

EE4717 / IM4717

NANYANG TECHNOLOGICAL UNIVERSITY

SEMESTER 1 EXAMINATION 2016-2017

EE4717 / IM4717 – WEB APPLICATION DESIGN

November / December 2016

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. EBIDS (Electronics Bidding System) is an Internet-based vendor list and online bidding system. It maintains a database for online *Request for Tender* (RFT) and *Interest to Bid* (ITB) registration. Both vendors and suppliers wishing to participate in the EBIDS's database are required to register onto the EBIDS system. Vendors will post their RFTs on the EBIDS system for suppliers to obtain an up-to-date list of RFTs, and register their ITBs online.

The EBIDS system promotes supplier's price competitiveness and shortens turnaround time in awarding tender contracts. The system allows tenders to be awarded on the basis of price competitiveness with respect to project lead-time and defect risk. At the same time, suppliers can efficiently source for suitable projects that match the expertise and size of their companies.

Registration on the EBIDS system requires the user to choose between registering as a vendor or a supplier. Registration information required includes *user name*, *personal ID number* (PIDN), *contact number*, *email address*, *company name* and *company address*. Upon successful registration, a system generated password will be sent to the registered user's email address. The user's PIDN and password will be required for subsequent login to the EBIDS system.

Note: Question No. 1 continues on page 2.

A vendor, upon successful login, will see a customised vendor page. The vendor can publish new RFTs on the EBIDS system by filling up an input form with the following information: title of tender, industrial sector of project, geographical scope of project, and brief description of project. Each record is uniquely identifiable by its key attribute, “tenderID”. Other attributes in the RFT record include the above underlined key words.

A supplier, upon successful login, will see a customised supplier page, which shows a current list of RFTs. The supplier can then express his interest to bid for a particular RFT by providing the following information in his ITB: estimated cost of project, duration to complete project, and warranty period of project. Each ITB record includes the above underlined key words as attributes for the bid.

The EBIDS homepage has a top banner with an iconic logo, a brief description on the EBIDS system, a login form for both new and registered users, and a side navigation bar for related information on the bidding rules and regulations, contracts award policies, FAQs and contact information.

- (a) Study the above web application scenarios and design the overall web application software architecture. Show the website organization using a site map and list the titles of the web pages you have designed. Draw the storyboards for all the possible user activities, including registration for new users, publishing of RFTs by vendors and registration of ITBs by suppliers. Your storyboards should cover both the client-side activities and the server-side activities.

(20 Marks)

- (b) The home page of the EBIDS website should look like the one shown in Figure 1 on page 6. The main features in the design of the home page are as follows:

- The background of the page area is in light grey, with a color code of #CCCCCC, while the content area has a white background.
- The font used for the text is Verdana, Calibri or Arial, or a font in the Sans-Serif family. The text’s color code is #000066.
- The page content area is centered and occupies 90% of the browser window width, but subject to a minimum width of 1000 pixels. There is a border of 5 pixels width, with a color code of #0099CC.
- The top banner area is a banner image with an iconic logo of size 850×100 pixels, and on a background with a color code of #0099CC.

Note: Question No. 1 continues on page 3.

- There are two columns under the banner area. The left column is used for navigation bar and user login form, with a column width of 300 pixels. The right column is used for main content area, with a column width of 700 pixels.
- The navigation bar is located at the upper half of the left column, which consists of a few 150×40 pixels image buttons, i.e. image links to other parts of the website.
- The user login form is located at the lower half of the left column, with the form layout as shown in Figure 1. Upon submission of this form, the web server will run the *login.php* script.
- In the right column, there are some brief descriptions for the EBIDS, RFT and ITB as the main text in the home page. The text for the headings has a color code of #66AAFF.
- There is an advertisement slide-show image of size 250×180 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 and a background color code of #0099CC.

You may make further assumptions after studying Figure 1.

(i) Write the CSS3 codes in an external CSS file for ensuring that the website has a consistent look and feel.

(ii) Write the HTML5 codes for the home page.

