Test Data Management

Software Version 24.4.0

User Guide

opentext™

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Documentation updates

The title page of this document contains the following identifying information:

- Software Version number, which indicates the software version.
- Document Release Date, which changes each time the document is updated.
- Software Release Date, which indicates the release date of this version of the software.

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Introduction

Test Data Management is the most important component of the software testing process within the software development lifecycle. The preparation of the test data takes a significant amount of the total effort spent on the test. As the size and variety of the test data increase, factors such as data security, consistency, and integrity cause data management to get more challenging. That could affect the software testing process negatively. In addition, the regulations on the protection of personal data have been tightened and the size of the data contacted within the scope of Test Data Management has increased compared to the past. This ended up with an increased demand for faster and more reliable data transfer between environments. As a solution, we have developed a product named TDM (Test Data Management) that facilitates the process as an extension to the Structured Data Management (SDM) product.

Abbreviations

Information about the abbreviations used in this guide is given in the table below.

Abbreviations	Definition
BF	Business Flow
DGC	Data Generation Case
DGS	Data Generation Suite
SDM	Structured Data Manager
TDM	Test Data Management

TDM User Types

SDM has flexible user role management support that makes TDM available to create its roles depending on the privileges defined before. These roles are called Groups in SDM that can be assigned to each user. They consist of **Test User**, **Test Manager**, and **Admin**. You can find detailed information on roles and privileges within each authority section.

TDM Architecture

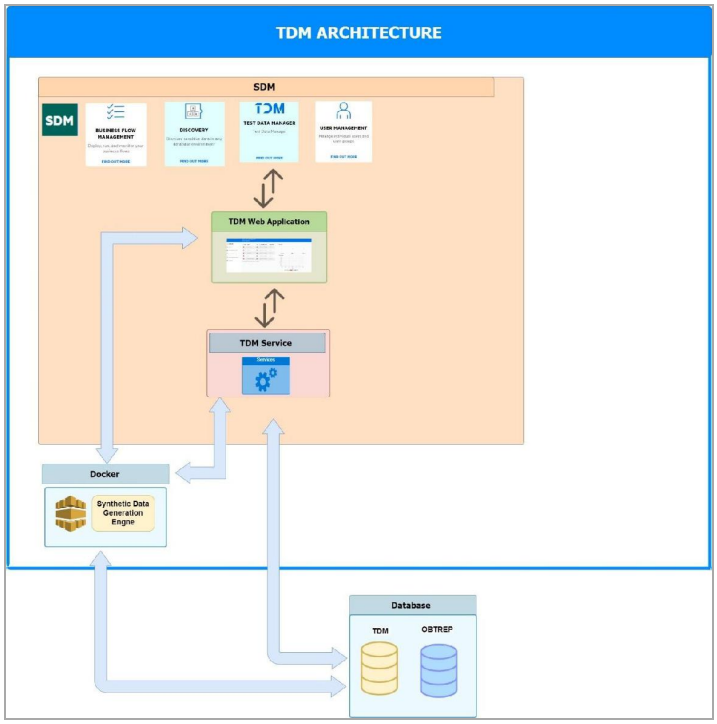


Figure 1: TDM Architecture

TDM runs as an extension of SDM. TDM's logical and repository operations are done by a TDM service called "tdm-service.jar". TDM can use all functions and methods of this library. "`tdm-service.jar`" is connected to the TDM schema to perform its processes with its data, besides this service is connected read-only to the `OBTREP` schema of SDM.

Synthetic Data Management service runs in Docker Engine Container. This service offers the functions required for the configuration of synthetic data flows. The service performs data operations in the TDM database. The `SDMIN OBTREP` scheme is used for user and environment operations.

TDM Application hierarchy structure

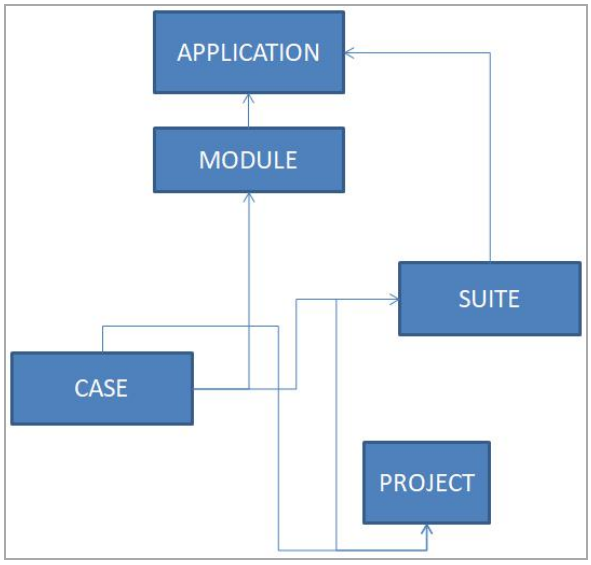


Figure 2: TDM Application Hierarchy Structure

TDM components are Project, Application, Data Generation Suite, and Data Generation Case.

Users need to create a project at the beginning of the process. See Project, on page 15 for more.

Following the project creation, an application should be created afterward. See Application management, on page 17 for more.

Data Generation Case is the main component of TDM that runs a business flow or synthetic flow. With DGC, users can choose a related business flow or synthetic flow and set its parameters prior to execution. See Data generation case, on page 19 for more.

Data Generation Suite is used to encapsulate Data Generation Cases. Users can add one or more DGCs to a DGS. Once DGS is executed, DGCs will be executed in an order. Therefore, users should consider prioritization of DGCs at the creation stage. See Data generation suite, on page 24 for more.

Logging in to TDM module

> **NOTE:** If the SSL protocol is enabled when setting up TDM, SDM must be run on port 8443 with the HTTPS protocol. If not, it must be run on port 8080 with HTTP protocol.

Since the TDM module is an add-on to the SDM core, the TDM user should log in to SDM first.

1. Enter **Login Name** and **Password** on the SDM login window.
2. Click **LOG IN**.
3. Click TDM tile in the opened window.

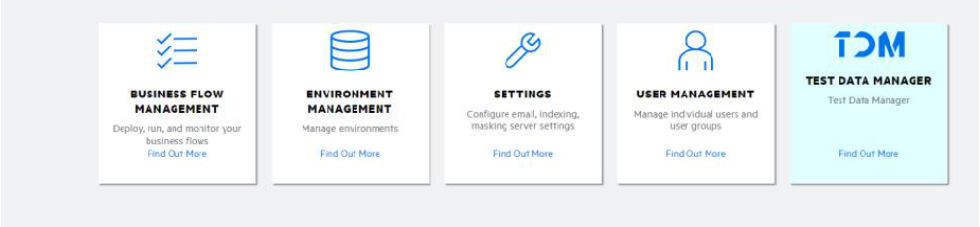


Table 1: TDM on the Main Screen

> **NOTE:** The user can log on to TDM with access granted by the SDM administrator.

TDM Usage

Menu and controls

TDM has seven menu items and some control buttons. These are listed in the table below.

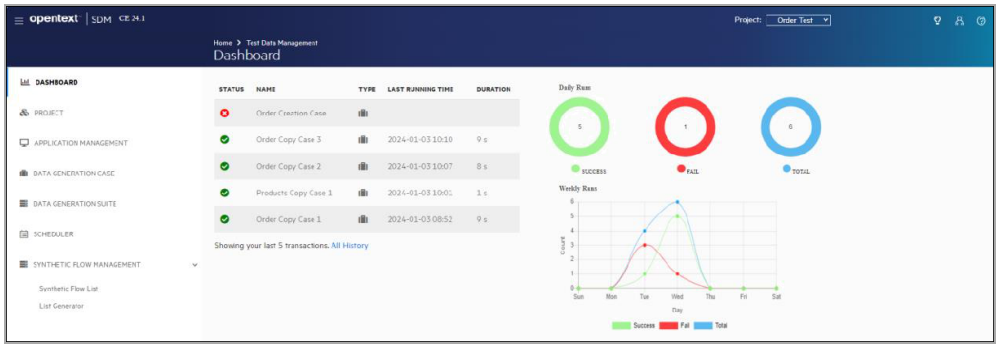


Figure 3: TDM Dashboard Menu and Controls

Menu	Function
Dashboard	Used to display the dashboard.
Project	Used to view projects.
Application Management	Used to manage applications.
Data Generation Case	Used to view data generation cases.
Data Generation Suite	Used to view data generation suites. DGS encapsulates DGCs.
Scheduler	Used to view scheduled cases and suites.
Synthetic Flow Management	Used to generate synthetic data. Includes **Synthetic Flow List** and **List Generator** submenus.
	Used to show submenu options.
	Used to close and open the menu on the left. The menu part can be closed for a wider graphic view.
	Used to view product information about TDM.

Menu	Function
	Used to reach **User Information**, **Subscriptions**, **Change Password** and **Logout** options.
	Used to reach **Product Info**, **Online Help** and **Software Support** options.
	Used to select project. To create a DGS or DGC, the project must be selected.

Product information

Product Info () button (at the top right of the dashboard) is used to view **Product Name**, **Version**, **Build Number**, **Build Date** and **Repository** information of TDM.

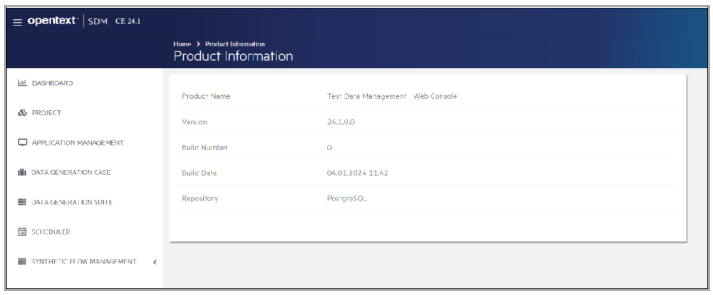


Figure 4: Product Information

Personal settings

Personal Settings () button (at the top right of the dashboard) includes **User Information**, **Subscriptions**, **Change Password** and **Logout** submenus.

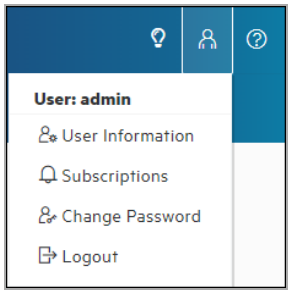


Figure 5: Personal Settings

User information

User Information submenu is used to reach **Login Name**, **Full Name**, **Description**, **E-mail Address** and **Contact Number** details of the user. These details (except **Login Name**) can be updated by using **UPDATE** button. **ACTION** button is used to provide easy access to **Personal Information** submenus.

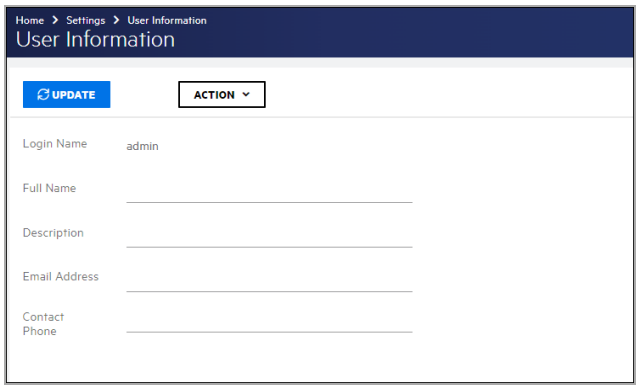


Figure 6: User Information

Subscription

For the **Subscription** section to be activated, e-mail must be setup. **Click here to setup the emails link** can be used to setup an e-mail. The Receive email notifications on Business Flow execution feature can be turned on by using the toggle.

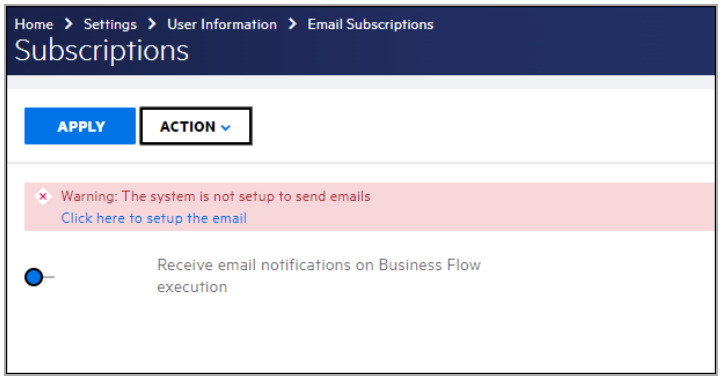


Figure 7: Subscription

Change password

Change Password submenu is used to change password. After filling in the **Old Password**, **New Password**, and **Confirm Password** fields, click **Apply**.

