Extending the ODS and EDW

Presented by:
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Ellucian
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Session ID 2464

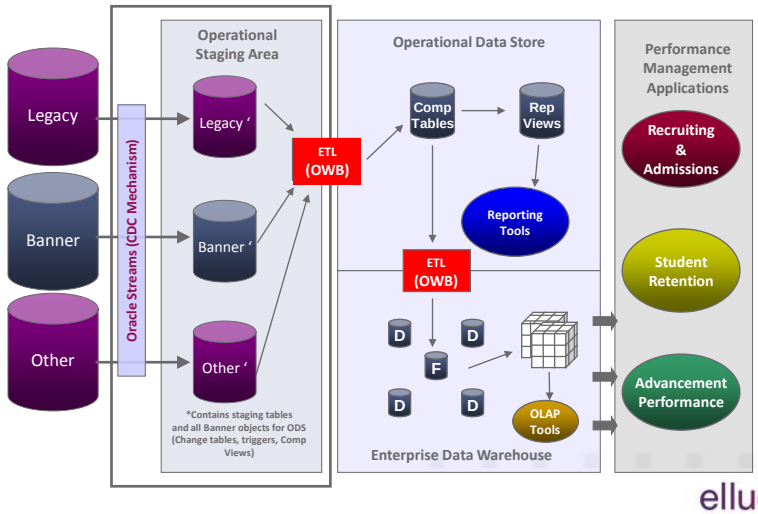
Introduction

- This presentation is aimed at providing direction and insight into Ellucian's recommended approach for extending the Banner Operational Data Store and Banner Enterprise Data Warehouse solutions.
- Following these approaches will help ensure that your customizations are not overwritten as product upgrades are applied.

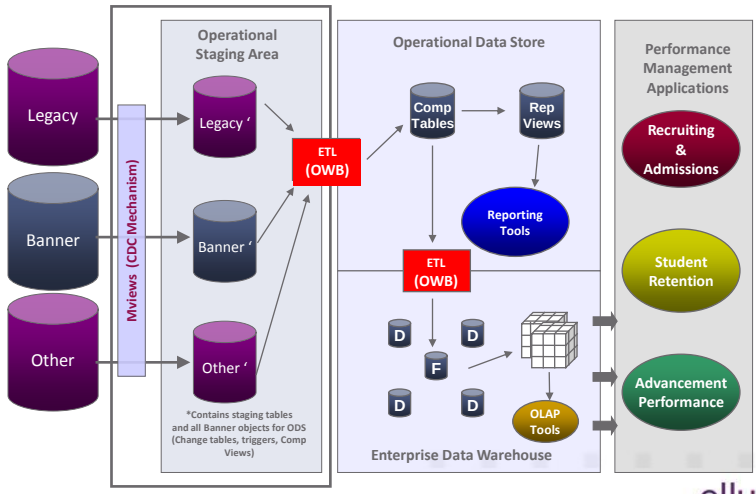
Agenda

- Extending the ODS
  - Overall Recommendations
  - Overview of Staging (Streams/Mviews)
  - Adding New Content
- Extending the EDW
  - Overall Recommendations
    - EDW Objects
    - OWB Mappings
    - Administrative Interface
- Extending Delivered Cognos Models

BPRA Architecture (Oracle Streams Foundation)



BPRA Architecture (Mviews Foundation)



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Extending the ODS

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Extending the ODS

- Overall Recommendations
- Overview of Staging (Streams/Mviews)
- Adding New Content

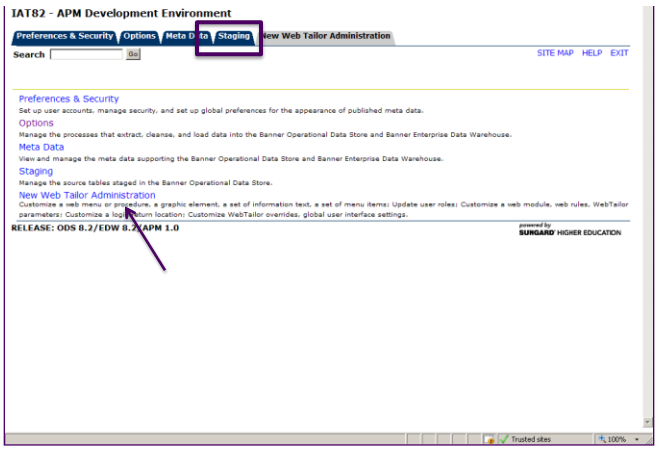
Overall Recommendations

- DO NOT modify the delivered ODS product objects.
  - Doing so may result in customizations lost when upgrading.
- DO NOT modify the delivered OWB projects.
  - Any custom work in OWB should be done in a new project.
  - Upgrades may involve dropping and recreating all projects or dropping and recreating individual mappings within a project.
- Make a copy of the object and rename
  - Use X, Y or Z as identifier in object name
    - Composite View: AX_ADDRESS or XS_ADDRESS
    - Composite Table: MXT_ADDRESS or XST_ADDRESS
  - OR use Institution extension or prefix as identifier in object name
    - Composite View: AS_ADDRESS_SJU
    - Composite Table: MST_ADDRESS_SJU
    - Reporting View: ADDRESS_SJU
  - This enables SGHE to identify custom objects for SRs

Oracle Streams – Administrative UI

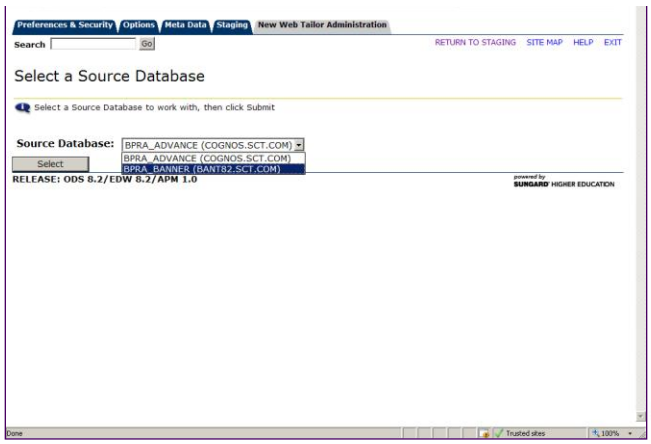
- 'Staging' tab and security
- Maintain Stage Tables
  - Add non-baseline source tables
- Report Staging Area Status
  - Status of processes
  - List of staged tables
  - Misc. staging checks
- Control Reports

Embedded Within Administrative UI



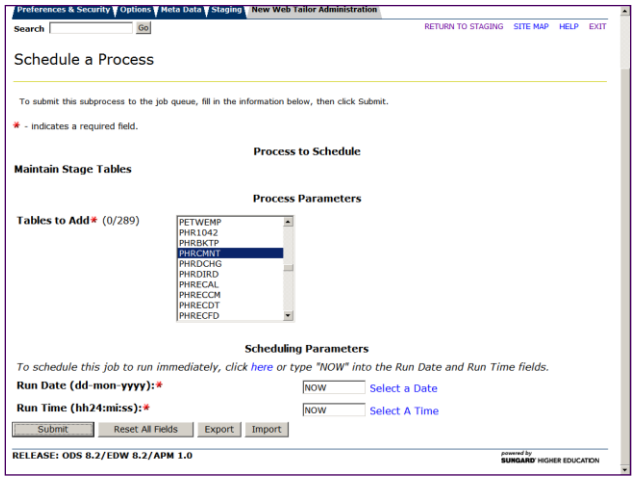
Staging Menu (Streams)

Maintain Stage Tables (Streams)

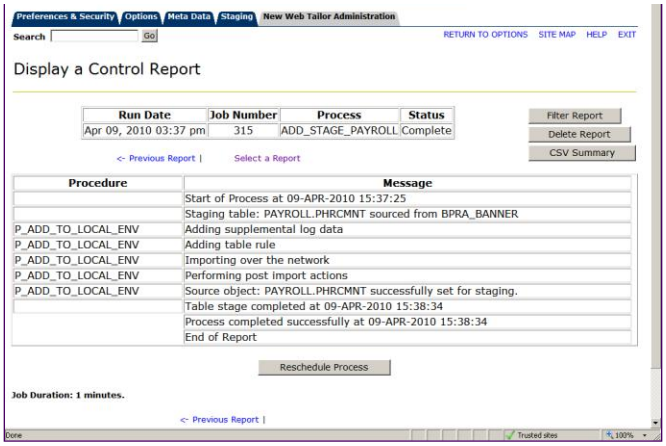


Staging Menu (Streams)

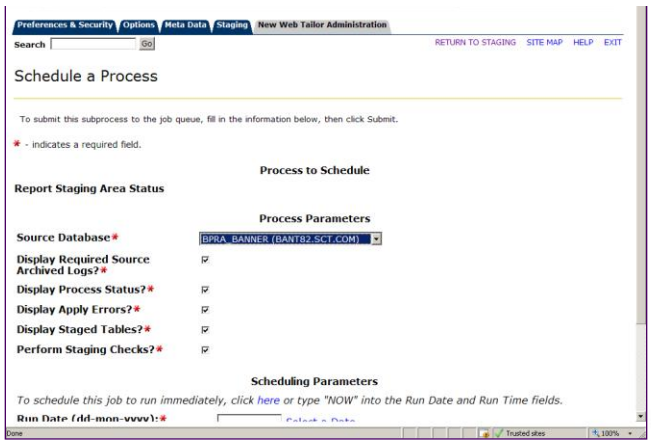
Adding Tables (Streams)