(30 Marks)

(c) New vendors and suppliers joining as users of the EBIDS system are required to register their particulars on a user registration form. All particulars are to be validated for format compliance before they are accepted into a user database. Create the literal regular expressions using JavaScript to validate the following user particulars:

(i) User's name should contain alphabet characters and case-insensitive. It may contain character spaces and/or period ('.') symbols. The period symbol should only be preceded by one or more alphabet characters and never stand-alone. It should also not appear in the first or the last character of the user's name.

Note: Question No. 1 continues on page 4.

- (ii) User's PIDN should begin with an upper case alphabet character followed by a string of 7 numeric digits, and ends with another upper case alphabet character.
- (iii) User's contact number should contain 8 numeric digits. It may be separated by a hyphen ('-') symbol in between the first and second halves of the contact number.
- (iv) User's email address should contain a username part and a domain name part. The two parts should be separated by a single character symbol '@'. The username comprises word characters and may include a period ('.') and/or a hyphen ('-') symbol. When both symbols are present, they should not occur consecutively. The domain name comprises one or more sequences of word characters, each separated by a period ('.'). The last sequence, however, should have only between 2 and 4 alphabet characters.

(20 Marks)

- (d) The EBIDS system provides a list of RFTs submitted by vendors and allows bidding of tenders by suppliers. A supplier registers his bid for a particular RFT by entering the required information in the ITB record. A vendor decides on the criteria for award of contracts based on ITB record information.
 - (i) Design the database schema to provide the necessary database supports for the following functions:
 - Registration of vendors and suppliers as users of EBIDS. The user particulars are user name, PIDN, contact number, email address, company name, and company address.
 - Publication of RFTs and registration of ITBs. The required attributes in each record of RFT and ITB should include those underlined key words as reflected in the above system description. The index key for RFT records is “tenderID” and begins with 9000. The index key for ITB is “bidID” and begins with 8000.
 - Award of tender contracts for each RFT to the successful ITB. The successful bid is evaluated based on the ITB record submitted by the supplier. It should also be possible to identify the matching pair of vendor and supplier based on the records of the tender awards.

Note: Question No. 1 continues on page 5.

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- (ii) Clearly indicate the primary key in each of the database tables and any foreign keys, where necessary, to minimize data redundancy. Highlight the primary keys with double underline and foreign keys with single underline.
- (iii) Based on the database schema designed in part (i), write object-oriented MySQL queries in PHP script to obtain the ITB record with the lowest cost bid, for a RFT with a record ID number, tenderID number = 9002. Briefly explain each line of your query statements.
- (iv) In order to track all records of tenders awarded, it is necessary to update all successful bids onto the corresponding records of RFTs. Write object-oriented MySQL queries in PHP script to update the lowest cost bid obtained in part (iii) as the successful bid. Assume that the ITB record for the successful bid has a bidID number = 8025.

(20 Marks)

- (e) Figure 2(a) on page 7 shows a list of RFT records retrieved from the EBIDS database. A supplier indicates his interest to bid (ITB) for a particular tender by clicking the corresponding button in the RFT record. Upon clicking the button, the ITB form shown in Figure 2(b) on page 7 will be brought up onto a new page. The form carries the tenderID number passed from the previous page. It also displays a new bidID number = 8025, which is generated for the current ITB record being created onto the system.
 - (i) Write MySQL queries and PHP script to illustrate how the list in Figure 2(a) is generated. You may ignore generating the table header.
 - (ii) Write the necessary script to illustrate how each button is linked to a new page, and how the tenderID number is passed onto the ITB form. The filename for the new page is “newpage.php” and the button image is “button.jpg”. You need not generate the ITB form.

(10 Marks)

Note: Question No. 1 continues on page 6.

