

MLFM | Machine Learning Flow Manager

User Manual

MLFM Version 3.0

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Overview

This document is meant to be the essential documentation as a user manual for MLFM installer v3.0, it provides useful information about the bundle, health check commands, debugging commands, and a step by step guide to install the MLFM platform. Also, it provides a scope about the version.

1. MLFM Installation

1.1. Install A New Version

Shared artifacts

1. A .run file (**shared via SecuFEx**) is a self extracting Unix script including all the batteries needed to power and manage an MLFM installation.
2. DEPLOY_KEY_USERNAME and DEPLOY_KEY_PASSWORD (**shared via Mail or SecuFEx**) are the access credentials used to pull secured MLFM resources.

Prerequisites

To run MLFM smoothly, you need to have the following

Minimum Requirements:

- Memory: 6 GBvm
- Storage: 80 GB
- CPU: 2 cores
- Virtualbox 6.1 (Incase virtualization is used instead of bare metal)

Recommended Requirements:

- Memory: 8 GB
- Storage: 100 GB
- CPU: 4 cores
- Virtualbox 6.1 (Incase virtualization is used instead of bare metal)

Virtual machine provisioning steps

1. Download and install Virtualbox 6.1
2. Download [Ubuntu 18.04](#) or [Ubuntu 20.04](#) iso image (other distros could be tried as well)
3. Create a new Linux 64bit VM from Virtualbox
4. Change resources allocated to the VM (memory, cpu, storage) as per requirements mentioned above
5. Start installing Linux distro (Ubuntu) by inserting downloaded iso from step 2
6. On Ubuntu once installation is complete, we'd need to install Guest additions
7. Setup a shared folder between host and guest VM (this is where MLFM .run (**Will be shared via SecuFEx**) shall be placed)

Step by step guide

To run the installer, follow the following steps, and make sure you satisfy the prerequisites.

Installation could typically take up to 45 mins, but it varies depending on hardware specs and internet bandwidth. The reason behind the long installation time is that the bundle typically orchestrates 32 k8s pods, which takes a while to create and orchestrate.

1. Download MLFM .run file (**Will be shared via SecuFEx**) and place it in the shared folder on your host machine
2. Open a terminal window in the guest VM using the GUI, or using the following shortcut: CTRL + ALT + T
3. cd into the shared folder where MLFM .run file resides
4. Make sure the .run file is executable by running `chmod +x ./MLFM_Installer_<version>.run`
5. Run in the terminal to start the installation process
 1. `export DEPLOY_KEY_USERNAME={Paste the DELPOY_KEY_USERNAME that is shared via SecuFEx or Mail}`
 2. `export DEPLOY_KEY_PASSWORD={Paste the DELPOY_KEY_PASSWORD that is shared via SecuFEx or Mail}`
 3. `export VERBOSE=1`
 4. `./MLFM_Installer_<version>.run`
6. During the installation prompt for root password might be required

Start MLFM

- Just open your browser and Enter <http://mlfm.siemens.local> in the url box

MLFM built-in users

- admin user
 - email : csp-r8_dadmin@mentor.com
 - password : Test12345
- workflow creator user (this user has 2 roles workflow creator and plugin manager)
 - email : creator@siemens.com
 - password : Test12345
- operator user
 - email : basic@siemens.com
 - password : Test12345
- documenter user
 - email : documenter@siemens.com
 - password : Test12345

Expected outcomes of the installation

If the installation finishes successfully, there are expected outcomes (logs).

You can check the readiness of the pods using the following command

- `mlfman kubectl get pods -A`

In case you found some pods are running, and others have problems initializing (for ex : ImagePullBackOff), you can do the following steps to help installation continue successfully

- You can try to restart the virtual machine, sometimes this helps refresh kubernetes resource orchestration and restarts the pod initialization .

Note that the previous tips are optional, typically if you just wait long enough, all the pods eventually will be initialized, because kubernetes retries to initialize all the failed containers periodically, but restarting proved to be accelerating that process in this situation.

In case you reboot the vm, please run the following command after 15 mins of the reboot : `mlfman kubectl get pods -A` make sure that the all the pods status now are in "Running" state, if not, please wait for other 15 mins, then re-run the command.

1.2. Useful commands

MLFM is a very resource exhaustive set of applications, running in a K8s cluster, so you are expected to face high CPU utilization sometimes, this is only normal, specially while an experiment takes place.

Sometimes you would need the following commands while running the platform on your host or your virtual machine, each command will be described with an example if possible.

1.3. K8s resource monitoring

- Check online pods and all existing resource status- `mlfman kubectl get pods -A`
- Get service cluster ip (example, get the ip of pipelines ui)- `mlfman kubectl get svc -A`

You can also specify kubeflow namespace using `-n kubeflow` instead of `-A` if your cluster has many existing namespaces

1.4. Uninstall MLFM

Run the following command `mlfman uninstall`

1.5. Update MLFM

Currently the update process is to uninstall the older version of MLFM and install the new one.

Seek [1.4. Uninstall MLFM](#) for uninstall steps and [Step by step guide](#) for installation steps

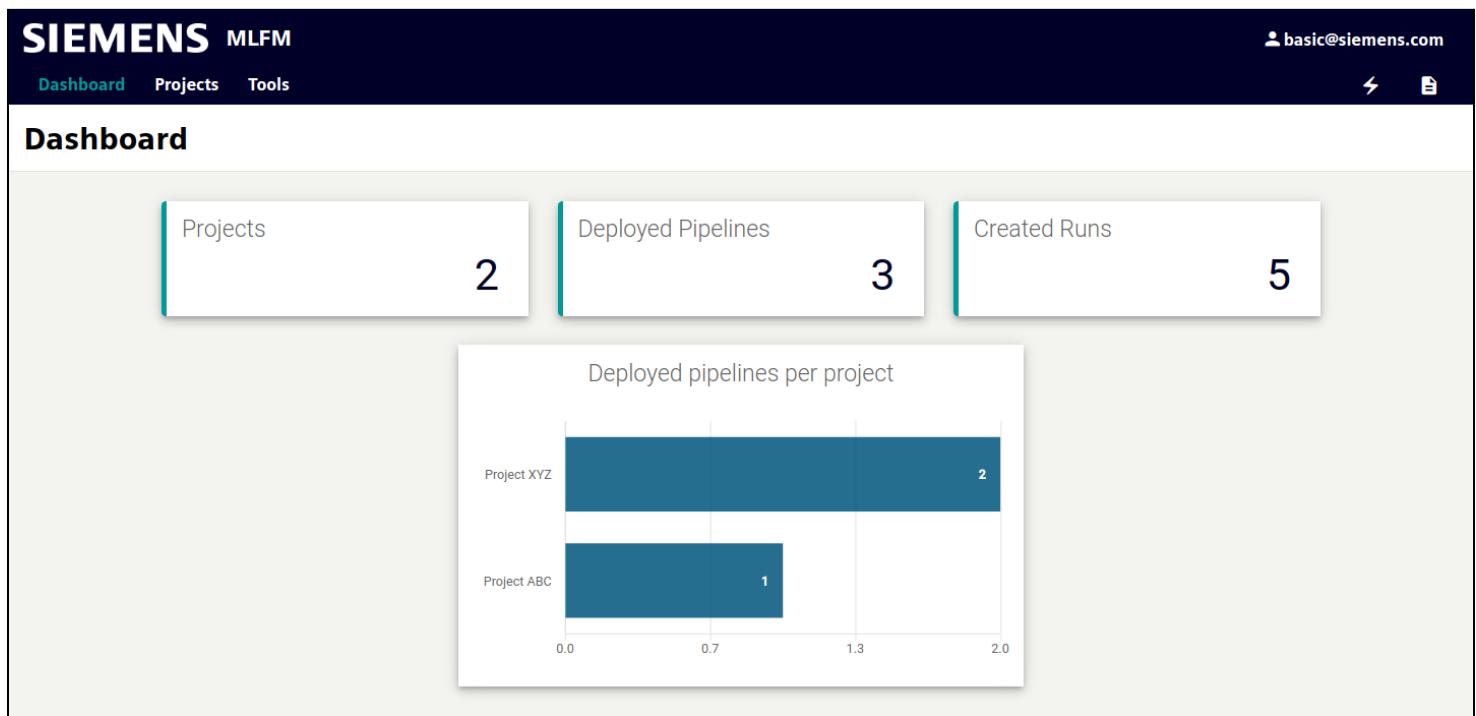
2. User Stories

2.1. Basic User

2.1.1. Dashboard Page

The dashboard is the entry point for the MLFM portal. It has a navigation bar for quick routing for other pages (Projects, Tools and Documentation)

The dashboard contains some statistics about the user activities (created projects, deployed pipelines, and runs). It gives an overview for the user about the system in general.



2.1.2. Projects Page

A project in MLFM is the key for pipelines and “runs”. Every pipeline must be linked with a project. So project creation is the first step for cloning and running pipelines.

2.1.2.1. Create project

In the projects page, we can see a top-right button for project creation.

The screenshot shows the 'Projects' section of the SIEMENS MLFM interface. At the top right is an account icon and the email 'basic@siemens.com'. Below it is a green button labeled '+ Create project'. Two projects are listed: 'Project XYZ' and 'Project ABC'. Each project card includes a brief description and an 'Edit' button.

The create new project button will pop-up a form that requires project details (name and description).