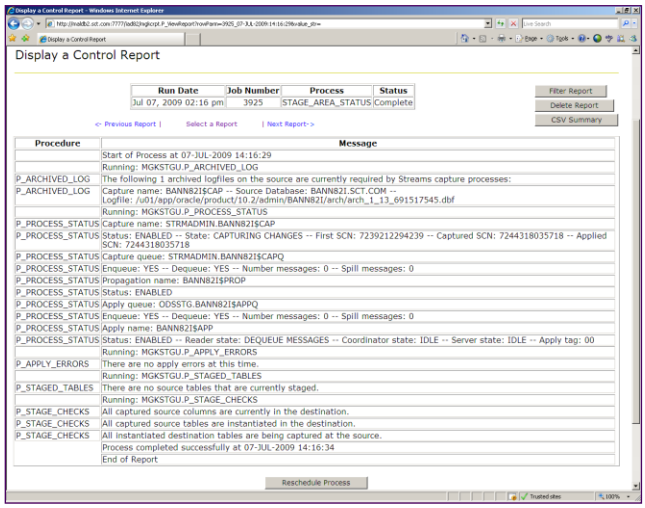
Adding Tables (Streams)



Staging Area Status Report (Streams)



Staging Area Status Report (Streams)



Display a Control Report

Run Date	Job Number	Process	Status
Jul 07, 2009 02:16 pm	3925	STAGE_AREA_STATUS	Complete

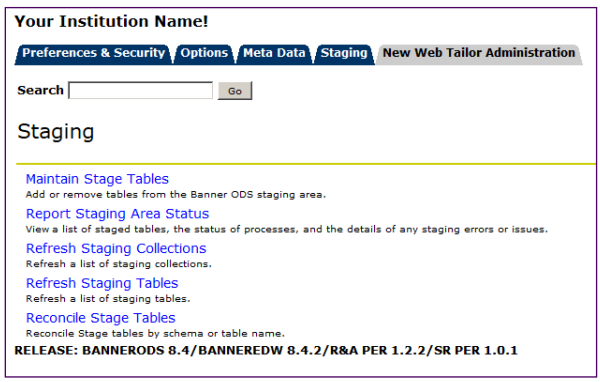
Filter Report | Delete Report | CSV Summary

<- Previous Report | Select a Report | Next Report->

Procedure	Message
	Start of Process at 07-JUL-2009 14:16:29
	Running: MGKSTGU.P_ARCHIVED_LOG
P_ARCHIVED_LOG	The following 1 archived logfiles on the source are currently required by Streams capture processes:
P_ARCHIVED_LOG	Capture name: BANN82I$CAP -- Source Database: BANN82I.SCT.COM -- Logfile: /u01/app/oracle/product/10.2/admin/BANN82I/arch/arch_1_13_691517545.dbf
	Running: MGKSTGU.P_PROCESS_STATUS
P_PROCESS_STATUS	Capture name: STRMADMIN.BANN82I$CAP
P_PROCESS_STATUS	Status: ENABLED -- State: CAPTURING CHANGES -- First SCN: 7239212294239 -- Captured SCN: 7244318035718 -- Applied SCN: 7244318035718
P_PROCESS_STATUS	Capture queue: STRMADMIN.BANN82I$CAPQ
P_PROCESS_STATUS	Enqueue: YES -- Dequeue: YES -- Number messages: 0 -- Spill messages: 0
P_PROCESS_STATUS	Propagation name: BANN82I$PROP
P_PROCESS_STATUS	Status: ENABLED
P_PROCESS_STATUS	Apply queue: ODSSTG.BANN82I$APPQ
P_PROCESS_STATUS	Enqueue: YES -- Dequeue: YES -- Number messages: 0 -- Spill messages: 0
P_PROCESS_STATUS	Apply name: BANN82I$APP
P_PROCESS_STATUS	Status: ENABLED -- Reader state: DEQUEUE MESSAGES -- Coordinator state: IDLE -- Server state: IDLE -- Apply tag: 00
	Running: MGKSTGU.P_APPLY_ERRORS
P_APPLY_ERRORS	There are no apply errors at this time.
	Running: MGKSTGU.P_STAGED_TABLES
P_STAGED_TABLES	There are no source tables that are currently staged.
	Running: MGKSTGU.P_STAGE_CHECKS
P_STAGE_CHECKS	All captured source columns are currently in the destination.
P_STAGE_CHECKS	All captured source tables are instantiated in the destination.
P_STAGE_CHECKS	All instantiated destination tables are being captured at the source.
	Process completed successfully at 07-JUL-2009 14:16:34
	End of Report

Reschedule Process

Staging Menu (Mviews)



Your Institution Name!

Preferences & Security | Options | Meta Data | Staging | New Web Tailor Administration

Search Go

Staging

Maintain Stage Tables
Add or remove tables from the Banner ODS staging area.

Report Staging Area Status
View a list of staged tables, the status of processes, and the details of any staging errors or issues.

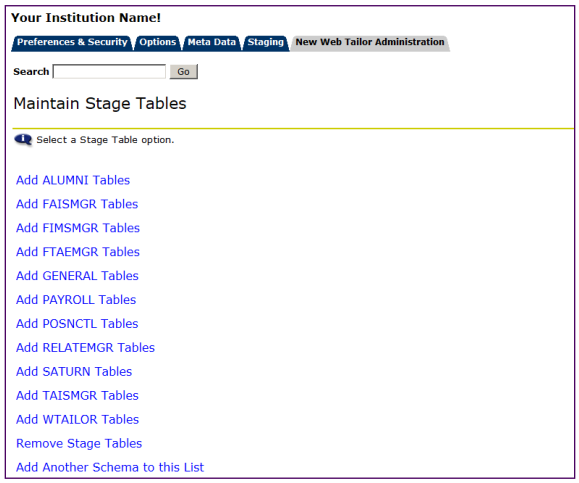
Refresh Staging Collections
Refresh a list of staging collections.

Refresh Staging Tables
Refresh a list of staging tables.

Reconcile Stage Tables
Reconcile Stage tables by schema or table name.

RELEASE: BANNERODS 8.4/BANNEREDW 8.4.2/R&A PER 1.2.2/SR PER 1.0.1

Maintain Stage Tables (Mviews)



Adding Tables (Mviews)

Adding Tables (Mviews)

Display a Control Report

Run Date	Job Number	Process	Status
Mar 06, 2013 03:49 pm	1327	ADD_STAGE_ALUMNI	Complete

<- Previous Report | Select a Report

Procedure	Message
	Start of Process at 06-MAR-2013 15:49:02
	Session set to Resumable, timeout = 3 days (259200)
	Staging table: ALUMNI.AABCTRL sourced from BPRA_BANNER
	Staging source tables as materialized views at 06-MAR-2013 15:49:02
P_STAGE_MVIEW	Verifying schemas exist
P_STAGE_MVIEW	Finding tables to stage
P_STAGE_MVIEW	Creating materialized view logs at 06-MAR-2013 15:49:05
P_STAGE_MVIEW	Creating materialized view logs completed at 06-MAR-2013 15:49:05
P_STAGE_MVIEW	Creating materialized views at 06-MAR-2013 15:49:05
P_STAGE_MVIEW	Creating materialized view ALUMNI.AABCTRL at 06-MAR-2013 15:49:05
P_STAGE_MVIEW	Creating materialized views completed at 06-MAR-2013 15:49:09
P_STAGE_MVIEW	Creating synonyms
P_STAGE_MVIEW	Source tables successfully staged.
	Table stage completed at 06-MAR-2013 15:49:09
	Process completed successfully at 06-MAR-2013 15:49:09
	End of Report

Reschedule Process

Staging Area Status Report (Mviews)

Schedule a Process

To submit this subprocess to the job queue, fill in the information below, then click Submit.

* - indicates a required field.

Process to Schedule

Report Staging Area Status

Process Parameters

Source Database* BPRA_BANNER (BAND84.SCT.COM)

Display Staged Tables?* No

Change Count Limit* 100

Perform Staging Checks?* ☑

Check Staging Triggers?* ☑

Process Info

Note: The **Change Count Limit** parameter is only applicable when **Display Staged Tables** is set to "Yes, with Change Counts".

Scheduling Parameters

To schedule this job to run immediately, click here or type "NOW" into the Run Date and Run Time fields.

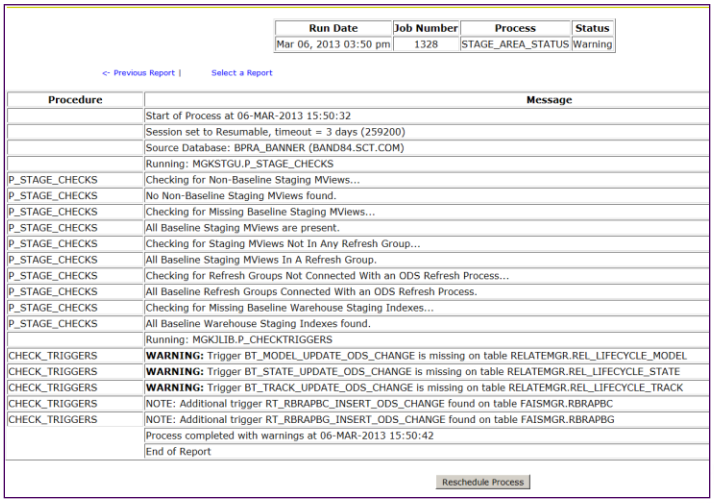
Run Date (dd-mon-yyyy):* Select A Date

Run Time (hh24:mi:ss):* Select A Time

Interval: Select An Interval

Submit | Reset All Fields | Export | Import

Staging Area Status Report (Mviews)



Run Date	Job Number	Process	Status
Mar 06, 2013 03:50 pm	1328	STAGE_AREA_STATUS	Warning