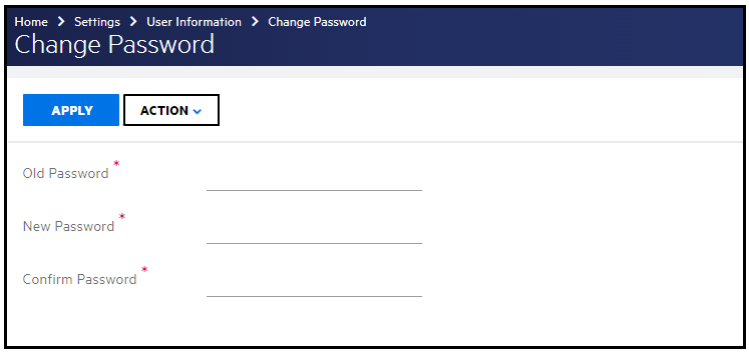


Figure 8: Change password

Logout

Logout submenu is used to log out of the session.

Help

Help ( ) button (at the top right of the dashboard) includes **Product Info**, **Online Help**, and **Software Support** submenus. These submenus are related with SDM.

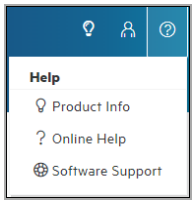


Figure 9: Help

Dashboard

When clicked TDM on SDM Dashboard is opened as default. The dashboard page shows the usage statistics of the user considering Data Generation Case and Data Generation Suite . Users can only see usage data depending on the authorization.

Figure 10: Dashboard

Charts

TDM's main dashboard provides Daily Runs and Weekly Runs. Charts are given below with related information.

Figure 11: Charts of Dashboard

- **Daily Runs** shows the daily runs with their status as Success and Fail.
- **Weekly Runs** shows the weekly count of runs with their status as Success and Fail.

Transaction list

When the Dashboard is first loaded, the last 5 transactions of the user are listed in Transaction List. Users can reach the entire list of completed actions by clicking on All History. Admin users can see all transactions done by other users.

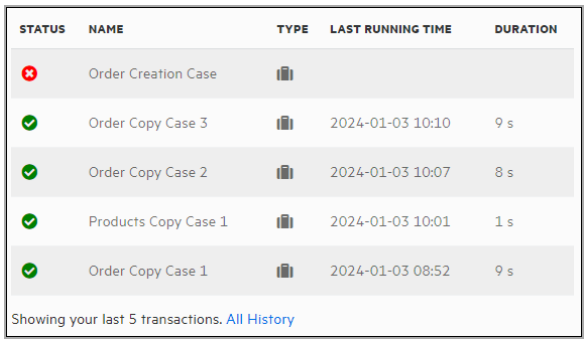


Figure 12: Transaction list

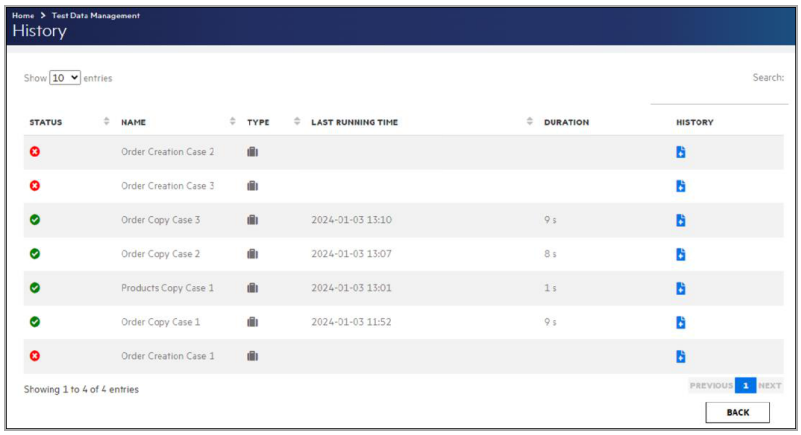


Figure 13: All history

When any row (Data Generation Case or Data Generation Suite) in the list is clicked, **Status Report** and **Duration Report** will be displayed at the bottom of the list.

- **Status Report**: It is a pie chart shows the status of runs as Success, Running and Fail.
- **Last Run Duration Report**: It is a bar graph shows the last runs' duration and status.

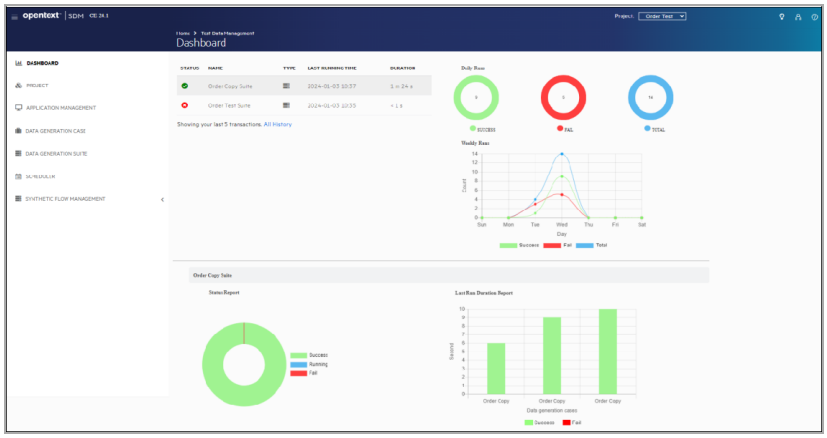


Figure 14: Status Report and Last Run Duration Report

Project

Project menu is used to create new projects, view the project list and edit existing projects.

Project list

The Project List page will be opened as a blank page for the application's first use. A new project can be created by pressing NEW button (follow the details of Create a new project, below).

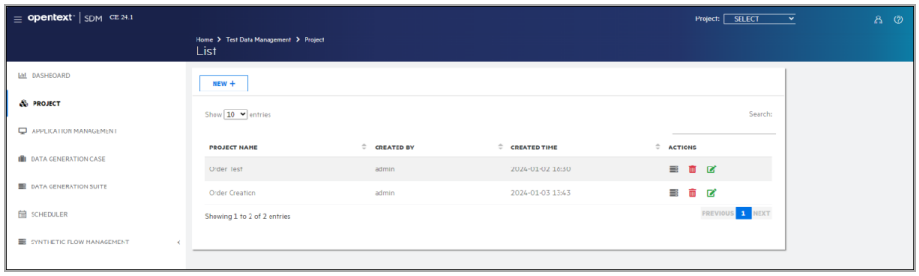


Figure 15: Project menu

Menu	Function
	Used to explore project's suites. See Data generation suite list, on page 24 for more.
	Used to delete the project. When the project is deleted, all suites and cases connected to the current project will also be deleted.
	Used to edit the project details. See Create a new project, below for more.
	Used to navigate the project list.
	Used to add new a project.

Create a new project

To create a new project, the user must fill **Environment**, **Project Name**, **Selectable Users**, **Selectable Business Flow**, and **Selectable Synthetic Flows** fields. The details to be considered while creating a new project are given below.

- **Project Name** field is limited to 100 characters to be entered.
- **Selectable Business Flow**, **Selectable Synthetic Flow**, and **Selectable Users** fields are defined in SDM.
- Flows defined in another project will not be listed on this page. That means the Flows shown here are the only ones in that project. As the Flows are directly connected to the environments, users need to select the environment from the Environment drop-down box to see the available

flows in the **Selectable Business Flows** and **Selectable Synthetic Flows** fields.

- **Project Name**, at least **1 Business Flow** or at least **1 Synthetic Flow**, and at least **1 User** must be given to creating a new project.
- If there is any BF defined from SDM during the creation of a new project, a warning will be displayed on the screen.
- **Selectable Users**, **Selectable Business Flow** and **Selectable Synthetic Flow** fields have filtering options.

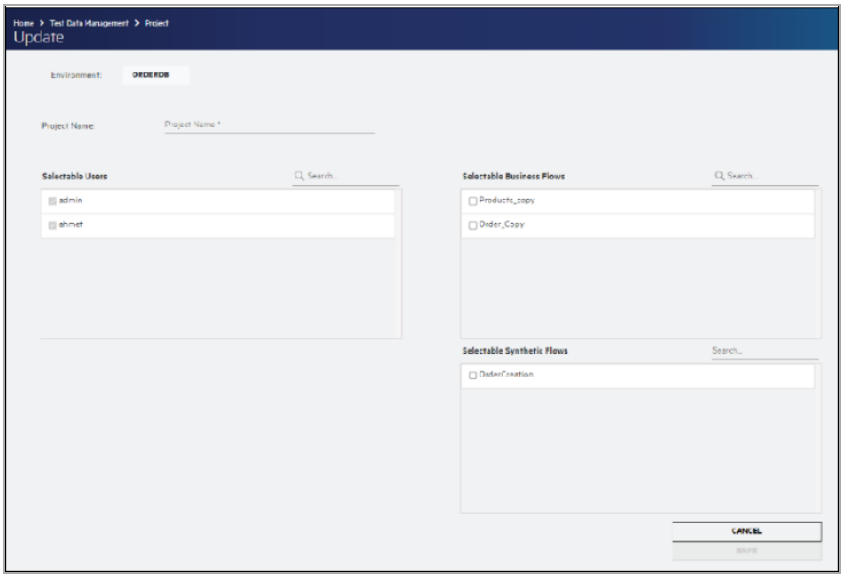


Figure 16: Project - Create

Project authorization

Authorization on Project's Create and List pages is as follows.

Authority type	Authorities
Admin	All Projects, All Operations
Test Manager	Only Authorized Projects, All Operations
Tester	Only Project List Page, Only Authorized Projects Listed

The admin user can see all projects. For the first time using the application, projects are created by the admin, and Test Manager users are added to these projects with their authorizations. Test Manager users can only see the projects authorized by the admin. Test Manager users are able to create their projects. Test users can see authorized projects on the Project List page, but they have an obligation on updating or deleting the projects. Test users cannot see the Project Form page.

Application management

Application Management menu is used to create new applications, view the application list and edit existing applications. It has **Create** and **List** submenus.

Application management list

The Application Management - List page will be empty when the application is used for the first time. New application can be created by clicking on **NEW** button and follow the instruction with Create a new application, below. Users can see the versions and module details, add modules, edit and delete applications on the Application Management – List.

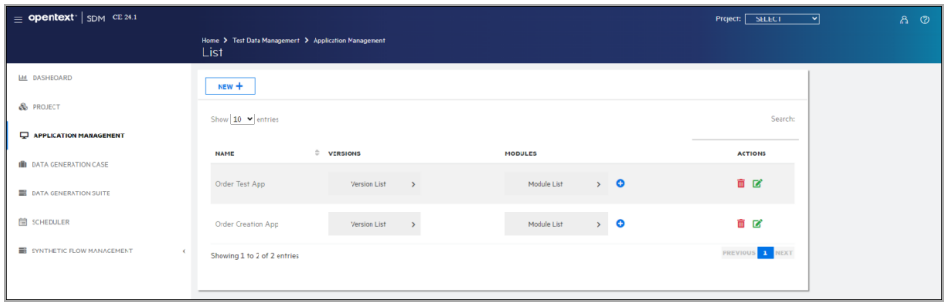


Figure 17: Application Management – List

Menu	Function
	Used to add a module. In module creation page, user can add a new module with its versions.
	Used to delete the application. When a case or suite is connected to the application, the user needs to delete them first. Otherwise, the application doesn't allow the user to delete.
	Used to edit the project details as name and version.
	Used to navigate the application list.
	Used to create a new application.

Create a new application

To create a new application, the user must fill **Application Name (Type Name)** and **Type Version** fields. Users can add one or more versions to the application.

