



Data Virtualization Use Cases at SNL

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Introduction

Marquita Apodaca

I have a passion for all things relating to Enterprise Architecture and Data Architecture! I have been with Sandia for 12 years and overall experience within the Department of Energy including Los Alamos National Labs and National Nuclear Security Administration for the past 20 years in various roles in IT Project Management and Enterprise Architecture. I hold certifications in The Open Group Architecture Framework (TOGAF), Scaled Agile Framework (SAFe) Product Owner/Product Manager and am a Certified Scrum Master.

What is Data Virtualization

Data Virtualization allows business users to access enterprise data across individual systems regardless of the type of data source, combine any type of data, and consume the data in any mode.

Data Sources: data bases, data warehouses, cloud applications, excel files

Data Formats: data bases, web services, APIs, files

Tools Used

- Denodo – Data Virtualization Tool
- Microsoft SQL Server Management Studio (SSMS)
- Microsoft PowerBI
- Salesforce Tableau
- Atlassian Confluence
- Microsoft SharePoint



Use Cases

1. Creating API's from Data Sources in Denodo

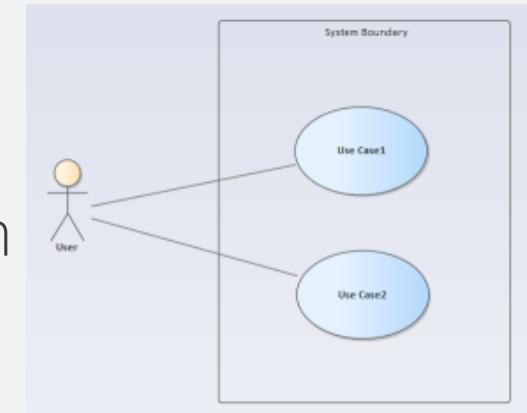
- Automating capturing evidence in our Solution Delivery Lifecycle (SDL)
Evidence sheets for Project Management information

2. Using Confluence Conforms data as a Data Source in Denodo

- Making Technical Business Management (TBM) Data accessible at an enterprise level, financial reports, TBM reporting

3. Identifying duplicate data across many sources

- Project Management data and identifying a source of truth



Use Case 1 – Denodo API

Our Solutions Delivery Lifecycle (SDL) Process identified several areas to automate in Evidence Sheet Submissions

- Project Evaluation Application determines if a project is a Low, Medium or High Category
- The SDL Evidence sheet requires evidence of the Category

PRE Application

Project Evaluations

All PrEs My PrEs

All Revisions Current Revisions

CLEAR FILTERS **EDIT** **DELETE** **CLONE** **REVISE** **DOWNLOAD PDF** **EXPORT SUMMARY** **INITIATE REVIEW**

REVIEW **UNLOCK** **ADMIN CHANGE**

PrE ID	Rev	Project Name	Current Status	Locked for Editing By	Approved Project Category	Portfolio	Program
				Any		Any	

SDL Evidence Sheet

Determine Project Evaluation Category (1.j)

Provide a link to PrE entry, project artifact, and/or location in another artifact where PrE Category result has been documented.

For Medium and High PrE Category solutions: if consideration of the PPDR creates artifacts either in the PPDR tool or a PPDR template, include link(s) to either here. (As described in Step 1.k)

Confluence and Denodo API Use Case

- Creating Data Sources in Denodo from other systems Databases for easy access
- Join or Union data from data sources in Denodo to virtualize the data
- Easy to create a REST API to be consumed by other systems

PRE Data with Project Manager

Created by Marquita Apodaca, last modified just a moment ago

Locate your PRE Record and take a screen shot to be saved in this field:

