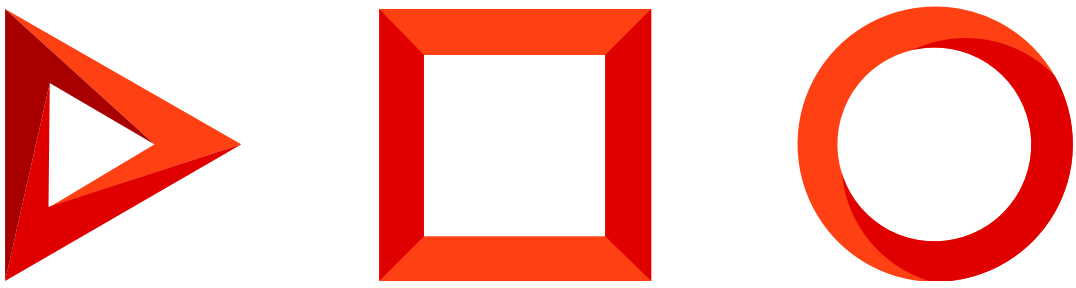
Creatio Academy

Инструменты для работы с базой данных

Версия 8.0



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Особенности работы в PostgreSQL

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Общие рекомендации

- Для создания триггеров, представлений и функций используйте конструкцию `DROP … IF EXISTS` (при необходимости допускается использование команды `CASCADE`), а затем `CREATE OR REPLACE`. Не используйте команду `CREATE OR REPLACE`.
- Используйте `"public"` вместо схемы `"dbo"`.
- Учитывайте регистрозависимость системных имен, используйте кавычки (`""`) для имен таблиц, колонок и т. д.
- Используйте тип `BOOL` вместо типа `BIT` в MS SQL. Для проверки значения поля типа `BOOL` необязательно использовать конструкцию `WHERE "boolColumn" = true`, допускается использование конструкций `WHERE "boolColumn"` или `WHERE NOT "boolColumn"`.
- Допускается использование сокращенного вида явного преобразования `::TEXT`.
- При сравнении строк в PostgreSQL учитывается регистр. Для выполнения регистронезависимого сравнения допускается использование ключевого слова `iLIKE`. Учитывайте, что сравнение выполняется медленнее, чем при использовании комбинации `UPPER+LIKE`. У комбинации `UPPER+LIKE` менее строгие правила применимости индексов, чем у `iLIKE`.
- Приведение типов допускается выполнять с помощью команды `CREATE CAST`, если отсутствует неявное приведение типов. Приведение типов описано в официальной документации PostgreSQL.
- Для хранения текущего уровня рекурсии создайте специальный параметр процедуры, поскольку в рекурсивных процедурах PostgreSQL отсутствует встроенная функция `NESTLEVEL`.
- В PostgreSQL используйте тип `NAME` вместо типа `SYSNAME` в MS SQL.
- Создавайте правила вместо пустых `INSTEAD`-триггеров. Например:

```
CREATE RULE RU_VwAdministrativeObjects AS
ON UPDATE TO "VwAdministrativeObjects"
DO INSTEAD NOTHING;
```

- Явно выполните преобразование типа `INT` к типу `BOOL`, поскольку при наличии соответствующего оператора `CAST` и выполнении команды `UPDATE` в PostgreSQL не работает неявное преобразование типа `INT` в тип `BOOL`.
- Используйте разрешенные способы форматирования строковых литералов. Строковые литералы подробно описаны в официальной документации PostgreSQL (quote_ident, quote_literal, format).
- Используйте конструкцию

```
DECLARE rowsCount BIGINT = 0;
```

```
GET DIAGNOSTICS rowsCount = row_count;
```

вместо `@@ROWCOUNT`.

- Используйте конструкцию

```
EXISTS (
 SELECT 1
 FROM "SysSSPEntitySchemaAccessList"
 WHERE "EntitySchemaUId" = BaseSchema."UId"
) "IsInSSPEntitySchemaAccessList"
```

вместо MS SQL-конструкции

```
(CASE
    WHEN EXISTS
        (SELECT 1
            FROM [SysSSPEntitySchemaAccessList]
            WHERE [SysSSPEntitySchemaAccessList].[EntitySchemaUId] = [BaseSchemas].[UId] ) TH
    ELSE 0
END) AS [IsInSSPEntitySchemaAccessList]
```

Поле, полученное в результате выполнения запроса, будет иметь тип `BOOL`.

Соответствие типов данных

Соответствие типов данных Creatio, MS SQL и PostgreSQL

Значение типа в дизайнере объектов Creatio	Тип данных	
	MS SQL	PostgreSQL
BLOB	`VARBINARY`	`BYTEA`
Boolean	`BIT`	`BOOLEAN`
Color	`NVARCHAR`	`CHARACTER VARYING`
CRC	`NVARCHAR`	`CHARACTER VARYING`
Currency	`DECIMAL`	`NUMERIC`
Date	`DATE`	`DATE`

Date/Time	`DATETIME2`	`TIMESTAMP WITHOUT TIME ZONE`
Decimal (0.00000001)	`DECIMAL`	`NUMERIC`
Decimal (0.0001)	`DECIMAL`	`NUMERIC`
Decimal (0.001)	`DECIMAL`	`NUMERIC`
Decimal (0.01)	`DECIMAL`	`NUMERIC`
Decimal (0.1)	`DECIMAL`	`NUMERIC`
Encrypted string	`NVARCHAR`	`CHARACTER VARYING`
File	`VARBINARY`	`BYTEA`
Image	`VARBINARY`	`BYTEA`
Image Link	`UNIQUEIDENTIFIER`	`UUID`
Integer	`INTEGER`	`INTEGER`
Lookup	`UNIQUEIDENTIFIER`	`UUID`
Text (250 characters)	`NVARCHAR(250)`	`CHARACTER VARYING`
Text (50 characters)	`NVARCHAR(50)`	`CHARACTER VARYING`
Text (500 characters)	`NVARCHAR(500)`	`CHARACTER VARYING`
Time	`TIME`	`TIME WITHOUT TIME ZONE`
Unique identifier	`UNIQUEIDENTIFIER`	`UUID`
Unlimited length text	`NVARCHAR(MAX)`	`TEXT`

Примеры скриптов для MS SQL и PostgreSQL

Средний

Пример 1 (представления)

Пример. Пример SQL-скрипта, который создает представление и триггеры для добавления, изменения и удаления записей из целевой таблицы.

MS SQL

```
-- Представление и триггеры, которые позволяют редактировать целевую таблицу
-- MSSQL
IF EXISTS (SELECT * FROM sys.views WHERE object_id = OBJECT_ID(N'[dbo].[VwSysAdminUnit]'))
DROP VIEW [dbo].[VwSysAdminUnit]
GO
CREATE VIEW [dbo].[VwSysAdminUnit]
AS
SELECT [SysAdminUnit].[Id]
    ,[SysAdminUnit].[CreatedOn]
    ,[SysAdminUnit].[CreatedById]
    ,[SysAdminUnit].[ModifiedOn]
    ,[SysAdminUnit].[ModifiedById]
    ,[SysAdminUnit].[Name]
    ,[SysAdminUnit].[Description]
    ,[SysAdminUnit].[ParentRoleId]
    ,[SysAdminUnit].[ContactId]
    ,[SysAdminUnit].[IsDirectoryEntry]
    ,[TimeZone].[Id] AS [TimeZoneId]
    ,[SysAdminUnit].[UserPassword]
    ,[SysAdminUnitType].[Id] AS [SysAdminUnitTypeId]
    ,[SysAdminUnit].[AccountId]
    ,[SysAdminUnit].[Active]
    ,[SysAdminUnit].[LoggedIn]
    ,[SysAdminUnit].[SynchronizeWithLDAP]
    ,[SysAdminUnit].[LDAPEntry]
    ,[SysAdminUnit].[LDAPEntryId]
    ,[SysAdminUnit].[LDAPEntryDN]
    ,[SysAdminUnit].[SysCultureId]
    ,[SysAdminUnit].[ProcessListeners]
    ,[SysAdminUnit].[PasswordExpireDate]
    ,[SysAdminUnit].[HomePageId]
    ,[SysAdminUnit].[ConnectionType]
    ,[ConnectionType].[Id] AS [UserConnectionTypeId]
    ,[SysAdminUnit].[ForceChangePassword]
    ,[SysAdminUnit].[DateTimeFormatId]
    ,[SysAdminUnit].[Id] as [SysAdminUnitId]
    ,[SysAdminUnit].[SessionTimeout] as [SessionTimeout]
FROM [SysAdminUnit]
INNER JOIN [SysAdminUnitType] ON [SysAdminUnitType].[Value] = [SysAdminUnit].[SysAdminUnitTypeVa
LEFT JOIN [ConnectionType] AS [ConnectionType] ON [ConnectionType].[Value] = [SysAdminUnit].[Cor
LEFT JOIN [TimeZone] AS [TimeZone] ON [TimeZone].[Code] = [SysAdminUnit].[TimeZoneId]
```

```
GO
CREATE TRIGGER [dbo].[ITR_VwSysAdminUnit_I]
ON [dbo].[VwSysAdminUnit]
    INSTEAD OF INSERT
AS
BEGIN
SET NOCOUNT ON;
INSERT INTO [SysAdminUnit](
    [Id]
    ,[CreatedOn]
    ,[CreatedById]
    ,[ModifiedOn]
    ,[ModifiedById]
    ,[Name]
    ,[Description]
    ,[ParentRoleId]
    ,[ContactId]
    ,[IsDirectoryEntry]
    ,[TimeZoneId]
    ,[UserPassword]
    ,[SysAdminUnitTypeValue]
    ,[AccountId]
    ,[Active]
    ,[LoggedIn]
    ,[SynchronizeWithLDAP]
    ,[LDAPEntry]
    ,[LDAPEntryId]
    ,[LDAPEntryDN]
    ,[SysCultureId]
    ,[ProcessListeners]
    ,[PasswordExpireDate]
    ,[HomePageId]
    ,[ConnectionType]
    ,[ForceChangePassword]
    ,[DateTimeFormatId]
    ,[SessionTimeout])
SELECT [Id]
    ,[CreatedOn]
    ,[CreatedById]
    ,[ModifiedOn]
    ,[ModifiedById]
    ,[Name]
    ,[Description]
    ,[ParentRoleId]
    ,[ContactId]
    ,[IsDirectoryEntry]
    ,(SELECT COALESCE(
        (SELECT [TimeZone].[Code] FROM [TimeZone]
            WHERE [TimeZone].[Id] = [INSERTED].[TimeZoneId]), ''))
```

```
    ,[UserPassword]
    ,ISNULL((SELECT [SysAdminUnitType].[Value] FROM [SysAdminUnitType]
        WHERE [SysAdminUnitType].[Id] = [INSERTED].[SysAdminUnitTypeId]), 4)
    ,[AccountId]
    ,[Active]
    ,ISNULL([LoggedIn], 0)
    ,[SynchronizeWithLDAP]
    ,[LDAPEntry]
    ,[LDAPEntryId]
    ,[LDAPEntryDN]
    ,[SysCultureId]
    ,[ProcessListeners]
    ,[PasswordExpireDate]
    ,[HomePageId]
    ,COALESCE([INSERTED].[ConnectionType],
        (SELECT [ConnectionType].[Value] FROM [ConnectionType]
        WHERE [ConnectionType].[Id] = [INSERTED].[UserConnectionTypeId]), 0)
    ,ISNULL([ForceChangePassword], 0)
    ,[DateTimeFormatId]
    ,[SessionTimeout]
FROM [INSERTED]
END
GO
CREATE TRIGGER [dbo].[ITR_VwSysAdminUnit_U]
ON [dbo].[VwSysAdminUnit]
    INSTEAD OF UPDATE
AS
BEGIN
SET NOCOUNT ON;
UPDATE [SysAdminUnit]
SET [SysAdminUnit].[CreatedOn] = [INSERTED].[CreatedOn]
    ,[SysAdminUnit].[CreatedById] = [INSERTED].[CreatedById]
    ,[SysAdminUnit].[ModifiedOn] =[INSERTED].[ModifiedOn]
    ,[SysAdminUnit].[ModifiedById] = [INSERTED].[ModifiedById]
    ,[SysAdminUnit].[Name] = [INSERTED].[Name]
    ,[SysAdminUnit].[Description] = [INSERTED].[Description]
    ,[SysAdminUnit].[ParentRoleId] = [INSERTED].[ParentRoleId]
    ,[SysAdminUnit].[ContactId] = [INSERTED].[ContactId]
    ,[SysAdminUnit].[IsDirectoryEntry] = [INSERTED].[IsDirectoryEntry]
    ,[SysAdminUnit].[TimeZoneId] =
        (SELECT COALESCE(
            (SELECT [TimeZone].[Code] FROM [TimeZone]
                WHERE [TimeZone].[Id] = [INSERTED].[TimeZoneId]), ''))
    ,[SysAdminUnit].[UserPassword] = [INSERTED].[UserPassword]
    ,[SysAdminUnit].[SysAdminUnitTypeValue] =
        (SELECT [SysAdminUnitType].[Value] FROM [SysAdminUnitType]
            WHERE [SysAdminUnitType].[Id] = [INSERTED].[SysAdminUnitTypeId])
    ,[SysAdminUnit].[AccountId] = [INSERTED].[AccountId]
```

```
    ,[SysAdminUnit].[Active] = [INSERTED].[Active]
    ,[SysAdminUnit].[LoggedIn] = [INSERTED].[LoggedIn]
    ,[SysAdminUnit].[SynchronizeWithLDAP] = [INSERTED].[SynchronizeWithLDAP]
    ,[SysAdminUnit].[LDAPEntry] = [INSERTED].[LDAPEntry]
    ,[SysAdminUnit].[LDAPEntryId] = [INSERTED].[LDAPEntryId]
    ,[SysAdminUnit].[LDAPEntryDN] = [INSERTED].[LDAPEntryDN]
    ,[SysAdminUnit].[SysCultureId] = [INSERTED].[SysCultureId]
    ,[SysAdminUnit].[ProcessListeners] = [INSERTED].[ProcessListeners]
    ,[SysAdminUnit].[PasswordExpireDate] = [INSERTED].[PasswordExpireDate]
    ,[SysAdminUnit].[HomePageId] = [INSERTED].[HomePageId]
    ,[SysAdminUnit].[ConnectionType] = COALESCE([INSERTED].[ConnectionType],
        (SELECT [ConnectionType].[Value] FROM [ConnectionType]
        WHERE [ConnectionType].[Id] = [INSERTED].[UserConnectionTypeId]), 0)
    ,[SysAdminUnit].[ForceChangePassword] = [INSERTED].[ForceChangePassword]
    ,[SysAdminUnit].[DateTimeFormatId] = [INSERTED].[DateTimeFormatId]
    ,[SysAdminUnit].[SessionTimeout] = [INSERTED].[SessionTimeout]
FROM [SysAdminUnit]
INNER JOIN [INSERTED] ON [SysAdminUnit].[Id] = [INSERTED].[Id]
END
GO
CREATE TRIGGER [dbo].[ITR_VwSysAdminUnit_D]
ON [dbo].[VwSysAdminUnit]
    INSTEAD OF DELETE
AS
BEGIN
SET NOCOUNT ON;
DELETE FROM [SysAdminUnit]
WHERE EXISTS(SELECT * FROM [DELETED] WHERE [SysAdminUnit].[Id] = [DELETED].[Id])
END
GO
```

