



Basics of Stored Procedures

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What is a stored procedure?

- ▶ Name of the procedure

```
CREATE PROCEDURE [dbo].[RP_SEATING_BOOK_RPT](
```

- Usually the procedure will have:

- ▶ One or more inputs (parameters)
- ▶ One output (result set)

```
create procedure [dbo].[LWP_TNEW_EBulletin]  
( @sessionkey varchar(64) = null, -- session ke  
  @line_id varchar(50) = null , -- documentation s  
  @EBulletinOptIn varchar(255)= null  
  ) -- line item id is always pro
```

```
Select s.seat_no,  
       o.customer_no,  
       name = CASE WHEN o.customer_no = 0 THEN '(General Public)' ELSE d.display_name END,  
       sort_name = CASE WHEN o.customer_no = 0 THEN '(General Public)' ELSE d.sort_name END
```

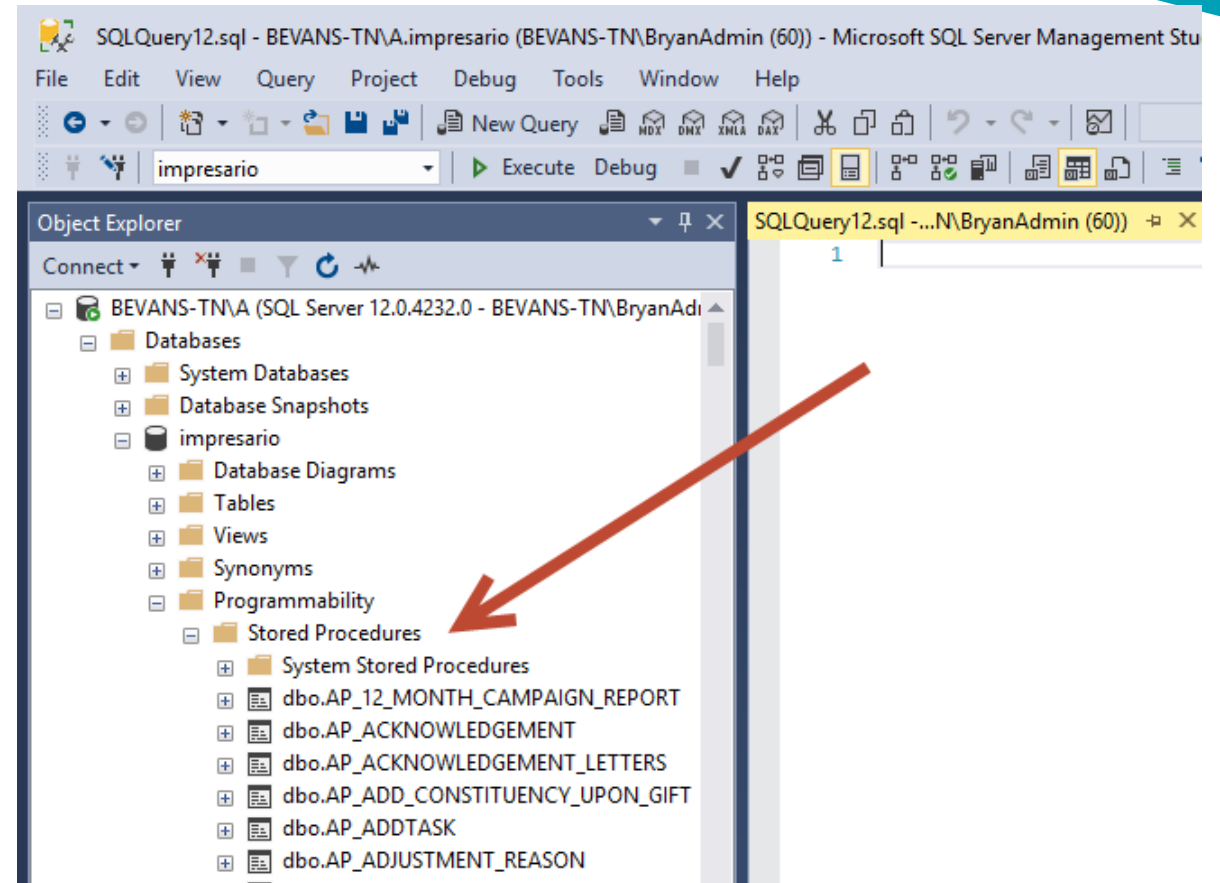
How are they used?

- In SQL Server Management Studio (SSMS)
- By our application
 - ▶ Updating data in your database
 - For example, in the table LTR_TNEW_CUSTOM_FORM_SAVE_DATA for TNEW form data having it call a stored procedure to add in attribute data
 - Importing data from other systems for contributions, or orders
 - ▶ Report(s) – Like a custom SQL Server Reporting Services (SSRS), to provide insight into your data
- Scheduled SQL Agent jobs – on going data maintenance

Where can I find a stored procedure?