<- Previous Report | Select a Report

Procedure	Message
	Start of Process at 06-MAR-2013 15:50:32
	Session set to Resumable, timeout = 3 days (259200)
	Source Database: BPRA_BANNER (BAND84.SCT.COM)
	Running: MGKSTGU.P_STAGE_CHECKS
P_STAGE_CHECKS	Checking for Non-Baseline Staging MViews...
P_STAGE_CHECKS	No Non-Baseline Staging MViews found.
P_STAGE_CHECKS	Checking for Missing Baseline Staging MViews...
P_STAGE_CHECKS	All Baseline Staging MViews are present.
P_STAGE_CHECKS	Checking for Staging MViews Not In Any Refresh Group...
P_STAGE_CHECKS	All Baseline Staging MViews In A Refresh Group.
P_STAGE_CHECKS	Checking for Refresh Groups Not Connected With an ODS Refresh Process...
P_STAGE_CHECKS	All Baseline Refresh Groups Connected With an ODS Refresh Process.
P_STAGE_CHECKS	Checking for Missing Baseline Warehouse Staging Indexes...
P_STAGE_CHECKS	All Baseline Warehouse Staging Indexes found.
	Running: MGKJLIB.P_CHECKTRIGGERS
CHECK_TRIGGERS	**WARNING:** Trigger BT_MODEL_UPDATE_ODS_CHANGE is missing on table RELATEMGR.REL_LIFECYCLE_MODEL
CHECK_TRIGGERS	**WARNING:** Trigger BT_STATE_UPDATE_ODS_CHANGE is missing on table RELATEMGR.REL_LIFECYCLE_STATE
CHECK_TRIGGERS	**WARNING:** Trigger BT_TRACK_UPDATE_ODS_CHANGE is missing on table RELATEMGR.REL_LIFECYCLE_TRACK
CHECK_TRIGGERS	NOTE: Additional trigger RT_RBRAPBC_INSERT_ODS_CHANGE found on table FAISMGR.RBRAPBC
CHECK_TRIGGERS	NOTE: Additional trigger RT_RBRAPBG_INSERT_ODS_CHANGE found on table FAISMGR.RBRAPBG
	Process completed with warnings at 06-MAR-2013 15:50:42
	End of Report

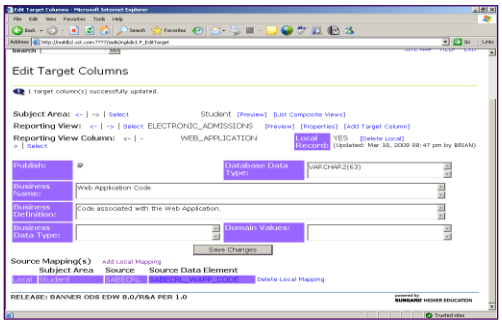
Reschedule Process

Create Reporting View (Optional)

- Create a Reporting View on top of Custom Table
  - Creates a layer of insulation
  - Gives the ability to join to other tables
  - Can create calculations

Create Custom Meta Data (Optional)

- Using the Administrative Interface
  - Create Local Meta Data
  - Won't be overwritten in upgrades



Add to Reporting Tools

- Add tables to your Reporting Tool layer
  - Import into baseline Cognos Model or Discoverer End User Layer or add to any other Reporting Tool being used
  - Create joins to existing packages or create your own packages
  - Retain transaction logs for changes made – upgrades will redeploy the packages and the scripts would need to be rerun.
- Cognos 10
  - Add reporting view to sghe_ods_dv and sghe_ods_bv framework models
  - Customizations will not be overwritten with upgrades
    - Using Transaction History
- Discoverer
  - Grant object access the EUL schema
    - GRANT SELECT on ELECTRONIC_ADMISSIONS to ODSEUL
  - Add reporting view to the End User Layer
  - Customizations will not be overwritten with upgrades

Extending the EDW

Baseline EDW, BRM, RAP and SRP

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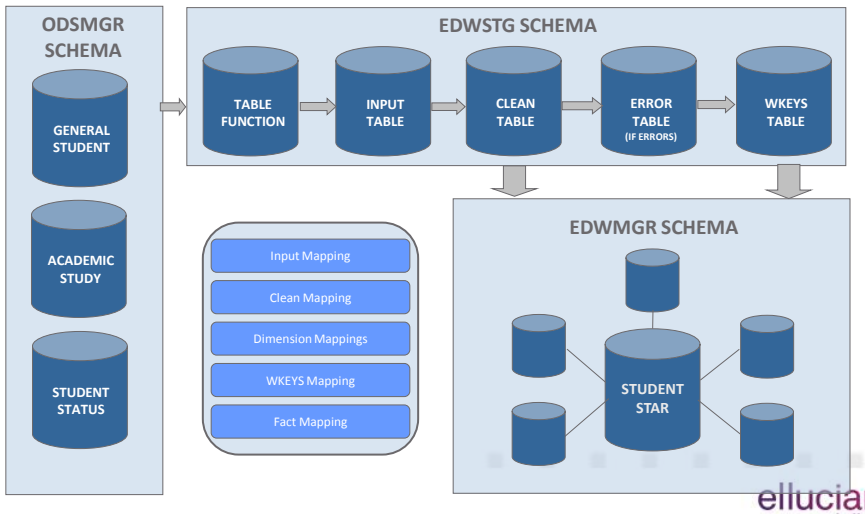
EDW Detailed Processing



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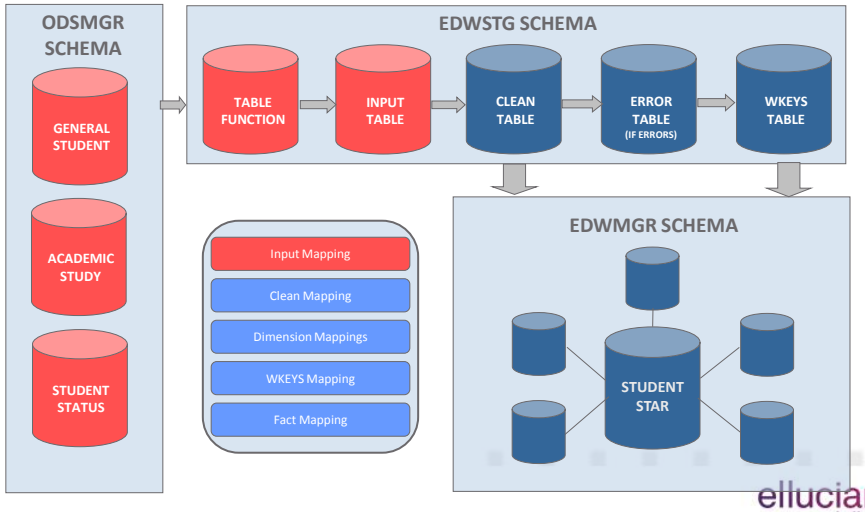
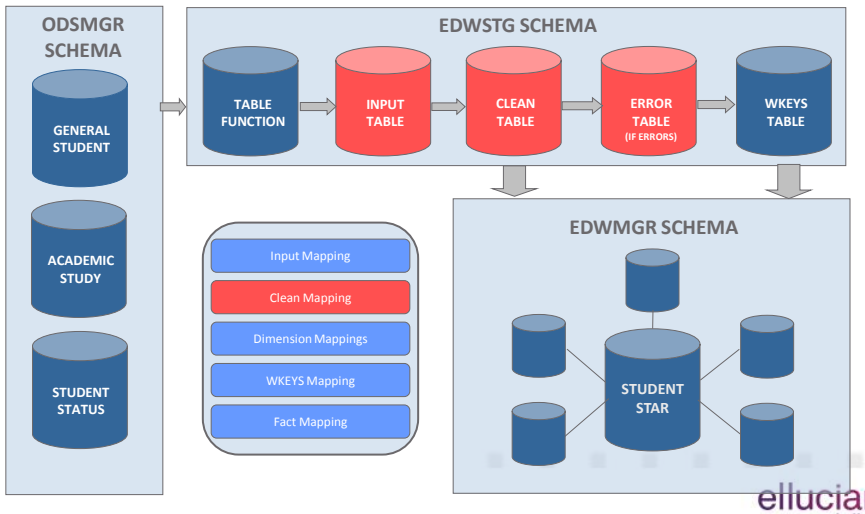
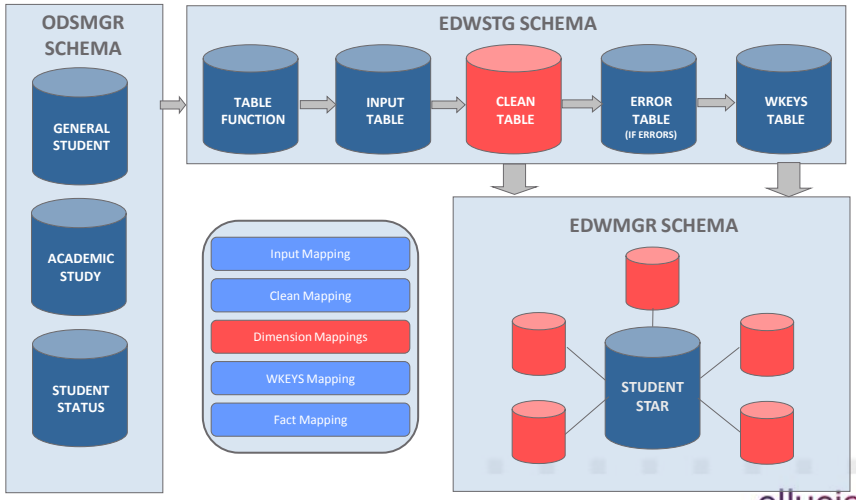
EDW Detailed Processing