Postgre SQL

```
-- Представление и триггеры, которые позволяют редактировать целевую таблицу
-- PostgreSql
DROP FUNCTION IF EXISTS "public"."ITR_VwSysLookup_IUD_Func" CASCADE;
DROP VIEW IF EXISTS "public"."VwSysLookup";

CREATE VIEW "public"."VwSysLookup" AS
SELECT "SysLookup"."Id"
    ,"SysLookup"."CreatedOn"
    ,"SysLookup"."CreatedById"
    ,"SysLookup"."ModifiedOn"
    ,"SysLookup"."ModifiedById"
    ,"SysLookup"."Name"
    ,"SysLookup"."Description"
    ,"SysLookup"."SysFolderId"
```

```
    ,"SysLookup"."SysEntitySchemaUId"
    ,"SysLookup"."SysGridPageSchemaUId"
    ,"SysLookup"."SysEditPageSchemaUId"
    ,"VwSysSchemaInfo"."SysWorkspaceId"
    ,"SysLookup"."ProcessListeners"
    ,"SysLookup"."IsSystem"
    ,"SysLookup"."IsSimple"
FROM "public"."SysLookup"
INNER JOIN "public"."VwSysSchemaInfo" ON "SysLookup"."SysEntitySchemaUId" = "VwSysSchemaInfo"."U

CREATE FUNCTION "public"."ITR_VwSysLookup_IUD_Func"() RETURNS TRIGGER AS $$
    BEGIN
        IF TG_OP = 'INSERT' THEN
            INSERT INTO "public"."SysLookup"(
                "Id"
                ,"CreatedOn"
                ,"CreatedById"
                ,"ModifiedOn"
                ,"ModifiedById"
                ,"Name"
                ,"Description"
                ,"SysFolderId"
                ,"SysEntitySchemaUId"
                ,"SysGridPageSchemaUId"
                ,"SysEditPageSchemaUId"
                ,"ProcessListeners"
                ,"IsSystem"
                ,"IsSimple")
            SELECT NEW."Id"
                ,NEW."CreatedOn"
                ,NEW."CreatedById"
                ,NEW."ModifiedOn"
                ,NEW."ModifiedById"
                ,NEW."Name"
                ,NEW."Description"
                ,NEW."SysFolderId"
                ,NEW."SysEntitySchemaUId"
                ,NEW."SysGridPageSchemaUId"
                ,NEW."SysEditPageSchemaUId"
                ,NEW."ProcessListeners"
                ,NEW."IsSystem"
                ,NEW."IsSimple";
            RETURN NEW;
        ELSIF TG_OP = 'UPDATE' THEN
            UPDATE "public"."SysLookup"
            SET "CreatedOn" = NEW."CreatedOn"
                ,"CreatedById" = NEW."CreatedById"
                ,"ModifiedOn" = NEW."ModifiedOn"
```

```
                ,"ModifiedById" = NEW."ModifiedById"
                ,"Name" = NEW."Name"
                ,"Description" = NEW."Description"
                ,"SysFolderId" = NEW."SysFolderId"
                ,"SysEntitySchemaUId" = NEW."SysEntitySchemaUId"
                ,"SysGridPageSchemaUId" = NEW."SysGridPageSchemaUId"
                ,"SysEditPageSchemaUId" = NEW."SysEditPageSchemaUId"
                ,"ProcessListeners" = NEW."ProcessListeners"
                ,"IsSystem" = NEW."IsSystem"
                ,"IsSimple" = NEW."IsSimple"
            WHERE "SysLookup"."Id" = NEW."Id";
            RETURN NEW;
        ELSIF TG_OP = 'DELETE' THEN
            DELETE FROM "public"."SysLookup" WHERE OLD."Id" = "SysLookup"."Id";
            RETURN OLD;
        END IF;
        RETURN NEW;
    END;
$$ LANGUAGE plpgsql;
CREATE TRIGGER "ITR_VwSysLookup_IUD"
    INSTEAD OF INSERT OR UPDATE OR DELETE ON "public"."VwSysLookup"
    FOR EACH ROW EXECUTE PROCEDURE "public"."ITR_VwSysLookup_IUD_Func"();
```

Пример 2 (представления)

Пример. Пример SQL-скрипта, который иллюстрирует использование правила вместо триггера в PostgreSQL.

MS SQL

```
-- Использование rule вместо instead of триггера
-- MSSQL
IF EXISTS (SELECT * FROM sys.views WHERE object_id = OBJECT_ID(N'[dbo].[VwAdministrativeObjects]
DROP VIEW [dbo].[VwAdministrativeObjects]
GO
CREATE VIEW [dbo].[VwAdministrativeObjects]
AS
WITH
[SysSchemaAdministrationProperties] AS (
SELECT [AdministrationPropertiesAll].[Id] AS [SysSchemaId],
    max([AdministrationPropertiesAll].[AdministratedByOperations]) AS [AdministratedByOperations
    max([AdministrationPropertiesAll].[AdministratedByColumns]) AS [AdministratedByColumns],
    max([AdministrationPropertiesAll].[AdministratedByRecords]) AS [AdministratedByRecords],
```

```
    max([AdministrationPropertiesAll].[IsTrackChangesInDB]) AS [IsTrackChangesInDB]
FROM (
    SELECT [SysSchema].[Id],
            (CASE WHEN EXISTS (
                SELECT 1
                FROM [SysSchemaProperty]
                WHERE (([SysSchemaProperty].[SysSchemaId] = [SysSchema].[Id] AND [SysSchema].[Ex
                    OR [SysSchemaProperty].[SysSchemaId] = [DerivedSysSchema].[Id])
                    AND [SysSchemaProperty].[Name] = 'AdministratedByOperations'
                    AND [SysSchemaProperty].[Value] = 'True'
                    AND [SysSchemaProperty].[SysSchemaId] IS NOT NULL
                )
            THEN 1 ELSE 0 END) AS [AdministratedByOperations],
            (CASE WHEN EXISTS (
                SELECT 1
                FROM [SysSchemaProperty]
                WHERE (([SysSchemaProperty].[SysSchemaId] = [SysSchema].[Id] AND [SysSchema].[Ex
                    OR [SysSchemaProperty].[SysSchemaId] = [DerivedSysSchema].[Id])
                    AND [SysSchemaProperty].[Name] = 'AdministratedByColumns'
                    AND [SysSchemaProperty].[Value] = 'True'
                    AND [SysSchemaProperty].[SysSchemaId] IS NOT NULL
                )
            THEN 1 ELSE 0 END) AS [AdministratedByColumns],
            (CASE WHEN EXISTS (
                SELECT 1
                FROM [SysSchemaProperty]
                WHERE (([SysSchemaProperty].[SysSchemaId] = [SysSchema].[Id] AND [SysSchema].[Ex
                    OR [SysSchemaProperty].[SysSchemaId] = [DerivedSysSchema].[Id])
                    AND [SysSchemaProperty].[Name] = 'AdministratedByRecords'
                    AND [SysSchemaProperty].[Value] = 'True'
                    AND [SysSchemaProperty].[SysSchemaId] IS NOT NULL
                )
            THEN 1 ELSE 0 END) AS [AdministratedByRecords],
            (CASE WHEN EXISTS (
                SELECT 1
                FROM [SysSchemaProperty]
                WHERE (([SysSchemaProperty].[SysSchemaId] = [SysSchema].[Id] AND [SysSchema].[Ex
                    OR [SysSchemaProperty].[SysSchemaId] = [DerivedSysSchema].[Id])
                    AND [SysSchemaProperty].[Name] = 'IsTrackChangesInDB'
                    AND [SysSchemaProperty].[Value] = 'True'
                    AND [SysSchemaProperty].[SysSchemaId] IS NOT NULL
                )
            THEN 1 ELSE 0 END) AS [IsTrackChangesInDB]
    FROM [SysSchema]
    LEFT OUTER JOIN [SysSchema] AS [DerivedSysSchema] ON ([SysSchema].[Id] = [DerivedSysSchema].
    WHERE [SysSchema].[ManagerName] = 'EntitySchemaManager'
        AND [SysSchema].[ExtendParent] = 0
) AS [AdministrationPropertiesAll]
GROUP BY [AdministrationPropertiesAll].[Id]
```

```
)
SELECT [BaseSchemas].[UId] AS [Id],
    [BaseSchemas].[UId],
    [BaseSchemas].[CreatedOn],
    [BaseSchemas].[CreatedById],
    [BaseSchemas].[ModifiedOn],
    [BaseSchemas].[ModifiedById],
    [BaseSchemas].[Name],
    [VwSysSchemaExtending].[TopExtendingCaption] as Caption,
    [BaseSchemas].[Description],
    (CASE WHEN EXISTS (
        SELECT 1
        FROM [SysLookup]
        WHERE [SysLookup].[SysEntitySchemaUId] = [BaseSchemas].[UId])
        THEN 1 ELSE 0 END) AS [IsLookup],
    (CASE WHEN EXISTS (
        SELECT 1 FROM [SysModule]
        INNER JOIN [SysModuleEntity] ON [SysModuleEntity].[Id] = [SysModule].[SysModuleEntityId]
        WHERE [BaseSchemas].[UId] = [SysModuleEntity].[SysEntitySchemaUId])
        THEN 1 ELSE 0 END) AS [IsModule],
    [SysSchemaAdministrationProperties].[AdministratedByOperations],
    [SysSchemaAdministrationProperties].[AdministratedByColumns],
    [SysSchemaAdministrationProperties].[AdministratedByRecords],
    [SysSchemaAdministrationProperties].[IsTrackChangesInDB],
    [SysWorkspaceId],
    [BaseSchemas].[ProcessListeners],
    (CASE WHEN EXISTS (
        SELECT 1
        FROM [SysSSPEntitySchemaAccessList]
        WHERE [SysSSPEntitySchemaAccessList].[EntitySchemaUId] = [BaseSchemas].[UId]
        )
        THEN 1 ELSE 0 END) AS [IsInSSPEntitySchemaAccessList]
FROM  [SysSchema] as [BaseSchemas]
INNER JOIN [VwSysSchemaExtending] ON BaseSchemas.[Id] = [VwSysSchemaExtending].[BaseSchemaId]
INNER JOIN [SysPackage] on [BaseSchemas].[SysPackageId] = [SysPackage].[Id]
INNER JOIN [SysSchemaAdministrationProperties] ON [BaseSchemas].[Id] = [SysSchemaAdministrationP
GO
CREATE TRIGGER [dbo].[TRVwAdministrativeObjects_IU]
ON [dbo].[VwAdministrativeObjects]
    INSTEAD OF UPDATE
AS
BEGIN
    SET NOCOUNT ON;
    RETURN
END
GO
```

