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Kanwardeep Singh Gill
November 24, 2014   3 minute read

Multi-Level Expansion with GET_EXPANDED_ENTITYSET

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This blog is based on the idea of expanding Entities linked with Multi-Level Navigation Properties(A->B->C->D) in a single Gate Way framework call.

To get an idea of expanding multiple entities linked with Navigation property in a single ENTITYSET call with $EXPAND, refer to my recent blog at Expand Parent Child Entities in a Single Expansion – GET_EXPANDED_ENTITYSET.

Consider below entity relation ship ENTITY A -> ENTITY B-> ENTITY C linked with Navigation properties Entity A to Entity B = AB and Entity B to Entity C = BC. With this blog I am trying to fetch data for all the entities A, B and C in a single call of the gateway framework using below URI call where A is linked to B and B is linked to C via a navigation property. This is like an INNERJOIN on the interrelated Entities linked via navigation properties:

/sap/opu/odata/sap/zmultilevel_exp_srv/EntitySetA?$expand=AB/BC,

this would return data for entity A, B and C in a single Gateway Framework Call which would otherwise be achieved with below 2 Odata Calls:

/sap/opu/odata/sap/zmultilevel_exp_srv/EntitySetA?$expand=AB

/sap/opu/odata/sap/zmultilevel_exp_srv/EntitySetB?$expand=BC

In above entity expansion, you could always use filters based on the entities A and B, However, the way you access the various properties of entities A and B is slightly different.
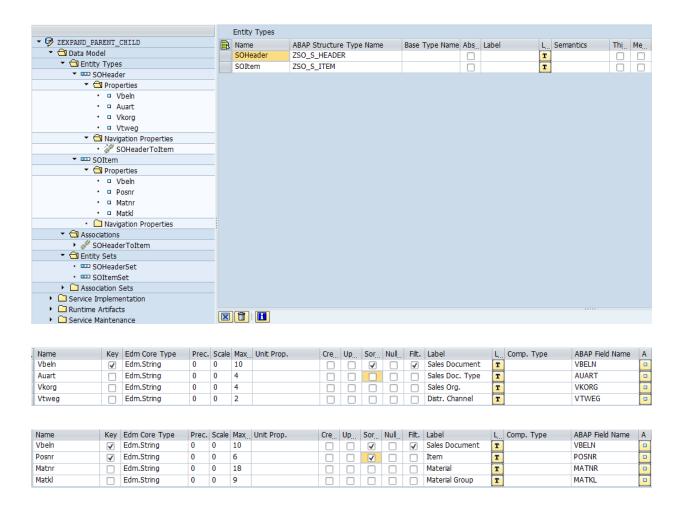
Say you want to filter data result on the basis of property X of entity A, the above link would be represented as /sap/opu/odata/sap/zmultilevel_exp_srv/EntitySetA?$expand=AB/BC&$filter=X eq <Filter Value>.

However, if you want to filter result set based on property Y of entity B, the link would be represented as

/sap/opu/odata/sap/zmultilevel_exp_srv/EntitySetA?$expand=AB/BC&$filter=AB/Y eq <Filter Value>.

We will consider above situations with the help of Sales Order Data linked with entity relations SalesOrder Header -> Sales Order Items ->Sales Order Schedule Lines

Consider below Entity Structures and Navigation Properties:

Name	Key	Edm Core Type	Prec.	Scale	Max	Unit Prop.	Cre...	Up...	Sor...	Null...	Filt.	Label	L...	Comp. Type	ABAP Field Name	A
Vbeln	✓	Edm.String	0	0	10		☐	☐	✓	☐	✓	Sales Document	T		VBELN	☐
Auart	☐	Edm.String	0	0	4		☐	☐	☐	☐	☐	Sales Doc. Type	T		AUART	☐
Vkorg	☐	Edm.String	0	0	4		☐	☐	☐	☐	☐	Sales Org.	T		VKORG	☐
Vtweg	☐	Edm.String	0	0	2		☐	☐	☐	☐	☐	Distr. Channel	T		VTWEG	☐

