A Joint Oracle Teradata White Paper
March 2012

Configuring Oracle Business Intelligence Enterprise Edition for Teradata Temporal Tables

Executive Overview

Teradata temporal capabilities allow data warehouse time travel. Temporal supports the reproduction of a report that ran previously, such as six months ago, even though numerous changes have been made to the underlying data.

Oracle Business Intelligence Enterprise Edition (OBIEE) supports and can utilize the temporal capabilities of Teradata and expose them to end users in an easy-to-use fashion.

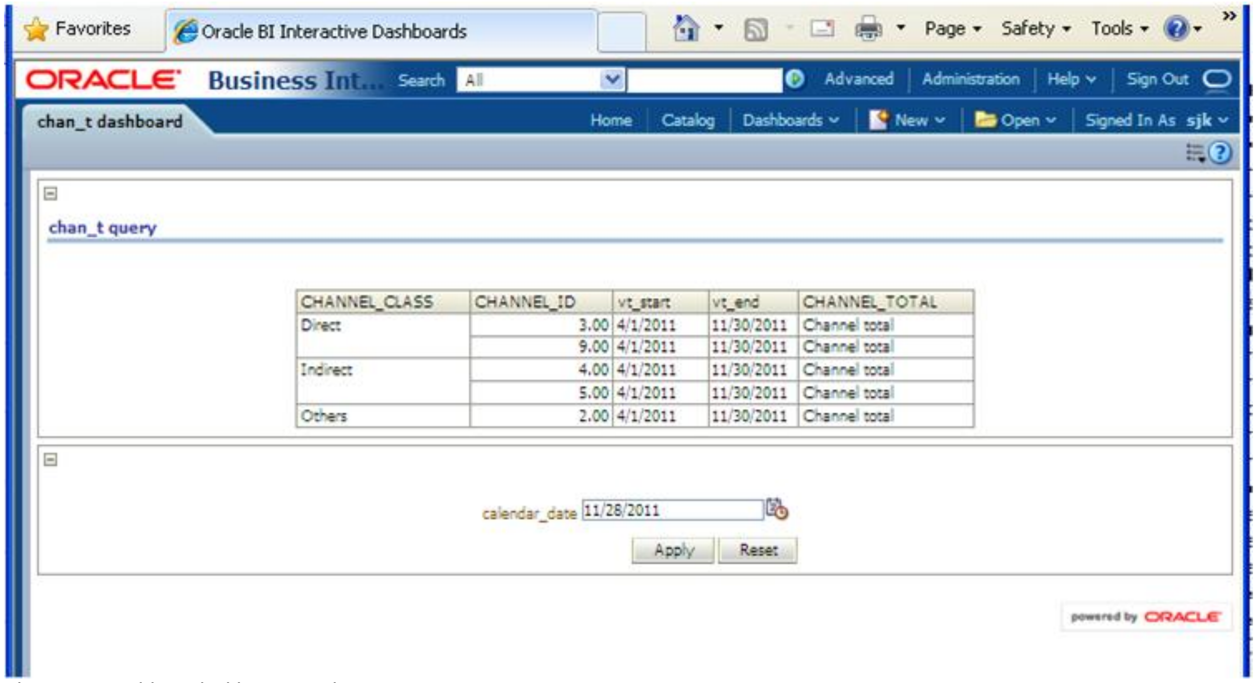
Introduction

The purpose of this document is to show how to integrate OBIEE with Teradata Temporal Tables. It details how to set up OBIEE for "as-is" and "as-was" type analysis. It is a cook book style write-up and assumes the customer has (and knows) OBIEE and that the customer knows what they want to do with temporal. It does not go into detailed analysis of different use cases for temporal tables. This write-up was done using OBIEE 11g, although it is completely applicable for OBIEE version 10.1.x. There are some variations in the setup but the concepts are the same.

Teradata Database 13.10, released in September of 2010, included a number of fully integrated, in-database data attributes, qualifiers, and predicates that are extremely useful for automating the management of time-varying data. Also included were a number of powerful functions to enable native time series analysis and comparison of periods of time.

“As-is” and “As-was” Example

Temporal tables can be configured as “regular” OBIEE source tables. However, the data returned for queries will only reflect the current transaction time or valid time. In order to return data for a specific point in time, regular OBIEE source tables cannot be used. OBIEE requires special configuration to take advantage of a table’s temporal capabilities. Basically, a normally defined OBIEE table needs to be converted to a “select” type table (also known as opaque views). A SQL select statement is defined for the temporal table and can then include temporal keywords such as “as of”. The following is an example of an OBIEE dashboard that has a temporal query.



CHANNEL_CLASS	CHANNEL_ID	vt_start	vt_end	CHANNEL_TOTAL
Direct	3.00	4/1/2011	11/30/2011	Channel total
	9.00	4/1/2011	11/30/2011	Channel total
Indirect	4.00	4/1/2011	11/30/2011	Channel total
	5.00	4/1/2011	11/30/2011	Channel total
Others	2.00	4/1/2011	11/30/2011	Channel total