Postgre SQL

```
-- Использование rule вместо instead of триггера
-- PostgreSql
DROP VIEW IF EXISTS public."VwAdministrativeObjects";
DROP RULE IF EXISTS RU_VwAdministrativeObjects ON "VwAdministrativeObjects";

CREATE VIEW public."VwAdministrativeObjects" AS
WITH SysSchemaAdministrationProperties AS (
    SELECT AdministrationPropertiesAll.Id "SysSchemaId",
        MAX(AdministrationPropertiesAll.AdministratedByOperations) "AdministratedByOperations",
        MAX(AdministrationPropertiesAll.AdministratedByColumns) "AdministratedByColumns",
        MAX(AdministrationPropertiesAll.AdministratedByRecords) "AdministratedByRecords",
        MAX(AdministrationPropertiesAll.IsTrackChangesInDB) "IsTrackChangesInDB"
    FROM (
        SELECT ss."Id" Id
            ,(CASE WHEN EXISTS (
                SELECT 1
                FROM "SysSchemaProperty" ssp
                WHERE ((ssp."SysSchemaId" = ss."Id" AND NOT ss."ExtendParent") OR ssp."SysSchema
                    AND ssp."Name" = 'AdministratedByOperations'
                    AND ssp."Value" = 'True'
                    AND ssp."SysSchemaId" IS NOT NULL
            ) THEN 1 ELSE 0 END) AdministratedByOperations
            ,(CASE WHEN EXISTS (
                SELECT 1
                FROM "SysSchemaProperty" ssp
                WHERE ((ssp."SysSchemaId" = ss."Id" AND NOT ss."ExtendParent") OR ssp."SysSchema
                    AND ssp."Name" = 'AdministratedByColumns'
                    AND ssp."Value" = 'True'
                    AND ssp."SysSchemaId" IS NOT NULL
            ) THEN 1 ELSE 0 END) AdministratedByColumns
            ,(CASE WHEN EXISTS (
                SELECT 1
                FROM "SysSchemaProperty" ssp
                WHERE ((ssp."SysSchemaId" = ss."Id" AND NOT ss."ExtendParent") OR ssp."SysSchema
                    AND ssp."Name" = 'AdministratedByRecords'
                    AND ssp."Value" = 'True'
                    AND ssp."SysSchemaId" IS NOT NULL
            ) THEN 1 ELSE 0 END) AdministratedByRecords
            ,(CASE WHEN EXISTS (
                SELECT 1
                FROM "SysSchemaProperty" ssp WHERE ((ssp."SysSchemaId" = ss."Id" AND NOT ss."Ext
                    OR ssp."SysSchemaId" = DerivedSysSchema."Id")
                    AND ssp."Name" = 'IsTrackChangesInDB'
                    AND ssp."Value" = 'True'
                    AND ssp."SysSchemaId" IS NOT NULL
            ) THEN 1 ELSE 0 END) IsTrackChangesInDB
```

```
        FROM "SysSchema" ss
        LEFT OUTER JOIN "SysSchema" DerivedSysSchema ON (ss."Id" = DerivedSysSchema."ParentId" A
        WHERE ss."ManagerName" = 'EntitySchemaManager' AND NOT ss."ExtendParent"
    ) AdministrationPropertiesAll
    GROUP BY AdministrationPropertiesAll.Id
)
SELECT BaseSchema."UId" "Id"
    ,BaseSchema."UId"
    ,BaseSchema."CreatedOn"
    ,BaseSchema."CreatedById"
    ,BaseSchema."ModifiedOn"
    ,BaseSchema."ModifiedById"
    ,BaseSchema."Name"
    ,public."VwSysSchemaExtending"."TopExtendingCaption" "Caption"
    ,BaseSchema."Description"
    ,EXISTS (
        SELECT 1
        FROM "SysLookup"
        WHERE "SysEntitySchemaUId" = BaseSchema."UId"
    ) "IsLookup"
    ,EXISTS (
        SELECT 1
        FROM "SysModule" sm
        INNER JOIN "SysModuleEntity" sme ON sme."Id" = sm."SysModuleEntityId"
        WHERE BaseSchema."UId" = sme."SysEntitySchemaUId"
    ) "IsModule"
    ,SysSchemaAdministrationProperties."AdministratedByOperations"::BOOLEAN
    ,SysSchemaAdministrationProperties."AdministratedByColumns"::BOOLEAN
    ,SysSchemaAdministrationProperties."AdministratedByRecords"::BOOLEAN
    ,SysSchemaAdministrationProperties."IsTrackChangesInDB"::BOOLEAN
    ,"SysWorkspaceId"
    ,BaseSchema."ProcessListeners"
    ,EXISTS (
        SELECT 1
        FROM "SysSSPEntitySchemaAccessList"
        WHERE "EntitySchemaUId" = BaseSchema."UId"
    ) "IsInSSPEntitySchemaAccessList"
FROM "SysSchema" BaseSchema
INNER JOIN "VwSysSchemaExtending" ON BaseSchema."Id" = "VwSysSchemaExtending"."BaseSchemaId"
INNER JOIN "SysPackage" on BaseSchema."SysPackageId" = "SysPackage"."Id"
INNER JOIN SysSchemaAdministrationProperties ON BaseSchema."Id" = SysSchemaAdministrationPropert

CREATE RULE RU_VwAdministrativeObjects AS
    ON UPDATE TO "VwAdministrativeObjects"
    DO INSTEAD NOTHING;
```

Пример 3 (хранимые процедуры)

Пример. Пример SQL-скрипта, который создает хранимую процедуру, использующую циклы, курсоры и временные таблицы.

MS SQL

```
-- Хранимая процедура, в которой используются циклы, курсоры, временные таблицы
-- MSSQL
IF NOT OBJECT_ID('[dbo].[tsp_ActualizeUserRoles]') IS NULL
BEGIN
    DROP PROCEDURE [dbo].[tsp_ActualizeUserRoles]
END
GO

CREATE PROCEDURE dbo.tsp_ActualizeUserRoles (@UserId uniqueidentifier)
AS
BEGIN
    SET NOCOUNT ON

    IF OBJECT_ID('tempdb..#AdminUnitListTemp') IS NOT NULL
    BEGIN
        DROP TABLE [#AdminUnitListTemp];
    END;
    CREATE TABLE [#AdminUnitListTemp] (
        [UserId] uniqueidentifier NOT NULL,
        [Id] uniqueidentifier NOT NULL,
        [Name] NVARCHAR(250) NOT NULL,
        [ParentRoleId] uniqueidentifier NULL,
        [Granted] BIT NULL
    );

    DECLARE @GetAdminUnitList TABLE (
        [Id] uniqueidentifier NOT NULL,
        [Name] nvarchar(260) NOT NULL,
        [ParentRoleId] uniqueidentifier NULL
    );
    DECLARE @NewRoles TABLE ([Id] uniqueidentifier NOT NULL);
    DECLARE @OldUserRoles TABLE ([Id] uniqueidentifier NOT NULL);

    DECLARE @getUserAdminUnits CURSOR;
    DECLARE @SysAdminUnitRoles TABLE (
        [Id] uniqueidentifier,
        [Name] nvarchar(260),
        [ParentRoleId] uniqueidentifier
    );
```

```
DECLARE @ManagersBeforeActualization TABLE ([Id] uniqueidentifier NOT NULL);
DECLARE @ManagersAfterActualization TABLE ([Id] uniqueidentifier NOT NULL);
DECLARE @StillManagers TABLE ([Id] uniqueidentifier NOT NULL);
DECLARE @NoLongerManagers TABLE ([Id] uniqueidentifier NOT NULL);
DECLARE @NewManagers TABLE ([Id] uniqueidentifier NOT NULL);
DECLARE @SysAdminUnitId uniqueidentifier;

-- Old user roles
INSERT INTO @OldUserRoles
    SELECT DISTINCT [SysAdminUnitInRole].[SysAdminUnitRoleId] [Id]
    FROM [SysAdminUnitInRole]
    WHERE [SysAdminUnitInRole].[SysAdminUnitId] = @UserId

-- Old user managers
INSERT INTO @ManagersBeforeActualization
    SELECT DISTINCT [SysUserInRole].[SysUserId] [Id]
    FROM [SysAdminUnitInRole]
    INNER JOIN [SysAdminUnit] [Roles]
        ON [SysAdminUnitInRole].[SysAdminUnitRoleId] = [Roles].[Id]
    INNER JOIN @OldUserRoles
        ON [Roles].[ParentRoleId] = [@OldUserRoles].[Id]
    INNER JOIN [SysUserInRole]
        ON [SysUserInRole].[SysRoleId] = [Roles].[Id]
    WHERE [Roles].[SysAdminUnitTypeValue] = 2

-- Get and insert new user roles
INSERT INTO @GetAdminUnitList EXEC [tsp_GetAdminUnitList] @UserId=@UserId;
INSERT INTO @NewRoles SELECT [Id] FROM @GetAdminUnitList;
DELETE FROM [SysAdminUnitInRole] WHERE [SysAdminUnitId] = @UserId;
INSERT INTO [SysAdminUnitInRole] ([SysAdminUnitId], [SysAdminUnitRoleId])
    SELECT DISTINCT @UserId, [Id] FROM @NewRoles;

-- User managers after actualization
INSERT INTO @ManagersAfterActualization
    SELECT DISTINCT
        [SysUserInRole].[SysUserId] [Id]
    FROM [SysAdminUnitInRole]
    INNER JOIN [SysAdminUnit] [Roles]
        ON [SysAdminUnitInRole].[SysAdminUnitRoleId] = [Roles].[Id]
    INNER JOIN @NewRoles NewRoles
        ON [Roles].[ParentRoleId] = NewRoles.[Id]
    INNER JOIN [SysUserInRole]
        ON [SysUserInRole].[SysRoleId] = [Roles].[Id]
    WHERE [Roles].[SysAdminUnitTypeValue] = 2;

-- New (who were not but become) user managers
INSERT INTO @NewManagers
    SELECT [Id] FROM @ManagersAfterActualization AS managersAfterActualization
        WHERE NOT EXISTS (
```

```
            SELECT NULL
            FROM @ManagersBeforeActualization AS managersBeforeActualization
            WHERE managersBeforeActualization.[Id] = managersAfterActualization.[Id]
        );

-- Add all user roles to new managers and their grantee-users, if they arent already have
SET @getUserAdminUnits = CURSOR FOR
    SELECT DISTINCT [Id] FROM (
        SELECT [Id] FROM @NewManagers
        UNION
        SELECT [GranteeSysAdminUnitId]
        FROM [SysAdminUnitGrantedRight]
        WHERE EXISTS (
            SELECT NULL FROM @NewManagers as newManagers
            WHERE [SysAdminUnitGrantedRight].[GrantorSysAdminUnitId] = newManagers.[Id]
        )
    ) Roles;

OPEN @getUserAdminUnits;
FETCH NEXT
FROM @getUserAdminUnits INTO @SysAdminUnitId;
WHILE @@FETCH_STATUS = 0
BEGIN
    INSERT INTO [SysAdminUnitInRole] ([SysAdminUnitId], [SysAdminUnitRoleId])
        SELECT DISTINCT @SysAdminUnitId, [Id]
        FROM @NewRoles AS newRoles
        WHERE NOT EXISTS (
            SELECT 1
            FROM [SysAdminUnitInRole]
            WHERE [SysAdminUnitInRole].[SysAdminUnitId] = @SysAdminUnitId
            AND [SysAdminUnitInRole].[SysAdminUnitRoleId] = newRoles.[Id]
        );
    FETCH NEXT FROM @getUserAdminUnits INTO @SysAdminUnitId;
END;
CLOSE @getUserAdminUnits;
DEALLOCATE @getUserAdminUnits;

DECLARE @isUserLostAtLeastOneRole INT = (
    SELECT COUNT(*)
    FROM @OldUserRoles AS oldUserRoles
    WHERE NOT EXISTS (
        SELECT 1
        FROM @NewRoles AS newUserRoles
        WHERE newUserRoles.[Id] = oldUserRoles.[Id]
    )
);

-- Still (who were and remained) user managers
```

```
    INSERT INTO @StillManagers
        SELECT  DISTINCT managersAfterActualization.[Id] AS [Id]
        FROM @ManagersAfterActualization AS managersAfterActualization
            JOIN @ManagersBeforeActualization AS managersBeforeActualization
                ON managersAfterActualization.[Id] = managersBeforeActualization.[Id];

    -- If user lost at least one role, we need to actualize all his still-managers.
    -- If not (user only gained new roles) - we just add to still-managers and their grantee-use
    IF (@isUserLostAtLeastOneRole = 0)
    BEGIN
        -- Add all new user roles to his still-managers and to their grantee-users
        SET @getUserAdminUnits = CURSOR FOR
            SELECT DISTINCT [Id] FROM (
                SELECT stillManagers.[Id] AS [Id]
                FROM @StillManagers AS stillManagers
                UNION
                SELECT [GranteeSysAdminUnitId]
                FROM [SysAdminUnitGrantedRight]
                WHERE EXISTS (
                    SELECT NULL
                    FROM @StillManagers AS stillManagers
                    WHERE stillManagers.[Id] = [GrantorSysAdminUnitId]
                )
            ) Roles;

        OPEN @getUserAdminUnits;
        FETCH NEXT
        FROM @getUserAdminUnits INTO @SysAdminUnitId;
        WHILE @@FETCH_STATUS = 0
        BEGIN
            INSERT INTO [SysAdminUnitInRole] ([SysAdminUnitId], [SysAdminUnitRoleId])
                SELECT DISTINCT @SysAdminUnitId, [Id]
                FROM @NewRoles AS newRoles
                WHERE NOT EXISTS (
                    SELECT 1
                    FROM [SysAdminUnitInRole]
                    WHERE [SysAdminUnitInRole].[SysAdminUnitId] = @SysAdminUnitId
                        AND [SysAdminUnitInRole].[SysAdminUnitRoleId] = newRoles.[Id]
                );
            FETCH NEXT FROM @getUserAdminUnits INTO @SysAdminUnitId;
        END;
        CLOSE @getUserAdminUnits;
        DEALLOCATE @getUserAdminUnits;
    END ELSE
    BEGIN
        --Actualize all roles for still-managers
        SET @getUserAdminUnits = CURSOR FOR
            SELECT DISTINCT [Id]
            FROM @StillManagers
```

```
            UNION
                SELECT [GranteeSysAdminUnitId]
                FROM [SysAdminUnitGrantedRight]
                WHERE EXISTS (
                SELECT NULL
                FROM @StillManagers AS stillManagers
                WHERE stillManagers.[Id] = [GrantorSysAdminUnitId]
                );

        OPEN @getUserAdminUnits;
        FETCH NEXT
        FROM @getUserAdminUnits INTO @SysAdminUnitId;
        WHILE @@FETCH_STATUS = 0
        BEGIN
            DELETE FROM @SysAdminUnitRoles;
            INSERT INTO @SysAdminUnitRoles
                EXEC [tsp_GetAdminUnitList] @UserId=@SysAdminUnitId;
            BEGIN TRAN;
                DELETE FROM [dbo].[SysAdminUnitInRole] WHERE SysAdminUnitId = @SysAdminUnitId;
                INSERT INTO [dbo].[SysAdminUnitInRole] (SysAdminUnitId, SysAdminUnitRoleId)
                    SELECT @SysAdminUnitId, [Id] FROM @SysAdminUnitRoles;
            COMMIT;
            FETCH NEXT
                FROM @getUserAdminUnits INTO @SysAdminUnitId;
        END;
        CLOSE @getUserAdminUnits;
        DEALLOCATE @getUserAdminUnits;
    END;

    -- No longer (who were but not remained) user managers
    INSERT INTO @NoLongerManagers
        SELECT [Id] FROM @ManagersBeforeActualization as managersBeforeActualization
            WHERE NOT EXISTS (
                SELECT NULL
                FROM @ManagersAfterActualization AS managersAfterActualization
                WHERE managersAfterActualization.[Id] = managersBeforeActualization.[Id]
            );

    --Actualize roles for all noLonger-managers, his grantee-users and all grantee-users of user
    SET @getUserAdminUnits = CURSOR FOR
        SELECT DISTINCT [Id] FROM (
            SELECT [Id] FROM @NoLongerManagers
            UNION
            SELECT [GranteeSysAdminUnitId]
            FROM [SysAdminUnitGrantedRight]
            WHERE EXISTS (
                SELECT NULL
                FROM @NoLongerManagers AS noLongerManagers
```

```
                WHERE noLongerManagers.[Id] = [GrantorSysAdminUnitId]
            )
            UNION ALL
            SELECT GranteeSysAdminUnitId
            FROM SysAdminUnitGrantedRight
            WHERE GrantorSysAdminUnitId = @UserId
        ) Roles;

    OPEN @getUserAdminUnits;
    FETCH NEXT
        FROM @getUserAdminUnits INTO @SysAdminUnitId;
    WHILE @@FETCH_STATUS = 0
    BEGIN
        DELETE FROM @SysAdminUnitRoles;
        INSERT INTO @SysAdminUnitRoles
            EXEC [tsp_GetAdminUnitList] @UserId=@SysAdminUnitId;
        BEGIN TRAN;
            DELETE FROM [dbo].[SysAdminUnitInRole] WHERE SysAdminUnitId = @SysAdminUnitId;
            INSERT INTO [dbo].[SysAdminUnitInRole] (SysAdminUnitId, SysAdminUnitRoleId)
                SELECT @SysAdminUnitId, [Id] FROM @SysAdminUnitRoles;
        COMMIT;
        FETCH NEXT
            FROM @getUserAdminUnits INTO @SysAdminUnitId;
    END;
    CLOSE @getUserAdminUnits;
    DEALLOCATE @getUserAdminUnits;

    IF OBJECT_ID('tempdb..#AdminUnitListTemp') IS NOT NULL
    BEGIN
        DROP TABLE [#AdminUnitListTemp];
    END;
END;
GO
```

