

NANYANG TECHNOLOGICAL UNIVERSITY

SEMESTER 1 EXAMINATION 2017-2018

CI6206 – INTERNET PROGRAMMING

November/December 2017

Time Allowed: **3 hours**

INSTRUCTIONS

1. This paper contains **FOUR (4)** questions and comprises **NINE (9)** pages. Appendices of **SEVEN (7)** pages are distributed separately.
 2. Part One: Answer the **COMPULSORY** question. (40 marks)
 3. Part Two: Answer **TWO (2)** of the **THREE (3)** questions. (60 marks)
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PART ONE: Answer the COMPULSORY question.

1. **CleanMyLaundry** is a fast growing Singapore-based company that provides door-to-door laundry services for busy working adults. The services offered by the company includes collection and delivery. In order to keep themselves attuned to market needs and competitiveness, the company hopes to reach out to more customers by creating an online presence for their business.

CleanMyLaundry.com engages your service to develop an ‘Open source’ Java-based web application that allows users to schedule laundry collection at specific date, time and place. The project team conducted an interview session with the operation team, managed to gather the following user requirements, and intended features of the system:

- Sign-up page. Online customers must first register an account in the website. The following are information that users must enter.
 - (i) Registration Information
 - ‘Email Address’ as login name
 - ‘First Name’, ‘Surname’
 - ‘Mobile No’ – to provide sms verification of mobile no.
 - ‘Postal code of home address’
 - ‘Password’ and ‘Confirm Password’

Question 1 continues on Page 2

- (ii) System will check if both passwords entered matches – ‘Password’ and ‘Confirm Password’ fields.
- Login Page
 - (i) The page should allow customers to login to the website if they already have an account.
 - (ii) **CleanMyLaundry.com** is secured with 2-factor authentication: “Login & password” and “SMS OTP”.
 - (iii) Sign-up for a new account if they do not have any existing account.
 - (iv) ‘Forget Password’ feature that reset and send new password to user via email – users are required to enter both email and mobile number.
- Manage Services. The system should allow users to manage the required services by adding or removing of services according to type and quantity of apparels.

Type of apparels, services and pricing

Users are allowed to add more than 1 item. There is a “Total price” panel that will display an updated overall price of the services chosen. Below is a list of laundry services and their prices.

- (i) Business Shirt (per item)
 - Wash & Iron : fixed at \$5
 - Dry Clean & Iron : fixed at \$4
 - Iron Only : fixed at \$3
- (ii) Blouse (per item)
 - Wash & Iron : fixed at \$3
 - Dry Clean & Iron : fixed at \$4
 - Iron Only : fixed at \$3
- (iii) Jeans (per item)
 - Wash & Iron : fixed at \$5
 - Dry Clean & Iron : fixed at \$4
 - Iron Only : fixed at \$5
- (iv) Suit (per item)
 - Dry Clean & Iron : fixed at \$13
- Check Out. The system should allow users to choose the “Pick up address” and Date/Time of the collection.
 - (i) Pick up address. User choose default or add new pickup address.
 - (ii) Schedule Pick up :
 - Date of pickup
 - Time of pickup (by 1 hour interval e.g 4-5pm)

Question 1 continues on Page 3

- (iii) Payment :
- Only credit card payment is allowed.
 - Users are allowed to enter special promotion code before payment.
- View Ad Details. Users shall be directed to this page if they wish to view more details of an ad list in the search results. This page should consist of the following information and features :
 - (i) Add the ad to user's favorite list.
 - (ii) Title, description, photos and price of the ad.
 - (iii) Seller information
 - Seller ratings
 - Mobile no.
- (a) Design **TWO (2)** graphical user interfaces for the ‘Register’ and **TWO (2)** graphical user interfaces for the “Login” feature, focusing on functionalities and user friendliness. State any assumptions clearly.
- (16 marks)
- (b) Design **TWO (2)** graphical user interfaces for the ‘Manage Services’ and **TWO (2)** graphical user interfaces for the “Check out” including the focusing on functionalities and user friendliness. State any assumptions clearly.
- (16 marks)
- (c) List and describe **TWO (2)** additional useful functionalities not listed in the above requirement. Provide graphical user interfaces to illustrate your solution. State any assumptions clearly.
- (8 marks)

PART TWO: Answer TWO (2) of the THREE (3) questions.

2. (a) What do you understand by the term “HTTP is a stateless protocol”? If a web application needs to retain user’s progress from page to page, list and describe the various methods a developer may use to solve the issues resulting from the stateless nature of HTTP. Use appropriate code example to illustrate your solution.
- (6 marks)
- (b) Explain the following terms related to web application vulnerabilities. For each vulnerabilities, describe the attack and preventive measures.
- (i) SQL Injection
 - (ii) Cross-site scripting
- (8 marks)

Question 2 continues on Page 4

- (c) There is a server-side program (servlet) that allows users of **CleanMyLaundry.com** to access the web application - a login servlet (Refer to Question 1 for more information). In order to complete any transaction in the website, customers are required to login to the system - which means, they must be a registered user of **CleanMyLaundry.com**.