- SQL Server Management Studio (SSMS)
 - ▶ Object Explorer
 - Databases > {database}* > Programmability > Stored Procedures

*for our purposes, usually impresario



Why do the names start like that?

- Naming Conventions specific to impresario (Tessitura) database

AP_ Mostly Constituent/Fundraising

RP_ Reports

TP_ Mostly Ticketing

UP_ Utility Procedures

WP_ Web API

LP_ Local procedures

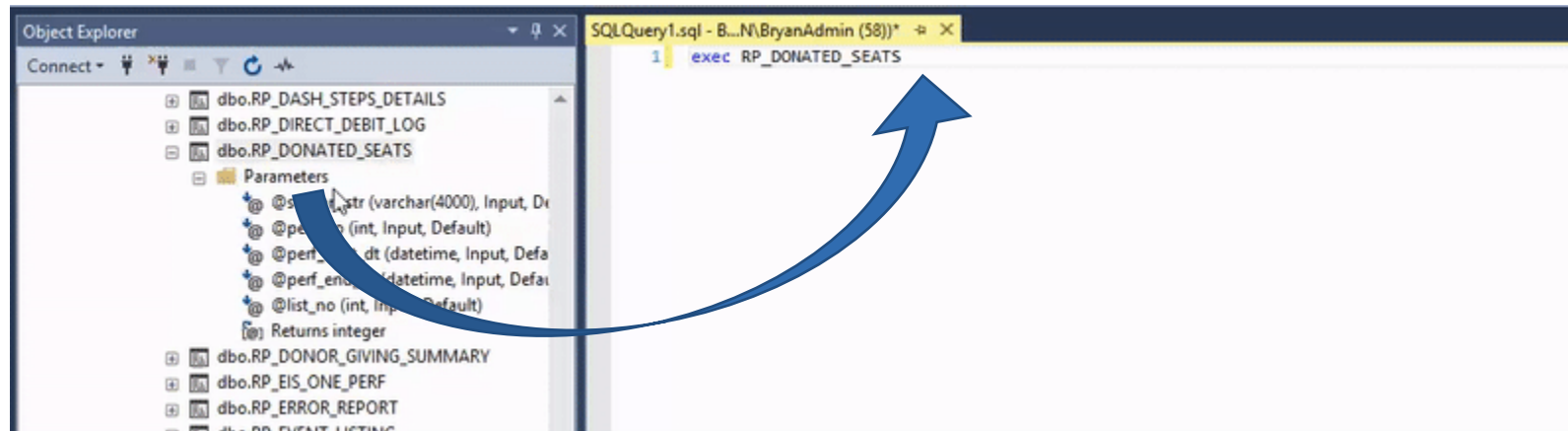
Who can run one?

- Administrators
- Groups granted permissions
 - ▶ ImpUsers
 - ▶ tessitura_app

How do I run a stored procedure?

- Use EXEC/EXECUTE
- Parameters can be named or ordered
 - ▶ Named in the execution statement
 - Can be in any order
 - Can exclude parameters with default values
 - `exec RP_DONATED_SEATS @season_str = NULL, @perf_no = 38264, @perf_start_dt = NULL, @perf_end_dt = NULL, @list_no = NULL`
 - `exec RP_DONATED_SEATS @perf_no = 38264`
 - ▶ Ordered
 - Must be in the same order as created in the procedure
 - Can exclude parameters with default values only if they come after specified values
 - `exec RP_DONATED_SEATS NULL, 38264`

