

Exopen Report 6 Report Developer Manual

Introduction

Terminology

- **EOR** is a shorthand for **Exopen Report**.
- **EWR** is a shorthand for **Exopen Web Reports**.
- **EOX6** is a collective term including both **Exopen Report 6** and **Exopen Web Reports 6**.
- **EOX4** is a collective term including both **Exopen Report 4** and **Exopen Web Reports 2.x**.

Sheet functions

Exopen Report 6 uses the Excel built-in function CHOOSE to specify the **Exo...**-functions in the Excel sheets, e.g.

- `=CHOOSE(1;"ExoListLoad";;"Contoso";A1:A34;A40:AA1000;"";"VERTICAL";"FALSE";"TRUE";"FALSE")`

For more details, see the section *ExoFunctions in EOX6* further down in this document.

Store functions

In Exopen Report 6 the **Exo...**Store functions need to call a stored procedure, which in turn requires an User Defined Type (UDT) set up to define the table-valued parameter. All the rows in the function input area are sent to the procedure at once, and in the procedure you can define how the data is to be handled.

See also the section *Creating store functions and associated procedure and UDT* section under the *Examples* section further down in this document.

Security Functions

By default, every report requires an **ExoProtect** function to be present. This function contains a hash value of the report's functions and query areas to prevent inadvertent and unauthorized modification of the report functionality and queries. The hash value of the function is updated when publishing the report, or when re-running the Function Wizard on it.

For those who create reports frequently, it can be convenient to enable the *Ignore ExoProtect* setting for the user so one doesn't have to update the **ExoProtect** function constantly during the report creation process.

Administrative Features

Use the menus under *Admin* to manage e.g.

- Settings: logging, default start page, default connection, etc.
 - Connections: Define the connections to data sources.
 - Groups: Manage the groups that users can belong to.
 - Users: Manage users and set what groups they are members of.
 - Document Permissions: Manage which users have access to which reports.
 - Dimensions: Define logical hierarchies of data, e.g. Cost Centers
 - Objects: Define dimension entries, e.g. specific Cost Centers.
 - Object Permissions: Manage which users have access to which Objects.
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Examples

Creating store functions and associated procedure and UDT

The following example demonstrates how the Store functions work. In the example we create a database containing a table, an User Defined Type (UDT), and a stored procedure. And we create a report that can read and write data from that table.

This example requires an instance of Microsoft SQL Server where you can create and modify databases.

1. Connect to the database instance with SQL Server Management Studio and create a new database with the name `ExampleSimpleBlog`
2. Create a table

```
CREATE TABLE [dbo].[Blog](
    [id] [int] IDENTITY(1,1) NOT NULL,
    [title] [nvarchar](100) NOT NULL,
    [content] [nvarchar](max) NOT NULL,
    [created] [datetime2](7) NOT NULL,
    [createdby] [nvarchar](100) NOT NULL,
    [modified] [datetime2](7) NULL,
    [modifiedby] [nvarchar](100) NULL
)
```

3. Create a table-valued User Defined Type (UDT)

```
CREATE TYPE [dbo].[BlogCreateUpdateDeleteType] AS TABLE(
    [id] [int] NULL,
    [title] [nvarchar](100) NULL,
    [content] [nvarchar](max) NULL,
    [created] [datetime2](7) NULL,
    [createdby] [nvarchar](100) NULL,
    [modified] [datetime2](7) NULL,
    [modifiedby] [nvarchar](100) NULL,
    [delete] [bit] NULL
)
```

4. Create a Stored Procedure

```
CREATE PROCEDURE [dbo].[BlogCreateUpdateDelete]
    @EosTableVariable AS dbo.BlogCreateUpdateDeleteType READONLY,
    @EosUserVariable AS NVARCHAR(100)
AS
BEGIN
    SET NOCOUNT ON;

    SET @EosUserVariable =
        SUBSTRING(@EosUserVariable,
            CHARINDEX('\', @EosUserVariable) + 1,
            LEN(@EosUserVariable) - CHARINDEX('\', @EosUserVariable) + 1)

    BEGIN /* MERGE statement for Insert/Delete/Update. */

    MERGE dbo.Blog AS t
    USING @EosTableVariable AS s
    ON (t.id = s.id)

    -- Insert new entries.
    WHEN NOT MATCHED BY TARGET
    THEN INSERT
    (
        title,
```

```

        content,
        created,
        createdby
    )
VALUES
(
    s.title,
    s.content,
    SYSDATETIME(),
    @EosUserVariable
)

-- Delete existing entries which have the Delete field set to 1.
WHEN MATCHED AND s.[delete] = 1
    THEN DELETE

-- Only update existing entries if the title and/or content has actually changed.
WHEN MATCHED AND (t.title <> s.title OR t.content <> s.content)
    THEN UPDATE
    SET
        t.title = s.title,
        t.content = s.content,
        t.modified = SYSDATETIME(),
        t.modifiedby = @EosUserVariable
;

END /* MERGE statement for Insert/Delete/Update. */

END