Name	Key	Edm Core Type	Prec.	Scale	Max	Unit Prop.	Cre...	Up...	Sor...	Null...	Filt.	Label	L...	Comp. Type	ABAP Field Name	A
Vbeln	✓	Edm.String	0	0	10		☐	☐	✓	☐	✓	Sales Document	T		VBELN	☐
Posnr	✓	Edm.String	0	0	6		☐	☐	✓	☐	☐	Item	T		POSNR	☐
Matnr	☐	Edm.String	0	0	18		☐	☐	☐	☐	☐	Material	T		MATNR	☐
Matkl	☐	Edm.String	0	0	9		☐	☐	☐	☐	☐	Material Group	T		MATKL	☐

Properties

Name	Key	Edm Core Type	Prec.	Scale	Max	Unit Prop.	Cre	Up	Sor	Null	Filt.	Label	L	Comp. Type	ABAP Field Name
Vbeln	✓	Edm.String	0	0	10		☐	☐	☐	☐	✓	Sales Document	T		VBELN
Posnr	✓	Edm.String	0	0	6		☐	☐	☐	☐	✓	Item	T		POSNR
Etenr	✓	Edm.String	0	0	4		☐	☐	☐	☐	✓	Schedule Line	T		ETENR
Edatu	☐	Edm.DateTime	8	0	0		☐	☐	☐	☐	✓	Delivery Date	T		EDATU
Bmeng	☐	Edm.Decimal	13	3	0		☐	☐	☐	☐	☐	Confirmed Qty	T		BMENG
Wmeng	☐	Edm.Decimal	13	3	0		☐	☐	☐	☐	☐	Order quantity	T		WMENG

Associations

Name	E	Principal Entity	Principal Entity Cardinality	Dependent Entity	Dependent Entity Cardinality
SOHeaderToItem		SOHeader	N	SOItem	M
SOItemToSchdLn		SOItem	M	SOItemSchdLn	N

Navigation Properties

Name	Relationship Name	Label
SOHeaderToItem	SOHeaderToItem	Sales Order Header to Items

Name	Relationship Name	Label
SOItemToSchdLn	SOItemToSchdLn	Sales Order Item to Schedule Lines

Redefine GET_EXPANDED_ENTITYSET as explained in the attached snapshot.

```abap
METHOD /iwbep/if_mgw_appl_srv_runtime~get_expanded_entityset.
  DATA: lt_soheadertoitemstoschdlns TYPE STANDARD TABLE OF zso_s_headertoitemtoschdlines,
        lt_vbak TYPE STANDARD TABLE OF zso_s_header,
        lt_vbap TYPE STANDARD TABLE OF zso_s_item,
        lt_vbep TYPE STANDARD TABLE OF zso_s_schedulelines.
  DATA: ls_vbak TYPE zso_s_header,
        ls_vbap TYPE zso_s_item,
        ls_vbep TYPE zso_s_schedulelines,
        ls_headertoitemtoschdln TYPE zso_s_headertoitemtoschdlines.
  DATA: lv_techname TYPE string.

  IF is_paging-top IS NOT INITIAL.
    SELECT vbeln auart vkorg vtweg FROM vbak
      UP TO is_paging-top ROWS INTO TABLE lt_vbak.
  ELSE.
    SELECT vbeln auart vkorg vtweg FROM vbak
      UP TO 100 ROWS INTO TABLE lt_vbak.
  ENDIF.

  IF lt_vbak IS NOT INITIAL.
    SELECT vbeln posnr matnr matkl FROM vbap INTO TABLE lt_vbap
      FOR ALL ENTRIES IN lt_vbak WHERE vbeln = lt_vbak-vbeln.
    IF sy-subrc = 0.
      SELECT vbeln posnr etenr edatu bmeng wmeng FROM vbep INTO TABLE lt_vbep
        FOR ALL ENTRIES IN lt_vbap WHERE vbeln = lt_vbap-vbeln AND posnr = lt_vbap-posnr.
    ENDIF.
  ENDIF.


  LOOP AT lt_vbak INTO ls_vbak.
    MOVE-CORRESPONDING ls_vbak TO ls_headertoitemtoschdln.

    LOOP AT lt_vbap INTO ls_vbap WHERE vbeln = ls_vbak-vbeln.
      APPEND ls_vbap TO ls_headertoitemtoschdln-soheadertoitem.
    ENDLOOP.
```

```
    LOOP AT lt_vbep INTO ls_vbep WHERE vbeln = ls_vbak-vbeln.
      APPEND ls_vbep TO ls_headertoitemtoschdln-soitemtoschdln.
    ENDLOOP.

    APPEND ls_headertoitemtoschdln TO lt_soheadertoitemstoschdlns.
    CLEAR ls_headertoitemtoschdln.
  ENDLOOP.

* Tell the framework not to expand the Child Entity for Sales Order Items
  lv_techname = 'SOHEADERTOITEM/SOITEMTOSCHDLN'.
  APPEND lv_techname TO et_expanded_tech_clauses.


* Create Data Reference to Output
  copy_data_to_ref( EXPORTING is_data = lt_soheadertoitemstoschdlns
                    CHANGING  cr_data = er_entityset ).
ENDMETHOD.                    "/IWBEP/IF_MGW_APPL_SRV_RUNTIME~GET_EXPANDED_ENTITYSET
```