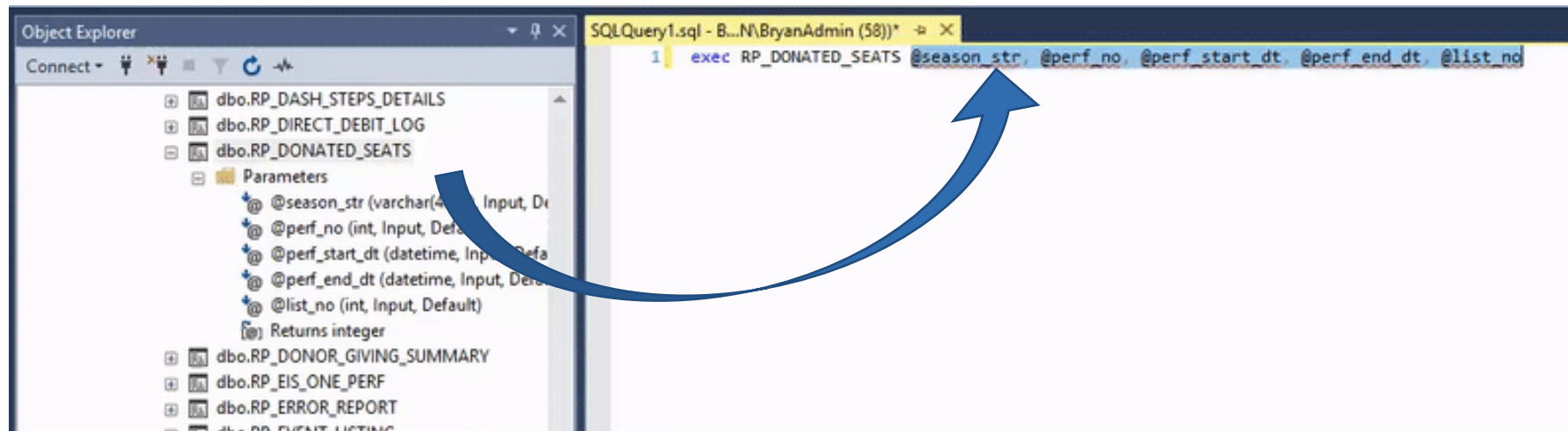
Hint for running a stored procedure:



- List of parameters can be pulled from Object Explorer

Hint for running a stored procedure:

- List of parameters can be pulled from Object Explorer



- Just drag and drop!
- Then add in values.

Scheduling stored procedures

- I have a procedure that I want to run every hour, how can I do that?
 - ▶ Report scheduler within Tessitura, if it is a report
 - ▶ SQL Server Agent jobs
 - This allows procedures to be run on a schedule without having to create a report

Creating a Procedure



Structure of a stored procedure script

- Beginning
 - ▶ Create/Alter statement
 - ▶ Name -
 - ▶ Parameters

```
CREATE PROCEDURE [dbo].[LRP_SEATING_BOOK_RPT](  
    @season_no_str varchar(4000) = null,  
    @perf_no int = NULL,  
    @perf_start_dt datetime = NULL,  
    @perf_end_dt datetime = NULL,  
    @section_str varchar(4000) = null,  
    @gen_public int = 1, -- 1 (yes) or 2 (no)  
    @list_no int = null,  
    @list_acts_upon int = 1)
```

Structure of a stored procedure script

- Notes

- ▶ Comment Block

- ▶ `exec LRP_SEATING_BOOK_RPT @perf_start_dt = '1/1/2017', @perf_end_dt = '6/1/2017', @season_no_str = '2'`

```
Set NoCount On
```

```
/*  
*****  
*/
```

```
New Procedure 9/22/2000 by CWR based on SQL by S. Dorey for Seating Book Report  
Shows only seats that have been sold
```

```
Modified 11/15/2005 - LB Changed the sortname to handle null values in the lname and fname
```

```
Modified CWR 1/21/2006 -- added owner name to table references
```

```
Modified RCreps 4/6/2007 -- removed unnecessary join to TR_SEAT_STATUS in result set.
```

Structure of a stored procedure script

- Code
 - ▶ Processing
 - ▶ Select statement

```
Declare @tsections Table (id int null, description varchar(30) null)

If @list_no > 0 and not exists (Select * From [dbo].VS_LIST Where list_no = @list_no)
Begin
    RAISERROR('Invalid List (list_no).', 11, 2) WITH SETERROR
    RETURN
End
```

```
Select s.seat_no,
       o.customer_no,
       name = CASE WHEN o.customer_no = 0 THEN '(General Public)' ELSE d.display_name END,
       sort_name = CASE WHEN o.customer_no = 0 THEN '(General Public)' ELSE d.sort_name END,
       sli.order_no,
       section = sc.description,
       s.seat_row,
       s.seat_num,
       sublineitem_status = slis.description,
       package_or_single = Case When sli.pkg_no > 0 then 'Package' Else 'Single' End,
       pricetypecategory = ptc.description
From [dbo] tx_perf_seat ps (NOLOCK)
     JOIN [dbo] t_sub_lineitem sli (NOLOCK) ON ps.sli_no = sli.sli_no
```

