An eCommerce Development Case: Your Company's eCommerce Web Site

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ABSTRACT

This case provides a real-world semester long project-oriented case study for students enrolled in an electronic commerce course that has a significant development component. The case provides the technical framework in the form of functional requirements for students to design and build a fully functional transaction processing e-commerce Web site over the course of a semester based on the company, products and/or services, content, and graphic images they choose. The case is divided into three assignments. The first assignment is a basic e-commerce Web site that emphasizes site layout, navigation, text formatting, inserting graphics, and the content necessary to market products and services online. Additional complexity is added in the second assignment, an enhanced e-commerce Web site. In this assignment students will create their own graphics images, menus, and image maps, use JavaScript to create image rollovers and image swaps, dynamically generate Web pages based on the contents of a database, and use a form to send data to an email address. The third assignment is a full-fledged transaction processing e-commerce Web site with a virtual shopping cart and checkout processing procedures. The case can to be used in a course where the students have little or no prior programming or relational database experience. The case was written so that the creation of the student's e-commerce Web site is not dependent upon the student's e-commerce development software, graphics tool set, Web server, Web programming environment, or relational database management system. Teaching notes containing suggested instructions, possible development environments, Web server configurations hints, individual assignment objectives, and a sample solution to the final assignment are provided.

Keywords: Electronic commerce development, electronic commerce transaction processing.

1. CASE SUMMARY

The purpose of this assignment is to develop a basic electronic commerce Web site to sell your company's products or services. You may select any company or organization you wish. It may be a real or fictitious business or organization. The products/services may be real or fictitious. However, the products or services must not be of an offensive nature and must be suitable for viewing by a general audience, which may include teenagers and children.

The electronic commerce Web site you develop should have the look, feel, and functionality of a professionally developed site. Consequently, the Web site will operate and run without error, contain no broken links, be easy to navigate, take user accessibility into account, use graphic images as appropriate, be easy to read, be visually appealing, encourage visitors to explore the site, entice visitors to purchase, and employ a consistent visual theme. You should show off what you have learned, explore new areas and techniques and use the best techniques you know.

2. ASSIGNMENT #1
BASIC E-COMMERCE WEB SITE

The Web site you develop in this assignment will serve as the foundation for the next two Web site development assignments.

2.1 Functional Requirements
The site will consist of four (4) pages, plus the disclaimer page. The minimum specific required content for the site is detailed below.

2.1.1 General Requirements: The following requirements are to be applied to the entire site. 1) A navigational menu bar is to appear on all pages. It may be text or graphical. The menu bar is to include links to the four main pages. 2) All graphic images are to contain alternative text based descriptions and the alignment of the graphic images relative to text on the Web page is to be professional. 3) Each page is to contain a different graphic image that visually portrays the content of the page. There are many resources on the Web to

download graphic images, backgrounds, and photographs. Use the search engines to find a site that suits your needs. 4) You are not to use functions, features, html tags, or technology that were not discussed in class when developing your site. 5) You will publish your site to or develop it in your *root directory*. The file name for the home page is to be "*home.htm*". All images are to be stored in the "*images*" directory.

2.1.2 Home Page: This page is to be an introduction to your site and should invite the visitor to browse further. Remember you only get one chance to make a first impression. The following elements are to be included. 1) A graphic image map created from a single image with hotspots to navigate to the three other main pages in the site. The hotspots are to have alternative text descriptions that display to the user the name of the page associated with the hotspot. 2) Any text you deem appropriate to describe the site and encourage browsing (put on your marketing hat). 3) Copyright information is to appear at the bottom of the page.

2.1.3 About the Company Page: This page is to contain pertinent information about the company and their products and/or services. The following items are to be included on this page. 1) A brief description of the company along with an overview of products and/or services offered. 2) A brief company history. 3) A list of customers or quotes from customers. 4) Contact information, including: legal company name, complete postal address, a hyperlinked email contact, phone number, and fax number.

