
Apromore

Apromore

Dec 27, 2021

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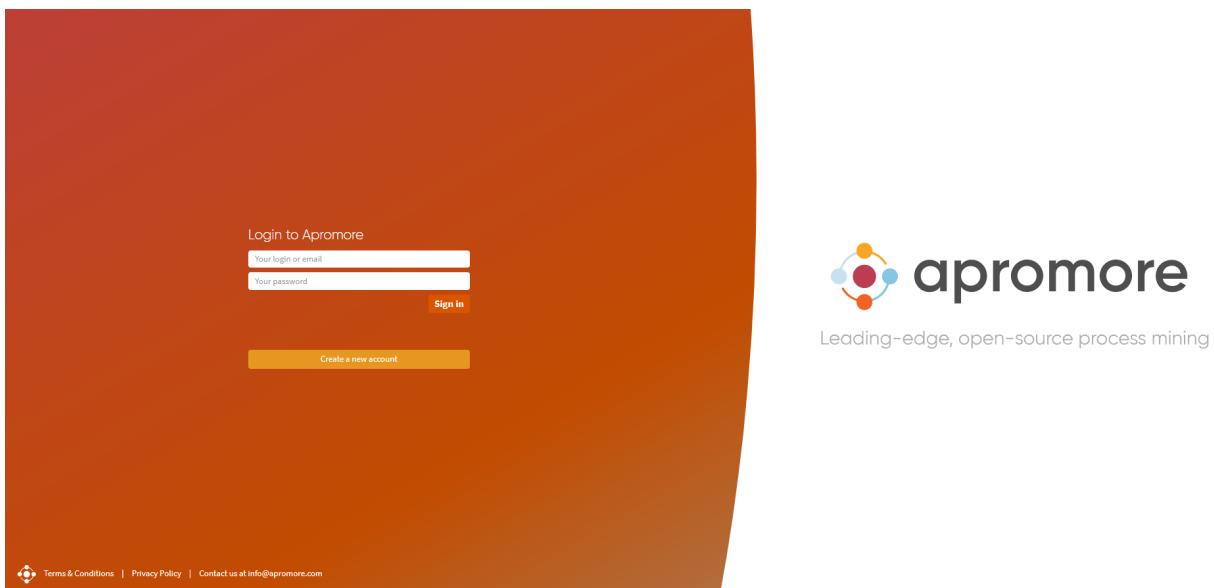
CHAPTER ONE

QUICK START

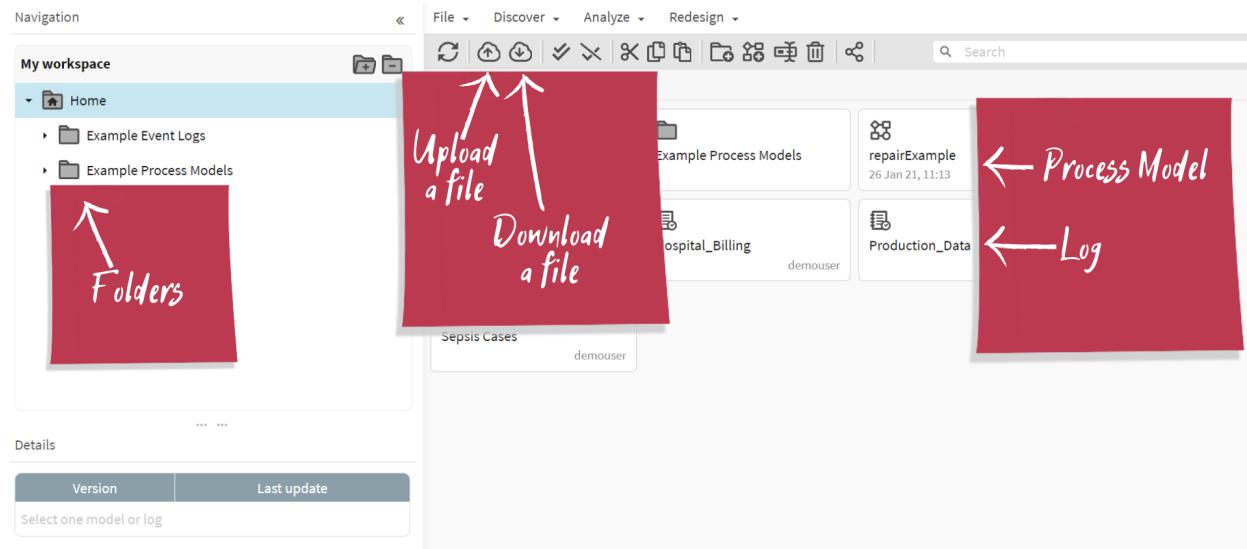
Apromore is a leading provider of open-source solutions for process mining and AI-driven business process improvement. Our vision is to democratize process mining by enabling organizations to achieve digital transparency and operational excellence.

1.1 Apromore Portal

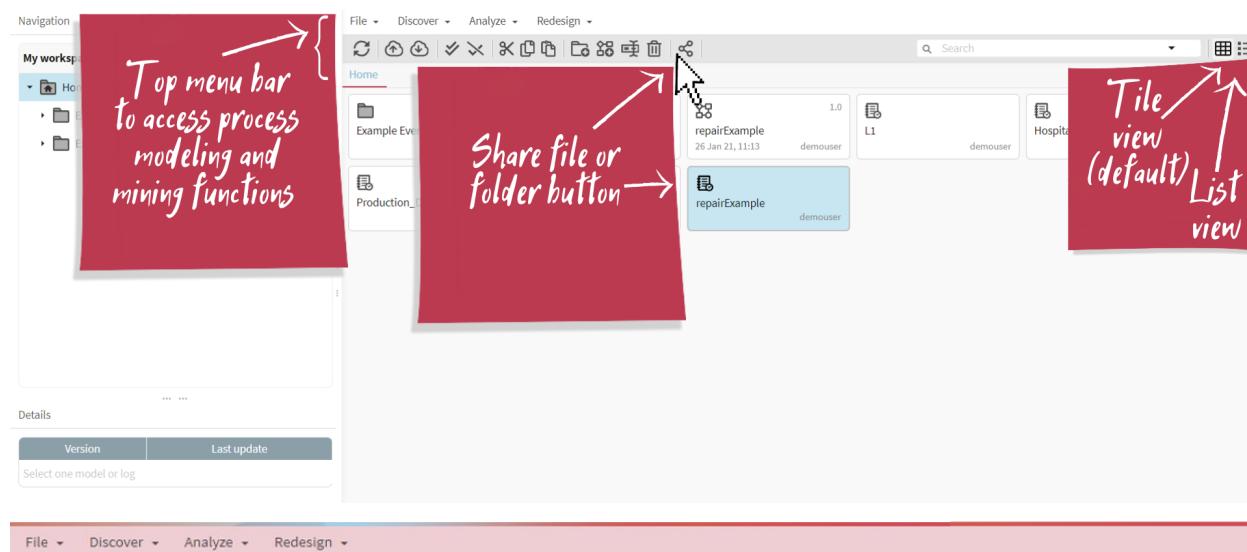
The Apromore Portal is the first and primary interface that users access. One can navigate the workspace folders and perform various actions through the available plugins.



The Apromore workspace containing files and folders appears after successfully logging in. Different icons represent a process model and log. To select a file, click on it. To add a new file, click on *Upload*. To save a file, click on *Download*.

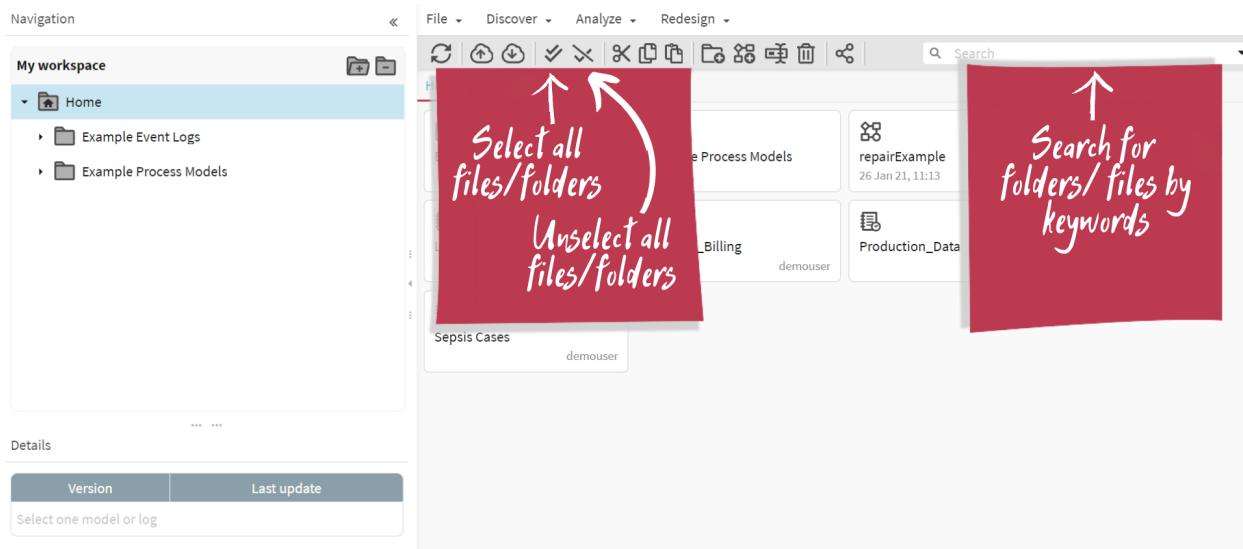


Note: We can also select the *Upload* and *Download* options from the *File* menu drop-down.

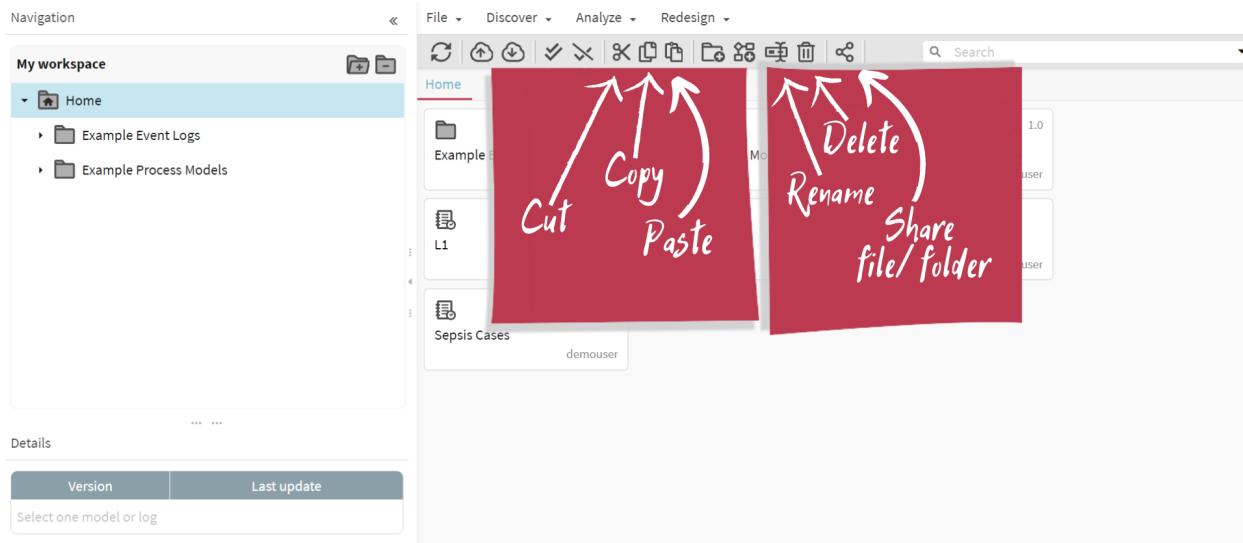


File	Discover	Analyze	Redesign
Manage all your files here. <ul style="list-style-type: none"> Upload Download Cut Copy Paste Create folder Rename Delete 	To create, edit or discover process models, and filter event logs. <ul style="list-style-type: none"> Create model Discover model Edit model Filter log 	Animate one or more logs on top of a BPMN process model, view the performance dashboard and create custom dashboards, and search for similar process models. <ul style="list-style-type: none"> Animate logs Simulate model View performance dashboard 	To merge two or more process models or search for similar ones. <ul style="list-style-type: none"> Merge models Search similar models

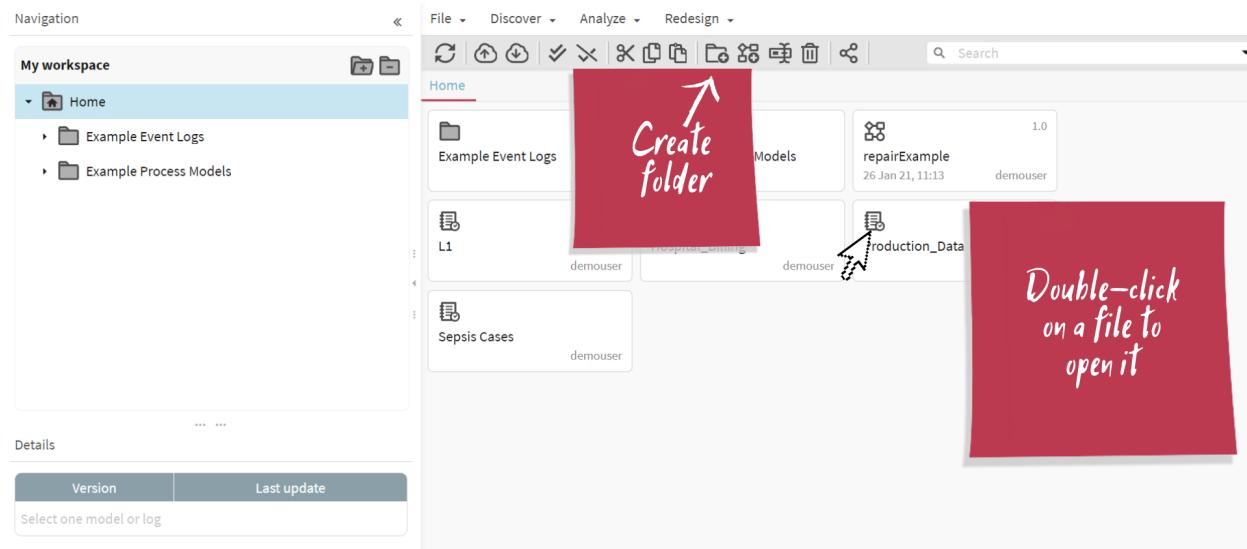
We can select and unselect all files simultaneously by clicking on *Select/Unselect* buttons for ease of access. To search a file, use the *Search* bar.



To remove the selected file/folder from the workspace, click on *Cut* while to create a duplicate, click on *Copy*. To paste the file/folder in the desired directory, click on the *Paste* button. To rename or delete a file/folder – select it and click on *Rename* or *Delete*.



To add a new folder to the workspace, click on the *Create folder* button. The created folder appears on the *My Workspace* panel.

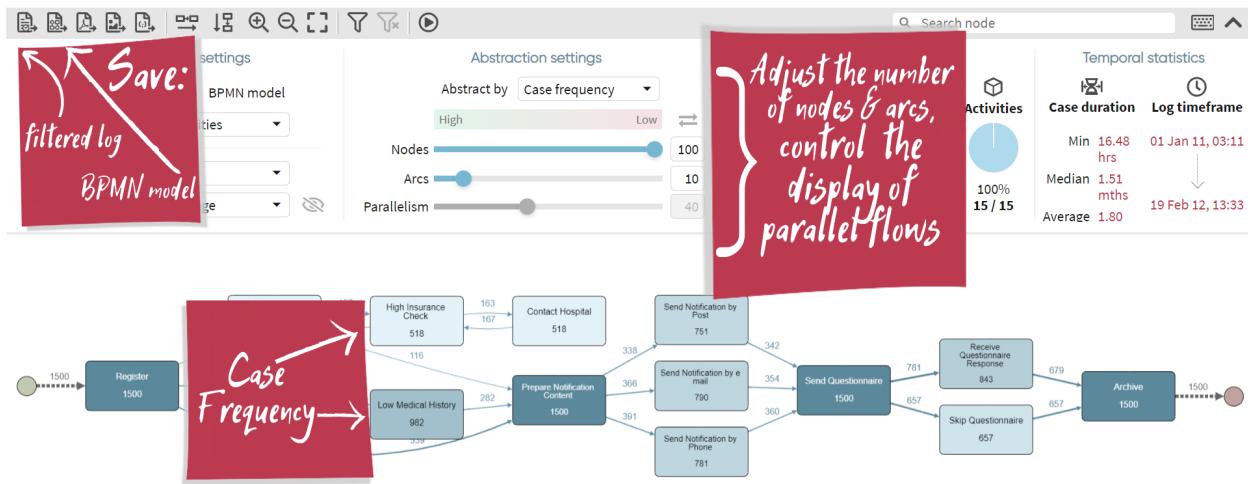


To open the log – double-click on the file, and by default, it opens in the process discover plugin.

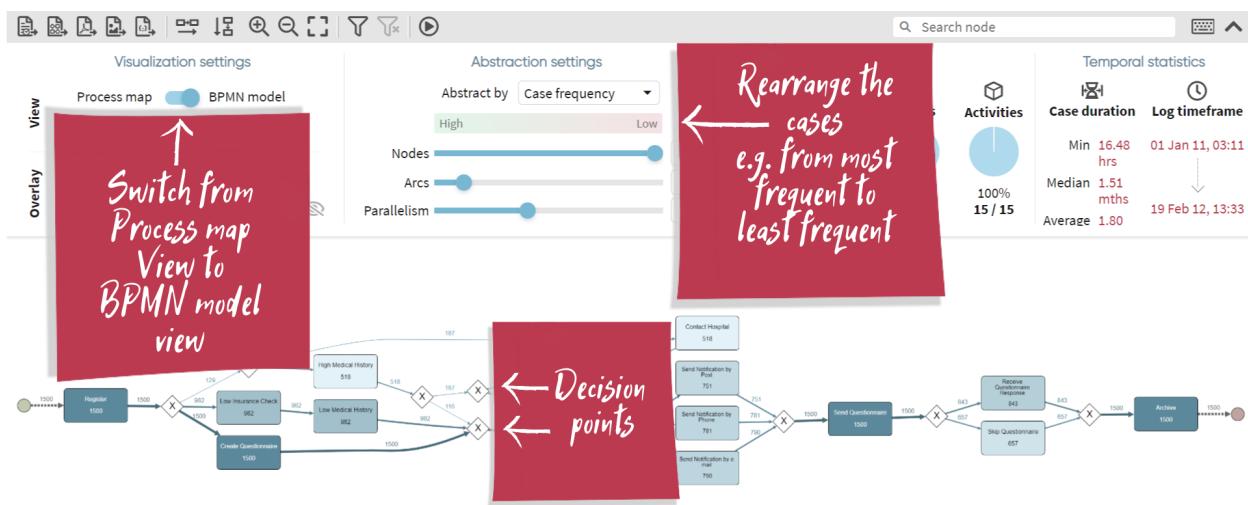
1.2 Process discoverer

When first opened, the Process Discoverer displays a process map of the event log. By default, each node in the process map represents an activity. Each arc represents a directly-follows relation between two activities. We can tune the number of nodes and arcs in the process map using the *Abstraction sliders*. To change the percentage of visible nodes, use the *nodes slider*. When the *nodes slider* is set to 100%, the Process Discoverer displays all the nodes. When the *nodes slider* is 0%, we only see one node. Similarly, when the *Arcs slider* is set to 100%, we can see all the arcs, and if we set it to 0%, we see a minimal number of arcs, in such a way that all the selected nodes are displayed, and every node is on a path from the start node to the end node of the process map. When we move the *Abstraction sliders* from right to left, Apromore gradually removes elements starting from the least frequent one to the most frequent one. By clicking on the *Invert Ordering*, we can ask Apromore to do the opposite. This means that as we move a slider from right to left, Apromore will remove the most frequent elements and keep the less frequent ones. If we select the *Average duration* option in the *Abstract* drop-down menu, Apromore will remove nodes and arcs based on their duration (instead of their case frequency).

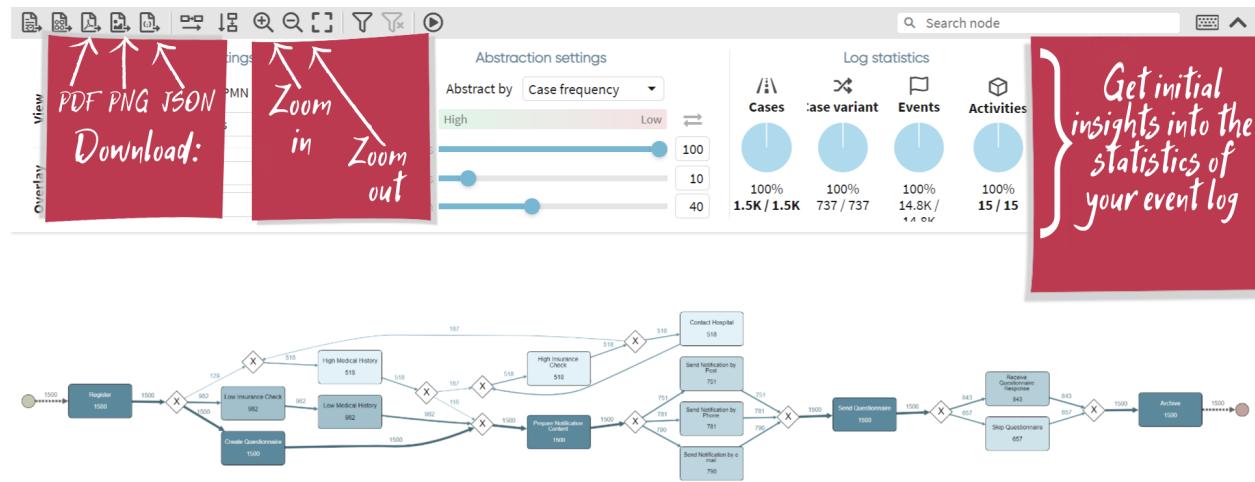
If we wish to observe the branching points, rework loops, and parallel activities in the process, it is better to switch to the *BPMN view*. When we switch to the *BPMN view*, Apromore tries to discover parallel relations between activities. We can ask Apromore to find less parallelism or more parallelism by using the *Parallelism slider*. When the *Parallelism slider* is at 0%, Apromore will not display any parallel gateway. When it is set to 100%, Apromore tries to discover as much parallelism as possible, given the selected level of arcs abstraction. By default, the Process Discoverer displays the case frequency of each activity and each arc. We can change the statistics overlaid on top of each activity or arc by using the drop-down menus in the Overlay section of the Process Discoverer.



We can save the finished file in a BPMN format or as a filtered log after applying different filters. To see both tasks and gateways and explore decision points, switch to BPMN mode.



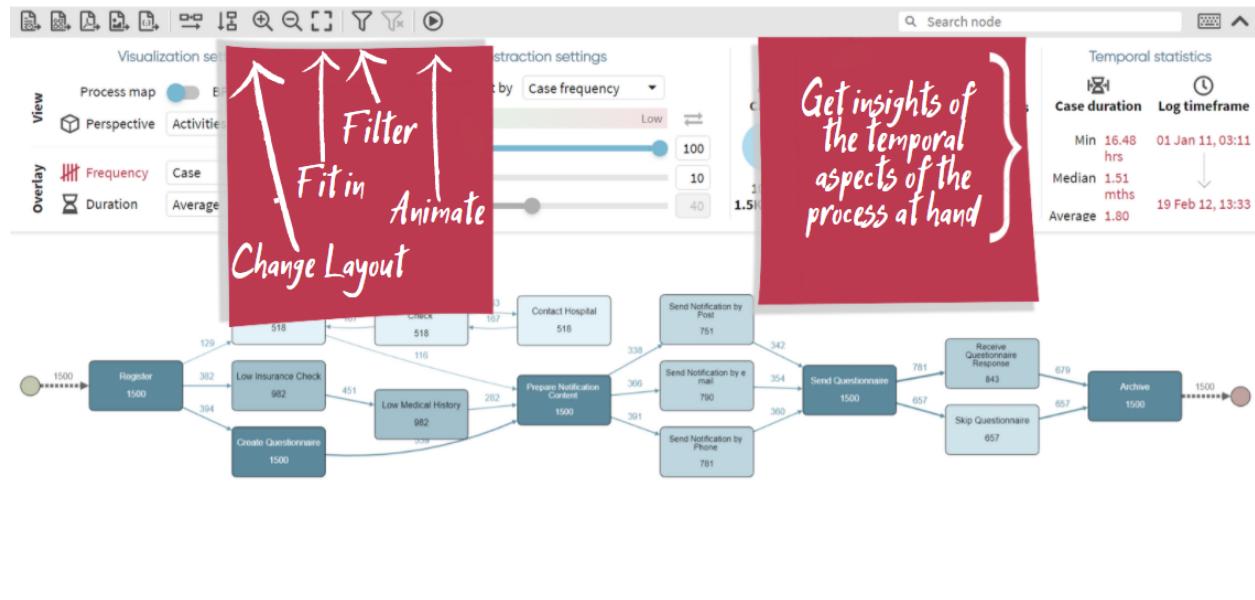
Use the Log statistics panel to check the *Case variants*, the *Events*, and *Activities* one by one.



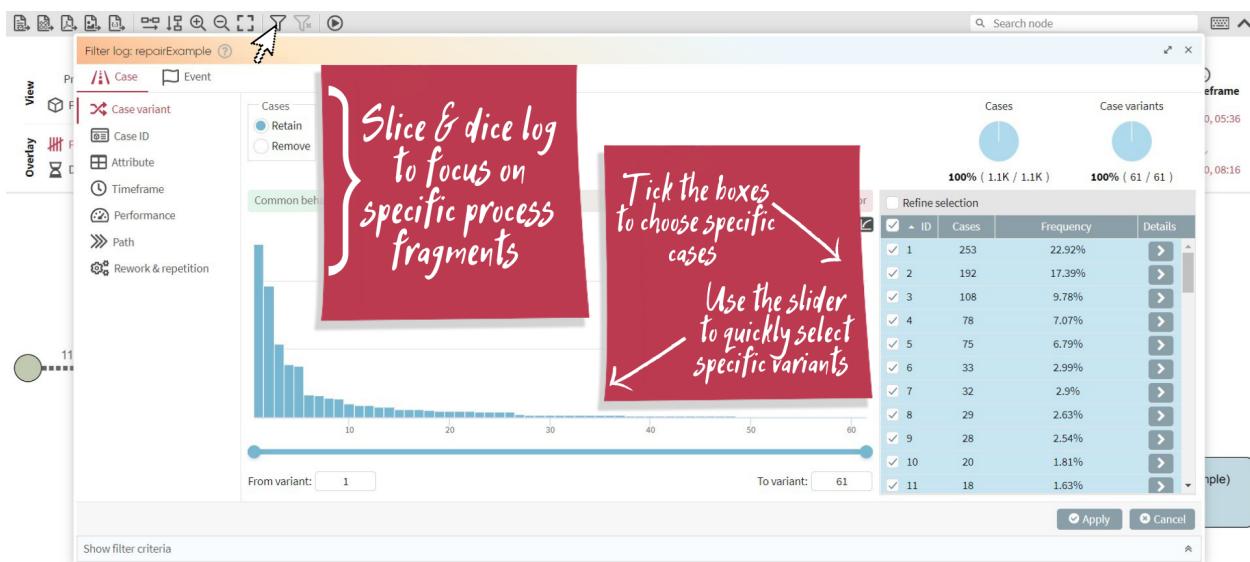
For convenience, there is also a possibility to change the layout or fit the model.

1.3 Filter

An alternative way to select a subset of cases or processes and retain specific cases is to use *Filter*.



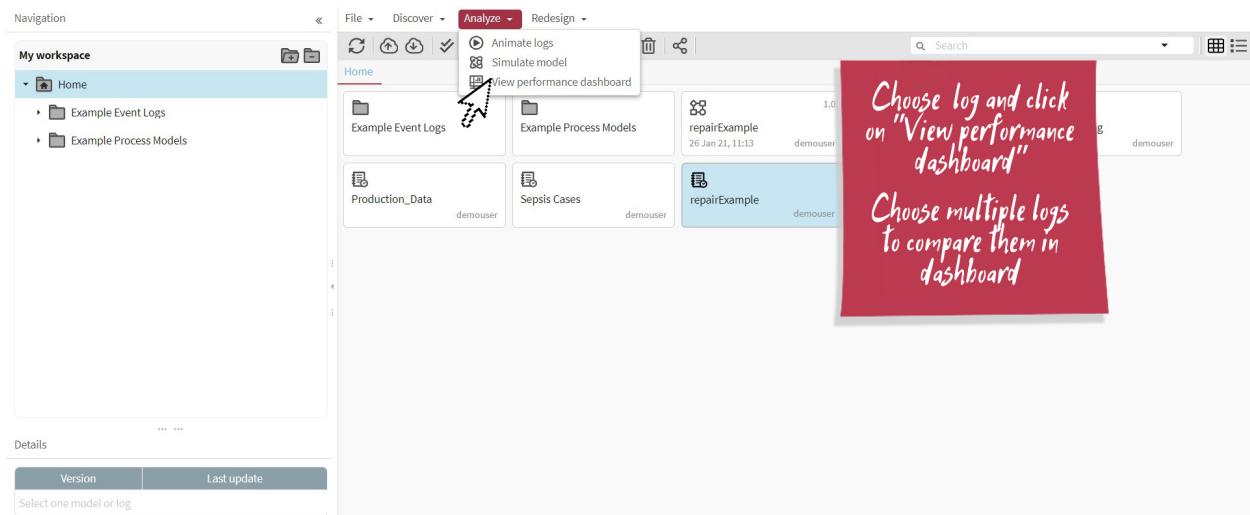
To filter logs, click on the *Filter*.



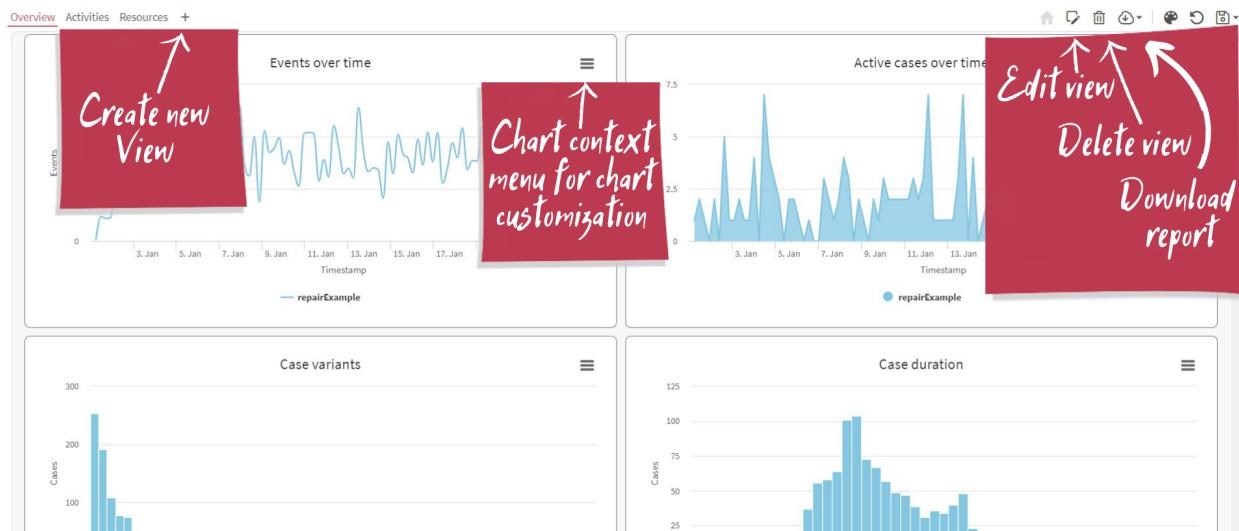
1.4 Dashboards

To open the dashboard, go back to the Portal, select at least one event log and select the *View performance* dashboard option from the *Analyze* menu drop-down.

Note: Select multiple event logs to compare them in the dashboard.



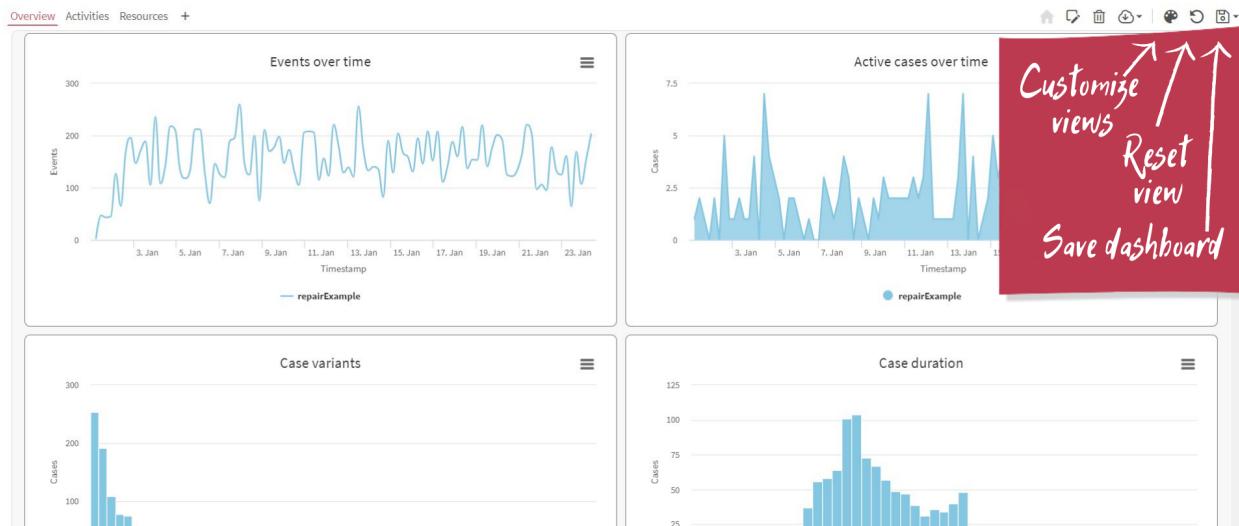
To create a dashboard from an existing dashboard or create a dashboard from scratch, click on the '+' button. To download the current view of the dashboard, click on the *Download report* button.



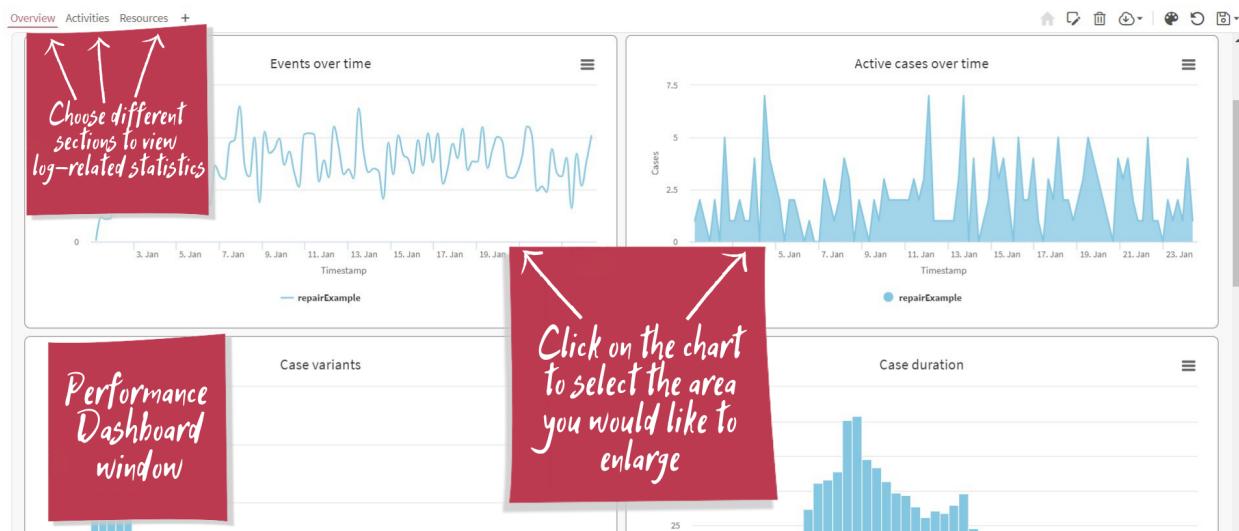
To customize view of the dashboard, click on the *Change style* button and select from different styling options. We can choose to reset view of the dashboard by clicking on the *Reset view* button.

Note: We can choose to reset the current view or all the views.

To auto-save a file, click on the *Save dashboard* button.

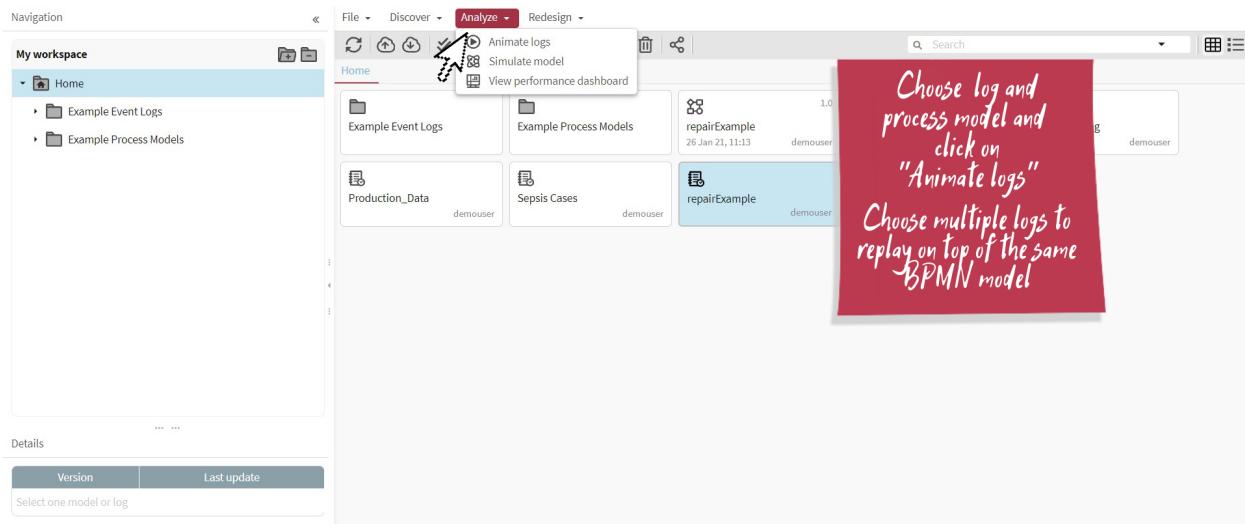


To enlarge the specific area - click on the chart and select the area. As soon as you release the mouse, the tool zooms into the selected part of the chart. To zoom out and see the entire chart again, click on *Reset Zoom*.

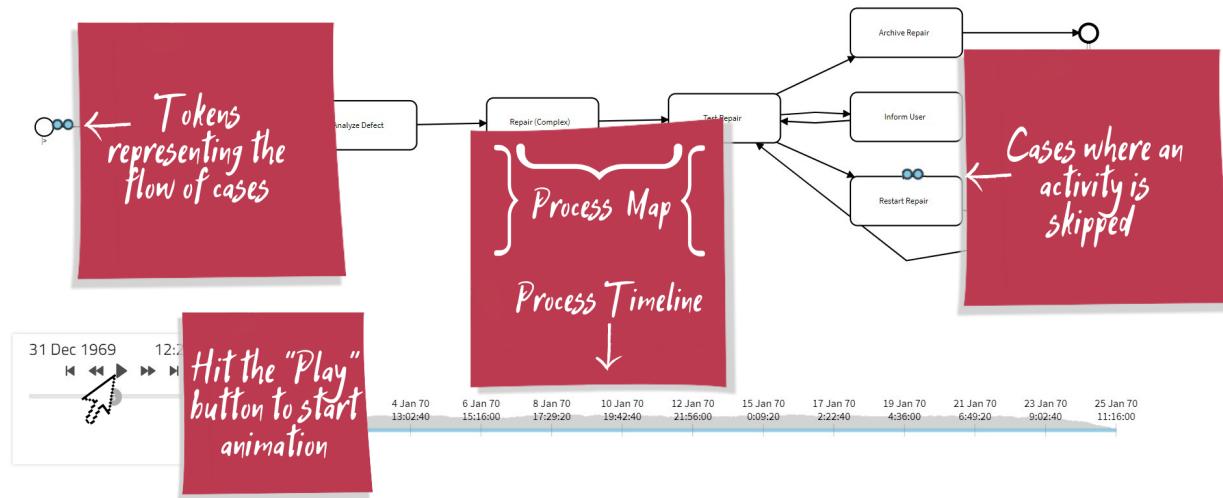


1.5 Process Animation

To trigger log animation from the Portal, select at least one event log and a process model and click on the *Animate logs* from the *Analyze* menu drop-down.



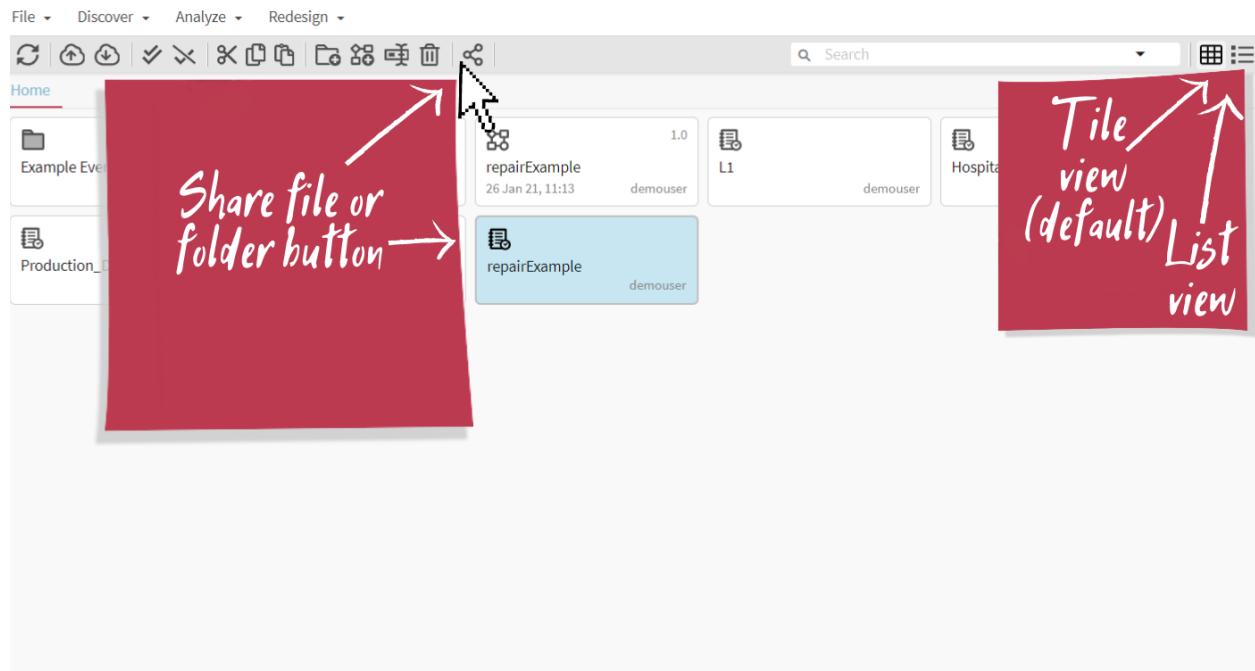
Each case is captured by one token and is displayed on the process map/BPMN model. A bottleneck can be identified depending on how the different tokens traverse process map/BPMN model.



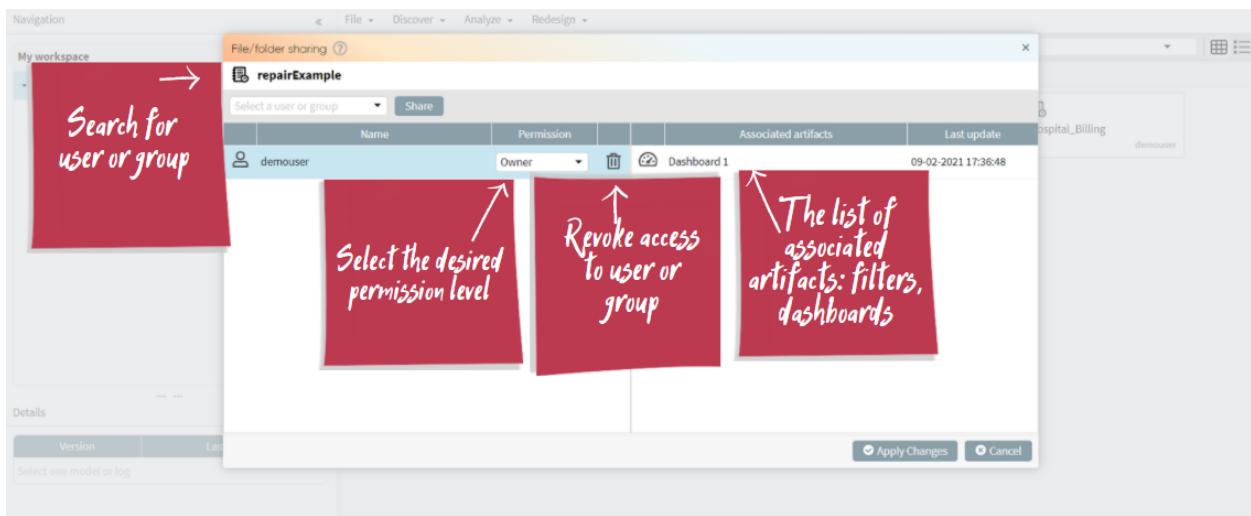
Note: If the token goes around an activity's border, this indicates that the particular activity is skipped in that process case.

1.6 Administration

To manage the item's access right, select a folder, event log, or model in the Portal and click *Share file or folder*.



Select the user and assign the desired permission. Click on *Apply Changes* to save the changes.



CHAPTER
TWO

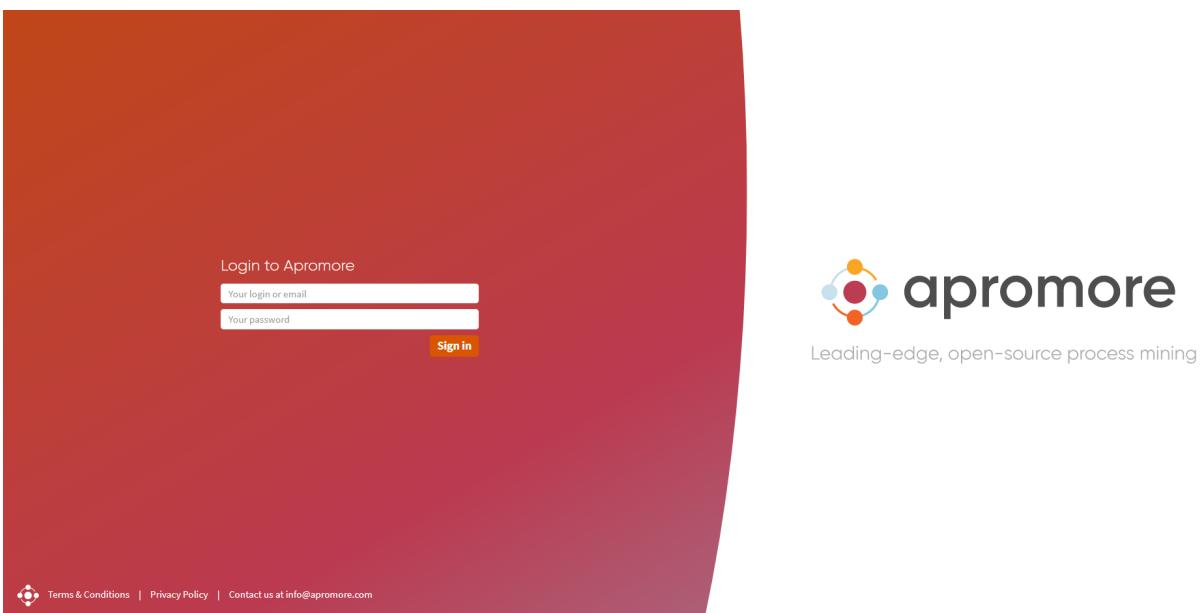
THE APROMORE PORTAL

2.1 Navigating the Apromore Portal

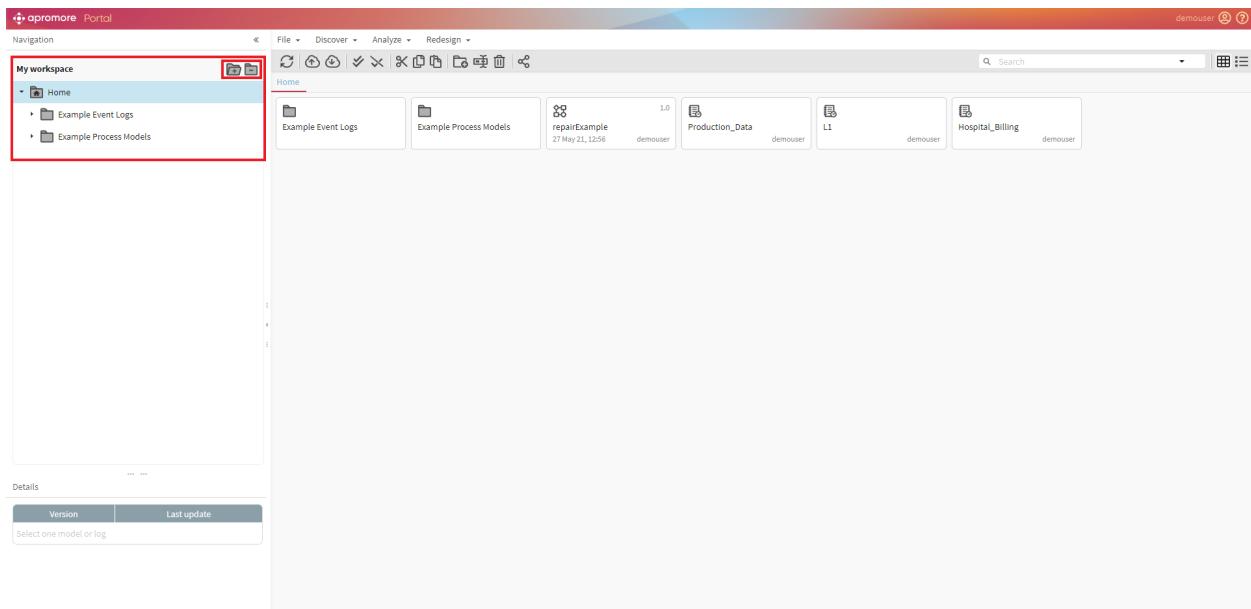
The Apromore Portal is the first and primary interface that users access. One can navigate the workspace folders and perform various actions through the available plugins. This introduction covers the basics of the Apromore Portal.

Please refer to the various entries in the *user guide* for specific plugins information and capability.

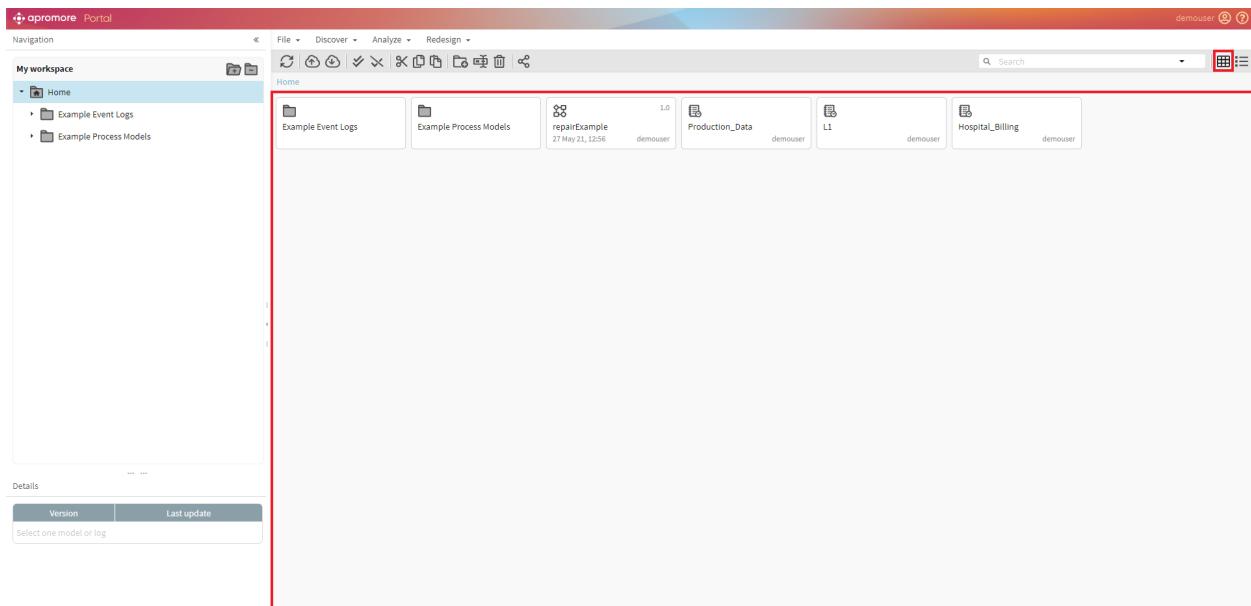
To view the Apromore portal, log in using valid credentials.

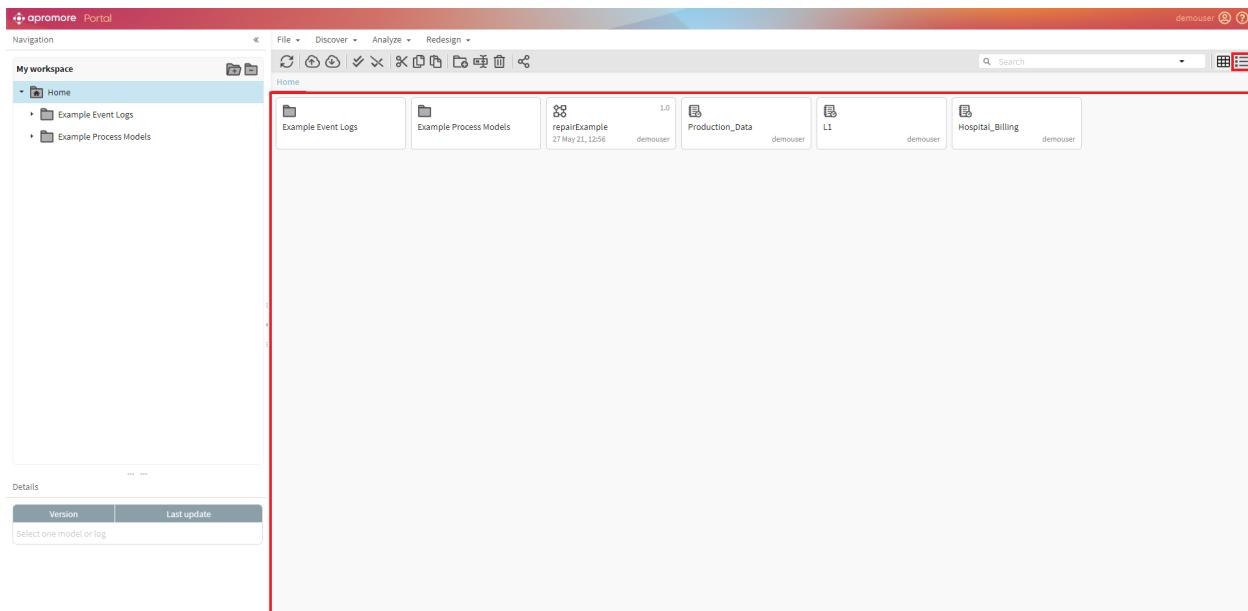


The Apromore Portal appears after successfully logging in. The workspace folder structure/folders tree is on the left-hand side of the portal window in the *My workspace* area. We can expand/collapse individual folders by using the arrow icon next to each folder. We can also expand/collapse all folders at once using the two icons located on the top-right of the folders tree.



The central area of the portal contains the file view. The file view shows folders, process models (represented by a flowchart icon), and event logs (represented by a logbook icon). We can view the files either in grid or list format.





We can see the details such as version, last update time, and owner of a process model in the *Details* view.

This screenshot shows the 'Details' view for the 'repairExample' process model. The table displays the following information:

Name	ID	Last version	Last update	Owner
Example Event Logs	401			
Example Process Models	402			
repairExample	3617	1.0	27 May 21, 12:56	demouser
Production_Data	4967			demouser
L1	4968			demouser
Hospital_Billing	4969			demouser

A red box highlights the selected row for 'repairExample'. At the bottom left, there's a 'Details' section with tabs for 'Version' and 'Last update', showing '1.0' and '27 May 21, 12:56' respectively.

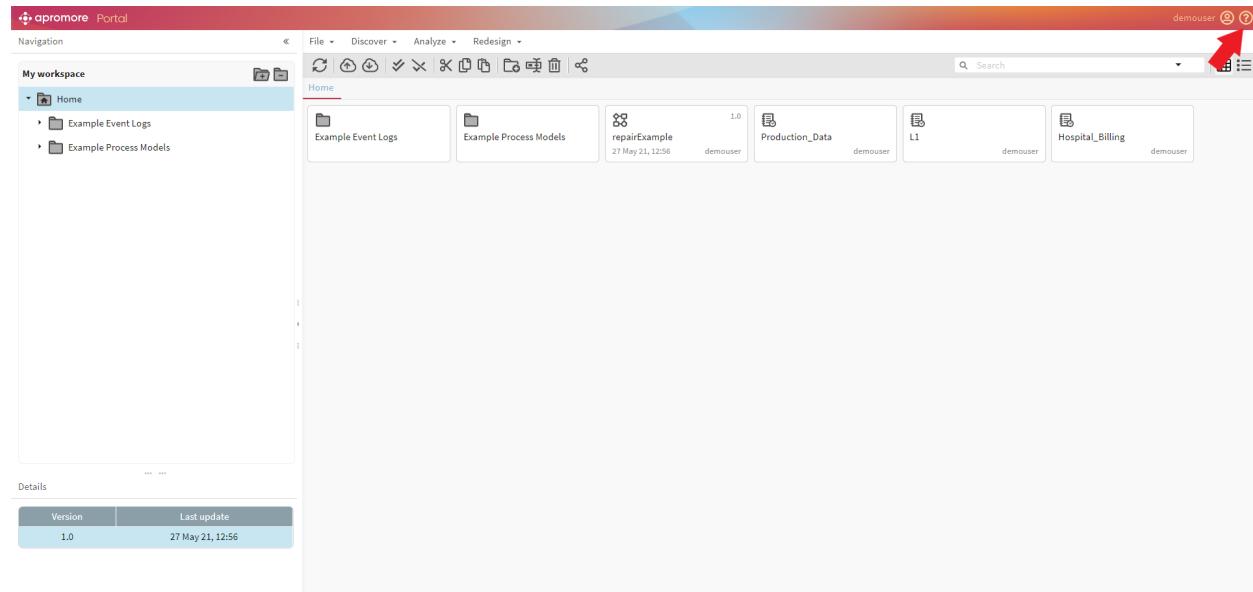
Note: The *Details* view is populated only when a process model is selected

We can double-click on a process model to edit it using the BPMN 2.0 standard in the *Apromore Editor*. Likewise, we can also double-click on an event log to reverse-engineer the process map or BPMN model from the selected log in the *Process Discoverer*.

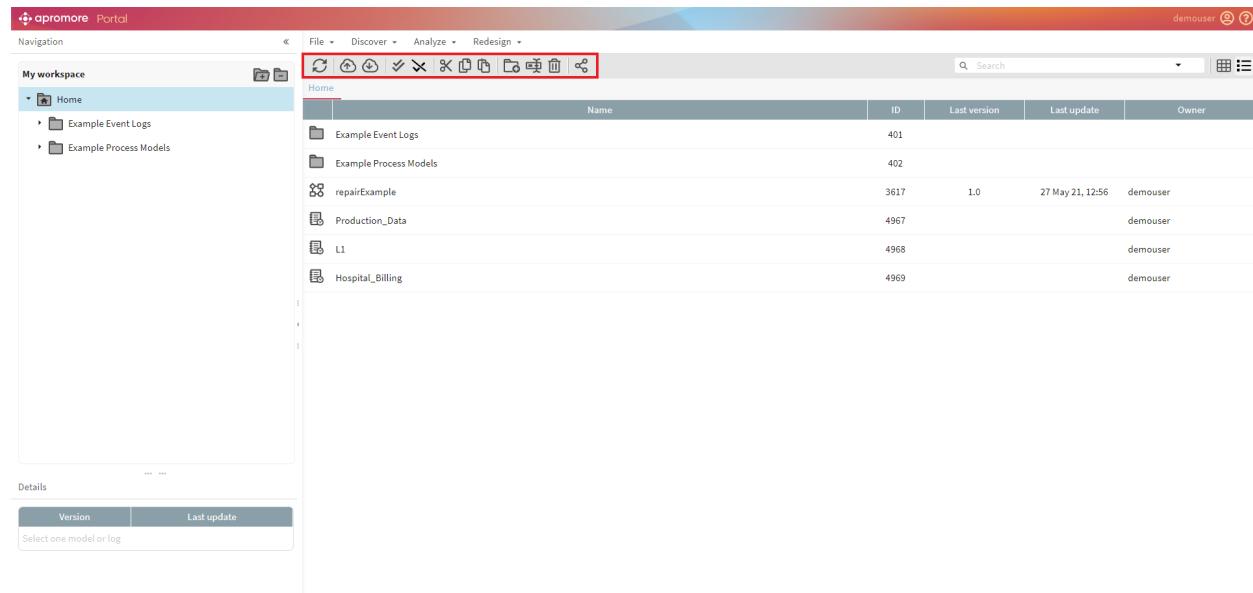
2.1.1 File Menu

The *File* menu is used to manipulate files, such as uploading or downloading models and logs, creating a new folder or process model, renaming a file, and deleting it. The other menus (*Discover*, *Analyze*, *Redesign*) provide access to the various process mining and process model manipulation plugins.

We can access the user guide from the *question mark* button on the top-right corner of the Portal.

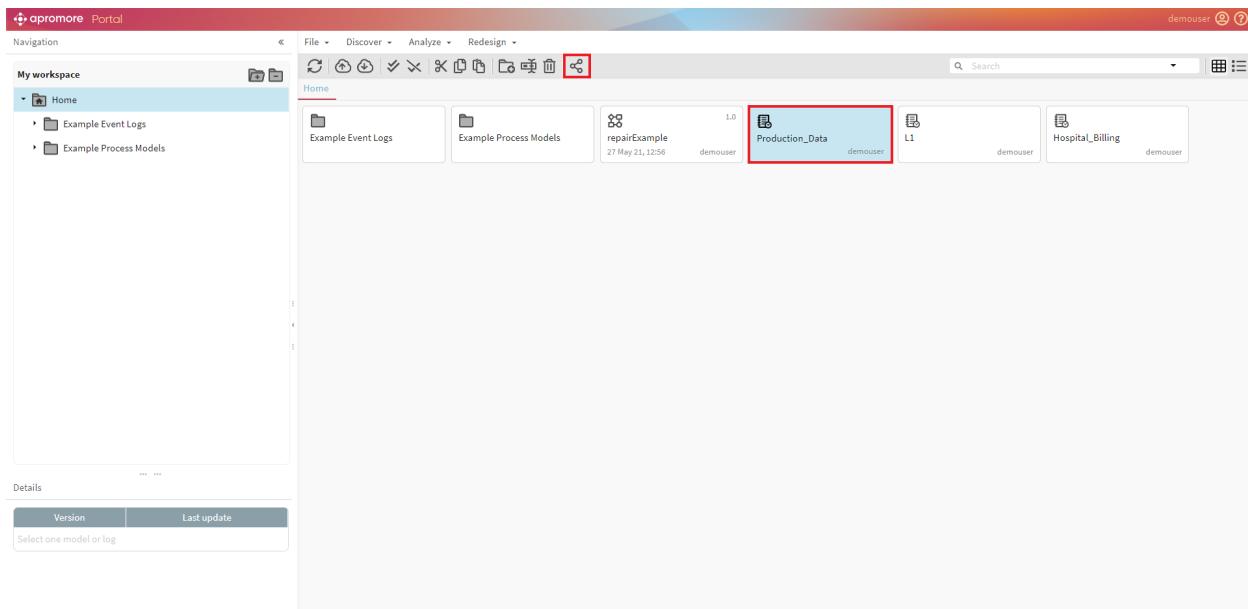


The *File* menu functionality is also easily accessible from the top buttons bar.



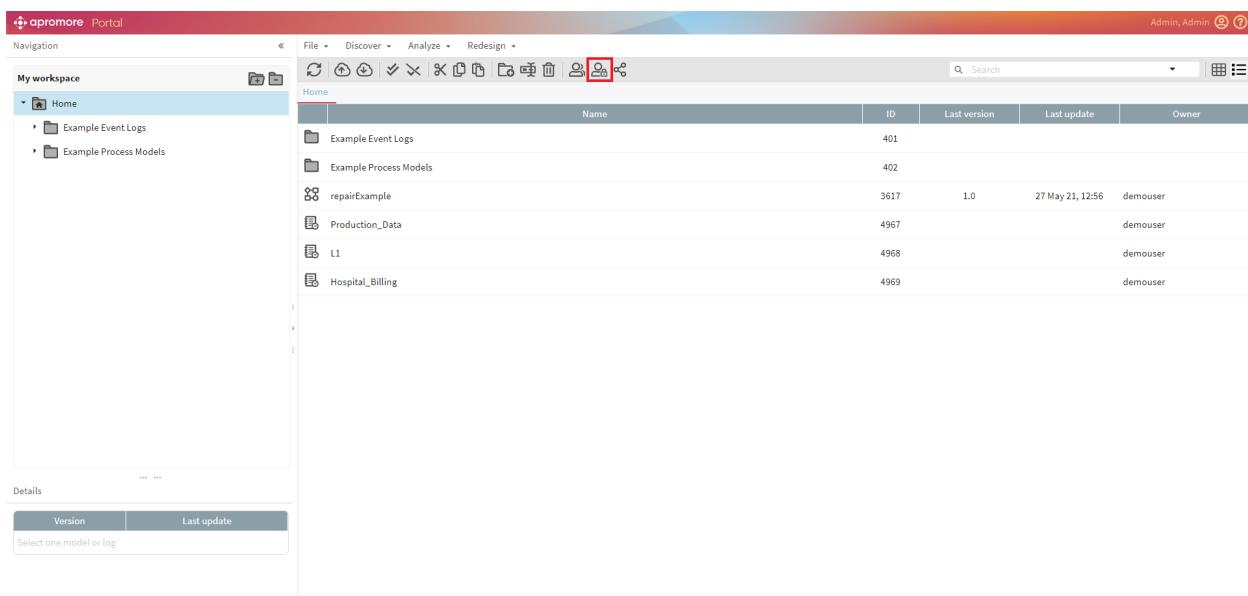
2.1.2 Share file/folder

To share an individual file/folder, select the file and click on the *Share file or folder* button.



2.1.3 Access Rights

To view a comprehensive list of all the files and folders along with the users and access rights, click on the *Manage Access Rights* button.



Note: Only a user with administrator rights can access the *Access Rights Management* functionality

2.1.4 Manage users and groups

To manage different users and groups, click on the *Manage users and groups* button.

The screenshot shows the Apromore Portal interface. At the top, there is a navigation bar with links for File, Discover, Analyze, and Redesign. On the right side of the header, there is a user profile icon and a search bar. Below the header, the main area is titled 'My workspace' and shows a list of items under 'Home'. One item, 'repairExample', is highlighted with a red box. A details panel on the left shows 'Version' and 'Last update' information for selected models. The bottom of the screen has a footer with a copyright notice.

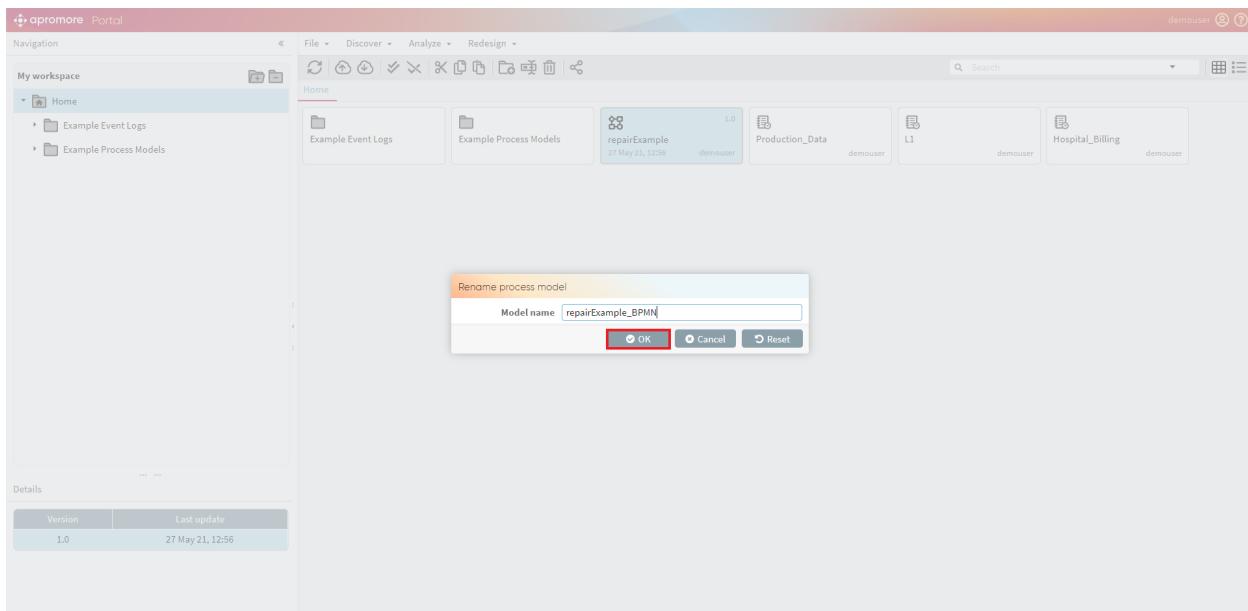
Note: Only a user with administrator rights can access the *Manage users and groups* functionality

2.1.5 Rename File

To rename a file, select a file and click on *File > Rename*.

The screenshot shows the Apromore Portal interface. A context menu is open over a folder named 'repairExample'. The 'Rename' option in the menu is highlighted with a red box. The rest of the interface is similar to the previous screenshot, showing the workspace and a details panel.

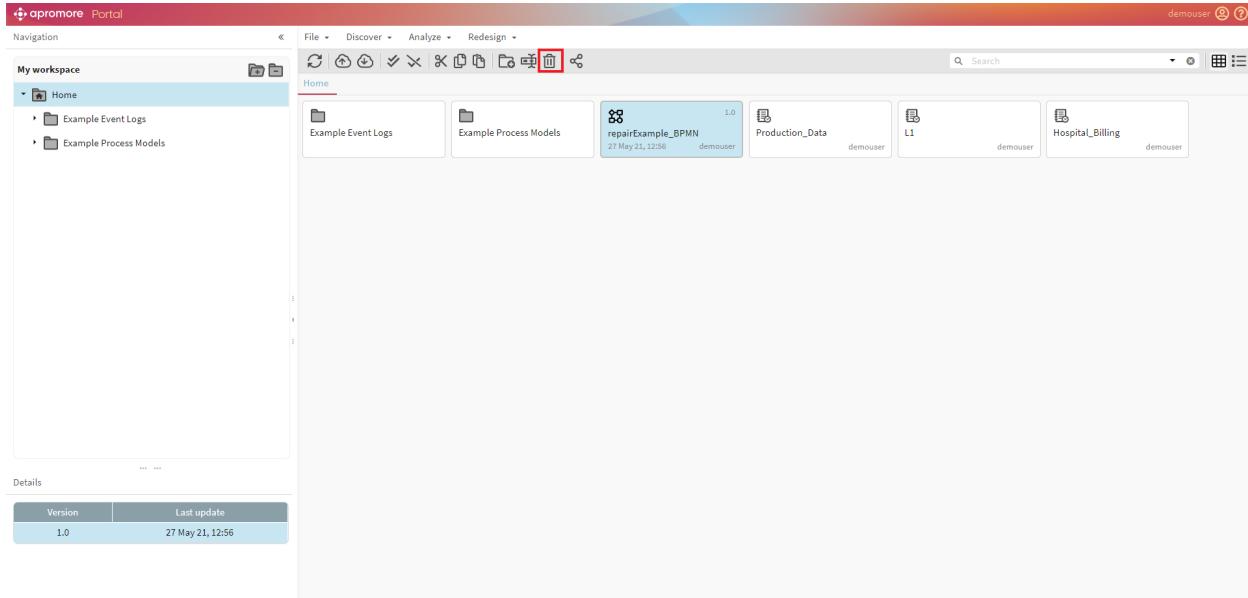
Enter a file name and click *OK*.



Tip: As an alternative, we can click on to rename a file/folder

2.1.6 Delete File/Folder

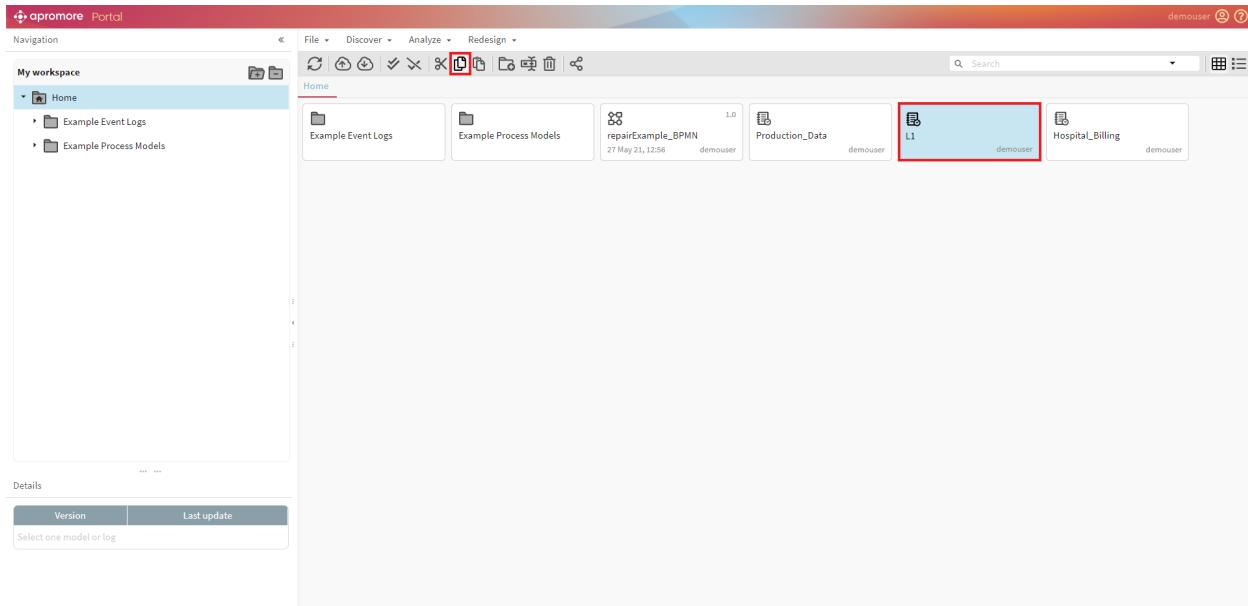
To delete a file/folder, select a file and click on *File > Delete*.



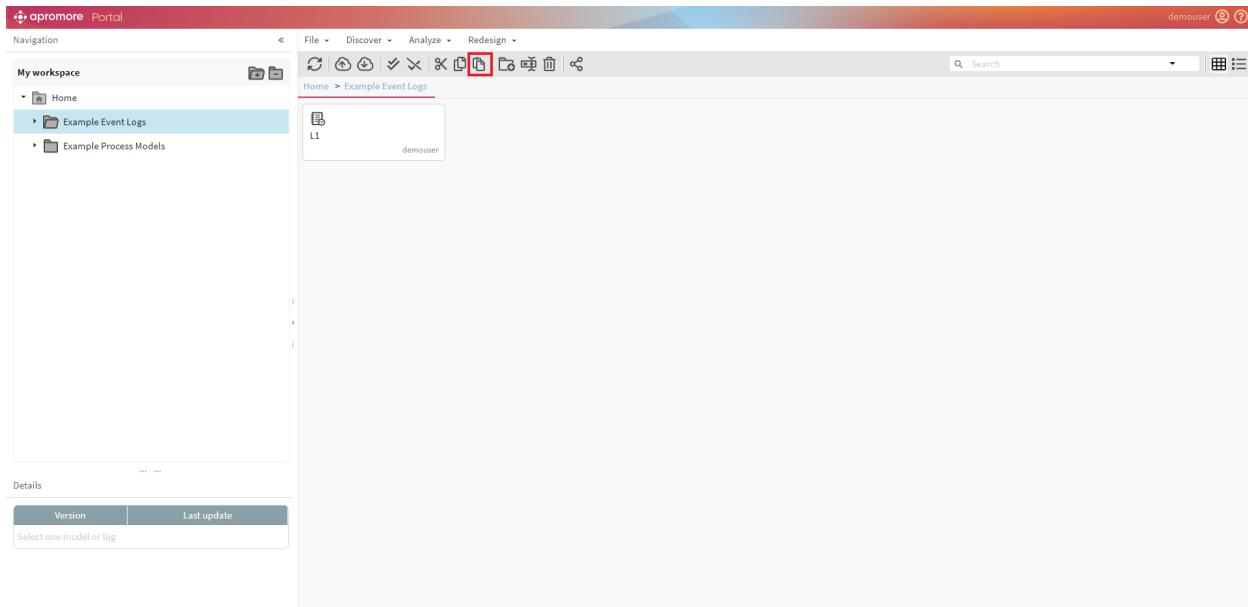
Note: If a process model has multiple versions, the model with the latest version is deleted

2.1.7 Cut/Copy/Paste files

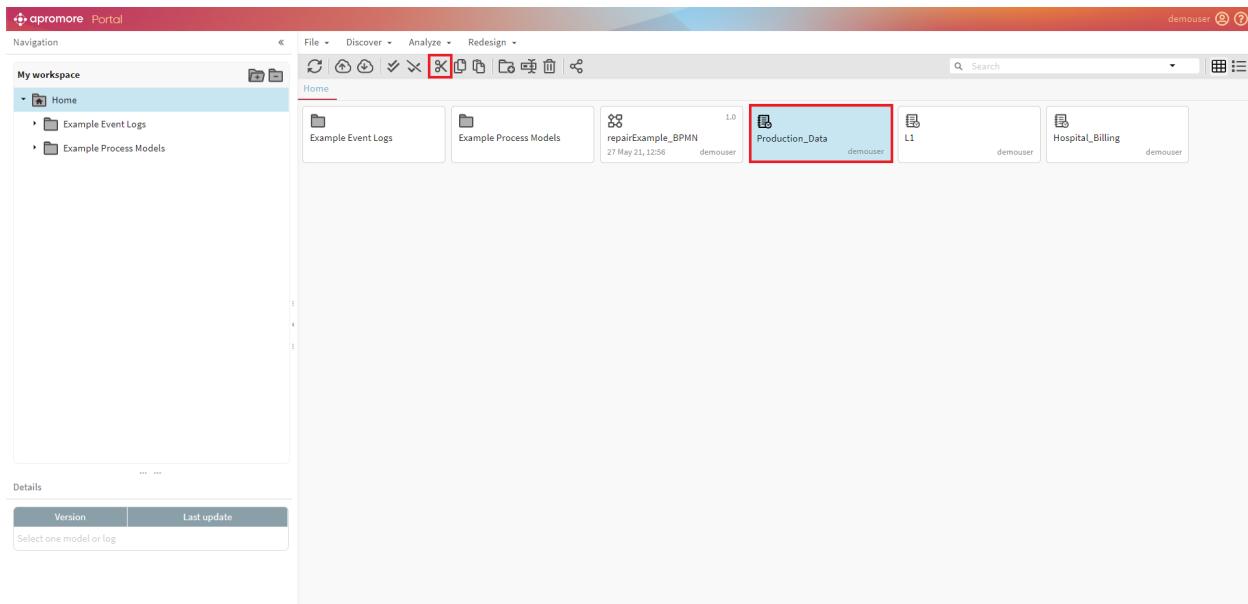
To copy a log/model, select it and click on the *Copy* button.



Paste the log/model in the desired directory by clicking on the *Paste* button.

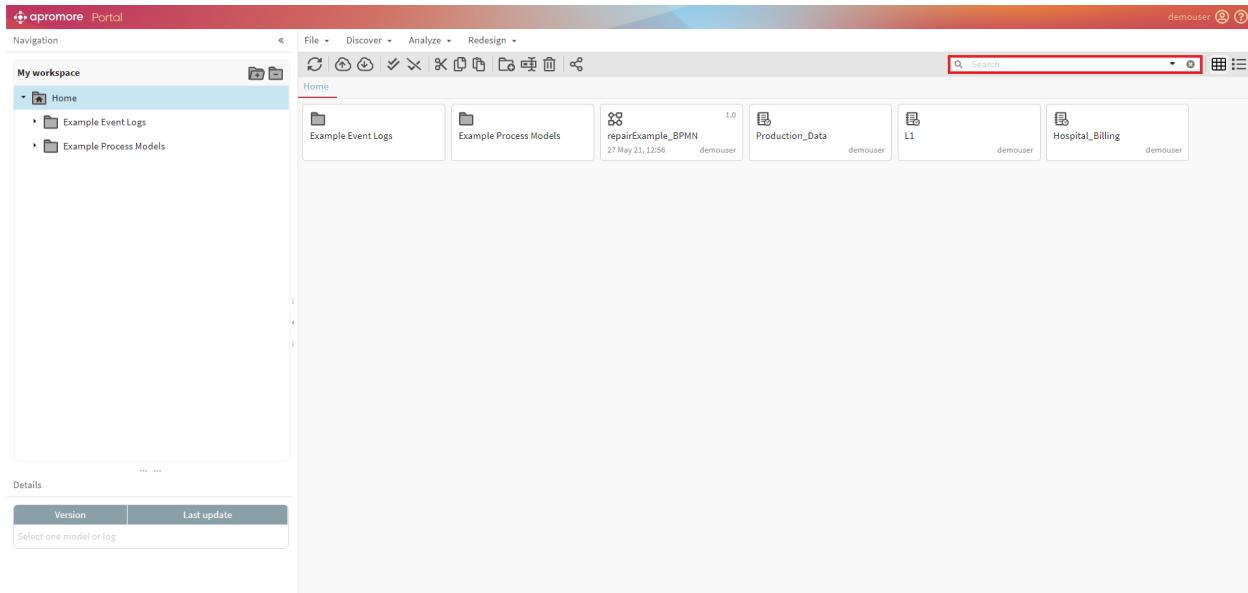


To move a log/model, select it and click on the *Cut* button and then paste the log/model to the desired directory.



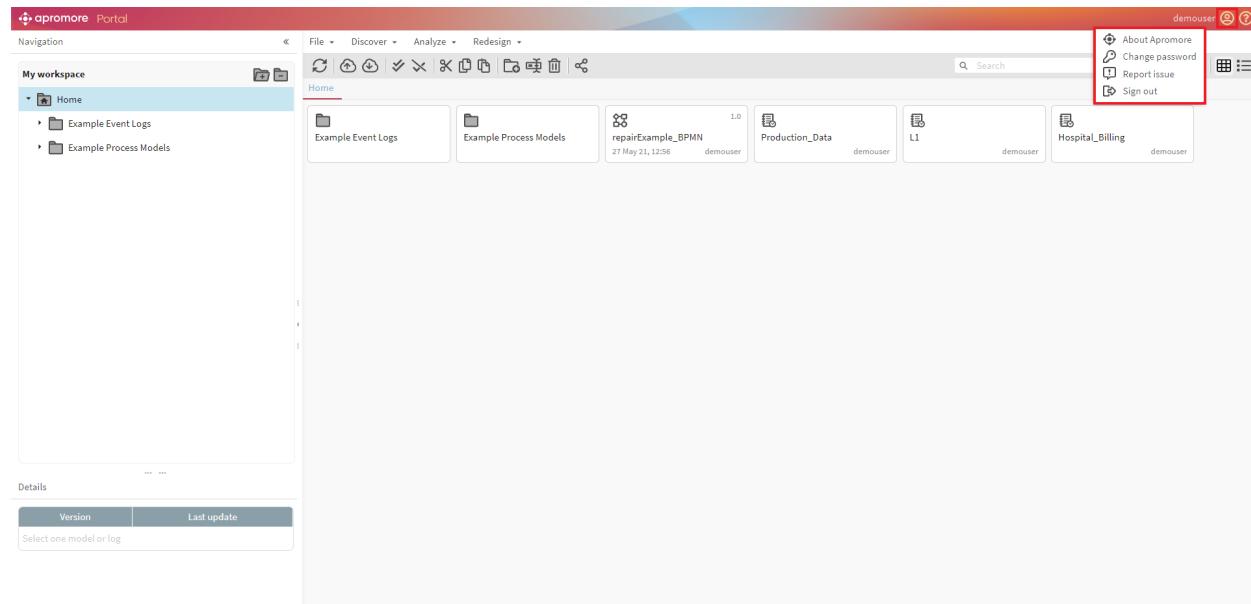
2.1.8 Search File/Folder

We can search for specific folders or files by entering keywords in the textbox. The results appear in the file view.

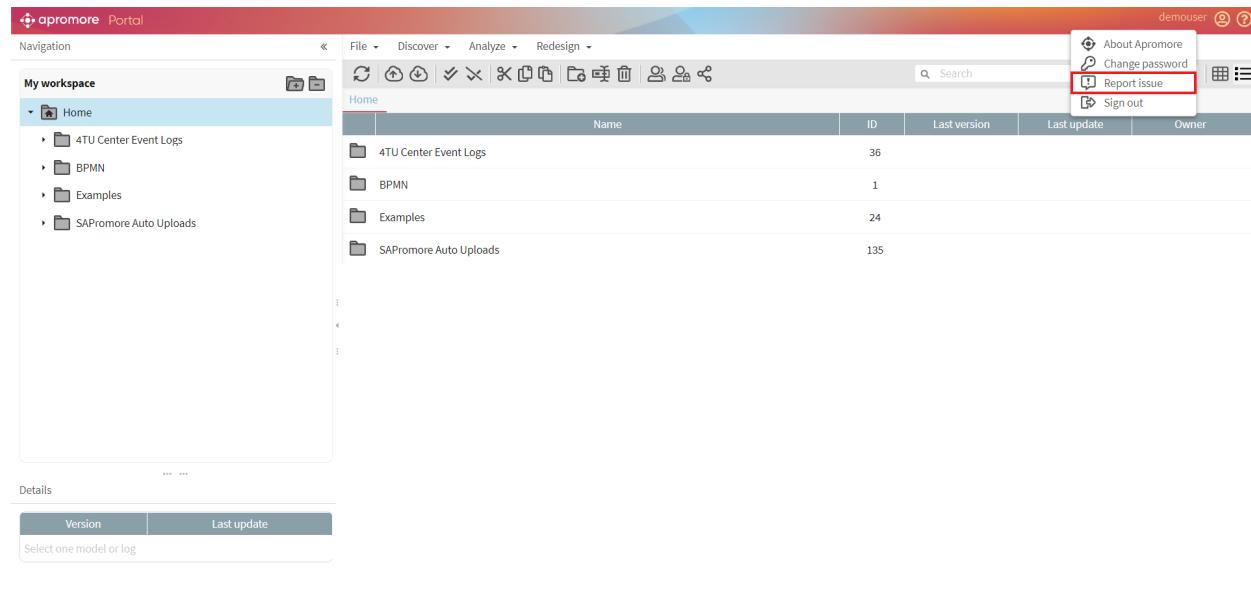


2.1.9 User Menu

To check Apromore's version number and the list of available plugins, change the password and sign-out, click on the *user menu*.



To report a bug or any other problem related to Apromore, select *Report Issue* from the user menu drop-down.



Note: If possible, please mention the steps you performed that led to the issue and also attach the related logs so that the Apromore team can quickly and effectively address the issue.

2.2 Upload a file

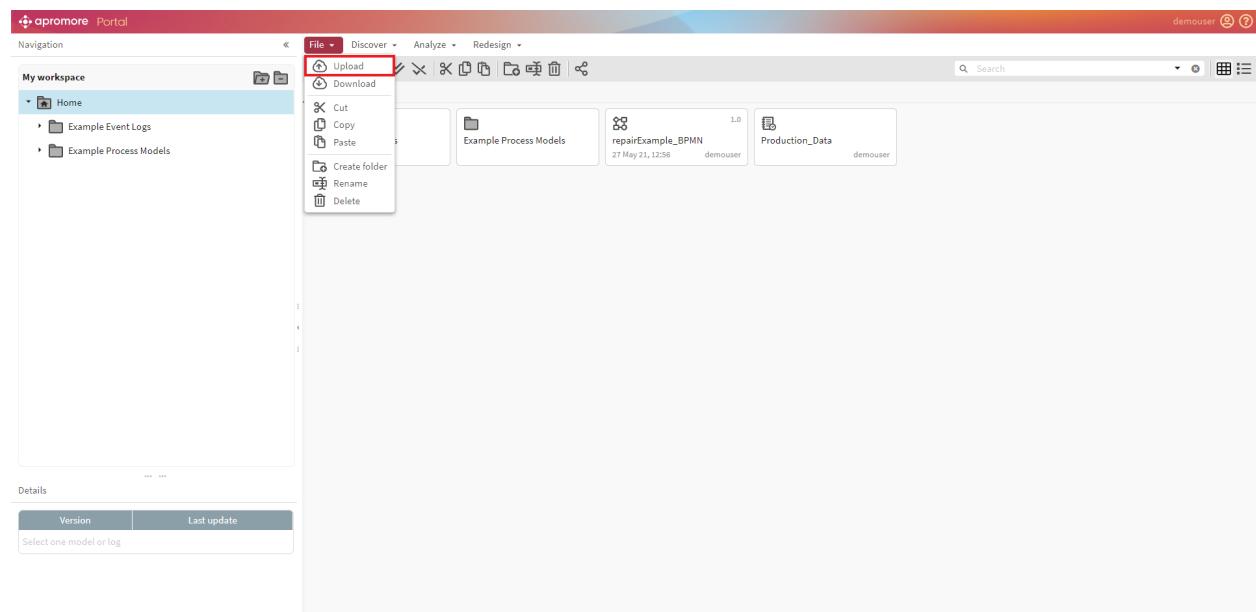
We can upload both process models in BPMN and event logs in CSV, XES, MXML, XLSX, and Parquet formats.

We can do it through two options – *Upload Local File* and *Upload File from a URL*.

Note: The plugin supports the following delimiters: Tab, Semicolon, Comma, and Spaces. However, the plugin supports comma delimiter the most.

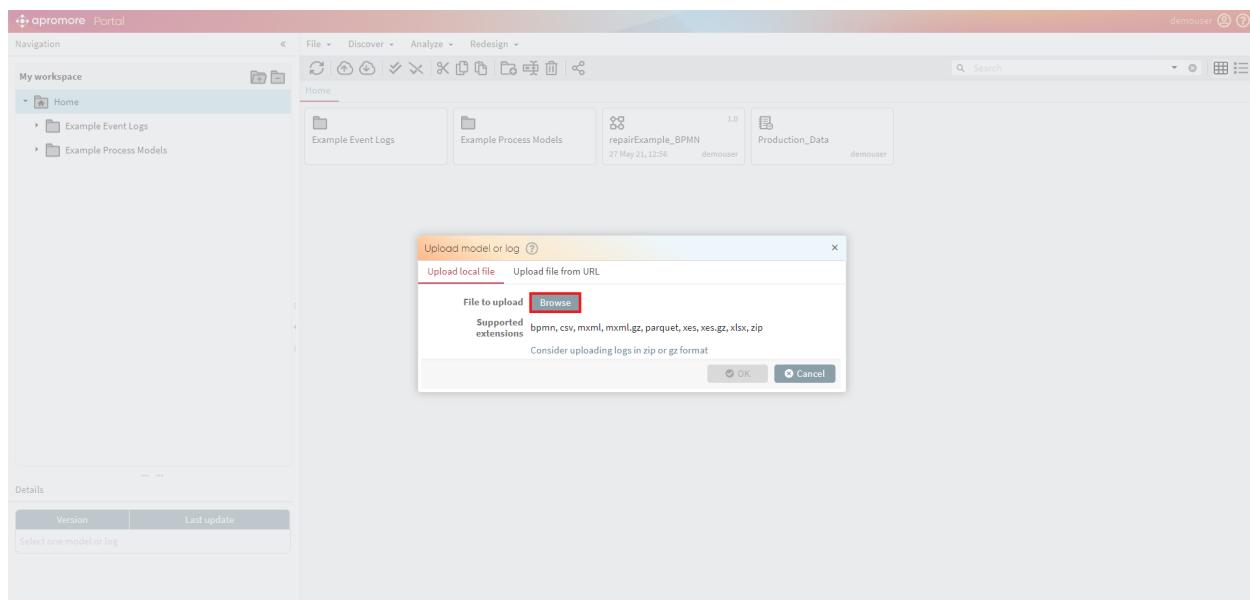
2.2.1 Upload a Process Model

To begin uploading a file, click on *File -> Upload*.

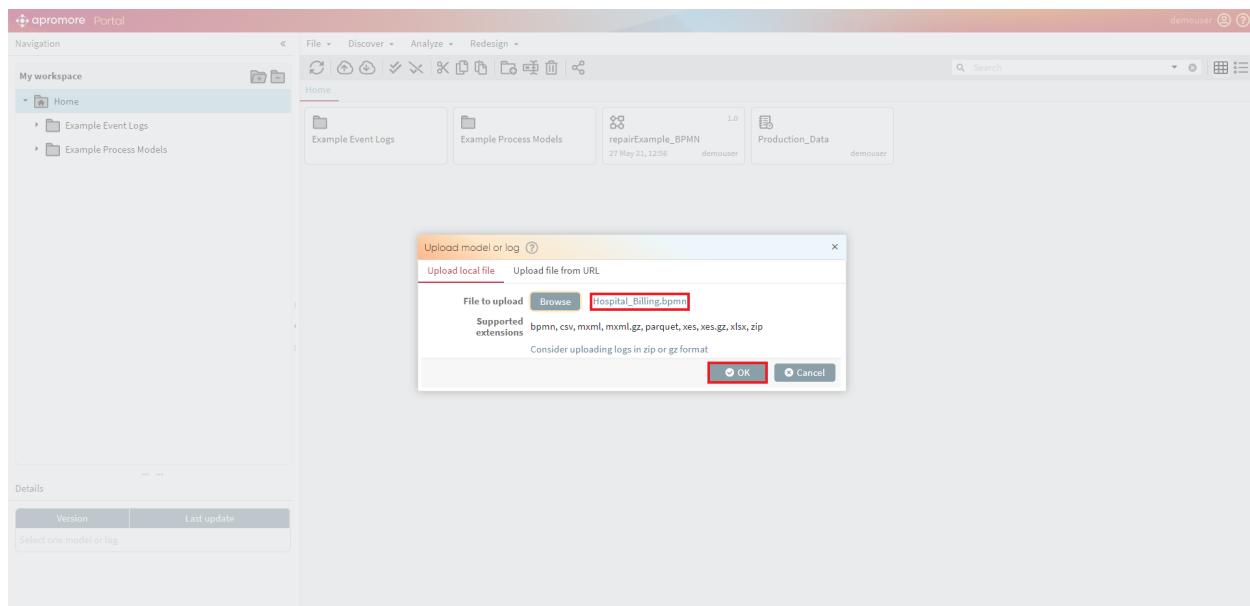


Tip: As an alternative, we can click on  to upload a file/folder.

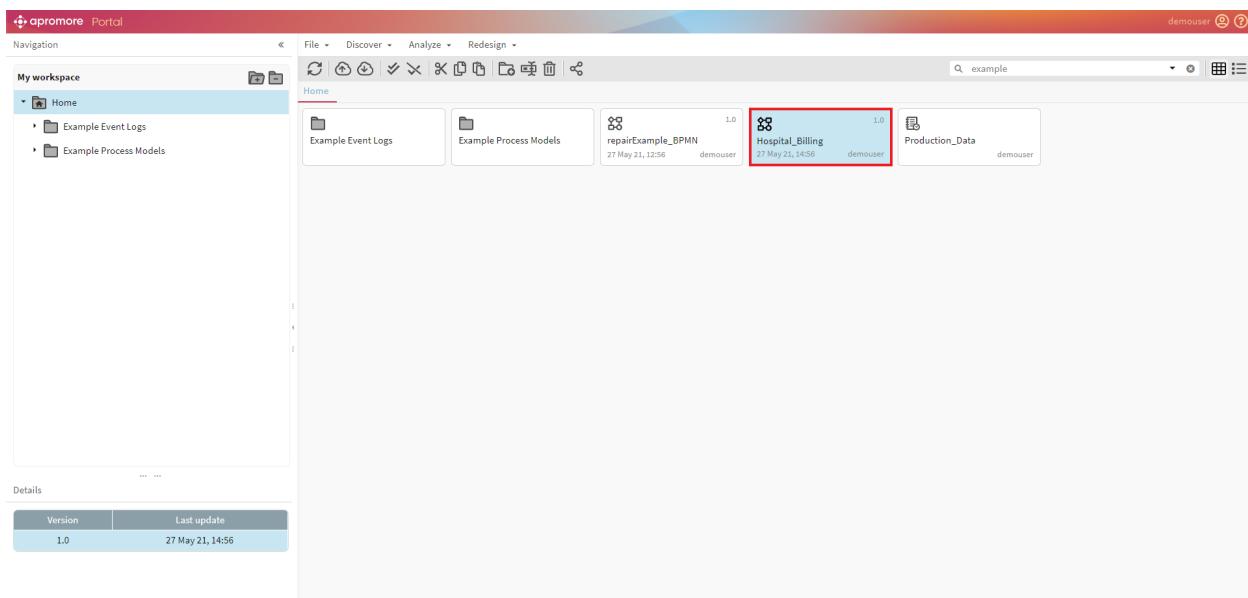
To browse for the .bpmn file, click *Browse* and locate the file.



We can upload both process models in BPMN and event logs in CSV, XES, MXML, XLSX, and Parquet formats. A window will open, displaying a file selection. Here we can select the relevant file, and it will appear beside the “Browse”. Click *OK* to upload the file.



Finally, the successfully uploaded file will be placed into the location/repository in which we have initiated the plugin.



2.2.2 Upload an Event Log

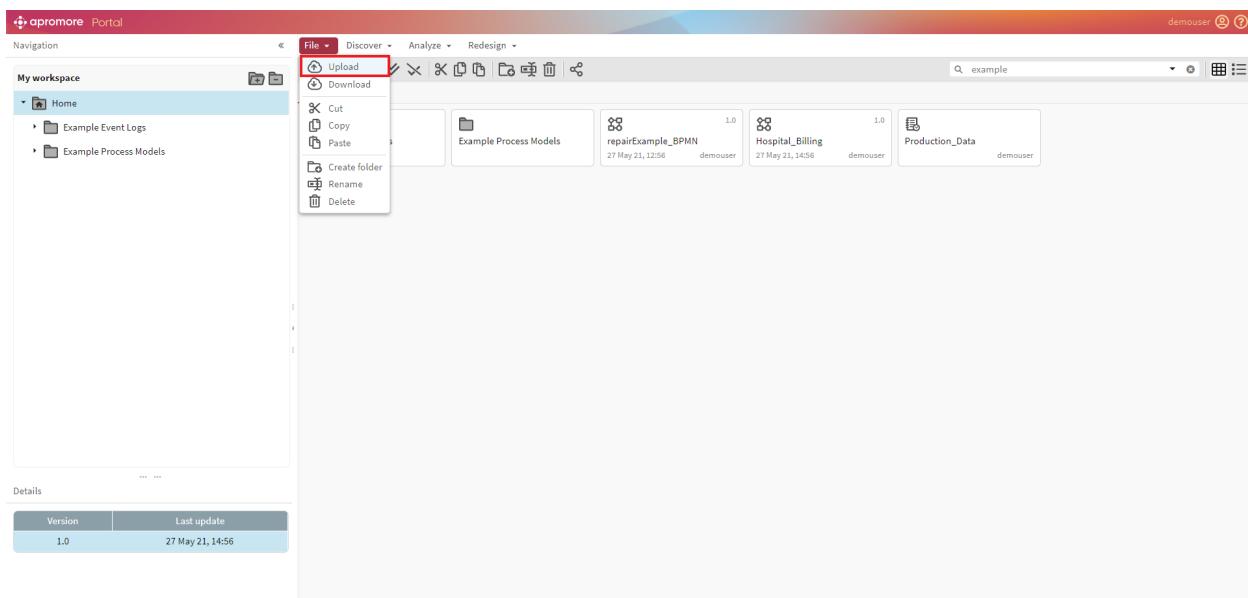
Apromore allows us to import event logs in Comma-Separated Value (CSV) format, standard [XES format](#) and in MXML format. Event logs can be uploaded uncompressed or compressed (zip or gz). The supported file extensions are .csv, .csv.zip, .xlsx, .xes, .xes.zip, .xes.gz, .mxml, .mxml.gz, .parquet.

Files in XES format are imported directly, as they already contain all the metadata required by Apromore.

On the other hand, we need to pre-process CSV files before import into the Apromore workspace.

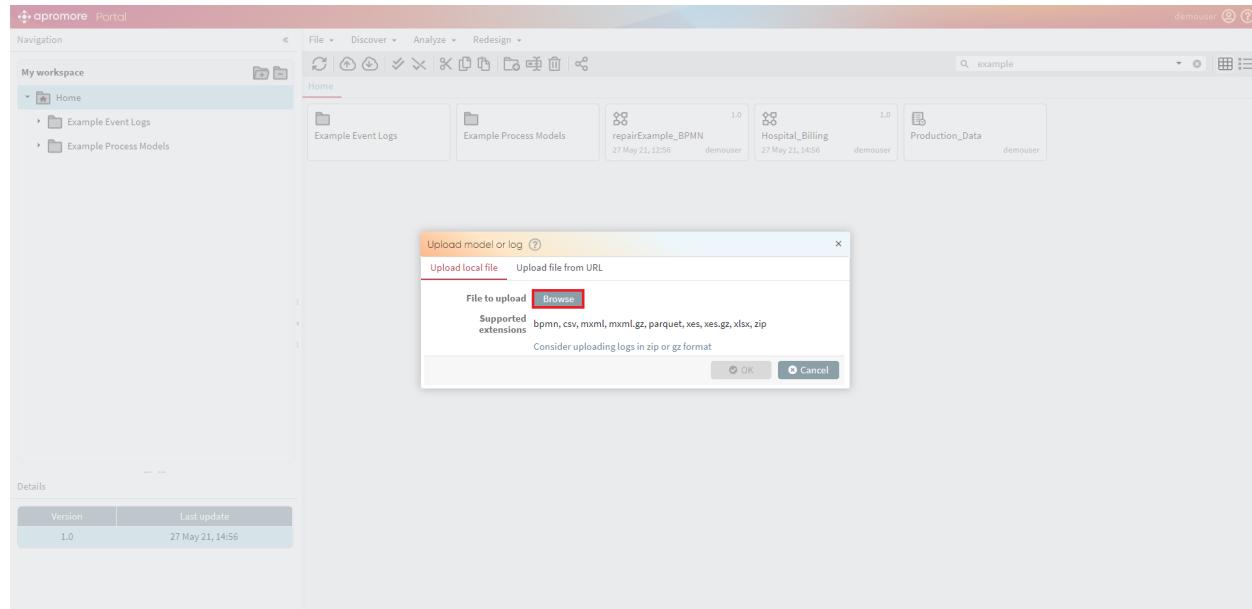
To begin uploading a file, click on *File -> Upload*.

Note: As an alternative, we can click on  icon.

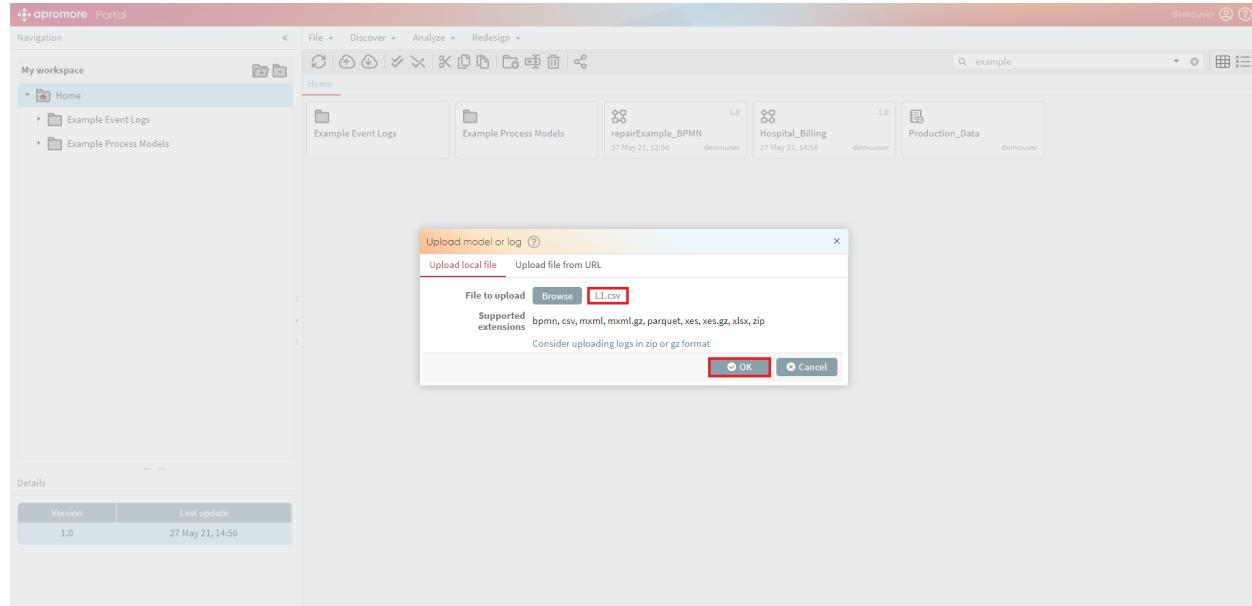


To browse for the CSV file, click *Browse* and locate the file.

Note: The plugin supports the following delimiters: Tab, Semicolon, Comma, and Spaces. However, the plugin supports comma delimiter the most.



After we insert the link, click *OK* to finalize the uploading process.



A window will open up, displaying the data based on the imported. CSV file.

In this pop up window, we can tag each column in the CSV file with one of the following column types: case identifier, activity, start timestamp, end timestamp, other timestamps, resource, case attribute, event attribute, or ignore (in the latter case, some columns are dropped, but we can see them at the columns drop-down menu).

To upload a CSV file, we must indicate which column corresponds to the *case identifier*, which column corresponds to the *activity*, and the *end timestamp*. These three columns are mandatory. We may also tag other columns.

For example, a *case attribute* is a column whose value is the same for every event of a case. For example, an attribute “Customer Gender” is likely to be a case attribute since it does not change during the execution of a case.

An *event attribute* is an attribute that changes during the execution of a case, e.g. the “Offered Loan Amount” is likely to change: at the beginning it has an empty value and then it gets a value in the middle of the execution of a case.

Additionally, the CSV importer supports a wide range of encoding options. We can change the encoding by merely clicking on the *Encoding* drop-down menu.

By default, the time zone is automatically detected. To change it, select the desired time zone from the *TimeZone* drop-down.