Structure of a stored procedure script

- Permission

- ▶ Grant Permission

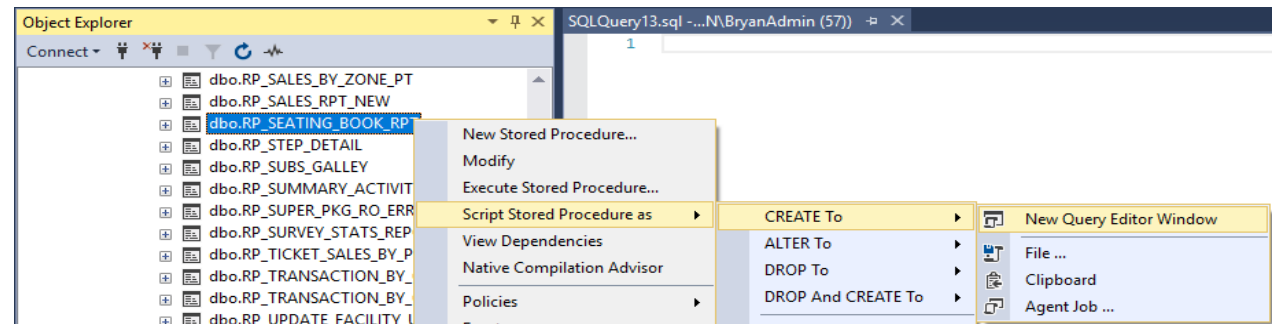
```
GRANT EXECUTE ON [dbo].[RP_SEATING_BOOK_RPT] TO [ImpUsers]  
GO
```

 - Only needed for creating the procedure
- ▶ Save you SQL file to your organization code repository.
 - This is key so that if you are working in your test environment and there is a live to test completed, you are able to redeploy this new stored procedure.

Creating a procedure from an existing procedure

- Easiest to create from an existing procedure that is similar output to what you want to create

- ▶ Right click procedure in Object Explorer
- ▶ Script Stored Procedure as > CREATE To > New Query Editor Window



- Change the name, parameters, and body
- Best Practice:
 - ▶ Add schema to the front of the procedure.
 - Impresario database for custom procedure(s) it is usually dbo
 - It is best practice to do this development in either **your test or dev environment** first, and confirm it is working as expected, before deploying to your production.

Creating a procedure from an existing procedure

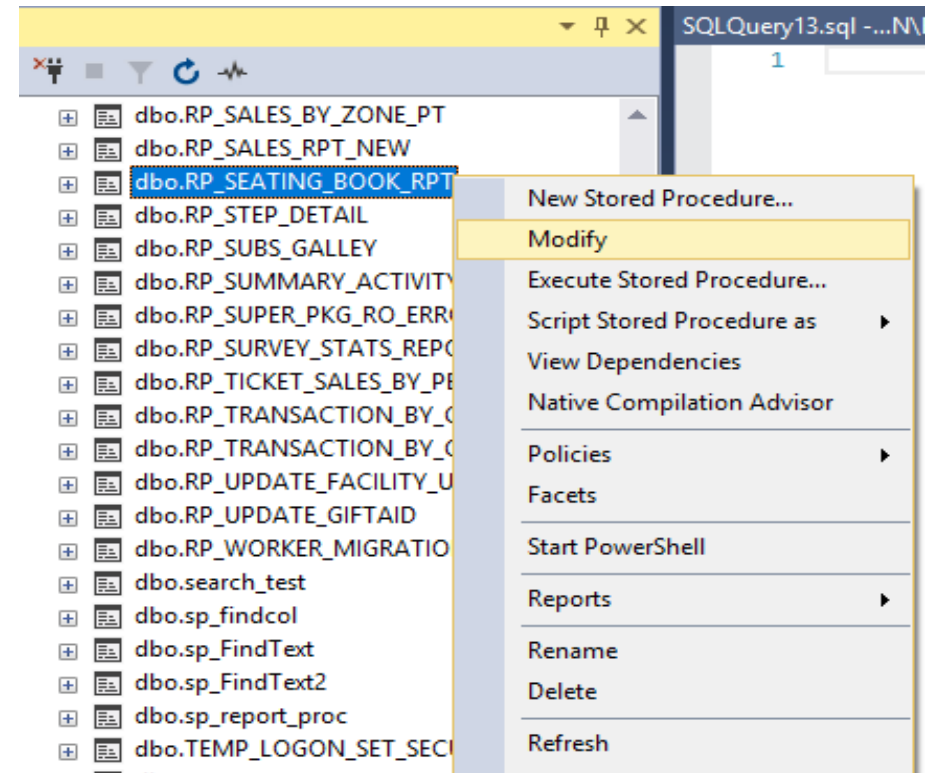
- Add permissions
- Execute the script, this will save the procedure on the database
- Save your procedure file following your organization code repository process
- To save to a specific location click on the save as and saving it in your desired location.

