

EE4717 / IM4717

NANYANG TECHNOLOGICAL UNIVERSITY

SEMESTER 1 EXAMINATION 2017-2018

EE4717 / IM4717 – WEB APPLICATION DESIGN

November / December 2017

Time Allowed: 2 hours

INSTRUCTIONS

1. This paper contains 1 question and comprises 7 pages.
2. Answer 1 question.
3. This is an open book examination.
4. Unless specifically stated, all symbols and acronyms have their usual meanings.

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1. *eBookStore* is an online web portal for purchase of popular books by famous authors at discounted rates for its registered members only. It allows members to browse through the latest categories of book titles, place an order and make payment through a third-party credit-card payment system. The web portal serves to support both its customer sales and administrative functions.

A customer purchasing books on *eBookStore* is required to login as a registered member. Upon successful login, a list of categories of books will be displayed on the member's personalized welcome page. On selection of a book category, a list of books and their corresponding prices will be displayed on another page. On further selection of a book item will bring up a page showing the details of the book, including book title, author, cover image, abstract, ISBN, price and book reviews (if any). Customers can place an order, make payment and receive email confirmation upon successful payment.

An administrator can also login on the same home page but will be granted access privilege to perform administrative functions of updating the book titles and prices on the *eBookStore*. User authentication based on login credentials of registered User ID (UID) and personal Password (PW) will identify the user as a customer or an administrator.

Note: Question No. 1 continues on page 2.

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The *eBookStore* home page provides a brief description on the *eBookStore* online system, the current top 5 best sellers and latest new book releases. There is a login form for registered users and a request button for new user registration. For convenience, there is a row of navigation bars for related information on member's benefits, sales policy, FAQs and contact information.

- (a) Study the above web application scenarios and design the overall web application architecture.
- (i) List the titles of the web pages you have designed and show the website organization using a site map.
 - (ii) Draw the storyboards for all the possible user activities, including registration for new members, browsing and ordering of books by registered members. Your storyboards should cover both the client-side and server-side activities. You only need to illustrate the storyboards for one category of books.

(20 Marks)

- (b) The wireframe of the *eBookStore* website home page is shown in Figure 1 on page 6. The detailed features in the home page layout are as follows:
- The page is centered and occupies 80% of the browser window width, subject to a minimum width of 900 pixels. There is a border of 5 pixels width, with a color code of #3377FF.
 - The font used for the text is Arial, Verdana, or a font in the Sans-Serif family, with text color code of #002266. The background of the page area is in white.
 - The top banner area consists of an image logo of size 800×80 pixels, on a background with a color code of #3377FF. The image logo also serves as an alternative hyperlink to the home page.
 - The horizontal navigation area is located below the banner area, with a light background color code of #CCDDFF. It consists of five 150×40 pixels image buttons, i.e. image links to other pages of the website.
 - There are two columns under the navigation area. The left column is used for user login panel and video display, with a column width of 300 pixels. The right column is used for main content area, with a column width of 600 pixels.
 - The user login panel is located at the upper half of the left column, with the form layout as shown in Figure 1. The panel has a background color code of #FFCC99. Upon submission of this form, the web server will run the *login.php* script.

Note: Question No. 1 continues on page 3.

- A “New User” input button is provided below the user login panel for new user’s registration request. Upon submission, the web server will run the *new_user.php* script.
- At the lower half of the left column, there is a 280×200 pixels frame which allows users to view a short MP4 video clip of a recent event on book launches, with related audio/video control buttons.
- In the right column, there is a brief description for the *eBookStore* system, the top 5 best sellers and the latest new book releases, which serves as the main content area in the home page. The text for the headings has a color code of #6699FF. The 100×100 pixels book-cover images and their selling prices are tabulated as shown in Figure 1.
- There is an animated advertisement image of size 200×100 pixels in GIF format, displayed on the top-right corner of the right column.
- There is a footer area with a copyright notice in white, centered and in small font size, with a background color code of #3377FF.