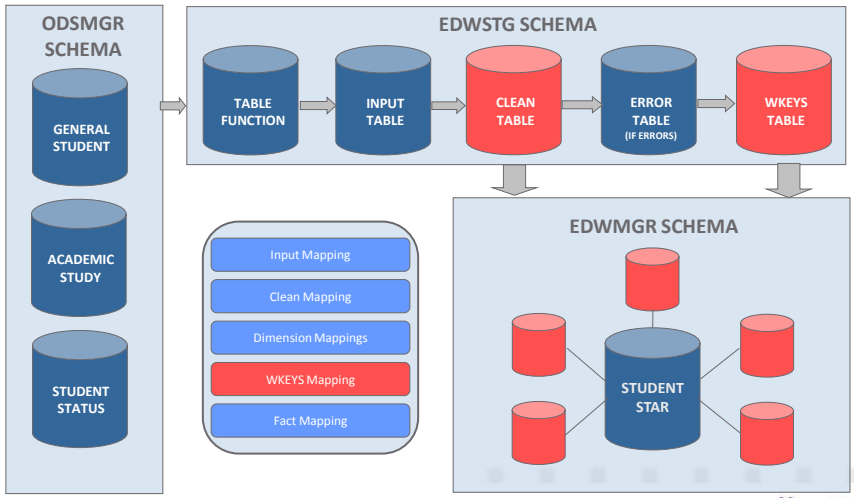
EDW Detailed Processing



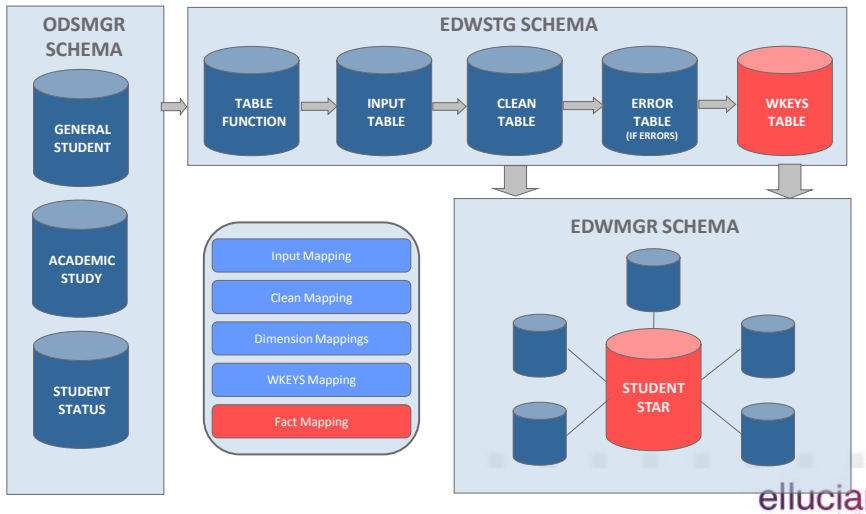
EDW Detailed Processing



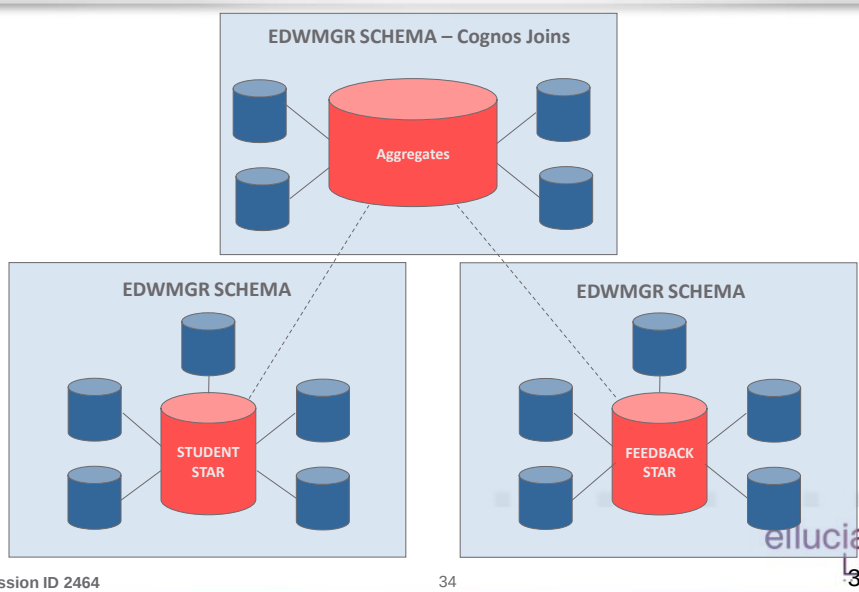
EDW Detailed Processing



EDW Detailed Processing



EDW Detailed Processing



Enterprise Data Warehouse Overview

- Dimensionally modeled, i.e. Star Schemas
- Fact tables
  - Contain Measures Used to Perform Analysis
- Dimension Tables
  - Contain Attributes
  - Surrogate (Calculated) Keys
  - Conformed
- Every dimension and every fact table has five additional user defined fields that may be exercised for extensibility purposes

Considerations when extending models

- Where/how is that data being captured?
  - This will tell you what the source is, is it already in the ODS or some other system, will it be automatically incorporated into the refresh.
- How will the new object be used – as an attribute or as a measure?
  - This will tell you whether it should be added to a dimension or fact table.
- If a measure, is it captured at the same level of granularity as the other data in the star?
  - If different, this will tell you what adjustments should be made on either the reporting or ETL side to accommodate the difference.

Step 1: Table Function Modification

- Table functions are used to extract the data from the ODS to the EDW for loads/refreshes
- There is one table function per star schema
- Snapshot stars' table functions live in individual PL/SQL packages
- Operational stars' table functions live in one package per product
- Table function packages created in EDWSTG schema
- Package naming convention is EDW_<product or snapshot star>_EXTR

Table Function Packages

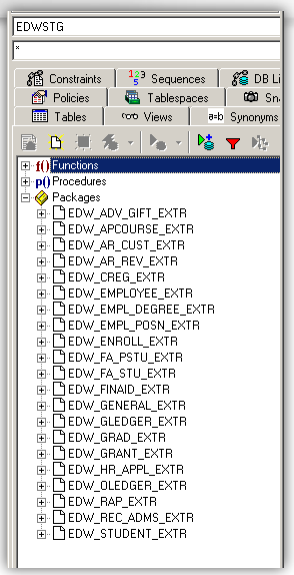
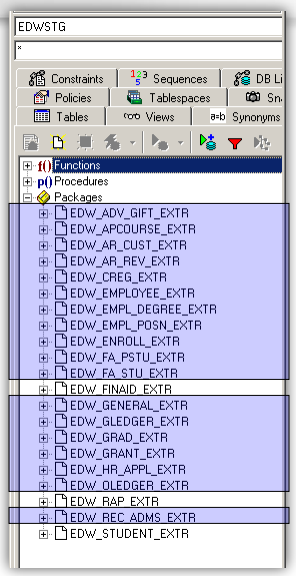


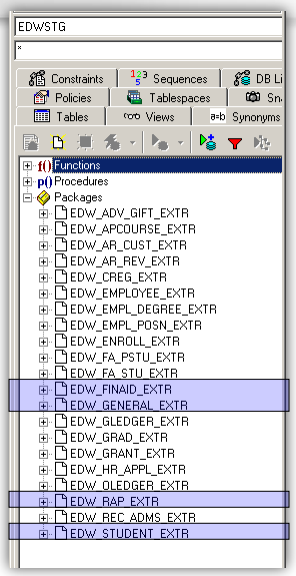
Table Function Packages



Snapshot Stars

One package per star

Table Function Packages



Operational Stars

One package per product

Recommendations

- Copy of the table function package script to an institution-specific directory outside of the baseline EDW code tree
- Rename the script to reflect that it is modified
- Do not change the name of the object created by the script
- Update the script to include desired attributes or measures

Table Function Structure

- Driving cursor – selects population that will drive extract
- Supporting cursors – select supporting data related to driving population
- Return row definition – where selected values are assigned to staging input table columns

Function Table Cursor Modification

- In our example we will add Academic Period Type to the first set of user defined fields in the Academic Time Dimension for the Admissions Application star
- The Academic Period Type is part of our driving cursor, selected from the ODS composite table MST_ADMISSIONS_APPLICATION
- The Banner validation table for this column is STVTRMT

WDT_ACADEMIC_TIME

WDT_ACADEMIC_TIME: Created: 8/5/2008 2:47:48 PM Last DDL: 1/30/2009 5:54:29 PM

Columns | Indexes | Constraints | Triggers | Data | Scripts | Grants | Synonyms | Partitions | Subpart

ACADEMIC_TIME_KEY

Column Name	ID	Pk	Null?	Data Type
ACADEMIC_TIME_KEY	1	1	N	NUMBER
ACADEMIC_PERIOD	2		Y	VARCHAR2 (63 Char)
ACADEMIC_PERIOD_SD	3		Y	VARCHAR2 (255 Char)
ACADEMIC_PERIOD_LD	4		Y	VARCHAR2 (255 Char)
ACADEMIC_PERIOD_BEGIN_DATE	5		Y	DATE
ACADEMIC_PERIOD_END_DATE	6		Y	DATE
ACADEMIC_YEAR	7		Y	VARCHAR2 (63 Char)
ACADEMIC_YEAR_SD	8		Y	VARCHAR2 (255 Char)
ACADEMIC_YEAR_LD	9		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_01	10		Y	VARCHAR2 (63 Char)
USER_ATTRIBUTE_01_SD	11		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_01_LD	12		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_02	13		Y	VARCHAR2 (63 Char)
USER_ATTRIBUTE_02_SD	14		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_02_LD	15		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_03	16		Y	VARCHAR2 (63 Char)
USER_ATTRIBUTE_03_SD	17		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_03_LD	18		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_04	19		Y	VARCHAR2 (63 Char)
USER_ATTRIBUTE_04_SD	20		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_04_LD	21		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_05	22		Y	VARCHAR2 (63 Char)
USER_ATTRIBUTE_05_SD	23		Y	VARCHAR2 (255 Char)
USER_ATTRIBUTE_05_LD	24		Y	VARCHAR2 (255 Char)
SYSTEM_LOAD_PROCESS	25		N	VARCHAR2 (30 Char)
SYSTEM_LOAD_TMSTMP	26		N	DATE

Driving Cursor Update

BASELINE:

```
SELECT ...
        ACADEMIC_YEAR,
        ACADEMIC_PERIOD,
        PERSON_UID,
        APPLICATION_NUMBER,
        APPLICATION_RANKING_ORDER,
        APPLICATION_STATUS,
        ....
    FROM MST_ADMISSIONS_APPLICATION
   WHERE ...;
```

MODIFIED:

```
   SELECT ...
        ACADEMIC_YEAR,
        ACADEMIC_PERIOD,
        ACADEMIC_PERIOD_TYPE,
        PERSON_UID,
        APPLICATION_NUMBER,
        APPLICATION_RANKING_ORDER,
        APPLICATION_STATUS,
        ....
    FROM MST_ADMISSIONS_APPLICATION
   WHERE ...;
```


