

Case Study: 1

Scenario 1

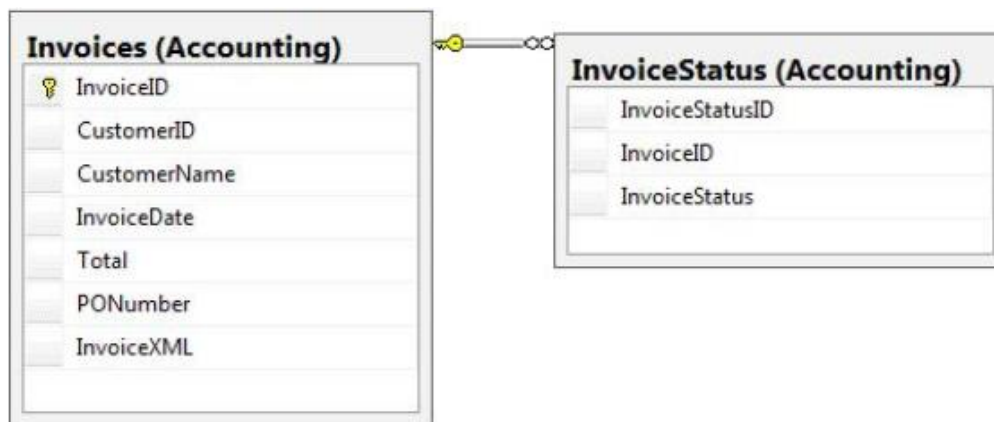
Application Information

Your company receives invoices in XML format from customers. Currently, the invoices are stored as files and processed by a desktop application. The application has several performance and security issues. The application is being migrated to a SQL Server-based solution. A schema named InvoiceSchema has been created for the invoices.xml.

The data in the invoices is sometimes incomplete. The incomplete data must be stored and processed as-is. Users cannot filter the data provided through views.

You are designing a SQL Server database named DB1 that will be used to receive, process, and securely store the invoice data. A third-party Microsoft .NET Framework component will be purchased to perform tax calculations. The third-party tax component will be provided as a DLL file named Treytax.dll and a source code file named Amortize.cs. The component will expose a class named TreyResearch and a method named Amortize(). The files are located in c:\temp\.

The following graphic shows the planned tables:



You have a sequence named Accounting.InvoiceID_Seq.

You plan to create two certificates named CERT1 and CERT2. You will create CERT1 in master. You will create CERT2 in DB1.

You have a legacy application that requires the ability to generate dynamic T-SQL statements against DB1. A sample of the queries generated by the legacy application appears in Legacy.sql.

Application Requirements

The planned database has the following requirements:

- All stored procedures must be signed.
- The original XML invoices must be stored in the database.
- An XML schema must be used to validate the invoice data.
- Dynamic T-SQL statements must be converted to stored procedures.
- Access to the .NET Framework tax components must be available to T-SQL objects.
- Columns must be defined by using data types that minimize the amount of space used

by each table.

- Invoices stored in the InvoiceStatus table must refer to an invoice by the same identifier used by the Invoice table.
- To protect against the theft of backup disks, invoice data must be protected by using the highest level of encryption.
- The solution must provide a table-valued function that provides users with the ability to filter invoices by customer.
- Indexes must be optimized periodically based on their fragmentation by using the minimum amount of administrative effort.

Usp_InsertInvoices.sql

```
01 CREATE PROCEDURE InsertInvoice @XML nvarchar(1000)
02 AS
03 DECLARE @XmlDocumentHandle INT;
04 DECLARE @XmlDocument nvarchar(1000);
05 SET @XmlDocument = @XML;
06
07 EXEC sp_xml_preparedocument @XmlDocumentHandle OUTPUT, @XmlDocument;
08
09 INSERT INTO DB1.Accounting.Invoices (
10     InvoiceID,
11     InvoiceXML,
12     CustomerID,
13     CustomerName,
14     InvoiceDate,
15     Total,
16     PONumber
17 )
18 SELECT (NEXT VALUE FOR Accounting.InvoiceID_Seq),
19     @XML, * FROM OPENXML (@XmlDocumentHandle, '/Invoice', 2)
20     WITH (
21         CustomerID nvarchar(11) 'Customer/@ID',
22         CustomerName nvarchar(50) 'Customer/@Name',
23         InvoiceDate date 'InvoiceDate',
24         Total decimal(8, 2) 'Total',
25         PONumber bigint 'PONumber'
26     );
27
28 EXEC sp_xml_removedocument @XmlDocumentHandle;
```

Invoices.xml

All customer IDs are 11 digits. The first three digits of a customer ID represent the customer's country. The remaining eight digits are the customer's account number.