#	Case ID	Activity	Resource	Complete Timestamp
1	1	Register	P02	2011/01/01 03:00:00.000
2	1	Low Insurance Check	IB2	2011/01/01 06:00:00.000
3	1	Low Medical History	IB2	2011/01/01 08:00:00.000
4	1	Create Questionnaire	Mgr1	2011/01/01 10:00:00.000
5	1	Skip Questionnaire	PR4	2011/01/01 11:00:00.000
6	1	Prepare Notification Content	Mgr1	2011/01/01 16:00:00.000
7	1	Receive Questionnaire Response	PR4	2011/01/01 17:00:00.000
8	1	Send Notification by e-mail	PR4	2011/01/01 17:20:00.000
9	1	Send Notification by Post	PR3	2011/01/01 17:30:00.000
10	1	Archive	PR2	2011/01/01 17:30:00.000
11	1	Register	PR4	2011/01/01 20:00:00.000
12	100	Low Insurance Check	IB1	2011/01/01 22:00:00.000
13	100	Low Medical History	IB2	2011/01/01 22:00:00.000
14	100	Create Questionnaire	Mgr1	2011/01/01 22:00:00.000
15	100	Skip Questionnaire	PR4	2011/01/01 22:00:00.000
16	100	Prepare Notification Content	Mgr1	2011/01/01 22:00:00.000
17	100	Receive Questionnaire Response	PR4	2011/01/01 22:00:00.000
18	100	Send Notification by Post	PR3	2011/01/01 22:00:00.000
19	100	Archive	PR2	2011/01/01 22:00:00.000
20	100	Register	PR4	2011/01/01 23:00:00.000
21	100	Low Insurance Check	IB1	2011/01/01 23:00:00.000
22	100	High Medical History	IA2	2011/01/01 14:00:00.000
23	100	High Insurance Check	IA2	2011/01/01 14:00:00.000
24	100	Contact Hospital	IA2	2011/01/01 14:00:00.000
25	100	Prepare Notification Content	Mgr1	2011/01/01 14:00:00.000
26	100	Receive Questionnaire Response	PR4	2011/01/01 14:00:00.000
27	100	Send Notification by Phone	PR4	2011/01/01 14:00:00.000
28	100	Send Notification by e-mail	PR4	2011/01/01 14:00:00.000
29	100	Send Notification by Post	PR3	2011/01/01 14:00:00.000
30	100	Archive	PR2	2011/01/01 14:00:00.000
31	100	Register	PR4	2011/01/01 14:00:00.000
32	100	Low Insurance Check	IB1	2011/01/01 03:00:00.000
33	100	Low Medical History	IB2	2011/01/01 03:00:00.000
34	100	Create Questionnaire	Mgr1	2011/01/01 03:00:00.000
35	100	Skip Questionnaire	PR4	2011/01/01 03:00:00.000
36	100	Prepare Notification Content	Mgr1	2011/01/01 03:00:00.000
37	100	Receive Questionnaire Response	PR4	2011/01/01 03:00:00.000
38	100	Send Notification by Phone	PR4	2011/01/01 03:00:00.000
39	100	Send Notification by e-mail	PR4	2011/01/01 03:00:00.000
40	100	Send Notification by Post	PR3	2011/01/01 03:00:00.000
41	100	Archive	PR2	2011/01/01 03:00:00.000
42	1001	Low Insurance Check	IB1	2011/01/01 16:00:00.000
43	1001	Low Medical History	IB2	2011/01/01 16:00:00.000
44	1001	Create Questionnaire	Mgr1	2011/01/01 16:00:00.000
45	1001	Skip Questionnaire	PR4	2011/01/01 16:00:00.000
46	1001	Prepare Notification Content	Mgr1	2011/01/01 16:00:00.000
47	1001	Receive Questionnaire Response	PR4	2011/01/01 16:00:00.000

The CSV importer can sometimes automatically tag the columns corresponding to the case identifier and activity. It is important, however, to check that the columns have been tagged correctly. We can manually alter the column attribute by clicking the drop-down menu as shown below and choosing the desired attribute.

#	Case ID	Activity	Resource	Start timestamp
1	1	Low Insurance Check	Case ID	2011/01/01 06:56:00.000
2	1	Low Medical History	Activity	2011/01/01 08:32:00.000
3	1	Create Questionnaire	End timestamp	2011/01/01 13:29:00.000
4	1	Send Questionnaire	Start timestamp	2011/01/01 15:50:00.000
5	1	Prepare Notification Content	Other timestamp	2011/01/01 16:55:00.000
6	1	Receive Questionnaire Response	Event timestamp	2011/01/01 17:01:00.000
7	1	Send Notification by Phone	Case Attribute	2011/01/01 17:22:00.000
8	1	Send Notification by e-mail	Event Attribute	2011/01/01 17:27:00.000
9	1	Send Notification by Post	Ignore Attribute	PR3
10	1	Archive	PR3	2011/01/01 17:34:00.000
11	10	Register	PR4	2011/01/01 20:17:00.000
12	10	Low Insurance Check	IB1	2011/01/01 22:10:00.000
13	10	Low Medical History	IB2	2011/01/01 22:33:00.000
14	10	Create Questionnaire	Mgr1	2011/01/02 02:09:00.000
15	10	Skip Questionnaire	PR4	2011/01/02 13:09:00.000
16	10	Prepare Notification Content	Mgr1	2011/01/02 23:46:00.000
17	10	Receive Questionnaire Response	PR4	2011/01/05 14:09:00.000
18	10	Send Notification by Phone	PR4	2011/01/06 00:25:00.000
19	10	Send Notification by e-mail	PR4	2011/01/06 00:25:00.000
20	100	Archive	PR4	2011/01/09 23:33:00.000
21	100	Register	PR2	2011/01/09 23:33:00.000
22	100	High Medical History	IA2	2011/01/09 14:39:00.000
23	100	High Insurance Check	IA2	2011/01/09 14:47:00.000
24	100	Contact Hospital	IA2	2011/01/09 14:56:00.000
25	100	Prepare Notification Content	Mgr1	2011/01/10 00:27:00.000
26	100	Receive Questionnaire Response	PR3	2011/01/10 05:22:00.000
27	100	Send Notification by Phone	PR3	2011/01/11 11:48:00.000
28	100	Skip Questionnaire	PR4	2011/01/12 06:17:00.000
29	100	Prepare Notification Content	Mgr1	2011/01/12 14:56:00.000

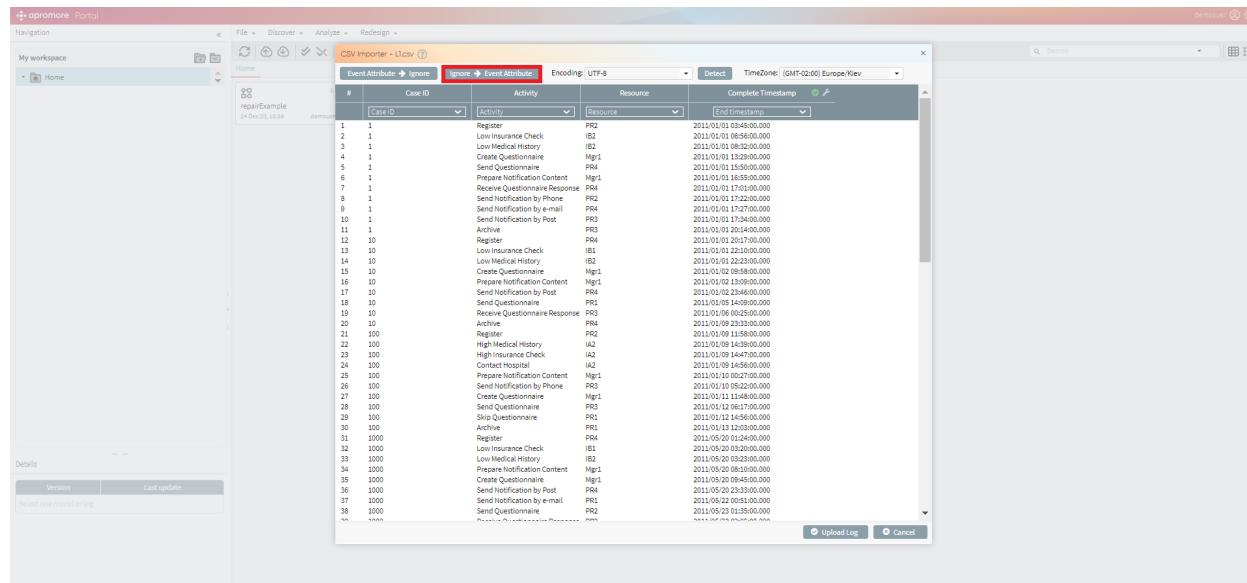
The timestamp is automatically detected. To change it, click on the *Specify timestamp format* button.

The screenshot shows the Aproximere Portal interface with the 'Log Importer' dialog open. The dialog title is 'Log Importer - L1.csv'. It contains a table with columns: #, Case ID, Activity, Resource, and End timestamp. The 'Event Attribute -> Ignore' button is located at the top left of the dialog. A tooltip above the button reads 'Timestamp format automatically detected. Overriden? yyyy/MM/dd HHmmss.SSS'. At the bottom right of the dialog are 'Upload Log' and 'Cancel' buttons.

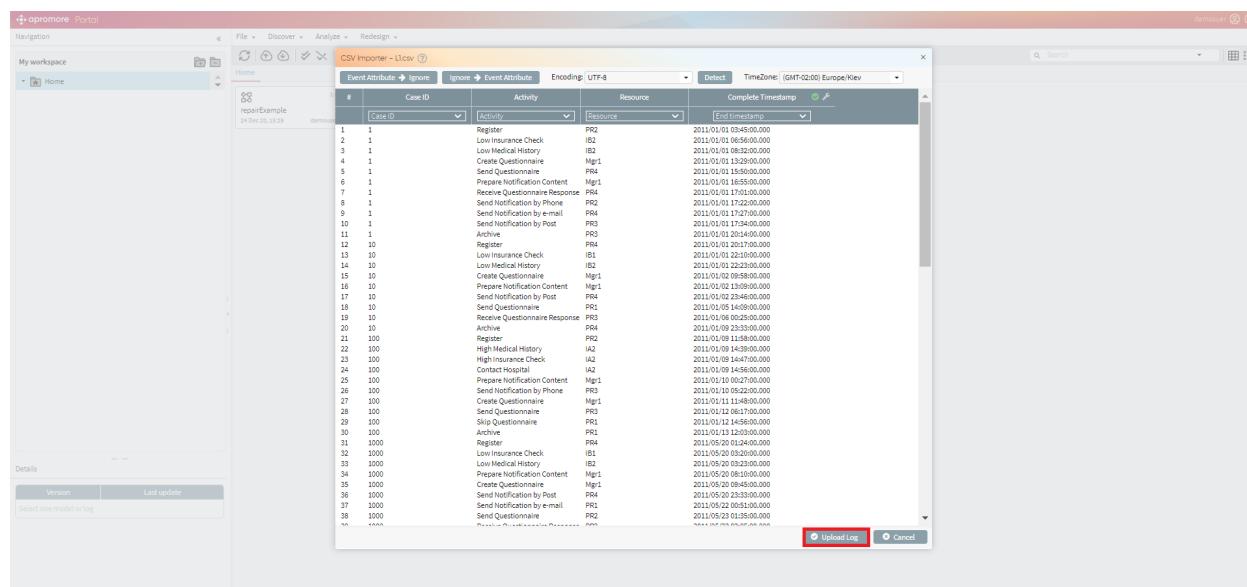
We can opt not to import a column by attaching the *Ignore* tag to it. To make it easier to ignore multiple columns, we can click on the *Event attribute -> Ignore* button at the bottom-left corner. From that point on, any column we select becomes tagged with *Ignore*.

The screenshot shows the Aproximere Portal interface with the 'CSV Importer' dialog open. The dialog title is 'CSV Importer - L1csv'. It contains a table with columns: #, Case ID, Activity, Resource, and End timestamp. The 'Event Attribute -> Ignore' button is located at the top left of the dialog. A tooltip above the button reads 'Event Attribute'. At the bottom right of the dialog are 'Upload Log' and 'Cancel' buttons.

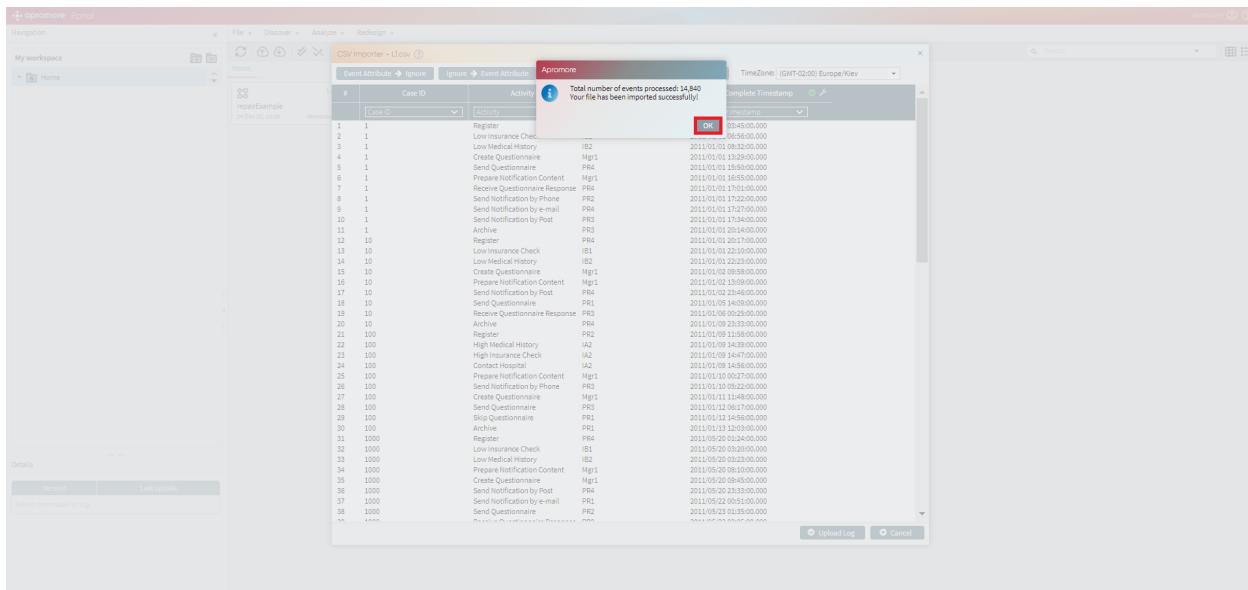
Similarly, if we need to tag multiple columns as *Event attribute*, we can click on *Ignore -> Event Attribute* in the bottom-left corner. From that point on, any column we select becomes tagged with *Event Attribute*.



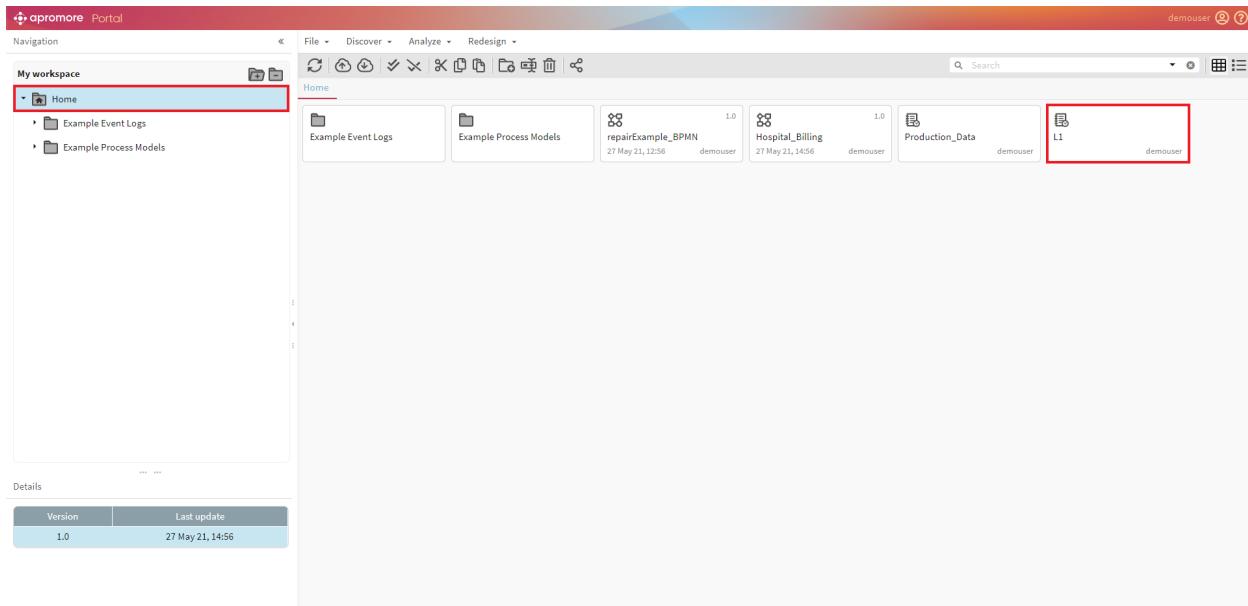
After the columns have been tagged, click *Upload Log* to finish the import.



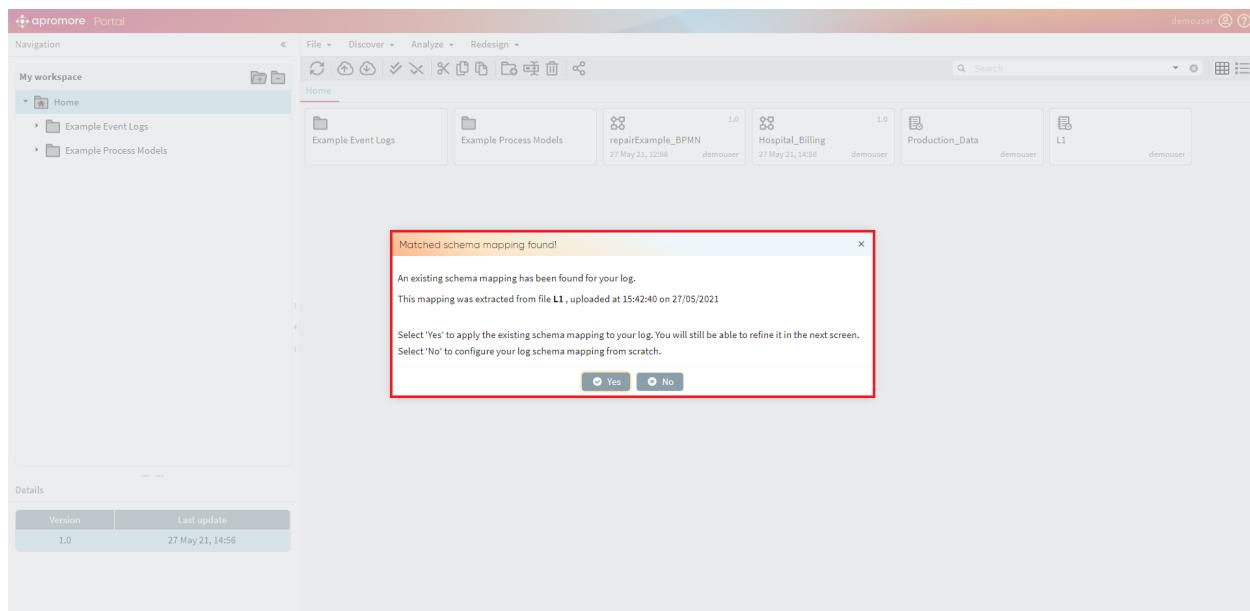
A dialog box will appear with a message about the total number of events process and if the file has been imported successfully. Click *OK* to complete the import.



The successfully imported log will be placed in the current folder in the Apromore workspace. Apromore internally stores files in XES format.



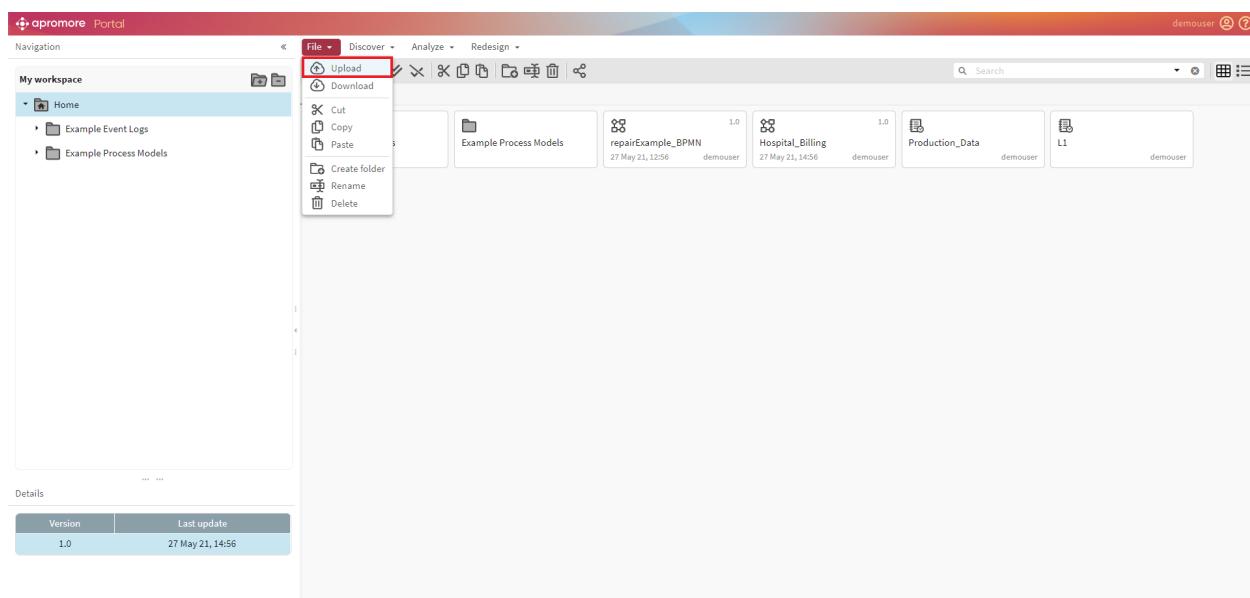
Note: After we upload a CSV file, the schema mapping is stored in system. So next time when we try to upload a CSV file with the same header (both header names and order), the importer will prompt a dialog to let us choose whether to apply the saved mapping.



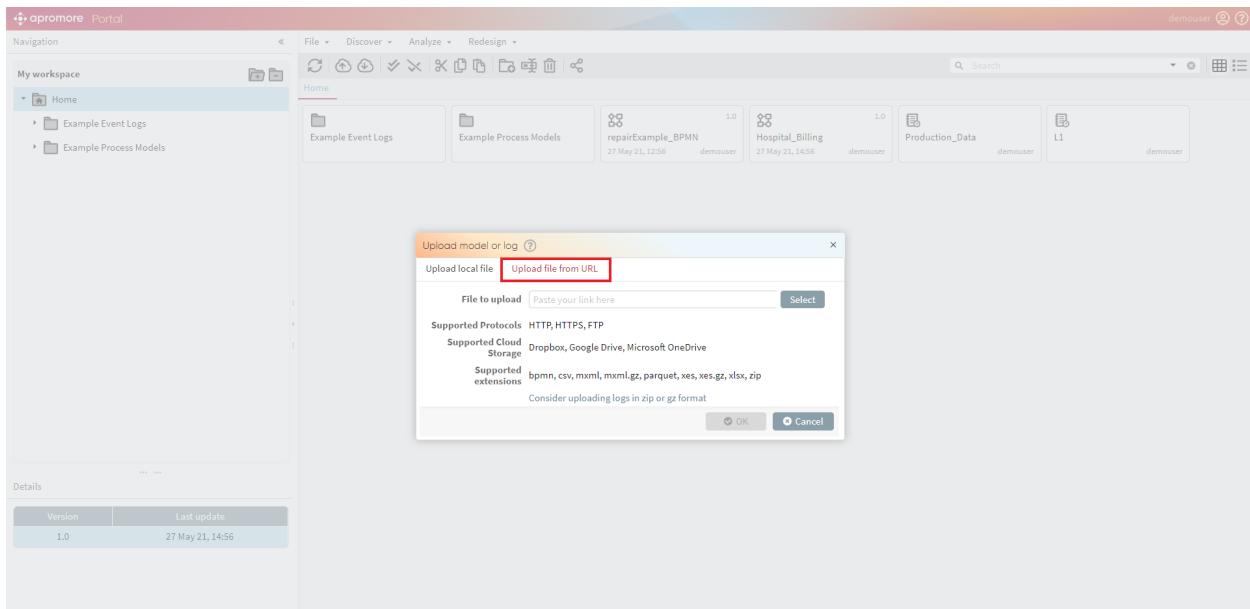
2.2.3 Upload a file from URL

This feature allows us to upload a file from Dropbox, Google Drive, and Microsoft OneDrive. To upload a file from a URL, click on *File* -> *Upload*.

Note: As an alternative, we can click on icon.



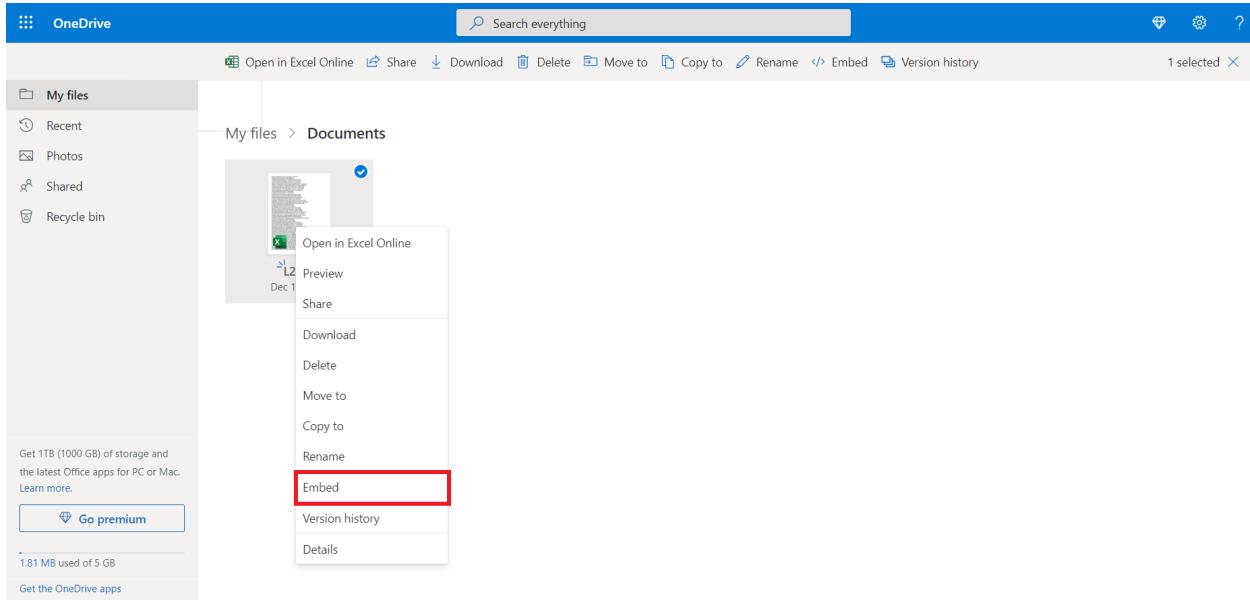
Switch to the “Upload file from URL” tab.



Note: The supported file formats are bpmn, csv, xlsx, mxml, mxmL.gz, xes, xes.gz, zip and parquet.

2.2.4 Upload from Microsoft OneDrive

In Microsoft OneDrive, right-click on the file we want to upload and click on *Embed*.



Once the Embed drawer opens, click on the *Generate* button to generate the URL of the file.

My files > Documents

L2.csv

Dec 11, 2020

Get 1TB (1000 GB) of storage and the latest Office apps for PC or Mac. Learn more.

Go premium

1.81 MB used of 5 GB

Get the OneDrive apps

Embed "L2" in a blog or webpage.

Generate HTML code to embed this file

Generate

Note: Anyone who visits the blog or webpage with this embedded file will be able to view it without signing in.

Once the link is generated, copy the link contained in the inverted commas (" ") of the *iframe src* parameter in the embed code snippet.

My files > Documents

L2.csv

Dec 11, 2020

Get 1TB (1000 GB) of storage and the latest Office apps for PC or Mac. Learn more.

Go premium

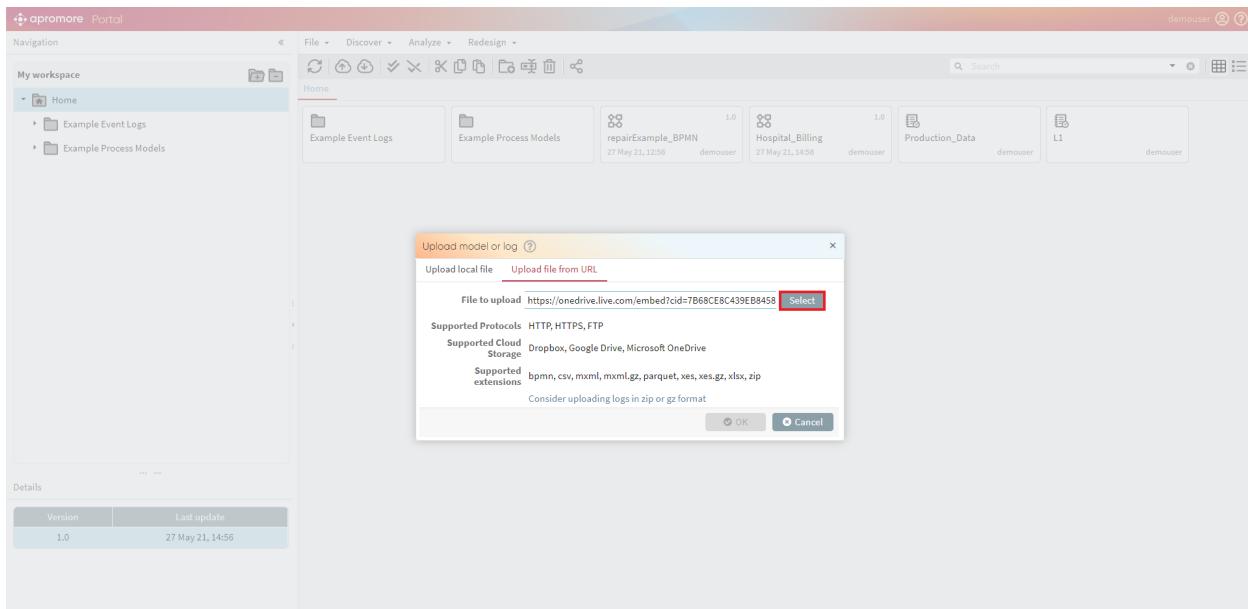
1.81 MB used of 5 GB

Get the OneDrive apps

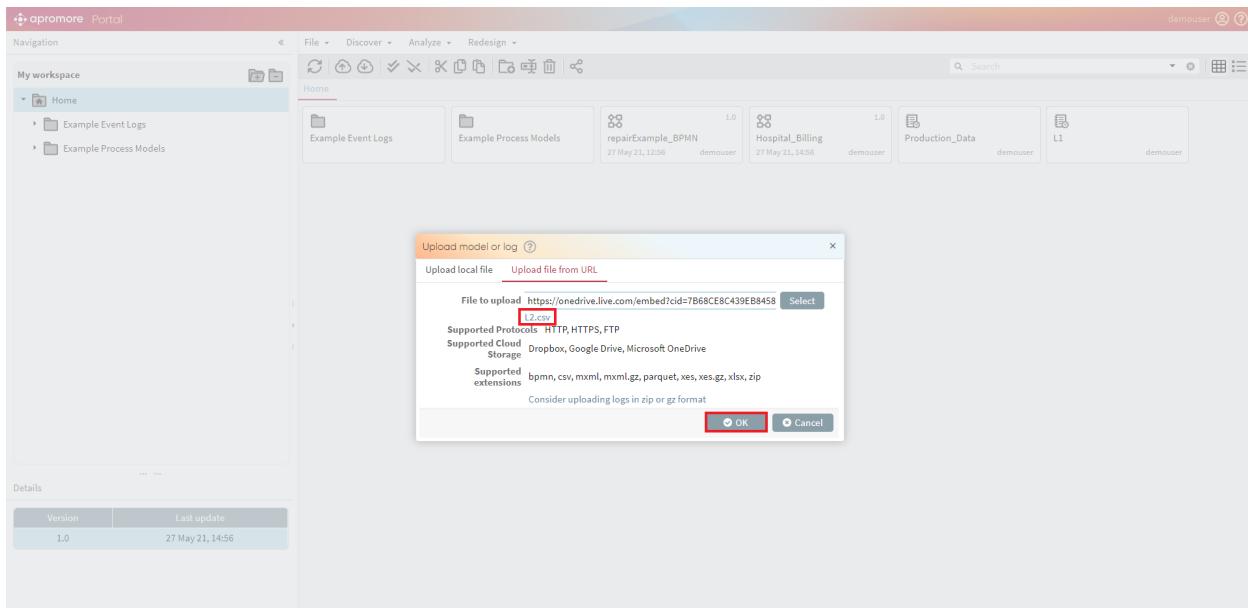
Embed "L2" in a blog or webpage.

```
<iframe src="https://onedrive.live.com/embed?cid=7B68CE8C439EB845&resid=7B68CE8C439EB845%21106&authkey=ANIEuu-HyECsma" width="98" height="120" frameborder="0" scrolling="no"></iframe>
```

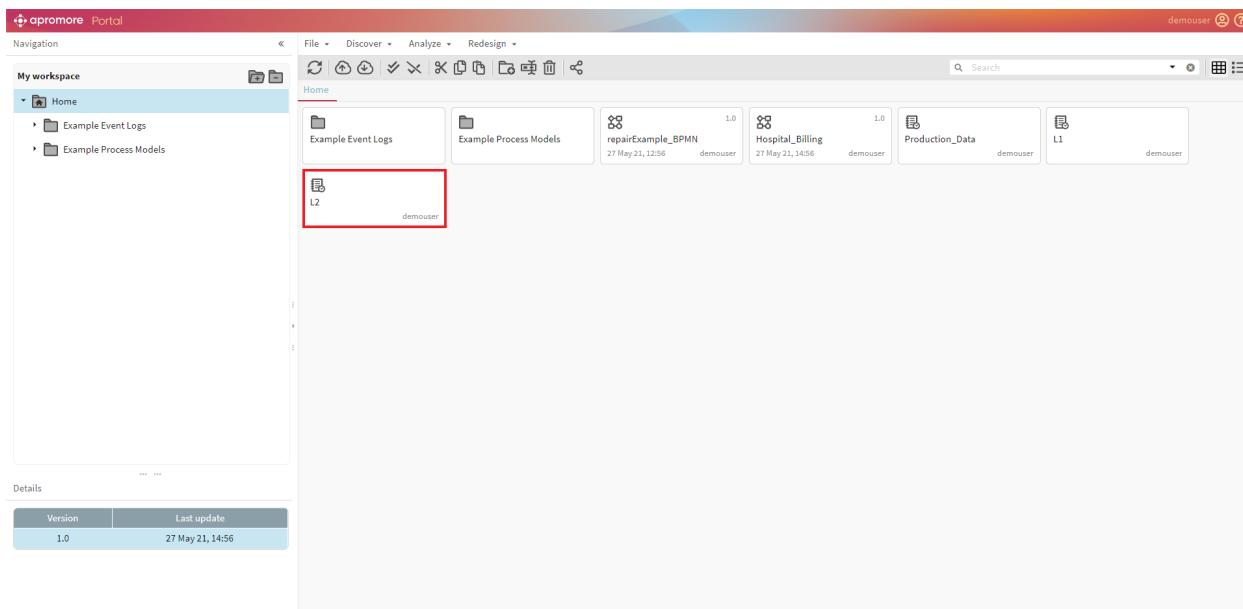
Paste the link to the *File to upload* input box and click on *Select*.



Once we click on *Select*, the file name will be displayed as highlighted below. Click on *OK* to upload the file.

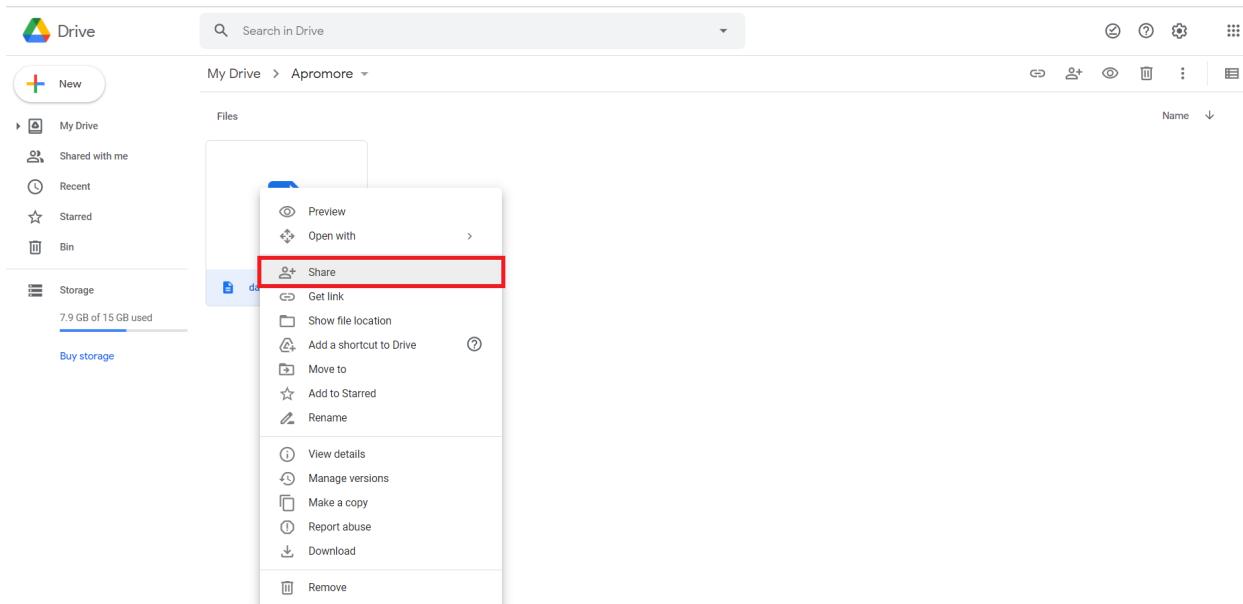


The log will be successfully uploaded in the Apromore workspace.



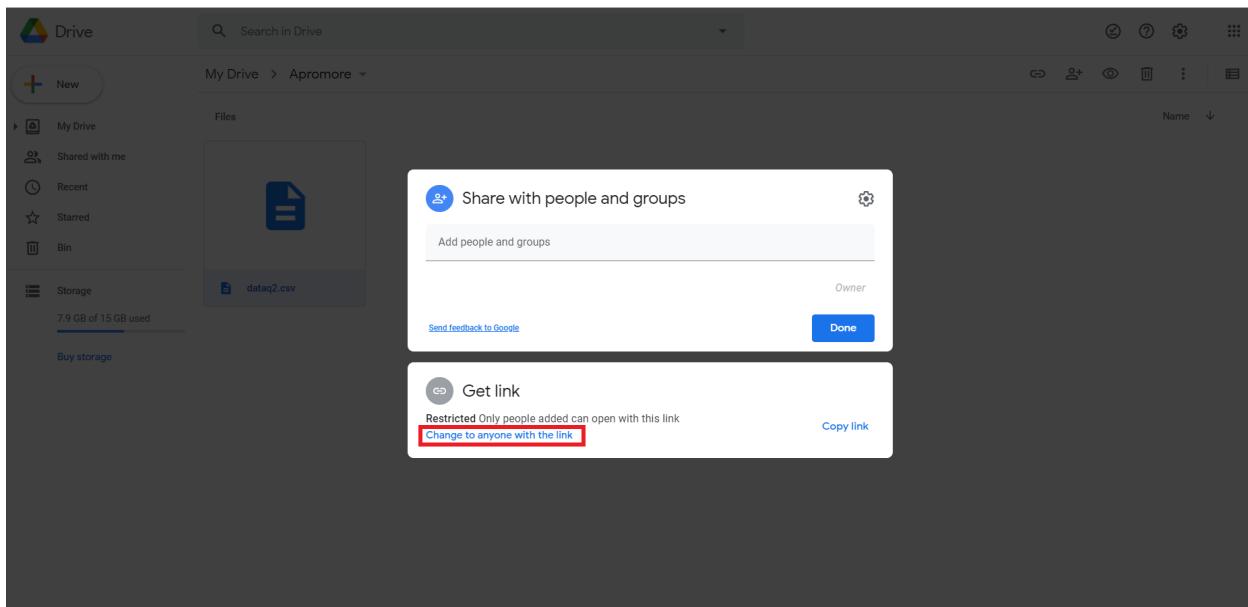
2.2.5 Upload from Google Drive

To upload a file from Google Drive, right-click on the file we want to upload and click on *Share*.

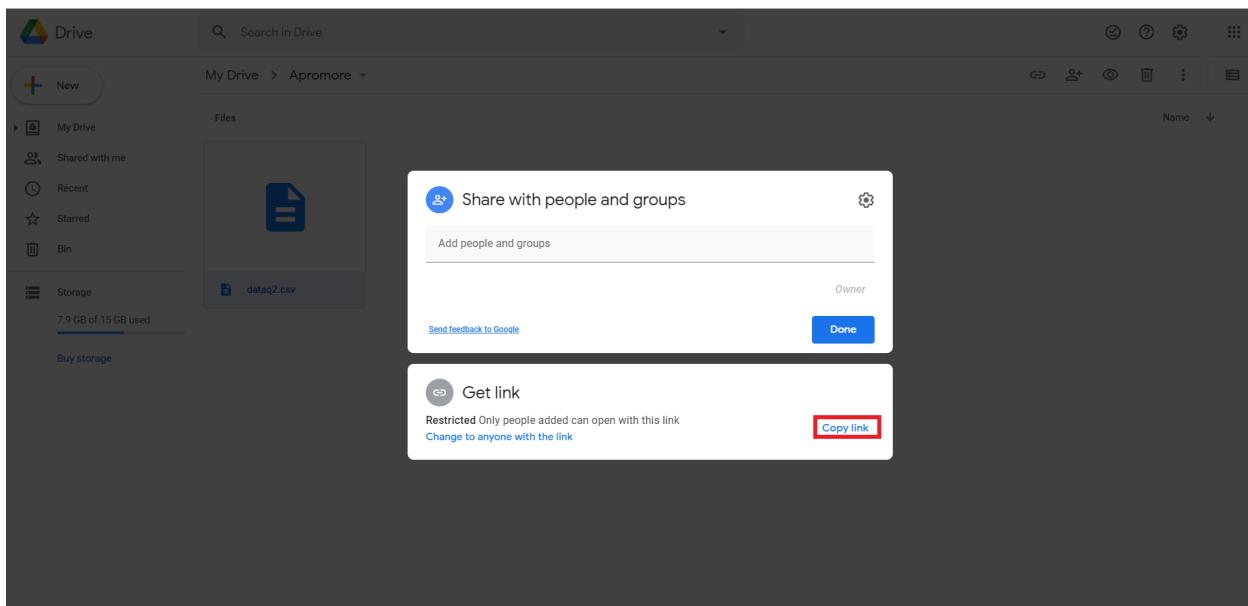


Once the share window opens up, click on the *Change* button in the *Get Link* section to change the file-sharing permissions.

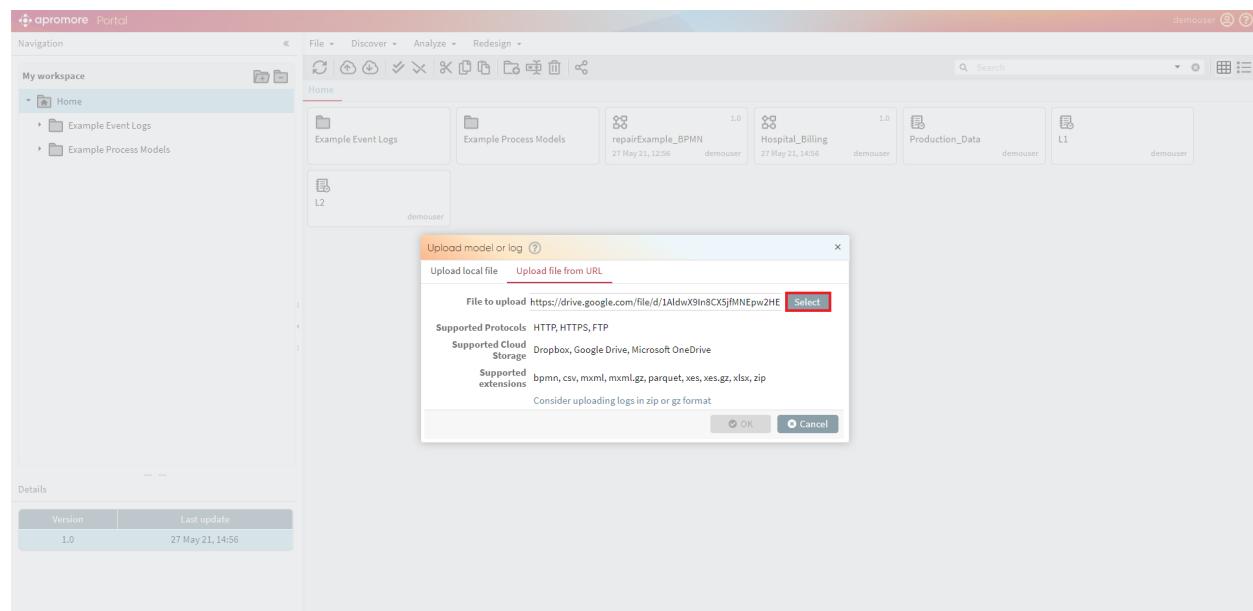
Note: Make sure the file's visibility is set to *Anyone with the link*.



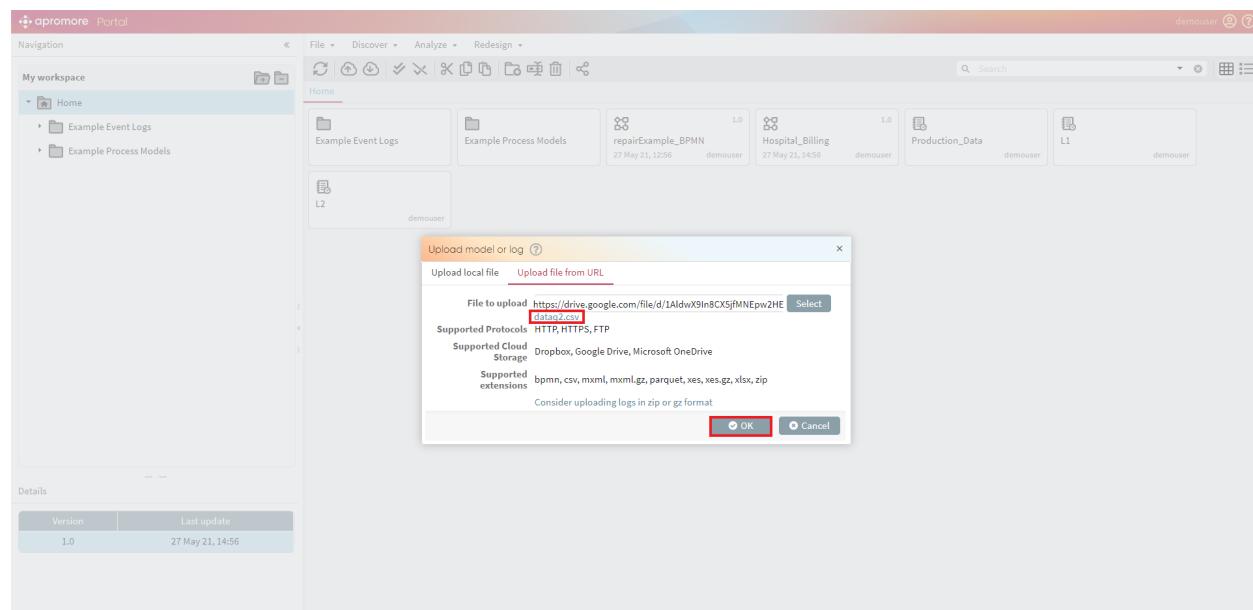
Once the sharing permissions are set, click on the *Copy link* button to copy the URL of the file.



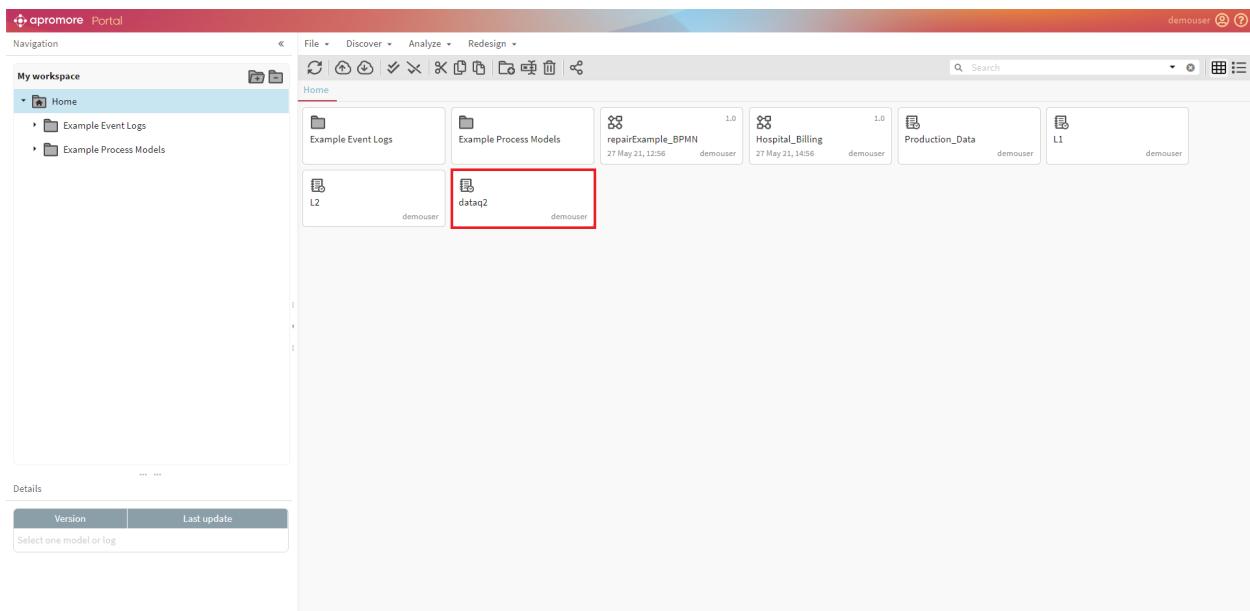
Paste the link to “File to upload” input box and click on *Select*.



Once you click on *Select*, the file name will be displayed as highlighted below. Click on *OK* to upload the file.



The log will be successfully uploaded in the Apromore workspace.

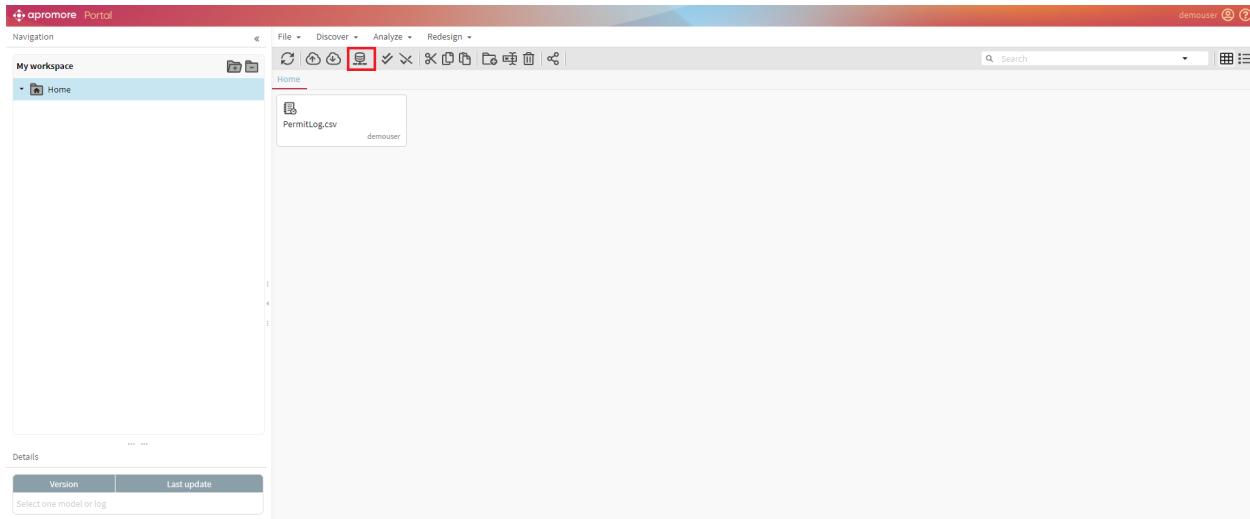


Note: Similarly, to upload a file from Dropbox, make sure the file's visibility is set to *Anyone with the link*.

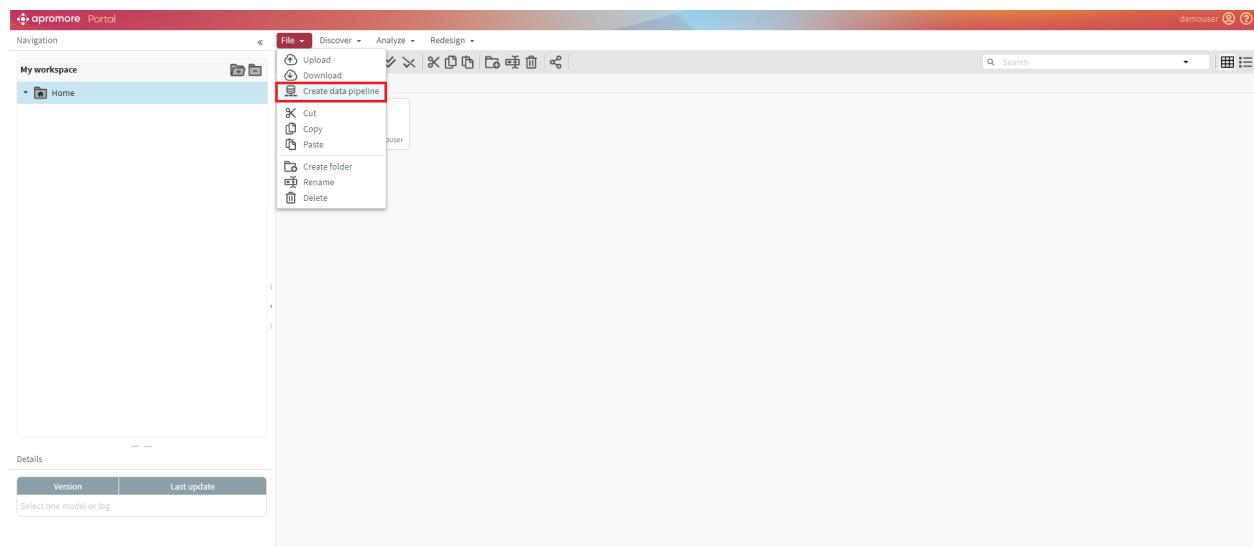
Paste the link to the *File to Upload* input box under the *Upload file from URL* tab to upload the file in Aproximere successfully.

2.3 Create data pipeline

The Create data pipeline plugin, also referred as the ETL plugin, allows users to compose event logs from one or more tables or data sources. It aims to integrate data from multiple sources by extracting, transforming, and loading to gain essential business insights for competitive advantage. To define a data pipeline, click on *Create data pipeline* button.

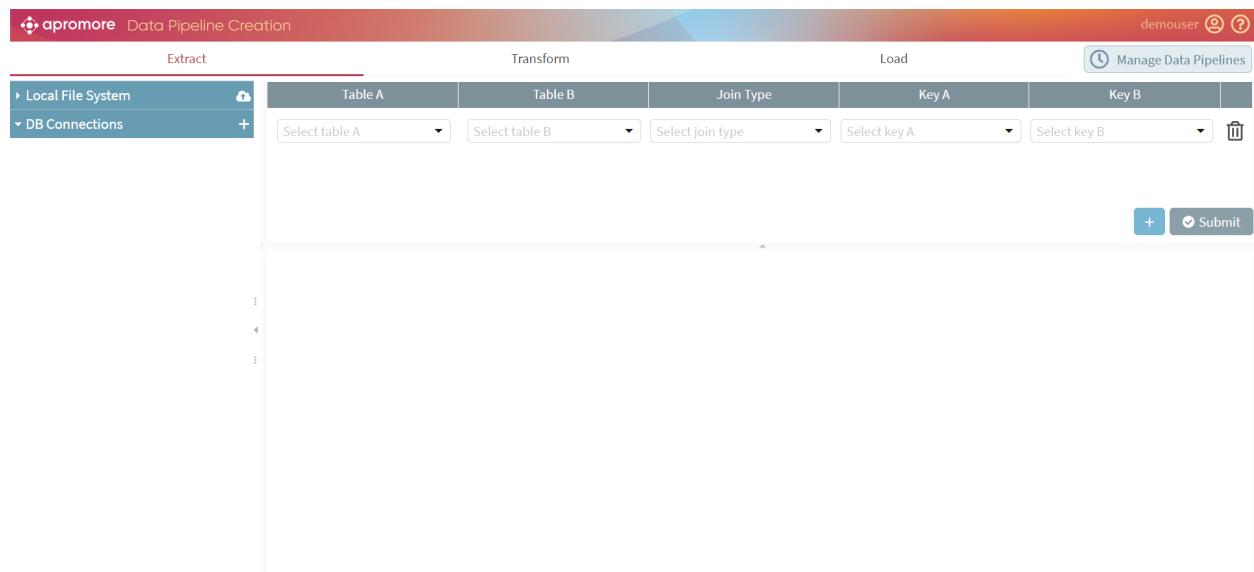


Note: We can also select the *Create data pipeline* option from the *File* menu drop-down.



The Extract-Transform-Load view appears after clicking on create data pipeline.

Note: We can switch between three main views. However, to create the insightful result, it is essential to complete steps in the default order: Extract - Transform - Load.



2.3.1 Extract data

We can extract data through two options – *Local File System* and *DB Connections*. The corresponding buttons are placed in the left pane right under the *Extract view*.

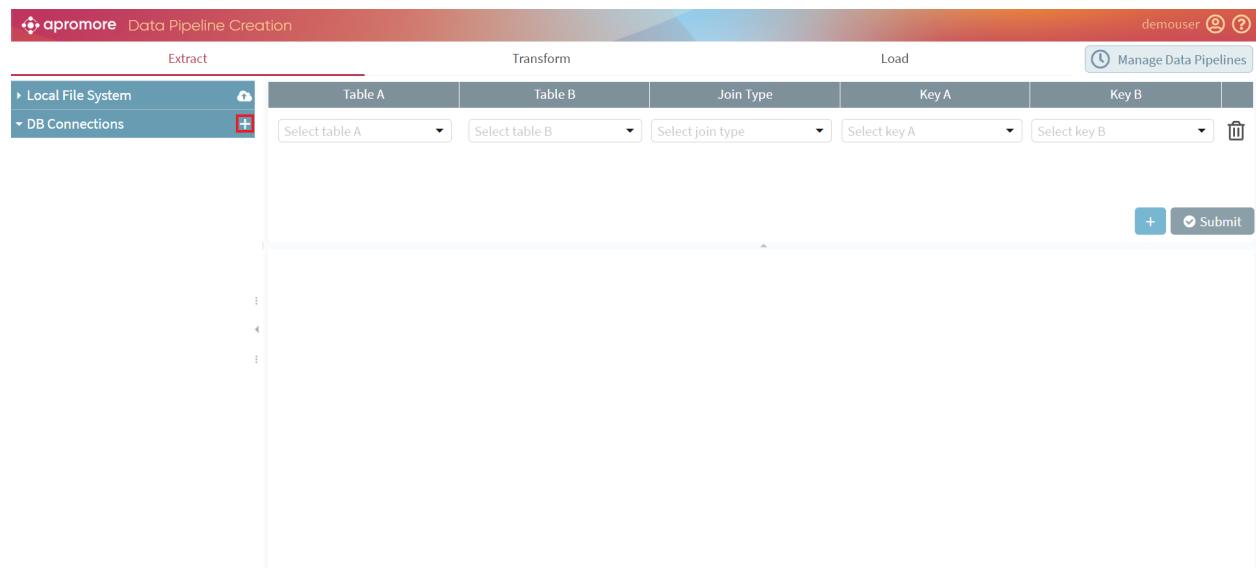
Note: We can extract tables from relational databases and upload files in CSV and Parquet formats from the local system.

The screenshot shows the Aproxmore Data Pipeline Creation interface. At the top, there are tabs for Extract, Transform, and Load. The Extract tab is active. Below it, there are two sections: Local File System and DB Connections. The Local File System section has a dropdown menu with options like 'Select table A' and 'Select key A'. The DB Connections section has a '+' button to add new connections. On the right side of the Local File System section, there is an icon of a cloud with a camera, which is highlighted with a red box. At the bottom right of the interface, there is a 'Submit' button.

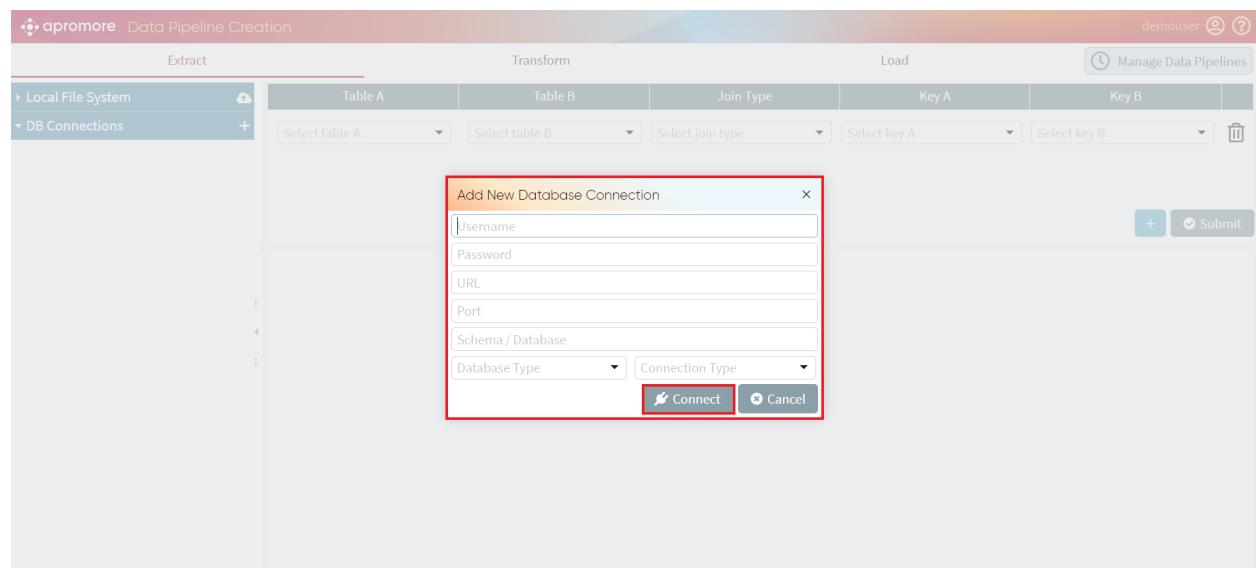
To upload a file from the personal computer, click on the icon in the right corner of the *Local File System*.

This screenshot is similar to the one above, showing the Aproxmore Data Pipeline Creation interface. The Extract tab is active. The Local File System section is visible but not highlighted. The DB Connections section is highlighted with a red box. The '+' button in the top right corner of the DB Connections section is also highlighted with a red box. The rest of the interface, including the table selection dropdowns and the 'Submit' button, remains the same.

To begin uploading a file from the database, click on the “+” icon in the right corner of the *DB Connections*.



When *Add New Database Connection* window appears, insert all the details, choose the suitable options from the *Database Type* and *Connection Type* drop-downs and click on *Connect*.



To delete a file, click on the *Trash bin* - right next to it.

When at least 2 logs are uploaded, merge them by selecting the relevant join type from the *Join Type* drop-down menu and appropriate keys.

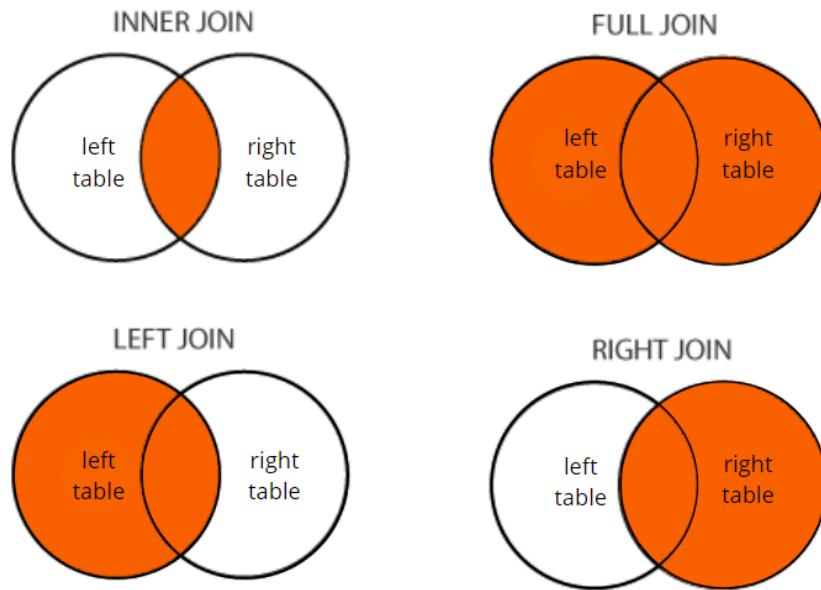


Fig. 1: INNER JOIN - Returns records that have matching values in both tables; FULL JOIN - Returns all records when there is a match in either left or right table; LEFT JOIN - Returns all records from the left table, and the matched records from the right table; RIGHT JOIN - Returns all records from the right table, and the matched records from the left table;

After all the files are uploaded, table keys and the join type are chosen, click on *Submit*.

The table obtained by joining the two logs appears right beneath the *table and join selections*.

case_id	activity	resource	complete_timestamp	variant	variant_index	case_activitynumbe
travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000	Variant 387	387	UNKNOWN
travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000	Variant 387	387	UNKNOWN
travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000	Variant 387	387	UNKNOWN
travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000	Variant 387	387	UNKNOWN
travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000	Variant 387	387	UNKNOWN

2.3.2 Transform data

There are 2 main areas in the Transform view - the list of tables containing all the columns from the extracted logs (marked blue) and the transformed table (marked red).

Note: To complete transformation, we must select at least three compulsory columns: case id, activity, and timestamp

The screenshot shows the Aproxmore Data Pipeline Creation interface. The Extract tab on the left lists the schema for 'permitlogcsv', including columns such as case_id, activity, resource, complete_timestamp, variant, variant_index, case_activitynumber, case_activity_0, case_activity_1, case_activity_10, case_activity_11, case_activity_12, case_activity_13, case_activity_14, case_activity_2, case_activity_3, case_activity_4, case_activity_5, case_activity_6, and case_activity_7. The Transform tab in the center contains a table with three columns: case_id, activity, and complete_timestamp. Each row in the table corresponds to a log entry from the extract schema. The Load tab is located at the top right of the interface.

To add the column from the list to the transformed table, click on the “+” button next to the column name.

This screenshot is similar to the previous one, showing the Aproxmore Data Pipeline Creation interface. The Extract tab on the left lists the schema for 'permitlogcsv'. A red box highlights the '+' button next to the 'case_id' column, indicating where to click to add it to the transformed table. The Transform and Load tabs are also visible.

Note: In the case of large logs, the addition of columns might take some time. Do not click on the same column several times to prevent column duplicates in the transformed table.

To add the whole extracted table to the *Transformed table*, click the “+” button next to the table name. The tables are marked as 

The screenshot shows the Apromore Data Pipeline Creation interface. The Extract tab on the left displays a list of columns from the source file 'permitlogcsv', including 'case_id', 'activity', 'resource', 'complete_timestamp', and various 'case_activity_x' columns. The Transform tab in the center contains a table with three columns: 'case_id', 'activity', and 'complete_timestamp'. The 'case_id' column has an 'Edit Rules' button highlighted with a red box. The Load tab is visible at the top right.

To rename the column, click on right next to the column name.

Warning: Spaces in the column name aren't supported.

The screenshot shows the Apromore Data Pipeline Creation interface. The Extract tab on the left displays a list of columns from the source file 'permitlogcsv', including 'case_id', 'activity', 'resource', 'complete_timestamp', and various 'case_activity_x' columns. The Transform tab in the center contains a table with three columns: 'case_id', 'activity', and 'complete_timestamp'. All three columns ('case_id', 'activity', and 'complete_timestamp') have their 'Edit Rules' buttons highlighted with red boxes. The Load tab is visible at the top right.

To delete the column from the Transformation table, click on the red “X” button next to Rename.

Note: If the column was deleted by mistake or becomes necessary, we can easily add it to the table again from the columns list.

To add a customized column that is not present in any of the tables, click on **+ New column** button placed in the upper right corner beneath **Manage data pipelines** button.

The screenshot shows the Apromore Data Pipeline Creation interface. The top navigation bar includes 'apromore' logo, 'Data Pipeline Creation', 'demouser', and a 'Manage Data Pipelines' button. The main area has tabs for 'Extract', 'Transform', and 'Load'. The 'Transform' tab is active, showing a table with three columns: 'case_id', 'activity', and 'complete_timestamp'. A sidebar on the left lists fields from 'permitslogcsv' such as 'case_id', 'activity', 'resource', etc. A large red box highlights the 'New Column' button in the top right corner of the transform table.

After a new column window appears, enter the new column name and click *Create*.

This screenshot shows the same interface as above, but with a 'Create New Column' dialog box open over the transform table. The dialog has a text input field containing 'contact_timestamp' and two buttons at the bottom: 'Create' (highlighted with a red box) and 'Cancel'. The transform table and sidebar are visible in the background.

To check or change the values of the column, click *Edit rules* right beneath the name of the necessary column.

The screenshot shows the Aproxmore Data Pipeline Creation interface. The Extract section on the left displays a tree view of the 'prepaidtravelcostcsv' dataset, listing columns such as case_id, activity, resource, complete_timestamp, variant, variant_index, case_activity, case_cost_type, case_organizationalentity, case_permit_activitynumber, case_permit_budgetnumber, case_permit_organizational..., case_permit_projectnumber, case_permit_requestedbud..., case_permit_tasknumber, case_permit_id, case_permit_travel_permit..., case_project, case_requestedamount, and case_rfpnumber. The Transform tab is active, showing three columns: 'activity', 'complete_timestamp', and 'case_id'. Each column has an 'Edit Rules' button at the top, which is highlighted with a red box. The data in the 'activity' column includes entries like 'Permit SUBMITTED by EMPLOYEE' and 'Permit FINAL APPROVED by SUPERVISOR'. The 'complete_timestamp' column shows dates and times, and the 'case_id' column shows payment IDs.

Edit rules window appears. The default rule is displayed. In addition to different join operations, we can create columns in the event log by composing existing columns using arithmetic, concatenation, and find-and-replace operations. For example, you can add a *Cost* column to an event log and compute this cost based on the hourly rate of your resources and the duration of tasks.

The screenshot shows the 'Edit Rules: activity' dialog box. It contains a list of available rules: value, addition, subtraction, multiplication, division, concatenation, value, max, min, average, and find and replace. The 'value' option is selected and highlighted with a red box. At the bottom right, there are 'OK' and 'Cancel' buttons.

We can add a new rule by clicking **+ Add new rule**.

To apply the rule, after the condition is set, click on *OK*.

To apply the rule, after the condition is set, click on *OK*.

2.3.3 Load data

When we click on Load view, the transformed log is displayed.

#	activity	complete_timestamp	case_id
	Activity	End timestamp	Case ID
1	Permit SUBMITTED by EMPLOYEE	2017/07/28 11:10:18.000	request for payment 73550
2	Permit SUBMITTED by EMPLOYEE	2017/04/06 01:00:00.000	request for payment 73550
3	Permit SUBMITTED by EMPLOYEE	2017/04/01 01:00:00.000	request for payment 73550
4	Permit SUBMITTED by EMPLOYEE	2017/01/26 18:30:47.000	request for payment 73550
5	Permit SUBMITTED by EMPLOYEE	2017/01/23 15:43:35.000	request for payment 73550
6	Permit SUBMITTED by EMPLOYEE	2017/01/19 19:47:21.000	request for payment 73550
7	Permit SUBMITTED by EMPLOYEE	2017/01/19 19:47:18.000	request for payment 73550
8	Permit SUBMITTED by EMPLOYEE	2017/01/12 12:53:07.000	request for payment 73550
9	Permit SUBMITTED by EMPLOYEE	2017/01/12 12:41:59.000	request for payment 73550
10	Permit SUBMITTED by EMPLOYEE	2017/01/12 12:40:27.000	request for payment 73550
11	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:55.000	request for payment 73550
12	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
13	Permit FINAL_APPROVED by SUPERVISOR	2017/07/28 11:10:18.000	request for payment 73550
14	Permit FINAL_APPROVED by SUPERVISOR	2017/04/06 01:00:00.000	request for payment 73550
15	Permit FINAL_APPROVED by SUPERVISOR	2017/04/01 01:00:00.000	request for payment 73550
16	Permit FINAL_APPROVED by SUPERVISOR	2017/01/26 18:30:47.000	request for payment 73550
17	Permit FINAL_APPROVED by SUPERVISOR	2017/01/23 15:43:35.000	request for payment 73550

Click on *Detect* to automatically detect encoding option.

#	activity	complete_timestamp	case_id
	Activity	End timestamp	Case ID
1	Permit SUBMITTED by EMPLOYEE	2017/07/28 11:10:18.000	request for payment 73550
2	Permit SUBMITTED by EMPLOYEE	2017/04/06 01:00:00.000	request for payment 73550
3	Permit SUBMITTED by EMPLOYEE	2017/04/01 01:00:00.000	request for payment 73550
4	Permit SUBMITTED by EMPLOYEE	2017/01/26 18:30:47.000	request for payment 73550
5	Permit SUBMITTED by EMPLOYEE	2017/01/23 15:43:35.000	request for payment 73550
6	Permit SUBMITTED by EMPLOYEE	2017/01/19 19:47:21.000	request for payment 73550
7	Permit SUBMITTED by EMPLOYEE	2017/01/19 19:47:18.000	request for payment 73550
8	Permit SUBMITTED by EMPLOYEE	2017/01/12 12:53:07.000	request for payment 73550
9	Permit SUBMITTED by EMPLOYEE	2017/01/12 12:41:59.000	request for payment 73550
10	Permit SUBMITTED by EMPLOYEE	2017/01/12 12:40:27.000	request for payment 73550
11	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:55.000	request for payment 73550
12	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
13	Permit FINAL_APPROVED by SUPERVISOR	2017/07/28 11:10:18.000	request for payment 73550
14	Permit FINAL_APPROVED by SUPERVISOR	2017/04/06 01:00:00.000	request for payment 73550
15	Permit FINAL_APPROVED by SUPERVISOR	2017/04/01 01:00:00.000	request for payment 73550
16	Permit FINAL_APPROVED by SUPERVISOR	2017/01/26 18:30:47.000	request for payment 73550
17	Permit FINAL_APPROVED by SUPERVISOR	2017/01/23 15:43:35.000	request for payment 73550

We can opt not to import a column by attaching the *Ignore* tag to it. To make it easier to ignore multiple columns, we can click on the *Event attribute -> Ignore* button at the upper-left corner. From that point on, any column we select becomes tagged with *Ignore*.

The screenshot shows the Apromore Data Pipeline Creation interface. At the top, there are three tabs: Extract, Transform, and Load. The Load tab is selected. Below the tabs, there are buttons for 'Event Attribute → Ignore' (highlighted with a red box), 'Ignore → Event Attribute', 'Encoding: UTF-8', 'Detect', 'Schedule pipeline', and 'Upload Log'. The main area is a table with the following columns: #, activity, complete_timestamp, and case_id. The 'activity' column contains entries like 'Permit SUBMITTED by EMPLOYEE' and 'Permit FINAL_APPROVED by SUPERVISOR'. The 'complete_timestamp' column contains dates and times such as '2017/07/28 11:10:18.000' and '2017/01/23 15:43:35.000'. The 'case_id' column contains 'request for payment 73550' repeated multiple times.

Similarly, if we need to tag multiple columns as *Event attribute*, we can click on *Ignore* → *Event Attribute* in the upper-left corner next to *Event attribute* → *Ignore*. From that point on, any column we select becomes tagged with *Event Attribute*.

This screenshot is identical to the one above, but the 'Ignore → Event Attribute' button is highlighted with a red box, indicating it has been selected. The rest of the interface and data table remain the same.

Click on *Upload Log* to finish the import.

#	activity	complete_timestamp	case_id
	Activity	End timestamp	Case ID
1	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
2	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
3	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
4	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
5	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
6	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
7	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
8	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
9	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
10	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
11	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
12	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
13	Permit FINAL_APPROVED by SUPERVISOR	2017/01/09 15:48:55.000	request for payment 73550
14	Permit FINAL_APPROVED by SUPERVISOR	2017/01/09 15:48:55.000	request for payment 73550
15	Permit FINAL_APPROVED by SUPERVISOR	2017/01/09 15:48:55.000	request for payment 73550
16	Permit FINAL_APPROVED by SUPERVISOR	2017/01/09 15:48:55.000	request for payment 73550

The *Save Log As* dialog box appears. Enter the log name and choose the destination folder from the drop-down. Click on *Upload* to successfully import the log into Apromore.

#	activity	complete_timestamp	case_id
	Activity	End timestamp	Case ID
1	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
2	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
3	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
4	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
5	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
6	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
7	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
8	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
9	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
10	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
11	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
12	Permit SUBMITTED by EMPLOYEE	2017/01/09 15:48:43.000	request for payment 73550
13	Permit FINAL_APPROVED by SUPERVISOR	2017/01/09 15:48:55.000	request for payment 73550
14	Permit FINAL_APPROVED by SUPERVISOR	2017/01/09 15:48:55.000	request for payment 73550
15	Permit FINAL_APPROVED by SUPERVISOR	2017/01/09 15:48:55.000	request for payment 73550
16	Permit FINAL_APPROVED by SUPERVISOR	2017/01/09 15:48:55.000	request for payment 73550

2.4 Schedule/Manage Data Pipeline

Create data pipeline allows to update logs automatically by scheduling. After scheduling a pipeline, the logs will be fetched directly from the database and transformed according to the set transformation.

We can also manage the scheduled pipelines.

2.4.1 Schedule pipeline

To schedule pipeline, go to the *Load* view and click on the *Schedule pipeline* button placed in the right corner under the *Manage Data Pipelines* button.

The screenshot shows the Apromore Data Pipeline Creation interface in the Load view. At the top, there are tabs for Extract, Transform, and Load. The Load tab is active and has a red border around its header. Below the tabs is a toolbar with buttons for Event Attribute → Ignore, Ignore → Event Attribute, Encoding: UTF-8, Detect, and two buttons on the far right: Schedule pipeline (highlighted with a red border) and Upload Log. The main area contains a table with columns: #, case_id, activity, resource, and complete_timestamp. The table has 16 rows of log data. The 'Schedule pipeline' button is located in the top right corner of the Load tab's header.

The *Schedule Data pipeline* window appears.

The screenshot shows the Apromore Data Pipeline Creation interface in the Load view with the 'Schedule Data Pipeline' dialog box open. The dialog box has a title 'Schedule Data Pipeline' with a help icon. It contains several settings: 'Pipeline_1' (selected), frequency options (Hourly is selected, Daily, Weekly, Monthly are radio buttons), a time selector showing '5:52 PM' and '(UTC+0:00) Etc/UTC', and a checkbox 'Run pipeline now, in addition to the scheduled time'. Below this is a 'Save Log' section with fields 'Enter log name*' and 'Select destination folder*', and two buttons: 'Schedule' (with a checkmark) and 'Cancel'. The background table in the Load view shows log data with columns: #, case_id, activity, resource, and complete_timestamp. The 'Schedule' button in the dialog box is highlighted with a red border.

We can choose the frequency of the updates – hourly, daily, weekly, or monthly to extract, transform, and load event logs into Apromore.

The screenshot shows the Aproxmore Data Pipeline Creation interface. In the center, a modal window titled "Schedule Data Pipeline" is open. Inside, there's a section for "Pipeline_1" with a radio button for "Hourly" selected, and other options for Daily, Weekly, and Monthly. Below that is a time selector set to "5:52 PM (UTC+0:00) Etc/UTC". There's also a checkbox labeled "Run pipeline now, in addition to the scheduled time" which is unchecked. At the bottom of the modal are "Schedule" and "Cancel" buttons. The background shows a table of data with columns like "#", "case_id", and "Status". To the right of the table is a log table with columns "complete_timestamp" and "End timestamp".

To run pipeline instantly, tick the box *Run pipeline now in addition to the scheduled time* placed right beneath the frequency settings.

This screenshot is identical to the one above it, except the checkbox "Run pipeline now, in addition to the scheduled time" is now checked. The rest of the interface, including the pipeline name, frequency, time, and the underlying data tables, remains the same.

When frequency settings are complete, choose the *Log name* and *Log destination* and click on *Schedule*.

#	case_id	activity	resource	complete_timestamp
1	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
2	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
3	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
4	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
5	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
6	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
7	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
8	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
9	travel permit 73549	Permit FINAL_APPROVED by SUPERVISOR	STAFF MEMBER	2017/01/09 15:48:43.000
10	travel permit 73549	Permit FINAL_APPROVED by SUPERVISOR	STAFF MEMBER	2017/01/09 15:48:43.000
11	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
12	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
13	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
14	travel permit 73549	Permit FINAL_APPROVED by SUPERVISOR	STAFF MEMBER	2017/01/09 15:48:55.000
15	travel permit 73549	Permit FINAL_APPROVED by SUPERVISOR	STAFF MEMBER	2017/01/09 15:48:55.000

2.4.2 Manage pipeline

To check or edit scheduled pipelines, click on *Manage Data Pipelines* button placed in the right corner under the user's details.

#	case_id	activity	resource	complete_timestamp
1	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
2	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
3	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
4	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
5	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
6	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
7	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
8	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
9	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
10	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
11	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
12	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
13	travel permit 73549	Permit SUBMITTED by EMPLOYEE	STAFF MEMBER	2017/01/09 15:48:43.000
14	travel permit 73549	Permit FINAL_APPROVED by SUPERVISOR	STAFF MEMBER	2017/01/09 15:48:55.000
15	travel permit 73549	Permit FINAL_APPROVED by SUPERVISOR	STAFF MEMBER	2017/01/09 15:48:55.000
16	travel permit 73549	Permit FINAL_APPROVED by SUPERVISOR	STAFF MEMBER	2017/01/09 15:48:55.000

The *Data pipeline Management* window appears, displaying all the scheduling-related details next to the pipeline name: time/frequency of loads, status, last run.

#	Pipeline Name	Schedule (UTC)	Last Run	Status	Actions
1	Procure to pay	At 16:42	22/05/2021 06:46 UTC	SUCCESS	▶ 🗑️ ⚓
2	P2p	At 16:44	22/05/2021 06:46 UTC	SUCCESS	▶ 🗑️ ⚓
3	Incident detail pipeline	At 06:51	22/05/2021 06:55 UTC	SUCCESS	▶ 🗑️ ⚓
4	Permit log pipeline	Every hour at minute 59	22/05/2021 13:59 UTC	FAILED	▶ 🗑️ ⚓
15	travel permit 73549	Permit FINAL_APPROVED by SUPERVISOR	STAFF MEMBER	2017/01/09 15:48:55.000	
16	travel permit 73549	Permit FINAL_APPROVED by SUPERVISOR	STAFF MEMBER	2017/01/09 15:48:55.000	

Note: By default, the window shows all the pipelines. To see only Running or Paused ones, click on the corresponding section.

#	Pipeline Name	Schedule (UTC)	Actions	Run ID	Execution Time	Status	Time Elapsed
1	Procure to pay	At 16:42	▶ 🗑️ ⚓	scheduled__2018-01-01T00:00:00+00:00	01/01/2018 00:00 UTC	SUCCESS	4s
2	P2p	At 16:44	▶ 🗑️ ⚓	scheduled__2021-05-20T16:42:00+00:00	20/05/2021 16:42 UTC	SUCCESS	4s
3	Incident detail pipeline	At 06:51	▶ 🗑️ ⚓	manual__2021-05-22T06:46:13.227339+00:00	22/05/2021 06:46 UTC	SUCCESS	3s
4	Permit log pipeline	Every hour at minute 59	▶ 🗑️ ⚓	manual__2021-05-22T06:46:37.003223+00:00	22/05/2021 06:46 UTC	SUCCESS	4s

We can pause or unpause the pipeline by moving the *pipeline activation slider* next to the pipeline name.

The screenshot shows the 'Data Pipeline Management' section of the Apromore portal. It lists four pipelines:

#	Pipeline Name	Schedule (UTC)	Last Run	Status	Actions
1	Procure to pay	At 16:42	22/05/2021 06:46 UTC	SUCCESS	
2	P2p	At 16:44	22/05/2021 06:46 UTC	SUCCESS	
3	Incident detail pipeline	At 06:51	22/05/2021 06:55 UTC	SUCCESS	
4	Permit log pipeline	Every hour at minute 59	22/05/2021 13:59 UTC	FAILED	

To view the details of all the updates of the scheduled pipeline, click on .

Note: The status of the pipeline run might be either success or fail, where fail means that for some reason system wouldn't able to run the scheduled pipeline successfully.

The screenshot shows the 'Data Pipeline Management' section of the Apromore portal. It lists four pipelines:

#	Pipeline Name	Schedule (UTC)	Actions
1	Procure to pay	At 16:42	
2	P2p	At 16:44	
3	Incident detail pipeline	At 06:51	
4	Permit log pipeline	Every hour at minute 59	

The 'Load' tab is selected. Below it, a table shows the execution history of the 'Permit log pipeline':

Run ID	Execution Time	Status	Time Elapsed
scheduled_2018-01-01T00:00:00+00:00	01/01/2018 00:00 UTC	SUCCESS	4s
scheduled_2021-05-20T16:42:00+00:00	20/05/2021 16:42 UTC	SUCCESS	4s
manual_2021-05-22T06:46:13.227339+00:00	22/05/2021 06:46 UTC	SUCCESS	3s
manual_2021-05-22T06:46:37.003223+00:00	22/05/2021 06:46 UTC	SUCCESS	4s

To delete the scheduled pipeline, click on .

The screenshot shows the Aproxmore Data Pipeline Creation interface. The main area displays a table of data pipelines. The table has columns for #, Pipeline Name, Schedule (UTC), Last Run, Status, and Actions. The Permit log pipeline is listed with a status of FAILED. The Actions column contains icons for running, pausing, deleting, and more.

#	Pipeline Name	Schedule (UTC)	Last Run	Status	Actions
1	Procure to pay	At 16:42	22/05/2021 06:46 UTC	SUCCESS	
2	P2p	At 16:44	22/05/2021 06:46 UTC	SUCCESS	
3	Incident detail pipeline	At 06:51	22/05/2021 06:55 UTC	SUCCESS	
4	Permit log pipeline	Every hour at minute 59	22/05/2021 13:59 UTC	FAILED	

To run pipeline now, click on

The screenshot shows the Aproxmore Data Pipeline Creation interface. The main area displays a table of data pipelines. The Permit log pipeline is listed with a status of SUCCESS. The Actions column contains icons for running, pausing, deleting, and more.

#	Pipeline Name	Schedule (UTC)	Last Run	Status	Actions
1	Procure to pay	At 16:42	22/05/2021 06:46 UTC	SUCCESS	
2	P2p	At 16:44	22/05/2021 06:46 UTC	SUCCESS	
3	Incident detail pipeline	At 06:51	22/05/2021 06:55 UTC	SUCCESS	
4	Permit log pipeline	Every hour at minute 59	22/05/2021 13:59 UTC	SUCCESS	

To close the *Data Pipeline Management* window, click on the “X” button in the upper right corner of the window.

The screenshot shows the Apromore Data Pipeline Creation interface. At the top, there are tabs for Extract, Transform, and Load. Below the tabs is a section titled "Event Attribute → Ignore". A red box highlights the "Manage Data Pipelines" button in the top right corner.

#	Pipeline Name	Schedule (UTC)	Last Run	Status	Actions
1	Procure to pay	At 16:42	22/05/2021 06:46 UTC	SUCCESS	▶ 🗑️ ⚙️
2	P2p	At 16:44	22/05/2021 06:46 UTC	SUCCESS	▶ 🗑️ ⚙️
3	Incident detail pipeline	At 06:51	22/05/2021 06:55 UTC	SUCCESS	▶ 🗑️ ⚙️
4	Permit log pipeline	Every hour at minute 59	22/05/2021 13:59 UTC	FAILED	▶ 🗑️ ⚙️

Below the table, there are three rows of log entries:

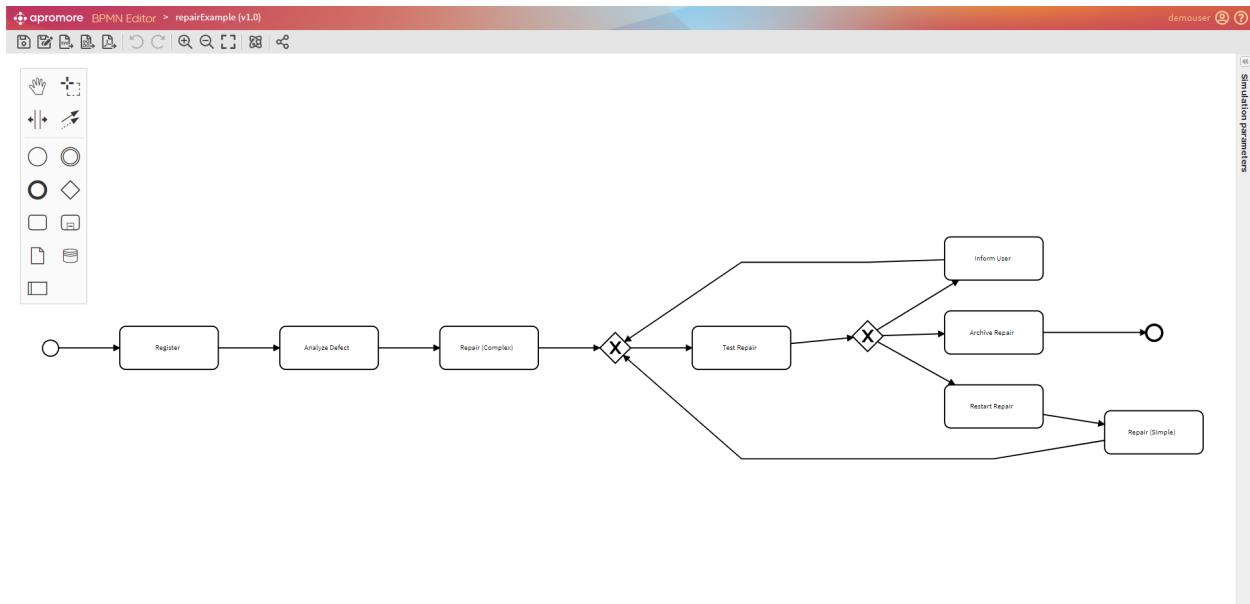
- Line 24: travel permit 73549 - Permit FINAL_APPROVED by SUPERVISOR STAFF MEMBER 2017/01/09 15:48:55.000
- Line 25: travel permit 73549 - Permit FINAL_APPROVED by SUPERVISOR STAFF MEMBER 2017/01/09 15:48:55.000
- Line 26: travel permit 73549 - Permit FINAL_APPROVED by SUPERVISOR STAFF MEMBER 2017/01/09 15:48:55.000

To refresh the window, click on

This screenshot is identical to the one above it, showing the same list of pipelines and log entries. A red box highlights the refresh icon in the top right corner of the main content area.

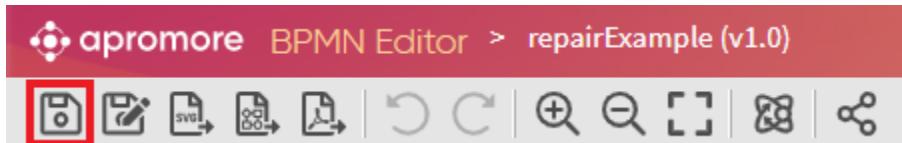
2.5 Create/edit process model

The editor allows one to edit, save, and export (BPMN) process models. To access the editor, double click on the process model you want to edit in the repository browser. The image below shows a snapshot of the editor environment. On the left, the palette containing the BPMN elements. To add any of these elements to the process model, drag-and-drop it on the desired location.

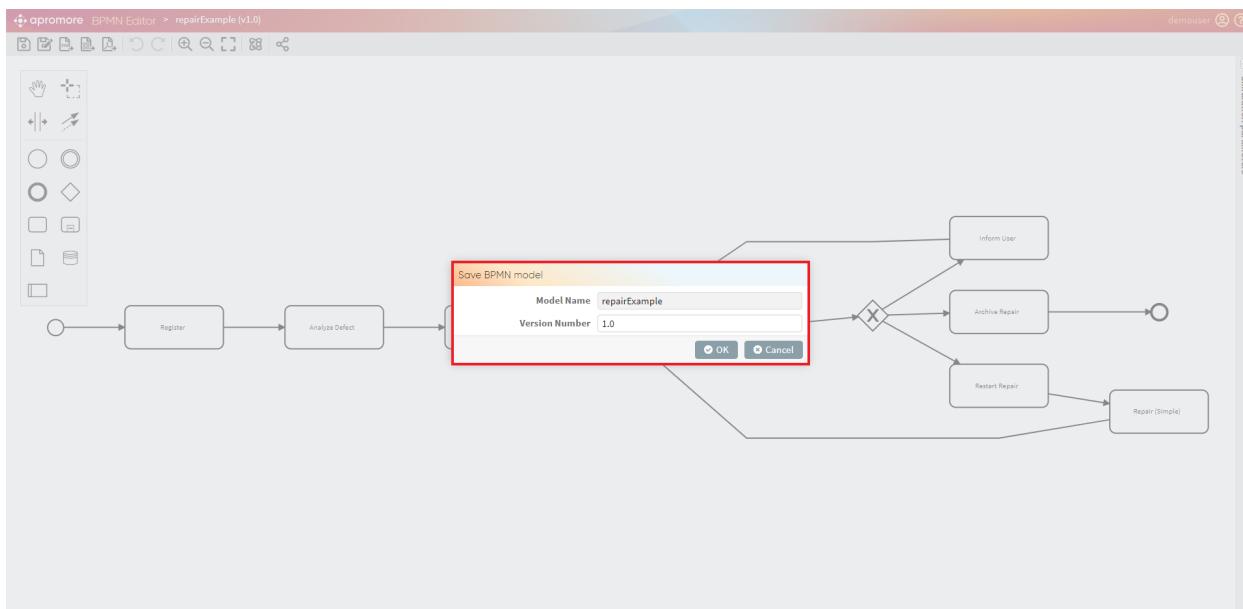


2.5.1 Save model

At the top of the editor, a menu shows the icons of the essential functionalities provided within the editor. The first icon starting from the left, allows us to save the model.



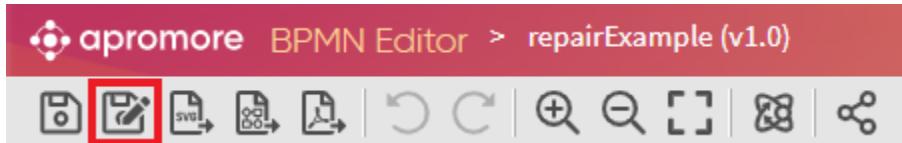
When selected this option, the following message-box appears.



We can choose the version number of the process and the branch (folder) to save it. Each process version is kept in the memory, and it is possible to retrieve any of it at any time (more details on how to access the older versions of a process model come below).

2.5.2 Save a copy of a model

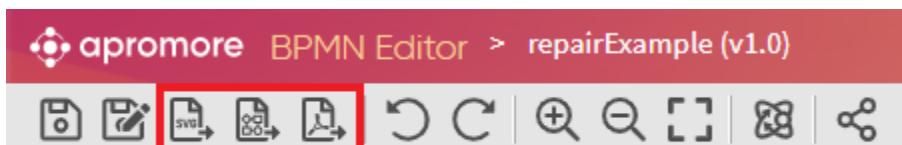
If we want to save a copy of the process model, we can click on the menu's second icon, as shown below.



Save a copy allows us to duplicate the process model in the repository, rename it, and restart the version counter from 1.0.

2.5.3 Export model

The third icon exports the process model in the format .SVG. The fourth and fifth icons export the process model in the formats .BPMN and .PDF (respectively), as pictured below.



Export as **.SVG .BPMN PDF**

Note: Remember to allow pop-up windows before exporting the process, otherwise, the export may fail.

2.5.4 Undo/Redo

The next two icons allow to undo and redo changes applied to the process model.



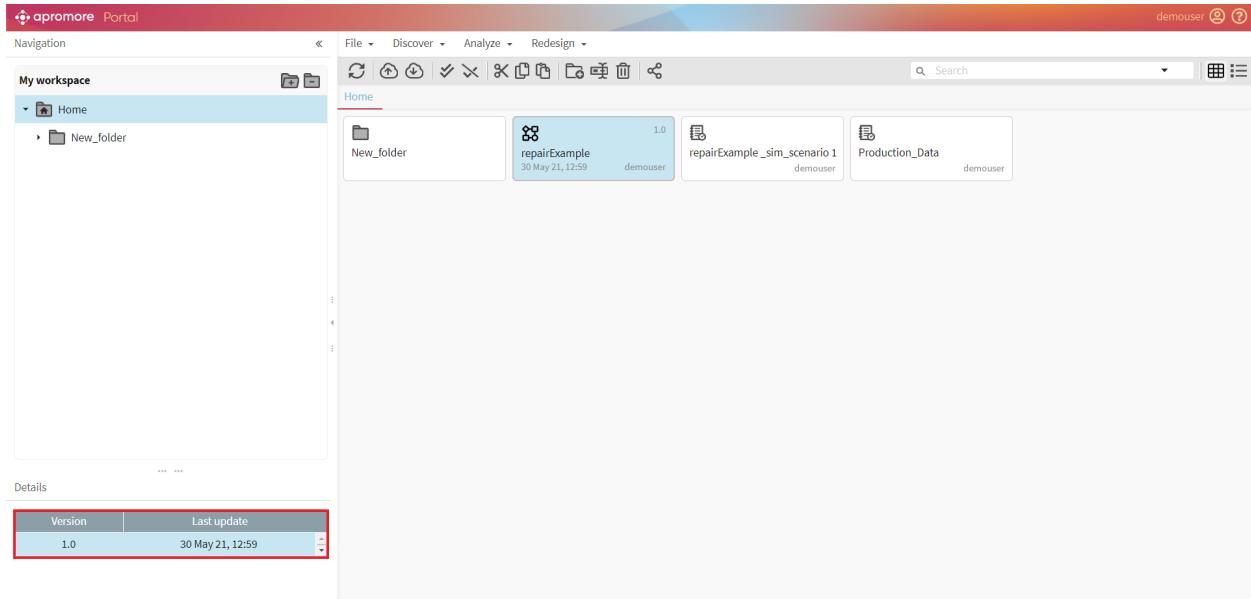
2.5.5 Zoom-in/Zoom-out

Finally, the two zoom lenses allow to zoom-in and zoom-out.



2.5.6 Access an older version of a process model

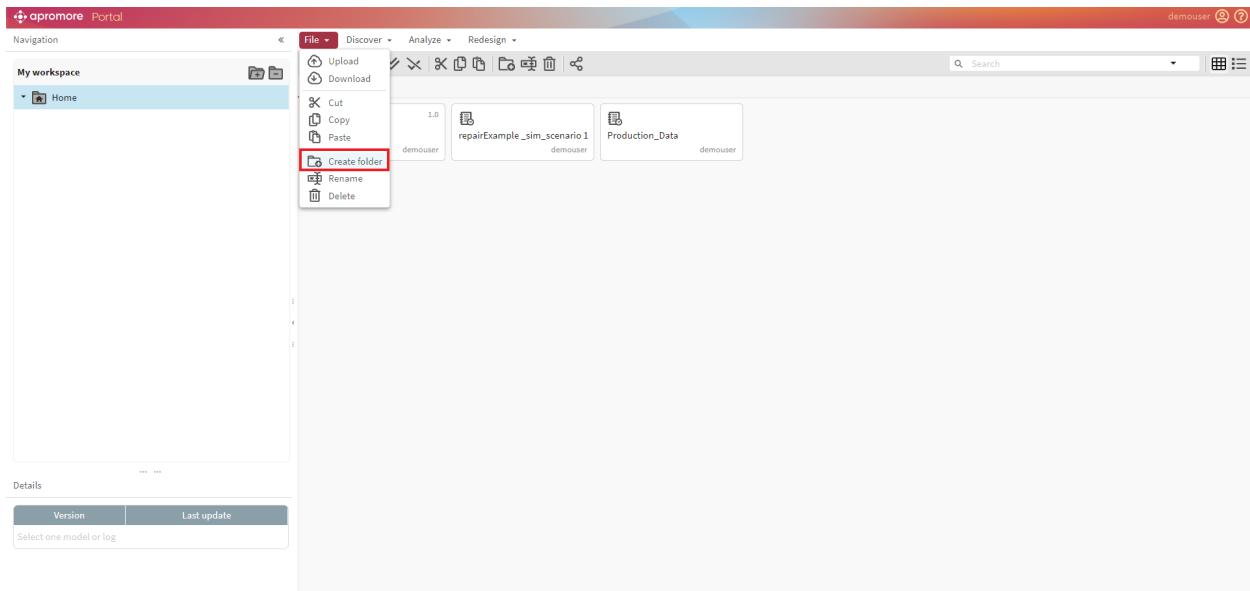
To access older versions of a process model, select the process model in the repository browser. Please select the version we want to edit from the tab on the left bottom corner (as highlighted in the screenshot), and either double-click on it or hit the *File -> Edit Model*.



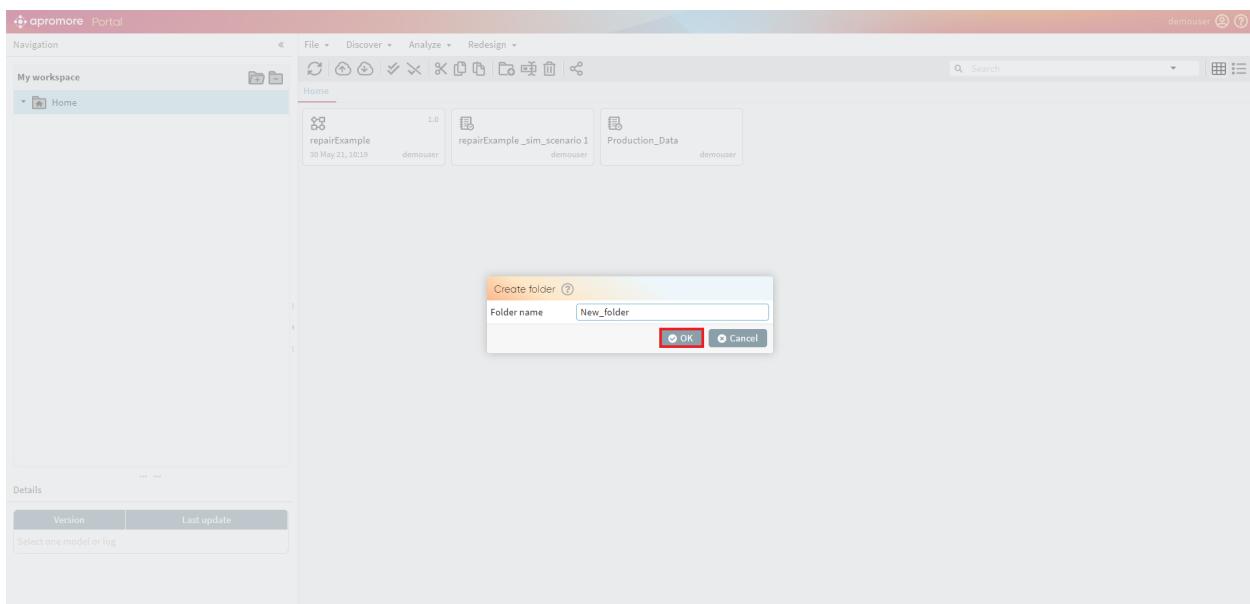
2.6 Create new folder

Folders help to organize the files for better management.

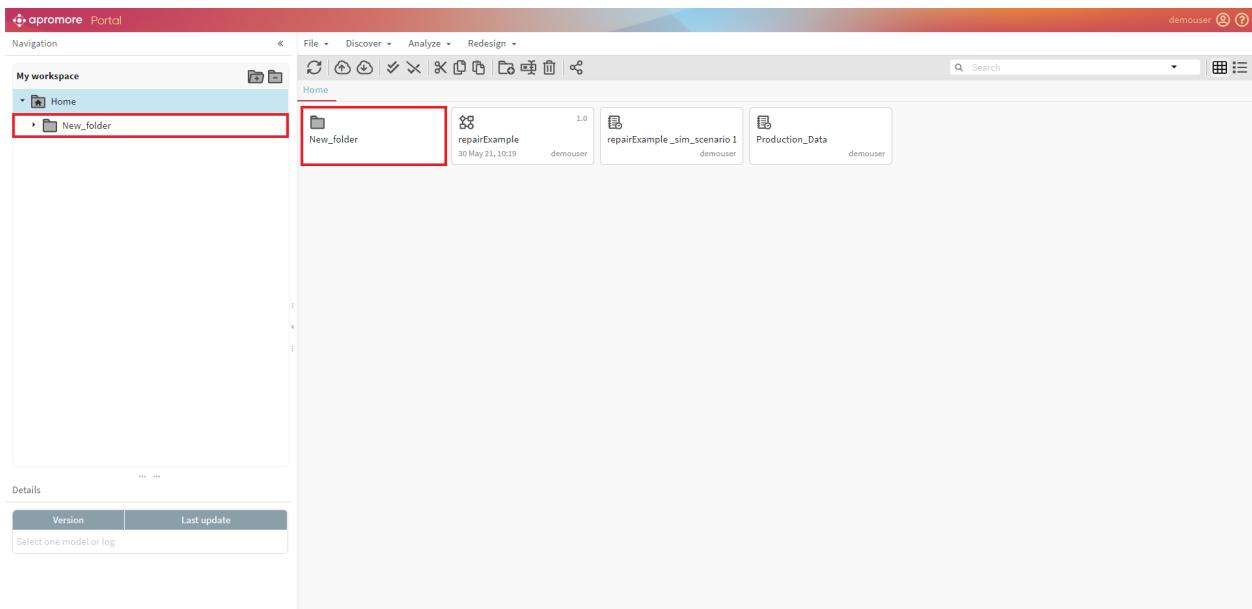
To create a folder, browse to the directory you want to create a folder and click on *File -> Create folder*.



Enter the folder name in the window displayed. Click *OK*.



The folder will be placed into the location/repository in which the user had initiated the plugin.



2.7 Sharing and Access Rights

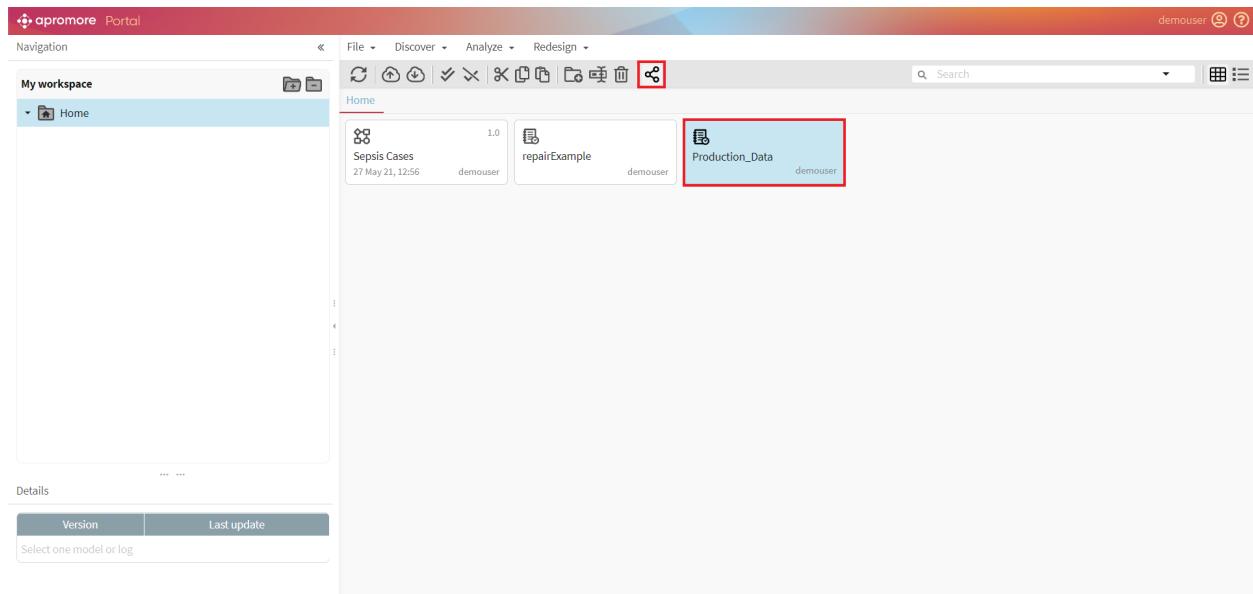
Aproxmore allows us to share files/folders. Each file/folder has a particular security level.

Note: By default, each file/folder is created and saved as private and can be accessed, edited, deleted only by the owner.

