

Министерство образования Республики Беларусь

Учреждение образования
БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ
ИНФОРМАТИКИ И РАДИОЭЛЕКТРОНИКИ

Факультет компьютерных систем и сетей

Кафедра программного обеспечения информационных технологий

ОТЧЕТ
по лабораторной работе № 4
Вариант 1

Выполнила
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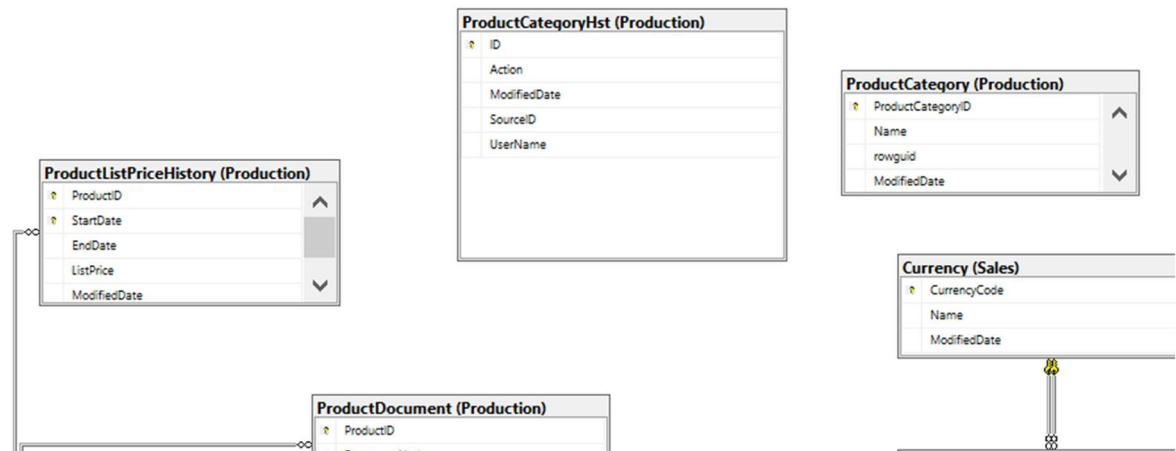
Проверил

О.А. Салей

Минск, 2020

Выполнение лабораторной работы

Задание 1

| | |
|---|---|
| a | <p>Создайте таблицу Production.ProductCategoryHst, которая будет хранить информацию об изменениях в таблице Production.ProductCategory. Обязательные поля, которые должны присутствовать в таблице: ID — первичный ключ IDENTITY(1,1); Action — совершенное действие (insert, update или delete); ModifiedDate — дата и время, когда была совершена операция; SourceID — первичный ключ исходной таблицы; UserName — имя пользователя, совершившего операцию. Создайте другие поля, если считаете их нужными.</p> <pre>5 CREATE TABLE [Production].[ProductCategoryHst](6 [ID] INT IDENTITY(1, 1) PRIMARY KEY, 7 [Action] CHAR(6) NOT NULL CHECK (Action IN('INSERT', 'UPDATE', 'DELETE')), 8 [ModifiedDate] DATETIME NOT NULL DEFAULT GETDATE(), 9 [SourceID] INT NOT NULL, 10 [UserName] VARCHAR(40) NOT NULL 11);</pre> <p>0 %</p> <p>Messages</p> <p>Commands completed successfully.</p> <p>Completion time: 2020-10-30T00:31:17.6583392+03:00</p>  |
| b | <p>Создайте один AFTER триггер для трех операций INSERT, UPDATE, DELETE для таблицы Production.ProductCategory. Триггер должен заполнять таблицу Production.ProductCategoryHst с указанием типа операции в поле Action в зависимости от оператора, вызвавшего триггер</p> |

```

14 CREATE TRIGGER [Production].[ProductCategoryActionTrg] ON [Production].[ProductCategory]
15 AFTER INSERT, UPDATE, DELETE AS
16 DECLARE @datetime DATETIME;
17 SET @datetime = CURRENT_TIMESTAMP;
18
19 INSERT INTO [Production].[ProductCategoryHst] (
20     [Action],
21     [ModifiedDate],
22     [SourceID],
23     [UserName]
24 )
25 SELECT
26     'UPDATE',
27     @datetime,
28     [INSERTED].[ProductCategoryID],
29     CURRENT_USER
30 FROM [INSERTED]
31 INNER JOIN [DELETED] ON [INSERTED].[ProductCategoryID] = [DELETED].[ProductCategoryID]
32 UNION ALL
33 SELECT
34     'INSERT',
35     @datetime,
36     [INSERTED].[ProductCategoryID],
37     CURRENT_USER
38 FROM [INSERTED]
39 LEFT JOIN [DELETED] ON [INSERTED].[ProductCategoryID] = [DELETED].[ProductCategoryID]
40 WHERE [DELETED].[ProductCategoryID] IS NULL
41 UNION ALL
42 SELECT
43     'DELETE',
44     @datetime,
45     [DELETED].[ProductCategoryID],
46     CURRENT_USER
47 FROM [DELETED]
48 LEFT JOIN [INSERTED] ON [INSERTED].[ProductCategoryID] = [DELETED].[ProductCategoryID]

```

1 %

Messages

Commands completed successfully.