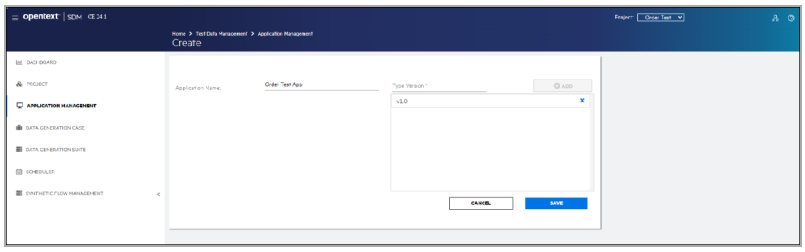


Figure 18: Application Management - Create

Action details

Add Module ( ): When the user clicks on **Add Module** icon, the module creation page opens. In this page, user selects **Application**, and fills **Module Name** and **Type Version** to add a new module.

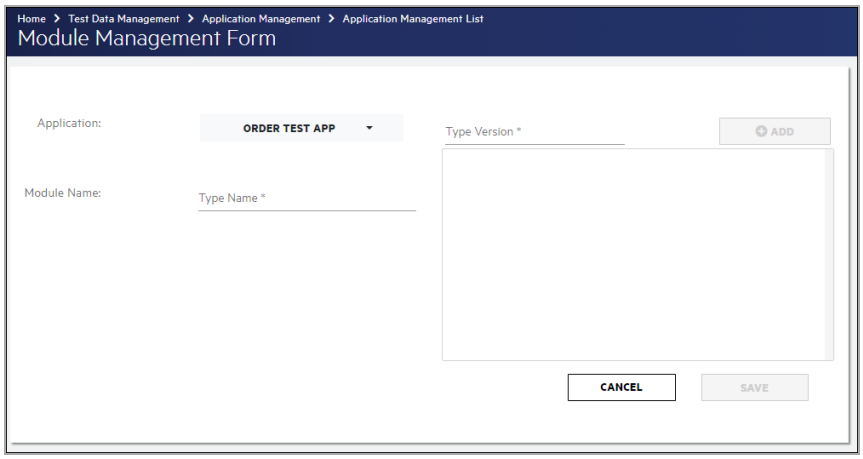


Figure 19: Add Module

Data generation case

Data Generation Case menu is used to create new cases, view the case list, and edit existing cases. Data Generation Cases are used for obtaining test data that is required within the projects.

Data generation case list

The Data Generation Case - List page will be empty on the first use of the application. It shows the Data Generation Suits with details as flow type, flow name, last runner etc.

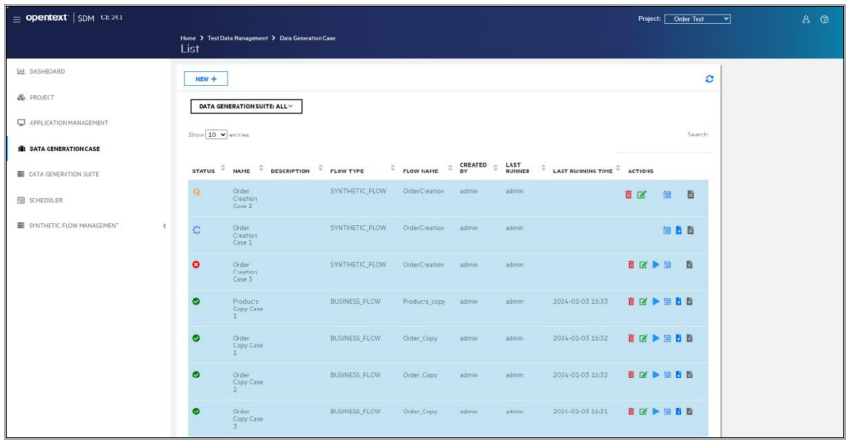


Figure 20: Data Generation Case – List

Menu	Function
	Used to delete the data generation case. If the case is connected to any suite, then the application warns the user on the case cannot be removed.
	Used to edit the case. Users can only change the name and description fields.
	Used to run the case.
	Used to schedule the case for the automatic executions as run just once, daily, weekly, or monthly.
	Used to view run history for the case.
	Used to view logs of the last run of the case.
	Indicates the status of being in the queue.

Menu	Function
	Indicates the status as running.
	Indicates the status as completed.
	Indicates the status as failed.
	Used to refresh the data generation case list.
	Used to navigate the application list.
	Used to create a new application.

Create a new Data generation case

The Data Generation Case - Create page includes **Data Generation Suite**, **Application**, **Module**, **Module Version**, **Type**, **Business Flow**, **DGC Name** and **DGC Description** fields. To create a new Data Generation Case, all the fields except suite and description are mandatory. The details to be considered while creating a new Data Generation Suite are given below.

- **DGC Name** field is limited to 100 characters.
- **DGC Description** field is limited to 150 characters.
- When one of a business flow or synthetic flow is selected, its parameters are listed under the Parameters box.

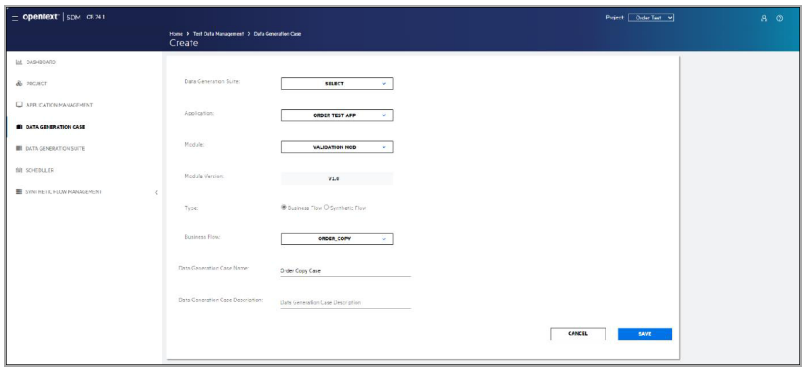


Figure 21: Data Generation Case – Create

Action details

Run (): When the user clicks on **Run** icon, the parameters page of the case opens. Here users can change or leave the parameter values as they are.

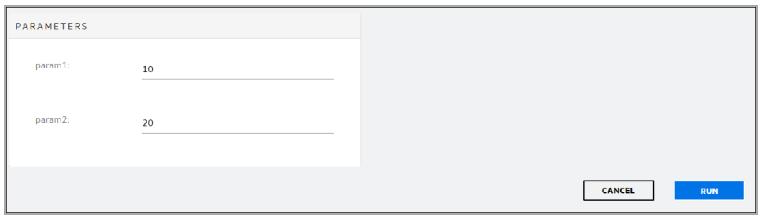


Figure 22: Data Generation Case - Run Parameters

When the **RUN** button is clicked, the case will be executed and then the page redirects to the list page. Users can see the execution status of the case from the STATUS column of the list. Data generation case list, on page 19 for more.

Schedule (): When the user clicks on the icon, the schedule page for automatic executions opens. Users can schedule the case with optional parameters. Users can schedule the job with the options for the run just once, daily, weekly, or monthly.

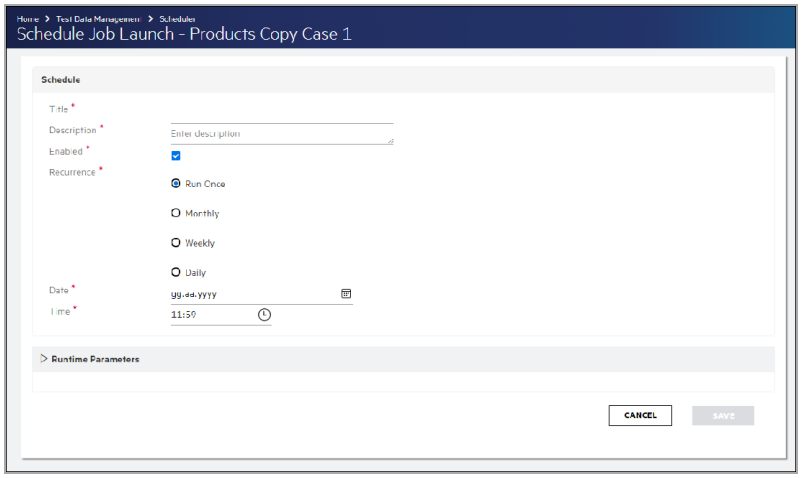


Figure 23: Data Generation Case - Schedule

History (): When the user clicks on the marked icon above, the run history page for the case will be listed. From this page, the user is allowed to see the logs of each run of a case. If the business flow of the case creates a file, the user can download this file from **Actions > Logs** page. User can also see the parameter details by clicking the **PARAMS** ( ) button.

If the database location and schema name for the upload is set on the creation of a business flow, the user only needs to create the schema for the destination location. Otherwise, the user should only create a schema by giving the same name as a source of the business flow.

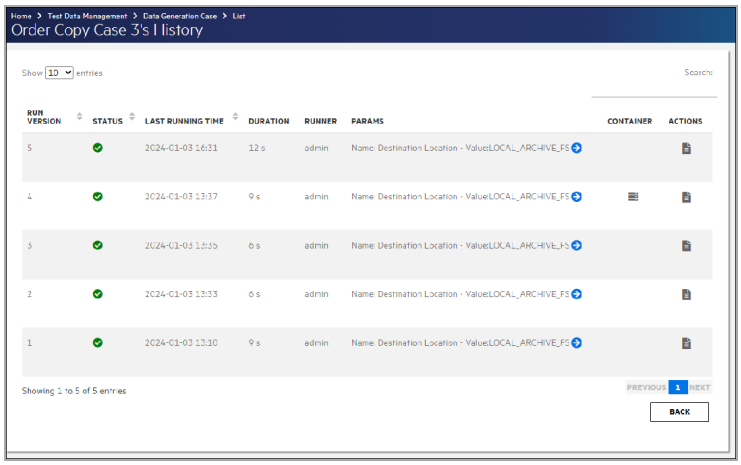


Figure 24: Data Generation Case – History

Logs ( ): When the user clicks on **Logs** icon, the logs of the last run of the case will be shown. Users can see the full log or just the brief version of it by using the switch. Downloading the log file is also possible.

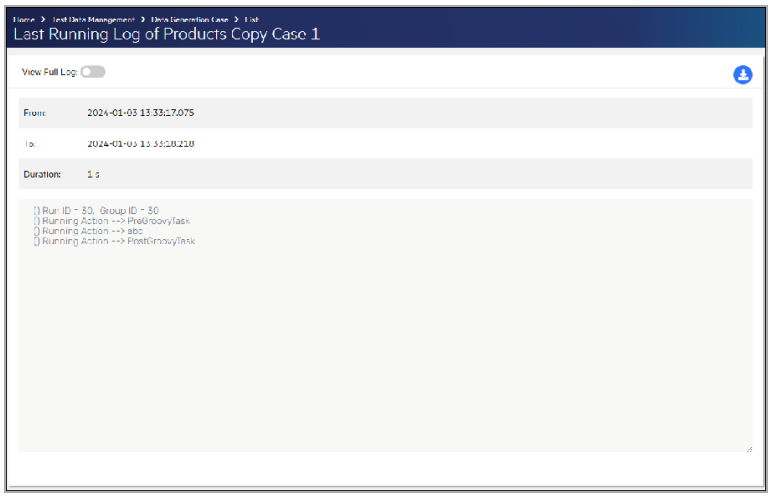


Figure 25: Data Generation Case – Brief Logs

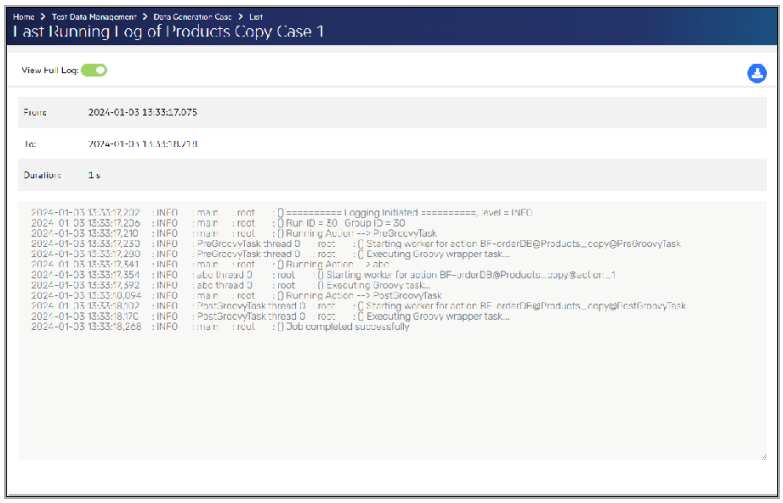


Figure 26: Data Generation Case – Full Logs

Data generation case authorization

Authorization on Data Generation Case's Create and List pages is as follows.