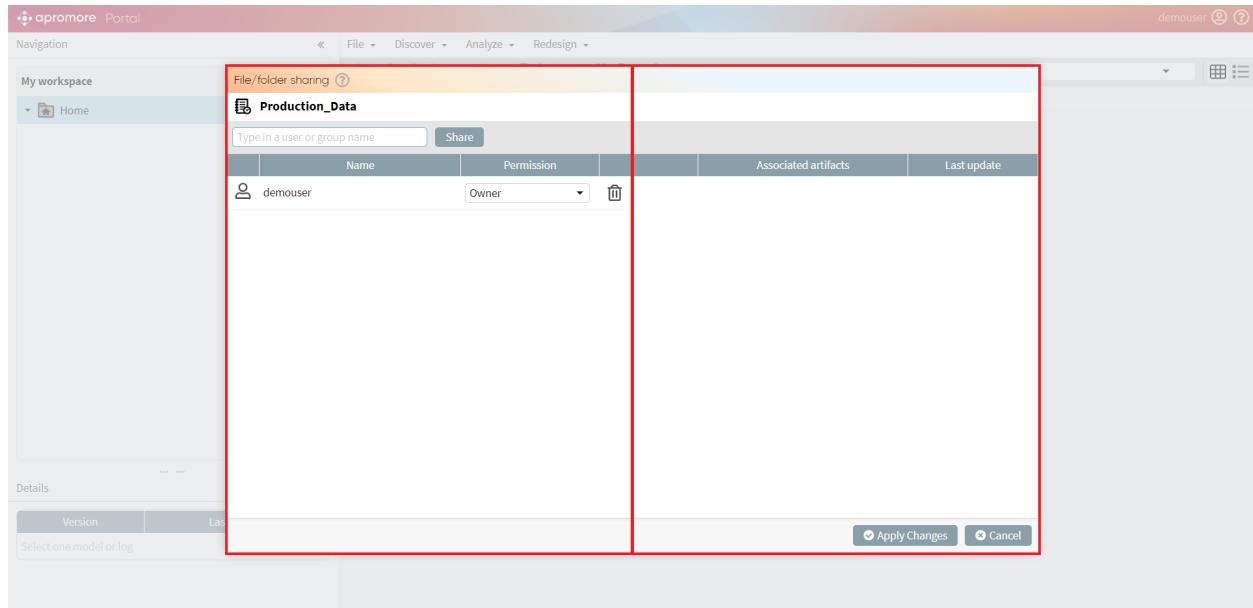
It is possible to change a file/folder's security level by selecting it in the workspace and clicking the  button.

2.7.1 Share an event log

To share an event log, select the log from the workspace and click on the  button.



File Sharing window consists of two sections: *List of Users and Associated artifacts*.



Note: To share all the artifacts (filters/dashboards) associated with a log, set the *Viewer (full)* permission to the user. To share only specific artifacts(filters/dashboards) associated with a log, set the *Viewer (restricted)* permission to the user and tick the boxes next to the artifacts to be shared.

We can find a user or group with whom we want to share the file using the *Type in a user or group name* textbox.

Click on *Share*.

The screenshot shows the Aproxmore Portal interface. In the center, there's a modal window titled 'Production_Data' under the 'File/folder sharing' tab. The 'Share' button is highlighted in red. Below it, a table lists users with their names, permissions, associated artifacts, and last update times. The user 'demouser' is listed as the owner. Two artifacts are associated with this folder: 'Filter 1' and 'Dashboard 1'.

Name	Permission	Associated artifacts	Last update
demouser	Owner	Filter 1, Dashboard 1	21-01-2021 10:28:58, 21-01-2021 10:37:38

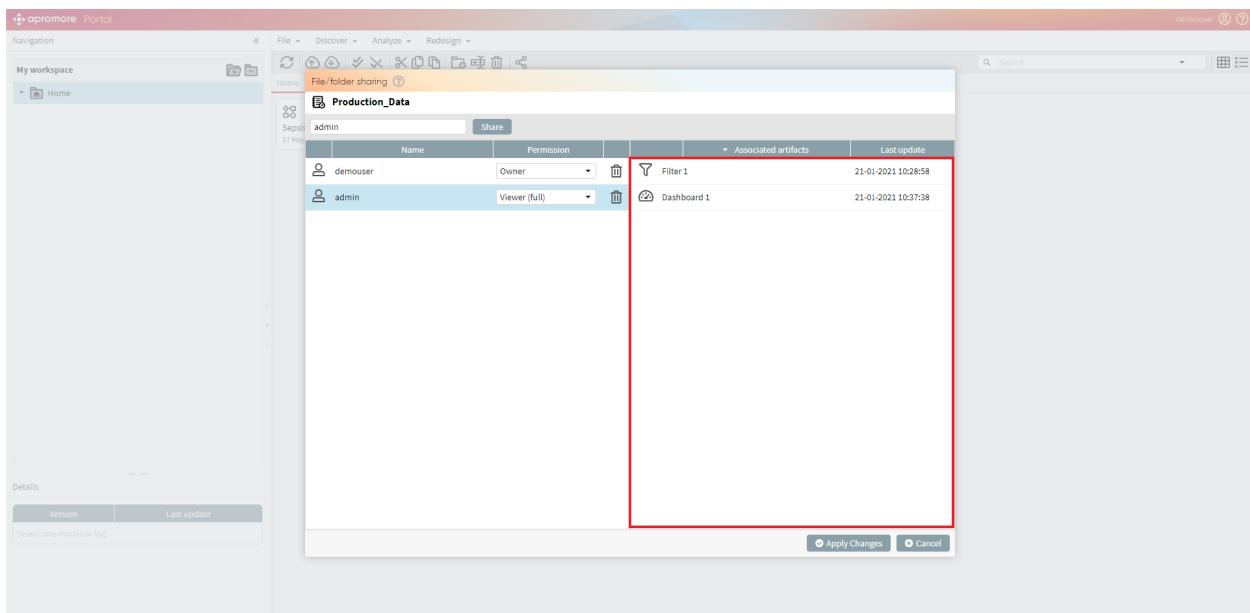
The selected user appears in the users' list.

This screenshot shows the same sharing interface as the previous one, but with a different user selected. The user 'admin' is now listed with 'Viewer (full)' permission. The associated artifacts remain the same: 'Filter 1' and 'Dashboard 1'.

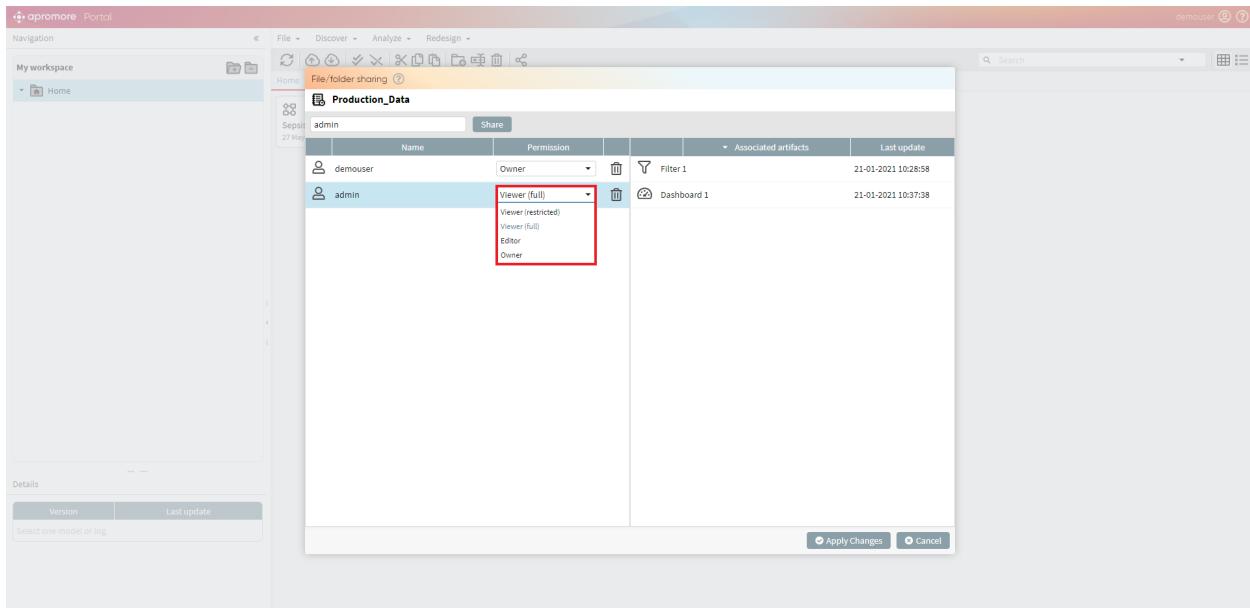
Name	Permission	Associated artifacts	Last update
demouser	Owner	Filter 1, Dashboard 1	21-01-2021 10:28:58, 21-01-2021 10:37:38
admin	Viewer (full)	Filter 1, Dashboard 1	21-01-2021 10:28:58, 21-01-2021 10:37:38

We can see the list of associated artifacts automatically shared with a user in the *Associated Artifacts* section.

Note: Only an owner or editor can edit/rename/delete the associated artifacts.



To change the access rights for a particular user, click on the *Permission* drop-down list and select the desired permissions.



Finally, click on *Apply Changes*.

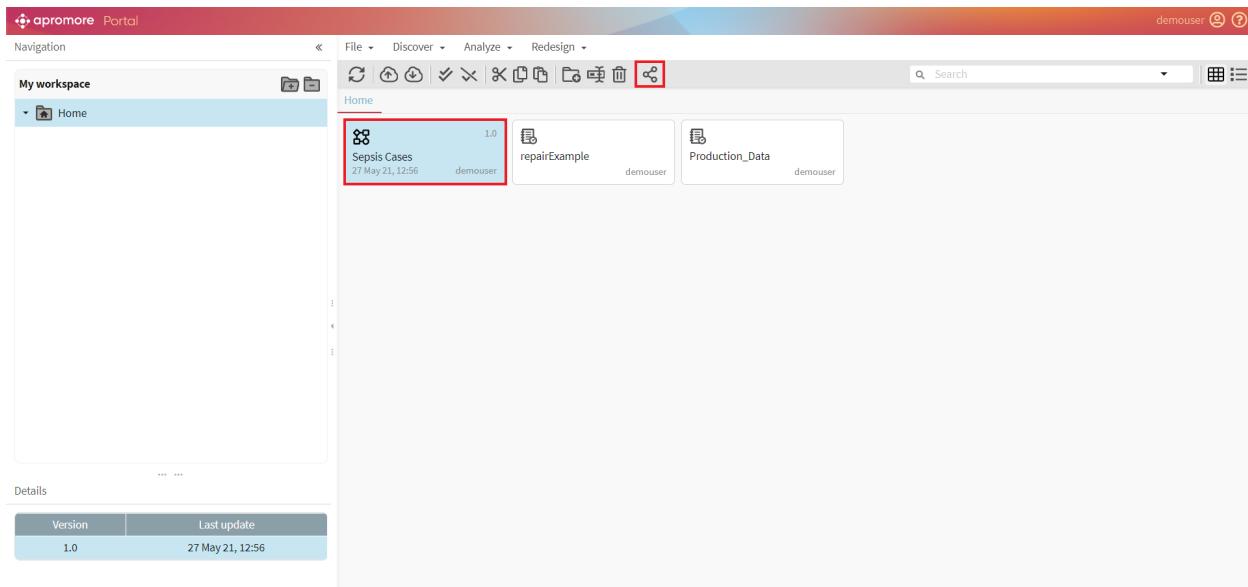
Name	Permission	Associated artifacts	Last update
demouser	Owner		21-01-2021 10:28:58
admin	Viewer (full)	Dashboard 1	21-01-2021 10:37:38

To revoke access for a particular user, click on the button.

Name	Permission	Associated artifacts	Last update
demouser	Owner		21-0-2021 10:28:58
admin	Viewer (full)	Dashboard 1	21-0-2021 10:37:38

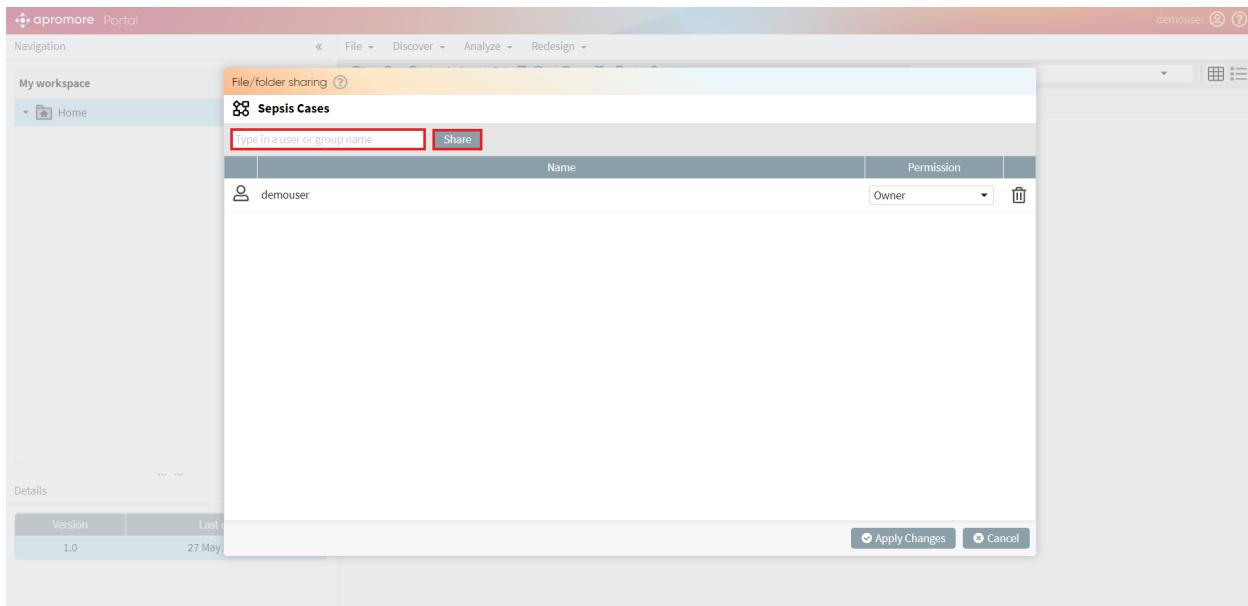
2.7.2 Share a process model

To share a process model, select it from the workspace and click on the  button.



We can find a user or group with whom we want to share the model using the *Type in a user or group name* textbox.

Click on *Share*.



The selected user appears in the users' list.

The screenshot shows the Aproxmore Portal interface. In the center, there's a modal window titled "File/folder sharing" for a folder named "sepsis Cases". The modal contains a table with two rows. The first row is for "demouser" and has "Owner" selected in the "Permission" dropdown. The second row is for "admin" and has "Viewer (full)" selected. Both rows have a small trash icon in the last column. At the bottom of the modal, there are "Apply Changes" and "Cancel" buttons. On the left side of the main screen, there's a sidebar with "My workspace" and a "Home" link.

To change the access rights for a particular user, click on the *Permission* drop-down list and select the desired permissions.

This screenshot is similar to the one above, showing the "File/folder sharing" modal for the "sepsis Cases" folder. The "admin" row in the table now has a dropdown menu open next to the "Permission" column. The menu contains three options: "Viewer (full)", "Editor", and "Owner", with "Viewer (full)" highlighted by a red box. The other parts of the interface, including the "Details" section at the bottom, remain the same.

Finally, click on *Apply Changes*.

Name	Permission
demouser	Owner
admin	Viewer (full)

Details

Version	Last
1.0	27 May

Apply Changes Cancel

To revoke access for a particular user, click on the  button.

Name	Permission
demouser	Owner
admin	Viewer (full)

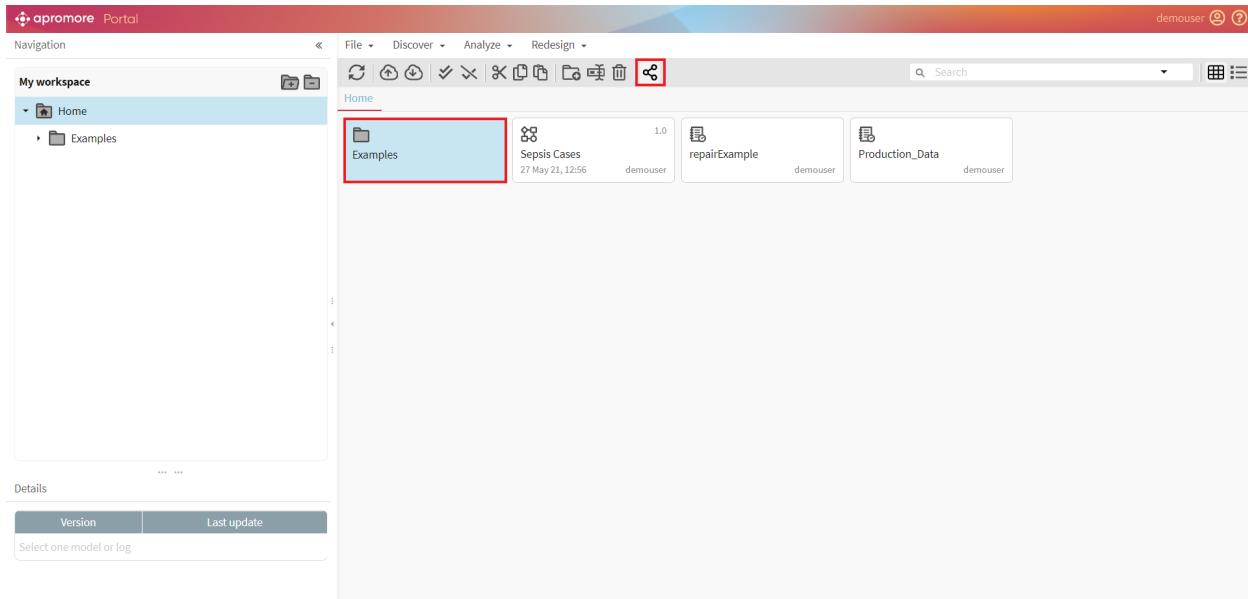
Details

Version	Last
1.0	27 May

Apply Changes Cancel

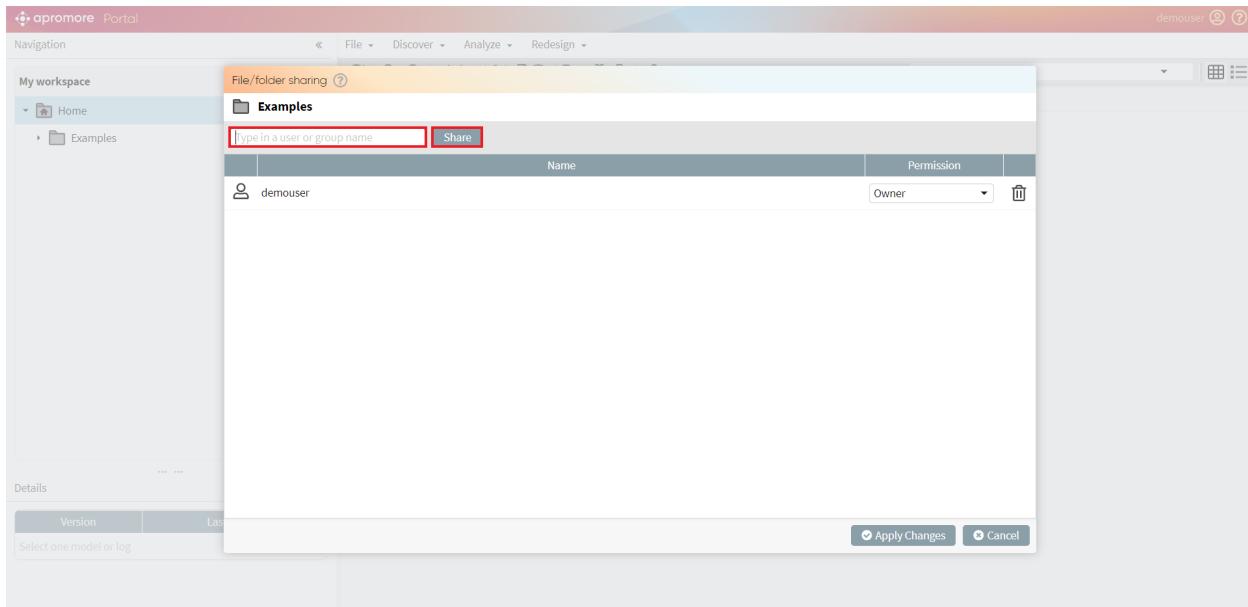
2.7.3 Share a folder

To share a folder, select the folder from the workspace and click on the  button.

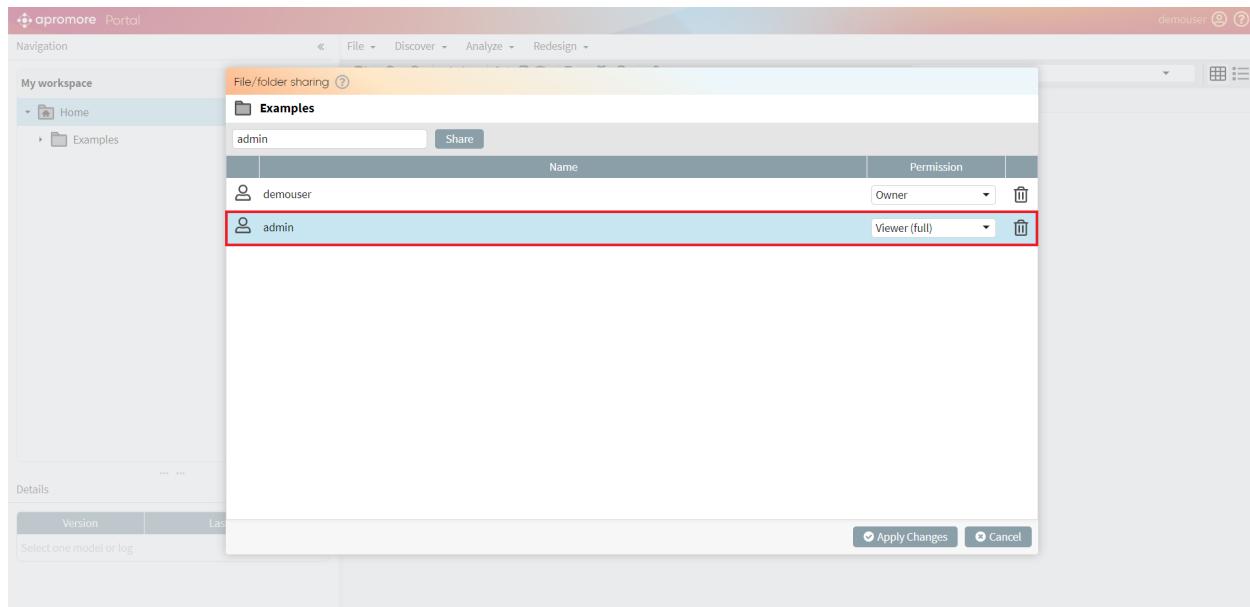


We can find a user or group with whom we want to share the folder using the *Type in a user or group name* textbox.

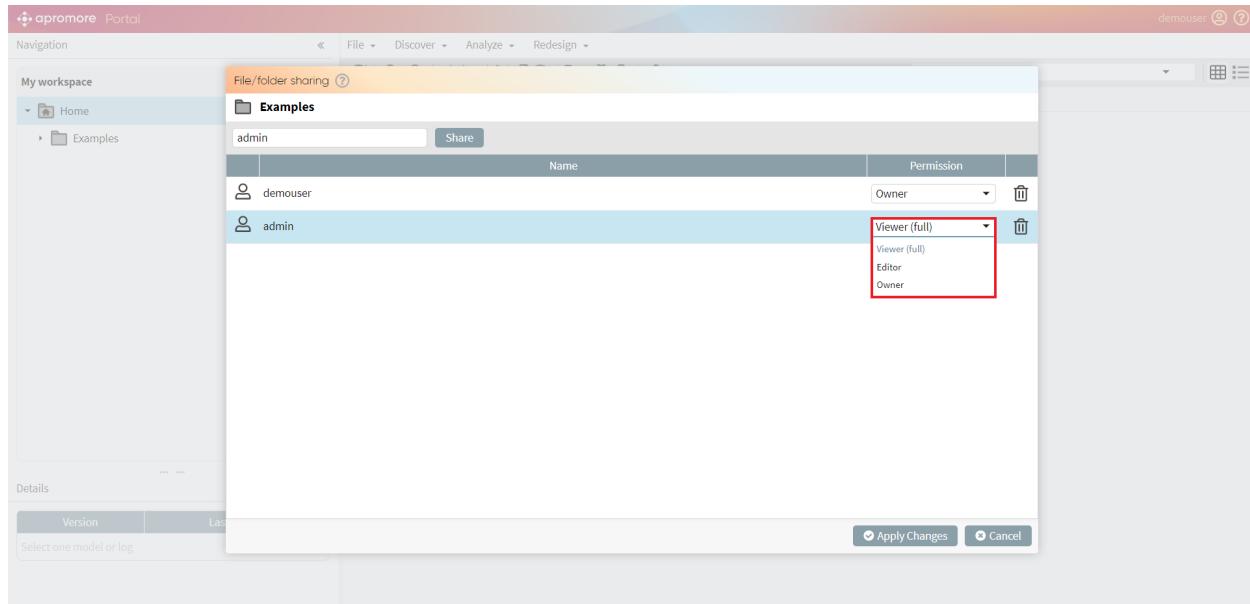
Click on *Share*.



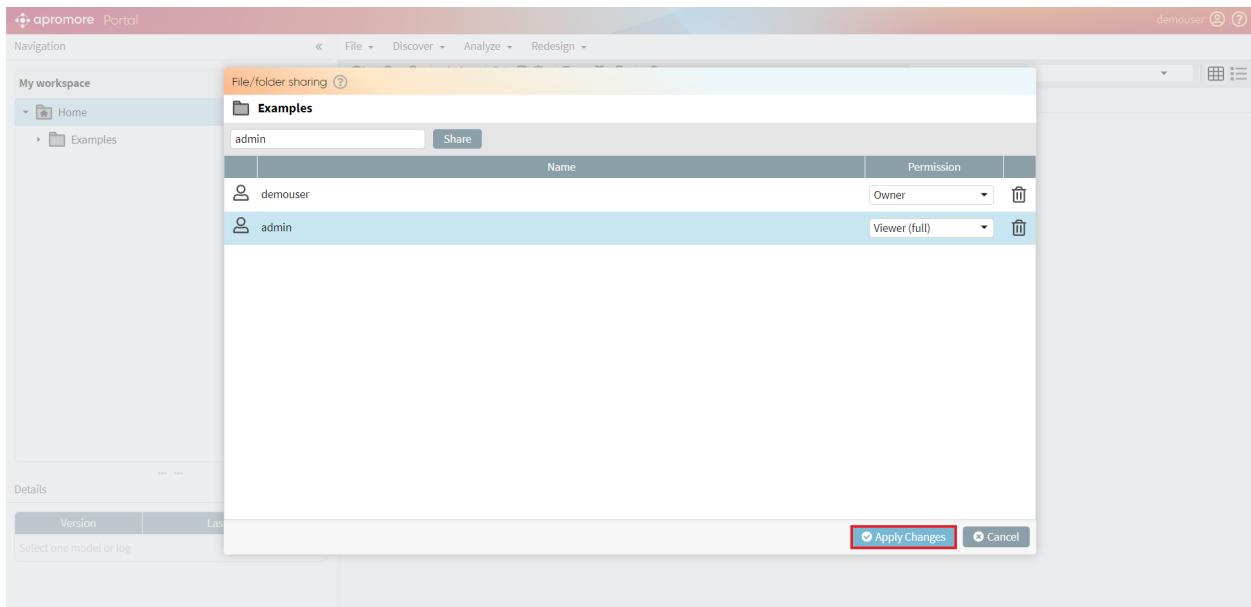
The selected user appears in the users' list.



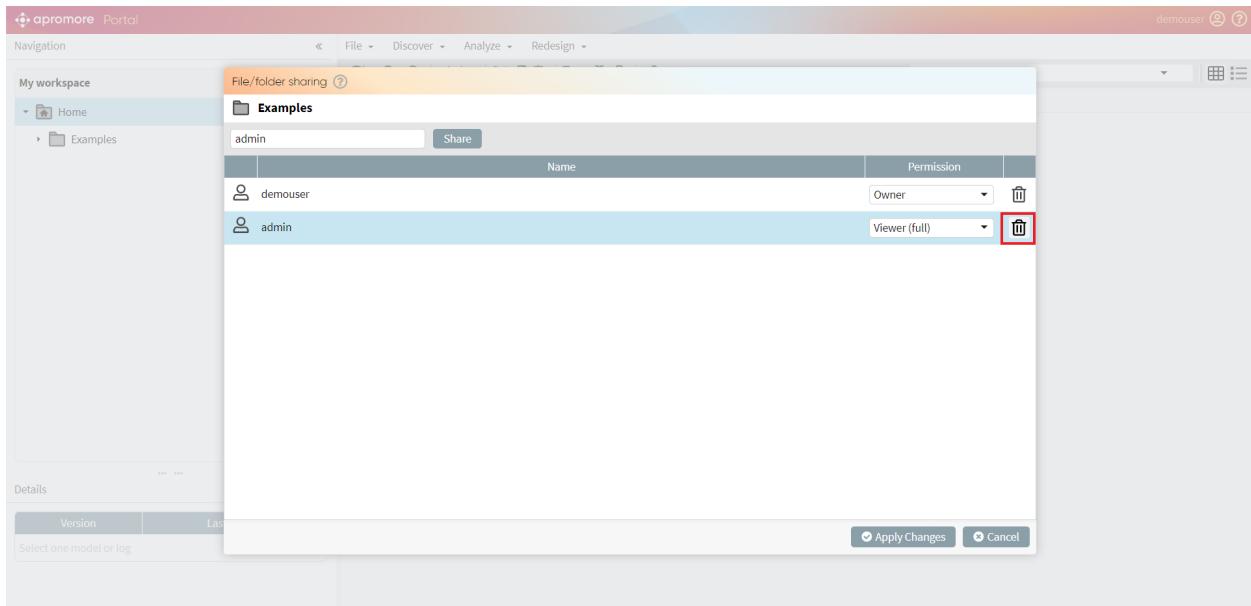
To change the access rights for a particular user, click on the *Permission* drop-down list and select the desired permissions.



Finally, click on *Apply Changes*.



To revoke access for a particular user, click on the button.



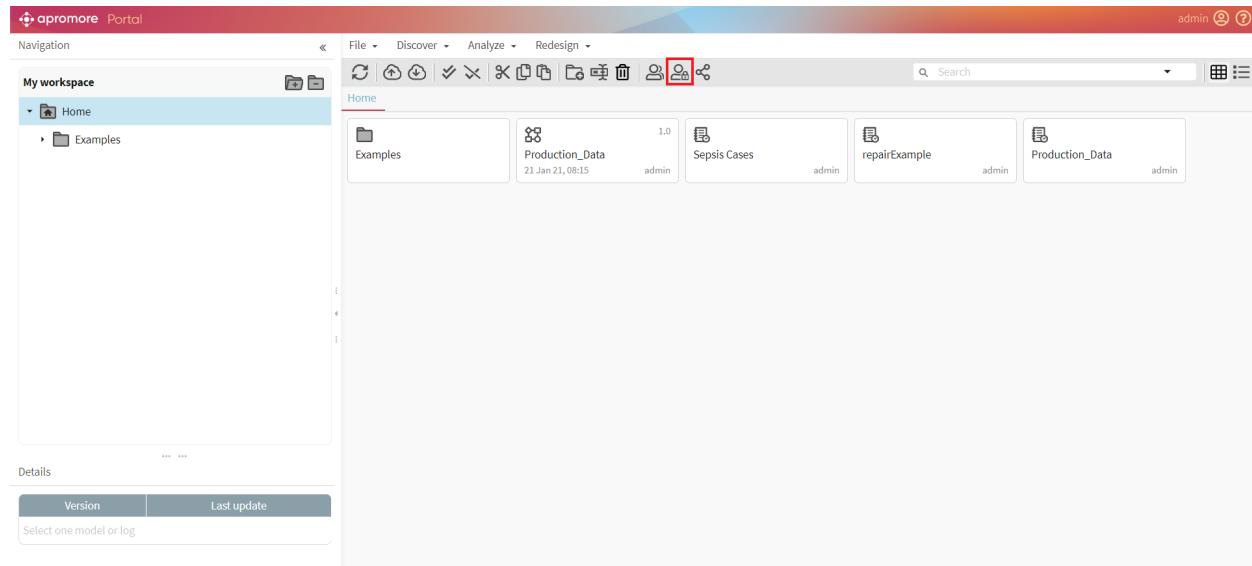
Note: For security reasons, the files in the folder are not automatically shared. To share a file within a folder, we must select it individually and provide access.

2.7.4 Access Rights Management

Access Rights Management functionality provides the administrators with a comprehensive view of all the files and folders along with the users and their access rights. The administrator can easily browse through the permissions of the files/folders.

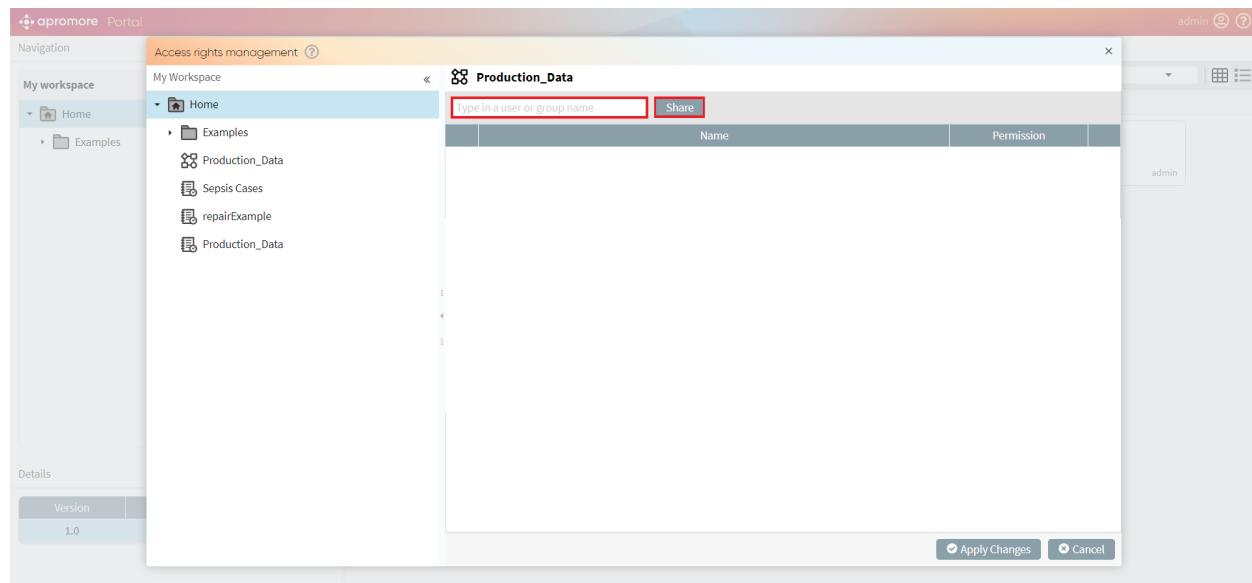
Note: Only a user with administrator rights can access the *Access Rights Management* functionality.

To share files/folders, click on the  button.



After the *Access rights management* window opens, select the file/folder to be shared and enter the username you intend to share the file/folder with in the *Type in a user or group name* textbox.

Click on *Share* to share the file/folder.



On clicking *Share*, the user appears in the users list.

Name	Permission
admin	Owner
demouser	Viewer

To change the access rights for a particular user, click on the *Permission* drop-down list and select the desired permissions.

Name	Permission
admin	Owner
demouser	Viewer (full)

Finally, click on *Apply Changes*.

The screenshot shows the Apromore Portal interface. In the center, a modal window titled "Access rights management" is open for the "Production_Data" workspace. The workspace navigation tree on the left includes "Home", "Examples", "Production_Data", "Sepsis Cases", "repairExample", and another "Production_Data". The main area displays a table of users with their names, roles, and permission levels. The "admin" user is listed as the "Owner". The "demouser" user is listed with "Viewer (full)" permission. At the bottom right of the modal, there are "Apply Changes" and "Cancel" buttons.

To revoke access for a particular user, click on the button.

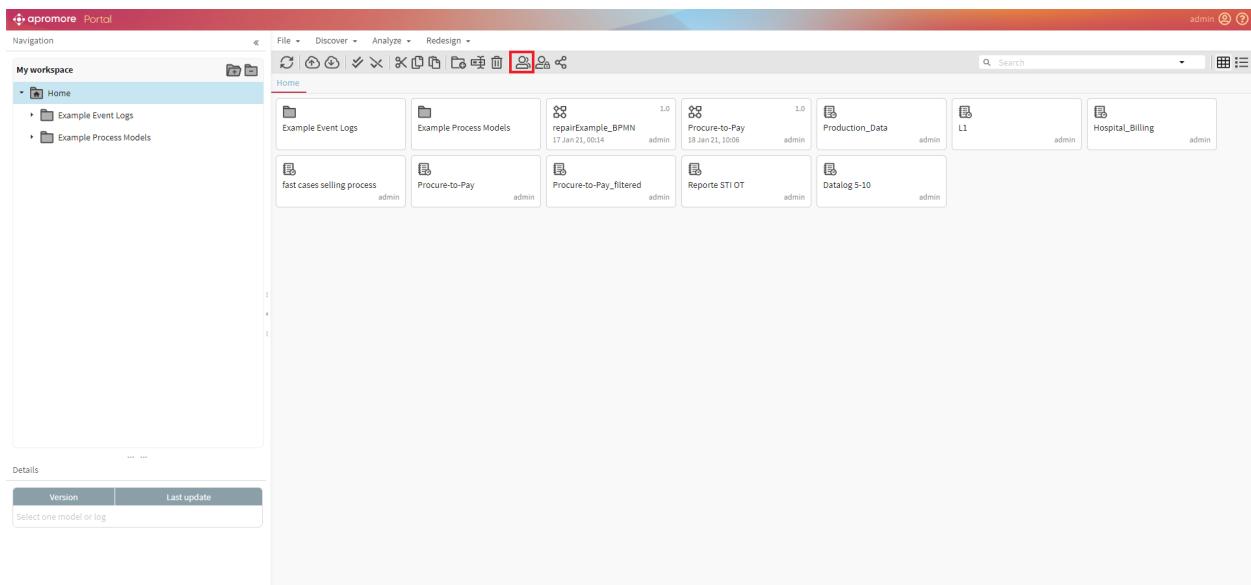
This screenshot shows the same "Access rights management" dialog after the "demouser" row has been deleted. The "demouser" entry is no longer present in the list, and the "Apply Changes" button at the bottom is highlighted with a red box.

2.8 Manage users and groups

Users and groups management functionality allows us to grant permissions to users for either using features or different artifacts. Each user can belong to a group or can be associated with a role. A Role is an attribute of the user. A Group is a set of users and is about access rights to different folders/files (e.g. as a member of the group Sales I can only access files related to the Sales Department).

Note: Only a user with administrator rights can access the *Manage users and groups* functionality

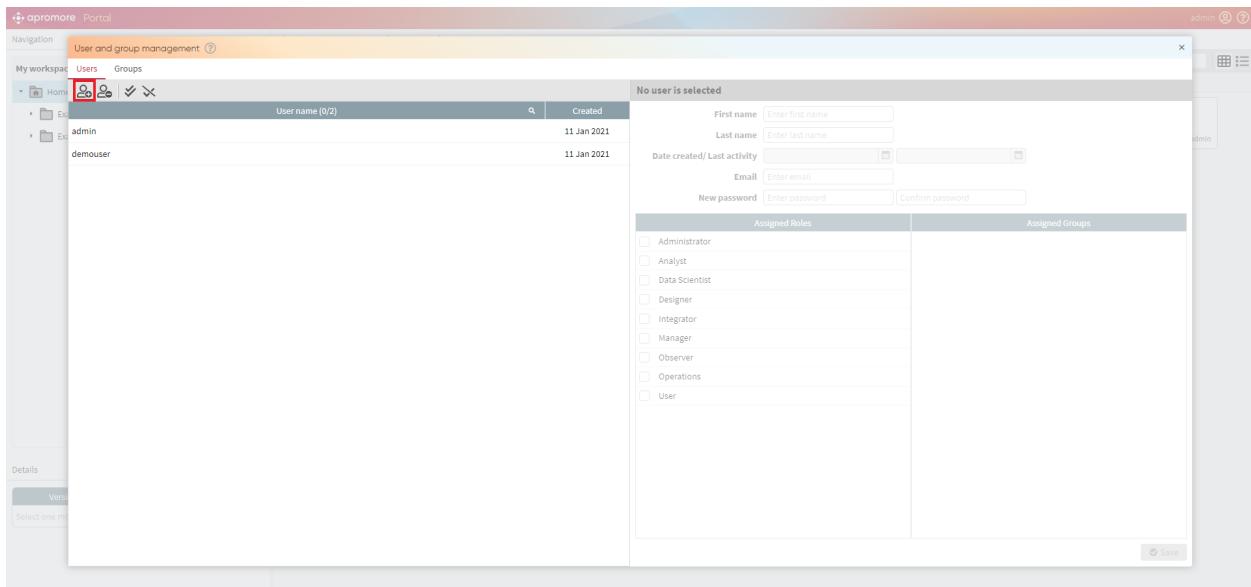
Click on the *Manage users and groups* button.



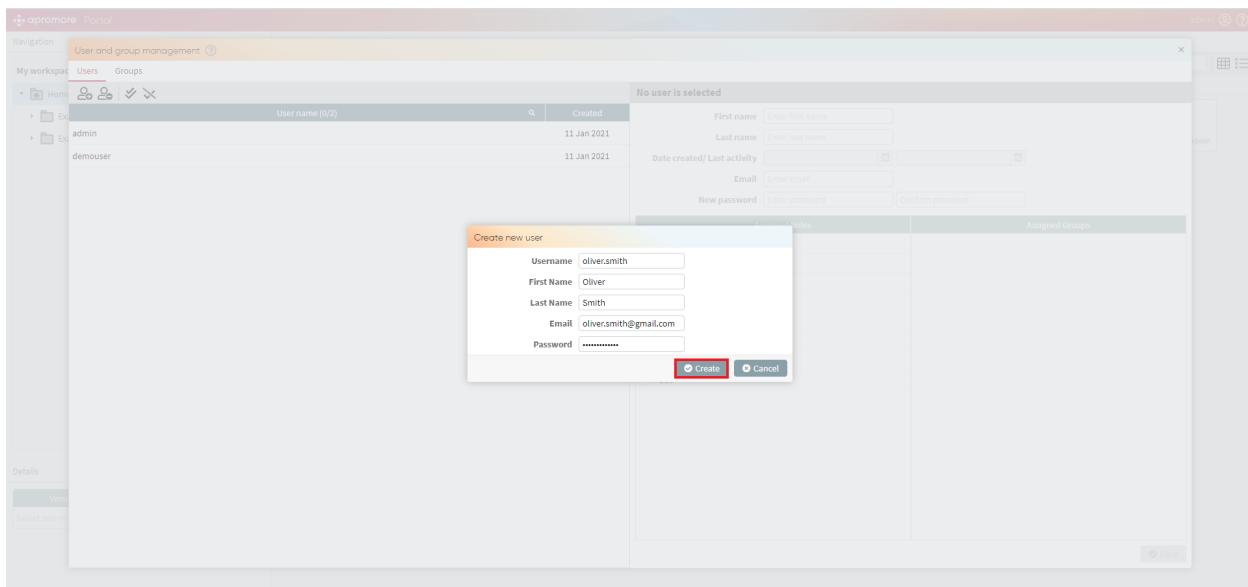
Once the *User and group management* dialog opens up, we can create/remove a user, create/remove a group and assign users different roles and groups.

2.8.1 Create new user

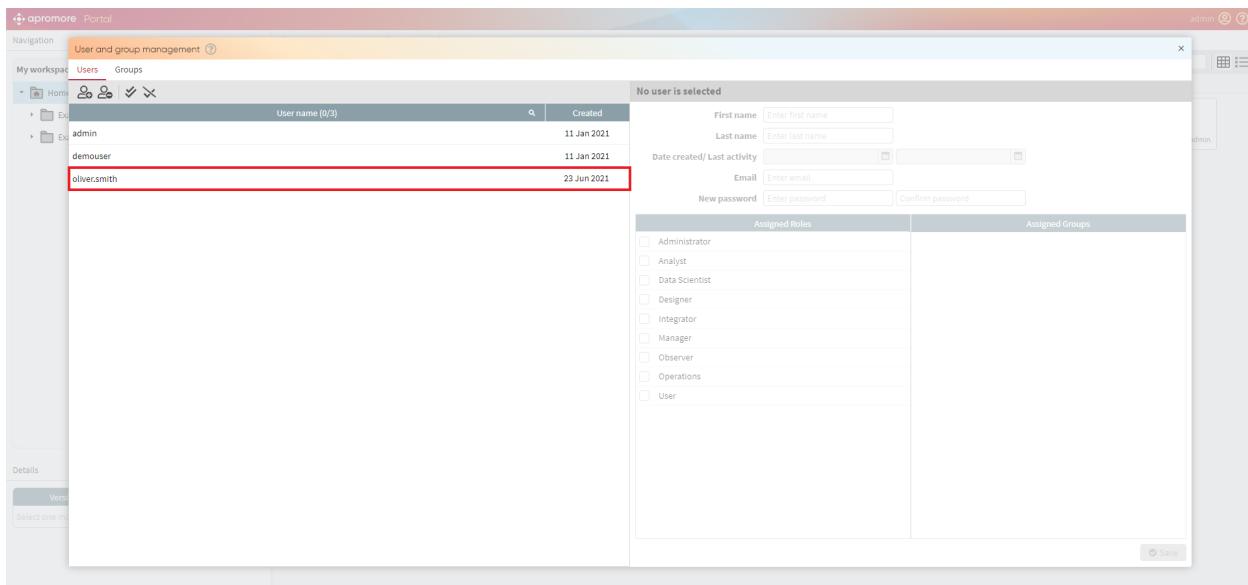
To create a new user, click on the *create new user* button.



Enter all the details in the *Create new user* dialog and click on *Create* button.



The user will be created.



2.8.2 Remove User

To delete a user, select the user you want to delete and click on *Remove user* button.

User: oliver.smith

Assigned Roles	Assigned Groups
<input type="checkbox"/> Administrator	
<input checked="" type="checkbox"/> Analyst	
<input type="checkbox"/> Data Scientist	
<input type="checkbox"/> Designer	
<input type="checkbox"/> Integrator	
<input type="checkbox"/> Manager	
<input type="checkbox"/> Observer	
<input type="checkbox"/> Operations	
<input checked="" type="checkbox"/> User	

Click on *OK* to delete the user.

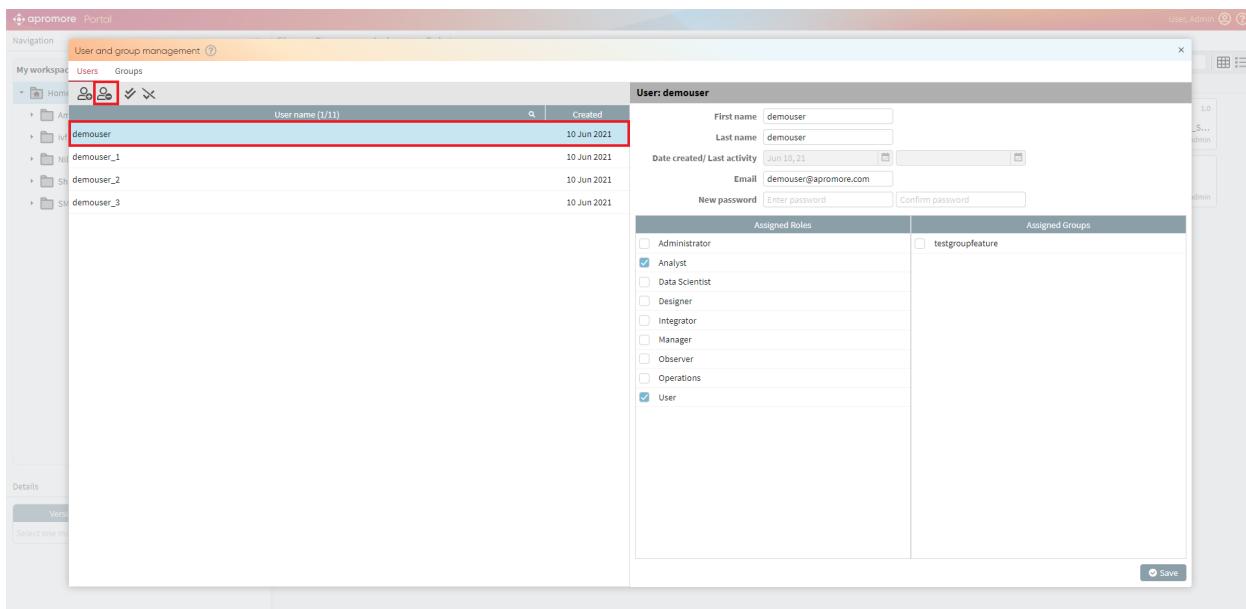
Question

Do you really want to delete oliver.smith?

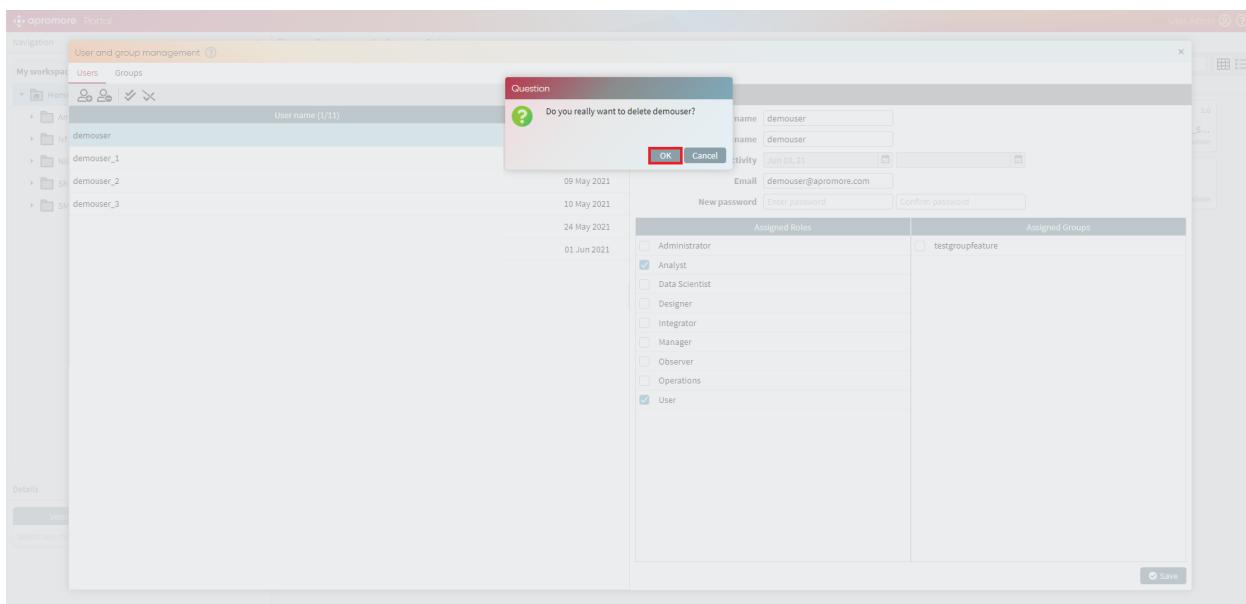
OK Cancel

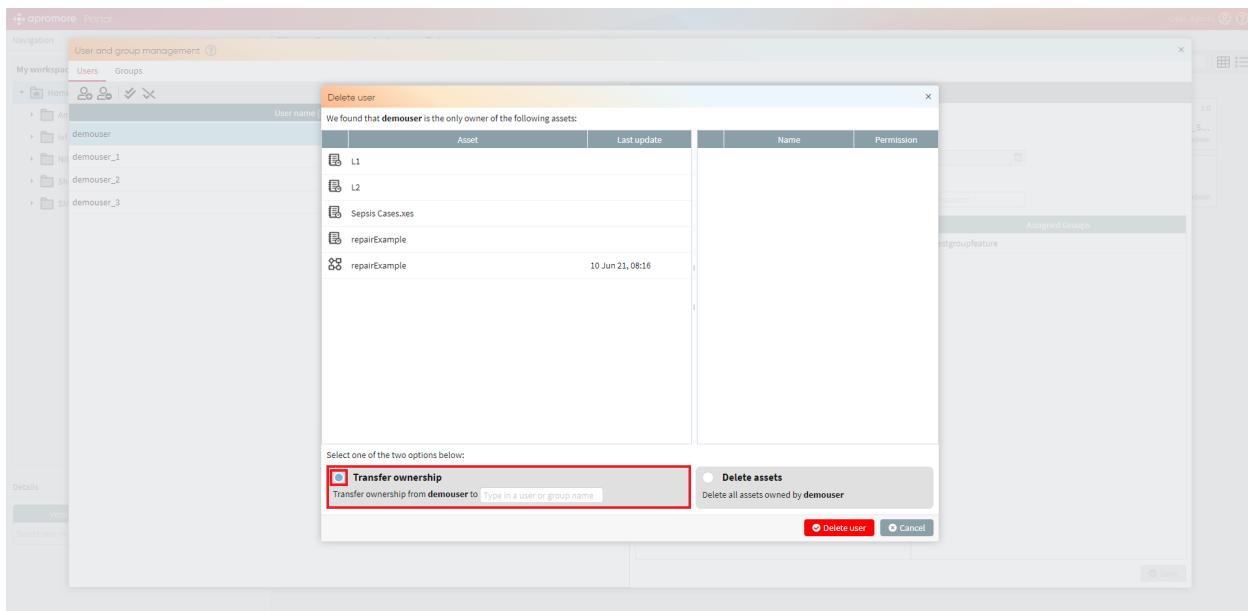
In case we don't want to lose files that the user had in his workspace we can transfer them to another user.

To do so, select the user we want to delete and click on *Remove user* button.

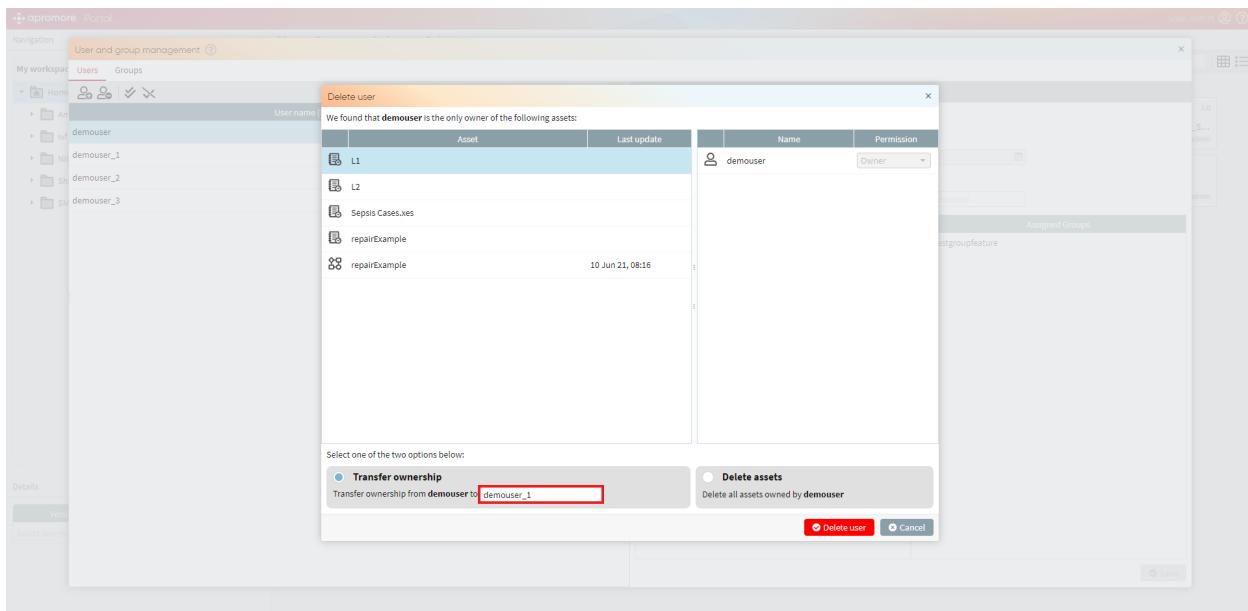


To transfer files, choose *Transfer ownership option* in the bottom left corner of the *Delete user window*, which appears right after we click *OK* in the *confirmation window*.

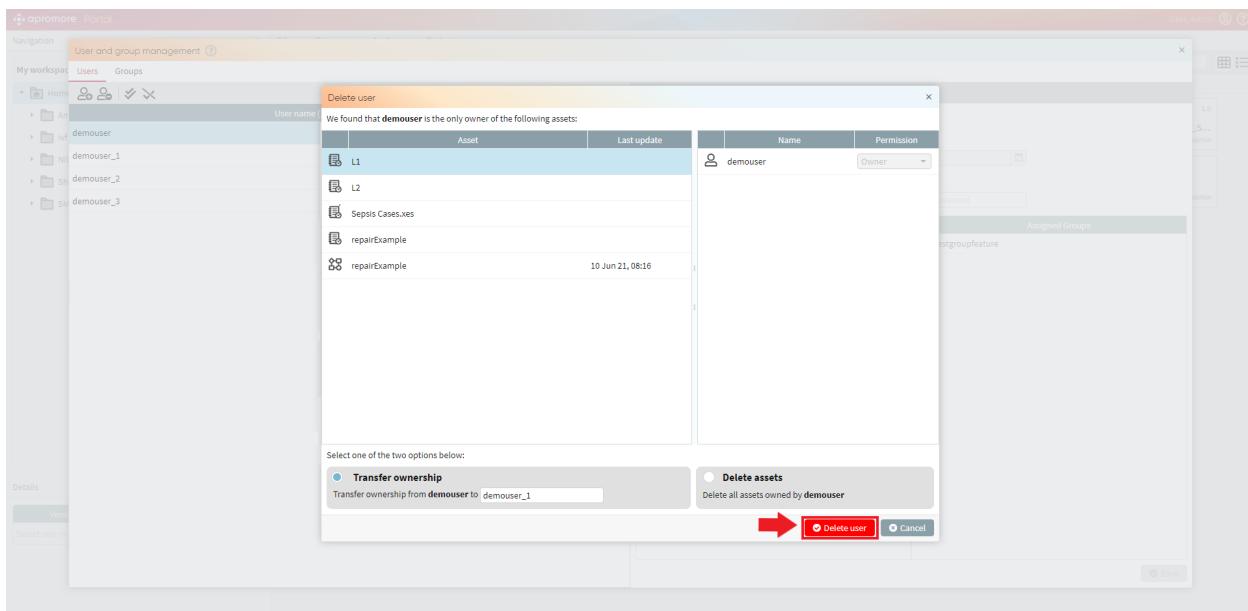




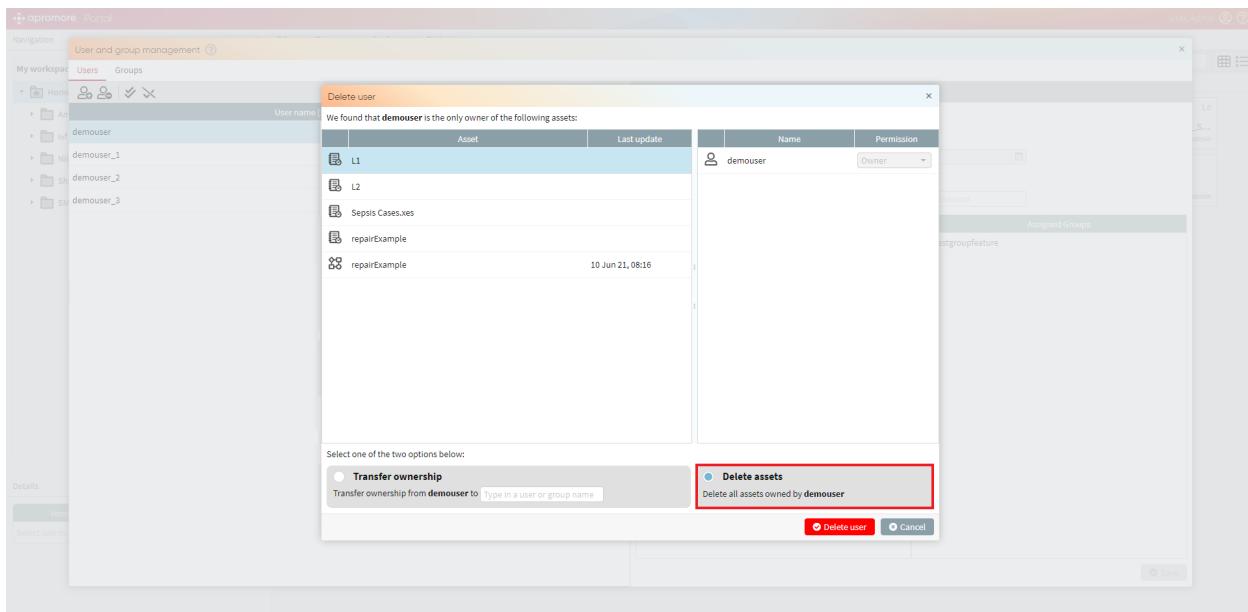
Specify the name of the user to whom we want to transfer the files.



Click *Delete user* to finalize the process.



If we looked through the files and didn't find them necessary, we can remove them by choosing the *Delete assets option*.

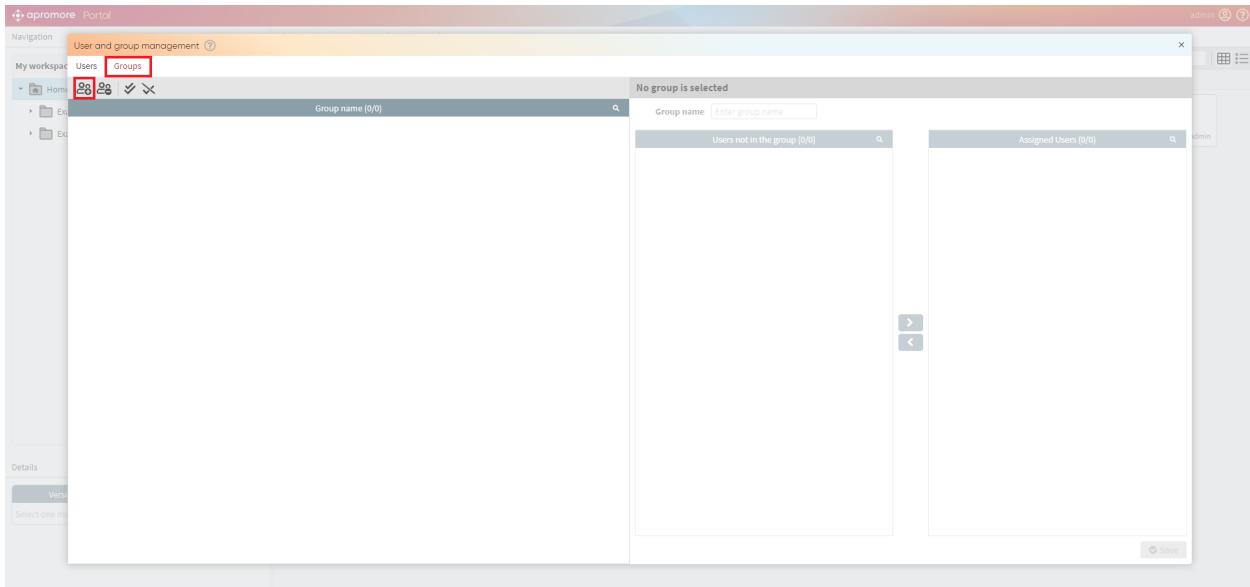


If the user didn't have any logs/folders in his workspace, he will be deleted right after we click on *OK* in the confirmation window.

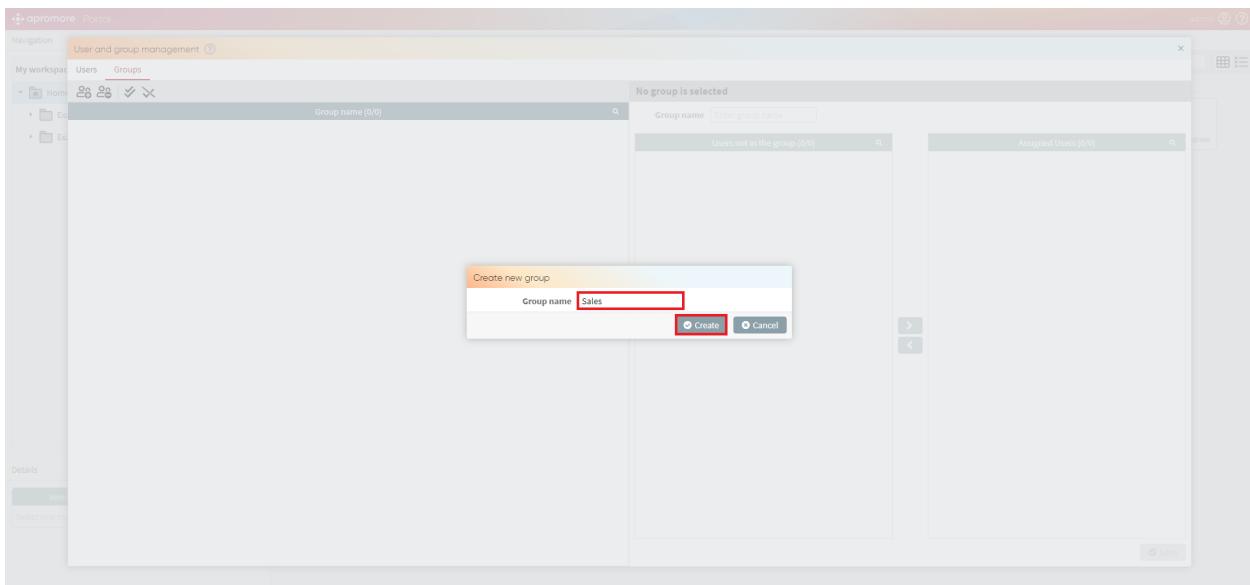
Note: If the user didn't have any logs/folders in his workspace, he will be deleted right after we click on *OK* in the confirmation window.

2.8.3 Create new group

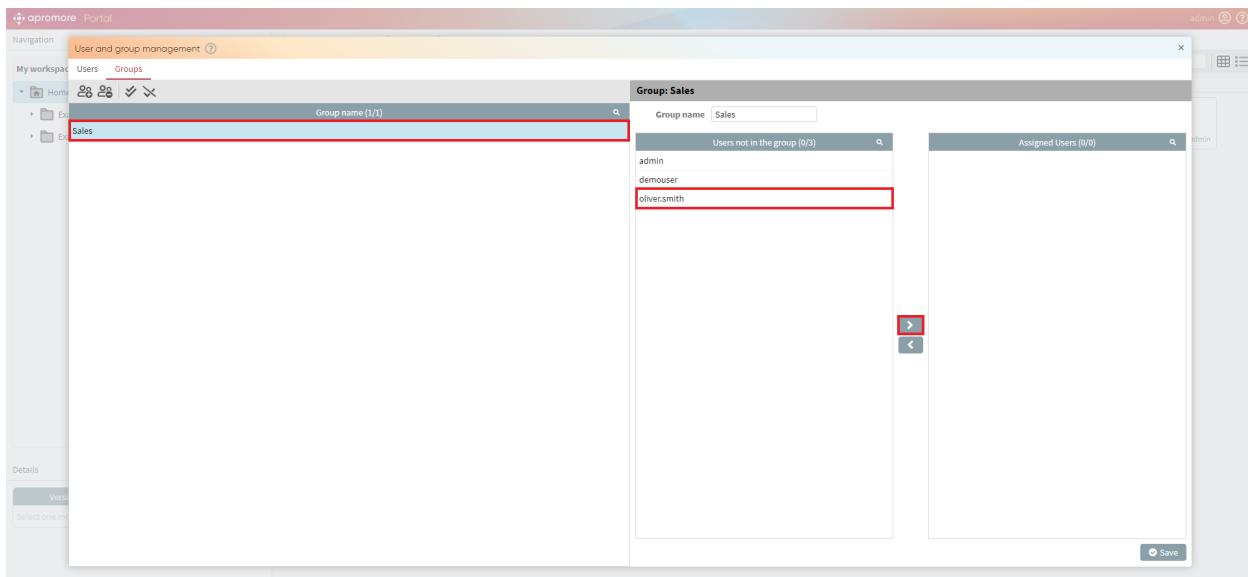
To create a new group, click on *Create new group* button in the *Groups* section.



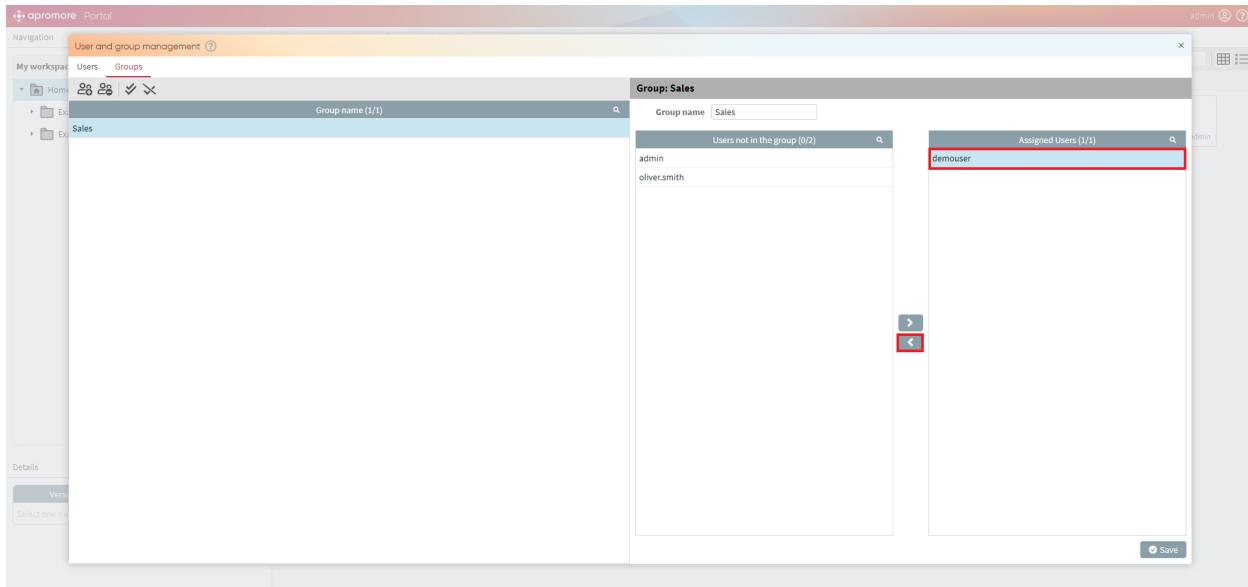
Enter the name of the group and click on *Create*.



The group will be created. To add users to a group, select the group. On the right-hand side, we can select the user and click on “>” button to add the users to the group.

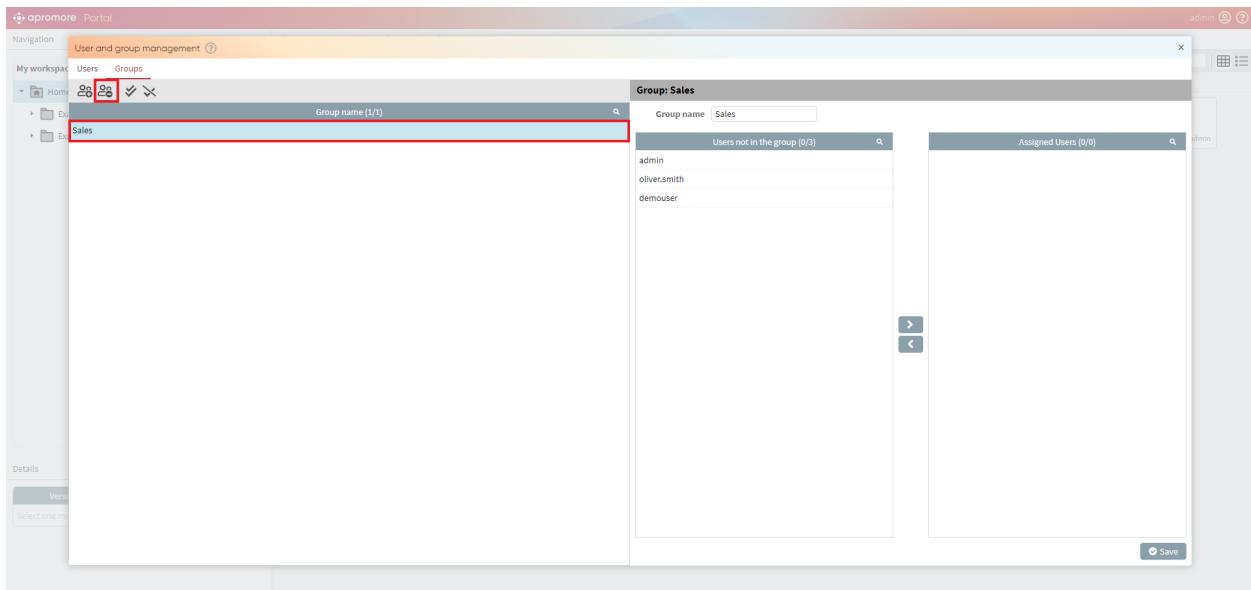


To remove a user from the group, select the user in *Assigned Users* section and click on “<” button.



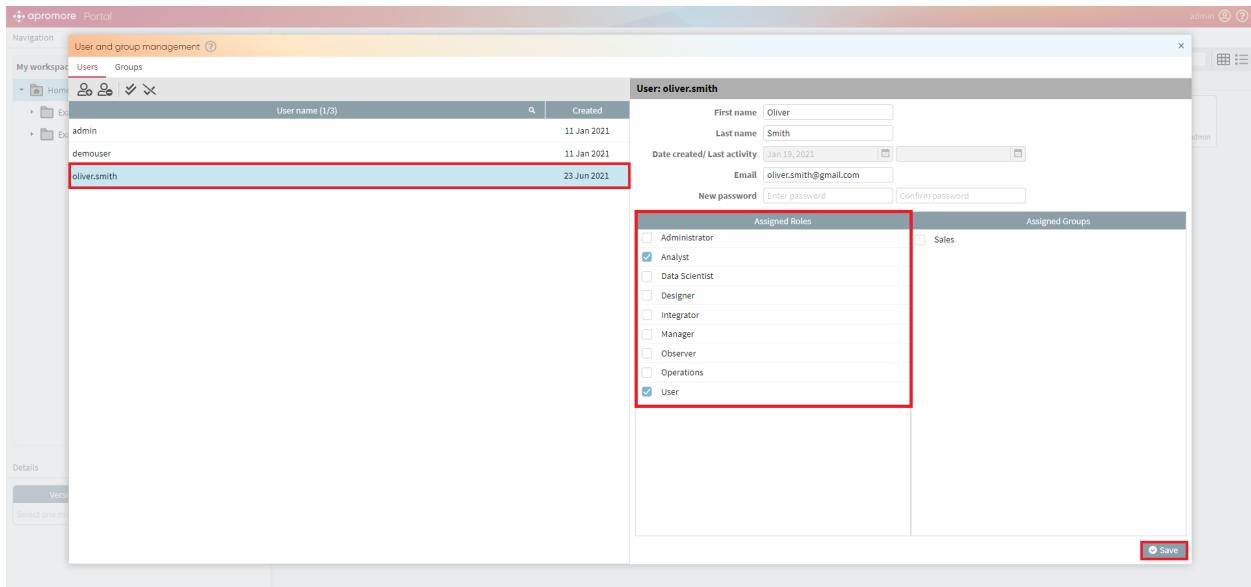
2.8.4 Remove group

To remove a group, select the group and click on the *Remove group* button.



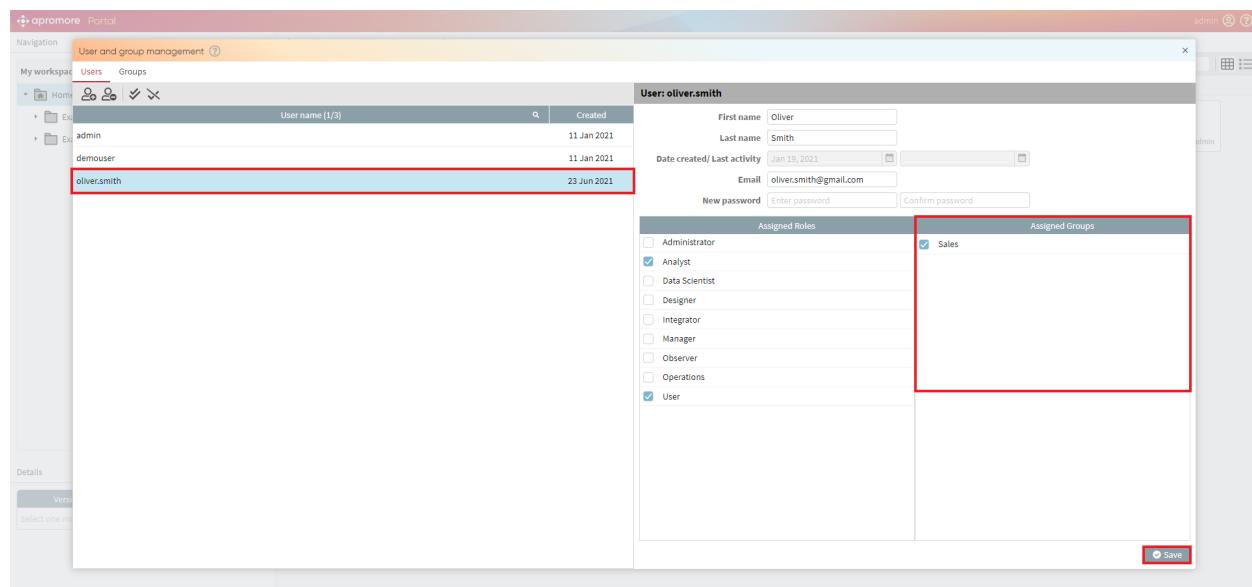
2.8.5 Assign roles to a user

To assign roles to a user, select the user and choose a role in *Assigned Roles* section and click on *Save*.



2.8.6 Add a user to a group

To add a user to a group, select the user and choose a group in the *Assigned Groups* section and click on *Save*.



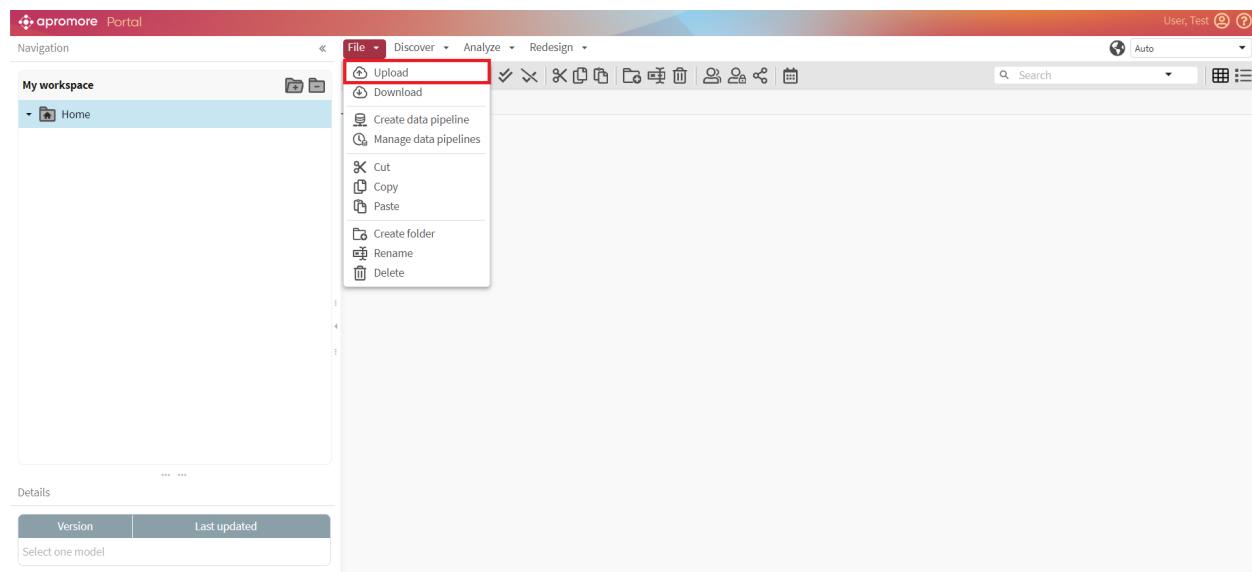
2.9 Manage calendars

Apromore allows to create and apply a calendar to a log. All the computations and execution times related to the selected log are calculated according to the calendar.

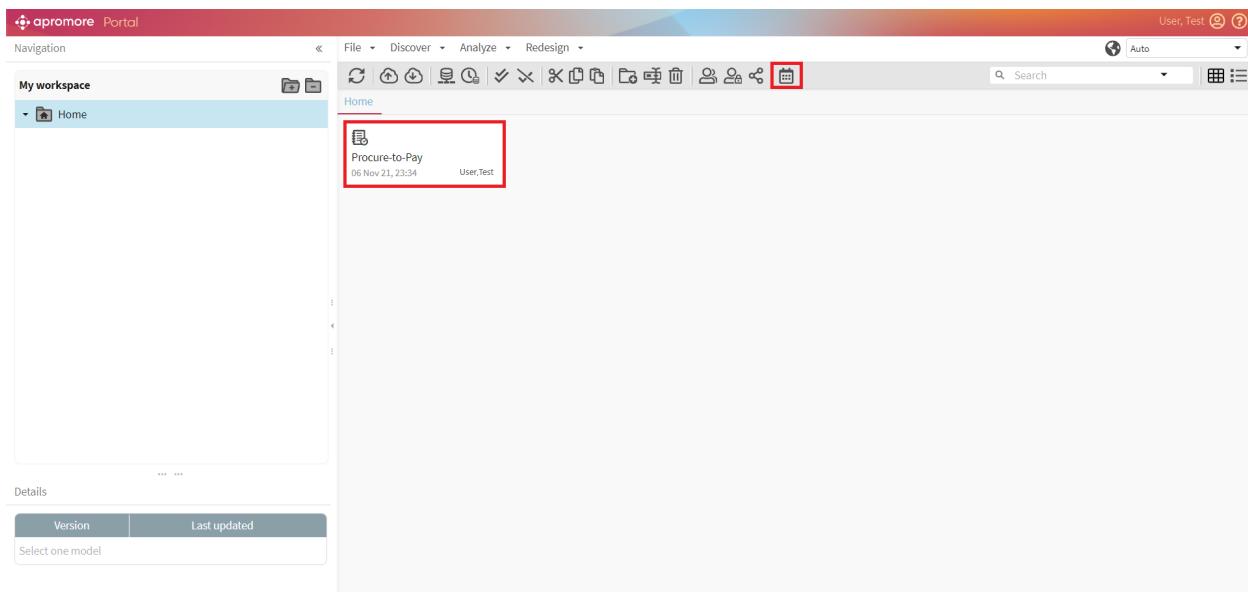
Creating a calendar includes selecting the working time range and adding public and custom holidays.

To create a calendar, first, upload a log by clicking on *File -> Upload*.

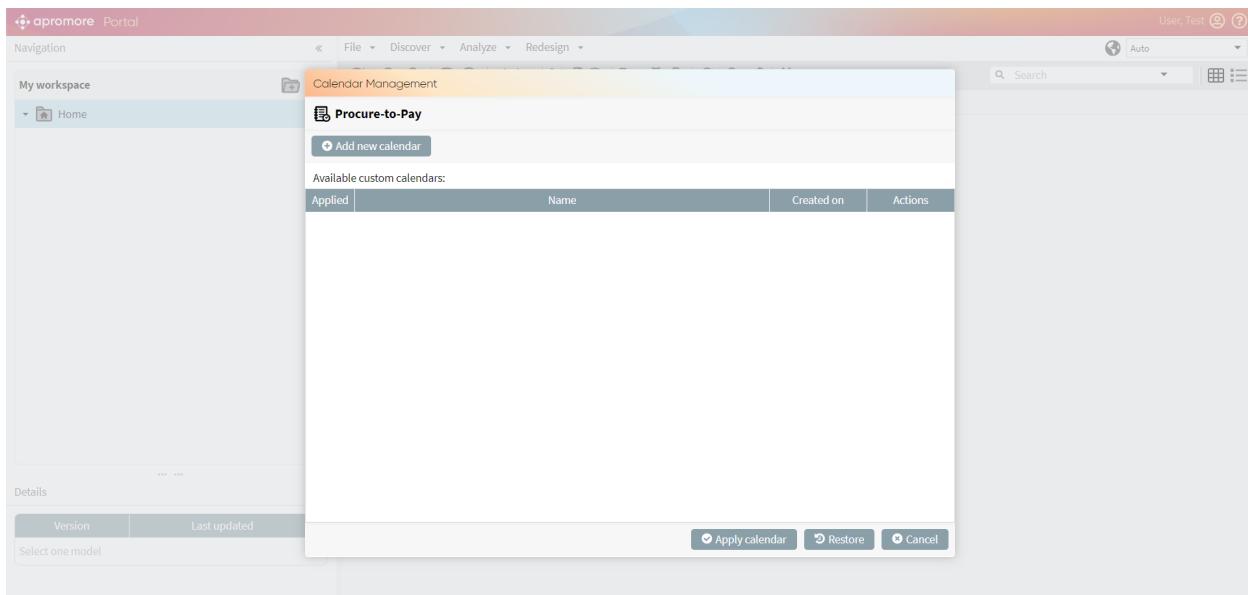
Tip: As an alternative, we can click on



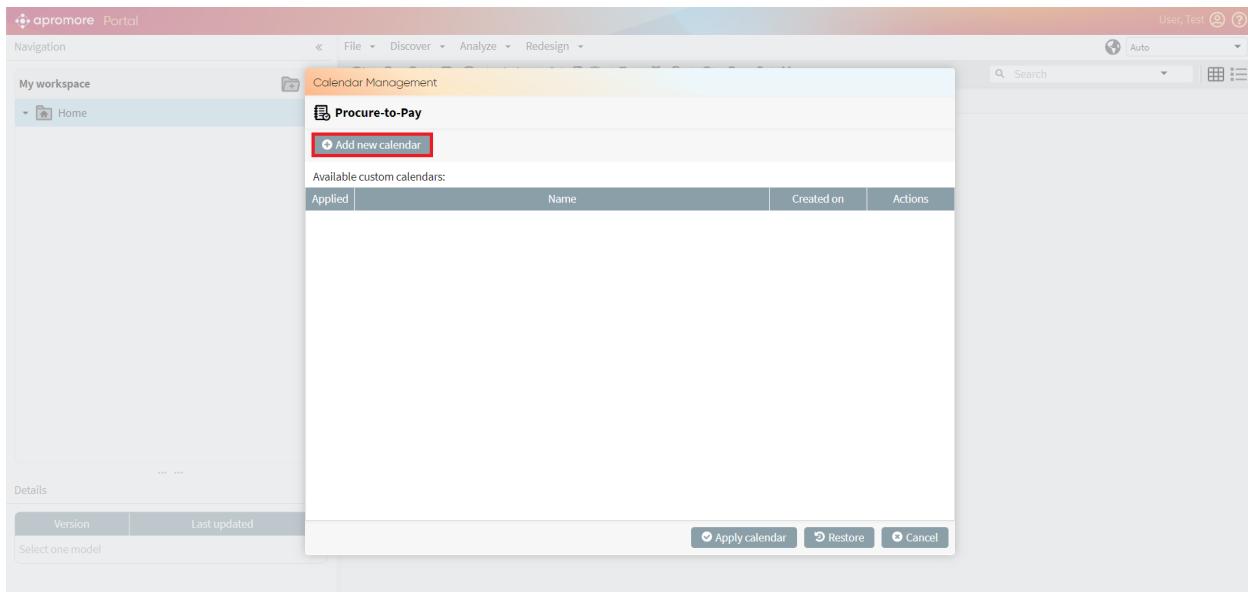
When the log is successfully uploaded, select it, and click on button.



Calendar management window appears, consisting of two parts: *Add new calendar* button and the list of *Available custom calendars*.



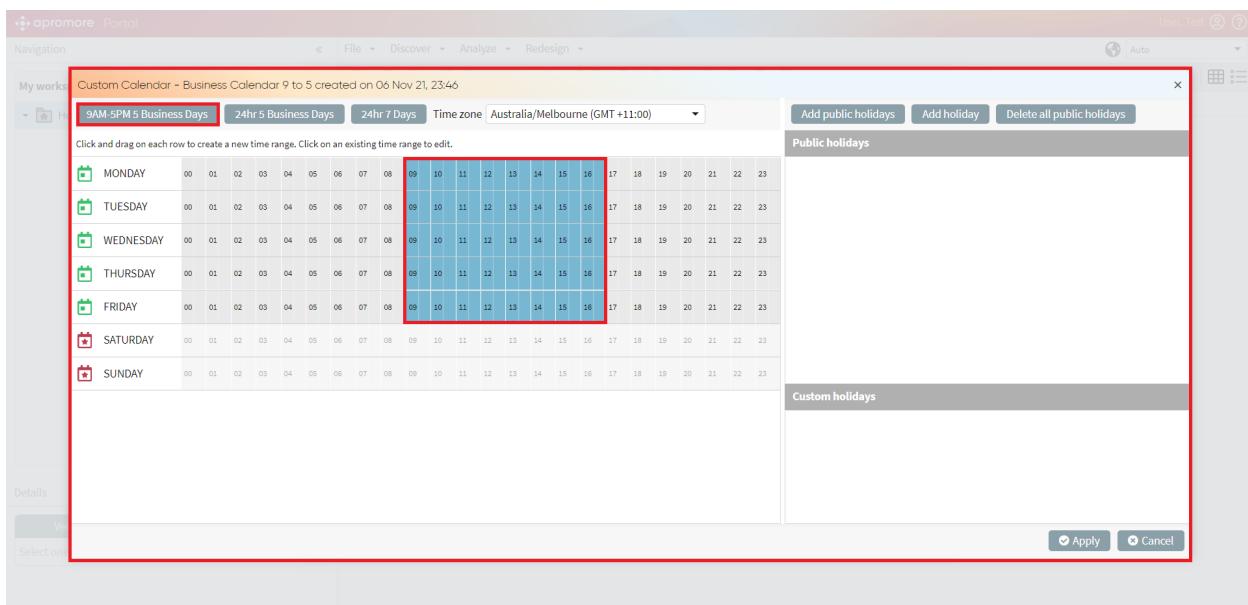
To create a calendar, click on *Add new calendar*.



Custom Calendar window appears with the 3 basic time range calendar options to choose from:

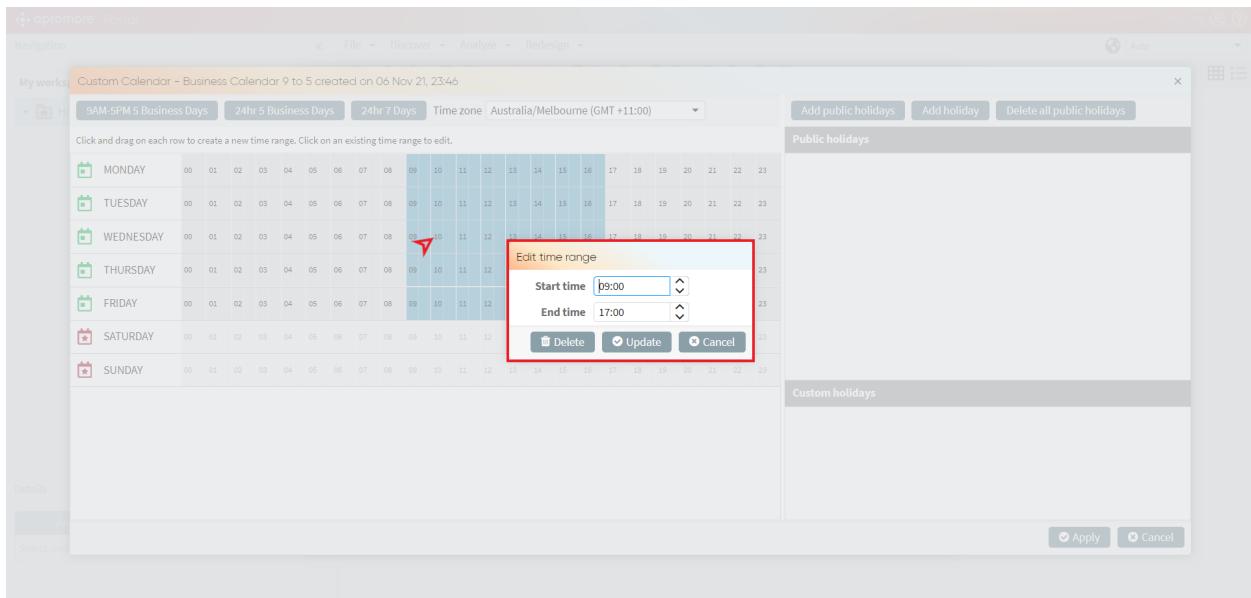
- 9AM-5PM 5 Business Days
- 24hr 5 Business Days
- 24hr 7 Business Days

When clicking on any of them the time range change is reflected on the calendar placed beneath the basic options.

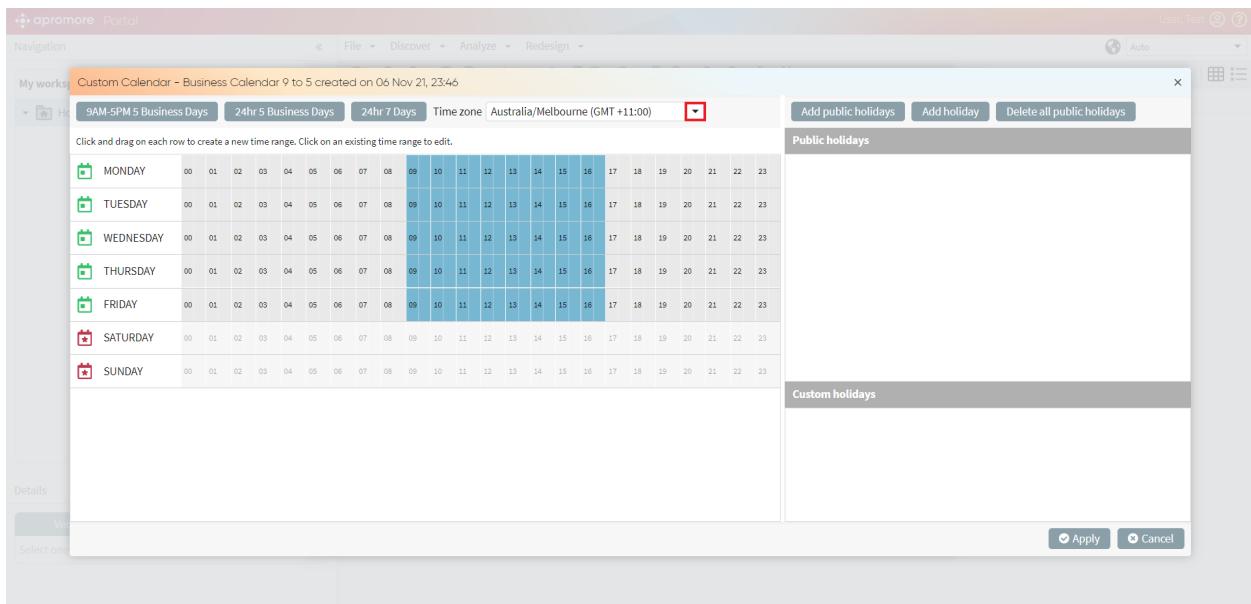


To create an alternative time range, click on the calendar and drag on each row till the time range reflects your calendar preferences.

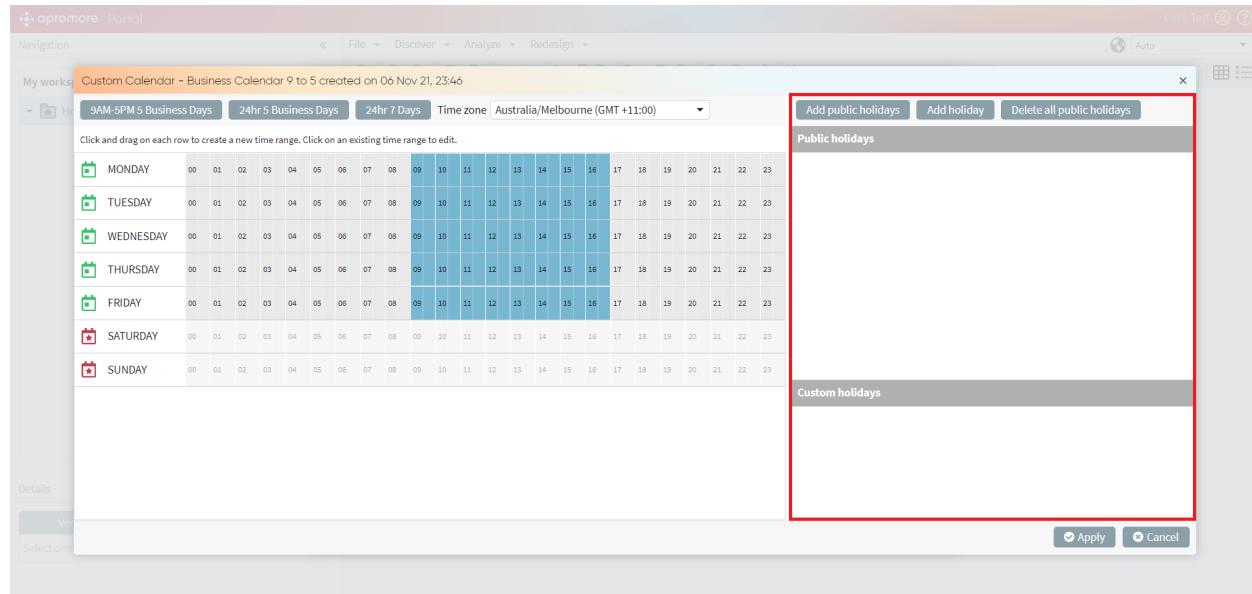
Note: To edit existing calendar, just click on it. *Edit time range* window appears.



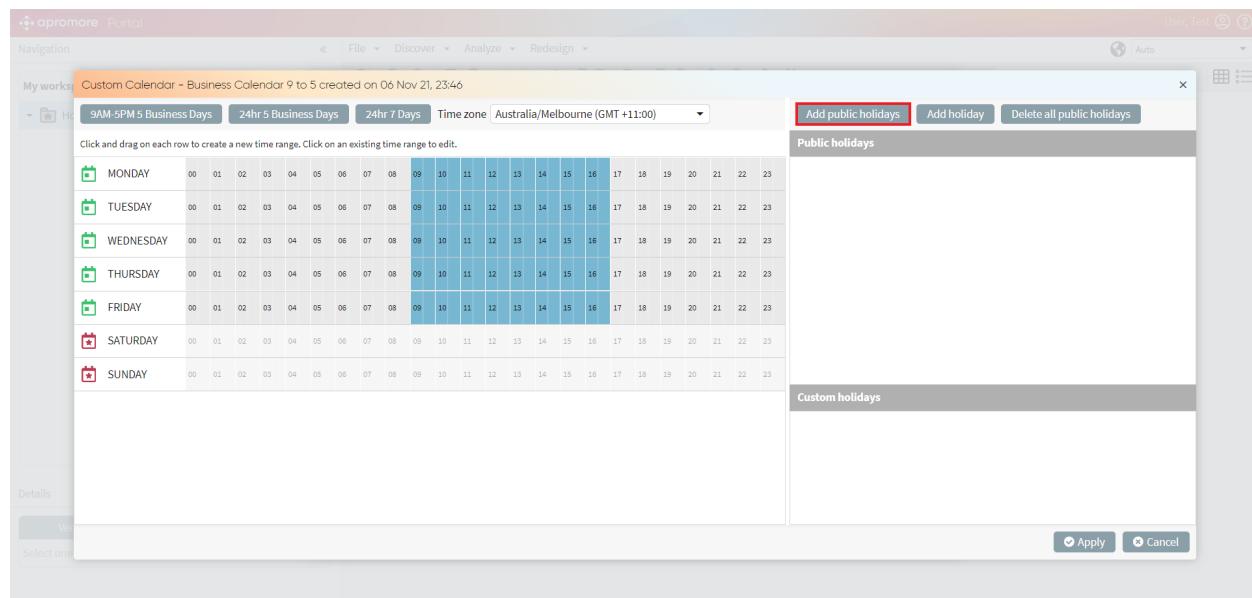
To change the Time zone, click on the *Time zone drop-down* placed left to the basic time range options.



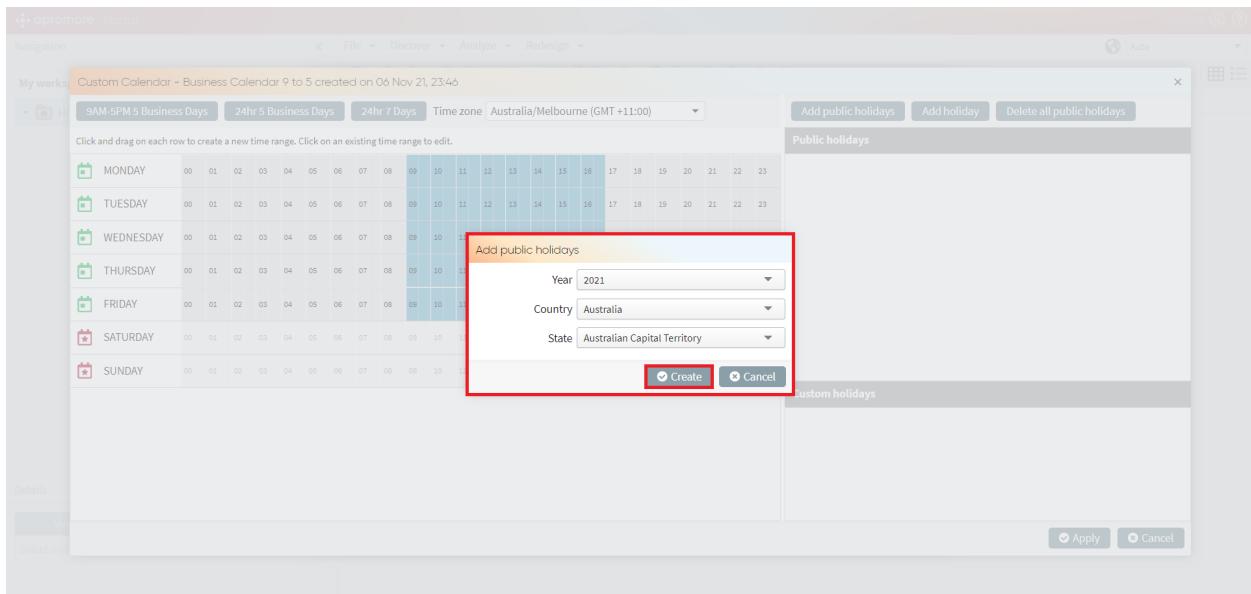
To make the calendar precise, add holidays, using the *holidays part* of the *Calendar management* window.



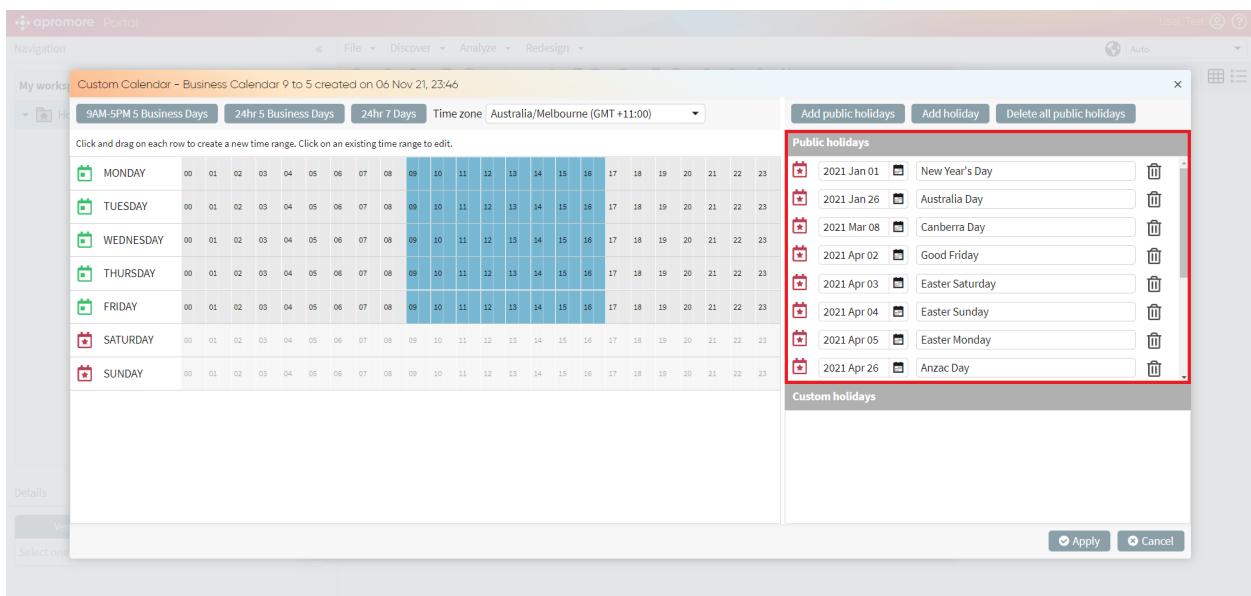
To reflect public holidays on the calendar, click on *Add public holidays* button.



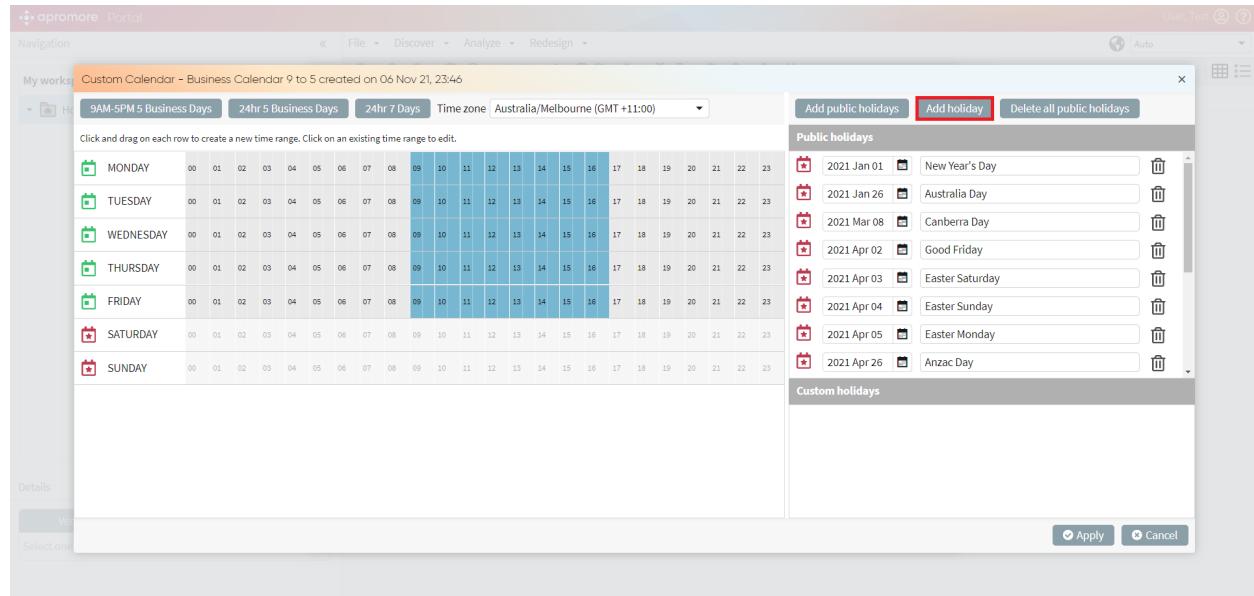
Add public holidays window appears. To finalize the adding, choose *Year*, *Country*, and *State* from the corresponding drop-downs. Click *Create*.



The list of public holidays relevant for the chosen location and timeframe appears.

