

Industrial Edge Flow Creator

Operating Manual

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Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

 DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.

 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.

 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.


If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

 WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Data Protection

Siemens observes the principles of data protection, in particular the principle of data minimization (privacy by design). This means for this SIMATIC product, the product does not process / save any personal information.

Security Information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines, and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines, and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
<https://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
<https://www.siemens.com/industrialsecurity>.

Customers are responsible for protecting the Industrial Edge Flow Creator within the Industrial Edge Device and for preventing unauthorized access to the Industrial Edge Flow Creator.

Read and write access to controllers Industrial:

Edge does not in itself support read or write access to controller data. The Industrial Edge Flow Creator for example, can only grant read access to controller data; customer can download the write node from internet, which can grant write access to controller data. Customers are responsible for managing read and write access of Industrial Edge Flow Creator controller data. Customers are responsible for any damages that are caused by changing or overwriting controller data. In addition, customers are also responsible for protecting Industrial Edge Flow Creator that have write access to controller data with regard to security and preventing unauthorized access to Industrial Edge Flow Creator apps.

Introduction to Industrial Edge Flow Creator

The Industrial Edge Flow Creator (IE Flow Creator) application is a web browser-based programming tool that works on any platform. It is used to develop and deploy software services to hardware devices. This browser-based application is an editor that is designed for the Internet of Things.

It is also used to create solution-oriented, message-based flows.

Advantages of IE Flow Creator application

- As Industrial Edge Flow Creator is a web-based application, you can easily re-create your programs in the application as flows and deploy them simultaneously with a single click.
- A built-in library allows you to save functions, templates, and flows for reuse.
- JavaScript based functions can be easily created.
- The flows are saved using JSON and can be easily imported and exported.

Log into Industrial Edge Flow Creator

When you launch the IE Flow Creator application, the login page is displayed. You can log into IE Flow Creator application using Industrial Edge Device login credentials or login credentials provided by admin.

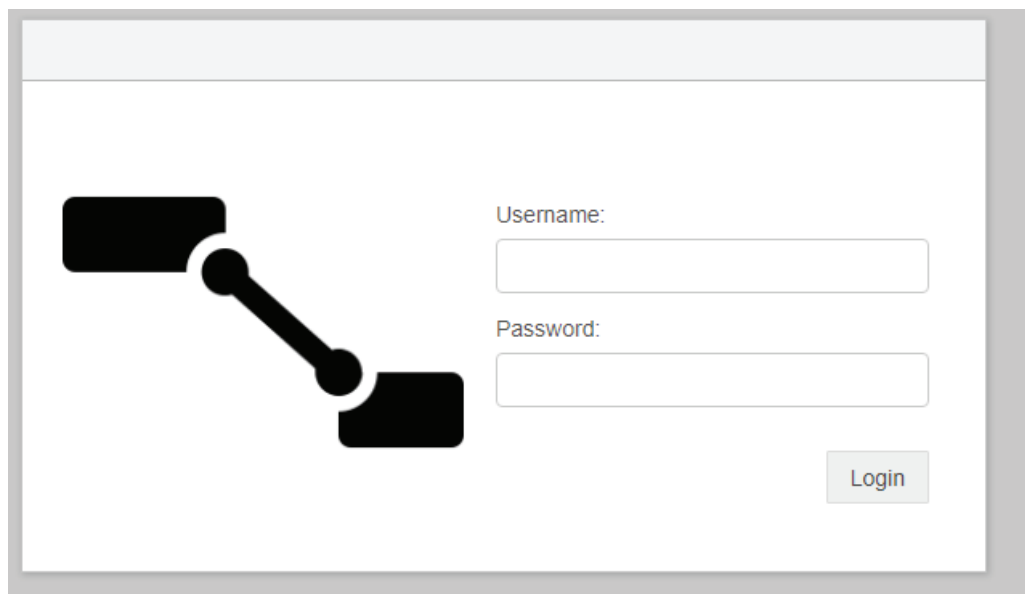
Prerequisite

You must have admin login credentials to be able to log in with 'Read' and 'Write' permission.

Procedure

To log into IE Flow Creator application, follow these steps:

1. Launch IE Flow Creator application.
The following page is displayed:




2. Enter the username and password in "Username" and "Password" fields respectively and click "Login".
The IE Flow Creator application is displayed.

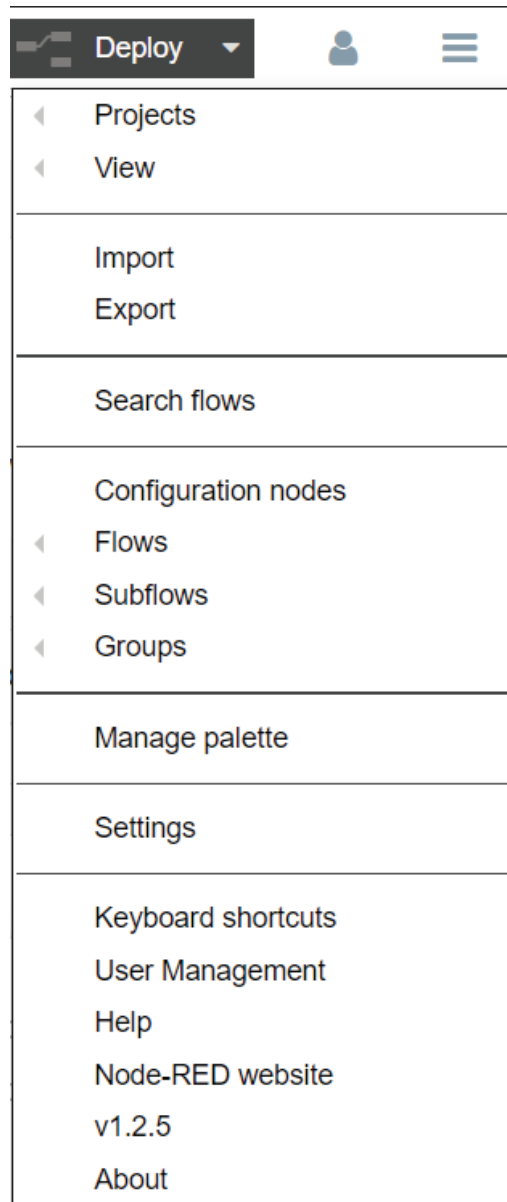
Note

- If you try to log in with random credentials, then the error message is displayed.
 - If admin deletes a user from the group and the user tries to login with the same credentials, then the error message is displayed.
 - ~!@#\$\$^&*-<>/?_\\%|{} special characters are allowed in password field while logging into IE Flow Creator and while adding users from User Management.
-

User Management

To log into User Management, follow these steps:

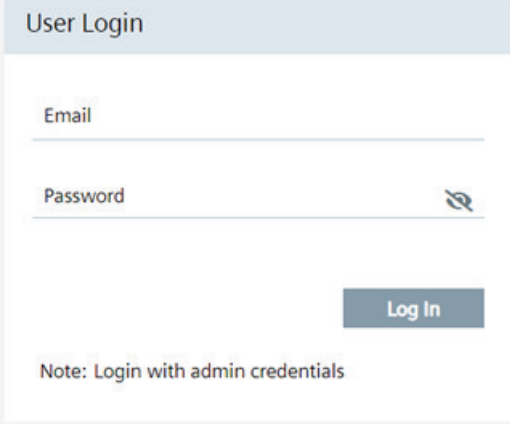
1. Click  in the upper-right corner.
The menu is displayed as follows:



2. Click "User Management".
The "User Management" login page is displayed as follows:

User Management

SIEMENS Industrial Edge



The screenshot shows a 'User Login' form within a 'User Management' interface. The form has a light blue header with the text 'User Login'. Below the header are two input fields: 'Email' and 'Password'. The 'Password' field includes a small icon of an eye with a slash through it, indicating a toggle for password visibility. A dark blue 'Log In' button is positioned to the right of the 'Password' field. Below the input fields, there is a note: 'Note: Login with admin credentials'.

Note

You must be logged in with admin credentials (Industrial Edge Device login credentials) to redirect to next page. Only admin is authorized to perform add user and delete user operations. If you try to log in with user credentials other than admin credentials, then the error message is displayed.

3. Enter the email and password in "Email" and "Password" fields respectively and click "Log In". The "User Management" page is displayed as follows:

The screenshot shows the 'User Management' interface. At the top left, the text 'User Management' is displayed. At the top right, the 'SIEMENS Industrial Edge' logo is visible. Below the header, there are two buttons: '+ Add User' and 'Delete User'. A table with the following columns is shown: First Name, Last Name, Email ID, and Permission. The table contains one row of data:

<input type="checkbox"/>	First Name	Last Name	Email ID	Permission
<input type="checkbox"/>	two	enter	two@siemens.com	Read

The list of users is displayed in the table if users are present in edge auth Database.

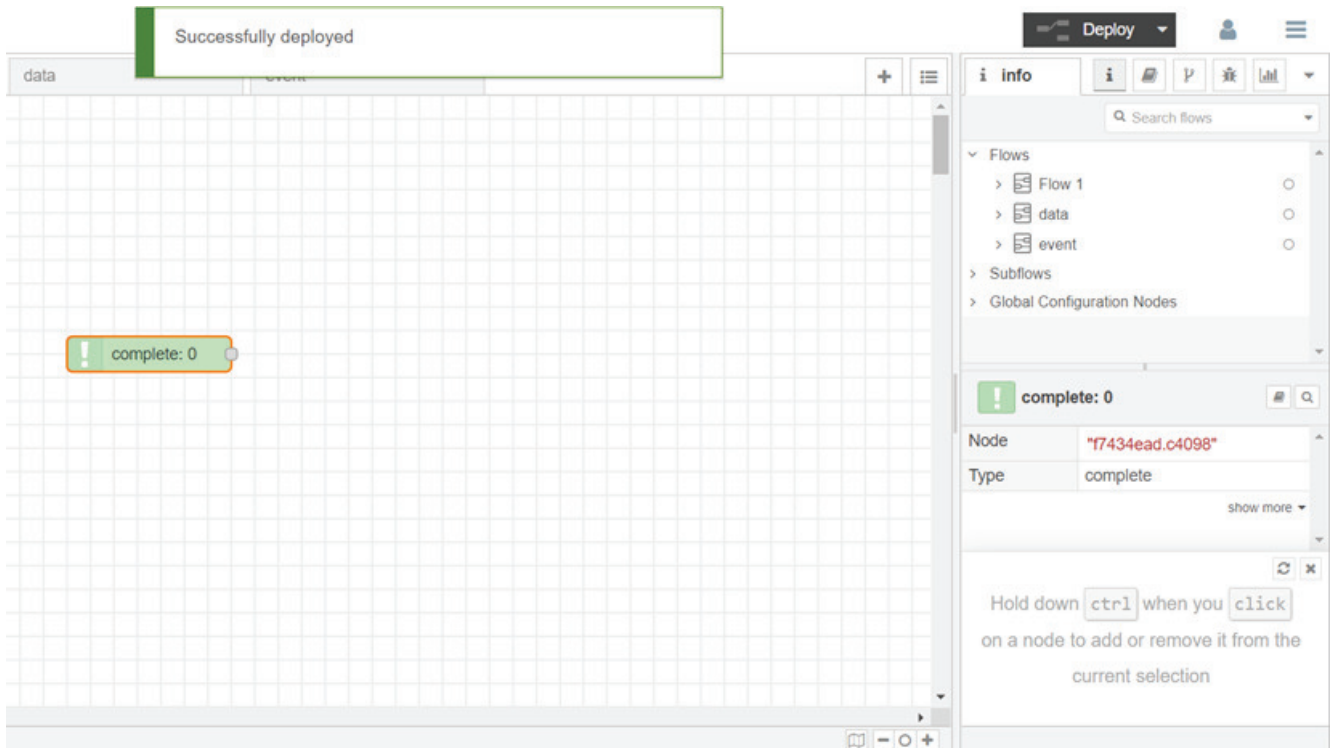
You can add a user using "Add User" button by providing specific permission. The admin can delete the users using "Delete User" button as required.

if you leave "User Management" page idle for 10 minutes, then the session automatically gets closed with a pop-up and you are redirected to login page.

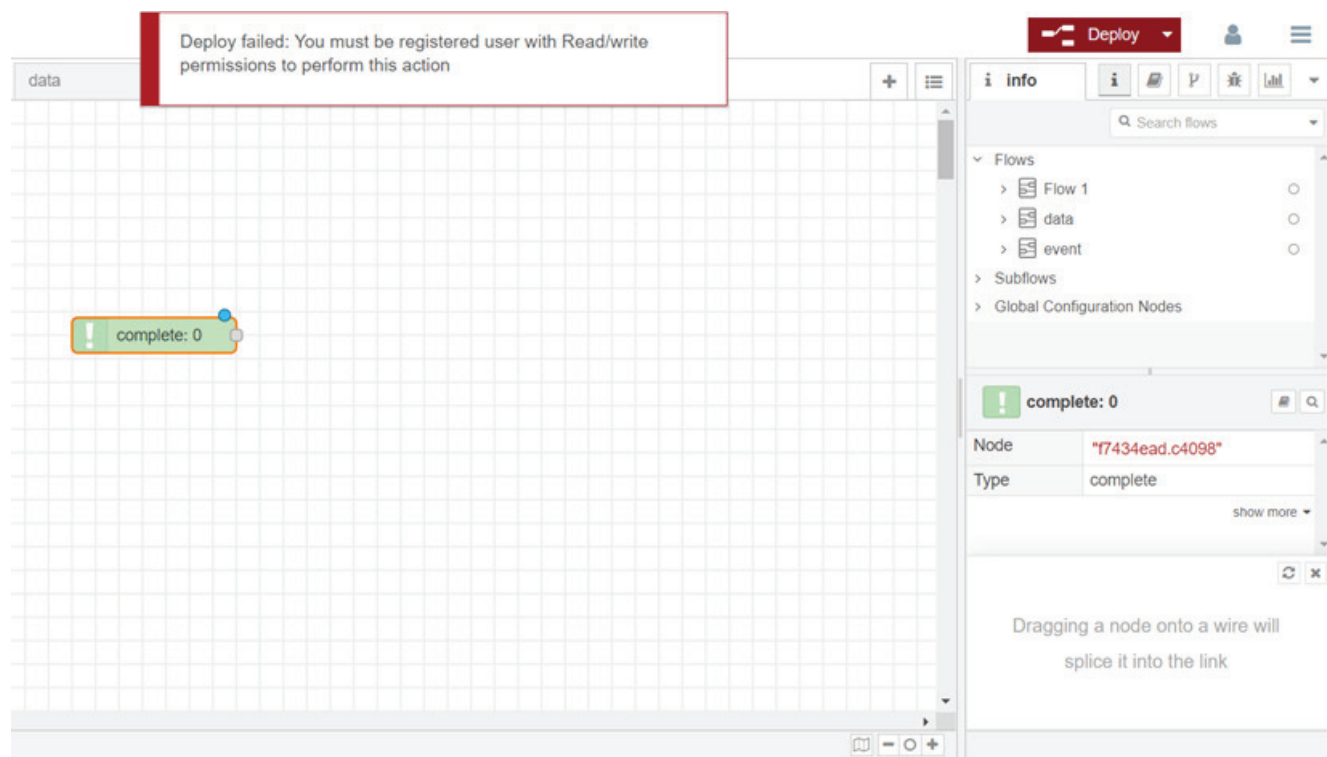
IE Flow Creator Access Permission

Based on the login credentials, IE Flow Creator provides the following access permissions:

- Read and Write Permission
User added by the admin with read and write permission from the user management gets read and write access. With read and write access, you can edit the flow and deploy it successfully, and can perform other operations like installing nodes from palette.



- Read Permission
User added by the admin with read permission from the user management can only have read access. With only read access, you can view the flow and edit the flow, but you cannot deploy the flow. With read access, all other operations are also restricted.

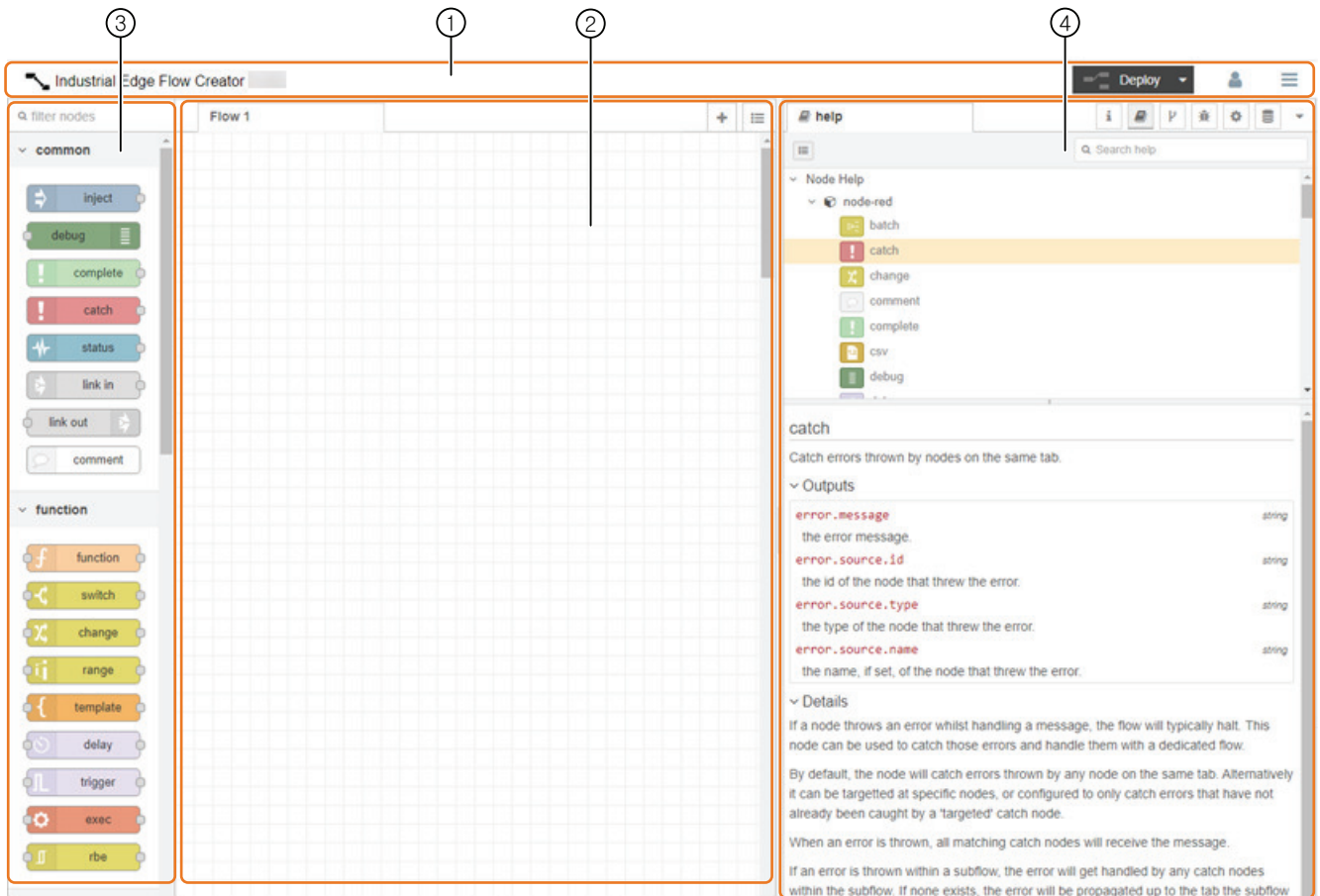


Working with Industrial Edge Flow Creator

Industrial Edge Flow Creator Editor Window

The "Industrial Edge Flow Creator" editor window is the user-interface of IE Flow Creator application. Through this interface, you can drag-and-drop nodes to create flows/subflows.

Flows are the programs you create using this application.



The editor window is divided into the following areas:

Heading	Description
① Header area	The header is at the top of the editor window.
② Workspace	The workspace is an area for creating flows.




5.1 Header

Heading	Description
③ Palette	The palette on the left of the screen displays the available nodes.
④ Sidebar	The sidebar on the right of the screen displays: <ul style="list-style-type: none"> • Node information • Debug messages • Configuration nodes • Context Data • Project History • Dashboard

5.1 Header

Introduction

Each button on the header area has a specific functionality to perform. The following table describes the various buttons and their functions:

Command	Function
	Deploys the created or modified flows.
	Displays the user's profile and logout option.
	Opens the menu with further functions.

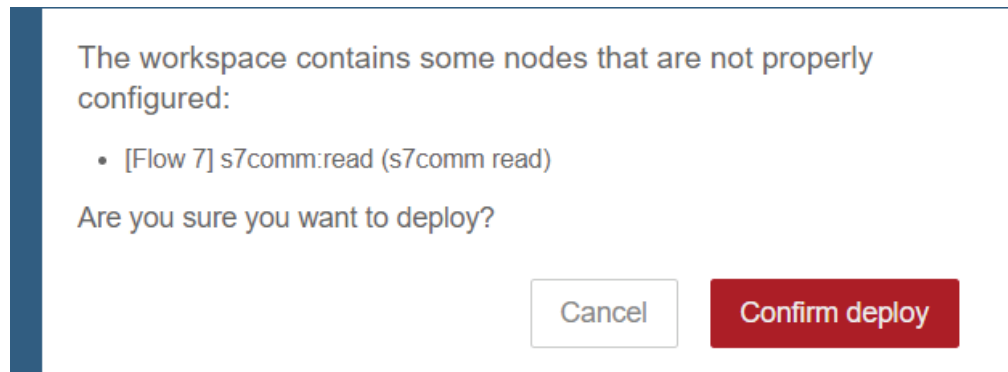
Deploy

After creating a flow, it must be deployed in the server. This action saves the flows as well as runs them.

Deploy is categorized into three types:

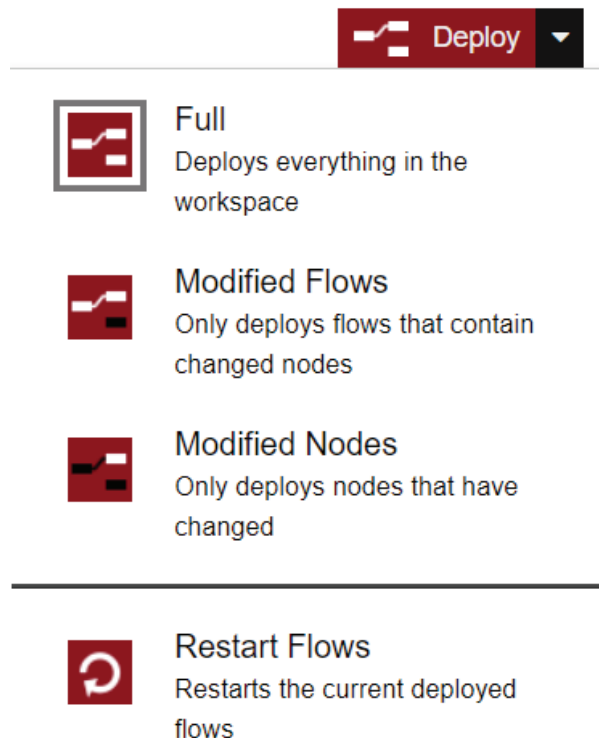
Command	Function
Full	Deploys all the flows in the workspace.
Modified flows	Deploys flows that contain modified nodes.
Modified nodes	Deploys only the modified nodes.

If the nodes are not configured properly, a pop-up message appears for confirmation before deploying. Click "Confirm deploy" or "Cancel" as needed.



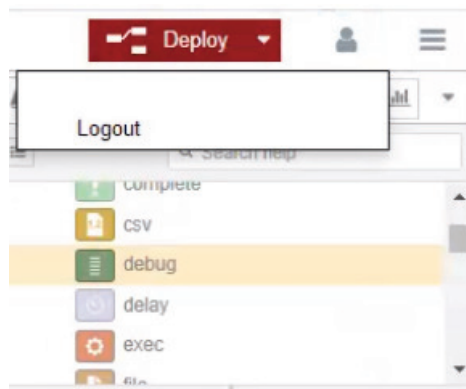
When you deploy a flow, you will receive a message notification as "Successfully deployed" in the editor.