The catch here is that, we have to tell the GW framework that we have expanded the Header, Item and Schedule Line entities in a single entity set call and no need to call the child entity set to fetch the the Sales Order Items and Sales Order Schedule Lines. **We can do this using parameter ET_EXPANDED_TECH_CLAUSES of GET_EXPANDED_ENTITYSET. Append both the Navigation Property Name(SOHEADERTOITEM/SOITEMTOSCHDLN) in this exporting parameter, which will tell the gate way framework that the child entity has already been expanded and there is no need to call the child entity sets.**

An important point to not here is that the structure of the output entity set should have fields with Name same as Navigation Property Name(SOHEADERTOITEM and SOITEMTOSCHDLN). Check structure below.
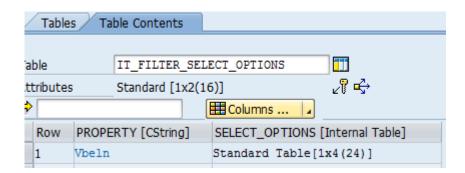

Access Scheduel lines data along with Header and Line Items:
https://vmw4462.wdf.sap.corp:44362/sap/opu/odata/sap/ZMULTILEVEL_EXPAND_SRV/SOHeaderSet?$expand=SOHeaderToItem/SOItemToS...
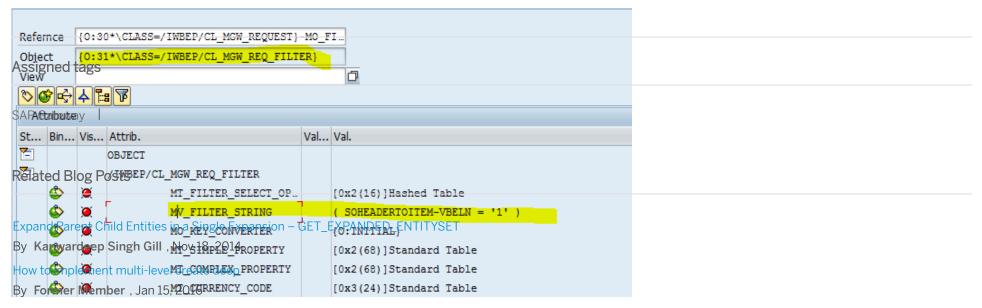
With filter on base entity(SOHeader)

https://vmw4462.wdf.sap.corp:44362/sap/opu/odata/sap/ZMULTILEVEL_EXPAND_SRV/SOHeaderSet?
$expand=SOHeaderToItem/SOItemToSchdLn&$filter=Vbeln%20eq%20%271%27&$format=json

With filter on Items Entity (SOItem): The catch here is that, you have to fetch the filter from the filter string from IO_TECH_REQUEST_CONTEXT->MO_FILTER-
`…/_FIL___STR…`.

https://vmw4462.wdf.sap.corp:44362/sap/opu/odata/sap/ZMULTILEVEL_EXPAND_SRV/SOHeaderSet?$expand=SOHeaderToItem/SOItemToS...