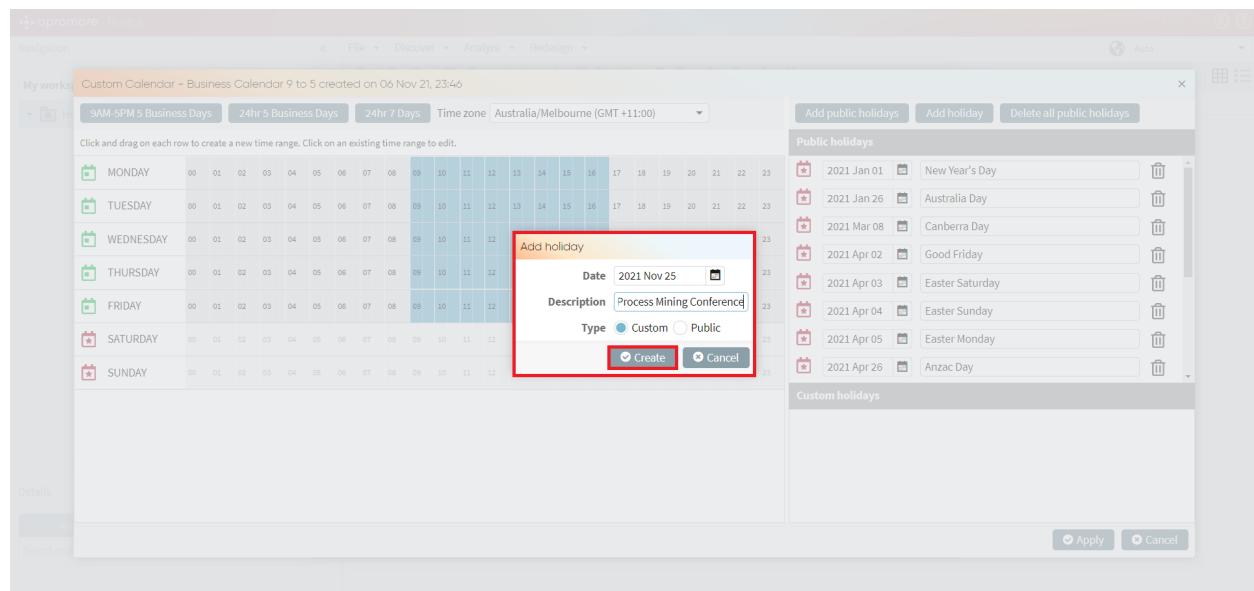


To reflect custom holidays on the calendar, click on *Add holiday* button.

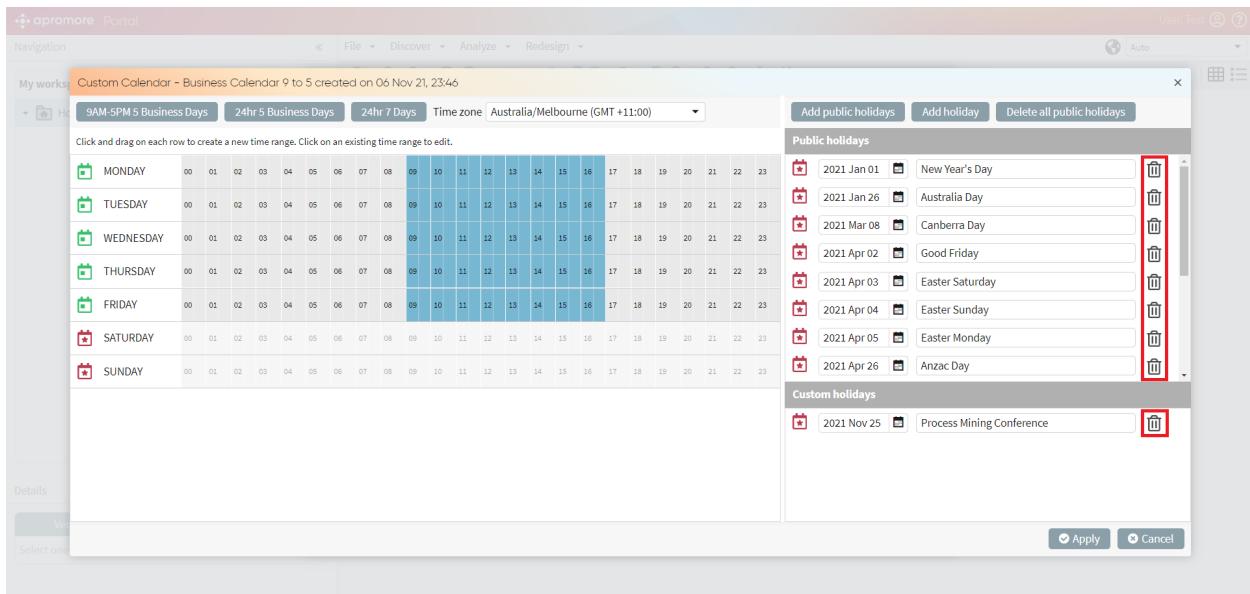


Add holiday window appears. To finalize the process, choose *Date* and specify *Description*, *Type*. Click *Create*.

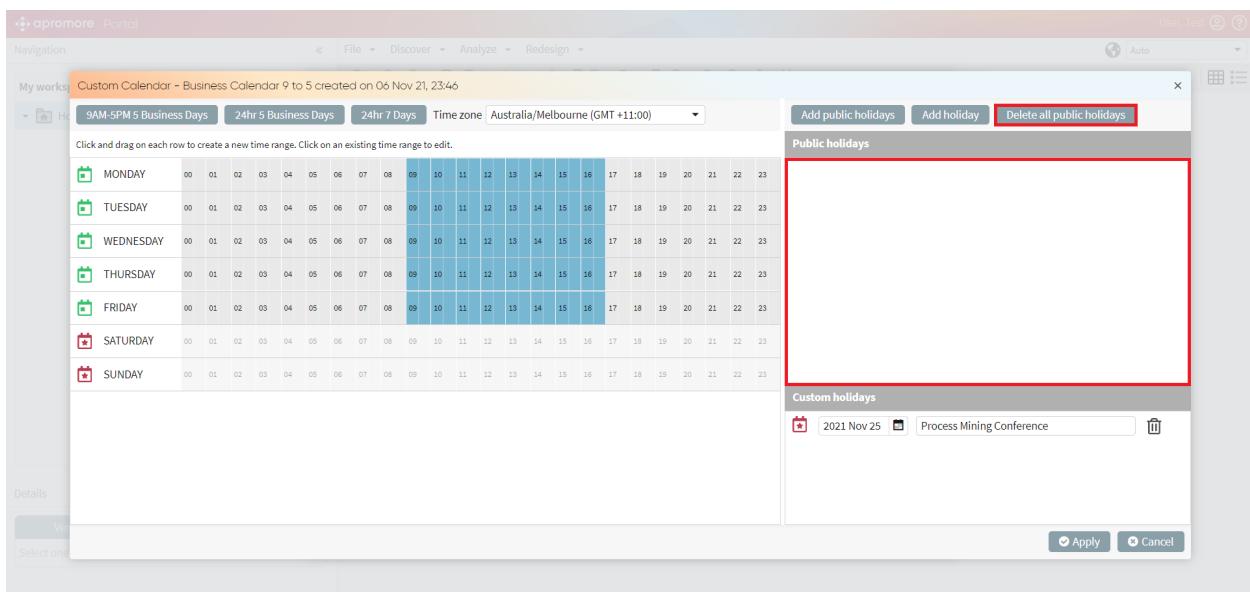
Note: In the *Type* section the user has to select one of the two options. Choose *Public* for the public holidays that were missed in the public holiday's list. Choose *Custom* for personal events like conferences, hackathons, etc.



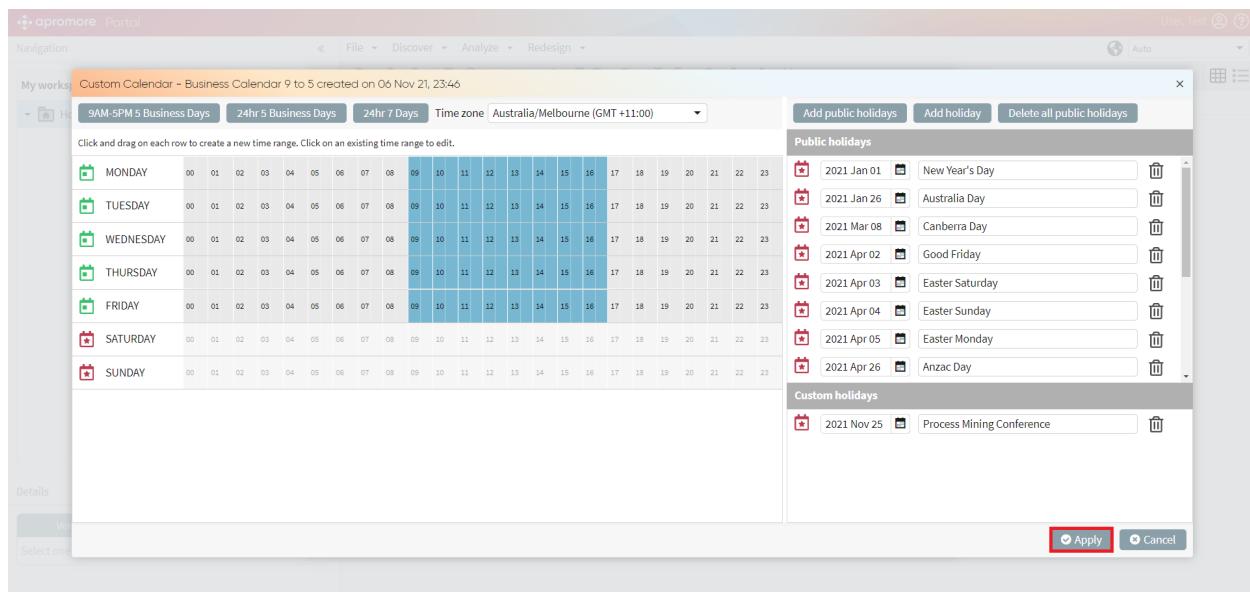
To delete a holiday (public or custom), click on button next to it.



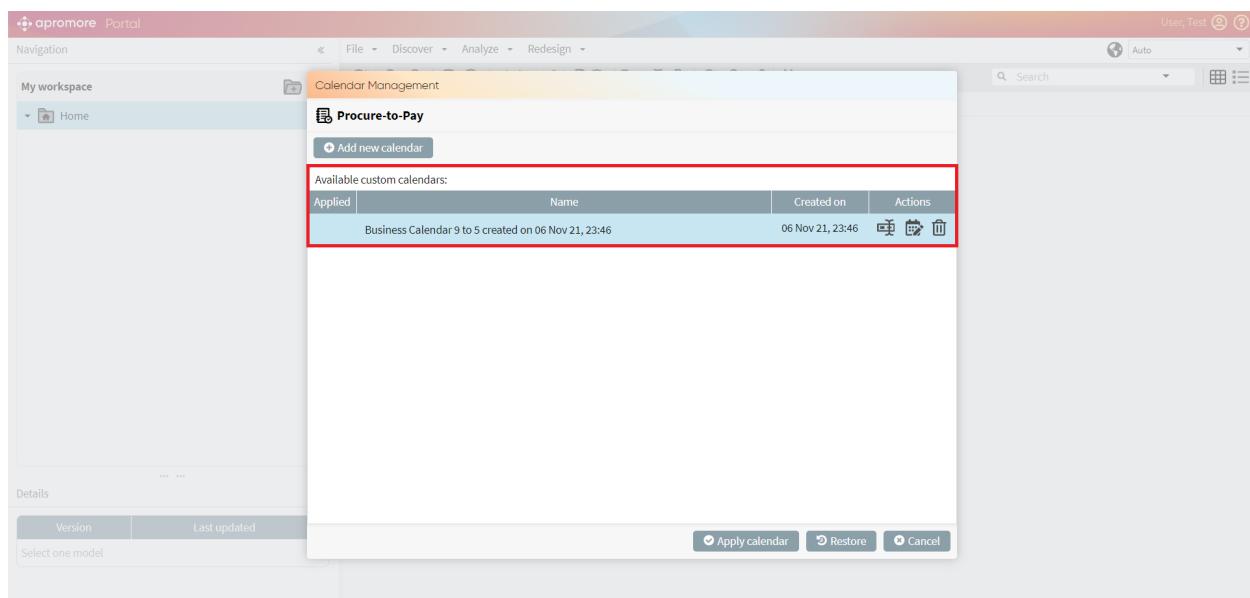
To delete all the public holidays at once, click *Delete all public holidays*.



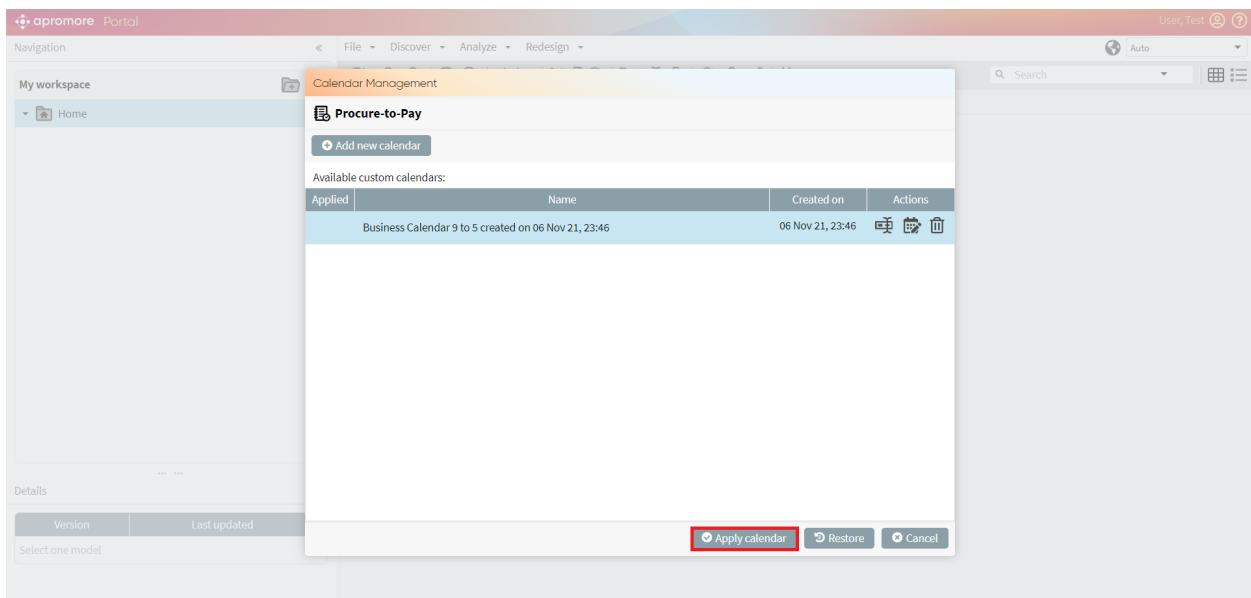
When all the holidays are added, click on *Apply*.



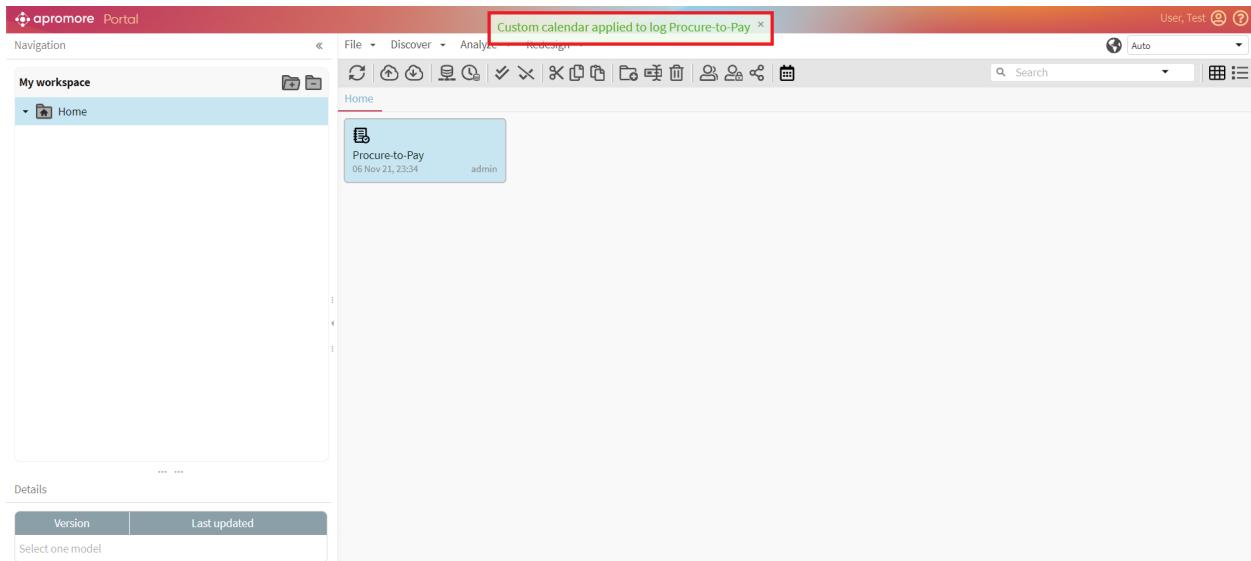
The calendar will be successfully created and displayed in the list of *Available custom calendars*.



To apply calendar to the log, select it and click on *Apply calendar*.



A green pop-up message appears, confirming that the calendar was applied successfully.



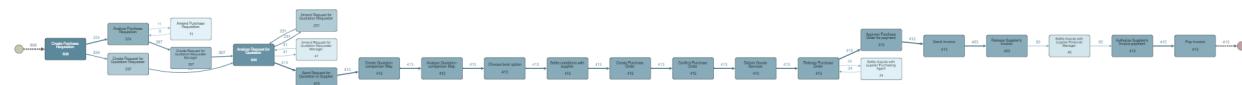
To edit/rename/delete the calendar, click on *Manage calendar* button, select the calendar and click to the corresponding button next to it.

The screenshot shows the 'Calendar Management' section of the Apromore Portal. It lists a single custom calendar named 'Business Calendar 9 to 5 created on 06 Nov 21, 23:46'. The 'Actions' column for this calendar contains three icons: a pencil, a copy, and a delete. A red box highlights these icons. Below the calendar list is a modal dialog titled 'Details' with tabs for 'Version' and 'Last updated'. The 'Version' tab is selected, showing the current version and last update date.

Once the calendar is applied, we can visualize the log in the process discoverer. After applying the calendar, the actual working time of the resources are taken into consideration. This leads to the change in the case durations.

The screenshot shows the 'Procure-to-Pay' process map in the Apromore Process Discoverer. On the right side, there is a summary section titled 'Temporal statistics' with the following data:

Case duration	Log timeframe
Min instant: 01 Jan 11, 00:00	01 Jan 11, 00:00
Median: 3.00 days	↓
Average: 5.11 days	14 Oct 11, 15:31
Max: 3.71 wks	



CHAPTER THREE

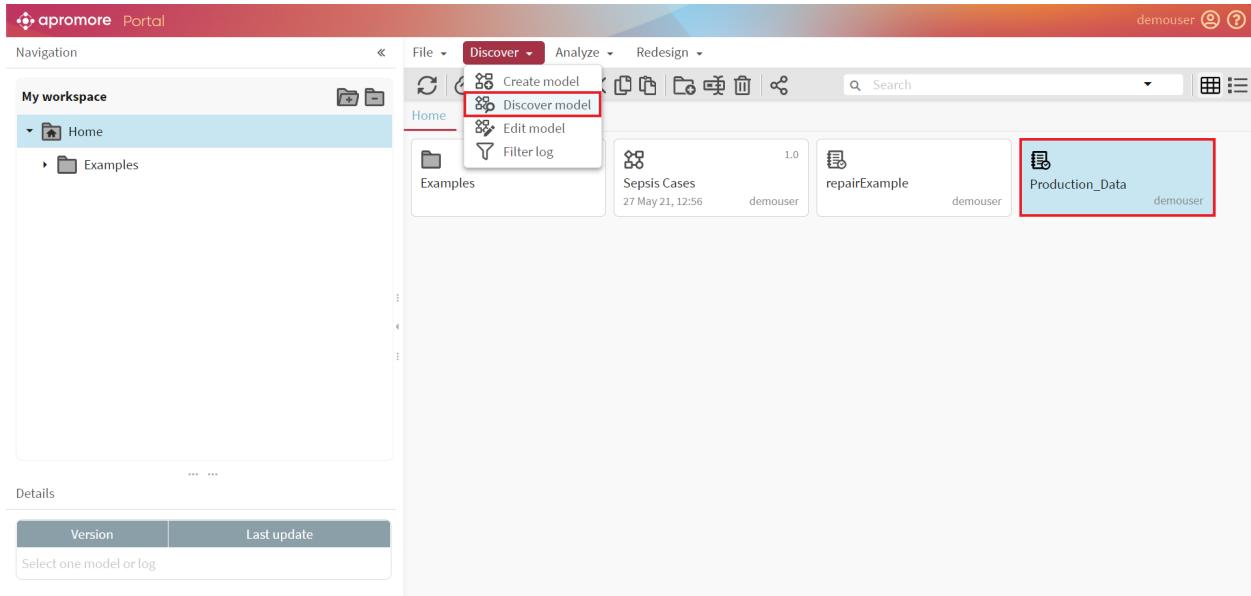
DISCOVERY

3.1 Discover model

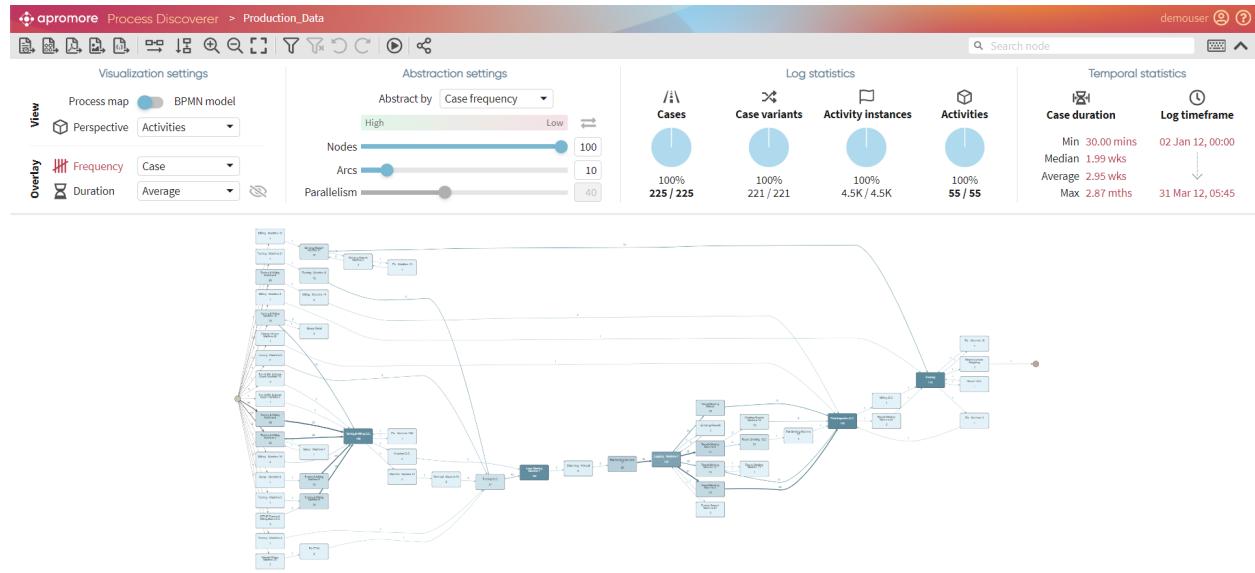
Apromore allows us to discover a process map or a BPMN model from an event log. A process map (a.k.a. directly-follows graph) is a visual representation of the log as a graph where nodes capture process activities and directed arcs between them capture sequential order relations between the activities. For example, an arc going from activity *Accept order* to activity *Check order* indicates that in the log, we can observe that process cases flow from *Accept order* to *Check order*. Process maps are a simple yet effective means to understand the basic order of relationships between process activities. As such, they are the most common type of model discovered by commercial process mining tools.

3.1.1 View process map

To view the process map, double-click on a log. Alternatively, we can select a log from the repository and click on *Discover > Discover model*.



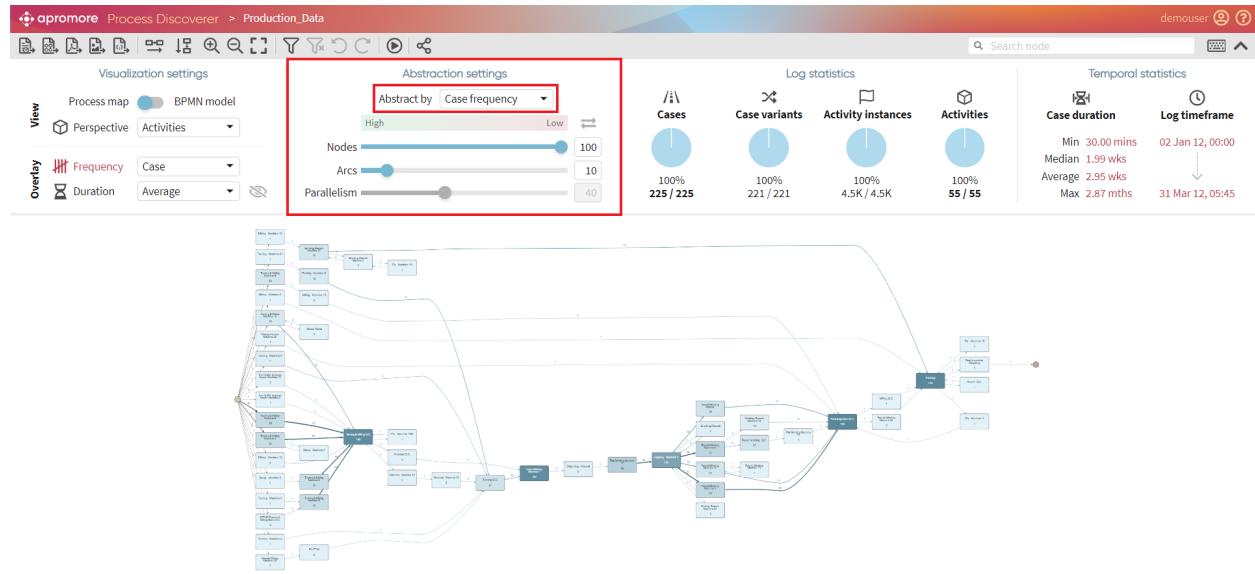
A window will open up, showing the process map discovered from the log.



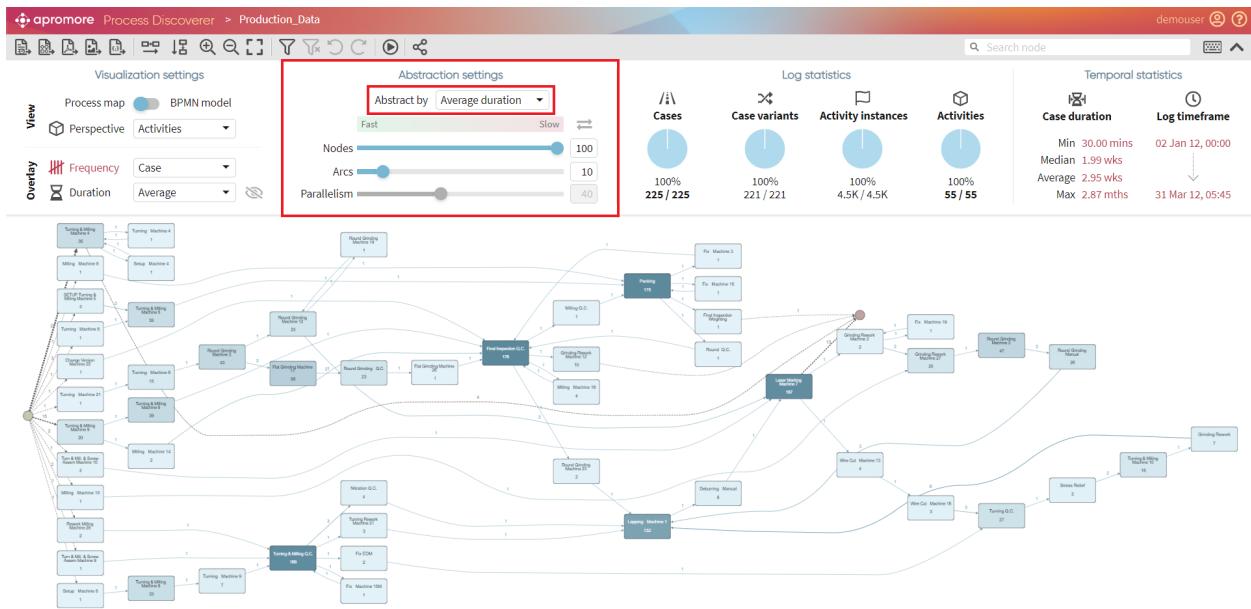
3.1.2 Abstraction Settings

We can adjust the complexity of the discovered map by increasing or decreasing the frequency or duration of nodes and arcs visualized in our process map. The default values for the nodes and arcs sliders are 100% and 10%, respectively.

We can abstract a process map by *Case frequency* or *Average Duration*. For example, if we abstract by case frequency and shift the arcs or nodes slider towards the left, more edges/nodes with low case frequency will be removed from the process map.

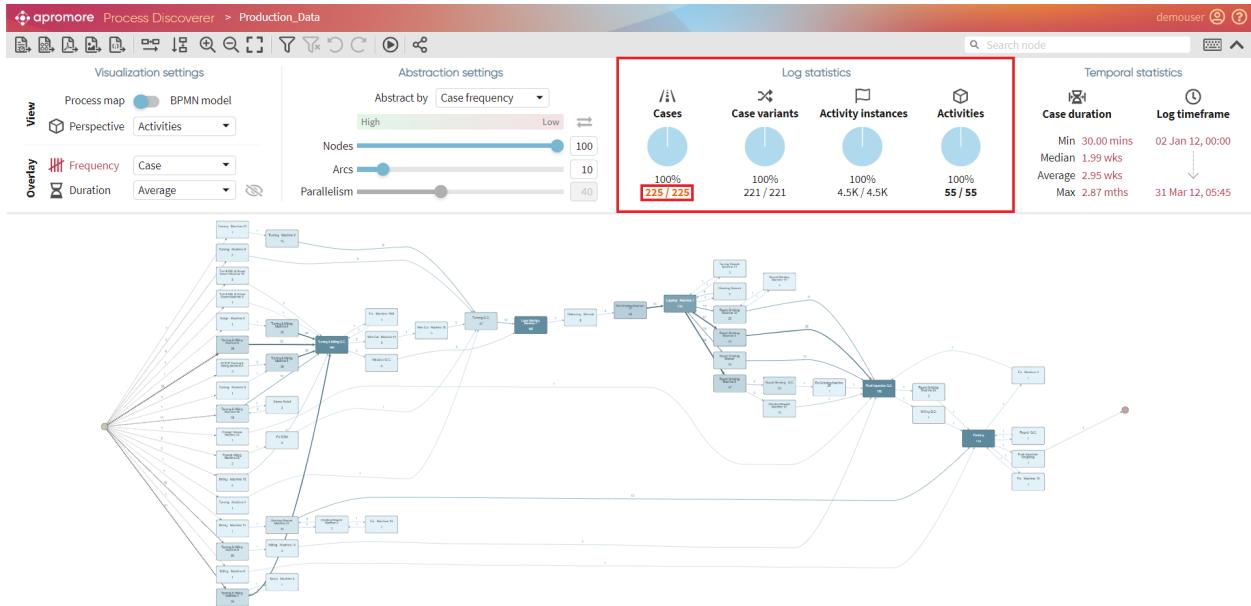


Similarly, if we abstract by *Average Duration* and shift the arcs or nodes slider towards the left, more edges/nodes with low average duration will be removed from the process map.

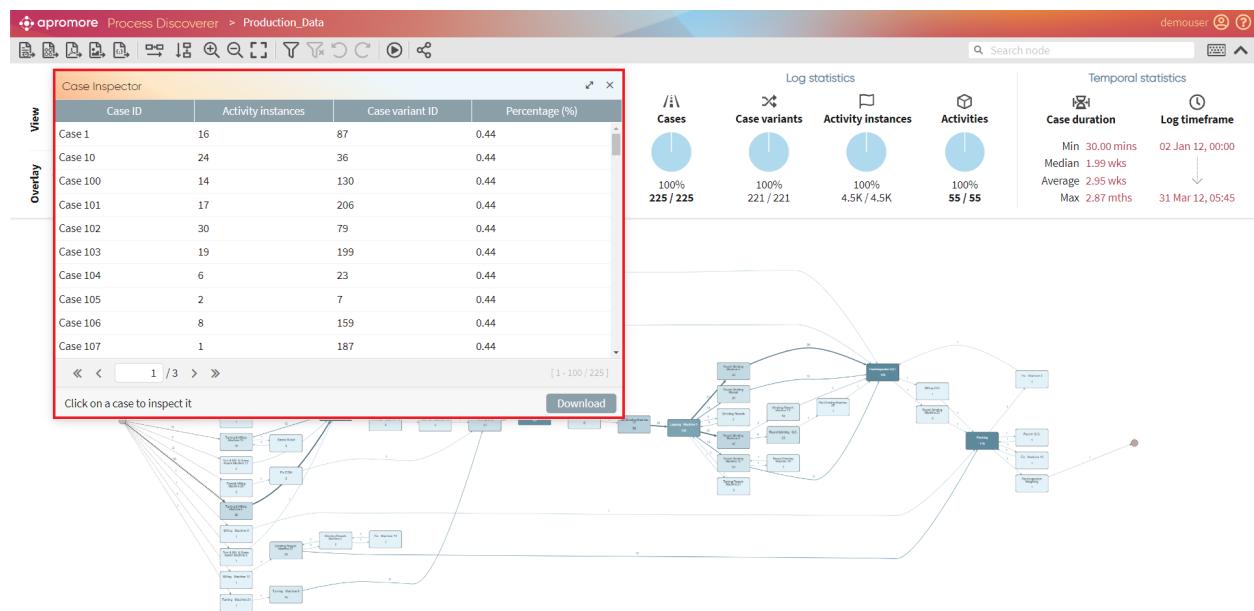


3.1.3 Log statistics

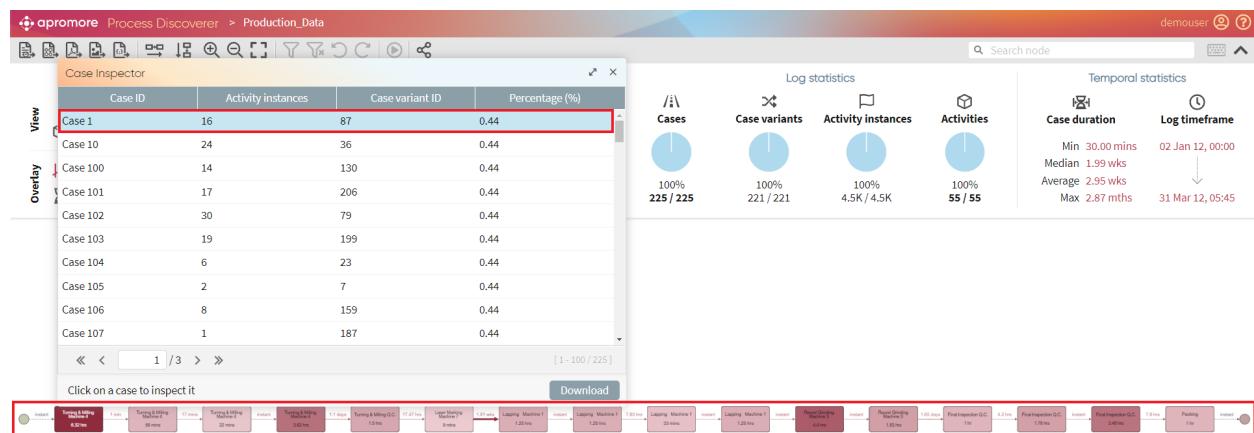
We can also check more detailed statistics. To inspect individual cases, use the *Case Inspector*. To open the *Case Inspector*, click on the number of cases under the *Log statistics* section.



The *Case Inspector* window will open.



Click on a specific case to visualize it exclusively in the Process Discoverer.



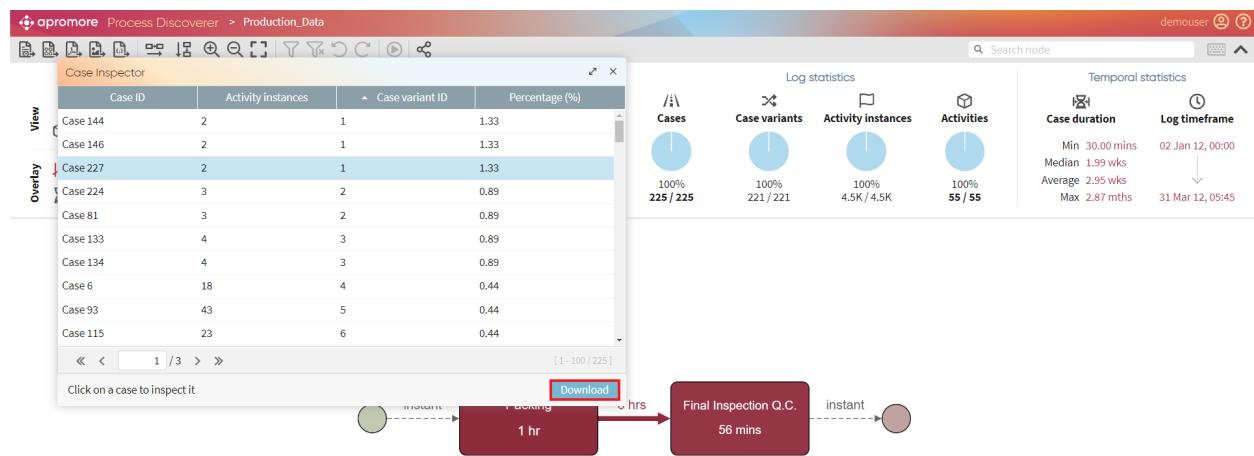
To check the length of the cases, click on the *Activity instances* column. Cases will be sorted from the shortest to the longest.

Case ID	Activity instances	Case variant ID	Percentage (%)
Case 107	1	187	0.44
Case 130	1	188	0.44
Case 139	1	190	0.44
Case 141	1	200	0.44
Case 157	1	198	0.44
Case 222	1	193	0.44
Case 105	2	7	0.44
Case 142	2	21	0.44
Case 144	2	1	1.33
Case 146	2	1	1.33

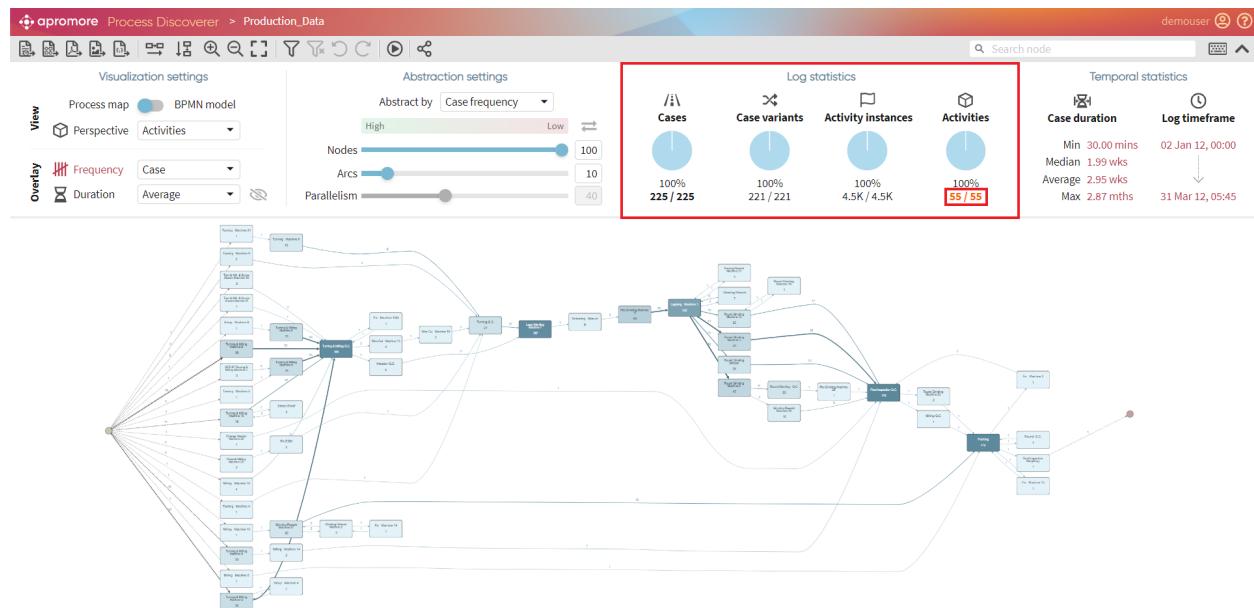
We can also sort them by pathway, using the *Case variant ID* column or by the Frequency of the pathway - *Percentage(%)* column.

Case ID	Activity instances	Case variant ID	Percentage (%)
Case 144	2	1	1.33
Case 146	2	1	1.33
Case 227	2	1	1.33
Case 224	3	2	0.89
Case 81	3	2	0.89
Case 133	4	3	0.89
Case 134	4	3	0.89
Case 6	18	4	0.44
Case 93	43	5	0.44
Case 115	23	6	0.44

To download the list of cases and their statistics, click on *Download*.



To inspect individual activity, use the *Activity Inspector*. To open the *Activity Inspector*, click on the number of activities under the Activities chart in *Log statics* section.



The *Activity Inspector* window will open.

apromore Process Discoverer > Production_Data

The screenshot shows the apromore Process Discoverer interface with the title "Production_Data". On the left, there is a sidebar with "View" and "Overlay" buttons. The main area features a process model diagram at the bottom and a detailed "Activity Inspector" table above it. The table has columns for "Activity", "Activity instances", and "Percentage (%)".

Activity	Activity instances	Percentage (%)
Turning & Milling - Machine 4	262	5.77
Turning & Milling Q.C.	522	11.49
Laser Marking - Machine 7	252	5.55
Lapping - Machine 1	370	8.14
Round Grinding - Machine 3	273	6.01
Final Inspection Q.C.	550	12.11
Packing	277	6.1
Turning & Milling - Machine 9	158	3.48
Turning Q.C.	55	1.21
Flat Grinding - Machine 11	113	2.49

On the right side, there are four circular charts under "Log statistics": Cases (100% 225 / 225), Case variants (100% 221 / 221), Activity instances (100% 4.5K / 4.5K), and Activities (100% 55 / 55). Below these are "Temporal statistics" for "Case duration" and "Log timeframe".

To check the length of the activity, click on the *Activity instances* column. To check activity variant frequency, click on *Percentage(%)* column.

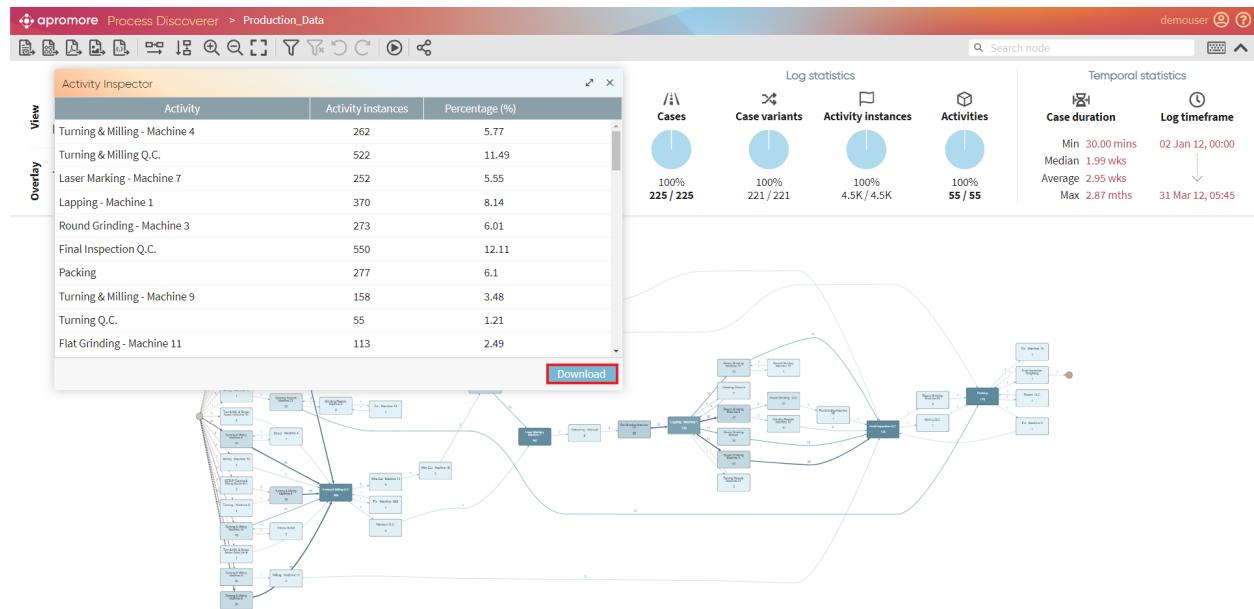
apromore Process Discoverer > Production_Data

This screenshot shows the same interface but with a different set of activities selected in the "Activity Inspector" table. The table now includes activities like "Flat Grinding - Machine 26", "Milling - Machine 8", etc., with their respective instance counts and percentages.

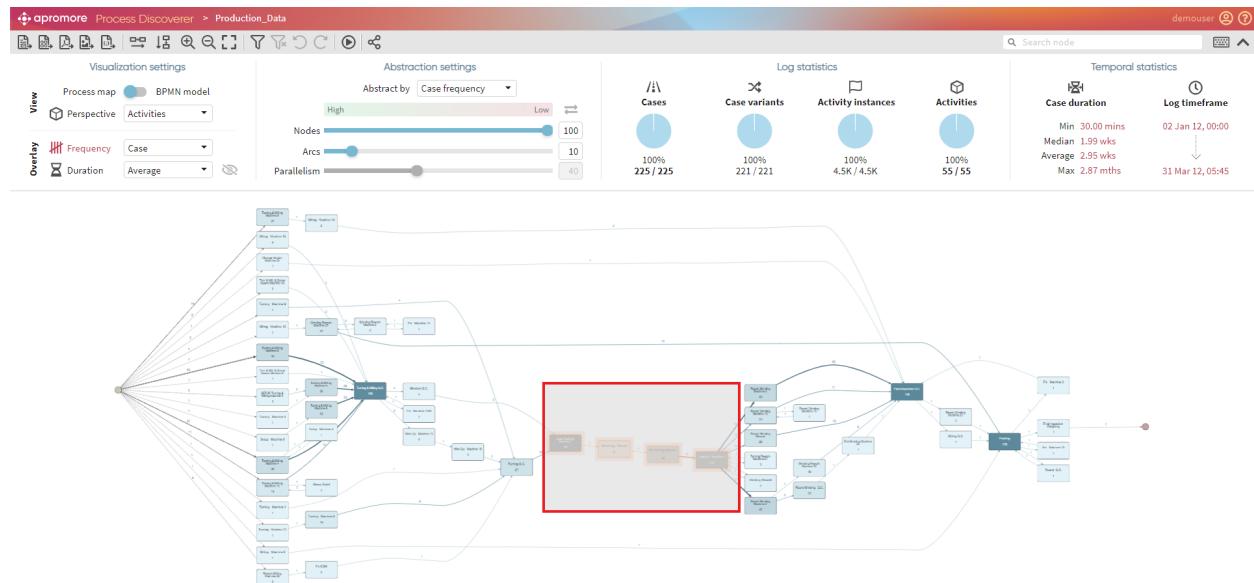
Activity	Activity instances	Percentage (%)
Flat Grinding - Machine 26	1	0.02
Milling - Machine 8	1	0.02
Milling - Machine 10	1	0.02
Fix - Machine 15M	1	0.02
Rework Milling - Machine 28	2	0.04
Turning - Machine 5	2	0.04
Fix - Machine 15	2	0.04
Fix - Machine 3	2	0.04
Round Q.C.	2	0.04
SETUP Turning & Milling - Machine 5	3	0.07

The rest of the interface, including the process model diagram and the "Log statistics" and "Temporal statistics" sections, remains the same.

To download the list of activities and their statistics, click on *Download*.

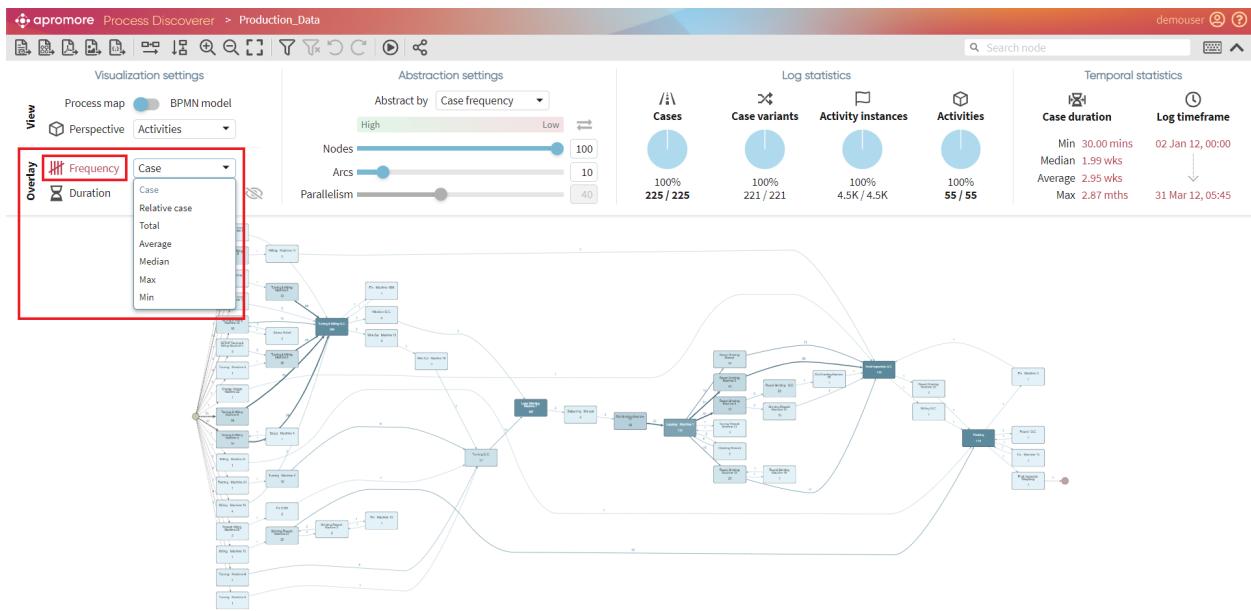


To check the individual activity statistics, we can simply click on the activity. We can also select multiple activities at once by pressing *Ctrl* and dragging the mouse over the part of the model which consists of these activities.



3.1.4 Visualize by Frequency

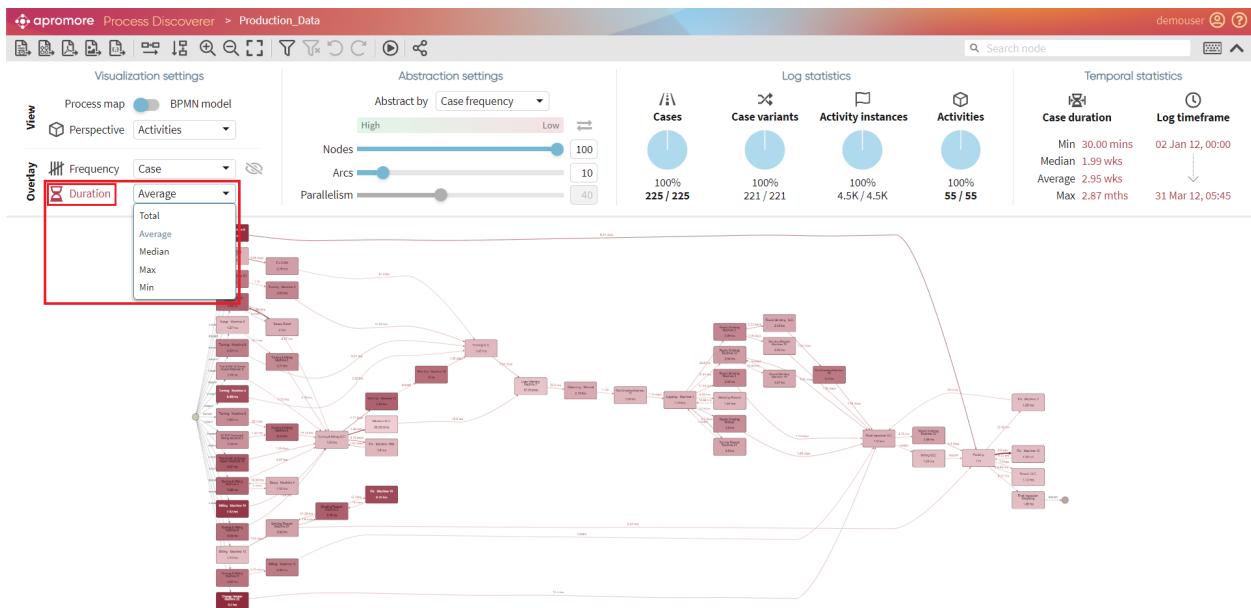
We can also view the event log's simple statistics, such as the total, median, minimum, maximum, and average number of times an activity is executed. This information is provided as a label on the activities/arcs, color of activities, and arcs' thickness. The darker the blue color, the higher the number of times that activity has been observed in the log. The thicker arc, the higher the frequency of that arc. We can use the Frequency drop-down list in the *Visualization settings* section to view different statistics.



3.1.5 Visualize by Duration

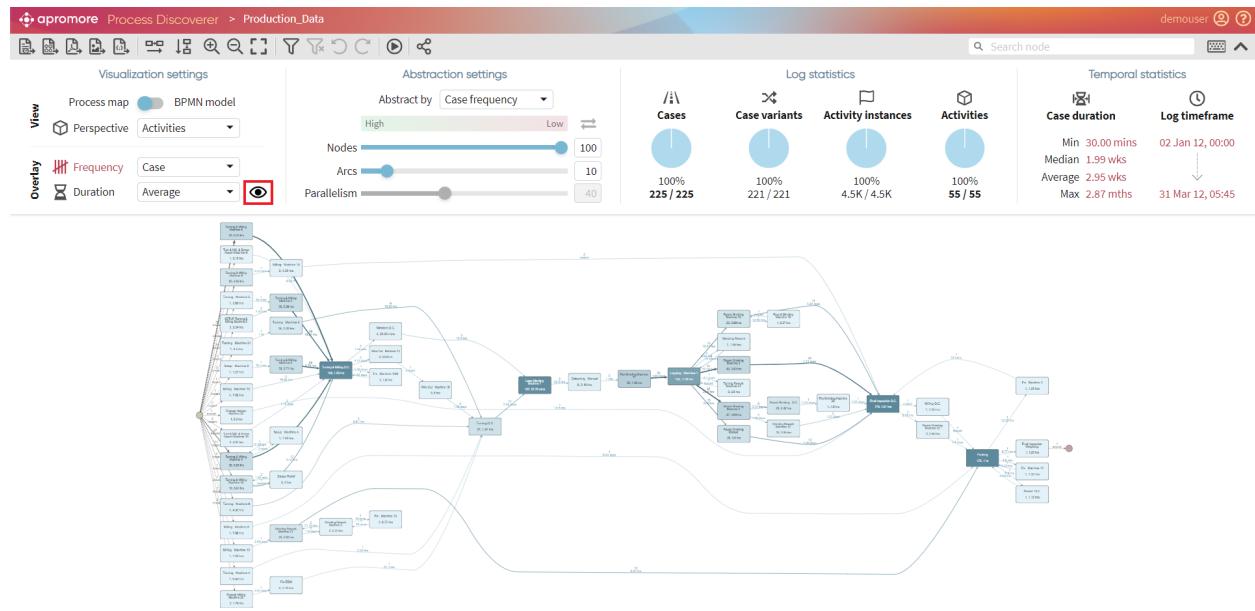
Additionally, we can view the statistics on the time performance of the activities and arcs in the process map using the *Duration* drop-down list in the *Visualization settings* section. These are total, mean, median, minimum, maximum, and average duration of each arc (indicating the waiting time before starting a given activity, once the previous one has been completed), and total, mean, median, minimum, maximum, and average duration of each arc duration of an activity (a.k.a. the activity's processing time). Suppose the log only has completion timestamps for each activity and not their start timestamp. In that case, these performance statistics will combine both processing time and waiting time into a single time statistics visualized on the arc. At the same time, activities will be shown as having an instantaneous duration.

Like frequency statistics, we can also visualize time performance statistics via labels on activities and arcs and via colors and line thickness (on a red scale) for activities and arcs.



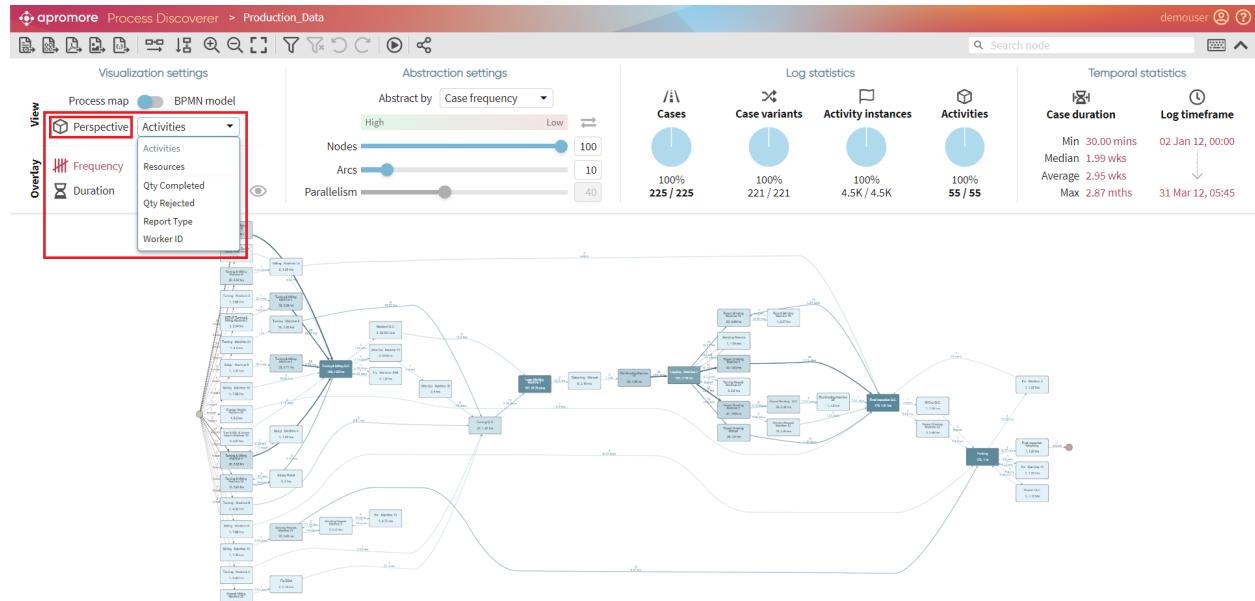
3.1.6 Visualize by Frequency and Duration

We can also view both *Frequency* and *Duration* at the same time by clicking the . For example, if we are viewing our process map in *Frequency* mode, we can also view the *Duration* as a secondary metric by clicking on the .



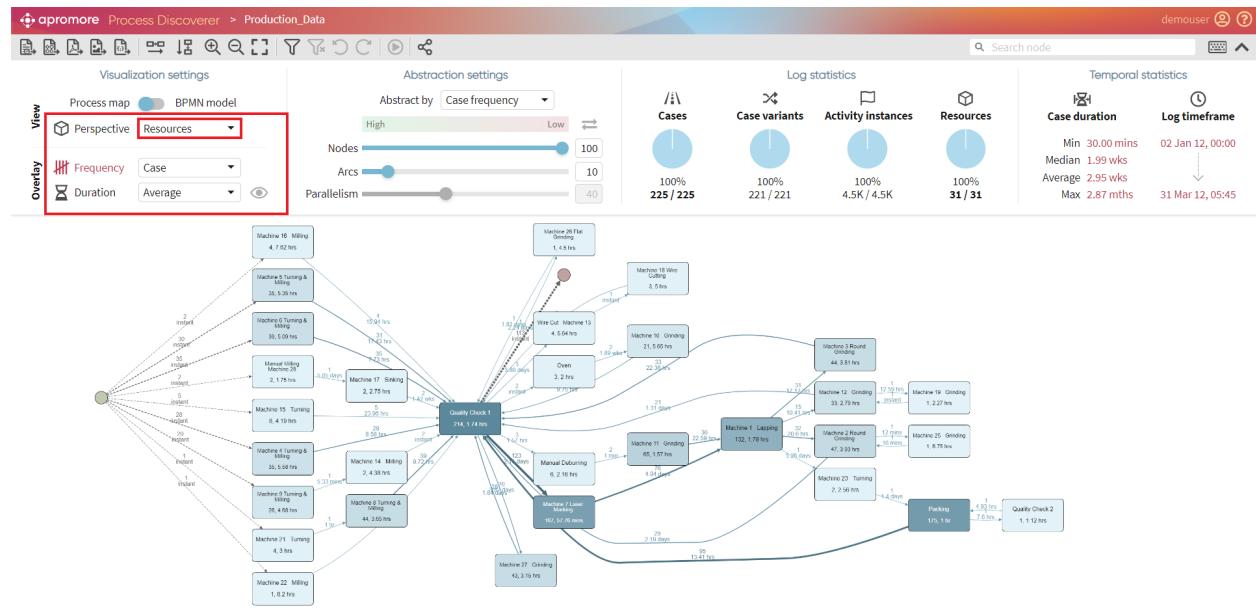
3.1.7 Visualize by Different Perspectives

Visualizing the handover between activities is not the only way a process can be analyzed. There will be times when we may be interested in assessing if a specific resource or group of resources are overloaded with work. When clicking on *Perspective* we can decide which attribute of the log will focus on the process map.



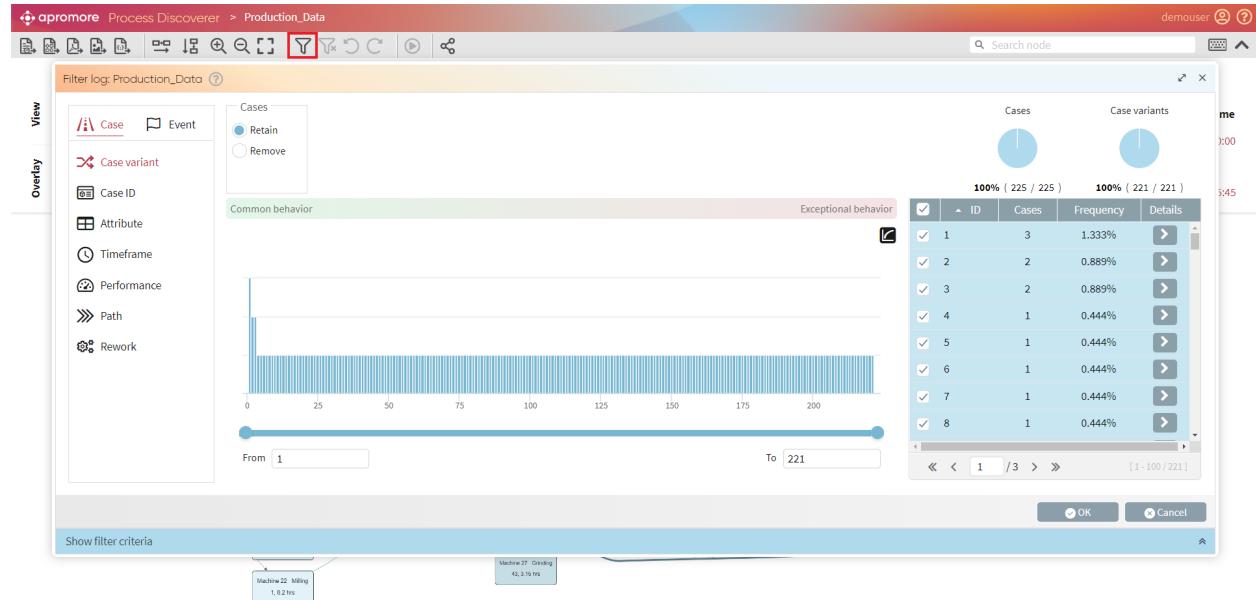
For example, to visualize the handover of work among a group of resources, we can select the *Resources* option. This option will map each actor's organizational role in our process to a node and connect two nodes if a handover of work

occurs between the two nodes.



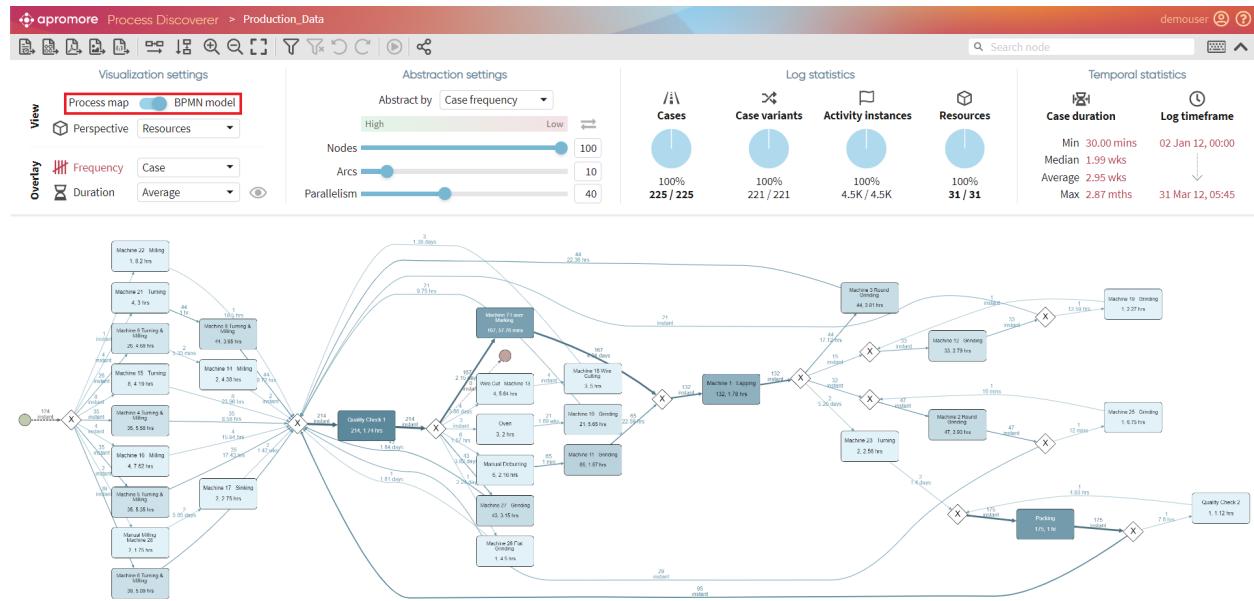
3.1.8 Filter Log

When analyzing an event log, we may be interested in isolating a particular type of behavior or removing a specific activity. An event log can be filtered by clicking on the *Filter* icon and creating a new filter that fits our needs. For more information on the optimal use of *Filter*, we suggest viewing the [Filter Log manual](#).



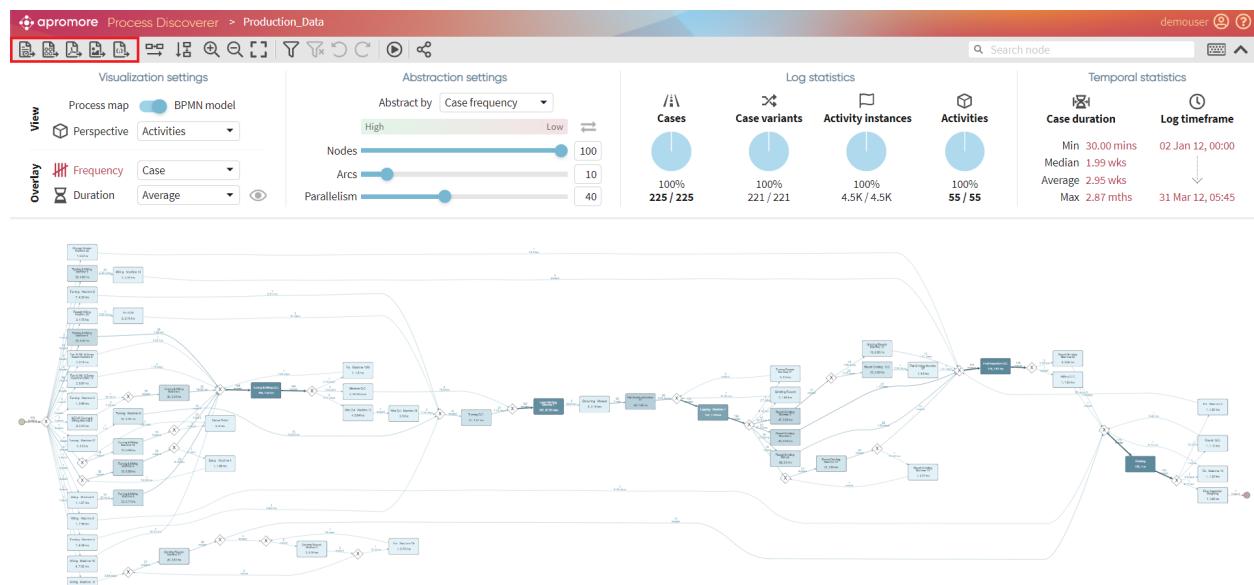
3.1.9 View BPMN Model

Whenever the insights deriving from the analysis of a process map are not sufficient, the same functionalities are offered on top of a BPMN model. Changing the view from *Process Map* to *BPMN model* will automatically discover a BPMN model from an event log. When visualizing a BPMN model, the slider *Parallelism* offers the possibility to adjust the amount of parallelism (e.g., AND and OR gateways) discovered by the plugin.



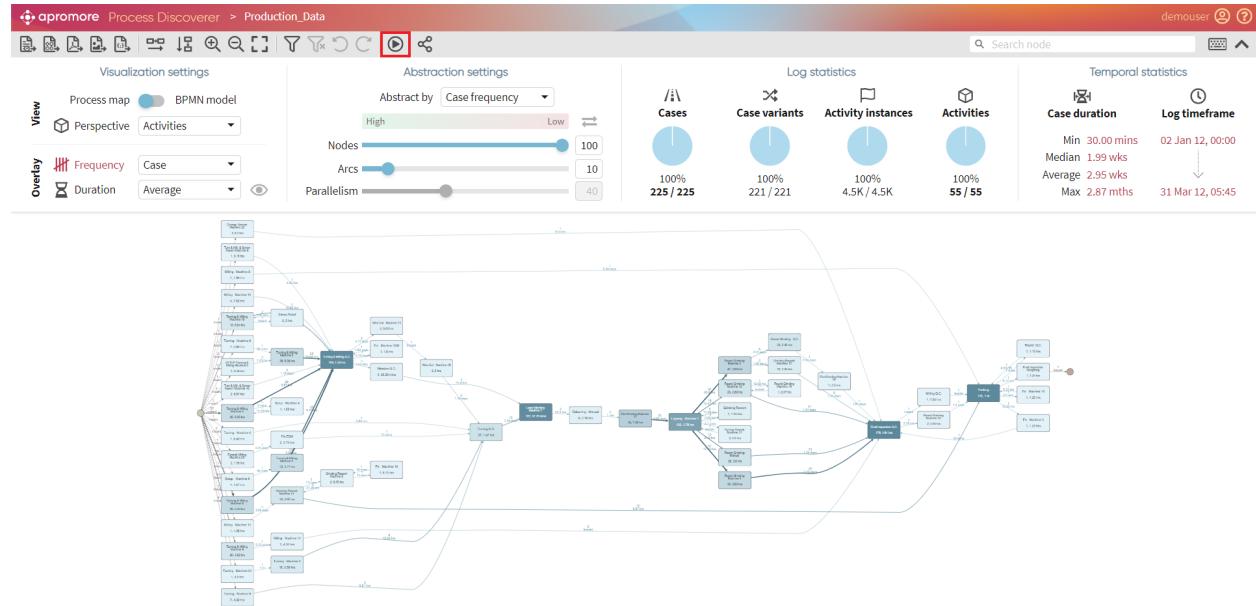
3.1.10 Export Process Map/BPMN Model

A filtered log or discovered process map/BPMN can be exported by clicking on the different save buttons to export the model as a “.bpmn”, a PDF, PNG, or a JSON file.



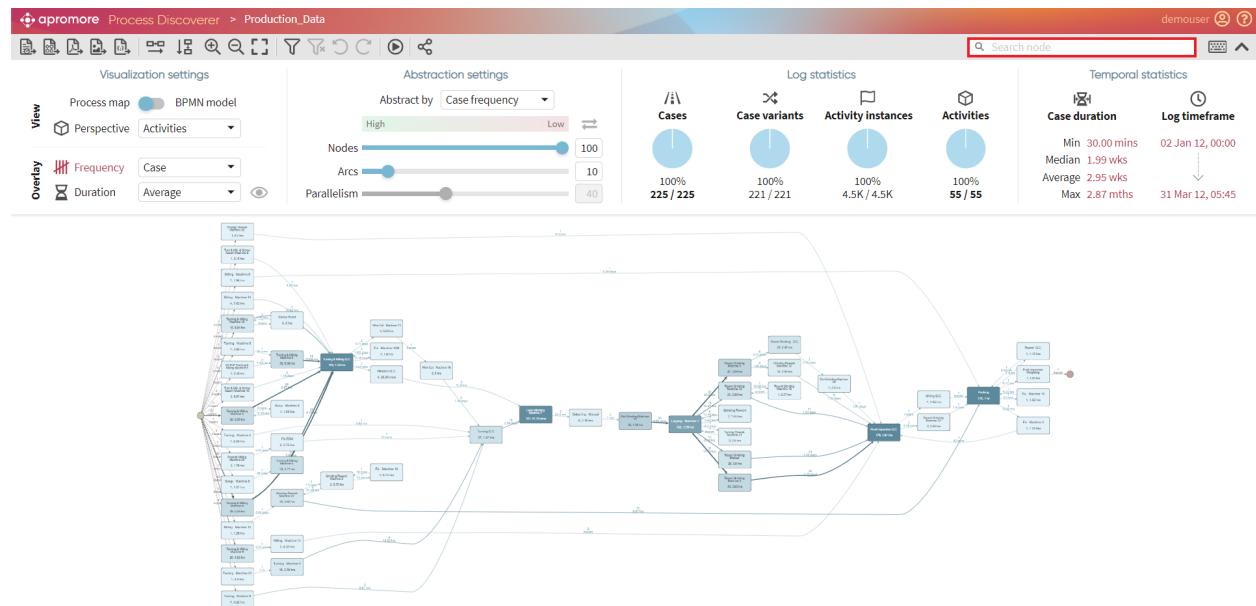
3.1.11 Animate Log (Process Map)

The *Animate* button allows us to replay the log on top of the process map, using the *Animate a log* on top of the process map feature.

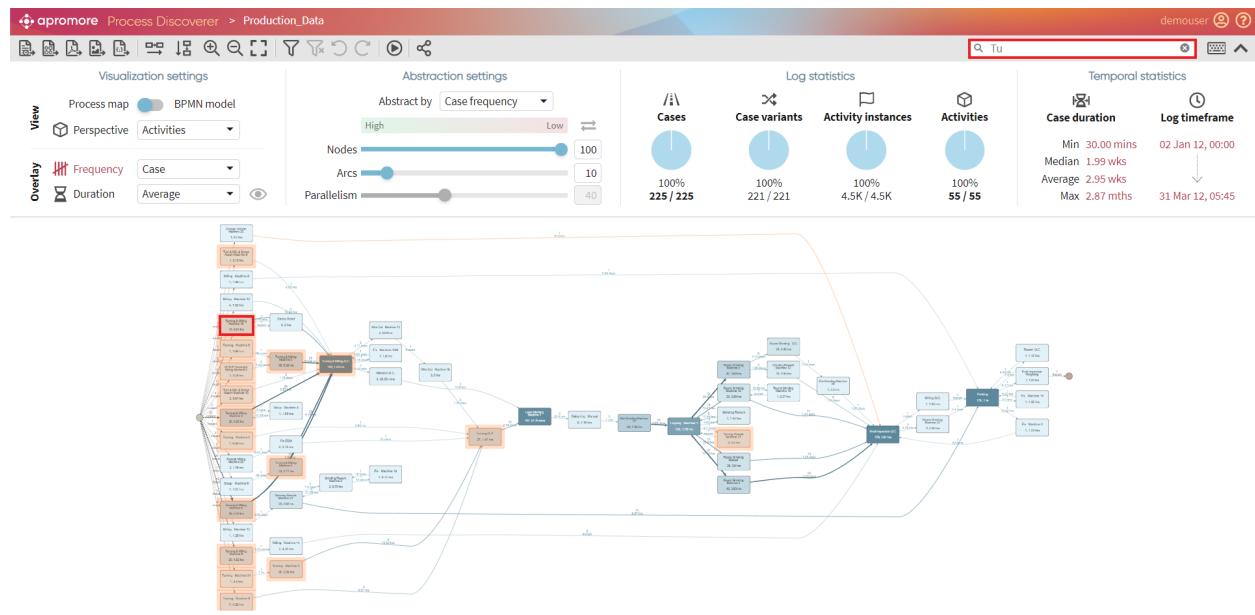


3.1.12 Search Activity

We can also search for an activity by using the search bar on the top-right.



For ease of view, the search results get highlighted in the process map.

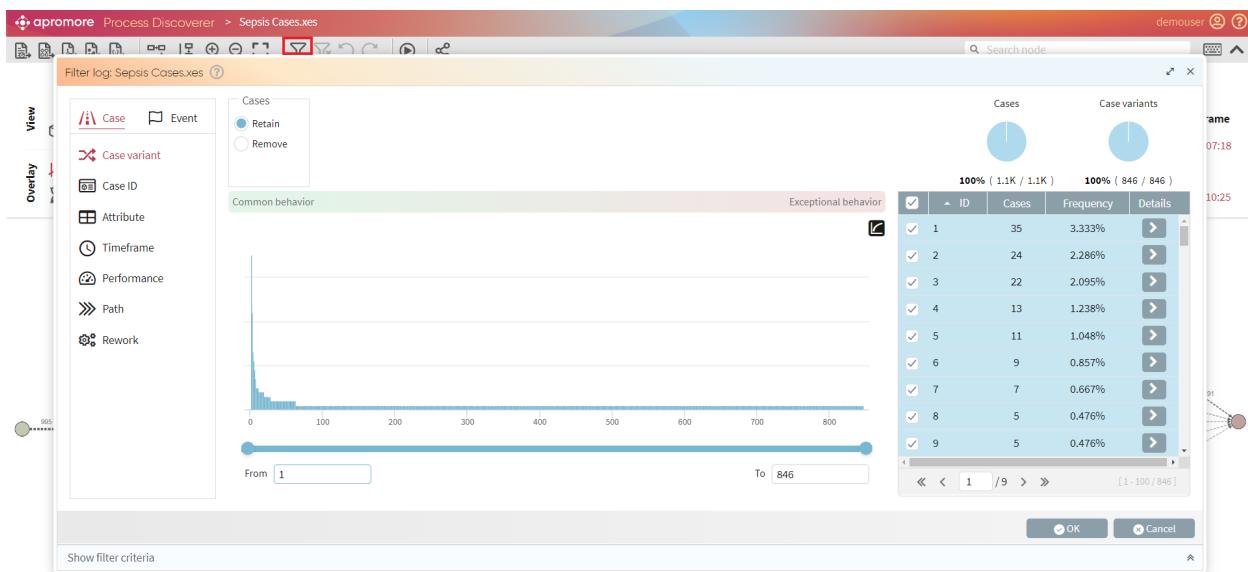


3.2 Filter log

Apromore allows us to apply various filters to slice and dice an event log in different ways and focus on the filtering results. For example, we can use it to segregate specific process cases that fulfill certain conditions, e.g., all cases that transit via a particular activity or segregate two variants of the same process, e.g., the first variant containing slow cases and the second one containing fast cases.

We can access Log filtering from various places:

- In the Portal, select an event log and click on “Filter log” from the Discover menu.
- In the Performance Dashboard, click on the “Filter” menu on the top-right corner or select.
- In the Custom View of the Performance Dashboard, select Advanced and then “Filter log” from the Edit frame.
- In Process Discoverer, click on the “Filter” button from the top buttons bar, as shown below.



No matter where we invoke the filter from, the filter editor showed above will pop up.

3.2.1 Filter types: Case vs. Event

There are two main filter types supported by Aproximare: Case Filter and Event Filter. Both filter types allow us to create a filter based on particular conditions on the cases or events.

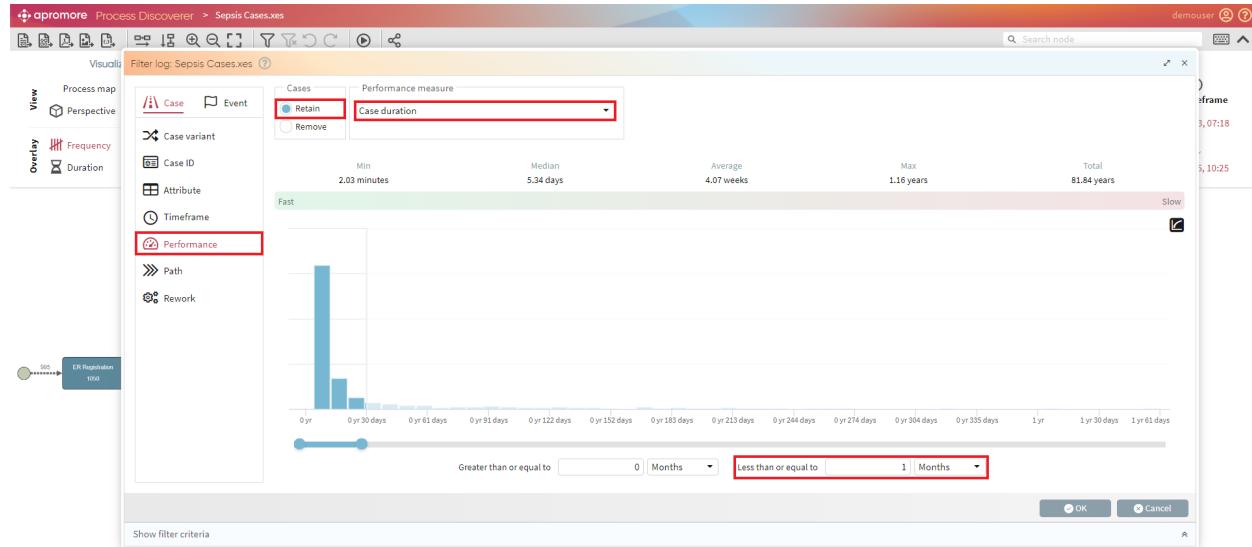
More specifically:

- A case filter allows us to “slice” a log, i.e., to retain a subset of the process cases, e.g., those cases that contain a specific activity;
- An event filter allows us to “dice” a log, i.e., to retain a fragment of the process across multiple cases, e.g., an element containing two specific activities.

For the case and event filters, we can set several filter criteria. Let us take a look at the case filters first.

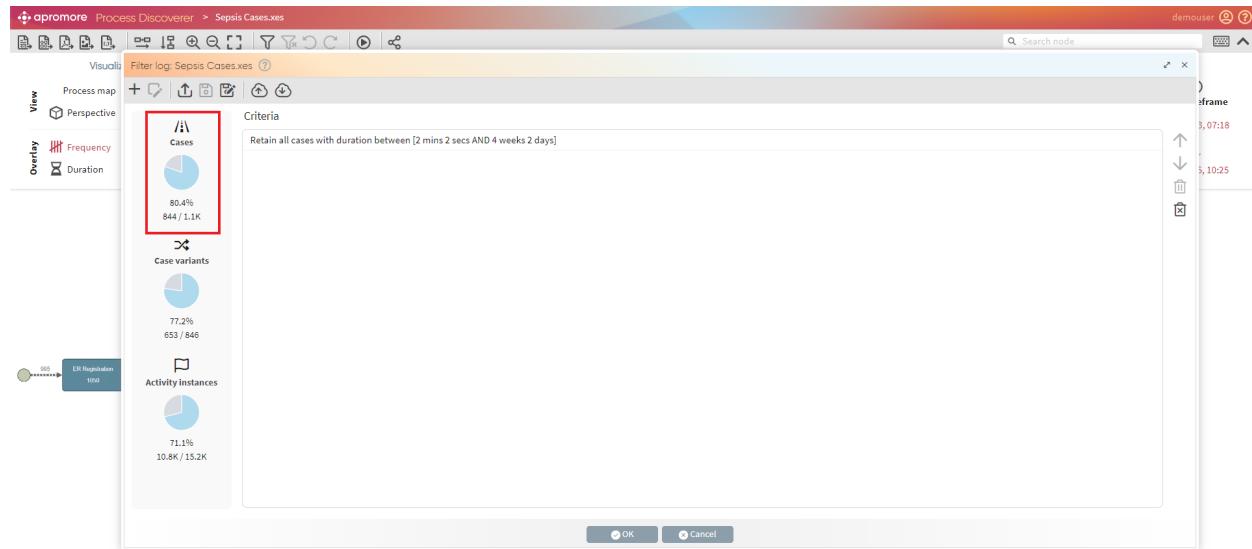
3.2.2 Case > Performance filter

To understand a process, we might want to retain or remove cases that fulfill specific performance requirements, e.g., retain all cases that complete within one month. We can use the “Performance” filter for this purpose. For example, the below screenshot captures only those cases that last no more than one month in duration.

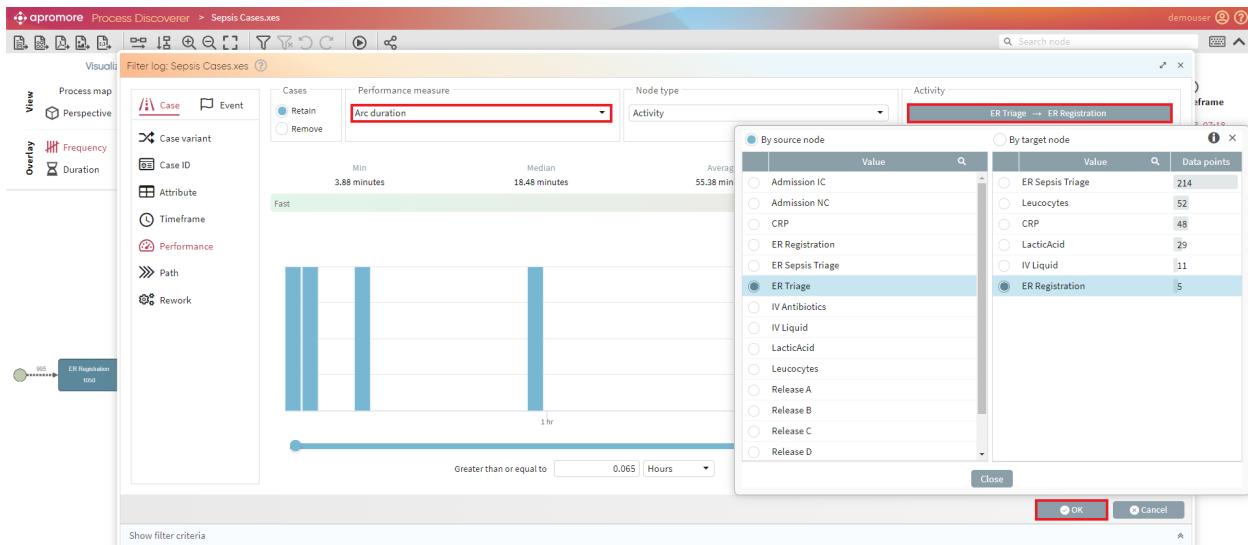


We can decide whether to retain or remove the cases that fulfill each filter's condition set in the filter criteria. Concerning the example above, we may determine whether to retain or remove all cases that complete in one month.

We create a filter by clicking *Apply*. We can observe that 80.4% of the cases fulfill this requirement.



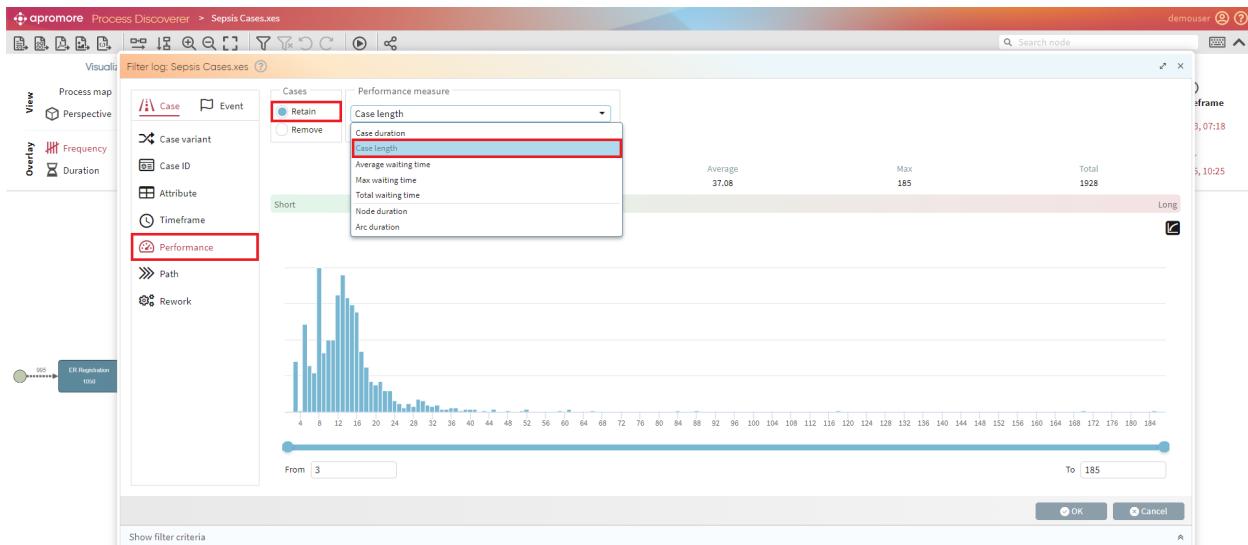
We can use the *Arc duration* metric from the *Performance measure* drop-down menu to perform the analysis based on the duration of the path between different nodes of type activity, resource, or other event attributes.



In the example above, we decide to retain all cases where the arc duration between *ER Triage* and *ER Registration* is not more than 3,25 hours. The filter is created by clicking *Apply*.

In addition to the arc duration, we can also select a node duration performance metric to analyze performance by retaining or removing different nodes of type activity, resource, or different event attributes.

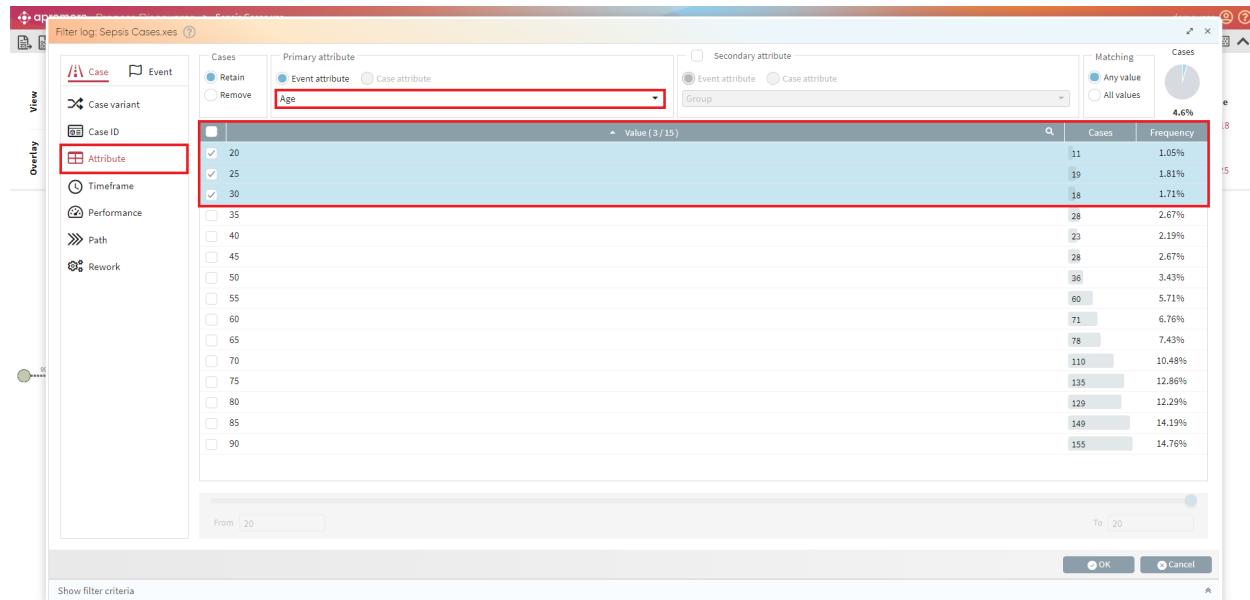
We can also filter out cases based on *case length* (number of activity instances in the case). Thus, in the example below, we retain all cases whose length is between 3 to 15 activity instances.



3.2.3 Case > Attribute filter

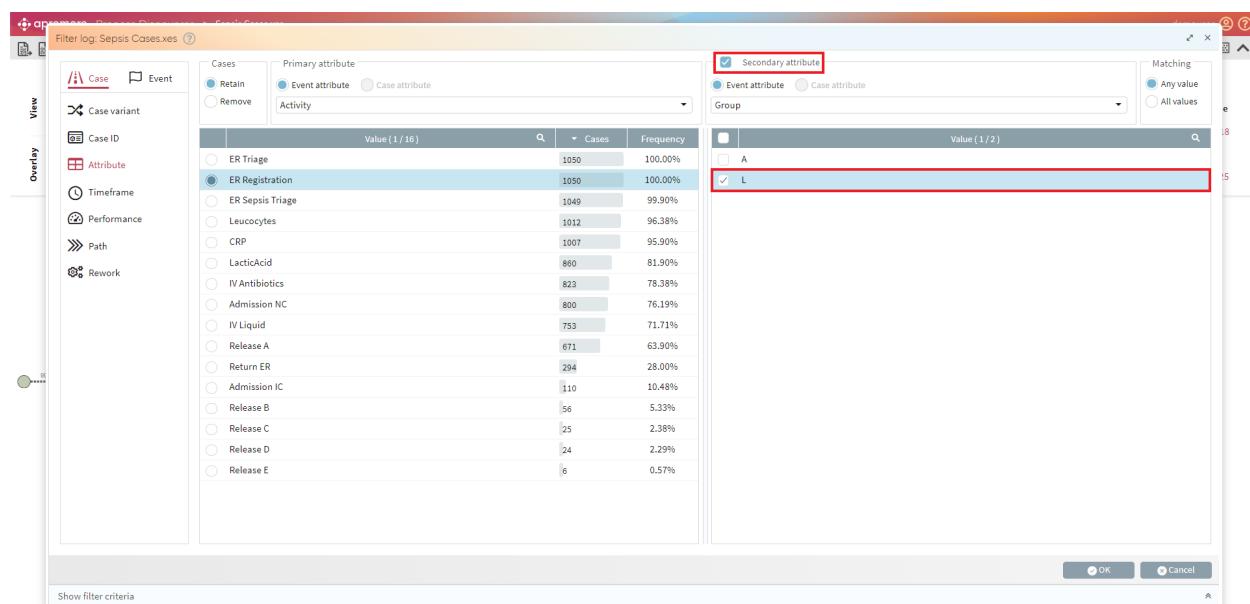
To retain or remove all the cases that include a specific attribute, we can use the *Attribute* filter. For example, we want to retain only those whose attribute *Age* is between 20 to 30.

For this, click on the *Attribute* filter. Select the age attribute from the drop-down list and tick the specific values to retain. Finally, click on *Apply*. In the example below, the result would be only those cases where the age attribute is between 20 to 30.



Note: For the numerical attributes only, there is an alternative to retain or remove cases by choosing the range of values using the “From”/“To” slider at the bottom of the filter window. We will see the list of values (categories) for categorical attributes like resources or product types and choose which specific values to retain or remove.

We can also retain/remove cases that include a secondary attribute.



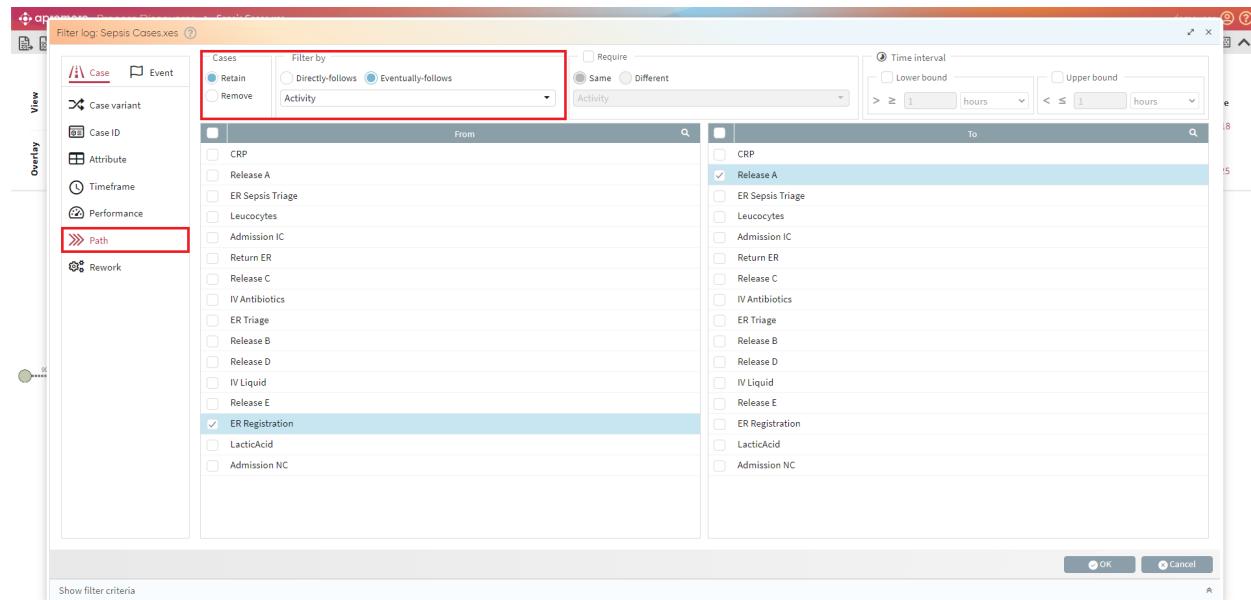
In the given example, we retain cases where resource group L (Secondary Attribute) performs an activity *ER Registration*.

Note: We can also filter cases that include a specific case attribute as a primary/secondary attribute.

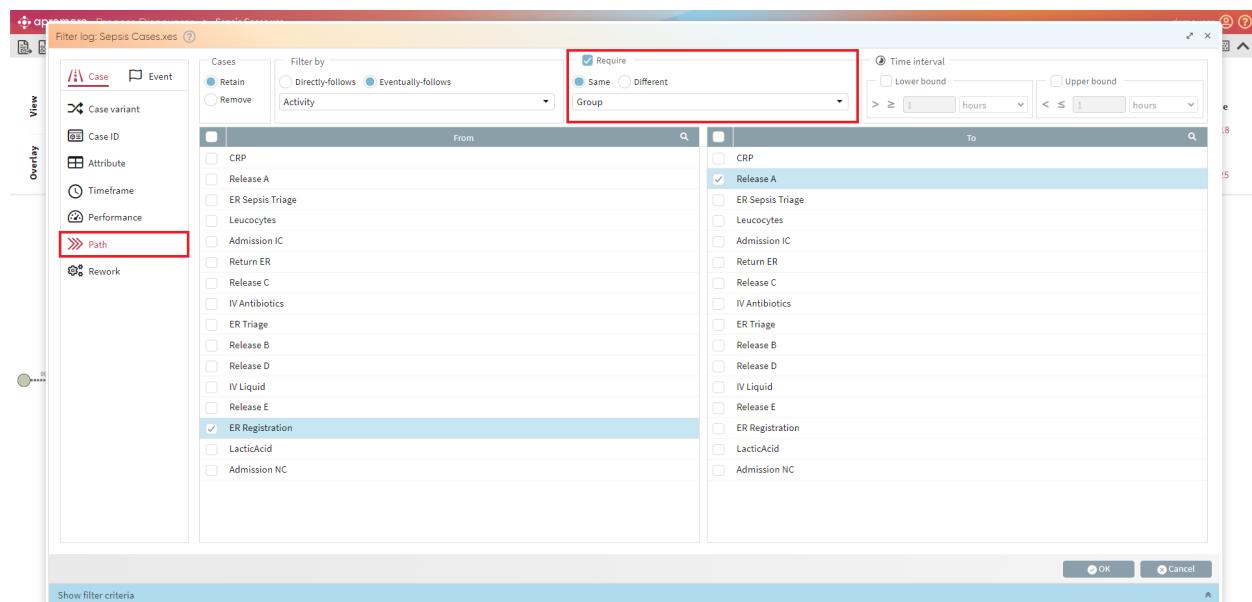
In addition, the Matching section allows us to set whether cases should be retained that satisfy any of the selected values (default selection) or all the selected values.

3.2.4 Case > Path filter

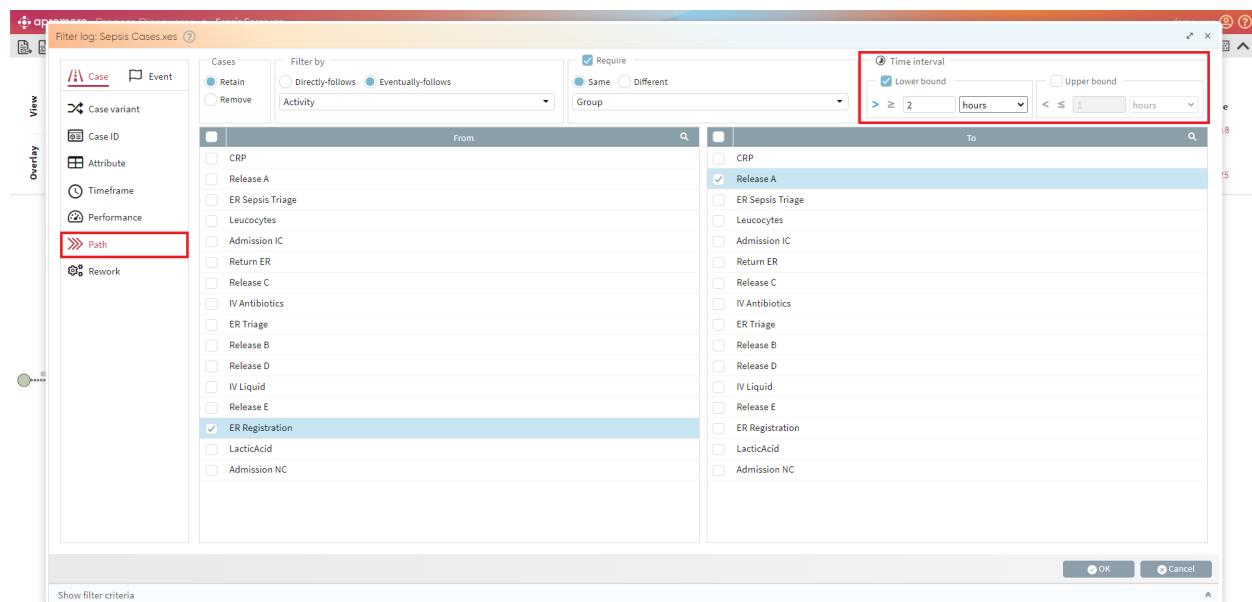
We can use the *Path* filter to identify bottlenecks or analyze the transitions between the activities performed. For example, click on the *Path* filter to retain those cases where the activity *ER Registration* eventually follows *Release A*.



We can also filter out those cases where the same resource group is performing the activities. This can be done by checking the *Require* checkbox and selecting *Group* from the drop-down list of the *Path* filter.

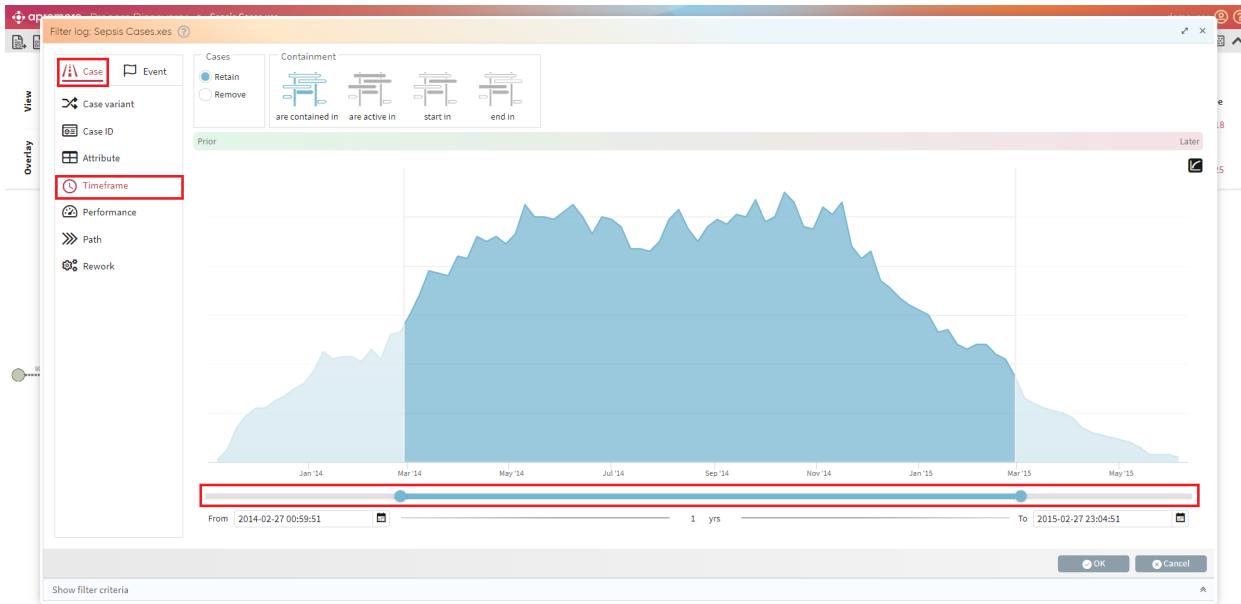


The time between the occurrence of activities can also be captured by using the *Lower* and *Upper* bound fields of the *Path* filter. For example, retain those cases where the time interval between ER Registration and Release A is greater than 2 hours.



3.2.5 Case > Timeframe filter

The *Timeframe* filter allows us to retain or remove those cases that are “active in”, “contained in”, “start in,” or “end in” a particular time period of the log. We can set the desired timeframe by entering the *Start* and *End* dates or using the time slider at the bottom of the Filter criteria window.



3.2.6 Case > Rework & repetition filter

In some processes, certain activities are repeated – this can be done in direct repetitions or through the *back and forth* between two or more activities.

A *Rework* filter can be used to isolate repetitions so that only those process sequences are retained or removed that contain specific repetitions. We can also set the *Lower* and *Upper* bound for the reworked activities.

When setting multiple conditions on repeated activities, we can define whether the filter criterion should satisfy any condition or all conditions on the repeated activities.

The screenshot shows the 'Filter log: Sepsis Cases.xes' dialog. On the left, the 'View' sidebar has 'Case' selected. Under 'Case variant', 'Case ID' is selected and highlighted with a red box. The main area shows a table of cases with various filters applied. One row for case ID 69 has a specific filter applied: 'Value' is set to '69', 'Max' is '10', 'Lower bound' is '>= 0 time(s)', and 'Upper bound' is '<= 30 time(s)'. Other rows show similar filters for other case IDs.

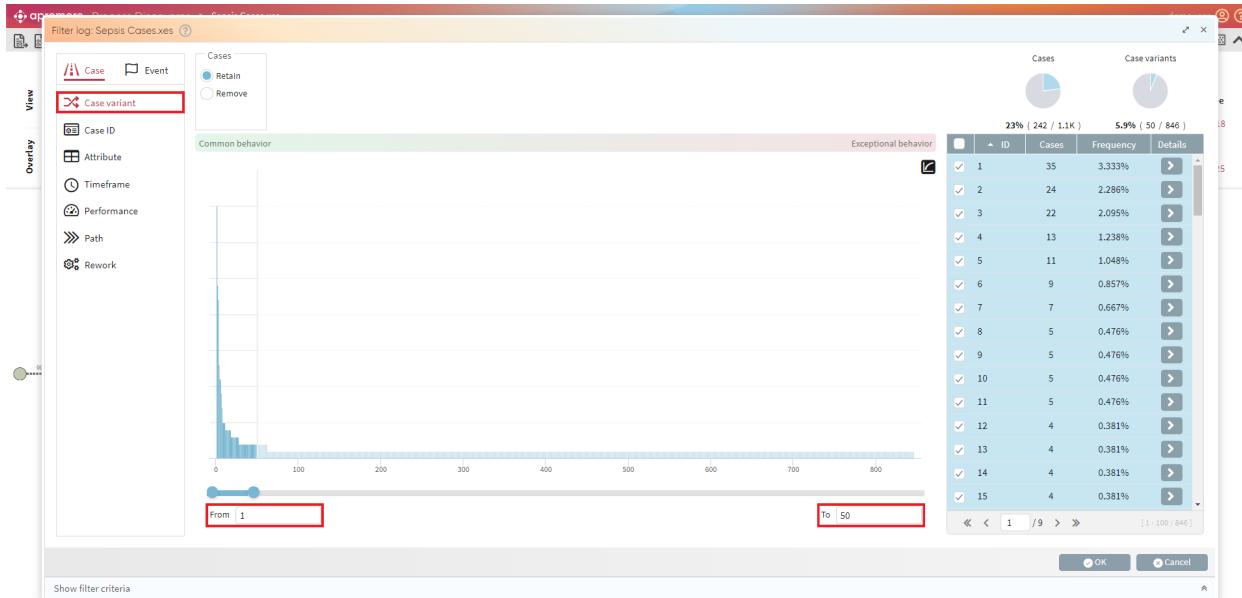
3.2.7 Case > Case ID filter

We can choose to retain or remove cases based on a particular case ID using the *Case ID* filter. In the below screenshot, we are retaining those cases with case ID ‘AA’. The result would include the activities performed by the case ID ‘AJ’.