Return Row Update

BASELINE:

```
ret_row.academic_period := admissions_appl_rec.academic_period;
ret_row.academic_period_begin_date := acad_time_rec.start_date;
ret_row.academic_period_end_date := acad_time_rec.end_date;
ret_row.academic_year := admissions_appl_rec.academic_year;
ret_row.atim_user_attribute_01 := NULL;
ret_row.atim_user_attribute_02 := NULL;
ret_row.atim_user_attribute_03 := NULL;
ret_row.atim_user_attribute_04 := NULL;
ret_row.atim_user_attribute_05 := NULL;
```

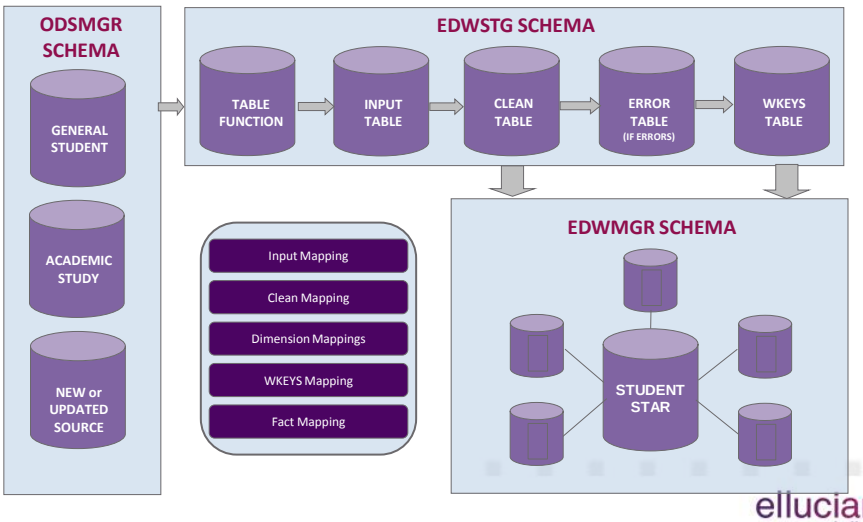
MODIFIED:

```
ret_row.academic_period := admissions_appl_rec.academic_period;
ret_row.academic_period_begin_date := acad_time_rec.start_date;
ret_row.academic_period_end_date := acad_time_rec.end_date;
ret_row.academic_year := admissions_appl_rec.academic_year;
ret_row.atim_user_attribute_01 := admissions_appl_rec.academic_period_type;
ret_row.atim_user_attribute_02 := NULL;
ret_row.atim_user_attribute_03 := NULL;
ret_row.atim_user_attribute_04 := NULL;
ret_row.atim_user_attribute_05 := NULL;
```

Table Function Compilation

- Compile your modified package under the EDWSTG schema
- Grant execute on the package to IA_ADMIN
  - This ensures that permissions were not lost
  - Reminder that load/refresh jobs are run from the Administrative Interface utilizing records in the IA_ADMIN schema tables
- No updates to OWB mappings needed

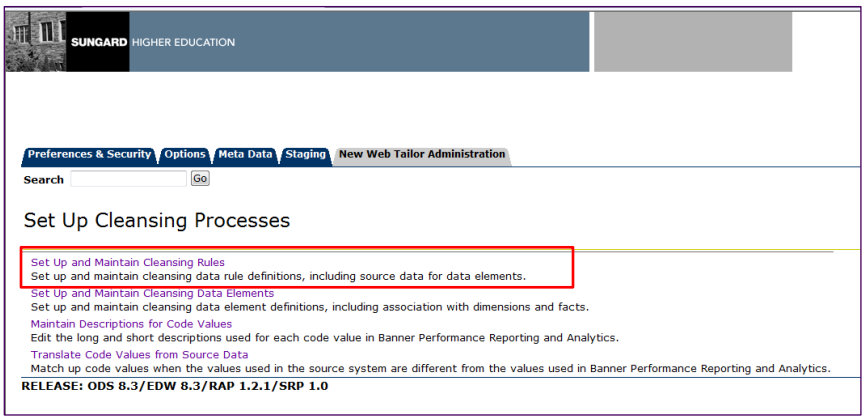
EDW Architecture



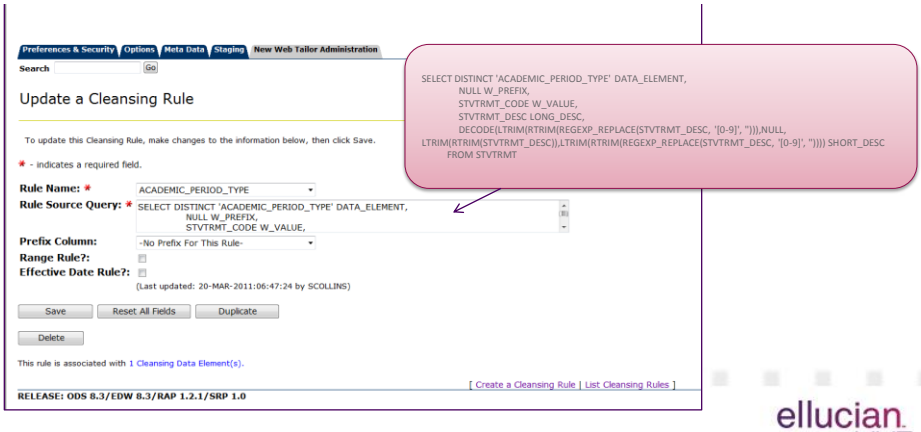
Step 2: Cleansing Rule Creation

- Via Admin Interface, set up new Parameters
- Cleansing Rule - identifies the source query that should be used to generate the default cleansing values and translations for your new data element
  - Our Banner source validation table is STVTRMT
  - Our new data element is ACADEMIC_TERM_TYPE
- Cleansing Data Element – links your newly defined data element to the star, dimension and input table field it will be used to cleanse
  - Our star, dimension and input table field are ADMISSIONS_APPL, WDT_ACADEMIC_TIME and ATIM_USER_ATTRIBUTE_01
  - Our data element is ACADEMIC_TERM_TYPE

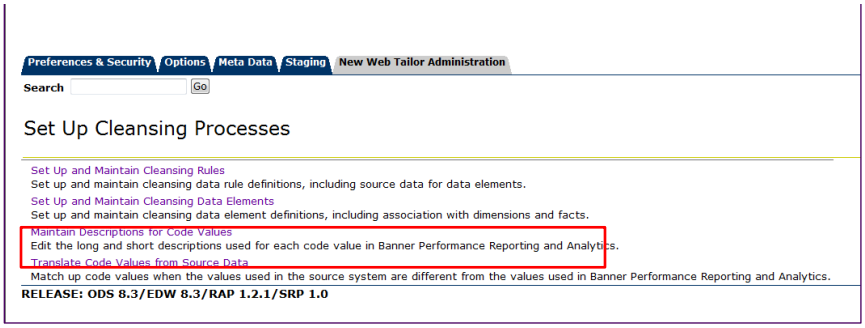
Cleansing Rule Definition



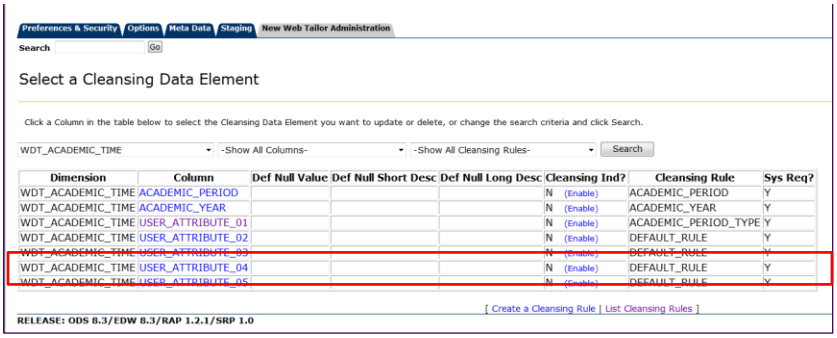
Cleansing Rule Definition



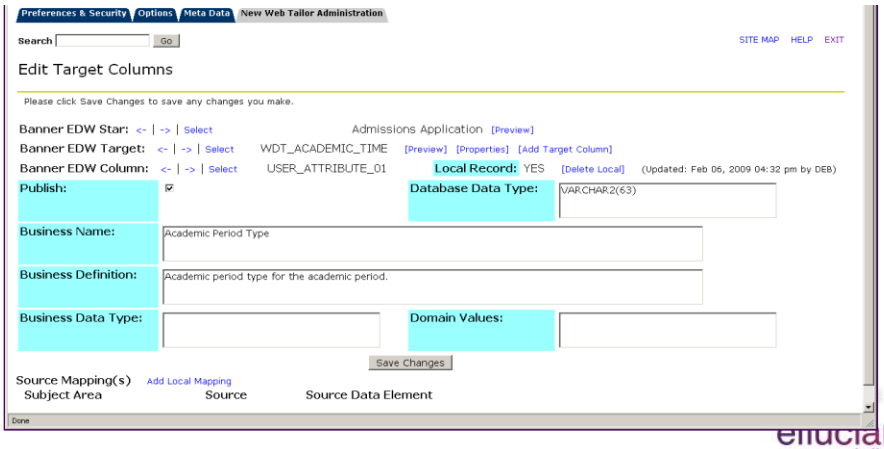
Cleansing Data Element Definition



Cleansing Data Element Definition



Step 3: Meta Data Creation



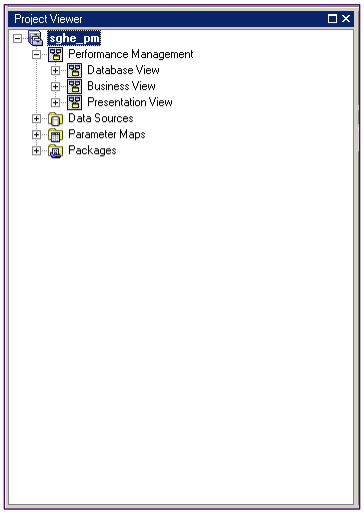
Step 4: Reporting Metadata Modification

- Update reporting metadata to include new column
- User Attribute and Measure fields exist in database layer
- Rename WDT_ACADEMIC_TIME's USER_ATTRIBUTE_01, USER_ATTRIBUTE_SD and USER_ATTRIBUTE_LD fields to have business name
  - E.g. Academic Period Type, Academic Period Type Description, and Academic Period Type Long Description