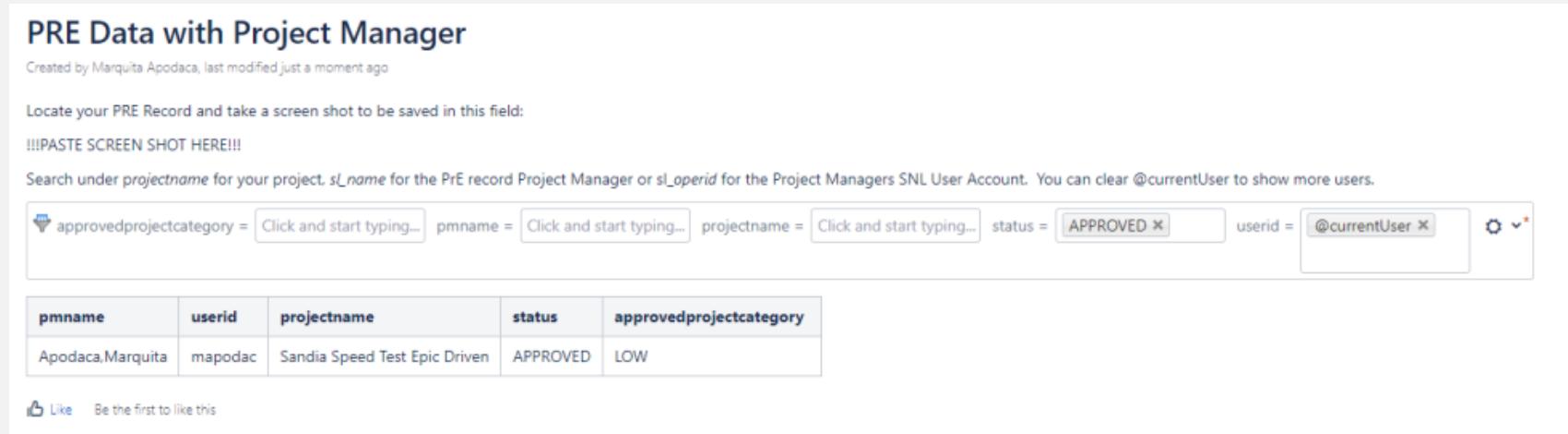
!!!PASTE SCREEN SHOT HERE!!!

Search under projectname for your project, sl_name for the PrE record Project Manager or sl_operid for the Project Managers SNL User Account. You can clear @currentUser to show more users.

approvedprojectcategory = pmname = projectname = status = userid =

pmname	userid	projectname	status	approvedprojectcategory
Apodaca,Marquita	mapodac	Sandia Speed Test Epic Driven	APPROVED	LOW

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Reasons for Creating an API in Denodo

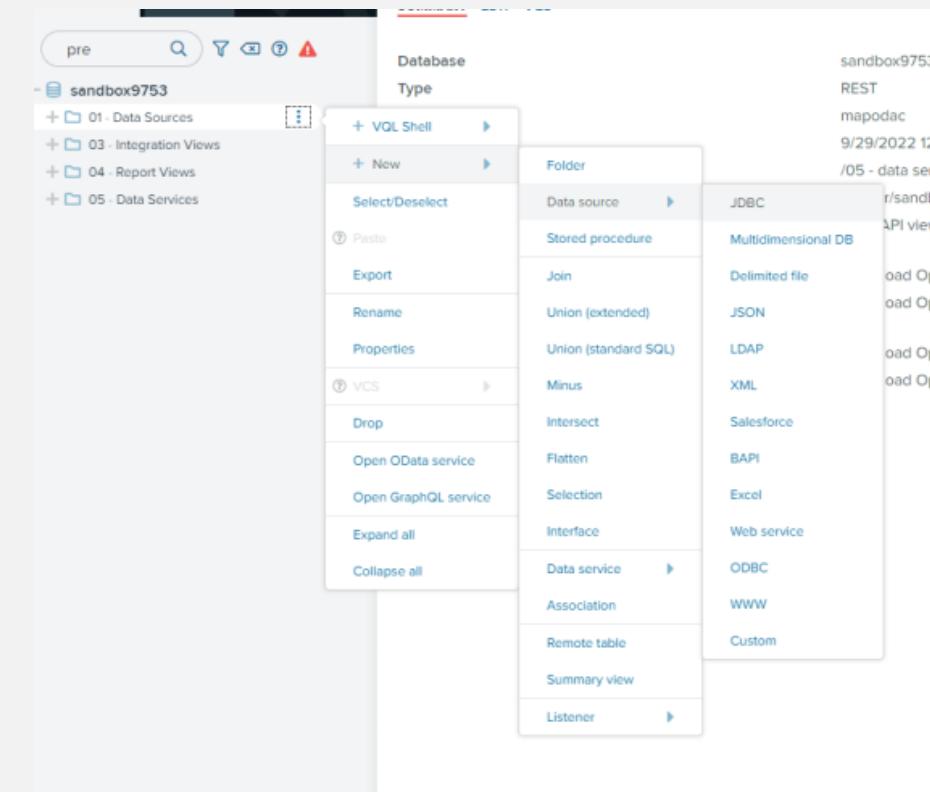
- Access to Data
- Ease of Use to create Denodo API
- No extra resources were needed to code an API from scratch
- API is reusable and can be easily modified
- Automation of data entry into SDL Evidence Sheet