The screenshot shows the 'Filter log: Sepsis Cases.xes' dialog. On the left, the 'View' sidebar has 'Case' selected. Under 'Case variant', 'Case ID' is selected and highlighted with a red box. The main area shows a list of case IDs. The case ID 'AA' is checked and highlighted with a red box. The total count of cases is shown as 0.1% (1 / 1.1K).

3.2.8 Case > Variant filter

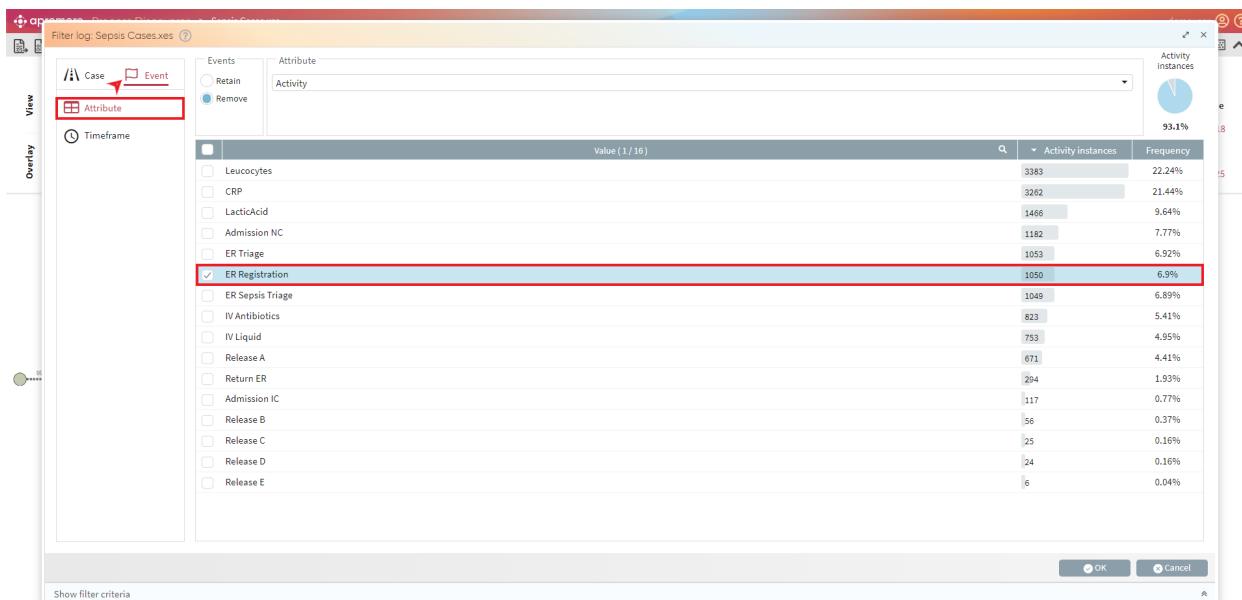
We can use the *Case variant* filter to retain or remove the case variants based on a particular condition by entering the *From variant* and *To variant* values or using the time slider at the bottom of the Filter criteria window. For example, we want to retain up to 50 case variants to analyze the process's most common behavior.



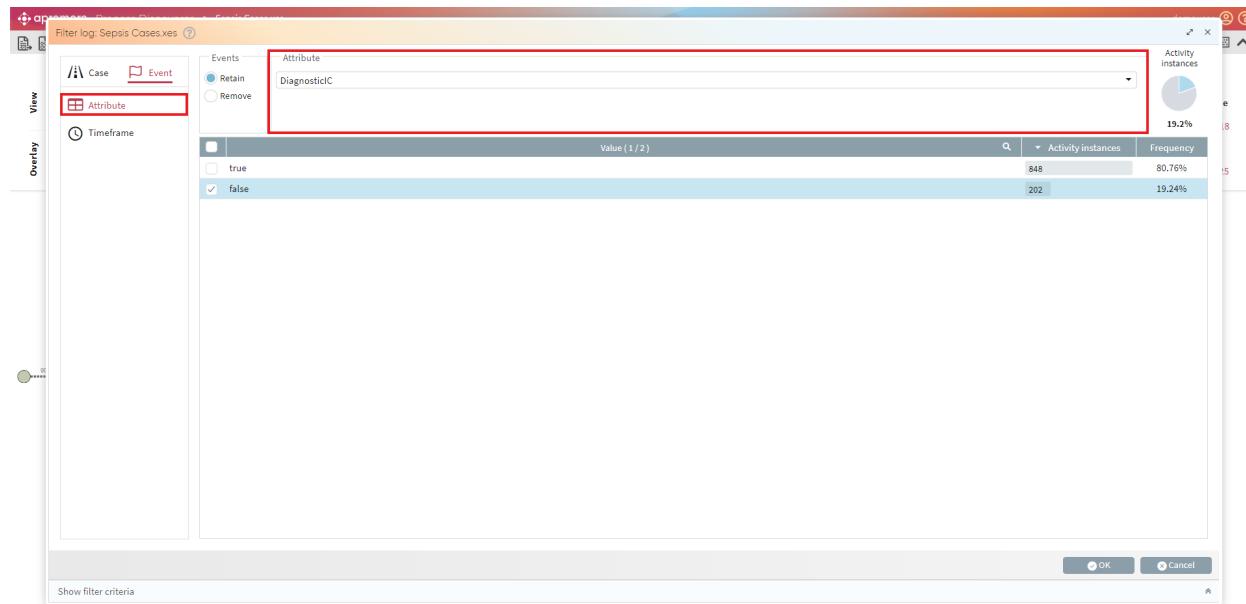
Let us now take a look at the filter criteria for event filters. We can use the *Event* filter to dice the log, i.e., isolate a specific fragment of the process across all cases. The *Event* filter allows us to filter by *Attribute* and *Timeframe*.

3.2.9 Event > Attribute filter

The *Attribute* filter of type *Event* allows us to retain or remove those events that satisfy the values of a specific event attribute. For example, we may want to remove those events whose activity label is “ER Registration”. This means effectively to dice the log in such a way to exclude all events related to activity “ER Registration”.

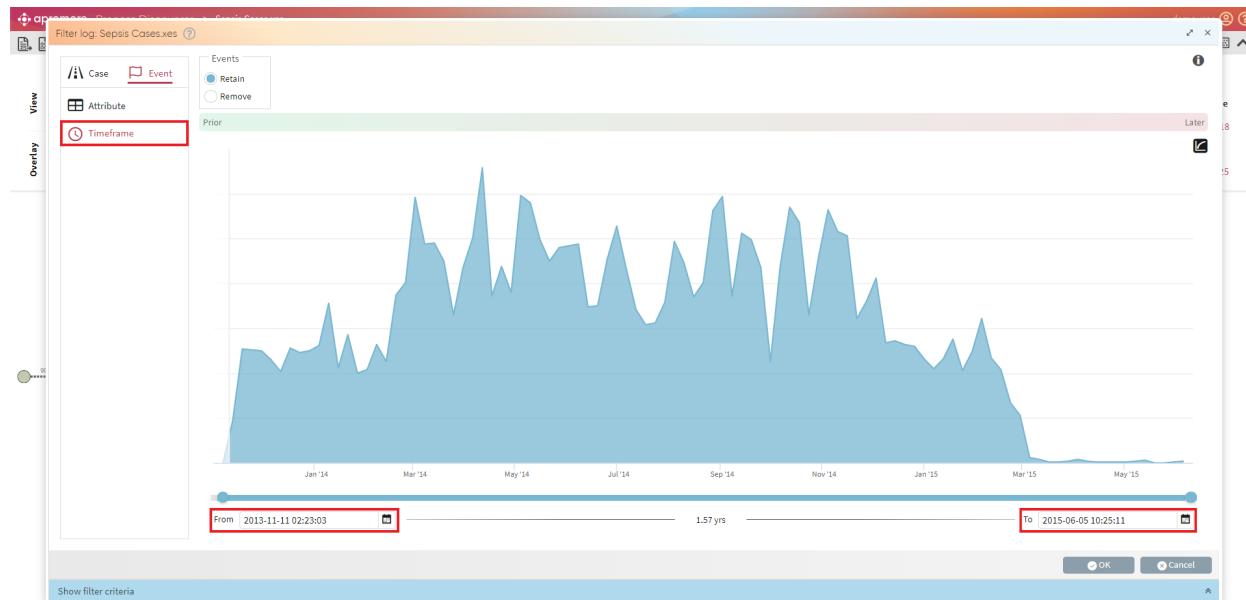


Any attribute value can be used to set conditions. For example, in order to remove all events where the value of “DiagnosticIC” is false, we can select *DiagnosticIC* from the drop-down list of event attributes and then select the specific value we may want to retain or remove.



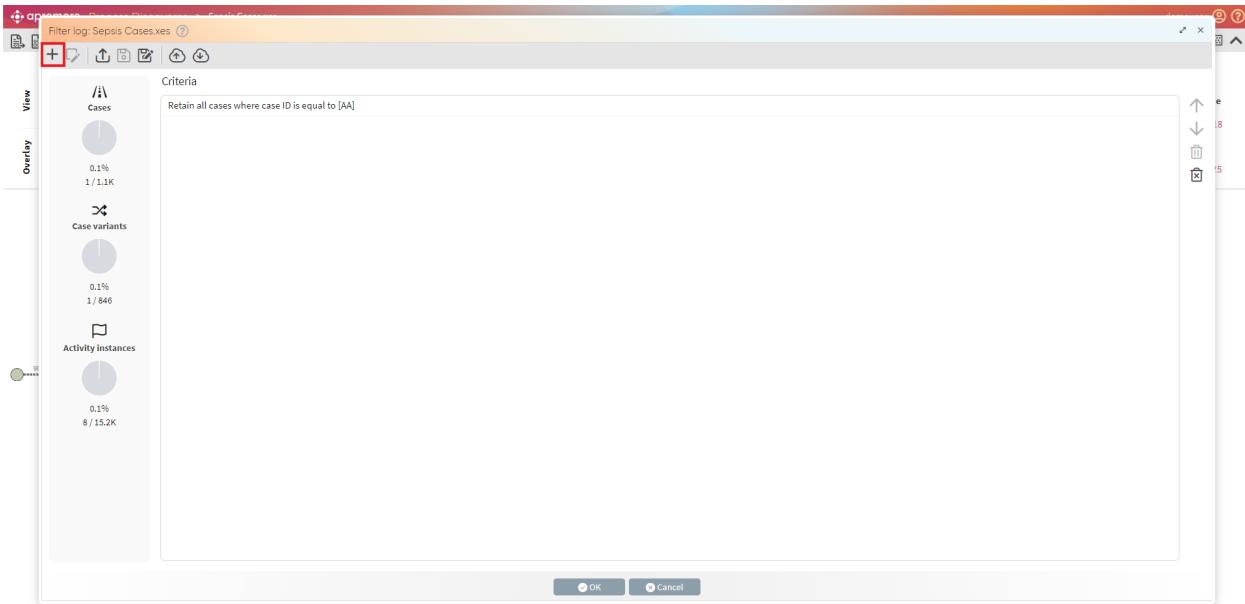
3.2.10 Event > Timeframe filter

The second type of filter criterion for events allows us to retain or remove events based on a particular timeframe. We can set the desired timeframe by entering the *Start* and *End* dates or using the time slider at the bottom of the Filter criteria window.

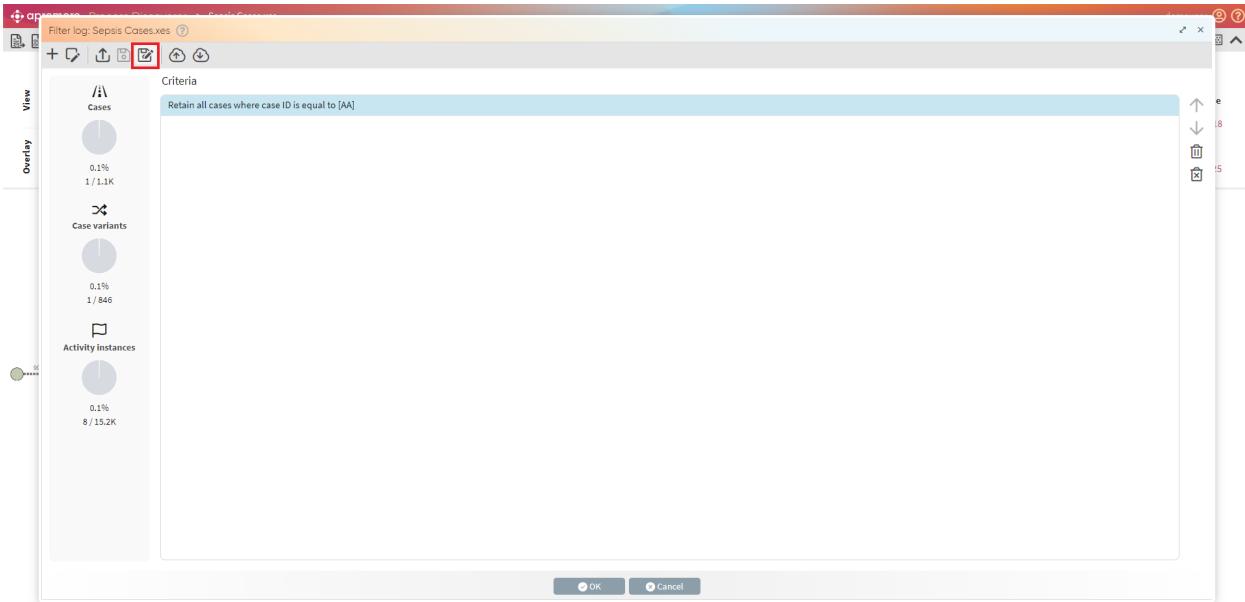


3.2.11 Managing filter criteria

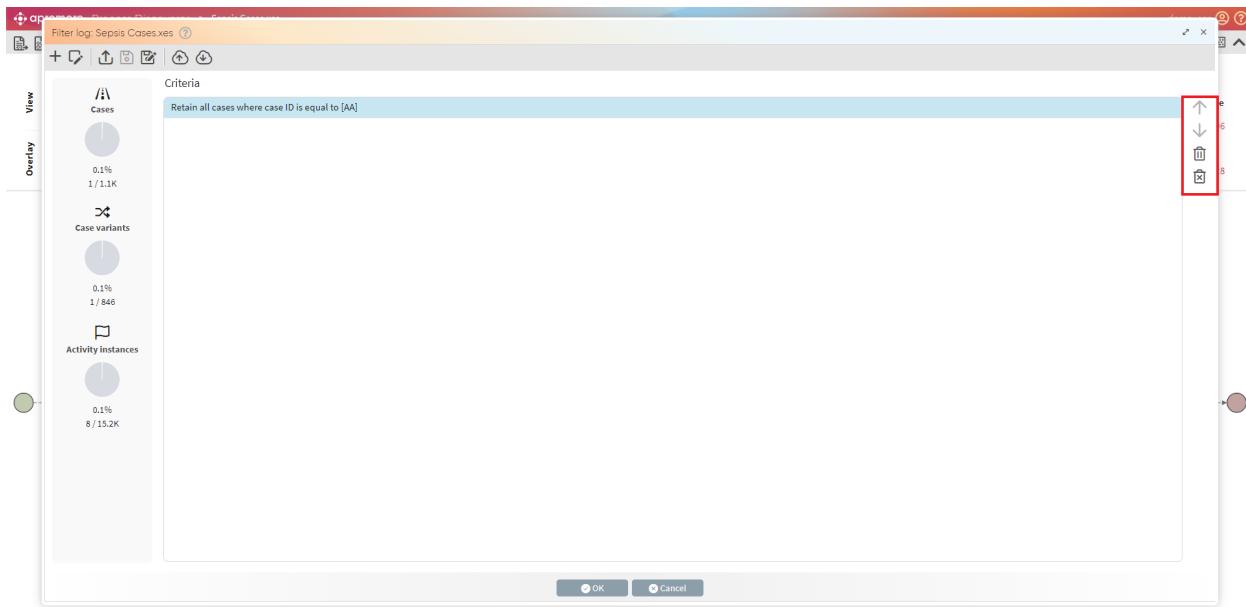
Aproxmore allows us to create one filter on top of another. We can do this by clicking the *Create* button.



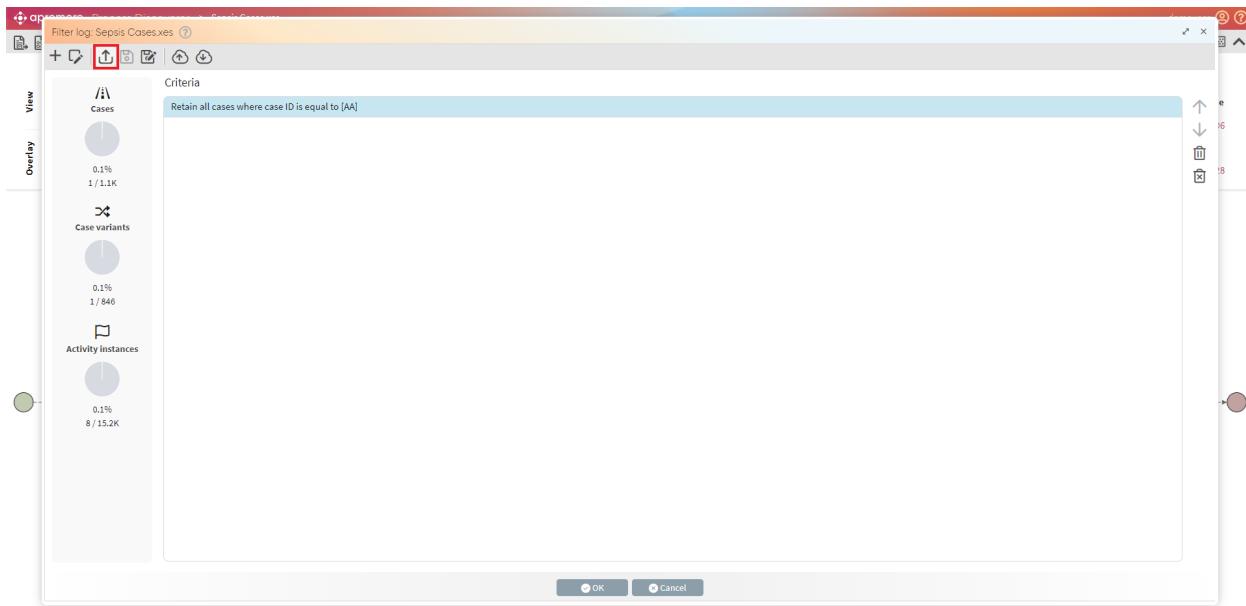
In order to edit an existing filter, select the filter and click on *Edit*.



We can change the sequence of the filters by using the top-down arrows on the right side. In order to delete a single filter, click on button. Alternatively, to delete all the filters at once click the last button - .

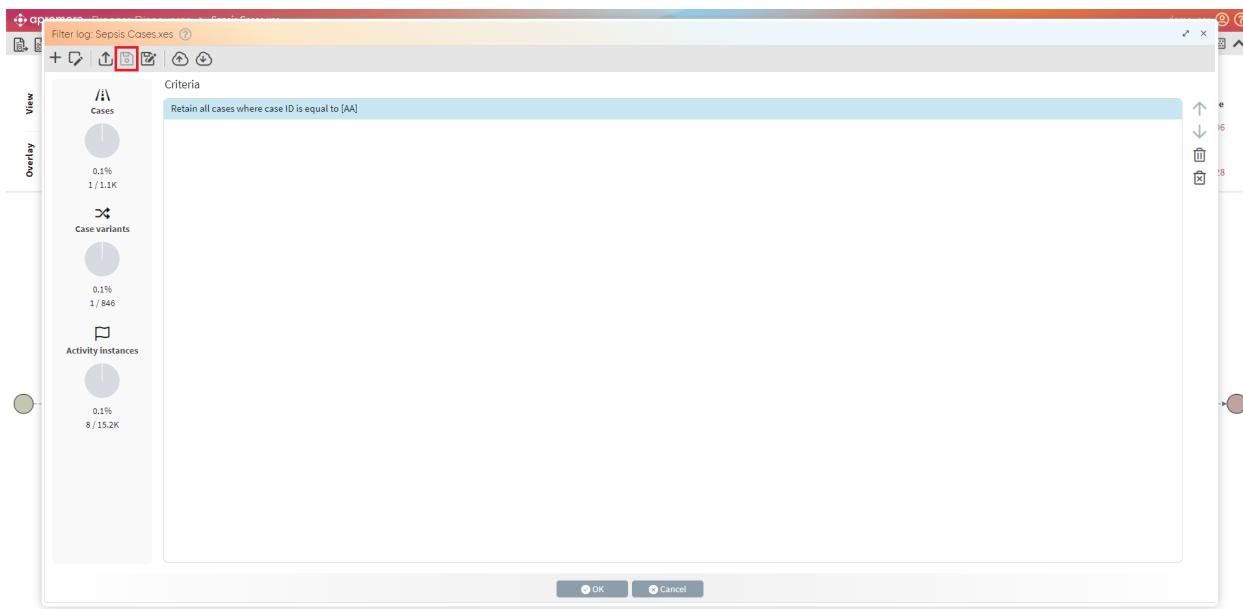


To open a saved filter click on *Open* button.

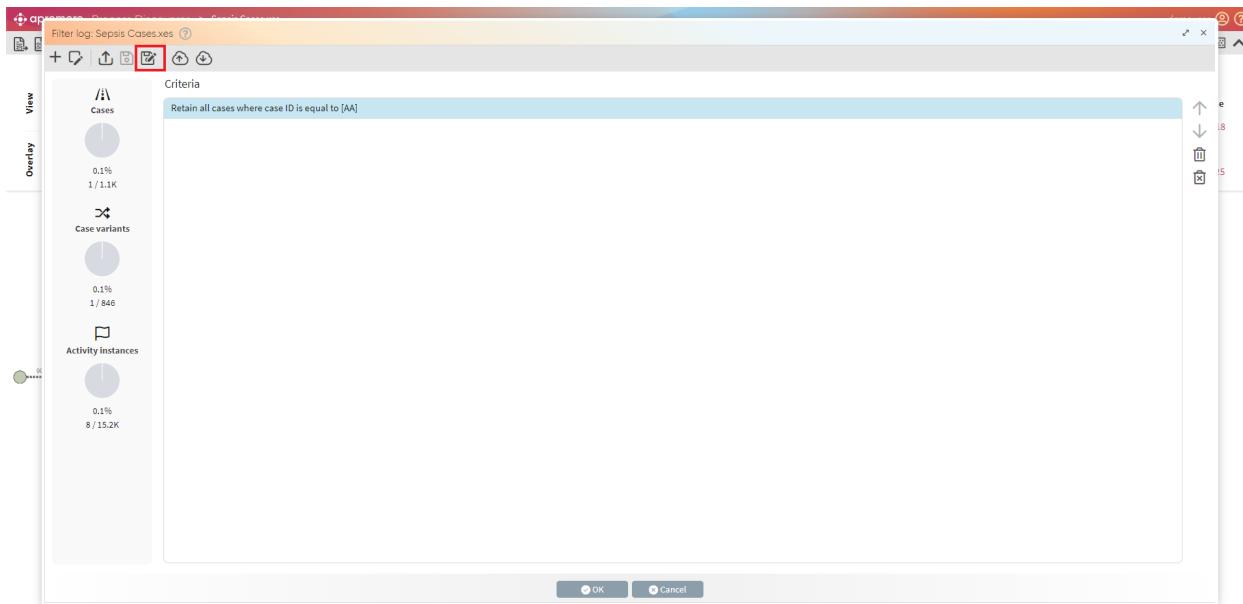


Note: In the filter window, a red exclamation mark next to the filter name means that another user has made changes to the filter. Click on it to save/discard changes.

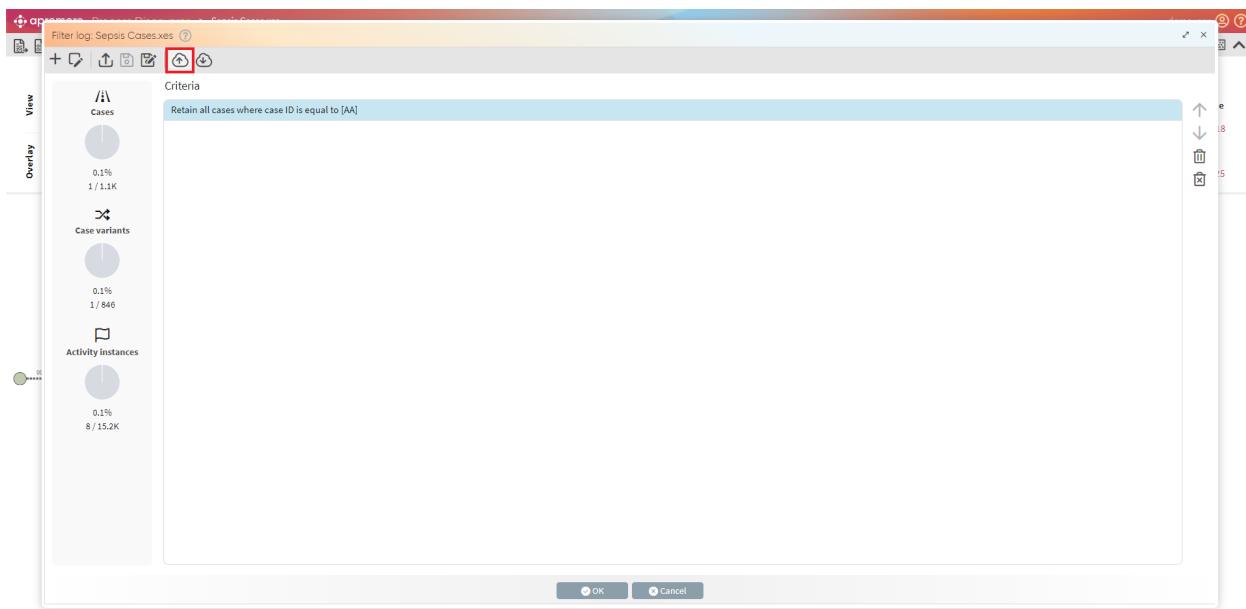
We can make changes to an existing filter and then click on *Save* to save it.



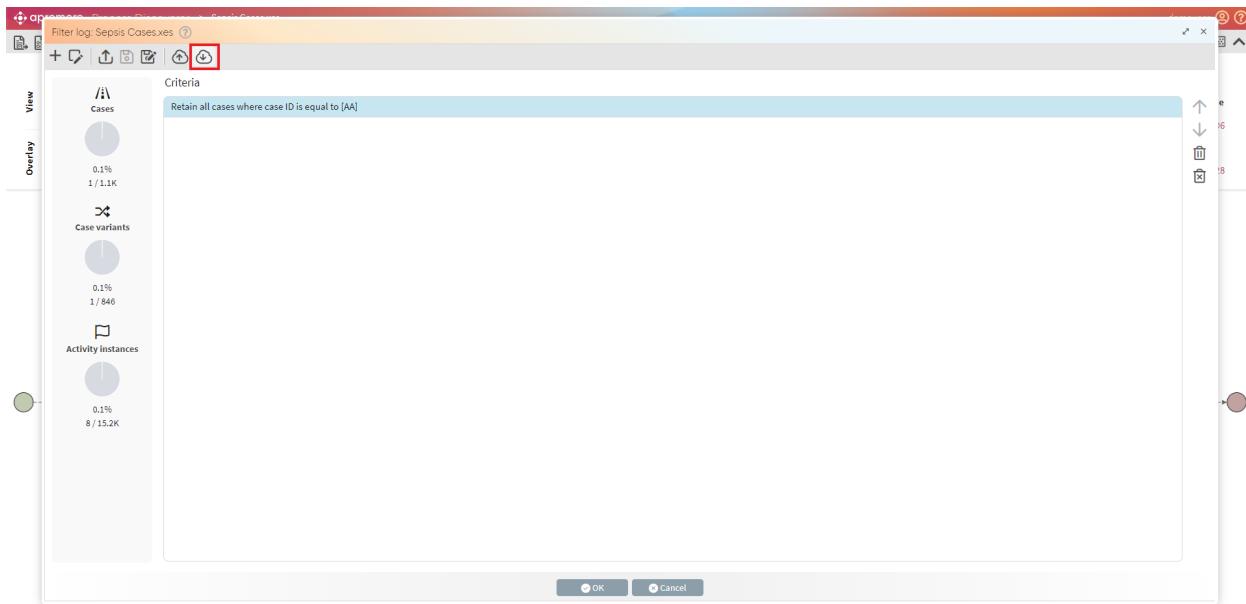
The *Save as* button is used to save a new filter.



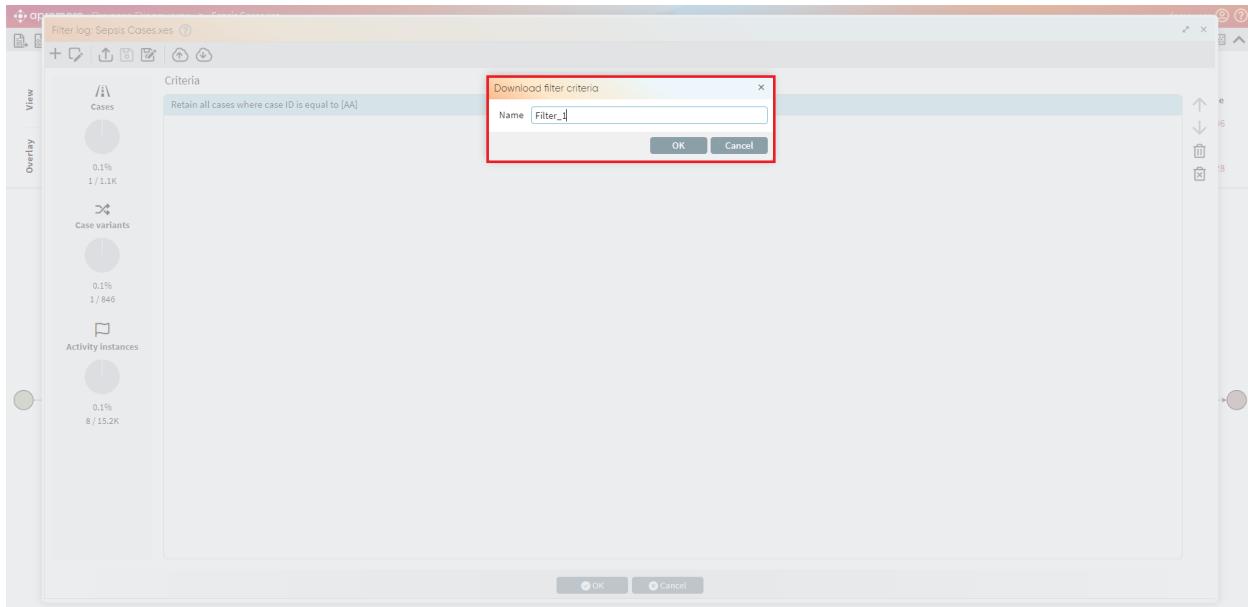
We can also upload a filter by clicking on the *Upload* button. Select the filter (.json file format) from the file explorer.



A filter can also be downloaded using the *Download* button.

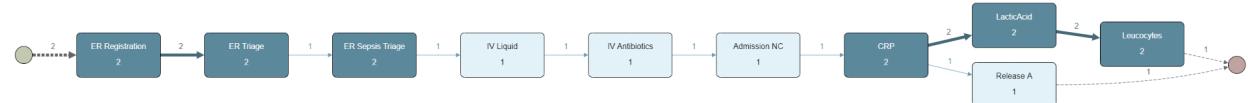
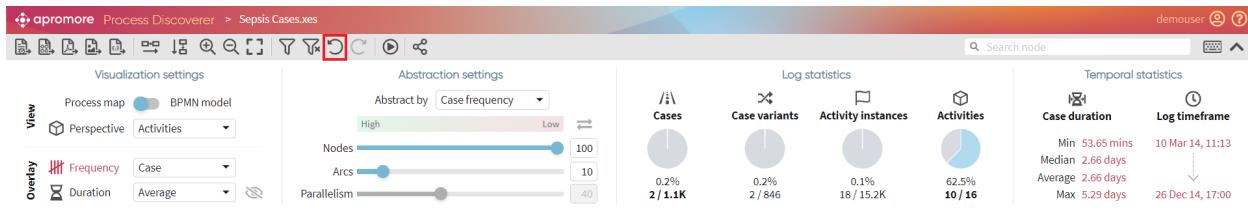


We can edit the name of the filter before downloading it.



3.2.12 Undo/Redo filters

The application of filters can be applied and removed by using the *Undo/Redo* buttons. To undo a filter criterion, click on *Undo filter*.



To reapply the previous filter, click on *Redo*.



3.2.13 Clear all filters

To clear all the applied filters, click on the *Clear all filters* button.



3.2.14 Shortcuts

Note:

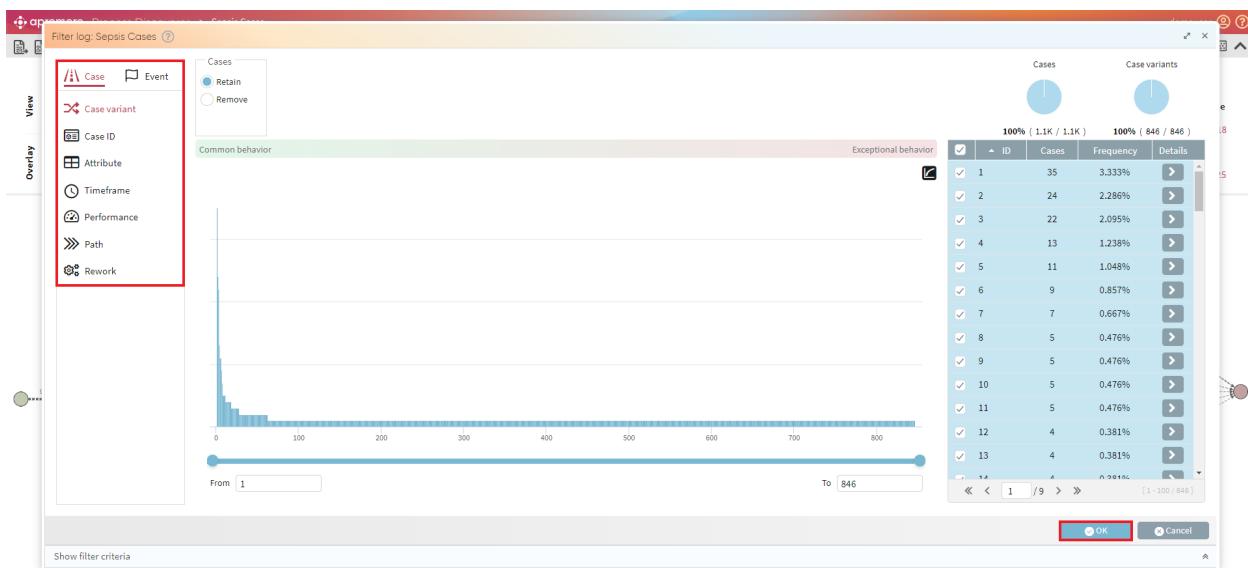
- Right-click on an arc: remove all cases containing the selected directly-follows relation
- Shift + right-click on arc: filter cases based on this arc's duration (from any perspective)
- CTRL + Right-click on an arc: retain only cases containing the selected directly-follows relation
- Right-click on a node: remove all cases with an event containing the selected attribute

- CTRL + Right-click on a node: retain only cases with an event containing the selected attribute
- Alt (Option) + Right-click on a node: remove all events containing the selected attribute
- Alt (Option) + CTRL + Right-click on a node: retain only events containing the selected attribute
- Shift + right-click on a node: filter cases based on this node's duration (from any perspective)
- Shift + CTRL+ right-click on a node: filter cases using this node as a primary attribute.
- CTRL + Z: Undo
- CTRL + Y: Redo

3.3 Save filter

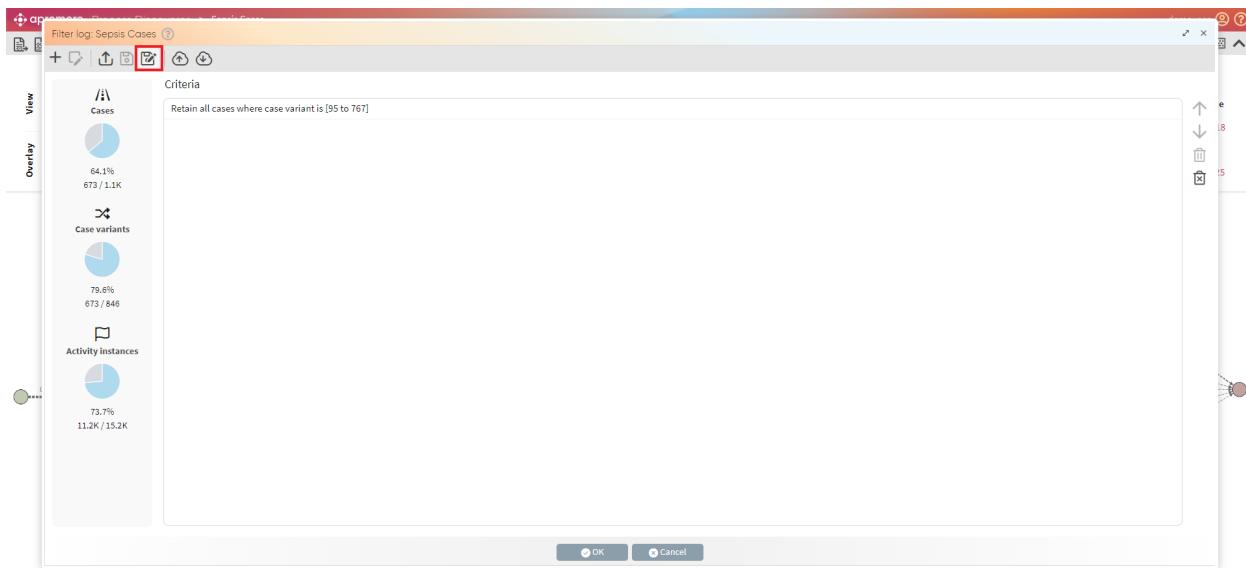
Apronmore provides the functionality of saving and sharing filters. To save a filter we first need to create a new filter and then save the filter.

To create a new filter, choose the type of filter and click on *OK*.

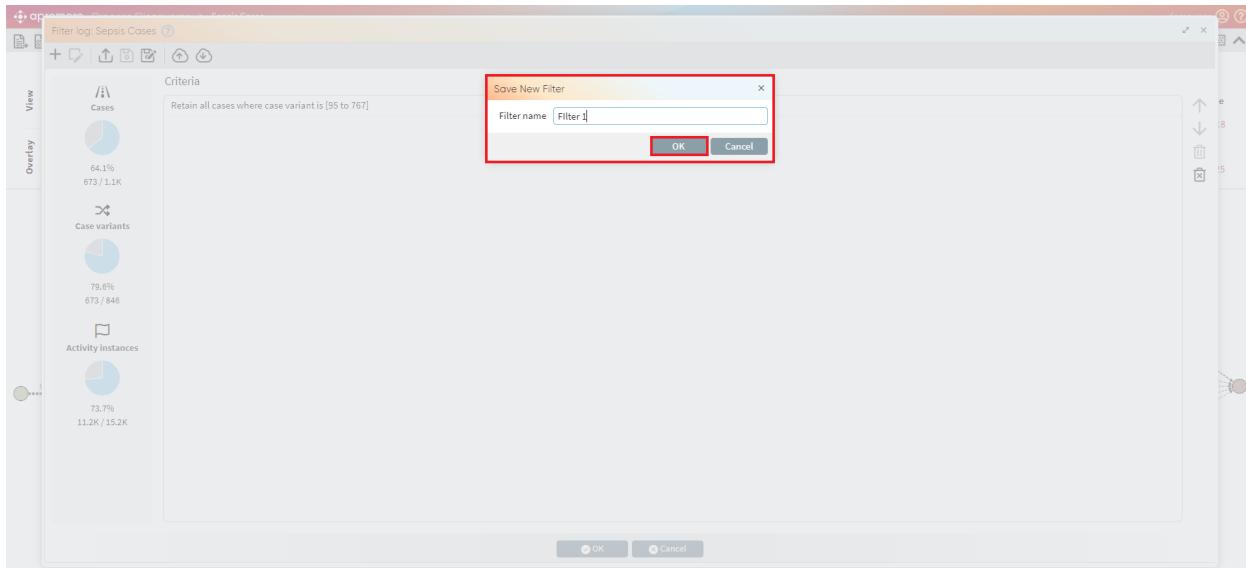


3.3.1 Save as

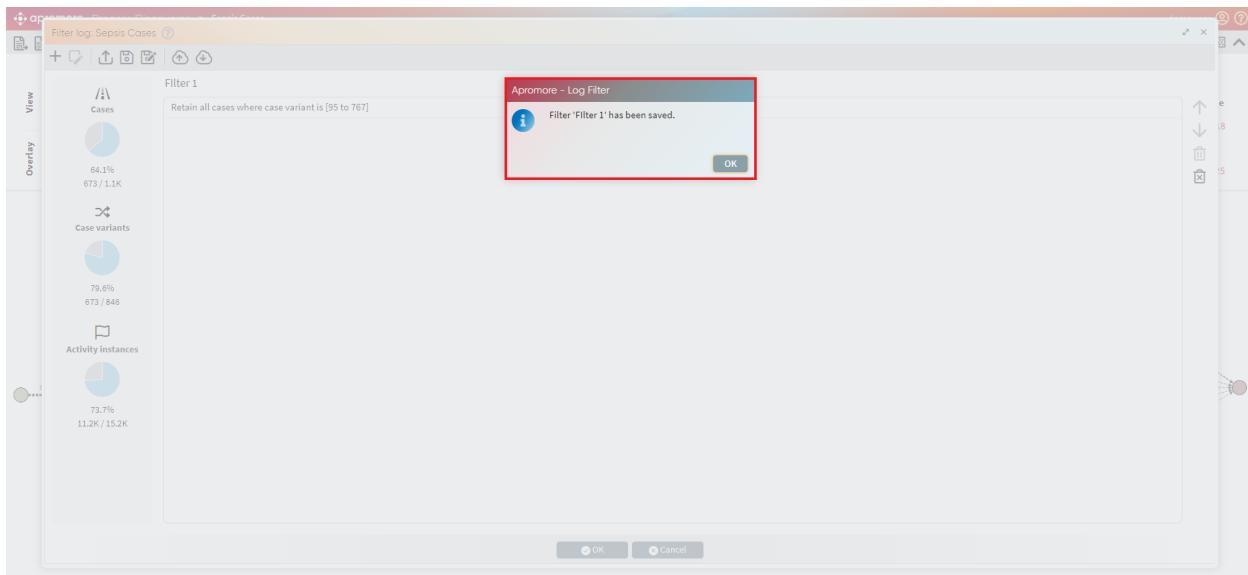
Once a filter is created, click *Save as* in order to save the new filter.



The *Save filter criteria* dialog will appear. Give a name to the filter and click *OK*.

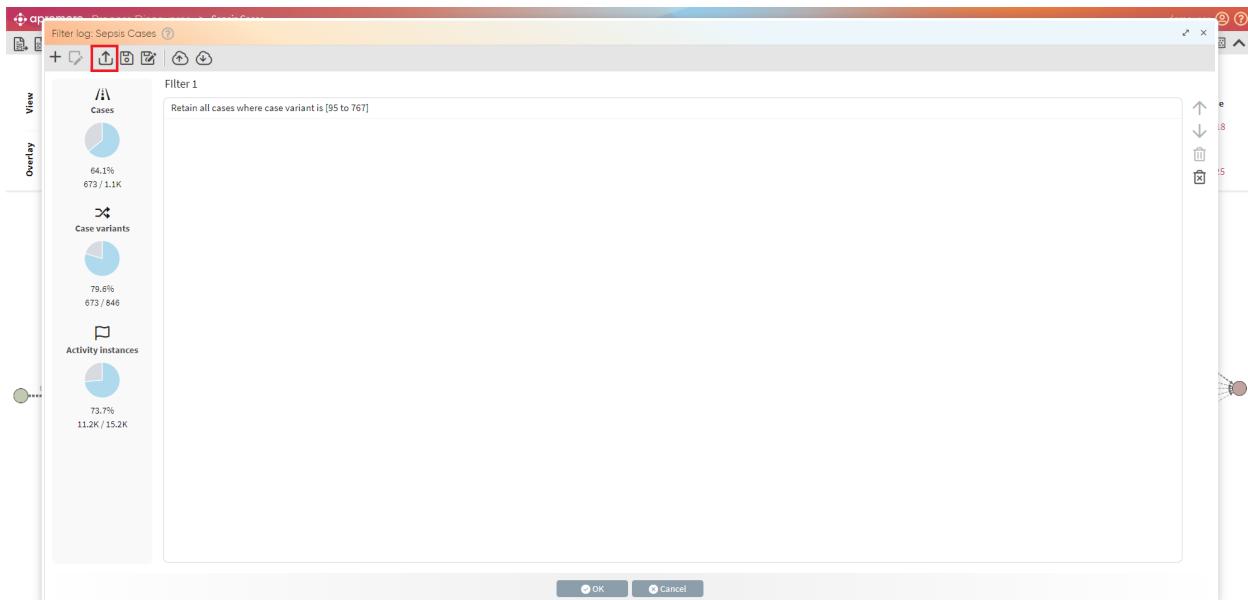


Once the filter is saved, we can see a confirmation message.

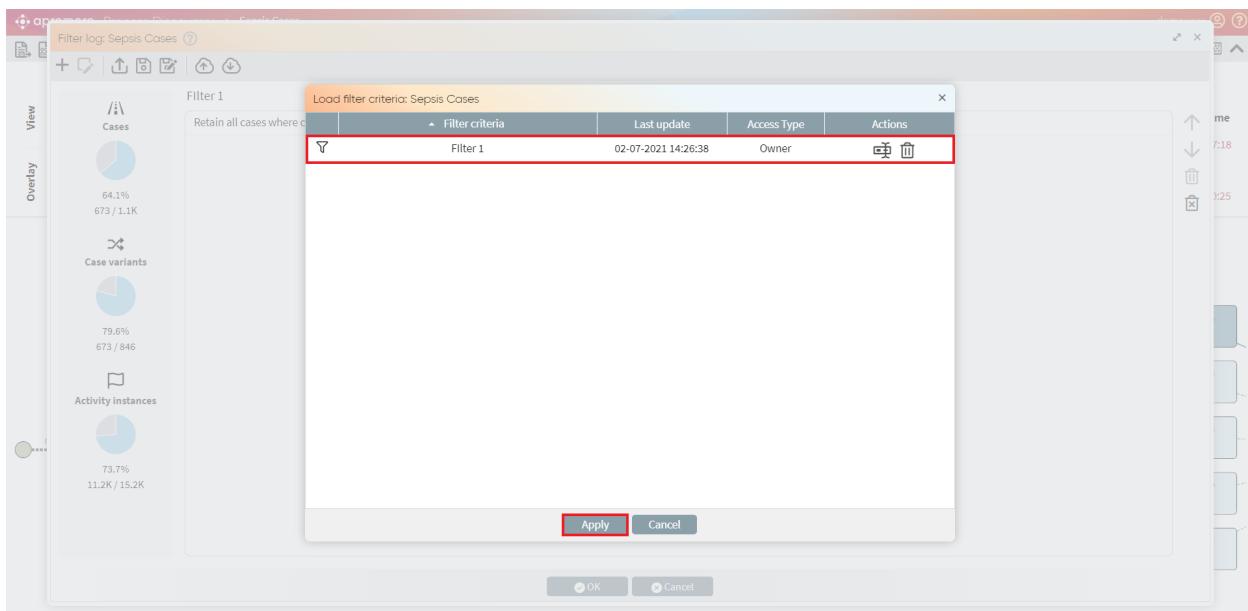


3.3.2 Load

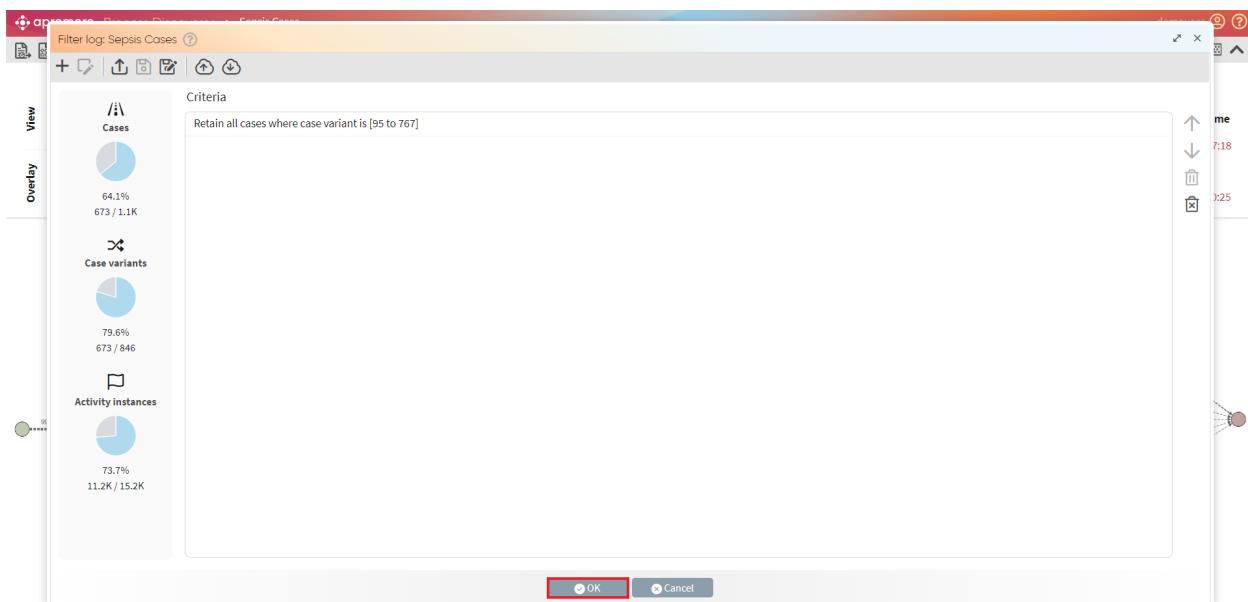
To load filters associated to a log, click on *Open* button.



We select a filter that we wish to load and click *Apply*.

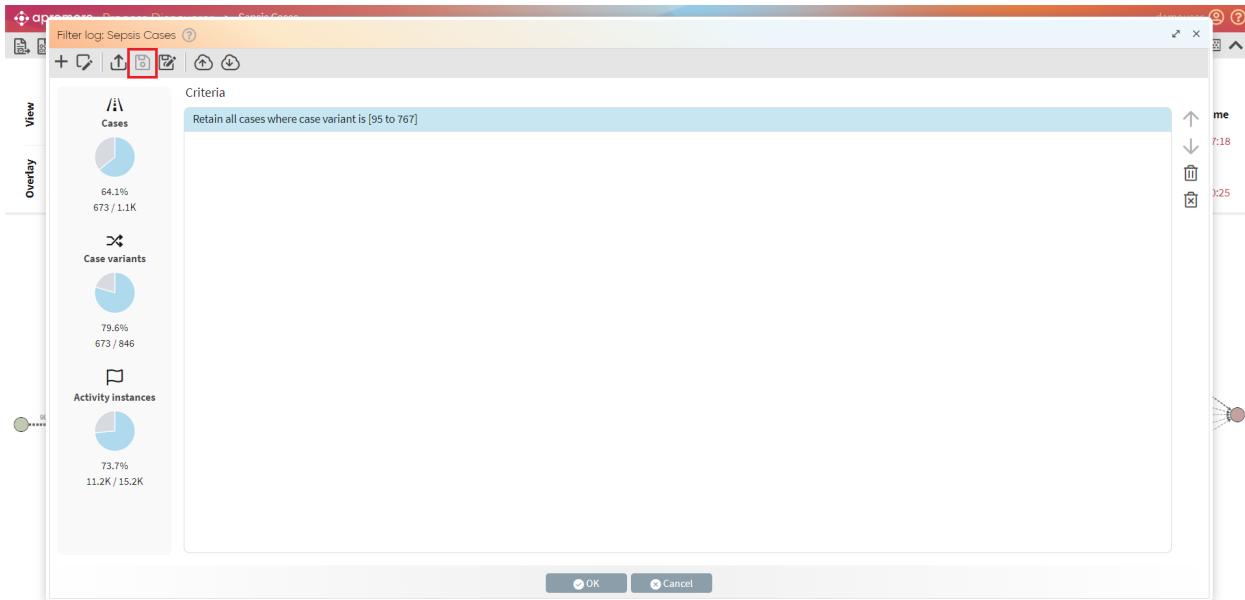


Once the filter is loaded, click on *OK* to filter the event log.

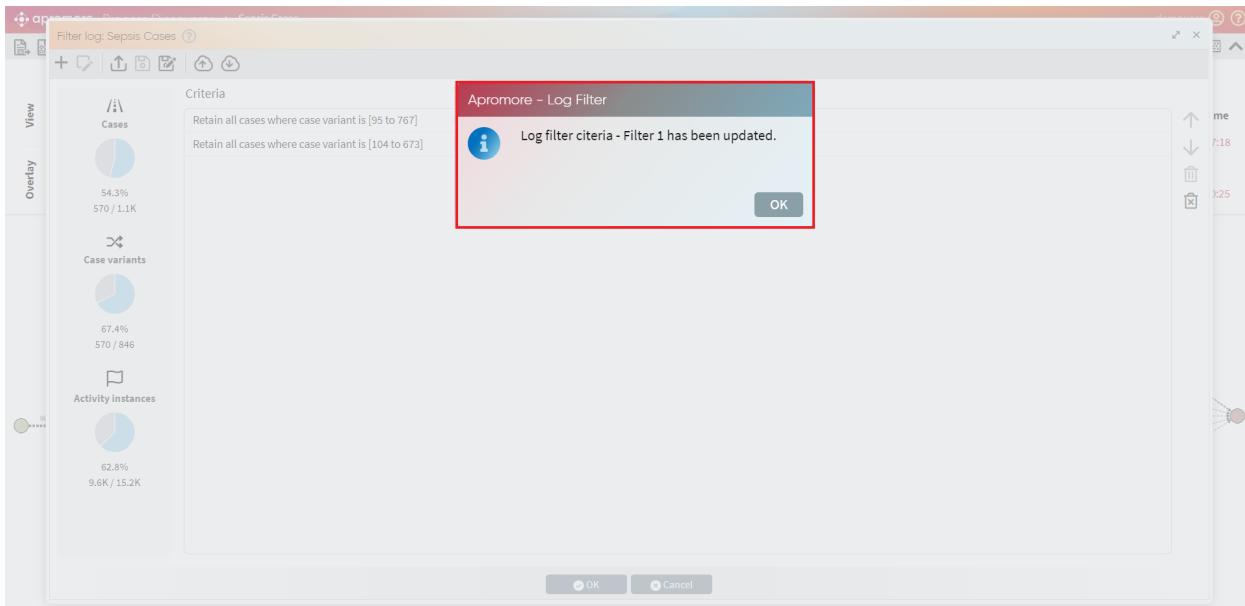


3.3.3 Save

We can update an existing filter and save it. For example, we add an additional filter criterion to an existing filter and click on *Save*.



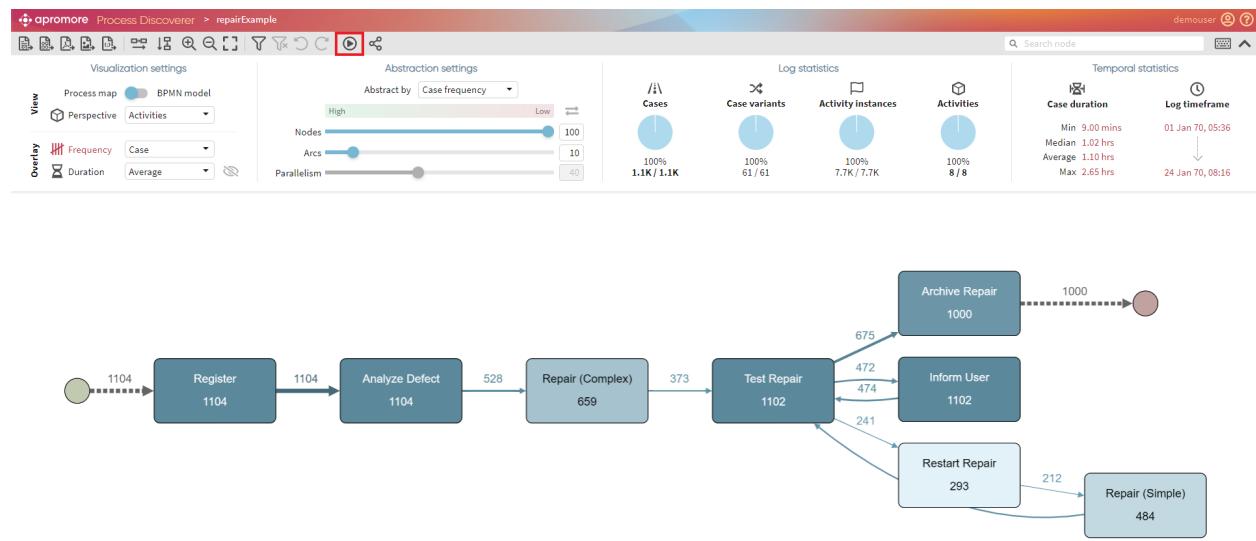
We can see a confirmation message that the filter for the associated log is updated.



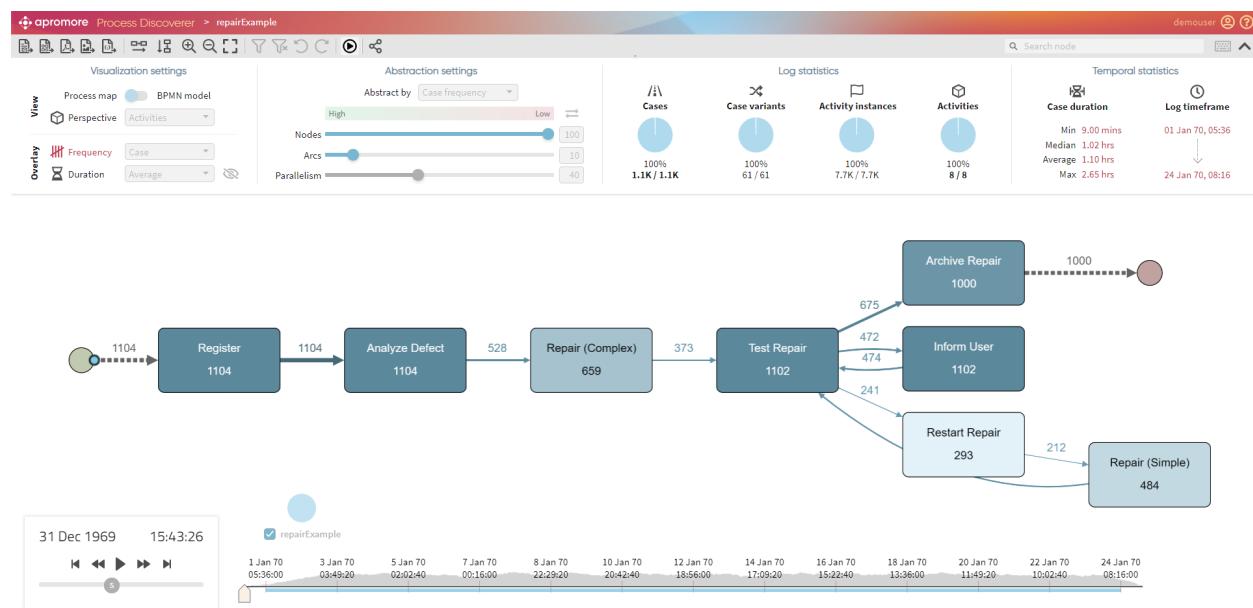
ANALYSIS

4.1 Animate logs (Process map)

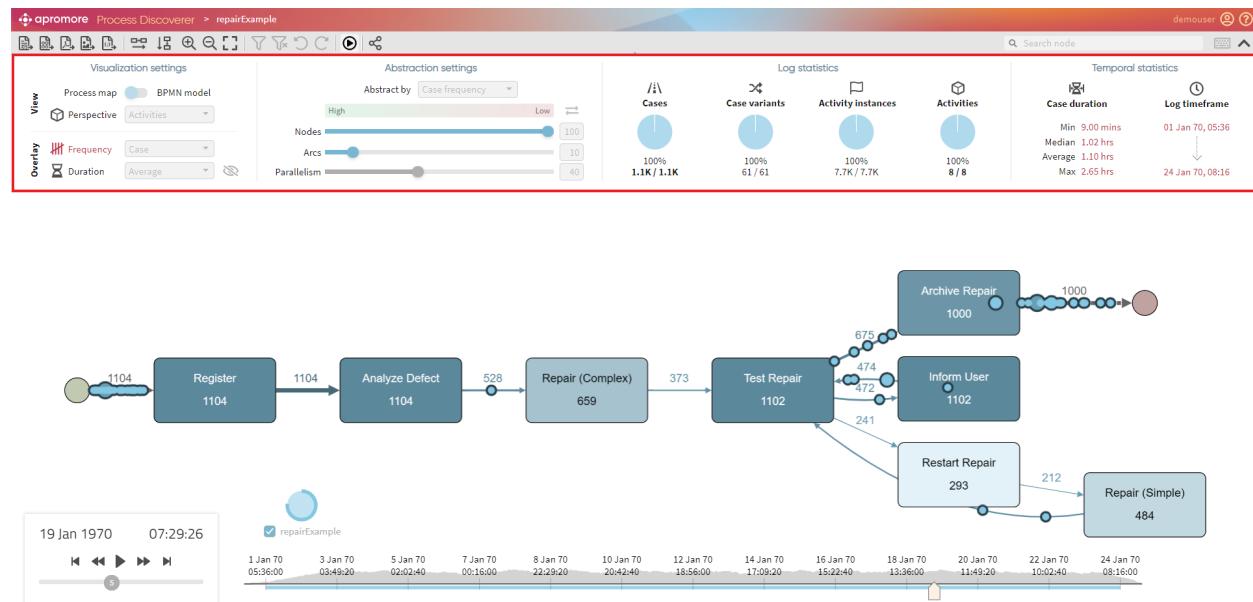
Apromore allows us to replay an event log on top of its process map. To use this plugin, select an event log from the repository and click the *Animate* button in the process discoverer.



The process map within Editor along with the timeline is displayed.

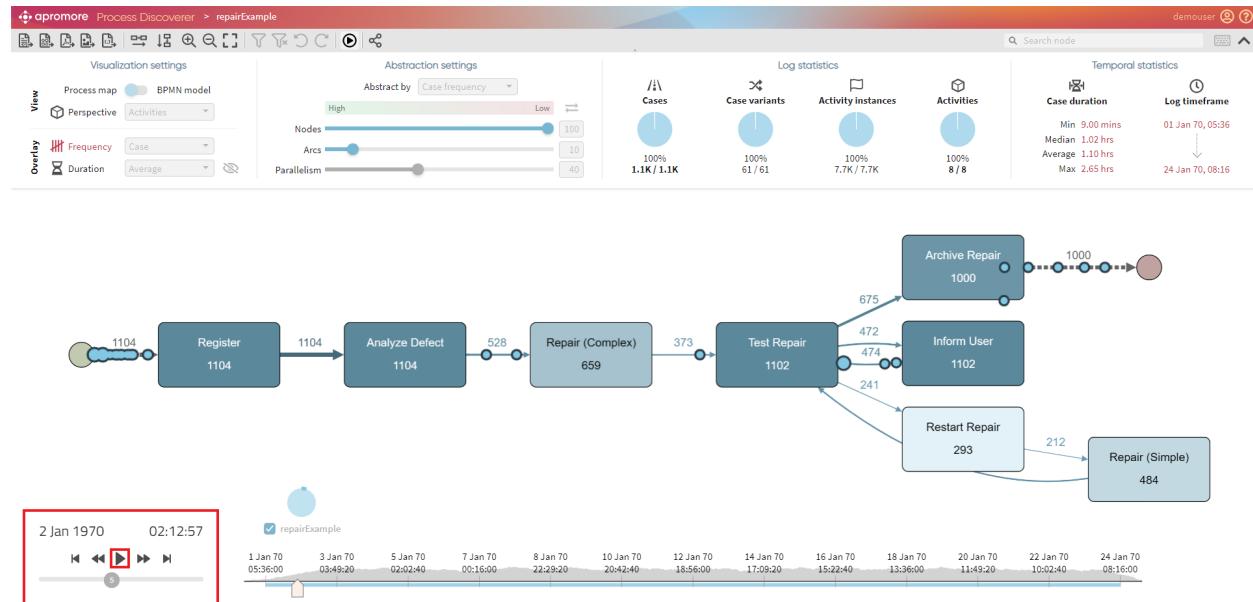


Note: Once the animation button is clicked, other functionalities like abstraction and visualization settings are disabled.



4.1.1 Standard Controls

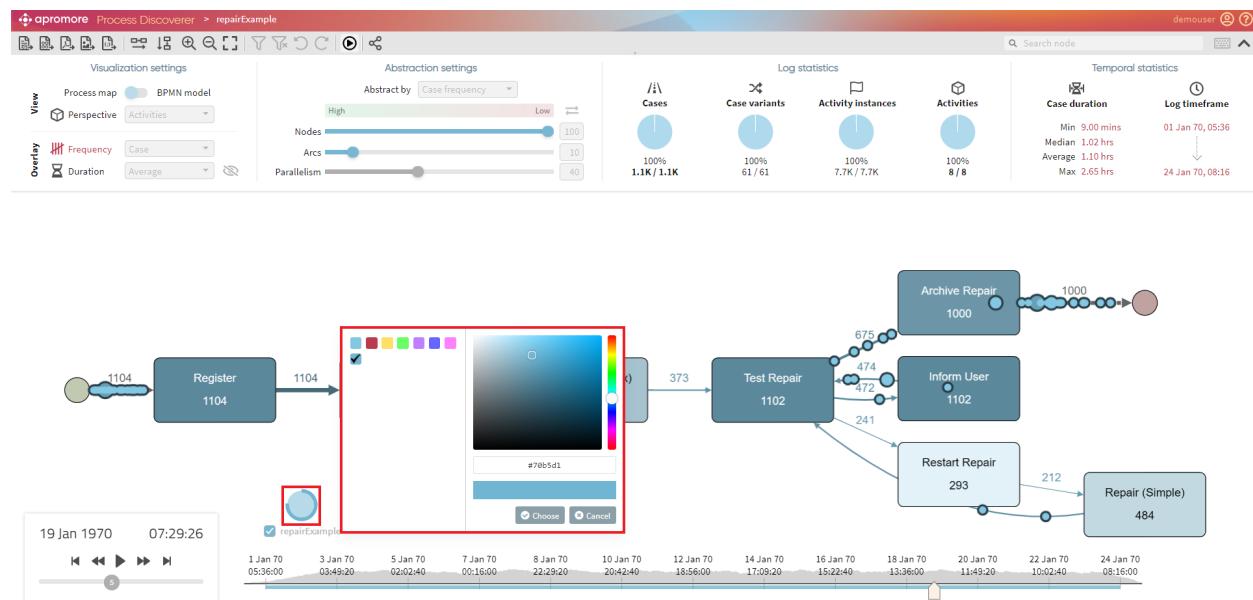
The animation will start by hitting the *Play* button. Each token represents the progress of a particular process instance, i.e., a case.



Standard controls are available to play, pause, fast or slow forward/rewind the animation and to skip through the end/beginning. The replay speed can be changed with the vertical bar. These actions are also available during the animation. If the view on the process map is zoomed in/out, or the process map layout is changed, the tool will try to adapt the animation to the new position of the elements on the canvas.

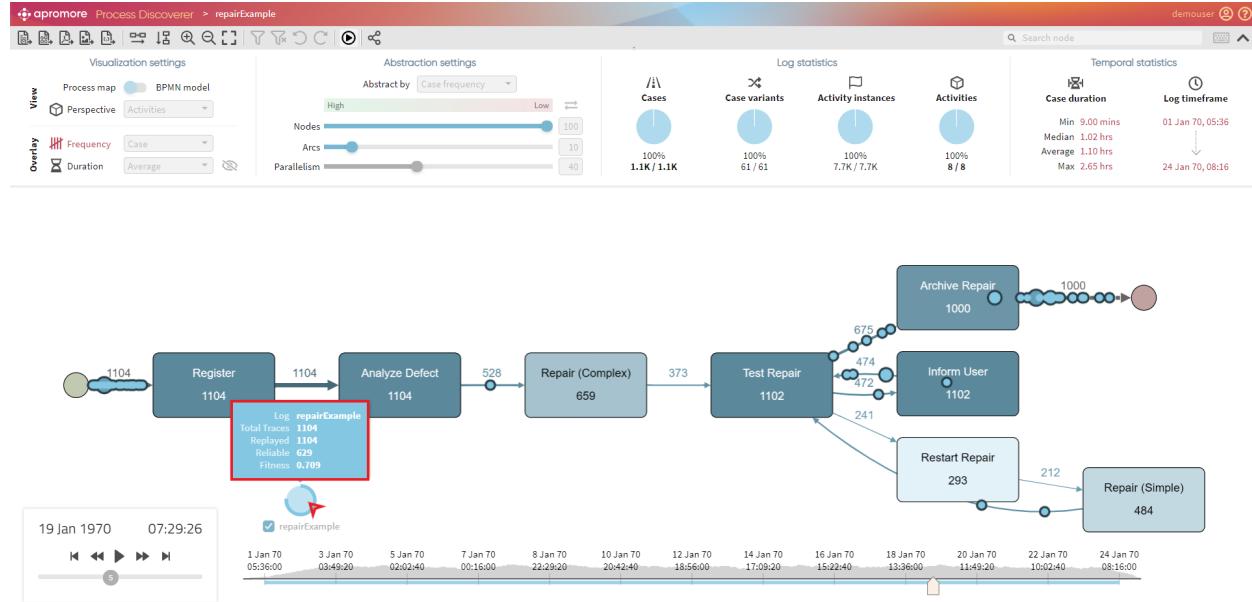
Tip: To zoom-in/zoom-out, press *Ctrl* and use the mouse scroll wheel

We can change the color of tokens by clicking on the pie chart.



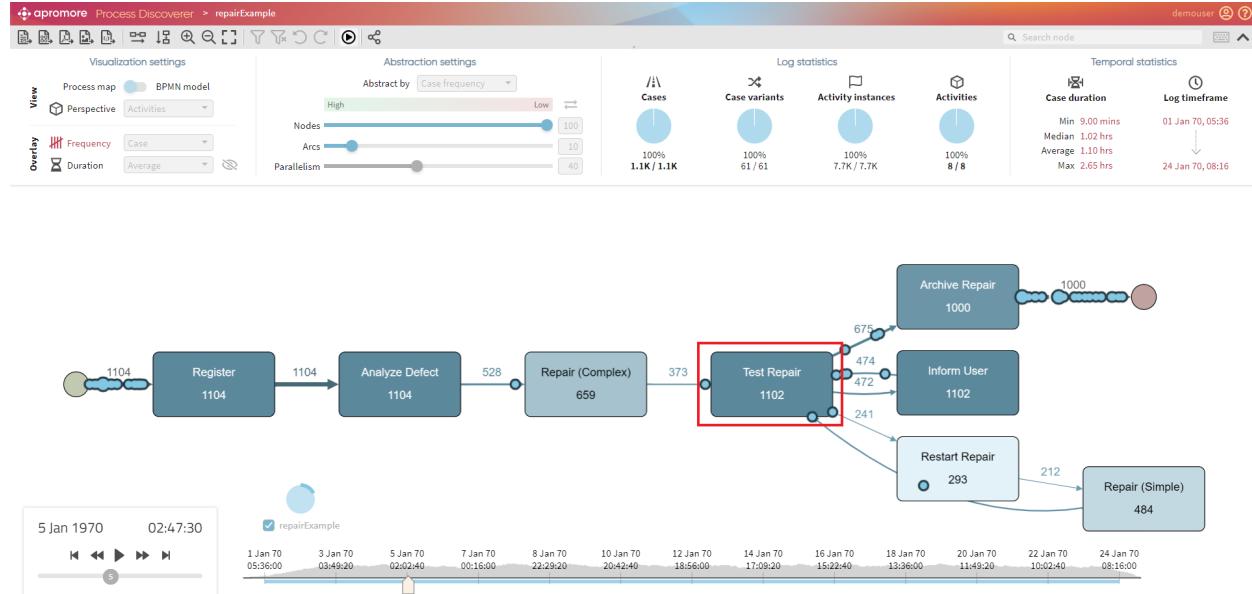
Note: We can either choose from the default colors or add the customized ones. To add a customized color - enter a color code or drag the mouse over the palette.

To check log-related statistics, hover over the *pie chart*.

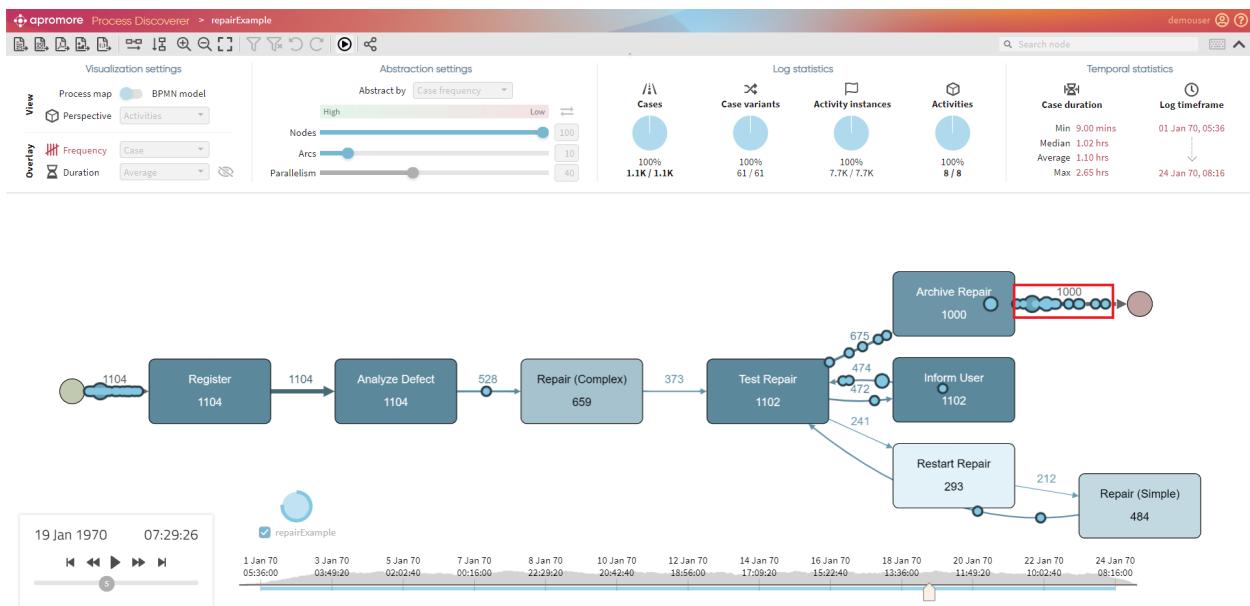


4.1.2 Token Traversal

A token traversing an activity indicates that the case captured by that token is performing that activity. However, if the token goes around an activity's border, this indicates that the particular activity is skipped in that process case.



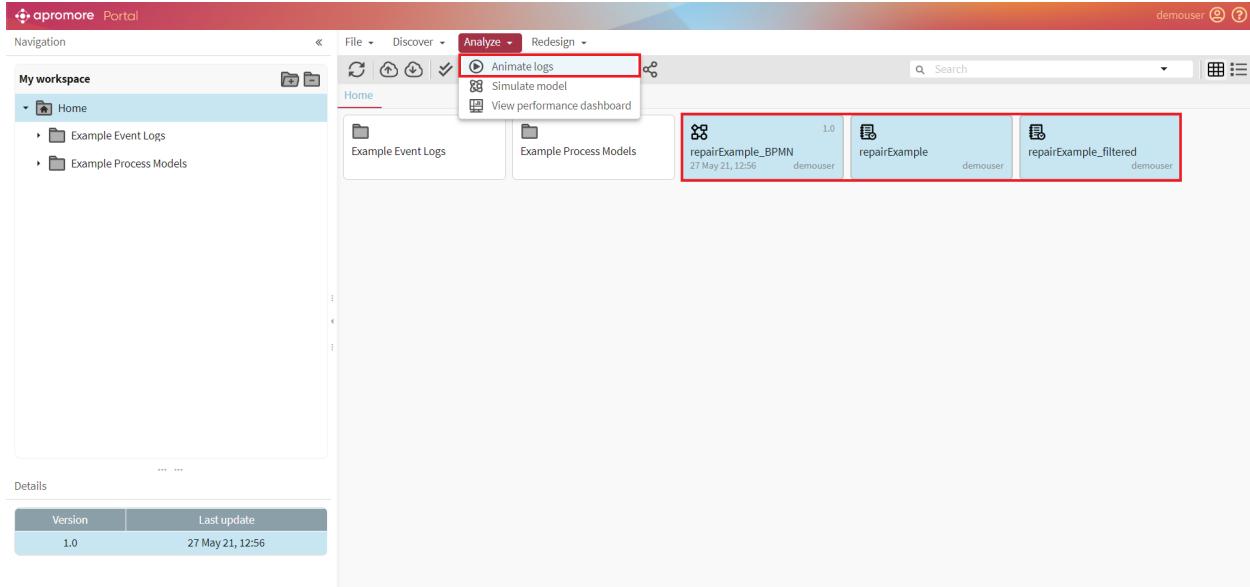
A token of a larger size or a large number of tokens slowly traversing a given path may indicate a performance bottleneck, e.g. cases pile up in a particular point of the process due to resources unavailability.



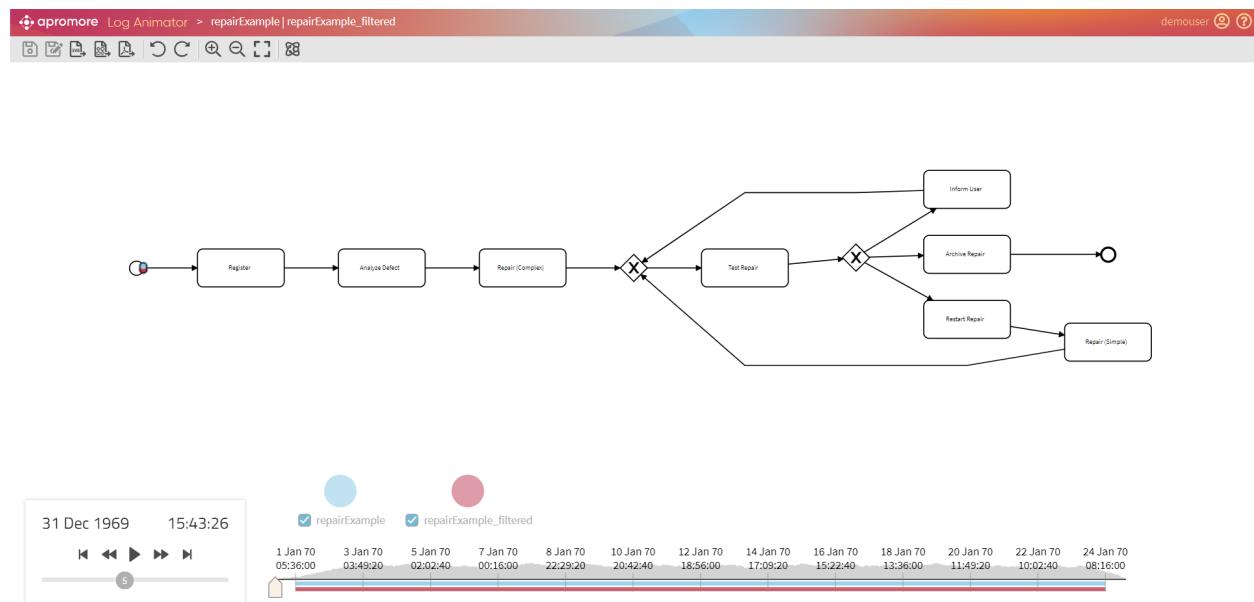
4.2 Animate logs (BPMN model)

Aproxmore allows us to animate one or more event logs to be replayed on top of a BPMN model. When using multiple logs, these could capture different variants of the same business process, while the process model would represent a normative specification of how things should be performed within an organization.

We can select one or more logs and one BPMN model from the repository, and click *Analyze > Animate logs*. In case we want to animate a single event log on top of a BPMN model, we can also switch the view from *Process Map* to *BPMN Model* in the *Process Discoverer* and click the *Animate* button.

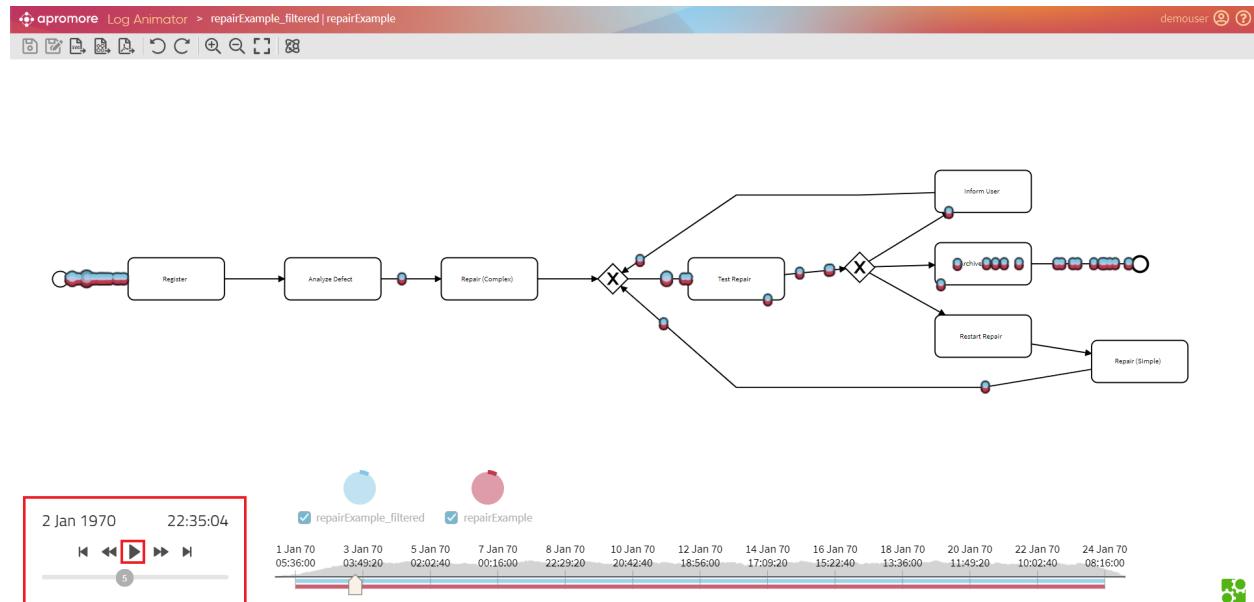


A window will open up showing the BPMN model along with the timeline.



4.2.1 Standard Controls

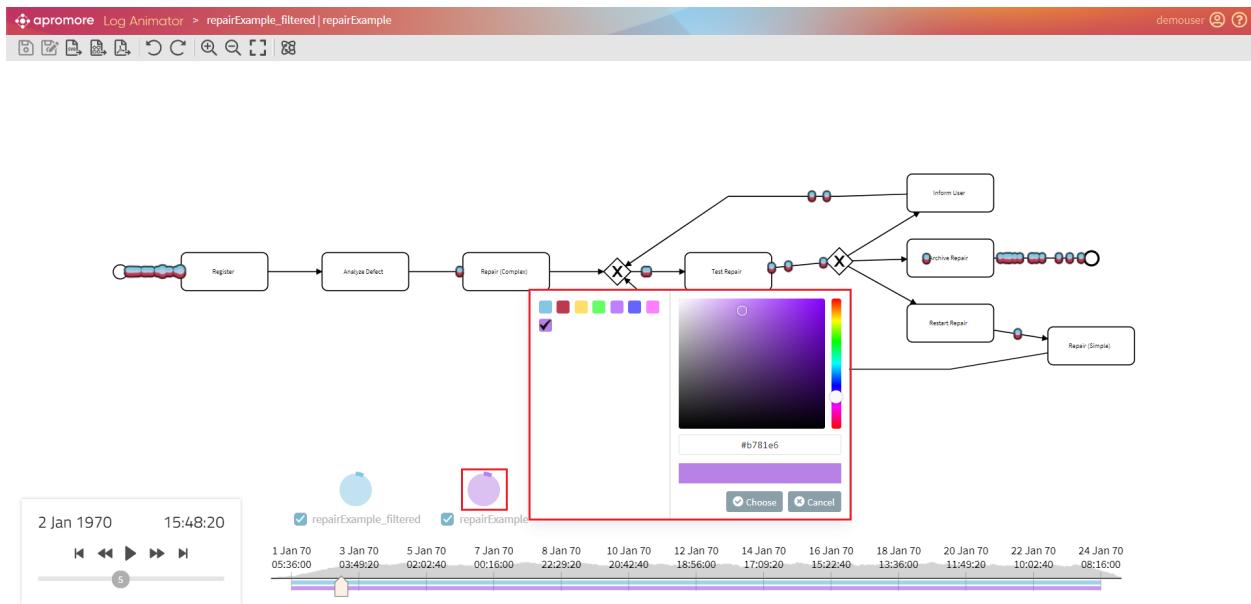
The animation will start by clicking on the *Play* button. Each token represents the progress of a particular process instance (a case), with the token's color encoding the log the case comes from.



Standard controls are available to play, pause, fast or slow forward/rewind the animation and to skip through the end/beginning. The replay speed can be changed with the vertical bar. These actions are also available during the animation. If the view on the model is zoomed in/out, or the model layout is changed, the tool will try to adapt the animation to the new position of the elements on the canvas.

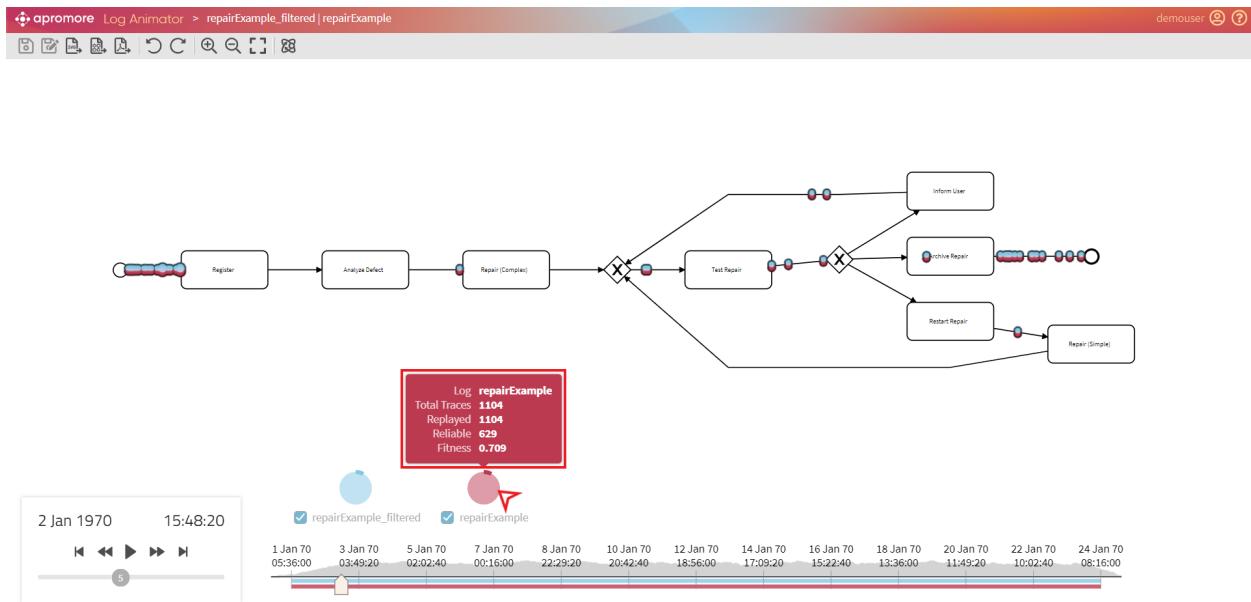
Tip: To zoom-in/zoom-out, press *Ctrl* and use the mouse scroll wheel.

We can change the color of tokens of a specific log by clicking on the *pie chart* next to the needed log name.



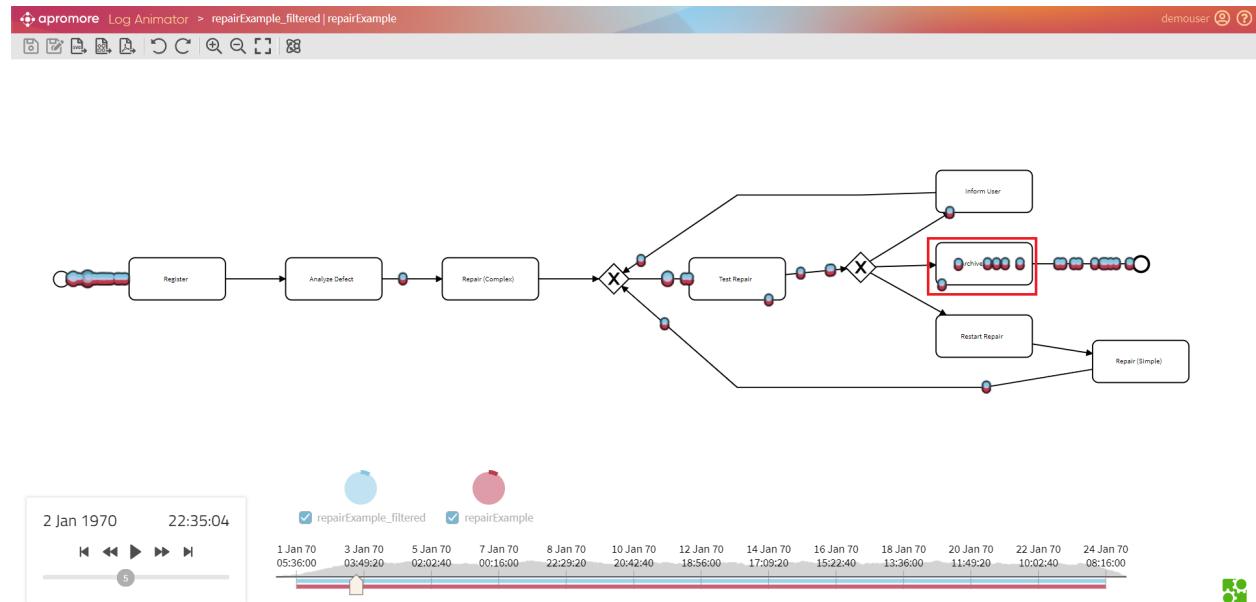
Note: We can either choose from the default colors or add the customized ones. To add a customized color - enter a color code or drag the mouse over the palette.

To check log-related statistics, hover over the *pie chart* next to the needed log name.

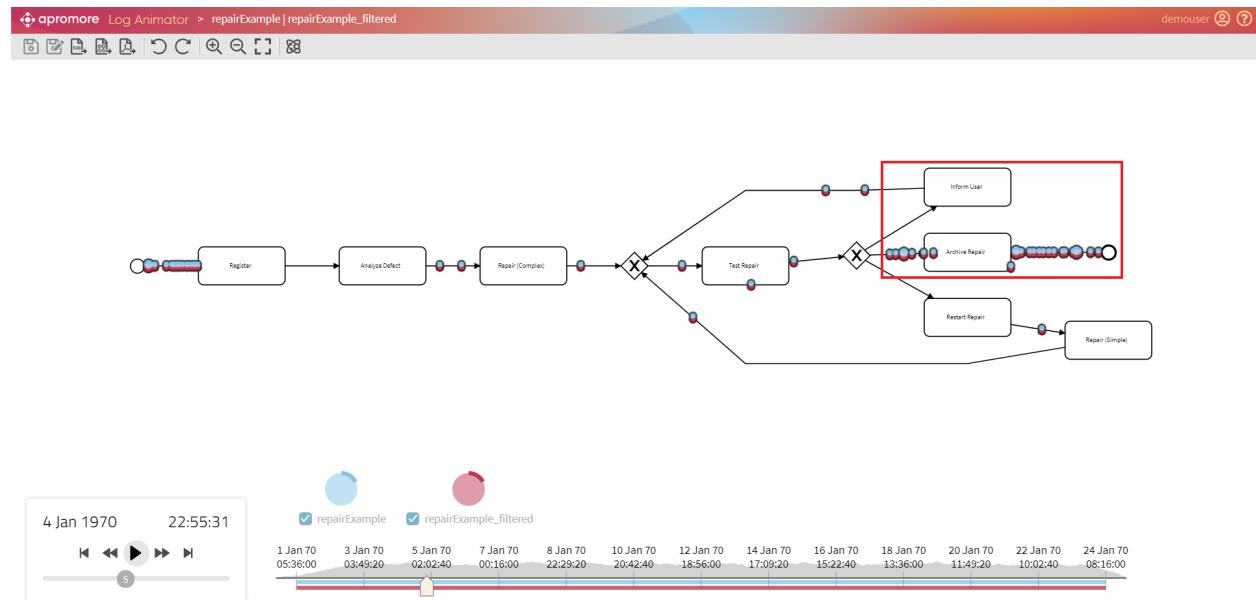


4.2.2 Token Traversal

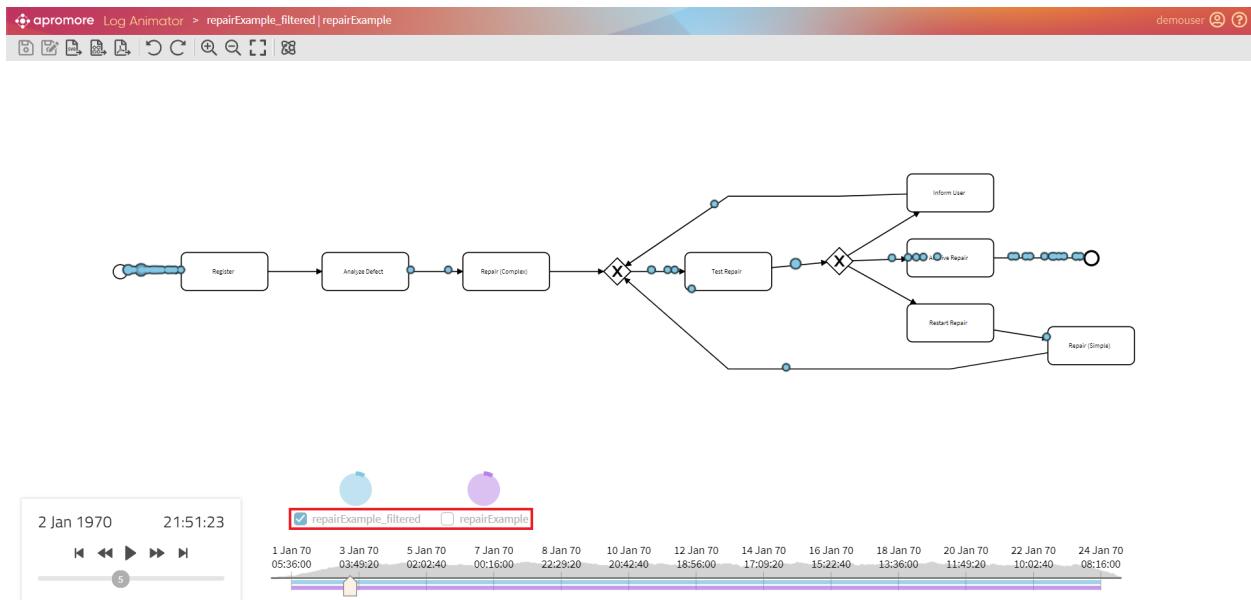
A token traversing an activity indicates that the case captured by that token is performing that activity. However, if the token goes around an activity's border, this indicates that the particular activity is skipped in that process case.



A large number of tokens slowly traversing a given path may indicate a performance bottleneck, e.g. cases pile up in a particular point of the process due to resources unavailability.



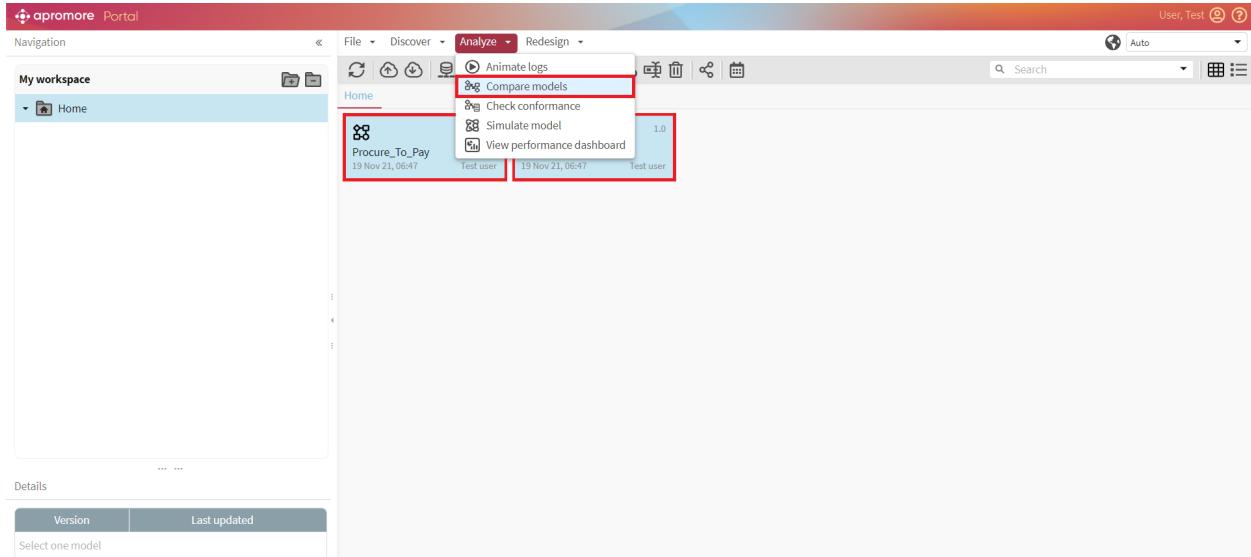
For visualization purpose, we can hide and show individual/multiple log tokens by unchecking/checking the *checkbox* below the pie chart.



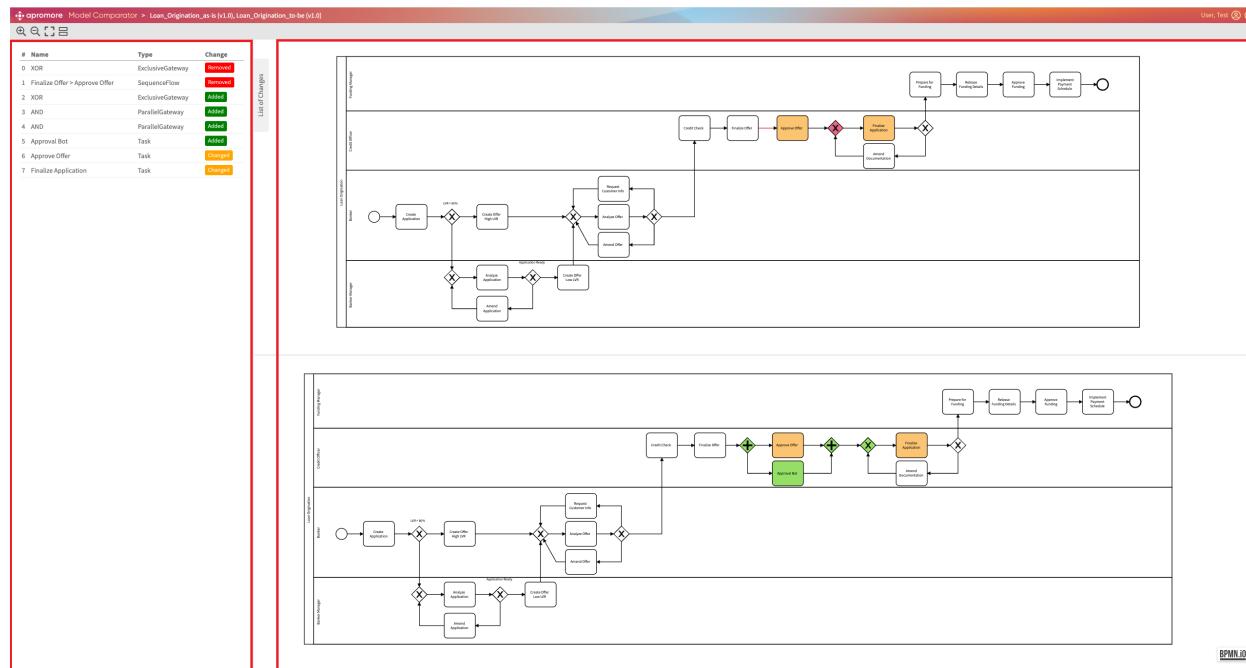
4.3 Compare models

Apromore now allows comparing two BPMN process models to perform delta analysis. For example, we can perform delta analysis to compare a process model discovered from an event log (capturing the as-is process) with a reference process model (capturing a to-be process).

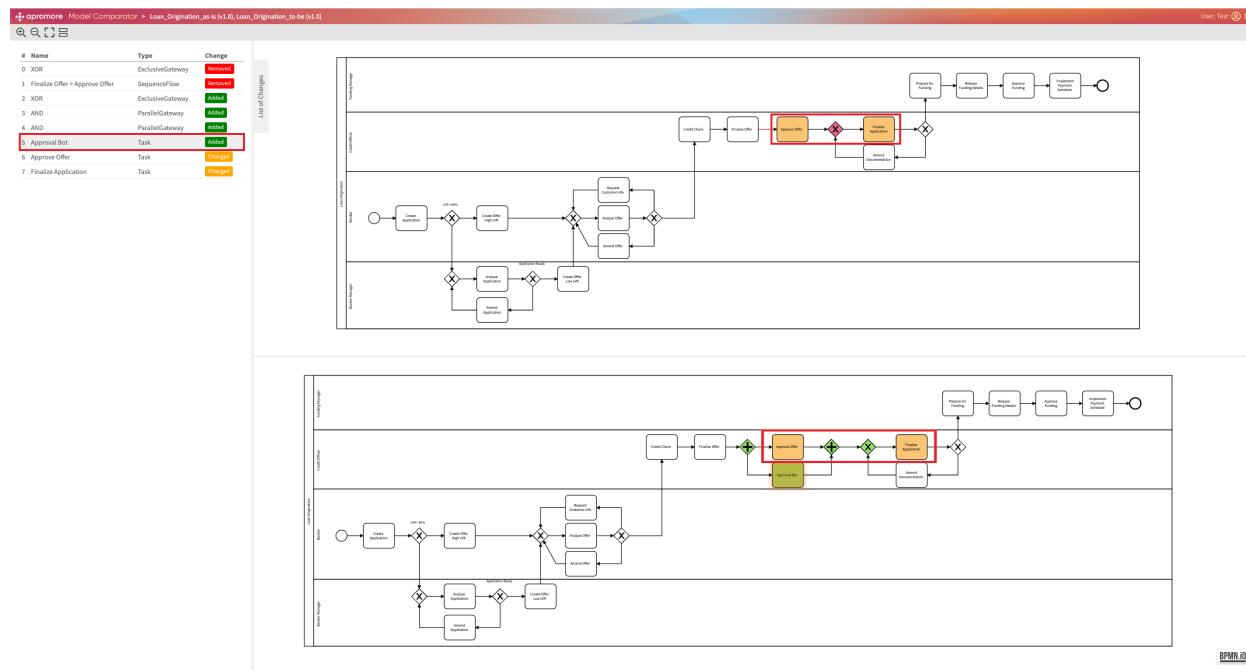
When comparing two process models using delta analysis, Apromore displays the differences and allows to overlay them on top of the process models. To compare models, first, select 2 models and click on *Analyze -> Compare models*.



Model Comparator window appears, consisting of two parts: *List of changes* on the left side and *models* on the right side.

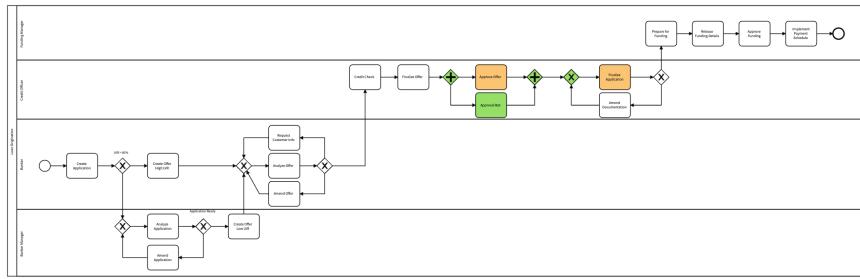
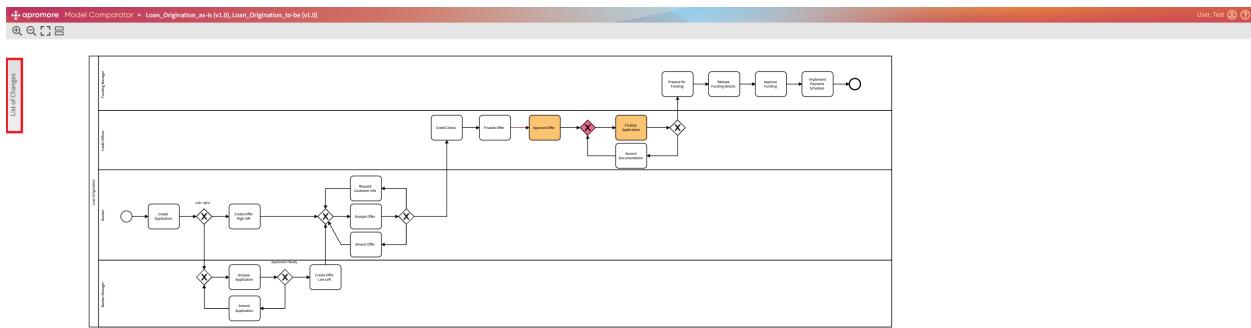


For ease of analysis, the activity gets highlighted in the model when we hover over it in the *List of Changes*.

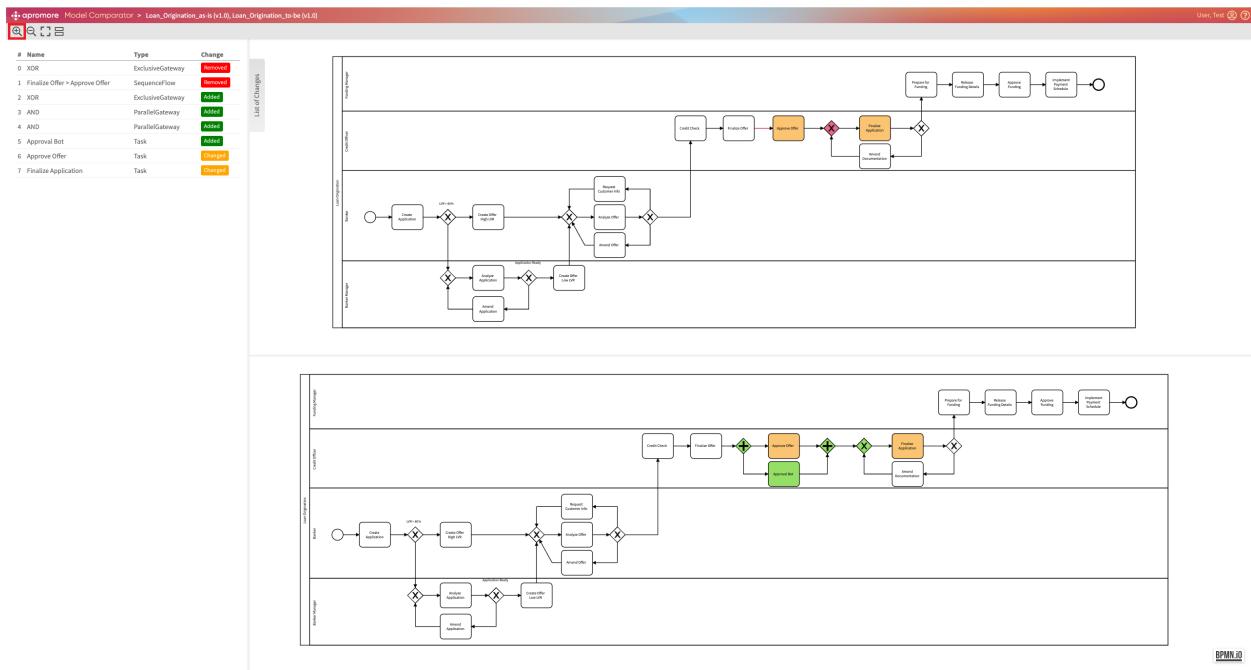


Note: To monitor the activities changes easily, take a look at color coding. *Removed activities* are marked red. *Changed activities* are marked yellow. *Added activities* are marked green.