```

5. Add a connection in Exopen Report to this database.

- Start Excel, go to the Exopen Report tab, log in, and then under Admin, choose Connections.
- Add a connection with the name ExampleSimpleBlog whose connection string points to the above database.

6. Add a function for ExoClearArea in cell C20.

This function is for clearing the input/output range before running the Load function.

```
=CHOOSE(1;"ExoClearArea";;$C$26:$J$100;;;;;;)
```

7. Add a function for ExoListLoad in cell C20.

This function retrieves the data from the database table Blog and outputs it to the output area of C25:I100 on the sheet. The first row in the area is the column names.

```
=CHOOSE(1;"ExoListLoad";;"ExampleSimpleBlog";$C$1:$C$19;$C$25:$I$100;"";"VERTICAL";"FALSE";"TRUE")
```

- Insert the function's query in range C1:C19.

```

SELECT
b.id,
b.title,
b.content,
b.created,
b.createdby,
b.modified,
b.modifiedby
FROM
dbo.Blog AS b
ORDER BY
b.created DESC

```

8. Add a function for `ExoListStore` in cell E20.

This function calls the stored procedure named in the query area, `BlogCreateUpdateDelete` in this case and sends the data from the input area C26:J100 as a table valued variable typed as `BlogCreateUpdateDeleteType` to the procedure. The procedure then performs an `INSERT`, `UPDATE`, or `DELETE` based on the data.

The delete functionality is in this case achieved by having an explicit delete flag not part of the Store function's output. Set a 1 in the J column for the rows you want to delete.

```
=CHOOSE(1;"ExoListStore";;"ExampleSimpleBlog";$E$1:$E$19;$C$26:$J$100;BlogCreateUpdateDeleteType
```

- Insert the function's statement in range E1:E19.

```
dbo.BlogCreateUpdateDelete
```

Using this example Store report

1. Start by running *Load Data* so any data that is in the database table will be loaded into the report. The first time there is no data in the table so the output area will remain empty with the exception of the column headers.
2. On an empty row in the input area Enter a title in column D and some content in column E.
3. Run *Store Data*.
4. Run *Load Data*. Now the column C on the row has the ID value the row got in the database table, and column F has the creation timestamp, and column G has the username of the user who ran the Store Data that inserted this row.
5. Change the title and/or value in columns D and/or E, and run *Store Data* again.
6. Run *Load Data*. Column H has the modification timestamp, and column I has the username of the user who ran the Store Data that modified this row.
7. Set a 1 in column J on the row.
8. Run *Store Data*.
9. Run *Load Data*. Now the row has been deleted.
10. Now try adding multiple rows, editing, and deleting so you get a feel for how this works.

ExoFunctions in EOX6

General information

All ExoFunctions use the Excel function `CHOOSE` to contain the function arguments. The first argument (*Index_num*) is always 1 and the second argument (*Value1*) is always the name of the ExoFunction. This way Excel will always display the name of the ExoFunction in the cell, and it allows for EOX6 to identify the `CHOOSE` function as an ExoFunction. Third argument (*Value2*) and onward are specific to the ExoFunction in question.

Usually the third argument (*Value2*) is used for function versioning, that is, if breaking changes (e.g. function parameters have been added, removed, or changed meaning) have at some point been introduced to a function, the value in this argument can be used to have older behaviour. Most functions do not use this argument and in that case it should just be left empty.

If the function uses a connection to a data source, usually the connection name is placed in the fourth argument (*Value4*).

- `=CHOOSE(1, "ExoListLoad", ...)`
- `=CHOOSE(1, "ExoMatrixStore", ...)`
- `=CHOOSE(1, "ExoClearArea", ...)`

The most convenient way of creating these Exo-functions is by using the Function Wizard in Exopen Report 6. The following list specifies the function arguments if you are editing the Exo-functions using Excel's function editor.