The following is a sample of a customer invoice in XML format:

```
01 <?xml version="1.0"?>
02 <Invoice InvoiceDate="2012-02-20">
03     <Customer ID="00156590099" Name="Litware" />
04     <Total>125</Total>
05     <PONumber>1666</PONumber>
06 </Invoice>
```

InvoicesByCustomer.sql

```
01 (SELECT CustomerID,  
02     CustomerName,  
03     InvoiceID,  
04     InvoiceDate,  
05     Total,  
06     PONumber  
07     FROM Accounting.Invoices  
08     WHERE CustomerID=@CustID);
```

Legacy.sql

```
01 DECLARE @sqlstring AS nvarchar(1000);  
02 DECLARE @CustomerID AS varchar(11), @Total AS decimal(8,2);  
03  
04 SET @sqlstring=N'SELECT CustomerID, InvoiceID, Total  
05     FROM Accounting.Invoices  
06     WHERE CustomerID=@CustomerID AND Total > @Total;';  
07  
08 EXEC sys.sp_executesql  
09     @statement=@sqlstring,  
10     @params=N'@CustomerID AS varchar(11), @Total AS decimal(8,2)',  
11     @CustomerID=999, @Total=500;
```

CountryFromID.sql

```
01 CREATE FUNCTION CountryFromID (@CustomerID varchar(11)) RETURNS varchar(20)  
02 AS  
03 BEGIN  
04     DECLARE @Country varchar(20);  
05     SET @CustomerID = LEFT(@CustomerID,3);  
06     SELECT @Country = CASE @CustomerID  
07         WHEN '001'  
08             THEN 'United States'  
09         WHEN '002'  
10             THEN 'Spain'  
11         WHEN '003'  
12             THEN 'Japan'  
13         WHEN '004'  
14             THEN 'China'  
15         WHEN '005'  
16             THEN 'Brazil'  
17         ELSE 'Other'  
18     END;  
19     RETURN @Country;  
20 END;
```

IndexManagement.sql

```

01 DECLARE @IndexTable TABLE (
02     TableName varchar(100), IndexName varchar(100), Fragmentation int, RowNumber int
03 );
04 DECLARE @TableName sysname, @IndexName sysname, @Fragmentation int,
05     @RowNumber int, @sqlcommand varchar(1000);
06
07 INSERT INTO @IndexTable (TableName, IndexName, Fragmentation, Rownumber)
08     SELECT OBJECT_NAME(i.Object_id),
09         i.name AS IndexName,
10         indexstats.avg_fragmentation_in_percent,
11         ROW_NUMBER() OVER(ORDER BY i.name DESC) AS 'RowNumber'
12     FROM sys.dm_db_index_physical_stats(DB_ID(), NULL, NULL, NULL, 'DETAILED')
13     AS indexstats INNER JOIN sys.indexes AS i
14     ON i.OBJECT_ID = indexstats.OBJECT_ID AND i.index_id = indexstats.index_id;
15
16 DECLARE @counter int = 0;
17
18 WHILE @counter < (SELECT RowNumber FROM @indextable)
19     BEGIN
20         SET @counter = @counter + 1;
21         WITH t AS (
22             SELECT TableName, IndexName, Fragmentation
23             FROM @IndexTable WHERE RowNumber = @counter
24         )
25         SELECT
26             @TableName= TableName,
27             @IndexName = IndexName,
28             @Fragmentation = Fragmentation
29         FROM t;
30
31         IF @Fragmentation <= 30
32             BEGIN
33                 SET @sqlCommand =
34                     N'ALTER INDEX '+@indexName+N' ON '+@TableName+N' REORGANIZE';
35                 EXEC sp_executesql @sqlCommand;
36             END;
37         ELSE
38             BEGIN
39                 SET @sqlCommand=N'ALTER INDEX '+@indexName+N' ON '+@TableName+N' REBUILD';
40                 EXEC sp_executesql @sqlCommand;
41             END;
42         END;

```

Question: 1

You are testing disaster recovery procedures.

You attempt to restore DB1 to a different server and you receive the following error message: "Msg 33111.

Level 16, State 3, Line 1

Cannot find server certificate with thumbprint

,0xA694FBEA88C9354E5E2567C30A2A69E8FB4C44A9\

Msg 3013, Level 16, State 1, Line 1

RESTORE DATABASE is terminating abnormally."

You need to ensure that you can restore DB1 to a different server.

Which code segment should you execute?