2.1.4 Products and/or Services Page: This page is to supply the visitor with specific product and/or service knowledge so that they will place an order. You are to describe at least five different products or services. The description is to include the following: 1) a graphic image of the product or service, 2) an item number, 3) name of product or service, 4) color/style/size options, if appropriate, 5) selling price, and 6) shipping and handling fees, if appropriate. You are to use tables to display and format the above information. Somewhere on the page is to be a description of the shipping or delivery options available to the customer.

2.1.5 Off-Line Order Page: This page is to contain a printable order form that the customer can use to fax, phone, or mail an order to you for the products found on the *Products and/or Services Page*. The page is to be designed so that when a user prints the Web page they can use a pen or pencil to enter the requested data. Consequently, the layout of the page needs to be user-friendly with all requested data items well organized, labeled, and neatly laid out on the page. The off-line order page is to allow the user to order multiple items. You are not to use HTML form objects to layout this page. The page is to clearly display instructions on how to use the order form, including fax and phone numbers and a mailing address for orders. The off-line order page is to include the ability to manually enter the following: 1) name and complete billing address, 2) method of payment, for credit card payments the type of credit card, the card holder's name, account number, and expiration date are to be entered, 3) ship to name and address, if necessary,

4) for each item ordered the item number, description, quantity ordered, selling price, and extension[1] (quantity x selling price) are to be entered, 5) total due for the items ordered (add all the extensions), 6) shipping charges, and 7) total order amount. In the vicinity of where the shipping charges are to be entered on the form, the available shipping options along with the corresponding charges are to be listed.

2.1.6 Disclaimer Page: The link to this page is to be from the *home page*, immediately after copyright. There is to be no link to this page from the navigational menu. This page is to contain two statements: 1) a copyright disclaimer, and 2) a pledge that you alone developed the site. The copyright disclaimer is to state that this site was developed for educational purposes. As such, it may contain copyrighted images, which belong to the owners of the images and not the developer of this site. The pledge is to state that you have neither given nor received any unacknowledged aid on this assignment. Your name is to appear below the pledge along with the date you completed the assignment.

3. ASSIGNMENT #2
ENHANCED E-COMMERCE WEB SITE

The purpose of this assignment is to enhance the eCommerce Web site you developed in the first assignment. You are to correct ALL errors found in the first version of your Web site then enhance its functionality by adding custom graphic images, controlling the layout and user interface of the Web site by using frames, adding a "Request for Information Page" and implementing data driven dynamic Web pages for displaying your products and/or services. The Web site you develop in this assignment will serve as the foundation for the final e-Commerce development project.

3.1 Functional Requirements
The site will consist of seven (7) pages, plus the disclaimer. The minimum specific required content of the seven pages is detailed below.

3.1.1 General Requirements: All General Requirements from assignment #1 are to be met, unless stated otherwise. Below are the new general requirements for this assignment.

1) Your company's Web site is to be modified to accommodate the use of frames. At a minimum you must use one frameset that contains at least two frames. One of these frames is to contain your new graphical navigational menu and its size is to be fixed. One of the other frames is to be used to display the site's Web pages. The frameset is to contain no borders or allow the user the ability to resize the frames.

2) All graphic images will meet the following criteria. All non-photographic images are to be transparent so that the background color of the image blends with the background color of your Web site. Using an appropriate graphics editor, all images are to be appropriately sized and re-sampled (sharpened) as necessary. Make appropriate use of drop-shadows for photographic images.

3) You are to develop a new graphical navigational

menu for your company's Web site that implements mouse rollover effects for each menu item. All menu images are to be pre-loaded into the browser's cache. The menu is to include links to the five primary pages contained in the site: *Home, About the Company, Products, Request for Information* and *Off-Line Orders*. In addition, the menu must function properly in the frames environment you create.