How to Create a REST API in Denodo

Establish access to Data Sources in Denodo

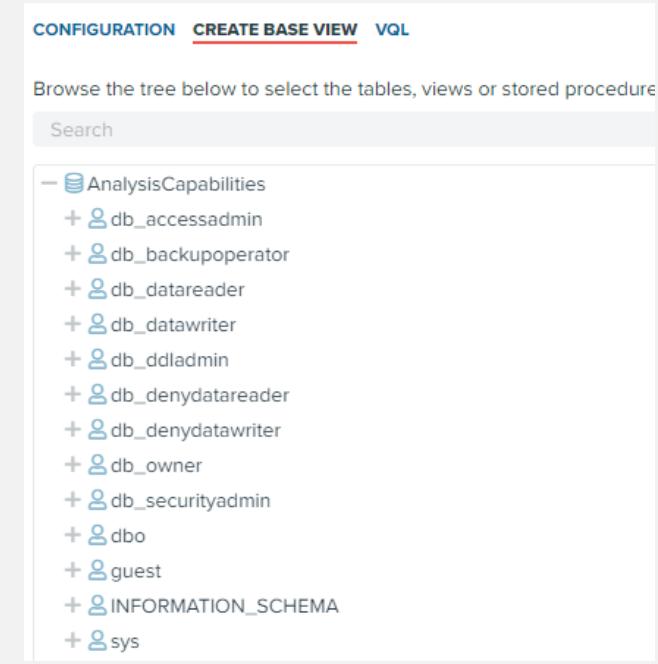
- For this API, both Data Sources needed were SQL Server Databases
- Create new JDBC Data Source



Create Base View from Data Source

Once you have established connection to your data source, you can create base views

- Standard practice is to name your base view: bv_(name of base view)
- Selecting tables in Denodo is simple using the GUI



The screenshot shows the Denodo Platform interface with the following details:

- Top Navigation:** Configuration, **CREATE BASE VIEW** (which is selected and highlighted in red), and VQL.
- Header:** Browse the tree below to select the tables, views or stored procedure.
- Search:** A search bar labeled "Search" is present.
- Tree View:** A hierarchical tree structure showing database objects. The root node is "AnalysisCapabilities", which is collapsed. Under it, several system users are listed: db_accessadmin, db_backupoperator, db_datareader, db_datawriter, db_ddladmin, db_denydatareader, db_denydatawriter, db_owner, db_securityadmin, dbo, guest, INFORMATION_SCHEMA, and sys.

Create an Integration View

- Use Integration Views when you need to join data from multiple data sources
- Integration views allow you to create custom queries to get the data for your business needs
- In this case we needed to join our person data with the data from our Project Rigor Evaluation tool

Create a Report View and Rest API

Create a Report View from your Integration View

Once you have your report view, you can create a new Data Service (REST API)



The screenshot shows the VQL Shell interface with a tab for 'VQL Shell' and another for 'sandbox9753.preprojectmgrname'. The 'SUMMARY' tab is selected. The interface displays the following details for the Data Service:

Database	Value	Name
Type	REST	Deployment status
Owner	mapodac	Last modifier
Creation	9/29/2022 12:12 PM	Last modification
Folder	/05 - data services	
Open web service	/server/sandbox9753/preprojectmgrname	
OpenAPI document	OpenAPI viewer	

Below the table, there are download links for the OpenAPI document in JSON and YAML formats, as well as for the OpenAPI/Swagger document in JSON and YAML formats.