calendar_date 11/28/2011

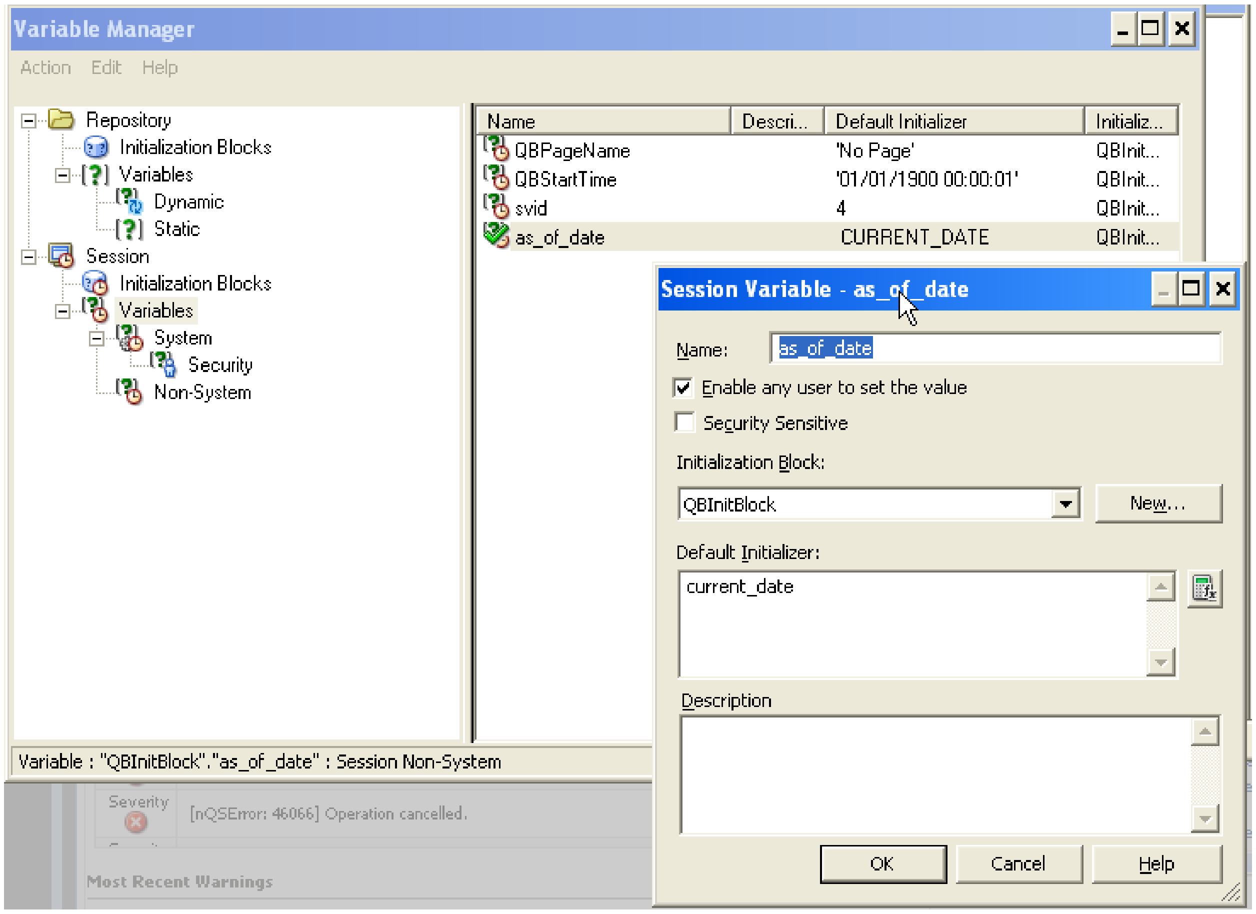
Figure 1. Dashboard with temporal query

“Channel” is defined in Teradata as a temporal table with a valid time column. The dashboard above queries the channel table with an “as of” date based on the prompt for “calendar_date”. The temporal columns for valid start date and valid end date are exposed on the dashboard.

Follow the steps below to see how to put together a temporal dashboard.

Step 1. Define a session variable

The first step is to define a session variable that will be used to determine and store the "as of" date for the temporal query. The session variable should be set so that any user can set the value. The default Initializer should be set to "current_date" (without the quotes). The screen shot below shows the properties for the "as_of_date" variable.



Name	Descri...	Default Initializer	Initializ...
QBPageName		'No Page'	QBInit...
QBStartTime		'01/01/1900 00:00:01'	QBInit...
svid		4	QBInit...
as_of_date		CURRENT_DATE	QBInit...

Name: as_of_date
[✓] Enable any user to set the value
[ ] Security Sensitive
Initialization Block: QBInitBlock
Default Initializer: current_date
Description:

Variable : "QBInitBlock"."as_of_date" : Session Non-System

[nQSError: 46066] Operation cancelled.

Figure 2. "as_of_date" variable

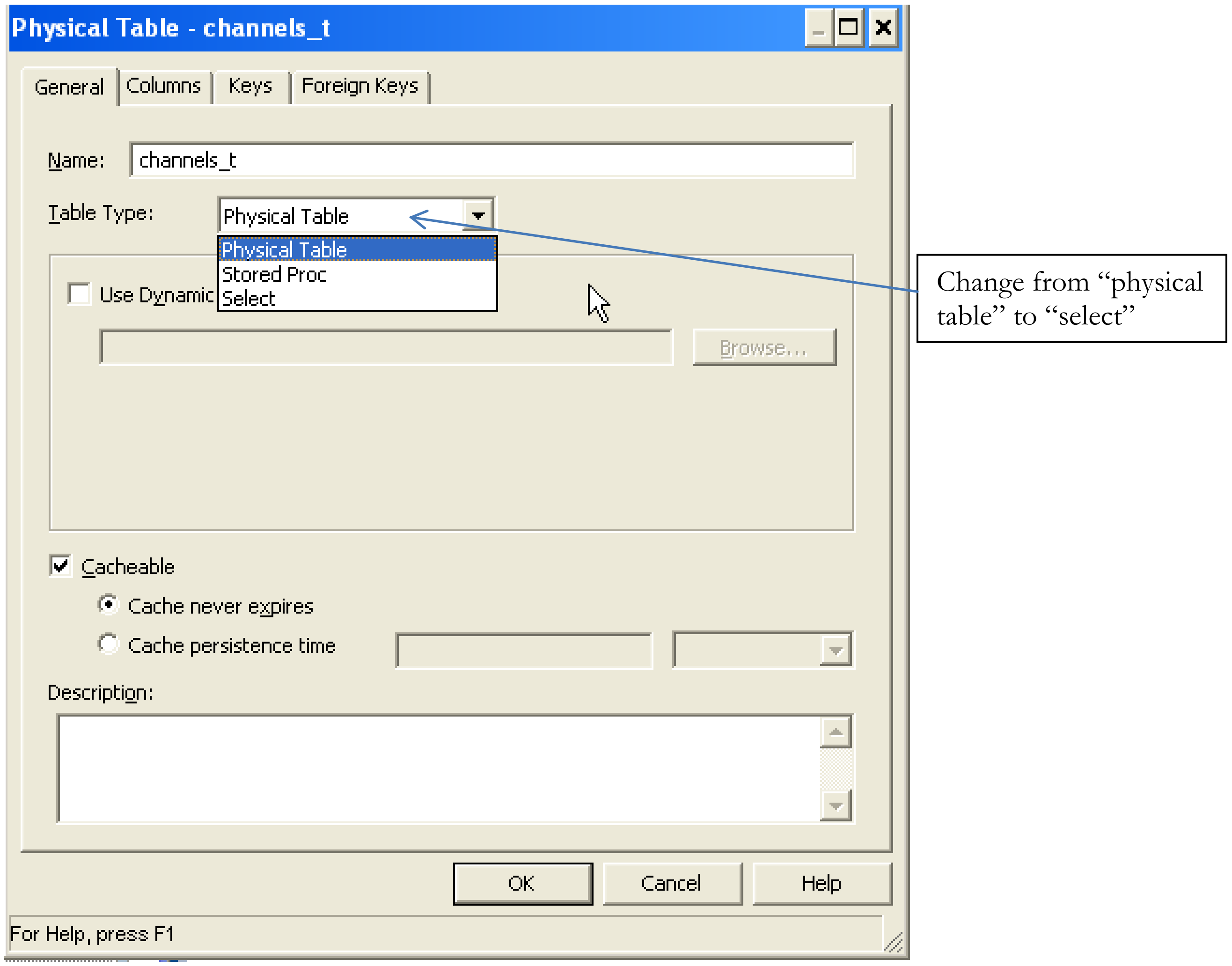
Step 2. Define the temporal table

Below is the DDL for the channel example table; the vt column (in red) is the temporal column:

```
CREATE MULTISET TABLE SAMPLEDATA.channels_t ,NO FALLBACK ,
     NO BEFORE JOURNAL,
     NO AFTER JOURNAL,
     CHECKSUM = DEFAULT,
     DEFAULT MERGEBLOCKRATIO
     (
      CHANNEL_ID FLOAT FORMAT '+9.99999999999999E+999' NOT NULL,
      CHANNEL_DESC VARCHAR(20) CHARACTER SET LATIN NOT CASESPECIFIC NOT NULL,
      CHANNEL_CLASS VARCHAR(20) CHARACTER SET LATIN NOT CASESPECIFIC NOT NULL,
      CHANNEL_CLASS_ID FLOAT FORMAT '+9.99999999999999E+999' NOT NULL,
      CHANNEL_TOTAL VARCHAR(13) CHARACTER SET LATIN NOT CASESPECIFIC NOT NULL,
      CHANNEL_TOTAL_ID FLOAT FORMAT '+9.99999999999999E+999' NOT NULL,
      vt PERIOD(DATE) NOT NULL AS VALIDTIME)
PRIMARY INDEX ( CHANNEL_ID );
```