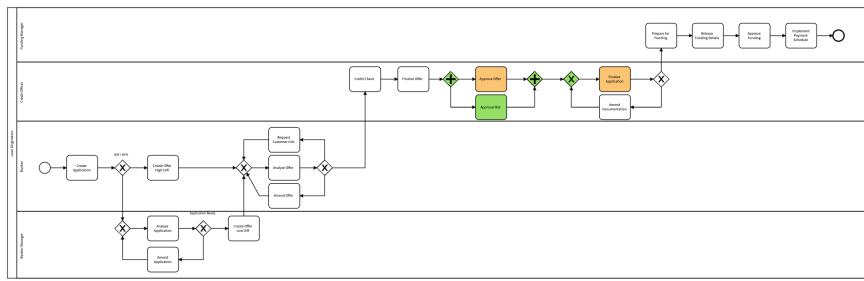
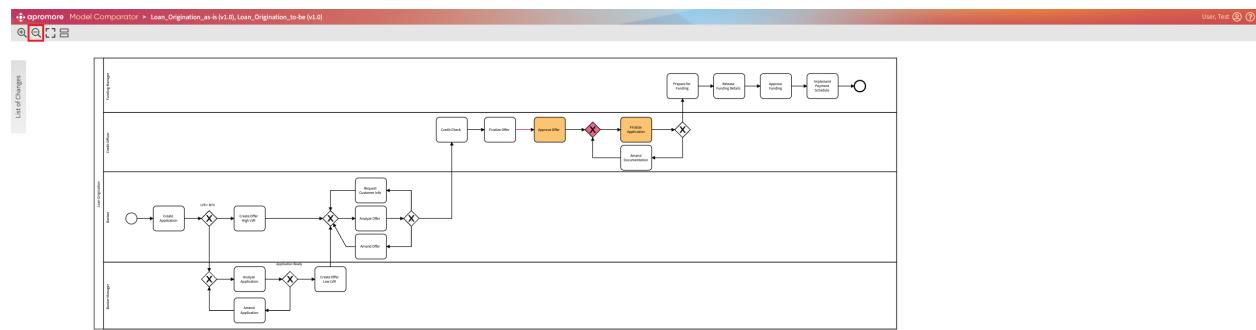
To hide the list of changes panel, you can click on the *List of Changes* button on the top left corner of the panel.



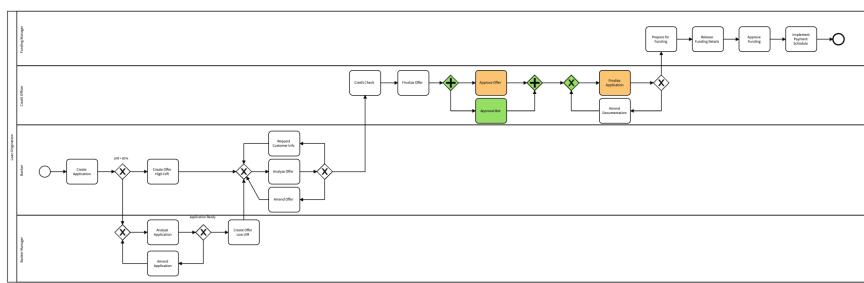
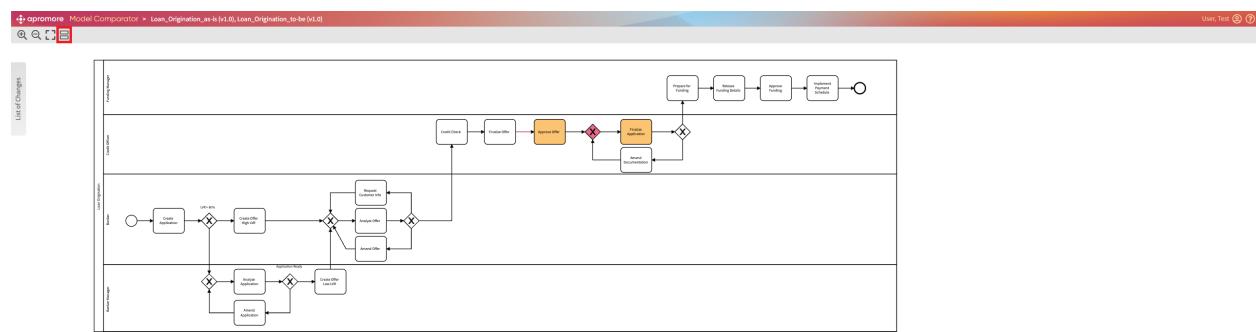
To make the model size bigger, click on the *Zoom in* button.



To reduce the model size, click on the *Zoom out* button.



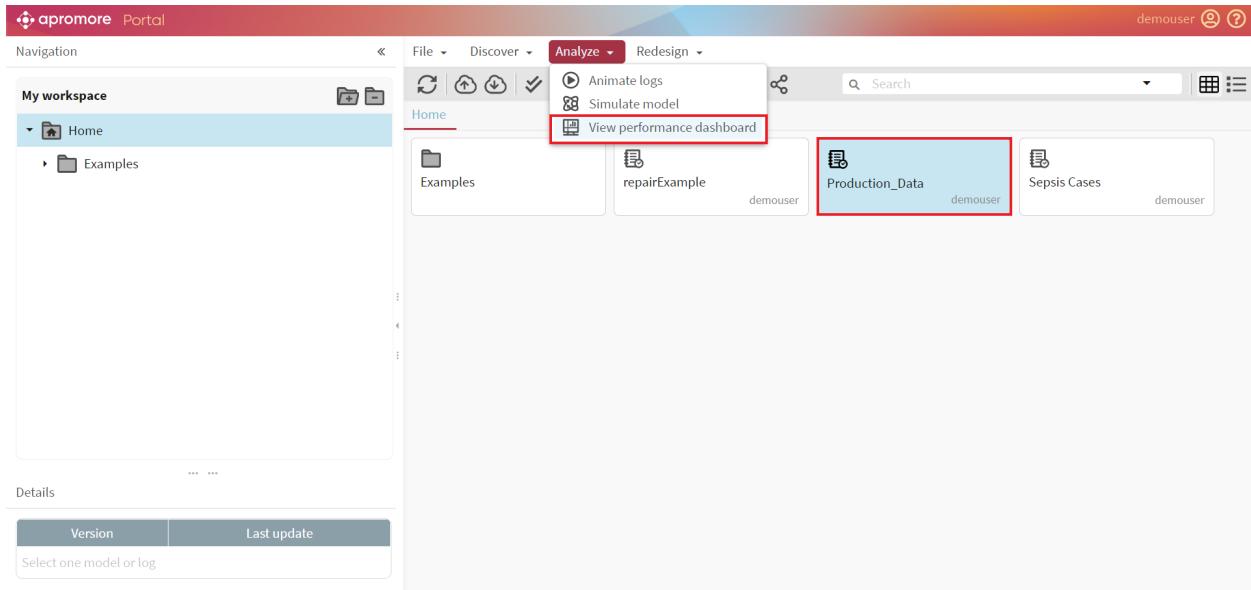
To make the whole model fit in the size of the screen, click on the *Fit to screen* button.



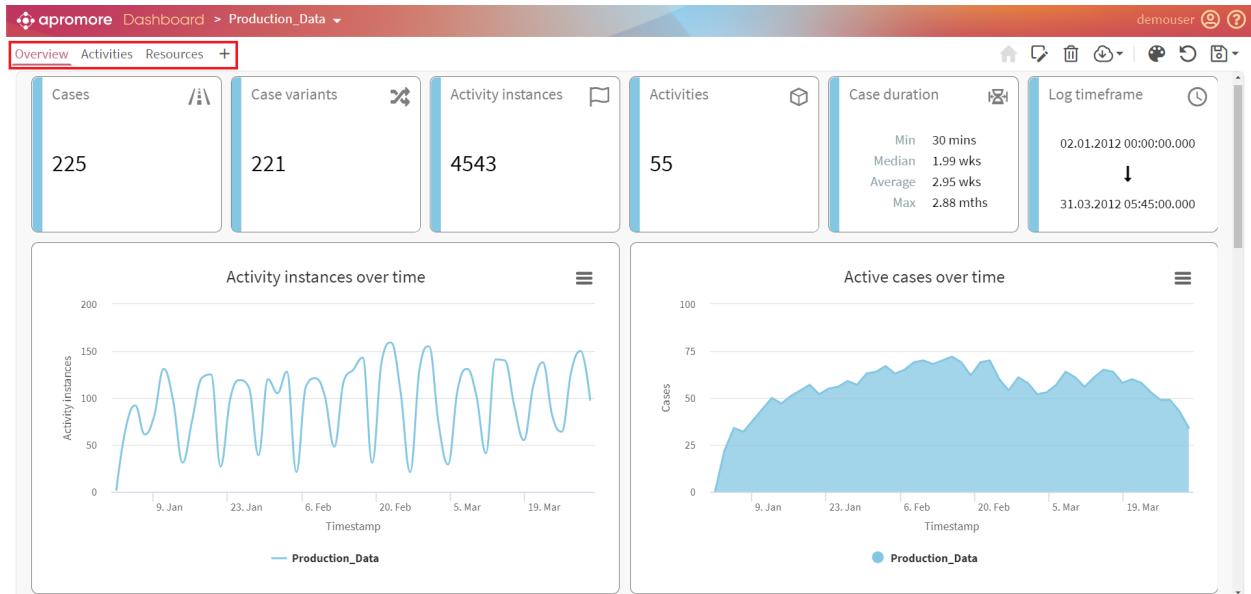
4.4 View dashboards

Apronmore's Custom Performance Dashboard allows users to analyze a business process from a performance measurement perspective visually. The *Performance Dashboard* displays a variety of aggregate statistics and charts. The *Performance Dashboard plugin* allows us to analyze one process in isolation or to compare multiple process variants. For example, we can use the *Performance Dashboard plugin* to compare how a given process is executed across multiple regions or compare the variant of a process consisting of slow cases versus faster cases.

To open the dashboard plugin, select at least one event log and click on *Analyze -> View performance dashboard*. To compare multiple process variants, we need to select multiple event logs and then open the Performance Dashboard plugin.

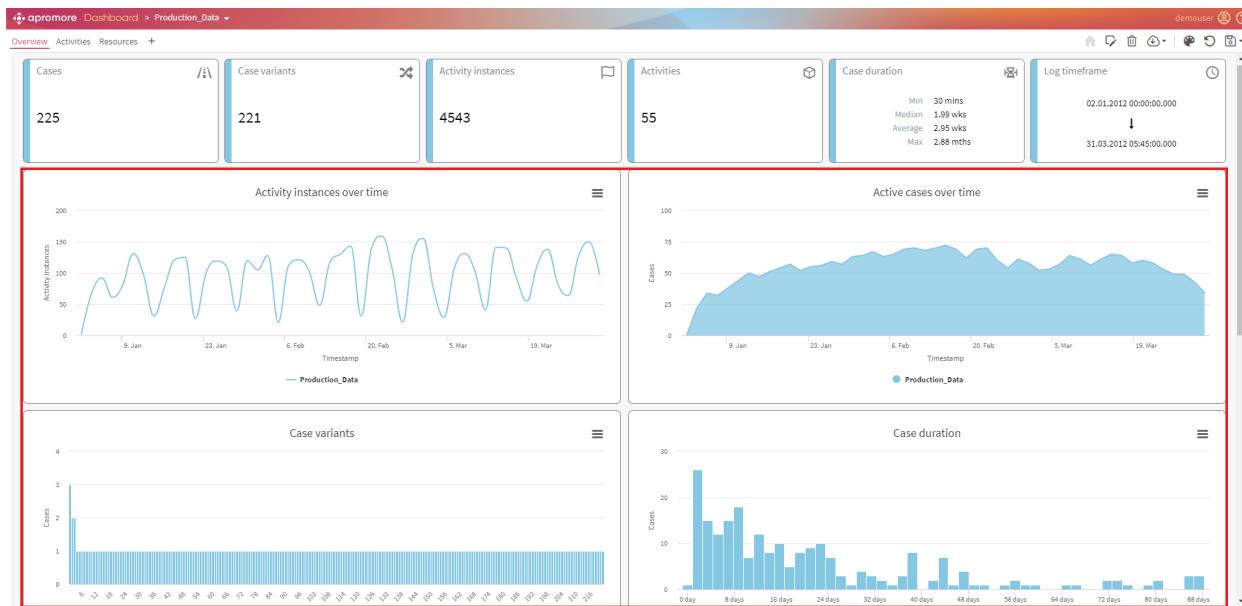


The customizable performance dashboard consists of three default views: *Overview*, *Activities*, and *Resources*. All the dashboards include statistic tiles, charts, and tables.



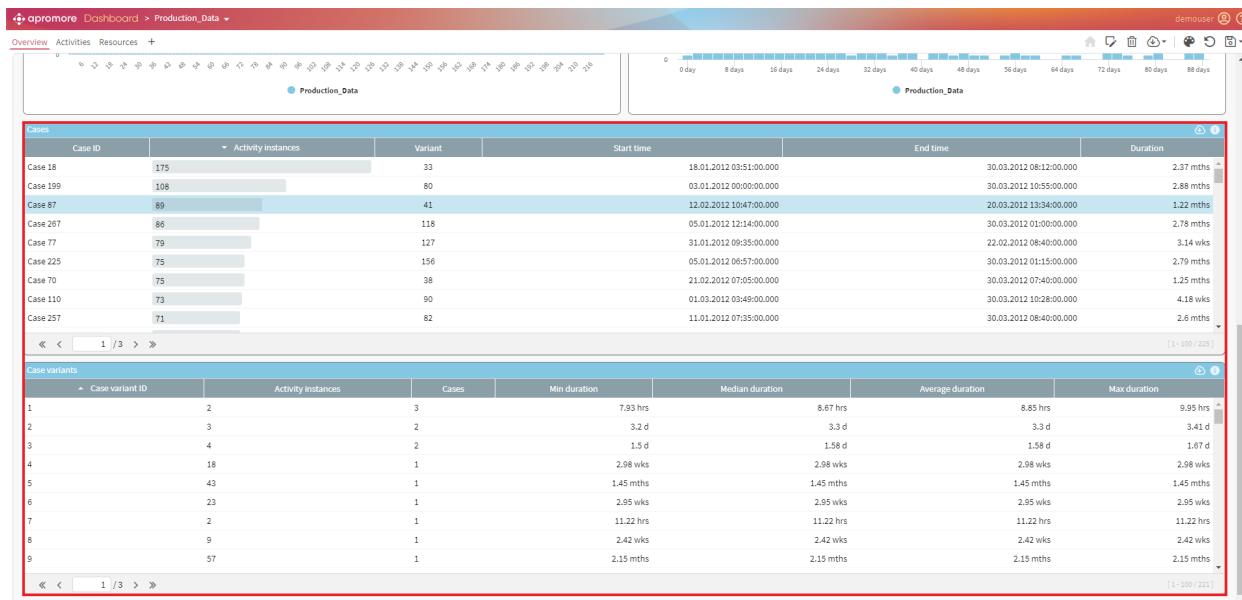
4.4.1 Overview

The overview section's stat tiles consist of the event log's performance measures like the number of activity instances, active cases over time, case variants, case duration, and log timeframe. Four main charts are presented in the overview dashboard: Events over time, Active cases over time, Case variants, and Case utilization.



4.4.2 Case Inspector

The case inspector displays a full list of cases and case variants for the selected event log, together with their corresponding statistics.



We can click on a given case in the Case Inspector to get further details about the activities performed in this case.

The screenshot shows the Aproxmore Dashboard with the 'Production_Data' section selected. At the top, there's a timeline chart from 0 to 88 days. Below it is a table titled 'Cases' with columns for Case ID, Activity Instances, Variant, Start time, End time, and Duration. A red box highlights the 'Case variants' section, which lists variants with their activity instances, cases, and min/max duration. Another red box highlights row 87, which corresponds to the data in the detailed table below.

Order	Activity	Min duration	Median duration	Average duration	Max duration
1	Turning & Milling - Machine 4	60 secs	5.58 hrs	5.56 hrs	20 hrs
2	Turning & Milling - Machine 4	60 secs	5.58 hrs	5.56 hrs	20 hrs
3	Turning & Milling - Machine 4	60 secs	5.58 hrs	5.56 hrs	20 hrs
4	Turning & Milling - Machine 4	60 secs	5.58 hrs	5.56 hrs	20 hrs
5	Turning & Milling Q.C.	60 secs	1.23 hrs	1.53 hrs	10.62 hrs
6	Laser Marking - Machine 7	60 secs	52.5 mins	57.76 mins	41.7 hrs
7	Lapping - Machine 1	instant	1.25 hrs	1.78 hrs	18.63 hrs
8	Lapping - Machine 1	instant	1.25 hrs	1.78 hrs	18.63 hrs
9	Lapping - Machine 1	instant	1.25 hrs	1.78 hrs	18.63 hrs
10	Lapping - Machine 1	instant	1.25 hrs	1.78 hrs	18.63 hrs
11	Round Grinding - Machine 3	60 secs	2.92 hrs	3.83 hrs	11.07 hrs
12	Round Grinding - Machine 3	60 secs	2.92 hrs	3.83 hrs	11.07 hrs
13	Final Inspection Q.C.	instant	1.25 hrs	1.91 hrs	10.78 hrs
14	Final Inspection Q.C.	instant	1.25 hrs	1.91 hrs	10.78 hrs
15	Final Inspection Q.C.	instant	1.25 hrs	1.91 hrs	10.78 hrs

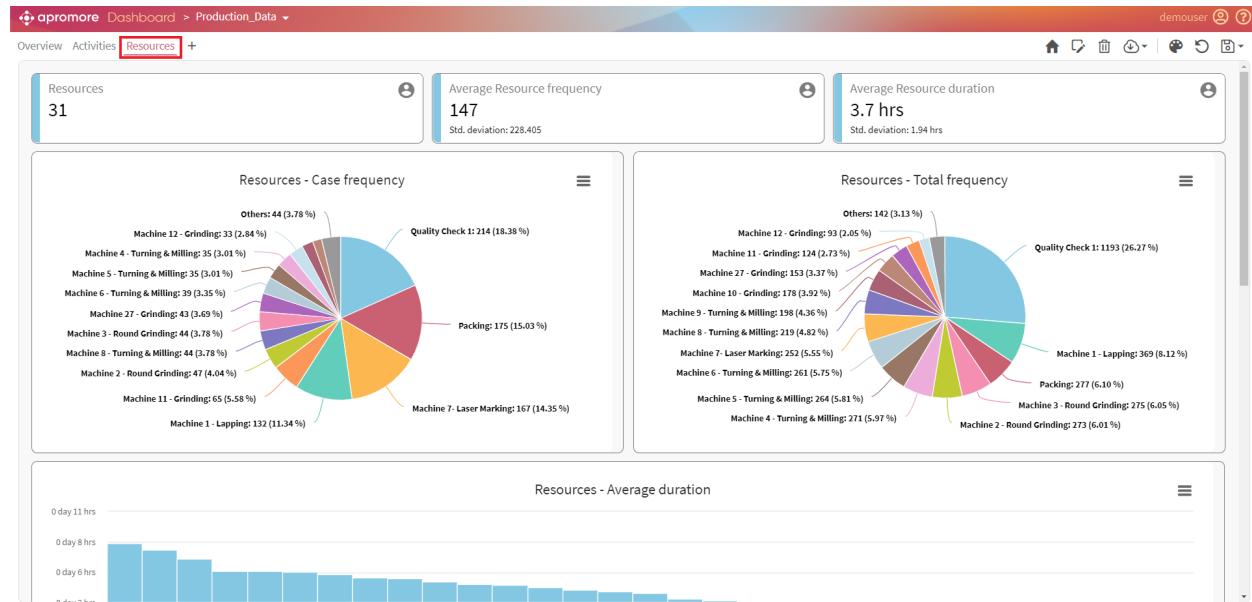
4.4.3 Activities

The activities dashboard includes the activities, average activity frequency, and average activity duration statistic tiles. It also includes different charts of various activity performance metrics such as case frequency, min/max duration, min frequency per case, et cetera.

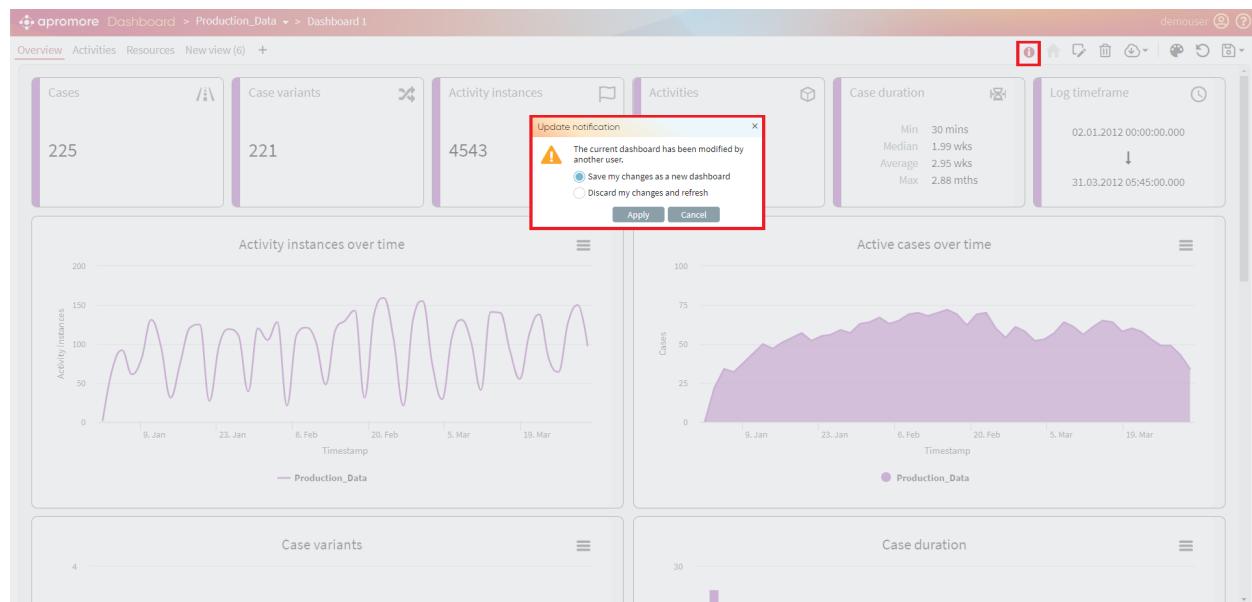
The screenshot shows the Aproxmore Dashboard with the 'Activities' section selected. It features several statistic tiles and charts. The tiles include 'Activities' (count 55), 'Average Activity frequency' (83, std. dev. 132.93), and 'Average Activity duration' (3.33 hrs, std. dev. 2 hrs). Below these are four charts: 'Activities - Case frequency' (bar chart showing frequency for various activities like Final Inspection, Turning & Milling, etc.), 'Activities - Average duration' (bar chart showing average duration for various activities), 'Activities - Min duration' (bar chart showing minimum duration for various activities), and 'Activities - Max duration' (bar chart showing maximum duration for various activities).

4.4.4 Resources

The resources dashboard includes all the resource performance metrics like case frequency, total frequency, average duration, min duration, and max duration.



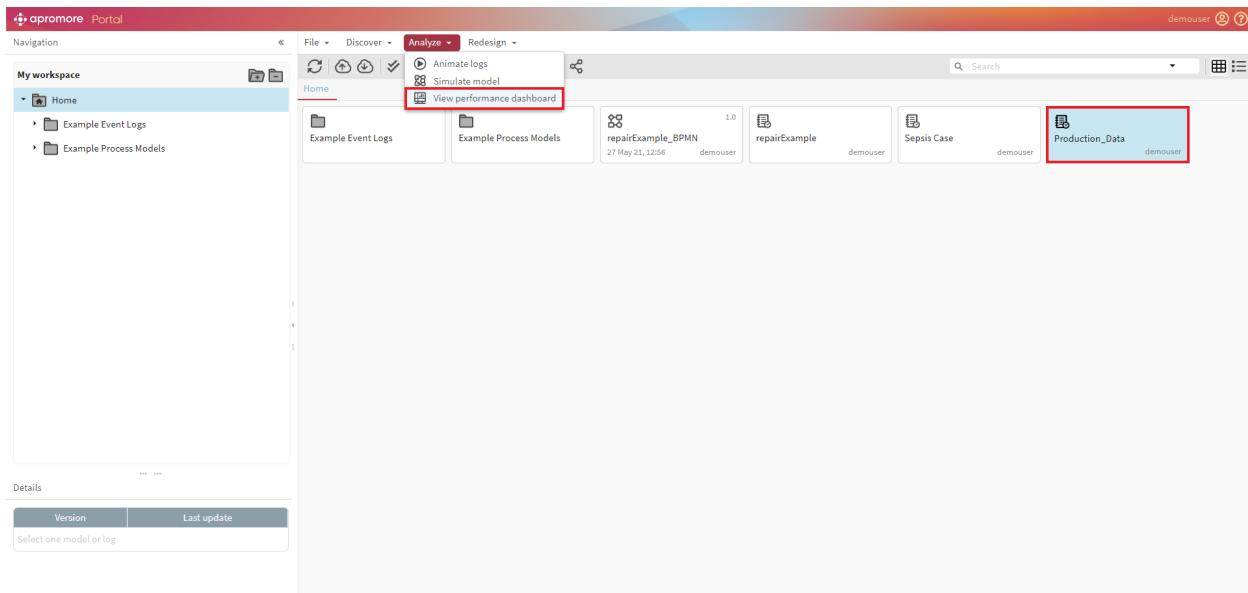
While viewing/editing a shared dashboard, we may receive an update notification stating that the dashboard is modified. We can choose to save/discard changes and click on *Apply*.



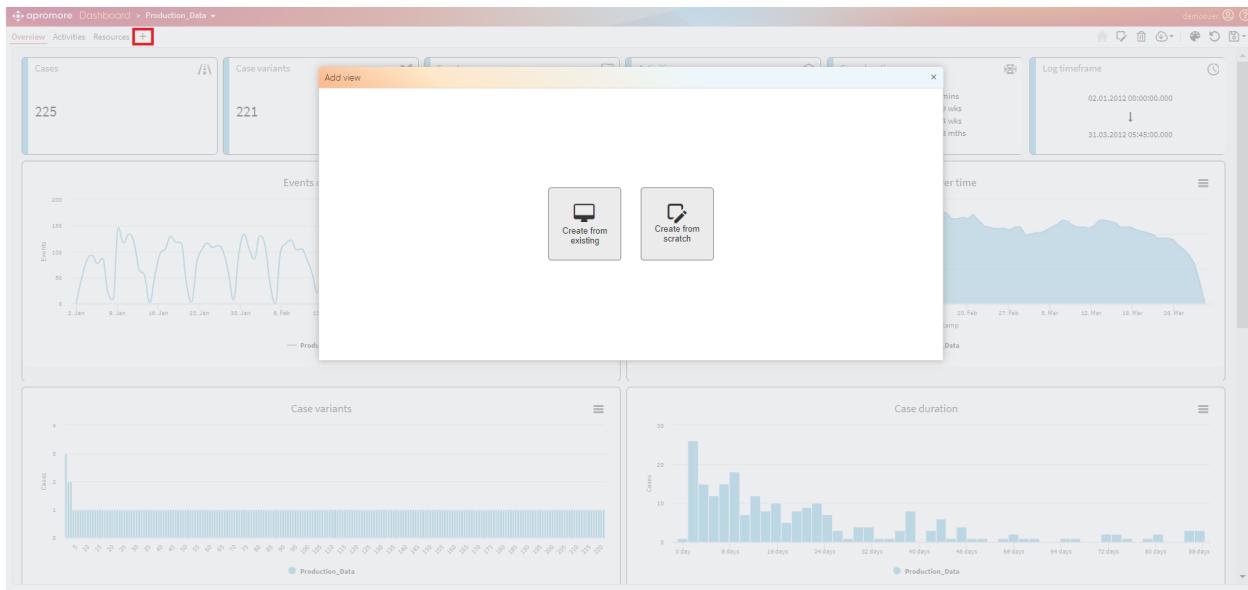
4.5 Create dashboards

The Apromore Custom Performance Dashboard offers a variety of custom visualization options.

To open the dashboard, select at least one event log and click on *Analyze* -> “View performance dashboard”. We can also visualize multiple event logs in the custom dashboard by selecting them.



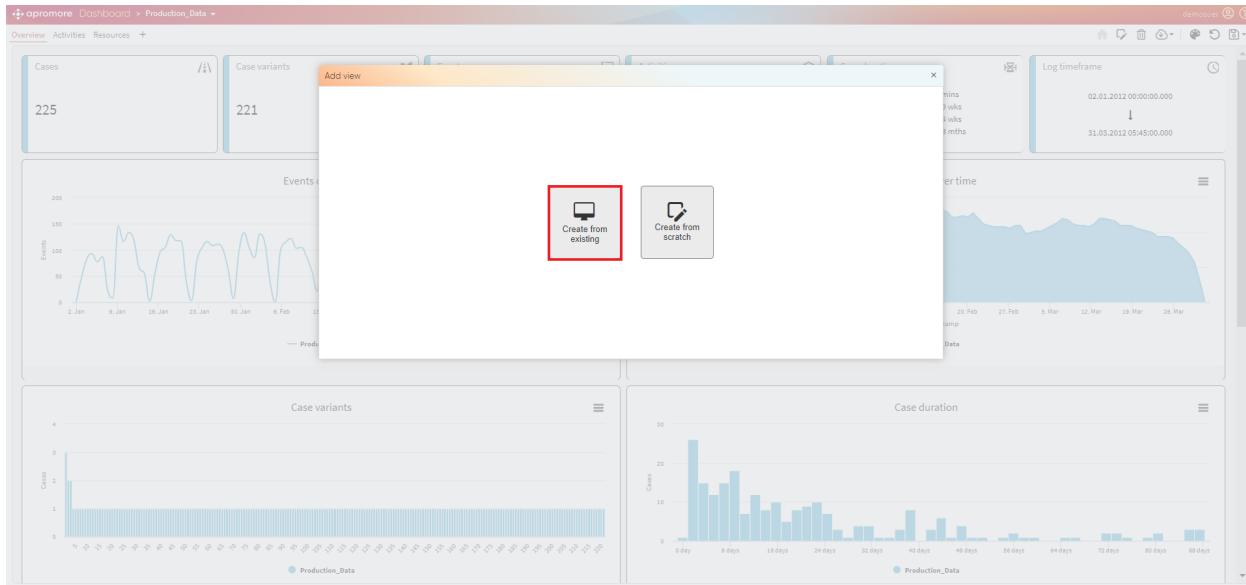
Once the performance dashboard opens up, click on the ‘+’ button to create a dashboard from an existing dashboard, or create a dashboard from scratch.



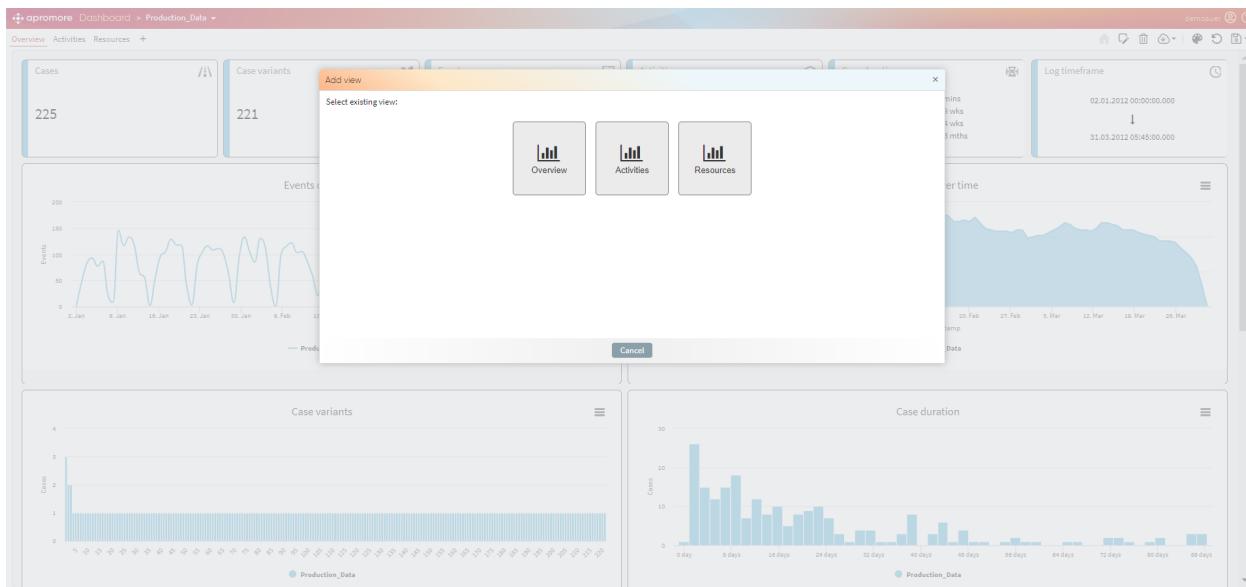
4.5.1 Create from existing views

The main purpose of creating a dashboard from an existing view is to modify an existing view by retaining the existing performance metrics and adding additional performance metrics.

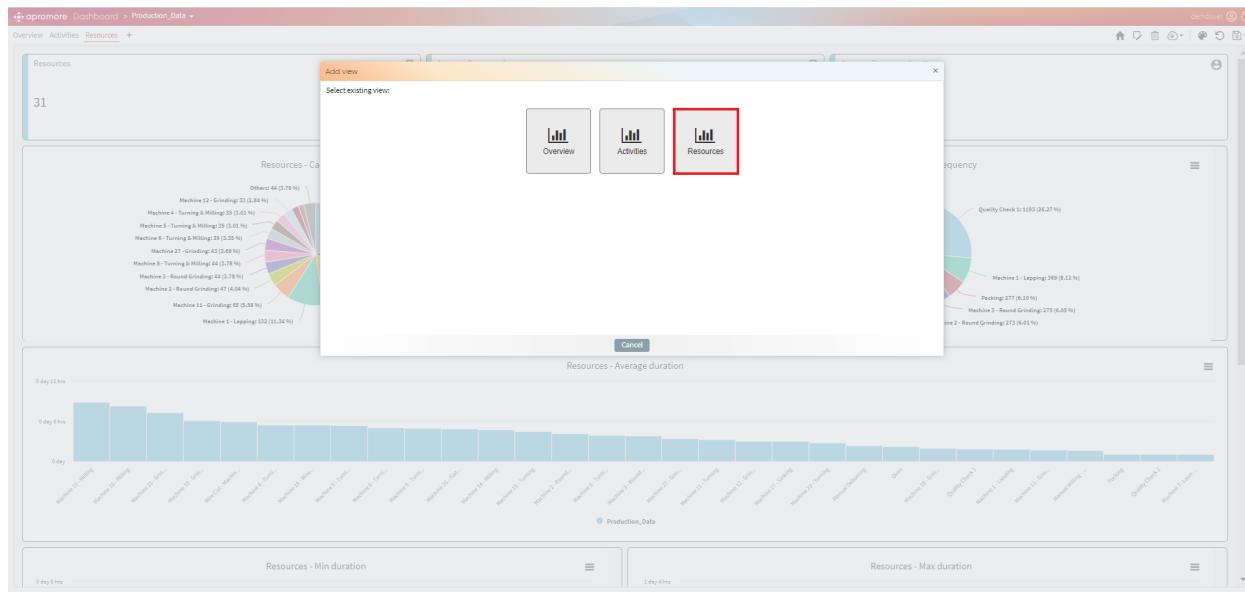
To create a custom dashboard from an existing view, click on *Create from existing*.



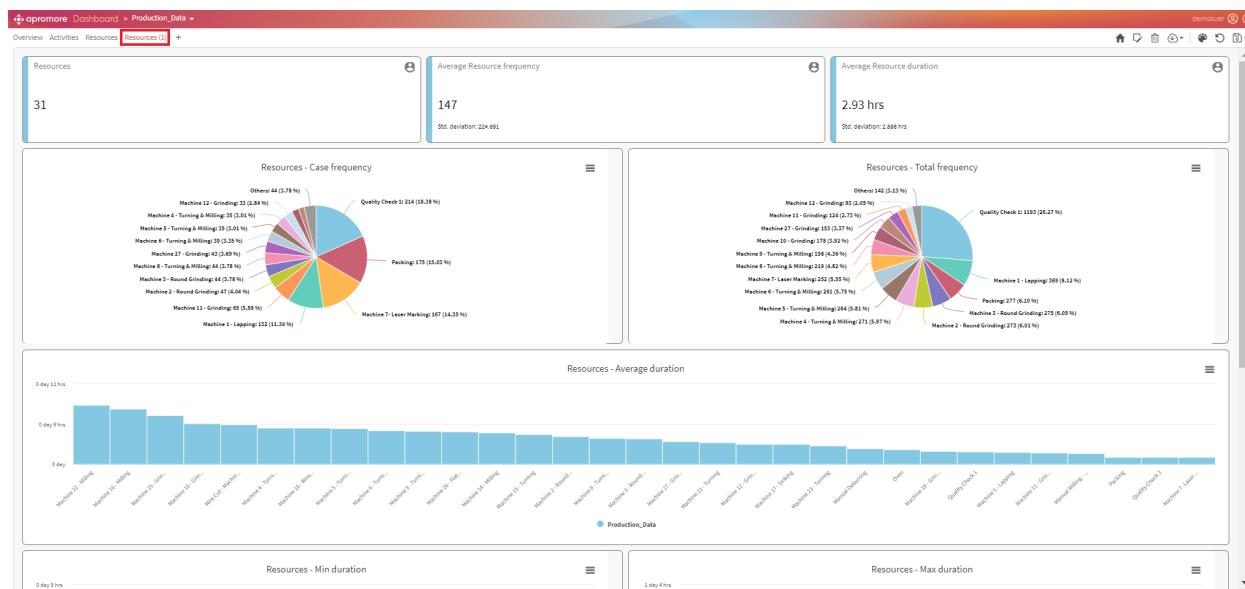
We can choose from three different views: Overview, Activities and Resources.



To create a new dashboard from an existing resources view, click on *Resources*.

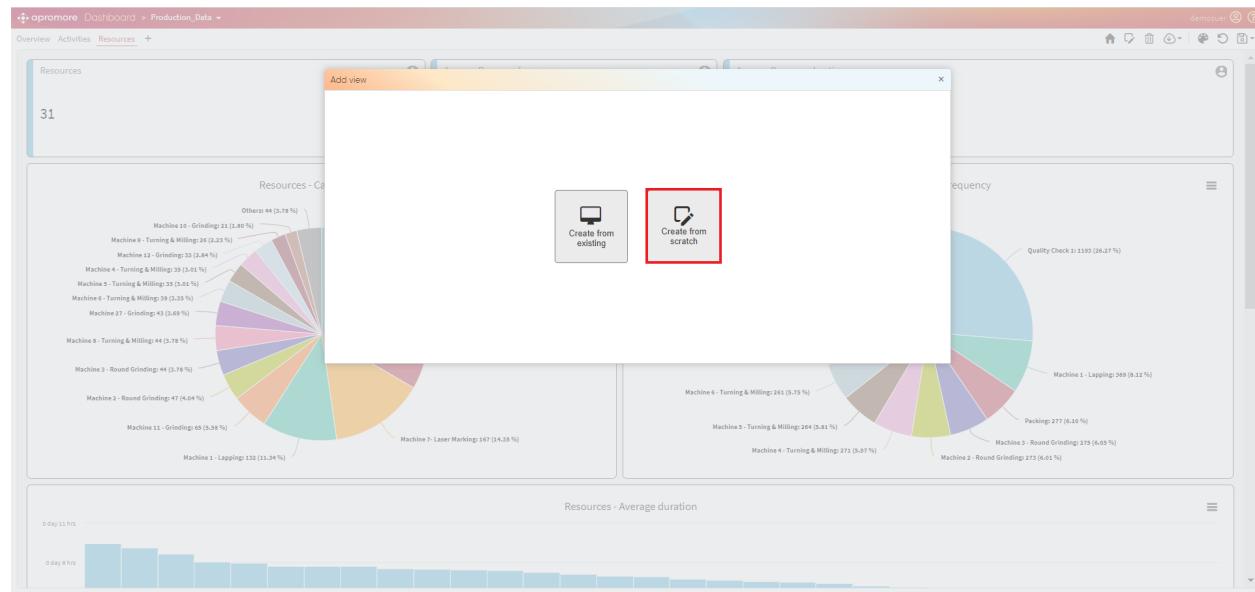


A new *Resources* dashboard will open up. Similarly, we can create a new dashboard from *Overview* and *Activities*.

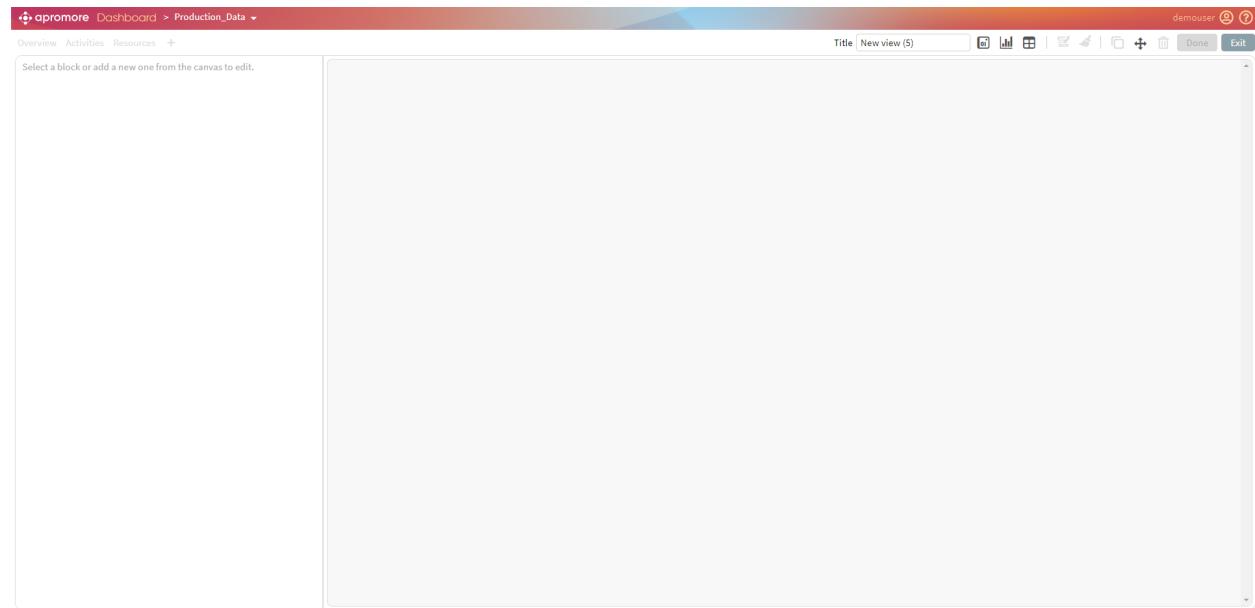


4.5.2 Create from scratch

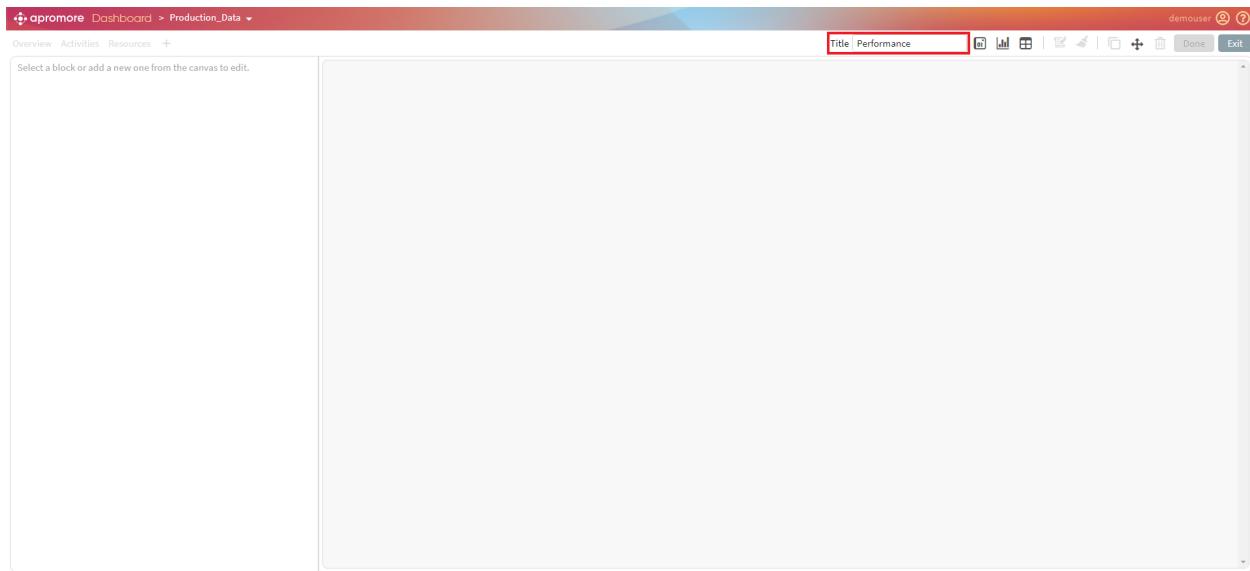
To create a custom dashboard from scratch, click on *Create from scratch*.



A blank editable view will open up.

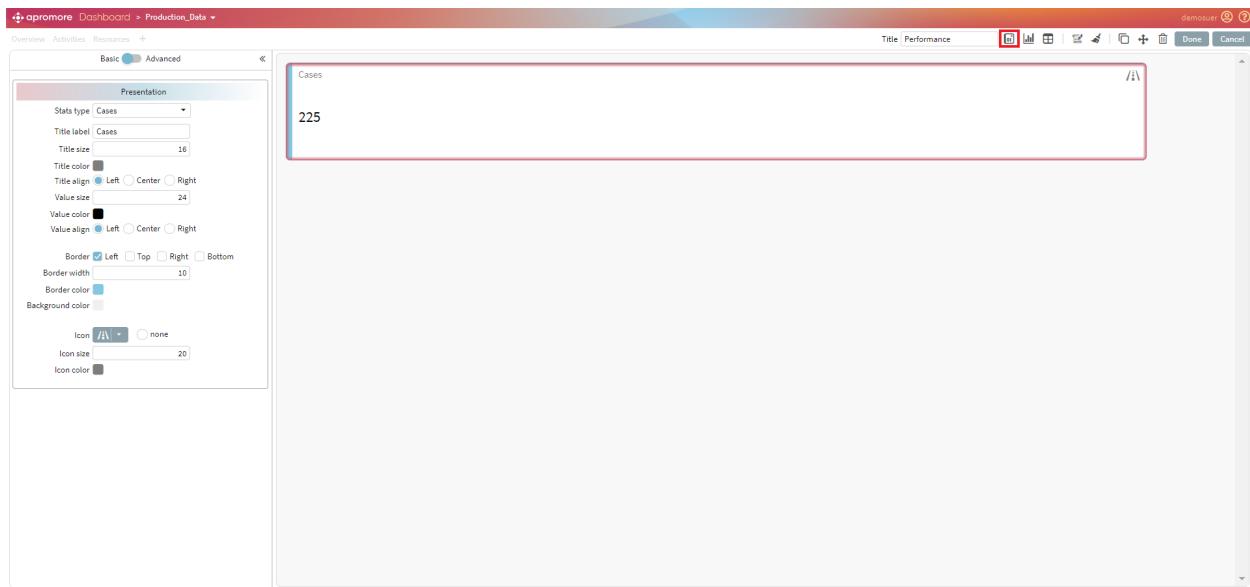


We can change the view's title by entering the text in the *Title* text field.

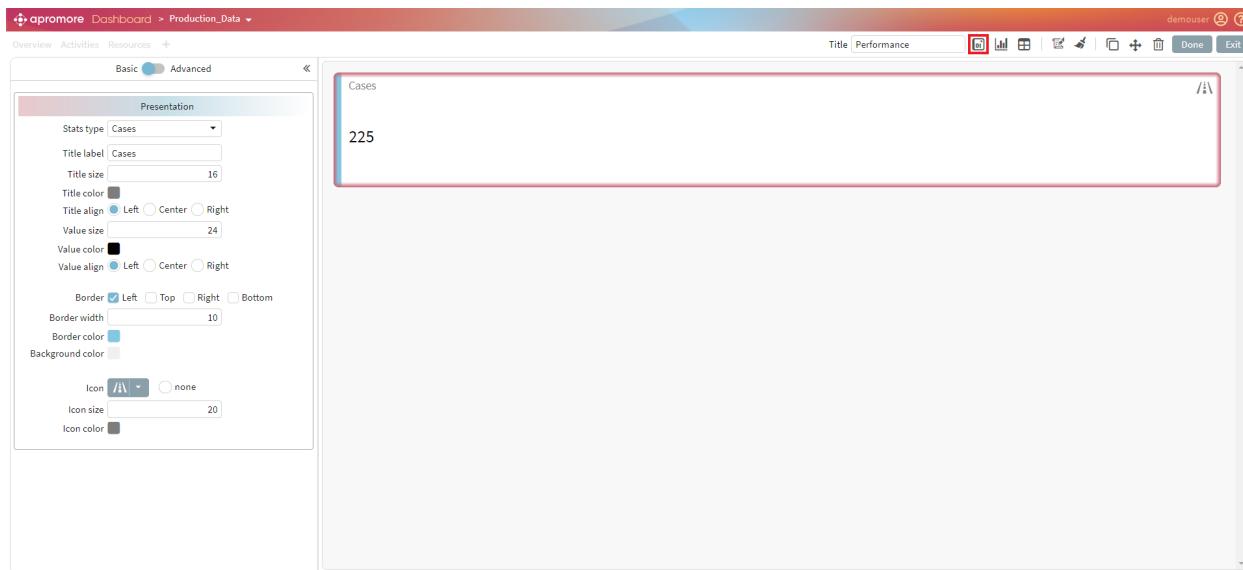


4.5.3 Add Stat Tiles

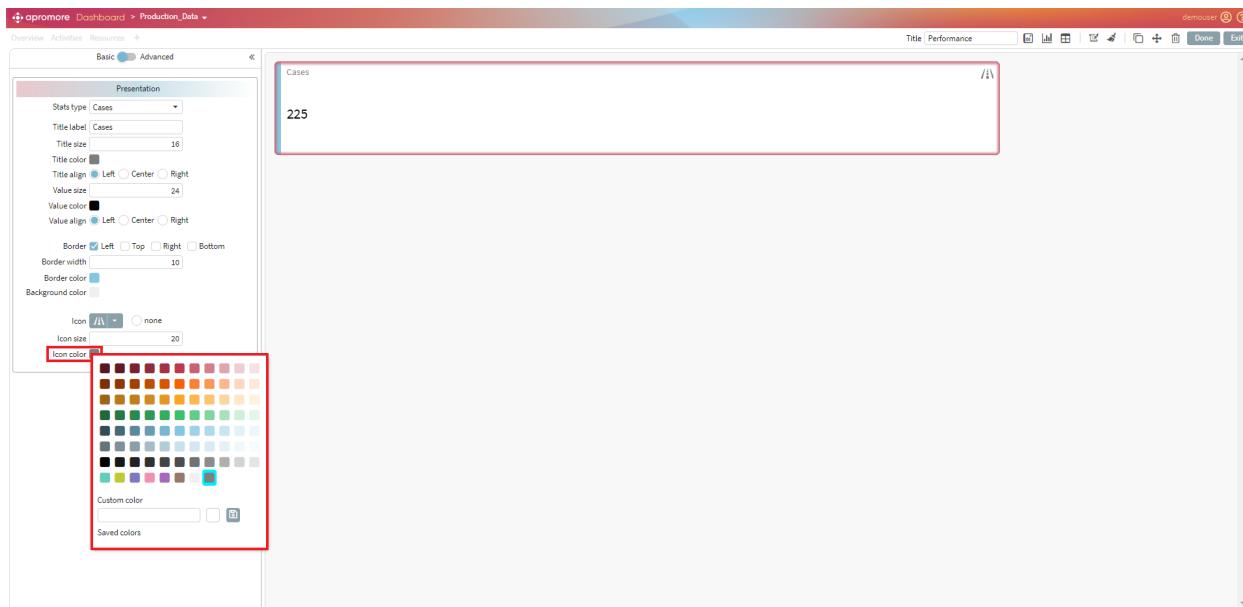
We can also add different statistic metrics by clicking on the *Add a new tile* button.



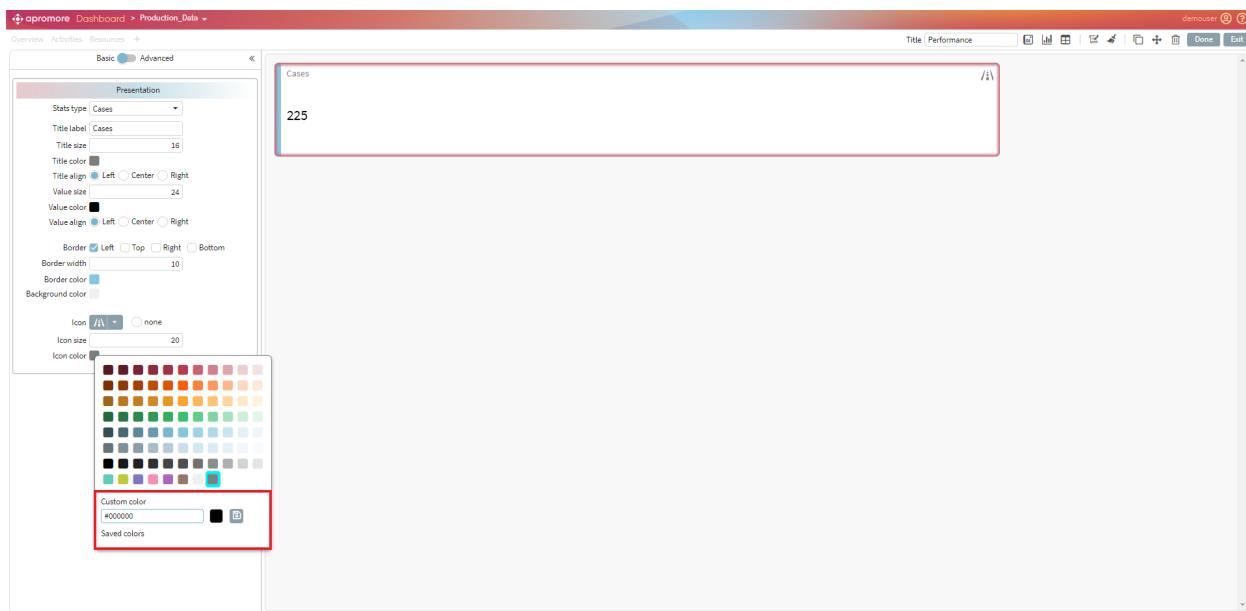
We can select different metrics from the *Stats type* drop-down list and make changes to different visualization metrics.



We can also change the colors of a value or an icon by clicking on the color box.

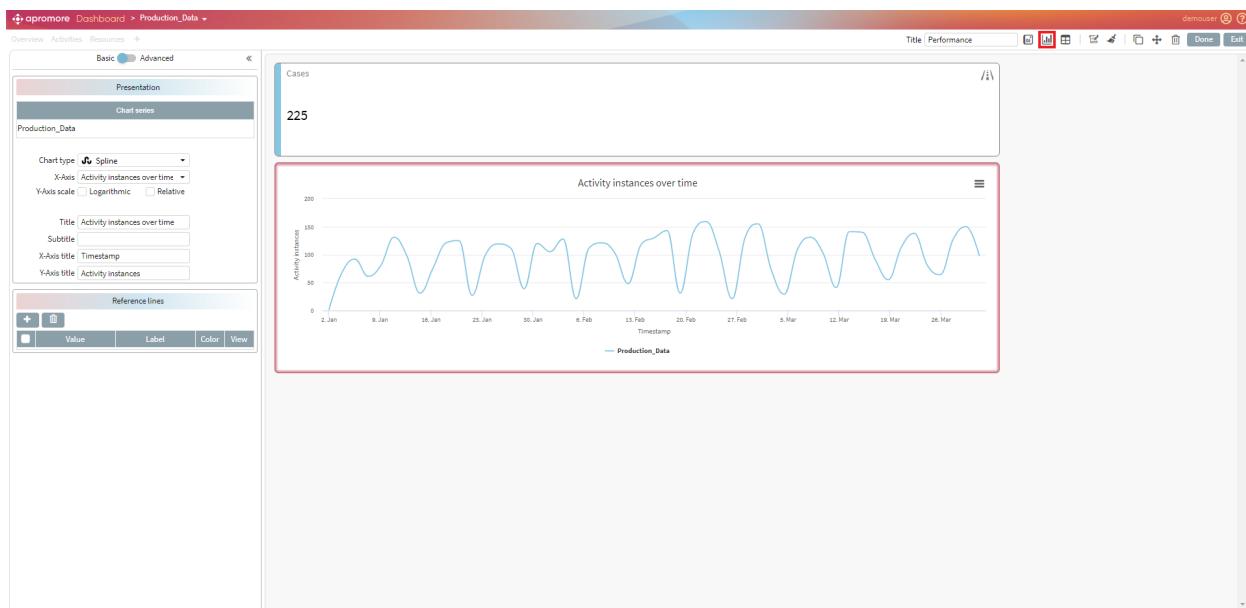


We can also add and save a custom color by adding the Hex code of the desired color.

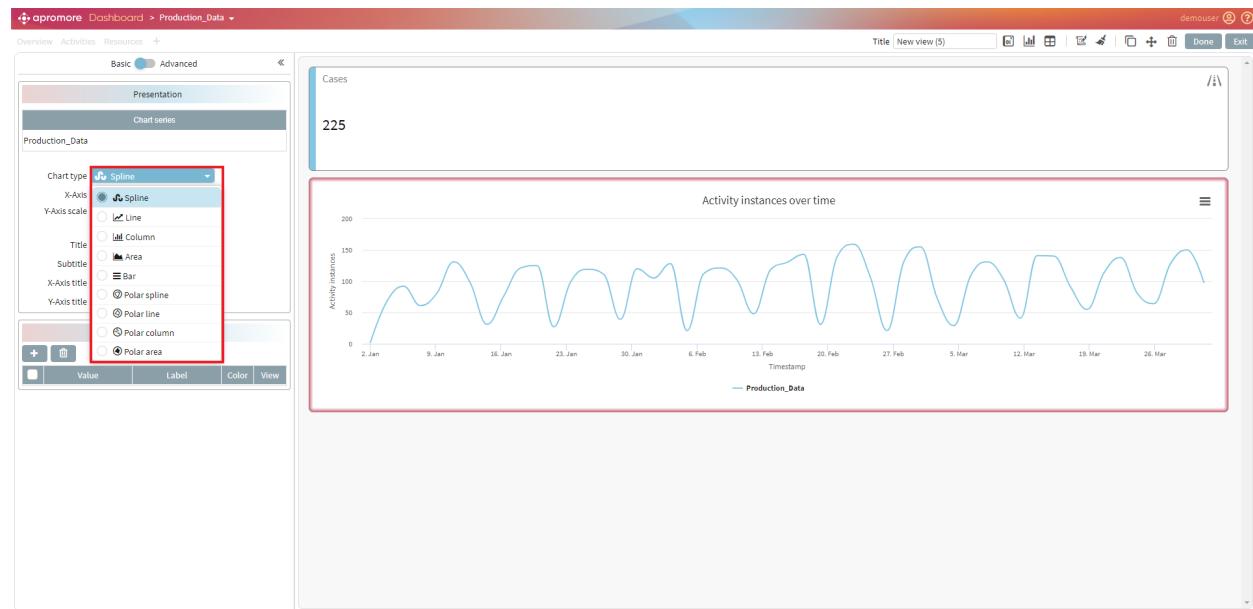


4.5.4 Add charts

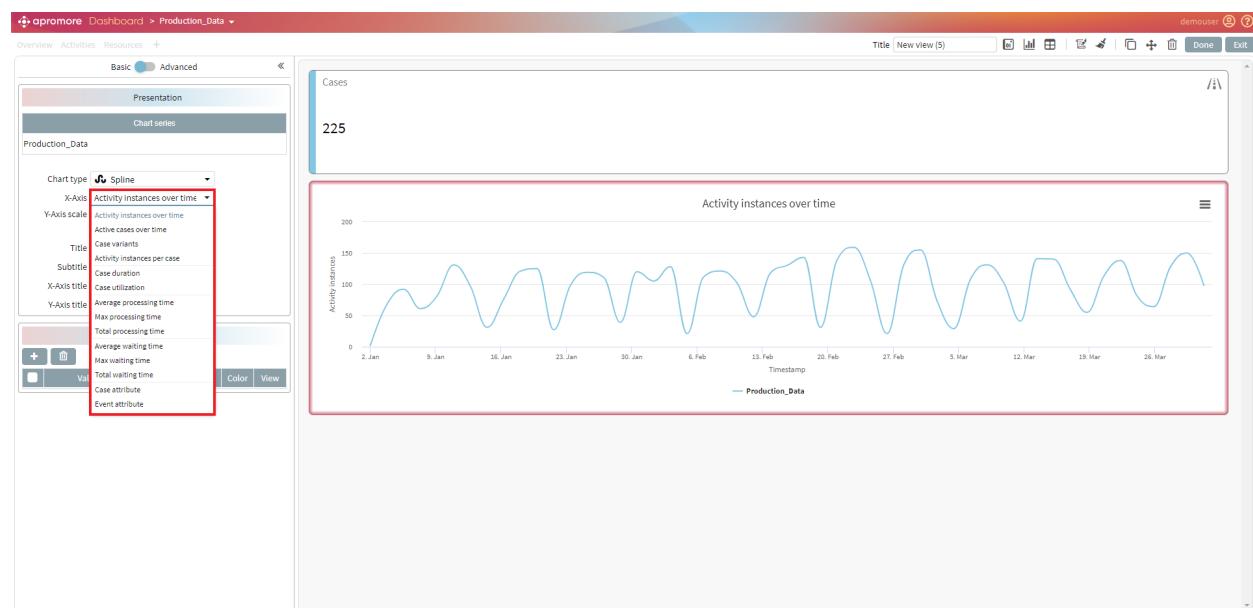
To add a chart, click on the *Add new chart* button.



To make changes to a chart, make sure the chart is selected first from the *Chart type* dropdown.



We can add different types of charts to the dashboard. To know more about different charts, please check the manual.



4.5.5 Add Tables

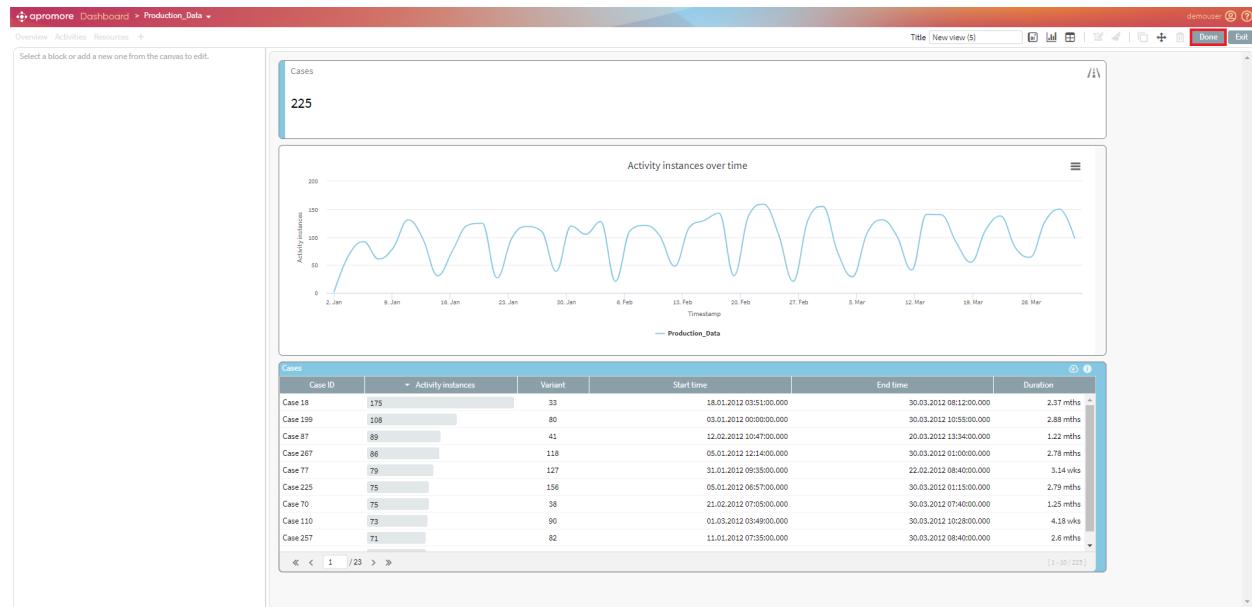
To add a table, click on the *Add new table* button.

The screenshot shows the Aproxmore dashboard interface. On the left, there is a configuration panel for a table. Under the 'Presentation' tab, the 'Table type' dropdown is set to 'Cases'. Other settings include 'Header font size' at 14 and 'Header background color'. The main area contains a card titled 'Cases' with a count of 225. Below the title is a line chart titled 'Activity instances over time' showing activity instances from January 2nd to March 26th. At the bottom of the card is a table with columns: Case ID, Activity instances, Variant, Start time, End time, and Duration. The table lists several cases with their respective details. The entire card has a red border.

We can select different tables from the *Table type* dropdown.

This screenshot is similar to the previous one, but the 'Table type' dropdown in the configuration panel is open, revealing a list of options: Cases, Case variants, Case attributes, and Event attribute. The 'Cases' option is highlighted with a red box. The rest of the interface, including the card and table below, remains the same.

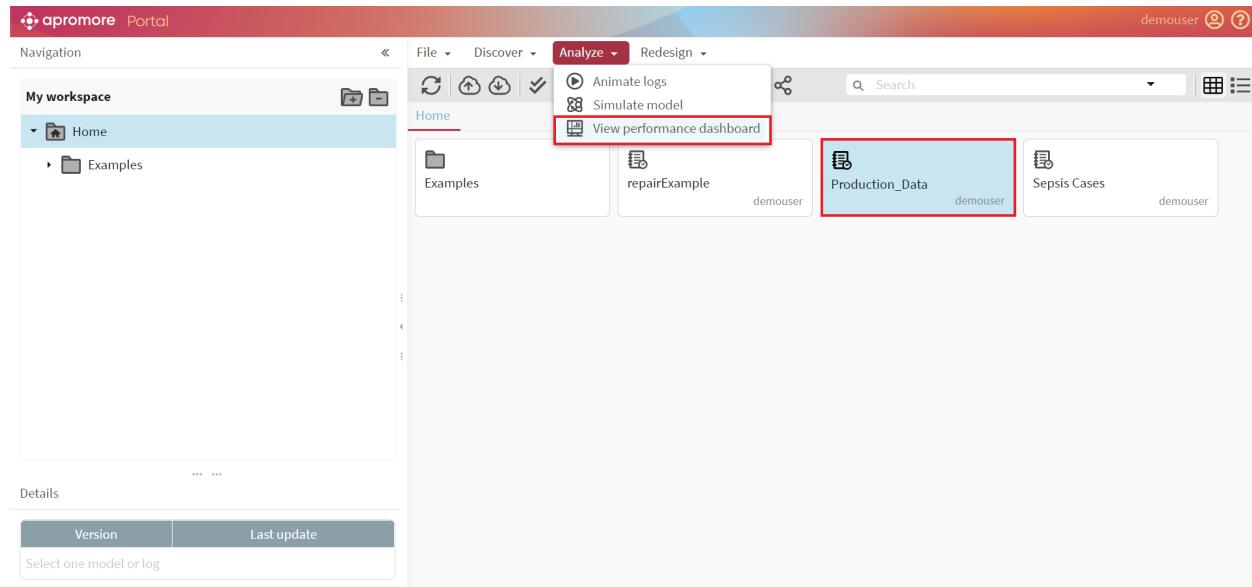
After all the changes have been made, click on *Done*.



4.6 Add charts to dashboard

Apronmore's Performance Dashboard allows users to analyze a business process from a performance measurement perspective visually. The Performance Dashboard displays a variety of aggregate statistics and charts. The *Performance Dashboard plugin* allows us to analyze one process in isolation or to compare multiple process variants. For example, we can use the *Performance Dashboard plugin* to compare how a given process is executed across multiple regions or compare the variant of a process consisting of slow cases versus faster cases.

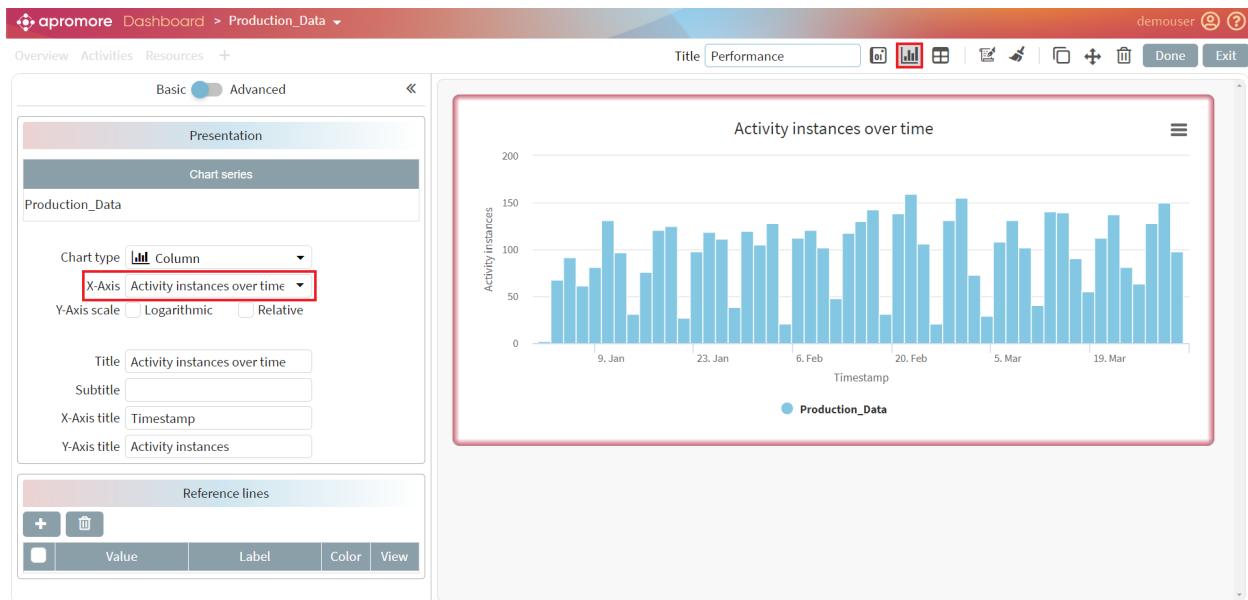
To open the dashboard plugin, select at least one event log and click on *Analyze -> View performance dashboard*. To compare multiple process variants, we need to select multiple event logs and then open the Performance Dashboard plugin.



4.6.1 Activity instances over time chart

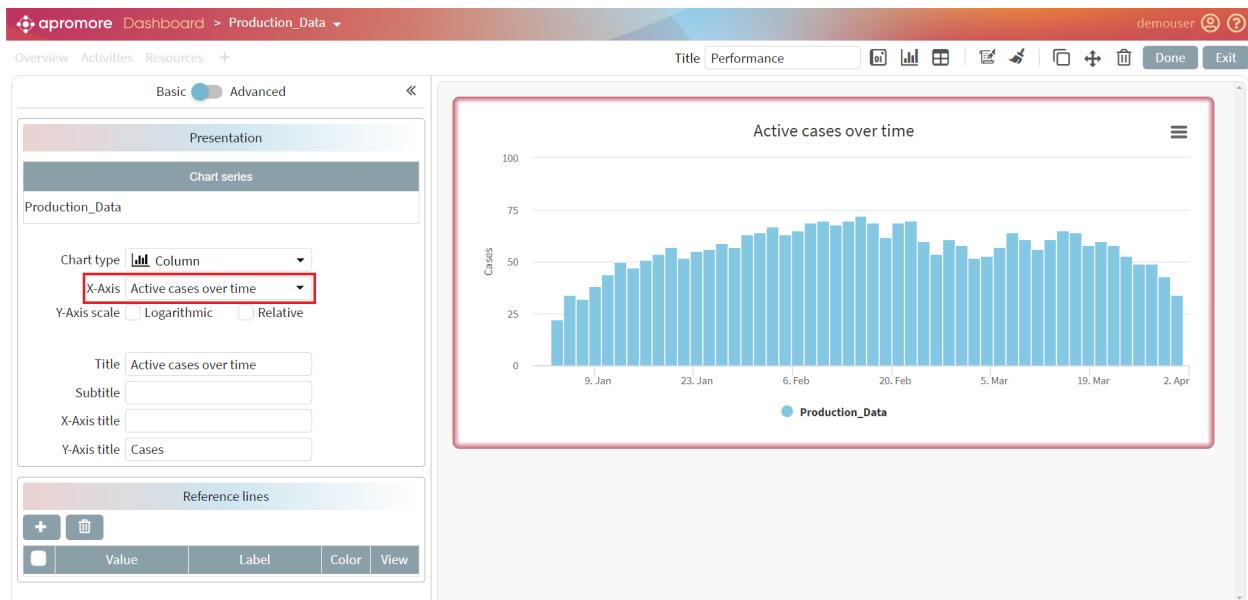
We can add different charts by clicking on the *Add a new chart* button.

The *Activity instances over time chart* displays how many activity instances occur during the time frame of the entire event log. The Y-axis denotes the ‘Timestamp’ of the entire log. The X-axis denotes the number of activity instances. This chart can help us to identify various patterns, such as the periodicity of the process. We can observe, for example, that in certain months of the year or certain days of the week, there is more activity than in others.



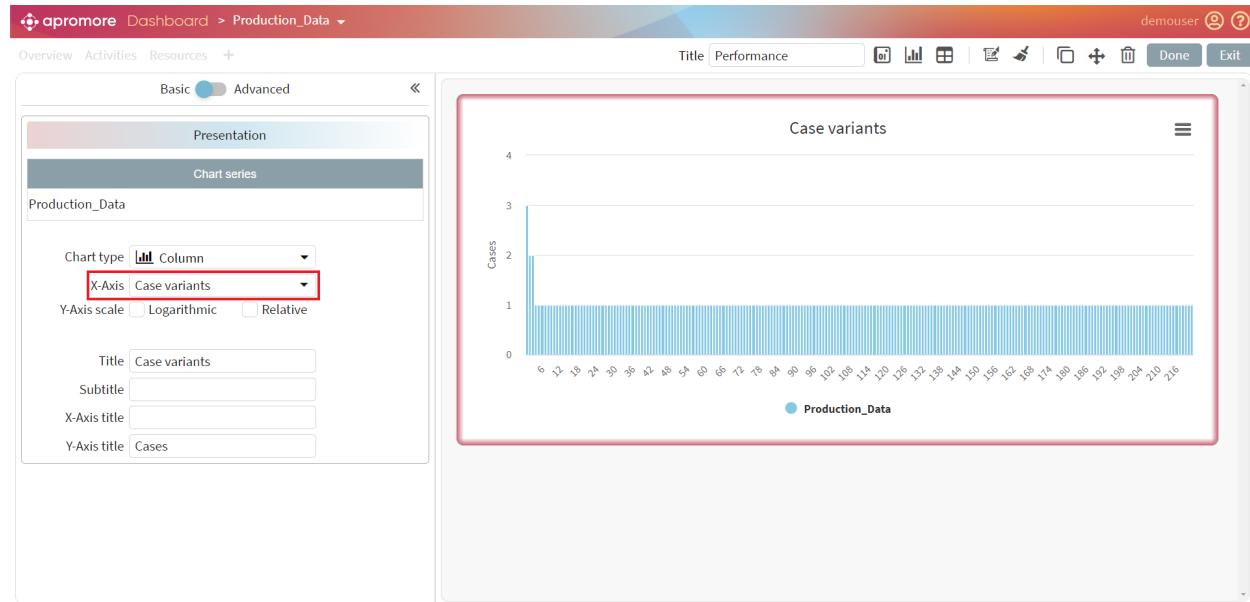
4.6.2 Active cases over time chart

The *Active cases over time chart* displays the work-in-progress over the entire timeframe of the log. To understand and view the work-in-progress over a period of time, click the *Active cases over time* tab. Alternatively, we can use *Case length filter*.



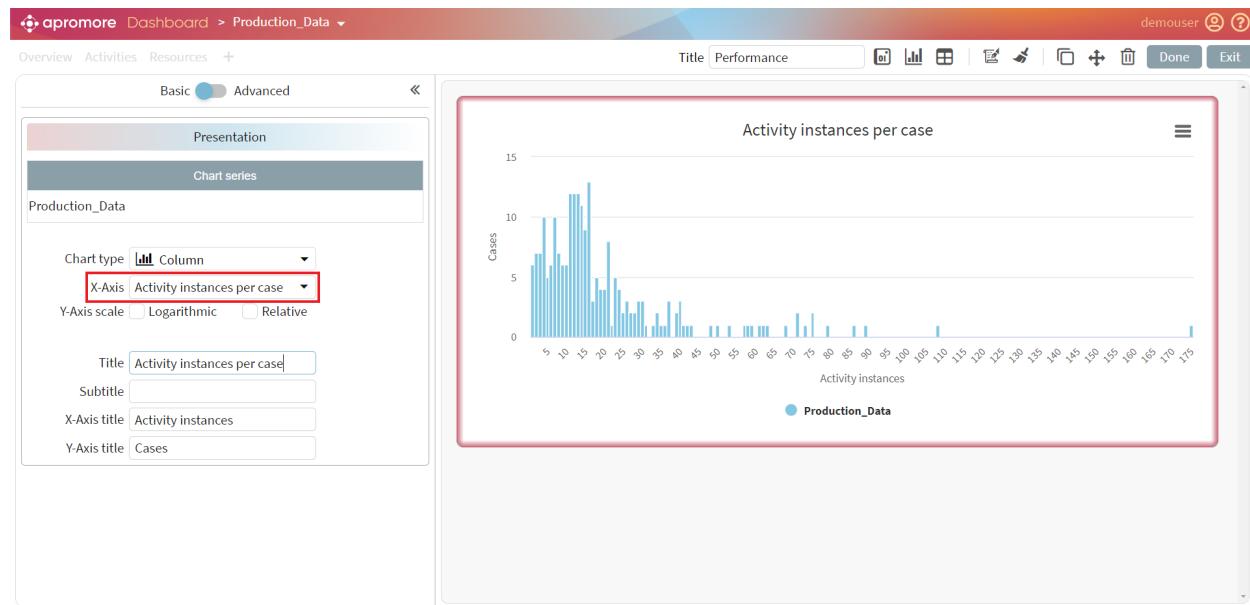
4.6.3 Case variants chart

A case variant is a sequence of activities followed by one or more cases, i.e., a distinct pathway. For example, if A, B, C, and D represent activities, then ABCD, ACBD, and ABC represent three case variants. Typically, there are multiple cases in a log that follow the same case variant. For example, it may be that 10 cases follow the case variant ABCD, while 5 cases follow the case variant ACBD. The *Case variants chart* displays the number of cases that follow each variant. The variants are sorted from most frequent to least frequent.



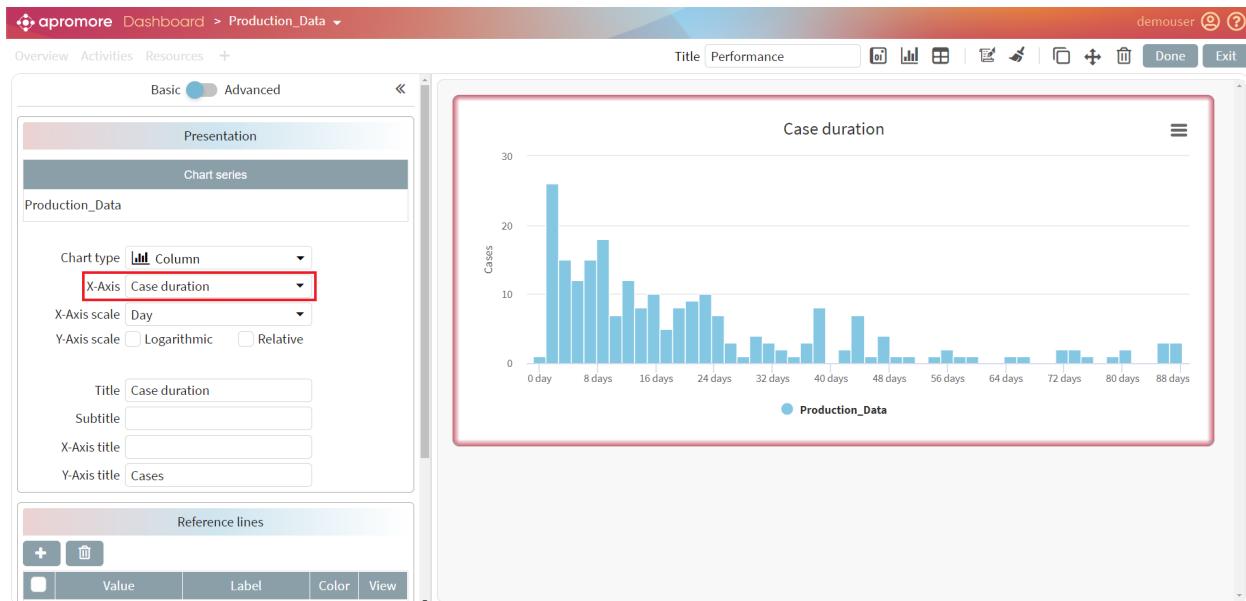
4.6.4 Activity instances per case chart

The *Activity instances per case chart* displays the number of activity instances in each case. The horizontal axis depicts the number of activity instances, while the vertical axis depicts the number of cases.



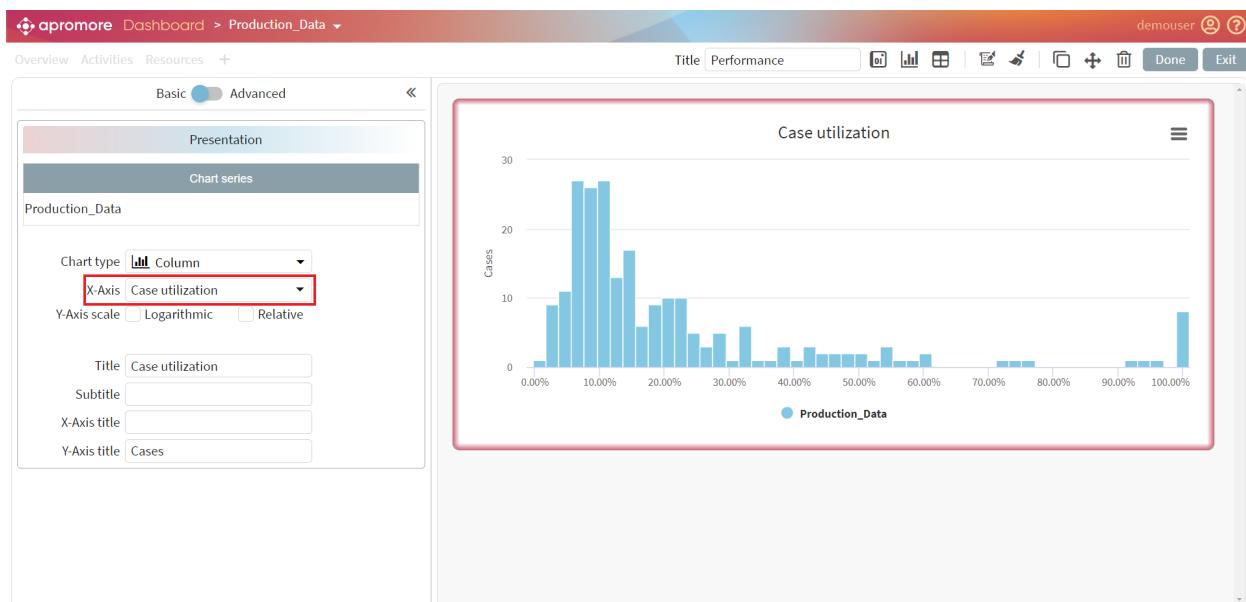
4.6.5 Case duration chart

To visualize the histogram of the case duration of the process, click on the *Case Duration tab*. Based on the screenshot below, we can identify many cases between the start time and approximately 23 days. However, some cases took more than a month.



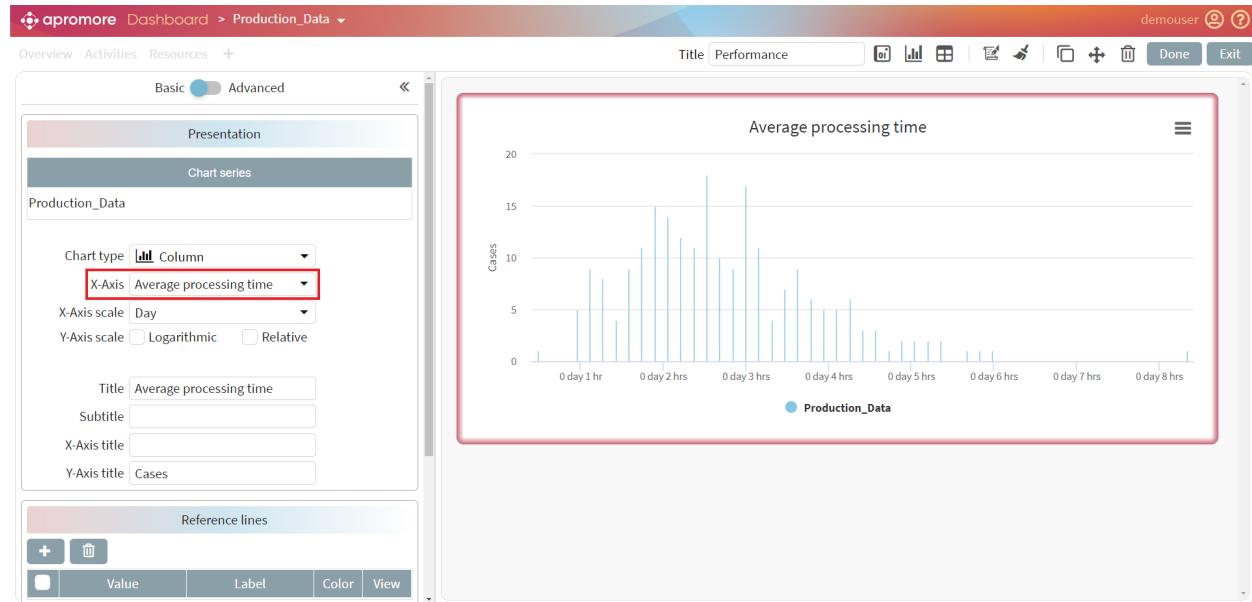
4.6.6 Case Utilization

The *Case utilization* is the ratio between the processing time of a case and the case duration. The processing time of a case is the amount of time during which someone was actively working on an activity in the case (i.e., the case duration excluding waiting times). The “Case utilization” chart displays the histogram of case utilizations in the log. Each bar in the chart shows the number of cases (Y-axis) with a given case utilization (X-axis). If we see one bar only, there may be two reasons: either all cases have the same value of case utilization, or the other bars are tiny. If that is the case, press the “Log scale” button on the chart’s top left corner to make the other bars visible.



4.6.7 Processing time chart

The processing time of a case is the amount of time during which someone was actively working on an activity in the case (i.e., the case duration excluding idle times). We can choose between the total, maximum, and average processing time from the dropdown menu. The *Processing time chart* displays the histogram of processing times of the cases in the log. Each bar in the chart shows the number of cases (Y-axis) with a given processing time (X-axis). If we see one bar only, there may be two reasons: either all cases have the same value of processing time, or the other bars are tiny. If that is the case, press the *Log scale* button on the chart's top left corner to make the other bars visible.



4.6.8 Waiting time chart

The waiting time of a case is the amount of time during which nobody was actively working on an activity in the case. We can choose between the total, maximum, and average waiting time from the dropdown menu. The *Waiting Time chart* displays the histogram of waiting times of the cases in the log. Each bar in the chart shows the number of cases (Y-axis) with a given waiting time (X-axis). If we see one bar only, there may be two reasons: either all cases have the same value of waiting time, or the other bars are tiny. If that is the case, press the *Log scale* button on the chart's top left corner to make the other bars visible.

The screenshot shows the Aproxmore dashboard editor interface. On the left, there's a configuration panel for a chart titled "Average waiting time". The "Chart type" is set to "Column". The "X-Axis" dropdown is highlighted with a red box and contains the value "Average waiting time". The "Y-Axis scale" dropdown has "Logarithmic" checked. Below the configuration are fields for "Title" (set to "Average waiting time"), "Subtitle", "X-Axis title", and "Y-Axis title" (set to "Cases"). To the right is the resulting chart, a histogram titled "Average waiting time" showing the distribution of waiting times in days. The x-axis ranges from 0 day to 11 days, and the y-axis ranges from 0 to 50 cases. The chart is labeled "Production_Data".

We can create different types of charts using the custom dashboard. Charts like column and pie charts work best with categorical values, while line charts work best with numerical data.

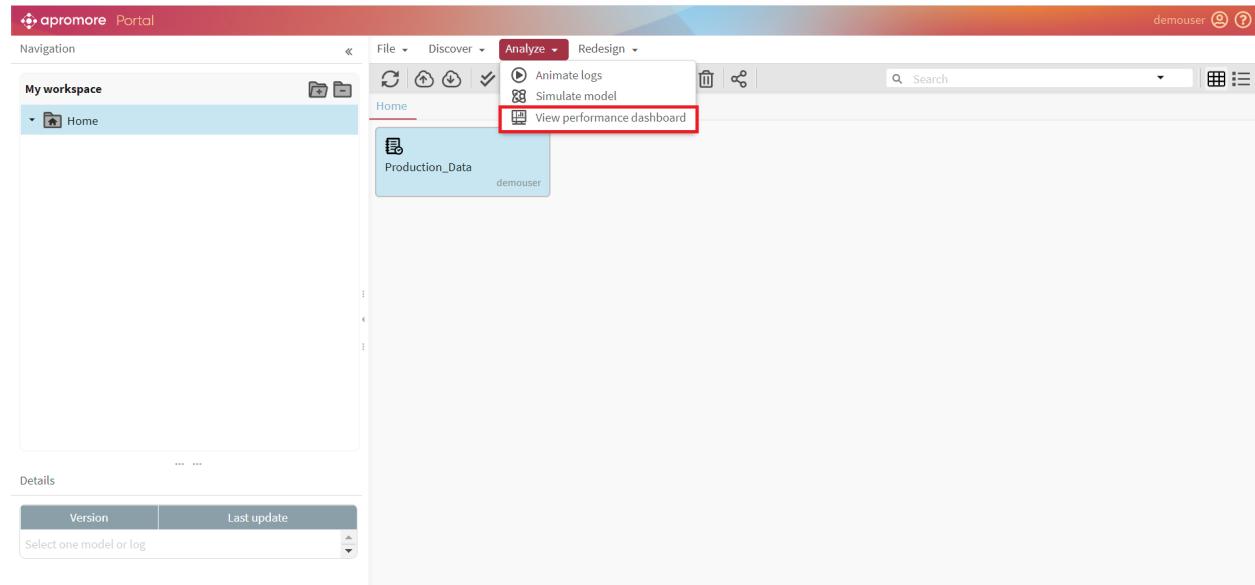


4.7 Save dashboard

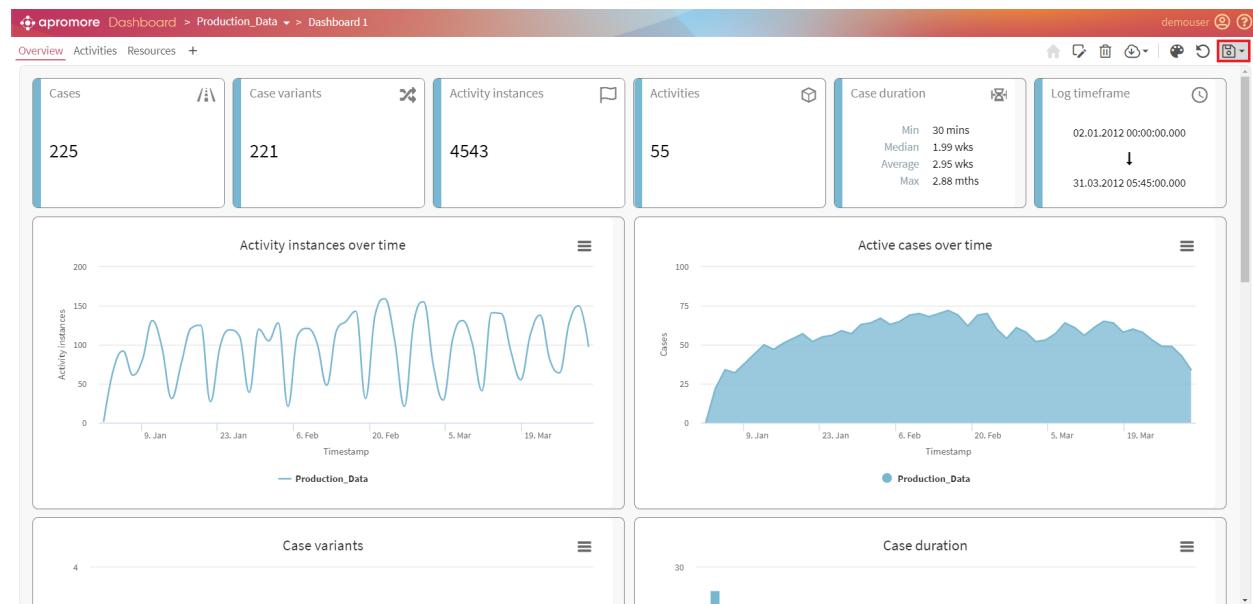
Apromore allows us to choose whether or not to auto-save changes to a dashboard.

4.7.1 Save a dashboard

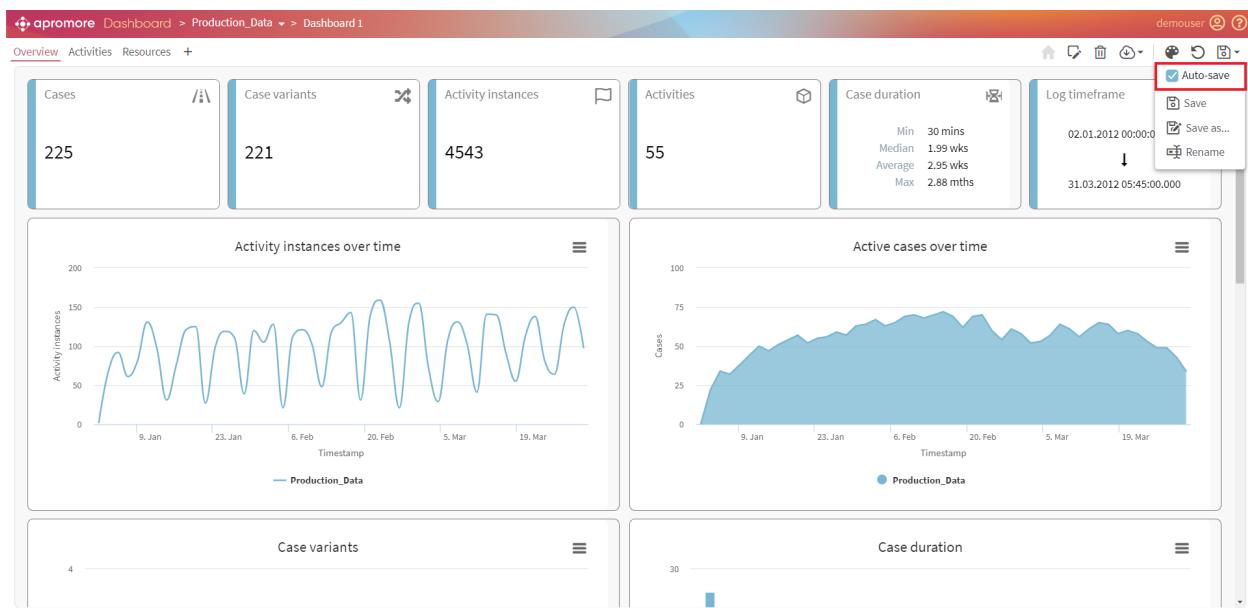
Select a log and click on *View performance dashboard*.



To auto-save a file, click on the *Save dashboard* button.



To enable/disable the auto-save option, click on the tick-box.



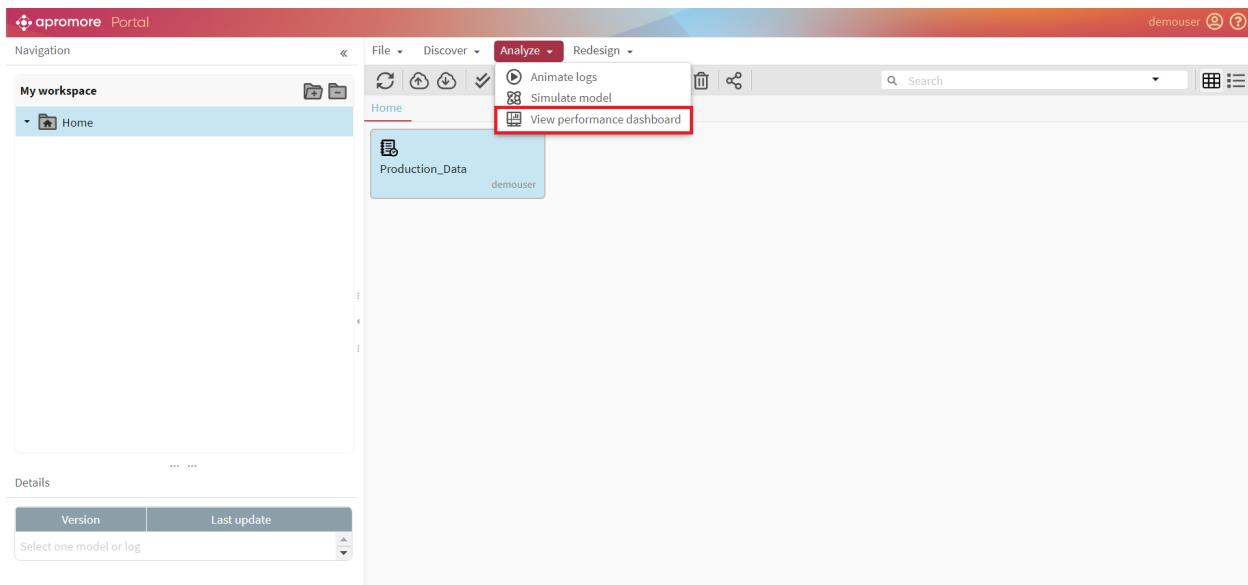
Note: The auto-save option is enabled by default

The auto-save option is triggered when we:

- Click on *Done* after editing a dashboard view.
- Click on *Apply* after making changes to the style of the dashboard.
- Click on *OK* after applying a filter to the dashboard.

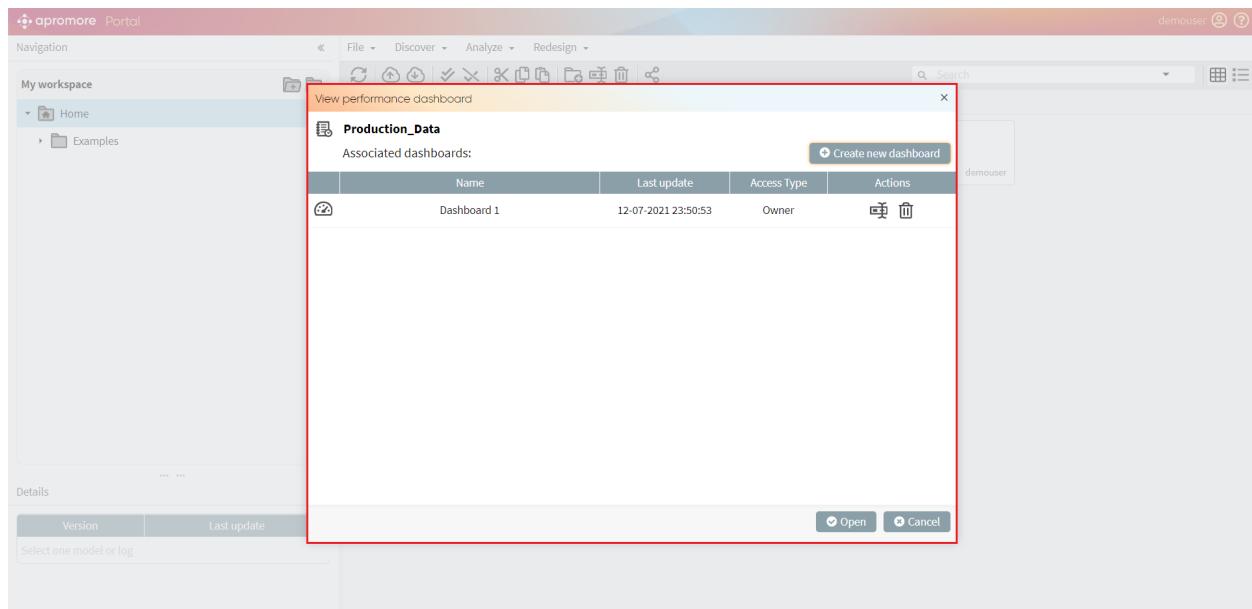
4.7.2 Open a saved dashboard

To open a saved dashboard, select a log and click on *View performance dashboard*.

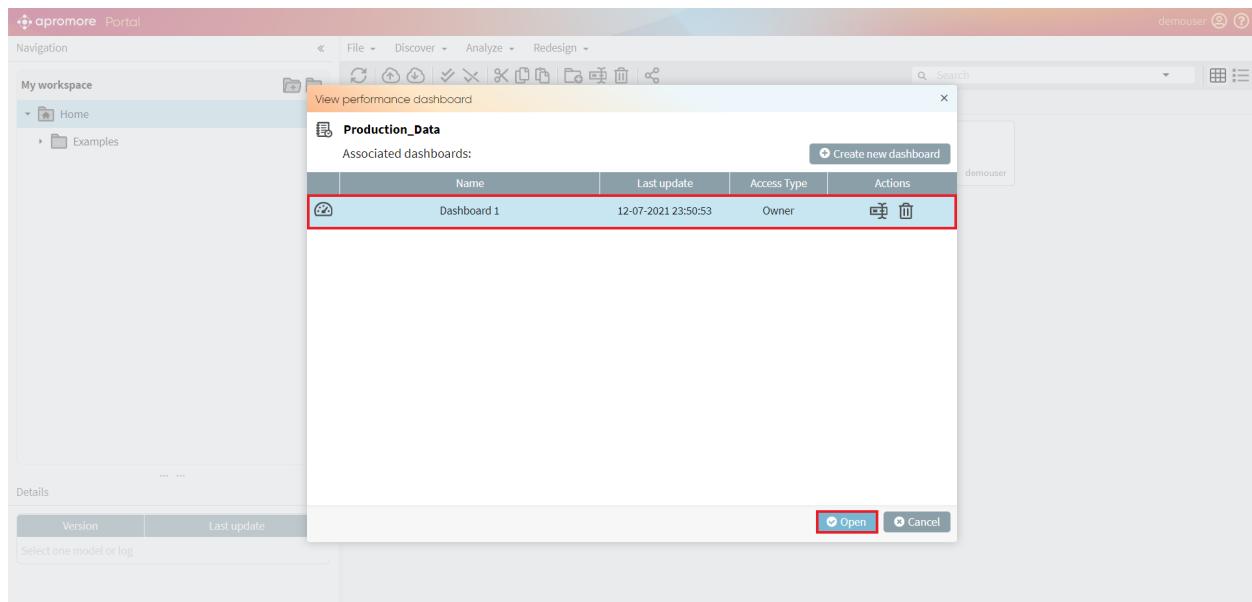


The *View performance dashboard* window appears if the log have any saved dashboards associated with it.

4.7. Save dashboard



To open a saved dashboard, select it and click on *Open*.



4.8 Additional dashboard functionality

4.8.1 Advanced View – Slice & Filter

The *Advanced view* allows us to *slice* and *filter* the logs. To slice a log click on the **+** button next to the *Slice Log*.

4.8.2 Advanced > Slice

We can slice a log based on *Event attribute*, *Case attribute*, *Timeframe* or *Performance*. In case of *Event attribute* select the events with which you want to slice the log.

After clicking on *OK*, we can see the details of the selection we made.

Slice log: Production_Data

Event attribute Case attribute Timeframe Performance

Activity	Value (2 / 55)	Cases	Frequency
Change Version - Machine 22		1	0.44%
Deburring - Manual		6	2.67%
Final Inspection - Weighting		1	0.44%
Final Inspection Q.C.		176	78.22%
Fix - Machine 15		1	0.44%
Fix - Machine 15M		1	0.44%
Fix - Machine 19		1	0.44%
Fix - Machine 3		1	0.44%
Fix EDM		2	0.89%
Flat Grinding - Machine 11		58	25.78%
Flat Grinding - Machine 26		1	0.44%
Grinding Rework		7	3.11%
Grinding Rework - Machine 12		10	4.44%
Grinding Rework - Machine 2		2	0.89%
Grinding Rework - Machine 27		20	9.09%

OK Cancel

Basic Advanced

Slicing & filtering

Slice log Description

Event Attribute: Activity Slice by 'Final Inspection - Weighting' and 'Fix - Machine 19'

Filter log Apply Keep as default

Cases 225

Case variants 221

Activity instances 4543

Activities 55

Case duration Min 30 mins Median 1.99 wks Average 2.95 wks Max 2.88 mths

Log timeframe 02.01.2012 00:00:00.000

Activity instances over time

Production_Data

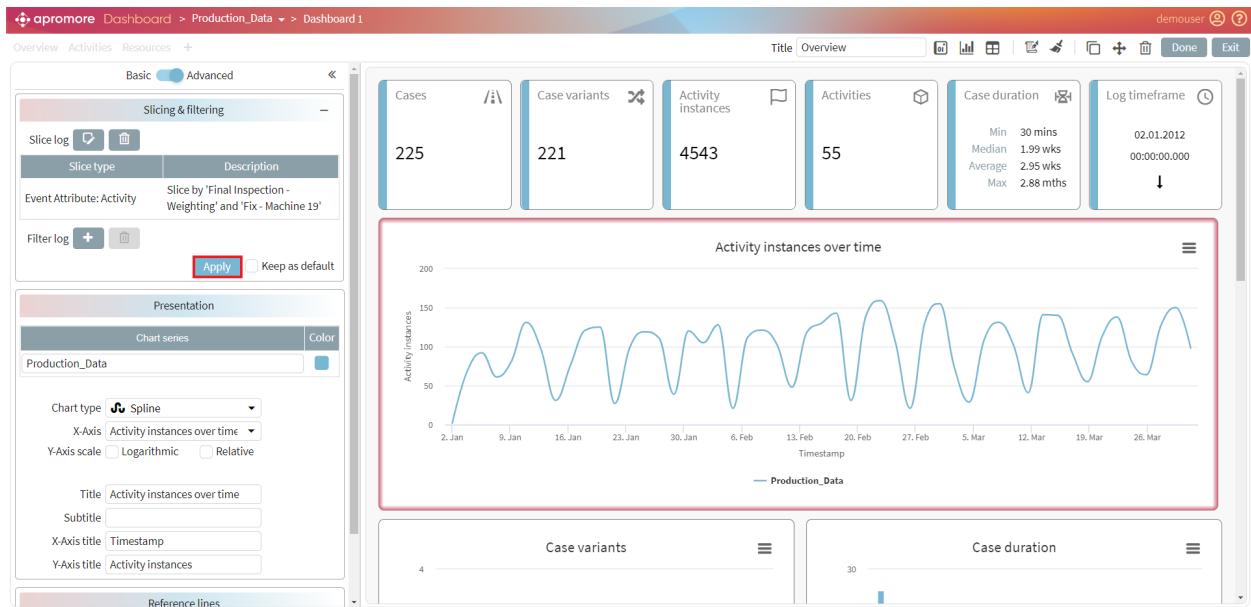
Activity instances over time

Timestamp

Case variants

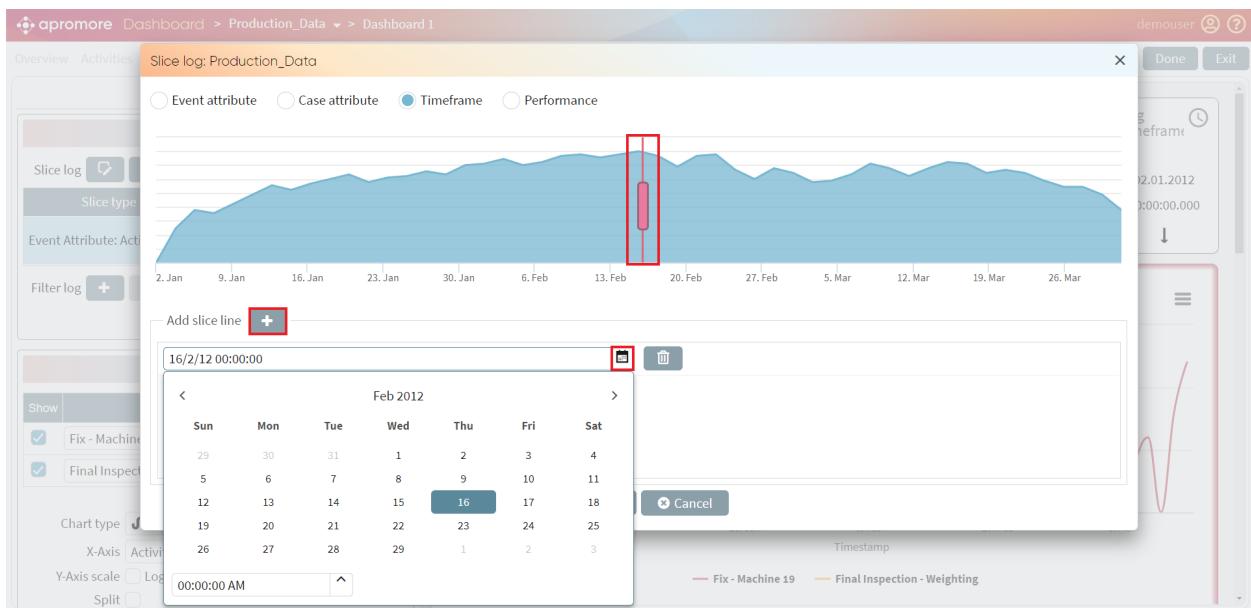
Case duration

Click on **Apply**, to see the results.