Postgre SQL

```
-- Хранимая процедура, в которой используются циклы, курсоры, временные таблицы
-- PostgreSql
DROP FUNCTION IF EXISTS "tsp_ActualizeUserRoles";
CREATE FUNCTION "tsp_ActualizeUserRoles"(
    UserId UUID
)
RETURNS VOID
AS $$
DECLARE
    getUserNewManagers CURSOR FOR
        SELECT DISTINCT "Id" FROM (
```

```
            SELECT "Id" FROM "NewManagers"
            UNION
            SELECT "GranteeSysAdminUnitId"
            FROM "SysAdminUnitGrantedRight"
            WHERE EXISTS (
                SELECT NULL FROM "NewManagers" as "newManagers"
                WHERE "SysAdminUnitGrantedRight"."GrantorSysAdminUnitId" = "newManagers"."Id"
            )
        ) "Roles";
    lostUserRolesCount INT;
    getUserStillManagers CURSOR FOR
        SELECT DISTINCT "stillManagers"."Id" AS "Id"
        FROM "StillManagers" AS "stillManagers"
        UNION
        SELECT "GranteeSysAdminUnitId"
        FROM "SysAdminUnitGrantedRight"
        WHERE EXISTS (
            SELECT NULL
            FROM "StillManagers" AS "stillManagers"
            WHERE "stillManagers"."Id" = "GrantorSysAdminUnitId"
        );
    getUserNoLongerManagers CURSOR FOR
        SELECT DISTINCT "Id" FROM (
            SELECT "Id"
            FROM "NoLongerManagers"
            UNION
            SELECT "GranteeSysAdminUnitId"
            FROM "SysAdminUnitGrantedRight"
            WHERE EXISTS (
                SELECT NULL
                FROM "NoLongerManagers" AS "noLongerManagers"
                WHERE "noLongerManagers"."Id" = "GrantorSysAdminUnitId"
            )
            UNION ALL
            SELECT "GranteeSysAdminUnitId"
            FROM "SysAdminUnitGrantedRight"
            WHERE "GrantorSysAdminUnitId" = UserId
        ) "Roles";
BEGIN
    DROP TABLE IF EXISTS "GetAdminUnitListTmp";
    CREATE TEMP TABLE "GetAdminUnitListTmp" (
        "Id" UUID,
        "Name" VARCHAR(250),
        "ParentRoleId" UUID
    );

    DROP TABLE IF EXISTS "SysAdminUnitRoles";
    CREATE TEMP TABLE "SysAdminUnitRoles" (
```

```
    "Id" UUID,
    "Name" VARCHAR(250),
    "ParentRoleId" UUID
);

-- Old user roles
DROP TABLE IF EXISTS "OldUserRoles";
CREATE TEMP TABLE "OldUserRoles" (
    "Id" UUID
);
INSERT INTO "OldUserRoles"
    SELECT DISTINCT "SysAdminUnitInRole"."SysAdminUnitRoleId" "Id"
    FROM "SysAdminUnitInRole"
    WHERE "SysAdminUnitInRole"."SysAdminUnitId" = UserId;

-- Old user managers
DROP TABLE IF EXISTS "ManagersBeforeActualization";
CREATE TEMP TABLE "ManagersBeforeActualization" (
    "Id" UUID
);
INSERT INTO "ManagersBeforeActualization"
    SELECT DISTINCT "SysUserInRole"."SysUserId" "Id"
    FROM "SysAdminUnitInRole"
    INNER JOIN "SysAdminUnit" "Roles"
        ON "SysAdminUnitInRole"."SysAdminUnitRoleId" = "Roles"."Id"
    INNER JOIN "OldUserRoles"
        ON "Roles"."ParentRoleId" = "OldUserRoles"."Id"
    INNER JOIN "SysUserInRole"
        ON "SysUserInRole"."SysRoleId" = "Roles"."Id"
    WHERE "Roles"."SysAdminUnitTypeValue" = 2;

-- Get and insert new user roles
DROP TABLE IF EXISTS "GetAdminUnitList";
CREATE TEMP TABLE "GetAdminUnitList" (
    "Id" UUID,
    "Name" VARCHAR(250),
    "ParentRoleId" UUID
);
DROP TABLE IF EXISTS "NewRoles";
CREATE TEMP TABLE "NewRoles" (
    "Id" UUID
);
INSERT INTO "GetAdminUnitList" SELECT * FROM "tsp_GetAdminUnitList"(UserId);
INSERT INTO "NewRoles" SELECT "Id" FROM "GetAdminUnitList";
DELETE FROM "SysAdminUnitInRole" WHERE "SysAdminUnitId" = UserId;
INSERT INTO "SysAdminUnitInRole" ("SysAdminUnitId", "SysAdminUnitRoleId")
    SELECT DISTINCT UserId, "Id" FROM "NewRoles";

-- User managers after actualization
```

```
DROP TABLE IF EXISTS "ManagersAfterActualization";
CREATE TEMP TABLE "ManagersAfterActualization" (
    "Id" UUID
);
INSERT INTO "ManagersAfterActualization"
    SELECT DISTINCT
        "SysUserInRole"."SysUserId" "Id"
    FROM "SysAdminUnitInRole"
    INNER JOIN "SysAdminUnit" "Roles"
        ON "SysAdminUnitInRole"."SysAdminUnitRoleId" = "Roles"."Id"
    INNER JOIN "NewRoles" "NewRoles"
        ON "Roles"."ParentRoleId" = "NewRoles"."Id"
    INNER JOIN "SysUserInRole"
        ON "SysUserInRole"."SysRoleId" = "Roles"."Id"
    WHERE "Roles"."SysAdminUnitTypeValue" = 2;

-- New (who were not but become) user managers
DROP TABLE IF EXISTS "NewManagers";
CREATE TEMP TABLE "NewManagers" (
    "Id" UUID
);
INSERT INTO "NewManagers"
    SELECT "Id" FROM "ManagersAfterActualization" AS "managersAfterActualization"
        WHERE NOT EXISTS (
            SELECT NULL
            FROM "ManagersBeforeActualization" AS "managersBeforeActualization"
            WHERE "managersBeforeActualization"."Id" = "managersAfterActualization"."Id"
        );

-- Add all user roles to new managers and their grantee-users, if they arent already have
FOR UserNewManager IN getUserNewManagers LOOP
    EXIT WHEN UserNewManager = NULL;
    INSERT INTO "SysAdminUnitInRole" ("SysAdminUnitId", "SysAdminUnitRoleId")
        SELECT DISTINCT UserNewManager."Id", "Id"
        FROM "NewRoles" AS "newRoles"
        WHERE NOT EXISTS (
            SELECT 1
            FROM "SysAdminUnitInRole"
            WHERE "SysAdminUnitInRole"."SysAdminUnitId" = UserNewManager."Id"
            AND "SysAdminUnitInRole"."SysAdminUnitRoleId" = "newRoles"."Id"
        );
END LOOP;

SELECT COUNT(*) INTO lostUserRolesCount
FROM "OldUserRoles" AS "oldUserRoles"
WHERE NOT EXISTS (
    SELECT 1
    FROM "NewRoles" AS "newUserRoles"
```

```
        WHERE "newUserRoles"."Id" = "oldUserRoles"."Id"
    );

    -- Still (who were and remained) user managers
    DROP TABLE IF EXISTS "StillManagers";
    CREATE TEMP TABLE "StillManagers" (
        "Id" UUID
    );
    INSERT INTO "StillManagers"
        SELECT DISTINCT "managersAfterActualization"."Id" AS "Id"
        FROM "ManagersAfterActualization" AS "managersAfterActualization"
            JOIN "ManagersBeforeActualization" AS "managersBeforeActualization"
                ON "managersAfterActualization"."Id" = "managersBeforeActualization"."Id";

    -- If user lost at least one role, we need to actualize all his still-managers.
    -- If not (user only gained new roles) - we just add to still-managers and their grantee-use
    IF lostUserRolesCount = 0 THEN

        -- Add all new user roles to his still-managers and to their grantee-users
        FOR UserStillManager IN getUserStillManagers LOOP
            EXIT WHEN UserStillManager = NULL;
            INSERT INTO "SysAdminUnitInRole" ("SysAdminUnitId", "SysAdminUnitRoleId")
                SELECT DISTINCT UserStillManager."Id", "Id"
                FROM "NewRoles" AS "newRoles"
                WHERE NOT EXISTS (
                    SELECT 1
                    FROM "SysAdminUnitInRole"
                    WHERE "SysAdminUnitInRole"."SysAdminUnitId" = UserStillManager."Id"
                        AND "SysAdminUnitInRole"."SysAdminUnitRoleId" = "newRoles"."Id"
                );
        END LOOP;
    ELSE

        --Actualize all roles for still-managers
        FOR UserStillManager IN getUserStillManagers LOOP
            EXIT WHEN UserStillManager = NULL;
            DELETE FROM "SysAdminUnitRoles";
            INSERT INTO "SysAdminUnitRoles"
                SELECT * FROM "tsp_GetAdminUnitList"(UserStillManager."Id");
                DELETE FROM "SysAdminUnitInRole" WHERE "SysAdminUnitId" = UserStillManager."Id";
                INSERT INTO "SysAdminUnitInRole" ("SysAdminUnitId", "SysAdminUnitRoleId")
                    SELECT UserStillManager."Id", "Id" FROM "SysAdminUnitRoles";
        END LOOP;
    END IF;

    -- No longer (who were but not remained) user managers
    DROP TABLE IF EXISTS "NoLongerManagers";
    CREATE TEMP TABLE "NoLongerManagers" (
        "Id" UUID
```

```
    );
    INSERT INTO "NoLongerManagers"
        SELECT "Id" FROM "ManagersBeforeActualization" AS "managersBeforeActualization"
            WHERE NOT EXISTS (
                SELECT NULL
                FROM "ManagersAfterActualization" AS "managersAfterActualization"
                WHERE "managersAfterActualization"."Id" = "managersBeforeActualization"."Id"
            );


    -- Actualize roles for all noLonger-managers, his grantee-users and all grantee-users of use
    FOR UserNoLongerManager IN getUserNoLongerManagers LOOP
        EXIT WHEN UserNoLongerManager = NULL;
        DELETE FROM "SysAdminUnitRoles";
        INSERT INTO "SysAdminUnitRoles"
            SELECT * FROM "tsp_GetAdminUnitList"(UserNoLongerManager."Id");
            DELETE FROM "SysAdminUnitInRole"
                WHERE "SysAdminUnitId" = UserNoLongerManager."Id";
            INSERT INTO "SysAdminUnitInRole" ("SysAdminUnitId", "SysAdminUnitRoleId")
                SELECT UserNoLongerManager."Id", "Id" FROM "SysAdminUnitRoles";
    END LOOP;

    DROP TABLE IF EXISTS "GetAdminUnitListTmp";
END;
$$ LANGUAGE plpgsql;
```

Пример 4 (хранимые процедуры)

Пример. Пример рекурсивной хранимой процедуры, которая возвращает таблицу и в которой используется `PERFORM`.

