API Developer Homework Assignment - 2020

Instructions

You have 24 hours to complete as many questions as you would like. You are free to use whatever tools you would like, for any development questions, please include all source code, implementation instructions, etc. that would be needed to run (please note that there is a 5mb file attachment size limit for our emails, so if your zipped file is larger than that, you will have to arrange for an alternate delivery mechanism for us to get the source.

Question 1

In question 4 there are a series of tables in a database used for storing related data. You need to design a simple REST API to allow for the CRUD operations on those tables. Please provide all the REST endpoints that you think would be necessary to Create, Read, Update, and Delete the various objects.

Question 2

Write a function in Go, Java, or C# that returns the number of occurrences of a specified digit in a series between 2 numbers that have been supplied, and whose behaviour is controlled by a supplied parameter. Ideally the function signature should have the following parameters:

- SeriesStart – the number that begins the series, which can be a number between $-(2^{53}-1)$ and $(2^{53}-1)$
- SeriesEnd – the number that ends the series, which can be a number between $-(2^{53}-1)$ and $(2^{53}-1)$
- SeriesIncrement – the increment to be used to determine the individual elements in the series
- SpecifiedDigit – the digit that you want the number of occurrences of in the series
- SeriesType – an identifier that affects which items in the series to analyze, it can have 1 of the following values:
    - 1 – analyze all elements in the series
    - 2 – analyze only even numbered elements in the series
    - 3 – analyze only odd numbered elements in the series

As an example, if I called this function with the following parameters:

- SeriesStart = 1
- SeriesEnd = 11
- SeriesIncrement = 1
- SpecifiedDigit = 1
- SeriesType = 1

I would expect that the function would return 4 for the number of occurrences of the digit “1”, as it would be present in the series elements 1, 10, and 11 and it occurs 4 times, once in each of “1” and “10”, and twice in “11”.

Question 3

Take the function you created in question #2 and turn it into a REST API end so that it could hosted on the internet and used by developers worldwide.

Question 4

You have a database with the following structure:

Order

Column Name	Data Type	Description
OrderID	Int	Primary key
OrderNumber	Nvarchar(50)	Unique number displayed to the customer
CustomerID	Int	Foreign key to Customer table
OrderCreatedDate	DateTime	The datetime the order was created
OrderFulfilledDate	DateTime	The datetime that the order was fulfilled
OrderTotal	Decimal(8,2)	The total value of the order
OrderTaxTotal	Decimal(8,2)	The total amount of taxes on the order

LineItem

Column Name	Data Type	Description
LineItemID	Int	Primary key
OrderID	int	Foreign key to the Order table
ProductID	int	Foreign key to Product table
LineItemUnitPrice	Decimal(8,2)	The unit price for the product being purchased
Quantity	int	The number of the item being ordered
LineItemDiscount	Decimal(8,2)	The total discount applied to the lineitem

Customer

Column Name	Data Type	Description
CustomerID	Int	Primary key
FirstName	Nvarchar(50)	First name of the customer
LastName	Nvarchar(50)	Last name of the customer
DOB	DateTime	Date of birth of customer
OrderTotal	Decimal(8,2)	The total value of the order
OrderTaxTotal	Decimal(8,2)	The total amount of taxes on the order

CustomerAddress

Column Name	Data Type	Description

CustomerAddressID	Int	Primary key
CustomerID	Int	Foreign key to Customer table
Line1	Nvarchar(100)	Address line 1
Line2	Nvarchar(100)	Address line 2
City	Nvarchar(50)	City
StateProvince	Nvarchar(50)	State or province
Country	Nvarchar(50)	Country

ReturnItem

Column Name	Data Type	Description
ReturnedItemID	Int	Primary key
OrderID	Int	Foreign key to Order table
LineItemID	Int	Foreign key to LineItem table identifying the lien item that was returned
Quantity	Int	The quantity of the item returned
AmountReturned	Decimal(8,2)	The amount of money returned to the customer for the line item that was returned

Please provide the SQL to answer the following questions:

- What is the best-selling product for a given time period, based on total sales (i.e. it has generated the most revenue), and unit sales (i.e. it has sold the most units)?
- Who are the top 5 customers based on their total net sales (i.e. net sales would be the total amount of sales they have placed minus a returns they have made)?
- If we categorize customers by these age brackets:
    - Under 18 years old
    - 18 – 29 years old
    - 30 – 45 years old
    - 46 – 65 years old
    - 65+ years old
    - How would we get the following:
        - Which age group generated the greatest sales
        - What was the top country from sales perspective for each age bracket and what was their total sales?
- Please produce the underlying data for a Histogram, that shows the number of orders by the number of days it took to fulfill the order after it was placed. For example, would be looking for something like the following:
    - Less than a day – 50 orders
    - 1-2 days – 350 orders

    - 2-3 days – 400 orders
    - 3-4 days 200 orders
    - Greater than 4 days – 75 orders
- What percentage of items that were order included a discount from the full price?