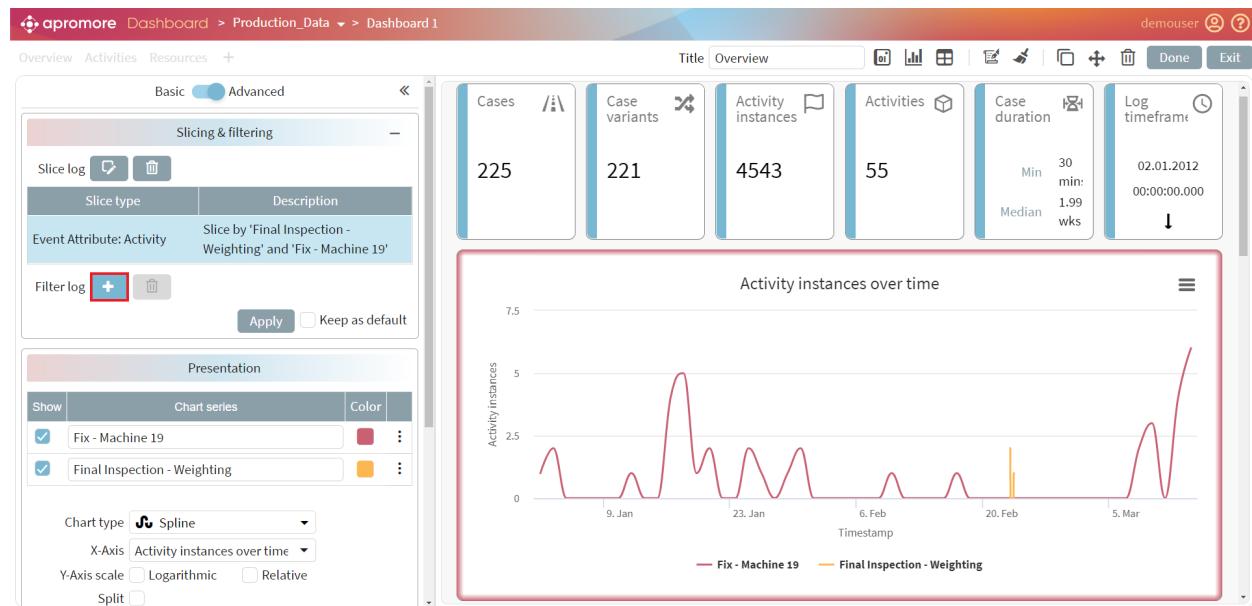
Similarly, we can either slice by *Case attribute*, *Performance* or *Timeframe*.

In case of *Timeframe* and *Performance* there is an option of *Add slice line*. For this click on the **+** button next to *Add slice line* and slide the slider. Alternatively, you can also select a date from the date picker.

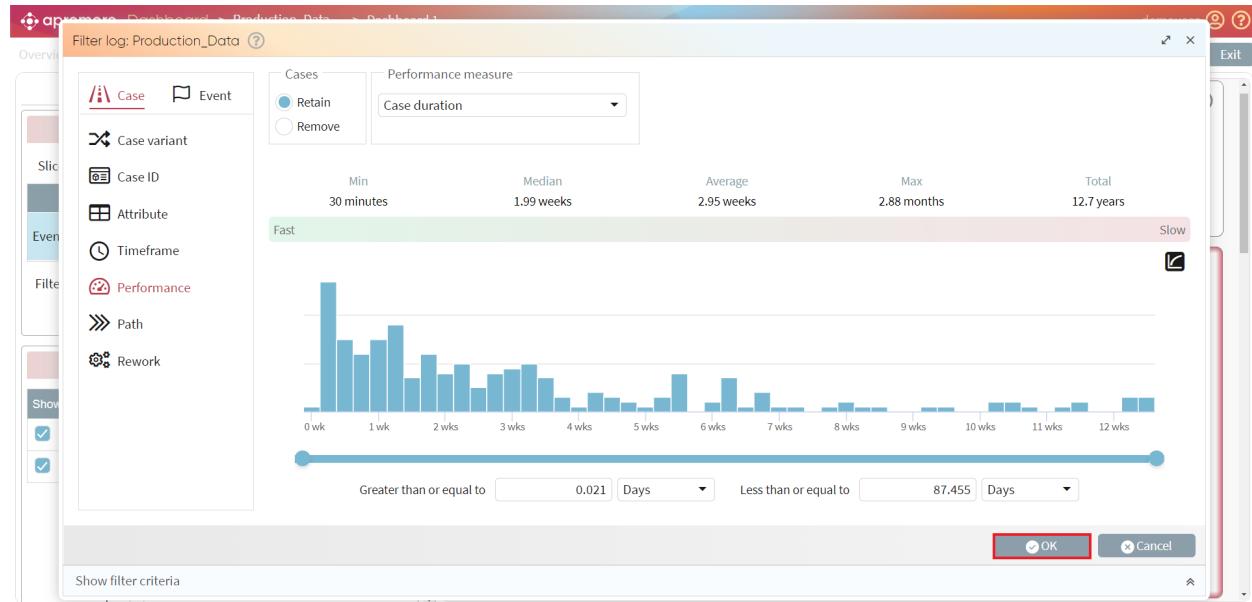


4.8.3 Advanced > Filter

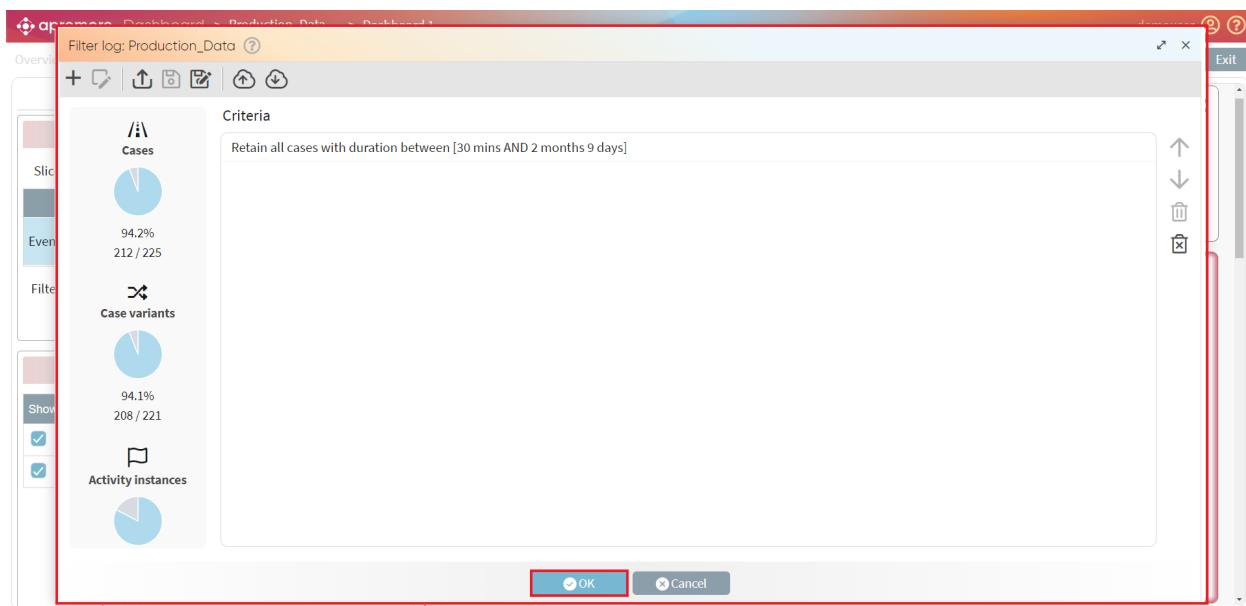
We can add a filter by clicking on the button next to *Filter log*.



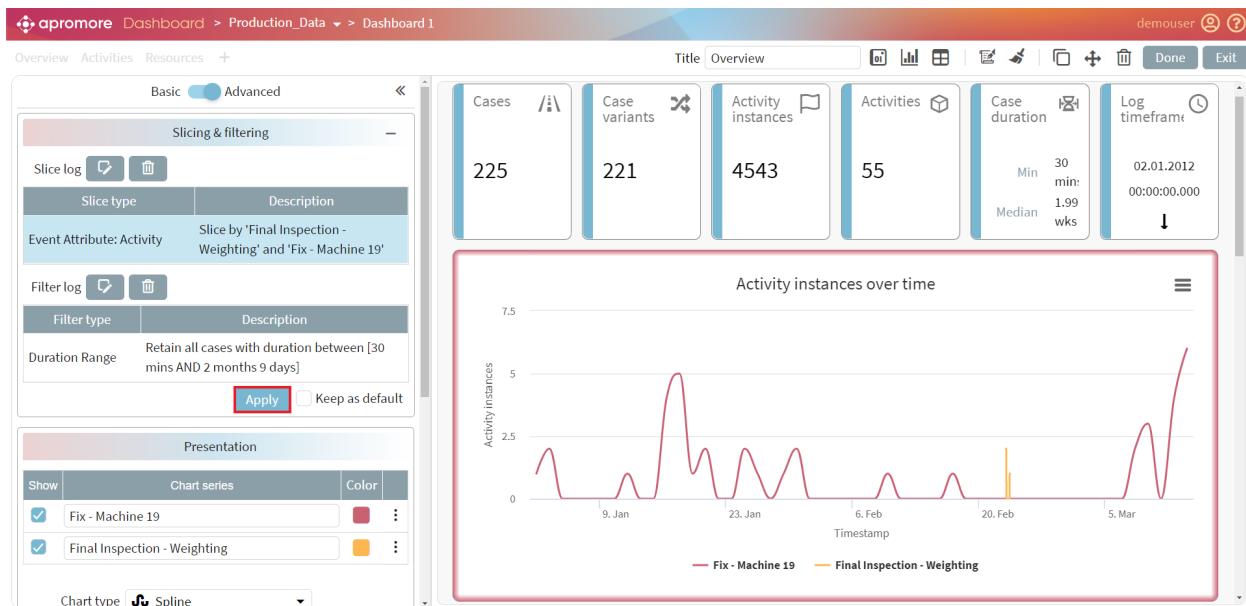
Select the desired filter and click on *Ok*. For optimal use of filters, please go through the *Filter Log manual*.



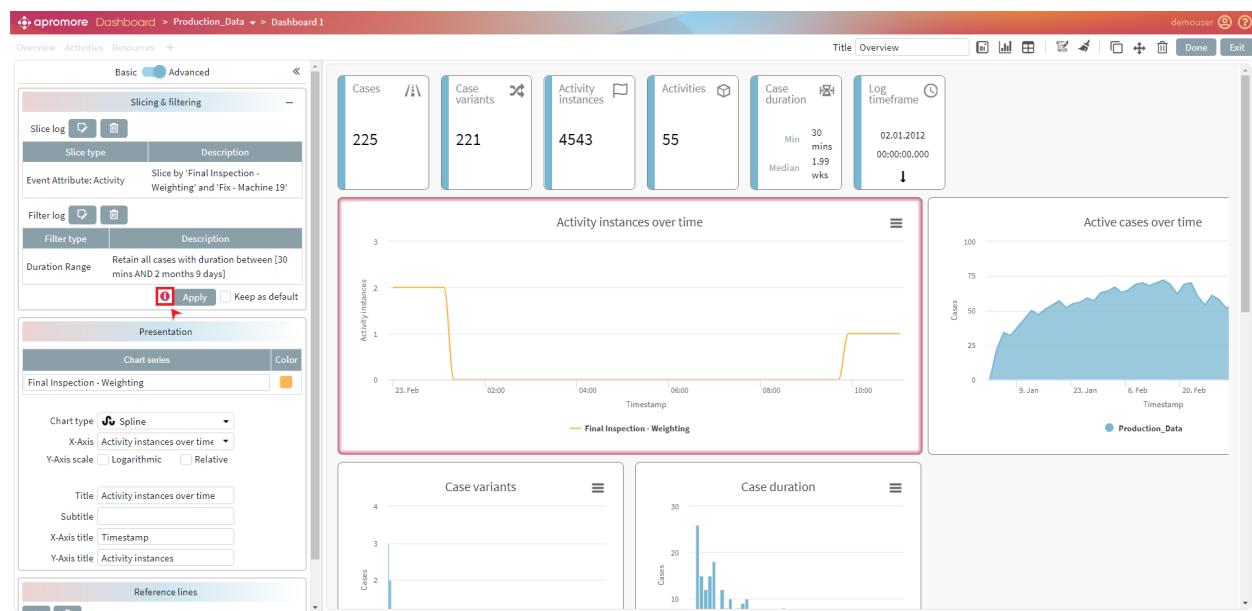
Filter Log window appears. Click *OK* to complete filter setting.



To apply the filter click on *Apply* in the Slicing and Filtering section.

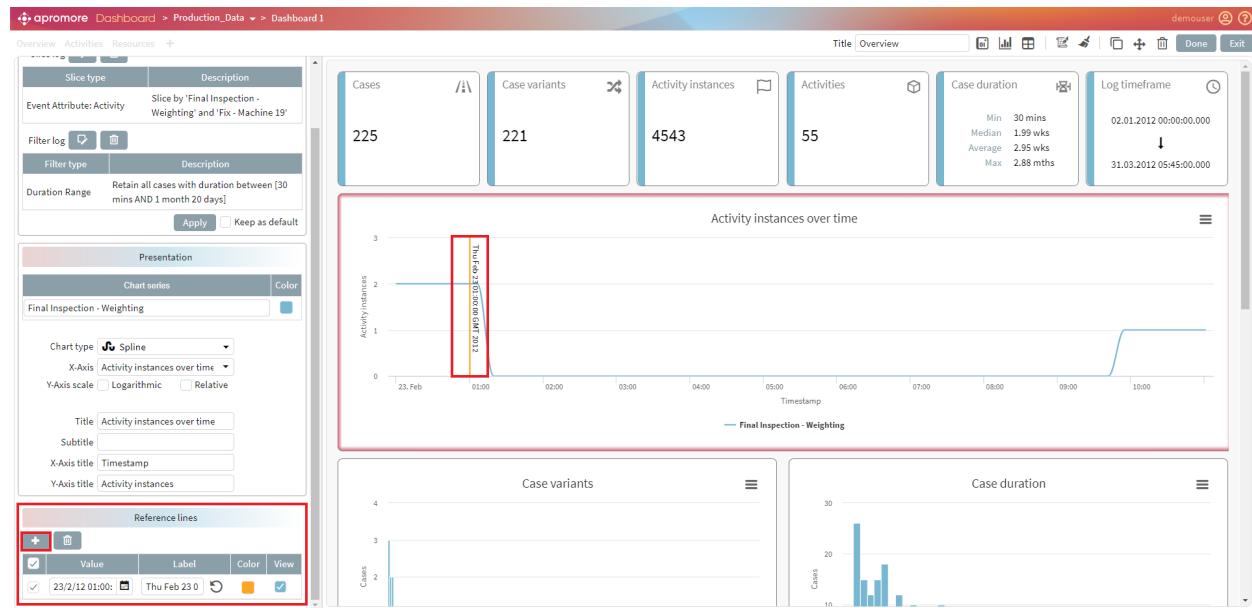


Note: While slicing/filtering log, we may get a warning sign stating if there is a problem. Hover over to see the details.



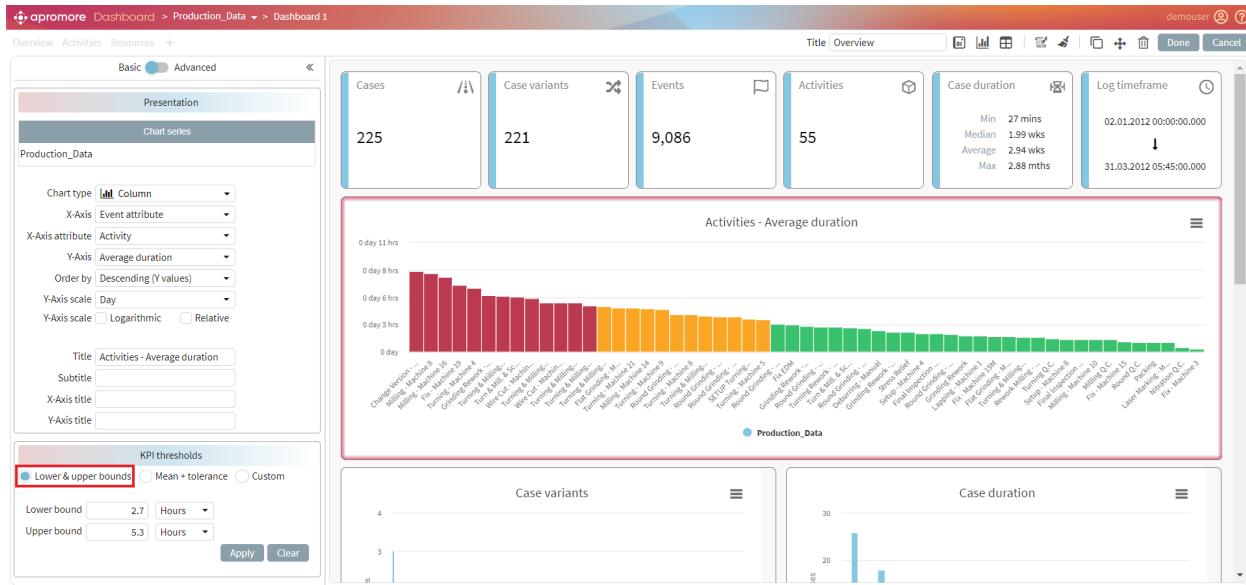
4.8.4 Add Reference Lines

For visualization purpose, we can also add reference lines to a chart to mark important timelines. For this click on the **+** button in the *Reference lines* section.

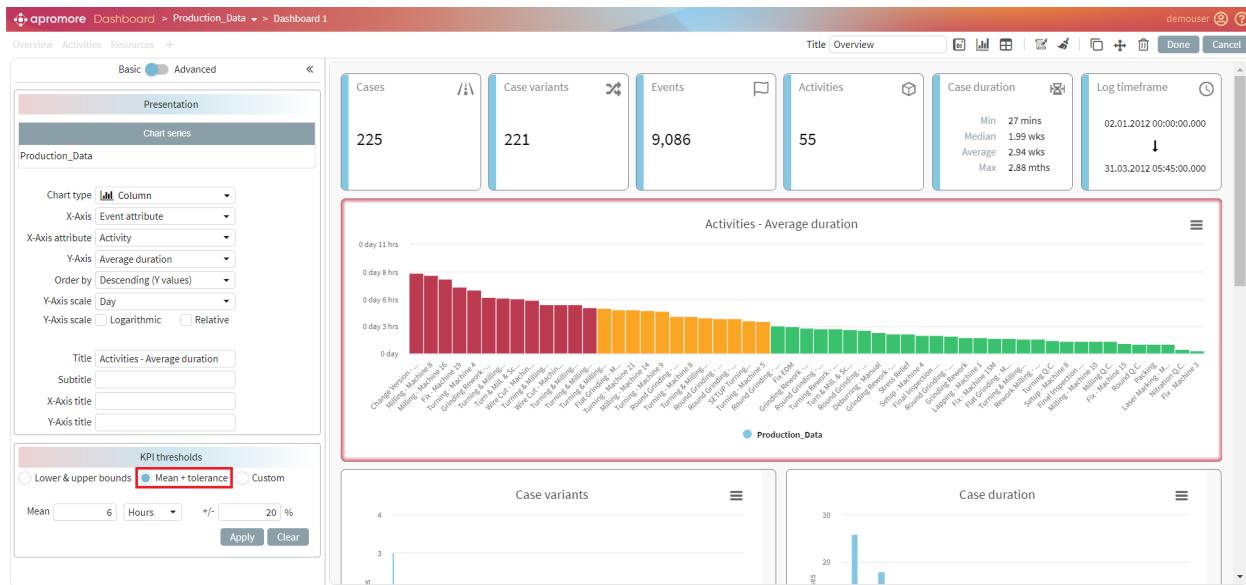


4.8.5 Add KPI

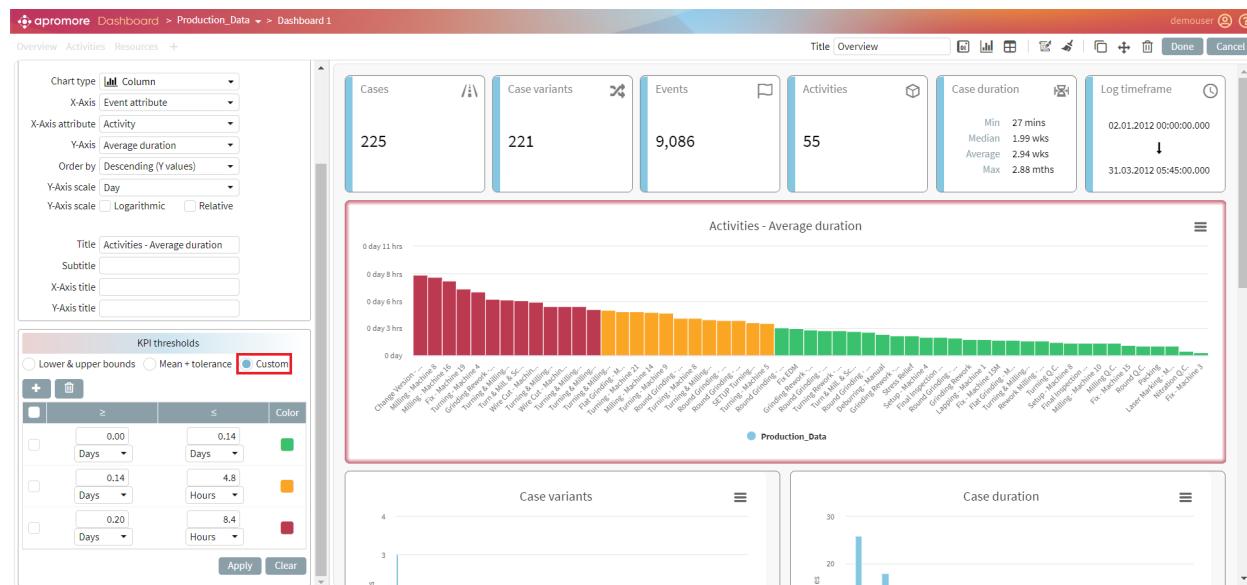
We can add KPI target from the KPI thresholds section, which is available in the *Basic* view.



The *Mean + Tolerance* metric allows us to specify a mean performance metric with a specific tolerance (in percentage).

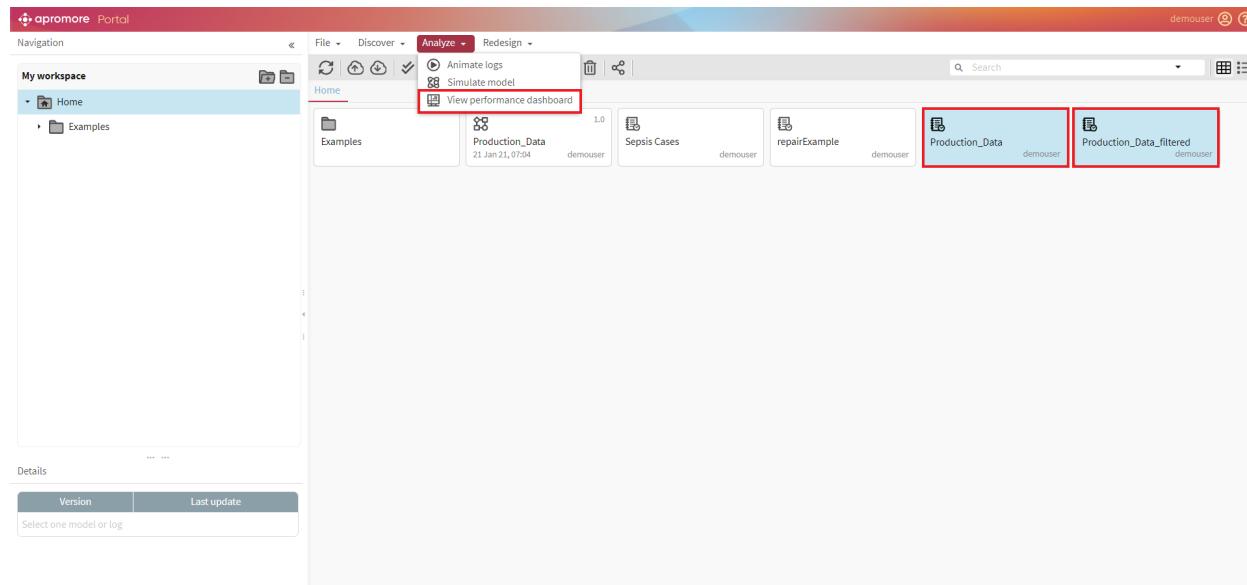


The *Custom* metric allows us to specify custom performance indicators.

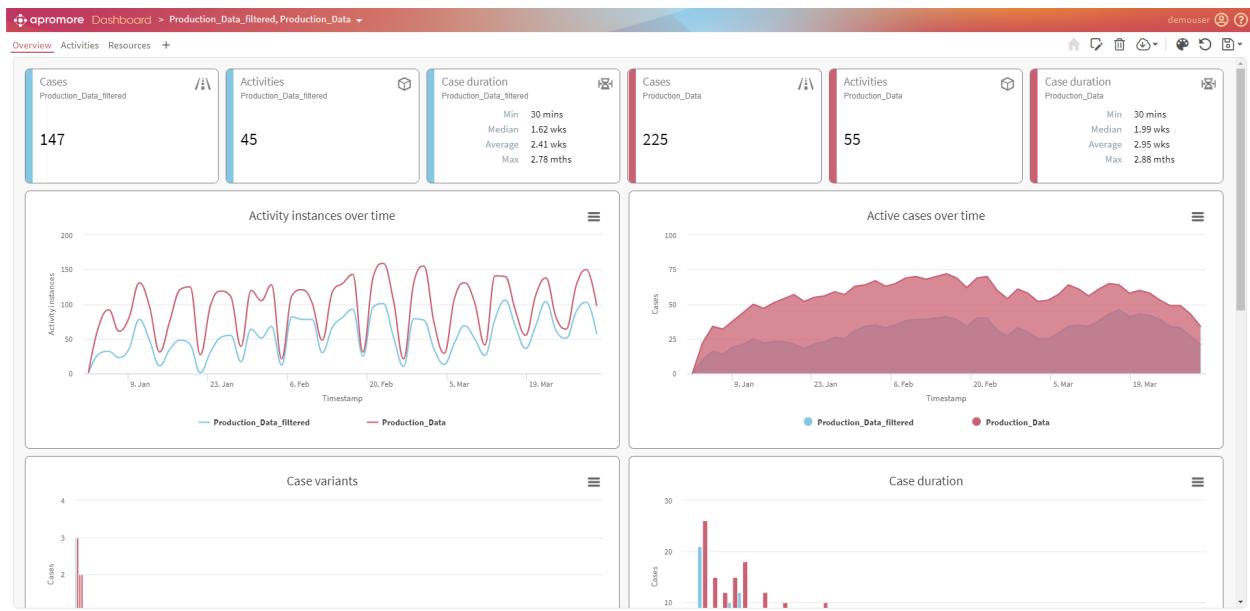


4.8.6 Compare Multiple Process Variants

Custom Performance dashboard not only helps us to dive into the statistical metrics of a single event log but also helps us to compare different versions of an event log. For this, select more than one version of the same event log and click on *Analyze* -> *View performance dashboard*.

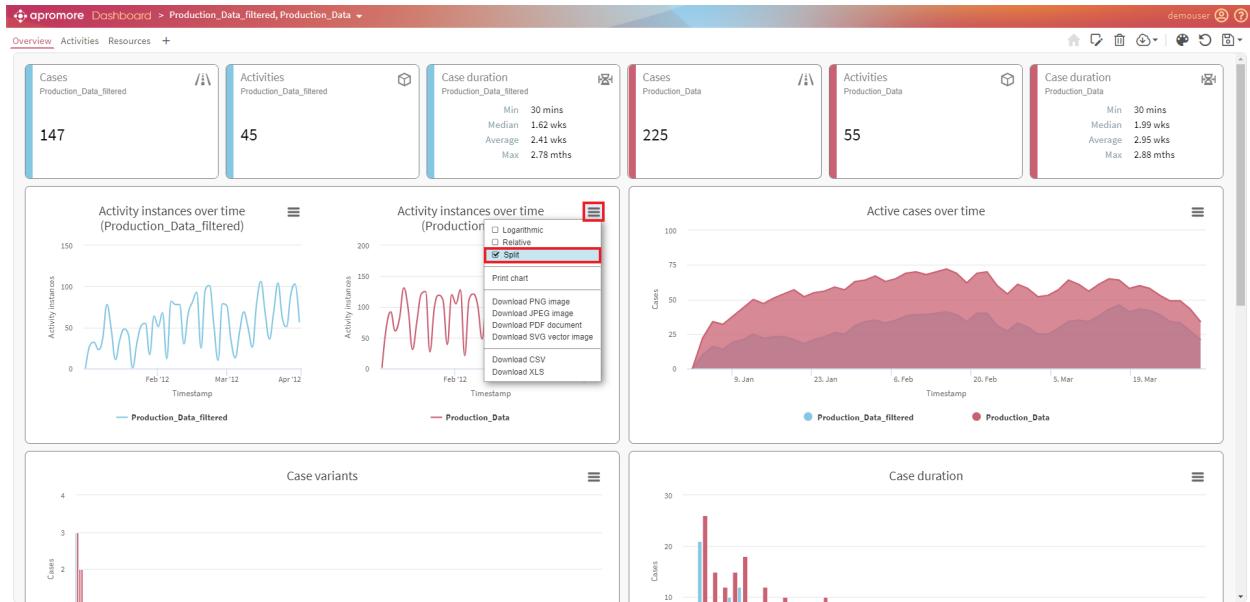


We see the charts of both the logs combined.



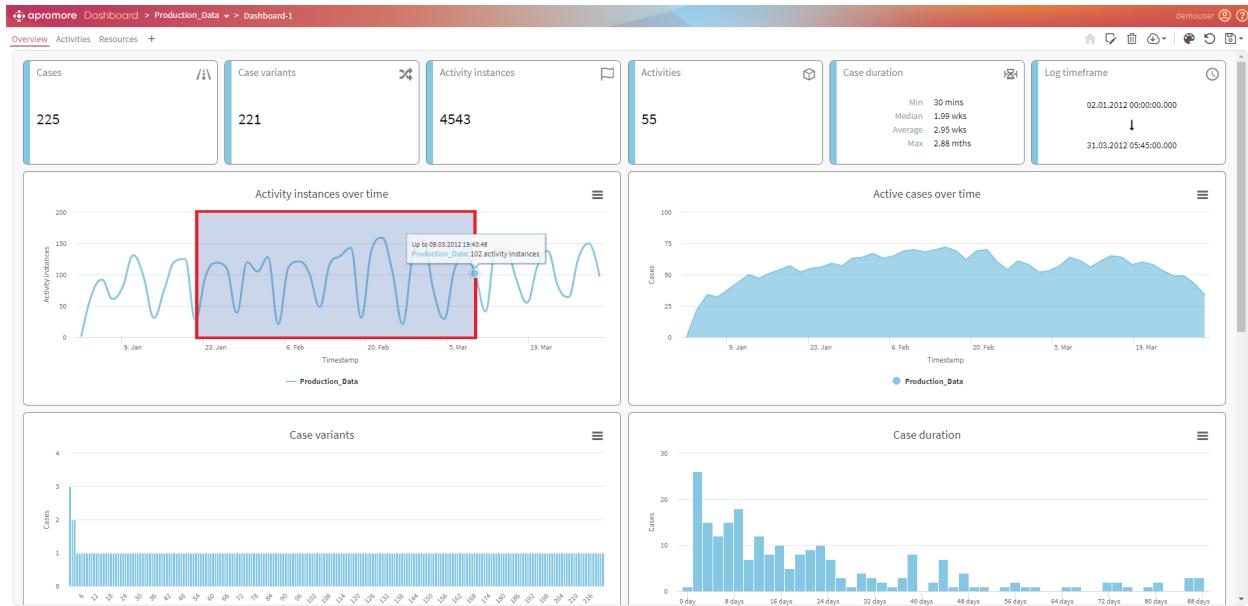
4.8.7 Split Charts

We can also choose to *split* charts to compare multiple process variants.

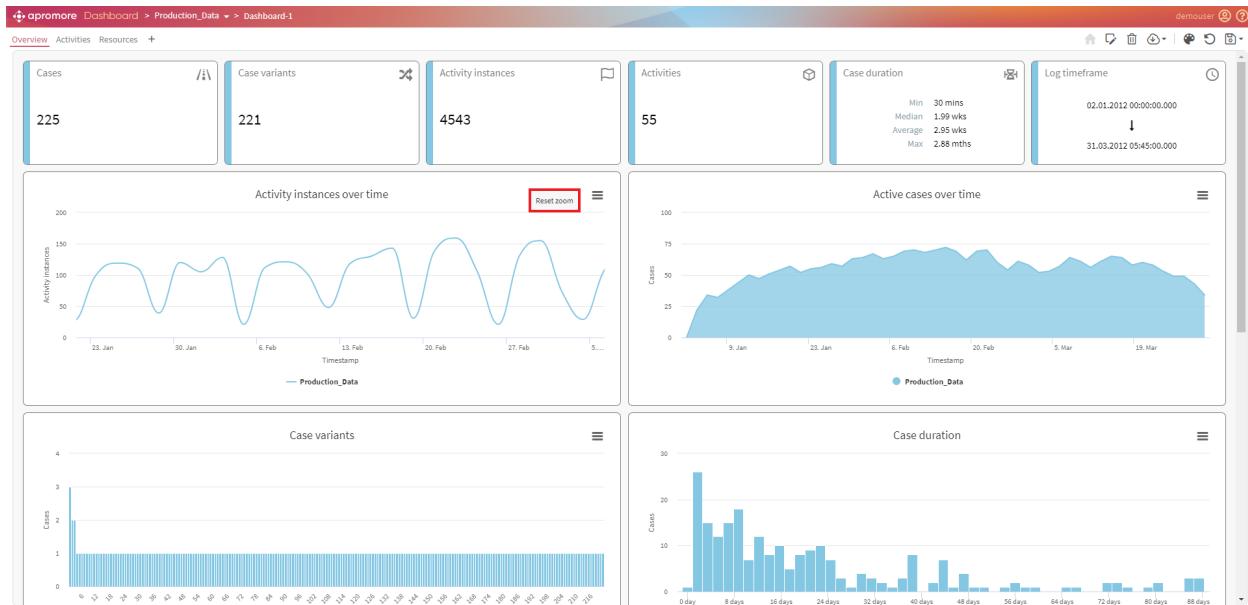


4.8.8 Zoom-in/Zoom-out

We can zoom into the graph by simply dragging the mouse over the part of the chart we would like to zoom.

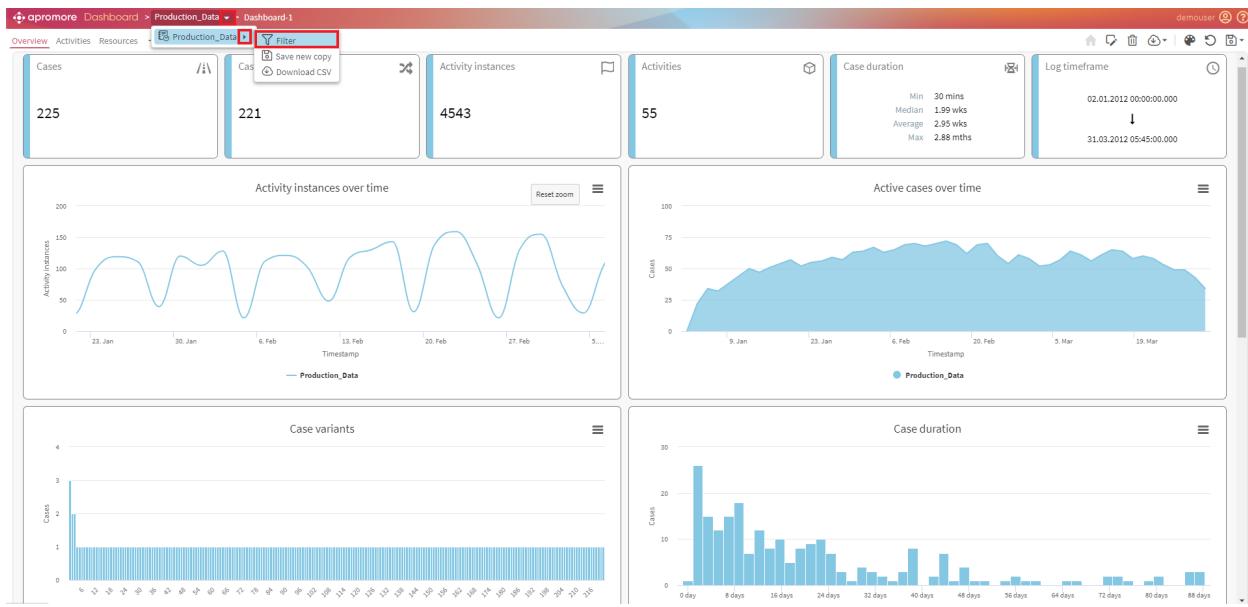


We can zoom out of the graph by clicking on *Reset Zoom* button.

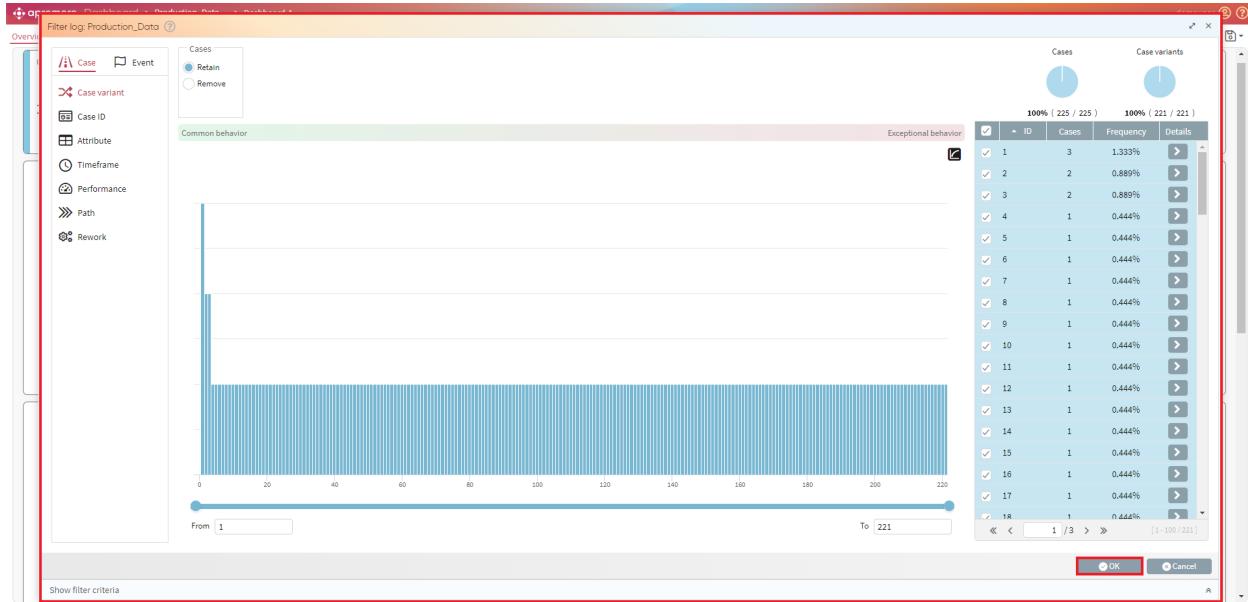


4.8.9 Add filter

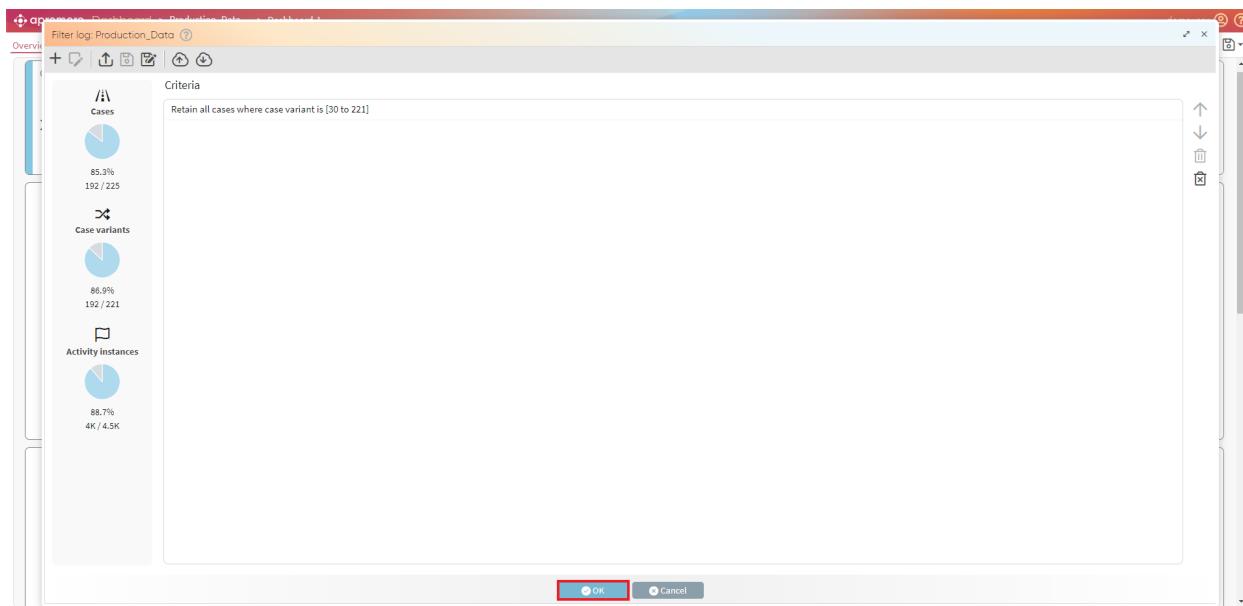
To add a filter, click on the *drop-down* button next to the log name.



Filter log window appears. Select the desired filter and click on *Ok*. For optimal use of filters, please go through the *Filter Log manual*.

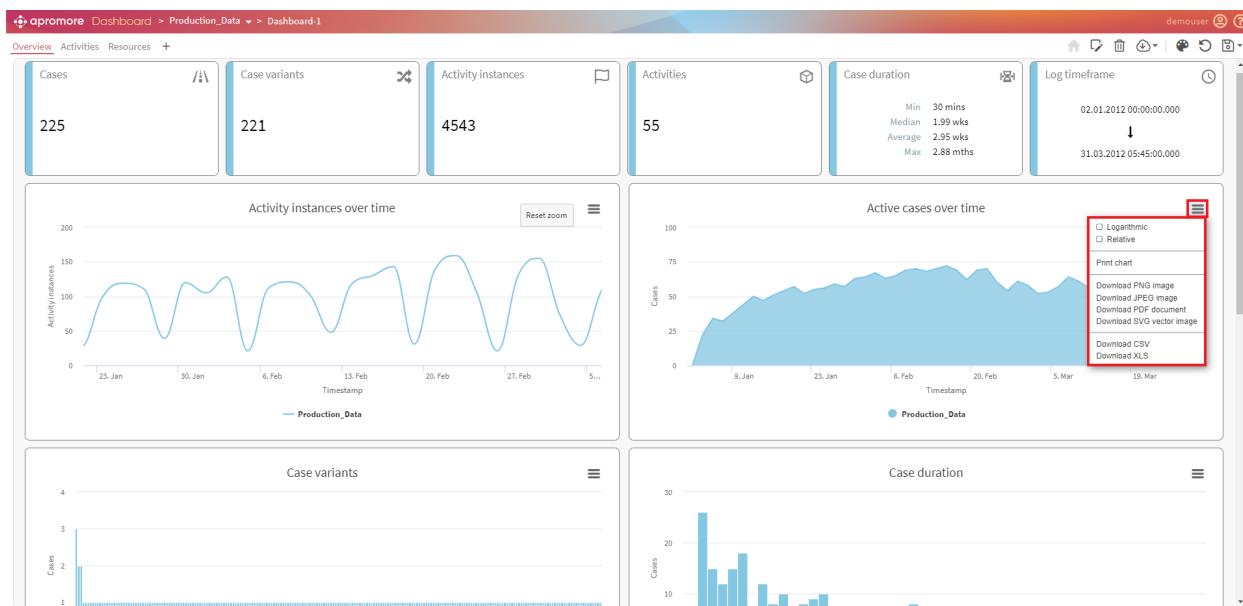


Create a filter and click on *OK*.



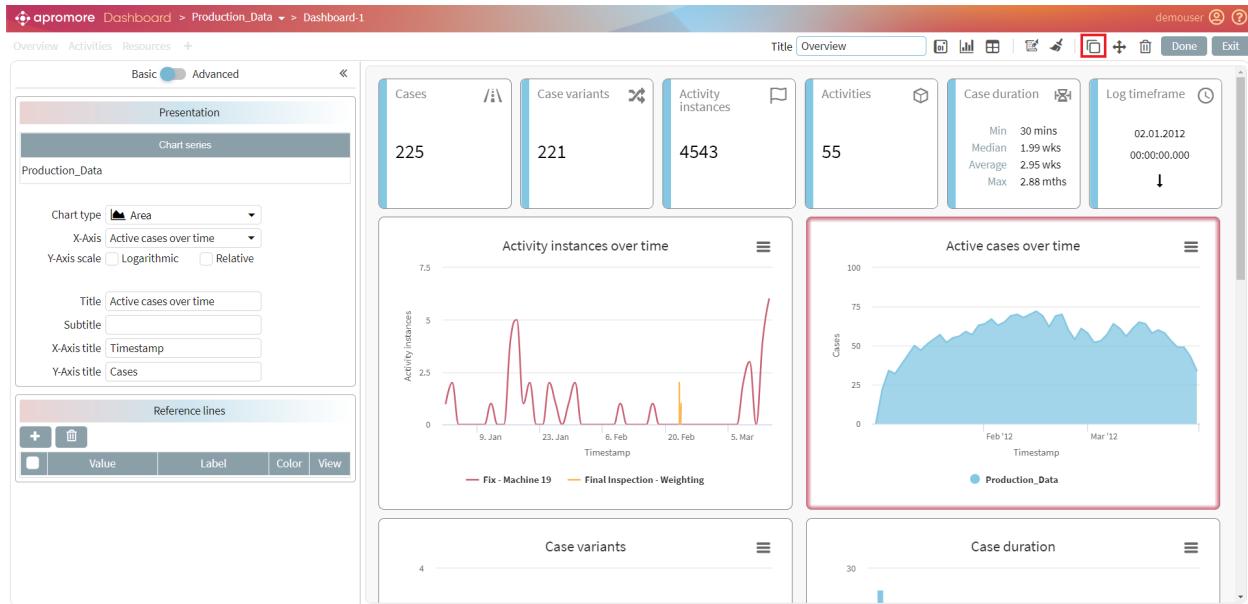
4.8.10 Export/Download Chart

We can also print or download a chart to a PNG, JPEG, PDF, SVG vector, CSV and XLS file.



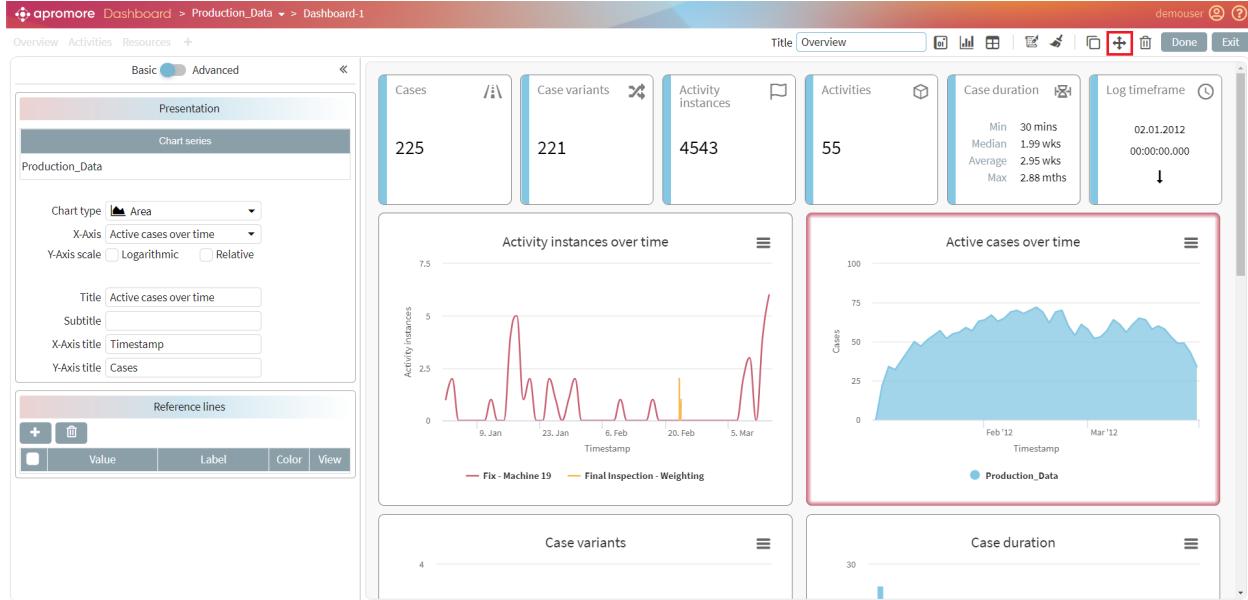
4.8.11 Clone Chart

To add the same chart again, click *Edit view*, select the chart and click on *Clone content*.



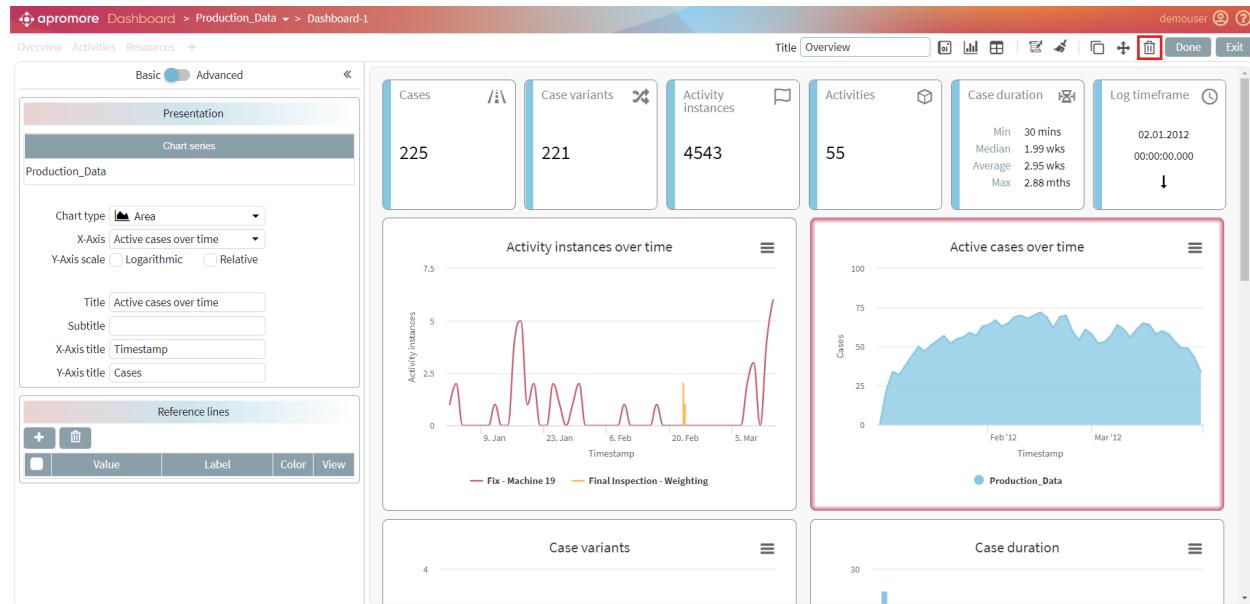
4.8.12 Organize Charts

In case of multiple charts/stats, we can re-arrange it by clicking on the button and simply moving the charts/stats by drag-and-drop method. Click the move button once to move a selected block. Click the move button twice to move all the blocks.



4.8.13 Remove Chart/Table

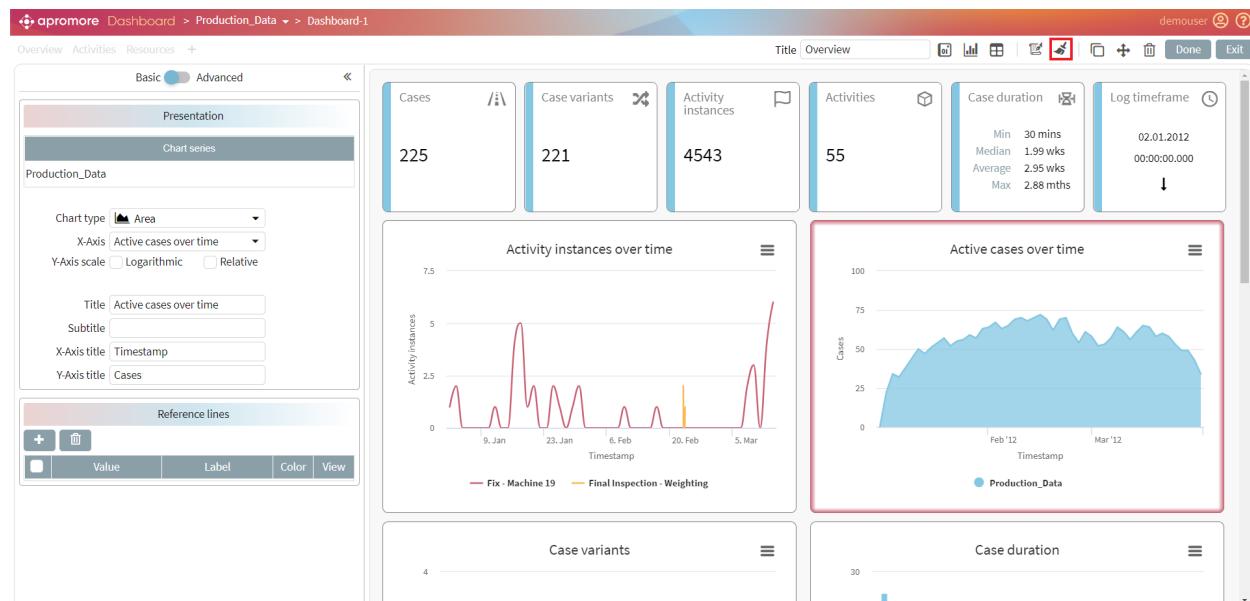
In order to remove a chart/table/block, select a chart and click on .



The screenshot shows a dashboard interface with various cards and charts. A chart titled "Active cases over time" is highlighted with a red border, indicating it is selected for removal. The chart displays activity instances over time from January to March. Other visible cards include "Cases" (225), "Case variants" (221), "Activity instances" (4543), "Activities" (55), "Case duration" (Min: 30 mins, Median: 1.99 wks, Average: 2.95 wks, Max: 2.88 mths), and "Log timeframe" (02.01.2012, 00:00:00.000). The top navigation bar includes "Overview", "Activities", "Resources", and a search bar.

4.8.14 Copy Format

To copy the formatting settings used in one block to another block, select a chart/table/block and click on the  button.

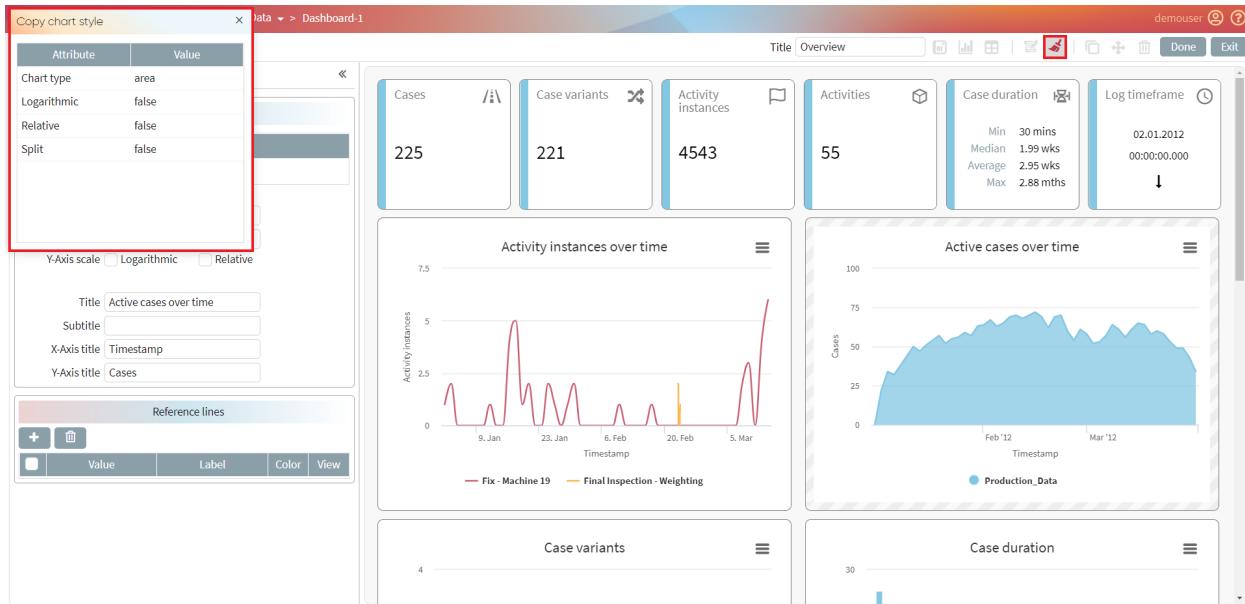


The screenshot shows a dashboard interface with various cards and charts. A chart titled "Active cases over time" is highlighted with a red border, indicating it is selected for copying. The chart displays active cases over time from January to March. Other visible cards include "Cases" (225), "Case variants" (221), "Activity instances" (4543), "Activities" (55), "Case duration" (Min: 30 mins, Median: 1.99 wks, Average: 2.95 wks, Max: 2.88 mths), and "Log timeframe" (02.01.2012, 00:00:00.000). The top navigation bar includes "Overview", "Activities", "Resources", and a search bar.

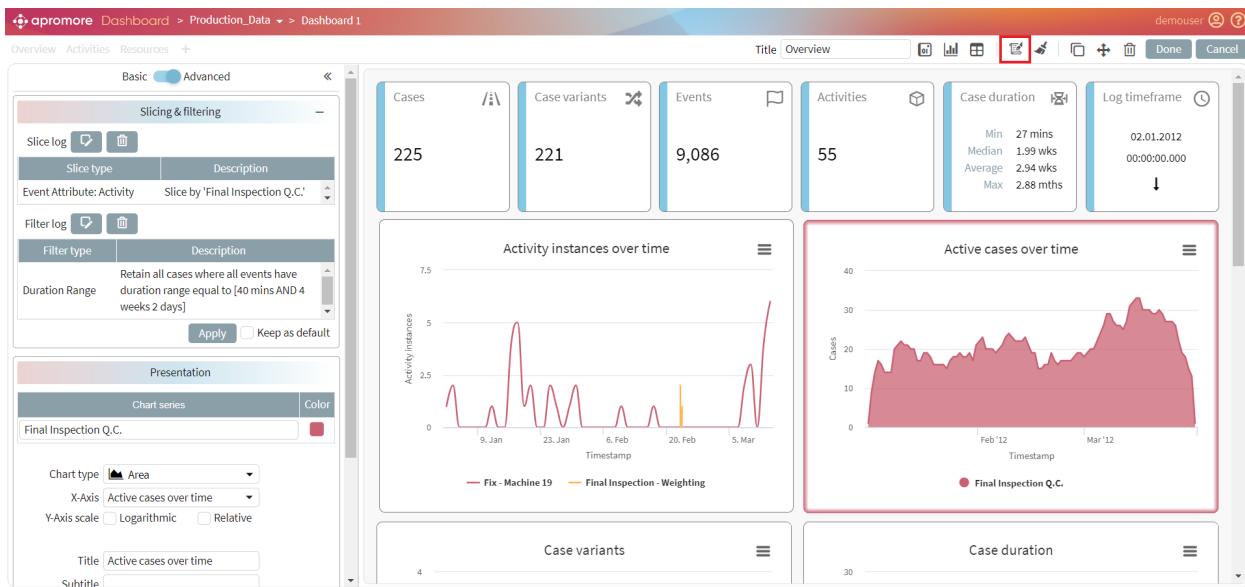
Click on the  button once to copy the formatting from one block to another. Double click to paste to multiple blocks. We can see the style of the block to be copied. Click on another block to paste the formatting settings.

4.8.15 Copy Settings

To copy the filter and slicing rules from one block to another, select the block and click on the  button.

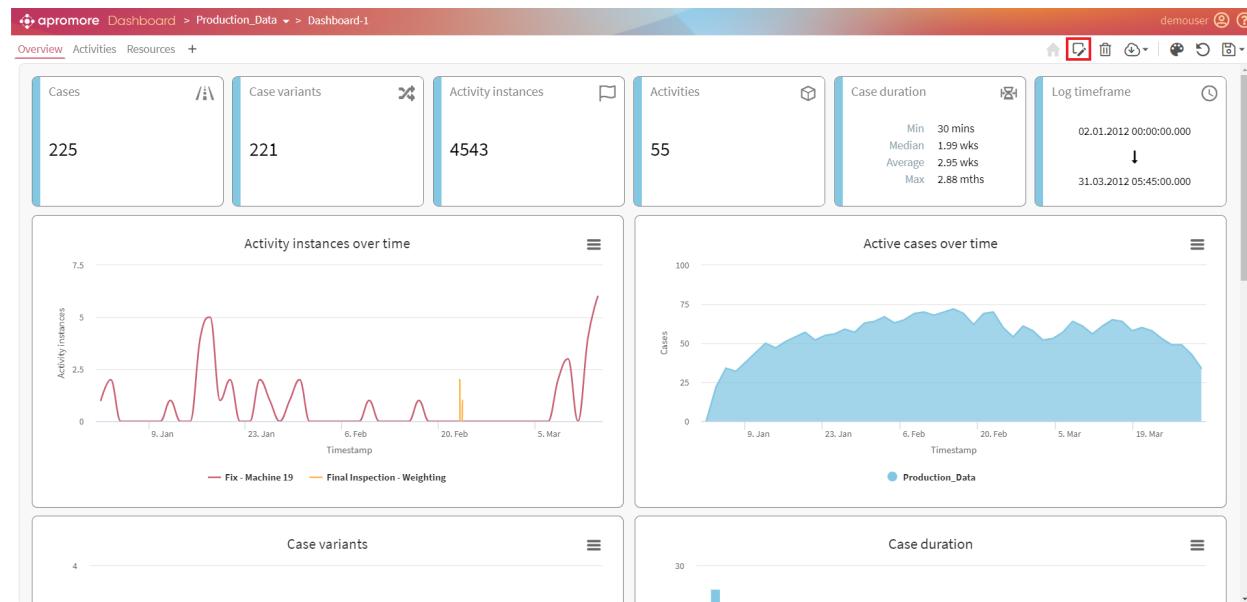


Click on the  button once to copy the settings from one block to another. Double click to paste to multiple blocks. We can see the slicing and filtering rules of the block to be copied. Click on another block to paste the settings.



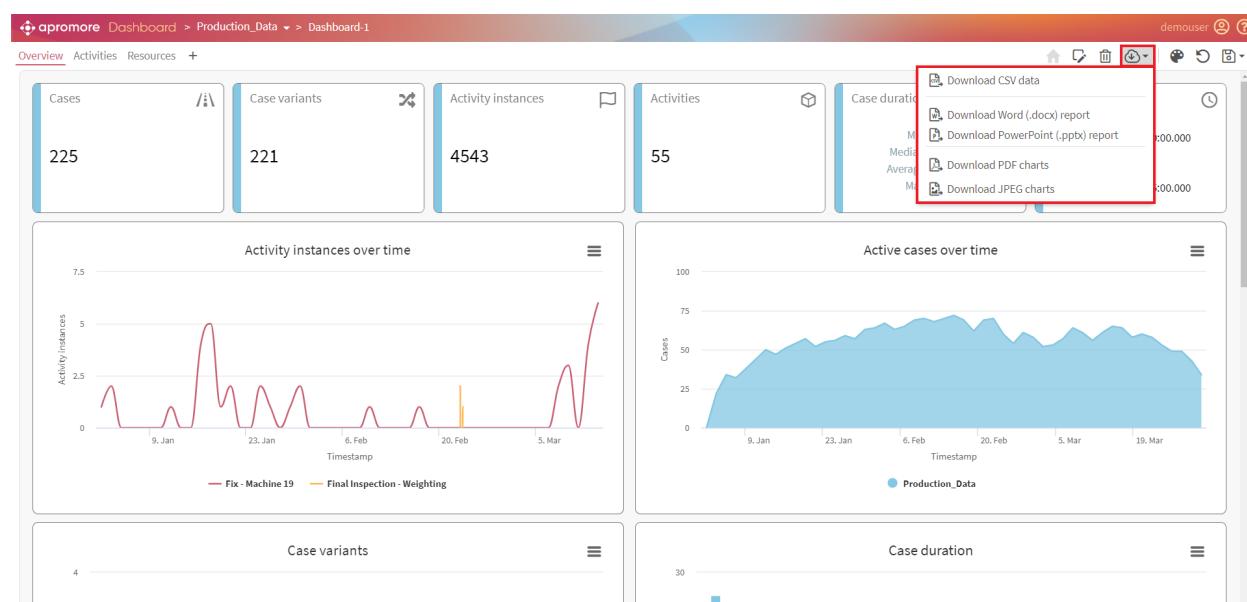
4.8.16 Edit Dashboard

To edit the new a dashboard click on the  button.

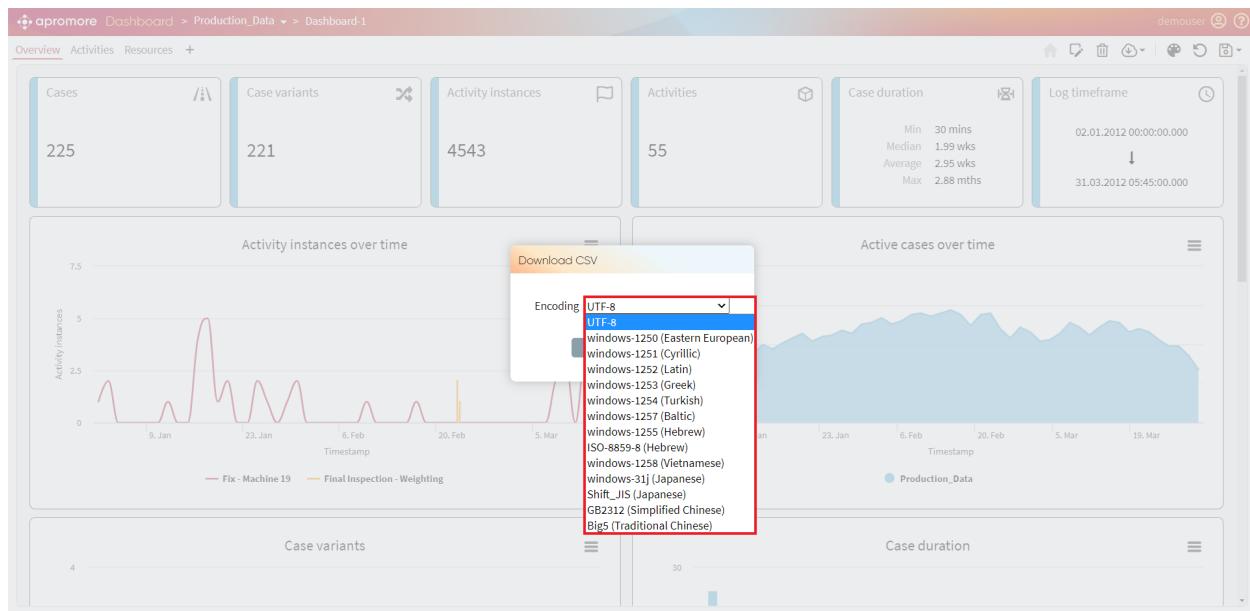


4.8.17 Download Dashboard

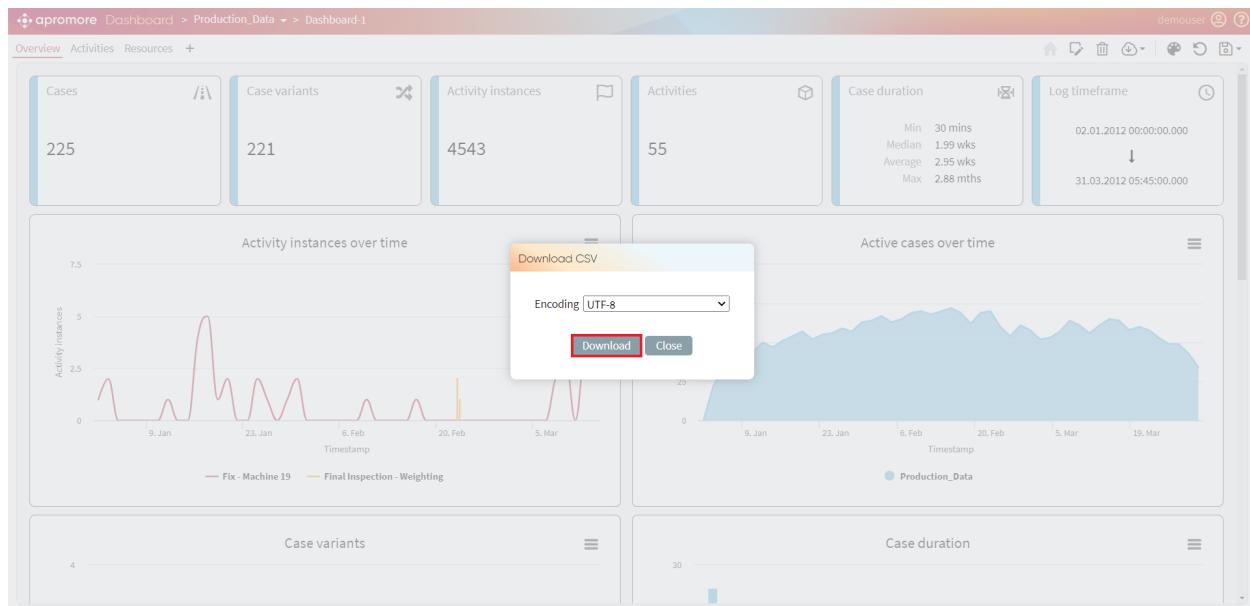
To download the current view of the dashboard, click on the *Download data of current view in CSV* button.



We can select from a wide range of encoding options to download the dashboard into a CSV file.



Select the appropriate option and Click on *Download*.

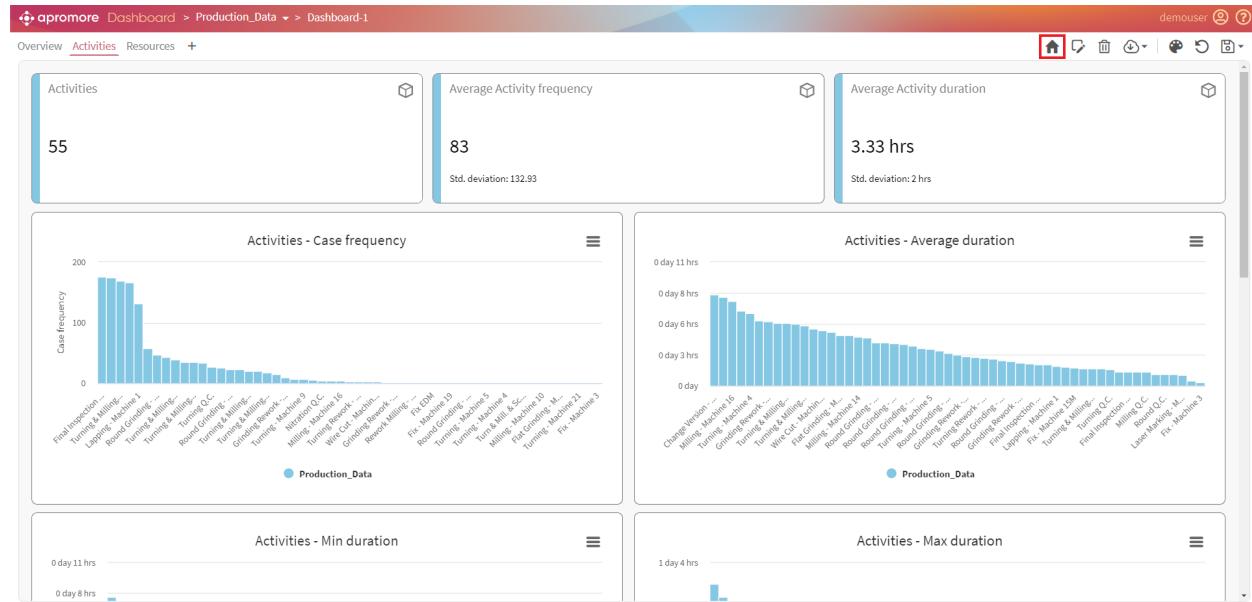


The file will be downloaded as a zip file and contain all the performance metrics charts/tiles/tables.

Name	Size	Packed Si...	Modified	Created
Overview - Tiles.csv	445	200	2020-09-...	
Overview - Events over time chart...	2 515	448	2020-09-...	
Overview - Cases table table.csv	16 596	4 169	2020-09-...	
Overview - Case variants table ta...	10 069	2 405	2020-09-...	
Overview - Case variants chart.csv	1 249	469	2020-09-...	
Overview - Case utilization chart.c...	538	289	2020-09-...	
Overview - Active cases over time...	2 753	888	2020-09-...	

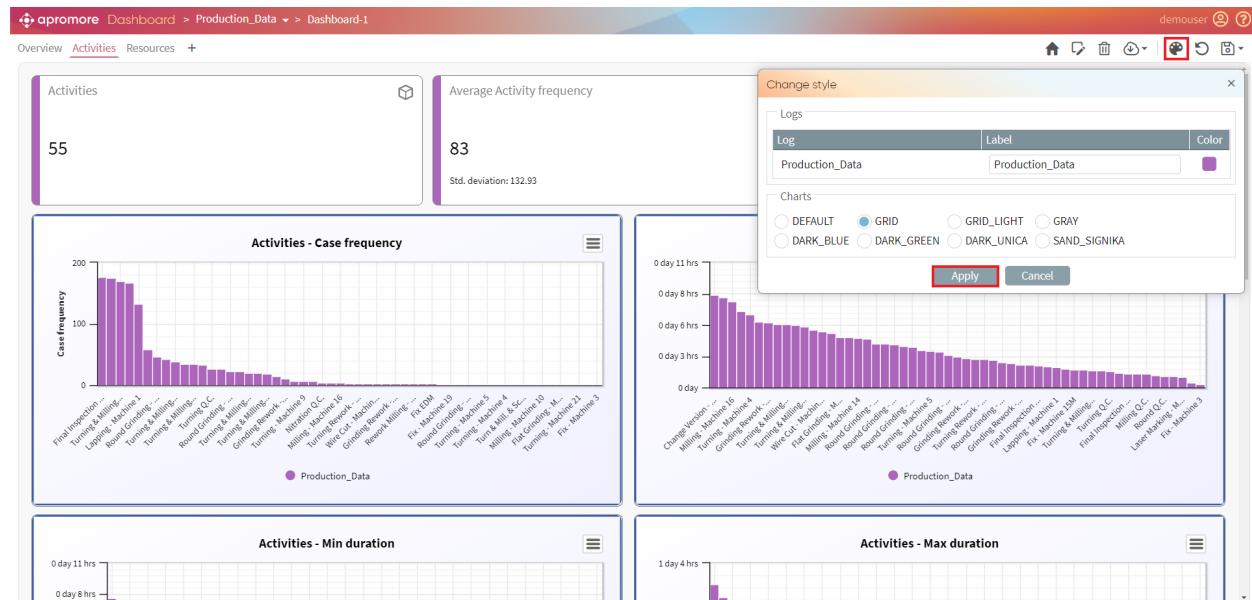
4.8.18 Set Dashboard as “Home”

For ease of access, we can set a dashboard as *Home* by clicking on the  button.



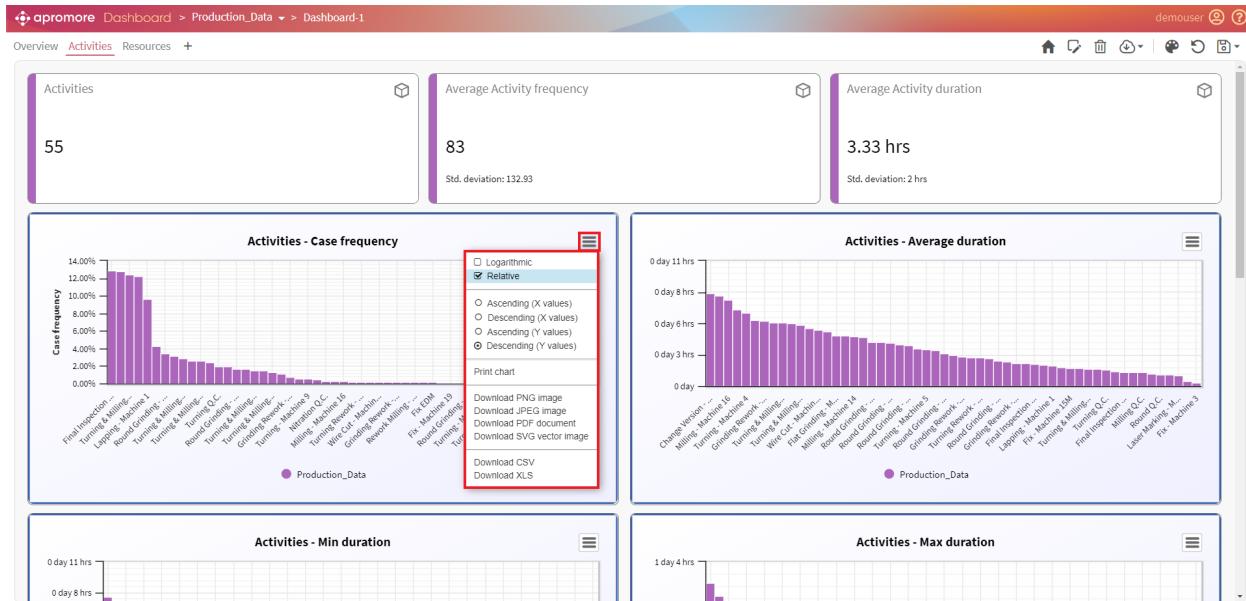
4.8.19 Change style of dashboard

To change the style of the dashboard, click on the  button and select from different styling options.



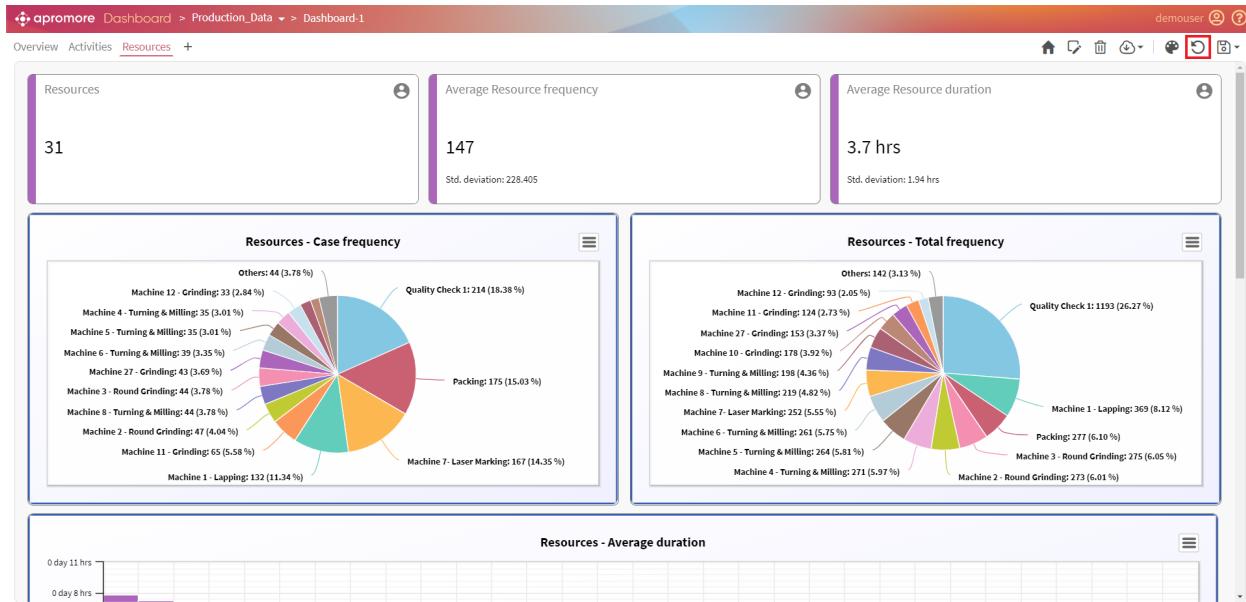
4.8.20 Change Scale

The scale can also be changed to *Logarithmic* and *Relative* from *Y-Axis scale*.



4.8.21 Reset Views

In case of dashboards created from existing views or changes made to an existing default view (Overview, Resources, Activities), we can choose to reset view of the dashboard by clicking on the button. We can choose to reset the current view or all the views.



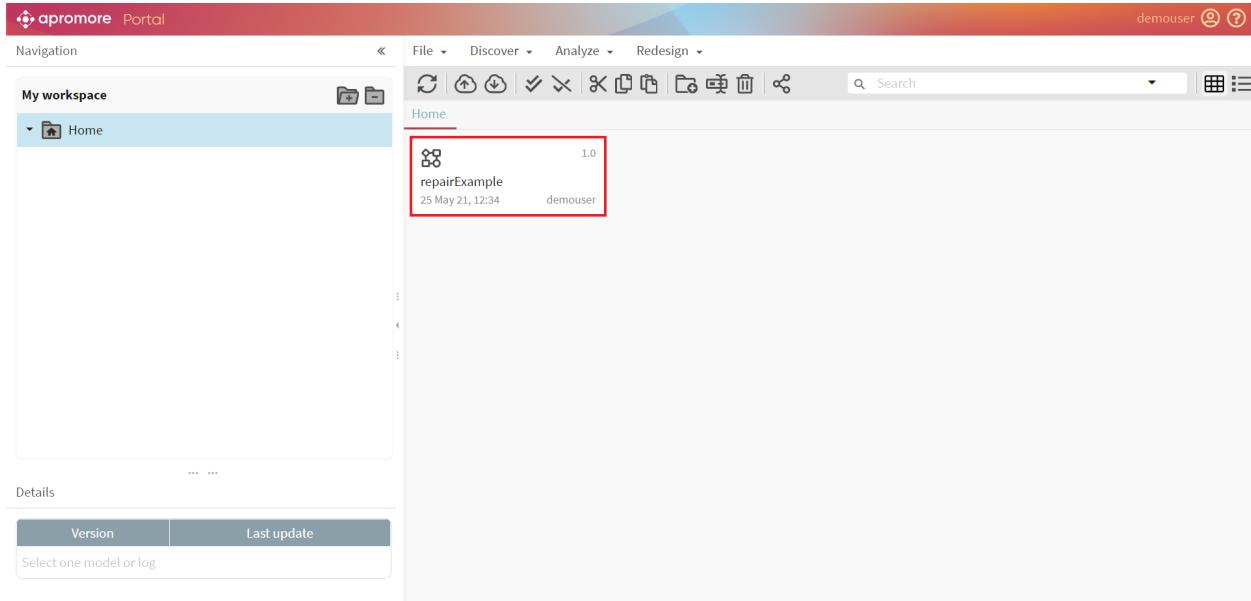
4.9 Simulate process

Apromore allows users to simulate .bpmn models to understand how the business process will look and work in different scenarios.

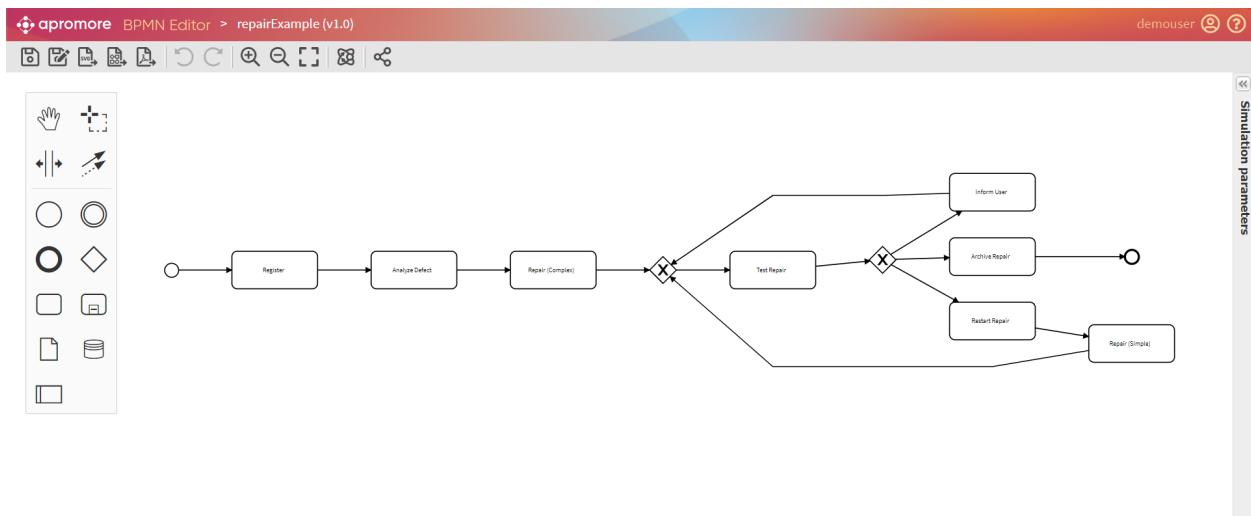
We can do the simulation of process models in Apromore by performing two steps:

- Specification of simulation parameters
- Creation of simulated log

Double-click the BPMN model to open it.

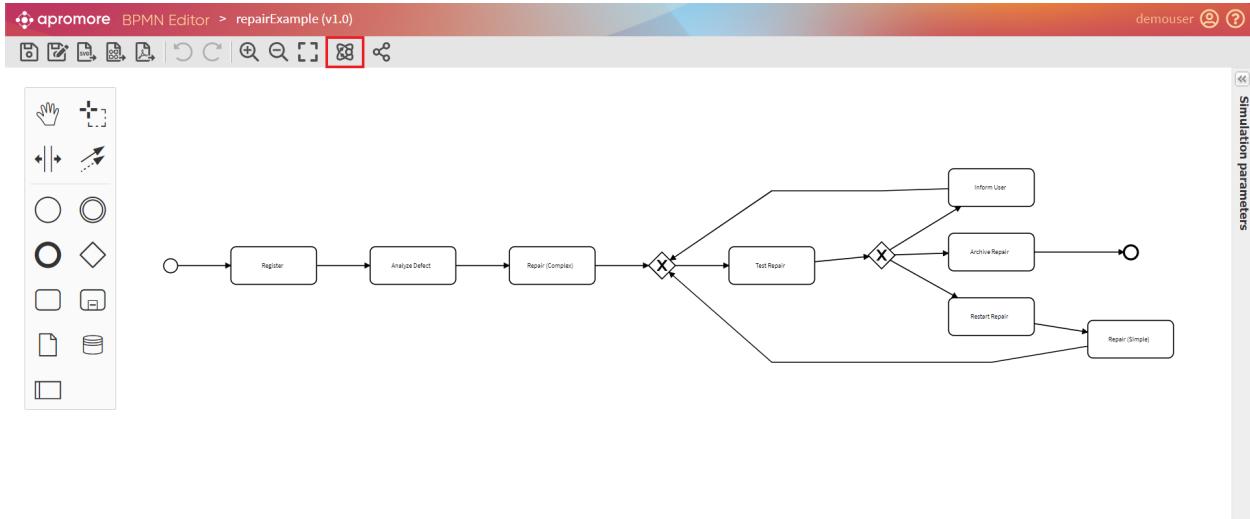


A window will open up, showing the selected BPMN model.

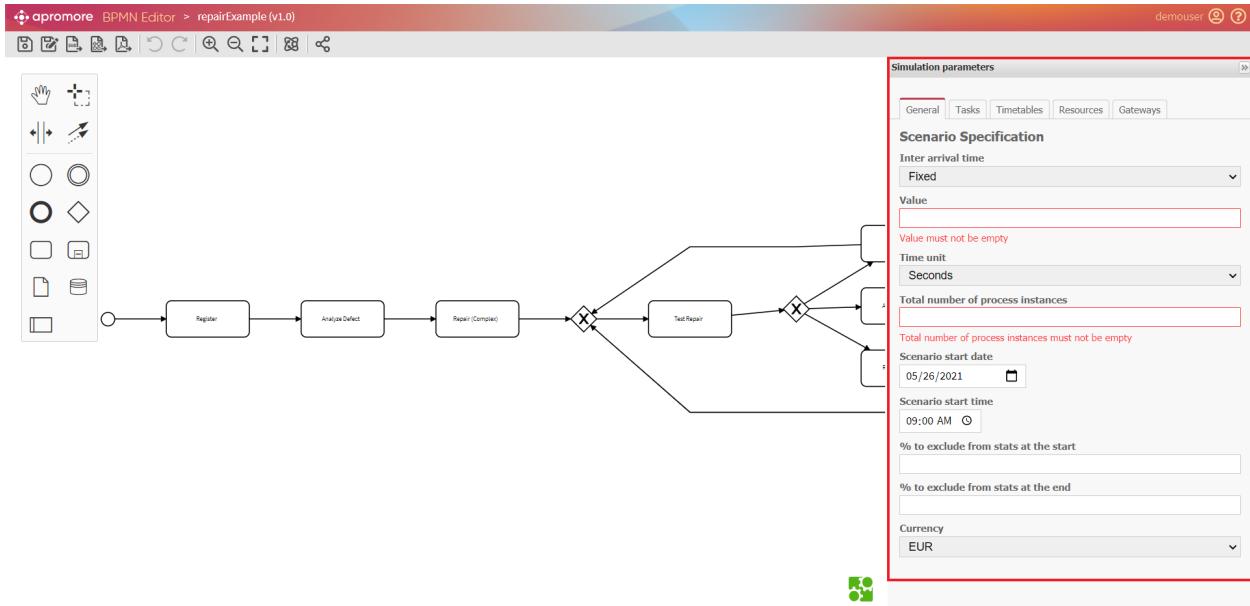


4.9.1 Specification of simulation parameters

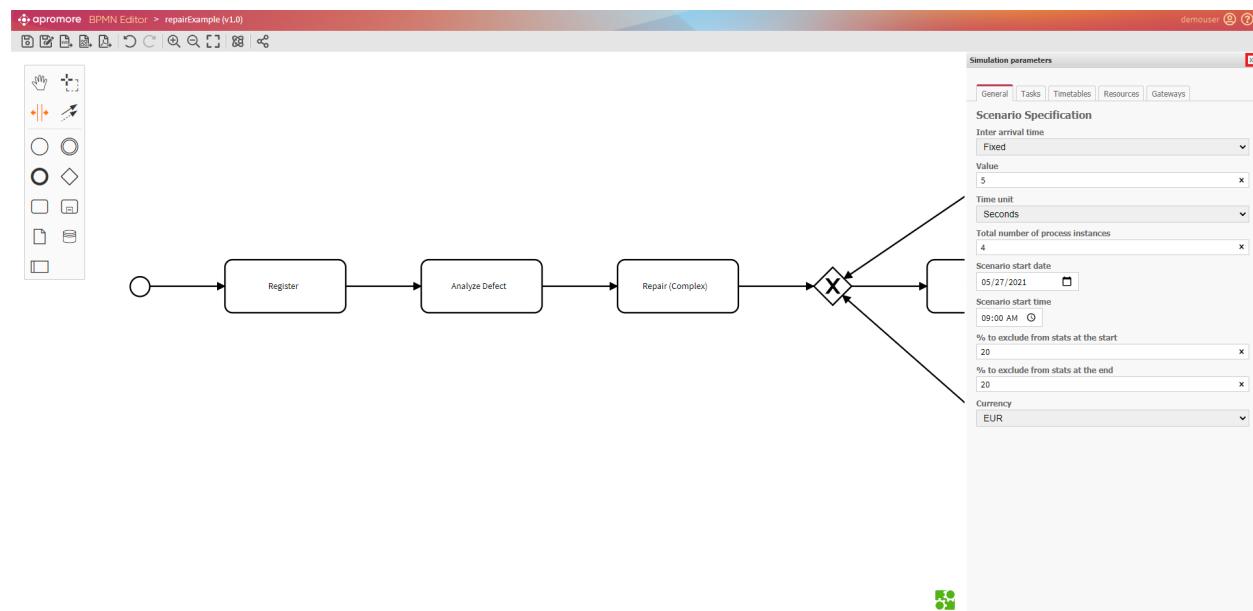
To specify simulation parameters, click on the *Toggle simulation parameters panel* button.



The simulation panel with different parameters to be specified will appear from the BPMN editor window's right side

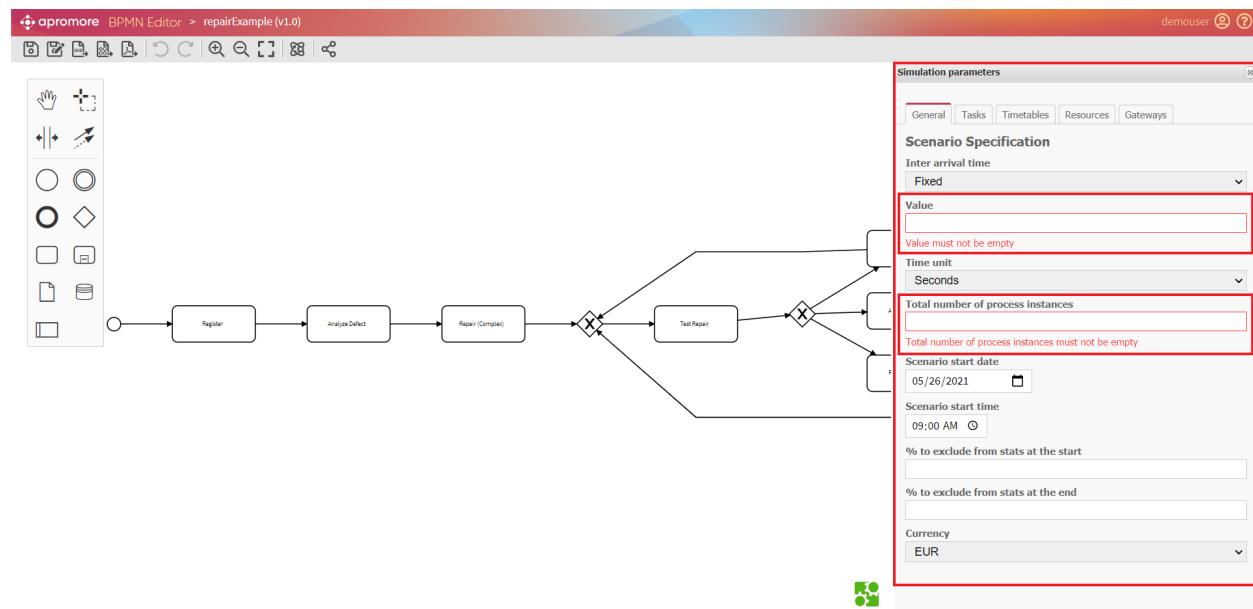


Note: If we want to hide the parameters panel, we can always click on the “>>” sign located at the right side of the panel and click on it once again to make it visible.



The parameters are organized into different tabs. For convenience, it is recommended to fill it in the following order: *General* -> *Timetables* -> *Resources* -> *Tasks* -> *Gateways*.

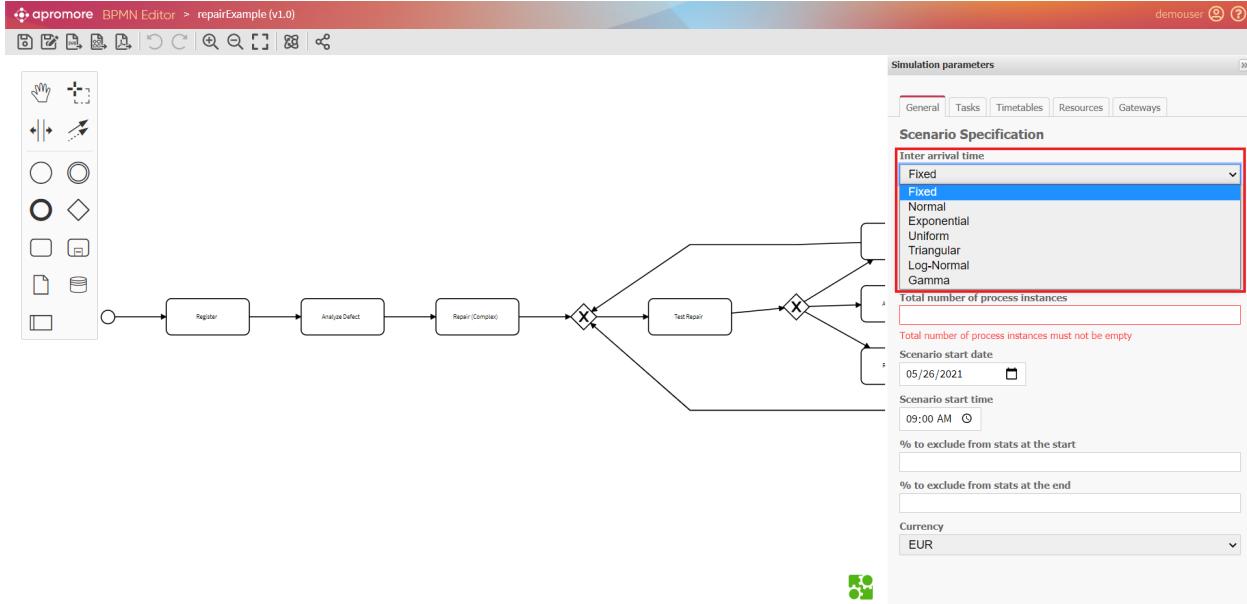
Note: We can't proceed without the specification of the mandatory parameters. These are marked red.



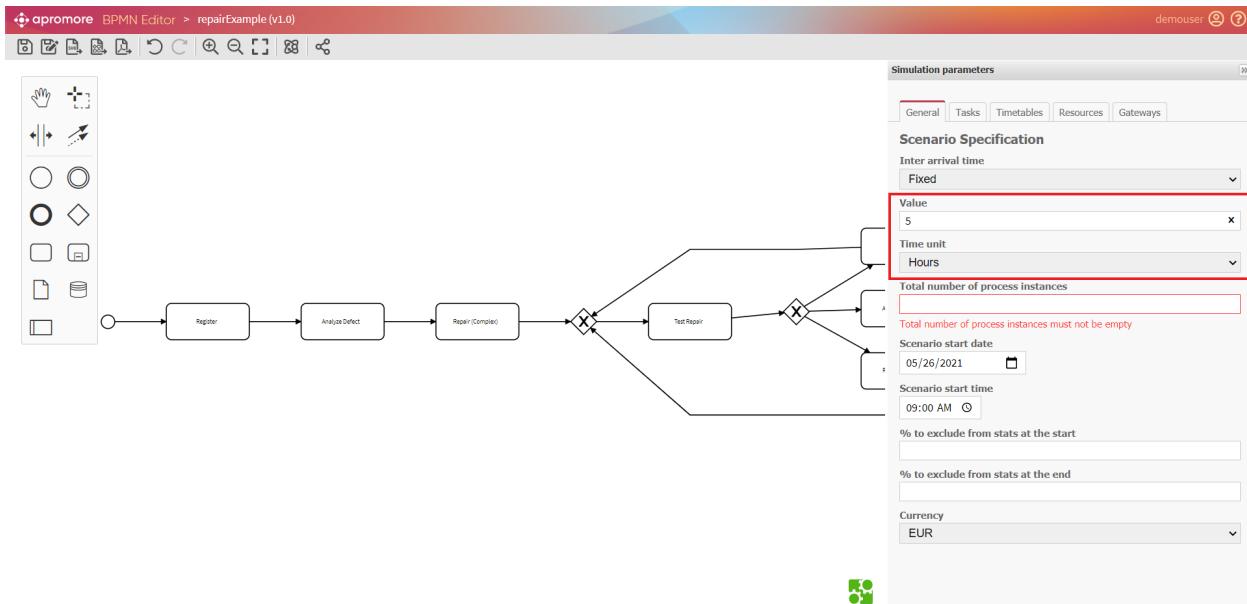
4.9.2 General parameters tab

The inter-arrival time is the time between each arrival of the process instances. It shows how frequently a new process instance starts.

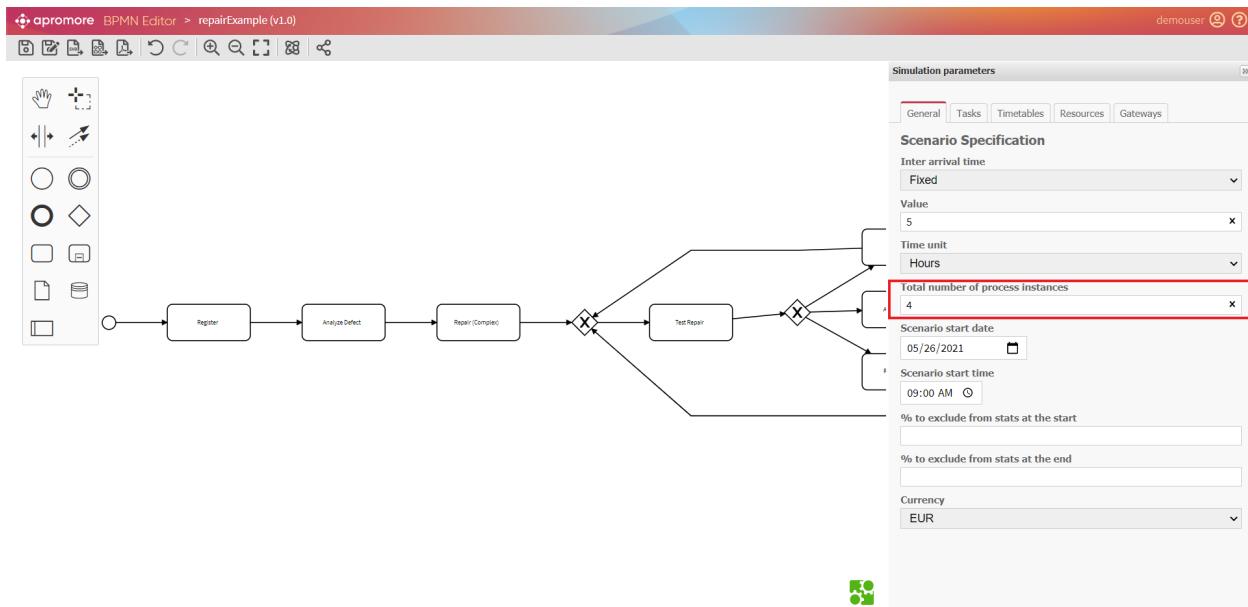
Apronmore offers a variety of options for inter-arrival time, as shown below.



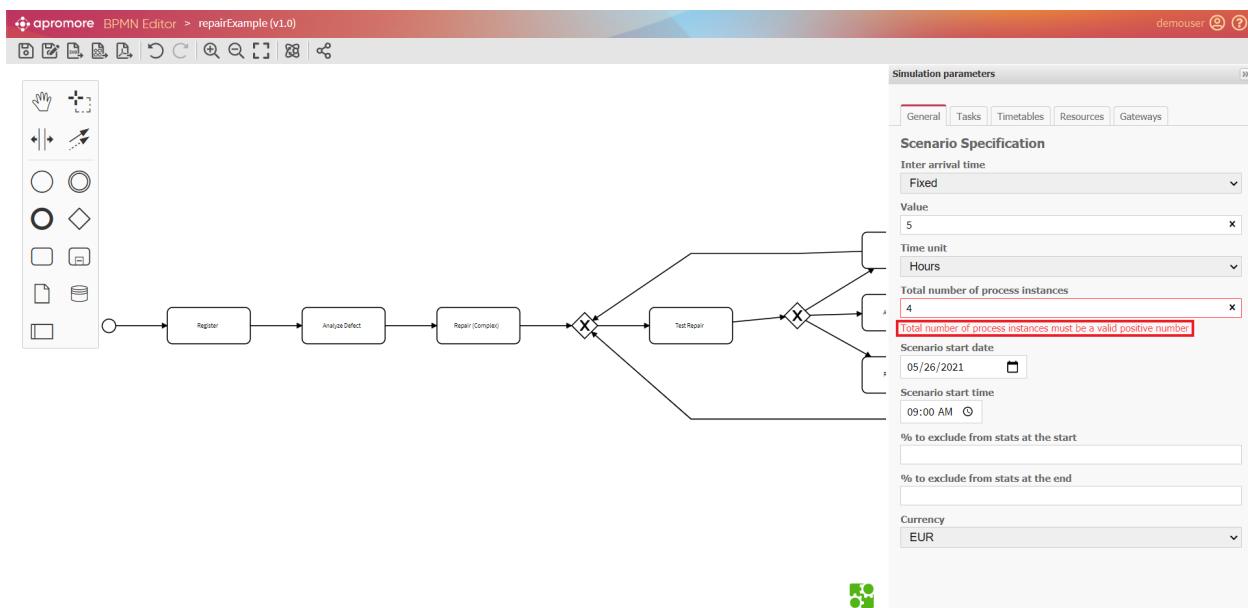
The value denotes the inter-arrival time unit. In the following example, the inter-arrival time is fixed and equals 5 hours, meaning that a new process instance starts every 5 hours.