Authority type	Authorities
Admin	All Data Generation Cases, All Operations
Test Manager	Only Authorized Projects, All Data Generation Case Operations
Tester	Only Authorized Projects, Add, Update, Delete Data Generation Case created by itself, Not Delete Others

Data generation suite

Data Generation Suite menu is used to create new suits, view the suit list, and edit existing suits.

Data generation suite list

The Data Generation Suite list page is as follows. This page will be empty when the application is used for the first time. New Data Generation Suite can be created by clicking **NEW** button.

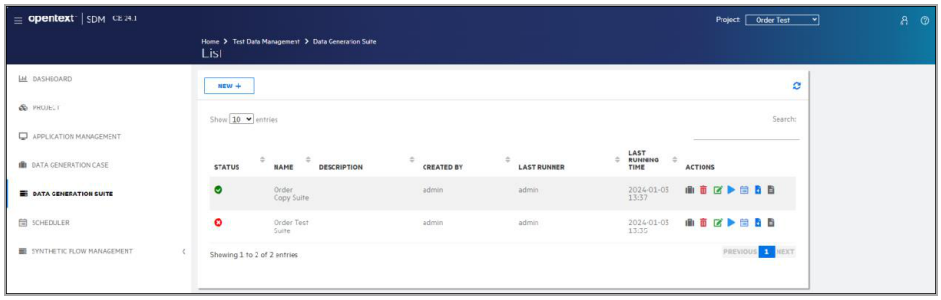


Figure 27: Data Generation Suite – List

Menu	Function
	Used to view the cases for the project. See Data generation case list, on page 19 for more.
	Used to delete Data Generation Suite.
	Used to edit the suite. Users can change the name and the description fields, add a new case to the suite or change the running order of cases.
	Used to execute any case from the case list of suites.
	Used to schedule the suite for the next runs.
	Used to view execution history.
	Used to view cases inside the suite.
	Indicates the status as completed.
	Indicates the status as failed.
	Used to refresh the data generation suite list.

Menu	Function
NEW +	Used to create a new application.

Create a new Data generation suite

The Data Generation Suite - Create page includes **Application**, **Application Version**, **DGS Name**, **Description**, **All Data Generation Cases** and **Selectable Data Generation Cases** fields. The details to be considered while creating a new Data Generation Suite are given below.

- To create a new Data Generation Suite, the Application, Application Version, Name, and Description fields must be filled in before.
- The name field is limited to 100 characters, and the description field is limited to 150 characters to enter.
- All Data Generation Cases can be filled out from the Selectable Data Generation Cases list box. Users can drag and drop the cases from each All-Data Generation Cases box and vice versa.
- Once the Data Generation Suite is executed, cases will be run in the order, so users should consider the order of Data Generation Cases sent from the All-Data Generation Cases area to the Selectable Data Generation Cases area.
- All Data Generation Cases and Selectable Data Generation Cases have filtering options.

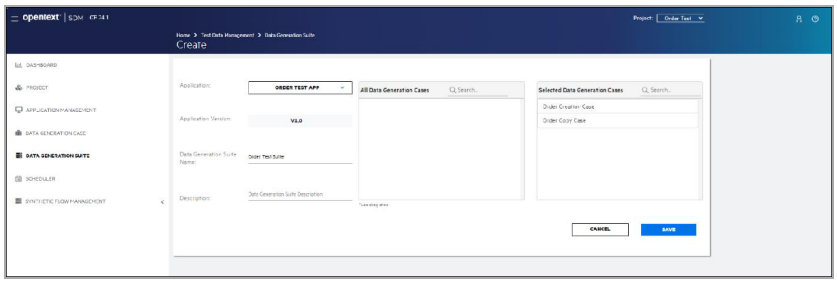


Figure 28: Data Generation Suite – Create

Action details

Delete ( ): When a DGS is deleted, DCSs connected to it will not be deleted because the link between DGS and DGC is no longer existing. So that DGCs will be reusable for the desired DGS. On the other side, all reports of the DGS will also be deleted. This information is shared with the user during the operation.

Run ( ): When the user clicks on **Run** icon, the page of the suite opens with the cases. Users can select any case from the list to execute.

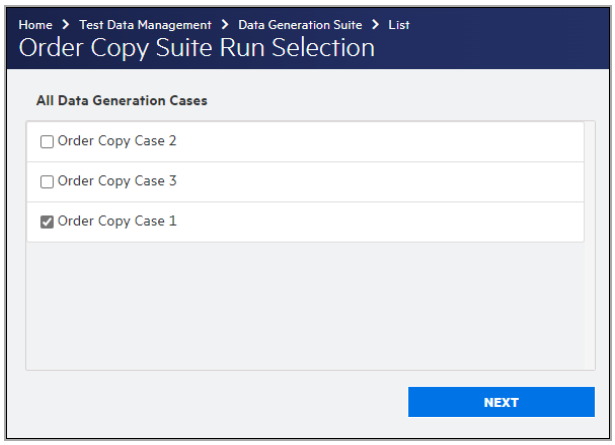


Figure 29: Data Generation Suites - Run Selection

After selection, the page would direct the user to the parameters page.

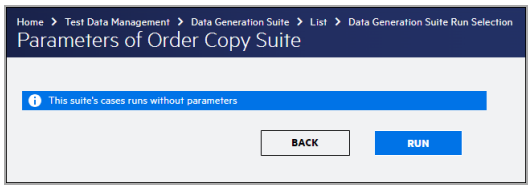


Figure 30: Data Generation Suites - Run Parameters

The user can change the default parameters of each case and execute the suite. Users can see the running status of the suite from the STATUS column of the list. See Data generation suite list, on page 24 for more.

Schedule (): When the user clicks on **Schedule** icon, the page opens where the user can schedule the suite for the next runs. Suites can be scheduled to work just once, as well as daily, weekly, and monthly. All test case parameters that are within the suites can be set on this screen for scheduling times.

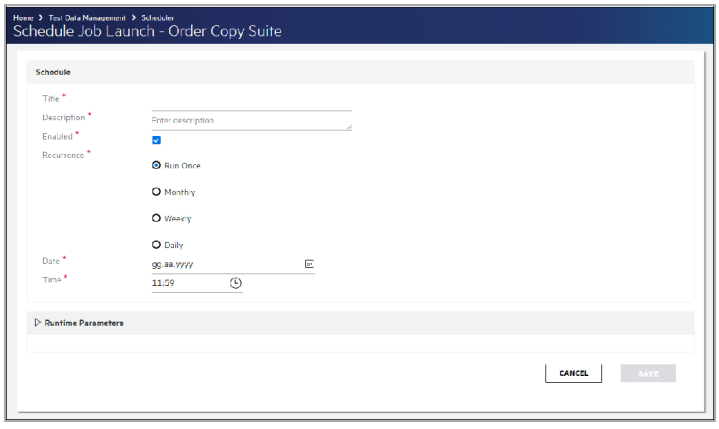


Figure 31: Data Generation Suites – Schedule

History ( ): When the user clicks on the marked icon above, the run history page for the suite opens. On this page, users can see the execution history of the suite with its cases. When the user clicks History icon on “Data Generation Cases” column, case runs will be also shown.

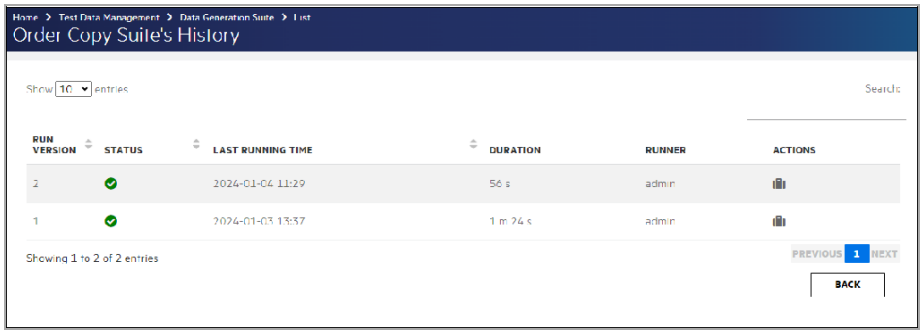


Figure 32: Data Generation Suites – History

Logs ( ): When the user clicks on **Logs** icon, cases inside the suite will be shown.

Figure 33: Data Generation Suites – Logs

When the log icon is clicked on, the log of the suite is shown. Users can see the full log history or preferably only the brief log version here. Downloading the log file is also possible.

Figure 34: Data Generation Suites – Log History

Data generation suite authorization

Authorization on Data Generation Suite's Create and List pages is as follows.

Authority type	Authorities
Admin	All Data Generation Suites, All Operations
Test Manager	Only Authorized Data, Generation Suites, All Operations
Tester	Only Authorized Data Generation Suites, Add, Update, Delete Functions of Data Generation Suite that are created by Tester User

Change log

This page shows the scheduled suites and cases in a list. Users can edit or delete the scheduled jobs from the list.

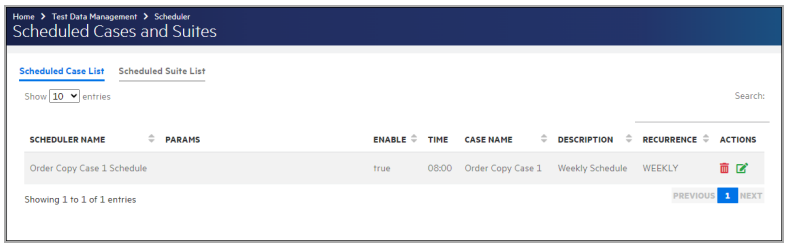


Figure 35: Scheduled Case List

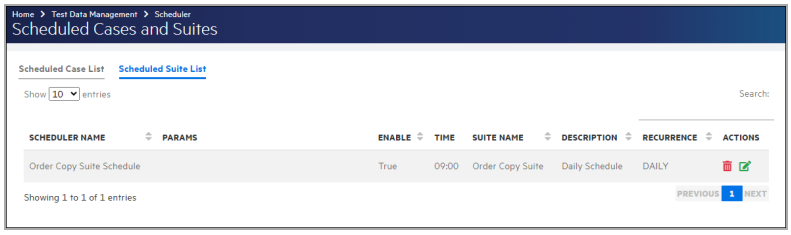


Figure 36: Scheduled Suite List

Synthetic flow management

Synthetic flow list

Synthetic Flows are the configuration of data generation settings that are wanted to be generated. The page shows up with the list of existing flows on start-up. Users can create a new synthetic flow by choosing the environment. The system gets the schema and table (with all the relations) information from the database. Users can delete the synthetic flow at any time unless they are in use.

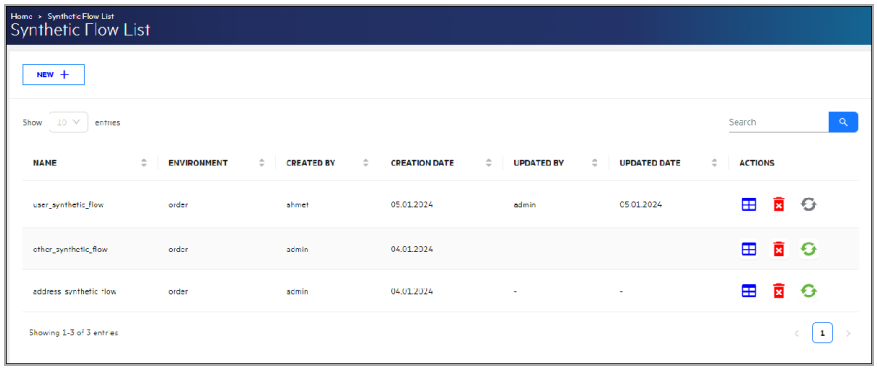


Figure 37: Synthetic Flow List

Menu	Function
	Used to delete the business flow. For business flow to be deleted, it must not be running.
	Used to configure the data generation settings of the synthetic flow. See Create a new Synthetic flow management, below for more.
	Used to check if any possible updates in terms of tables or columns of related Synthetic Flow.
	Indicates the updates are applied by a user.
	Used to open business flow creation page.

Create a new Synthetic flow management

To create a New Synthetic Flow, users can click **NEW** button. After entering the Name, Environment and Tables, Synthetic Flow is created. If there is no table selection, it means all the tables contained in the selected environment will be considered.

