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Extending the Banner Enterprise Data Warehouse

Presented by: Brian Large, Ellucian
April 7th, 2014 @ 3:30pm
Session ID 2617

Session Objectives

- Describe Enterprise Data Warehouse (EDW) basics for Banner.
- Extend the EDW by bringing in an existing field from ODS.

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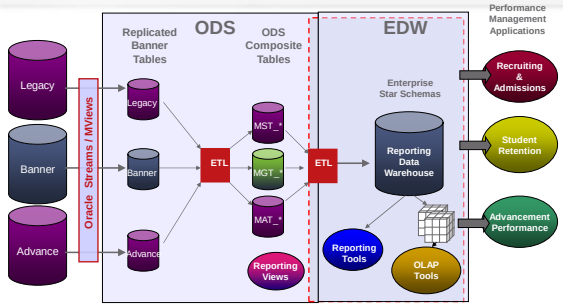
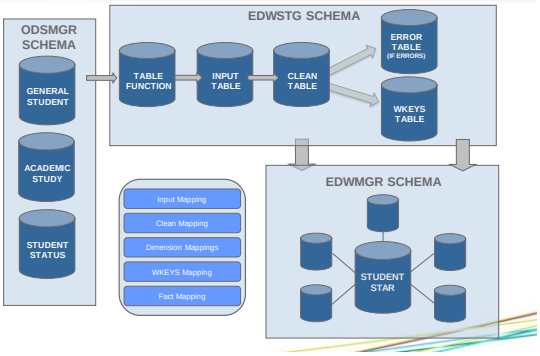
Understanding the EDW Architecture

Banner BI Architecture - EDW

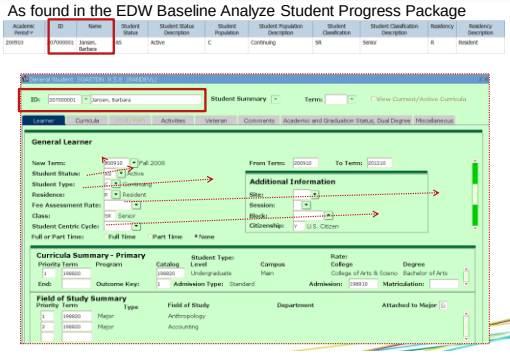


EDW Baseline ETL Processing Flow

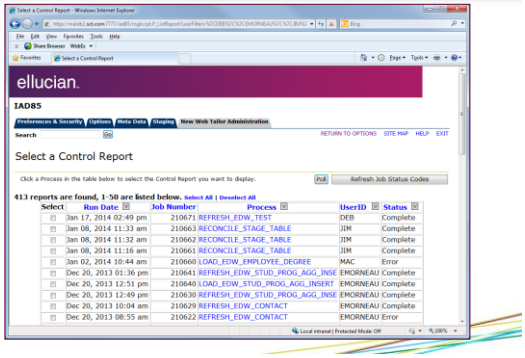


SGASTDN (SGBSTDN) Data

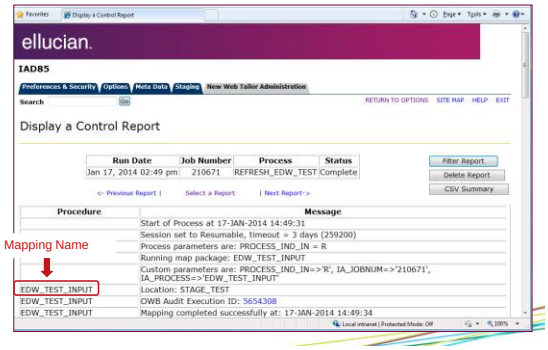
As found in the EDW Baseline Analyze Student Progress Package



Extending EDW – Control Reports



Extending EDW – Typical ETL Job CR



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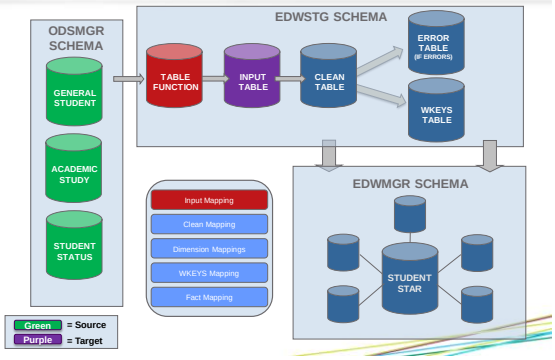