Additionally, application provides you "Restart Flow" option to restart the current deployed flows.



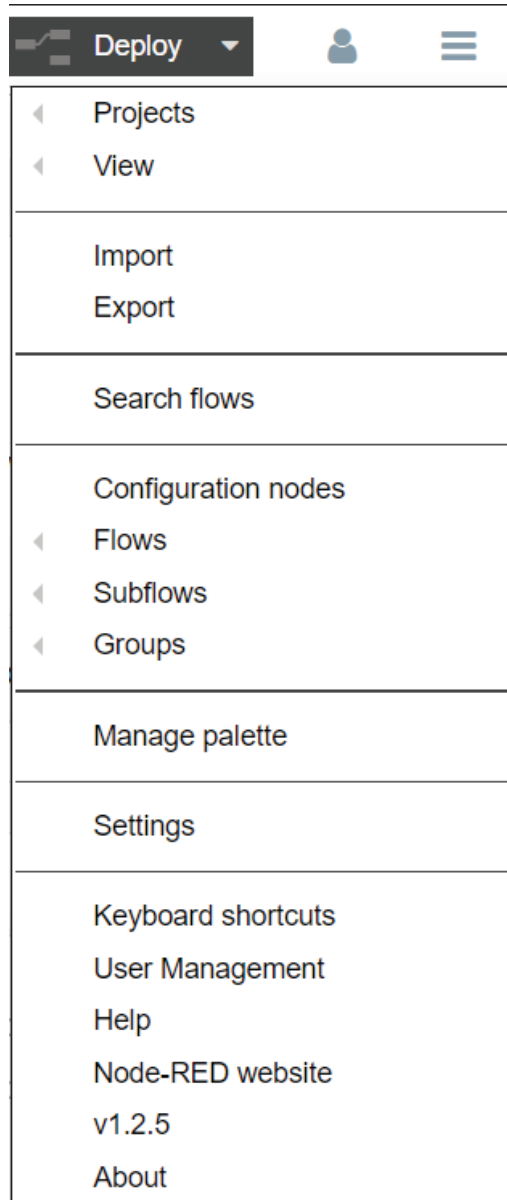
User profile

The user profile displays the logout option.



Menu

The menu contains a variety of options that you can use to work with IE Flow Creator application.







You can do various actions like view, import, flow, help, and so on.

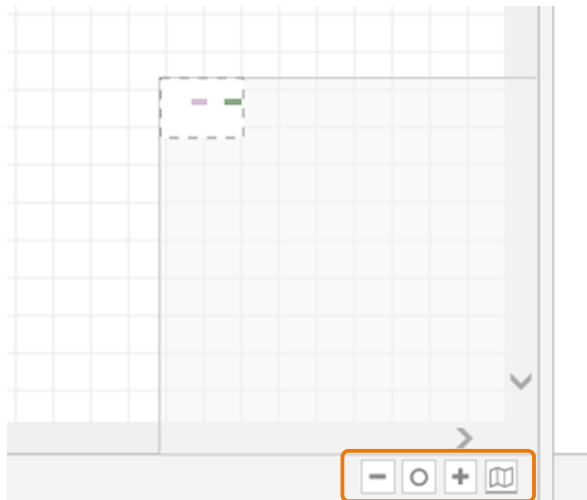
5.2 Workspace

The workspace is the empty squared area in the center of the editor where flows are created.

View Tools

The right-hand bottom of the workspace contains the following buttons:

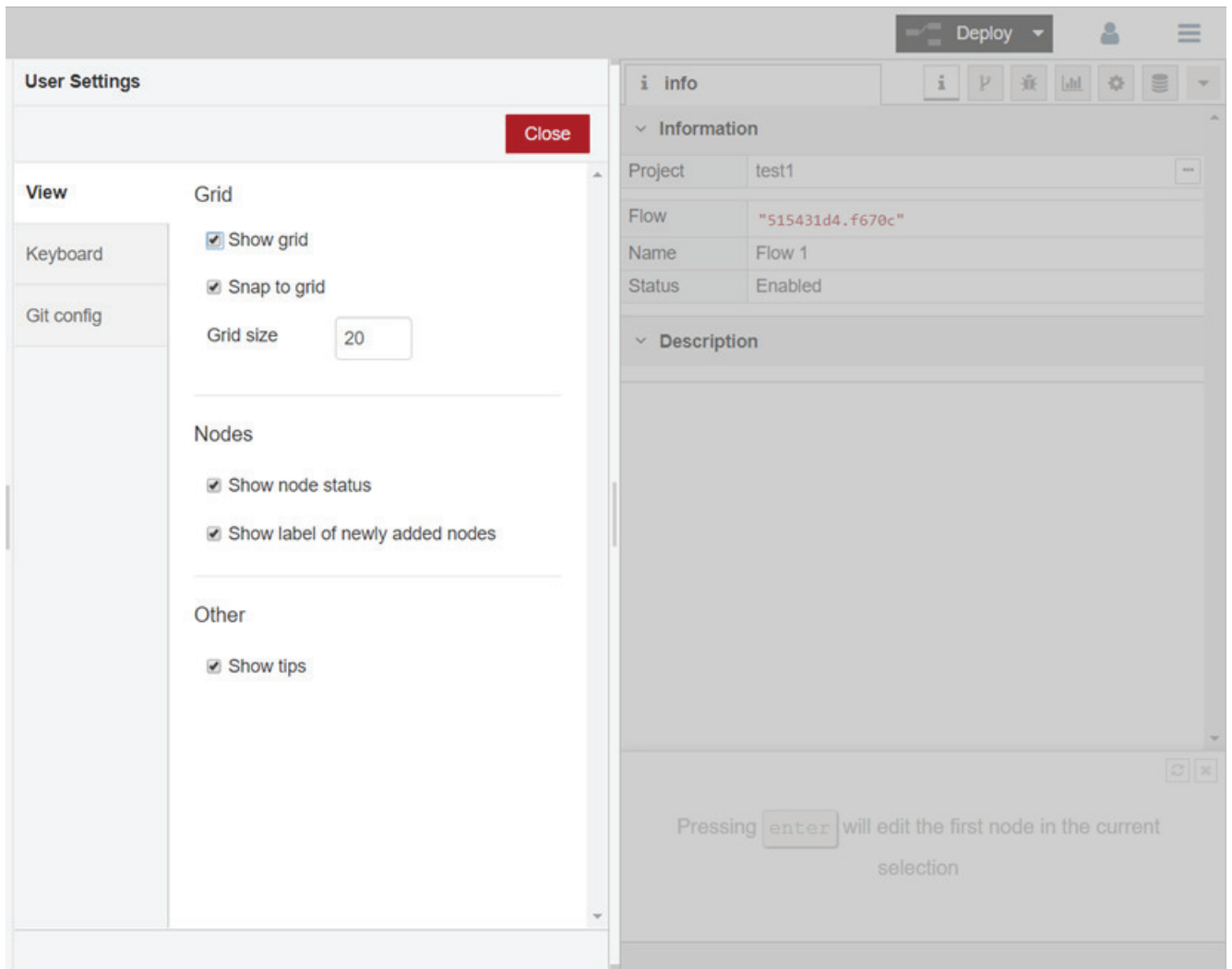
Icon	Function
	Maximizes the selected area in the workspace.
	Minimizes the selected area in the workspace.
	Resets to default zoom level.
	Displays the scaled-down view of the workspace where the area is highlighted. Drag the selected area around to view the nodes lost in the open-end workspace. You can also use it to jump to different areas of the workspace.



Customizing the workspace

To customize the workspace, do as follows:

1. Go to "Menu > Settings > View".
2. Choose the desired options provided in the "View" tab to customize the workspace.
3. Click "Close".



5.2.1 Projects

IE Flow Creator allows you to manage your flow files and include version control of your flows using "Projects". You can perform the following tasks:

- Create Project
- Clone Repository
- Open Existing Project
- Delete Project
- Edit Project

5.2 Workspace

5.2.1.1 Create Projects

When you log into IE Flow Creator, you are prompted to create a project, clone a repository, or open a project. If you choose to skip this, you can create a project later using the "Menu".

To create a project,

1. Go to "Menu > Projects > New".
The following dialog box opens:



Hello! We have introduced 'projects' to Node-RED.

This is a new way for you to manage your flow files and includes version control of your flows.

To get started you can create your first project or clone an existing project from a git repository.

If you are not sure, you can skip this for now. You will still be able to create your first project from the 'Projects' menu at any time.



Open existing project

Not right now

2. Click "Create Project".
The following dialog box appears:



Setup your version control client

Node-RED uses the open source tool Git for version control. It tracks changes to your project files and lets you push them to remote repositories.

When you commit a set of changes, Git records who made the changes with a username and email address. The Username can be anything you want - it does not need to be your real name.

You can change these settings later under the 'Git config' tab of the settings dialog.

Username

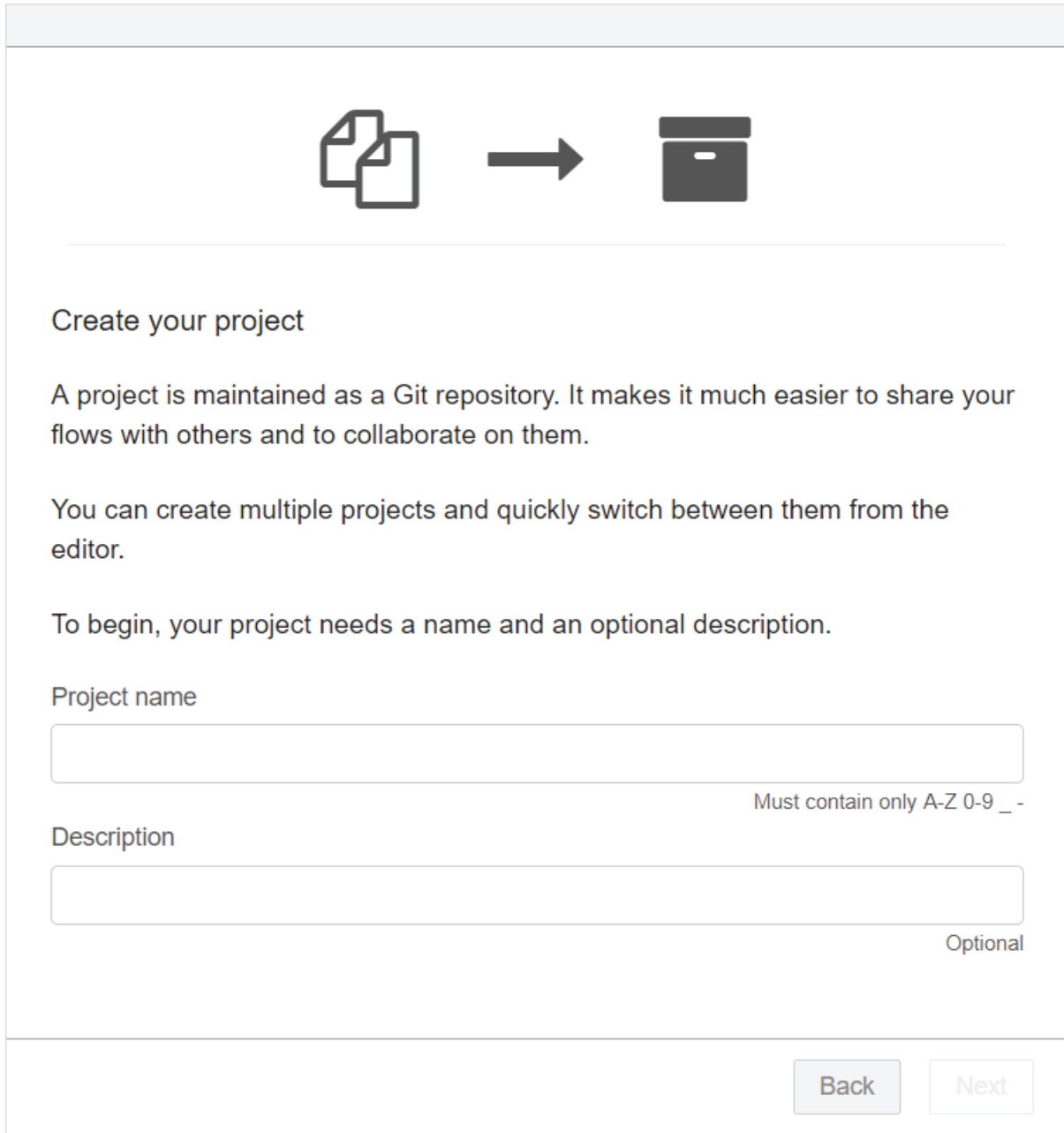
Email




Back

Next

3. Enter the username and email address in "Username" and "Email" fields respectively and click "Next".

The following dialog box appears:



Create your project

A project is maintained as a Git repository. It makes it much easier to share your flows with others and to collaborate on them.

You can create multiple projects and quickly switch between them from the editor.

To begin, your project needs a name and an optional description.

Project name

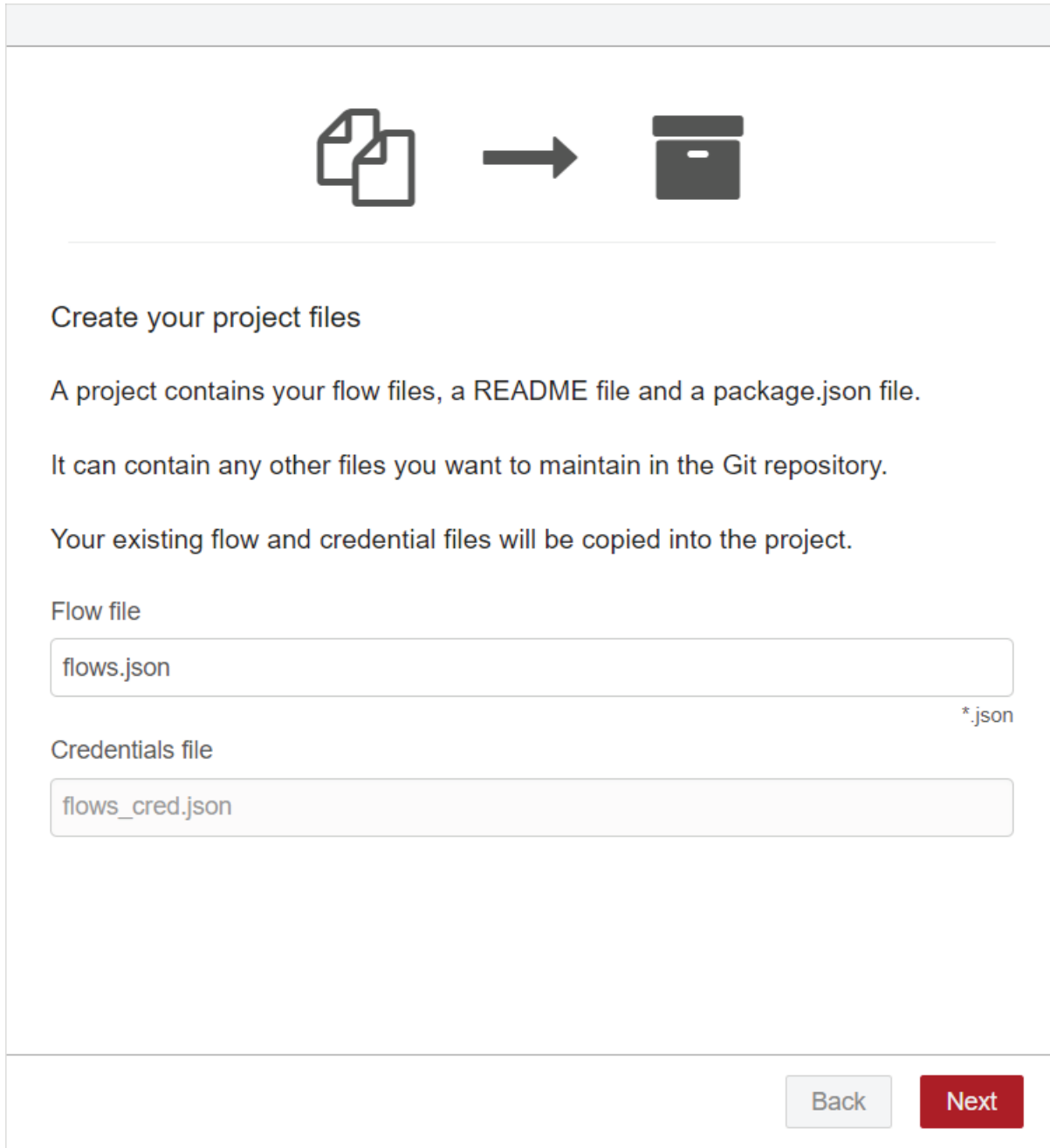
Must contain only A-Z 0-9 _ -

Description

Optional

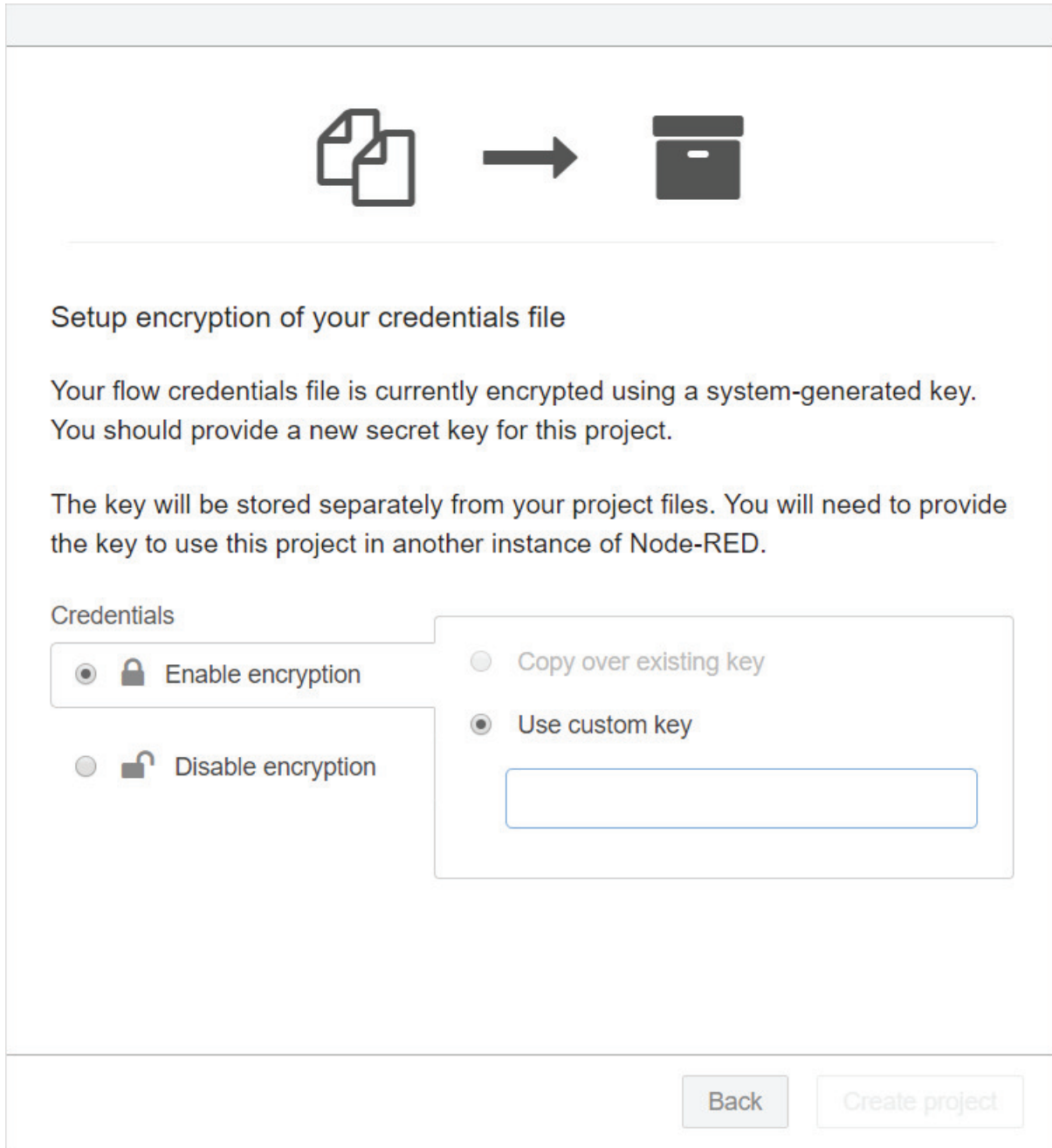
5.2 Workspace



- 4. Enter the project name and description (optional) in "Project name" and "Description" fields respectively and click "Next".
The following dialog box appears:



The dialog box features a header with an icon of two overlapping documents on the left, a right-pointing arrow in the center, and a server rack icon on the right. Below this is the title "Create your project files" and three paragraphs of text explaining project contents and file copying. Two input fields are provided: "Flow file" with the value "flows.json" and a "* .json" label to its right, and "Credentials file" with the value "flows_cred.json". At the bottom right, there are "Back" and "Next" buttons.

5. Define the flow file in "Flow file" field and click "Next".
The following dialog box appears:




 → 


Setup encryption of your credentials file

Your flow credentials file is currently encrypted using a system-generated key. You should provide a new secret key for this project.

The key will be stored separately from your project files. You will need to provide the key to use this project in another instance of Node-RED.

Credentials

 Enable encryption

 Disable encryption

Copy over existing key

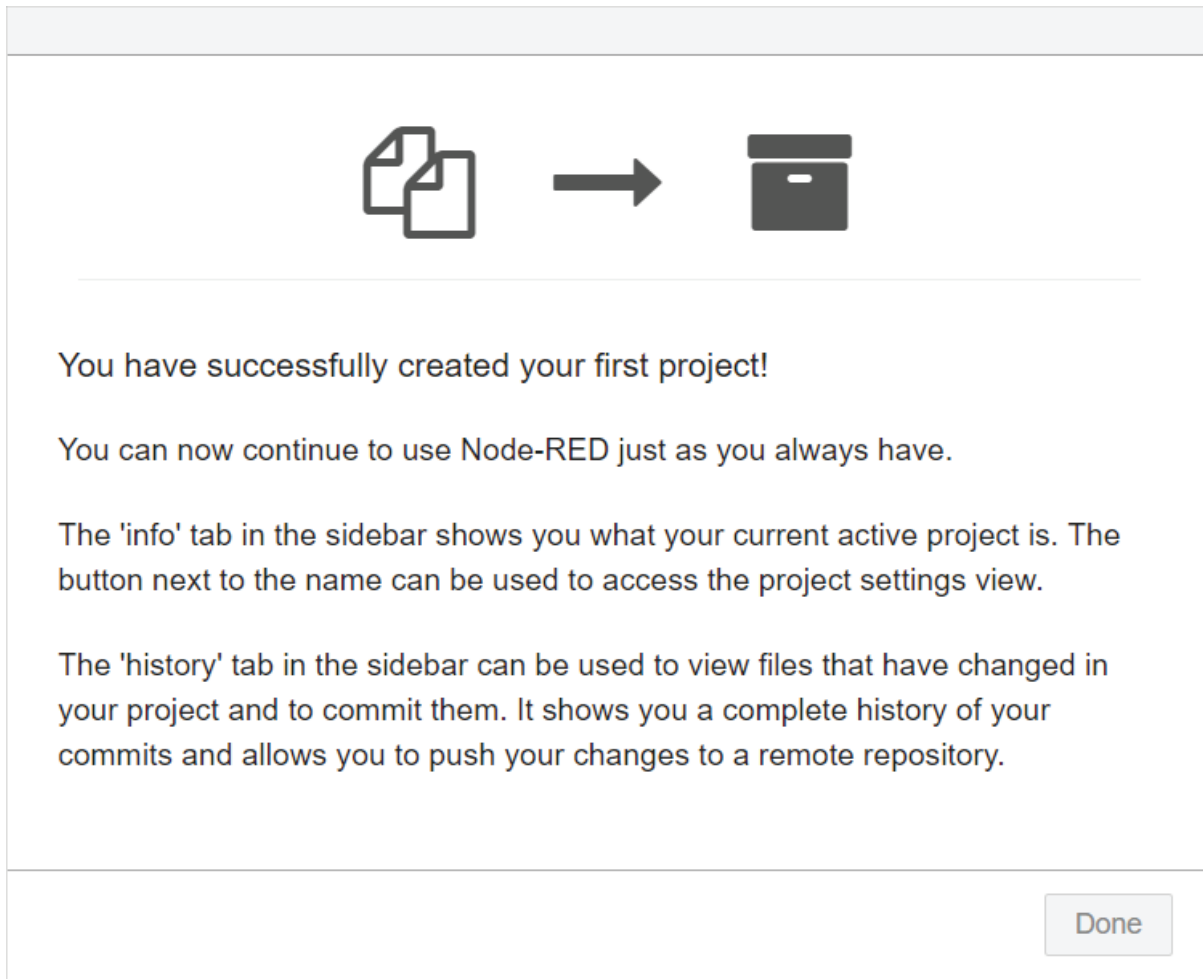
Use custom key

5.2 Workspace

- 6. Do one of the following:
 - Select "Enable encryption" to enable the encryption and enter the secret key in "Use custom key" field.
 - Select "Disable encryption" to disable the encryption.

