buttons for 'our favourites', 'lowest price' (selected), 'highest star rating', and 'alphabetical'. The 'Search Results' section contains a table with the following data:

Name	Min Stay	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Total	
Lyons Motel, Cairns (2.5')	Rooms From (AUD)	1 nt 65							AUD 65	Continue
Figtree Lodge - Cairns, QLD (4')	Rooms From (AUD)	1 nt 80							AUD 80	Continue
On The Beach Holiday Apartments - Trinity Beach, QLD (4')	Rooms From (AUD)	1 nt 99							AUD 99	Continue
All Seasons Esplanade Hotel, Cairns QLD (3.5')	Rooms From (AUD)	1 nt 120							AUD 120	Continue
BreakFree Trilogy Resort, Cairns, QLD (4')	Rooms From (AUD)	1 nt 130							AUD 130	Continue
The Sebel Reef House & ...	Rooms From (AUD)	1 nt 199							AUD 199	Continue

Screenshot 3

Screenshot 3 shows a web page resulting from a successful search. The page shows:

- *workflow* that informs that making a reservation consists of four steps: (1) search, (2) choose hotel, (3) choose room type, and (4) confirm reservation
- *summary* that displays the original search criteria
- *search again* option, which returns the customer to Screenshot 1
- option to *sort results by*: (1) our favourites, (2) lowest price, (3) highest star rating, and (2) alphabetical
- *search results* listing the hotels and basic information about them, as well as the *continue* option to proceed with the reservation

Screenshot 4 shows a web page resulting from pressing a Continue button in Screenshot 3. The page informs the customer about the room availability (if *some* rooms are available) and allows the customer to modify the check in date and the number of nights. It also invites the customer to specify required rooms and the number of adults and children in each room.

After pressing Continue in Screenshot 4, the system verifies if the exact reservation request can be met by the hotel and, if not, the system displays an informational message as shown in the upper part of Screenshot 4 and the system displays the same web page.

The screenshot shows a hotel booking website interface. At the top, there is a navigation menu with links for Home, Flights, Hotels, Cars, Holidays, Cruises, Insurance, Hot Specials, Destinations, Corporate, and Our Experts. Below the menu, a banner reads "Book online or call our travel experts on 1300 130 482" and "Email this page to a friend".

The main content area features a "Hotel" header with a "help" link. Below this is a search bar with the steps: "Search > Choose dates > choose room type > confirm reservation". A pink message box states: "Sorry, we have no rooms available on those dates. Please either select new dates or choose a different hotel."

A "Summary" section displays:

- Hotel name: Royce Hotel - St Kilda Road, Melbourne - (5*)
- City: MELBOURNE

Below the summary is a promotional banner for "Royce Hotel - St Kilda Road, Melbourne - (5*) up to 53% off" with a description: "Melbourne's deluxe 5 star boutique hotel. Modern contemporary rooms all with high speed broadband connections, stylish lounge bar & award winning restaurant. The Royce is the premier choice." An image of a hotel room is shown.

A "Room Availability in March" calendar shows dates from 1 to 31. Availability is indicated by red 'X' marks for dates 20, 21, 22, and 23, and green checkmarks for dates 24 through 31.

The "Arrival and Departure dates" section includes:

- Check in date: Thu 24 Mar 2005
- No. of Nights: 1
- Check out date: 25 March

The "Rooms" section shows a total of 3 rooms selected, broken down as follows:

- Room 1: 2 Adults, 0 Children
- Room 2: 1 Adult, 0 Children
- Room 3: 2 Adults, 2 Children

 Child age is set to 11 and 16.

A "Continue" button is located at the bottom right of the form area.

The "Hotel information" section at the bottom shows an image of the hotel and text: "Royce Hotel - St Kilda Road, Melbourne - (5*) Melbourne's deluxe 5 star boutique hotel. Modern".

Screenshot 4

If the reservation is possible to be made, the system displays room selection information that contains the price, as in *Screenshot 5*.

Home Flights **Hotels** Cars Holidays Cruises Insurance Hot Specials Destinations Corporate Our Experts

Book online or call our travel experts on 1300 130 482 [Email this page to a friend](#)

Hotel

Search > choose hotel > choose room type > confirm reservation

Summary

Hotel name: Royce Hotel - St Kilda Road, Melbourne - (5*)
City: MELBOURNE
Check in: Thu 31 Mar 2005
Check out: Fri 01 Apr 2005

Room Selection

Rates are per night and include all taxes unless otherwise stated.