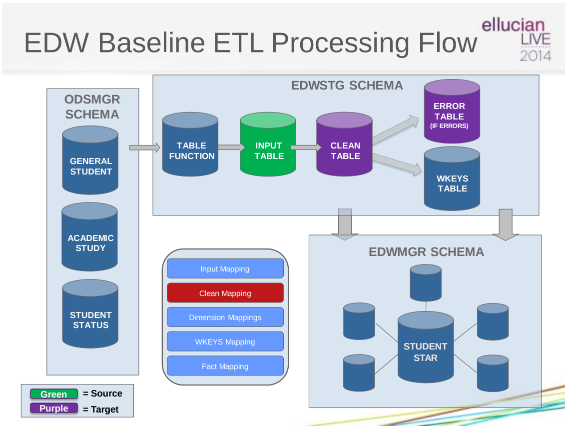
EDW Baseline ETL Processing Flow
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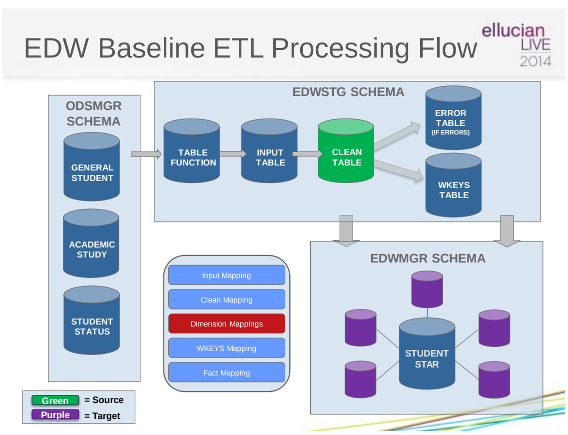
ODSMGR SCHEMA
GENERAL STUDENT
ACADEMIC STUDY
STUDENT STATUS
EDWSTG SCHEMA
TABLE FUNCTION
INPUT TABLE
CLEAN TABLE
ERROR TABLE (IF ERRORS)
WKEYS TABLE
Input Mapping
Clean Mapping
Dimension Mappings
WKEYS Mapping
Fact Mapping
EDWMGR SCHEMA
STUDENT STAR
Green = Source
Purple = Target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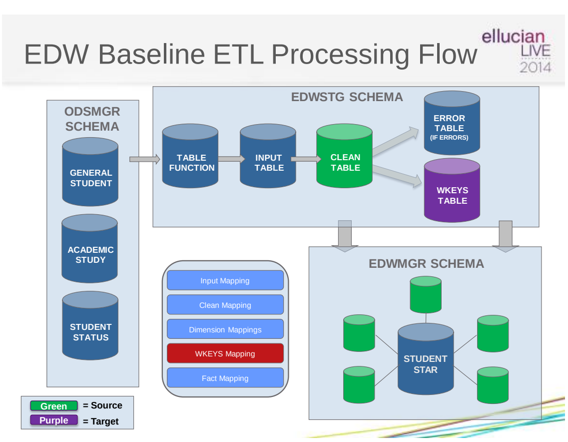
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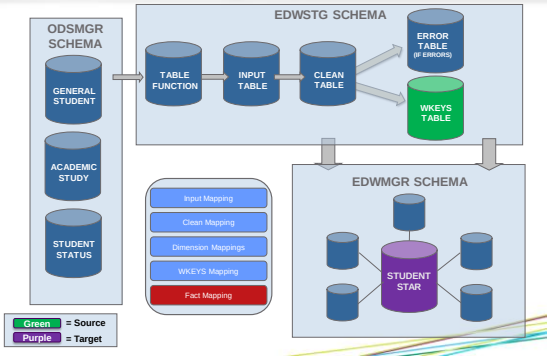
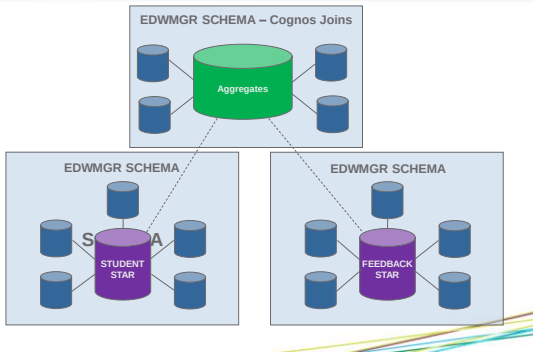


EDW Aggregate Processing



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Add existing ODS fields into an EDW Dimension

Enterprise Data Warehouse Overview

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- Dimensionally modeled, uses Star Schemas.
- Fact tables.
  - Contain Measures for performing analysis
- Dimension Tables.
  - Contain Attributes.
  - Surrogate (Calculated) Keys.
  - Conformed.
- Every dimension and every fact table has five additional user defined fields for extensibility purposes.