The "Create project" button is enabled.

- 7. Click "Create project".
The project is created, and the following dialog box appears:




5.2.1.2 Clone Repository


When you log into IE Flow Creator, you are prompted to create a project, clone a repository, or open a project. If you choose to skip this, you can clone a repository later using the "Menu".


To clone a repository,

1. Go to "Menu > Projects > New".
The "Project" dialog box opens:

Projects

 Open Project

 Create Project

 Clone Repository

Project name

Must contain only A-Z 0-9 _ -


Description


Optional

Flow file

*.json

Credentials

 Enable encryption

 Disable encryption




Encryption key

A phrase to secure your credentials with

Cancel Create Project

2. Click "Clone Repository" tab.
The following dialog box appears:

Projects

Open Project Create Project Clone Repository

Project name

Must contain only A-Z 0-9 _ -

Git repository URL

https://, ssh:// or file://

Credentials encryption key

Cancel Clone Repository

3. Complete the following fields:

Field Name	Description
Project name	Defines the project name.
Git repository URL	Specifies the Git repository URL.
Credentials encryption key	Defines the encryption key.

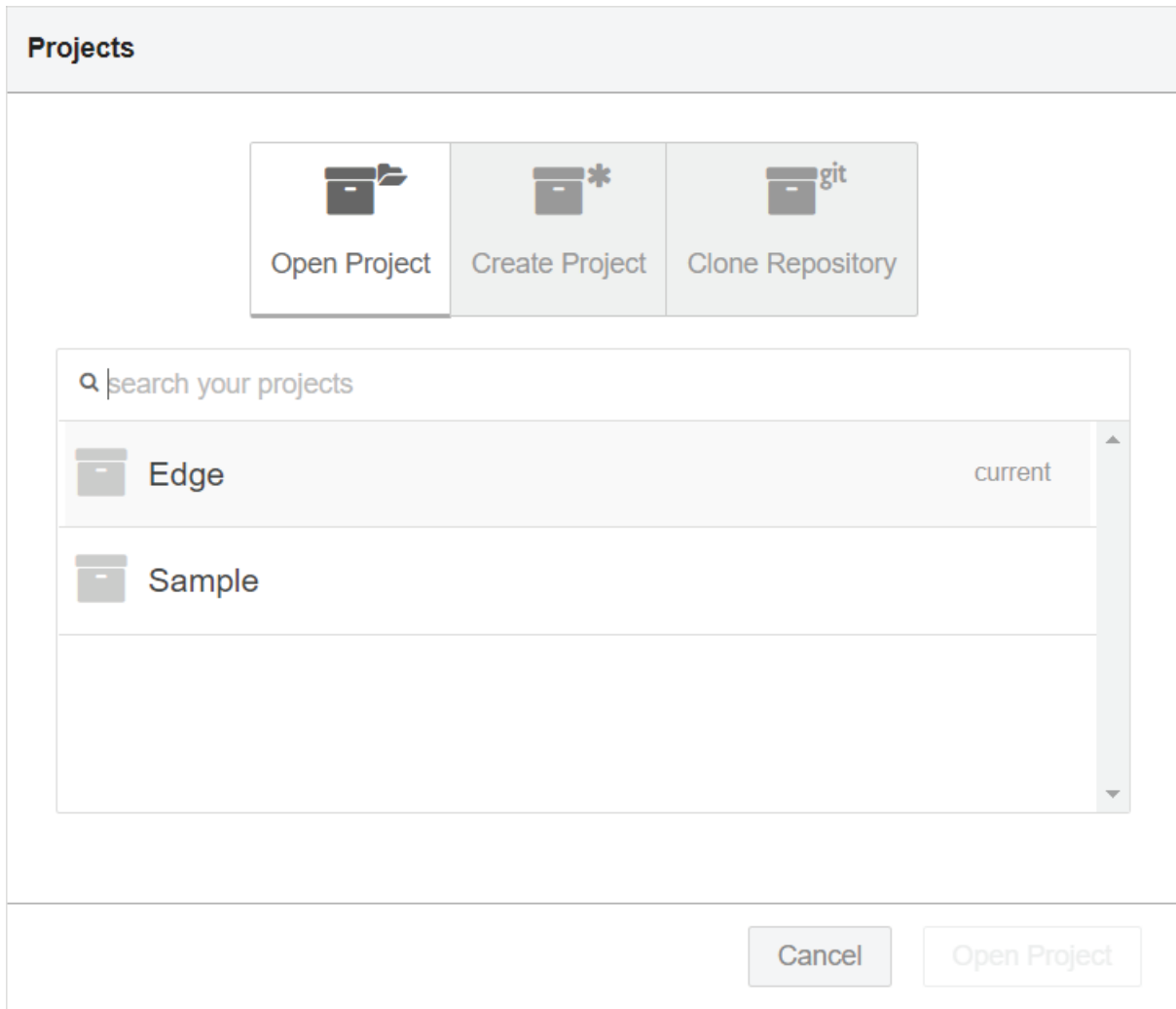
4. Click "Clone Repository".
The repository is cloned.

5.2.1.3 Open Projects

When you log into IE Flow Creator, you are prompted to create a project, clone a repository, or open a project. If you choose to skip this, you can open an existing project later using the "Menu".

To open an existing project,

1. Go to "Menu > Projects > Open".
The "Projects" dialog box opens:



2. Select the project that you want to open.
The "Open Project" button is enabled.
3. Click "Open Project".
The project is loaded.

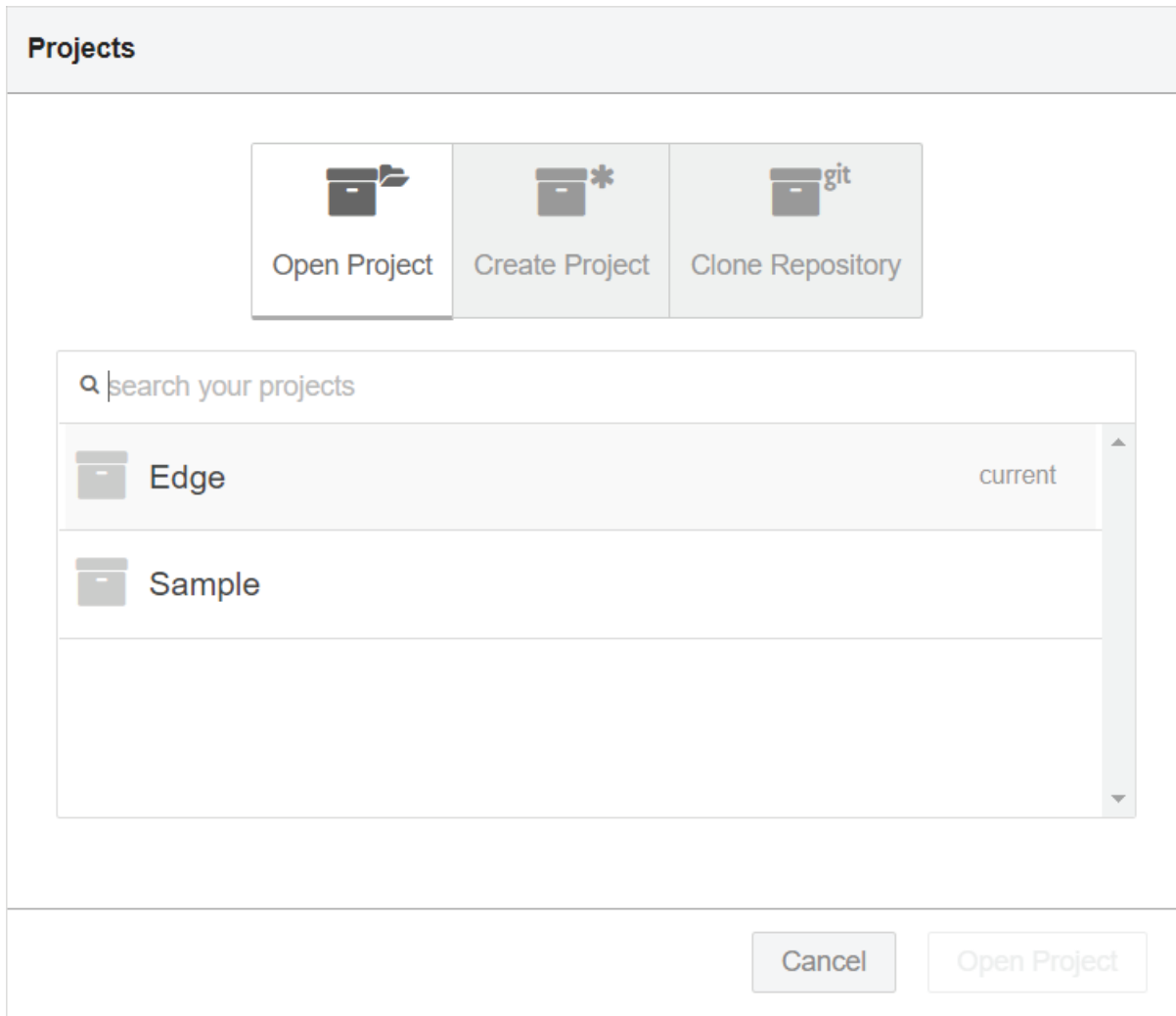
Note**Search a Project**

Additionally, you can search a project from the list of the available projects using the search field.

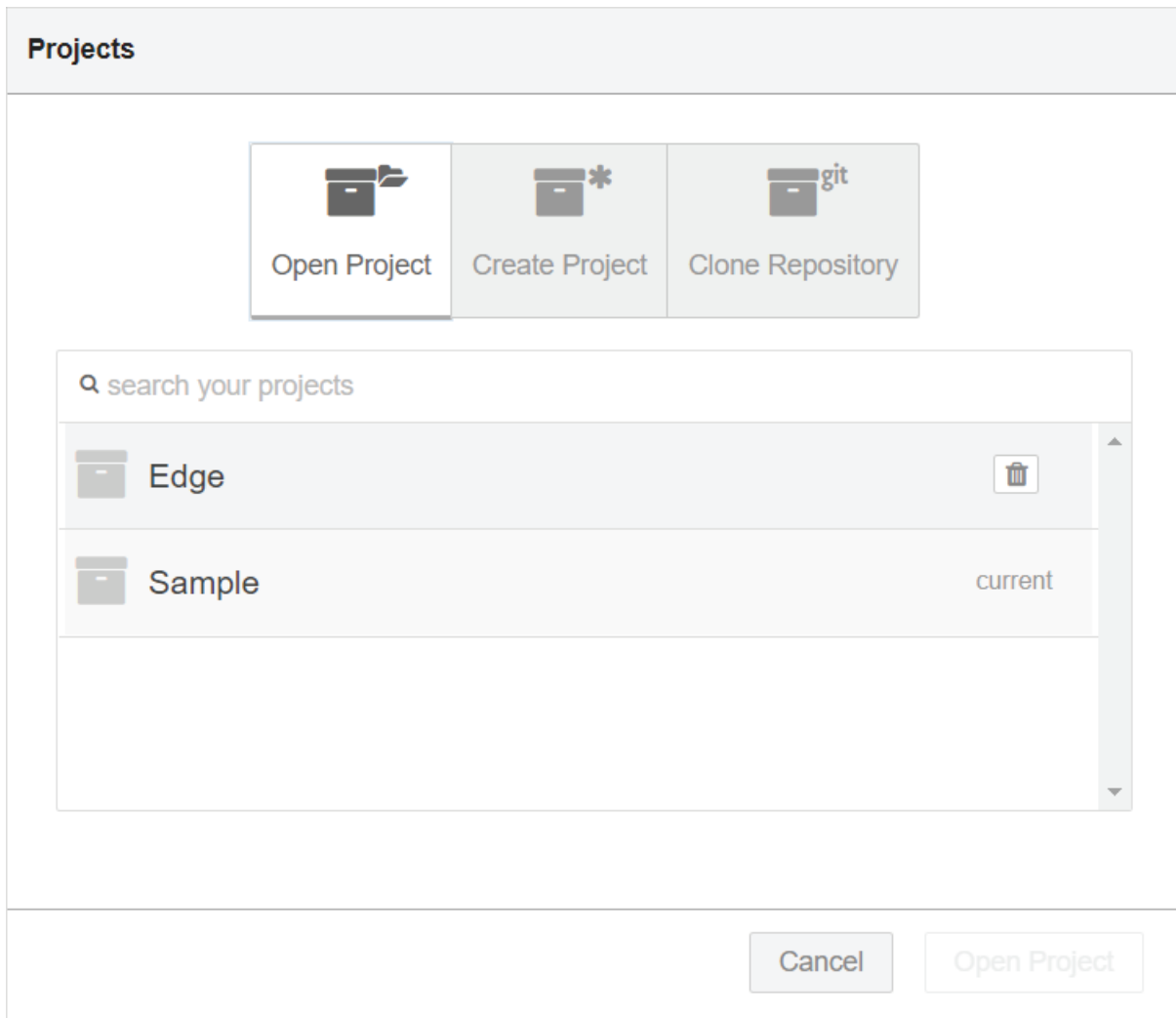
5.2.1.4 Delete Projects


You can delete a project as required. To delete an existing project,

1. Go to "Menu > Projects > Open".
The "Projects" dialog box opens:



2. Hover the mouse pointer across the project that you want to delete.
The delete icon appears:



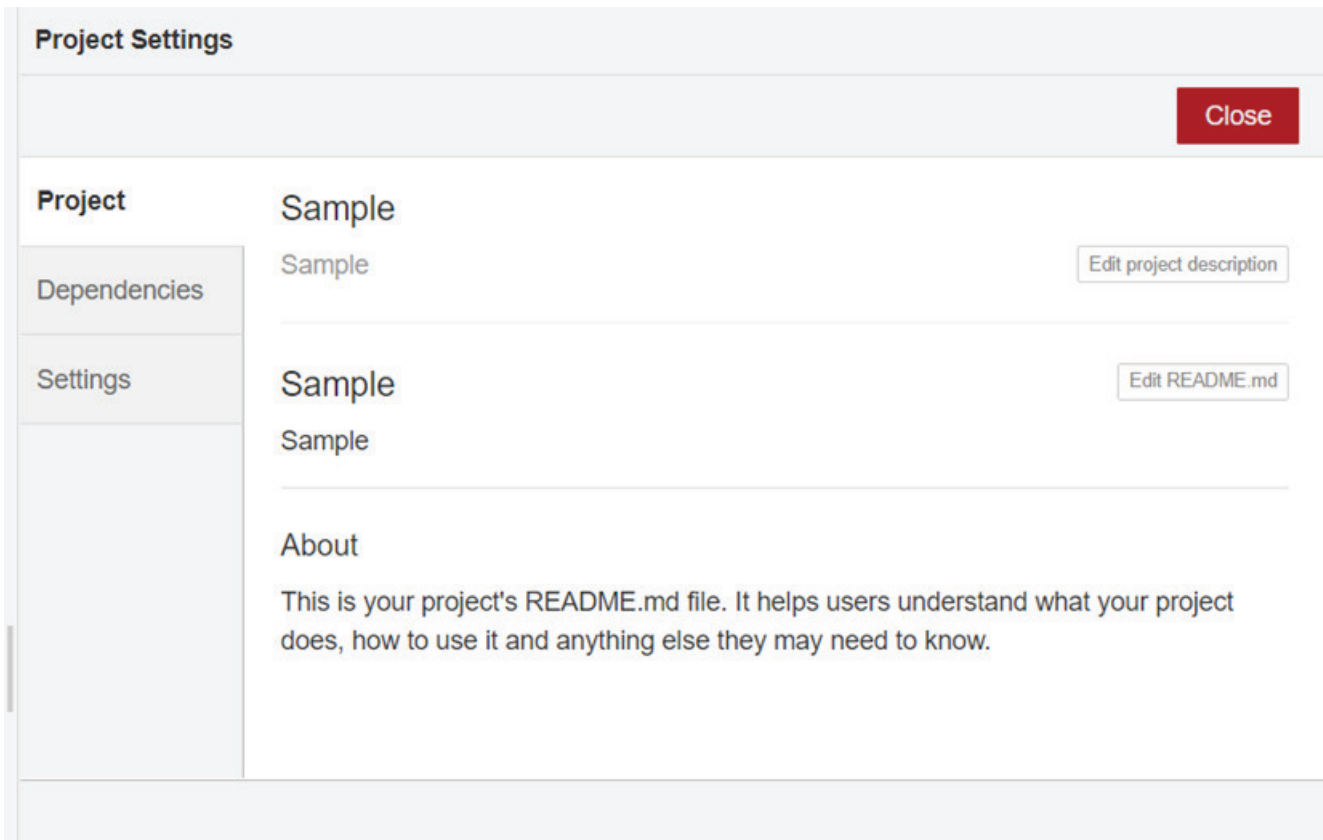
3. Click .
A confirmation message appears.
4. Click "Delete".
The project is deleted.

5.2.1.5 Edit Project

You can edit a project details and update it as required.

To edit a project details, go to "Menu > Projects > Project Settings".

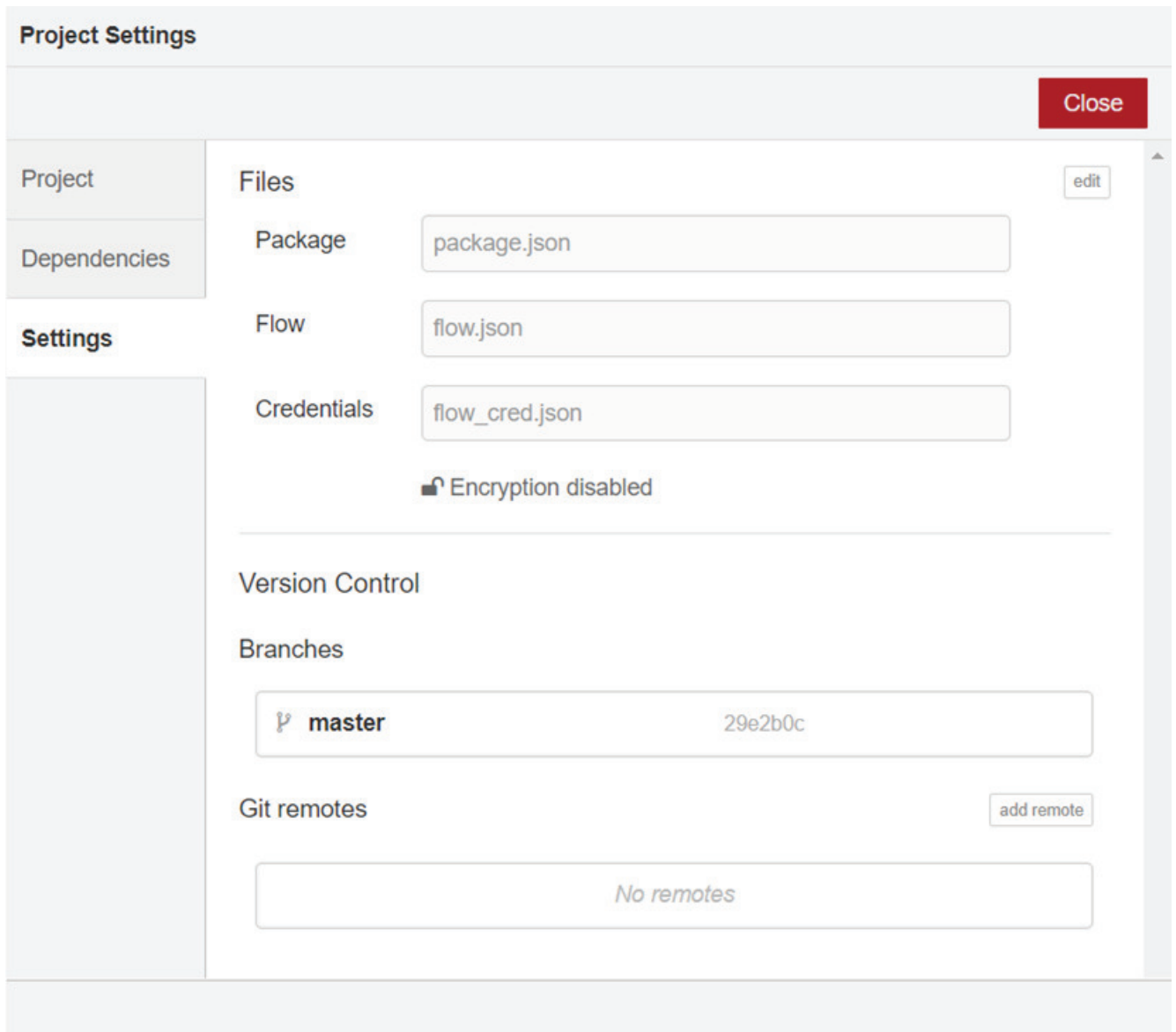
The "Project Settings" dialog box opens:



As depicted in the above image, you can perform the following tasks:

- Edit project description using "Edit project description" button
- Edit readme markdown file using "Edit README.md" button
- Edit project dependencies using "Dependencies" tab
- Edit associated project JSON files and manage version control using "Settings" tab

Click "Settings" tab, the following dialog box appears:



As depicted in the above image, you edit the project associated JSON files using "Edit" button.

Manage Git Configuration

You can manage Git configuration and committer details for a project. This committer configuration is used to create the secure connection to remote git repositories.