Completion time: 2020-10-30T00:59:57.6484901+03:00

Проверка работы триггера:

```

4 INSERT INTO [Production].[ProductCategory]
5     ([Name]
6     , [rowguid]
7     , [ModifiedDate])
8 VALUES
9     ('TestName'
10     , NEWID()
11     , CURRENT_TIMESTAMP)
12 GO
13
14 UPDATE [Production].[ProductCategory]
15 SET [Name] = 'updatedName'
16     , [ModifiedDate] = CURRENT_TIMESTAMP
17 WHERE [Name] = 'TestName'
18 GO
19
20 DELETE FROM [Production].[ProductCategory]
21 WHERE [Name] = 'updatedName'
22 GO
23

```

2 %

Messages

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

1

SELECT * FROM [AdventureWorks2012].[Production].[ProductCategoryHst]

2 %

Results

Messages

| | ID | Action | ModifiedDate | SourceID | UserName |
|---|----|--------|-------------------------|----------|----------|
| 1 | 1 | INSERT | 2020-10-30 01:05:29.970 | 6 | dbo |
| 2 | 2 | UPDATE | 2020-10-30 01:05:29.997 | 6 | dbo |
| 3 | 3 | DELETE | 2020-10-30 01:05:30.000 | 6 | dbo |

c

Создайте представление VIEW, отображающее все поля таблицы Production.ProductCategory.

52

CREATE VIEW [Production].[vProductCategory]

53

WITH ENCRYPTION

54

AS

55

SELECT * FROM [Production].[ProductCategory];

56

GO

57

2 %

Messages

Commands completed successfully.

Completion time: 2020-10-30T01:15:26.9040156+03:00

Views

System Views

HumanResources.vEmployee

HumanResources.vEmployeeDepartment

HumanResources.vEmployeeDepartmentHistory

HumanResources.vJobCandidate

HumanResources.vJobCandidateEducation

HumanResources.vJobCandidateEmployment

Person.vAdditionalContactInfo

Person.vStateProvinceCountryRegion

Production.vProductAndDescription

Production.vProductCategory

Production.vProductModelCatalogDescription

Production.vProductModelInstructions

Purchasing.vVendorWithAddresses

Purchasing.vVendorWithContacts

Sales.vIndividualCustomer

Sales.vPersonDemographics

Sales.vSalesPerson

Sales.vSalesPersonSalesByFiscalYears

Sales.vStoreWithAddresses

Sales.vStoreWithContacts

Sales.vStoreWithDemographics

d

Вставьте новую строку в Production.ProductCategory через представление. Обновите вставленную строку. Удалите вставленную строку. Убедитесь, что все три операции отображены в Production.ProductCategoryHst.

```

59 INSERT INTO [Production].[vProductCategory]
60     VALUES
61     ( 'TestName'
62       ,NEWID()
63       ,CURRENT_TIMESTAMP)
64 GO
65
66 UPDATE [Production].[vProductCategory]
67     SET [Name] = 'updatedName'
68     , [ModifiedDate] = CURRENT_TIMESTAMP
69     WHERE [Name] = 'TestName'
70 GO
71
72 DELETE [Production].[vProductCategory]
73     WHERE [Name] = 'updatedName'
74 GO

```

2 %

Messages

(1 row affected)
 (1 row affected)
 (1 row affected)
 (1 row affected)
 (1 row affected)
 (1 row affected)

```

75
76 SELECT * FROM [Production].[ProductCategoryHst];

```

2 %

Results Messages

| | ID | Action | ModifiedDate | SourceID | UserName |
|---|----|--------|-------------------------|----------|----------|
| 1 | 1 | INSERT | 2020-10-30 01:05:29.970 | 6 | dbo |
| 2 | 2 | UPDATE | 2020-10-30 01:05:29.997 | 6 | dbo |
| 3 | 3 | DELETE | 2020-10-30 01:05:30.000 | 6 | dbo |
| 4 | 4 | INSERT | 2020-10-30 01:20:12.213 | 7 | dbo |
| 5 | 5 | UPDATE | 2020-10-30 01:20:12.223 | 7 | dbo |
| 6 | 6 | DELETE | 2020-10-30 01:20:12.250 | 7 | dbo |