Considerations when Extending Models

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- Where/how is that data captured?
  - This tells 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 tells 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 tells you what adjustments to make on either the reporting or ETL side to accommodate the difference.

Adding a New Value using the USER_DEFINED Fields

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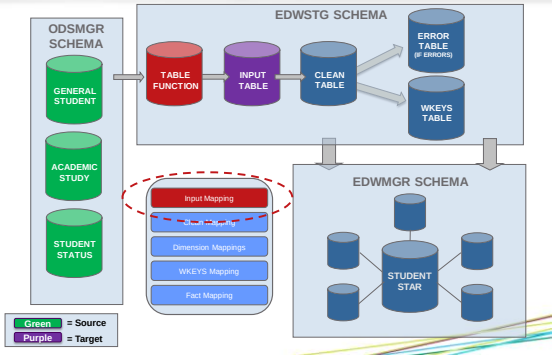
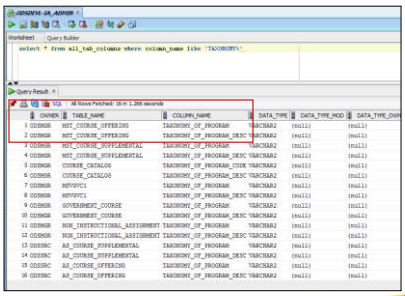
Scenario: You are asked to bring the ODS field **TAXONOMY_OF_PROGRAM** into the EDW for reporting on courses.

Step 1: Table Function Modification

EDW Baseline ETL Processing Flow



Where is TAXONOMY_OF_PROGRAM in ODS?



Which EDW Star?

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Schedule Banner EDW Operational Mappings - Parallel

* * *
Load/Refresh Combined Admissions Source Star
Load/Refresh Contact Star
Load/Refresh Course Instructor Star
Load/Refresh Course Section Star
Load/Refresh Course Meeting Time Star
Load/Refresh EM Campaign EDW Star
* * *
Load/Refresh Student Attribute Star
Load/Refresh Student Cohort Star
Load/Refresh Student Course Star
Load/Refresh Student Course Attribute Star
Load/Refresh Student Course Grade Change Star
Load/Refresh Student Star
* * *

Review existing usage of ODS tables

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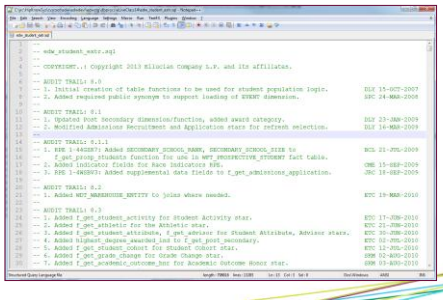
- Find **MST_COURSE_OFFERING** and **MST_COURSE_SUPPLEMENTAL**.



Which EDW Star?

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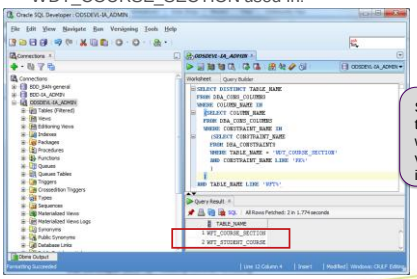
- Data associated with Courses/Sections: WDT_COURSE_SECTION
- WDT_COURSE_SECTION used in:



SQL finds Fact tables associated with the Dimension via referential integrity

USER_DEFINED Fields

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- Use the USER_ATTRIBUTE_01 column in the WDT_COURSE_SECTION table to store TAXONOMY_OF_PROGRAM (TOPS) data.