MS SQL

```
-- Рекурсивная хранимая процедура, которая возвращает таблицу и в которой используется PERFORM:
-- MSSQL
IF NOT OBJECT_ID('[dbo].[tsp_GetAdminUnitList]') IS NULL
BEGIN
    DROP PROCEDURE [dbo].[tsp_GetAdminUnitList];
END;
GO

CREATE PROCEDURE dbo.tsp_GetAdminUnitList (
    @UserId uniqueidentifier, @Granted BIT = 0
```

```
)
AS
BEGIN
    SET NOCOUNT ON;

    DECLARE @StartNestedLevel INT;

    IF object_id('tempdb..#AdminUnitList') IS NULL
    BEGIN
        CREATE TABLE [#AdminUnitList]
        (
            [Id] uniqueidentifier NOT NULL,
            [Name] NVARCHAR(250) NULL,
            [ParentRoleId] uniqueidentifier NULL,
            [Granted] BIT NULL,
            Level INT NOT NULL
        );
        SET @StartNestedLevel = @@NESTLEVEL;
    END;

    DECLARE @ConnectionType INT = (SELECT [ConnectionType] FROM SysAdminUnit WHERE [Id] = @UserI

    -- #AdminUnitListTemp should be created in tsp_ActualizeUserRoles or in tsp_ActualizeAdminUr
    DECLARE @IsAdminUnitListTempExists BIT = OBJECT_ID('tempdb..#AdminUnitListTemp');

    IF (@IsAdminUnitListTempExists IS NULL)
    BEGIN
        WITH
        [MainSelect] AS (
            SELECT
                [Id] [Id],
                [Name] [Name],
                [ParentRoleId] [ParentRoleId]
            FROM
                [dbo].[SysAdminUnit]
            WHERE
                ([SysAdminUnitTypeValue] <= 4 OR [SysAdminUnitTypeValue] = 6)
            AND [ConnectionType] = @ConnectionType
            UNION ALL
            SELECT
                [Id] [Id],
                [Name] [Name],
                [ParentRoleId] [ParentRoleId]
            FROM
                [dbo].[SysAdminUnit]
            WHERE
                [Id] = @UserId),
        [ChiefUnitsSelect] AS (
            (
```

```
                SELECT
                    [Chief].[ParentRoleId] [Id]
                FROM
                    [dbo].[SysUserInRole] userInRole
                    INNER JOIN [dbo].[SysAdminUnit] sau ON (sau.[Id] = userInRole.[SysUserId])
                    INNER JOIN [dbo].[SysAdminUnit] [Chief] ON ([Chief].[Id] = userInRole.[SysRo
                WHERE
                    sau.[Id] = @UserId AND NOT (userInRole.[SysRoleId] IS NULL) AND [Chief].[Sys
                UNION ALL
                SELECT
                    [Chief].[ParentRoleId] [Id]
                FROM
                    [dbo].[SysAdminUnit] [Chief]
                WHERE
                    [Chief].[Id] = @UserId AND [Chief].[SysAdminUnitTypeValue] = 2
            )
            UNION ALL
            SELECT
                sau.[Id]
            FROM
                [ChiefUnitsSelect]
                INNER JOIN [dbo].[SysAdminUnit] sau ON (sau.[ParentRoleId] = [ChiefUnitsSelect].
            WHERE
                sau.[SysAdminUnitTypeValue] < 4
        ),
        [HierarchicalSelect] AS (
            SELECT
                [Id],
                [Name],
                [ParentRoleId],
                0 [Level]
            FROM
                [MainSelect] [SelectStartLevel]
            WHERE
                [Id] IN (
                    SELECT
                        userInRole.[SysRoleId]
                    FROM
                        [dbo].[SysUserInRole] userInRole
                        INNER JOIN [dbo].[SysAdminUnit] sau ON (sau.[Id] = userInRole.[SysUserId
                    WHERE
                        sau.[Id] = @UserId
                    UNION ALL
                    SELECT [Id] FROM [ChiefUnitsSelect]
                    UNION ALL
                    SELECT
                        [Id]
                    FROM
```

```
                    [dbo].[SysAdminUnit]
                WHERE
                    ([ParentRoleId] IS NULL OR [Id] = @UserId)
                    AND [SysAdminUnitTypeValue] < 4
                UNION ALL
                SELECT
                    [FuncRoleId]
                FROM
                    [dbo].[SysFuncRoleInOrgRole]
                WHERE
                    [SysFuncRoleInOrgRole].[OrgRoleId] = @UserId
                )
            UNION ALL
            SELECT
                [SelectPriorLevel].[Id],
                [SelectPriorLevel].[Name],
                [SelectPriorLevel].[ParentRoleId],
                [Level] + 1 level
            FROM
                [MainSelect] [SelectPriorLevel]
                INNER JOIN [HierarchicalSelect] hierSelect ON (hierSelect.[ParentRoleId] = [Sele
        ),
        [FuncRoleHierarchicalSelect] AS (
            SELECT
                [Id],
                [Name],
                [ParentRoleId],
                0 [Level]
            FROM
                [MainSelect] [StartLevel]
            WHERE EXISTS (
                SELECT NULL
                FROM [dbo].[SysFuncRoleInOrgRole] funcRoleInOrgRole
                    INNER JOIN [HierarchicalSelect] hierSelect ON funcRoleInOrgRole.[OrgRoleId]
                WHERE funcRoleInOrgRole.[FuncRoleId] = [StartLevel].[Id]
            )
            UNION ALL
            SELECT
                [PriorLevel].[Id],
                [PriorLevel].[Name],
                [PriorLevel].[ParentRoleId],
                [Level] + 1 level
            FROM
                [MainSelect] [PriorLevel]
                INNER JOIN [FuncRoleHierarchicalSelect] funcRoleHierSelect ON (funcRoleHierSelec
        ),
        [DependentUserSelect] AS (
            SELECT
                mainSelect.[Id] [Id],
```

```
            mainSelect.[Name] [Name],
            mainSelect.[ParentRoleId] [ParentRoleId],
            0 [Level]
        FROM
            [MainSelect] mainSelect
        INNER JOIN [SysUserInRole] userInRole
            ON mainSelect.[Id] = userInRole.[SysUserId]
        INNER JOIN [ChiefUnitsSelect] [AllUnits]
            ON [AllUnits].[Id] = userInRole.[SysRoleId]
        WHERE
            NOT EXISTS (
                    SELECT
                        [UserUnits].[Id]
                    FROM [ChiefUnitsSelect] [UserUnits]
                    INNER JOIN [SysUserInRole] [UserInRole]
                        ON [UserUnits].[Id] = [UserInRole].[SysRoleId]
                    INNER JOIN [SysAdminUnit] sau
                        ON sau.[Id] = [UserUnits].[Id]
                    WHERE sau.[SysAdminUnitTypeValue] = 2
                        AND [UserInRole].[SysUserId] = @UserId
                        AND [UserUnits].[Id] = [AllUnits].[Id])
    )
    INSERT INTO [#AdminUnitList] ([Id], [Name], [ParentRoleId], [Granted], [Level])
    SELECT DISTINCT
        [Id],
        [Name],
        [ParentRoleId],
        @Granted,
        @@NESTLEVEL
    FROM
        (
            SELECT
                [Id],
                [Name],
                [ParentRoleId]
            FROM
                [HierarchicalSelect]
            UNION ALL
            SELECT
                [Id],
                [Name],
                [ParentRoleId]
            FROM
                [dbo].[SysAdminUnit]
            WHERE
                [Id] = @UserId
        UNION ALL
            SELECT
```

```
                    [Id],
                    [Name],
                    [ParentRoleId]
                FROM
                    [FuncRoleHierarchicalSelect]
            UNION ALL
                SELECT
                    [Id],
                    [Name],
                    [ParentRoleId]
                FROM
            [DependentUserSelect]
        ) [AdminUnitList];
    END ELSE
    BEGIN
        DECLARE @alreadyGotRolesForThisUser bit = 0;

        IF (@IsAdminUnitListTempExists = 1)
        BEGIN
            SET @alreadyGotRolesForThisUser = (SELECT CAST( CASE WHEN EXISTS(SELECT 1 FROM [#Adm
                    WHERE [UserId] = @UserId
                    )
                    THEN 1
                    ELSE 0
                END
            AS BIT));
        END;

        IF (@alreadyGotRolesForThisUser = 1)
        BEGIN
            INSERT INTO [#AdminUnitList] ([Id], [Name], [ParentRoleId], [Granted], [Level])
                SELECT DISTINCT
                    [Id],
                    [Name],
                    [ParentRoleId],
                    @Granted,
                    @@NESTLEVEL
                FROM [#AdminUnitListTemp] WHERE UserId = @UserId;
        END ELSE
        BEGIN
            WITH
            [MainSelect] AS (
                SELECT
                    [Id] [Id],
                    [Name] [Name],
                    [ParentRoleId] [ParentRoleId]
                FROM
                    [dbo].[SysAdminUnit]
                WHERE
```

```
                ([SysAdminUnitTypeValue] <= 4 OR [SysAdminUnitTypeValue] = 6)
            AND [ConnectionType] = @ConnectionType
            UNION ALL
            SELECT
                [Id] [Id],
                [Name] [Name],
                [ParentRoleId] [ParentRoleId]
            FROM
                [dbo].[SysAdminUnit]
            WHERE
                [Id] = @UserId),
        [ChiefUnitsSelect] AS (
            (
                SELECT
                    [Chief].[ParentRoleId] [Id]
                FROM
                    [dbo].[SysUserInRole] sysUserInRole
                    INNER JOIN [dbo].[SysAdminUnit] sau ON (sau.[Id] = sysUserInRole.[SysUse
                    INNER JOIN [dbo].[SysAdminUnit] [Chief] ON ([Chief].[Id] = sysUserInRole
                WHERE
                    sau.[Id] = @UserId AND NOT (sysUserInRole.[SysRoleId] IS NULL) AND [Chie
                UNION ALL
                SELECT
                    [Chief].[ParentRoleId] [Id]
                FROM
                    [dbo].[SysAdminUnit] [Chief]
                WHERE
                    [Chief].[Id] = @UserId AND [Chief].[SysAdminUnitTypeValue] = 2
            )
            UNION ALL
            SELECT
                sau.[Id]
            FROM
                [ChiefUnitsSelect] ChiefUnitsSelect
                INNER JOIN [dbo].[SysAdminUnit] sau ON (sau.[ParentRoleId] = [ChiefUnitsSele
            WHERE
                sau.[SysAdminUnitTypeValue] < 4
        ),
        [HierarchicalSelect] AS (
            SELECT
                [Id],
                [Name],
                [ParentRoleId],
                0 [Level]
            FROM
                [MainSelect] [SelectStartLevel]
            WHERE EXISTS (
                SELECT NULL
```

```
                    FROM (
                        SELECT [SysUserInRole].[SysRoleId] AS RoleId
                        FROM [dbo].[SysUserInRole]
                            INNER JOIN [dbo].[SysAdminUnit] ON ([SysAdminUnit].[Id] = [SysUserIr
                        WHERE [SysAdminUnit].[Id] = @UserId

                        UNION ALL

                        SELECT [Id] AS RoleId
                        FROM [ChiefUnitsSelect]

                        UNION ALL

                        SELECT [Id] AS RoleId
                        FROM [dbo].[SysAdminUnit]
                        WHERE ([ParentRoleId] IS NULL OR [Id] = @UserId)
                            AND [SysAdminUnitTypeValue] < 4

                        UNION ALL

                        SELECT [FuncRoleId] AS RoleId
                        FROM [dbo].[SysFuncRoleInOrgRole]
                        WHERE [SysFuncRoleInOrgRole].[OrgRoleId] = @UserId
                    ) AS Roles
                    WHERE Roles.RoleId = [SelectStartLevel].[Id]

                )
                UNION ALL
                SELECT
                    [SelectPriorLevel].[Id],
                    [SelectPriorLevel].[Name],
                    [SelectPriorLevel].[ParentRoleId],
                    [Level] + 1 level
                FROM
                    [MainSelect] [SelectPriorLevel]
                    INNER JOIN [HierarchicalSelect] hierSelect ON (hierSelect.[ParentRoleId] = [
            ),
            [FuncRoleHierarchicalSelect] AS (
                SELECT
                    [Id],
                    [Name],
                    [ParentRoleId],
                    0 [Level]
                FROM
                    [MainSelect] [StartLevel]
                WHERE EXISTS (
                    SELECT NULL
                    FROM [dbo].[SysFuncRoleInOrgRole] funcRoleInOrgRole
                        INNER JOIN [HierarchicalSelect] hierSelect ON funcRoleInOrgRole.[OrgRole
```

```
                WHERE funcRoleInOrgRole.[FuncRoleId] = [StartLevel].[Id]
            )
            UNION ALL
            SELECT
                [PriorLevel].[Id],
                [PriorLevel].[Name],
                [PriorLevel].[ParentRoleId],
                [Level] + 1
            FROM
                [MainSelect] [PriorLevel]
                INNER JOIN [FuncRoleHierarchicalSelect] funcRolesHierSelect ON (funcRolesHie
        ),
        [DependentUserSelect] AS (
            SELECT
                [MainSelect].[Id] [Id],
                [MainSelect].[Name] [Name],
                [MainSelect].[ParentRoleId] [ParentRoleId],
                0 [Level]
            FROM
                [MainSelect]
            INNER JOIN [SysUserInRole] sysUserInRole
                ON [MainSelect].[Id] = sysUserInRole.[SysUserId]
            INNER JOIN [ChiefUnitsSelect] [AllUnits]
                ON [AllUnits].[Id] = sysUserInRole.[SysRoleId]
            WHERE
                NOT EXISTS (
                        SELECT
                            [UserUnits].[Id]
                        FROM [ChiefUnitsSelect] [UserUnits]
                        INNER JOIN [SysUserInRole] [UserInRole]
                            ON [UserUnits].[Id] = [UserInRole].[SysRoleId]
                        INNER JOIN [SysAdminUnit] sau
                            ON sau.[Id] = [UserUnits].[Id]
                        WHERE sau.[SysAdminUnitTypeValue] = 2
                            AND [UserInRole].[SysUserId] = @UserId
                            AND [UserUnits].[Id] = [AllUnits].[Id])
        )
        INSERT INTO #AdminUnitListTemp ([UserId], [Id], [Name], [ParentRoleId], [Granted])
        SELECT DISTINCT
            @UserId,
            [Id],
            [Name],
            [ParentRoleId],
            @Granted
        FROM
            (
                SELECT
                    [Id],
```

```
                        [Name],
                        [ParentRoleId]
                    FROM
                        [HierarchicalSelect]
                    UNION ALL
                    SELECT
                        [Id],
                        [Name],
                        [ParentRoleId]
                    FROM
                        [dbo].[SysAdminUnit]
                    WHERE
                        [Id] = @UserId
                UNION ALL
                    SELECT
                        [Id],
                        [Name],
                        [ParentRoleId]
                    FROM
                        [FuncRoleHierarchicalSelect]
                UNION ALL
                    SELECT
                        [Id],
                        [Name],
                        [ParentRoleId]
                    FROM
                [DependentUserSelect]
                ) [AdminUnitList];

            INSERT INTO [#AdminUnitList] ([Id], [Name], [ParentRoleId], [Granted], [Level])
            SELECT DISTINCT
                [Id],
                [Name],
                [ParentRoleId],
                @Granted,
                @@NESTLEVEL
            FROM [#AdminUnitListTemp] WHERE UserId = @UserId;
        END;
    END;

    DECLARE @DependentUserId uniqueidentifier;
    DECLARE @DependentUsersList CURSOR;
    SET @DependentUsersList = CURSOR FOR
        SELECT
            [#AdminUnitList].[Id]
        FROM
            [#AdminUnitList]
        INNER JOIN [SysAdminUnit] ON [#AdminUnitList].[Id] = [SysAdminUnit].[Id]
        WHERE
```

```
        [SysAdminUnit].[SysAdminUnitTypeValue] = 4 AND [#AdminUnitList].[Id] <> @UserId
        AND [#AdminUnitList].[Granted] <> 1 AND [#AdminUnitList].[Level] >= @@NESTLEVEL;
OPEN @DependentUsersList;
FETCH NEXT
FROM @DependentUsersList INTO @DependentUserId;
WHILE @@FETCH_STATUS = 0
BEGIN
    EXEC [tsp_GetAdminUnitList] @UserId=@DependentUserId, @Granted=1;
FETCH NEXT
FROM @DependentUsersList INTO @DependentUserId;
END;
CLOSE @DependentUsersList;
DEALLOCATE @DependentUsersList;

DECLARE @GrantorSysAdminUnitId uniqueidentifier;
DECLARE @getGrantorSysAdminUnitList CURSOR;
SET @getGrantorSysAdminUnitList = CURSOR FOR
    SELECT
        [GrantorSysAdminUnitId]
    FROM
        [dbo].[SysAdminUnitGrantedRight]
    WHERE
        [GranteeSysAdminUnitId] = @UserId
        AND NOT EXISTS(SELECT * FROM [#AdminUnitList] WHERE [Id] = @UserId AND [Granted] = 1
OPEN @getGrantorSysAdminUnitList;
FETCH NEXT
FROM @getGrantorSysAdminUnitList INTO @GrantorSysAdminUnitId;
WHILE @@FETCH_STATUS = 0
BEGIN
    EXEC [tsp_GetAdminUnitList] @UserId=@GrantorSysAdminUnitId, @Granted=1;
FETCH NEXT
FROM @getGrantorSysAdminUnitList INTO @GrantorSysAdminUnitId;
END;
CLOSE @getGrantorSysAdminUnitList;
DEALLOCATE @getGrantorSysAdminUnitList;

IF @@NESTLEVEL = @StartNestedLevel
BEGIN
    WITH QQ ([Id], [Name], [ParentRoleId], SysAdminUnitTypeValue) as (
        SELECT DISTINCT adminUnitList.[Id],
            adminUnitList.[Name],
            adminUnitList.[ParentRoleId],
            sau.SysAdminUnitTypeValue
        FROM [#AdminUnitList] adminUnitList
        INNER JOIN SysAdminUnit sau on sau.Id = adminUnitList.[Id]
    )
    SELECT [Id], [Name], [ParentRoleId] FROM QQ
    ORDER BY SysAdminUnitTypeValue DESC;
```

```
    END;
END;
GO
```