A modal window titled 'Create project' is displayed over the projects list. It contains fields for 'Name *' and 'Description *'. At the bottom are 'Create' and 'Cancel' buttons. To the left of the modal, a project card for 'Image classification project' is visible.

After project creation, the project will be added to the projects board and can be accessed by the user to see project details and clone pipelines.

The screenshot shows the SIEMENS MLFM interface. At the top, there's a dark header bar with the SIEMENS logo and the text 'MLFM'. On the right side of the header, there's an email address 'basic@siemens.com' and some icons. Below the header, there's a navigation bar with 'Dashboard', 'Projects' (which is highlighted in green), and 'Tools'. The main content area has a title 'Project ABC' and a subtitle 'Project'. On the left, there's a sidebar with three sections: 'Overview' (selected and highlighted in grey), 'Pipelines' (with 'Cloneable pipelines' and 'Deployed pipelines' listed), and 'Runs Records'. The main content area under 'Overview' includes 'Main Details' which shows 'Project ABC' and its description 'A project for testing various image classification techniques.'. It also shows 'Pipelines' with the message 'It has 1 deployed pipelines.' and 'Runs Records' with the message '3 runs are executing, 0 runs were succeeded, and 0 runs were failed.'

In the project details page, you can find:

1. Overview: an overview of the project, like the number of deployed pipelines, and some statistics about the “runs” in this project.
2. Cloneable pipelines: a list of the pipelines that can be cloned and deployed.
3. Deployed pipelines: a list of the deployed pipelines in this project.

2.1.2.2. Clone pipeline

From the project details page, click on “Cloneable pipelines”. You will find a list of the pipelines that can be cloned.

The screenshot shows the SIEMENS MLFM interface. At the top, there's a header with the SIEMENS logo, the text 'MLFM', and a user email 'basic@siemens.com'. Below the header, there are navigation tabs: 'Dashboard', 'Projects', and 'Tools'. Under 'Projects', the 'Project ABC' is selected. On the left side, there's a sidebar with three options: 'Overview', 'Pipelines' (which is currently selected and highlighted in grey), and 'Deployed pipelines'. The main content area is titled 'Cloneable pipelines'. It contains a table with two rows:

Name	Description	Tags	Created On	Action
Meta Image classification	sample	Image classification	May 26, 2022, 12:45:13 PM	Clone
Sample pipeline	sample	Processing	May 26, 2022, 12:43:55 PM	Clone

Click on “Clone”.

The screenshot shows the 'Pipeline Editor' interface. At the top, there's a header with the SIEMENS logo, the text 'MLFM', and a user email 'basic@siemens.com'. Below the header, there are navigation tabs: 'Dashboard', 'Projects', and 'Tools'. In the top right corner, there are two buttons: 'Deploy' and 'Deploy & Run'. The main content area is titled 'Pipeline Editor'. It displays a data flow diagram on a grid background. The diagram consists of four components connected by arrows:

- Bucket Data Ingest**: A green rounded rectangle with an 'input' port on the left and an 'output' port on the right. An arrow points from its output to the 'Adapter' component.
- Adapter**: A green rounded rectangle with an 'input' port on the left and an 'output' port on the right. An arrow points from its output to the 'Rotation Augmentation' component.
- Rotation Augmentation**: A green rounded rectangle with an 'input' port on the left and an 'output' port on the right. An arrow points from its output to the 'Archive Data Egest' component.
- Archive Data Egest**: A green rounded rectangle with an 'input' port on the left and an 'output' port on the right. An arrow points from its output back to the 'Bucket Data Ingest' component, creating a loop.

Left-click on a plugin to edit its configuration.

The screenshot shows the Pipeline Editor interface. On the left, there is a grid-based workspace containing four data flow components: 'Bucket Data Ingest', 'Adapter', 'Rotation Augmentation', and 'Archive Data Egest'. The 'Bucket Data Ingest' component has an 'input' port on the left and an 'output' port on the right. The 'Adapter' component has an 'input' port on the left and an 'output' port on the right. The 'Rotation Augmentation' component has an 'input' port on the left and an 'output' port on the right. The 'Archive Data Egest' component has an 'input' port on the left and an 'output' port on the right. A curved line connects the 'output' port of 'Bucket Data Ingest' to the 'input' port of 'Adapter'. Another curved line connects the 'output' port of 'Adapter' to the 'input' port of 'Rotation Augmentation'. A third curved line connects the 'output' port of 'Rotation Augmentation' to the 'input' port of 'Archive Data Egest'. On the right side of the screen, there is a vertical panel titled 'Configuration Parameters' with several input fields:

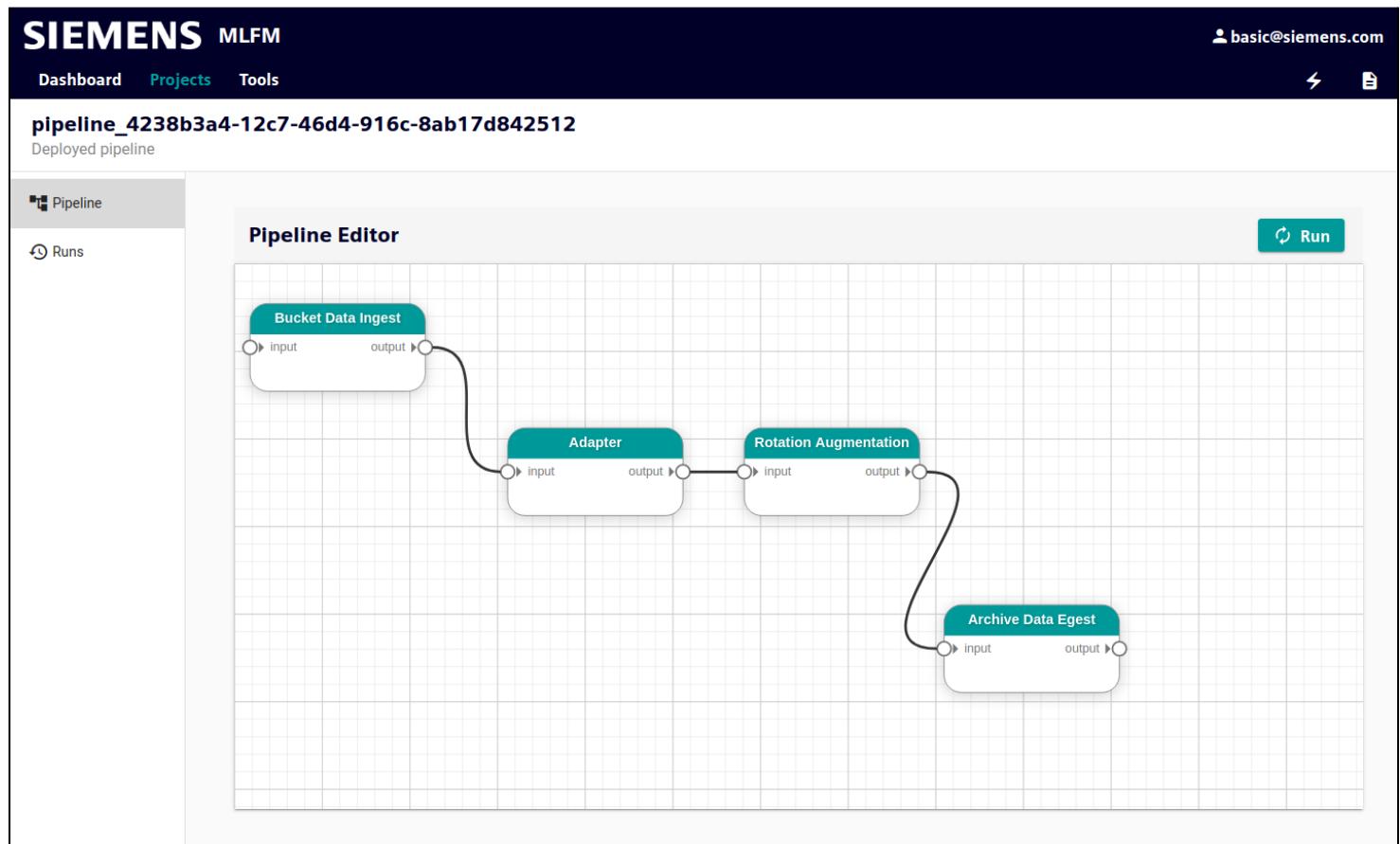
- endpoint: localhost:8000 (string)
- access_key: minioadmin (string)
- secret_key: minioadmin (string)
- session_token: (string)
- secure: checked (checkbox)
- bucket_name: (input field)

Left-click on a free area on the grid to close the configuration form.

When done, you can deploy, or deploy and run the pipeline, using the buttons on the top-right corner.

The screenshot shows the Pipeline Editor interface with the same components and connections as the previous screenshot. On the right side, there are two buttons at the top: 'Deploy' (with a blue icon) and 'Deploy & Run' (with a green icon). The rest of the interface is identical to the first screenshot, showing the Pipeline Editor workspace and configuration parameters.

When you click “Deploy”, the pipeline will be deployed, and you will be taken to the deployed pipeline page.



Click on “Runs” on the left side to view the list of “runs” of this deployed pipeline. Here you can see the status of each run, and you can view the run on “Kubeflow”

The screenshot shows the SIEMENS MLFM interface. At the top, there's a dark header bar with the SIEMENS logo and "MLFM" text, followed by a user email "basic@siemens.com". Below the header, a navigation bar has tabs for "Dashboard", "Projects", and "Tools". On the far right of the header are two small icons: a lightning bolt and a document.