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By Former Member , Oct 30, 2014

Kindly share your inputs and thoughts on this.

Related Questions

16 Comments

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Sebastian Hellmann

June 9, 2015 at 1:27 pm

Hi Kanwardeep,

thanky you for this explenaition as I have a similar problem to solve.

The only thing I am confused about is the way you address the third level information

Can you many post an example of the returned JSON/XML?

I would have expected to be some kind of nested expand call like

/SOHeaderSet?$expand=SOHeaderToItem$expand=SOItemToSchdln

I know that this is syntactically not correct but it just seems not consistent to me.

I also wonder why you did not have to create an additional custom structure for the ItemToSchdln accociation like ZSO_S_IETMTOSCHLDN:

    include type ZSO_S_ITEM,

    SOITEMTOSCHDLN type ZSO_TT_SCHLDN

How can the framework map this into the data model if it does not have the same structure?

maybe you can help me to understand this.

Thank you in advance!

Like (0)

Kanwardeep Singh Gill | Post author

June 9, 2015 at 2:50 pm

Hi Sebastian,

If you have observed the URL parameter $EXPAND, you must have noticed that the path passed expalins the hierarchy from HEADER to ITEM to SCHEDULELINE with $EXPAND=SOHeadertoItem/SOItemToSchdLn.

This $EXPAND expression tells the framework to map multi level associated entity sets to the output result from the GET_EXPANDED_ENTITYSET method of the DPC.

In turn, the framework maps corresponding fields in the output result with the name same as the Navigation Property of the entity sets.

```xml
- <link title="SOHeaderToItem" type="application/atom+xml;type=feed" rel="http://schemas.microsoft.com/ado/2007/08/dataservices/related/SOHeaderToItem" href="SOHeaderSet
    ('1')/SOHeaderToItem">
  - <m:inline>
    - <feed xml:base="https://vmw4462.wdf.sap.corp:44362/sap/opu/odata/sap/ZMULTILEVEL_EXPAND_SRV/">
        <id>https://vmw4462.wdf.sap.corp:44362/sap/opu/odata/sap/ZMULTILEVEL_EXPAND_SRV/SOHeaderSet('1')/SOHeaderToItem</id>
        <title type="text">SOItemSet</title>
        <updated>2015-06-09T14:16:06Z</updated>
      - <author>
          <name/>
        </author>
        <link title="SOItemSet" rel="self" href="SOHeaderSet('1')/SOHeaderToItem"/>
      - <entry>
          <id>https://vmw4462.wdf.sap.corp:44362/sap/opu/odata/sap/ZMULTILEVEL_EXPAND_SRV/SOItemSet(Posnr='000010',Vbeln='1')</id>
          <title type="text">SOItemSet(Posnr='000010',Vbeln='1')</title>
          <updated>2015-06-09T14:16:06Z</updated>
          <category scheme="http://schemas.microsoft.com/ado/2007/08/dataservices/scheme" term="ZMULTILEVEL_EXPAND_SRV.SOItem"/>
          <link title="SOItem" rel="self" href="SOItemSet(Posnr='000010',Vbeln='1')"/>
        - <link title="SOItemToSchdLn" type="application/atom+xml;type=feed" rel="http://schemas.microsoft.com/ado/2007/08/dataservices/related/SOItemToSchdLn" href="SOItemSet
            (Posnr='000010',Vbeln='1')/SOItemToSchdLn">
          - <m:inline>
            - <feed xml:base="https://vmw4462.wdf.sap.corp:44362/sap/opu/odata/sap/ZMULTILEVEL_EXPAND_SRV/">
                <id>https://vmw4462.wdf.sap.corp:44362/sap/opu/odata/sap/ZMULTILEVEL_EXPAND_SRV/SOItemSet(Posnr='000010',Vbeln='1')/SOItemToSchdLn</id>
                <title type="text">SOItemSchdLn</title>
                <updated>2015-06-09T14:16:06Z</updated>
              - <author>
                  <name/>
                </author>
                <link title="SOItemSchdLn" rel="self" href="SOItemSet(Posnr='000010',Vbeln='1')/SOItemToSchdLn"/>
            </feed>
          </m:inline>
        </link>
        <link title="SOItemToSchdLn" type="application/xml" rel="http://schemas.microsoft.com/ado/2007/08/dataservices/relatedlinks/SOItemToSchdLn" href="SOItemSet
            (Posnr='000010',Vbeln='1')/$links/SOItemToSchdLn"/>
      - <content type="application/xml">
        - <m:properties>
            <d:Matkl/>
            <d:Matnr>STE_001</d:Matnr>
            <d:Posnr>000010</d:Posnr>
            <d:Vbeln>1</d:Vbeln>
          </m:properties>
        </content>
      </entry>
    </feed>
  </m:inline>
</link>
<link title="SOHeaderToItem" type="application/xml" rel="http://schemas.microsoft.com/ado/2007/08/dataservices/relatedlinks/SOHeaderToItem" href="SOHeaderSet('1')/
    $links/SOHeaderToItem"/>
- <content type="application/xml">
```