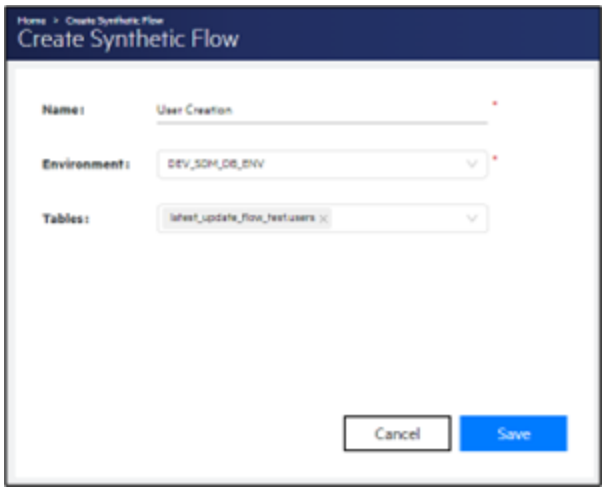


Figure 38: Synthetic Flow List-New

Action details

Check Flow Updates ( ): It shows the details of the table or column updates of the related Synthetic Flow.

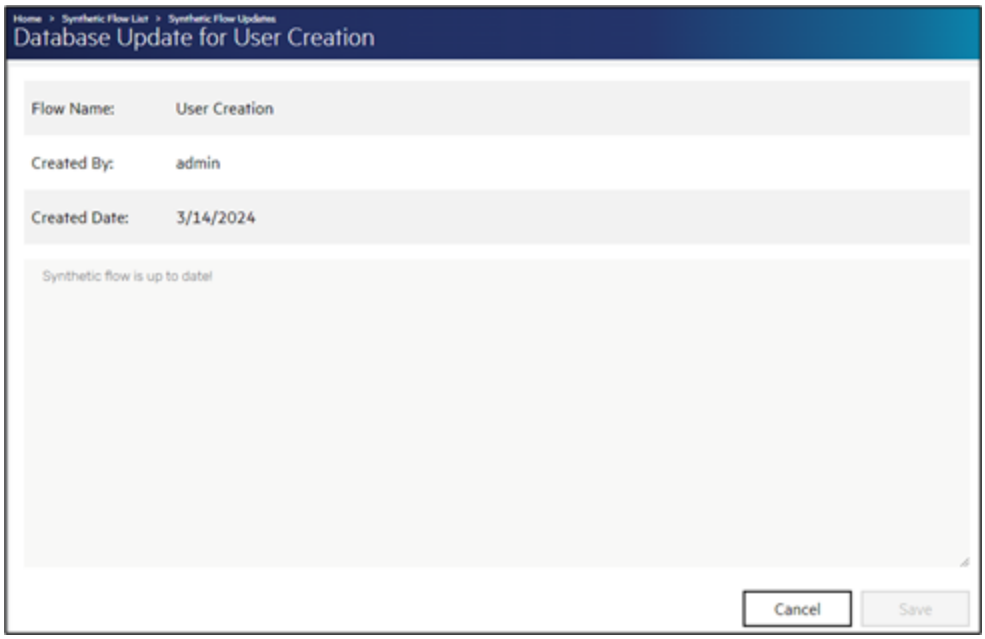


Figure 39: Check Flow Updates

Edit ( ): It includes two tabs as **Flow Edit** and **ER Diagram**.

Flow Edit : To configure the data generation settings of the synthetic flow, users can click on **Edit** on the list, and then the list of the tables shows up on the edit page.

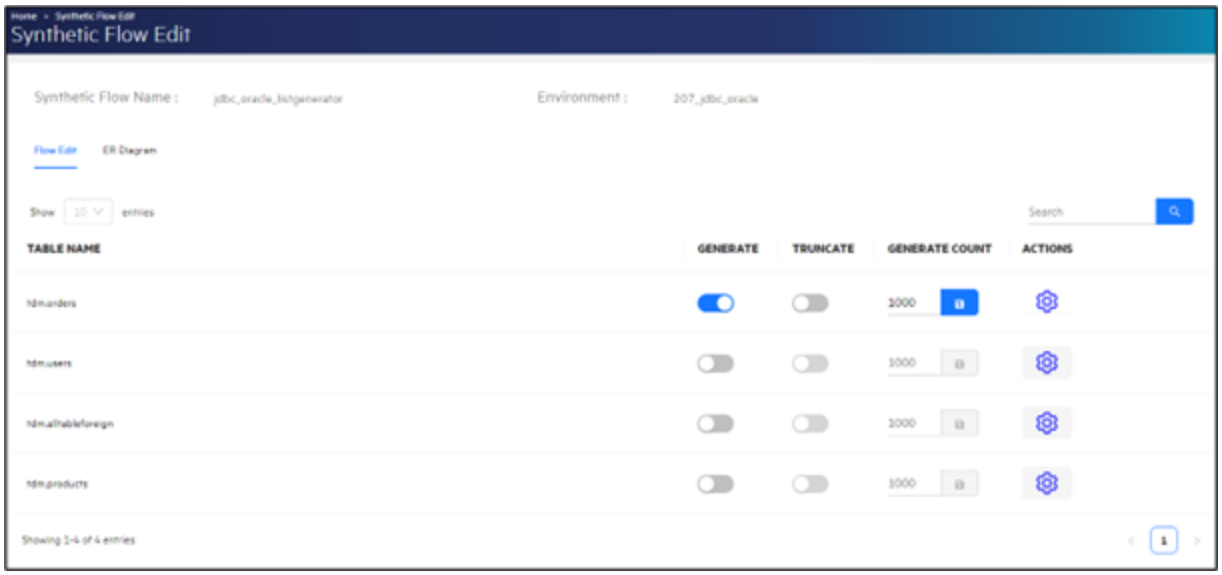


Figure 40: Synthetic Flow List - Edit

> **NOTE:** In a single synthetic data generation run, a maximum of 100 tables can be produced with a maximum of 10K data each. That is, a maximum of 1M data can be produced.

Users can switch **GENERATE** to on, if they want to generate the table or switch off it if they don't want to generate it at this time. If the button is switched on, then the user should fill in the number of rows to be generated.

Users can switch **TRUNCATE** to on, if they want to truncate table before generation or add the new data to the existing ones.

Users can set **GENERATE COUNT** value and press the **Save** button next to it to save.

Change Configuration Settings ( ): Generation rules are set to default. However, users have a chance to change them by clicking the rules button on the line. After clicking, each column of the selected table with matching generator types will be shown as a list on the new page. Each data type has its related built-in data generator. The status would show either the rule is set as default or changed by the user.

Confirm Updates ( ): It used to confirm any configuration updates.

Edit Generation Rule ( ): Users can click on the edit button to change the generator configuration and a pop-up screen shows up with the specific information depending on the generator type of the column. Users can also change the generator type. Here you can find below the built-in generator types and their settings that users can configure and save for the considered synthetic flow. For each generator type this pop-up window would change dynamically. "IsUnique" and "IsNullable" options are common for all generator types.

> **NOTE:** Red icon indicates that there are some updates on the related column.

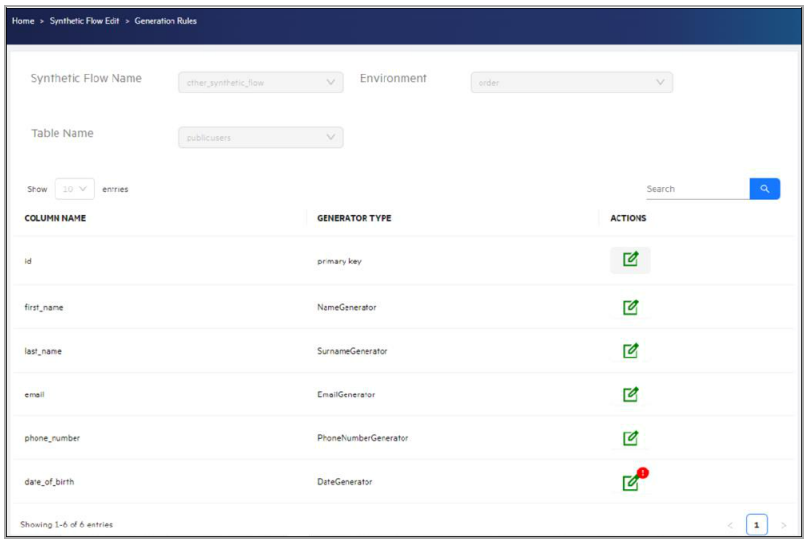
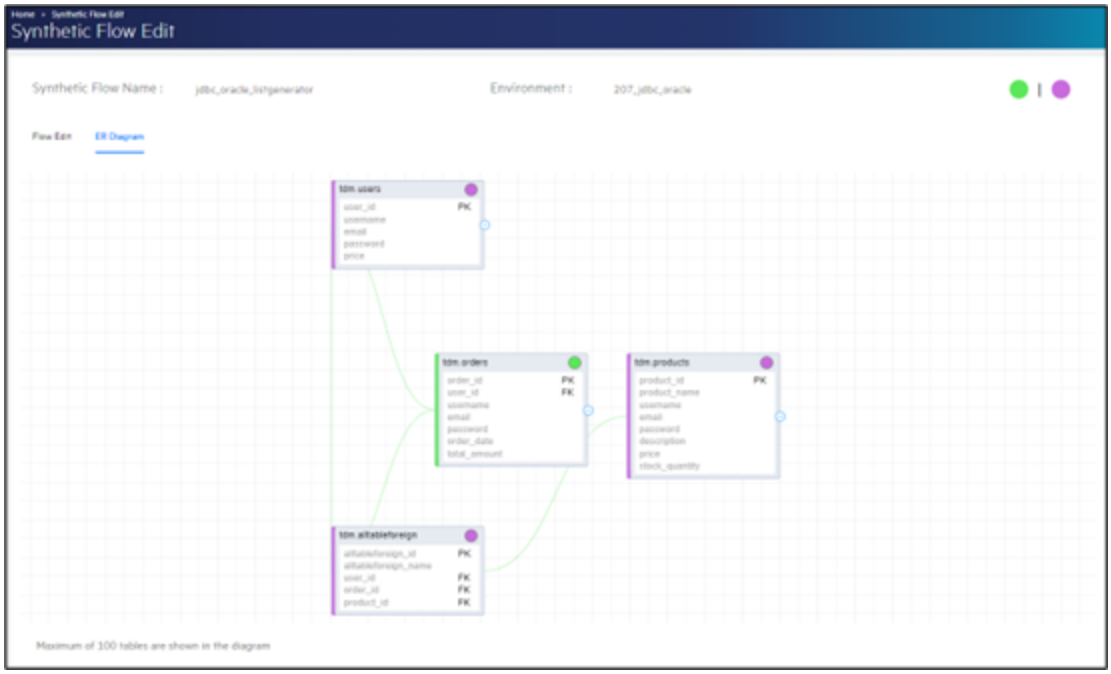


Figure 41: Synthetic Flow List - Change Configuration Settings

ER Diagram: It is used to display the ER diagram of the relevant synthetic flow.

- The parts highlighted in green indicate the data that will be generated.
- The parts highlighted in purple indicate the data that will not be generated.
- The – icon ( ) is used to hide the part it connects to in the chart. The + icon ( ) is used to display the hidden part.
- PK indicates primary key and FK indicates foreign key.



Generators

- **Email Generator**: The email generator takes the domain string from the user and takes columns to create a name for the email. Users can select the separator for two columns or can leave this dropdown without any selection. When generating data for the same project, only one type of e-mail domain extension is produced. Different domain types cannot be generated at the same time. However, e-mail data with different domain extensions can be generated in the column of the same table with new additions.

Figure 42: Synthetic Flow List - Email Generator

- **First Name or Lastname Generator**: To generate a first name or last name, users should select the language information from the dropdown.