Step 3. Pull the table and column definition into the physical layer

Use the OBIEE "import metadata" wizard to pull the table and column definition into the physical layer. The wizard is used so that all of the column definitions do not need to be manually added into the physical layer. Next, the table type for the physical table properties needs to switch from "physical table" to "select" and the temporal SQL needs to be added.



Name: channels_t

Table Type: Physical Table

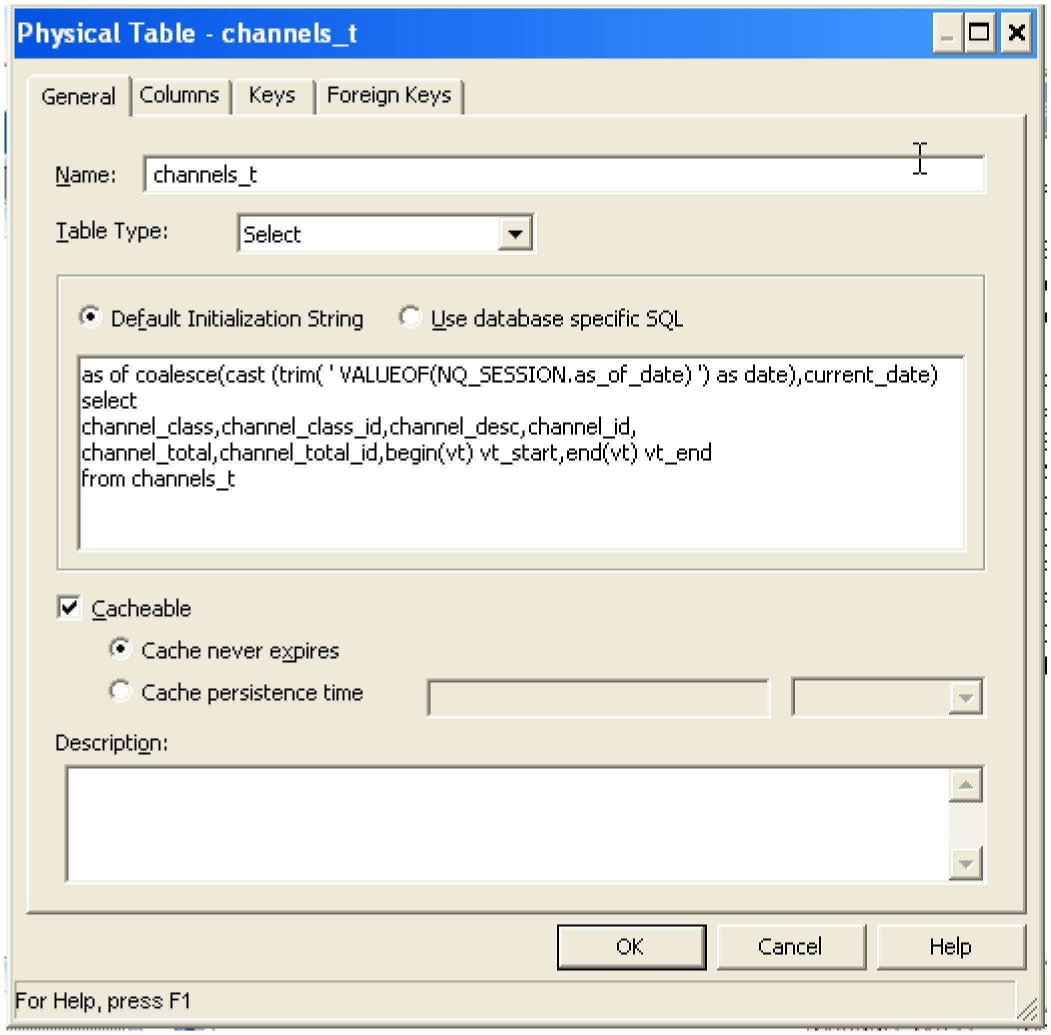
[✓] Cacheable

[✓ Cache never expires]

Change from "physical table" to "select"

Figure 3. Import metadata

The SQL for the "select" table is entered into the text box:



Name: channels_t

Table Type: Select

(●) Default Initialization String ( ) Use database specific SQL

```
as of coalesce(cast (trim( ' VALUEOF(NQ_SESSION.as_of_date) ') as date),current_date)
select
channel_class,channel_class_id,channel_desc,channel_id,
channel_total,channel_total_id,begin(vt) vt_start,end(vt) vt_end
from channels_t
```

[✓] Cacheable

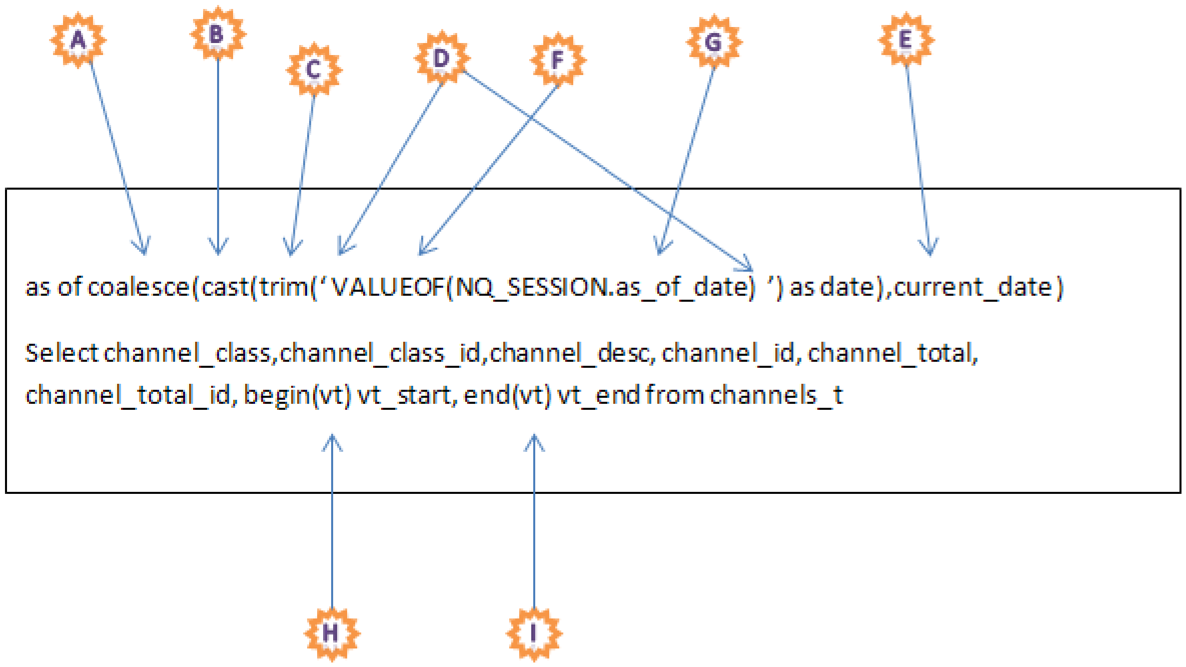
(●) Cache never expires

( ) Cache persistence time

Description:

Figure 4. Import metadata

The SQL needs to be carefully formed in order to support any valid "as of date" the user picks as well as to support the user not picking any value for "as of date". In the case of no "as of date", the query will default to the current date. The SQL is reiterated below with notes for key points.



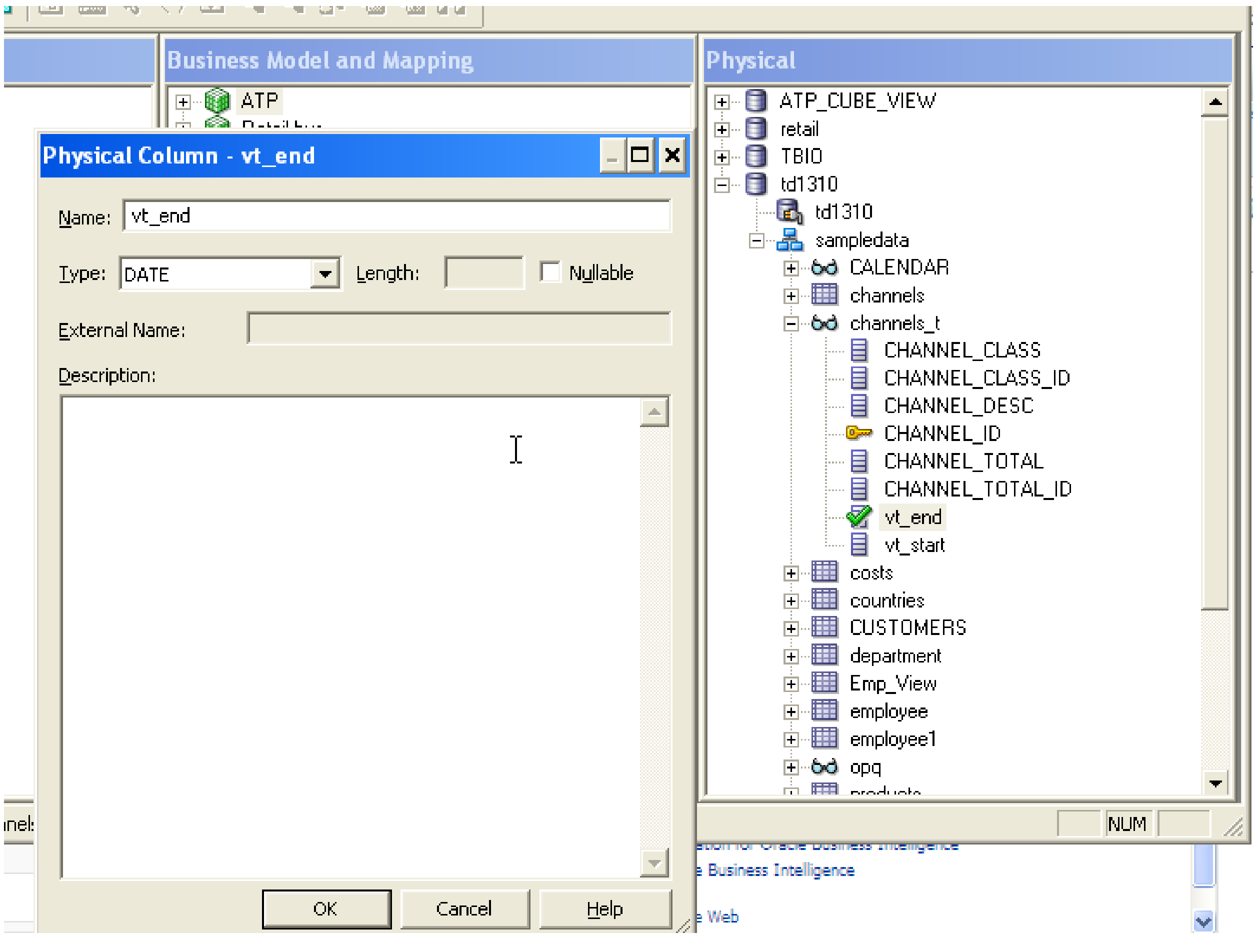
```
as of coalesce(cast(trim(' VALUEOF(NQ_SESSION.as_of_date)  ') as date),current_date)

Select channel_class,channel_class_id,channel_desc, channel_id, channel_total,
channel_total_id, begin(vt) vt_start, end(vt) vt_end from channels_t
```

A. “coalesce” is used to default the “as of date” when the end-user has not chosen a date
B. “cast” is used to convert the string returned from the “trim” function to the “date” data type
C. “trim” is used to get rid of the extra spaces in surrounding the “VALUEOF(…)” function
D. The string “VALUEOF(NQ_SESSION.as_of_date)” needs spaces surrounding it in order for the OBIEE to substitute the chosen date for the string. If there are no spaces around the VALUEOF() function then OBIEE will generate errors like “the repository variable as_of_date has no value definition. Substituting “sp” for space, the string needs to be formatted as such: ‘spVALUEOF(NQ_SESSION.as_of_date)sp’
E. “current_date” is used to default the “as of date” to today’s date
F. “VALUEOF(NQ_SESSION.as_of_date)” returns the chosen date stored in the variable that was defined in step 1
G. “as_of_date” is the variable that was defined in step 1
H. “Vt_start” is a derived column. Begin(vt) is a function that returns the beginning date of the valid time period (see Teradata temporal documentation for more details). This column is not mandatory in the physical layer. It is shown here as a way of exposing the data. The column alias name must match the column name in the physical layer.
I. “vt_end” is a derived column. End(vt) returns the ending date of the valid time period. This column is not mandatory in the physical layer. It is shown here as a way of exposing the data. The column alias name must match the column name in the physical layer.

