ABSTRACT
This hands-on workshop will give users a basic tour through the functionality of SAS ETL Studio to help build a small data mart. The participants in this workshop will use SAS ETL Studio to define necessary library definitions, in addition to source and target tables definitions. Participants will create a process flow diagram using a simple transformation and load the target table. In the last step, participants will create two reports using the target table.

INTRODUCTION
Data marts are typically created by using a simple two-stage process: planning, which uses a top-down approach; and implementing, which is performed from the bottom up. The planning stage (top-down) begins with determining what mission-critical questions need to be answered, and what type of data is needed to build a report that will answer those questions. This data is often referred to as target data. Then, you determine what operational data will build the target data. This data is often referred to as source data. Careful planning will help you design a meaningful report that answers your mission-critical questions.

SAS ETL Studio, a Java application, is a visual design tool that helps organizations quickly build, implement, and manage ETL processes from source to destination, regardless of the data sources or platforms. SAS ETL Studio enables you to perform the following tasks:
- Extract data from operational data stores
- Transform this data
- Load the extracted data into your data warehouse or data mart.

BREAKDOWN OF STEPS FOR BUILDING A DATA MART
This paper navigates through five basic steps that can be used to build a data mart:

Step 1: Define necessary libraries (for source and target data).
Step 2: Define the source tables metadata.
Step 3: Define the target table metadata.
Step 4: Create and execute the job that will load the target from the sources.
Step 5: Create the desired reports on the target data.
Launch SAS ETL Studio by selecting **Start** ➔ **All Program** ➔ **SAS** ➔ **SAS ETL Studio**. In the Open a Metadata Profile window, verify that **BIArchitecture** is selected and click **OK**.

Enter the Username and Password provided and click **OK**.

**STEP 1**

Define the necessary library objects. Two library definitions must be specified, one for the source tables and one for the destination table.

To define a library object in SAS ETL Studio:

1. Choose the **Inventory** tab and expand the **Foundation** repository.
2. Right-click the **Libraries** folder and select **New...** This invokes the New Library wizard.

3. Select **SAS Base Engine Library** as the type, then click **Next >**

4. Enter **SUGI30 HOW ETLS Source Library** as the **Name**, then click **Next >**
5. Specify a Libref of SrcData and a path of `C:\Workshop\Winsas\SBIP\Orion_Star_15Aug03\ordetail` (the path should be available in the Available Items list). Click **Next >**.

6. Select **SASMain** as the server where the library is to be assigned. Then, click **Next >**.

7. Review the specifications and click **Finish**.

8. The Libraries folder should now have the newly defined library (Note: Other libraries will be defined on the workshop image).
9. Repeat Steps 1-8 to define an additional library with the following specifications:

<table>
<thead>
<tr>
<th>Type</th>
<th>SAS Base Engine Library</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>SUGI30 HOW ETLS Target Library</td>
</tr>
<tr>
<td>Libref</td>
<td>Target</td>
</tr>
<tr>
<td>Path</td>
<td>C:\Workshop\Winsas\SBIP\Warehouse</td>
</tr>
<tr>
<td>SAS Server</td>
<td>SASMain</td>
</tr>
</tbody>
</table>

**STEP 2**

Define the table objects that represent source tables—two tables must be specified, the STAFF and ORGANIZATION tables.

1. Select **Tools ➔ Source Designer** from the menu bar.
2. Choose **SAS** as the source type that you want to import metadata about, then click **Next >**
3. Select **SUGI30 HOW ETLS Source Library** as the library that contains the tables to import metadata from, then click **Next >**

4. Select both **STAFF** and **ORGANIZATION** tables, then click **Next >**

5. Keep the default selection for grouping on the Custom Tree. Click **Next >**

6. Review the selection information and click **Finish**
So that you don't confuse these newly defined table objects with others, the next step will be to rename the table objects:

7. Select the **Inventory** tab and expand the **Tables** folder.
8. Right-click the **STAFF** table and select **Properties**.
9. On the **General** tab (in the Properties window), change **Name** to **SUGI30 STAFF**.