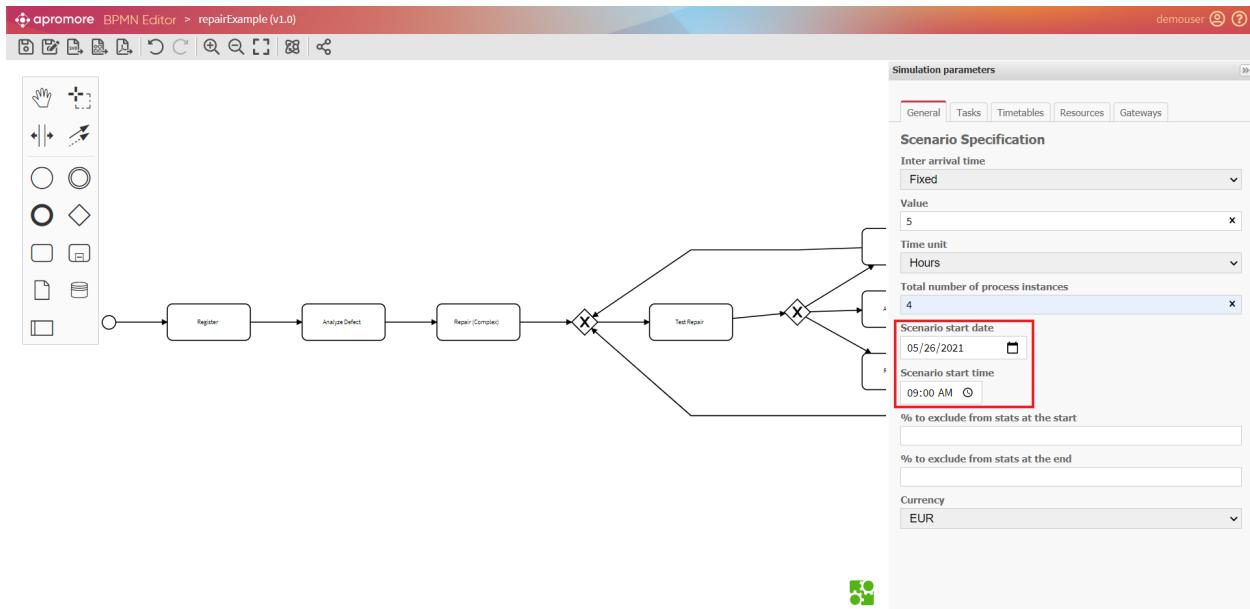
The total number of process instances shows how many BPMN process instances start in the simulation scenario.



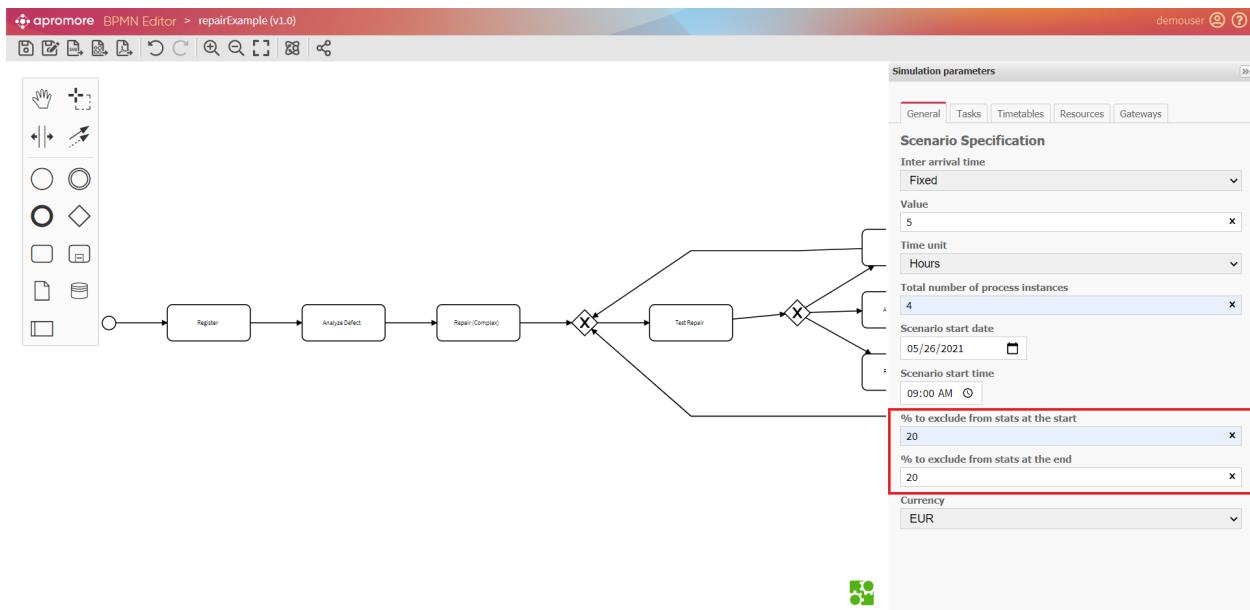
Note: For preventing us from entering incorrect values, Apromore displays inline alert messages signaling that we need to recheck the data.



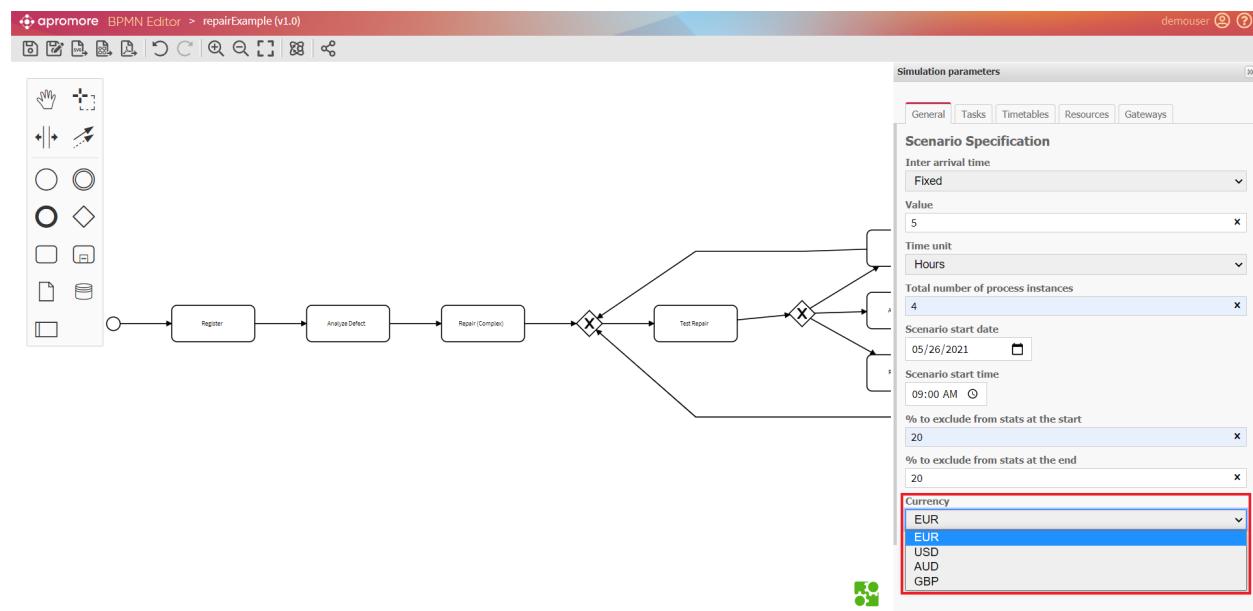
We can specify the simulated scenario start date and time to determine when the first process starts.



We can exclude a certain percentage of statistics from the start and the end of the process instances that fall between the start and the end time of the simulation scenario. This is usually done, considering the availability of resources and activities that are handled without any delays.

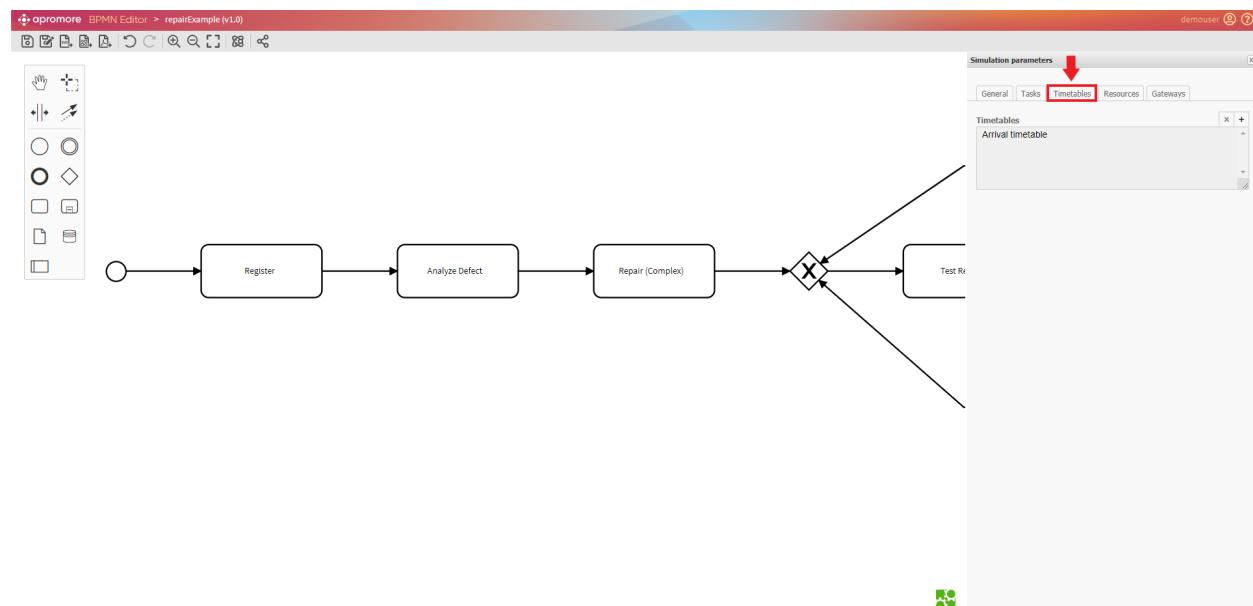


For the cost calculations, we may choose a suitable currency from the drop-down list.

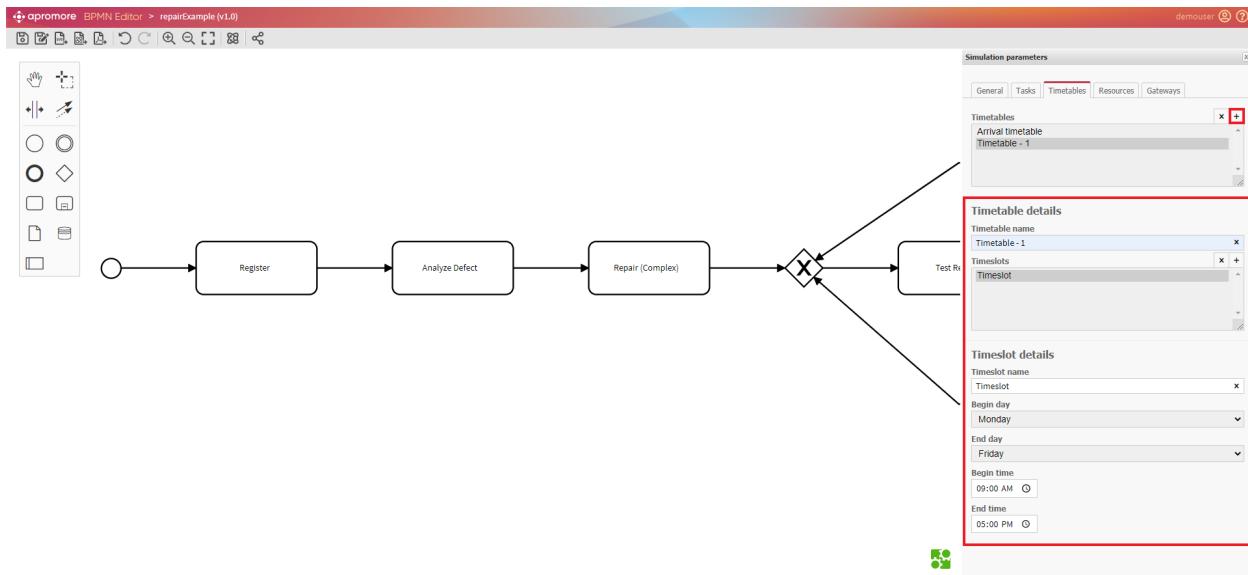


4.9.3 Timetables, Resources and Tasks parameters tabs

After we finished entering the general tab information, we then switch to the *Timetables* tab.

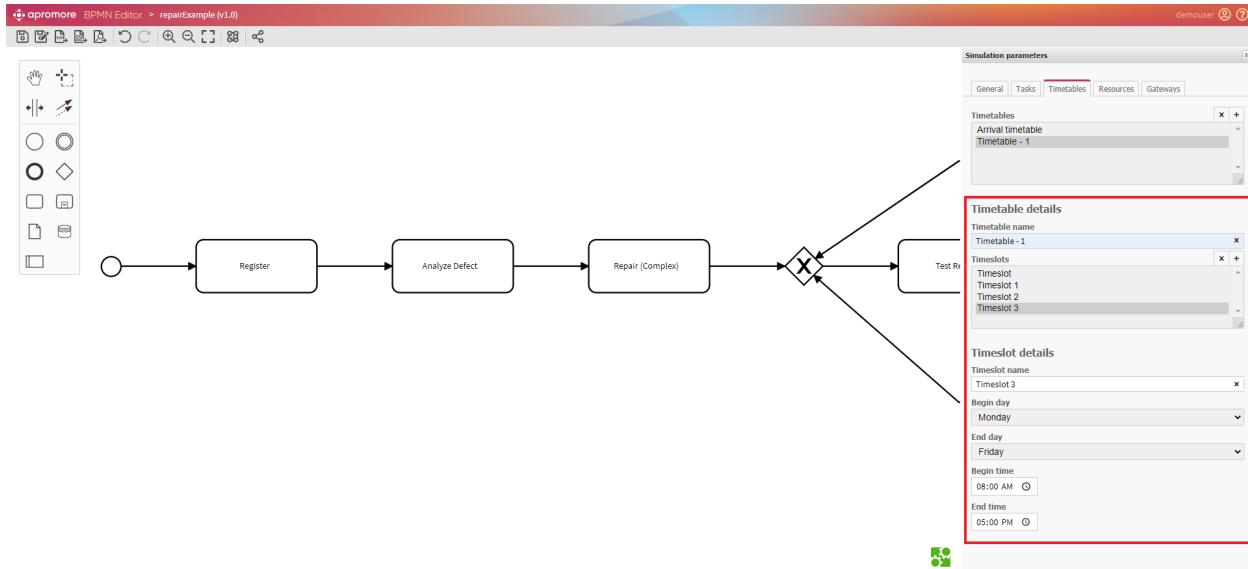


While adding the new timetable, it is required to name it and specify the working timeslot

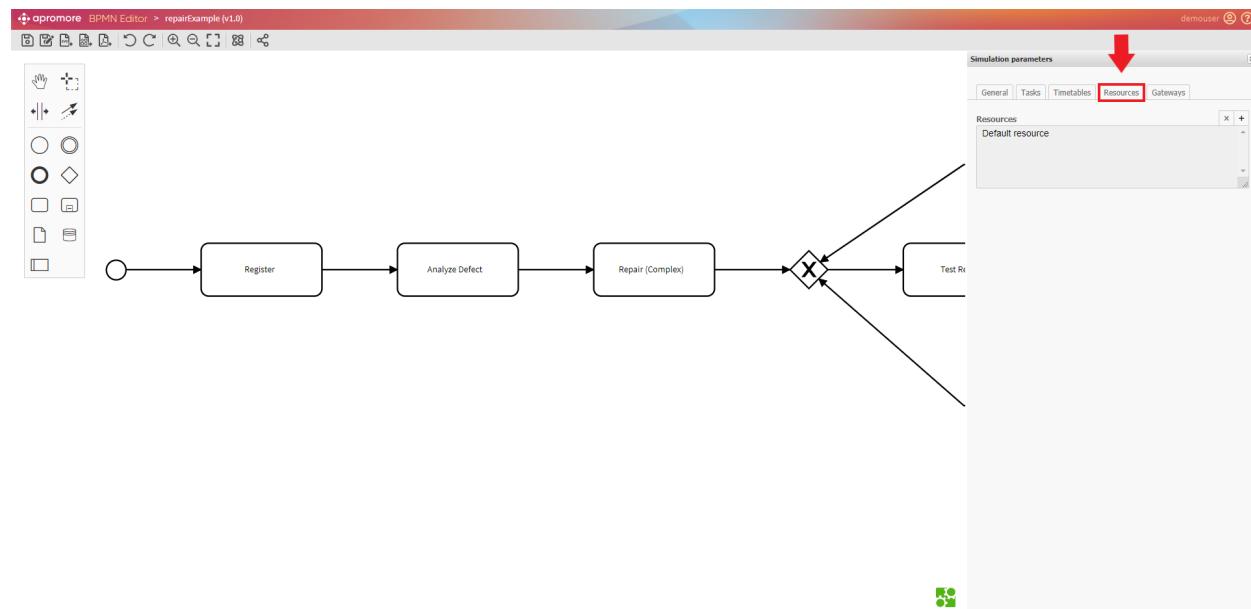


Note: One timetable may consist of many different timeslots. This is very useful when workers (also known as actors/resources) work in shifts.

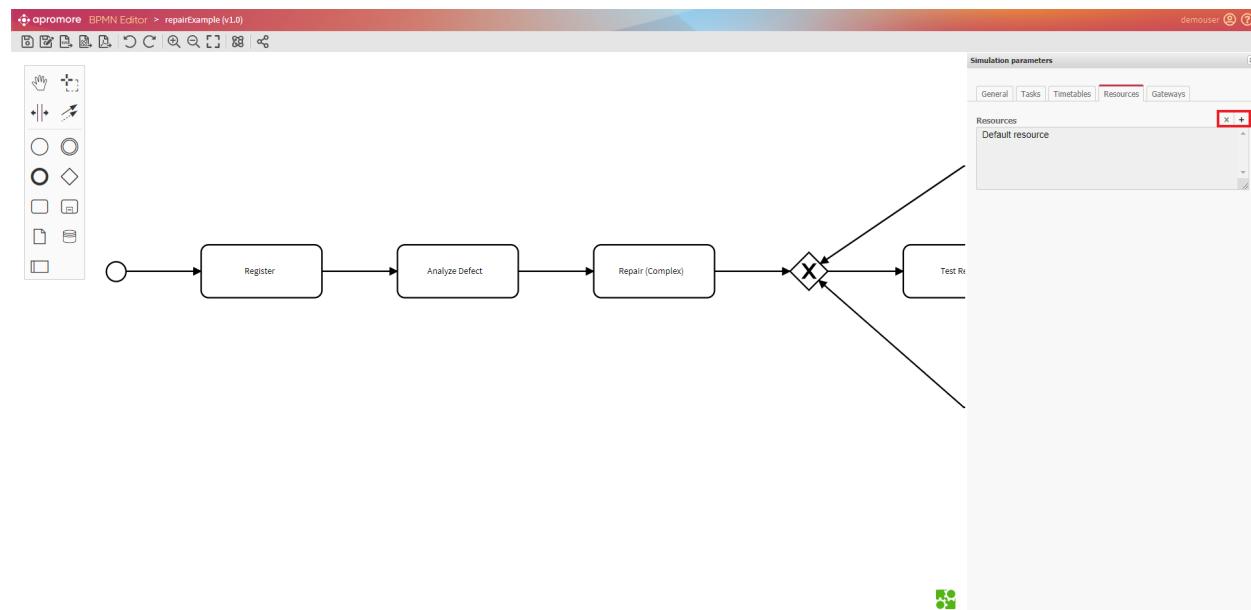
In the example below, workers who follow “Timeslot 3” from “Timetable-1” work five days (Monday-Friday) from 8.00 till 17.00.



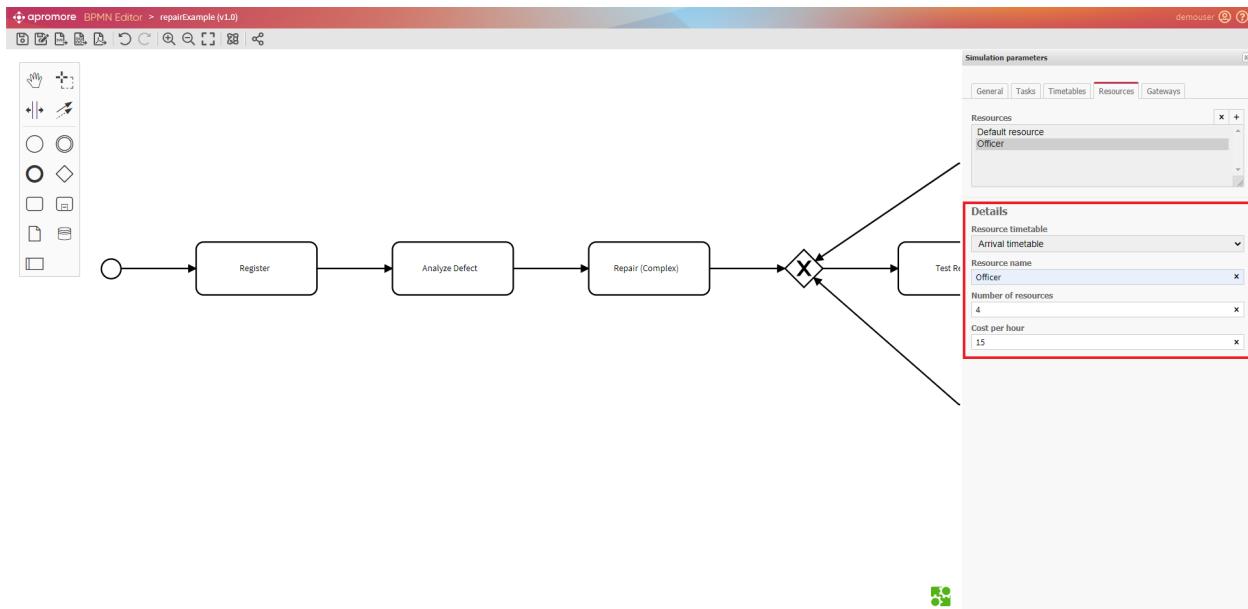
In the “Resources” tab, the default resource is created automatically.



To add the new resource, select it from the list and press “+”. To delete it, select and then press “x”.

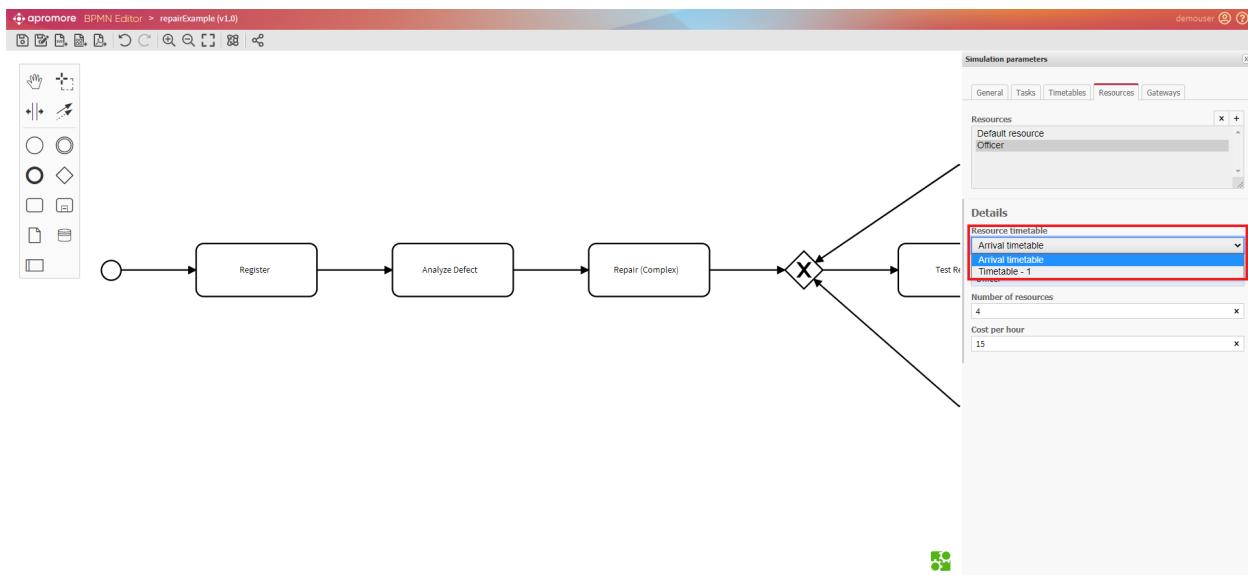


Specify all the resource details required in the new resource window, which loads right after clicking on “+”.

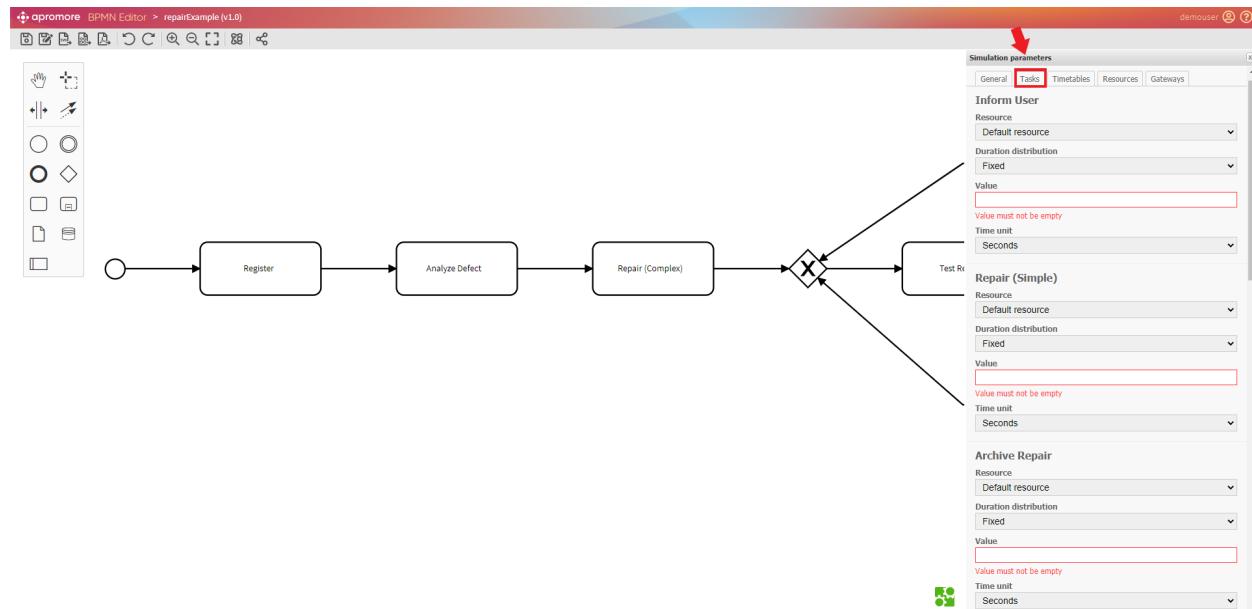


Number of Resources is the amount of the new resource type actors participating in this scenario. Cost per hour is the amount the resource earns per hour working.

A timetable is assigned to a resource from the *Resource timetable* drop-down list.

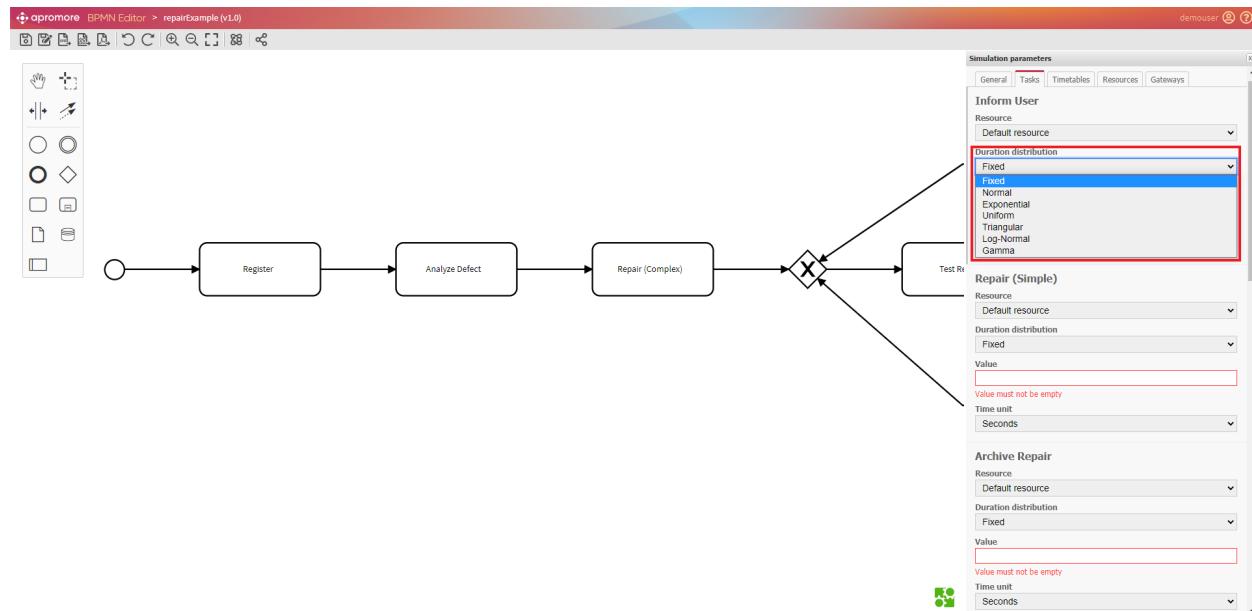


After we finished entering the information in the *Resources* tab, we then switch to the *Tasks* tab.



Click on a task in the BPMN model in order to set the simulation parameters for the task. The simulation parameters of a task are:

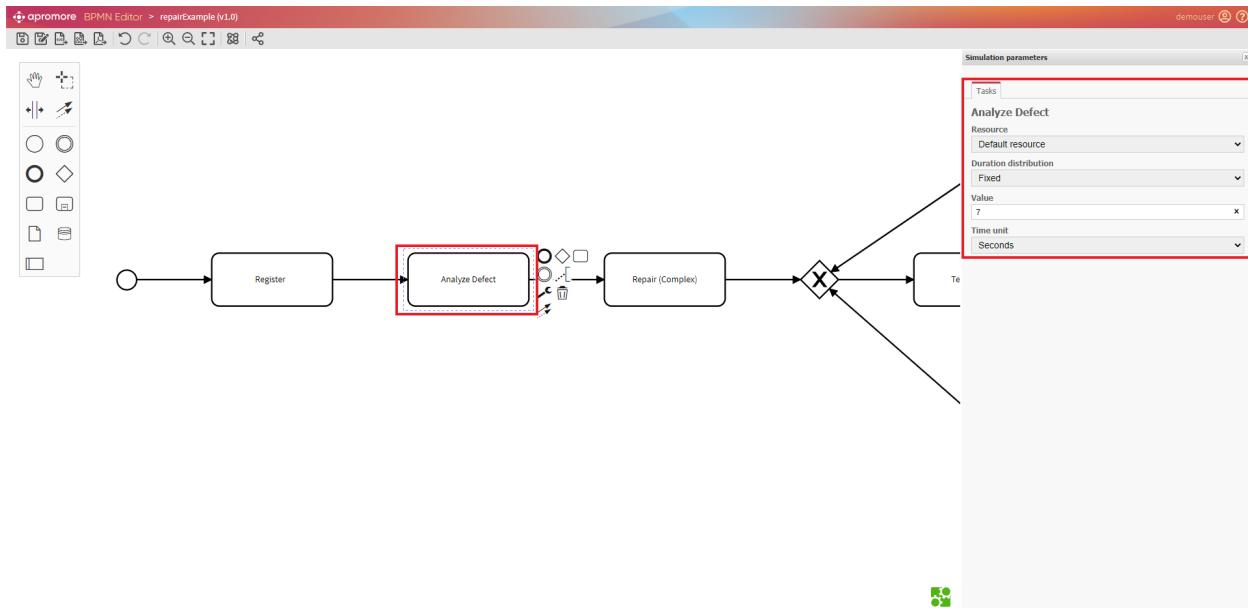
- The resource pool responsible for performing this task
- The probability distribution of the task duration and the parameters of this distribution (e.g. the mean in the case of an exponential distribution). The duration of the task is the time it takes for a resource to execute one instance of a task. Please note that the duration of a task must not include the waiting time before the start of the task. It should only include the processing time.



Note: For a model to be simulated, the tasks must be untyped (Abstract). Apromore does not currently support the simulation of process models where some of the tasks have a type such as *User task*, *Service task*, etc.

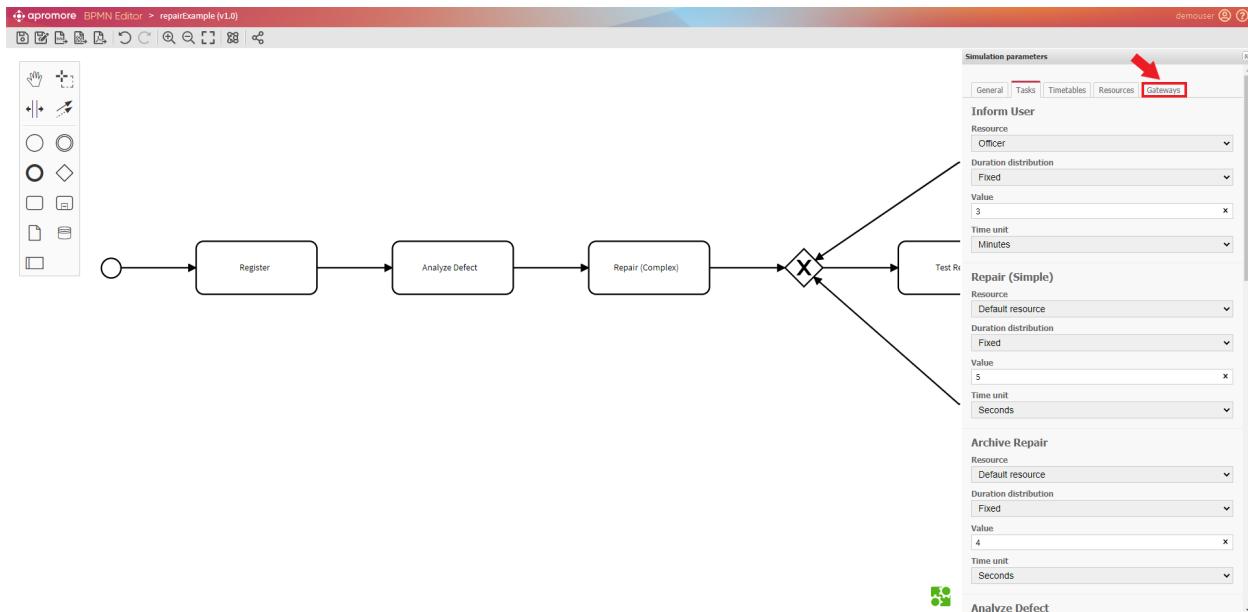
We can use an alternative approach for more complex models by just clicking on the task we would like to change.

The task details window will open automatically.

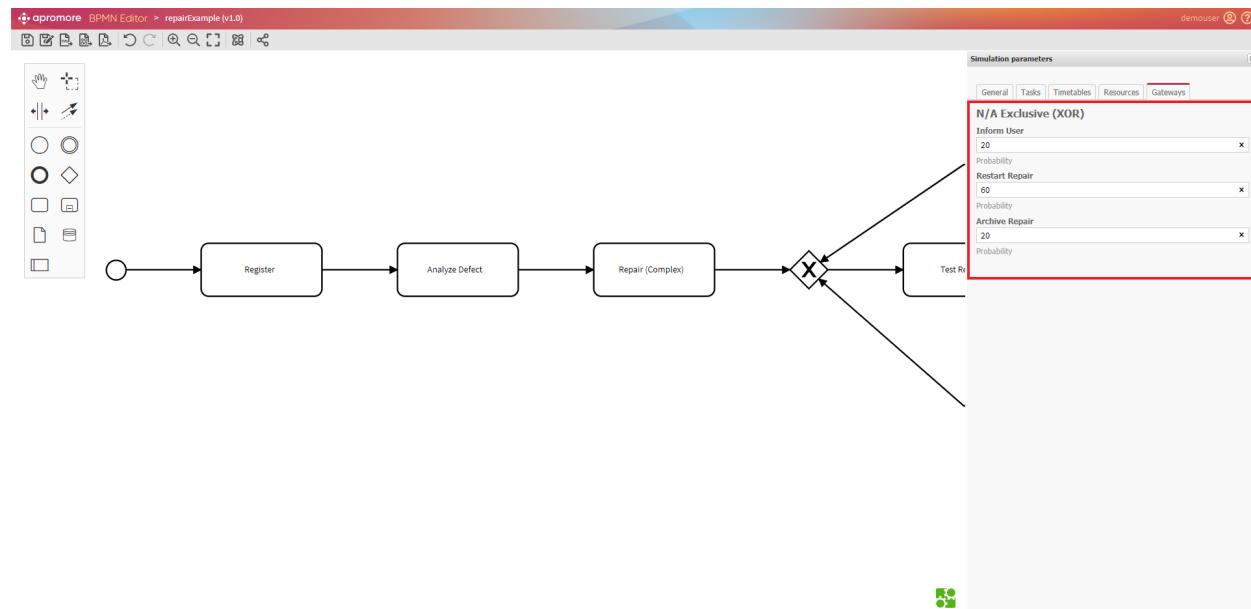


4.9.4 Gateways

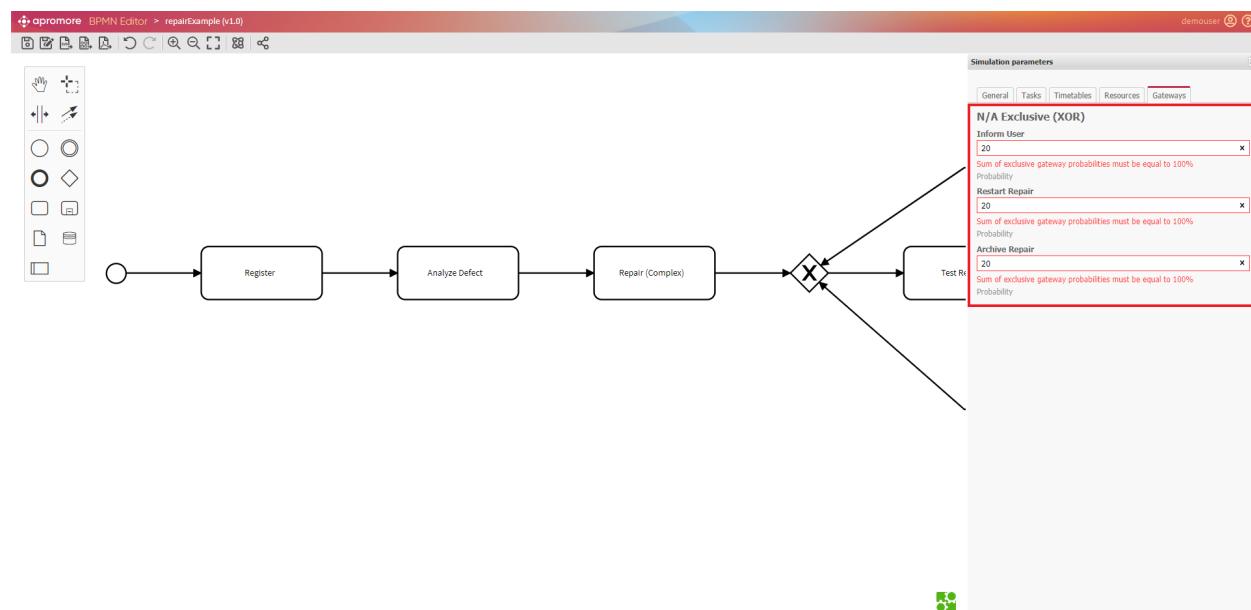
Gateways is a BPMN notation used to control how a process flows. Gateways can be exclusive (XOR), meaning that precisely one alternative path can be selected or inclusive (OR), meaning that there can be several paths.



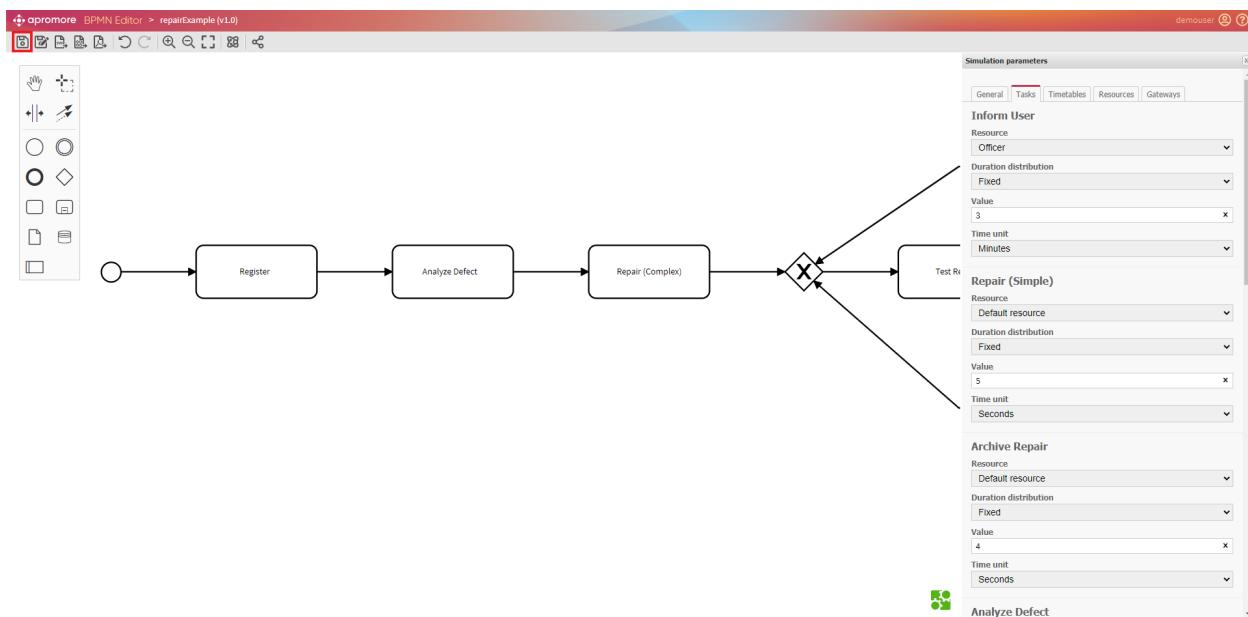
All gateway elements in the BPMN model require execution probabilities for their outgoing sequence flows.



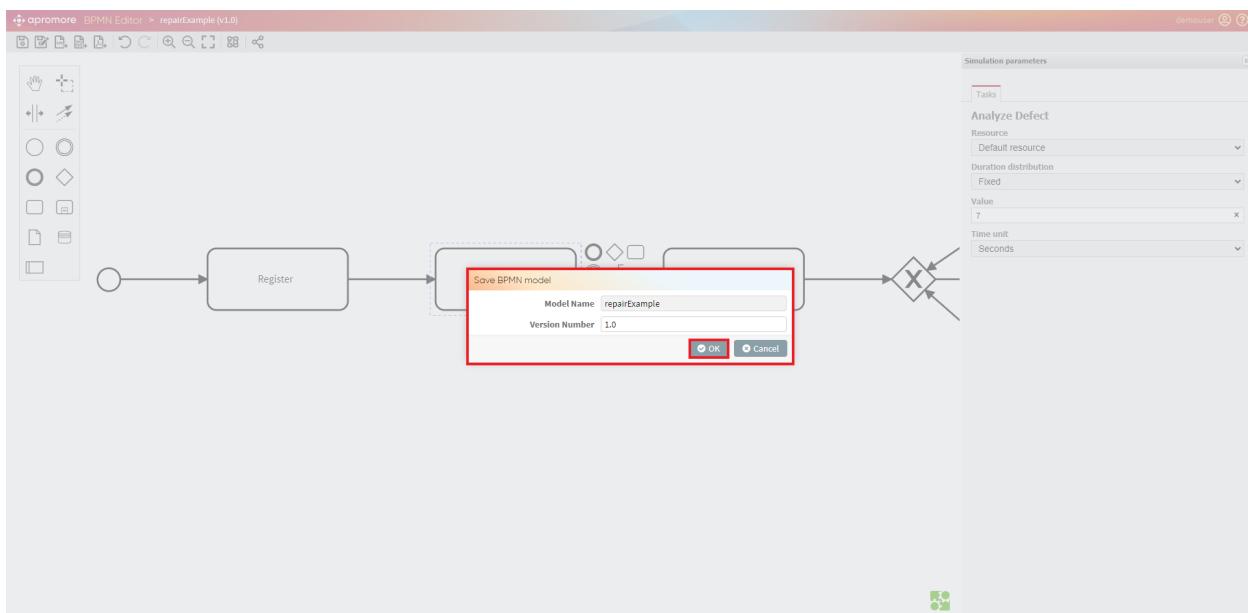
Note: The sum of the probabilities for the execution of each gateway must be 100%.



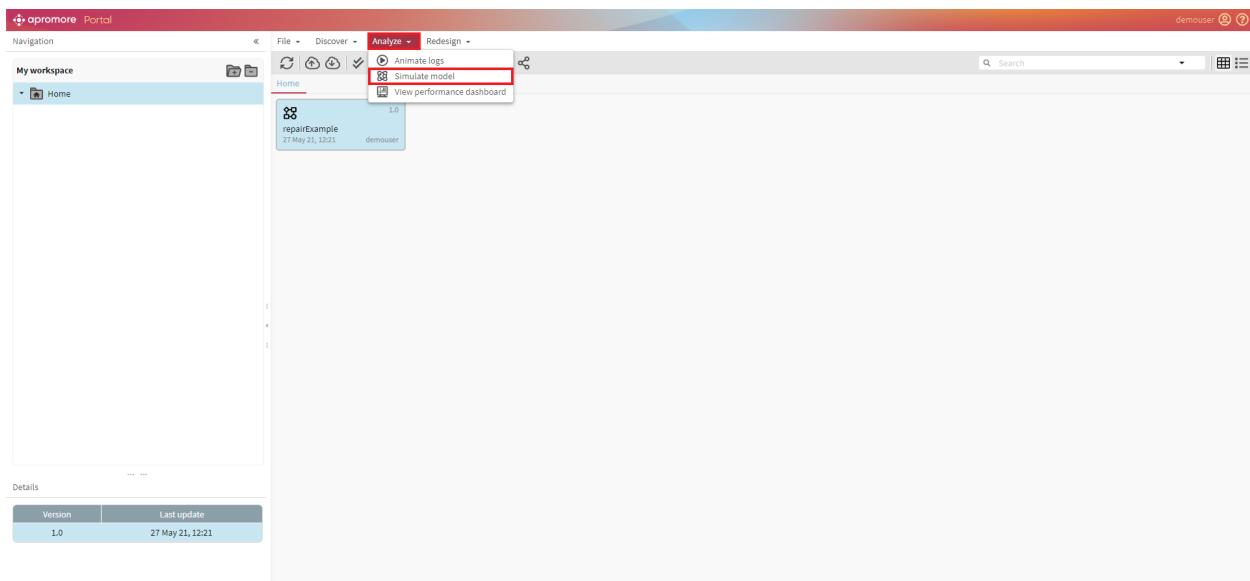
After we entered the simulation parameters, we can save the model.



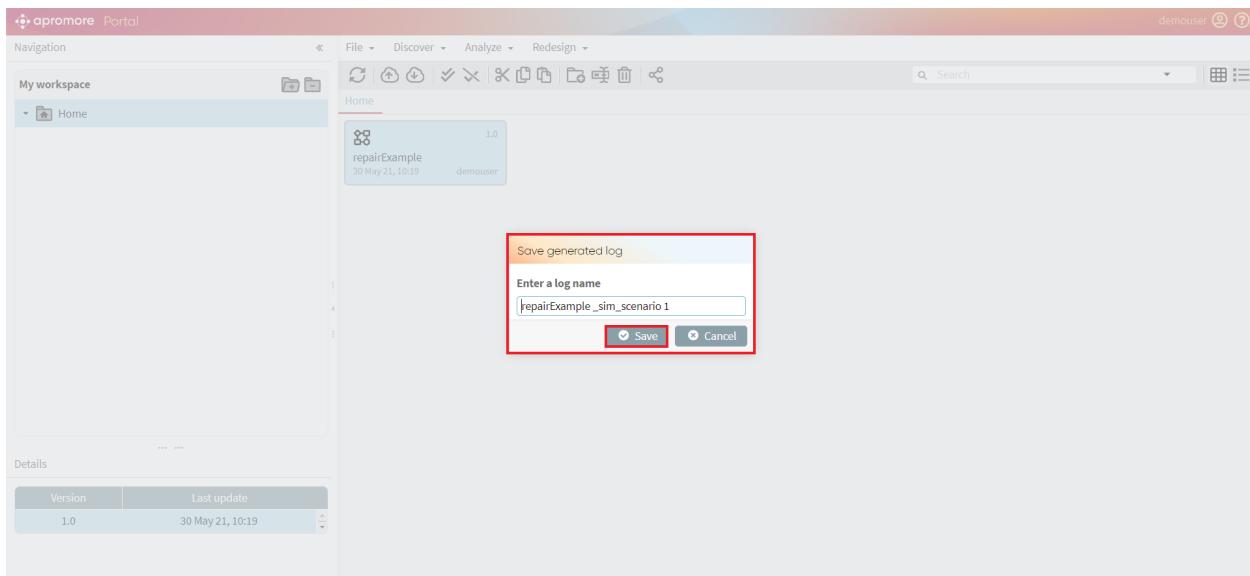
When the save dialog appears, click *OK*.



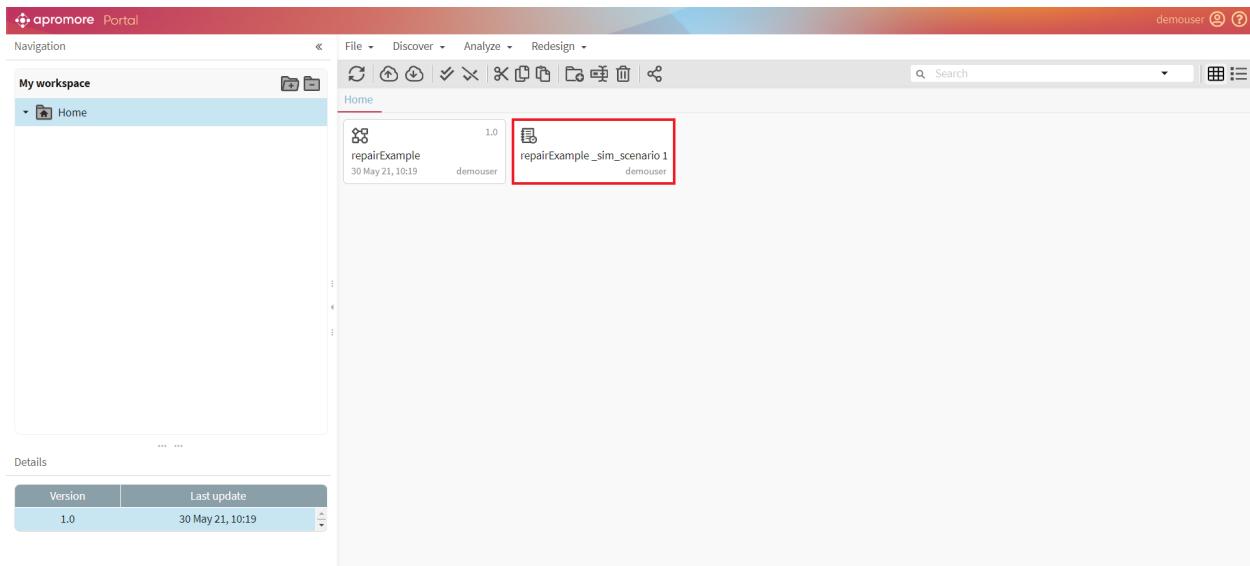
To simulate the saved model, go to the main workspace -> *Analyze* -> *Simulate model*.



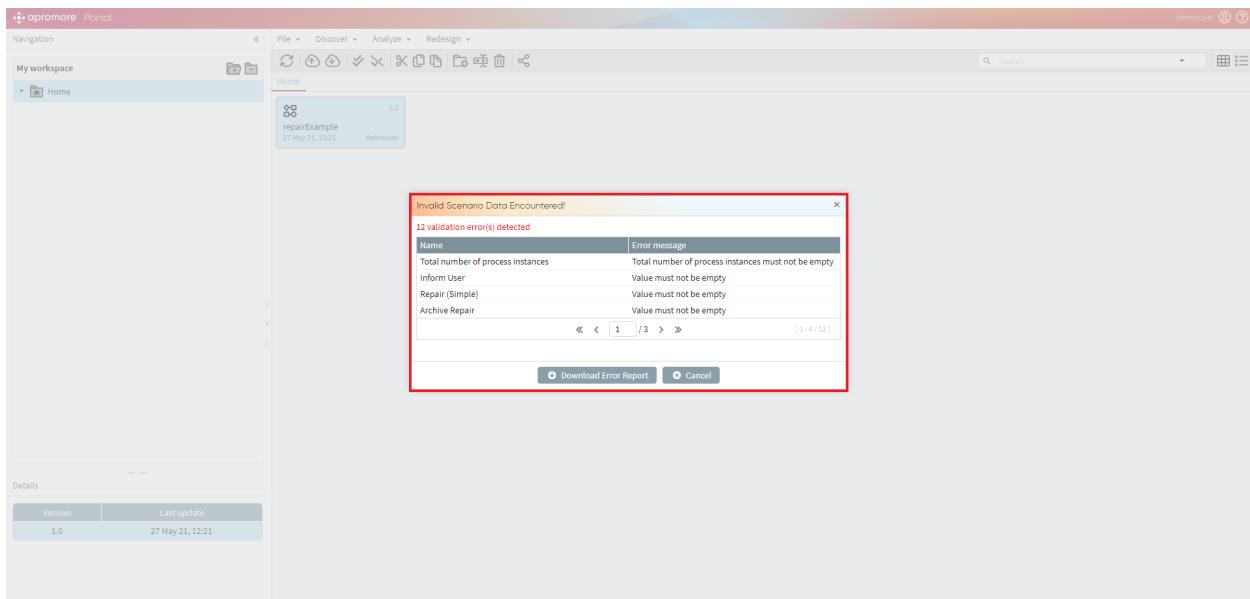
To save the simulated log, click on *Save*.



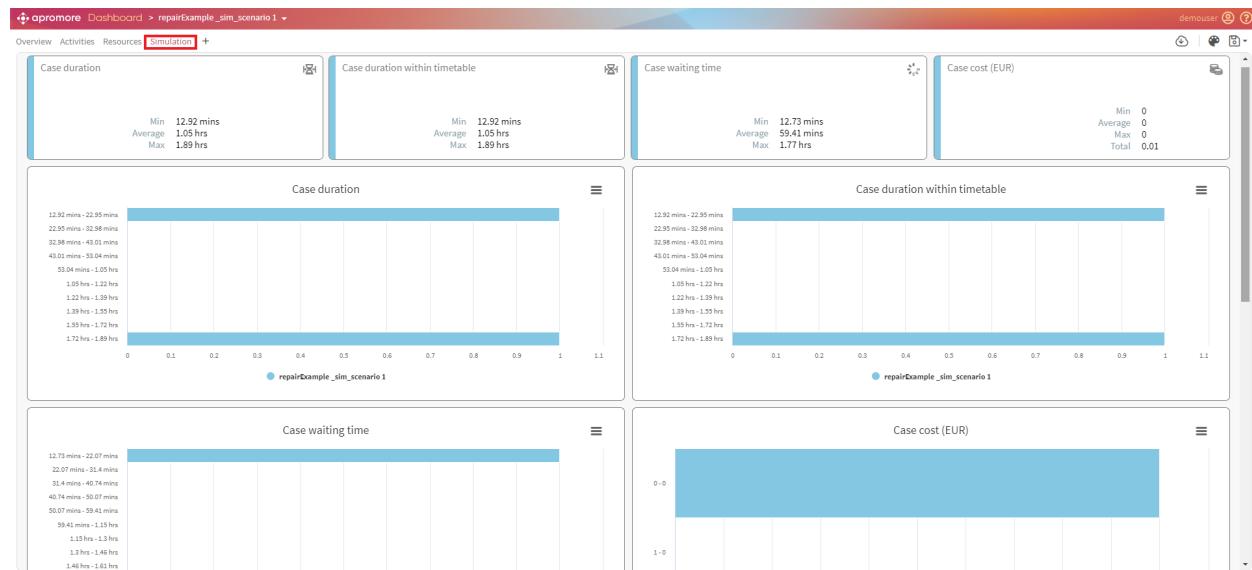
The simulated log appears in the workspace.



Note: Suppose, for some reason (for instance, the model was quite complex with the variety of tasks and many resources), we ignored the mandatory data lines and didn't specify them before. In that case, Apromore will display the list of errors to correct them.



We can view a range of statistics for simulated logs, including case duration, case duration within timetable, case waiting time, cycle time, waiting time, and cost in dashboards.



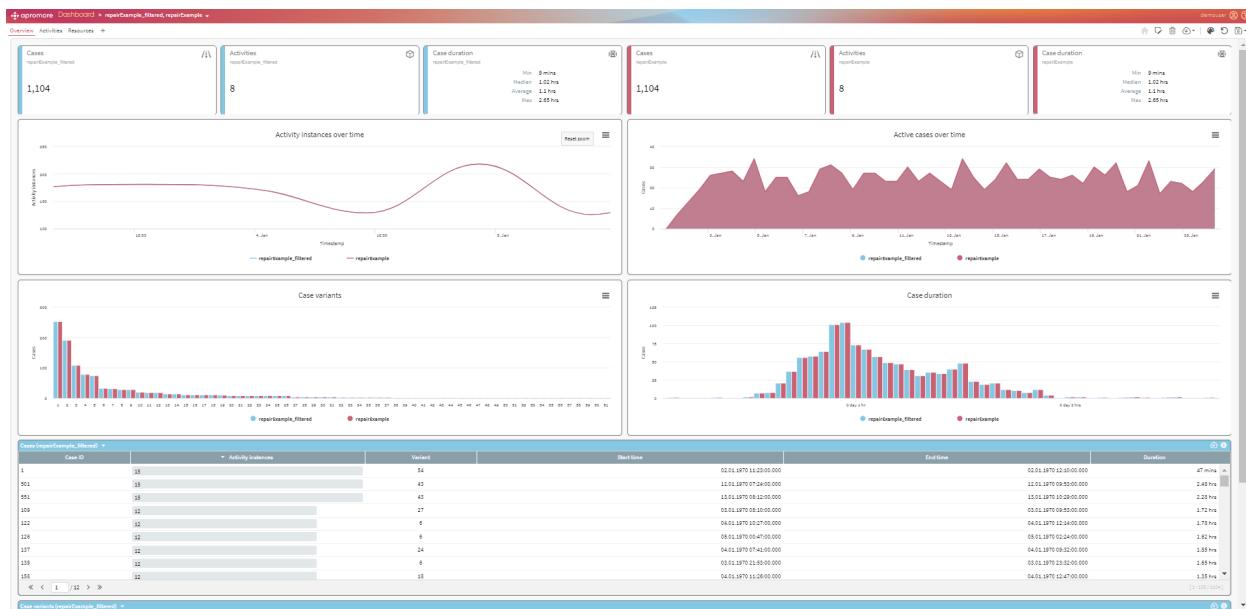
In addition to this, we can simulate two what-if scenarios. We can then compare the simulated logs by animating 2 logs against the BPMN model by going to the main workspace, selecting 2 logs and BPMN model -> Analyze -> Simulate model.

Analyze

- Animate logs
- Simulate model
- View performance dashboard**

Log	Version	Last update
repairExample_BPMN	1.0	27 May 21, 12:56
repairExample	1.0	27 May 21, 12:56
repairExample_filtered	1.0	27 May 21, 12:56

A window will open up, showing the simulation overview.

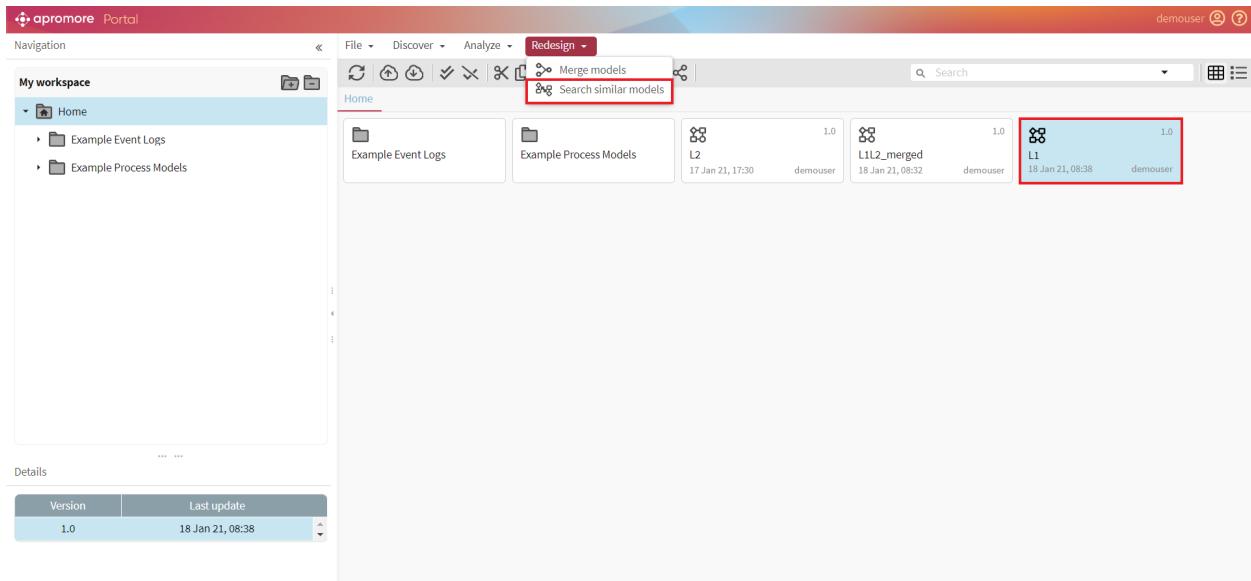


REDESIGN

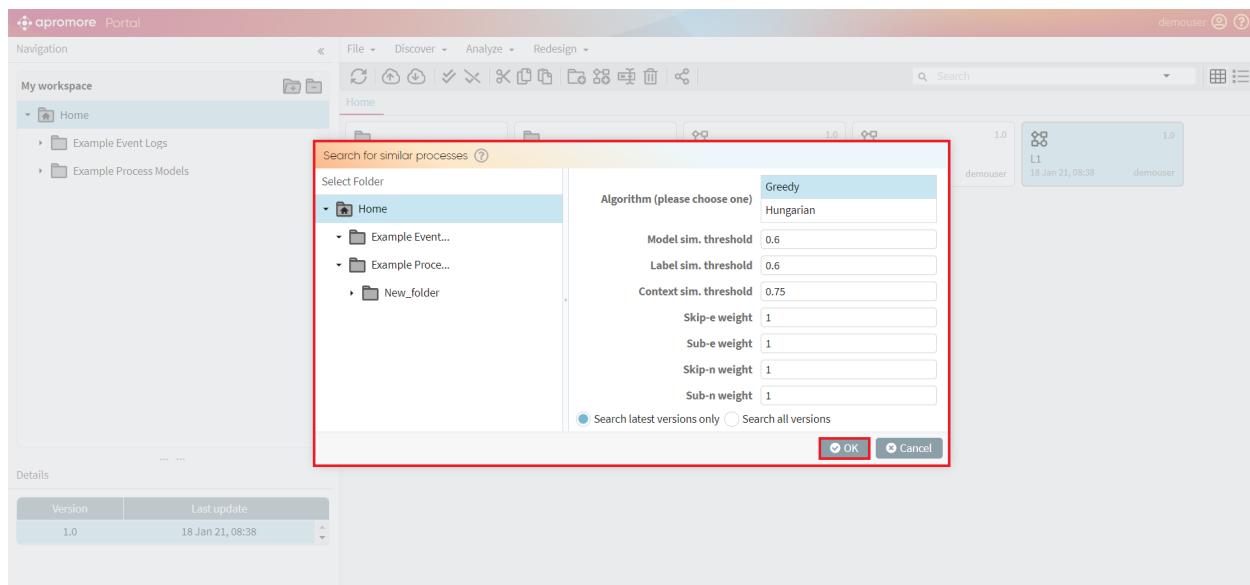
5.1 Search similar models

Apronmore allows us to search similar models.

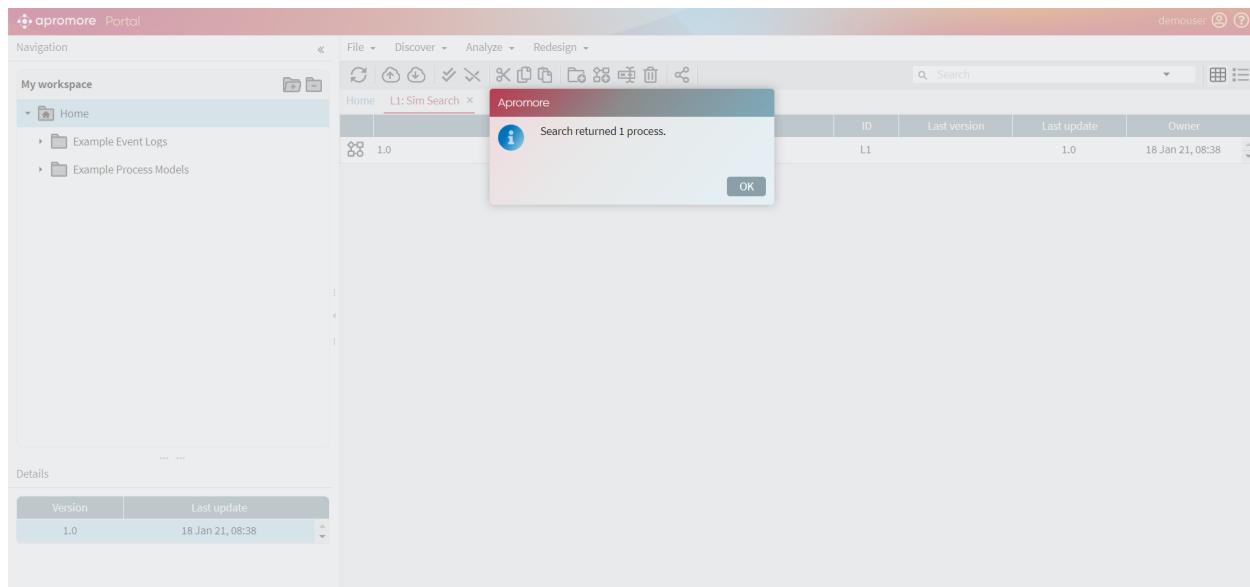
Select a BPMN model and click on *Redesign* -> *Search similar models*.



A window will pop up displaying various metrics. For example, the *Label sim. threshold* provides the similarity threshold of the different labels of a model. Initially, each field includes the default values. We can also choose to search the latest versions or all of the versions.



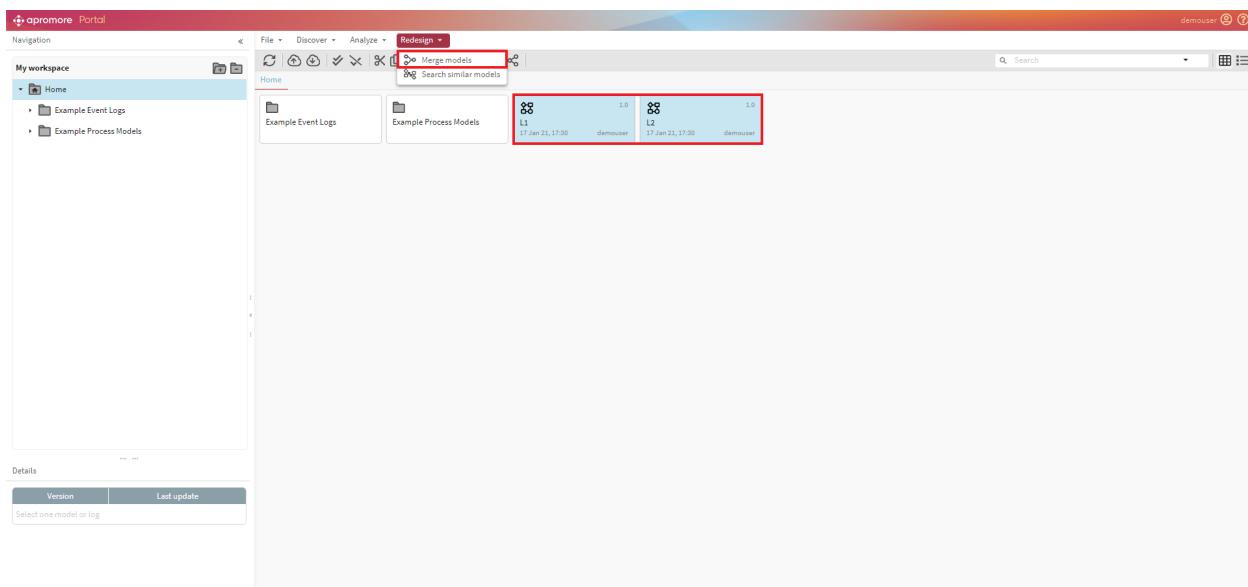
Click on *OK*. The results will contain similar models along with the similarity score.



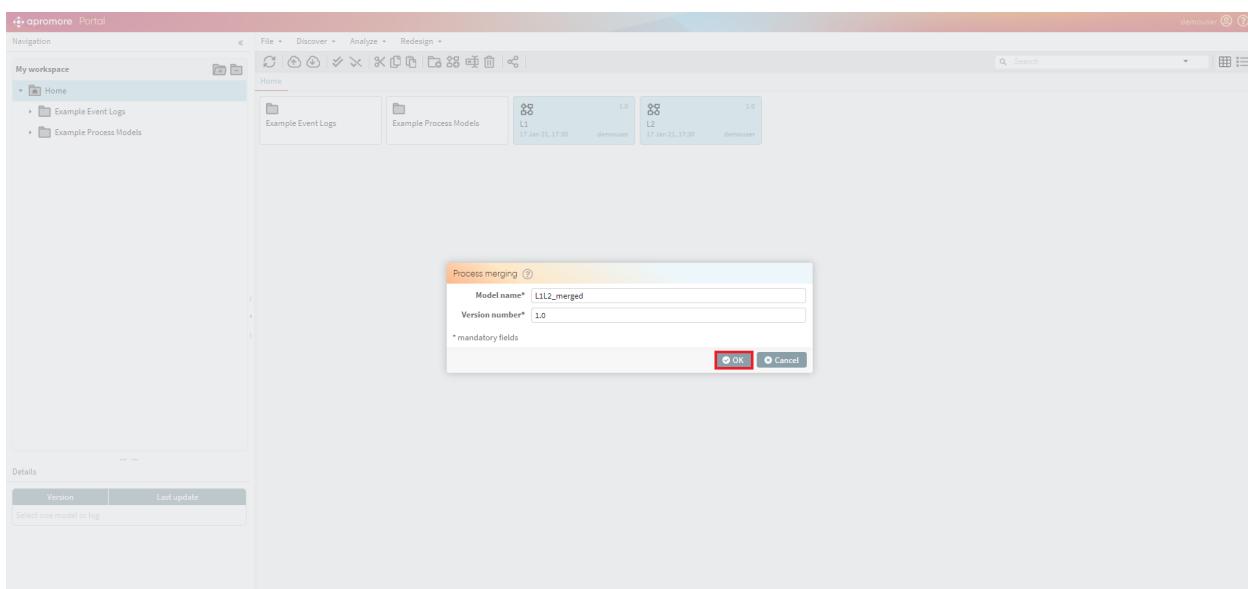
5.2 Merge models

Apromore allows us to merge models and animate a log on top of the merged models.

In order to merge a model, select two models and click on *Redesign -> Merge Models*.



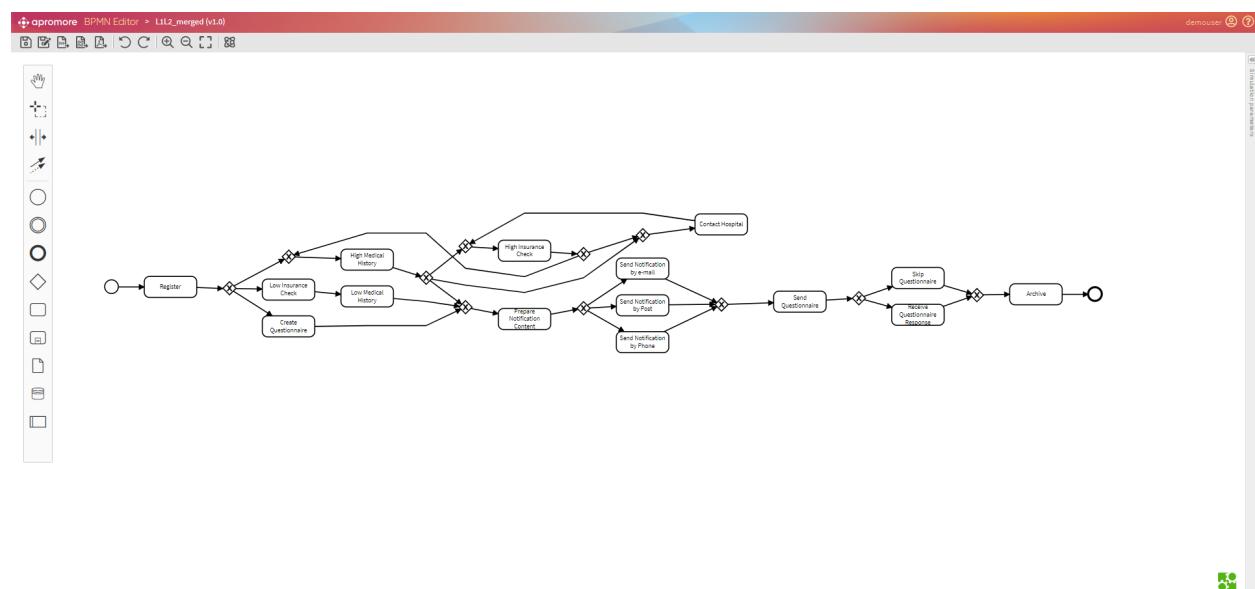
A window will pop up which will allow us to name the merged model. Enter the name and click on *OK*.



The merged model will now appear in the repository.

The screenshot shows the Apronmore Portal's Home page. On the left, there's a navigation sidebar with 'My workspace' and 'Home' selected. Under 'Home', there are links for 'Example Event Logs' and 'Example Process Models'. In the center, there's a grid of process models. One model, 'L1L2_merged' (version 1.0, last updated 18 Jan 21, 08:32), is highlighted with a red border. Below the grid, there's a 'Details' section with tabs for 'Version' and 'Last update', and a note saying 'Select one model or log'.

We can view the merged model in the BPMN editor.



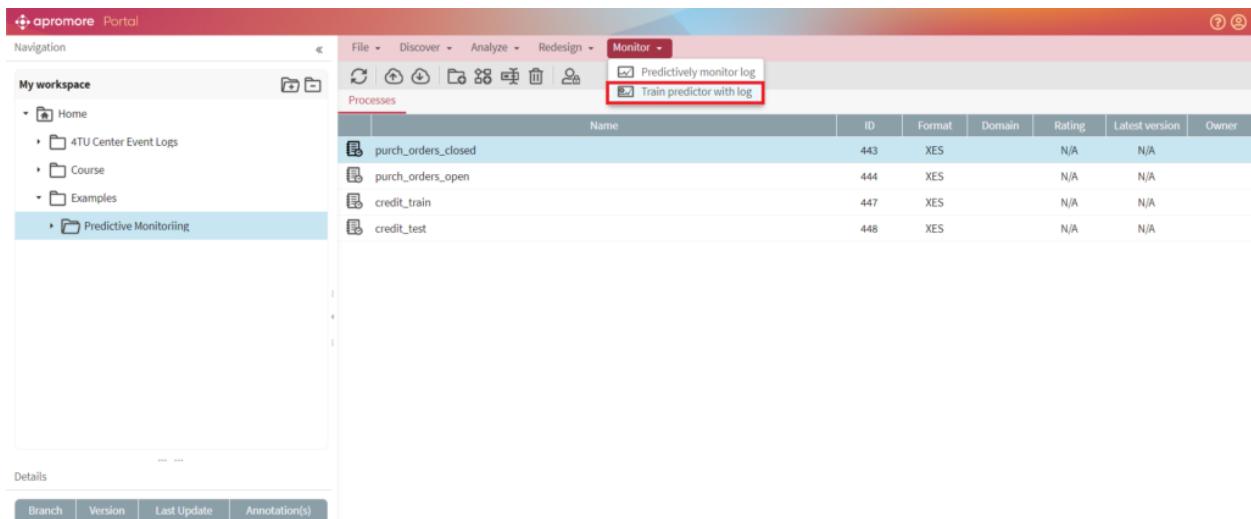
MONITOR

6.1 Train predictive models

The Training plugin allows users to generate predictive models for different types of predictions. Specifically, it is able to predict generic process properties, such as remaining time until case completion, the next most likely activity to be executed and whether a case will take longer than a user-defined time threshold. Additionally, the tool can build models to predict log-specific case properties, for example, the total application cost in an insurance claims handling process.

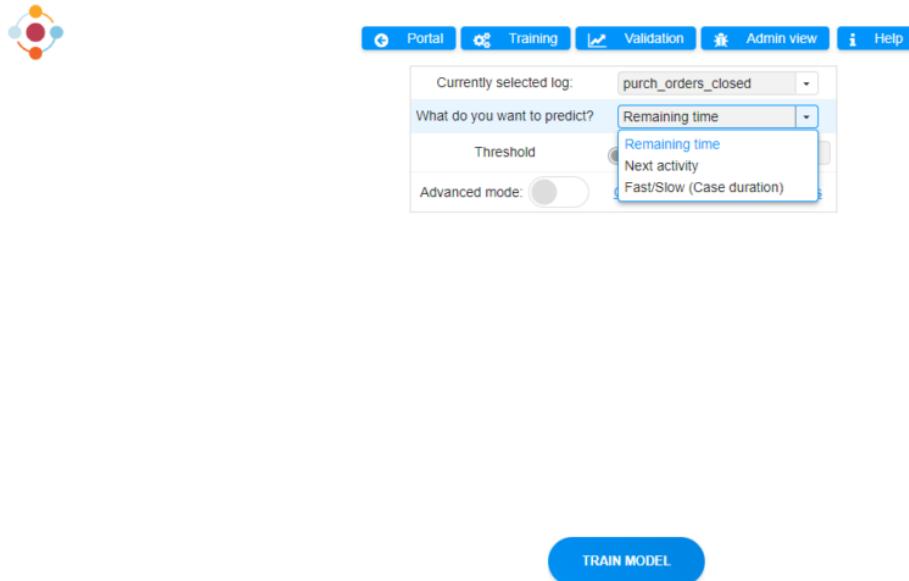
Before importing your log into Apromore, it needs to be pre-processed to add all the required attributes. The tutorial here describes a minimalist example of pre-processing operations for an event log. For demonstration purposes, Apromore repository provides several pre-processed logs under Examples/Predictive Monitoring folder. These logs can also be downloaded from [here](#).

- To use the plugin, select a training log from the repository and click on *Monitor -> Train predictor with log*.

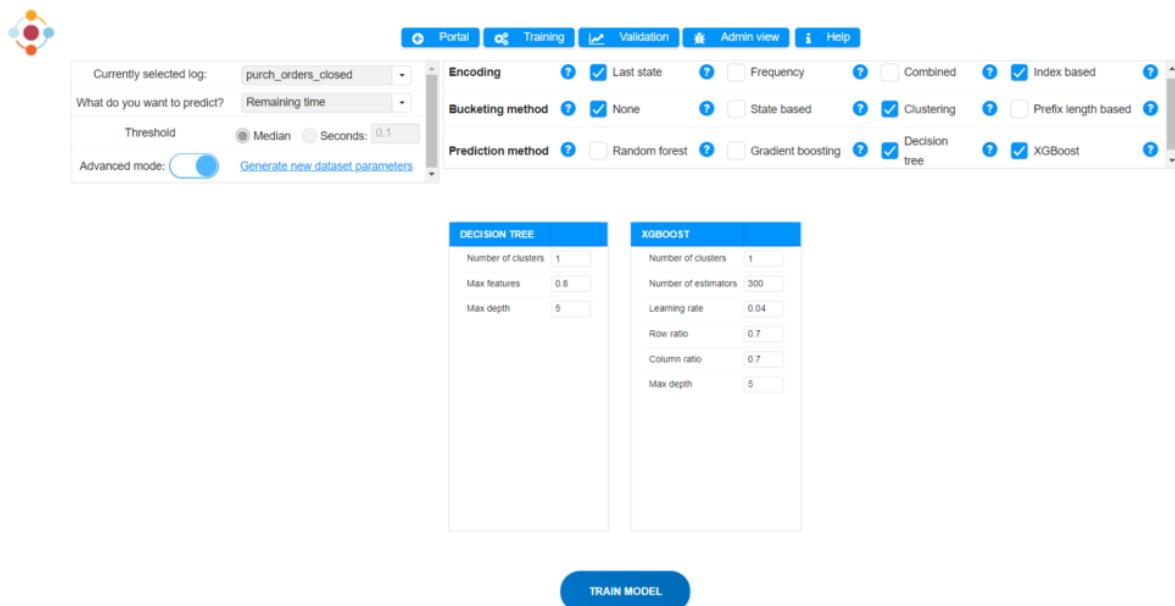


The screenshot shows the Apromore Portal interface. In the top navigation bar, there is a 'Monitor' dropdown with two options: 'Predictively monitor log' and 'Train predictor with log'. The 'Train predictor with log' option is highlighted with a red box. Below the navigation bar, the main area is titled 'Processes' and displays a table with four rows of data. The columns are labeled: Name, ID, Format, Domain, Rating, Latest version, and Owner. The data rows are: 1. purch_orders_closed (ID 443, XES format, N/A rating, N/A latest version, N/A owner). 2. purch_orders_open (ID 444, XES format, N/A rating, N/A latest version, N/A owner). 3. credit_train (ID 447, XES format, N/A rating, N/A latest version, N/A owner). 4. credit_test (ID 448, XES format, N/A rating, N/A latest version, N/A owner). On the left side, there is a 'Navigation' sidebar with a tree view of 'My workspace'. The 'Predictive Monitoring' folder is selected and highlighted with a blue box. Other visible items in the workspace include 'Home', '4TU Center Event Logs', 'Course', and 'Examples'.

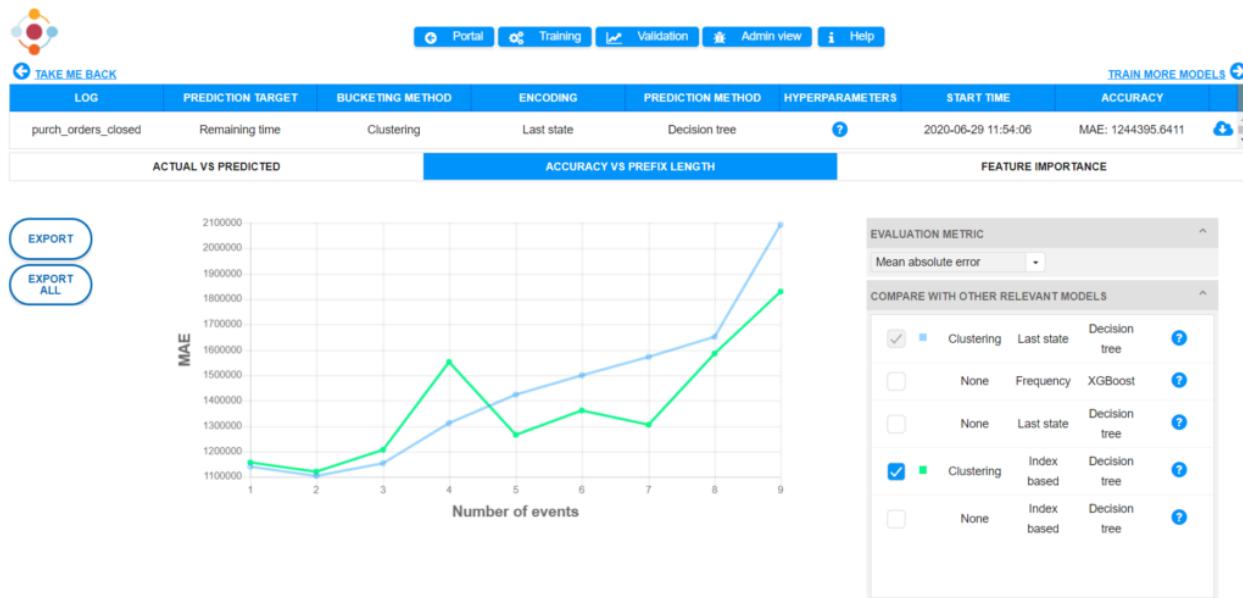
- As a minimum input, a user only needs to select a prediction target, i.e. an indicator to be predicted.



- Experienced users may switch to the advanced mode to fine-tune training configuration and even train multiple models at once.



- Once the necessary models have been built, the tool assesses their accuracy with respect to multiple evaluation metrics using a held-out validation set.



• Trained models are saved in the Apromore database and can be pushed to the *Runtime component* to make predictions for ongoing cases and visualize them in an operational dashboard. A screencast of this plugin can be found [here](#).

For non-Apromore users, a stand-alone version of the plugin can be accessed at training.nirdizati.org.

6.2 Open predictive dashboard

Note: Apromore's predictive monitoring plugins are available as add-ons to Apromore Enterprise Edition.

Once the predictive models have been trained, they can be deployed to the Runtime predictive monitoring environment of Apromore, to make predictions on ongoing cases. The Runtime plugin bundle can be used to stream an event log from the repository, or hook into an external stream. Either way, the input stream is transformed into a stream of predictions which is visualized in a Web-based dashboard.

To use the plugin, select an event log from the repository and click on *Monitor -> Predictively monitor log*. For demonstration purposes, Apromore repository provides several pre-processed logs under Examples/Predictive Monitoring folder. These logs can also be downloaded from [here](#)

The screenshot shows the Apronmore Portal interface. In the top navigation bar, the 'Monitor' tab is selected. Below it, a sub-menu is open with two options: 'Predictively monitor log' and 'Train predictor with log'. The main content area displays a table titled 'Processes' with four rows:

Name	ID	Format	Domain	Rating	Latest version	Owner
purch_orders_closed	443	XES		N/A	N/A	
purch_orders_open	444	XES		N/A	N/A	
credit_train	447	XES		N/A	N/A	

At the bottom of the screen, there is a 'Details' section with tabs for 'Branch', 'Version', 'Last Update', and 'Annotation(s)'. A note says 'Select exactly one process model.'

Create a new Predictive Monitor.

The screenshot shows the Apronmore Portal interface with a modal dialog box titled 'Predictive Monitoring: Create Predictor'. The dialog has the following fields:

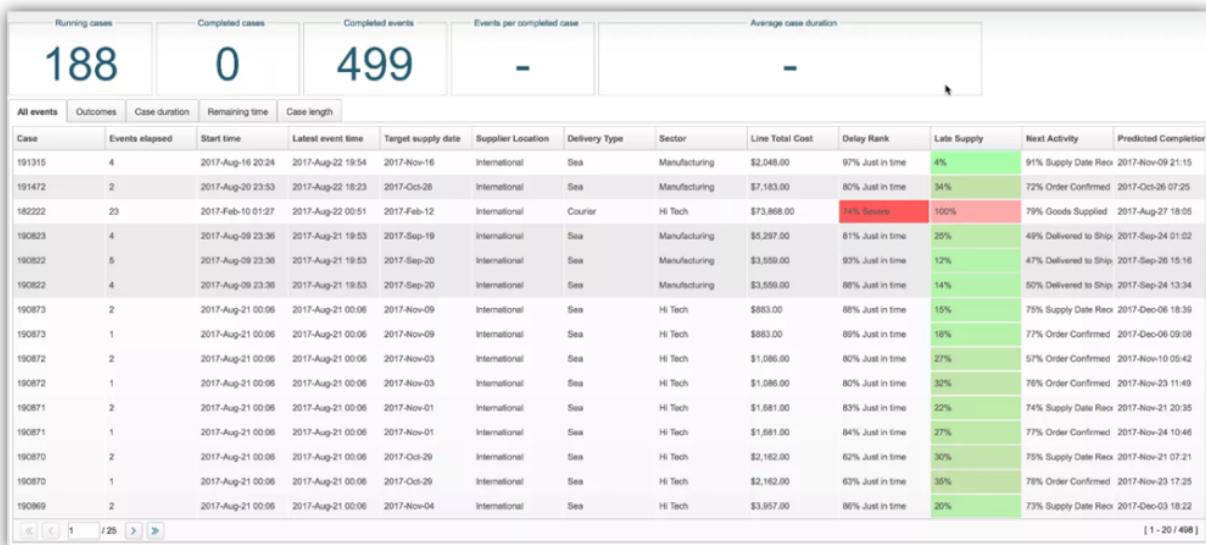
- Name: PO
- Pkl: Choose file
- Type: remaining time

At the bottom of the dialog are 'OK' and 'Cancel' buttons. In the background, the 'Processes' table from the previous screenshot is visible.

Select the created monitor and click *Stream log to dataflow*.

The screenshot shows the Aproximere Portal interface. In the center, a modal window titled "Predictive Monitoring setup" is open. It contains a list of "Predictive Monitors" with one item selected: "PO". Below the list are three buttons: "Create dataflow", "Delete dataflow", and "Stream log to dataflow". The "Stream log to dataflow" button is highlighted with a red border. At the bottom right of the modal is a "Show dashboard" button.

Click *Show dashboard* to start streaming events from the log. A dashboard will show up and populate with ongoing cases:



The dashboard provides a list of currently ongoing as well as completed cases. For each case, it is also possible to visualize a range of summary statistics including the number of events in the case, its starting time and the time when the latest event in the case has occurred. For the ongoing cases, the Runtime plugin bundle provides the predicted values of the performance indicators the user wants to predict. For completed cases, instead, it shows the actual values of the indicators. Color-coding is applied to help users quickly nail down potentially problematic cases.

6.2.1 Export performance predictions into CSV

In addition to the dashboard for continuous real-time process monitoring, the Runtime plugin supports a *regular reports* use case where users can get reports in a CSV format on a regular basis with the current set of predictions. These reports can be readily imported into common data analytics platforms (e.g. Microsoft Excel, Tableau, QlikView, R) for further exploration and visualization.

1	A Case	B Event #	C Activity	D Event time	E Elapsed	F next activi	G next activi	H next activi
2	180109	1	Updated Quantity	2017-Jan-01 11:06:00 PM	0s	0%	0%	0%
3	2180109	1	Updated Quantity	2017-Jan-01 11:06:00 PM	0s	0%	0%	0%
4	3180109	1	Updated Quantity	2017-Jan-01 11:06:00 PM	0s	0%	0%	0%
5	4180109	1	Updated Quantity	2017-Jan-01 11:06:00 PM	0s	0%	0%	0%
6	5180109	1	Updated Quantity	2017-Jan-01 11:06:00 PM	0s	0%	0%	0%
7	6180109	1	Updated Quantity	2017-Jan-01 11:06:00 PM	0s	0%	0%	0%
8	180112	1	Order Opened	2017-Jan-02 12:29:00 AM	0s	0%	87%	0%
9	2180112	1	Order Opened	2017-Jan-02 12:29:00 AM	0s	0%	87%	0%
10	3180112	1	Order Opened	2017-Jan-02 12:29:00 AM	0s	0%	87%	0%
11	4180112	1	Order Opened	2017-Jan-02 12:29:00 AM	0s	0%	87%	0%
12	5180112	1	Order Opened	2017-Jan-02 12:29:00 AM	0s	0%	87%	0%
13	6180112	1	Order Opened	2017-Jan-02 12:29:00 AM	0s	0%	87%	0%

A screencast of this plugin can be found [here](#).

RELEASE NOTES

7.1 Version 8.0

Release Date: November, 2021

7.1.1 Feature/Enhancement

Custom Calendars

- Apromore now provides the ability to create and edit custom calendars and to associate a custom calendar with an event log. When creating a calendar, you can include public holidays based on your location and add custom holidays to the calendar.

Delta Analysis between process models

- Apromore now allows you to compare two BPMN process models to perform delta analysis. For example, you can use delta analysis to compare a process model discovered from an event log (capturing the as-is process) with a reference process model (capturing a to-be process). When you compare two process models using delta analysis, the tool displays the differences and allows you to overlay the differences on top of the process models.

Filter and Dashboard Templates

- Apromore now provides the ability to save a filter or a dashboard template that you have defined on an event log, and to apply the saved template to another log. For example, you can create a dashboard template on an event log containing all the cases of an order-to-cash process that completed in October, and then copy it to an event log containing all the cases of the same order-to-cash process for the month of November.

Internationalization

- Apromore now provides the option to switch between different languages. Currently, we support English and Japanese, with German coming soon. New languages can easily be added.

Support for Group Authorization

- Apromore now supports group-based authorization using groups extracted from an external identity provider (SAML or LDAP).

Anonymization

- You can now choose to anonymize one or more columns during log import by selecting the “anonymization” icon on the columns you wish to anonymize. For example, you may anonymize sensitive information such as case IDs and resource names.

Automatic data ingestion via the S3 connector

- You can now ingest data into Apromore via our AWS S3 Connector. The logs can be pushed into S3 buckets via data ingestion pipelines, and picked up automatically by Apromore to be registered in Apromore's repository. The S3 bucket can be hosted by Apromore or the customer, in their private AWS cloud. Encryption can be managed by AWS with customer-provided master key, or directly by the customer.

Case and Event attribute on X and Y-axis

- We have added more customization options to Apromore's Dashboard. You can now display numerical or categorical case/event attributes on the X and Y-axis of any chart in a dashboard. For example, you can create a chart to display the number of resources (Y-axis) who perform each activity in the log (X-axis). If you select a numeric attribute in the Y-axis, you can also select an aggregation function such as average, total, median, etc. For example, you can create a chart that displays the countries on the X-axis and for each country, the total revenue on the Y-axis.

KPI Thresholds and Reference lines

- In the Dashboard, you can now set KPI thresholds and add reference lines for average and median, as well as custom reference lines, along both X and Y-axis. For example, you can choose to add a KPI threshold to separate the cases with a higher waiting time from those with a lower waiting time, or show the average number of active cases over time in the Work-in-Progress area chart.

Exporting Dashboard Analytics to S3 buckets

- Apromore now provides the capability to export dashboard analytics as CSV or Parquet files and save these locally or on an AWS S3 bucket.

Between Filter

- With a couple of clicks, you can now define a new filter criterion to retain or remove events between the first or last occurrence of a source and target node in the process map. For example, you can retain all events between the first occurrence of the "Send invoice" activity and the last occurrence of the "Receive payment" activity.

Save and edit ETL data pipelines

- Apromore now supports the ability to save and edit data ingestion pipelines. For example, you can now edit an existing pipeline by replacing the existing logs with an event log with the latest data.

Performance Improvement in Dashboard

- The performance of the operations performed on large logs in the dashboard has been improved.

Case Variant Inspector

- You can now inspect each case variant individually using the case variant inspector in the Process Discoverer plugin, and check out the value of attributes for each node in the variant.

7.1.2 Improvements and Bug Fixes

- **Improvement:** The start and end timestamps were exported in a single column when exporting an event log in CSV format. Now, both timestamps are placed in separate columns within the same row.
- **Improvement:** You can now choose to tag a column as a Perspective in the Log Importer. Once done, you can switch between these perspectives in Process Discoverer.
- **Improvement:** The Log Importer now supports ISO-8859-1 (Latin-1) encoding type.
- **Improvement:** An event log with a standard ISO-8601 format timestamp can now be imported into Apromore.
- **Improvement:** The ETL plugin now supports the ability to subtract two timestamps and trim a column value.
- **Improvement:** You can now upload zipped BPMN models
- **Improvement:** You can now set the name of the log when importing it into Apromore

- **Improvement:** A BPMN model shared with a viewer cannot be exported/modified.
- **Fix:** A log containing a case ID greater than 15 digits could not be uploaded.
- **Fix:** The labels on gateways in a BPMN model were not getting updated when changing them.
- **Fix:** Uploading files in Apromore using the ETL plugin used to throw an error when connecting to an S3 bucket with a name greater than 30 characters.

7.2 Version 7.20

Release Date: June, 2021

7.2.1 Feature/Enhancement

Extract-Transform-Load (ETL) Console

- Apromore now comes with a graphical ETL console that allows you to compose event logs from one or more tables or data sources. The ETL console allows you to define data pipelines to extract tables from relational databases, transform these tables to compose an event log, and load the resulting event log table into Apromore. In addition to different join operations, you can remove columns and create columns in the event log by composing existing columns using arithmetic, concatenation, and find-and-replace operations. For example, you can add a “Cost” column to an event log and compute this cost based on the hourly rate of your resources and the duration of tasks. You can also schedule a data pipeline to run hourly, daily, weekly, or monthly jobs to extract, transform, and load event logs into Apromore.

Single Sign-on Support

- Apromore can now be connected with your corporate identity system for single sign-on (SAML or OpenID).

Storage in Amazon S3 buckets

- Apromore now comes with an option to store your event logs in a dedicated Amazon S3 bucket for high reliability and security (available for enterprise licenses only). Your IT security team can be given rights to audit your tenancy’s S3 bucket. The data in your tenancy’s S3 bucket is protected at all times using either an Amazon S3-managed encryption key or an encryption key provided by your IT team. This enables your IT team to have full control over access to your event logs.

Transfer Ownership

- Before deleting a user, you can transfer ownership of all the assets (models, logs, analytics artifacts) to better manage business continuity.

Fine-Grained Sharing

- You can choose to share individual dashboards and filters associated with a log by giving a user restricted viewer rights. For example, when sharing an event log, you can choose which specific dashboards or filters you wish to share, as an alternative to sharing all the associated dashboards and filters.

Case Length Filter

- You can now filter out cases based on case length (number of activity instances in the case). For example, you can retain or remove all cases whose length is between 3 to 15 activity instances.

Undo/Redo Filter

- You can remove/reinstate a filter criterion using the undo/redo filter buttons in Process Discover.

Performance Improvements in Filter

- The performance of the filter operations on large logs has been improved.

Look-and-feel improvements in Log Animator

- The ability to hide/unhide tokens of a log in a multi-log animation has been introduced. You can also customize the color of the tokens.

Report Issue

- A Report Issue button has been introduced to allow users to report bugs.

Recursive Folder Sharing

- You can now share a folder in such a way that all sub-folders and files inside that folder are shared along, recursively.

7.2.2 Improvements and Bug Fixes

- **Improvement:** When trying to animate a syntactically incorrect process model, the log importer now shows user-friendly error messages.
- **Improvement:** You can now animate both process maps and BPMN models directly inside Process Discoverer.
- **Improvement:** File names can now contain commas and periods
- **Improvement:** A new “Generate report” function in the dashboard allows you to choose which tiles, charts, and tables you wish to include in the Word, PDF or Powerpoint report (or you can select “all” to include everything).
- **Fix:** The BPMN editor gives an error message when you change the version number to a different format.
- **Fix:** The shortcut for opening the arc duration filter is not working.
- **Fix:** In the slice log window, the number of cases is incorrect.
- **Fix:** Column names with accented letters are not displayed in the log importer.
- **Fix:** When a log contains empty column names, no data is shown in the log importer.
- **Fix:** Access rights management window gives an error when the group name matches the user name.
- **Fix:** The fields in the user creation window are not validated
- **Fix:** Incorrect error message is given when a file name contains more than 60 characters.

7.3 Version 7.19

Release Date: January, 2021

7.3.1 Feature/Enhancement

Process Simulator

- You can now attach a simulation scenario to a BPMN model and simulate a model with an attached simulation scenario. The output of a simulation is a simulated log. You can analyze a simulated log using all the functionality available in Apromore (Process Discoverer, Dashboard, etc.). In the Dashboard, you can view a range of statistics for simulated logs, including case duration, case duration within timetable, case waiting time, cycle time, waiting time, and cost.

Node duration performance filter

- You can filter out cases based on the node’s duration.

Arc duration performance filter

- You can filter out cases based on the arc's duration.

Secondary attribute filter

- You can filter out cases based on two attributes simultaneously, for example, retain or remove all cases where there is an event with Activity = "Create order" (primary attribute) and Resource = "John Smith" (secondary attribute).

Share filters and dashboards

- Multiple users can edit filters and dashboards concurrently.

Dashboard auto-saving

- You can now choose whether or not to auto-save changes to your dashboards.

Export dashboards

- You can now export your dashboards in a variety of formats incl. Word and PowerPoint to create professionally looking reports.

Timestamp format detection in CSV Importer

- A wider range of timestamp formats are now supported.

Timezone detection in CSV Importer

- When you import a CSV/XLSX/Parquet file, the timezone is automatically detected.

Import Parquet and XLSX files

- You can upload a parquet or XLSX file.

Performance and look-and-feel improvements in Log Animator

- The responsiveness of the log animator has been improved. When a large number of tokens are stuck in the same arc, a bubble is shown instead of showing individual tokens.

7.4 Version 7.18

Release Date: October, 2020

7.4.1 Feature/Enhancement

Portal grid view

- You can browse through the folders and files in Apromore's Portal in grid format (default mode) in addition to the old list format.

Import log from URL

- You can import a file from Dropbox, Google Drive, Microsoft OneDrive or from any URL.
- See: [Upload a file from URL](#)

Save and share filters

- You can [save filters](#) associated with a log and share these filters alongside the event log.
- Note: Only the owner of an event log can save, edit, or remove the filters associated with that log. Other users can define temporary filters but not save them.

Customize, save & share performance dashboards

- You can add, remove, or customize any performance indicator, chart or table in the default views of the performance dashboard.
- You can add one or more custom views to the performance dashboard of a log. Custom views can be created from [existing views](#) or from [scratch](#).
- You can save and share dashboards. All changes you make to a performance dashboard are saved together with the event log and are visible to all users who have access to the log.
- See: [Video demonstration of the new Performance Dashboard](#).
- Note: Only the owner of a log can edit the performance dashboard of the log. Other users can make a copy of a log and customize the dashboard on a copy of the log

Reusing CSV import schemas

- When you import a CSV file, the mapping of the columns (schema mapping) is automatically saved. When you later import a CSV file with the same column headers, the CSV importer prompts a dialog box to let you choose whether to [apply the saved mapping](#) or not.

Clear applied filters

- You can [clear all the filters](#) on the current log in Process Discoverer with a single click.

Search box in Process Discoverer

- A new [search box in Process Discover](#) allows you to search for a node (e.g. activity) by its name or a prefix of the name. All nodes that match the search string are highlighted.

Enhanced users and groups management

- You can grant access rights to any folder and file you own either to an individual user or to a group.
- Administrators can create groups and assign users to groups.
- See: [Users and groups management](#)

Download process performance stats from dashboard

- You can download the data behind any chart or table in the performance dashboard in CSV format, or you can download all CSV files with the data in the performance dashboard in a single zip file

Copying and moving logs or process models

- You can copy or move files across the folders in the Portal via the [copy, cut, and paste icons](#).

Improved session management

- We have made improvements to session management to improve performance and reduce session timeouts.

LDAP Authentication

- System administrators can more easily configure Apromore to connect to a corporate LDAP directory for authentication.

New shortcuts for filtering

- You can open the case filter, case variant filter, event filter, activity filter, performance and timeframe filters in one click from the Process Discoverer by clicking on the respective icons in the Log Statistics and Temporal statistics sections of the Process Discoverer.

Relative case frequency overlay

- You can now display the relative case frequency on each node/arc in the Process Discoverer. The relative case frequency is the percentage of cases in which a given node or directly-follows relation occurs.

7.4.2 Bug Fix

Folder and file renaming

- The portal gives an error message when you enter forbidden characters in file name.

Handling of long labels

- Fixed a bug that made long activity or node labels to go across the corresponding node in the process map/model.

7.5 Version 7.16

Release Date: June, 2020

• New Features:

- Tiles of performance measures can now be created in custom dashboards. These can be useful to display a set of standard and user-defined KPIs, in addition to the custom charts
- Aggregated log stats can now be exported from the Dashboard into CSV files
- Reimplemented median calculations for frequencies and durations in Process Discoverer
- Introduced “breadcrumbs” for easier Portal navigation
- Process models and logs can now be searched for from the Search bar of the Portal

• Improvements:

- Improved memory management across various plugins
- Process models created by the Merge plugin are now automatically laid out
- Improved automatic detection of various timestamp formats in CSV Importer
- Automatic detection of case attributes and event attributes in CSV Importer
- Removed unused fields in the Portal
- Simplified import of process models
- Multiple visual and performance improvements in custom dashboards

• Bug Fix:

- Fixed issue with not being able to animate some logs
- Fixed issue with misaligned timelines in the log animation
- Fixed issue with CSV importer failing due to missing case identifiers or activity names
- Fixed issue with the results of Similarity Search not being displayed until the Portal is refreshed
- Fixed some issues with the Rework & repetition filter

7.6 Version 7.15

Release Date: May, 2020

- **Process Discoverer:** New ribbon interface makes it easier to tune and switch between visualization and abstraction settings
- **Dashboard:** Ability to create customized charts with user-defined KPIs
- **Portal:**
 - Enhanced user registration screen
 - Ability to choose file format when downloading event logs (XES or CSV, and encoding for CSV files)
- **Log Animation:** Visual improvements in the Log Animation
- **CSV Importer:** UI and performance improvements
- **Various bug fixes and performance improvements**

7.7 Version 7.14

Release Date: March, 2020

- **Process Discoverer:**
 - Re-engineered plugin with new internal, high-performing data structure
 - Re-designed user interface with new abstraction functionality and statistics visualization
- **Filter:**
 - Cosmetic improvements
 - Performance improvements
- **Dashboard:**
 - Log cloning feature
 - Cosmetic improvements
 - Performance improvements
- **Various bug fixes and performance improvements**

7.8 Version 7.13

Release Date: February, 2020

- **New modern UI featuring consistent branding and look & feel**
- **CSV Importer:**
 - Support for non UTF-8 encodings
 - Fault tolerance (e.g. missing attribute value)
- **Filter:**

- New Rework & Repetition filter makes it easier to track cases with repeated tasks (e.g. rework due to amendments)
- Ability to search for specific cases and event attributes when setting filters
- New Case variant and Case ID Inspector view
- **Process Discoverer:**
 - Pie charts to show the percentage of cases, variants and events left after applying a filter
 - Performance improvements
- **Dashboard:**
 - Distinction between Case attributes and Event attributes
 - Relative frequency in Activities and Resources views
 - Performance improvements
- **Single Editor for process modeling based on BPMN.io (legacy editor deprecated)**
- **Various bug fixes**

7.9 Version 7.10

Release Date: December, 2019

- **Filter:**
 - Advanced case variant filter to show the distribution of case variants
 - Advanced options for the Eventually-follows filter
 - Filtering by processing time, waiting time and case utilization when events have start timestamps
 - Advanced options for Time window filters (case contained in the time window, active in, starts in, ends in)
 - Ability to download and upload filter criteria for reuse
 - Pie charts to show the percentage of cases, variants and events left after applying a filter
 - Minor cosmetic fixes
- **Dashboard:**
 - Support for case-level attributes
 - Minor cosmetic fixes
- **CSV Importer:**
 - Improved data type detection
 - Ability to import zipped and gzipped CSV files
- **Process Discoverer:** Various bug fixes and improvements
- **Caching mechanism to improve system performance**

7.10 Version 7.8

Release Date: October, 2019

- **Filter:** Advanced filtering options
- **CSV Importer:** More robust CSV Importer
- **Improved handling of security permissions for event logs**
- **Process Discoverer:**
 - Performance and visual improvements
 - Various bug fixes

7.11 Version 7.6

Release Date: August, 2019

- **Filter:** New Filter plugin
- **Process Discoverer:** Various bug fixes and performance and visual improvements
- **CSV Importer:** More robust CSV Importer
- **Improved handling of security permissions for event logs (Security button)**
- **Migrated to the current version of ZK libraries 8.6.0.1**
- **Dynamic switching of UI themes (Account -> Change theme)**

7.12 Version 7.5

Release Date: August, 2019

- **Dashboard:** New Dashboard plugin
- **Process Discoverer:**
 - Automatic centering and fit to screen when changing layout
 - Various bug fixes and performance improvements
- **CSV Importer:**
 - Improved tolerance for errors while importing CSVs
 - More robust mechanism to recognize timestamp format
 - Multiple UI improvements
- **Added password recovery feature**