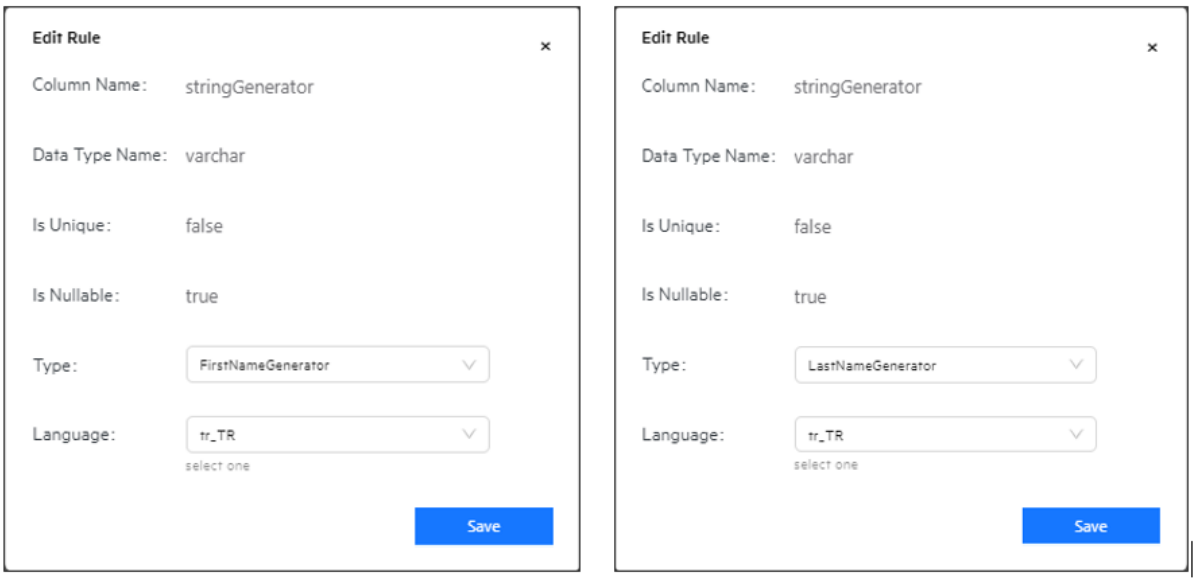


Figure 43: Synthetic Flow List – First Name or Last Name Generator

- **Password Generator**: Users can give specific password information to fill all the password areas with the same information or can leave this area empty to make the system generate a random password for each data row.

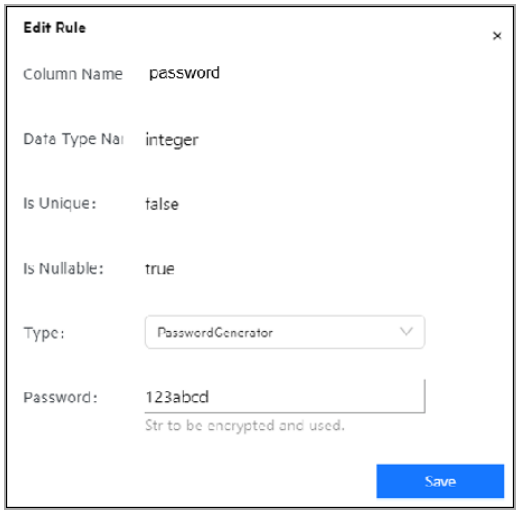


Figure 44: Synthetic Flow List - Password Generator

- **Text Generator**: Users can generate texts in terms of Text, Sentence, or Paragraph with the amount they specify. Generates random Latin texts based on specified parameters.
  - **Params**
    - **Context**: Choose the type of text from options like 'sentence', 'paragraph', and 'text'.
    - **Amount**:
      - For '**sentence**': Controls the number of words in a sentence. Words in these sentences can vary in length.
      - For '**paragraph**': Controls the number of sentences in a paragraph. Each sentence may contain a different number of words ranging from 3 to 8.
      - For '**text**': Approximate number of characters the text string will contain. '5' is the minimum for the 'text' option

> **EXAMPLE:**
>
> Context = sentence
>
> Amount = 2
>
> output = Ea voluptatibus.
>
> another output = Libero assumenda.
>
> - Context = paragraph
>
> Amount = 2

> output = Mollitia reprehenderit reiciendis necessitatibus quaerat velit sequi. Minus esse minima officia a facilis.
>
> another output = Natus odit doloribus quae. Ex id recusandae nesciunt.
>
> - Context = text
>
> Amount = 5
>
> output = Unde.
>
> another output = Non.

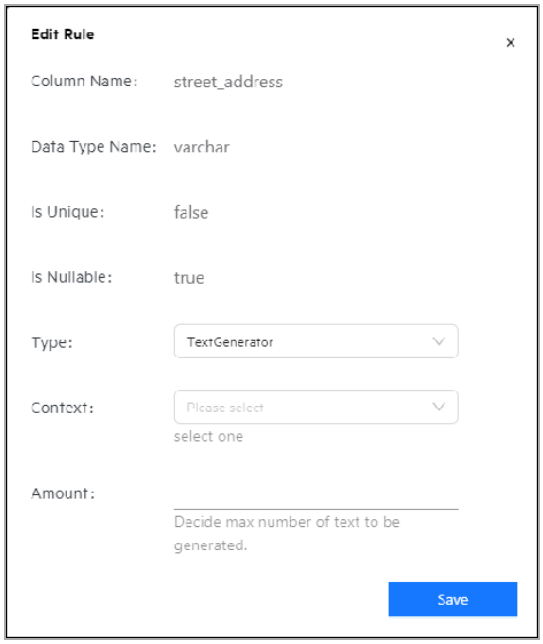


Figure 45: Synthetic Flow List - Text Generator

- **Full Address Generator**: Users should select the country that represents the address format for the generator.

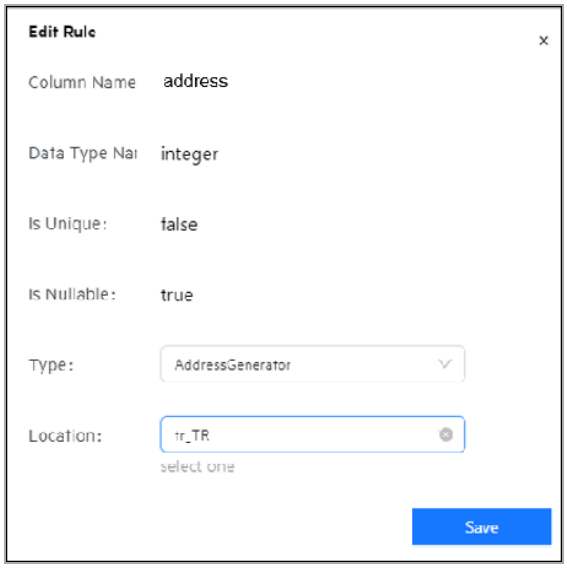


Figure 46: Synthetic Flow List - Full Address Generator

- **UUID Generator**: The system will generate UUID randomly.

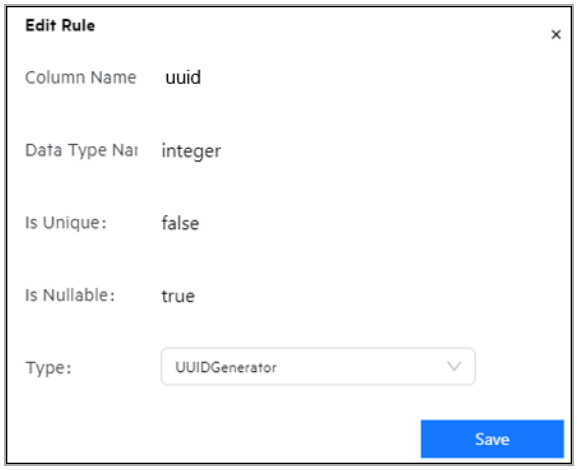


Figure 47: Synthetic Flow List - UUID Generator

- **Integer/Float/String Data Generator**: Users can add integer, float or string data and can specify the min/max values and the prefix and suffix of the string information for them. StringGenerator creates a random sequence comprising both uppercase and lowercase letters.
  - **Params**:
    - Min Chars: Specifies the minimum length of the random segment.
    - Max Chars: Sets the maximum length of the random segment.

- Prefix: An optional string to add before the random sequence.
- Suffix: An optional string to add after the random sequence.

- **Output**:
  - A random string with a length ranging from the minimum to the maximum specified characters.

> **EXAMPLE:** 'aJkdLAiOw', 'nmAvbBeQh'

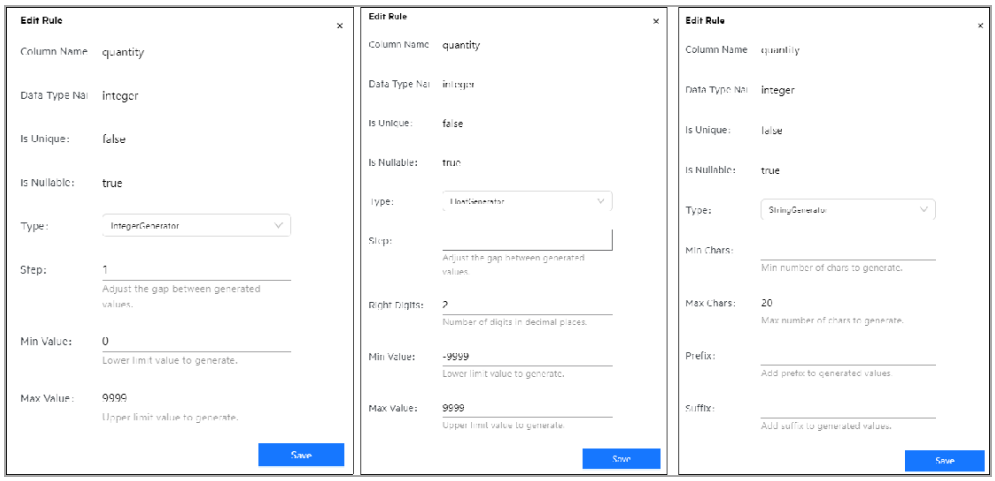


Figure 48: Synthetic Flow List - Integer/Float/String Data Generator

- **Date/Date Time Generator**: Users can specify the range for the dates or can specify only the earliest /latest dates or end datetime for the generations of DateTime data.

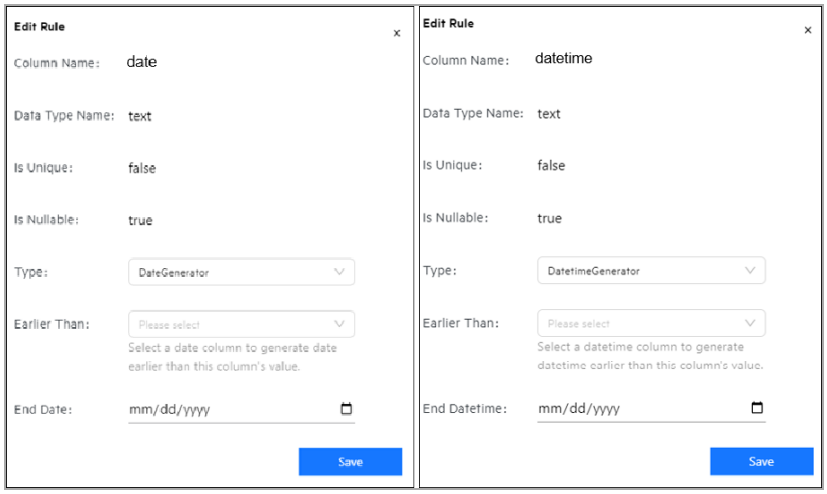


Figure 49: Synthetic Flow List - Date/Date Time Generator

- **Internal Generator**: The internal generator doesn't take any additional parameters and uses only the values that are existed within that column on the database.

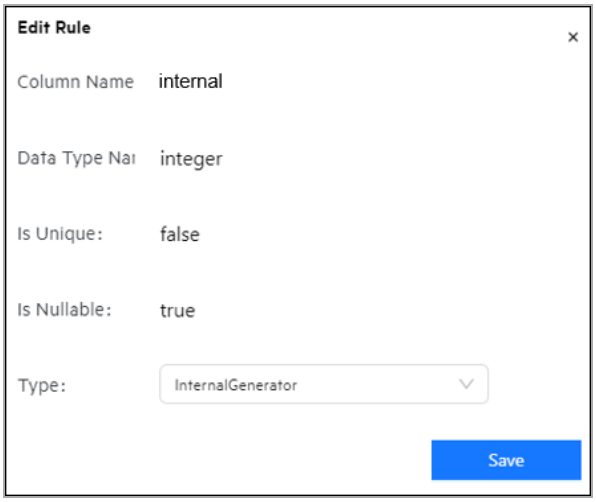


Figure 50: Synthetic Flow List - Internal Generator

- **Data Replicator**: It doesn't take any additional parameters and uses only the values that exist within that column on the database.