![STAFF Properties window](image)

10. Click **OK** to save the change.

11. Repeat steps 7-10 to rename the **ORGANIZATION** table to **SUGI30 ORGANIZATION**.
STEP 3

Define the table object that represents the target table.

1. Select **Tools ➔ Target Designer** from the menu bar.
2. Choose **Target Table** as the target type. Click **Next >**.

3. Specify **SUGI30 ORGSTAFF** as the Name of the object. Click **Next >**.
4. Expand the **SUGI30 ORGANIZATION** table and select the following variables:
   - Employee_ID
   - Org_Name
   - Country

Similarly, from the **SUGI30 STAFF** table, select the following variables:
   - JobTitle
   - Gender
   - Salary

When you’ve finished selecting the above columns, click **Next >**.
5. Change the attributes for ORG_NAME column:
   - ORG_NAME should be EMPLOYEE_NAME
   - Description should be Employee Name

Also, define a new column, Bonus, that has the following attributes:
   - Numeric
   - Default length of 8
   - Format of Dollar8

When you’ve finished modifying the column information, click **Next >**.
6. Specify a library of **SUGI30 HOW ETLS Target Library**. Click Next.

7. Review the specifications and click Finish.
STEP 4

Specify metadata for the process flow that’s needed for loading the target table:

1. Select **Tools ⇒ Process Designer** from the menu bar to launch the New Job Wizard.
2. Enter a Name of **Populate the SUGI30 ORGSTAFF Table**, then click **Next >**
3. Select **SUGI30 ORGSTAFF** as the table to load, then click **Next >**
4. Review the specifications and click **Finish**.
This launches the Process Designer window:

To complete the process flow diagram:

5. Select the **Process Library** tab from the Tree View area of SAS ETL Studio and expand the **Data Transforms** folder.

6. Locate the **SQL Join** transformation. Drag the **SQL Join** transformation to the process flow diagram, and drop it onto the template icon labeled “Place table or transform here”.

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**Diagram 1:**
- Node 1: SUG130 ORGSTAFF
- Node 2: Loader

**Diagram 2:**
- Node 1: SUG130 ORGSTAFF
- Node 2: Loader
- Node 3: SQL Join
- Node 4: Place table or transform here
- Node 5: Place table or transform here
7. Select the **Inventory** tab and expand the **Tables** folder.
8. Locate the table object for **SUGI39 STAFF** and drag it to one of the “Place table or transform here” templates.
9. Locate the table object for **SUGI30 ORGANIZATION** and drag it to the remaining “Place table or transform here” template.

Attributes now need to be specified for the SQL Join transformation and for the Loader process.

To specify attributes for the SQL Join transformation:
10. **Right-click** the **SQL Join** icon and select **Properties**.
11. Select the **Mapping** tab. On the Target table side of the Mapping tab, **right-click** and select **Import Columns**.
12. In the Import Columns window, expand **Foundation** and the **Ungrouped** group.
13. Expand the **SUGI30 ORGSTAFF** table, and move the **Bonus** column to the **Selected** area.

To specify the calculation for the Bonus column:
14. **Right-click** on the newly imported **Bonus** column and select **Expression**.
15. In the **Expression Text** area, enter `.06*Salary`.
16. Close the Properties window to save the changes.

To specify attributes for the Loader process:
17. **Right-click** the **Loader** icon and select **Properties**.
18. Select the **Mapping** tab. On the Target table side of the Mapping tab, **right-click** and select **Quick Map** (this should map the Bonus column).
19. Map the **Org_Name** column to the **Employee_Name** column by dragging.
20. Close the Properties window to save the changes.
To run the job to load the SUGI30 ORGSTAFF table:

21. **Right-click** in the background of the Process Editor tab in the Process Designer window and click **Submit**.

22. When the job finishes executing, select the **Log** tab in the Process Designer window.

23. Verify that the job ran successfully and that TARGET.SUGI30_ORGSTAFF with 1048 Observations and 7 variables was created.
STEP 5

Human Resources needs two reports created.
- The first report should show the breakdown by gender of the employees across the countries. Also, the total number of employees in each country is needed, in addition to the total number of females and males.
- The second report analyzes salary and bonus for the gender values in each country. Minimum, maximum, and average statistics have been requested.