Go to "Menu > Settings > Git config". The following dialog box appears:

User Settings

Close

View

Keyboard

Git config

Committer Details

Leave blank to use system default

Username

Email

SSH Keys

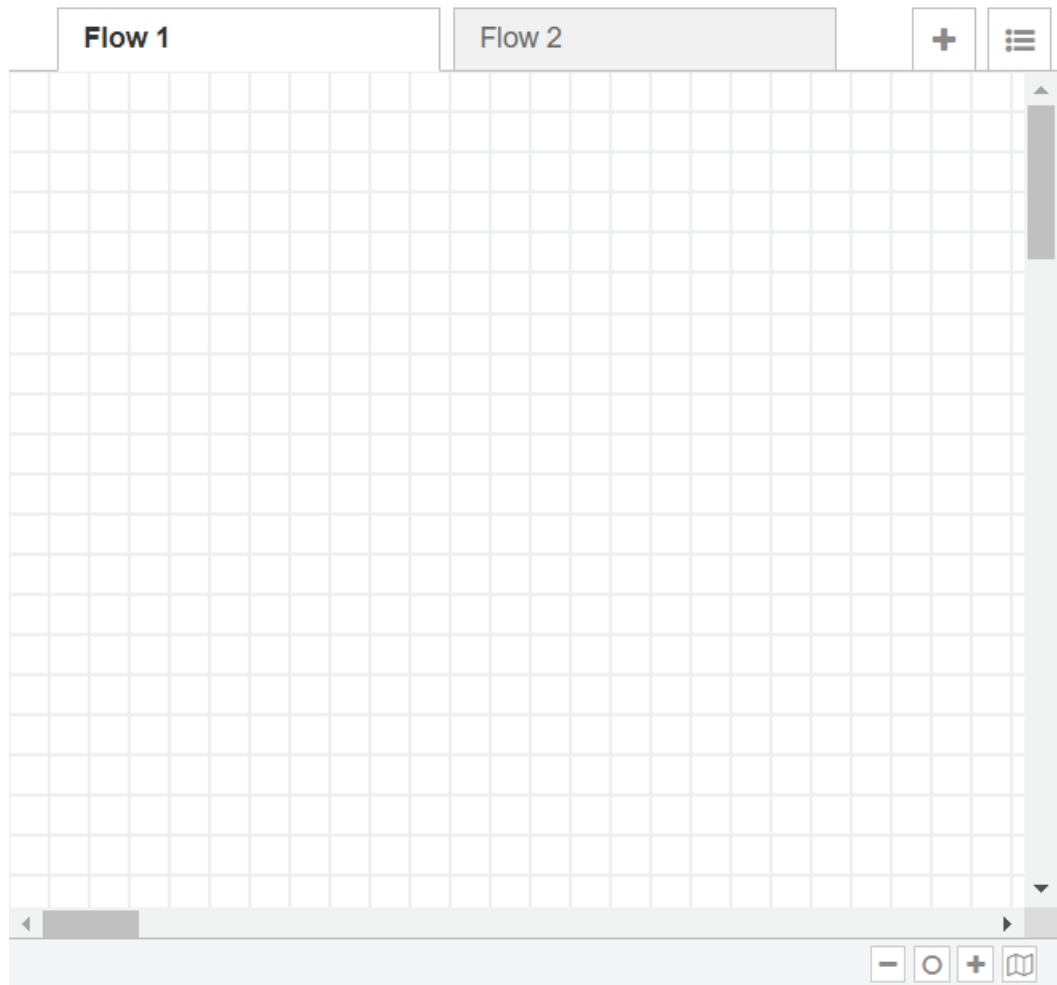
Allows you to create secure connections to remote git repositories. add key

🗑


You can update username and email as required and add SSH keys to create the secure connection to remote git repositories.

5.2.2 Flows

The programs in IE Flow Creator are called as flows. You can create many flows at the same time and can run all the flows simultaneously. Each flow created opens as a tab in the workspace area.



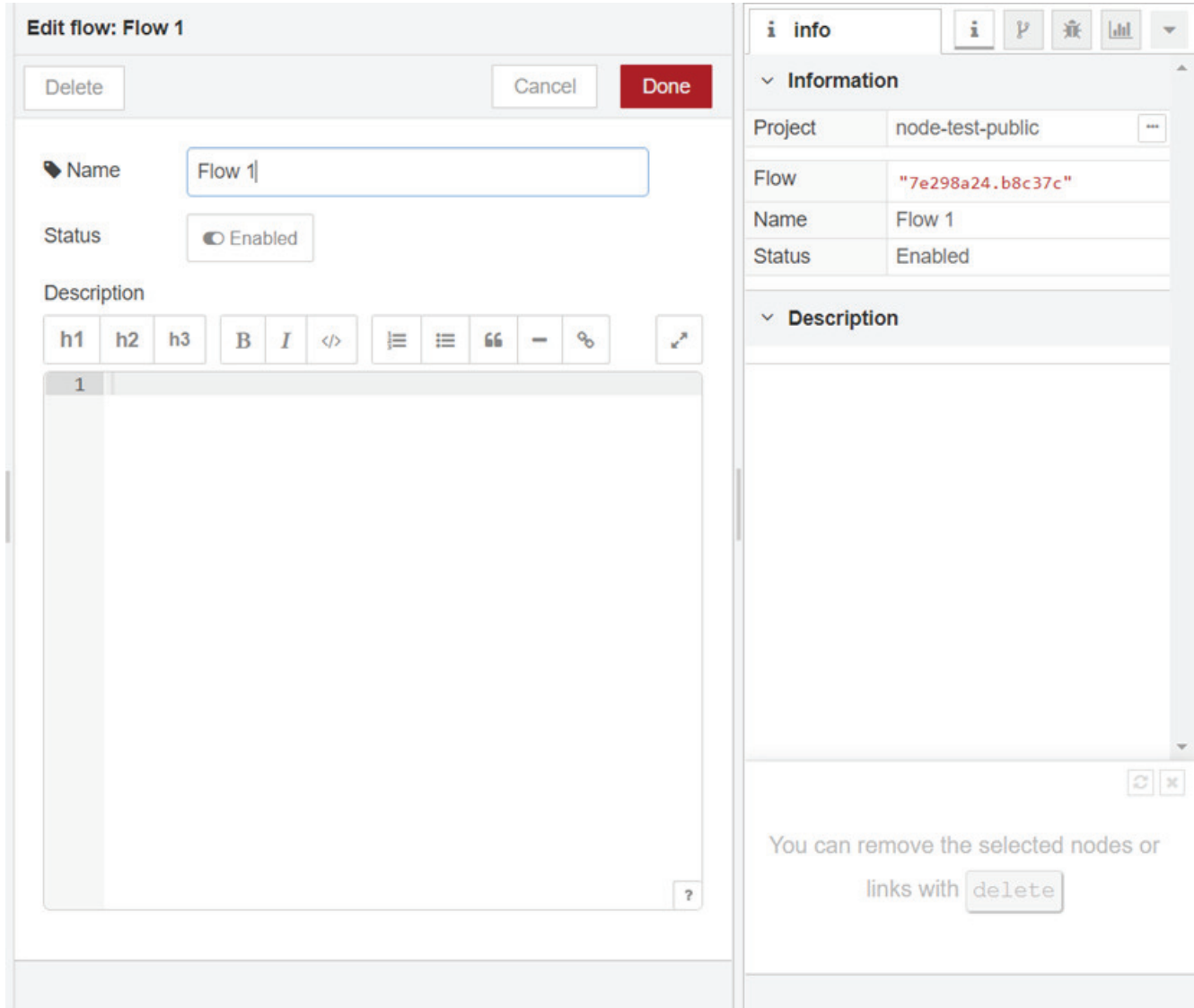
5.2.2.1 Adding a flow

To add a new flow, click  button at the top-right corner of the workspace.

5.2.2.2 Editing flow properties

To edit the properties of a flow:

1. Double-click on the specific flow tab. The flow properties dialog appears.




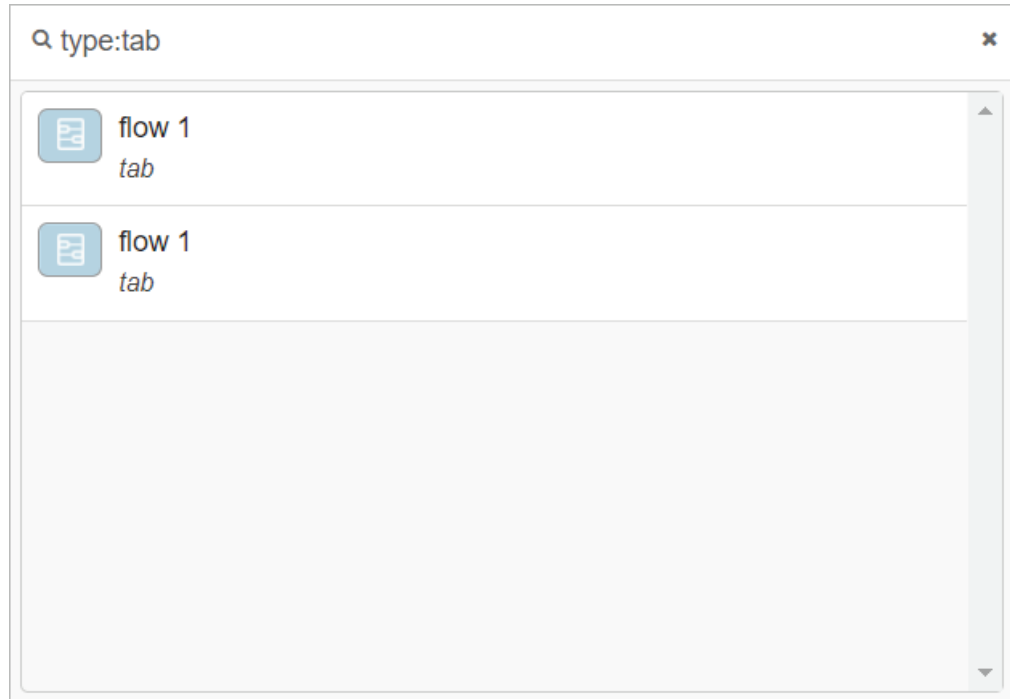
2. Enter the "Name" for the flow.
3. Enable/disable the "Status" button.
4. Add "Description". The description can use Markdown syntax for formatting and will appear in the "Information" sidebar.
5. Click "Done".

5.2.2.3 Deleting a flow

To delete a flow, click the "Delete" button in the flow properties dialog.

5.2.2.4 View Flow List

To view the flow list, click  button at the top-right corner of the workspace. The flows are displayed in the "List Flow" box as follows:



Additionally, you can search a flow using the "Search" area.

5.2.3 Nodes

Nodes are the smallest module in IE Flow Creator application. Each node is programmed to perform a specific function while creating flows.

You can add nodes to the workspace in multiple ways:

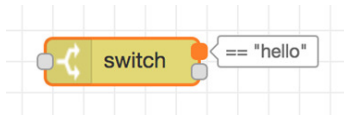
- Dragging-and-dropping from the palette
- Using the quick-add dialog
- Importing from the library or clipboard.

The procedure to import from the library is explained in detail in the topic Import/Export flows.

5.2.3.1 Drag-and-drop

You can easily drag-and-drop the desired nodes from the palette and connect them at their ports using wires.

A node can have one input port and multiple output ports. Some ports also support labels as shown in the screenshot below:



These labels also act as tooltips. A node may specify labels, for example the "Switch" node specifies the rule that matches the port. You can customize the labels in the "Node edit" dialog.

Some nodes display a status message and icon below the node to indicate the runtime state of the node.

There are additional icons that are used to indicate various other functions:

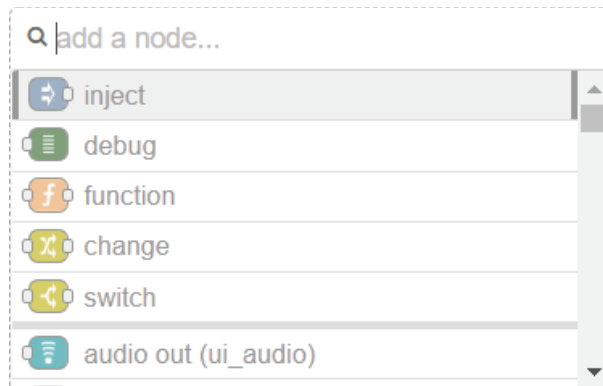
Icon	Function
	The node contains undeployed changes.
	The node contains configuration errors.
	Allows you to interact with the nodes from within the editor. These buttons may appear on the left or right edges of the nodes. For example, the Inject and Debug nodes.

5.2.3.2 Quick-add dialog

The quick-add dialog is an alternative method to add nodes to the workspace.

To launch the quick-add dialog:

1. Use the <CTRL + mouse click> action in the workspace. The quick-add dialog opens. The list in the quick-add dialog contains all the available nodes.



2. Type the node name in the search box to get the desired node. The five main core nodes are listed at the top.

5.2.3.3 Editing node configuration

To edit the configuration settings, Double-click the node or highlight the required node and press <ENTER>.

The "Edit node" dialog opens. If more than one node is selected at a time, the configuration of the first node in the flow displays.


An example of the "inject" node is shown in the screenshot below:

The "Edit node" dialog consists of two parts:

Command	Function
node properties	Displays the form specific properties of the node type being configured.
node settings	Displays the common settings for all available nodes. This includes custom port labels and icons for the node.

Note

Each node has its own specific set of properties and settings.

Use the  button to pick the desired icon from the list of all icons displayed.

5.2.4 Wires

Wires connect the nodes with each other creating a flow.

5.2 Workspace

Create a flow by joining two nodes using wires as follows:

1. Select a node's port.
2. Drag-and-drop to the destination port. A wire is created automatically connecting the two nodes.

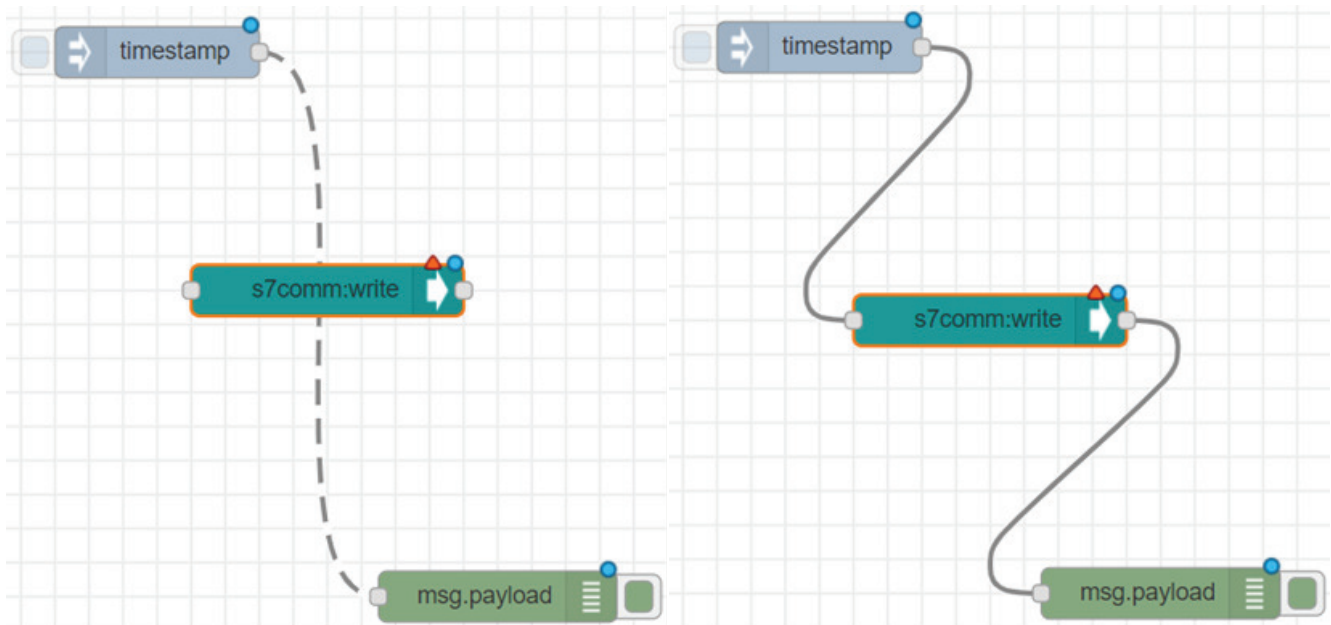
Alternative method to join nodes:

- Press the <CTRL> button and click the port of any node thereby starting a wire and then click the destination node again to connect them.
- If the <CTRL> button is held without being released, a new wire is formed at the output port of the destination node, which in turn can be connected to other nodes. This way, multiple nodes can be wired easily.

5.2.4.1 Inserting a node

A node containing both input and output ports can be introduced in the middle of a flow by dragging-and-dropping it in between the nodes.

The solid wire turns into a dashed-line and the new node immediately splits the continuous wire to insert itself into the flow.



5.2.4.2 Moving a wire

To move the wire from its current location:

1. Select the wire.
2. Use <SHIFT + mouse click> combination on the port and drag to a new port. If you release the mouse button in the workspace, the wire is deleted.

Note

If there are many wires attached to a port, not selecting the specific wire will make all the attached wires move with this action.

5.2.4.3 Deleting a wire

To delete a wire, select it and then press <Delete> button.

5.2.5 Subflows

A "Subflow" is a collection of nodes that can be collapsed into a single node in the workspace. Subflows are generally used to reduce the visual complexity of a flow or to group together a set of nodes that can be re-used in multiple locations in the flow.

Once you create a subflow, it is automatically added to the top of the palette just like any other node. You can use this subflow individually in various instances like any node.

Note

A subflow cannot contain an instance of itself - either directly or indirectly. For example, IE Flow Creator throws an error if you drag-and-drop a subflow from the palette into the same subflow in the workspace.

You can create a subflow in two ways:

- Creating an empty subflow
- Converting a selection to subflow

5.2.5.1 Creating an empty subflow

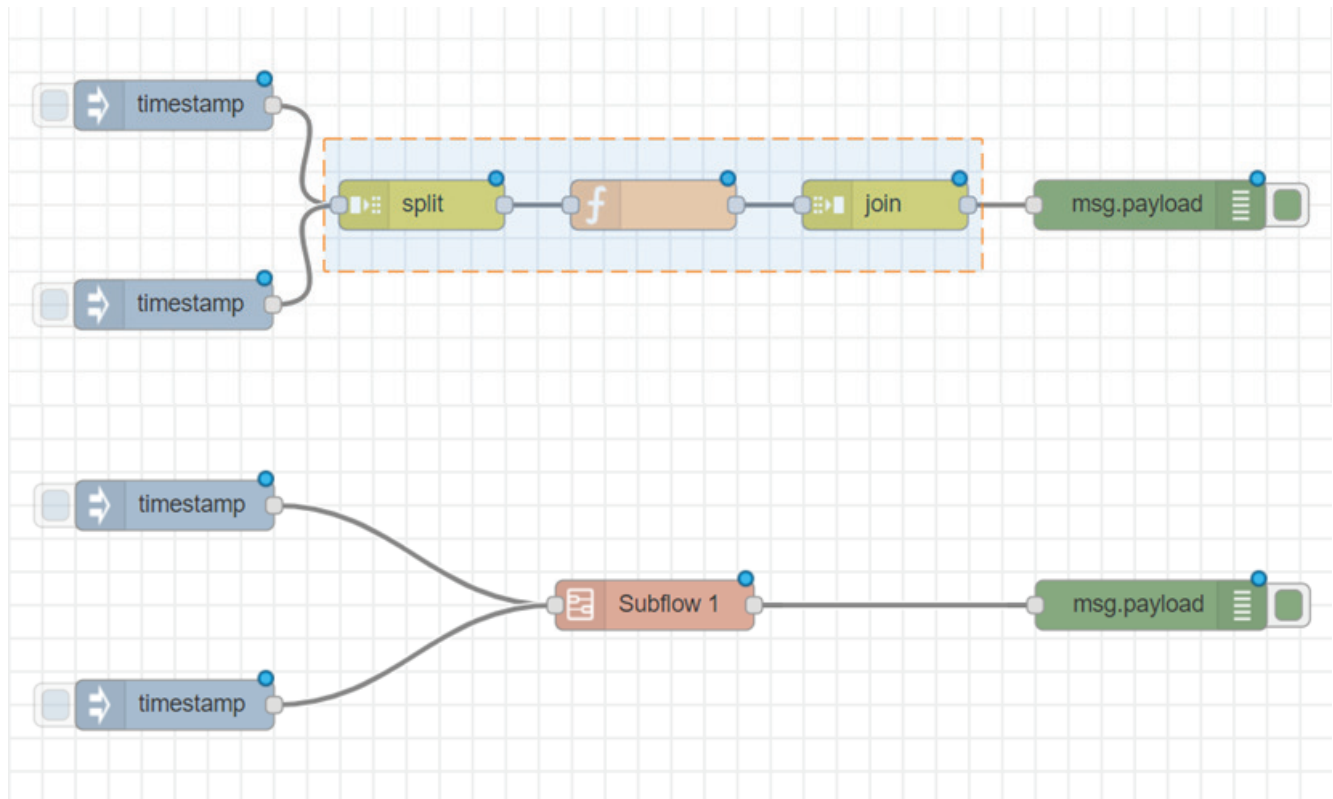
To create an empty subflow, go to "Menu > Subflows > Create subflow".

A blank subflow tab opens in the workspace. The subflow is also added to the palette simultaneously.

5.2.5.2 Converting selection to a subflow

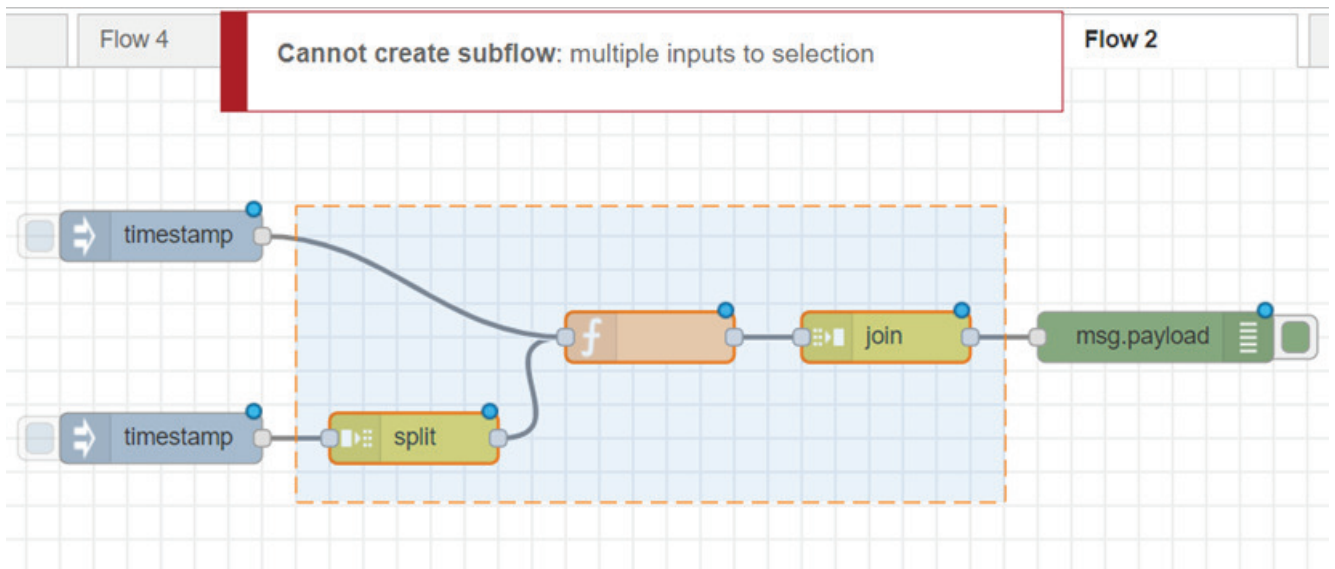
To convert a selection to a subflow, do as follows:

1. Drag the nodes to the workspace and select them.
2. Go to "Menu > Subflows > Selection to subflow". The nodes move into a subflow and a new instance of this subflow appears in its place.



Note

This action is only possible if the selected nodes have only one input, as the resulting subflow node can only have one input.



A subflow node is also added into the palette.

5.2.5.3 Editing a subflow

The subflow is opened in the workspace as a new tab. Unlike regular flow tabs, subflow tabs can be closed and hidden.