Denodo API in Confluence

In this example I used the following Macros:

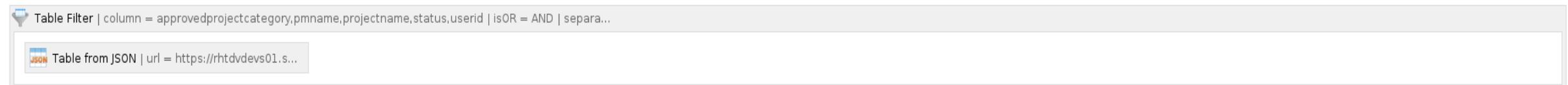
- Table from JSON Macro
- Table Filter Macro

PRE Data with Project Manager

Locate your PRE Record and take a screen shot to be saved in this field:

!!!PASTE SCREEN SHOT HERE!!!

Search under `projectname` for your project, `sl_name` for the PrE record Project Manager or `sl_operid` for the Project Managers SNL User Account. You can clear `@currentUser` to show more users.



The screenshot shows a Confluence page with a light gray background. At the top, there is a header bar with the Confluence logo and a search bar. Below the header, the main content area has a white background. The first macro, 'Table Filter', is located at the top left. It has a light gray border and contains the following text: 'Table Filter | column = approvedprojectcategory,pmname,projectname,status,userid | isOR = AND | separa...'. The second macro, 'Table from JSON', is located below the first one. It has a light gray border and contains the following text: 'JSON Table from JSON | url = https://rhtdvdevs01.s...'. Both macros are rendered in a standard black font on a white background.

Table from JSON Macro

To use this macro you will need to have

- A URL with JSON Formatting
 - Denodo creates a Swagger link
- The array you are using, located in JSON URL
- Login Credentials
 - For testing I used my Sandia Credentials
 - Entity Account using metagroups

Edit 'Table from JSON' Macro

Imports table from JSON data source. Post [Idea](#) or [Issue](#). [Documentation](#)

JSON source *

URL

JSON URL

Authentication type *

Login and password

Change login and password

Change additional headers

Path to array in the object

elements

Leave empty if JSON is an array or enter a

Select macro

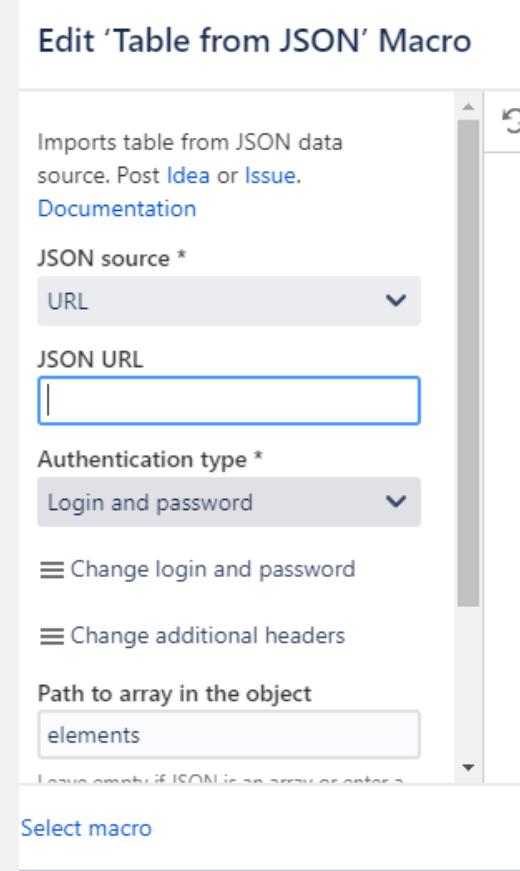


Table Filter Macro

In order to filter the results, wrap the Table from JSON Macro with the Table Filter Macro

- Set filter Default values to return a specific subset of data
- Configure settings to hide columns and change column names



The Final Result

- The filter will automatically display results for the current user
- The results are searchable by Project Name, Username, or Project Manager

Determine Project Evaluation Category (1.j)

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Search under projectname for your project, sl_name for the PrE record Project Manager or sl_operid for the Project Managers SNL User Account. You can clear @currentUser to show more users.

approvedprojectcategory = pmname = 
projectname = status =
userid =

pmname	userid	projectname	status	approvedprojectcategory
Apodaca,Marquita			APPROVED	LOW