Postgre SQL

```
-- Рекурсивная хранимая процедура, которая возвращает таблицу и в которой используется PERFORM:
-- PostgreSql
DROP FUNCTION IF EXISTS "tsp_GetAdminUnitList";
CREATE FUNCTION "tsp_GetAdminUnitList"(
    UserId UUID,
    IsGranted BOOLEAN = FALSE,
    NestLevel INT = 0
)
RETURNS TABLE (
    "Id" UUID,
    "Name" VARCHAR(250),
    "ParentRoleId" UUID
)
AS $$
DECLARE
    ConnectionType INT;
    IsAdminUnitListTempExists BOOLEAN = FALSE;
    DependentUserId UUID;
    DependentUsersList CURSOR FOR
        SELECT
            "AdminUnitList"."Id"
        FROM
            "AdminUnitList"
        INNER JOIN "SysAdminUnit" ON "AdminUnitList"."Id" = "SysAdminUnit"."Id"
        WHERE
            "SysAdminUnit"."SysAdminUnitTypeValue" = 4
            AND "AdminUnitList"."Id" <> UserId
            AND "AdminUnitList"."Granted" = FALSE
            AND "AdminUnitList"."Level" >= NestLevel;
    GrantorSysAdminUnitId UUID;
    GetGrantorSysAdminUnitList CURSOR FOR
        SELECT
            "GrantorSysAdminUnitId" AS "Id"
        FROM
            "SysAdminUnitGrantedRight"
        WHERE
            "GranteeSysAdminUnitId" = UserId
            AND NOT EXISTS (
                SELECT *
                FROM "AdminUnitList"
                WHERE "AdminUnitList"."Id" = UserId
```

```
                    AND "AdminUnitList"."Granted" = TRUE
                    AND "AdminUnitList"."Level" < NestLevel
            );
    ParentRoleId UUID = NULL;
BEGIN

    IF NestLevel = 0 THEN
        CREATE TEMPORARY TABLE IF NOT EXISTS "AdminUnitList" (
            "Id" UUID,
            "Name" VARCHAR(250),
            "ParentRoleId" UUID,
            "Granted" BOOLEAN,
            "Level" INT
        );
        TRUNCATE TABLE "AdminUnitList";
    END IF;

    SELECT "ConnectionType" INTO ConnectionType FROM "SysAdminUnit" WHERE "SysAdminUnit"."Id" =

    WITH RECURSIVE "MainSelect" AS (
        SELECT
            "SysAdminUnit"."Id" "Id",
            "SysAdminUnit"."Name" "Name",
            "SysAdminUnit"."ParentRoleId" "ParentRoleId"
        FROM
            "SysAdminUnit"
        WHERE
            ("SysAdminUnitTypeValue" <= 4 OR "SysAdminUnitTypeValue" = 6)
        AND "ConnectionType" = ConnectionType
        UNION ALL
        SELECT
            "SysAdminUnit"."Id" "Id",
            "SysAdminUnit"."Name" "Name",
            "SysAdminUnit"."ParentRoleId" "ParentRoleId"
        FROM
            "SysAdminUnit"
        WHERE
            "SysAdminUnit"."Id" = UserId),
        "ChiefUnitsSelect" AS (
            SELECT
                "chief"."ParentRoleId" "Id"
            FROM
                "SysUserInRole" AS "userInRole"
                INNER JOIN "SysAdminUnit" AS "sau" ON ("sau"."Id" = "userInRole"."SysUserId")
                INNER JOIN "SysAdminUnit" AS "chief" ON ("chief"."Id" = "userInRole"."SysRoleId"
            WHERE
                "sau"."Id" = UserId
                AND "userInRole"."SysRoleId" IS NOT NULL
```

```
                AND "chief"."SysAdminUnitTypeValue" = 2
            UNION ALL
            SELECT
                "chief"."ParentRoleId" "Id"
            FROM
                "SysAdminUnit" "chief"
            WHERE
                "chief"."Id" = UserId AND "chief"."SysAdminUnitTypeValue" = 2
            UNION ALL
            SELECT
                "sau"."Id"
            FROM
                "ChiefUnitsSelect"
                INNER JOIN "SysAdminUnit" "sau" ON ("sau"."ParentRoleId" = "ChiefUnitsSelect"."I
            WHERE
                "sau"."SysAdminUnitTypeValue" < 4
        ),
        "HierarchicalSelect" AS (
            SELECT
                "SelectStartLevel"."Id",
                "SelectStartLevel"."Name",
                "SelectStartLevel"."ParentRoleId",
                0 "Level"
            FROM
                "MainSelect" "SelectStartLevel"
            WHERE
                "SelectStartLevel"."Id" IN (
                    SELECT
                        "userInRole"."SysRoleId"
                    FROM
                        "SysUserInRole" AS "userInRole"
                        INNER JOIN "SysAdminUnit" AS "sau" ON ("sau"."Id" = "userInRole"."SysUse
                    WHERE
                        "sau"."Id" = UserId
                    UNION ALL
                    SELECT "ChiefUnitsSelect"."Id"
                    FROM "ChiefUnitsSelect"
                    UNION ALL
                    SELECT
                        "SysAdminUnit"."Id"
                    FROM
                        "SysAdminUnit"
                    WHERE
                        ("SysAdminUnit"."ParentRoleId" IS NULL OR "SysAdminUnit"."Id" = UserId)
                        AND "SysAdminUnitTypeValue" < 4
                    UNION ALL
                    SELECT
                        "FuncRoleId"
                    FROM
```

```
                    "SysFuncRoleInOrgRole"
                WHERE
                    "SysFuncRoleInOrgRole"."OrgRoleId" = UserId
                )
        UNION ALL
        SELECT
            "SelectPriorLevel"."Id",
            "SelectPriorLevel"."Name",
            "SelectPriorLevel"."ParentRoleId",
            "Level" + 1 "level"
        FROM
            "MainSelect" "SelectPriorLevel"
            INNER JOIN "HierarchicalSelect" AS "hierSelect" ON ("hierSelect"."ParentRoleId"
    ),
    "FuncRoleHierarchicalSelect" AS (
        SELECT
            "StartLevel"."Id",
            "StartLevel"."Name",
            "StartLevel"."ParentRoleId",
            0 "Level"
        FROM
            "MainSelect" "StartLevel"
        WHERE EXISTS (
            SELECT NULL
            FROM "SysFuncRoleInOrgRole" AS "funcRoleInOrgRole"
                INNER JOIN "HierarchicalSelect" AS "hierSelect" ON "funcRoleInOrgRole"."OrgR
            WHERE "funcRoleInOrgRole"."FuncRoleId" = "StartLevel"."Id"
        )
        UNION ALL
        SELECT
            "PriorLevel"."Id",
            "PriorLevel"."Name",
            "PriorLevel"."ParentRoleId",
            "Level" + 1 "level"
        FROM
            "MainSelect" "PriorLevel"
            INNER JOIN "FuncRoleHierarchicalSelect" AS "funcRoleHierSelect" ON ("funcRoleHie
    ),
    "DependentUserSelect" AS (
        SELECT
            "mainSelect"."Id" "Id",
            "mainSelect"."Name" "Name",
            "mainSelect"."ParentRoleId" "ParentRoleId",
            0 "Level"
        FROM
            "MainSelect" AS "mainSelect"
        INNER JOIN "SysUserInRole" AS "userInRole"
            ON "mainSelect"."Id" = "userInRole"."SysUserId"
```

```
            INNER JOIN "ChiefUnitsSelect" AS "AllUnits"
                ON "AllUnits"."Id" = "userInRole"."SysRoleId"
            WHERE
                NOT EXISTS (
                        SELECT
                            "UserUnits"."Id"
                        FROM "ChiefUnitsSelect" AS "UserUnits"
                        INNER JOIN "SysUserInRole" AS "UserInRole"
                            ON "UserUnits"."Id" = "UserInRole"."SysRoleId"
                        INNER JOIN "SysAdminUnit" AS "sau"
                            ON "sau"."Id" = "UserUnits"."Id"
                        WHERE "sau"."SysAdminUnitTypeValue" = 2
                            AND "UserInRole"."SysUserId" = UserId
                            AND "UserUnits"."Id" = "AllUnits"."Id")
        )
        INSERT INTO "AdminUnitList" ("Id", "Name", "ParentRoleId", "Granted", "Level")
        SELECT DISTINCT
            "AdminUnitList"."Id",
            "AdminUnitList"."Name",
            "AdminUnitList"."ParentRoleId",
            IsGranted,
            NestLevel
        FROM (
            SELECT
                "HierarchicalSelect"."Id",
                "HierarchicalSelect"."Name",
                "HierarchicalSelect"."ParentRoleId"
            FROM "HierarchicalSelect"
            UNION ALL
            SELECT
                "SysAdminUnit"."Id",
                "SysAdminUnit"."Name",
                "SysAdminUnit"."ParentRoleId"
            FROM "SysAdminUnit"
            WHERE
                "SysAdminUnit"."Id" = UserId
            UNION ALL
            SELECT
                "FuncRoleHierarchicalSelect"."Id",
                "FuncRoleHierarchicalSelect"."Name",
                "FuncRoleHierarchicalSelect"."ParentRoleId"
            FROM "FuncRoleHierarchicalSelect"
            UNION ALL
            SELECT
                "DependentUserSelect"."Id",
                "DependentUserSelect"."Name",
                "DependentUserSelect"."ParentRoleId"
            FROM "DependentUserSelect"
        ) AS "AdminUnitList";
```

```
    DependentUsersList := 'DependentUsersList' || NestLevel ;
    FOR DependentUser IN DependentUsersList LOOP
        EXIT WHEN DependentUser = NULL;
        DependentUserId = DependentUser."Id";
        PERFORM "tsp_GetAdminUnitList"(DependentUserId, 1, NestLevel + 1);
    END LOOP;

    GetGrantorSysAdminUnitList := 'GetGrantorSysAdminUnitList' || NestLevel ;
    FOR GrantorSysAdminUnit IN GetGrantorSysAdminUnitList LOOP
        EXIT WHEN GrantorSysAdminUnit = NULL;
        GrantorSysAdminUnitId = GrantorSysAdminUnit."Id";
        PERFORM "tsp_GetAdminUnitList"(GrantorSysAdminUnitId, 1, NestLevel + 1);
    END LOOP;

    IF NestLevel = 0 THEN
        RETURN QUERY
        SELECT "QQ"."Id",
                "QQ"."Name",
                "QQ"."ParentRoleId"
        FROM (
            SELECT DISTINCT
                "AdminUnitList"."Id",
                "AdminUnitList"."Name",
                "AdminUnitList"."ParentRoleId",
                "sau"."SysAdminUnitTypeValue"
            FROM "AdminUnitList"
            INNER JOIN "SysAdminUnit" AS "sau" ON "sau"."Id" = "AdminUnitList"."Id") AS "QQ"
        ORDER BY "QQ"."SysAdminUnitTypeValue" DESC;
    END IF;

END;
$$ LANGUAGE plpgsql;
```