The main content area has a title "pipeline_4238b3a4-12c7-46d4-916c-8ab17d842512" and a subtitle "Deployed pipeline". To the left of the main content is a sidebar with two items: "Pipeline" (with a pipeline icon) and "Runs" (with a clock icon). The "Runs" item is currently selected, indicated by a grey background.

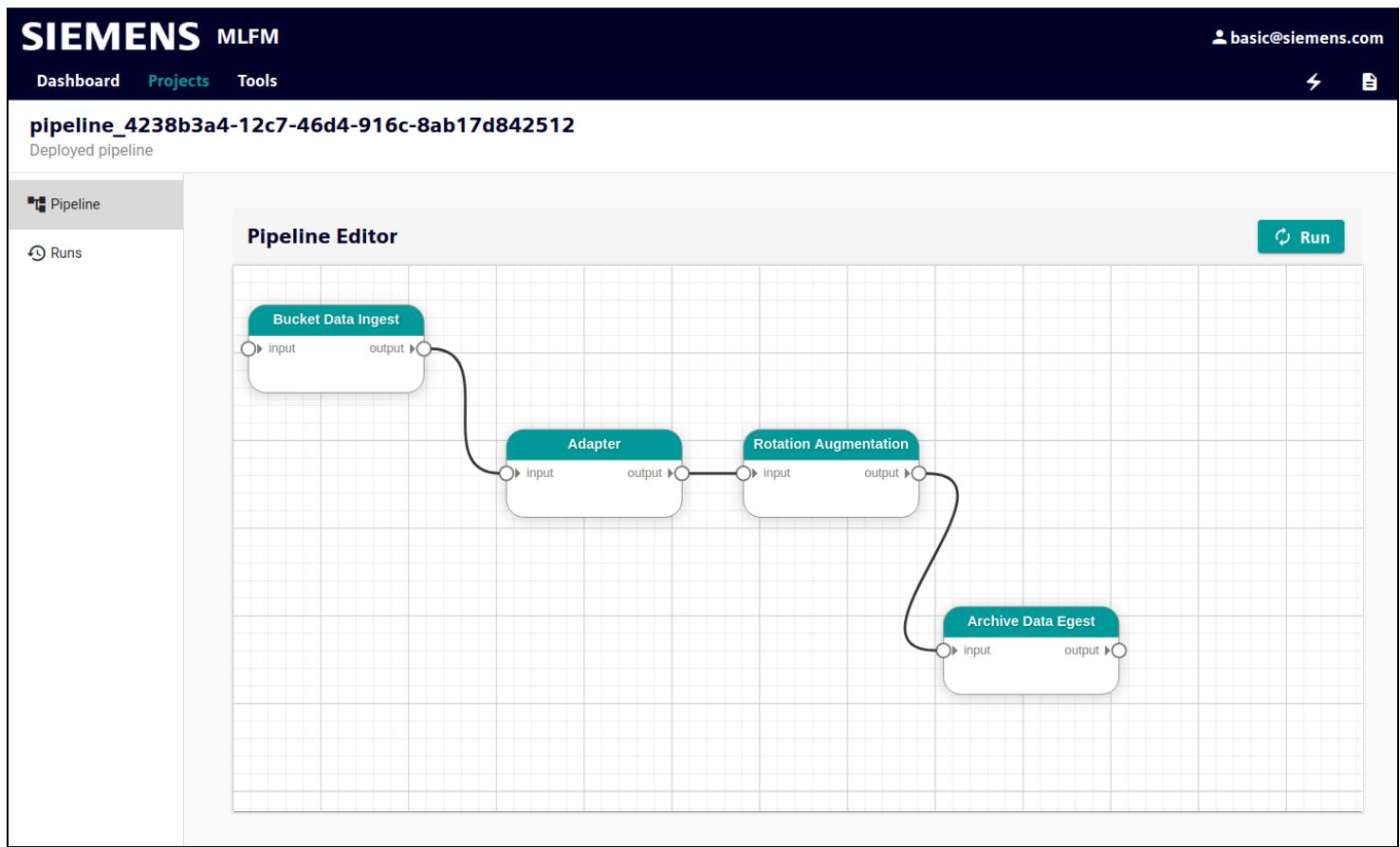
The main content area is titled "Runs" and contains a table with three columns: "Name", "Status", and "Created On". There are three rows in the table, each representing a run:

Name	Status	Created On
run_dfac80c9-8b70-49fc-ac45-52f9951cca31	Running	May 26, 2022, 12:50:30 PM
run_e3389b25-4111-4e74-bffc-2dc5e54b0d62	Running	May 26, 2022, 12:49:16 PM
run_8c2abf86-0fa9-48d0-a617-85817a13d65f	Running	May 26, 2022, 12:50:43 PM

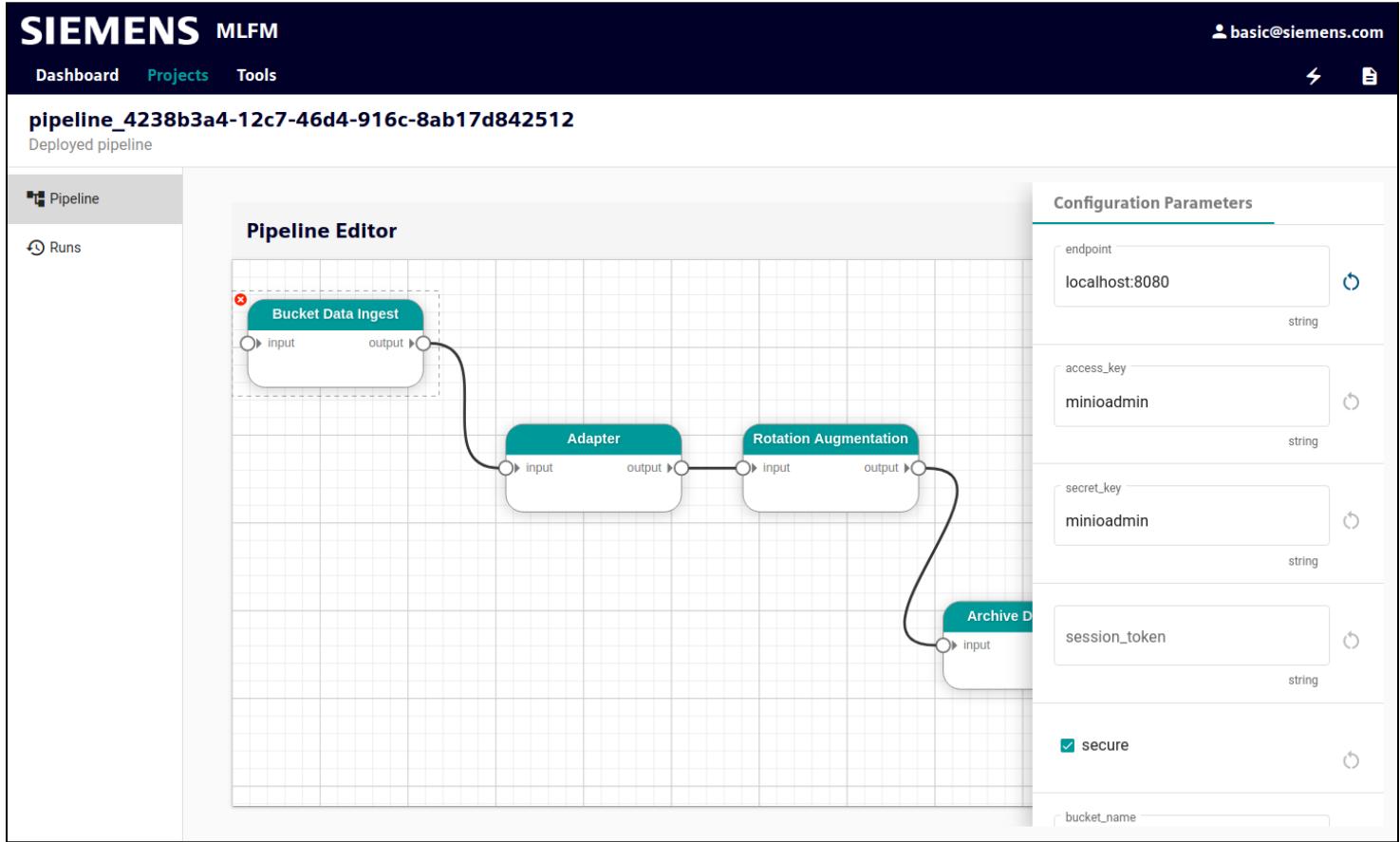
Each row in the table also has a "Kubeflow" link at the end.

2.1.2.3. Run pipeline

You can create a new “run” for a deployed pipeline, from the deployed pipeline’s page.



Configure the pipeline. Left-click on the plugin you want to edit its configuration. When done, left-click on a free area of the grid to close the configuration form.



When you finish configuring the pipeline, click on “Run” on the top-right corner to create a new run with the new configuration.