Новые
строки
в таблице

Задание 2

- a Создать представление VIEW, отображающее данные из таблиц Production.ProductCategory и Production.ProductSubcategory. Сделать невозможным просмотр исходного кода представления. Создать уникальный кластерный индекс в представлении по полям ProductCategoryID, ProductSubcategoryID.

```
4 CREATE VIEW [Production].[vProductCategoryWithSubcategory] (  
5     [ProductCategoryID],  
6     [CategoryName],  
7     [CategoryRowguid],  
8     [CategoryModifiedDate],  
9     [ProductSubcategoryID],  
10    [SubcategoryName],  
11    [SubcategoryRowguid],  
12    [SubcategoryModifiedDate]  
13 )  
14 WITH ENCRYPTION, SCHEMABINDING AS  
15 SELECT  
16     [category].[ProductCategoryID],  
17     [category].[Name],  
18     [category].[rowguid],  
19     [category].[ModifiedDate],  
20     [subcategory].[ProductSubcategoryID],  
21     [subcategory].[Name],  
22     [subcategory].[rowguid],  
23     [subcategory].[ModifiedDate]  
24 FROM [Production].[ProductCategory] [category]  
25 INNER JOIN [Production].[ProductSubcategory] [subcategory] ON [category].[ProductCategoryID] = [subcategory].[ProductCategoryID];  
26 GO
```

Messages
Commands completed successfully.
Completion time: 2020-10-30T01:40:06.7638559+03:00

- b Создать три INSTEAD OF триггера для представления на операции INSERT, UPDATE, DELETE. Каждый триггер должен выполнять соответствующие операции в таблицах Production.ProductCategory и Production.ProductSubcategory.

```
33 CREATE TRIGGER [Production].[vCategoryInsert] ON [Production].[vProductCategoryWithSubcategory]  
34 INSTEAD OF INSERT AS  
35 BEGIN  
36     DECLARE @category TABLE (  
37         [ProductCategoryID] int,  
38         [rowguid] uniqueidentifier  
39     );  
40  
41     INSERT INTO [Production].[ProductCategory] (  
42         [Name],  
43         [rowguid],  
44         [ModifiedDate]  
45     )  
46     OUTPUT [INSERTED].[ProductCategoryID], [INSERTED].[rowguid] INTO @category  
47     SELECT  
48         [CategoryName],  
49         [CategoryRowguid],  
50         [CategoryModifiedDate]  
51     FROM [INSERTED];  
52     INSERT INTO [Production].[ProductSubcategory] (  
53         [ProductCategoryID],  
54         [Name],  
55         [rowguid],  
56         [ModifiedDate]  
57     )  
58     SELECT  
59         [category].[ProductCategoryID],
```

Messages
Commands completed successfully.
Completion time: 2020-10-30T01:53:37.5889250+03:00


```

67 CREATE TRIGGER [Production].[vCategoryUpdate] ON [Production].[vProductCategoryWithSubcategory]
68 INSTEAD OF UPDATE AS
69 BEGIN
70     UPDATE [Production].[ProductCategory]
71     SET
72         [Name] = [INSERTED].[CategoryName],
73         [rowguid] = [INSERTED].[CategoryRowguid],
74         [ModifiedDate] = [INSERTED].[CategoryModifiedDate]
75     FROM [INSERTED]
76     WHERE [INSERTED].[ProductCategoryID] = [ProductCategory].[ProductCategoryID];
77
78     UPDATE [Production].[ProductSubcategory]
79     SET
80         [Name] = [INSERTED].[SubcategoryName],
81         [rowguid] = [INSERTED].[SubcategoryRowguid],
82         [ModifiedDate] = [INSERTED].[SubcategoryModifiedDate]
83     FROM [INSERTED]
84     WHERE [INSERTED].[ProductSubCategoryID] = [ProductSubcategory].[ProductSubcategoryID];
85 END;
86 GO

```

1 %

Messages

Commands completed successfully.