Load Functions

ExoColumnLoad

CHOOSE function arguments for ExoColumnLoad

- Index_num: always 1
- Value1: always "ExoColumnLoad"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: Horizontal Range.
- Value7: *(not used)*
- Value8: Output operation.
- Value9: Autofill.
- Value10: Ignore minus.
- Value11: Hide trailing.
- Value12: Match warning.
- Value13: Hide empty.
- Value14: Trim output.
- Value15: Show zero.
- Value16: Round.
- Value17: Zero is empty.
- Value18: Unique values only.

ExoColumnReplaceLoad

CHOOSE function arguments for ExoColumnReplaceLoad

- Index_num: always 1
- Value1: always "ExoColumnReplaceLoad"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: *(not used)*

ExoGroupedListLoad

CHOOSE function arguments for ExoGroupedListLoad

- Index_num: always 1
- Value1: always "ExoGroupedListLoad"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Output area.
- Value6: *(not used)*
- Value7: Design area.
- Value8: Grouping levels
- Value9: Hide trailing.

ExoListLoad

Performs a query to the data source and outputs the result set to a list on the sheet.

CHOOSE function arguments for ExoListLoad

- Index_num: always 1
- Value1: always "ExoListLoad"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area. Range.
- Value5: Output area. Range.
- Value6: *(not used)*
- Value7: Output orientation. VERTICAL or HORIZONTAL
- Value8: Hide trailing rows. TRUE or FALSE
- Value9: Output headers. TRUE or FALSE
- Value10: Map headers. TRUE or FALSE

ExoMatrixLoad

CHOOSE function arguments for ExoMatrixLoad

- Index_num: always 1
- Value1: always "ExoMatrixLoad"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: Horizontal Range.
- Value7: *(not used)*
- Value8: Output operation.
- Value9: Autofill.
- Value10: Ignore minus.
- Value11: Hide trailing.
- Value12: Match warning.
- Value13: Hide empty.
- Value14: Trim output.
- Value15: Show zero.
- Value16: Round.
- Value17: Zero is empty.

ExoMatrixMultiLoad

CHOOSE function arguments for ExoMatrixMultiLoad

- Index_num: always 1
- Value1: always "ExoMatrixMultiLoad"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: Horizontal Range.
- Value7: Data values.
- Value8: Hide empty.
- Value9: Output operation.
- Value10: *(not used)*
- Value11: Round.
- Value12: Show zero.
- Value13: Match warning.
- Value14: Autofill.
- Value15: *(not used)*
- Value16: Ignore minus.
- Value17: *(not used)*.
- Value18: Pivot orientation.

ExoRowLoad

CHOOSE function arguments for ExoRowLoad

- Index_num: always 1
- Value1: always "ExoRowLoad"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: Horizontal Range.
- Value7: *(not used)*
- Value8: Output operation.
- Value9: Autofill.
- Value10: Ignore minus.
- Value11: Hide trailing.
- Value12: Match warning.
- Value13: Hide empty.
- Value14: Trim output.
- Value15: Show zero.
- Value16: Round.
- Value17: Zero is empty.
- Value18: Unique values only.

ExoSingleRecordLoad

CHOOSE function arguments for ExoSingleRecordLoad

- Index_num: always 1
 - Value1: always "ExoSingleRecordLoad"
 - Value2: *(not used)*
 - Value3: Connection name.
 - Value4: Query area.
 - Value5: Output area 1.
 - Value6: Output area 2.
 - Value7: Output area 3.
 - Value8: Output area 4.
 - Value9: Output area 5.
 - Value10: *(not used)*
-

Store Functions

ExoColumnStore

CHOOSE function arguments for ExoColumnStore

- Index_num: always 1
- Value1: always "ExoColumnStore"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: Horizontal Range.
- Value7: UDT name.

ExoListStore

CHOOSE function arguments for ExoListStore

- Index_num: always 1
- Value1: always "ExoListStore"

- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Input area.
- Value6: UDT name.

ExoMatrixStore

CHOOSE function arguments for ExoMatrixStore

- Index_num: always 1
- Value1: always "ExoMatrixStore"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: Horizontal Range.
- Value7: UDT name.

ExoRowStore

CHOOSE function arguments for ExoRowStore

- Index_num: always 1
 - Value1: always "ExoRowStore"
 - Value2: *(not used)*
 - Value3: Connection name.
 - Value4: Query area.
 - Value5: Vertical Range.
 - Value6: Horizontal Range.
 - Value7: UDT name.
-

Query Functions

ExoFormatValue

CHOOSE function arguments for ExoFormatValue

- Index_num: always 1
- Value1: always "ExoFormatValue"
- Value2: *(not used)*
- Value3: Input area.
- Value4: ODBC format.