Modifying a procedure

- Find in SSMS Object Explorer for your Custom Procedure
 - ▶ Right click
 - ▶ Modify

IMPORTANT NOTE

- You should never modify a standard procedure
 - ▶ Instead, create a local copy of the procedure with an LP_ prefix and utilize that one instead



Parameters

- Declaration

```
(@parameter1 datatype,  
@parameter2 datatype)
```

- Parameter defaults

```
@parameter3 datatype = default value
```

```
create procedure [dbo].[LWP_TNEW_EBulletin]  
( @sessionkey varchar(64) = null, -- session key  
  @line_id varchar(50) = null , -- documentation s  
  @EBulletinOptIn varchar(255)= null  
  ) -- line item id is always pro
```

Reading Uncommitted

- Syntax

SET TRANSACTION ISOLATION LEVEL READ UNCOMMITTED

- What it does

- ▶ Allows the procedure to read data that another user might be modifying
- ▶ Allows other users to update data that the procedure might be reading

- May improve performance

- Like setting NOLOCK for the entire procedure

Set NoCount On

- What it does
 - ▶ Prevents SQL from tracking and outputting the number of rows affected by each statement in the procedure
- Benefit: Improves performance
- Best Practice: Put at start of every procedure*

*It can sometimes be helpful to see these counts if the procedure is altering data. Leave NoCount off only selectively.

Variables

- Scalar Variables
 - ▶ This is the used to stored specific data values to be used with in the stored procedure
 - `Declare @variable_name datatype`
- Table like Objects within the stored procedure to allow data manipulation
 - ▶ Table Variables
 - Creates table like object with in the stored procedure; good for smaller data sets
 - `Declare @table_var_name table (columns)`
 - ▶ Temp Tables
 - Creates table like object with in the stored procedure to use, acts like a standard table with in the stored procedure; good for larger data sets
 - `Create table #temp_table_name (columns)`

Conditional Processing

- If boolean_statement
 - ▶ Executes if statement is true
 - ▶ Followed by Begin
 - ▶ Executes until End
 - ▶ Begin/End not required with only one statement
 - Best practice: include anyway
- Else
 - ▶ Executes if statement is false
 - ▶ Also uses Begin/End

```
If @keep_base = 'Y'  
Begin  
    Insert dbo.T_LIST_CONTENTS (list_no, customer_no)  
    Select Distinct @list_no, customer_no  
    From #result  
    Where customer_no > 0  
End  
Else  
Begin  
    Insert dbo.T_LIST_CONTENTS (list_no, customer_no)  
    Select Distinct @list_no, customer_no  
    From #result  
    Where Not exists  
        (select * from #assoc where base_customer_no = #result.customer_no  
         and customer_no > 0)  
End
```

Handling lists with charindex

- Definition - “Returns the starting position of the specified expression in a character string.” - SQL Server help
- Syntax
 - ▶ Charindex(string_to_find, string_to_search)
- Example of use with delimited list
 - ▶ charindex(',' + convert(varchar, id) + ', ', ',' + @campaign_no + ',') > 0
 - ▶ This can be used when you have a parameter string like campaign id, so that a user can pick multiple campaign(s) in the report, and then it is passed through the stored procedure pull in just those campaign(s)
- If you don't remember the syntax, find a procedure that uses a list and copy the code, but here is an example from RP_CAMPAIGN_GIVING_COMPARISON

```
Insert into @gp1_campaign (campaign_no, description, fyear)
Select campaign_no, description, fyear
From [dbo].vs_campaign
Where charindex(',' + convert(varchar,campaign_no) + ', ', ',' + @group1_campaign_str + ',') > 0
```

Column Naming

- 2 syntaxes for column naming
 - ▶ `Select something AS column_name`
 - ▶ `Select column_name = something`
- The first is more standard now

Formatting Code

- When writing your stored procedure
 - ▶ Try to format it so that you can read it later
 - ▶ Avoid using select *

Example: We want to see only customer_no, perf_no, and activity_no

```
select * from T_CUST_ACTIVITY ca
join t_customer a on ca.customer_no = a.customer_no
where ca.activity_type = 3
```

Instead write it like this:

```
select ca.customer_no, ca.perf_no, ca_activity_no from T_CUST_ACTIVITY ca
join t_customer a on ca.customer_no = a.customer_no
where ca.activity_type = 3
```

Formatting Code

- When writing your stored procedure
 - ▶ Try to format it so that you can read it later
 - ▶ Avoid using select *
 - Instead, write out the columns that you are selecting
 - ▶ Include comments, as they are helpful when you have to make changes later
 - ▶ When joining multiple tables, use an alias to represent the table in the select process