To create the first report of frequencies:
1. Select the Process Library tab from the Tree View area of SAS ETL Studio.
2. Expand the Analysis folder and locate the Frequency - Report transformation.
3. Drag the Frequency - Report transformation to the process flow diagram and drop it into empty space.
4. Drag the SUGI30 ORGSTAFF icon from the process flow diagram onto the “Place table or transform here” icon that leads to the Frequency - Report transformation.

To specify attributes for the frequency report:
5. Right-click the Frequency - Report icon and select Properties.
6. Select the Options tab.
7. Specify Country*Gender for the TABLE statement option.
8. Specify NOCUM for the Options on the TABLE statement option.
9. Select the Column Options tab.
10. Select the Frequency Columns (TABLE statement) option.
11. Move both Country and Gender to the Selected Columns list.
12. Close the Properties window.
To view the report, display the Output tab in the Process Designer window by performing the following tasks:
13. Click the **Options** icon from the Shortcut bar.
14. On the General tab, select **Show Output tab in Process Designer**.
15. Close the Options window.
16. Re-run the job (right-click in the background of the Process Editor tab and click **Submit**).
17. View the report by selecting the Output tab.

The last step is to create the report that analyzes salary and bonus. For this report, it will be necessary to sort the data first, and then create the desired report on the sorted data. So this report writing task will be broken into three parts:

**Part 1** – Create the target table for the sorted data.
**Part 2** – Add the SAS Sort transformation.
**Part 3** – Add the Summary Statistics – Report transformation.

To create the needed target table:
1. Click the **Target Designer** icon from the Shortcut bar.
2. Select **Target Table** as the target type.
3. Specify **SUGI30 Sorted ORGSTAFF** for the **Name** of the object.
4. Select all the variables from the **SUGI30 ORGSTAFF** table.
5. Select **SUGI30 HOW ETLS Target Library** as library.
6. Specify **SortedOrgStaff** as the **Name** for the physical table.
7. Review the results and Finish.
To add the SAS Sort transformation:
1. Drag the SUGI30 Sorted OrgStaff table object to the process flow diagram and drop it into empty space.
2. Select the Process Library tab from the Tree View area of SAS ETL Studio.
3. Expand the Data Transforms folder and locate the SAS Sort transformation.
4. Drag the SAS Sort transformation to the process flow diagram and drop it onto the template icon labeled “Place table or transform here” (the template flowing into the Loader for the SUGI30 Sorted OrgStaff table).
5. Drag the SUGI30 OrgStaff table object (already in the process flow diagram) to the “Place table or transform here” template icon that flows into the SAS Sort transformation.

To specify properties for the SAS Sort transformation:
6. Right-click the SAS Sort icon and select Properties.
7. Select the Sort By Columns tab.
8. Move Country and Gender to the selected list (verify that Country is first in the selected list).
To add the **Summary Statistics - Report** transformation:

1. Select the **Process Library** tab from the Tree View area of SAS ETL Studio.
2. Expand the **Analysis** folder and locate the **Summary Statistics - Report** transformation.
3. Drag the **Summary Statistics - Report** transformation to the process flow diagram and drop into empty space.
4. Drag the **SUGI30 Sorted OrgStaff** table object (already in the process flow diagram) to the "Place table or transform here" template icon that flows into the **Summary Statistics - Report** transformation.

5. Right-click the **Summary Statistics - Report** icon and select **Properties**.
6. Select the **Options** tab.
7. Specify **MIN MAX MEAN** for the **Statistics (separated by spaces)** option.
8. Select the **Column Options** tab.
9. Select the **Grouping columns (BY statement)** option.
10. Move both **Country** and **Gender** to the Selected Columns list (place **Country** first!).
11. Select the **Analysis columns (VAR statement)** option.
12. Move both **Salary** and **Bonus** to the Selected Columns list.
13. Close the Properties window.
To view the report:
1. Re-run the job (right-click and **Submit**).
2. View the report(s) on the Output tab.

**CONCLUSION**

This hands-on workshop provides an overview of SAS ETL Studio and how it can be used to create a data mart.

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