Retracing Our Steps …

- Step 1 Table Function Modification
  - Change and/or enhance data being loaded from ODS
- Step 2 Cleansing Rule Creation
  - Ensure valid data is loaded into the EDW
- Step 3 Meta Data Creation
  - Update business definitions of data elements
- Step 4 Reporting Metadata Modification
  - Make new/updated columns available for end users

Cognos Framework Manager Model



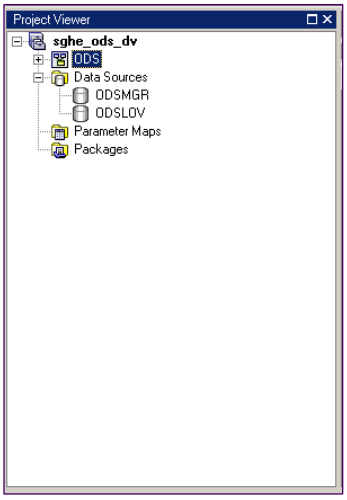
Three High Level Layers

Database View
- **Reference to database objects**

Business View
- **Business-centric grouping of objects**
- **Business-centric table aliases**
- **Business-centric relationships**

Presentation View
- **End user experience**

ODS FM Model: Database View



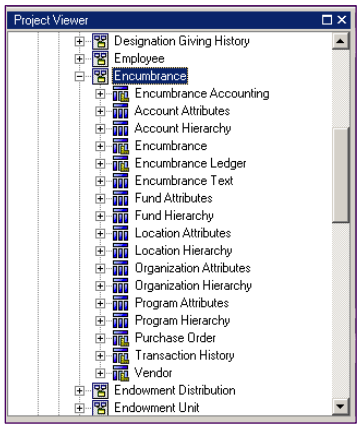
1st of 2 Layers in the Model
- **Separate model and referenced**
- **Ease of maintenance**
- **Layer of "insulation" for updates**
- **Objects referenced "as is"**

Objects Imported from 2 Sources

ODSMGR: **Reporting views**
Composite tables

ODSLOV: **LOV tables**

ODS FM Model: Business/Presentation View

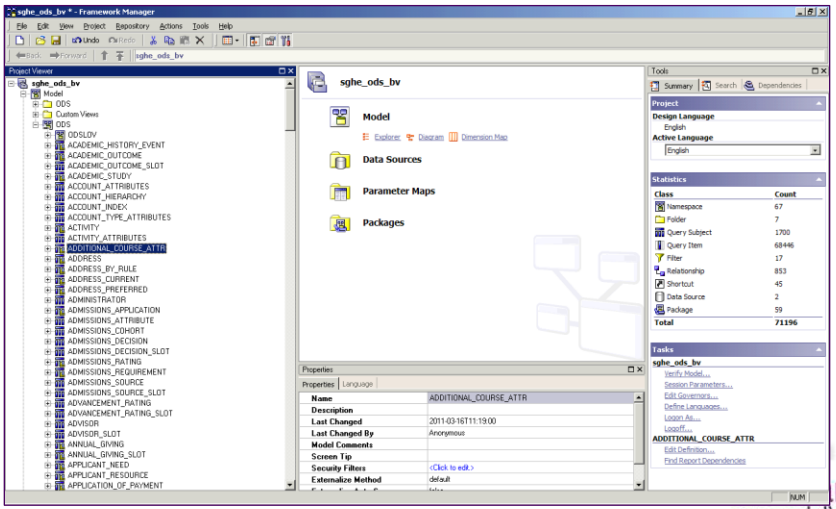


2nd of 2 Layers in the Model

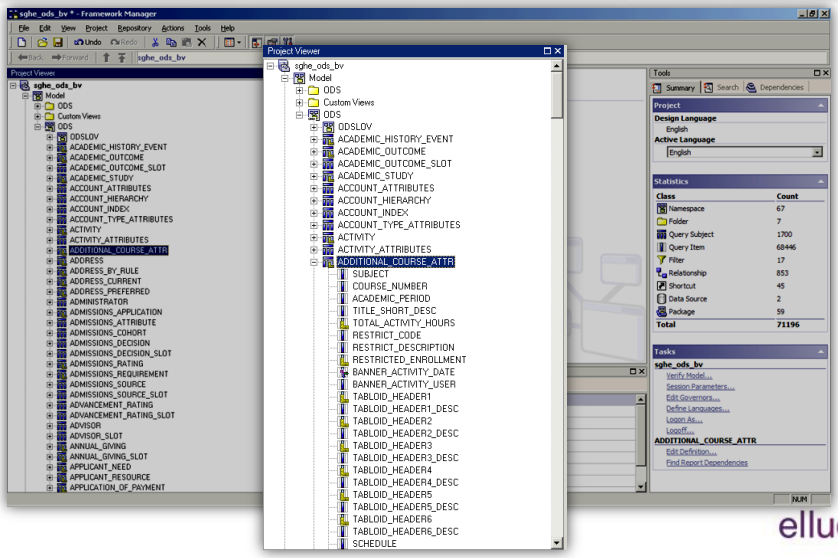
Business Concepts

- **Focused on specific reporting needs**
- **Roughly 50 Business Concepts**
- **Object names made readable**
- **Joins defined among objects (views)**
- **Some formatting defined**
- **Layer which is actually published**

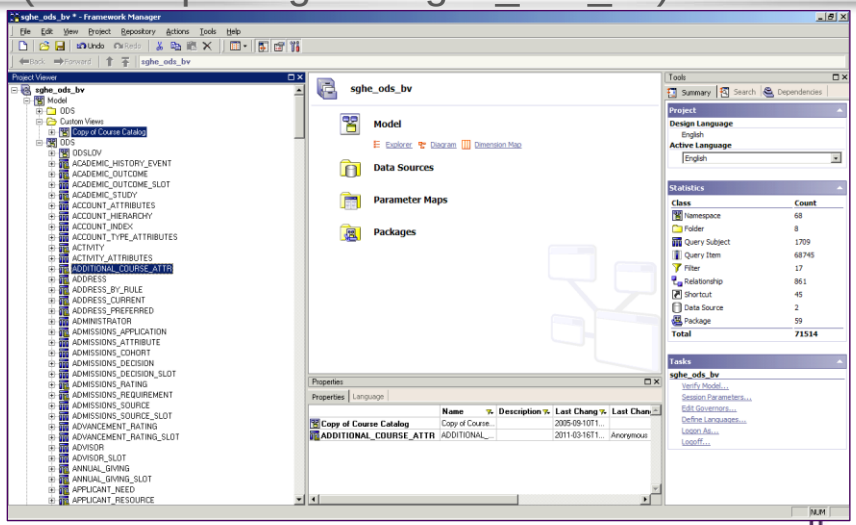
ODS: Business/Presentation View (After importing into sghe_ods_dv)



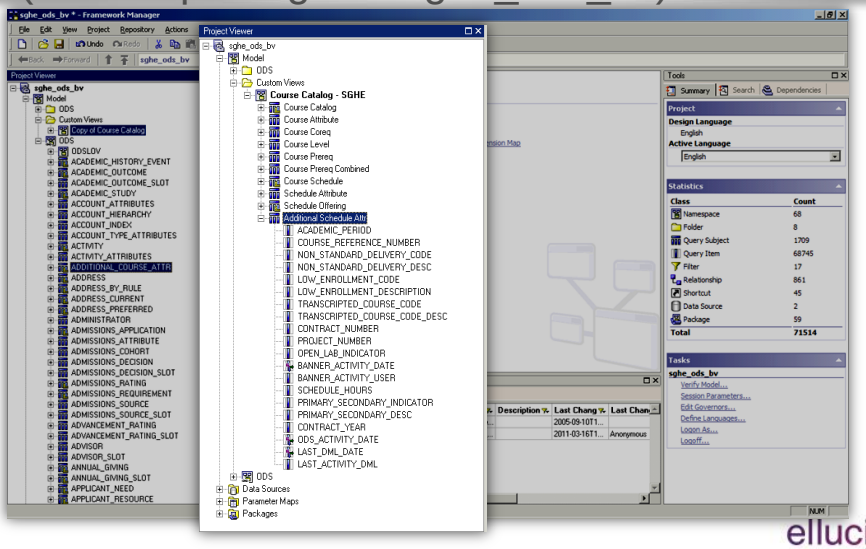
ODS: Business/Presentation View (After importing into sghe_ods_dv)



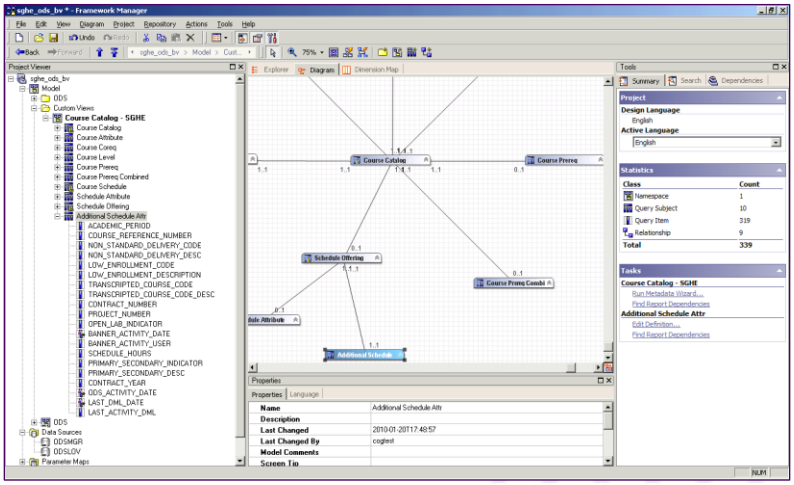
ODS: Business/Presentation View (After importing into sghe_ods_dv)