Banner	SCBSUPP. SCBSUPP_TOPS_CODE
ODS View	COURSE_CATALOG.TAXONOMY_OF_PROGRAM_CODE
ODS Table	MST_COURSE_SUPPLEMENTAL. TAXONOMY_OF_PROGRAM_CODE
EDW Star	COURSE_SECTION
EDW Dimension	WDT_COURSE_SECTION.USER_ATTRIBUTE_01

EDW Baseline ETL Processing Flow

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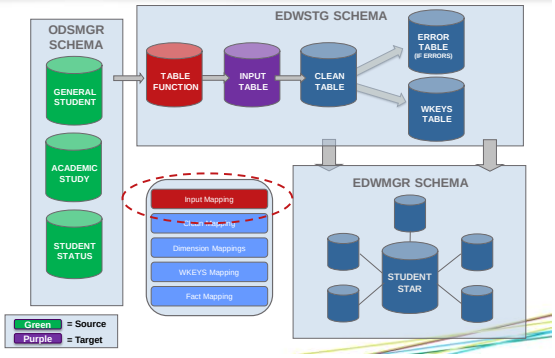

Oracle Warehouse Builder (OWB)

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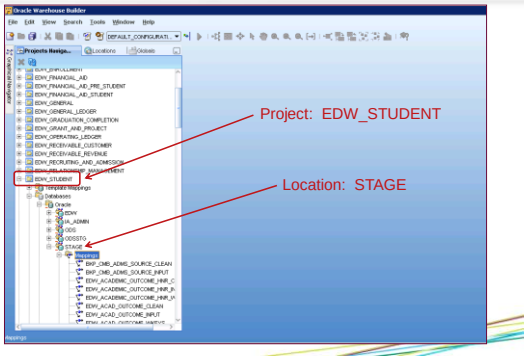

INPUT Mapping Flow

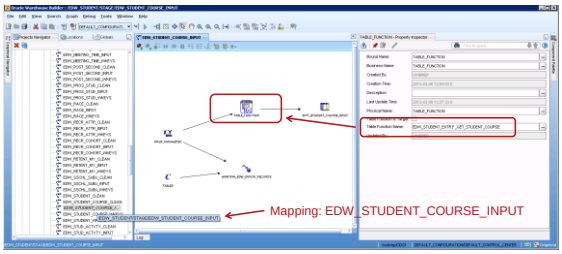

Table Functions

- Use table functions 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 are created in the EDWSTG schema.
- Package naming convention is EDW_<*product or snapshot star*>_EXTR.

Table Functions

- Pipelined table function.
- Source for INPUT mapping.
- Contains *driver* SQL to return rows.
- Uses function-specific and *shared* cursors to access ODS data.
- Contains USER_DEFINED fields for extensibility.
- Testable from SQL using the TABLE keyword:
  SELECT * FROM TABLE(*f_getData*());

Table Function Packages

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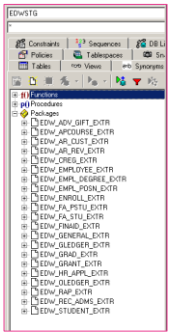

Table Function Packages

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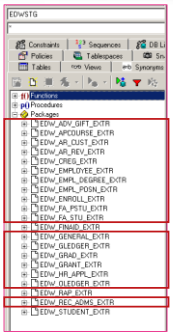

Snapshot Stars

One Package Per Star

Table Function Packages

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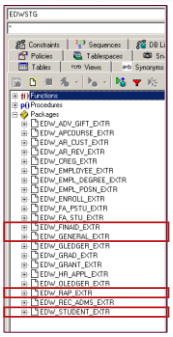

Operational Stars

One Package Per Product

Table Function Recommendations

- Copy the table function package script to an institution-specific directory outside the baseline EDW code tree.
- Rename the script to reflect it is modified.
- Do not change the name of the object created by the script.
- Update the script to include desired attributes or measures.
- Any patches or upgrades to the baseline version of these objects must be merged with the modified code.

Table Function Structure

Driving Cursor	Selects the population drives the extract.
Supporting Cursors	Selects support data related to driving population.
Return Row Definition	Where selected values are assigned to staging input table columns.

Modifying a Table Function Cursor

- In our example, we add **Taxonomy_Of_Program** to a user defined field in the Course Section star, in the **edw_student_extr.f_get_course_section** table function.
- Taxonomy data is already fetched as part of a supporting cursor, selected from the ODS composite table **MST_COURSE_SUPPLEMENTAL**.