Use Case 2 – Confluence as a Data Source

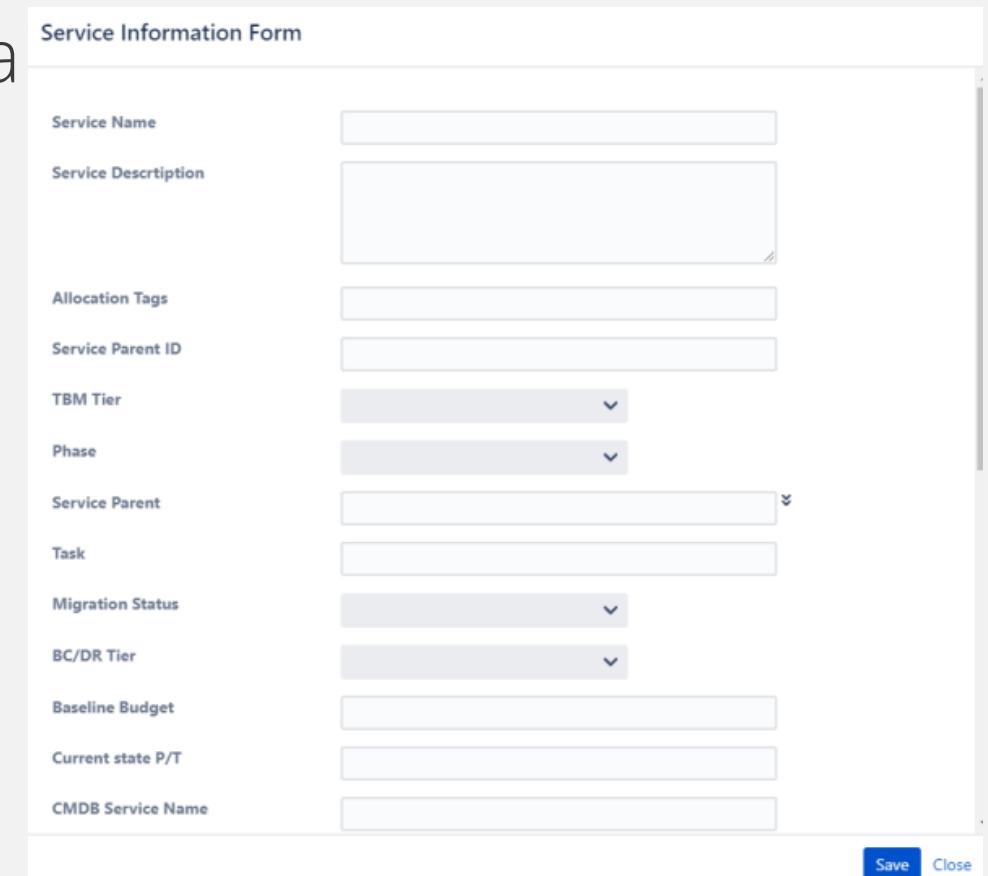
In this example we used Confluence data through the Conforms Macro to create a data source in Denodo

- Conforms is a plug in for Confluence to create data entry forms

Service Information Form

Service Name	<input type="text"/>
Service Description	<input type="text"/>
Allocation Tags	<input type="text"/>
Service Parent ID	<input type="text"/>
TBM Tier	<input type="text"/>
Phase	<input type="text"/>
Service Parent	<input type="text"/>
Task	<input type="text"/>
Migration Status	<input type="text"/>
BC/DR Tier	<input type="text"/>
Baseline Budget	<input type="text"/>
Current state P/T	<input type="text"/>
CMDB Service Name	<input type="text"/>

Save Close



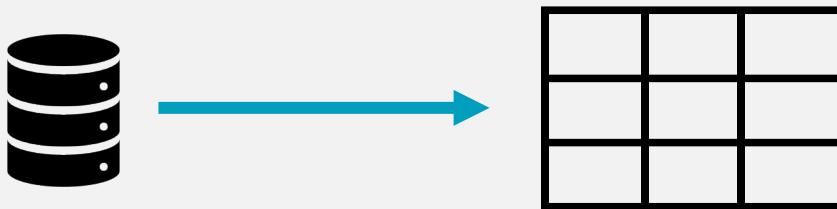
Confiforms Features

- Data can be displayed in various formats including in a table like the one below
- A user can submit their responses by clicking on the “Create New Service Entry” button