Step 4. Expose the temporal columns to the end user

If you want to expose the temporal columns to the end user you will need to manually add columns to the physical definition. In the example above, two columns were manually added: vt_start and vt_end (valid time start and end). Note that the additional columns need to be defined in the "select" SQL (as in the example above) as well as actual physical columns in OBIEE:



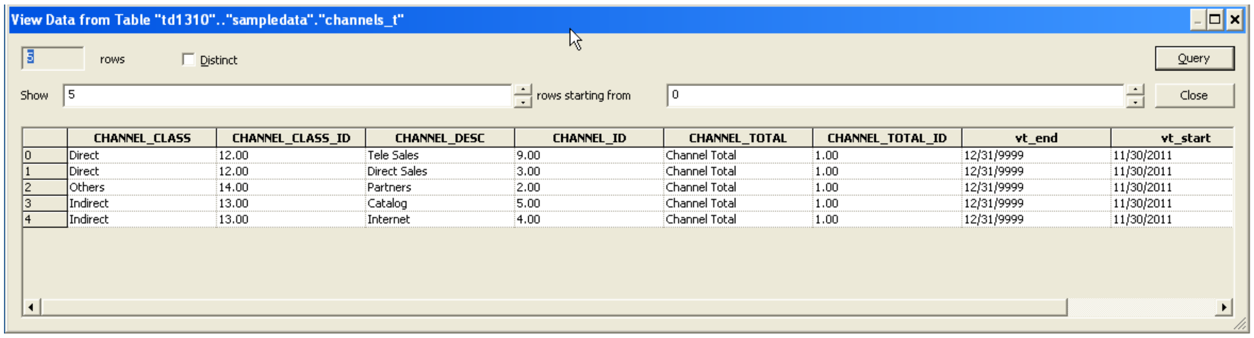
Name: vt_end
Type: DATE
Length:
Nullable
External Name:
Description:

ATP_CUBE_VIEW
retail
TBIO
td1310
td1310
sampledata
CALENDAR
channels
channels_t
CHANNEL_CLASS
CHANNEL_CLASS_ID
CHANNEL_DESC
CHANNEL_ID
CHANNEL_TOTAL
CHANNEL_TOTAL_ID
vt_end
vt_start
costs
countries
CUSTOMERS
department
Emp_View
employee
employee1
opq

Figure 5. Add columns to physical definitions

Note that they are defined as "date" data type columns as the functions return the "date" data type.

With all of the table and column and variable definitions correctly in place, the "view data" action (right click on table name) should show data from the table:


View Data from Table "td1310".."sampledata"."channels_t"

Show 5 rows starting from 0

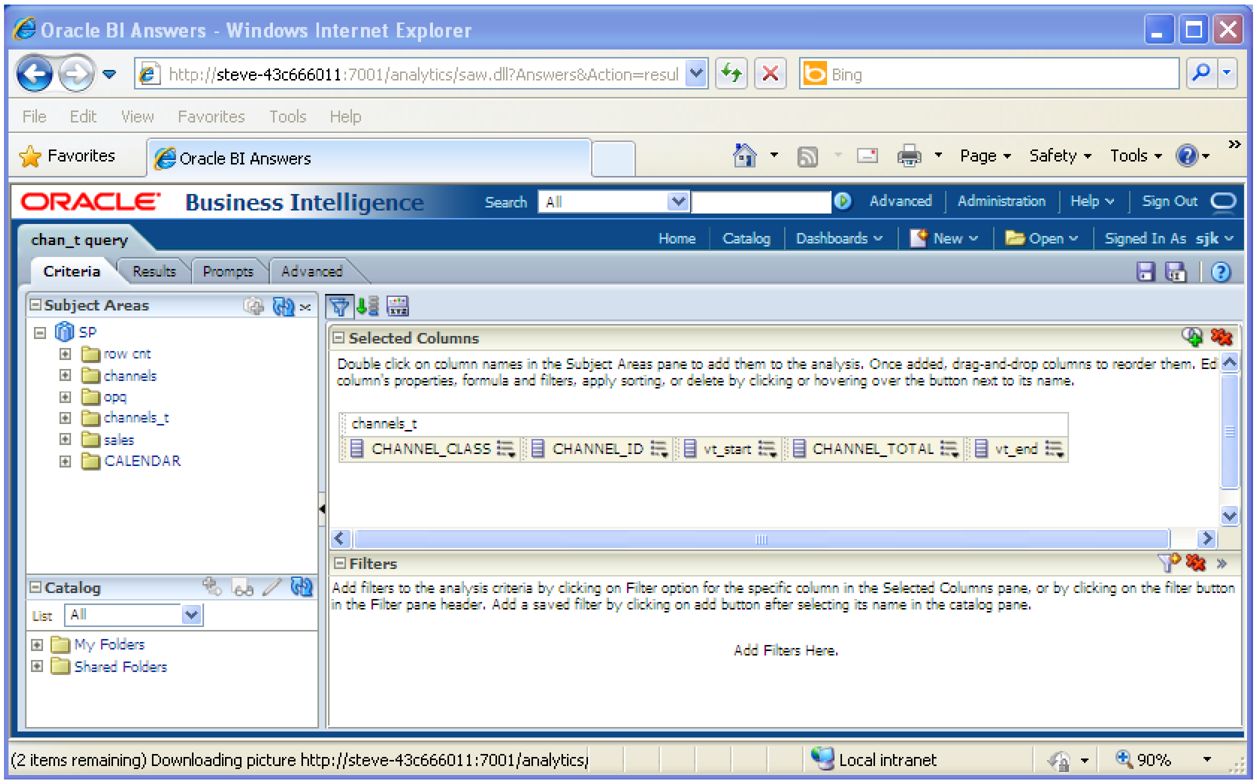
	CHANNEL_CLASS	CHANNEL_CLASS_ID	CHANNEL_DESC	CHANNEL_ID	CHANNEL_TOTAL	CHANNEL_TOTAL_ID	vt_end	vt_start
0	Direct	12.00	Tele Sales	9.00	Channel Total	1.00	12/31/9999	11/30/2011
1	Direct	12.00	Direct Sales	3.00	Channel Total	1.00	12/31/9999	11/30/2011
2	Others	14.00	Partners	2.00	Channel Total	1.00	12/31/9999	11/30/2011
3	Indirect	13.00	Catalog	5.00	Channel Total	1.00	12/31/9999	11/30/2011
4	Indirect	13.00	Internet	4.00	Channel Total	1.00	12/31/9999	11/30/2011

Figure 6. View data

That completes the configuration in the OBIEE Administrator. Next up is building the dashboard.

Step 5. Building the dashboard

In OBI Answers, configure and save your query on the temporal table. This is a standard dashboard query – there is nothing unique about it.


Oracle BI Answers - Windows Internet Explorer

http://steve-43c666011:7001/analytics/saw.dll?Answers&Action=resul

chan_t query

Subject Areas: SP – row cnt, channels, opq, channels_t, sales, CALENDAR

Selected Columns

Double click on column names in the Subject Areas pane to add them to the analysis. Once added, drag-and-drop columns to reorder them. Ed column's properties, formula and filters, apply sorting, or delete by clicking or hovering over the button next to its name.

channels_t: CHANNEL_CLASS, CHANNEL_ID, vt_start, CHANNEL_TOTAL, vt_end

Filters

Add filters to the analysis criteria by clicking on Filter option for the specific column in the Selected Columns pane, or by clicking on the filter button in the Filter pane header. Add a saved filter by clicking on add button after selecting its name in the catalog pane.