Completion time: 2020-10-30T01:59:10.1335873+03:00

```

88 CREATE TRIGGER [Production].[vCategoryDelete] ON [Production].[vProductCategoryWithSubcategory]
89 INSTEAD OF DELETE AS
90 BEGIN
91     DELETE [subcategory]
92     FROM [Production].[ProductSubcategory] [subcategory]
93     INNER JOIN [DELETED] ON [DELETED].[ProductSubcategoryID] = [subcategory].[ProductSubcategoryID];
94
95     DELETE [category]
96     FROM [Production].[ProductCategory] [category]
97     INNER JOIN [DELETED] ON [DELETED].[ProductCategoryID] = [category].[ProductCategoryID];
98 END;
99 GO

```

1 %

Messages

Commands completed successfully.

Completion time: 2020-10-30T02:21:17.6853969+03:00

с

Вставьте новую строку в представление, указав новые данные для ProductCategory и ProductSubcategory. Триггер должен добавить новые строки в таблицы Production.ProductCategory и Production.ProductSubcategory. Обновите вставленные строки через представление. Удалите строки.

Вставка строки:

```

94
95 INSERT INTO [Production].[vProductCategoryWithSubcategory] (
96     [CategoryName],
97     [CategoryRowguid],
98     [CategoryModifiedDate],
99     [SubcategoryName],
100    [SubcategoryRowguid],
101    [SubcategoryModifiedDate]
102 )
103 VALUES ('test category', NEWID(), CURRENT_TIMESTAMP, 'test subcategory', NEWID(), CURRENT_TIMESTAMP);
104

```

67 %

Messages

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

Completion time: 2020-10-31T18:29:01.7892696+03:00

```

1 SELECT TOP 1 * FROM [Production].[ProductCategory] ORDER BY [ModifiedDate] desc
2 SELECT TOP 1 * FROM [Production].[ProductSubcategory] ORDER BY [ModifiedDate] desc
3

```

67 %

Results Messages

| | ProductCategoryID | Name | rowguid | ModifiedDate |
|---|-------------------|---------------|--------------------------------------|-------------------------|
| 1 | 12 | test category | DCE24271-D7E6-4223-8BBD-96E2F27104E1 | 2020-10-31 18:29:01.747 |

| | ProductSubcategoryID | ProductCategoryID | Name | rowguid | ModifiedDate |
|---|----------------------|-------------------|------------------|--------------------------------------|-------------------------|
| 1 | 42 | 12 | test subcategory | 96C26AA1-D103-423B-880F-C95161985613 | 2020-10-31 18:29:01.747 |

Обновление строки:

```

105 UPDATE [Production].[vProductCategoryWithSubcategory]
106 SET
107     [CategoryName] = 'updated category',
108     [SubCategoryRowguid] = NEWID()
109 WHERE [CategoryName] = 'test category';
110

```

57 %

Messages

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

Completion time: 2020-10-31T18:33:45.0912933+03:00

```

1 SELECT TOP 1 * FROM [Production].[ProductCategory] ORDER BY [ModifiedDate] desc
2 SELECT TOP 1 * FROM [Production].[ProductSubcategory] ORDER BY [ModifiedDate] desc
3

```

57 %

Results Messages

| | ProductCategoryID | Name | rowguid | ModifiedDate |
|---|-------------------|------------------|--------------------------------------|-------------------------|
| 1 | 12 | updated category | DCE24271-D7E6-4223-8BBD-96E2F27104E1 | 2020-10-31 18:29:01.747 |

| | ProductSubcategoryID | ProductCategoryID | Name | rowguid | ModifiedDate |
|---|----------------------|-------------------|------------------|--------------------------------------|-------------------------|
| 1 | 42 | 12 | test subcategory | 366C3AE6-C6CD-419D-8499-85349B695796 | 2020-10-31 18:29:01.747 |

Удаление строки:

```

110
111 DELETE [Production].[vProductCategoryWithSubcategory]
112 WHERE [CategoryName] = 'updated category';

```

7 %

Messages

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

Completion time: 2020-10-31T18:35:16.7919320+03:00

1

2

3

SELECT TOP 1 * FROM [Production].[ProductCategory] ORDER BY [ModifiedDate] desc

SELECT TOP 1 * FROM [Production].[ProductSubcategory] ORDER BY [ModifiedDate] desc

7 %

Results

Messages

| | ProductCategoryID | Name | rowguid | ModifiedDate |
|---|-------------------|------------|--------------------------------------|-------------------------|
| 1 | 2 | Components | C657828D-D808-4ABA-91A3-AF2CE02300E9 | 2002-06-01 00:00:00.000 |

| | ProductSubcategoryID | ProductCategoryID | Name | rowguid | ModifiedDate |
|---|----------------------|-------------------|------------|--------------------------------------|-------------------------|
| 1 | 2 | 1 | Road Bikes | 000310C0-BCC8-42C4-B0C3-45AE611AF06B | 2002-06-01 00:00:00.000 |