Пример 5 (хранимые процедуры)

Пример. Пример хранимой процедуры, в которой используется обработка исключений и выполнение кастомного скрипта.

MS SQL

```
-- Хранимая процедура, в которой используется обработка исключений и выполнение кастомного скрип
-- MSSQL
```

```
IF  EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[tsp_CanConvertData]')
DROP PROCEDURE [dbo].[tsp_CanConvertData]
GO
CREATE PROCEDURE [dbo].[tsp_CanConvertData]
    @EntitySchemaName SYSNAME,
    @SourceColumnName SYSNAME,
    @NewColumnDataType SYSNAME,
    @Result BIT OUT
AS
BEGIN
    SET NOCOUNT ON

    SET @Result = 0

    DECLARE @sql NVARCHAR(MAX)
    DECLARE @unicodeCharLength INT = 2
    DECLARE @dataTypeName SYSNAME
    DECLARE @dataTypeSize INT
    DECLARE @dataTypePrecision INT

    SELECT
        @dataTypeName = UPPER(DATA_TYPE),
        @dataTypeSize =
        CASE
            WHEN CHARACTER_MAXIMUM_LENGTH IS NULL THEN NUMERIC_PRECISION
            ELSE CHARACTER_MAXIMUM_LENGTH
        END,
        @dataTypePrecision = ISNULL(NUMERIC_SCALE, 0)
    FROM INFORMATION_SCHEMA.COLUMNS
    WHERE TABLE_NAME = @EntitySchemaName
    AND COLUMN_NAME = @SourceColumnName

    IF (@dataTypeName IS NULL)
    BEGIN
        RETURN
    END

    DECLARE @newDataTypeName SYSNAME
    DECLARE @newDataTypeSize INT
    DECLARE @newDataTypePrecision INT
    DEClARE @i INT
    DECLARE @newDataTypeSizeDefinition NVARCHAR(MAX)

    SET @i = CHARINDEX('(', @NewColumnDataType)
    IF (@i = 0)
    BEGIN
        SET @newDataTypeName = @NewColumnDataType
        SET @newDataTypeSize = 0
```

```
        SET @newDataTypePrecision = 0
    END ELSE
    BEGIN
        SET @newDataTypeName = UPPER(LTRIM(RTRIM(SUBSTRING(@NewColumnDataType, 1, @i - 1))))
        SET @newDataTypeSizeDefinition = LTRIM(RTRIM(SUBSTRING(@NewColumnDataType, @i + 1,
            LEN(@NewColumnDataType))))
        SET @i = CHARINDEX(')', @newDataTypeSizeDefinition)
        IF (@i > 0)
        BEGIN
            SET @newDataTypeSizeDefinition = LTRIM(RTRIM(SUBSTRING(@newDataTypeSizeDefinition, 1
        END
        SET @i = CHARINDEX(',', @newDataTypeSizeDefinition)
        IF (@i > 0)
        BEGIN
            SET @newDataTypeSize = CAST(LTRIM(RTRIM(SUBSTRING(@newDataTypeSizeDefinition, 1, @i
            SET @newDataTypePrecision = CAST(LTRIM(RTRIM(SUBSTRING(@newDataTypeSizeDefinition, @
                LEN(@newDataTypeSizeDefinition)))) AS INT)
        END ELSE
        BEGIN
            SET @newDataTypePrecision = 0
            IF (UPPER(@newDataTypeSizeDefinition) = 'MAX')
            BEGIN
                SET @newDataTypeSize = -1
            END ELSE
            BEGIN
                SET @newDataTypeSize = CAST(@newDataTypeSizeDefinition AS INT)
            END
        END
    END

    DECLARE @ImplicitDataConvertTable TABLE (
        SourceDataType SYSNAME,
        DestinationDataType SYSNAME
    )
    INSERT INTO @ImplicitDataConvertTable
    SELECT 'INT', 'INT'
    UNION ALL
    SELECT 'INT', 'BIT'
    UNION ALL
    SELECT 'INT', 'DECIMAL'
    UNION ALL
    SELECT 'INT', 'VARCHAR'
    UNION ALL
    SELECT 'INT', 'NVARCHAR'
    UNION ALL
    SELECT 'INT', 'VARBINARY'
    UNION ALL
    SELECT 'BIT', 'BIT'
```

```
    UNION ALL
    SELECT 'BIT', 'INT'
    UNION ALL
    SELECT 'BIT', 'DECIMAL'
    UNION ALL
    SELECT 'BIT', 'VARCHAR'
    UNION ALL
    SELECT 'BIT', 'NVARCHAR'
    UNION ALL
    SELECT 'BIT', 'VARBINARY'
    UNION ALL
    SELECT 'DECIMAL', 'BIT'
    UNION ALL
    SELECT 'UNIQUEIDENTIFIER', 'UNIQUEIDENTIFIER'
    UNION ALL
    SELECT 'UNIQUEIDENTIFIER', 'VARBINARY'
    UNION ALL
    SELECT 'VARCHAR', 'INT'
    UNION ALL
    SELECT 'VARCHAR', 'BIT'
    UNION ALL
    SELECT 'VARCHAR', 'UNIQUEIDENTIFIER'
    UNION ALL
    SELECT 'DATETIME2', 'DATETIME2'
    UNION ALL
    SELECT 'DATETIME2', 'DATE'
    UNION ALL
    SELECT 'DATETIME2', 'TIME'
    UNION ALL
    SELECT 'DATETIME2', 'VARCHAR'
    UNION ALL
    SELECT 'DATE', 'DATE'
    UNION ALL
    SELECT 'DATE', 'DATETIME2'
    UNION ALL
    SELECT 'DATE', 'VARCHAR'
    UNION ALL
    SELECT 'DATE', 'NVARCHAR'
    UNION ALL
    SELECT 'TIME', 'TIME'
    UNION ALL
    SELECT 'TIME', 'DATETIME2'
    UNION ALL
    SELECT 'TIME', 'VARCHAR'
    UNION ALL
    SELECT 'TIME', 'NVARCHAR'
    UNION ALL
    SELECT 'VARBINARY', 'INT'
    UNION ALL
```

```
    SELECT 'VARBINARY', 'BIT'
    UNION ALL
    SELECT 'VARBINARY', 'UNIQUEIDENTIFIER'

    IF EXISTS(SELECT * FROM @ImplicitDataConvertTable
        WHERE SourceDataType = @dataTypeName AND DestinationDataType = @newDataTypeName)
    BEGIN
        SET @Result = 1
        RETURN
    END

    DECLARE @ImplicitDataOverflowConvertTable TABLE (
        SourceDataType SYSNAME,
        DestinationDataType SYSNAME
    )
    INSERT INTO @ImplicitDataOverflowConvertTable
    SELECT 'DECIMAL', 'INT'
    UNION ALL
    SELECT 'DECIMAL', 'DECIMAL'
    UNION ALL
    SELECT 'DECIMAL', 'VARCHAR'
    UNION ALL
    SELECT 'DECIMAL', 'NVARCHAR'
    UNION ALL
    SELECT 'DECIMAL', 'VARBINARY'
    UNION ALL
    SELECT 'UNIQUEIDENTIFIER', 'VARCHAR'
    UNION ALL
    SELECT 'UNIQUEIDENTIFIER', 'NVARCHAR'
    UNION ALL
    SELECT 'VARCHAR', 'INT'
    UNION ALL
    SELECT 'VARCHAR', 'BIT'
    UNION ALL
    SELECT 'VARCHAR', 'DECIMAL'
    UNION ALL
    SELECT 'VARCHAR', 'VARCHAR'
    UNION ALL
    SELECT 'VARCHAR', 'NVARCHAR'
    UNION ALL
    SELECT 'NVARCHAR', 'INT'
    UNION ALL
    SELECT 'NVARCHAR', 'BIT'
    UNION ALL
    SELECT 'NVARCHAR', 'DECIMAL'
    UNION ALL
    SELECT 'NVARCHAR', 'VARCHAR'
    UNION ALL
```

```
    SELECT 'NVARCHAR', 'NVARCHAR'
    UNION ALL
    SELECT 'VARBINARY', 'VARCHAR'
    UNION ALL
    SELECT 'VARBINARY', 'NVARCHAR'
    UNION ALL
    SELECT 'VARBINARY', 'VARBINARY'

    IF EXISTS(SELECT * FROM @ImplicitDataOverflowConvertTable
        WHERE SourceDataType = @dataTypeName AND DestinationDataType = @newDataTypeName)
    BEGIN
        SET @sql = N'IF EXISTS(SELECT * FROM [' + @EntitySchemaName + ']) SET @Result = 0 ELSE S
        EXEC sp_executesql @sql, N'@Result BIT OUT', @Result = @Result OUT

        IF (@Result = 1)
        BEGIN
            RETURN
        END
        BEGIN TRY
            IF (@dataTypeName = 'DECIMAL' AND @newDataTypeName = 'INT') OR
                (@dataTypeName = 'DECIMAL' AND @newDataTypeName = 'VARCHAR') OR
                (@dataTypeName = 'DECIMAL' AND @newDataTypeName = 'NVARCHAR') OR
                (@dataTypeName = 'DECIMAL' AND @newDataTypeName = 'VARBINARY') OR
                (@dataTypeName = 'DECIMAL' AND @newDataTypeName = 'DECIMAL')
            BEGIN
                DECLARE @cnt INT
                DECLARE @ConvertDescription NVARCHAR(MAX)
                SET @ConvertDescription = 'CONVERT(' + @NewColumnDataType +', [' + @SourceColumn
                SET @sql = N'IF EXISTS(SELECT * FROM [' + @EntitySchemaName + '] WHERE ' +
                @ConvertDescription + ' = ' + @ConvertDescription + ') SET @cnt = 1 ELSE SET @cn
                EXEC sp_executesql @sql, N'@cnt INT OUT', @cnt = @cnt OUT
                SET @Result = 1
            END ELSE
            BEGIN
                DECLARE @dl INT
                SET @sql = N'SELECT @dl = MAX(DATALENGTH([' + @SourceColumnName + ''])) ' +
                'FROM [' + @EntitySchemaName + ']'
                EXEC sp_executesql @sql, N'@dl INT OUT', @dl = @dl OUT
                IF (@newDataTypeName IN ('VARCHAR', 'NVARCHAR', 'VARBINARY') AND @newDataTypeSiz
                BEGIN
                    SET @Result = 1
                END ELSE
                IF (@dl <= @newDataTypeSize OR (
                    @newDataTypeName IN ('NVARCHAR', 'NCHAR') AND (@dl / @unicodeCharLength) <=
                BEGIN
                    SET @Result = 1
                END ELSE
                BEGIN
                    SET @Result = 0
```

```
                END
            END
        END TRY
        BEGIN CATCH
            SET @Result = 0
        END CATCH
    END ELSE
    BEGIN
        SET @Result = 0
    END
END
GO
```