Add Filters Here.

(2 items remaining) Downloading picture http://steve-43c666011:7001/analytics/

Figure 7. Save query

Step 6. Add a new Dashboard prompt

In OBI Answers, add a new Dashboard prompt:

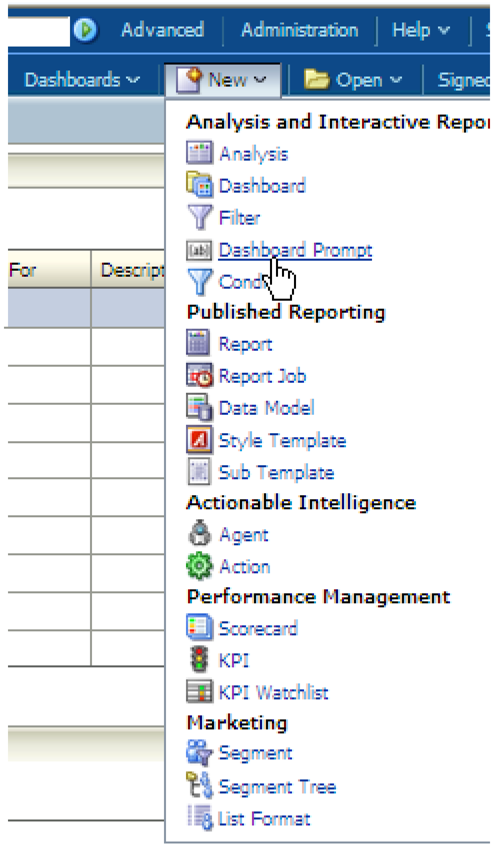
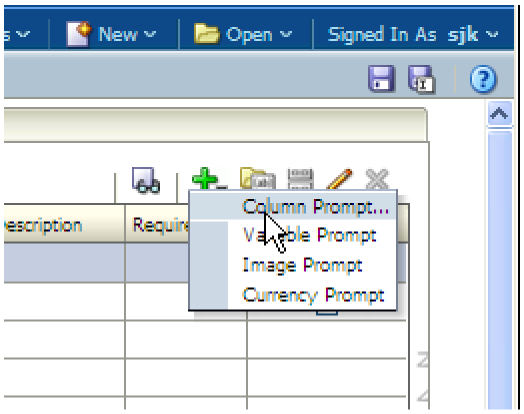


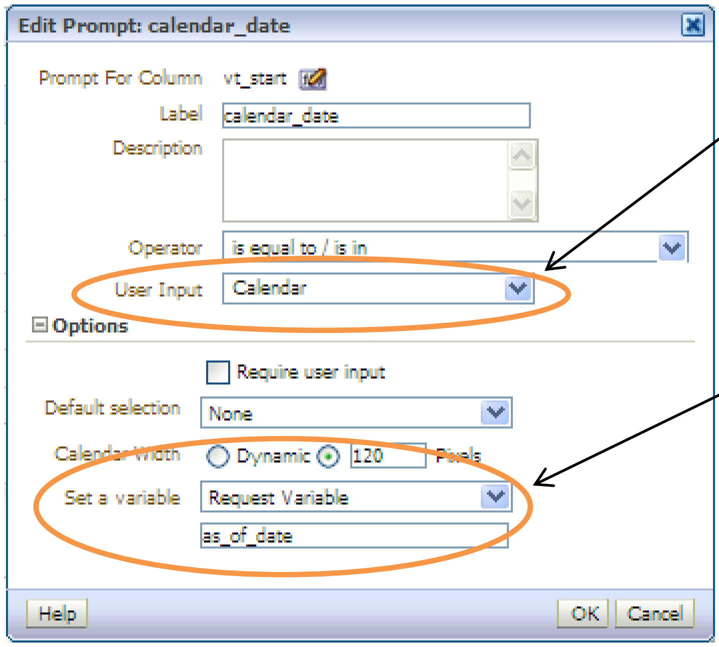
Figure 8. Dashboard prompt

Step 7. Add a column prompt

On the dashboard prompt page, add a new column prompt:



The column associated with the prompt is vt_start. Since it has a data type of "date", OBIEE allows us to use a calendar type input. Under Options, the "Set a variable" drop-down should be set to "Request Variable". Then the name of the variable that was defined in step 1 is entered, as_of_date, which is used to pick a date from a calendar.



Edit Prompt: calendar_date

Prompt For Column: vt_start
Label: calendar_date
Description:
Operator: is equal to / is in
User Input: Calendar

Options

Require user input: ☐
Default selection: None
Calendar Width: Dynamic [✓ 120] Pixels
Set a variable: Request Variable
as_of_date

"calendar" allows the end-user drop down

Enter the name of the variable defined in step 1

Figure 9. Column prompt

Save the prompt.

Step 8. Save and test the dashboard

Now create and save a dashboard with the query defined in step 5 and the prompt defined in step 6.