Like (0)

Sebastian Hellmann

June 9, 2015 at 3:06 pm

Hi Kanwardeep,

Thank you again for this, I appreciate it!

I just did a little research and found that nested expands are available at ODATA V4 spec which is not yet implemented in the Gateway

I am just wondering why

SOHeaderSet(vblen)?$expand=SOHeadertoItem/SOItemToSchdLn works but SOHeaderSet(vblen)/SOHeadertoItem/SOItemToSchdLn is not allowed.

I know that the response would be slightly different (no SOHeader information in example 2) but I hope you get my point.

Anyway that is exactly what I need and I thank you again for your post!

br

Sebastian

Like (0)

Kanwardeep Singh Gill | Post author

June 9, 2015 at 3:36 pm

Yeah, I got your point and i understand what you are trying to achieve, but sadly the later espression is not allowed.

In example 2, as per my understanding, it is possible to have an expression like this

SOHeaderSet('1')/SOHeaderToItem =>This will call SOITEM_GET_ENTITYSET of the entity **SOItem** which is associated to **SOHeader,** but the real parent child expansion does not happen here with GET_EXPANDED_ENTITYSET.

Similarly, you can ahieve SOHeaderSet('1')/SOHeaderToItem(VBELN='1',Posnr='000001')/SOItemToSchdLn => This will call SOITEMSSCHDLN_GET_ENTITYSET method of the entity SOItemsSchdLn which is associated to SOItem entity, which is further associated to SOHeader entity.

In both the scenarios, what you get is not an expanded result set, however, the result set of the child entity.

Like (0)

Sebastian Hellmann
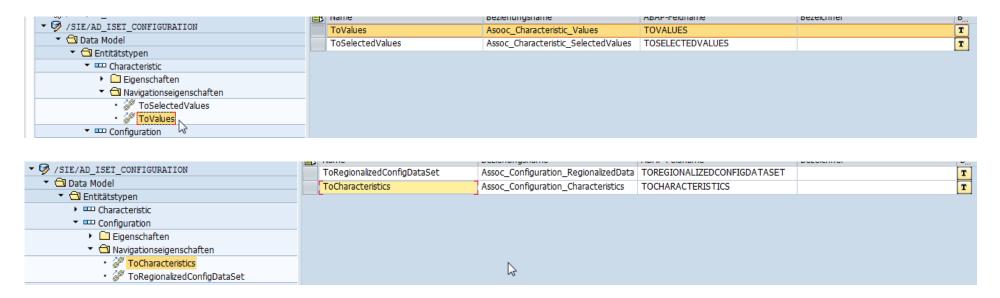
June 15, 2015 at 9:50 am

Hi Kanwardeep,

I now tried to implement it the way you described, but I don't get any output.