Postgre SQL

```
-- Хранимая процедура, в которой используется обработка исключений и выполнение кастомного скриг
-- PostgreSql
DROP FUNCTION IF EXISTS public."tsp_CanConvertData" CASCADE;
CREATE FUNCTION public."tsp_CanConvertData"(
    EntitySchemaName NAME,
    SourceColumnName NAME,
    NewColumnDataType NAME,
    CanConvert OUT BOOLEAN)
AS $BODY$
DECLARE
    dataTypeName NAME;
    newDataTypeName NAME;
    newDataTypeSize INTEGER;
    countRow INTEGER;
    dataLength INTEGER;
    convertDescription TEXT;
    unicodeCharLength INTEGER = 2;
    sqlQuery TEXT;
    castQuery TEXT;
BEGIN
    CanConvert = FALSE;
    dataTypeName = (
        SELECT UPPER(data_type) FROM information_schema.columns
        WHERE table_name = EntitySchemaName AND column_name = SourceColumnName);
    IF dataTypeName IS NULL THEN
        RETURN;
    END IF;

    SELECT "fn_ParseDataType".DataTypeName, "fn_ParseDataType".DataTypeSize
    FROM public."fn_ParseDataType"(NewColumnDataType)
    INTO newDataTypeName, newDataTypeSize;
```

```
DROP TABLE IF EXISTS "NotConvertTable";
CREATE TEMP TABLE "NotConvertTable" (
    SourceDataType NAME,
    DestinationDataType NAME
);
INSERT INTO "NotConvertTable" VALUES
    ('INTEGER', 'UUID'),
    ('INTEGER', 'TIMESTAMP WITHOUT TIME ZONE'),
    ('INTEGER', 'DATE'),
    ('INTEGER', 'TIME WITHOUT TIME ZONE'),
    ('NUMERIC', 'UUID'),
    ('NUMERIC', 'TIMESTAMP WITHOUT TIME ZONE'),
    ('NUMERIC', 'DATE'),
    ('NUMERIC', 'TIME WITHOUT TIME ZONE'),
    ('BOOLEAN', 'UUID'),
    ('BOOLEAN', 'TIMESTAMP WITHOUT TIME ZONE'),
    ('BOOLEAN', 'DATE'),
    ('BOOLEAN', 'TIME WITHOUT TIME ZONE'),
    ('UUID', 'INTEGER'),
    ('UUID', 'NUMERIC'),
    ('UUID', 'BOOLEAN'),
    ('UUID', 'TIMESTAMP WITHOUT TIME ZONE'),
    ('UUID', 'DATE'),
    ('UUID', 'TIME WITHOUT TIME ZONE'),
    ('TIMESTAMP WITHOUT TIME ZONE', 'INTEGER'),
    ('TIMESTAMP WITHOUT TIME ZONE', 'NUMERIC'),
    ('TIMESTAMP WITHOUT TIME ZONE', 'BOOLEAN'),
    ('TIMESTAMP WITHOUT TIME ZONE', 'UUID'),
    ('DATE', 'INTEGER'),
    ('DATE', 'NUMERIC'),
    ('DATE', 'BOOLEAN'),
    ('DATE', 'UUID'),
    ('DATE', 'TIME WITHOUT TIME ZONE'),
    ('TIME WITHOUT TIME ZONE', 'INTEGER'),
    ('TIME WITHOUT TIME ZONE', 'NUMERIC'),
    ('TIME WITHOUT TIME ZONE', 'BOOLEAN'),
    ('TIME WITHOUT TIME ZONE', 'UUID'),
    ('TIME WITHOUT TIME ZONE', 'DATE');
IF EXISTS(SELECT SourceDataType, DestinationDataType FROM "NotConvertTable"
    WHERE SourceDataType = dataTypeName AND DestinationDataType = newDataTypeName) THEN
    RETURN;
END IF;

DROP TABLE IF EXISTS ImplicitDataConvertTable;
CREATE TEMP TABLE ImplicitDataConvertTable (
    SourceDataType NAME,
    DestinationDataType NAME
);
```

```
    INSERT INTO ImplicitDataConvertTable VALUES
        ('INTEGER', 'INTEGER'),
        ('INTEGER', 'NUMERIC'),
        ('INTEGER', 'BOOLEAN'),
        ('INTEGER', 'CHARACTER VARYING'),
        ('INTEGER', 'TEXT'),
        ('NUMERIC', 'CHARACTER VARYING'),
        ('NUMERIC', 'TEXT'),
        ('BOOLEAN', 'INTEGER'),
        ('BOOLEAN', 'BOOLEAN'),
        ('BOOLEAN', 'CHARACTER VARYING'),
        ('BOOLEAN', 'TEXT'),
        ('CHARACTER VARYING', 'TEXT'),
        ('CHARACTER VARYING', 'BYTEA'),
        ('TEXT', 'TEXT'),
        ('TEXT', 'BYTEA'),
        ('BYTEA', 'BYTEA'),
        ('UUID', 'CHARACTER VARYING'),
        ('UUID', 'TEXT'),
        ('UUID', 'UUID'),
        ('TIMESTAMP WITHOUT TIME ZONE', 'CHARACTER VARYING'),
        ('TIMESTAMP WITHOUT TIME ZONE', 'TEXT'),
        ('TIMESTAMP WITHOUT TIME ZONE', 'TIMESTAMP WITHOUT TIME ZONE'),
        ('DATE', 'CHARACTER VARYING'),
        ('DATE', 'TEXT'),
        ('DATE', 'TIMESTAMP WITHOUT TIME ZONE'),
        ('DATE', 'DATE'),
        ('TIME WITHOUT TIME ZONE', 'CHARACTER VARYING'),
        ('TIME WITHOUT TIME ZONE', 'TEXT'),
        ('TIME WITHOUT TIME ZONE', 'TIMESTAMP WITHOUT TIME ZONE'),
        ('TIME WITHOUT TIME ZONE', 'TIME WITHOUT TIME ZONE'),
        ('TIMESTAMP WITHOUT TIME ZONE', 'DATE'),
        ('TIMESTAMP WITHOUT TIME ZONE', 'TIME WITHOUT TIME ZONE'),
        ('INTEGER', 'BYTEA'),
        ('NUMERIC', 'BOOLEAN'),
        ('NUMERIC', 'BYTEA'),
        ('BOOLEAN', 'NUMERIC'),
        ('BOOLEAN', 'BYTEA'),
        ('UUID', 'BYTEA'),
        ('TIMESTAMP WITHOUT TIME ZONE', 'BYTEA'),
        ('DATE', 'BYTEA'),
        ('TIME WITHOUT TIME ZONE', 'BYTEA'),
        ('NUMERIC', 'INTEGER'),
        ('NUMERIC', 'NUMERIC');
    IF EXISTS(SELECT SourceDataType, DestinationDataType FROM ImplicitDataConvertTable
        WHERE SourceDataType = dataTypeName AND DestinationDataType = newDataTypeName) THEN
        CanConvert = TRUE;
        RETURN;
```

```
    END IF;

    EXECUTE FORMAT('SELECT count(*) FROM %1$I', EntitySchemaName) INTO countRow;
    CanConvert = (countRow = 0);
    IF CanConvert THEN
        RETURN;
    END IF;

    DROP TABLE IF EXISTS "ExplicitDataConvertTable";
    CREATE TEMP TABLE "ExplicitDataConvertTable" (
        SourceDataType NAME,
        DestinationDataType NAME
    );
    INSERT INTO "ExplicitDataConvertTable" VALUES
        ('CHARACTER VARYING', 'INTEGER'),
        ('CHARACTER VARYING', 'NUMERIC'),
        ('CHARACTER VARYING', 'BOOLEAN'),
        ('CHARACTER VARYING', 'UUID'),
        ('CHARACTER VARYING', 'TIMESTAMP WITHOUT TIME ZONE'),
        ('CHARACTER VARYING', 'DATE'),
        ('CHARACTER VARYING', 'TIME WITHOUT TIME ZONE'),
        ('TEXT', 'INTEGER'),
        ('TEXT', 'NUMERIC'),
        ('TEXT', 'BOOLEAN'),
        ('TEXT', 'UUID'),
        ('TEXT', 'TIMESTAMP WITHOUT TIME ZONE'),
        ('TEXT', 'DATE'),
        ('TEXT', 'TIME WITHOUT TIME ZONE'),
        ('BYTEA', 'INTEGER'),
        ('BYTEA', 'NUMERIC'),
        ('BYTEA', 'BOOLEAN'),
        ('BYTEA', 'UUID'),
        ('BYTEA', 'TIMESTAMP WITHOUT TIME ZONE'),
        ('BYTEA', 'DATE'),
        ('BYTEA', 'TEXT'),
        ('BYTEA', 'TIME WITHOUT TIME ZONE'),
        ('NUMERIC', 'BOOLEAN');
    IF EXISTS(SELECT SourceDataType, DestinationDataType FROM "ExplicitDataConvertTable"
        WHERE SourceDataType = dataTypeName AND DestinationDataType = newDataTypeName) THEN
        castQuery = FORMAT('CAST(%1$I%3$s AS %2$s)', SourceColumnName, NewColumnDataType,
            CASE
                WHEN dataTypeName = 'BYTEA' THEN '::TEXT'
                WHEN dataTypeName = 'NUMERIC' THEN '::INTEGER'
                ELSE ''
            END);
        sqlQuery = FORMAT('SELECT COUNT(*) FROM %1$I WHERE %2$s = %2$s',
            EntitySchemaName, castQuery);
        BEGIN
            EXECUTE sqlQuery;
```

```
            CanConvert = TRUE;
        EXCEPTION WHEN OTHERS THEN
            CanConvert = FALSE;
        END;
        RETURN;
    END IF;

    DROP TABLE IF EXISTS "ImplicitDataOverflowConvertTable";
    CREATE TEMP TABLE "ImplicitDataOverflowConvertTable" (
        SourceDataType NAME,
        DestinationDataType NAME
    );
    INSERT INTO "ImplicitDataOverflowConvertTable" VALUES
        ('CHARACTER VARYING', 'CHARACTER VARYING'),
        ('TEXT', 'CHARACTER VARYING'),
        ('BYTEA', 'CHARACTER VARYING');
    IF EXISTS(SELECT SourceDataType, DestinationDataType FROM "ImplicitDataOverflowConvertTable"
        WHERE SourceDataType = dataTypeName AND DestinationDataType = newDataTypeName) THEN
        EXECUTE FORMAT('SELECT count(*) FROM %1$I', EntitySchemaName) INTO countRow;
        CanConvert = (countRow = 0);
        IF CanConvert THEN
            RETURN;
        END IF;
        BEGIN
            EXECUTE FORMAT('SELECT MAX(PG_COLUMN_SIZE(%1$I)) FROM %2$I', SourceColumnName, Entit
            INTO dataLength;
            IF (dataLength <= newDataTypeSize) THEN
                CanConvert = TRUE;
            ELSE
                CanConvert = FALSE;
            END IF;
        EXCEPTION WHEN OTHERS THEN
            CanConvert = FALSE;
        END;
    END IF;
END;
$BODY$
LANGUAGE 'plpgsql';
```

Пример 6 (функции)

Пример. Пример функции.

MS SQL

```
-- Функция
-- MSSQL
IF  EXISTS (SELECT * FROM sys.objects
        WHERE object_id = OBJECT_ID(N'[dbo].[fn_IsGuid]') AND type = N'FN')
DROP FUNCTION [dbo].[fn_IsGuid]
GO

CREATE FUNCTION [dbo].[fn_IsGuid] (
    @ValidateValue NVARCHAR(MAX))
RETURNS BIT
AS
BEGIN
    DECLARE @hasLeftBraces BIT
    IF @ValidateValue LIKE '{%'
    BEGIN
        SET @ValidateValue = SUBSTRING(@ValidateValue, 2, LEN(@ValidateValue) - 1)
        SET @hasLeftBraces = 1
    END ELSE
    BEGIN
        SET @hasLeftBraces = 0
    END
    DECLARE @hasRightBraces BIT
    IF @ValidateValue LIKE '%}'
    BEGIN
        SET @ValidateValue = SUBSTRING(@ValidateValue, 1, LEN(@ValidateValue) - 1)
        SET @hasRightBraces = 1
    END ELSE
    BEGIN
        SET @hasRightBraces = 0
    END
    DECLARE @Result BIT
    IF @ValidateValue LIKE '[0-9a-fA-F][0-9a-fA-F][0-9a-fA-F][0-9a-fA-F][0-9a-fA-F][0-9a-fA-F][0
    BEGIN
        SET @Result = 1
    END ELSE
    BEGIN
        SET @Result = 0
    END
    IF @hasLeftBraces = @hasRightBraces
    BEGIN
        RETURN @Result
    END ELSE
    BEGIN
        SET @Result = 0
    END
```

```
    RETURN @Result
END
GO
```

Postgre SQL

```
-- Функция
-- PostgreSql
DROP FUNCTION IF EXISTS "public"."fn_IsGuid";
CREATE OR REPLACE FUNCTION public."fn_IsGuid"(ValidateValue IN VARCHAR) RETURNS BOOLEAN AS $$
    BEGIN
        IF (regexp_matches(ValidateValue, '^\{?[0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9
            RETURN TRUE;
        ELSE
            RETURN FALSE;
        END IF;
    END;
$$ LANGUAGE plpgsql;
```