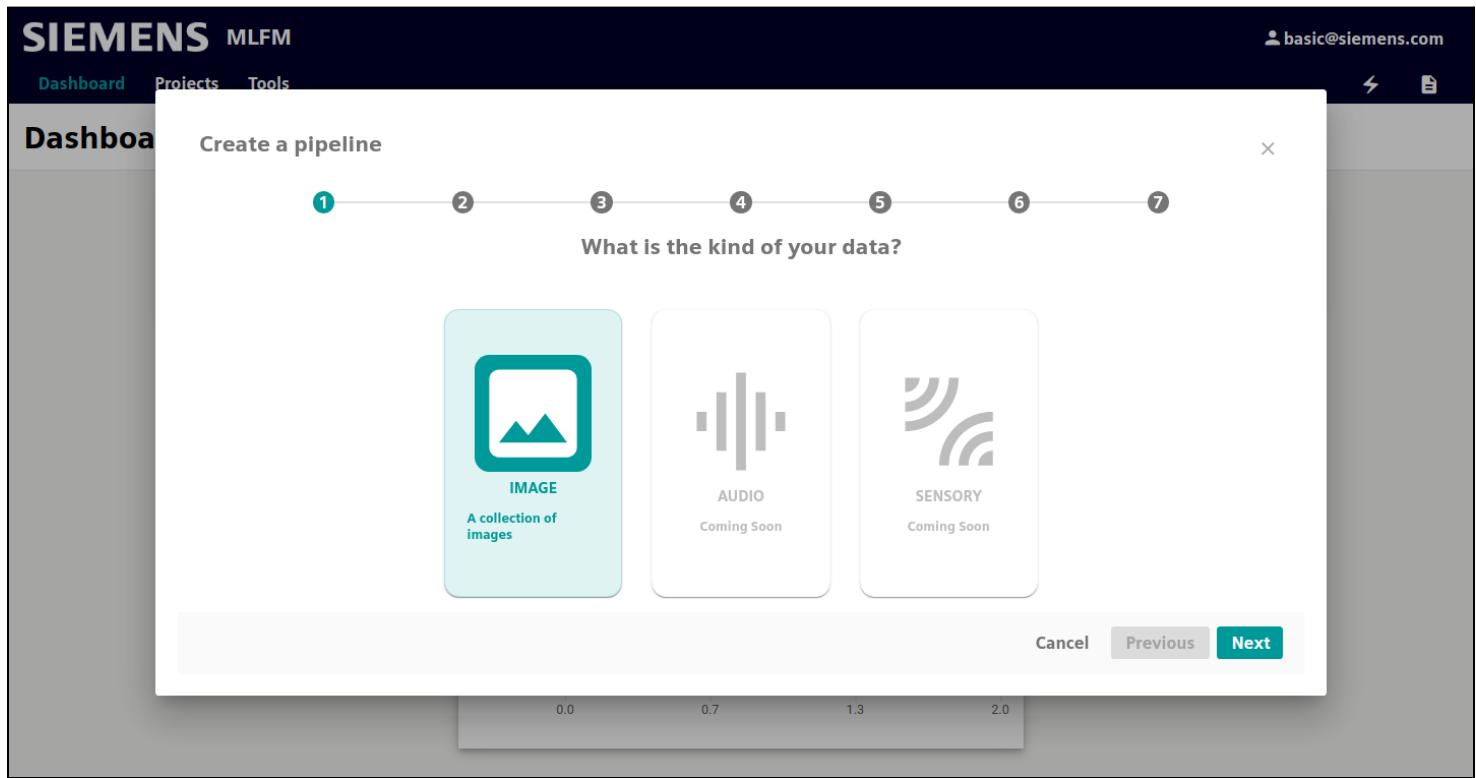
2.1.3. Tools Page

Contains the shipped tools with MLFM. MLFM is open for integration with other tools that can be used in ML activities. For now it is integrated only with the Computer Vision Annotation Tool (CVAT).

The screenshot shows the 'Tools' section of the SIEMENS MLFM interface. At the top, there's a header with the SIEMENS logo and 'MLFM'. Below it, a navigation bar has 'Dashboard', 'Projects', and 'Tools' buttons, with 'Tools' being the active tab. On the right side of the header, there's an email icon and 'basic@siemens.com'. The main content area is titled 'Tools' and features a card for 'CVAT Annotation Tool'. The card includes a thumbnail image of a street scene with several cars and a bus, some of which are highlighted with blue bounding boxes. Below the thumbnail, a text block describes CVAT as a free, online, interactive video and image annotation tool for computer vision, used by the team to annotate millions of objects. It mentions that UI and UX decisions are based on feedback from professional data annotation teams. At the bottom of the card are two buttons: 'Launch' and '<> GitHub'.

2.1.4. Quick start

Quick start button allows you to create a pipeline in a simple and quick way by answering some questions about the problem that you want to solve using ML.



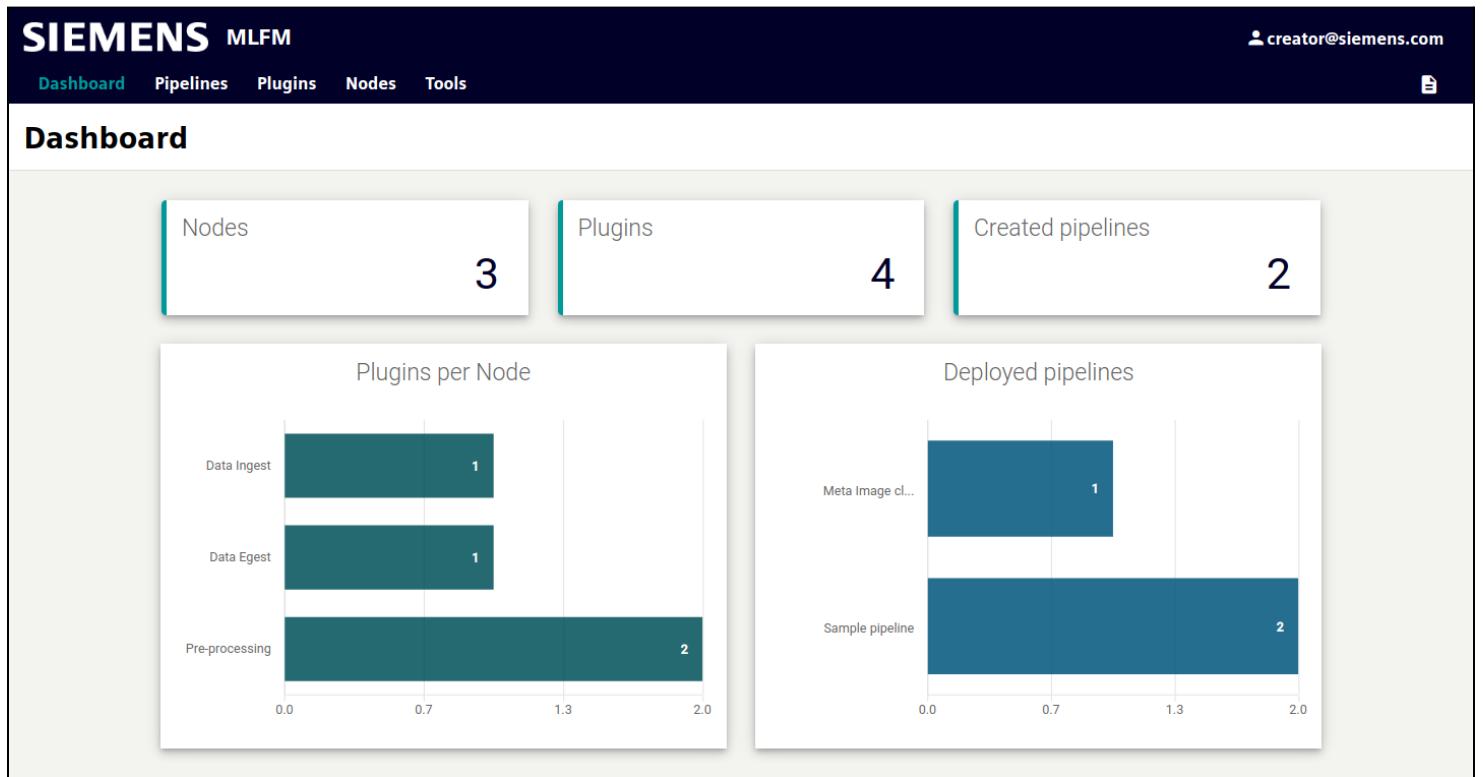
2.1.5. Documentation Page

The last page that can be accessed by the basic user is the 'Documentation' page, and it contains documentation about MLFM and functionalities that the user can use for guidance or to check steps for a specific task.

2.2. Workflow Creator User

2.2.1. Dashboard Page

Contains different charts to show some statistics about the user activities (created pipelines, nodes and plugins). It gives an overview for the user about the system in general.



2.2.2. Pipelines Page

2.2.2.1. Pipelines List

Contains the list of created pipelines. Clicking on a pipeline will open the pipeline details.

The screenshot shows the 'Created pipelines' section of the SIEMENS MLFM interface. The left sidebar has a 'Pipelines' menu with 'Created pipelines' selected. The main area is titled 'Created pipelines' and contains a table with two rows. The columns are 'Name', 'Description', 'Tags', and 'Created On'. The first row has 'Meta Image classification' in blue, 'sample' in grey, 'Image classification' in a button, and 'May 26, 2022, 12:45:13 PM'. The second row has 'Sample pipeline' in blue, 'sample' in grey, 'Processing' in a button, and 'May 26, 2022, 12:43:55 PM'. A green 'Create pipeline' button is at the top right.

Name	Description	Tags	Created On
Meta Image classification	sample	Image classification	May 26, 2022, 12:45:13 PM
Sample pipeline	sample	Processing	May 26, 2022, 12:43:55 PM

2.2.2.2. Create new pipeline

When the user clicks on create new pipeline, a new page will be rendered containing a board for pipeline creation and the creator will be able to see available plugins to use from the left side menu.