Service information self service										
809668419										
Create New Service Entry										
Service Name	Service Description	Allocation Tags	Service Parent ID	TBM Tier	Phase	Service Parent	Task	Migration Status	BC/DR Tier	Baseline Budget
Stakeholder Relations										

Exporting Data out of Confluence Coniforms

- Once your form is established and has collected data, you can easily export the data in several formats including JSON which is needed to create a REST API

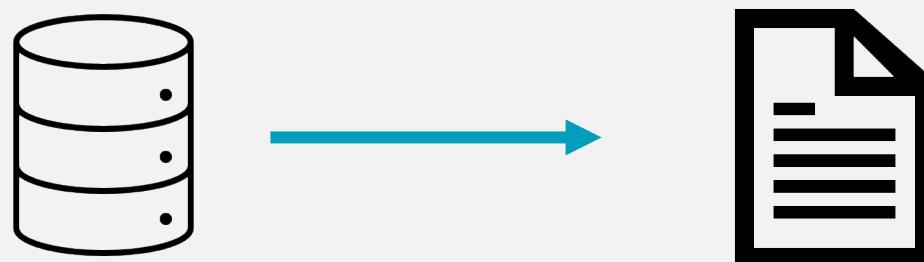


A screenshot of a Confluence Coniforms interface. At the top, it says "Form: CAWG". Below that is a table with columns: Page, LAB, Status, and Disposition Notes. The first row shows "Page" and "LAB ID". The second row shows "173" and "APPROVED". Below the table is a "Records" summary: "82 Total: 82 (486.4 KB)". At the bottom, there is an "Export" menu with options: CSV, XLS, JSON, XML, and RAW. The "RAW" option is currently selected. A small note at the bottom right says: "license type: Commercial license. Max users: 20000. Maintenance expiry date: 2023-08-31T08:00:00Z".

Confluence as a Data Source Continued

Once you have your data exported in JSON format, you can create a Data Source in Denodo

- The Data Source can be used to create reports in reporting tools like Tableau or PowerBI
- Tableau and PowerBI do require installing an ODBC Connector in order to access the Data Source from Denodo



Use Case 3 – Identify Duplicate Data

Denodo is a good tool to do a comparison of data across an organization

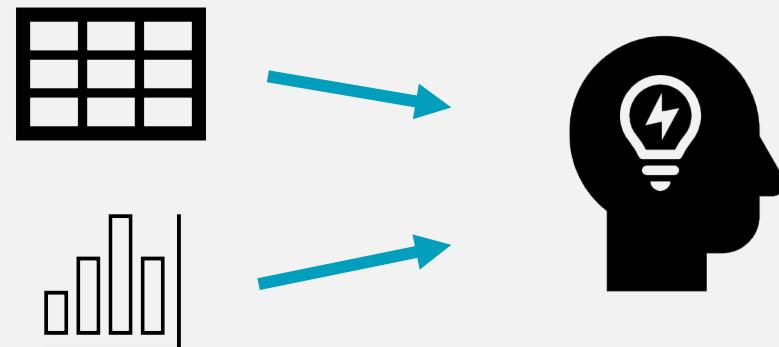
- You can create data sources from several platforms such as SQL, Oracle, Confluence, SharePoint, and CSV to name a few
- You can virtualize the data and run queries against other data sources within the Denodo tool



Analysis of Data

Although it is easy to run a query in Denodo, I find it useful to have Microsoft SQL Server Management Studio available to look at data in a particular database.

If the data source I am using is from Coniforms, I will export the data into a CSV file or excel file.