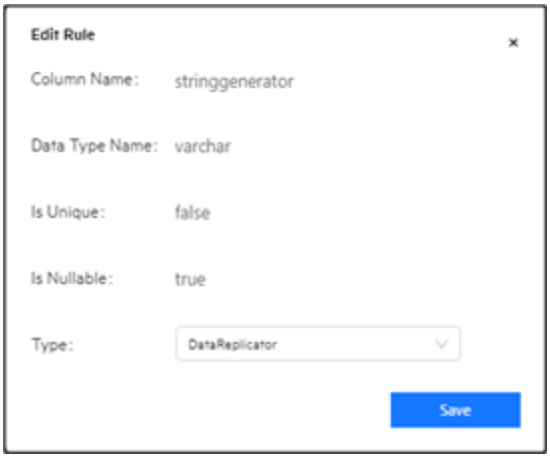


Figure 51: Synthetic Flow List – Data Replicator

- **Boolean Generator**: Users can give each boolean value a percentage information or can leave them empty to make the system generate boolean values randomly.

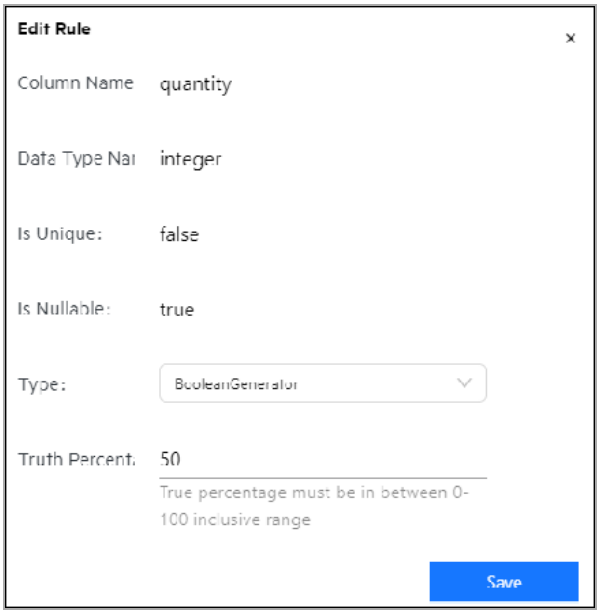


Figure 52: Synthetic Flow List - Boolean Generator

- **Phone Number Generator**: It generates formatted random phone numbers by taking Location, Mobile and Static parameters.

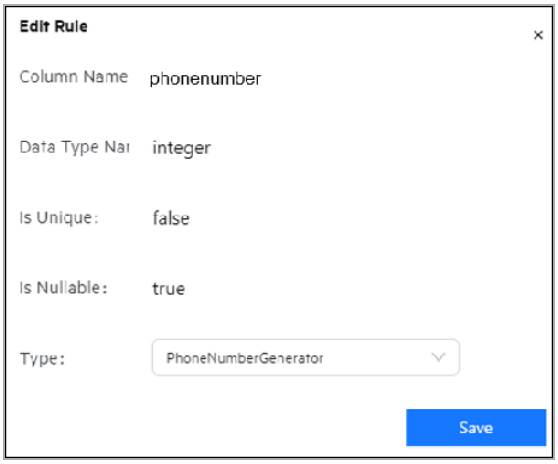


Figure 53: Synthetic Flow List - Phone Number Generator

- **Image URL Generator**: By taking width and height values, this generator finds the images that match with the given size and gives the URL of the image from an image website.

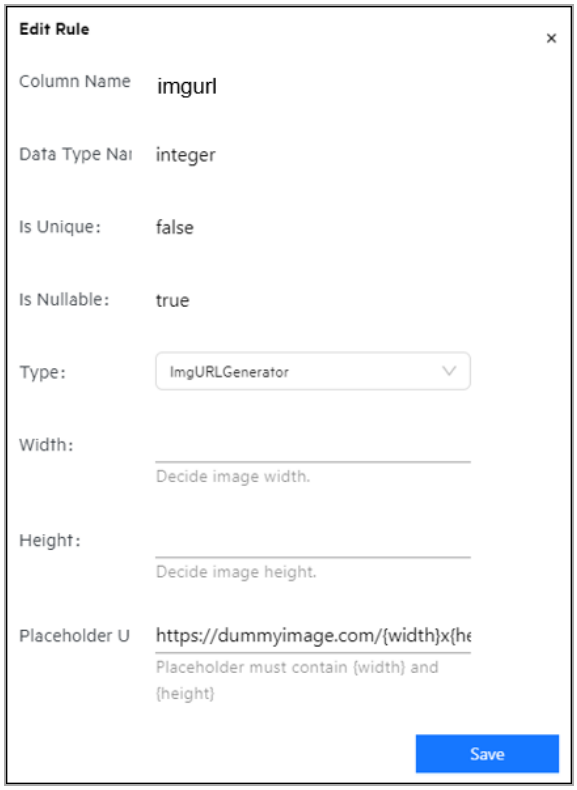


Figure 54: Synthetic Flow List - Image URL Generator

- **Regex Generator**: Users can create regular expressions by giving an example text.

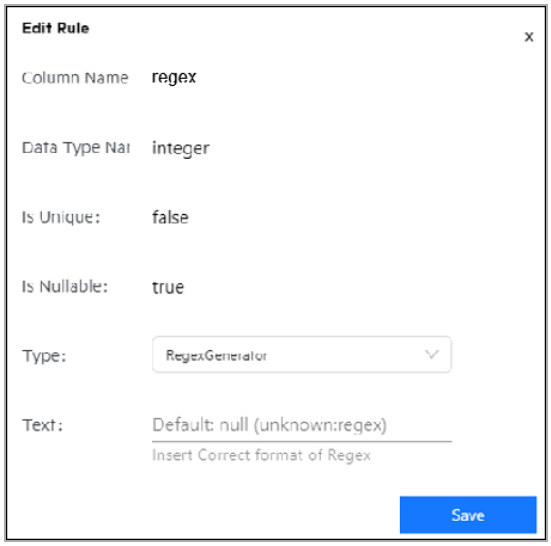


Figure 55: Synthetic Flow List - Regex Generator

- **BloodGroup Generator**: This generator takes no parameters and generates formatted random blood groups.

Figure 56: Synthetic Flow List - BloodGroup Generator

- **FileURL Generator**: This generator takes no parameters and generates formatted random file URLs.

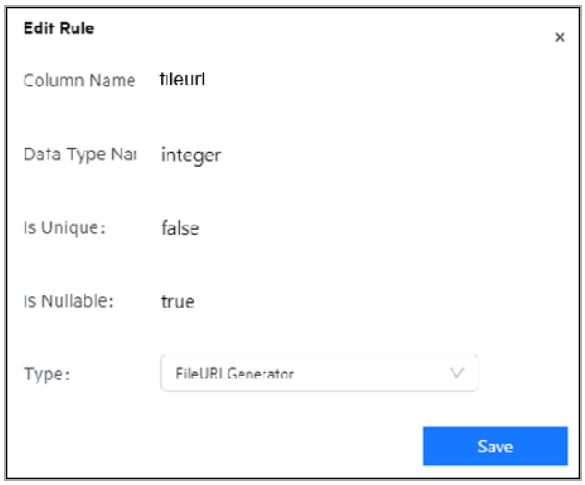


Figure 57: Synthetic Flow List - FileURL Generator

- **Null Generator**: This generator takes no parameters and generates "null" value in the relevant area.

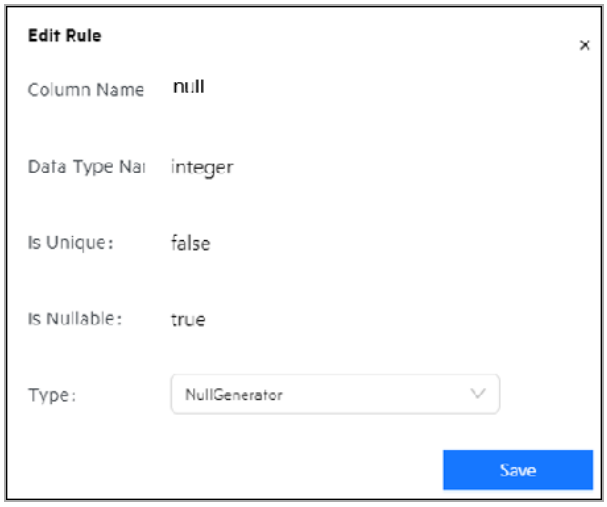


Figure 58: Synthetic Flow List - Null Generator

- **City Generator**: It generates random cities by taking Location parameter.

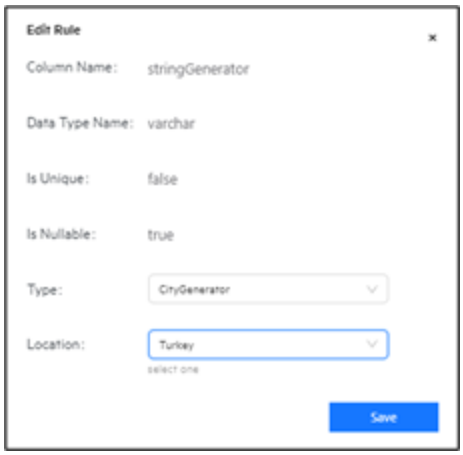


Figure 59: Synthetic Flow List - City Generator

- **Country Generator**: This generator takes no parameters and generates random countries.

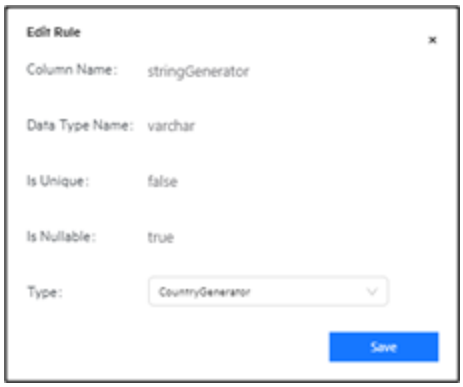


Figure 60: Synthetic Flow List - Country Generator

- **Credit Card Number Generator**: It generates random credit card numbers by taking Card Type [all, amex, mastercard, visa] parameter.

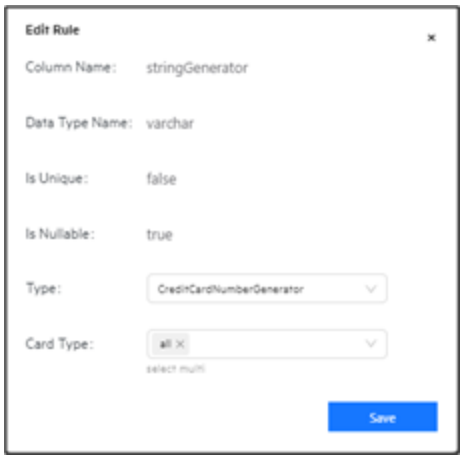


Figure 61: Synthetic Flow List - Credit Card Numberl Generator

- **IBAN Generator**: It generates random IBANs by taking country parameter.

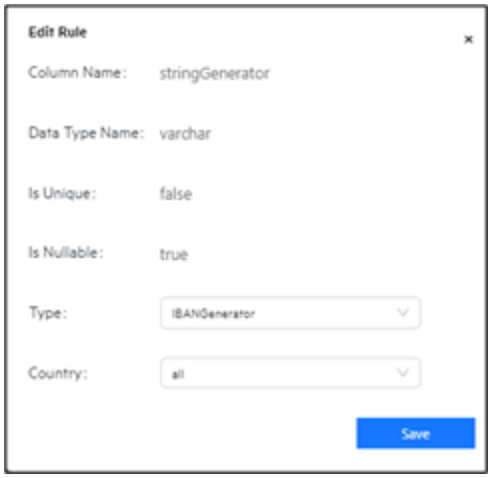


Figure 62: Synthetic Flow List - IBAN Generator

- **Postal Code Generator**: It generates random postal codes by taking location parameter.