Examples of creating a stored procedure

Customizing a procedure

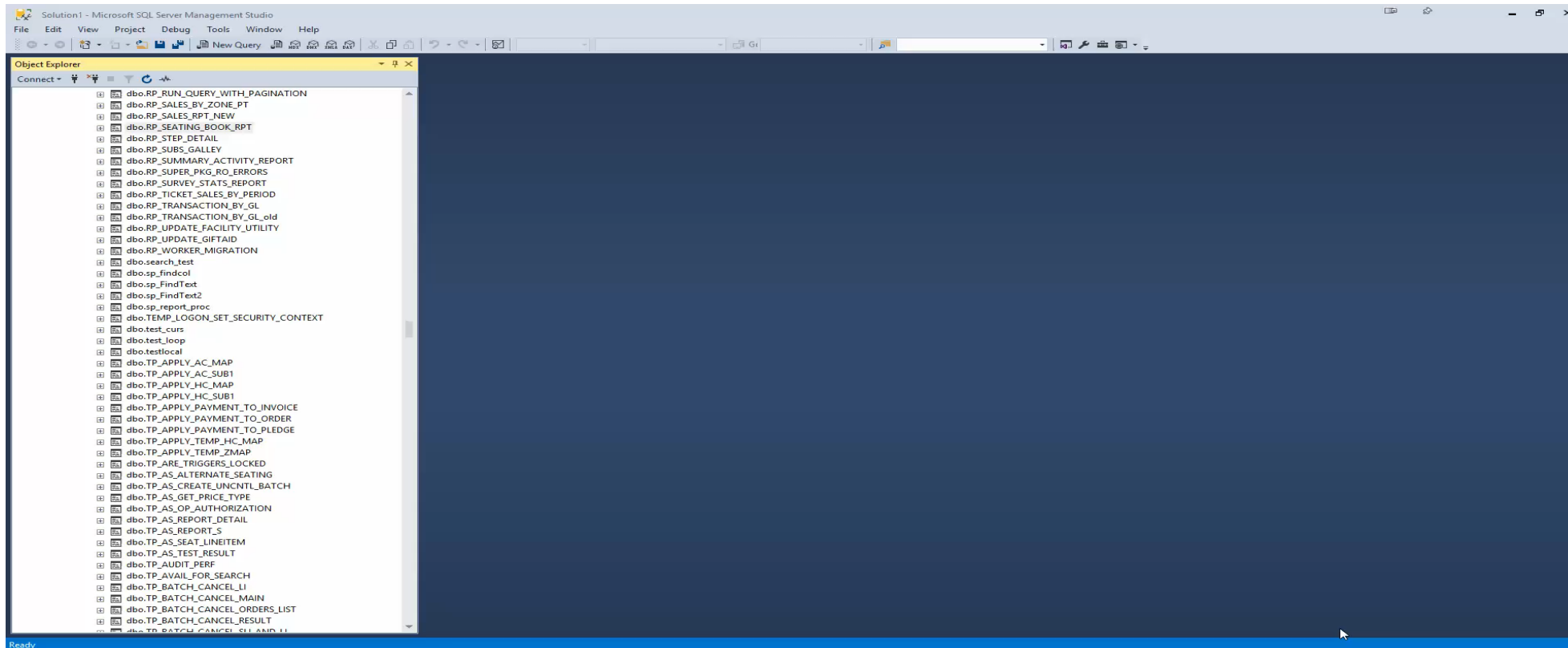
RP_SEATING_BOOK_RPT

- Add Order notes
- Add Mode of Sale Description
- Does the customer have a CSI?