ExoInfoSet

CHOOSE function arguments for ExoInfoSet

- Index_num: always 1
- Value1: always "ExoInfoSet"
- Value2: *(not used)*
- Value3: View name.

ExoInPermission

CHOOSE function arguments for ExoInPermission

- Index_num: always 1
- Value1: always "ExoInPermission"
- Value2: *(not used)*
- Value3: Dimension.

- Value4: Column name.
- Value5: Numeric.

ExoInQuery

CHOOSE function arguments for ExoInQuery

- Index_num: always 1
- Value1: always "ExoInQuery"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Numeric.
- Value6: True if empty.

ExoInRange

CHOOSE function arguments for ExoInRange

- Index_num: always 1
 - Value1: always "ExoInRange"
 - Value2: *(not used)*
 - Value3: Input area.
 - Value4: Numeric.
 - Value5: True if empty.
 - Value6: ExoInterval expression.
-

Input Functions

ExoInputCalendar

CHOOSE function arguments for ExoInputCalendar

- Index_num: always 1
- Value1: always "ExoInputCalendar"
- Value2: *(not used)*
- Value3: Print area.
- Value4: Description.
- Value5: Output area.
- Value6: Verify area.
- Value7: Function.
- Value8: Comparison area.
- Value9: On events.
- Value10: Warning message.
- Value11: Input tag.
- Value12: Input tag index.
- Value13: Edit mask.
- Value14: Include time component.

ExoInputFilter

CHOOSE function arguments for ExoInputFilter

- Index_num: always 1
- Value1: always "ExoInputFilter"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Print area.
- Value6: Description.
- Value7: Output area.

- Value8: Verify area.
- Value9: Function.
- Value10: Comparison area.
- Value11: On events.
- Value12: Warning message.
- Value13: Input tag.
- Value14: Input tag index.
- Value15: Input area.

ExoInputFilterMulti

CHOOSE function arguments for ExoInputFilterMulti

- Index_num: always 1
- Value1: always "ExoInputFilterMulti"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Print area.
- Value6: Description.
- Value7: Output area.
- Value8: Verify area.
- Value9: Function.
- Value10: Comparison area.
- Value11: On events.
- Value12: Warning message.
- Value13: Input tag.
- Value14: Input tag index.
- Value15: Input area.
- Value16: All message.

ExoInputText

CHOOSE function arguments for ExoInputText

- Index_num: always 1
 - Value1: always "ExoInputText"
 - Value2: *(not used)*
 - Value3: Print area.
 - Value4: Description.
 - Value5: Output area.
 - Value6: Verify area.
 - Value7: Function.
 - Value8: Comparison area.
 - Value9: On events.
 - Value10: Warning message.
 - Value11: Input tag.
 - Value12: Input tag index.
-

Other Functions

ExoActiveUser

CHOOSE function arguments for ExoActiveUser

- Index_num: always 1
- Value1: always "ExoActiveUser"
- Value2: *(not used)*
- Value3: User name output range.

ExoClearArea

CHOOSE function arguments for ExoClearArea

- Index_num: always 1
- Value1: always "ExoClearArea"
- Value2: *(not used)*
- Value3 up to and including Value12: Ranges to clear.
- Value13: Clear mode.
- Value14: Clear hyperlinks.

ExoDrillDown

CHOOSE function arguments for ExoDrillDown

- Index_num: always 1
- Value1: always "ExoDrillDown"
- Value2: *(not used)*
- Value3: From function area.
- Value4: Vertical Range.
- Value5: Horizontal Range.
- Value6: Workbook.
- Value7: Sheet.
- Value8 up to and including Value17: From ranges
- Value18 up to and including Value27: To ranges.
- Value28: Extra fields.
- Value29: Print area.

ExoFormatArea

CHOOSE function arguments for ExoFormatArea

- Index_num: always 1
- Value1: always "ExoFormatArea"
- Value2: *(not used)*
- Value3: Vertical range.
- Value4: Horizontal range.
- Value5: Orientation.
- Value6: Design area.

ExoHide

CHOOSE function arguments for ExoHide

- Index_num: always 1
- Value1: always "ExoHide"
- Value2: *(not used)*
- Value3: Input area.
- Value4: Hide empty.
- Value5: Zero is empty.