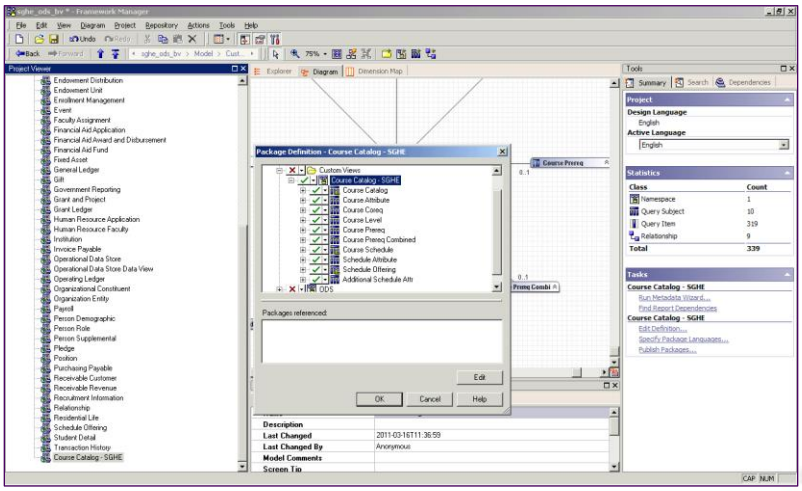
ODS: Business/Presentation View (After importing into sghe_ods_dv)



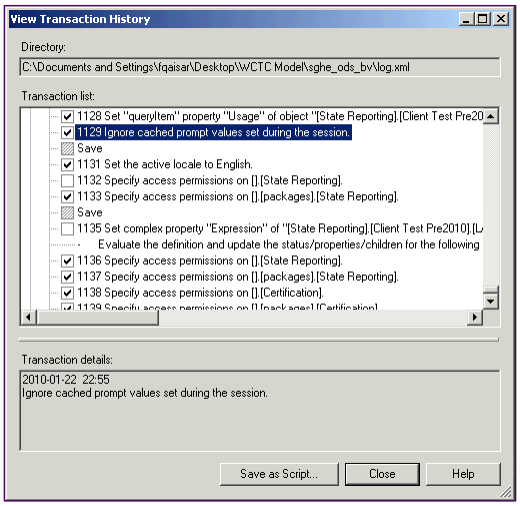
ODS: Business/Presentation View



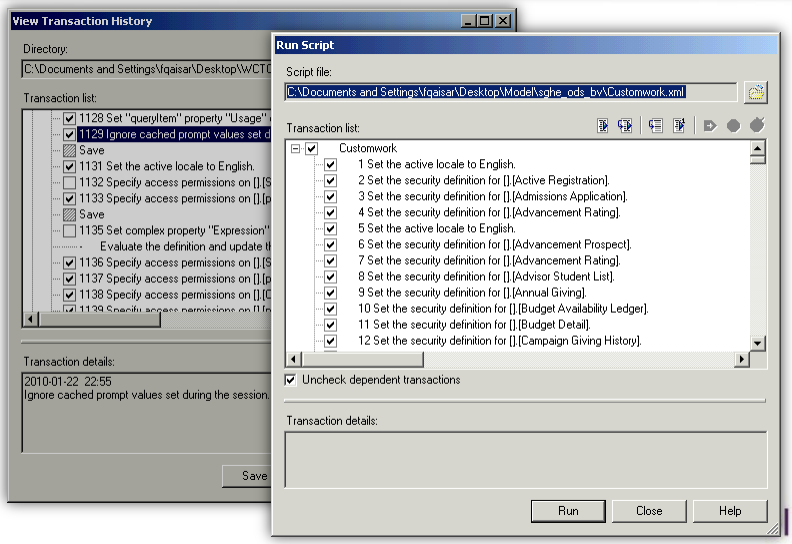
ODS: FM Package Definition



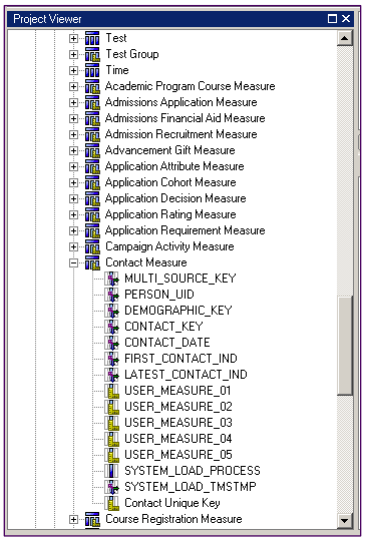
Save Custom Work Through Transaction History



… And Playback During Your Upgrades



EDW FM Model: Database View



1st of 3 Layers in the Model

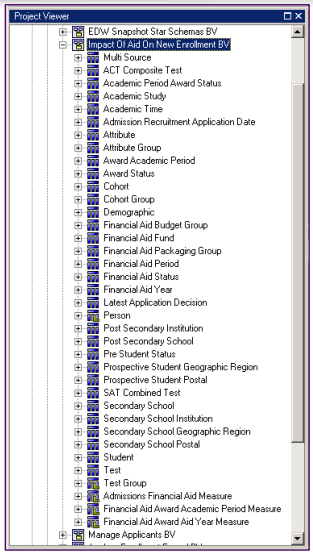
Objects May Be Renamed

- Table names made readable
- Select columns made readable
- Fact tables obtain "Measure" suffix
- Some concatenated unique keys added
- Some formatting and aggregation defined

Objects Imported from 1 Source

EDWMGR:	**Dimension tables**
	Fact tables

EDW FM Model: Business View

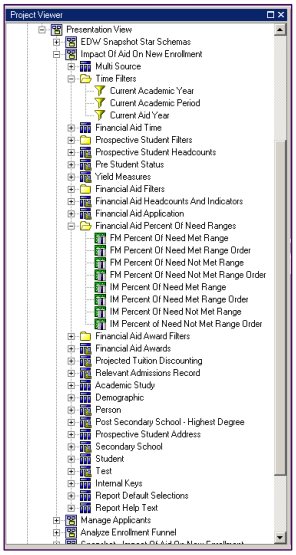


2nd of 3 Layers in the Model

Business Concepts

- 1 original snapshot EDW Stars
- 2 business centric EDW concepts
- 1 RAP-specific concept
- Alias (use case) tables created
- Alternate aggregation query items defined
  - Averages
  - Percents
  - Headcounts
  - Counts
- Joins defined among objects (tables)

EDW FM Model: Presentation View

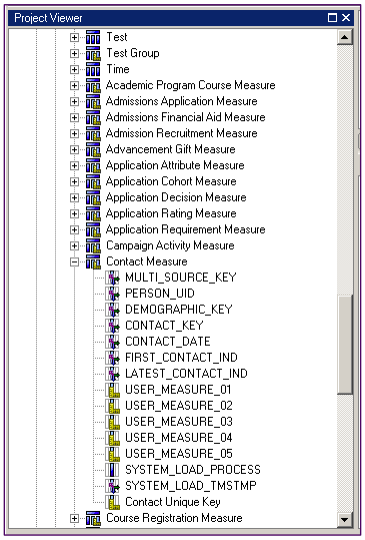


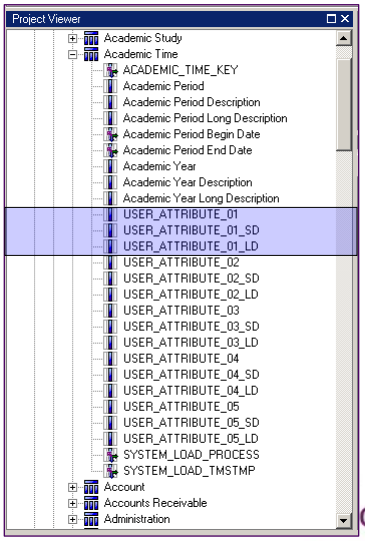
3rd of 3 Layers in the Model

Designed for Ease of Use

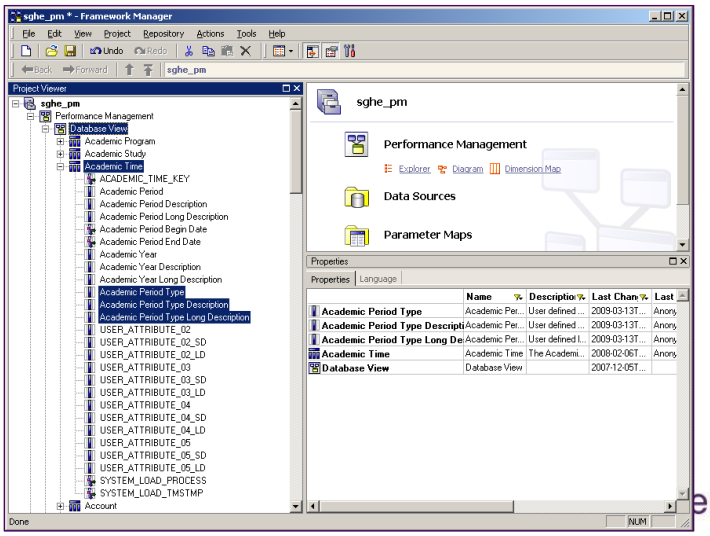
- Commonly used items grouped together
- Folders used to remove clutter
- Commonly used filters
- Commonly used calculations
- Customizable parameter driven items
- Layer which is actually published