4) You are to develop a custom logo for your Web site. You are to develop two versions of the logo. The first version is to be displayed on the home page. It is to be predominately featured on the page. It will contain the company's name along with any other graphic features or images you deem appropriate. This should look as if it is *professionally* developed and not like clip art. The second version is to be a much smaller version of the logo to be displayed on *all* other pages in the site. This smaller version of the logo should be displayed in the same location on all pages so that the site has a consistent look and feel. Consider this requirement when you implement your frames.

5) You are to create a new professional looking graphic image map from scratch. The graphic image map must contain hotspots that link to your *About the Company, Products and/or Services, Request for Information*, and *Off-Line Orders* pages. The image map is to contain appropriate text or graphic images that make it clear to the user the Web page *they will navigate* to if they click on the hotspot. In addition, the hotspots are to contain alternative text descriptions.

6) Be sure *the* organization and navigational structure of the site is correct, i.e. your *Home Page* is in the root directory and named *"home.htm" and all graphic images are in the "images" directory.*

3.1.2 Home *Page:* *All Home Page* requirements from assignment #1 are to be met. The new requirements for this assignment are delineated be*low.* 1) The Home Page is to be displayed in a frame within a frameset. 2) You are to remove your assignment #1 image map from the *Home Page.* Your newly created image map is to be placed appropriately on the *Home Page.* 3) As the user moves their mouse over the hotspots on your new image map, the image that portrays the content of the *Home Page* is to be swapped with the image that portrays the content of the page that corresponds to the hotspot. When the user moves their mouse off the hotspot the original image is to be restored. Note this is not a simple rollover, but an image swap. The swapped images are not graphic images within the image map itself but rather the images that were placed on each Web page in assignment #1 to portray the content of the page. 4) Enhance the layout of the page by making appropriate use of tables.

3.1.3 About the Company Page: All of the *About the Company Page* requirements from assignment #1 are to be met. The following are the new requirements. 1) The *About the Company Page* is to be displayed in a frame within a frameset. 2) Enhance the layout of the page by making appropriate use of tables. You are to use tables to control the

layout of page's content. 3) The email contact is to be linked to a valid email address, so that the user is able to send you an email message using the link.

3.1.4 Products and/or Services Pages: Similar to other pages in the site, all of the *Products Page* requirements from assignment #1 are to be met, unless otherwise specified. The *Products and/or Services Page* is to be displayed in a frame within a frameset.

How the products and/or services are displayed will change significantly. They will be dynamically generated based on the contents of tables in a database. In order to achieve this, you are to create two tables, category and product, in your assigned database schema. Sample SQL scripts are provided to get you started, see Figures 1, 2, and 3^2. You may use the sample scripts to create your tables or to add data to the tables in your assigned database schema. You may also modify the scripts to add or delete columns in your tables to accommodate the products/services you are marketing on your Web site. You are to use your assigned username and password when creating and populating your tables. After you have created your tables, you are to insert the necessary rows for each of your categories and products. Each product or service you are selling on your Web site is to be assigned to a product/service category. You are to have at least 2 product/service categories. Your instructor will provide the Data Source Name to access your data in the database dynamically.

When a Web site visitor requests the *Products and/or Services Page* to display the following is to occur. 1) A list of the valid product/service categories is to be displayed below the header information. The product/service categories are to be dynamically generated from the category table in your database schema. 2) The individual product/service categories are to be hyperlinked so that when the user clicks on a product category, a new page is to be displayed, containing the product/service page header information and all the products and/or services that you are selling that correspond to the selected category. 3) The name of the selected product/service category is to be displayed and highlighted before the products and/or services are displayed.

The following data are to be displayed for each product/service: 1) a graphic image of the product /service, 2) item number, 3) name of the product/service, 4) color/style/size options, if appropriate, 5) selling price, 6) shipping and handling fees, if appropriate. You are to use tables to professionally display and format the product/service data. All dynamically generated data is to be properly labeled. Make use of color to enhance the readability of the information contained in the products/services table. All product/service graphic images are to be approximately the same size. A description of shipping options is to appear on the products listing page.