The screenshot shows the 'Pipeline Editor' interface. On the left, there is a sidebar titled 'Plugins' with sections for 'Data Ingest', 'Data Egest', and 'Pre-processing'. Under 'Data Ingest', 'Bucket Data Ingest' is highlighted. Under 'Pre-processing', 'Rotation Augmentation' and 'Adapter' are listed. On the right, the main area is titled 'Pipeline Editor' and contains a large grid for building the pipeline. A 'Save' button is located in the top right corner of the main area.

To add a plugin to the pipeline, drag the plugin you want from the left side and drop it on the grid. A dialog that contains the list of versions of that plugin will appear.

The screenshot shows the 'Pipeline Editor' interface with a modal dialog open. The dialog is titled 'Select plugin version' and lists 'Bucket Data Ingest' with two versions: '1.0' and '2.1'. Version '1.0' is described as 'Ingest data from bucket'. Version '2.1' is described as 'Update plugin configuration parameters.' At the bottom right of the dialog is a 'Cancel' button.

Select the version you want to add, and it will be added to the pipeline.

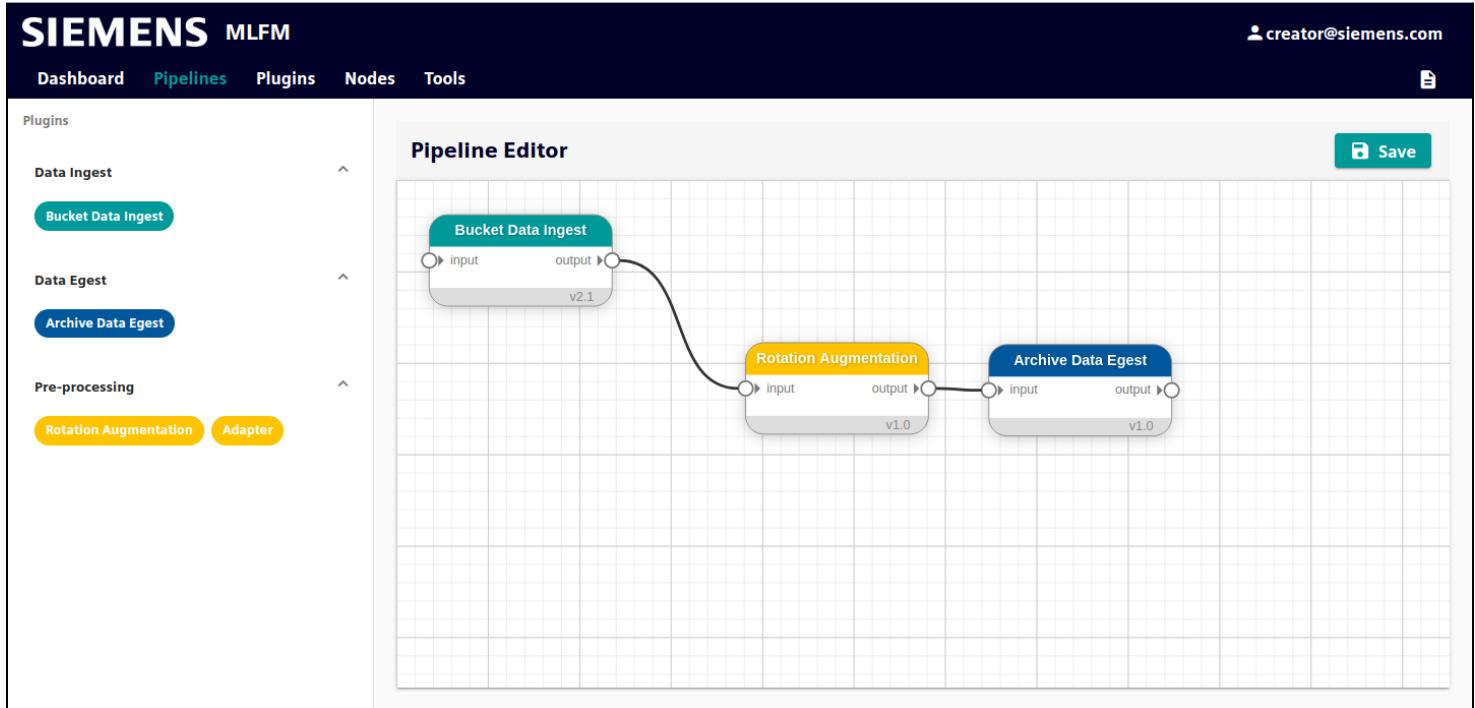
The screenshot shows the SIEMENS MLFM interface. The top navigation bar includes 'Dashboard', 'Pipelines', 'Plugins', 'Nodes', and 'Tools'. The 'creator@siemens.com' user is logged in. On the left, a sidebar titled 'Plugins' lists categories: 'Data Ingest' (Bucket Data Ingest), 'Data Egest' (Archive Data Egest), and 'Pre-processing' (Rotation Augmentation, Adapter). The main area is titled 'Pipeline Editor' and contains a single 'Bucket Data Ingest' node. The node is labeled 'v2.1' at the bottom. A 'Save' button is located in the top right corner of the editor area.

To configure the plugin, left-click on the plugin to select it, and the configuration will appear on the right side. Left-click on any free area on the grid to deselect the plugin, and hide the configuration form.

This screenshot shows the same interface as above, but the 'Bucket Data Ingest' node is now selected, indicated by a dashed border around the node itself. To the right, a 'Configuration Parameters' panel is open, displaying five configuration fields:

- endpoint: localhost:8080 (string)
- access_key: minioadmin (string)
- secret_key: minioadmin (string)
- session_token: (empty string)
- secure: checked (checkbox)

After adding all the plugins and connecting them, click on “Save”.



A form will appear on the right side, enter the pipeline details (like name and description), then click “Submit” to save the pipeline.

The screenshot shows the Siemens MLFM Pipeline Editor interface with a completed pipeline flow. On the right side, a 'Pipeline Details' form is displayed with fields for 'Name', 'Description', 'Version No.' (set to 1.0), and 'Pipeline Tags'. A 'Submit' button is at the bottom of the form. The pipeline flow consists of three nodes: 'Bucket Data Ingest' (v2.1), 'Rotation Augmentation' (v1.0), and 'Archive Data Egest' (v1.0), connected sequentially.

You can see the created pipeline in the [pipelines list](#).

2.2.3. Plugins Page

The plugin in MLFM is an entity for workflow, so workflow consists of some plugins connected with links. So to create a pipeline (workflow), you have to have plugins for that.

2.2.3.1. Plugins list

Plugins list contains all created/imported plugins. This is also where you can import a new plugin.

The screenshot shows the 'Created Plugins' section of the MLFM interface. It lists four plugins with their names in blue and descriptions in grey. A green 'Create plugin' button is located in the top right corner of the list area.

Name	Status
Rotation Augmentation	Ready to use
Archive Data Egest	Ready to use
Bucket Data Ingest Ingest data from bucket	Ready to use
Adapter	Ready to use

Create plugin

Click on a plugin to view the plugin versions, and the details of each version. Here you can also create a new version of that plugin.

SIEMENS MLFM

creator@siemens.com

Dashboard Pipelines Plugins Nodes Tools

Bucket Data Ingest

Version 2.1

Description
Ingest data from bucket

Image URL
10.43.169.85:5000/bucket_data_ingest:50e226be-5c34-4dd9-a68e-643076e525d9

Status
Ready to use

Created On
Mar 24, 2022, 2:30:00 PM

Configuration Schema

Created By
Workflow Creator

Create version

2.2.3.2. Create new plugin

To import a plugin into MLFM, you must have the URL of the plugin's container image.

Note: to build the plugin's container image, you need to use "MLFM SDK" and "MLFM CLI".

When you have the URL of the plugin's container image, go to the "Plugins" page.

Click on the "Create plugin" button in the top-right corner, and a dialog will appear.

Enter the plugin's details, like name, description, and image URL, then click "Create".

The screenshot shows the SIEMENS MLFM web application. At the top, there is a navigation bar with the SIEMENS logo and the text 'MLFM'. On the right side of the header, there is an email address 'creator@siemens.com' and a user icon. Below the header, there is a secondary navigation bar with tabs: 'Dashboard', 'Pipelines', 'Plugins' (which is currently selected), 'Nodes', and 'Tools'. A large modal window titled 'Create Plugin' is open in the center of the page. The modal contains several input fields: 'Plugin Name *' (empty), 'Plugin Description *' (empty), 'Select Node Type *' (dropdown menu open), 'Version' (text input containing '1.0'), 'Image URL *' (empty), and a checkbox labeled 'Needs Credentials?' (unchecked). At the bottom right of the modal are two buttons: 'Create' and 'Cancel'.

The plugin will be imported into MLFM, and once it's ready, it can be used when creating a new pipeline.

2.2.4. Nodes Page

The node in MLFM means a plugin type, so each plugin must have a node.

2.2.4.1. Nodes dashboard

Nodes dashboard contains all created plugin types (nodes) with the ability to edit them, and add new nodes.