You may make further assumptions after studying Figure 1.

- (i) Write the CSS3 codes for an external style sheet *eBookStore_site.css* to ensure that the entire website has a consistent look and feel.
- (ii) Based on the external style sheet *eBookStore_site.css* in part (b)(i), write the HTML5 codes for the *eBookStore* home page.
(30 Marks)
- (c) A user logging in to *eBookStore* is required to type in his registered UID and PW on a login panel in the home page. User login credentials will be validated and authenticated before the user is allowed to gain access onto the *eBookStore* portal.
- (i) Create a JavaScript regular expression using the constructor method to validate the input format of the UID. The UID should begin with an alphabet character and end with a word character. In between them, it may make up of any number of word characters, including a period (‘.’), a hyphen (‘-’), and a whitespace (‘ ’).
- (ii) Based on the regular expression created in part (c)(i), provide a valid sample of the UID and write a JavaScript to validate the UID using the *test()* method. On the condition of the test result, output a message “Valid UID” or “Invalid UID” onto a JavaScript *document* object.

Note: Question No. 1 continues on page 4.

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- (iii) Create a JavaScript regular expression object using the literal notation to test the validity of the user PW. The PW should contain the following:
- at least 1 upper case character
 - at least 1 numeric digit
 - at least 1 non-word character, such as !@#\$%
- (iv) Based on the regular expression created in part (c)(iii), provide a valid sample of the user PW with at least 10 characters in length. Write a JavaScript to validate the PW and output a message “Valid PW” or “Invalid PW” on the condition of the validation result.

(20 Marks)

- (d) To support online sales of books, a catalog of all the books sold on the *eBookStore* is maintained in a database. The database also supports authentication and identification of the login user as a customer or an administrator.
- (i) Design a database schema with the relevant tables to provide the following database functions:
- Records of user information, which includes user login credentials, user name, and whether the user is a customer or an administrator.
 - Records of books sold on *eBookStore*. The attributes in each record may contain ISBN, author, title, price of the book, and any other necessary fields. In particular, it includes an attribute, ‘qty_sold’ for tracking the current total number of copies of a book sold.
 - Searching of books by subject categories. It may be necessary to rename the categories of books when new categories are added to the *eBookStore*.
 - Records of books ordered by customers. The attributes in each record should include ‘qty_ordered’ for tracking the number of copies of each book ordered by a customer.
 - Tracking the top 5 most popular books sold on *eBookStore*. It may be necessary to anticipate such requirement during the design of the database.

The schema should clearly indicate the use of foreign keys to minimize data redundancy and the necessary primary keys in the database tables. Highlight the primary keys with double underline and foreign keys with single underline.

Note: Question No. 1 continues on page 5.

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- (ii) Based on the database schema designed in part (d)(i), write PHP scripts and object-oriented MySQL queries to update the total number of copies of a book sold ('qty_sold') with respect to the number of copies of books ordered ('qty_ordered').
- (iii) Following on from part (d)(ii), write MySQL query in PHP script to retrieve the book titles of the top 5 most popular books sold on *eBookStore*.
- (iv) Based on the database schema designed in part (d)(i), write PHP scripts and MySQL query to authenticate the login credentials and identify the user as a customer or an administrator. It is assumed that user passwords stored on the database are protected using the MD5 encryption algorithm. You may further assume that the user inputs are stored in superglobal variables, `$_POST['userid']` and `$_POST['password']`.

(20 Marks)

- (e) Figure 2 on page 7 shows a sequence of output pages generated using a PHP multi-purpose page for updating the price of a selected book. Explain the page control structure in a multipurpose page. Illustrate your answer with appropriate PHP scripts and control statements.

(10 Marks)

Note: Question No. 1 continues on page 6.

