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DURBAN UNIVERSITY OF TECHNOLOGY
INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE

FACULTY OF ACCOUNTING AND INFORMATICS

DEPARTMENT OF INFORMATION TECHNOLOGY

2024
YEAR END MAIN EXAMINATION

INSTRUCTIONAL PROGRAMME :	DIP ICT IN APPLICATIONS DEVELOPMENT
INSTRUCTIONAL OFFERING :	APPLICATIONS DEVELOPMENT 2B
PAPER NUMBER :	1
SUBJECT CODE/S :	APDB201
DATE :	12 NOVEMBER 2024
DURATION :	2½ HOURS
TIME :	09H00 - 11H30
TOTAL MARKS :	100
NUMBER OF PAGES :	5 (INCLUDING COVER)
EXAMINER/S :	B.NGXATA, F.KHUBISA
MODERATOR/S :	S.HOOSEN

INSTRUCTIONS/REQUIREMENTS:-

[1] Answer all questions

[2] Use Ink NOT Pencil

[3] Number you answers as in the question paper

[4] Use Property names and method names given on the question paper

Do not turn the page until permission is given

Section A: Multiple Choice Questions (MCQ) [20 marks]

For each of the questions 1.1 to 1.10 choose the correct option. Write only the question number and the letter that corresponds to the correct option.

1.1. Which of the following is NOT a valid Data Annotation attribute in ASP.NET MVC?

a) [Required]
b) [Calculate]
c) [ForeignKey]
d) [MaxLength]

1.2. In Entity Framework Code-First, what method would you use to add a custom configuration for a specific model in the DbContext class?

a) AddModelConfigurations
b) OnModelCreating
c) AddModelCreating
d) OnModelConfigureEntity

1.3. What is the correct way to create a DbSet property for an entity named Product in a DbContext class using Code-First?

a) public Product Products { get; set; }
b) public List<Product> Products { get; set; }
c) public DbSet<Product> Products { get; set; }
d) public ICollection<Product> Products { get; set; }

1.4. Which LINQ method allows you to filter data from a collection in C#?

a. Select
b. FirstOrDefault
c. Where
d. GroupBy

1.5. What is the primary role of DbContext in ASP.NET MVC applications using Entity Framework?

a. It handles the routing of URL requests to the correct controller actions.
b. It provides a way to pass data from the controller to the view.
c. It is used to store temporary data across different HTTP requests.
d. It is responsible for managing database connections, executing queries, and tracking changes made to entities.

1.6. In ASP.NET MVC, which of the following is used to pass data from the controller to the View and is available for one-time use (i.e., it doesn't persist across requests)?

a. ViewData
b. TempData
c. Session
d. ViewBag

1.7. In LINQ, what is the difference between the FirstOrDefault() and SingleOrDefault() methods?

a. FirstOrDefault() returns the first element in a collection or null if no elements exist, while SingleOrDefault() throws an exception if more than one element exists.
b. FirstOrDefault() throws an exception if more than one element exists, while SingleOrDefault() always returns the first element.
c. FirstOrDefault() returns null when more than one element exists, while SingleOrDefault() throws an exception.
d. FirstOrDefault() returns the last element, while SingleOrDefault() returns the first element in the collection.

1.8. In an ASP.NET MVC application, which of the following actions would correctly return a view for the Details action of a ProductController with an ID parameter?

a. return RedirectToAction("Details", new { id = id });
b. return View(id);
c. return RedirectToAction("Details", id);
d. return View();

1.9. In the Entity Framework Database First approach, which of the following is not automatically generated in the .edmx file when reverse engineering an existing database?

a. Entity classes
b. Controller class
c. DbContext class
d. Mapping configurations

1.1. In Entity Framework, what is the purpose of the DbContext.SaveChanges() method?

a. To rollback all changes made to the database context
b. To apply all pending changes in the database context to the database
c. To reset the DbContext state
d. To track changes in entity models