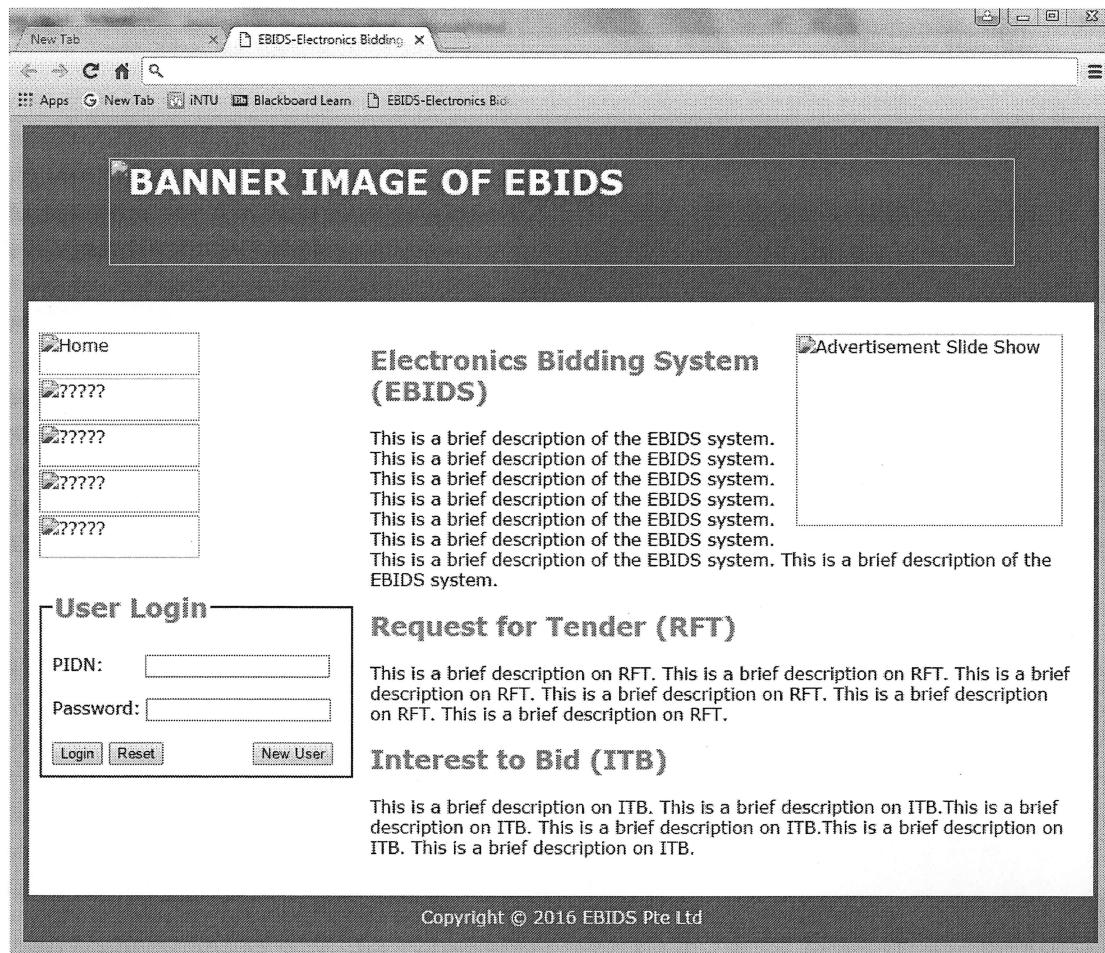


Figure 1: EBIDS Home Page

Note: Question No. 1 continues on page 7.

TenderID	Tender Title	Sector	Scope	Description	Click to Bid
9001	School Projects	Education	National	Upgrading of multipurpose hall in schools	<input type="radio"/>
9002	Building Automation	Industrial	Local	Improved access control to secured sites	<input type="radio"/>
9003	Rapid Rail links	Transportation	Regional	Development of rapid transport rail links between countries	<input type="radio"/>
9004	<input type="radio"/>
9005	Global Banking	Financial	Global	Implementation of new international banking standards	<input type="radio"/>

Figure 2(a): Request for Tender (RFT) List

ITB Form

Tender ID Number (tenderID):	9002
Bid ID Number (bidID):	8025
Cost:	Enter tender bid price
Duration:	Enter project duration
Warranty:	Enter warranty period
<input type="button" value="Submit"/>	

Figure 2(b): Interest to Bid (ITB) Form

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.