Room 1 (2 Adults)	Min Stay	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Total	Select
Deluxe room, including complimentary newspaper and express check out.	1 nt	190							AUD 190	<input type="button" value="Select"/>

[Terms & Conditions](#) [Continue](#)

Hotel information



Royce Hotel - St Kilda Road, Melbourne - (5*)
 Melbourne's deluxe 5 star boutique hotel. Modern contemporary rooms all with high speed broadband connections, stylish lounge bar & award winning restaurant. The Royce is the premier choice.

Screenshot 5

Screenshot 5 shows a web page with all the reservation information just prior to placing the reservation in the customer's shopping basket. To add the reservation to the basket, the customer must provide his/her full name and email address, shown in *Screenshots 6 and 7*.

Home Flights **Hotels** Cars Holidays Cruises Insurance Hot Specials Destinations Corporate Our Experts

Book online or call our travel experts on 1300 130 482 [Email this page to a friend](#)

Hotel

Search > choose hotel > choose room type > confirm reservation

Summary

Hotel name: Royce Hotel - St Kilda Road, Melbourne - (5*)
City: MELBOURNE
Check in: Thu 31 Mar 2005
Check out: Fri 01 Apr 2005

Billing Information

ROOM TYPE	NO. ROOMS	TOTAL
Deluxe room, including complimentary newspaper and express check out.	1	AUD 190 (AUD 190)
TOTAL DUE:		AUD 190 (AUD 190)

Room reservations

Deluxe room, including complimentary newspaper and express check out.

* Reservation in the name of: Special requirements** Smoking? Yes No

[back](#) [Add to basket](#)

** Please note the Special Requirements box is designed for ancillary items only. All requests (including smoking/non-smoking rooms) will be at the hotels discretion and subject to availability. In some instances an additional charge may apply. The hotel will try to fulfil your request, but there are no guarantees, regardless of the nature of the request or your receipt of a confirmation e-mail.

Screenshot 6

Home Flights **Hotels** Cars Holidays Cruises Insurance Hot Specials Destinations Corporate Our Experts

Book online or call our travel experts on 1300 130 482 [Email this page to a friend](#)

Proceed to checkout

Thanks for choosing this product, a few more steps and it's yours

Enter email address for your confirmation

Enter your email address:

I would like to receive our partner **lastminute.com's** weekly email filled with all the best deals at the last minute.

[continue to checkout](#)

Screenshot 7

Screenshot 8 shows the contents of the shopping basket. Prior to proceeding to the *Next Step*, the customer can ask for *booking details* and for *payment options* or can *remove* the item from the basket.

travel.com.au shopping basket powered by lastminute.com

contents delivery **payment** pay that's it

Check what's in your basket and choose which type of credit card you wish to use.

Item 1 details	Total
Novotel Palm Cove Resort, Cairns, QLD(4*) ▶ booking details ▶ remove	AUD 148.00

TOTAL COST OF ITEM(S) AUD 148.00
 This price includes GST and airport charges if applicable.

[▶ Payment options](#) [NEXT STEP >](#)

You will not be charged for the goods until you click the 'buy now' button.
 For specific customer service issues please [email here](#).

Screenshot 8

Screenshot 9 presents the customer with the selection of credit cards acceptable for making a payment.

travel.com.au shopping basket powered by lastminute.com

contents delivery **payment** pay that's it

Check what's in your basket and choose which type of credit card you wish to use.

You may choose to pay with same card for different products.

Item 1 details	Total
Novotel Palm Cove Resort, Cairns, QLD(4*) ▶ booking details ▶ remove	AUD 148.00

TOTAL COST OF ITEM(S) AUD 148.00
 This price includes GST and airport charges if applicable.

[▶ Payment options](#) [NEXT STEP >](#)

Amex
 DELTA
 Diners Club
 MasterCard
 VISA
 VSAE

You will not be charged for the goods until you click the 'buy now' button.
 For specific customer service issues please [email here](#).

Screenshot 9

Screenshot 10 shows the form that the customer needs to fill in and submit as the payment in order to secure the reservation. Once the payment is made, “Reserve Hotel” will email the customer the confirmation of the payment and the reservation.

travel.com.au shopping basket

powered by lastminute.com

contents
delivery
payment
pay
that's it

Enter your credit card details.