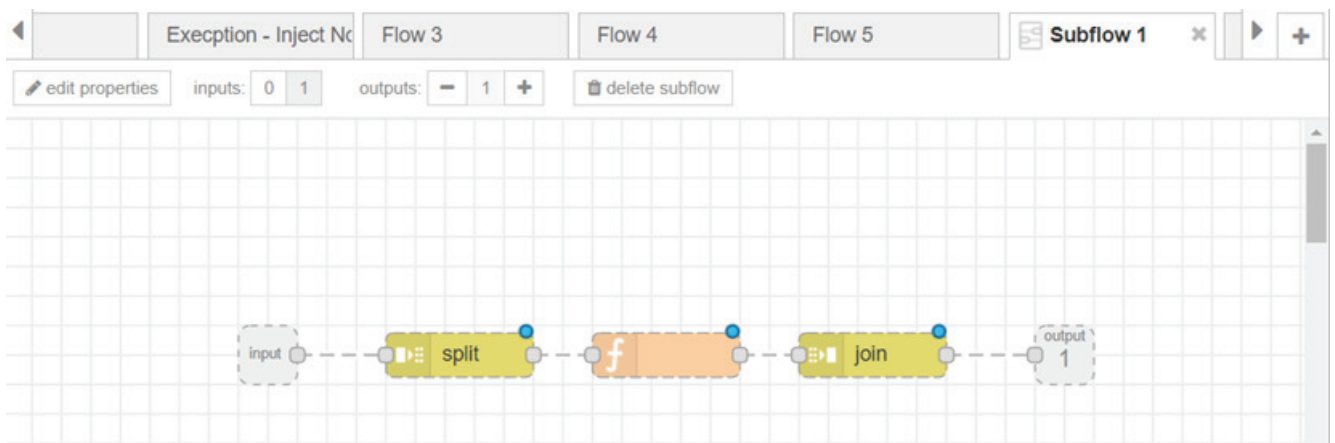
You can edit the subflows using two ways:

- Double-click the subflow tab in the workspace.
- Use the "Edit properties" button.

The "Edit flow template" dialog opens.

Inputs and Outputs

The inputs and outputs of the subflow are represented by the grey square nodes that can be wired into the flow.



5.2 Workspace

The toolbar at the top of the workspace provides options to add and remove these nodes. As with standard flows, there can only be one input and as many outputs as needed.

Subflow properties

To edit a subflow:

1. Double-click the subflow. The "edit properties" button opens the edit dialog.
2. Enter the following fields under the "node properties":
 - Name
 - Category
 - Description

Note

Select the category from the list given or create a new one.

3. Enter the following fields under the "node settings":
 - Inputs
 - Outputs
 - Icon

Edit flow template: Subflow 1

Cancel
Done

▼ **node properties**

📁 Name

📁 Category ▼

Description

1	

There is 1 instance of this subflow template

> **node settings**

Deleting a subflow

The "delete subflow" button in the subflow toolbar can be used to remove the subflow from the workspace and the palette.

5.2.6 Selection

You can select a node with a single mouse click. Consequently, this action deselects all older selections made.

To select multiple nodes, you can use various options such as:

- Lasso tool
- Key combination <CTRL+A>
- Use <CTRL + mouse click> to select the nodes individually.

Note

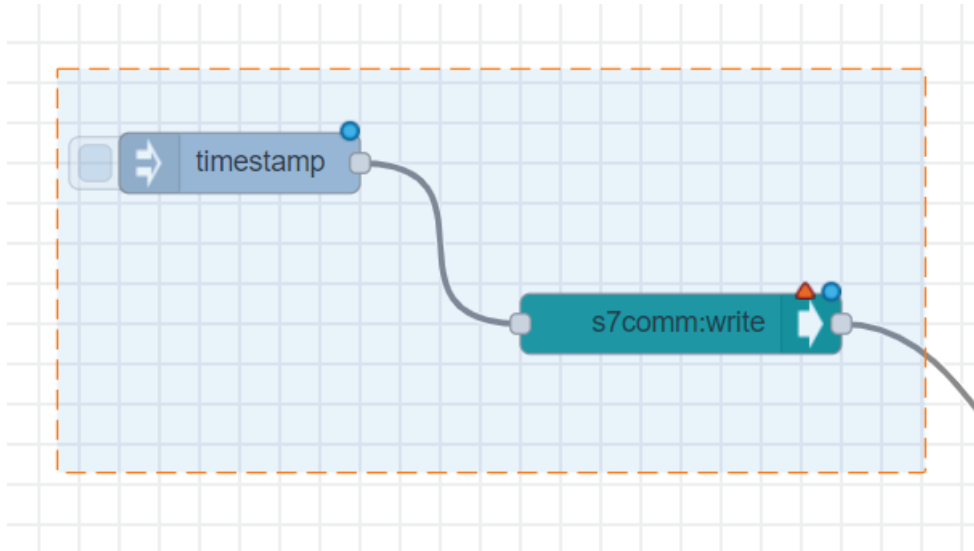
Click a node and use <SHIFT> to select all connected nodes.

5.2.6.1 Lasso tool

The lasso tool is the commonly selection method.

To select multiple nodes, press and hold the left-mouse button and drag it across the nodes to be selected.

The lasso tool selects only nodes and not wires. Wires can only be selected individually.



5.2.6.2 Editor clipboard

Flow Creator uses an internal clipboard to support the standard cut, copy and paste options.

5.2.7 Import/Export flows

It is very easy to share flows with other users using the import and export flow options.

5.2.7.1 Import flows

To import a flow, go to "Menu > Import > Clipboard". "Import nodes" dialog opens.

Import nodes

Paste flow json or

Import to

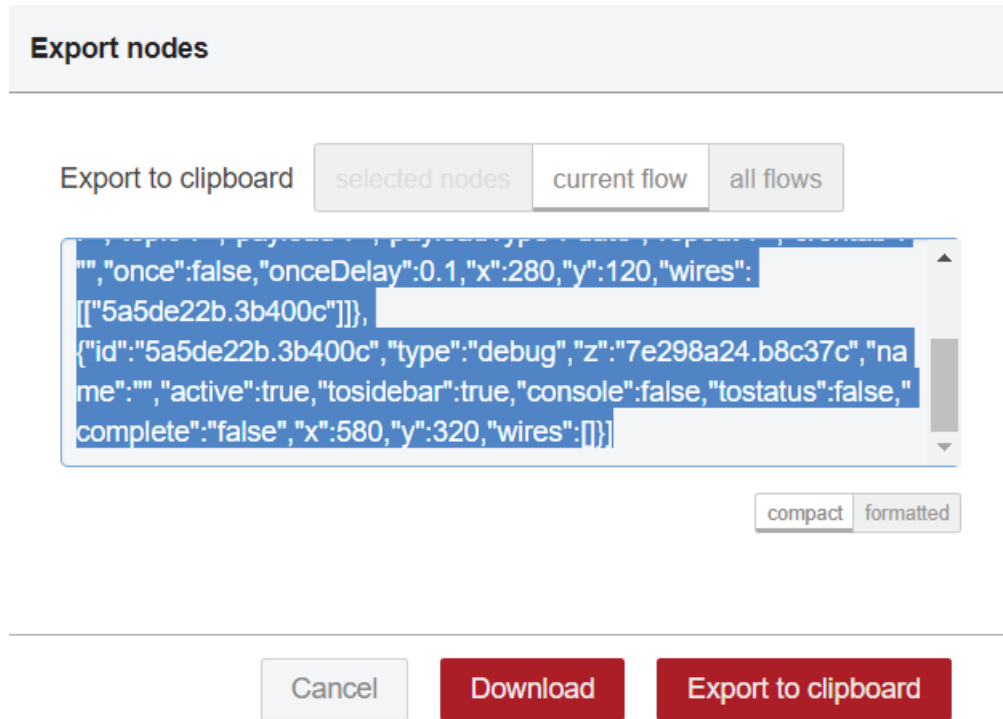
The dialog also offers the option to import nodes into the current flow, or to create a new flow for them.

Note

- The "Import" button will be active only if valid JSON is pasted into the dialog.
- You can also import flows from "Library" and "Examples".

5.2.7.2 Export flows

To export a flow, go to "Menu > Export > Clipboard". "Export nodes to clipboard" dialog opens.



The dialog offers the options to export the selected nodes, the current flow or all the flows. You can export compact or formatted JSON. The compact option compresses the JSON into a single line with no white spaces while the formatted option exports JSON over multiple lines with indentation. The latter option is easier to read.

You can also export flows from the "Library".

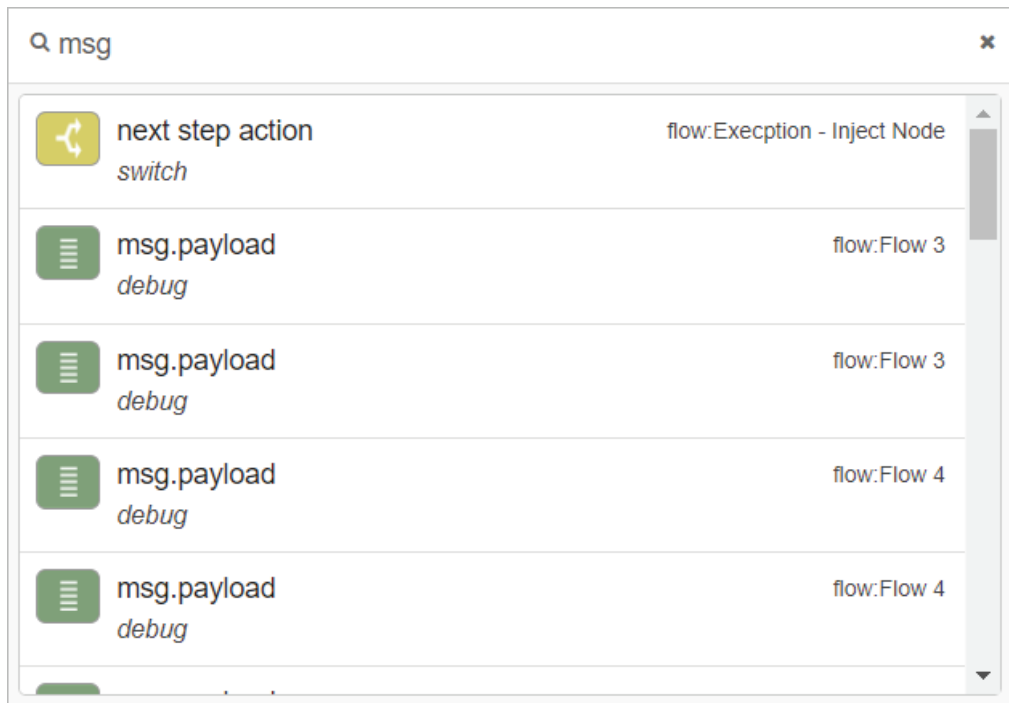
Note

In order to enable export property, select the flow to be exported.

5.2.8 Search

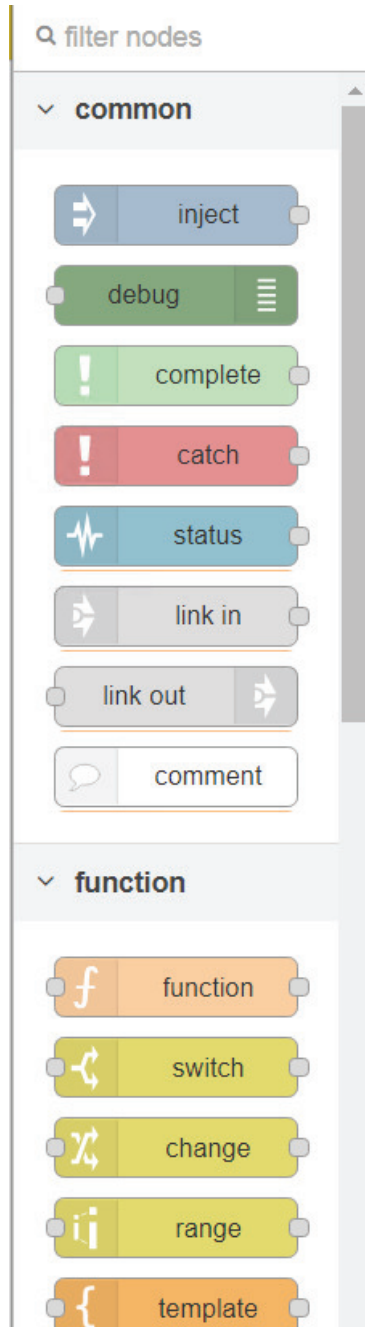
Use the "Search flows" option in the menu to search for a node in the workspace, including configuration nodes. The search dialog allows you to search through all the opened flows and it lists all the available nodes along with its properties. This makes it easier to look for a node based on its name, id, type, or any other property.



Selecting a node in the search list will take you to the node within the editor.



5.3 Palette


The palette contains all the nodes that are installed and available to use in IE Flow Creator. The nodes are categorized according to their purpose such as common, function, and so on.

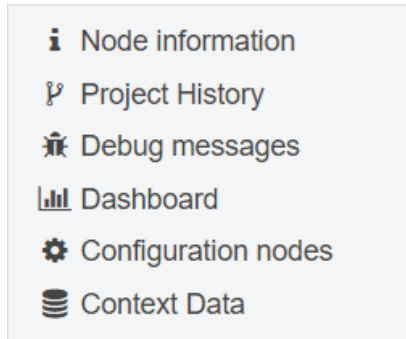


Use  and  icons at the bottom of the palette to expand and collapse the categories. The palette also contains an input to search for a node.

5.4 Sidebar

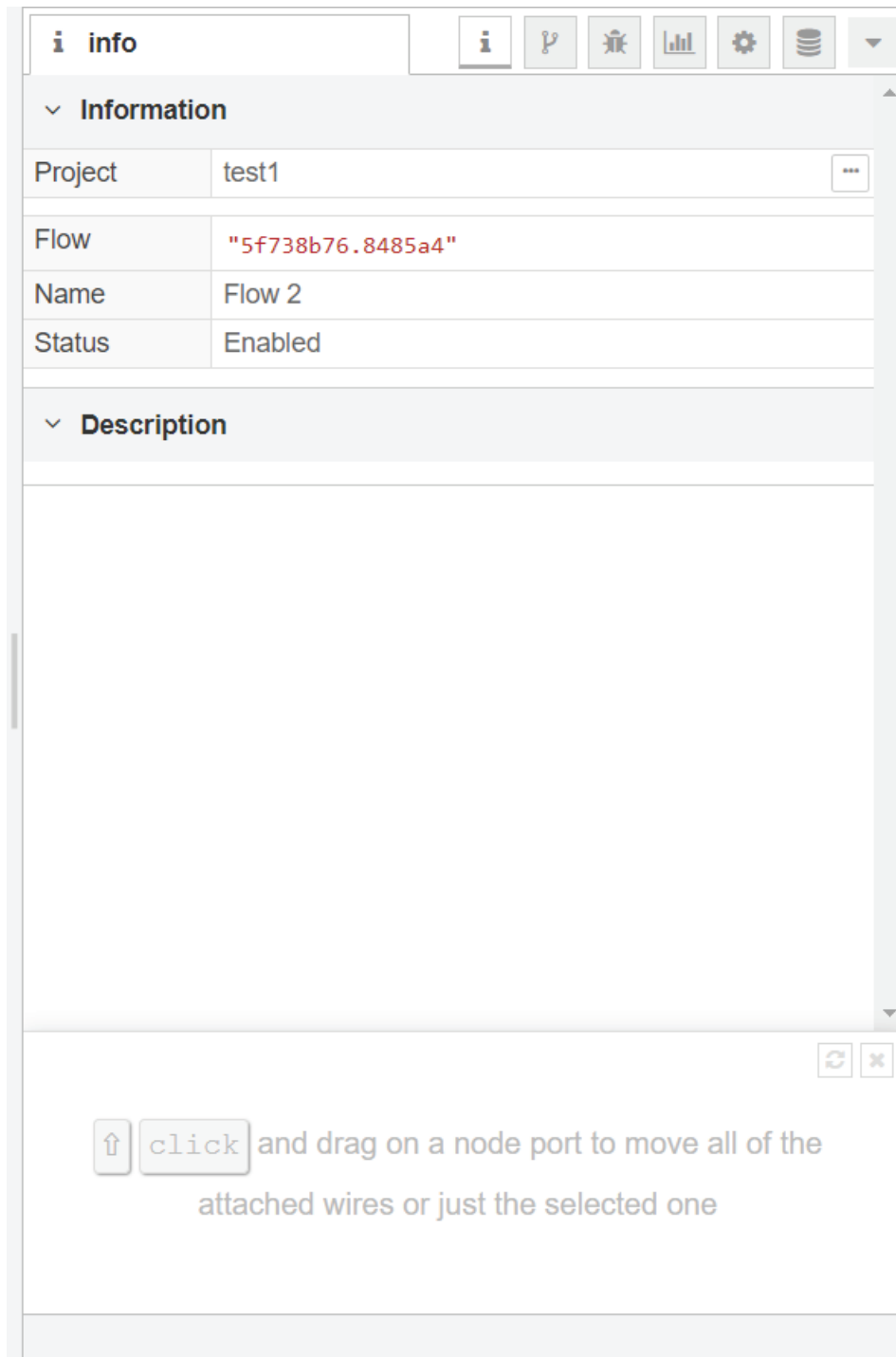
The sidebar contains several useful options used within the editor.

Click the  button on the sidebar to see the list of options:



Command	Function
Node Information (info)	Displays information about nodes, their type and help.
Debug messages (debug)	Displays messages passed to debug nodes.
Configuration nodes (config)	Manages the configuration nodes.
Context Data	Views the contents of context.
Project History	Displays the "Local Changes" and "Commit History".
Dashboard	Displays the dashboard properties like "Layout", "Theme" and "Site".

The "dashboard" is discussed in detail in topic Viewing dashboard (Page 112).



You can also open the "info" tab and "debug" panels by clicking their respective icons in the header of the sidebar.

The sidebar can be resized by dragging its edge across the workspace. Use "Menu > View > Show sidebar" to hide or show the sidebar.

5.4.1 Information

The "Information" or "info" sidebar displays the details about the selected flow or node.

The "Info" tab contains:

- Information: This displays the flow type, name, and status
- Flow Description: This displays the description of a flow.
- Node Help: This displays a short description of the node and configuration tips. It only appears when a node is selected in the workspace

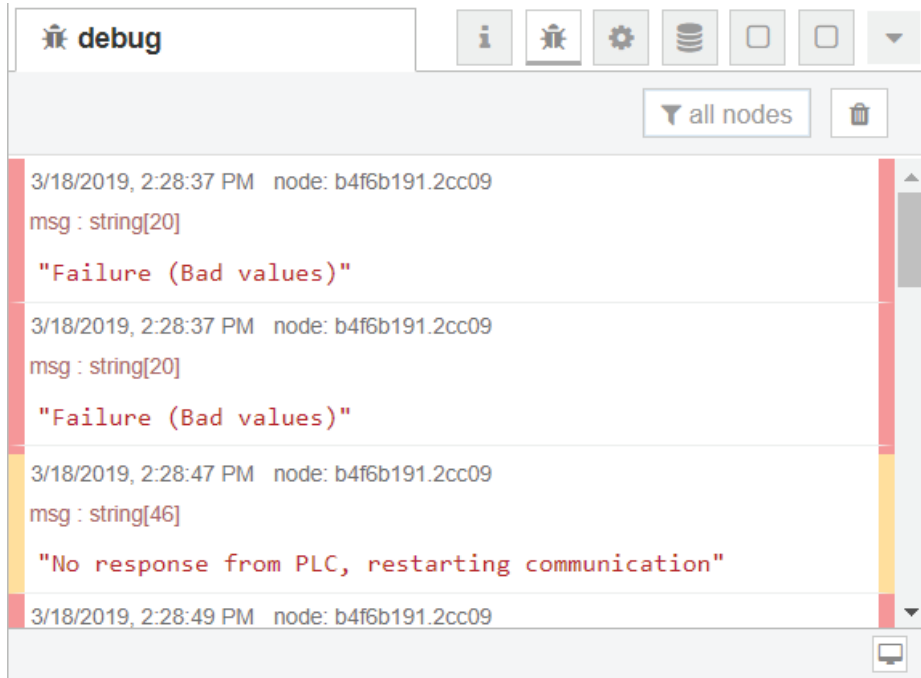
Information	
Flow	"69d6c9e6.9106e8"
Name	Flow 2
Status	Enabled


Flow Description

None

5.4.2 Debug

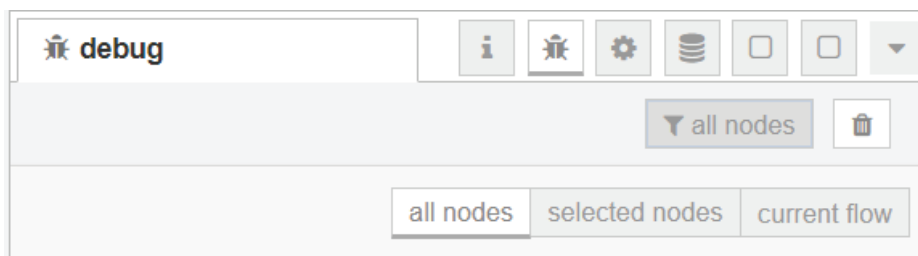
The "debug" panel displays messages passed to debug nodes within the flow, as well as log messages from the runtime.



By default, debug panel shows all the messages passed to the debug nodes. You can filter the messages using the  button.


The "debug messages" sidebar offers you three options to filter the messages:


Command	Function
All nodes	Displays all the messages
Selected nodes	Displays messages only from the selected debug nodes among all the available nodes
Current flow	Displays messages only from the current flow in the workspace



Note

The "Debug" sidebar can only show 100 recent messages. If the sidebar is currently showing a filtered list of messages, the list including the hidden messages is limited to 100. If a flow has noisy "Debug" nodes, disable them by clicking the square button on the left or right of the node in the workspace instead of filtering them from the sidebar.

The sidebar can be cleared at any time by clicking the  button.

The  button in the sidebar footer can be used to open a separate browser window containing the debug sidebar.

5.4.3 Config nodes


Introduction to Configuration nodes

A Configuration node (also termed as config node) is a special type of node which stores reusable configuration that can be shared by regular nodes in a flow.

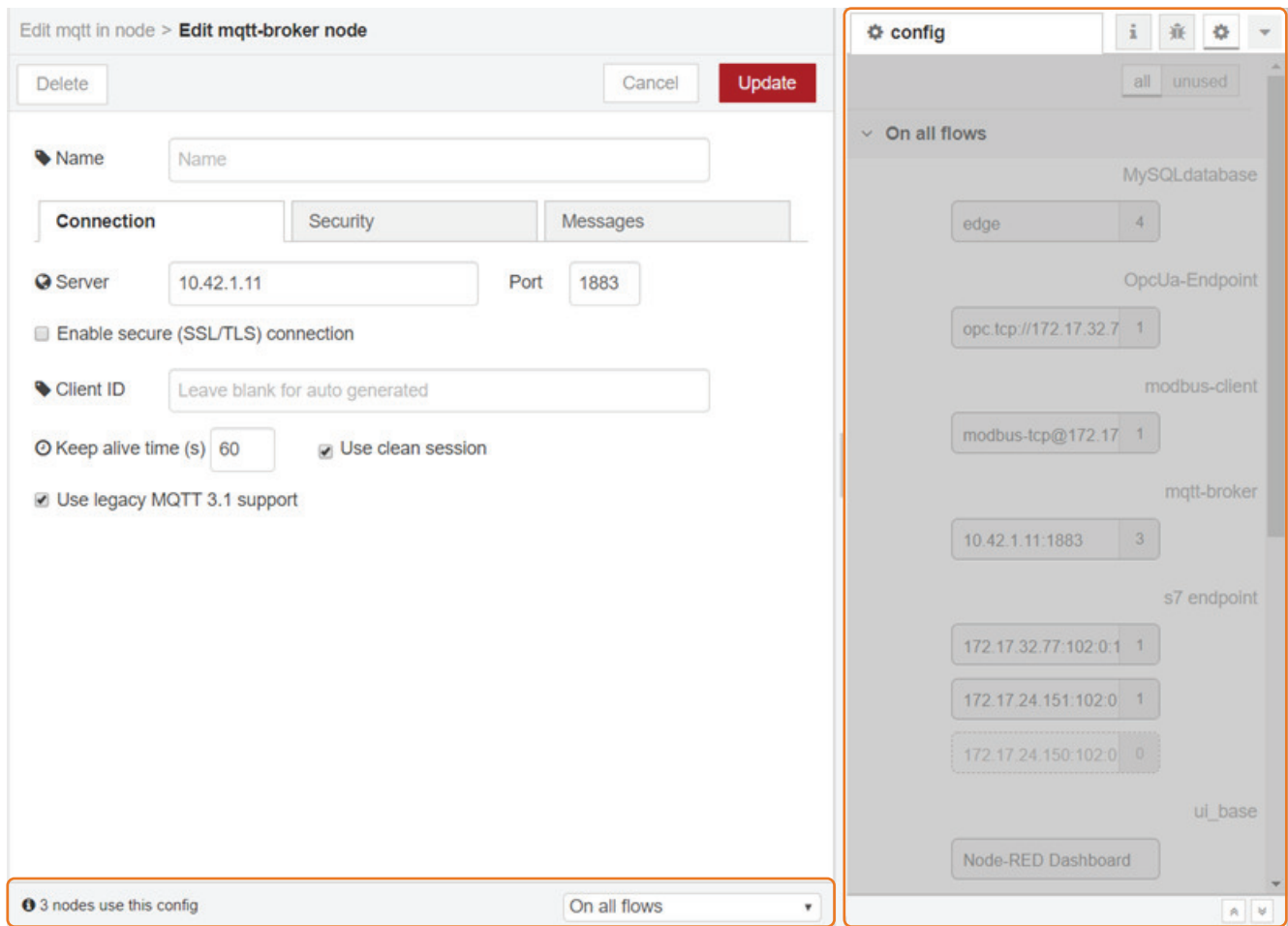
For example, the "mqtt in" and "mqtt out" nodes use a "mqtt-broker" config node to represent a shared connection to an "mqtt-broker".