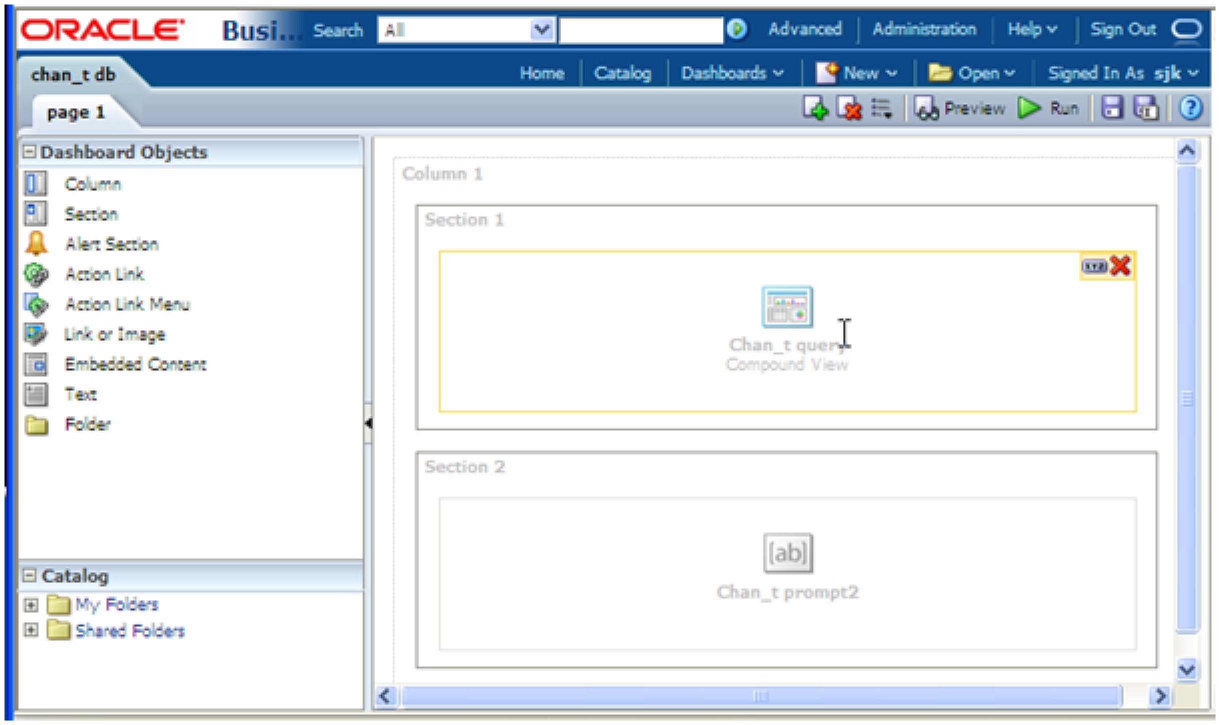
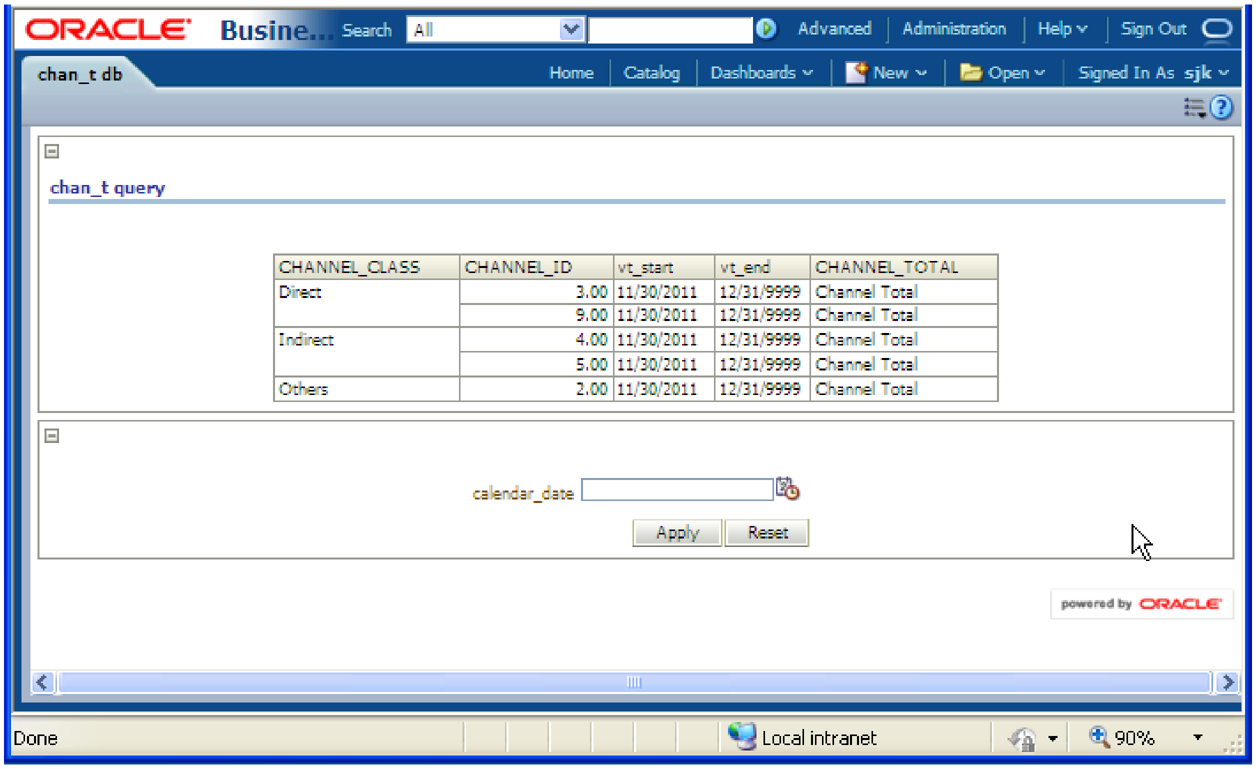


Figure 10. Save dashboard

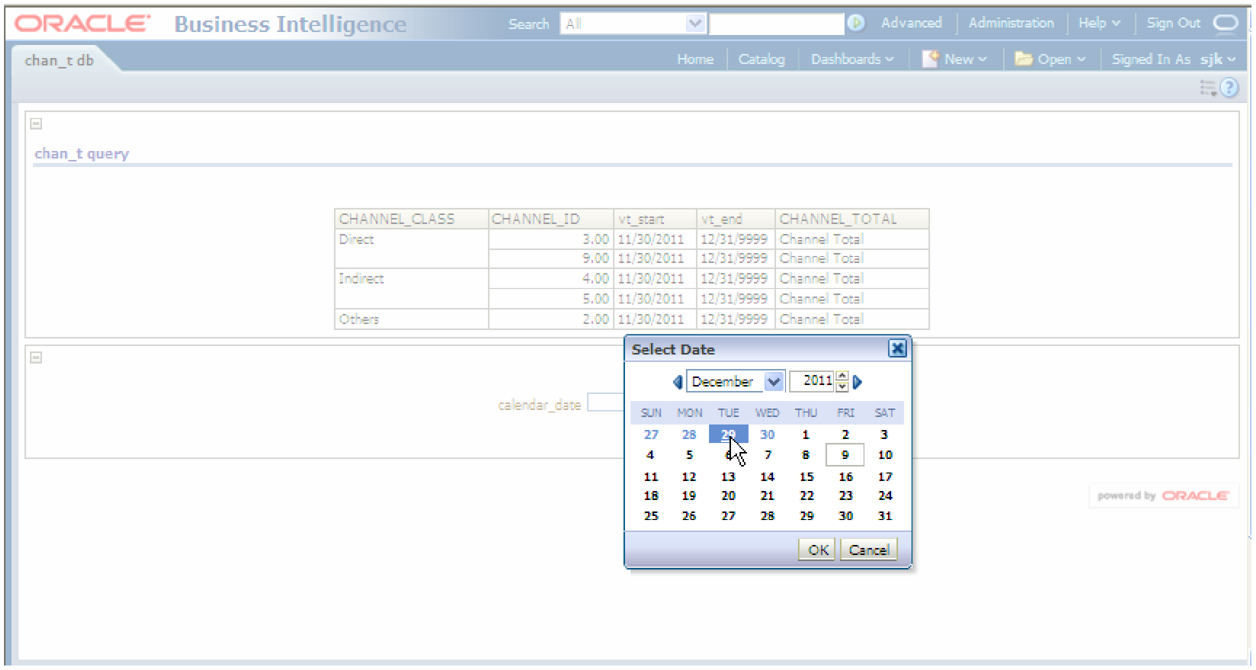
When the dashboard is run, the data from the query defaults to the current date.