The System will verify the user's credential before redirecting them to the correct servlet to process their customer's feedback request. Write a Java Servlet and/or JSP that meets the following specifications:

- Users first enter their userID and password details on the login screen, **Login.jsp**. The values of both parameters - **userID** and **password** - are sent to a servlet **LoginServlet**.

*Note : use the **getParameter** and **getParameterValues** methods to retrieve the parameters from the login form.*

- A database is used to verify the credential of the user. There is an existing method, **DBController.verifyUser (userID,password)**, that verifies the user's login credential and role. The method takes in the **userID** and **password** of the user. It returns that status of the verification as boolean value:
 - True – if customer login successfully
 - Servlet will redirect user to VerifyOTP.jsp screen where users are supposed to enter the OTP they received via their mobile phone. Another servlet will handle the request.
 - There is an existing method , **DBController.checkOTP (userID,OTP)** that verifies the user's OTP. It returns that status of the verification as boolean value:
 - True : if OTP is correct.
Servelt will redirect user to ManageService.jsp.
 - False : if OTP is incorrect.
Servelt will be redirected to VerifyOTP.jsp and display the message “OTP is incorrect” if the checkOTP.
 - False – if password or userID does not match the database.
 - Servlet will redirect user back to login.jsp and display additional information on the webpage: “The userID or password is incorrect or does not exist in our system.”

Question 2 continues on Page 5

- You do not need to write the entire Servlet. Only the **doPost** method is required. Additional methods and fields may be created if necessary.
- Perform session tracking whenever necessary.
- State any assumptions clearly.

(16 marks)

3. (a) AJAX – Asynchronous Javascript and XML is set of Web development techniques using many Web technologies on the client side to create asynchronous Web. Illustrate with the help of a process-flow diagram the communication that takes place between a client and server. List the steps involved in the process.

(8 marks)

- (b) A “well-formed” XML means it conforms to XML rules and specification. List and describe with the help of an example, **FOUR (4)** rules required for XML to be Well-formed. What do you understand by the term “Valid” XML document? Use appropriate code example to illustrate your solution.

(8 marks)

- (c) Figure Q3c shows a Web-based Student Management System – Search students. A JSP page **SearchStudents.jsp** allows the school facilitator to search and display the information of students who are currently enrolled in NTU. After submitting the request, an **AJAX request** is sent to a server-side program that returns a search results in **JSON or XML format**. If the return results are empty, a message “No students are found” is displayed instead of the table.

MatricNo	Fname	Lname	Course	Year
G1772404A	Jason	Wong	WKWSCI	2017
G1522397L	Xing Hui	Zhou	WKWSCI	2015
G1612416B	Sajeev	Kumar	WKWSCI	2016
G1702790A	Phoo	Pwint	WKWSCI	2017

Figure Q3c. Search Students (SearchStudents.jsp)

Question 3 continues on Page 6

Write an AJAX application that supports the functionality as described above that meets the following specifications:

- The content of the table shown in figure Q3c is loaded without requiring the screen to perform any refresh.
- Assume that the server-side program exists and its absolute path is **/SearchStudents**
- User enters the search string.
- The server-side application accepts one query string parameter named **searchString** as input field from **SearchStudents.jsp**.
- The server-side application will return data in XML or JSON format. Propose and design your own XML or JSON file and format.
- Provide sufficient comments in your code.
- A graphical user interface is shown in Figure Q3c.
- State any assumptions clearly.

You are to use the code listed in Appendix Q3. Comments are provided as a usage guide. Do not reproduce the code in your answers unless there are modifications. State any assumptions made.

(14 marks)

4. (a) Figure Q4a shows a HTML page with three radio buttons labelled as “2 years”, “5 years” and “10 years”.
- When user clicks on the radio button labelled as “2 years”, an alert box with the message ‘2 years membership’ will appear.
 - When user clicks on the radio button labelled as “5 years”, an alert box with the message ‘5 years membership’ will appear.
 - When user clicks on the radio button labelled as “10 years”, an alert box with the message ‘10 years membership’ will appear.

The screenshot shows a 'Membership Registration' form. At the top, it says 'Membership Registration'. Below that, there is a label 'Select membership period:' followed by a group of three radio buttons. The radio buttons are labeled '2 years', '5 years', and '10 years'. The '2 years' radio button is selected, indicated by a checked circle.

Figure Q4a. jQuery Radio button

Write jQuery code that supports the functionality described. Part of the code is provided in Appendix Q4a.

(5 marks)

Question 4 continues on Page 7

- (b) Figure Q4b-1 shows a HTML page with two buttons namely “Hide” and “Show”.
- When the button “Hide” is clicked, the line of text “My secret message” will be hidden. See figure Q4b-2.
 - When the button “Show” is clicked, the line of text “My secret message” will appear again.