Customizing a procedure – example

RP_SEATING_BOOK_RPT

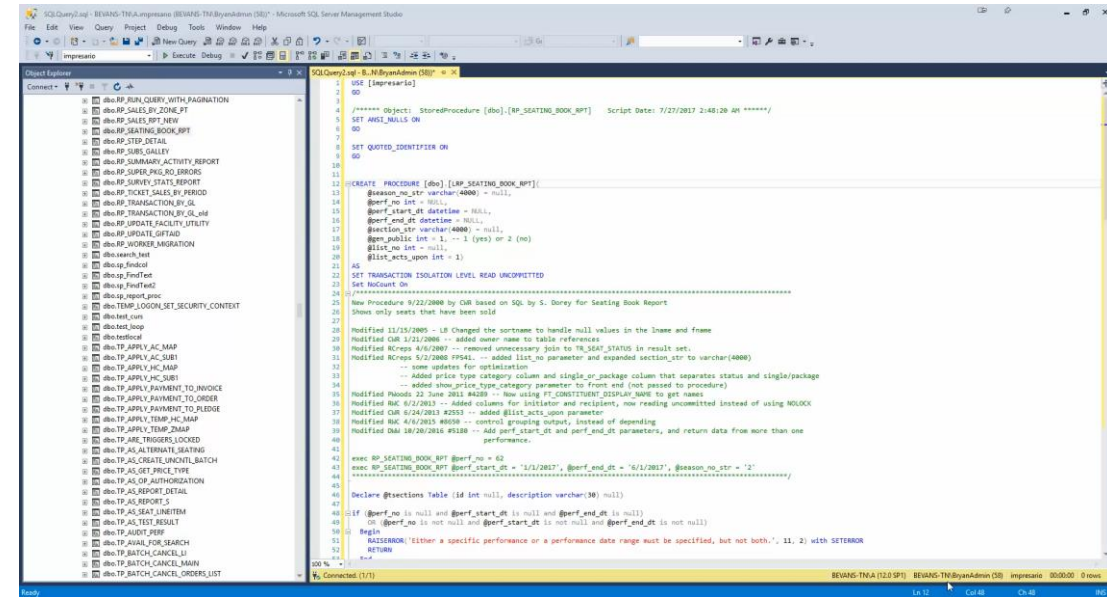
- First rename the stored procedure



Customizing a procedure – example

LRP_SEATING_BOOK_RPT

- Add Order notes
- Add Mode of Sale Description
- Does the customer have a CSI?



```
1 USE [Impresario]
2 GO
3
4 ***** Object: StoredProcedure [dbo].[LRP_SEATING_BOOK_RPT]   Script Date: 7/27/2017 2:46:28 AM *****
5 SET ANSI_NULLS ON
6 GO
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8 SET QUOTED_IDENTIFIER ON
9 GO
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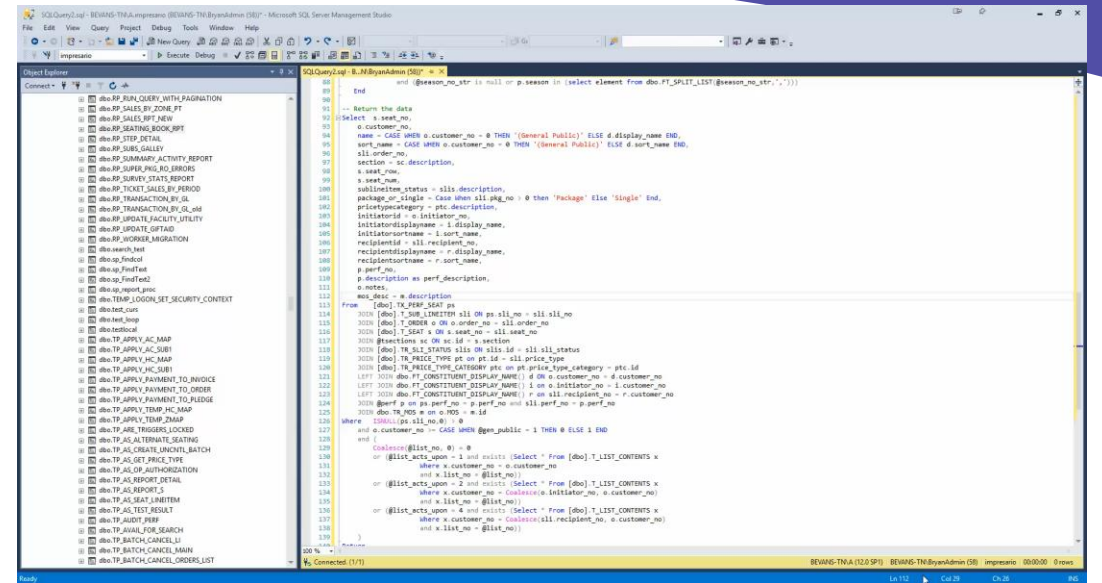
```


Customizing a procedure – example

LRP_SEATING_BOOK_RPT

- Add Order notes
- Add Mode of Sale Description
- Does the customer have a CSI?
 - ▶ Table: T_CUST_ACTIVITY
- Solution – Add to select clause:

```
has_csi = Case When Exists(Select ca.customer_no from T_CUST_ACTIVITY ca
                          Where ca.customer_no = o.customer_no
                          And ca.perf_no = @perf_no)
Then 'yes' else 'no' end
```



Helpful Stored Procedures – not just for reports

- Create a stored procedures to help find information on the database objects
 - ▶ Say you need to change a local table column name, and want to know what procedures might be impacted
 - If you create a procedure that queries the sys.objects table this can be done by simply calling that stored procedure
 - ▶ You need to find what stored procedures are being used by a SSRS reports
 - Instead of going to SSRS and looking report by report, you can create a stored procedure to look for this information

Helpful Stored Procedures – example

```
1 .exec lrp_ssrs_find  
2 .exec lrp_ssrs_find @report_name = 'CampaignGivingComparison'
```

100 %

Results Messages

	reportname	datasetname	datasourcename	sname
1	CampaignGivingComparison	SetSecurityContext	TessituraDB	EXEC AP_SET_SESSION_CONTEXT @UserId, @UserGroup
2	CampaignGivingComparison	CampaignGivingComparison	TessituraDB	RP_CAMPAIGN_GIVING_COMPARISON_NEW