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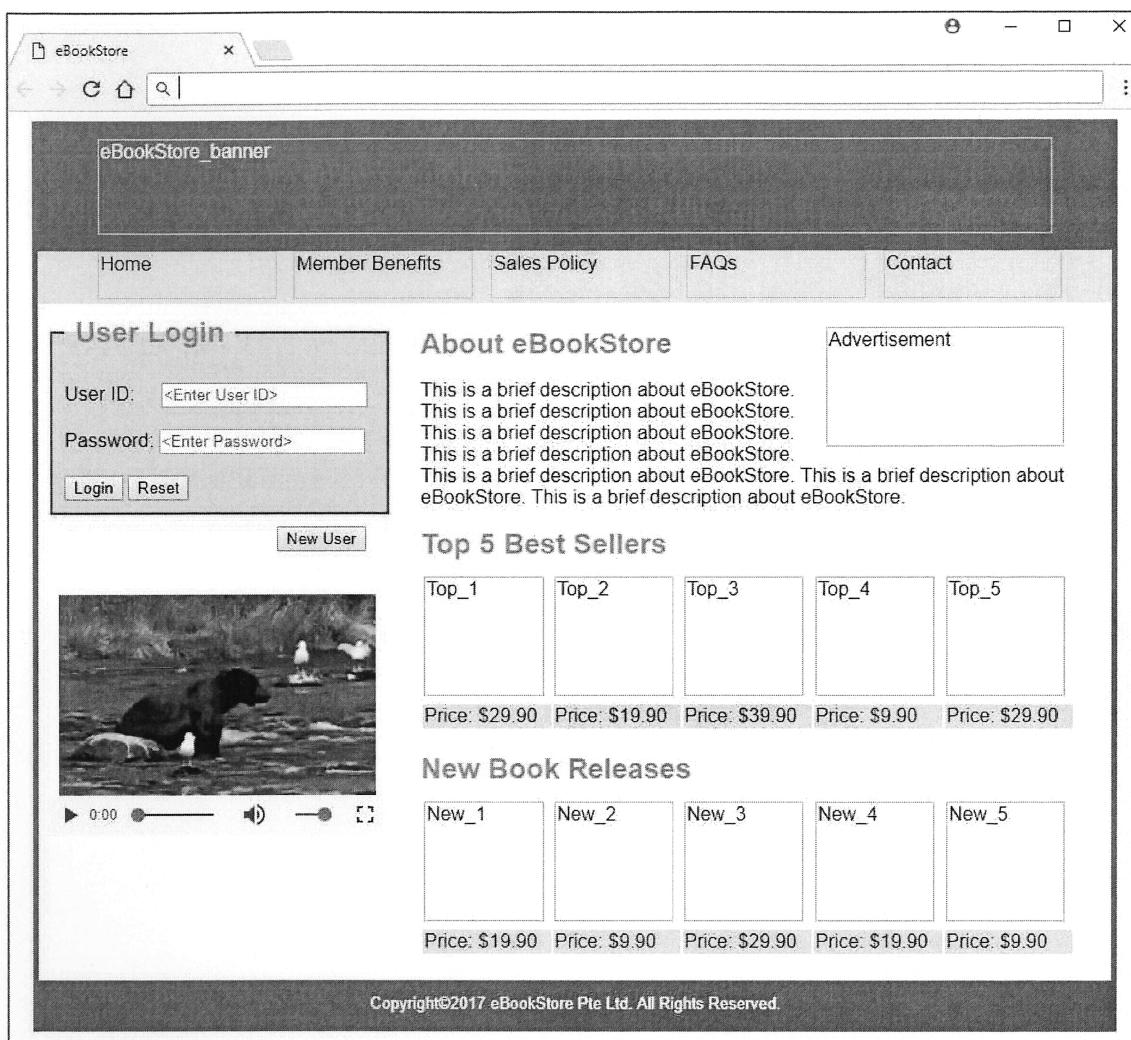
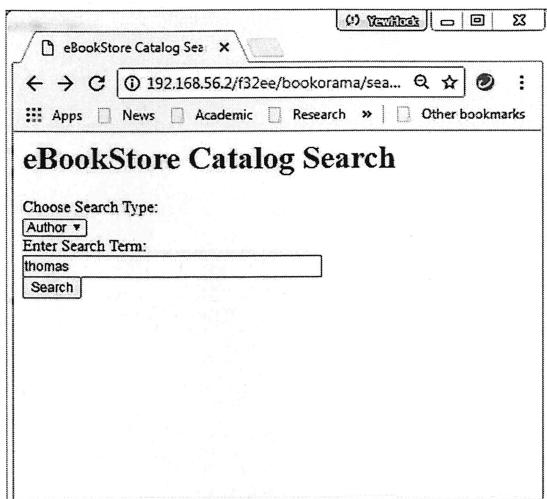