- ☐ A.

```
RESTORE CERTIFICATE CERT2
FROM FILE='CERT2.CER'
WITH PRIVATE KEY (FILE = 'CERT2.KEY',
DECRYPTION BY PASSWORD='p@ssw0rd1');
```
- ☐ B.

```
CREATE CERTIFICATE CERT1
FROM FILE='CERT1.CER'
WITH PRIVATE KEY (FILE = 'CERT1.KEY',
DECRYPTION BY PASSWORD='p@ssw0rd1');
```
- ☐ C.

```
CREATE CERTIFICATE CERT2
ENCRYPTION BY PASSWORD='p@ssw0rd1'
WITH SUBJECT = 'EncryptionCertificate';
```
- ☐ D.

```
CREATE CERTIFICATE CERT1
ENCRYPTION BY PASSWORD='p@ssw0rd1'
WITH SUBJECT = 'EncryptionCertificate';
```

- A. Option A
- B. Option B
- C. Option C
- D. Option D

Answer: B

Question: 2

You need to create the InvoiceStatus table in DB1.

How should you define the InvoiceID column in the CREATE TABLE statement?

- ☐ A.

```
InvoiceID bigint
DEFAULT (NEXT VALUE FOR Accounting.InvoiceID_Seq) NOT NULL,
```
- ☐ B.

```
InvoiceID bigint DEFAULT ((NEXT VALUE
FOR Accounting.InvoiceID_Seq OVER
(ORDER BY InvoiceStatusID))) NOT NULL FOREIGN
KEY REFERENCES Accounting.Invoices(InvoiceID),
```
- ☐ C.

```
InvoiceID bigint FOREIGN KEY REFERENCES
Accounting.Invoices(InvoiceID) NOT NULL,
```
- ☐ D.

```
InvoiceID bigint DEFAULT ((NEXT VALUE
FOR Accounting.InvoiceID_Seq
OVER (ORDER BY InvoiceStatusID))) NOT NULL,
```

- A. Option A
- B. Option B

- C. Option C
- D. Option D

Answer: C

Question: 3

Which data type should you use for CustomerID?

- A. varchar(11)
- B. bigint
- C. nvarchar(11)
- D. char(11)

Answer: D

Explanation:

Invoices.xml

All customer IDs are 11 digits. The first three digits of a customer ID represent the customer's country. The remaining eight digits are the customer's account number.

int: -2^{31} (-2,147,483,648) to $2^{31}-1$ (2,147,483,647) (just 10 digits max)

bigint: -2^{63} (-9,223,372,036,854,775,808) to $2^{63}-1$ (9,223,372,036,854,775,807)

<http://msdn.microsoft.com/en-us/library/ms176089.aspx>

<http://msdn.microsoft.com/en-us/library/ms187745.aspx>

Question: 4

You need to modify InsertInvoice to comply with the application requirements.
Which code segment should you execute?

- ☐ A. OPEN CERT1;
ALTER PROCEDURE Accounting.usp_InsertInvoice
WITH ENCRYPTION;
CLOSE CERT1;
- ☐ B. OPEN CERT2;
ALTER PROCEDURE Accounting.usp_InsertInvoice
WITH ENCRYPTION;
CLOSE CERT2;
- ☐ C. ADD SIGNATURE TO Accounting.usp_InsertInvoice
BY CERTIFICATE CERT1;
- ☐ D. ADD SIGNATURE TO Accounting.usp_InsertInvoice
BY CERTIFICATE CERT2;

- A. Option A
B. Option B
C. Option C
D. Option D

Answer: D

Question: 5

You attempt to process an invoice by using usp_InsertInvoice.sql and you receive the following error message: "Msg 515, Level 16, State 2, Procedure usp_InsertInvoice, Line 10
Cannot insert the value NULL into column 'InvoiceDate', table 'DB1.Accounting.Invoices'; column
does not allow nulls. INSERT fails."

You need to modify usp_InsertInvoice.sql to resolve the error.
How should you modify the INSERT statement?

- A. InvoiceDate varchar(100) 'InvoiceDate',
B. InvoiceDate varchar(100) 'Customer/InvoiceDate', '
C. InvoiceDate date '@InvoiceDate',
D. InvoiceDate date 'Customer/@InvoiceDate',

Answer: C

Question: 6

You need to modify the function in CountryFromID.sql to ensure that the country name is returned instead of the country ID.

Which line of code should you modify in CountryFromID.sql?

- A. 04
- B. 05
- C. 06
- D. 19

Answer: D

Explanation:

<http://msdn.microsoft.com/en-us/library/ms186755.aspx>

<http://msdn.microsoft.com/en-us/library/ms191320.aspx>

Question: 7

You execute IndexManagement.sql and you receive the following error message:

"Msg 512, Level 16, State 1, Line 12

Subquery returned more than 1 value. This is not permitted when the subquery follows =, !=, <, <=, >, >= or when the subquery is used as an expression."

You need to ensure that IndexManagement.sql executes properly.

Which WHILE statement should you use at line 18?