ORACLE Busine... Search All Advanced Administration Help Sign Out
chan_t db Home Catalog Dashboards New Open Signed In As sjk
chan_t query
calendar_date
Apply Reset
powered by ORACLE
Done Local intranet 90%

CHANNEL_CLASS	CHANNEL_ID	vt_start	vt_end	CHANNEL_TOTAL
Direct	3.00	11/30/2011	12/31/9999	Channel Total
	9.00	11/30/2011	12/31/9999	Channel Total
Indirect	4.00	11/30/2011	12/31/9999	Channel Total
	5.00	11/30/2011	12/31/9999	Channel Total
Others	2.00	11/30/2011	12/31/9999	Channel Total

Figure 11. Run dashboard report

Clicking on the calendar brings up the prompt:



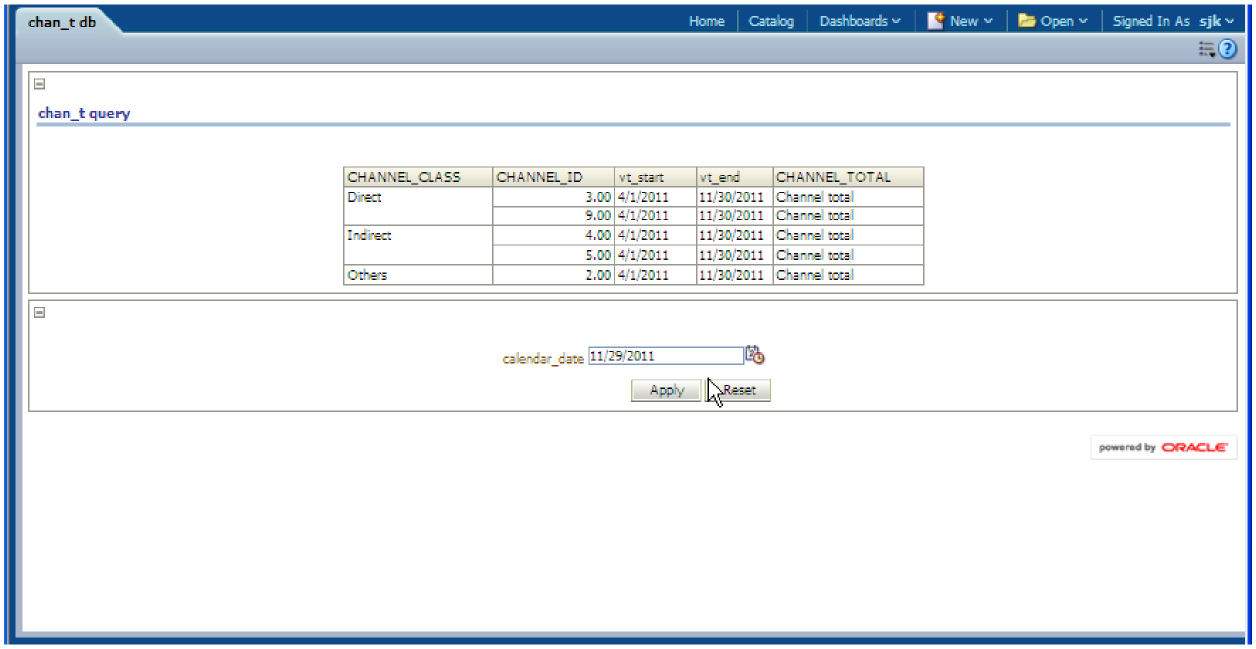
CHANNEL_CLASS	CHANNEL_ID	vt_start	vt_end	CHANNEL_TOTAL
Direct	3.00	11/30/2011	12/31/9999	Channel Total
	9.00	11/30/2011	12/31/9999	Channel Total
Indirect	4.00	11/30/2011	12/31/9999	Channel Total
	5.00	11/30/2011	12/31/9999	Channel Total
Others	2.00	11/30/2011	12/31/9999	Channel Total

SUN	MON	TUE	WED	THU	FRI	SAT
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Figure 12. Date prompt

Click "OK" on the prompt.

Click “Apply” on the dashboard. The data in the query now reflects the date selected on the calendar prompt.



CHANNEL_CLASS	CHANNEL_ID	vt_start	vt_end	CHANNEL_TOTAL
Direct	3.00	4/1/2011	11/30/2011	Channel total
	9.00	4/1/2011	11/30/2011	Channel total
Indirect	4.00	4/1/2011	11/30/2011	Channel total
	5.00	4/1/2011	11/30/2011	Channel total
Others	2.00	4/1/2011	11/30/2011	Channel total

calendar_date 11/29/2011

Figure 13. Temporal report run

This completes the tutorial on temporal dashboard set-up. This technique can be applied to many different temporal tables. They can use a common date, or dates can be set up for each table.

SQL Examples

The SQL that was generated by OBIEE for the above query is below. The temporal bits are in red:

```
select distinct 0 as c1,
     D1.c1 as c2,
     D1.c2 as c3,
     D1.c3 as c4,
     D1.c4 as c5,
     D1.c5 as c6
 from
     (select T2489."CHANNEL_CLASS" as c1,
          T2489."CHANNEL_ID" as c2,
          T2489."CHANNEL_TOTAL" as c3,
          T2489."vt_end" as c4,
          T2489."vt_start" as c5
       from
          (as of coalesce(cast (trim( ' 2011-12-09 ') as date),current_date)
 select
 channel_class,channel_class_id,channel_desc,channel_id,
 channel_total,channel_total_id,begin(vt) vt_start,end(vt) vt_end
 from channels_t
 ) T2489
     ) D1
 order by 2, 3, 6, 5, 4
```

A query that was generated by OBIEE that includes the temporal dimension "channel" and a fact table "sales" is shown below:

```
select distinct 0 as c1,
    D1.c2 as c2,
    D1.c3 as c3,
    D1.c1 as c4
from
    (select sum(T2086."AMOUNT_SOLD") as c1,
            T2489."CHANNEL_CLASS" as c2,
            T2489."CHANNEL_TOTAL" as c3
        from
            (as of coalesce(cast (trim( ' 2011-12-15 ') as date),current_date)
select
channel_class,channel_class_id,channel_desc,channel_id,
channel_total,channel_total_id,begin(vt) vt_start,end(vt) vt_end
from channels_t
) T2489,
            "sales" T2086
        where  ( T2086."CHANNEL_ID" = T2489."CHANNEL_ID" )
        group by T2489."CHANNEL_CLASS", T2489."CHANNEL_TOTAL"
    ) D1
order by 3, 2
```

Conclusion

Teradata 13.10 (and subsequent releases) allows organizations to gather, manage, and analyze “time varying” data with very little administration.

Using the above techniques allows Oracle Business Intelligence Enterprise Edition to utilize the temporal capabilities of Teradata and expose them to end users in an easy-to-use fashion.

This capability can be vital, for example, when responding to inquiries from regulators who want to know what information organizations had and when they had it.

Oracle is committed to developing practices and products that help protect the environment

Configuring Oracle BI EE for Teradata Temporal Tables
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Author: Stephen Kamyszek, Teradata Corporation
Contributing Authors:
Alan Lee, Oracle
Ragnar Edholm, Oracle

Oracle Corporation
World Headquarters
500 Oracle Parkway
Redwood Shores, CA 94065
U.S.A.

Worldwide Inquiries:
Phone: +1.650.506.7000
Fax: +1.650.506.7200

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