EDW: Database View

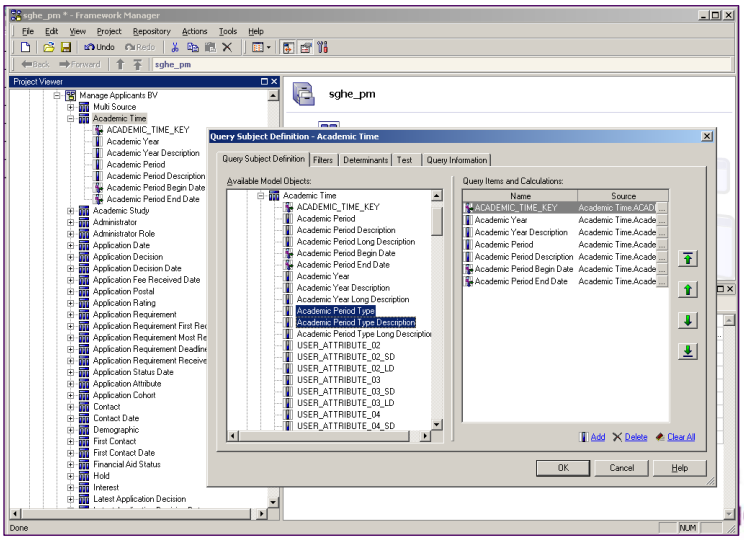




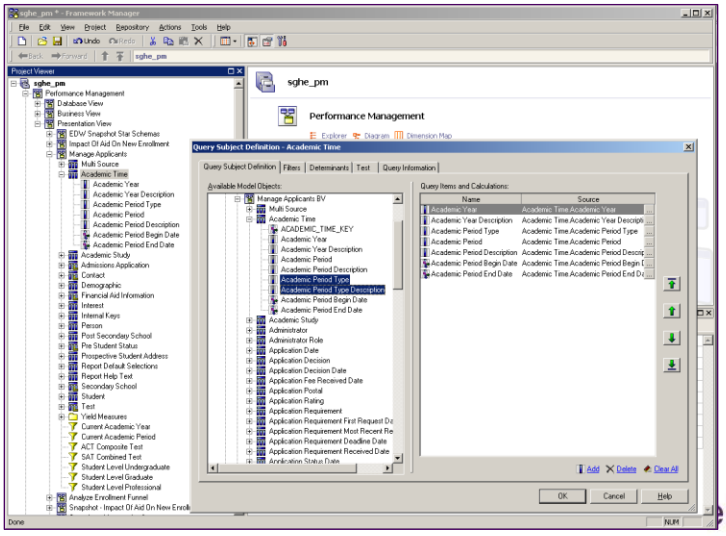
EDW: Database View



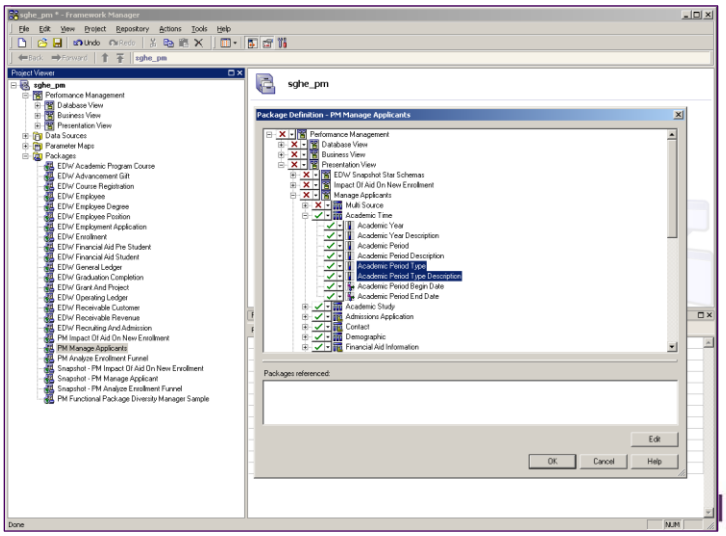
EDW: Business View



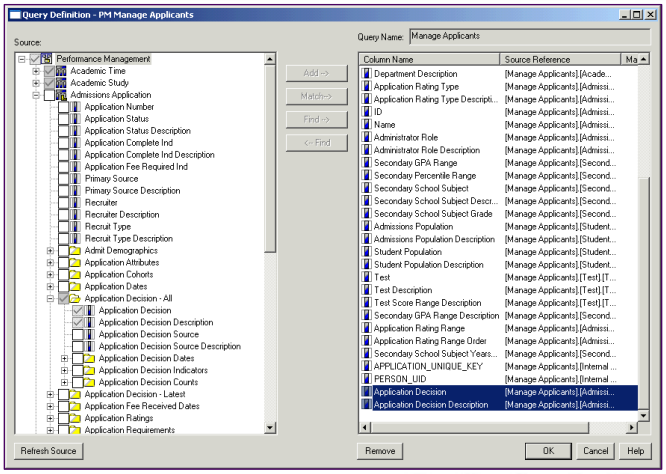
EDW: Presentation View



EDW: FM Package Definition

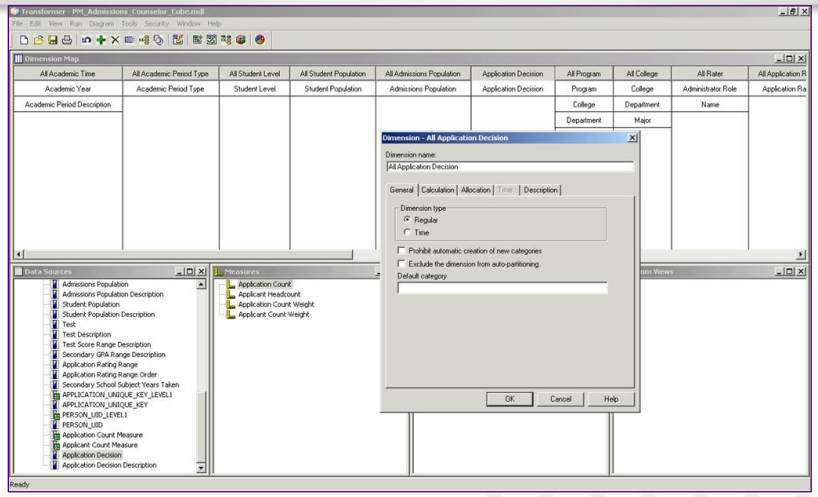


Extending Cognos Transformer Models



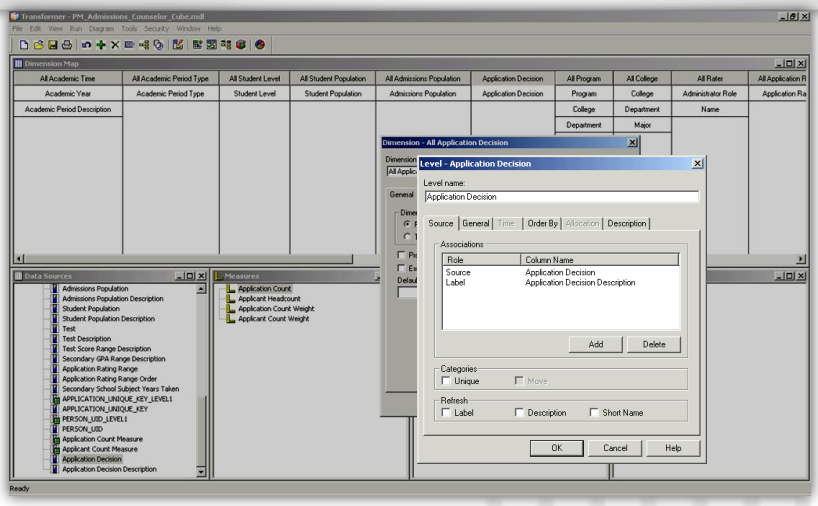
Update Cube Model Data Source with New/Existing Columns

Extending Cognos Transformer Models



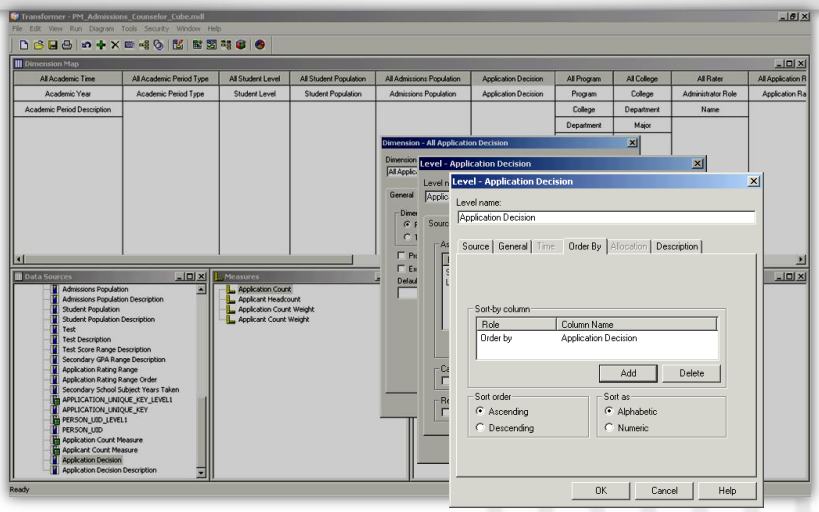
Identify Dimensional and Fact columns

Extending Cognos Transformer Models



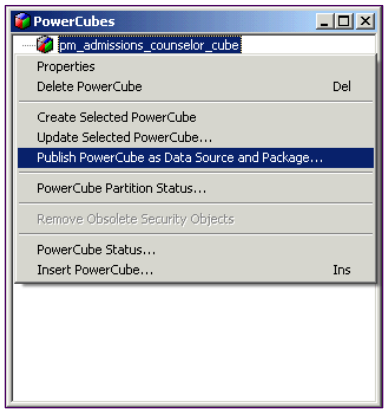
Identify Dimensional and Fact columns

Extending Cognos Transformer Models



Identify Dimensional and Fact columns

Extending Cognos Transformer Models



Publish Cube Model with Added Columns

Questions & Answers

Thank You!

Vishal Thacker vishal.thacker@ellucian.com

Please complete the online Session evaluation form
Session ID 2464