3.1.5 Request for Information Page: This page is to allow a visitor to request additional information concerning your products and/or services. You will need to gather the following information using the appropriate HTML form object: title (Mr., Mrs., Ms., Dr.), first name, last name, organization, street Address (2 lines), city, state, country,

postal code, phone, fax, email address, and preferred contact method. The page is to allow the visitor to describe the information they need or the problem they are trying to solve.

Use the following script to create your Category Table:

```
CREATE TABLE category
        (
category_code VARCHAR2(2) NOT NULL,
category_description VARCHAR2(30) NOT NULL,
    CONSTRAINT category_category_code_pk
        PRIMARY KEY(category_code)
        )
```

Use the following script to add data to your Category Table:

```
INSERT INTO category VALUES
        (
    '&category_code',
    '&category_description'
        )
```

Figure 1. Sample SQL Scripts - Category Table

Use the following script to create your Product Table:

```
CREATE TABLE product
        (
    product_nbr VARCHAR2(6) NOT NULL,
product_description VARCHAR2(35) NOT NULL,
    color_style_size VARCHAR2(10),
    retail_price NUMBER(7,2) NOT NULL,
        shipping_fee NUMBER(6,2),
URL_of_image VARCHAR2(30) NOT NULL,
category_code VARCHAR2(2) NOT NULL,
    CONSTRAINT product_product_nbr_pk
        PRIMARY KEY(product_nbr),
    CONSTRAINT category_category_code_fk
        FOREIGN KEY (category_code)
            REFERENCES category
        )
```

Use the following script to add data to your Product Table:

```
INSERT INTO product VALUES
        (
    '&product_nbr',
    '&product_description',
    '&color_style_size',
    '&retail_price',
    '&shipping_fee',
    '&URL_of_image',
    '&category_code'
        )
```

Figure 2. Sample SQL Scripts - Product Table

You are to develop a template to process this data when a user submits it to the server. The template is to generate an email to be sent to your instructor containing the data entered by the user[3]. The template is also to dynamically generate a *Confirmation Page* to be displayed back to the user. The *Confirmation Page* is to contain the user's first and last

names along with some appropriate text informing the user that someone from your organization will be in contact with them shortly.

Both the *Request for Information* and the *Confirmation Pages* are to operate properly within the frame system you developed so that the graphical navigational menu is available to the user when these pages are displayed. Both of these new pages are to have an appropriate graphic image at the top of the page portraying the content of the page.

To remove a table from the database:

```
DROP TABLE table_name
```

To delete a row from a table:

```
DELETE FROM table_name
WHERE tables_primary_key = 'primary key
        value'
```

To delete all rows from a table:

```
DELETE FROM table_name
```

Note:
After you execute an SQL INSET or DELETE command, you must run a COMMIT command to commit the changes to the database; otherwise your changes will not be permanent.

Figure 3. Other Useful SQL Commands

3.1.6 Off-Line Order Page: All of the *Off-Line Order Page* requirements from assignment #1 are to be met. Additional requirements for this assignment are as follows. 1) The *Off-Line Order Page* is to be displayed in a frame within a frameset. Alternatively, you may wish to have this page open in a new window. 2) Enhance the layout of the page by making appropriate use of tables.

3.1.7 Disclaimer Page: Update the date you completed the second assignment. The disclaimer page is not to appear on your new graphical navigational menu. Its link is ONLY to be at the bottom of the *Home Page* with the copyright information.

4. FINAL ASSIGNMENT
THE VIRTUAL SHOPPING CART

The purpose of this assignment is to enhance the electronic commerce Web site you developed in the first two assignments. You are to correct ALL the errors in the first two versions of your Web site then enhance its functionality by implementing a virtual shopping cart and the dynamic data driven Web pages associated with it.

4.1 Functional Requirements
The site will consist of the pages and templates discussed below, plus the disclaimer. The *minimum* specific required content of the pages and templates is detailed below.