Section B: Design and Implement a Trip Booking System using Code-First ASP.NET MVC [80 marks]

You are tasked with designing and implementing a Trip Booking System for a start-up company that manages bookings for trips to various international destinations, including Nairobi (Kenya), Lagos (Nigeria), New York (USA), and Paris (France). The system should handle customer information, trip details, and bookings. It must apply discounts based on factors such as customer loyalty, trip duration, travel season, and trip purpose. Each trip destination will have a base fare that you must define in your model. The base fare for the specified destinations for is as follows: Nairobi, Kenya: R38 250, Lagos, Nigeria: R45 900, New York, USA: R62 520 and Paris, France: R63 050. A customer can have multiple bookings, and a trip can be booked by multiple customers.

The system should calculate discounts based on the following criteria:

Table 1: *Discount Criteria for Trip Booking System*

Criteria	Discount
Customers with more than 5 trips	10% discount
VIP customer type; Premium customer type	VIP: 5%; Premium: 11%
Trips longer than 10 days	5% discount
Business trips; Leisure trips	Business: 15%; Leisure: 8%

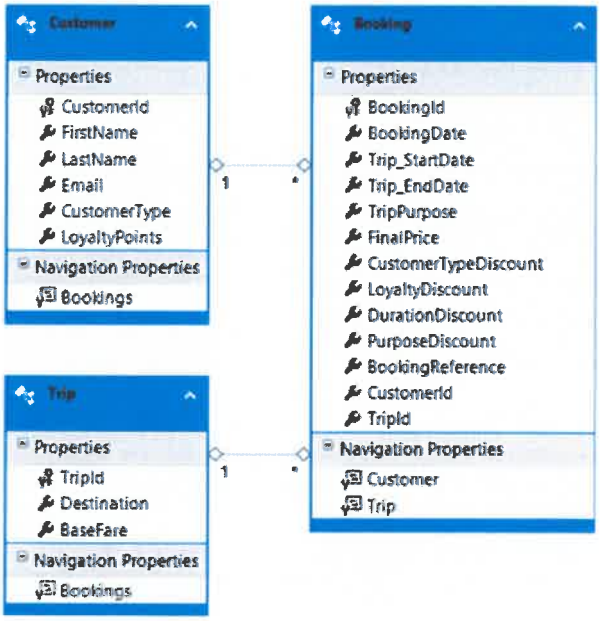

Figure 1: *TripBookingSystem class diagram*

2. Use Code First Approach (C#) and code **ONLY** the necessary primary keys, foreign keys, and navigational properties. Note that *CustomerId*, *TripId*, and *BookingId* should be auto-generated. [15]
3. Code the DbContext class called *TripBookingContext* for this system. Include the necessary namespaces for this class. [10]

Code the following methods, using LINQ where applicable:

4. ***getTripBaseFare*()** is the method that retrieves the base fare for a specific trip. [5]
5. ***calcTripDurationDiscount*()** is the method that calculates the discount applied for a trip booking based on the trip duration. [5]
6. ***calcCustomerTypeDiscount*()** is the method that calculates the discount applied for a trip booking based on the customer type. [10]
7. ***AddLoyaltyPoints()*** is the method that calculates loyalty points earned by the customer for each trip booking. Each trip earns a customer one point. [5]
8. ***calcLoyaltyPointsDiscount()*** is the method that will check if the customer has more than 5 completed trips and apply a 5% discount to the base fare. [7]
9. ***generateBookingReference()*** is the method that generates a unique booking reference number for each booking. It should combine the *CustomerId, TripId*, and the current booking timestamp to ensure that the reference is unique and easily traceable. [5]
10. ***calcFinalBookingPrice()*** is the method that calculates the final price of a booking after all relevant discounts have been applied. [5]
11. Code a full create action method of the ***BookingController*** that will handle the creation of a new booking in the database. Ensure that it validates input, calculates discounts, generates a booking reference number, calculates the final price, updates the royalty points and saves the booking to the relevant table in the database. [13]