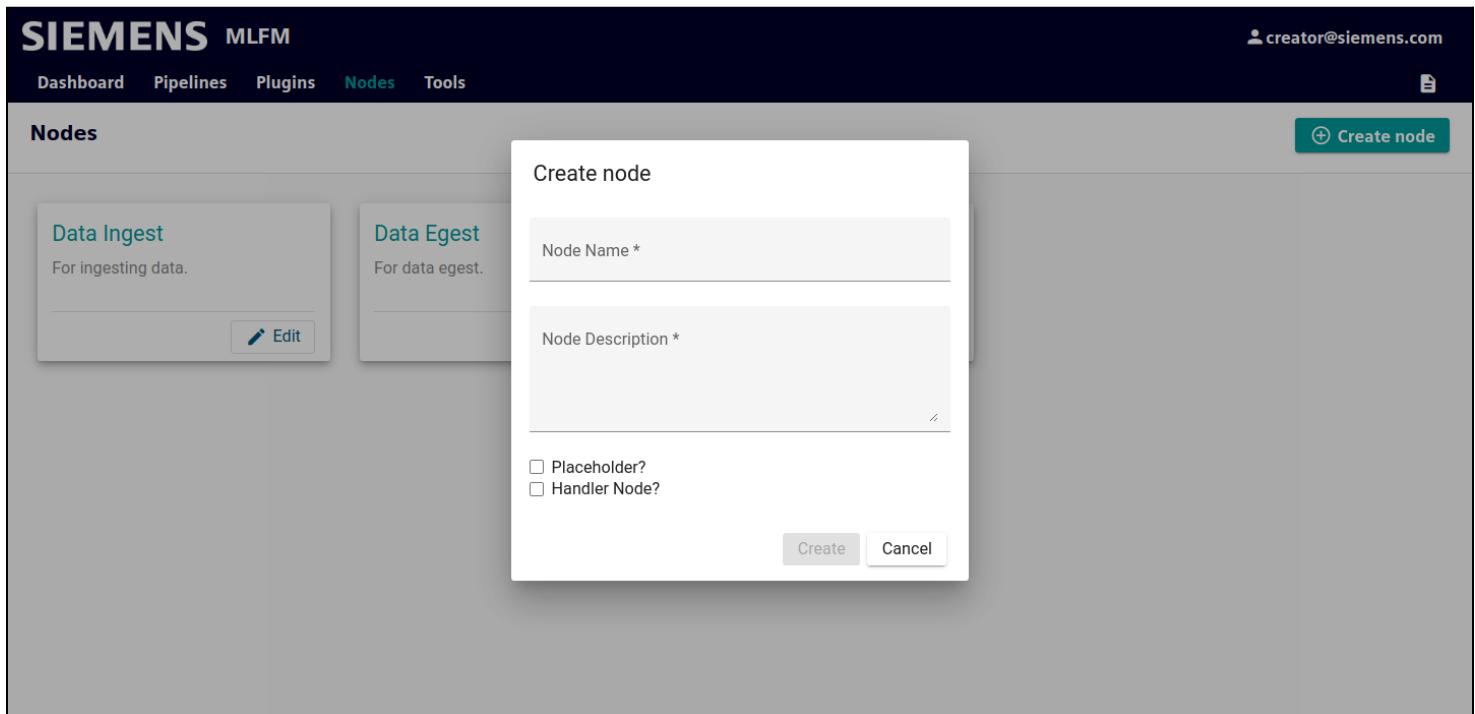
The screenshot shows the 'Nodes' dashboard of the SIEMENS MLFM platform. At the top, there is a navigation bar with links for Dashboard, Pipelines, Plugins, Nodes (which is the active tab), and Tools. On the right side of the header, there is a user profile icon and the email address creator@siemens.com. Below the header, the main content area is titled 'Nodes'. It displays three categories of nodes in separate boxes:

- Data Ingest**: For ingesting data. Includes an 'Edit' button.
- Data Egest**: For data egest. Includes an 'Edit' button.
- Pre-processing**: For pre-processing data before training. Includes an 'Edit' button.

On the far right of the dashboard, there is a green button labeled '+ Create node' with a plus sign icon.

2.2.4.2. Create new node

To create a new node you have to provide node details to the details form which will appear by clicking on the “Create node” button.



Once created, you can create plugins under this node.

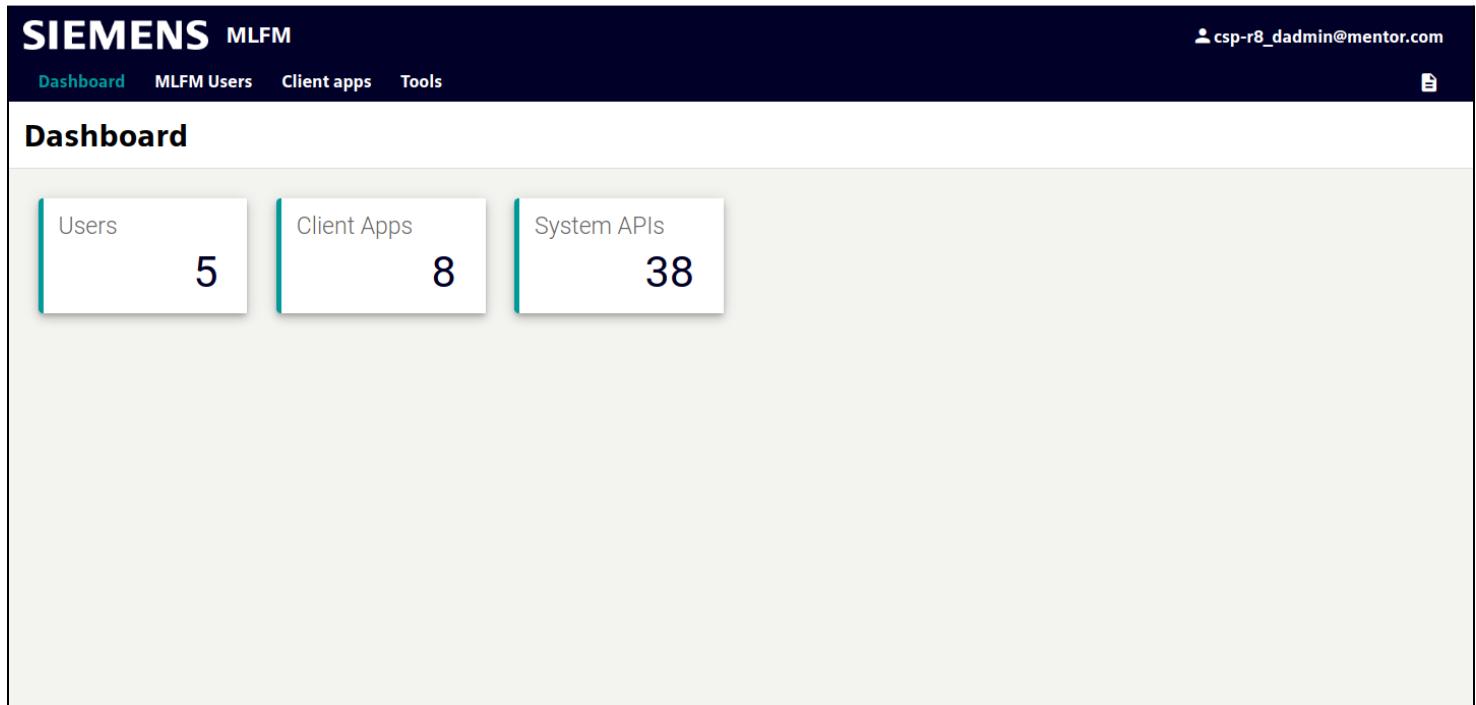
2.2.5. Documentation Page

The last page is the ‘Documentation’ page, and it contains documentation about MLFM and functionalities that the workflow creator can use for guidance or to check steps for a specific task.

2.3. Admin User

2.3.1. Dashboard Page

Contains different widgets to show some statistics about system users, APIs and client apps. Also a navigation bar to navigate to the user management page, client apps page, and documentation page.



The screenshot shows the MLFM Admin Dashboard. At the top, there is a dark header with the SIEMENS MLFM logo on the left and a user icon with the email 'csp-r8_dadmin@mentor.com' on the right. Below the header is a navigation bar with links: Dashboard, MLFM Users, Client apps, and Tools. The main area is titled 'Dashboard'. It features three large, rounded rectangular cards with a teal border. The first card contains the text 'Users' above the number '5'. The second card contains 'Client Apps' above '8'. The third card contains 'System APIs' above '38'. The background of the dashboard is light gray.

2.3.2. User Management Page

2.3.2.1 User Management Board

The user details table shows the created users, their emails and status. Also the admin user is able to add new users to the system by clicking on the create new user button.