Configuration nodes are added through the edit dialog of a node that requires the config node. You can select the required config node from the list shown or you can create a new instance.



Click  button next to the select box to edit the config node or to add a new instance. The config node edit dialog displays only the properties and settings and does not offer ports to label or icons to add.

5.4 Sidebar



Each config node has different settings and options. For example, the "mqtt" node is described in detail in the topic Mqtt node. (Page 67)

The footer of the config node edit dialog displays the number of nodes that use this config node.

The default setting is "On all flows". Use the drop-down list to select the number of flows this config node can be used on.

Config sidebar

The "config" sidebar is used to manage the config nodes. It displays a list of all the configuration nodes used and they are organized according to their scope.

The screenshot shows the 'config' sidebar with the following configuration nodes:

Scope	Node Name	Count
On all flows	MySQLdatabase	
	edge	4
	OpcUa-Endpoint	
	opc.tcp://172.17.32.7	1
modbus-client	modbus-tcp@172.17	1
	mqtt-broker	
	10.42.1.11:1883	3
s7 endpoint	172.17.32.77:102:0:1	1
	172.17.24.151:102:0	1
	172.17.24.150:102:0	0
ui_base	Node-RED Dashboard	

5.4 Sidebar

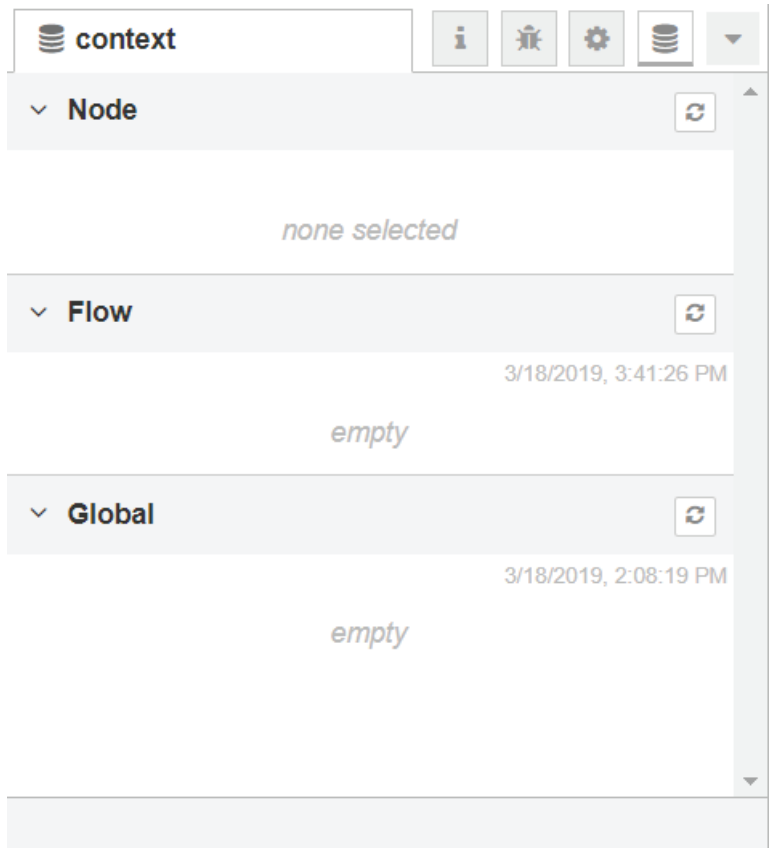
Command	Function
On all flows	Displays all the config nodes used in all the flows.
Flow	Displays the config nodes used in each flow.
Subflow	Displays the config nodes used in each subflow.


A toggle button allows you to toggle between "all" and "unused" config nodes.
 Double-click a config node to open its edit dialog.

5.4.4 Context data

The "context" sidebar displays the contents of the context data store.
 The panel is divided into three sections:

- **Node:** It displays context related to the currently selected node. The section is usually empty, and it is recommended to use the refresh button to see any new information.
- **Flow:** It displays the context of the current flow. This section automatically refreshes when the flow changes in the workspace.
- **Global:** It displays global context and is loaded each time the editor is loaded.



All the sections are collapsible and when there are changes, use the  button in all three sections to see any latest changes.

You can hover the mouse over any context property name to see a refresh button that can be used to refresh just that one value.

You can hover the mouse over any value of a context property to see a copy button. Use this copy button to copy the contents to the system clipboard. Only values supported by JSON are copied.

Configuring the nodes

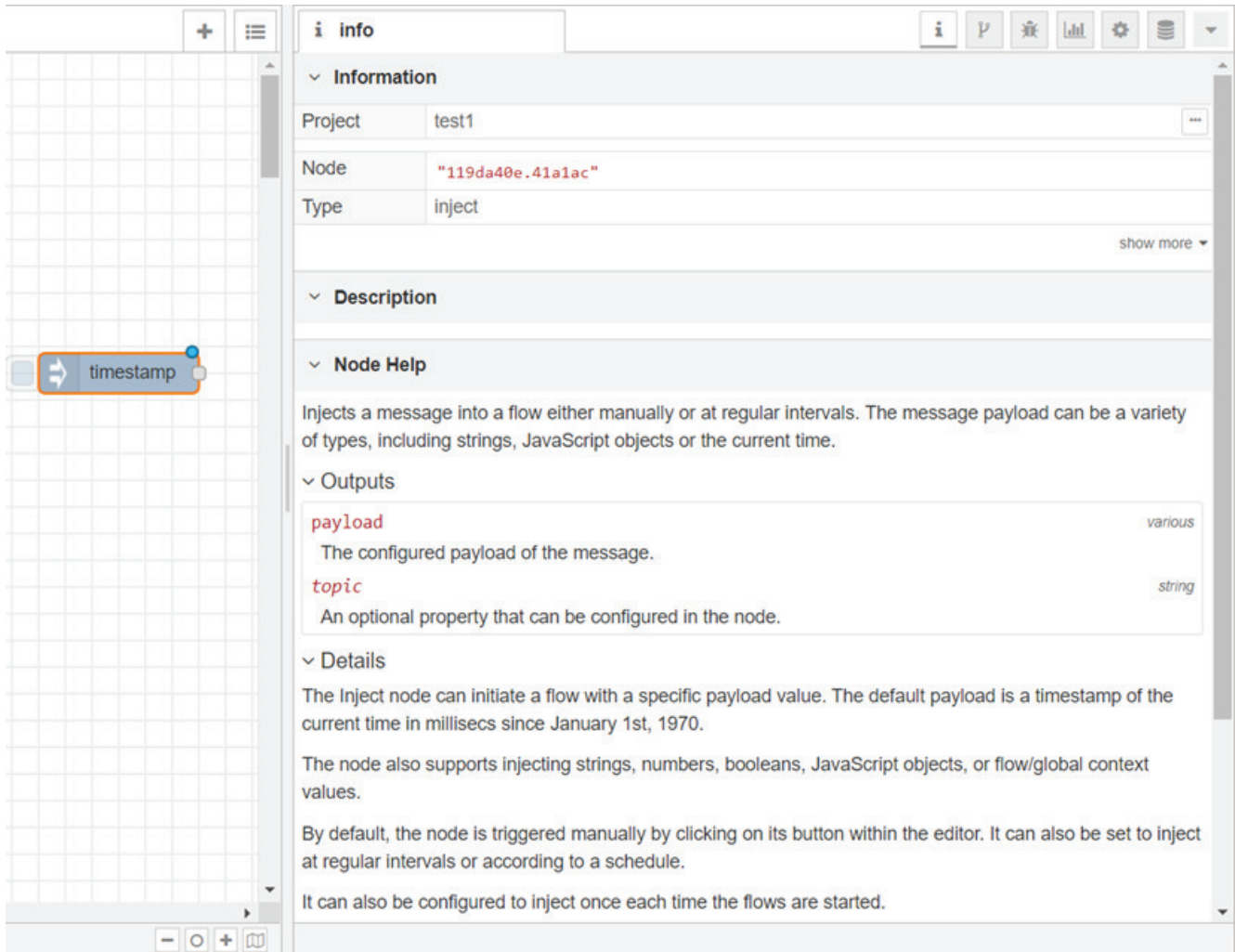
Default nodes in Industrial Edge Flow Creator

The IE Flow Creator palette includes a default set of nodes that are the building blocks for creating a flow. The image below shows the set of core nodes available by default.

The nodes are grouped into the following categories:

Q filter nodes
> common
> function
> network
> input
> output
> sequence
> parser
> storage
> analysis
> social
> mindsphere
> LiveTwin
> modbus
> opcua
> plc
> dashboard

Each category has a set of nodes under it. You can find documentation in the "Info" sidebar tab for all the nodes. Select a node to see information for a particular node. For example, when you select the "inject" node, you can see the information on the "info" panel on the right.



Discussion

For more details on each of the default nodes and their configurations, refer to IE Flow Creator Programming Guide documentation (<http://noderedguide.com/node-red-lecture-4-a-tour-of-the-core-nodes/>).

6.1 Mqtt node


Introduction

"Mqtt" is a messaging protocol that provides network clients with a simple way to distribute the information. The node uses a subscribe/publish method of communication and is used to communicate between two machines. This node plays an important role in the Internet of Things (IoT).

Prerequisites


The Mosquitto broker container and IE Flow Creator are running on the Industrial Edge Device.

Configuration of mqtt node

1. Drag-and-drop a mqtt node into the workspace and wire it together with an output node.
2. Double-click the "mqtt in" node. The "Edit mqtt in node" dialog opens.
3. Click the  button next to the "Server" selection box and the "Edit mqtt-broker node" dialog opens:

Edit mqtt in node > **Edit mqtt-broker node**


Delete
Cancel
Update

 Name


Connection


Security

Messages


 Server Port

Enable secure (SSL/TLS) connection

 Client ID

 Keep alive time (s) Use clean session

Use legacy MQTT 3.1 support

 3 nodes use this config

On all flows ▼

6.1 Mqtt node

- 4. In the "Connection" tab, enter the IP address of the mqtt-broker.
- 5. Enter the port number in the "Port" field.
- 6. In the "Security" tab, enter the username and password.

Note

This is applicable only if the container is configured for security protection when it is launched.

- 7. Click "Update". The "Edit mqtt in node" dialog appears.
- 8. Enter the required tag name in the "Topic" field:

Note

Use # symbol before the tag name to subscribe to all values.

- 9. Click "Done".
- 10. Click "Deploy" and the node configuration changes are deployed. In the workspace, the mqtt node displays the "Connected" message below it as shown in the screenshot below. This indicates the node is connected to the broker.



Example of IE Flow Creator mqtt as subscriber

Requirement

You want to subscribe to messages on an mqtt topic.

Solution

Use the "mqtt in" node to subscribe to messages sent to a topic or a topic pattern.

Example



Discussion

The "mqtt in" node with an associated "mqtt" config node connected to an mqtt broker can be used to subscribe to receive messages sent to a specific topic or mqtt topic pattern. In the example, we subscribe to all messages under the "sensors" topic level using the "sensors/#" pattern.

Example of IE Flow Creator mqtt as publisher

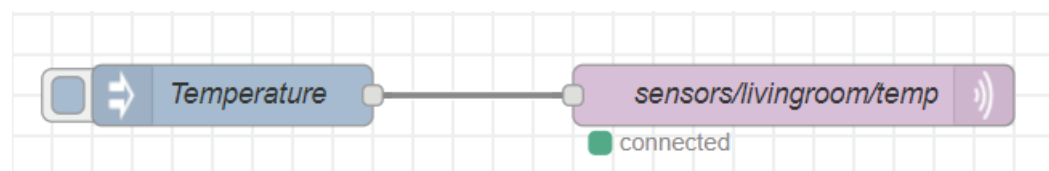
Requirement

You want to publish a retained message to an MQTT topic on a broker.

Solution

Set the "Retain" option to "true" in the "mqtt out" node configuration dialog or set the "retain" message property to "true" in the message sent to the output node.

Example



Discussion

Once you have sent a retained message to a topic, all subscribers will receive the same retained message when they subscribe. In IE Flow Creator, this scenario occurs when a "mqtt in" node is deployed. To clear a previously retained topic from the broker, send a blank message to the retained topic with the retain flag set.

6.2 S7 connection node

Introduction

S7 node allows communication to S7 PLCs such as 300/400/1200/1500. "s7 in" reads data from the PLC while "s7 out" writes data to the PLC.

All data is read in a cyclic order from the PLC as configured in the "s7 endpoint", but there are three modes of making it available in a flow:

- **Single variable:** A single variable can be selected from the configured variables. A message is sent every cycle, or only when the value changes if "diff" is checked. "msg.payload" contains the variable's value and "msg.topic" has the variable's name.
- **All variables, one per message:** This is like "Single variable" mode, but for all variables configured. If "diff" is checked, a message is sent every time any variable changes. If "diff" is unchecked, one message is sent for every variable, in every cycle. You must take care about the number of messages per second in this mode.
- **All variables:** In this mode, the "msg.payload" node contains an object with all configured variables and their values. If "diff" is checked, a message is sent if at least one of the variables changes its value.

Prerequisites

- IE Flow Creator app is running on the Industrial Edge Device.
- TIA portal settings are complete. Refer TIA Portal documentation to know how to make the TIA portal settings.

Configuration of S7 connection node

1. Drag-and-drop the "s7 in" node from the palette into the workspace.
2. Double-click the node. "Edit s7 in node" dialog appears:

Edit s7 in node

Delete Cancel Done

Properties


⚡ PLC Add new s7 endpoint...

☰ Mode Single variable ▼

🔄 Variable ▼

Emit only when value changes (diff)

📁 Name Name

3. Click the  button beside the "PLC" selection box. "Add new s7 endpoint config node" dialog appears:

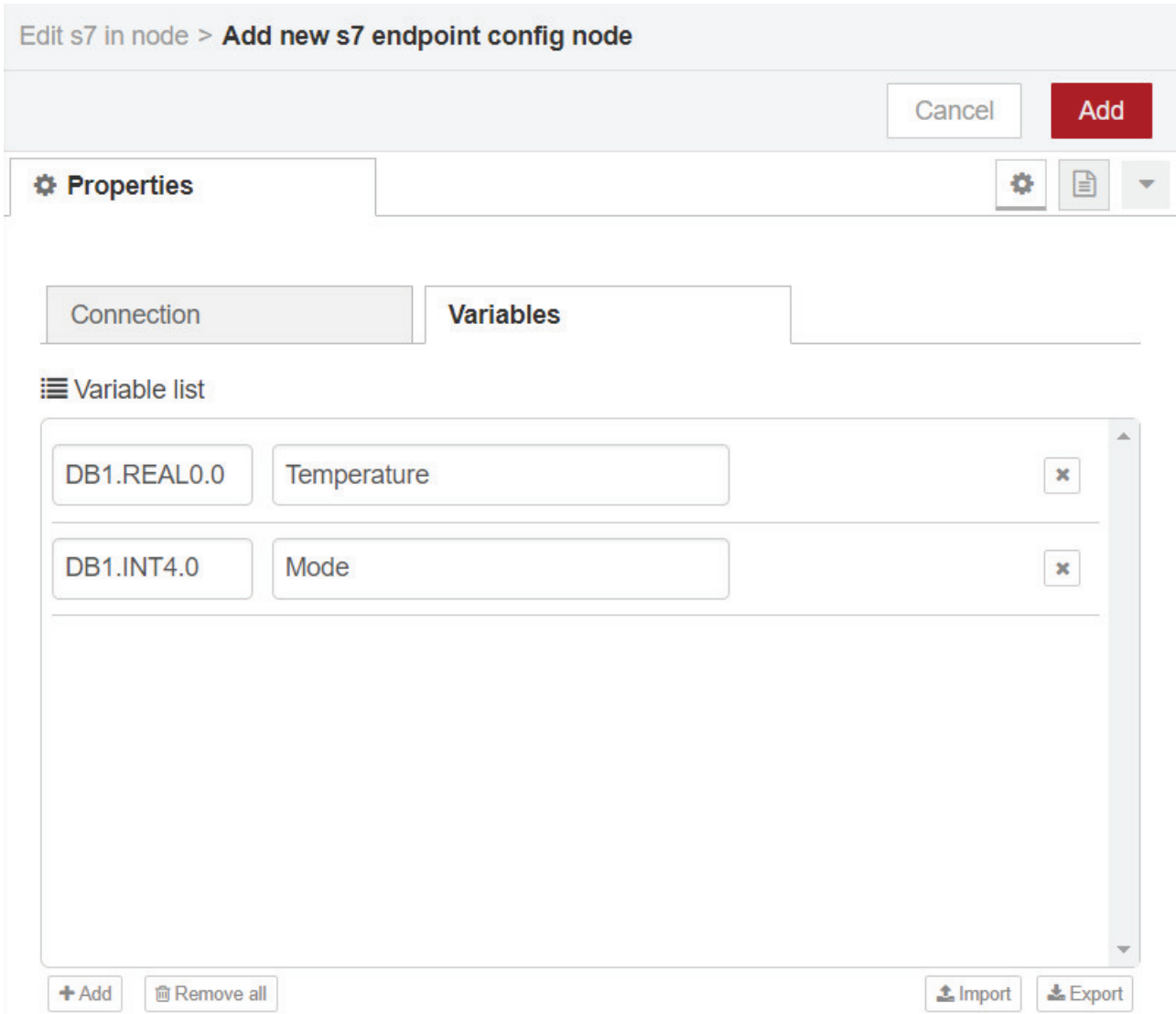
4. In the "Connection" tab, add a new endpoint with IP address, port, rack, and slot number of the S7-PLC.

Note

You can find this information in the "Device Configuration" dialog of the S7-PLC in the TIA portal.

5. Click the "Variables" tab:

6. Add the variables you want to read out and enter a name for the variables. For example, the variables temperature and mode are added in the image below:



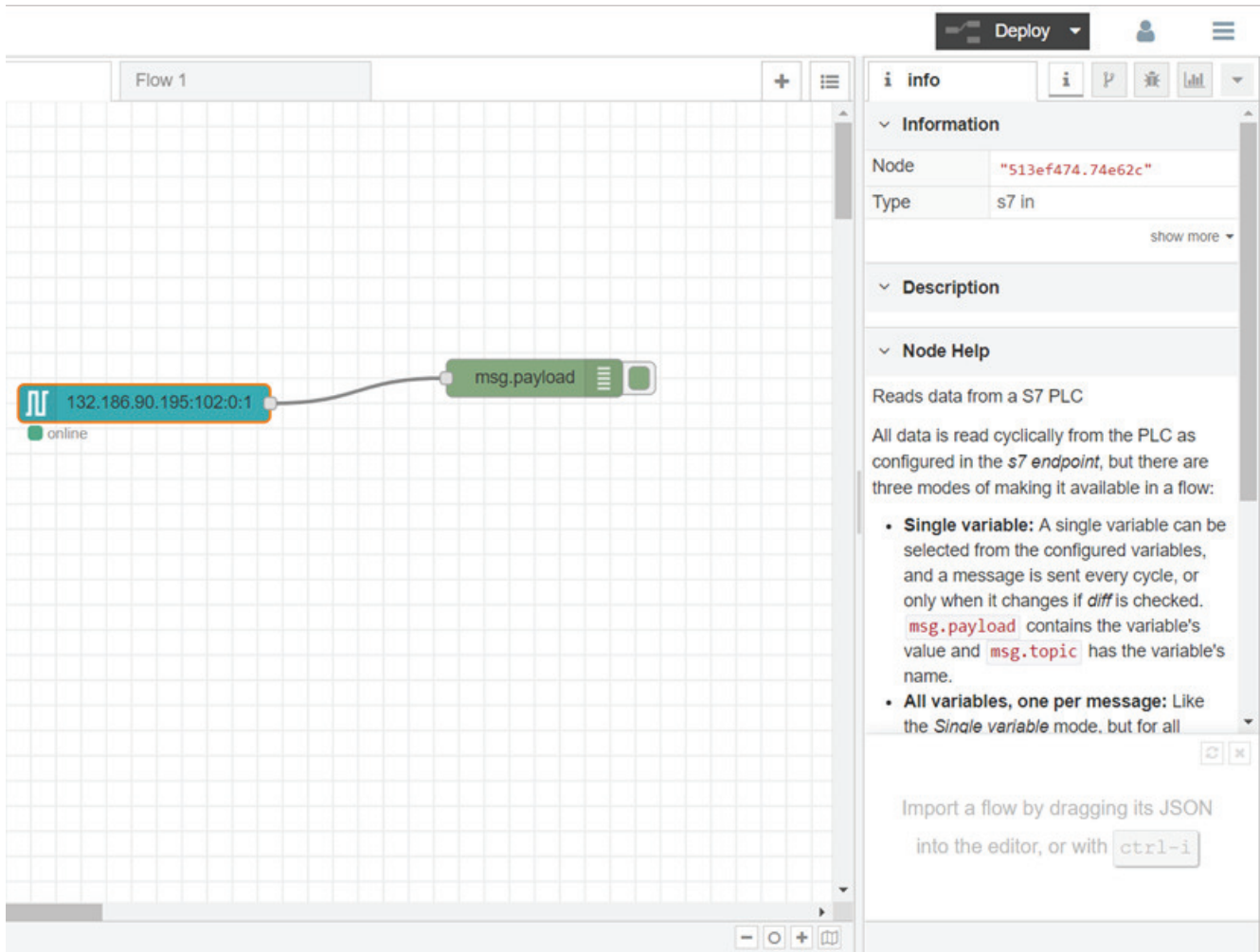
The address is "DB, DatatypeOffset". You can get this information from TIA Portal as shown in the image below:

	Name	Data type	Offset	Start value
1	Static			
2	Temperature	Real	0.0	0.0
3	Mode	Int	4.0	0

7. Click "Add".

6.2 S7 connection node

8. Select a mode from the drop-down list. Depending on the number of tags to be viewed on the debug panel through s7 communication the "Mode" option can be varied. The available options are as follows:
 - Single variable
 - All variables, one per message
 - All variables
9. Click "Done". The node is configured.
10. To view the output, drag-and-drop a "debug" node from the palette to the flow.
11. Wire the nodes together and click "Deploy".