Helpful Notes and Q/A



Stored Procedures vs. Functions

Stored Procedures	Functions
May or may not return values	Must return values
Can update data	Cannot update data
Can use transactions	Cannot use transactions
Allow try/catch blocks	Do not allow try/catch blocks
Can use temporary tables (as well as table variables and common table expressions)	Can only use table variables and common table expressions (no temporary tables)
Can call functions and other stored procedures	Can call other functions but not stored procedures
Cannot be called from a SELECT statement (must use EXEC statement)	Can be called from a SELECT statement

Additional Resources

- Internet resources for stored procedure(s)
- Other Community members
- While not covered in this presentation, another way to update and access data is an endpoint in the API. You can find documentation and training video for the Tessitura API here,
<https://www.tessituranetwork.com/en/Support/Documentation/API>

Additional Resources

- Tessitura Network
 - ▶ Basics of Stored Procedures
(https://www.tessituranetwork.com/en/Items/Videos/Training/Basics_Stored_Procedures)
- Custom Report Setup document
- Localized Procedures document

Additional Resources

Sample Local Procedure for Updating Contact Point Purpose via TNEW form. This was developed in v15 environment. Code is included in PDF version.

Sample Stored Procedure

SSRS Procedure:

```
USE [impresario]
GO
/***** Object: StoredProcedure [dbo].[LWP_TNEW_OPT_IN]  Script Date: 1/27/2023 7:30:22 AM *****/
SET ANSI_NULLS ON
GO
SET QUOTED_IDENTIFIER ON
GO
```

```
create procedure [dbo].[LWP_TNEW_SAMPLE]
( @sessionkey varchar(64) = null,-- session key is always provided by TNEW
  @line_id varchar(50) = null , -- documentation says this a required parameter but I'm not passing anything
  @EBulletinOptIn varchar(255)= null
)
```

```
as
set nocount on
/*****
2023-01-27 Jeanette Boudjouk, Sample to update contact permission from TNEW for specific element.
Updating only for the record id coming in, not for the associated household record.
If the value is already set to 'N' then we are not updating,
so the only action needed is an insert or update for a null value
This is for v15 environment
```

```
grant exec on LWP_TNEW_SAMPLE to impusers
grant exec on LWP_TNEW_SAMPLE to tessitura_app
```

```
select * from TR_LOCAL_PROCEDURE
Need to add to TR_LOCAL_PROCEDURE, can do it either with in the application, or update the query below with the new ID value
```

```
insert TR_LOCAL_PROCEDURE ( id, description, procedure_name, inactive)
values (new_id value, 'LWP_TNEW_SAMPLE', 'LWP_TNEW_SAMPLE', 'N') -- this is a sample
```

```
-- this is for customer need to find the correct XXXX value from t_web_session_session
Sample Testing internal with in Tessitura
exec LWP_TNEW_SAMPLE need value for t_web_session_session
@sessionkey = '', --- from t_web_session_session sessionkey
@line_id = null ,
@EBulletinOptIn = 'Sign me up for the weekly schedule and updates on series and events'
```

```
*****/
```

2nd section of Stored Procedure Sample

```
*****/

Declare @errmsg varchar(200)
,@customer_no int
,@update_needed int
,@no_update int
-- validate sessionkey parameter
If @sessionkey is null OR not exists (select * from t_web_session_session where sessionkey = @sessionkey)
Begin
select @errmsg = 'Invalid Session ID'
RAISERROR(@errmsg,11, 2) WITH SETERROR
return -101
End

set @customer_no = (select MAX(customer_no) from t_web_session_session where sessionkey = @sessionkey)
set @update_needed = coalesce ((select 1 from tx_cust_contact_perm_type where customer_no = @customer_no and type_id = 6 and answer is null ), 0)
set @no_update = coalesce ((select 1 from tx_cust_contact_perm_type where customer_no = @customer_no and type_id = 6 and answer is not null ), 0)

--select @customer_no, @update_needed, @no_update

if len(isnull(@EBulletinOptIn,"")) > 0 and @customer_no is not null and @update_needed = 0 and @no_update = 0

begin

insert tx_cust_contact_perm_type ( answer, customer_no, last_asked_dt, type_id )
select 'Y',@customer_no, getdate(), 6 ---- this is the contact permission you want to add if true

end

if len(isnull(@EBulletinOptIn,"")) > 0 and @customer_no is not null and @update_needed = 1 and @no_update = 0
Begin
update [tx_cust_contact_perm_type]
set answer = 'Y', last_asked_dt = getdate()
where customer_no = @customer_no and [type_id] in (6) --- this is the contact permission you want to update if true
and answer is null
End
```