The only difference in my code is that I created a local structure for the mapping of the expand path:

```
data: begin of ls_cfg_chars_values.
    include type /sie/cl_ad_iset_con_02_mpc=>ts_configuration.
data: tocharacterisitcs type standard table of /sie/cl_ad_iset_con_02_mpc=>ts_characteristic with default key,
    tovalues      type standard table of /sie/cl_ad_iset_con_02_mpc=>ts_value with default key,
    end of ls_cfg_chars_values.
```

my navigation attributes looks as follows:

The structure is correctly filled and passed to er_entity by:

```
copy_data_to_ref(
    exporting
```

```
        is_data = ls_cfg_chars_values
        changing
        cr_data = er_entity ).
```

but still my output shows me now values for both expanded entities.

Do you have any idea what could be the problem?

Appreciate you help here!

Thx Sebastian

Like (0)

Former Member

November 30, 2015 at 3:31 pm

Hi Kanwardeep,

do you know how to convert the filter string to select options?

I'm working with NetWeaver 7.31 SPS 06 and GW_CORE 200 SPS 06.

Like (0)

Kanwardeep Singh Gill | Post author

Hi Simon,

I achieved it by splitting the filter string.

i know it is not a clean way to achieve it, however, i could not not find any other option to convert the filter string into SO[].

Thanks!!

Like (0)

Former Member

All the gateway operations are explained in detailed with screenshots on below page. Hope it can be a help.

click4interview: SAP Netweaver Gateway Basics

click4interview: Working Example for SAP Netweaver Gateway Beginners

Like (0)

Former Member

Hi,

I implemented the above scenario, but I have an issue

My cr_entity has the multideep value, but in the output, only first entity is visible, the second entity is blank

Please help

Former Member

July 21, 2016 at 7:40 am

Hi,

Can you please tell how to fetch IO_TECH_REQUEST_CONTEXT->MO_FILTER->MV_FILTER_STRING using code based scenario?

Thanks in advance.

Parth 🙂

Kanwardeep Singh Gill | Post author

July 21, 2016 at 7:50 am

You just have to split the filter string at space and then delete unnecessary table rows which contain "(",")","=" etc. Loop over the internal table, first record is the filter name and subsequent is the filter value.

Former Member

July 21, 2016 at 7:56 am

Hi Kanwardeep,

Thanks for you prompt reply. I am trying to fetch the filter value in GET_EXPANDED_ENTITY method. I am not getting my hands on how to reach till MV_FILTER_STRING using object IO_TECH_REQUEST_CONTEXT. In debugger I am able to see but how to code for the same. Please help.

Best Regards

Parth

Like (0)

Kanwardeep Singh Gill | Post author

July 21, 2016 at 9:45 am

You should be able to access MV_FILTER_STRING using IO_TECH_REQUEST_CONTEXT->MO_FILTER->MV_FILTER_STRING

Like (0)

Former Member

July 24, 2016 at 5:17 pm

I am trying to access as the same you have mentioned, but it is not showing me method MO_FILTER for object IO_TECH_REQUEST_CONTEXT in GET_EXPANDED_ENTITY method.

Is there anything else that I am missing?

Regards

Parth

Like (0)

Tobias Spott

Hi,

first of all many thanks for your great post. I really liked reading it coz you described it as simple as possible.

In my case everthing works fine except the filtering ($filter) on a property of an expanded entity (not the root-node). If i try to filter on property Y of entity B, i get an gateway error which says:

"Linksseitiger Ausdruck des Elementzugriffsoperators mit falsche Kardinalität (zu viele nicht zulässig)"

It seems like there is something wrong with the cardinalities between the entities, but i set it up like in your example:

Entity A (principal entity) has cardinality N

Entity B (dependent entity) has cardinality M

If i filter directly on EntitySet B the filter works correctly.

Do you know this kind of issue? Do you have any clue what i'm doing wrong?

Many thanks in advance !

Cheers t.

Like (0)

Guru Prasad Yepuri

Hi Tobias,

I am facing the same issue.Could you please share a solution or work around?

Thanks,

Guru.

Like (0)

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