Name	Email	Status	Creation Date
dadmin	csp-r8_dadmin@mentor.com	active	
m3-basic_user	basic@siemens.com	active	Sep 25, 2020
m3-datasetmanager	datasetmanager@siemens.com	active	Aug 23, 2021
m3-creator_user	creator@siemens.com	active	Sep 25, 2020
m3-documenter	documenter@siemens.com	active	Apr 22, 2021

2.3.2.2 Create new user

On clicking on the “Add user” button, there is a pop-up to enter user’s details (name, role, email, address and phone)

Name	Email	Status	Creation Date
dadmin	csp-r8_dadmin@mentor.com	active	
m3-basic_user	basic@siemens.com	active	Sep 25, 2020
m3-datasetmanager	datasetmanager@siemens.com	active	Aug 23, 2021
m3-creator_user	creator@siemens.com	active	Sep 25, 2020
m3-documenter	documenter@siemens.com	active	Apr 22, 2021

Add new user

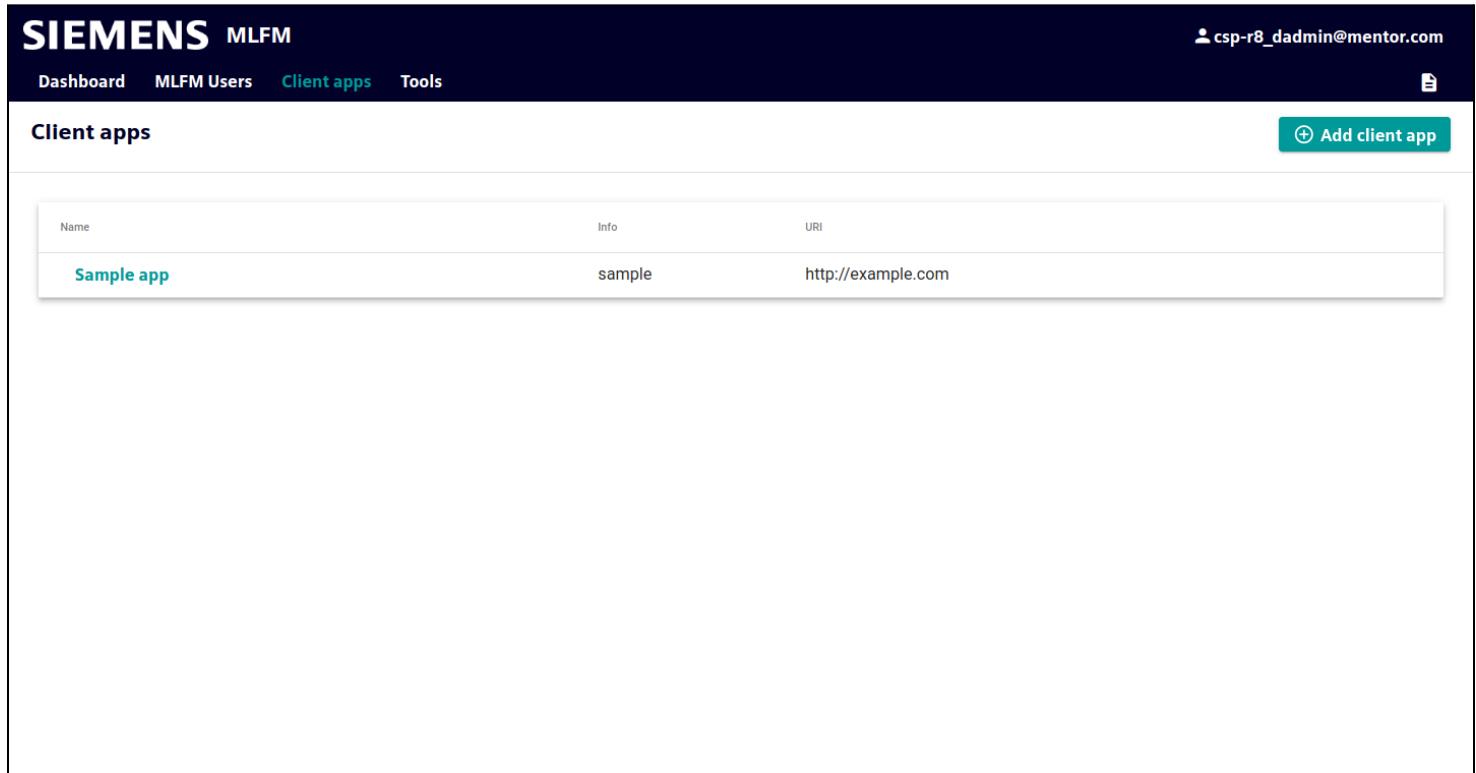
Add
Cancel

By filling the form and clicking on the “Add” button, a new user will be created and added to the users table.

2.3.3. Client Apps Page

2.3.3.1 Client Apps Board

The client apps details table shows the created client apps, their info and URI. Also the admin user is able to add/create new client apps by clicking on the “Add client app” button.

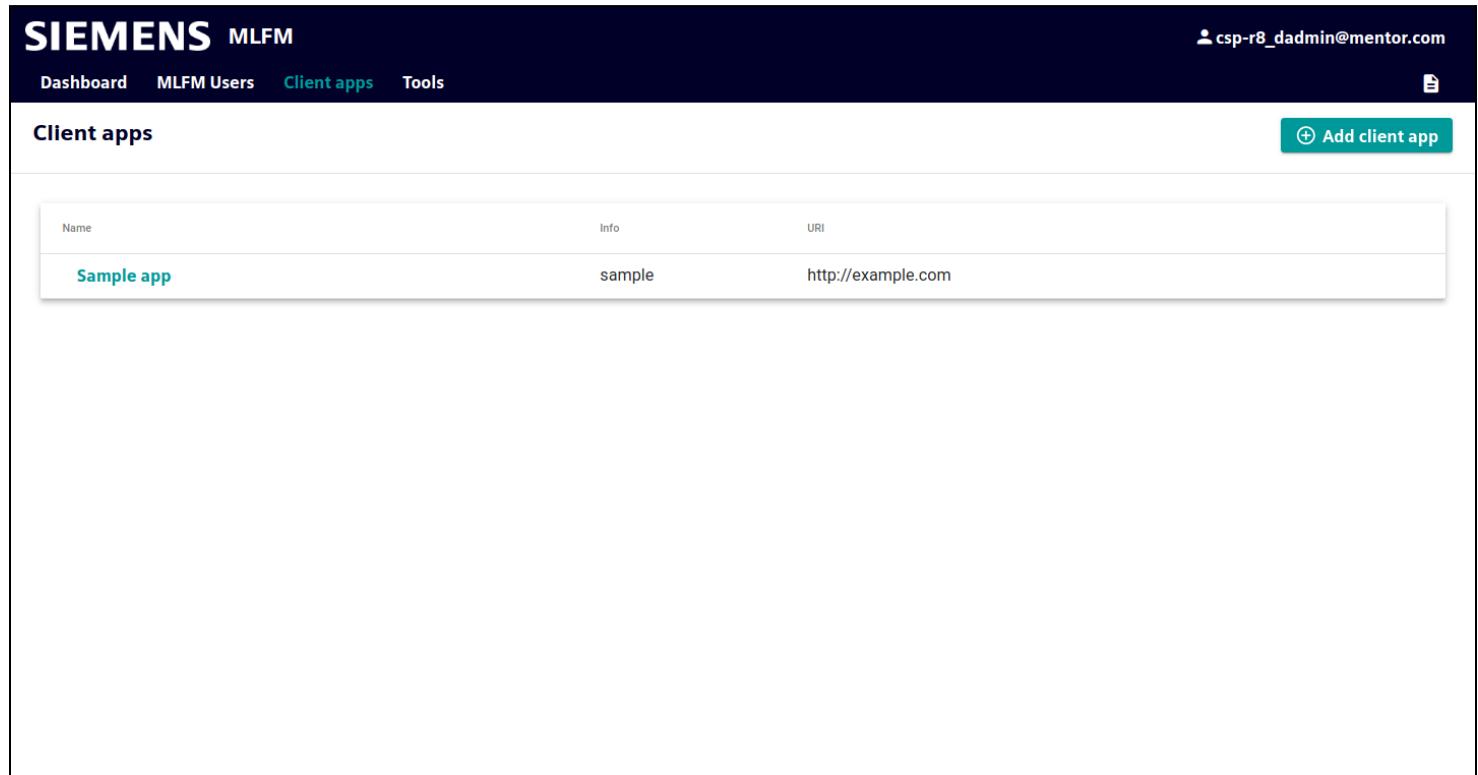


The screenshot shows a web application interface for managing client applications. At the top, there is a header bar with the SIEMENS MLFM logo on the left and a user account icon with the email 'csp-r8_dadmin@mentor.com' on the right. Below the header, a navigation menu includes 'Dashboard', 'MLFM Users', 'Client apps' (which is highlighted in blue), and 'Tools'. A small 'Logout' icon is also present in the top right corner. The main content area is titled 'Client apps'. On the far right of this title bar is a teal-colored button with a plus sign and the text 'Add client app'. The main content area contains a table with one row. The columns are labeled 'Name', 'Info', and 'URI'. The single row displays the values 'Sample app', 'sample', and 'http://example.com' respectively. The entire application has a clean, modern design with a white background and light gray horizontal grid lines for the table.

Name	Info	URI
Sample app	sample	http://example.com

2.3.3.2 Create new client app

On clicking on the “Add client app” button, there is a pop-up to enter the client app’s details (name, info and uri)



The screenshot shows a web application interface for managing client applications. At the top, there is a header with the SIEMENS MLFM logo and a user email address (csp-r8_dadmin@mentor.com). Below the header, a navigation bar includes links for Dashboard, MLFM Users, Client apps (which is the active tab, indicated by a teal color), and Tools. On the right side of the header, there is a small profile icon and a file icon. The main content area is titled "Client apps". It contains a table with one row, showing the following data:

Name	Info	URI
Sample app	sample	http://example.com

At the top right of the table, there is a green button labeled "+ Add client app" with a plus sign icon.

By filling the form and clicking on the save button, a new client app will be created and added to the client apps table.

2.3.3.3 Client app details

It is a page that is shown when the user clicks on a client app from the table. It contains a tab for general information about the created client app and its app and secret keys, and another tab for subscribed APIs and another tab for instructions on

how to use the created keys to integrate with MLFM.