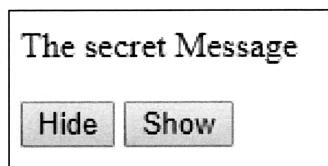


Figure Q4b-1. Clicking on the “Show” button

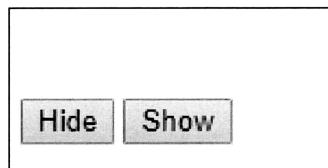


Figure Q4b-2. Clicking on the “Hide” button

Write jQuery code that supports the functionality described. Part of the code is provided in Appendix Q4b.

(5 marks)

- (c) Figure Q4c shows a HTML page with a two-section jQuery accordion UI. Each of the section should display the following text when selected:
- STAFF section displays a jQuery menu as shown in Figure Q4c.
 - ACCOUNT section displays a text message “Accounts related Information”.

The image displays a jQuery accordion interface. The first section, labeled "STAFF", is currently expanded. Inside this section, the text "Staff Information" is visible above a menu. The menu consists of four items: "View Personal Info", "Teaching", "Timetable", and "Modules". The "Teaching" item is highlighted with a grey background. The second section, labeled "ACCOUNTS", is collapsed and shown as a dark grey bar at the bottom.

Figure Q4c. Accordian Interface

Question 4 continues on Page 8

Write HTML and jQuery code that supports the functionality described.
Part of the code is provided in Appendix Q4c.

(10 marks)

- (d) Figure Q4d-1 shows a HTML page with one single main panel. When “Payment Options” is clicked, another panel will slide out and display two additional payment options as shown in figure Q4d-2. Clicking on the “Payment options” again will hide the two additional payment options.

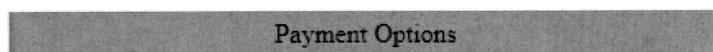


Figure Q4d-1 Main Panel (Before clicking on ‘Payment Options’)

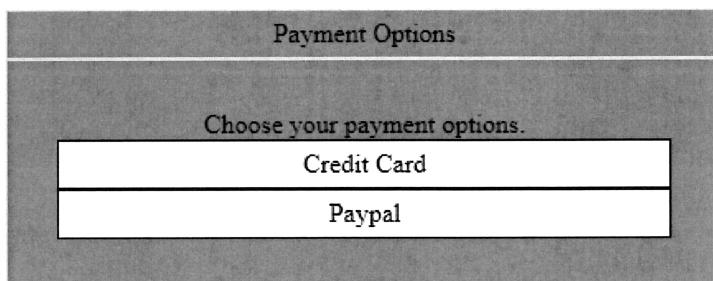


Figure Q4d-2 Main Panel (After clicking on ‘Payment Options’)

Clicking on the “Credit Card or “Paypal” will further exposed additional panels as shown in Figure Q4d-3.

- If “Credit Card” is clicked, a panel with the message “Pay by Credit Card” will appear.
- If “Paypal” is clicked, a panel with the message “Pay by Paypal” will appear.
- Clicking on either the “Credit Card” or “Paypal” text again will hide the related panel. (See Figure Q4d-2)

Question 4 continues on Page 9

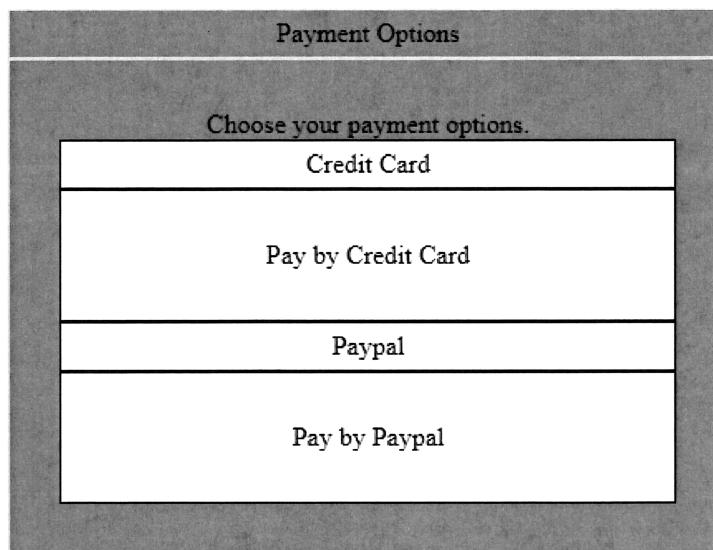


Figure Q4d-3 Multiple Panels

Write HTML and jQuery code that supports the functionality described.
Part of the code is provided in Appendix Q4d.

(10 marks)

END OF PAPER

CI6206 INTERNET PROGRAMMING

Please read the following instructions carefully:

- 1. Please do not turn over the question paper until you are told to do so. Disciplinary action may be taken against you if you do so.**
2. You are not allowed to leave the examination hall unless accompanied by an invigilator. You may raise your hand if you need to communicate with the invigilator.
3. Please write your Matriculation Number on the front of the answer book.
4. Please indicate clearly in the answer book (at the appropriate place) if you are continuing the answer to a question elsewhere in the book.