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4.1.1 General Requirements: All *General Requirements* from previous two Web assignments are to be met unless stated otherwise. Below are the new general requirements for this assignment.

1) All new pages/templates that are visible to a Web site visitor are to contain a graphic image that portrays the content of the page.
2) You are to use the graphic navigational menu bar created in assignment #2. There is no reason to change it.
3) All new pages and templates are to be displayed appropriately within the frameset designed in assignment #2.
4) You are to create any necessary tables in your database schema to complete your virtual shopping cart. A sample set of SQL scripts to create these tables is provided, see Figure 4. Do not allow duplicate orders to be added. Add the necessary columns to your tables to accommodate the products/services you are marketing on your Web site and the minimum functional requirements for this assignment. The Data Source Name is the same as assignment #2.
5) Make sure the organization and navigational structure of the site is correct, i.e. your *Home Page* is to be in the root directory and named "home.htm" all graphic images are to be in the "images" directory, and all scripts and templates are to be in the "scripts" directory.
6) Update the assignment completion date on the disclaimer page.

4.1.2 Previously Developed Pages or Templates: All requirements from assignments #1 and #2 are to be met for the following pages or templates: *Home, About the Company, Off-Line Order,* and *Request for Information.* You are to add additional comments to *the Off-Line Order Page* concerning the site's ability to accept online orders with appropriate instructions indicating that the *Off-Line Order Page* should only be used for fax, phone, or mail orders.

4.1.3 Product/Service Categories Template: You are to modify this template. The heading information at the top of the page should not change. However, how the categories are displayed will change significantly. When a visitor displays this page the following is to occur. 1) The product/service categories are to be dynamically generated from the category table in the your database and are to be displayed in a drop down menu box. 2) When the user clicks on the "Search" Button the dynamically generated products/services page from assignment #2 is to be displayed.

4.1.4 Products/Services Template: You are to slightly modify this template. The heading information at the top of the page should not change. The modifications are as follows. You are to add a brief description of how the virtual shopping cart operates, so that the visitor understands how they can order products or services online directly from this page. The objective here is to have the visitor click on the item they wish to order. The item selected will automatically be displayed on a new page within a form containing a

quantity textbox so that the visitor may enter the quantity desired. When the user wants to order an item, an appropriate graphic image indicating their desire to purchase this item is to be hyperlinked to an *Add to Shopping Cart Template* passing off the *item number* as part of the hyperlink.

Use the following script to create your Order Details Table:
| ```
CREATE TABLE order_details
        (
    order_number date NOT NULL,
 product_nbr VARCHAR2(9) NOT NULL,
     quantity NUMBER(6) NOT NULL,
   color_style_size VARCHAR2(10),
  retail_price NUMBER(7,2) NOT NULL,
       shipping_fee NUMBER(6,2)
              )
``` |

Use the following script to create your Product Table:

```
CREATE TABLE orders
        (
   order_number date NOT NULL,
   name VARCHAR2(30) NOT NULL,
  address VARCHAR2(25) NOT NULL,
     address2 VARCHAR2(25),
   city VARCHAR2(15) NOT NULL,
    state_province VARCHAR2(2),
  country VARCHAR2(15) NOT NULL,
     postal_code VARCHAR2(10),
   phone VARCHAR2(12) NOT NULL,
   email VARCHAR2(30) NOT NULL,
 cardholder_name VARCHAR2(30) NOT NULL,
   credit_card VARCHAR2(15) NOT NULL,
      credit_card_nbr VARCHAR2(20),
   expiration VARCHAR2(7) NOT NULL,
 CONSTRAINT orders_order_number_pk PRIMARY
        KEY(order_number)
)
```

Figure 4. Sample SQL Scripts - Shopping Cart Database

4.1.5 Add to Shopping Cart Template: This template is to display the item selected by the user along with a quantity desired textbox. Only one product/service item is to appear on this page. Instructions on how to use this form are to appear before the item information is displayed. The following is to be displayed in a properly formatted table containing appropriate column or row headings: 1) quantity (input textbox), 2) item number, 3) name of product/service, 4) color/style/size (if necessary), 5) price, 6) a *Process Order* button, and 7) a *Clear Quantity* button. The appropriate table in your database schema is to be updated when the user clicks the *Process Order* button.

4.1.6 Shopping Cart Details Template: This template is to display all the items in the user's shopping cart and the total for the order. This page is to contain the following elements and functionality. 1) The following data is to be displayed for each item in the shopping cart: quantity, item number, name of product/service, color/style/size (if necessary), price, and extension (quantity x price). 2) After the last item in the shopping cart is displayed the total amount of the order is to appear (ignore shipping charges for this assignment). 3)

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You are to use tables to display, label and format the product/service data and totals. 4) Beside each item displayed you are to have a small graphic image that contains the words "*Delete*", that when clicked will delete the corresponding item from the shopping cart. 5) Instructions on how to use this page are to appear immediately below the list of items in the shopping cart and order total. 6) Below the instructions, two graphic images are to be displayed, "*Continue Shopping*" and "*Proceed to Checkout*". These images are to be hyperlinked to the appropriate pages.

4.1.7 Shopping Cart Checkout Template: This template contains a form that accepts information from the user to complete the order. The information requested is a subset of the information currently contained on the *Off-Line Order Page*. The form is to contain the billing information: 1) name, 2) first address line, 3) second address line, 4) city, 5) state/province, 6) country, 7) postal code, 8) phone number - properly formatted, 9) email address, 10) credit card holder's name, 11) credit card type – use a drop down menu with the following options: American Express, MasterCard, Discover, and Visa, 12) credit card number, and 13) expiration date (mm/yyyy). All of the above fields are required, except for the second address line, state/province, and postal code. The field sizes are to be appropriate for the corresponding columns in your database tables. The form is to contain the following buttons: *Submit Order for Processing* and *Clear Form*. When the user clicks the *Submit Order for Processing* button the database is to be updated and the *Order Summary Page* is to be displayed. The *Clear Form* button is to reset the form back to its original state before the user entered any data.

4.1.8 Order Summary Template: As the name implies this template is to contain a <u>complete</u> summary of the order for the user to printout. This page is to contain the following functionality. 1) The page is to be formatted so that it is easy to read. 2) The page should contain all the information submitted by the user on the *Shopping Cart Checkout Template* and all the products ordered along with the appropriate extensions and totals, similar to the *Shopping Cart Details Template*. 3) Only the required fields from the *Shopping Cart Checkout Template* are to appear on this page. The optional fields are to appear only if they contain data. 4) After the order summary data is presented, the user should be given two options: *Finalize the Order* or *Cancel the Order*, which should be graphic images. 5) If the user selects *Finalize the Order*, then the user is to be sent a confirming email containing the details of the order. A simple order confirmation Web page is to be presented thanking the user for the order and, finally, the user's cookie is to be deleted. 6) If the user clicks on *Cancel the Order*

then all information pertaining to this order needs to be deleted from the necessary tables in the database along with the user's cookie. Finally, a Web page indicating the order has been canceled is to be displayed.

5. ENDNOTES

[1] An *extension* is a standard business term that refers to a column on an invoice or order that contains the total (quantity x selling price) for each line item on an invoice/order. The sum of the extensions for each line item equals the sub-total for an invoice/order, before taxes and freight charges are added.

[2] The sample SQL scripts are for an Oracle database but can easily be modified to run on any relational database. Your instructor will provide additional details if necessary.

[3] You are to test the *Request for Information* form with YOUR own email address and not your instructor's. When you are ready to submit the final version of the assignment you are to change the email address to your instructor's. Your instructor should not receive any emails that are the result of processing your form unless they generate it themselves. Failure to follow this procedure will result in points being deducted from the assignment.

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