6.3 LiveTwin Node

Introduction

"LiveTwin" node enables the IE Flow Creator app to handle simulation models loaded on LiveTwin app. The node allows to instantiate a 1D Simulation Model previously imported into LiveTwin app directly on IE Flow Creator.

"LiveTwin" node enables the Edge platform to handle simulation models from over 100 different simulation tools, such as Matlab® Simulink®, Amesim, Open Modelica, Ansys, and more.

Prerequisite

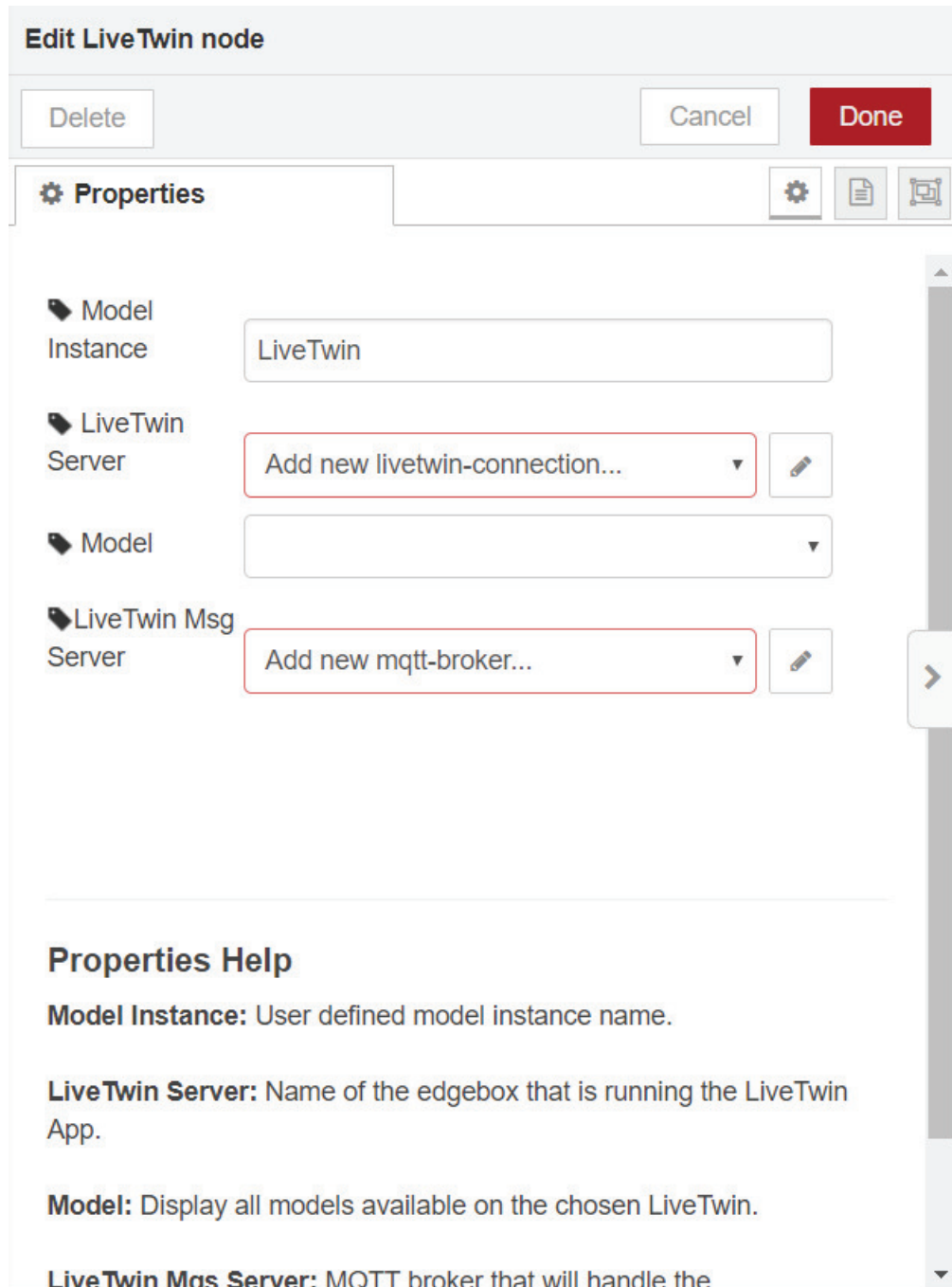
LiveTwin and IE Flow Creator app is running on the Industrial Edge Device.

Note


LiveTwin and IE Flow Creator app can run in different Industrial Edge Device in the same cluster. However, you must check the performance required for the model and the actual performance achieved when running LiveTwin and IE Flow Creator app in two different Industrial Edge Device.

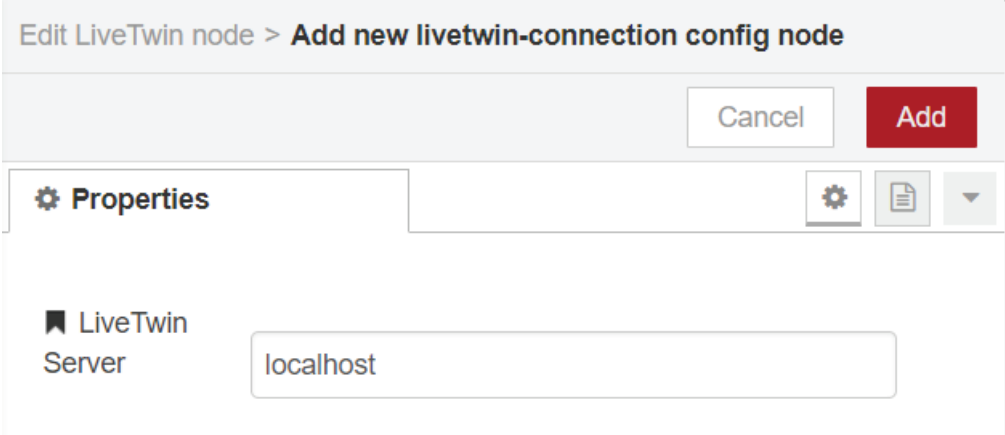
Configuration of LiveTwin Node

1. Drag-and-drop a LiveTwin node into the workspace and wire it together with an output node or other nodes as required for pre-process, aggregate, or post-process the data.
2. Double-click "LiveTwin" node. The "Edit LiveTwin node" dialog appears:



3. Define the model instance name in "Model Instance" field. It is advisable to fill the name as such that the running node can be easily identified afterwards on the dashboard of the LiveTwin app.

4. Specify the name of the Industrial Edge Device on which the LiveTwin is running in "LiveTwin Server" field. This allows you to run the IE Flow Creator and LiveTwin apps on different Industrial Edge Device in the same cluster. You can select a pre-registered server or add a new one. To add a new server,
 - Select "Add new livetwin-connection..." from the drop-down and click . The "Add new livetwin-connection config node" dialog appears:




- Complete the following fields:

Field	Description
LiveTwin Server	Defines the name of the Industrial Edge Device on which the LiveTwin app is running.


- Click "Add". The server is added.

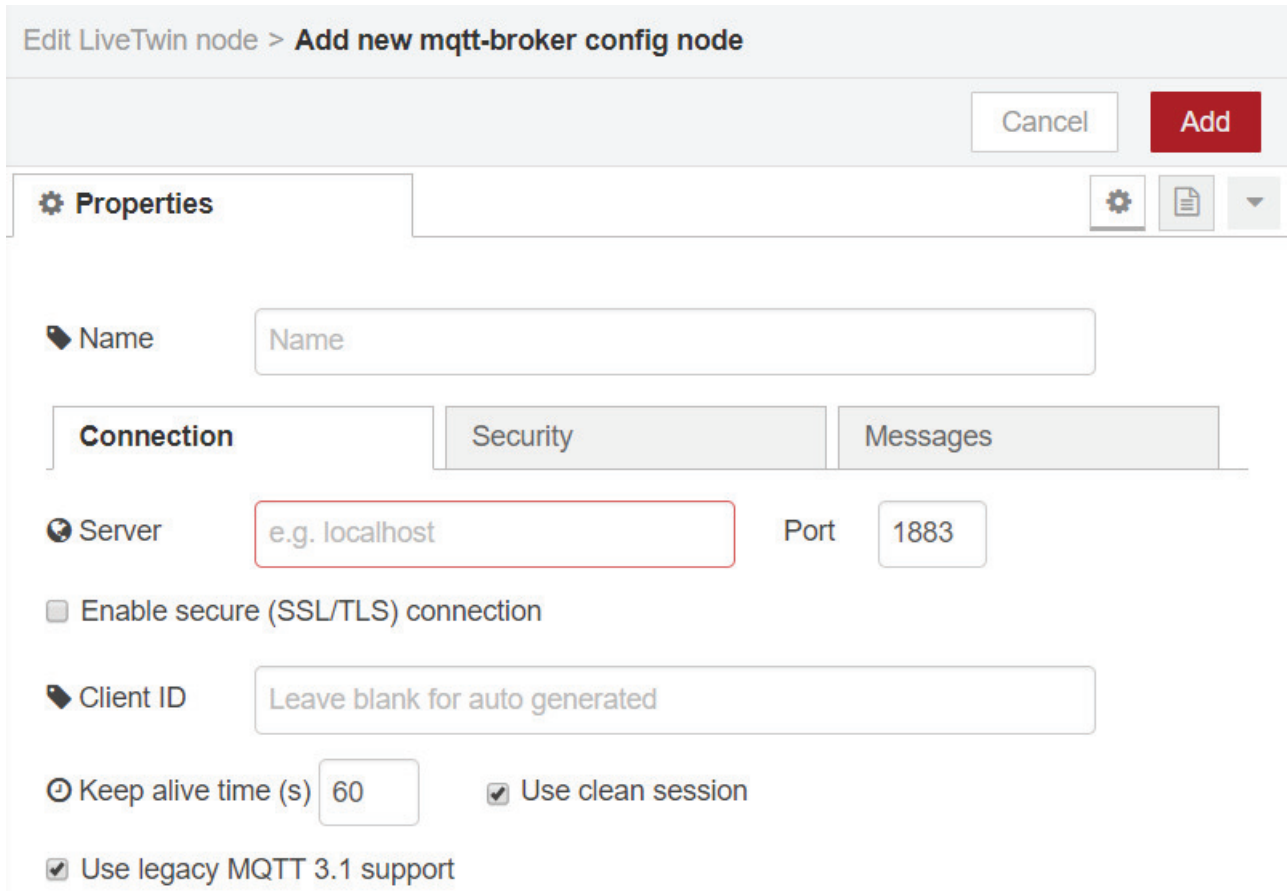
Note

Additionally, you can use  icon to update and delete an existing server as required.

5. Select a model available on the chosen LiveTwin server. When a valid LiveTwin address is provided in "LiveTwin Server" field, this field displays all the projects created in the correspondent LiveTwin app that are set as Project Type "IE Flow Creator". A LiveTwin project is a model which is imported into LiveTwin and was originally developed in any of the simulation tools that are compatible with LiveTwin.

6.3 LiveTwin Node

- 6. Specify the MQTT broker that handles the communication. For better performance the same server of LiveTwin is used. You can select a pre-registered server or add a new one. To add a new server,
 - Select "Add new mqtt-broker..." from the drop-down and click . The "Add new mqtt-broker config node" dialog appears:




- Complete the mandatory fields:

Field	Description
Server	Defines the name of the Industrial Edge Device on which the Live-Twin app is running.
Port	Defines the port number of the LiveTwin Databus.

- Complete all other optional fields as required.
- Click "Add". The mqtt-broker is added.

Note

Additionally, you can use  icon to update and delete an existing server as required.

- 7. Click "Done". The node is configured, and the "info" section of the node displays the model details.
- 8. Click "Deploy". The "LiveTwin" node configurations are deployed.

Additional Information

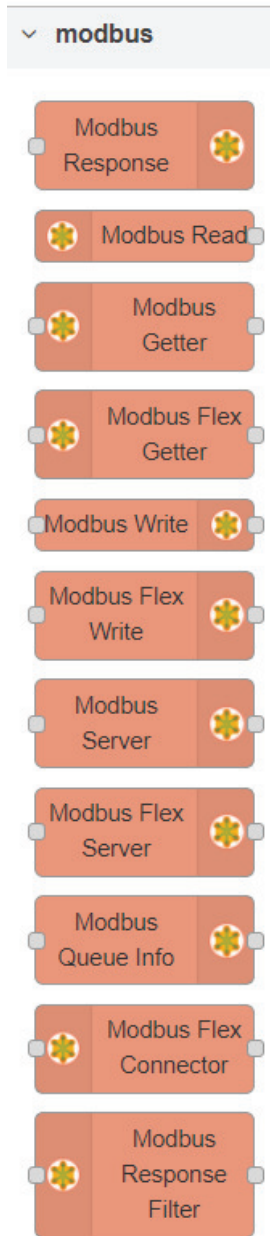
You can map PLC signals to use them as inputs to the LiveTwin node. The signal mapping is done by the name of the signals. You must set the names of the signals exactly the same as the names of the inputs of the model, which can be checked on the "info" section when the node is selected.

Additionally, you can use the "function node" to change the name of the signals as required.

6.4 Modbus node

Introduction

The Modbus node communicates with PLCs that support the MODBUS protocol. The image below shows the nodes which are grouped under the "Modbus" category:



The "Info" panel on the right displays the information on each node when the node is selected.

Prerequisites

The IE Flow Creator app is running on the Industrial Edge Device.

6.4.1 Modbus Read node

This node allows you to connect to a Modbus TCP or Serial to read register/coil values with a given polling rate.

Function Codes

The node supports different types of "Function codes" (FC):

- FC 1: Read Coil Status
- FC 2: Read Input Status
- FC 3: Read Holding Registers
- FC 4: Read Input Registers

Select the "FC" based on the type of data you like to read.

Address and quantity

"Address" indicates the value from which you will read the data and quantity is the number of data you read.

Unit-Id

TCP and Serial are allotted certain numbers known as "Unit-id". The value of "Unit-Id" ranges as follows:

- TCP: 0 to 255
- Serial: 1 to 247

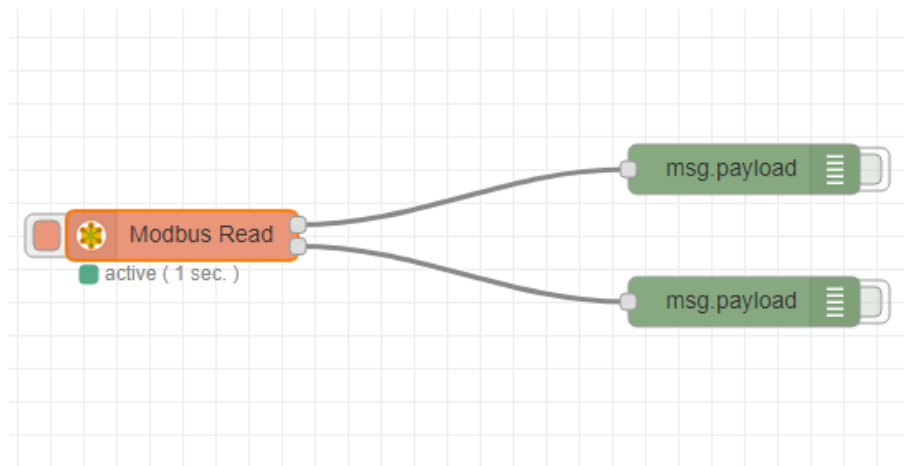
It is recommended to leave this field empty unless it is mandatory to override the default "Unit-Id" of the client configuration.

Polling rate

This indicates how frequently you can retrieve the data.

Configuring Modbus Read node

1. Drag-and-drop the "Modbus Read" node and two "debug" nodes into the workspace.
2. Wire them together as shown in the screenshot below:



3. Double-click on the node. The "Edit Modbus-Read node" dialog opens:

Edit Modbus-Read node

Delete Cancel Done

⚙️ Properties ⚙️ 📄 🖨️

Settings Options

📌 Name

📌 Topic

📌 Unit-Id

☰ FC

🏠 Address


📌 Quantity

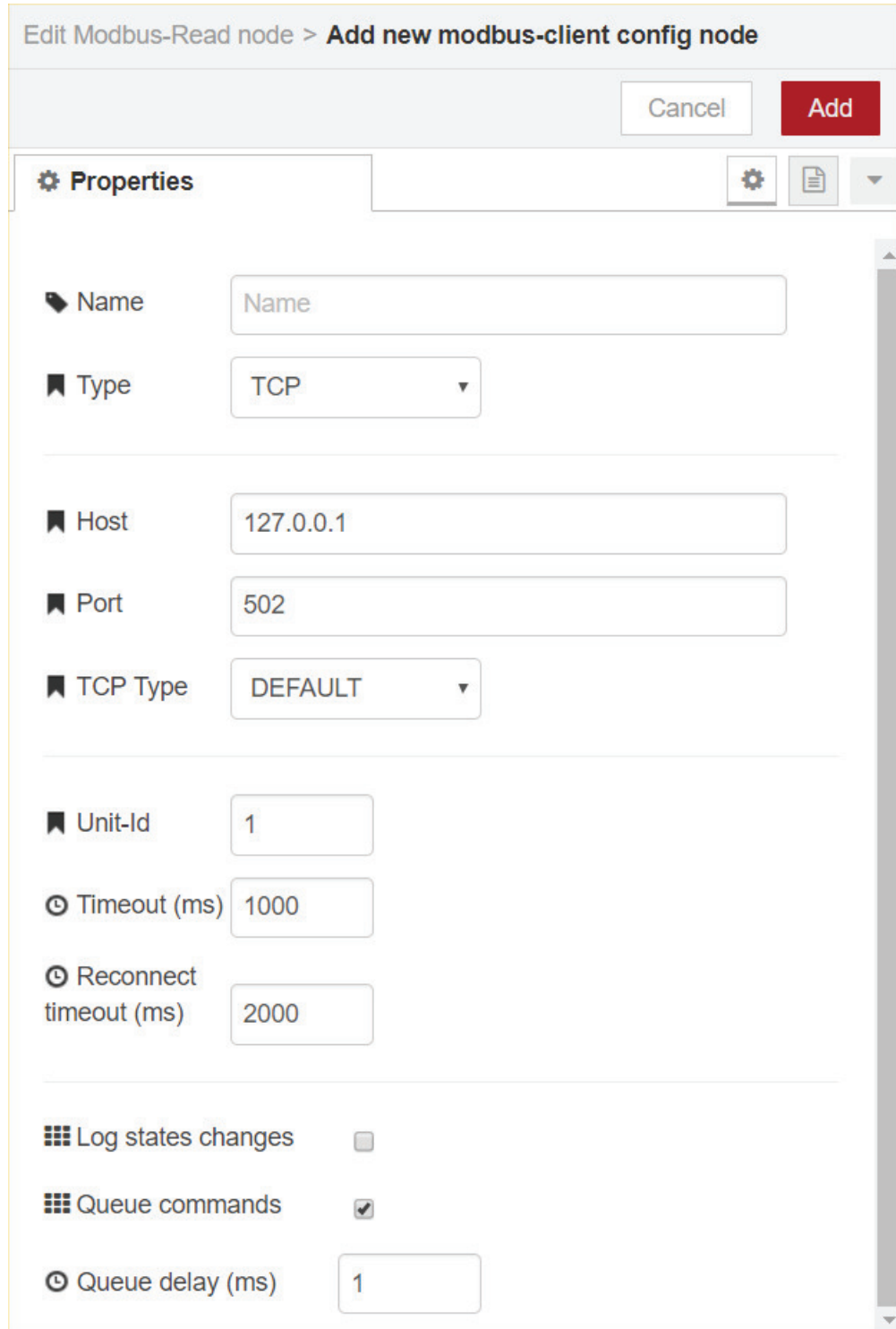
📌 Poll Rate

🔌 Delay on start

🌐 Server

4. Under the "Settings" tab, select a "FC" from the drop-down list. For example, select "FC 3: Read Holding Registers".
5. Enter "Address" as 0.
6. Enter "Quantity" as 8.
7. Type "Poll Rate" as 1 second.

- Click the  button next to the "Server" selection box. The "Add new modbus-client config node" dialog appears:



Edit Modbus-Read node > Add new modbus-client config node

Cancel Add

Properties

Name

Type

Host

Port

TCP Type

Unit-Id

Timeout (ms)

Reconnect timeout (ms)

Log states changes

Queue commands

Queue delay (ms)

- Select the "Type" as "TCP".
- In the "Host" field, enter the IP address of the Modbus PLC.

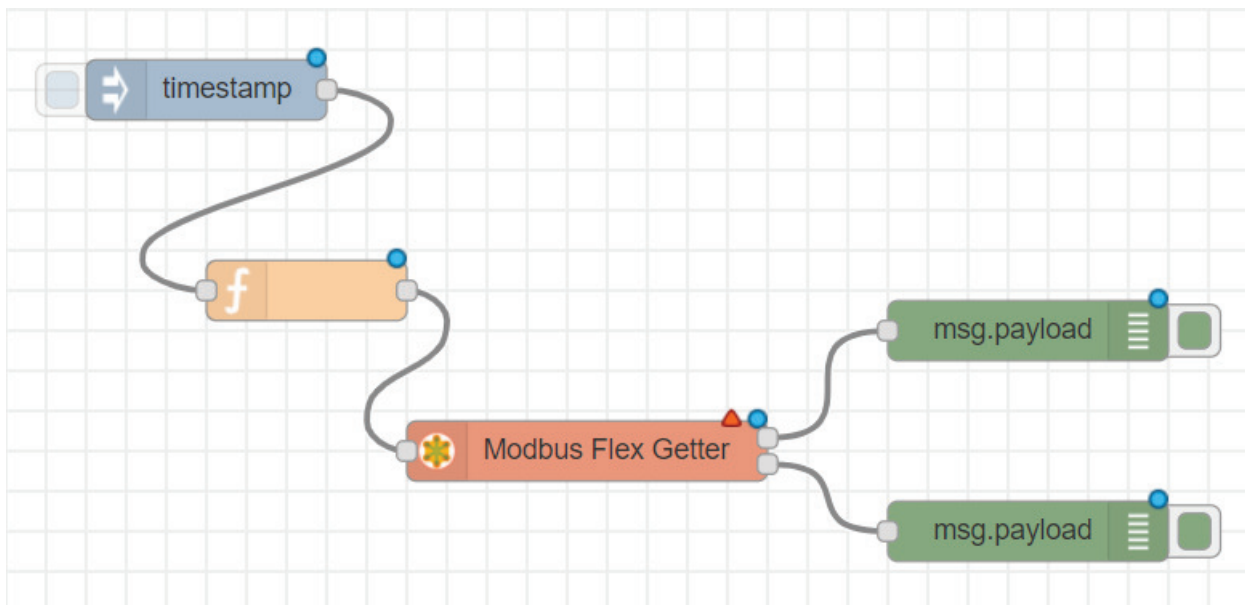
11. Enter the "Port" number. Default number is 502.
12. Select 'TCP Type' as "DEFAULT".
13. Click "Add". The "Edit Modbus-Read node" dialog opens.
14. Click "Done".
15. Click "Deploy". Navigate to the "debug" pane to view the results.
16. Active the "Modbus Read" node to get more results.