Credit card details



MasterCard

Card Number

Card Security Code

The Card Security Code (CSC) is the three digit number on the signature strip on the back of your credit card. AMEX CSC is four digits and printed on front of card.
For more information [click here](#)

Expiry date (mm/yy)

01

03

Cardholder's address details

Title	First name	Last name
<input type="text" value="--Select--"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
Address 1	Address 2	City
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
Country/State	Country	Postcode
<input style="width: 100%;" type="text"/>	<input type="text" value="AUSTRALIA"/>	<input style="width: 100%;" type="text"/>
Daytime telephone	Evening telephone	
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	

[▶ Payment options](#)

[NEXT STEP >](#)

You will not be charged for the goods until you click the 'buy now' button.
 For specific customer service issues please [email here](#)

Screenshot 10

Assignment tasks

Task 1 (? marks)

Develop a detailed use case model for “Reserve Hotel”. The model should take a user’s (rather than system’s) perspective. Hence, for example, “Acknowledge Basket Contents” rather than “Display Basket Contents”. For the same reason, define use cases for handling user’s input and actions, but do not be specific about system’s computations and web page creation activities.

Show dependencies between use cases to visualize the workflow-like behavior of the application. Specify «include» and «extend» relationships and any important constraints.

Answer to Task 1

...

Task 2 (? marks)

Develop a class model for business objects and business logic in “Reserve Hotel”. Note that according to the PCMEF meta-architecture, the business objects belong to the entity subsystem and the business logic to the mediator subsystem. As per the PCMEF class naming principle, name your entity classes starting with letter E, and the mediator classes starting with letter M. A related way of distinguishing between entity and mediator classes is to assume that all entity classes will persist in the database, whereas most, or even all, mediator classes are transient. Hence, for example, MShoppingBasket but ECreditCard (because there is no need to store shopping basket information in the database, but the provided credit card details will be kept in the database whether or not the successive payment is successful).

The class model should show attributes in classes and relationships between classes. Associations should be used to “legitimize” in the static structures all important dynamic communication paths between classes. This includes associations between mediator and entity classes. All associations should have multiplicities carefully defined. There is no need to specify attribute types and operations (methods).

Answer to Task 2

...

Task 3 (? marks)

Use your class diagram from Task 2 and make the CASE tool to automatically transform it to a relational database schema (targeting Oracle). Transform only the entity classes and relationships between them. Discuss the obtained relational diagram. Identify the transformation strengths and weaknesses.

Answer to Task 3

...

Task 4 (? marks)

Use your class diagram from Task 2 and manually transform it to a relational database (targeting Oracle). For class hierarchies use the approach of creating a table for each class.

Transform only the entity classes and relationships between them. You can provide a relational design diagram in any notation you like, but ultimately you need to write CREATE TABLE statements for the schema.

Identify any assumptions made in the process of mapping. Specify the constraints for all referential integrity relationships. You do not need to write CREATE ASSERTION statements. Just write short descriptions of what assertions would be needed on insert, update, and delete actions on the tables. For update and delete decide on one of typical actions: restrict, cascade, set null. Determine also for all relationships if “change parent allowed” and if “parent mandatory”. For example, in the case of Department – Employee relationship, we may say “change parent allowed” if an employee can “switch” from one department to another and we may say “parent not mandatory” if some employees may not be assigned to any department. Note that “parent mandatory” has a consequence on the insert assertions.

Use triggers to enforce constraints. Write a few CREATE TRIGGER statements for these assertions that enforce substantially different constraints (i.e. no need to write “duplicate” triggers that implement similar assertions).

Answer to Task 4

...

Task 5 (? marks)

Refer to Screenshots 1 and 3 and to your answers to previous questions. Consider that the customer has filled in the form in Screenshot 1 and pressed the Search button. Assume that the data has been entered correctly, including a City/Town name that exists in the database.

Design a sequence diagram necessary to accomplish the Search function. Follow the PCMEF meta-architecture. Refer also to Chapter 15 of the PSE (“Practical Software Engineering”) book (if you do not have the book, you can download Chapter 15 from http://www.comp.mq.edu.au/books/pse/about_book/PSE_sampleChapters.htm).

Assume that:

- the processing starts by a HTTP PUT request from the form on the web page in Screenshot 1
- there is only one control class to perform user actions, which is implemented as a servlet
- the page in Screenshot 3 is implemented as a JSP
- there is no need to show any JavaBeans as the vehicle for transporting search results data from the servlet to the JSP page

- there is only one data mapper class and one identity map class (rather than separate mappers and identity maps to represent individual entity classes)
- the data searched for is not in the cache and the program will need to search for data in the database
- you can use return messages to represent return types of messages
- there is no need to model the behavior of “lazy load” and “unit of work”

Answer to Task 5

...