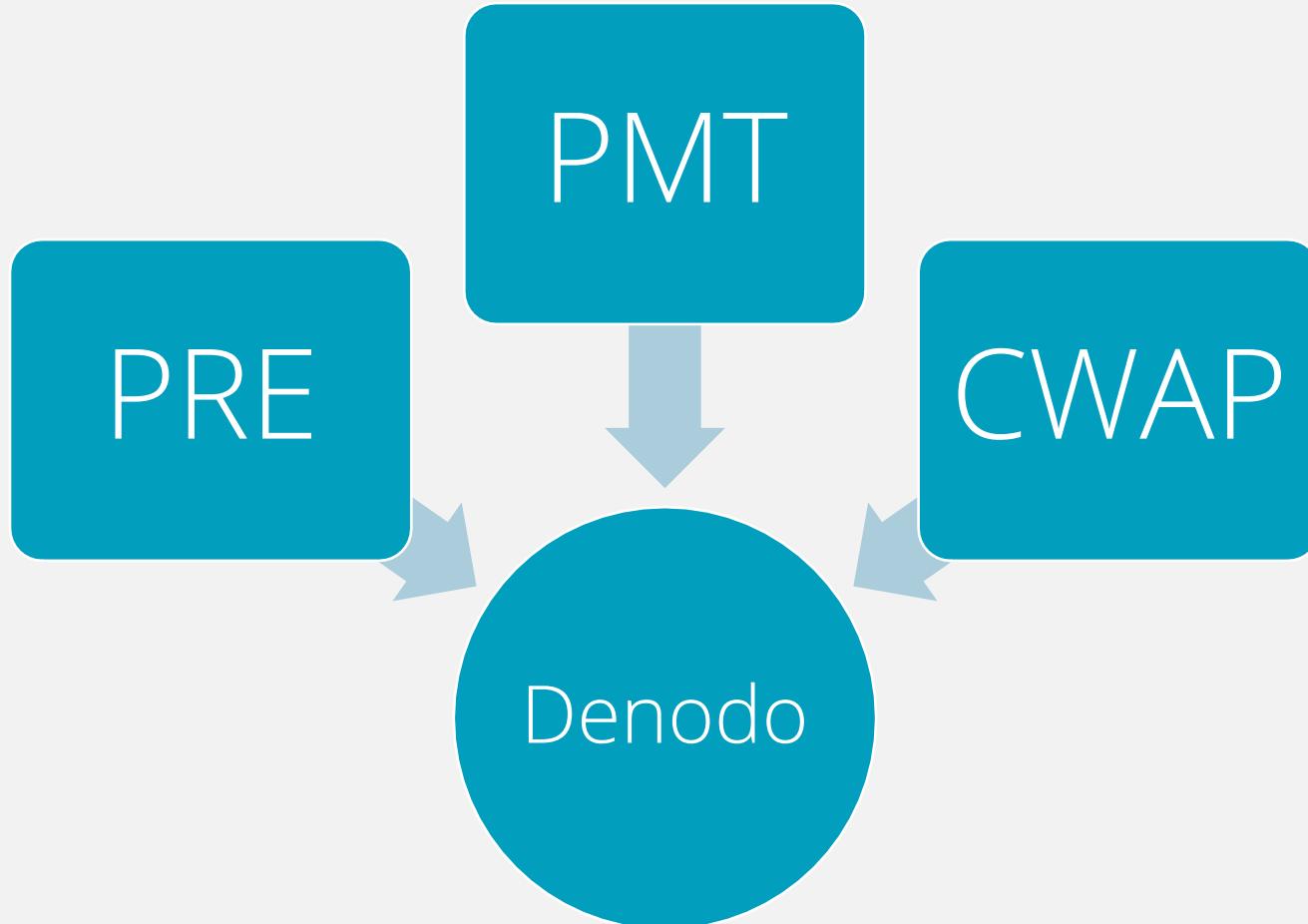


Project Management Data and Systems

Project Management data is used at an Enterprise level to determine cost, scheduling, and status

- There are several enterprise systems at Sandia that track similar data for project management
- We choose 3 systems
 - Center Work & Authorization Process (CWAP) – Project Authorization
 - Project Evaluation (PRE) – Categorize Projects into High, Medium, or Low
 - Portfolio Management Tool (PMT) – Track Financials

Common Project Management Data Fields



- Project Manager Name
- Project Name
- PRE
- Project UID

Reuse of PM Data

Once we establish a source of truth for Project Management Data, we can reuse it across other PM systems. This would help:

- Automate data entry
- Eliminate duplicate data
- Reduce human error in data entry
- Validate data

Questions?