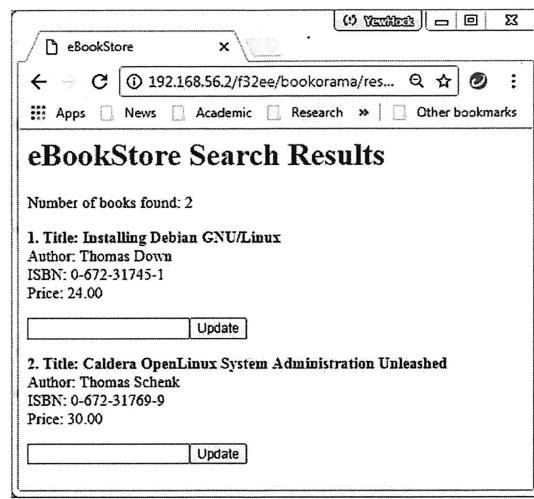
Figure 1: eBookStore Home Page

Note: Question No. 1 continues on page 7.

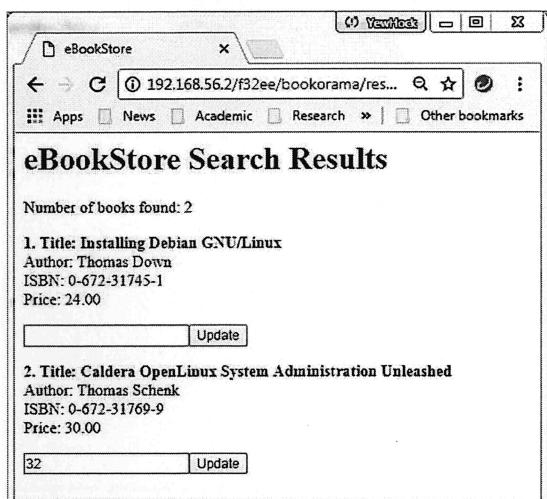
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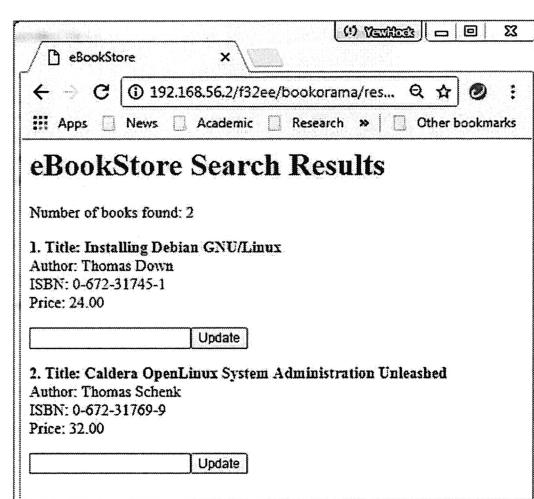
(a) Book search by author



(b) Result of book search



(c) New price entered



(d) New price updated

Figure 2: Sequence of book price updates using multi-purpose page.

END OF PAPER

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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.