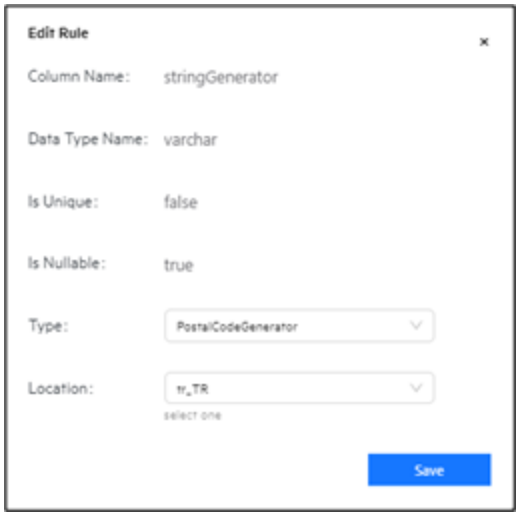


Figure 63: Synthetic Flow List - Postal Code Generator

- **Street Generator**: It generates random streets by taking location parameter.

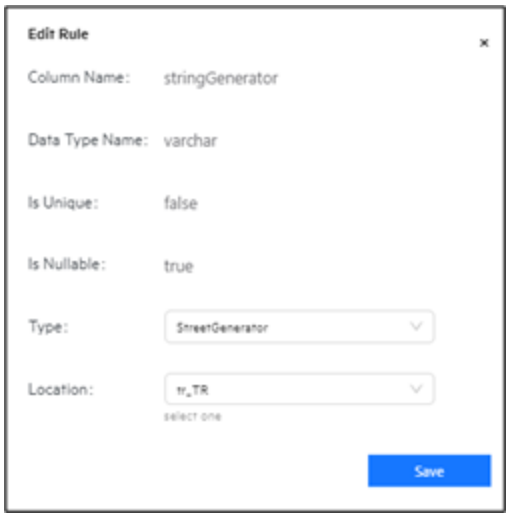


Figure 64: Synthetic Flow List - Street Generator

List generator

Users can create their list generators and customize them rather than just using the default generator types that are offered by the product. By clicking the List Generator menu item on the list on the left side of the page, users can reach out to the List Generator functionality. The page shows up with the list of the list generators that are created before and the user can create a new one by clicking the new button. This page supports all CRUD operations. However, if the generator is already in use, then the system cannot delete the record.

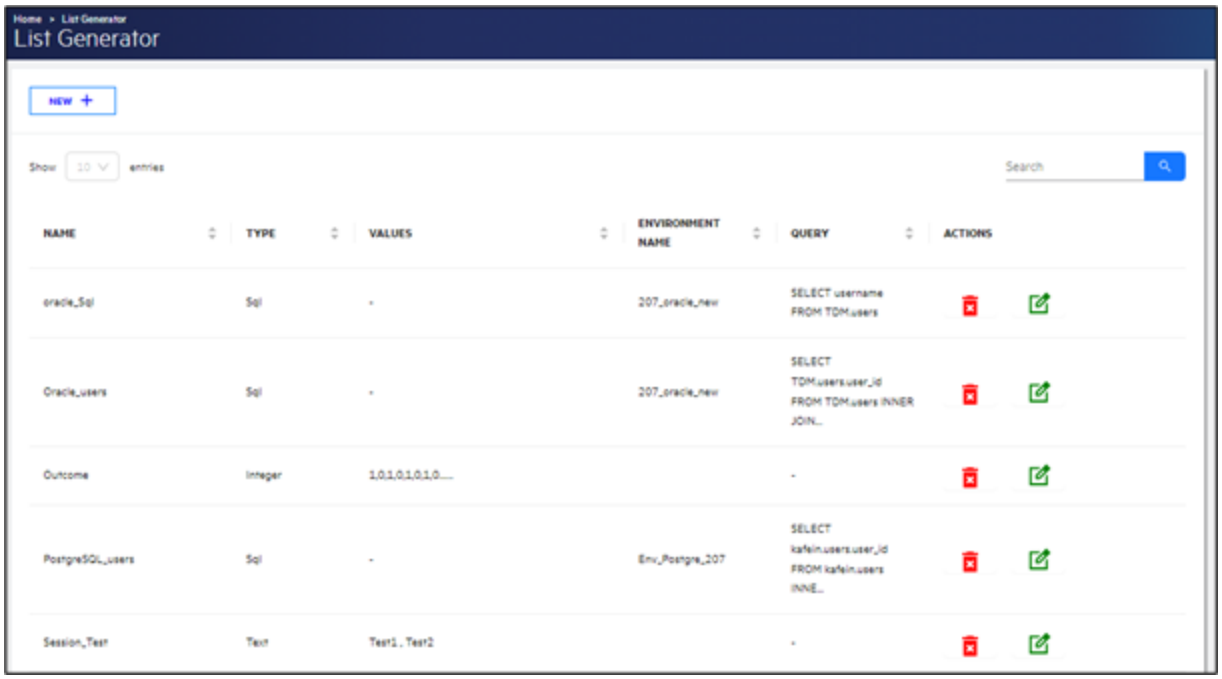


Figure 65: List Generator

List Generators can be created in three different ways with using **Create New**, **Create from File**, and **Create from SQL** tabs of the Create List Generator window.

- **Create New**: It can be created manually using the **Create New** tab. While creating the new custom generator, users can select the list item types (integer, decimal, text) and write down values and add them to the list by clicking the + button. This list allows the application to generate values using only from the custom list.

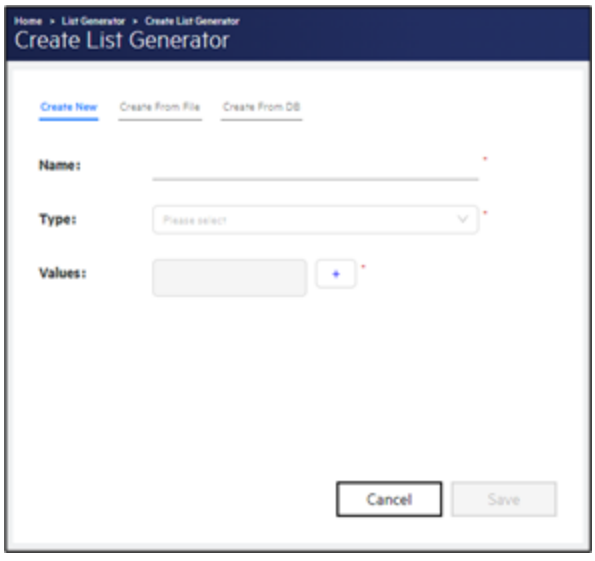


Figure 66: Create List Generator - Create New Tab

- **Create from File**: It can be created by importing a CSV file from the **Create from File** tab. Select the Separator Type [Comma, Tab, Semicolon, Space, Pipe, Colon] parameter and download the sample CSV file via the **Download** button. The desired data is added to the downloaded table and the table is uploaded to the Click or drag file to this area to upload field.

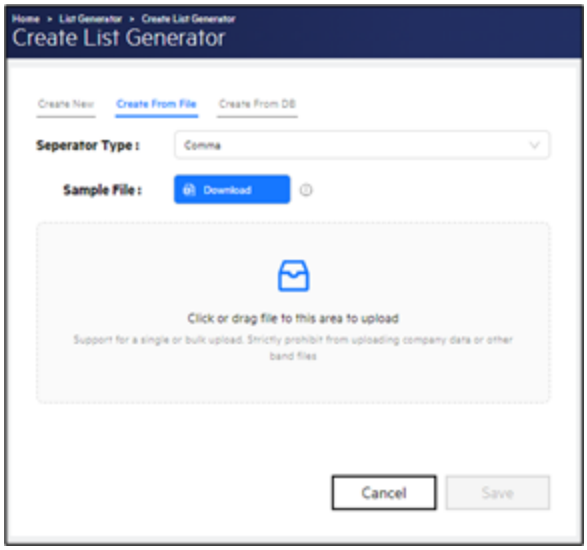


Figure 67: Create List Generator - Create from File Tab

> **NOTE:** CSV file can either include only one column that refers to one list generator or include multiple columns that refers to multiple distinct list generators. Each column name with in the file will be used as the name of the **List Generator**.

	A	B	C
1	List_Loan_Status	List_Interest_Rate	List_Amount
2	Text	Integer	Decimal
3	Approved	30	19.25
4	Denied	40	23.6
5	Pending	50	45.78

- **Create from DB**: It can be created using environment parameter and SQL code from the Create from DB tab.

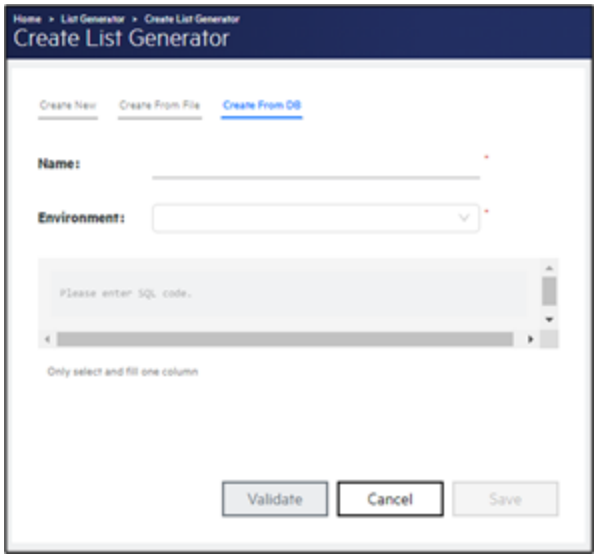


Figure 68: Create List Generator – Create from DB Tab

Users are only allowed to edit list values or they need to delete the whole list item and create from scratch. By clicking on the Delete ( ) button of any list generator, it can be deleted after confirmation.

Figure 69: Delete List Item

By clicking on the Edit ( ) button of any list generator, the information entered when creating it can be edited.

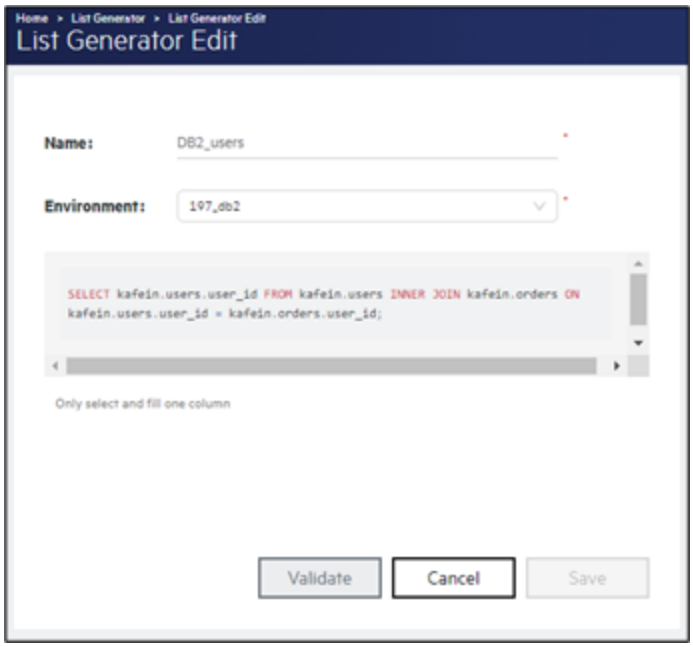


Figure 70: List Generator Edit

The created List Generators are used by selecting **ListGenerator** as the **Type** in the Edit Rule window of the Synthetic Flows.

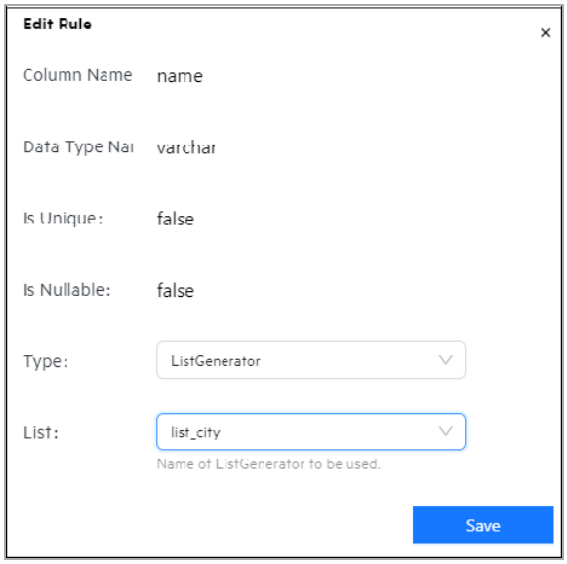


Figure 71: Edit Synthetic Flow List