The screenshot shows the SIEMENS MLFM web interface. At the top, there is a dark header bar with the SIEMENS logo and the text "MLFM". On the right side of the header, there is a user icon and the email address "csp-r8_dadmin@mentor.com". Below the header, there is a navigation menu with links: "Dashboard", "MLFM Users", "Client apps" (which is the active tab, indicated by a blue background), and "Tools".

The main content area has a title "Sample app" and a breadcrumb navigation path: "Client apps > Sample app".

On the left side, there is a sidebar with three items: "Overview" (selected and highlighted in grey), "Subscriptions", and "Help".

The main content area is titled "Overview" and displays two key values:

- App key**: 3c228038-2e8b-4178-b1fd-2ecfefc8bc0e
- Secret key**: (represented by a series of dots and a copy/paste icon)

2.3.3.4 APIs Subscription

To add an API subscription to a client app, click on “Subscriptions” on the left side, then click on the “Add subscription” button in the top-right corner.

The screenshot shows the SIEMENS MLFM web application. At the top, there is a dark header bar with the SIEMENS logo and the text "MLFM". On the right side of the header, there is a user icon and the email address "csp-r8_dadmin@mentor.com". Below the header, there is a navigation menu with four items: "Dashboard", "MLFM Users", "Client apps" (which is highlighted in blue), and "Tools".

The main content area has a title "Sample app" and a breadcrumb trail "Client apps > Sample app". To the left of the main content, there is a sidebar with three items: "Overview", "Subscriptions" (which is highlighted with a grey background), and "Help".

The main content area is titled "Subscriptions". At the top right of this section, there is a green button with a plus sign and the text "+ Add subscription". Below the button, there is a table with four columns: "API name", "Package", "Method", and "Public URI". The table contains three rows of data:

API name	Package	Method	Public URI	Start date
Get projects	Gold - Monthly	GET	/mlfm/v1/user/{userId}/projects	May 26, 2022, 2:14:00 PM
Add new project	Gold - Monthly	POST	/mlfm/v1/user/{userId}/project	May 26, 2022, 2:13:31 PM
Add new run	Gold - Monthly	POST	/mlfm/v1/experiment/{experimentId}/run	May 26, 2022, 2:13:43 PM

By clicking on that button a pop-up will appear with the available APIs that the user can subscribe to. The user will be able

to choose the required API and click on the save button.

The screenshot shows the SIEMENS MLFM application interface. At the top, there is a navigation bar with links for Dashboard, MLFM Users, Client apps (which is the active tab), and Tools. The user's email, csp-r8_dadmin@mentor.com, is displayed in the top right corner. Below the navigation bar, the main area has a title "Sample app" and a breadcrumb trail "Client apps > Sample app". On the left, there is a sidebar with three tabs: Overview, Subscriptions (which is selected and highlighted in grey), and Help. The main content area displays a table titled "Subscriptions" with three rows:

API name	Package
Get projects	Gold - Monthly
Add new project	Gold - Monthly
Add new run	Gold - Monthly

To the right of this table, a modal window titled "Add subscription" is open. It lists several API endpoints with their corresponding package requirements:

- Add artifact (POST)
- Add graph (POST)
- Add new experiment (POST)
- Add new node (POST)
- Add new project (POST)
- Add new run (POST)
- Configure and Deploy Pipeline (POST)
- Create new pluain

At the bottom of the modal, there are two buttons: "Add" and "Cancel".

2.4. Documenter User

2.4.1. Dashboard Page

Contains a widget that shows some statistics about system documentation. Also a navigation bar to navigate to the user documentation page.

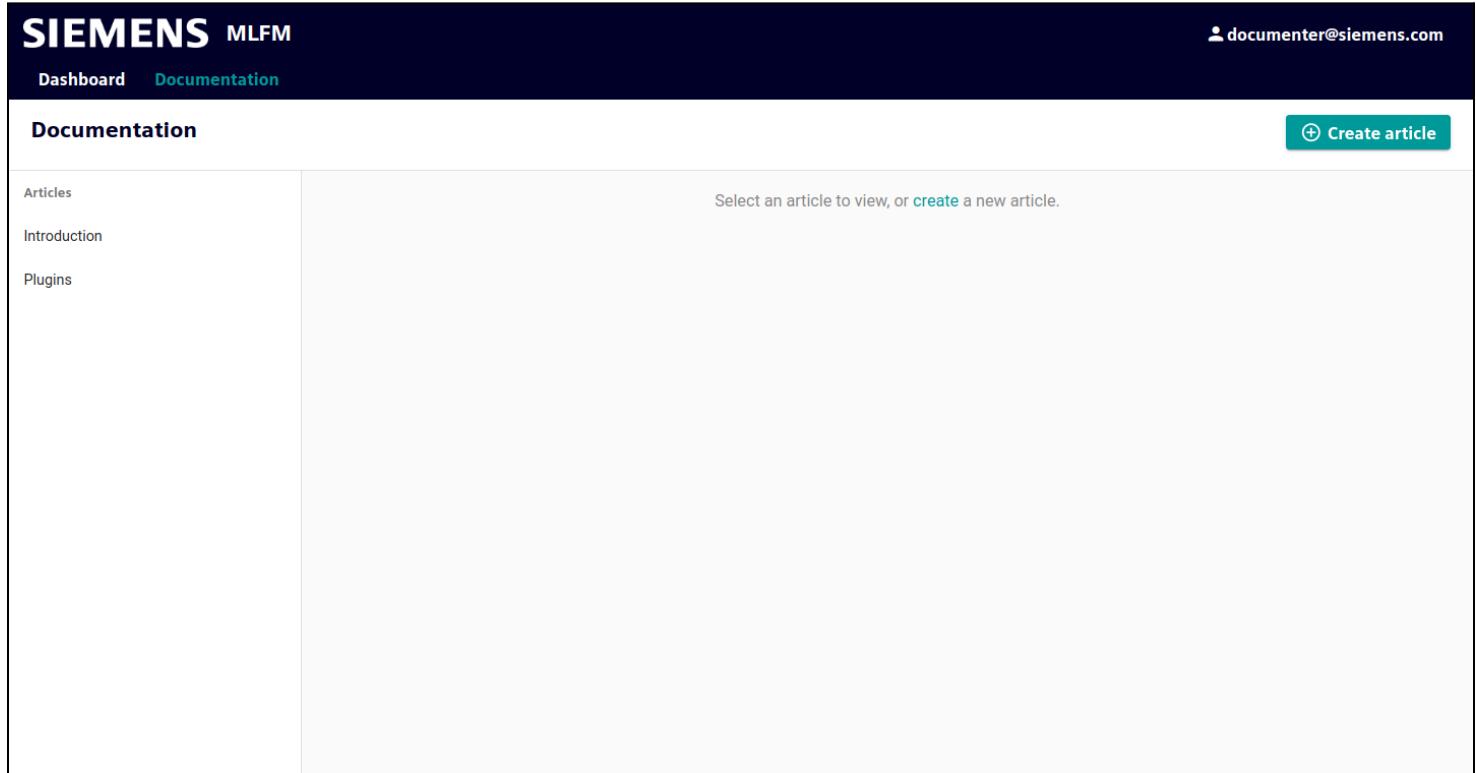


The screenshot shows the dashboard of the SIEMENS MLFM Documenter User interface. At the top, there is a dark header bar with the SIEMENS logo and the text "MLFM". On the right side of the header, there is an email address: "documenter@siemens.com". Below the header, there is a navigation bar with two items: "Dashboard" and "Documentation". The main area is titled "Dashboard". Inside this area, there is a card-like widget with a teal border. The text "Created Docs" is displayed above the number "2", indicating the count of created documents.

2.4.2. Documentation Page

2.4.2.1 Documentations List

It contains all system documentation. The user will be able to view the documentation and also has the ability to edit and create new documentation as well.



The screenshot shows a web-based documentation interface for Siemens MLFM. At the top, there is a dark header bar with the Siemens logo and the text "MLFM". On the right side of the header, there is an email address: "documenter@siemens.com". Below the header, there is a navigation bar with two items: "Dashboard" and "Documentation". The "Documentation" item is highlighted, indicating it is the active page. The main content area is titled "Documentation". On the left side of this area, there is a sidebar with a vertical list of categories: "Articles", "Introduction", and "Plugins". To the right of the sidebar, there is a large white space with the text "Select an article to view, or [create](#) a new article." In the top right corner of the main content area, there is a green button with the text "+ Create article" and a small icon.

2.4.2.2 Add new documentation

On clicking the “Create article” button, there is another page to enter the article’s title and content.

The content can be written in the “markdown” editor on the left side, and a live-preview is visible on the right side.

The screenshot shows the 'Create article' page in the Siemens MLFM Documentation system. At the top, there is a header with the Siemens logo and the text 'MLFM'. On the right, there is an email address: 'documenter@siemens.com'. Below the header, there are two navigation links: 'Dashboard' and 'Documentation'. The main area is titled 'Create article' and shows the path 'Documentation > Create article'. There are two buttons at the top right: 'Discard' and 'Save'. A text input field labeled 'Title *' is present. Below it is a rich-text editor toolbar with various icons for bold, italic, heading, and other formatting options. The main content area is a large text editor window where the number '1' is currently displayed. The entire interface has a clean, modern design with a dark header and light body.

When done, click “Save” to save the new article.