- A. WHILE SUM(@RowNumber) < (SELECT @counter FROM @indextable)
- B. WHILE @counter < (SELECT COUNT(RowNumber) FROM @indextable)
- C. WHILE COUNT(@RowNumber) < (SELECT @counter FROM @indextable)
- D. WHILE @counter < (SELECT SUM(RowNumber) FROM @indextable)

Answer: B

Question: 8

You need to convert the functionality of Legacy.sql to use a stored procedure.

Which code segment should the stored procedure contain?

- ☐ A. `CREATE PROC usp_InvoicesByCustomerAboveTotal(
 @sqlstring AS nvarchar(1000),
 @CustomerID AS char(11),
 @Total AS decimal(8,2))
AS
...`
- ☐ B. `CREATE PROC usp_InvoicesByCustomerAboveTotal(
 @sqlstring AS nvarchar(1000))
AS
...`
- ☐ C. `CREATE PROC usp_InvoicesByCustomerAboveTotal(
 @sqlstring AS nvarchar(1000),
 OUTPUT @CustomerID AS char(11),
 OUTPUT @Total AS decimal(8,2))
AS
...`
- ☐ D. `CREATE PROC usp_InvoicesByCustomerAboveTotal (
 @CustomerID AS char(11), @Total AS decimal(8,2))
AS
...`

- A. Option A
B. Option B
C. Option C
D. Option D

Answer: D

Explanation:

<http://msdn.microsoft.com/en-us/library/ms187926.aspx>

<http://msdn.microsoft.com/en-us/library/ms190782.aspx>

<http://msdn.microsoft.com/en-us/library/bb669091.aspx>

<http://msdn.microsoft.com/en-us/library/windows/desktop/ms709342.aspx>

<http://msdn.microsoft.com/en-us/library/ms188001.aspx>

Question: 9

You need to create a function that filters invoices by CustomerID. The SELECT statement for the function is contained in InvoicesByCustomer.sql.

Which code segment should you use to complete the function?

- ☐ A. `CREATE FUNCTION Accounting.fnInvoicesByCustomertest (@CustID varchar(11))
RETURNS @TblInvoices TABLE (CustomerID bigint, CustomerName NVARCHAR(255),
InvoiceID bigint, InvoiceDate date, Total decimal(8,2), PONumber bigint)
AS`
- ☐ B. `CREATE FUNCTION Accounting.fnInvoicesByCustomer (@CustID varchar(11))
RETURNS @tblInvoices TABLE (CustomerID bigint, CustomerName NVARCHAR(255),
InvoiceID bigint, InvoiceDate date, Total decimal(8,2), PONumber bigint)
AS
INSERT INTO @tblInvoices`
- ☐ C. `CREATE FUNCTION Accounting.fnInvoicesByCustomer (@CustID varchar(11))
RETURNS xml
AS
RETURN`
- ☐ D. `CREATE FUNCTION Accounting.fnInvoicesByCustomertest (@CustID varchar(11))
RETURNS @TblInvoices TABLE (CustomerID bigint, CustomerName NVARCHAR(255),
InvoiceID bigint, InvoiceDate date, Total decimal(8,2), PONumber bigint)
AS`

- A. Option A
B. Option B
C. Option C
D. Option D

Answer: A

Question: 10

DRAG DROP

You need to build a stored procedure that amortizes the invoice amount. Which code segment should you use to create the stored procedure? To answer, move the appropriate code segments from the list of code segments to the answer area and arrange them in the correct order.

Ordered List Title	Answer Choices Title
<div> <div>▲</div> <div>▼</div> </div> <div></div>	<pre> RECONFIGURE; EXEC sp_configure 'clr enabled', '1'; EXEC sp_recomple @objname = 'TaxCalc' CREATE PROCEDURE Accounting.Amortize(@total decimal(8,2), @period int) RETURNS decimal(8,2) AS EXTERNAL NAME TaxCalc.TreyResearch.Amortize; CREATE ASSEMBLY TaxCalc FROM 'C:\temp\TreyTax.DLL' CREATE ASSEMBLY TaxCalc FROM 'C:\temp\Amortize.cs' </pre>
	<div><< Move</div> <div>Remove >></div>

Answer:

```

EXEC sp_configure 'clr enabled', '1';
RECONFIGURE;
CREATE ASSEMBLY TaxCalc FROM
'C:\temp\TreyTax.DLL'
CREATE PROCEDURE
Accounting.Amortize(@total
decimal(8,2), @period int)
RETURNS decimal(8,2)
AS EXTERNAL NAME
TaxCalc.TreyResearch.Amortize;

```

Explanation:

<http://msdn.microsoft.com/en-us/library/ms131089.aspx>

<http://msdn.microsoft.com/en-us/library/ms131048.aspx>

<http://msdn.microsoft.com/en-us/library/ms187926.aspx>