ExoHyperlink

CHOOSE function arguments for ExoHyperLink

- Index_num: always 1
- Value1: always "ExoHyperLink"
- Value2: *(not used)*
- Value3: Input ara.
- Value4: EWR address.

ExoListSummation

CHOOSE function arguments for ExoListSummation

- Index_num: always 1
- Value1: always "ExoListSummation"
- Value2: *(not used)*
- Value3: Trigger.
- Value4: Accumulation value.
- Value5: Summation printout value.
- Value6: Summation range.

ExoProtect

CHOOSE function arguments for ExoProtect

- Index_num: always 1
- Value1: always "ExoProtect"
- Value2: *(not used)*
- Value3: Checksum.

ExoPublish

CHOOSE function arguments for ExoPublish

- Index_num: always 1
- Value1: always "ExoPublish"
- Value2: *(not used)*
- Value3: Load on open.
- Value4: Load after Store.
- Value5: Hide rows.
- Value6: Hide columns.
- Value7: Freeze panes.
- Value8: Collapse groupings.
- Value9: Hide grid lines.
- Value10: Hide row/column headers.
- Value11: Protect sheet.
- Value12: Load default mode.
- Value13: Store default mode.
- Value14: Checksum query area.
- Value15: Checksum Store area.
- Value16: Ignore checksum Store area.

ExoTimeStamp

CHOOSE function arguments for ExoTimeStamp

- Index_num: always 1
- Value1: always "ExoTimeStamp"
- Value2: *(not used)*
- Value3: Output area.
- Value4: Date format.

ExoVerify

CHOOSE function arguments for ExoVerify

- Index_num: always 1
- Value1: always "ExoVerify"
- Value2: *(not used)*
- Value3: Input area.
- Value4: Function.
- Value5: Verify area.

- Value6: On events.
- Value7: Warning message.

ExoVerifyQuery

CHOOSE function arguments for ExoVerifyQuery

- Index_num: always 1
 - Value1: always "ExoVerifyQuery"
 - Value2: *(not used)*
 - Value3: Input area.
 - Value4: Connection name.
 - Value5: Query area.
 - Value6: On events.
 - Value7: Warning message.
 - Value8: Negate.
-

Compatibility functions for migration from EOX4

The Exopen Report 4 Import functions cannot be converted automatically to the Exopen Report 6 Store functions. When using the EOR6 *Convert EOX4 to EOX6* functionality, any EOX4 Import functions will be converted to these compatibility functions.

From a performance point of view, it is recommended to manually convert these functions to corresponding Store functions.

Note: Some of the function options may not be implemented.

ExoColumnImport

CHOOSE function arguments for ExoColumnImport

- Index_num: always 1
- Value1: always "ExoColumnImport"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: Horizontal Range.
- Value7: Update mode.
- Value8: Mark updated cells.
- Value9: Transactions off.
- Value10: Import from color.
- Value11: Ignore minus.
- Value12: Auto field ID.
- Value13: Special options.

ExoMatrixImport

CHOOSE function arguments for ExoMatrixImport

- Index_num: always 1
- Value1: always "ExoMatrixImport"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: Horizontal Range.
- Value7: Update mode.
- Value8: Mark updated cells.
- Value9: Transactions off.

- Value10: Import from color.
- Value11: Ignore minus.
- Value12: Auto field ID.
- Value13: Import from notes.
- Value14: Special options.

ExoRecordImport

CHOOSE function arguments for ExoRecordImport

- Index_num: always 1
- Value1: always "ExoRecordImport"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Import area.
- Value6: Field names.
- Value7: Orientation.
- Value8: No initial reset.
- Value9: Mark updated cells.
- Value10: Transactions off.
- Value11: Special options.

ExoRowImport

CHOOSE function arguments for ExoRowImport

- Index_num: always 1
- Value1: always "ExoRowImport"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Vertical Range.
- Value6: Horizontal Range.
- Value7: Update mode.
- Value8: Mark updated cells.
- Value9: Transactions off.
- Value10: Import from color.
- Value11: Ignore minus.
- Value12: Auto field ID.
- Value13: Special options.

ExoSingleRecordImport

CHOOSE function arguments for ExoSingleRecordImport

- Index_num: always 1
- Value1: always "ExoSingleRecordImport"
- Value2: *(not used)*
- Value3: Connection name.
- Value4: Query area.
- Value5: Import area.
- Value6: Field names.
- Value7: Orientation.
- Value8: No initial reset.
- Value9: Mark updated cells.
- Value10: Transactions off.
- Value11: Special options.