WDT_COURSE_SECTION

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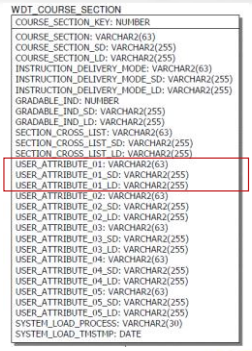

f_get_course_section() Cursor Logic

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```
CURSOR get_course_suppl(def_multi_source_in VARCHAR2,multi_src_in VARCHAR2,
    subject_in VARCHAR2, course_number_in VARCHAR2,academic_period_in VARCHAR2) IS
       SELECT *
         FROM MST_COURSE_SUPPLEMENTAL
        WHERE SUBJECT = subject_in
          AND COURSE_NUMBER = course_number_in
          AND academic_period_in BETWEEN ACADEMIC_PERIOD_START AND
    ACADEMIC_PERIOD_END
          AND NVL(MIF_VALUE, def_multi_source_in) = multi_src_in;

. . .
function f_get_course_Section(academic_year_in VARCHAR2, process_ind_in VARCHAR2,
    process_date DATE, debug_var_in VARCHAR2 DEFAULT NULL) RETURN
    tab_student_course_extr PIPELINED IS
--
     course_suppl_rec             EDW_STUDENT_EXTR.GET_COURSE_SUPPL%ROWTYPE;

. . .
 OPEN get_course_suppl(default_rec.multi_source_cleanse_value,
    student_course_info_recs(i).multi_source, student_course_info_recs(i).subject,
    student_course_info_recs(i).course_number,
    student_course_info_recs(i).academic_period);
FETCH get_course_suppl INTO course_suppl_rec;
CLOSE get_course_suppl;
```

f_get_course_section() Cursor Logic

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BASELINE:

```
-- Course Section
    ret_row.course_section            :=  crse_sec_rec.course_section;
    ret_row.instruction_delivery_mode :=  crse_sec_rec.instruction_delivery_mode;
    ret_row.gradable_ind         := case when crse_sec_rec.gradable_ind = 'Y' then 1 else 0
     end;
    ret_row.section_cross_list       := crse_sec_rec.section_cross_list;
    ret_row.crsn_user_attribute_01   := NULL;
    ret_row.crsn_user_attribute_02   := NULL;
    ret_row.crsn_user_attribute_03   := NULL;
    ret_row.crsn_user_attribute_04   := NULL;
    ret_row.crsn_user_attribute_05   := NULL;
```

MODIFIED:

```
-- Course Section
    ret_row.course_section            :=  crse_sec_rec.course_section;
    ret_row.instruction_delivery_mode :=  crse_sec_rec.instruction_delivery_mode;
    ret_row.gradable_ind     := case when crse_sec_rec.gradable_ind = 'Y' then 1 else 0 end;
    ret_row.section_cross_list       := crse_sec_rec.section_cross_list;
    ret_row.crsn_user_attribute_01   := course_suppl_rec.TAXONOMY_OF_PROGRAM;
    ret_row.crsn_user_attribute_02   := NULL;
    ret_row.crsn_user_attribute_03   := NULL;
    ret_row.crsn_user_attribute_04   := NULL;
    ret_row.crsn_user_attribute_05   := NULL;
```

Table Function Compilation

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- Compile the modified package as EDWSTG.
- Grant execute on the package to IA_ADMIN.
  - This ensures permissions are not lost.
- No Updates to OWB mappings are needed.
- Testable from SQL query or Admin UI job.

Test from SQL Query

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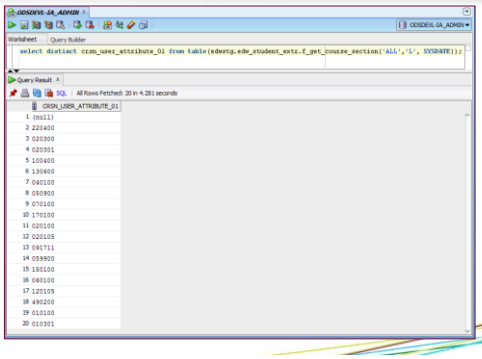

Test from Admin UI Job - After

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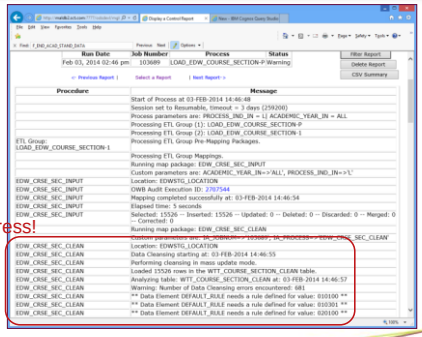


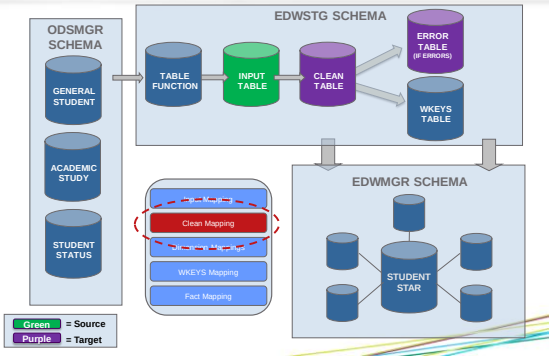
Progress!

Step 2: Cleansing Rules

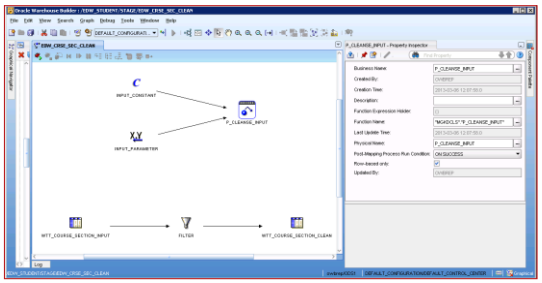
Cleansing Process Review

- Data cleansing is the process of verifying source system code values and translating them to standardized code values *and* descriptions in the warehouse.
- Configure data cleansing in Admin UI.
  - Options -> Set Up & Maintain Cleansing Parameters
  - Options -> Set Up Parameters

EDW Baseline ETL Processing Flow



CLEAN Mapping Flow



Cleansing Rule Configuration

- **Cleansing Rule**
  - Identifies the source query used to generate default cleansing values and translations for data element.
  - Stored in IA_ADMIN.MGRCRUL.
- **Cleansing Data Element**
  - Links cleansing rule to the dimension and column to cleanse.
  - Stored in IA_ADMIN.MGRCDIM.
- **Cleansing Data Element Parameter**
  - Links cleansing rule to the star, dimension, and input table field to cleanse.
  - Stored in IA_ADMIN.MTVPARM.
    - MTVPARM_INTERNAL_GROUP = CLEANSING DATA ELEMENT

Example Cleansing Rule Configuration

- **Cleansing Rule**
  - Example Source table: MST_COURSE_SUPPLEMENTAL
  - Example Data Element: TAXONOMY_CODE

Create

- **Cleansing Data Element**
  - Example Data Element: TAXONOMY_CODE
  - Example Dimension: WDT_COURSE_SECTION
  - Example Dim Column: USER_ATTRIBUTE_01

Update

- **Cleansing Data Element Parameter**
  - Example Dimension: TAXONOMY_CODE
  - Example Dim Column: WDT_COURSE_SECTION
  - Example Star: USER_ATTRIBUTE_01
  - Example Table Field Col: CRSN_USER_ATTRIBUTE_01

No Change

Cleansing Rule Navigation

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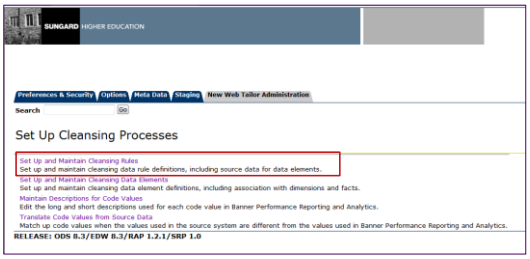

Cleansing Rule Definition

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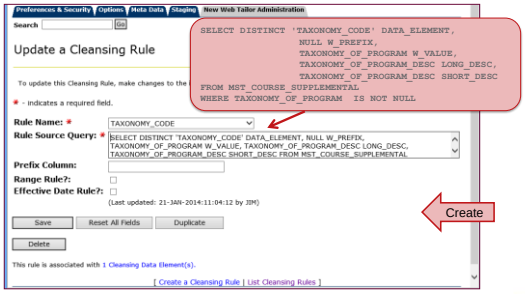

Cleansing Data Element Definition

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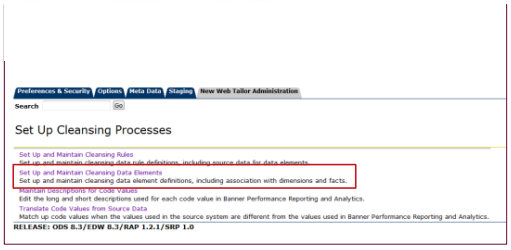
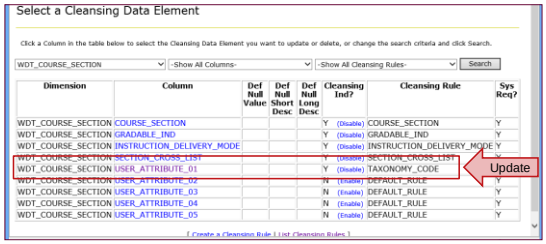
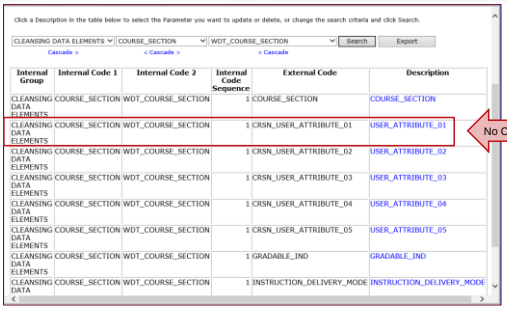


Cleansing Data Element Definition



Cleansing Data Element Definition

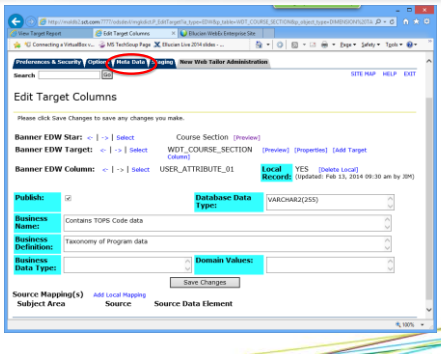


Step 3: Metadata Creation

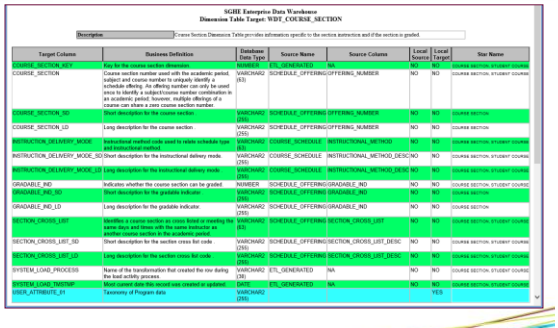
Updating Metadata

- Administrative User Interface
  - Add the USER_ATTRIBUTE_01 column and provide a meaningful Business Name/Definition.
  - Publish the Metadata report.
- Reporting Tool (Cognos)
  - Framework Manager
    - Rename USER_ATTRIBUTE_01 to a new column name (TAXONOMY_OF_PROGRAM).
    - Publish the package.

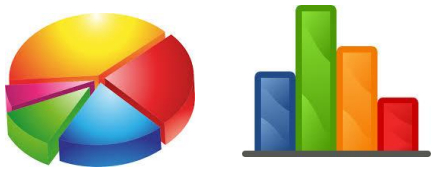
Updating Metadata (Maintain)



Updating Metadata (Publish)



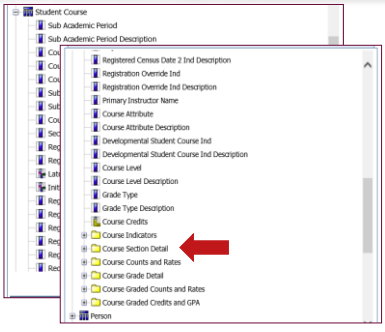
Step 4: Cognos Modification



Cognos Metadata Modification

- Update reporting metadata to include the new column.
- User Attribute and Measure fields exist in the database layer.
- Rename WDT_ACADEMIC_TIME's attributes USER_ATTRIBUTE_01, USER_ATTRIBUTE_SD, and USER_ATTRIBUTE_LD fields to business names.
  - For example: Academic Period Type, Academic Period Type Description, and Academic Period Type Long Description.

Query Subjects in Cognos



Retracing Our Steps …

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- 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

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Thank You!

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