6.4.2 Modbus Flex Getter node

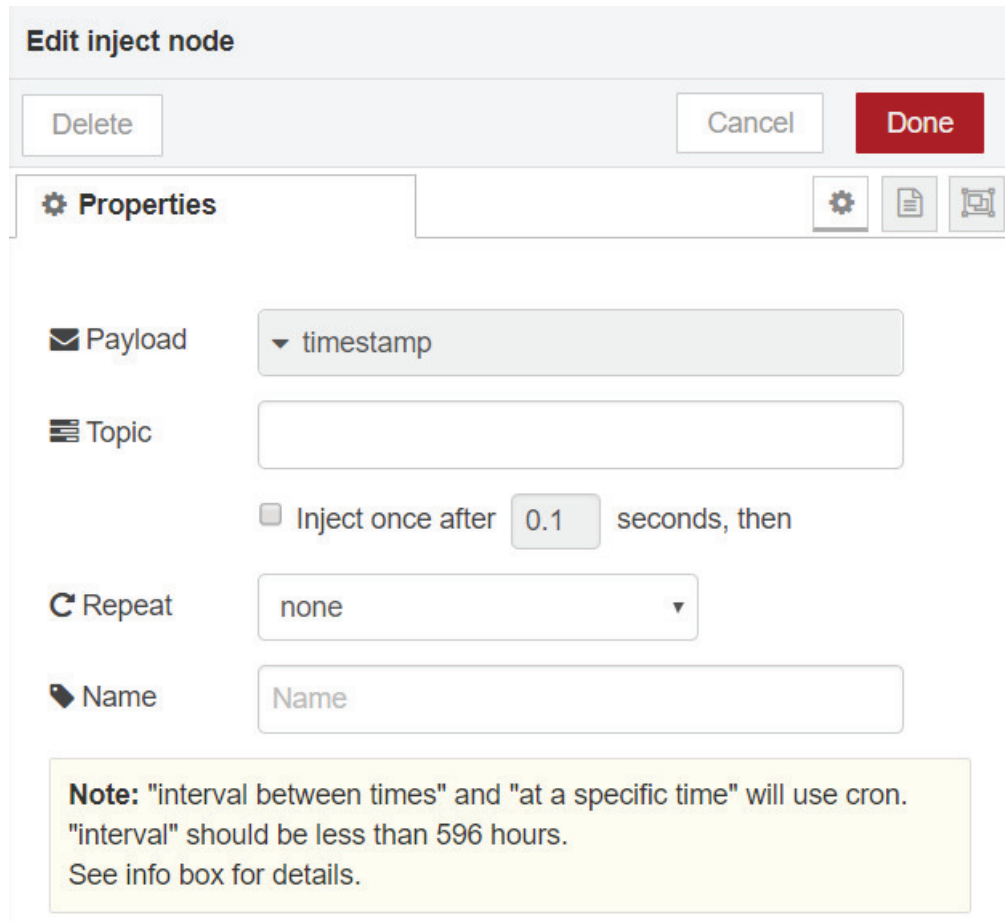
This node allows you to connect to a Modbus TCP or Serial to read registers/inputs/coils at the rate of the incoming message. It usually works with a triggered read function by an "inject" node.

Configuring Modbus Flex Getter node

1. Drag-and-drop an "inject" node, the "Modbus Flex Getter" node, a "function" node and two "debug" nodes.
2. Wire them together as shown in the image below:



3. Double-click the "inject" node. The "Edit inject node" dialog appears:



Edit inject node

Delete Cancel Done

Properties

Payload ▼ timestamp

Topic

Inject once after seconds, then

Repeat none ▼

Name

Note: "interval between times" and "at a specific time" will use cron.
"interval" should be less than 596 hours.
See info box for details.

4. Select the "Payload" field as "timestamp" from the drop-down list.
5. Click "Done".

6. Double-click the "function" node. The "Edit function node" dialog appears:

Edit function node

Delete Cancel Done

⚙️ **Properties** ⚙️ 📄 🖨️

📁 **Name** Name 📄

🔧 **Function** ↗️

```
1  
2 return msg;
```

🔄 **Outputs** 1

7. Add a function payload to the "Function" field as follows:

```
msg.payload = {  
  'fc': 4,  
  'unitid': 1,  
  'address':0,  
  'quantity': 8 } ;  
return msg;
```

8. Click "Done".

9. Double-click the "Modbus Flex Getter" node. The "Edit Modbus-Flex-Getter node" dialog appears:

Edit Modbus-Flex-Getter node


Delete Cancel Done

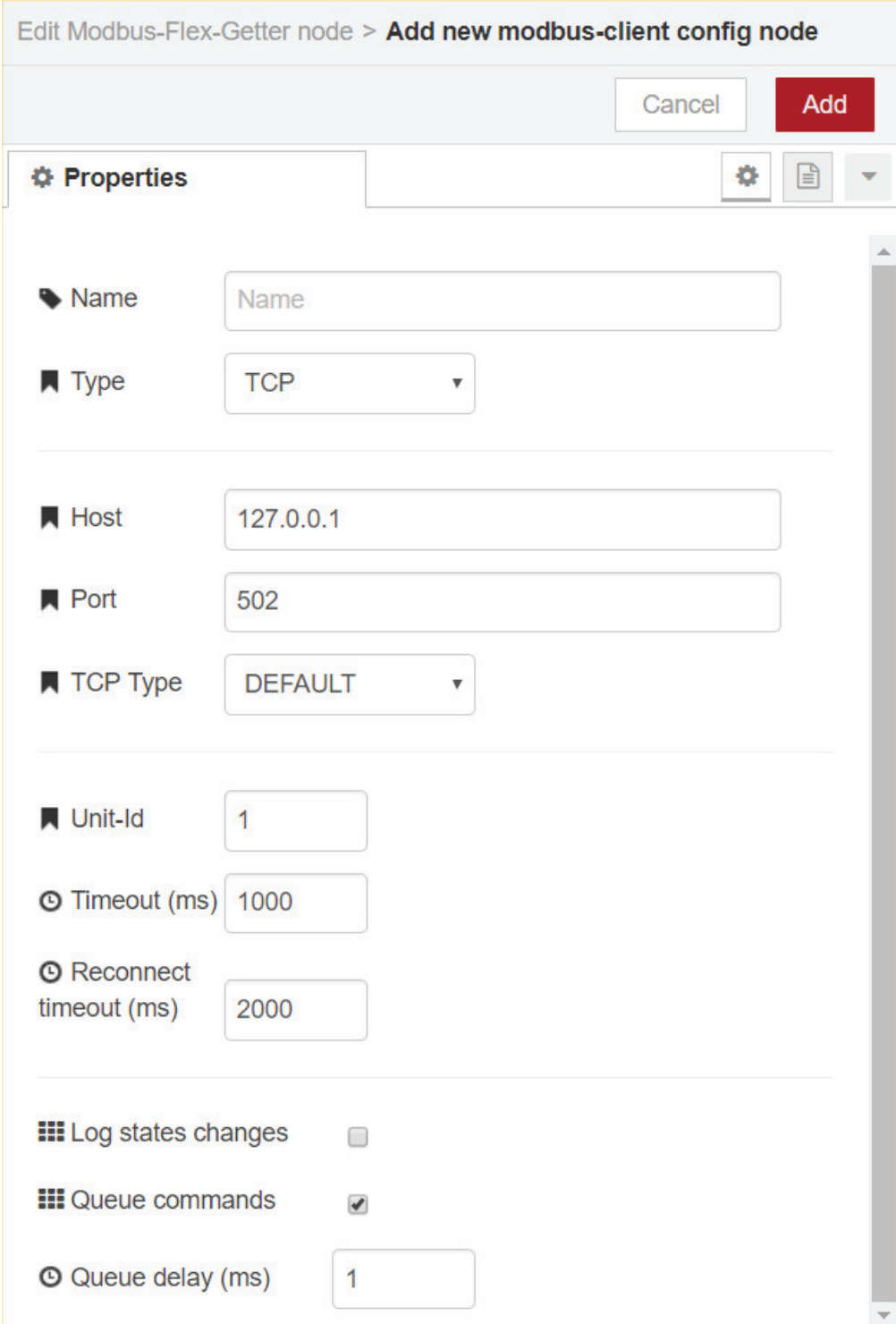
⚙️ **Properties** ⚙️ 📄 🖨️

Settings Options

📁 Name

🌐 Server 🖋️

- Click the  button beside the "Server" selection box. The "Add new modbus-client config node" dialog opens:



Edit Modbus-Flex-Getter node > Add new modbus-client config node

Cancel Add

Properties

Name

Type

Host

Port

TCP Type

Unit-Id

Timeout (ms)

Reconnect timeout (ms)

Log states changes

Queue commands

Queue delay (ms)

- Select the "Type" as "TCP".
- In the "Host" field, enter the IP address of the Modbus PLC.

13. Enter the "Port" number. Default number is 502.
14. Select "TCP Type" as "DEFAULT".
15. Click "Add". The "Edit Modbus-Flex-Getter node" dialog appears.
16. Click "Done".
17. Click "Deploy". The flow is deployed to the server.
18. Navigate to the "debug" pane to view the results.

6.5 OPC UA node

Introduction

"OPC UA Client" node is used to subscribe to tag values from the field devices in remote locations through the OPC UA channel and to use those values in IE Flow Creator flows. The "OPC UA Client" node connects to an endpoint like **opc.tcp://host:port/UA/EndPointName**.

The node can be used to:

- Read
- Write
- Browse
- Subscribe
- Unsubscribe
- Event
- Info

There are two ways to inject data into the OPC UA nodes:

- Use the "Topic" of an "inject" node to input the OPC UA address (Nodename).
- Inject data using the "OPC UA Item" node controlled by an "inject" node.

Prerequisites

- IE Flow Creator app is running on the Industrial Edge Device.
- TIA portal settings are complete. To know how to make the settings, refer to the section TIA portal settings for OPC UA. (Page 91)

Configuration of OPC UA Client node

The "OPC UA Client" node can be configured to receive input in two different ways, depending on the function it must perform:

- Configuring an "OPC UA Client" node to subscribe
- Configuring an "OPC UA Client" node to write

6.5.1 TIA portal settings for OPC UA node

To use the "OPC UA Client" node to connect to a Siemens PLC, do the following settings in TIA portal:

Step 1: Enable OPC UA server

1. Right-click the PLC device from the project tree and navigate to "Properties > General > OPC UA > Server > General".
2. Enable the "Activate OPC UA Server" checkbox.
3. Click "OK".

Step 2: Add license

1. Right-click the PLC device from the project tree and navigate to "Properties > General > Runtime Licenses > OPC UA".
2. In the "Type of purchased license" field, select the correct license from the drop-down list.
3. Click "OK".

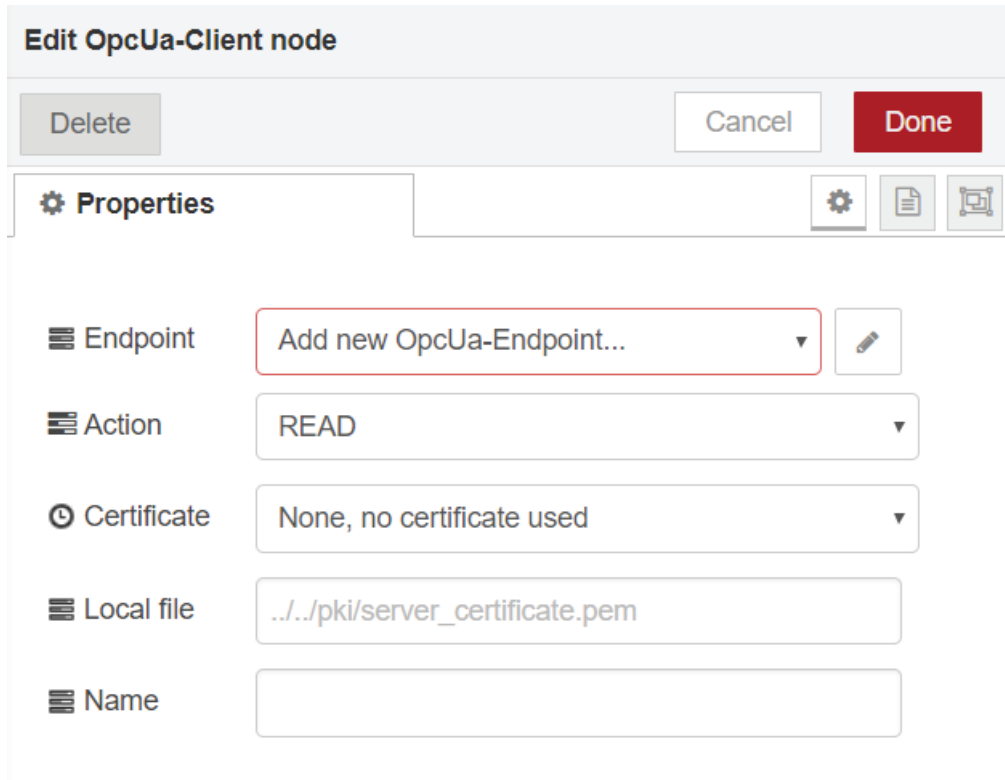
Once the settings are done in TIA portal, the "OPC UA" node is ready for use.


Note

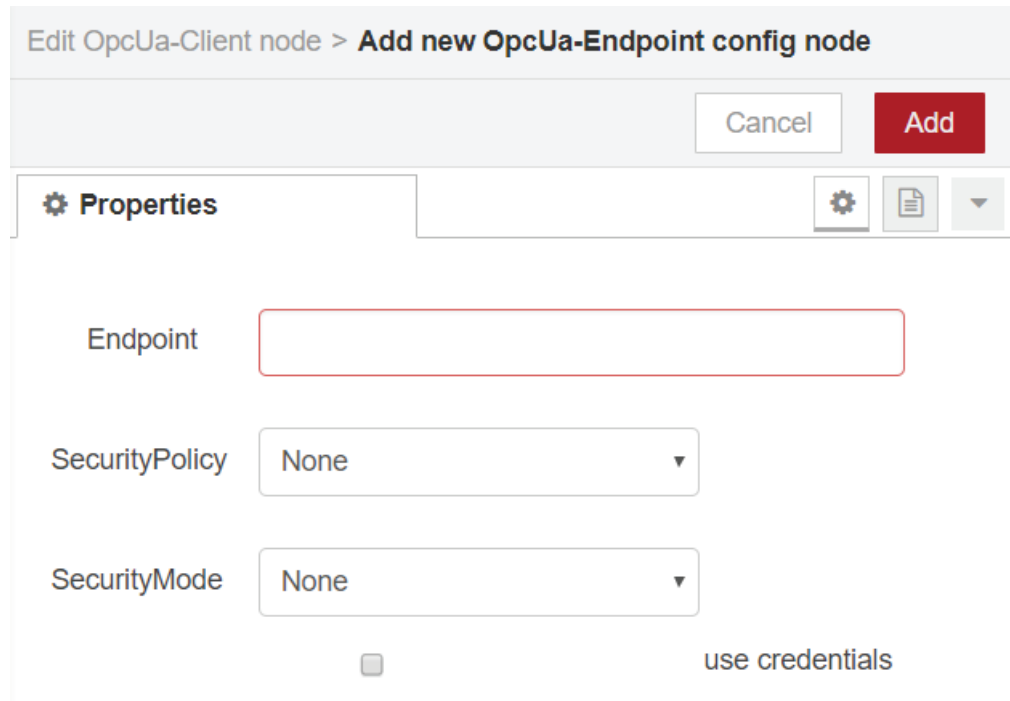
For more information related to TIA portal, refer TIA portal documentation.

6.5.2 Configuring OPC UA node to subscribe

1. Drag-and-drop an "inject" node, an "OPC UA Client" node and a "debug" node. Wire them together.
2. Double-click the "OPC UA Client". The "Edit OpcUa-Client node" dialog opens:



- Click the  button next to the "Endpoint" field. The "Add new OpcUa-Endpoint config node" dialog appears:



Edit OpcUa-Client node > Add new OpcUa-Endpoint config node

Cancel Add

⚙ Properties

Endpoint

SecurityPolicy None ▼

SecurityMode None ▼

use credentials

- Add a new "Endpoint" with IP address and port from the OPC UA Server.

Note

The IP address has the format "opc.tcp:///" followed by the IP address of the PLC.

- Click "Add". The "Edit OpcUa-Client node" appears.
- In the "Action" field, select "SUBSCRIBE" from the drop-down list.
- Select the required interval.
- Enter the "Name" for the node. For example, "Subscribe Temperature".
- Click "Done". The "OPC UA Client" node is configured to subscribe.

10. Double-click the "inject" node. The "Edit inject node" dialog opens:

11. In "Payload", select "String" type.


12. In the "Topic" field, type the NodeID of the required value and give an optional name to the node.

13. Click "Done".

14. Navigate to the "debug" pane to view the results.

6.5.3 Configuring OPC UA node to write

1. Drag-and-drop an "inject" node, an "OPC UA Item" node and an "OPC UA Client" node. Wire them together.
2. Double-click the "OPC UA Item" node. The "Edit OpcUa-Item node" dialog appears"

3. In the "Item" field, add the NodeID of the value to write and choose its "Type".
4. Click "Done".
5. Double-click the "OPC UA Client" and the "Edit OpcUa-Client node" dialog opens.
6. Click the  button next to the "Endpoint" field. The "Add new OpcUa-Endpoint config node" dialog appears.
7. Add a new "Endpoint" with IP address and port from the OPC UA Server.

Note

The IP address has the format "opc.tcp://" followed by the IP address of the PLC. The port number is 4840

8. Click "Add". The "Edit OpcUa-Client node" dialog appears:

9. In the "Action" field, select "WRITE" from the drop-down list.
10. Select the required interval and enter the "Name" for the node. For example, subscribe temperature.
11. Click "Done". The "OPC UA Client" node is configured to write.
12. Navigate to the "debug" pane to view the results.

6.5.4 Security in OPC UA node

1. In TIA portal, right-click the PLC and navigate to "Properties > General > OPC UA > Security > User authentication".
2. Under "User name and password authentication" tab, activate the "Enable user name and password authentication" checkbox.
3. Under "User management" tab, type in a password.

Note

This security feature is optional. For more information related to TIA portal, refer TIA portal documentation.

6.6 Mindconnect node

Introduction

The Mindconnect node allows you to send data to MindSphere for data storage and processing.

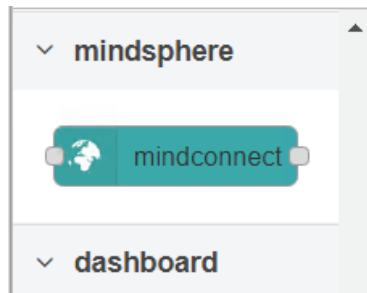
The MindSphere is the Siemens data hosting cloud platform for industry in the field of Internet of Things (IoT) and Analytics. MindSphere connects you to the devices in the field or the manufacturer's shop floor and allows you to store data in it.

Prerequisites

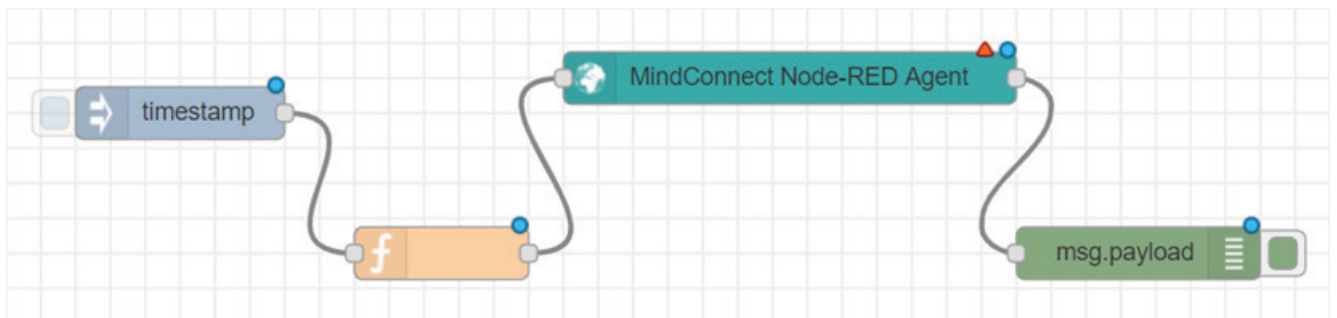
- An account in MindSphere.
- Create "Aspect", "Aspect Types", and "Assets" in MindSphere. Click here (<https://documentation.mindsphere.io/resources/html/asset-manager/en-US/index.html>) to know how to create "Aspect", "Aspect Types", and "Assets".
- The IE Flow Creator app is running on the Industrial Edge Device.

Configuration of mindconnect node

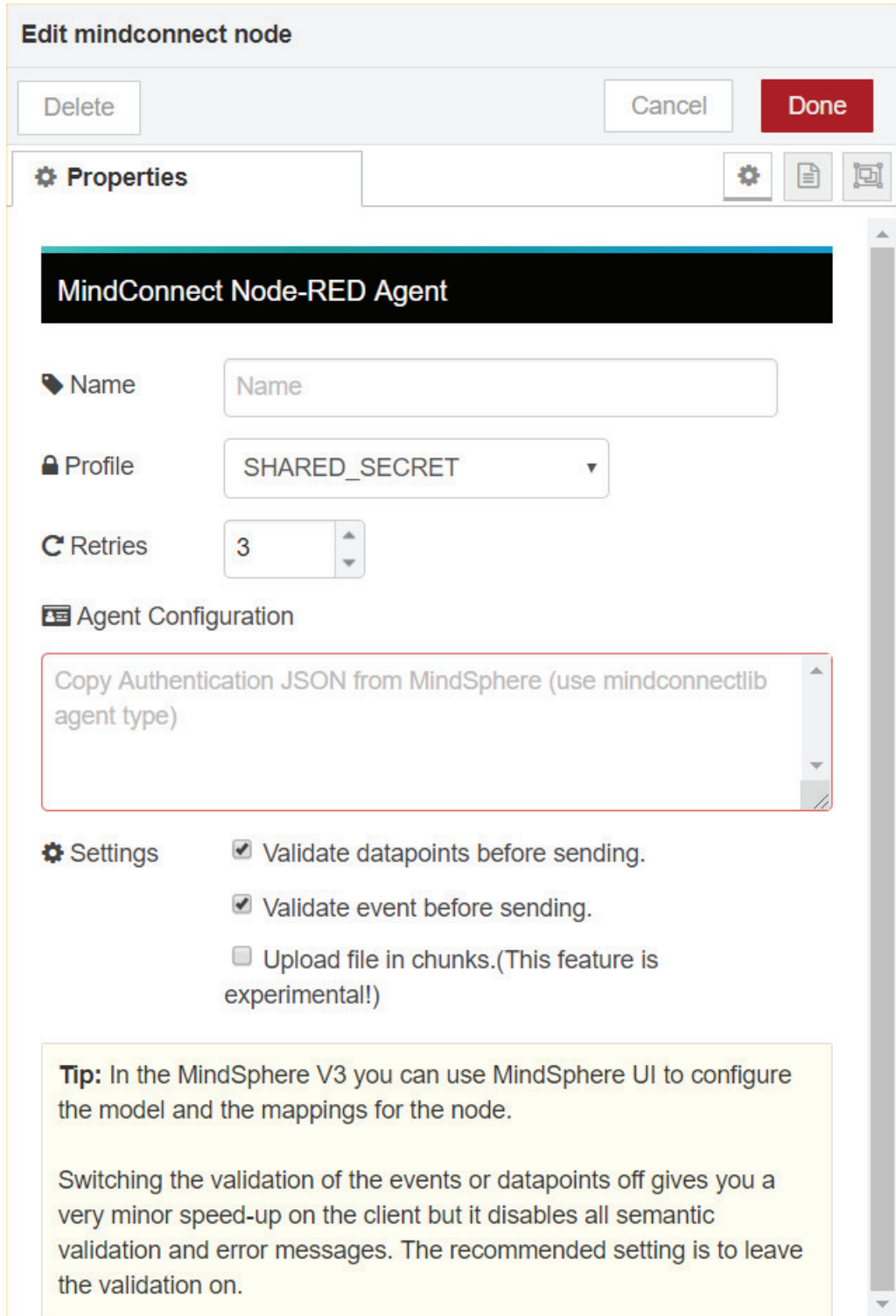
1. Drag-and-drop an "inject" node, an "output" node, a "function" node, and a "mindconnect" node into the workspace:



2. Wire them together:



- 3. Double-click the "mindconnect" node. The "Edit mindconnect node" dialog appears:



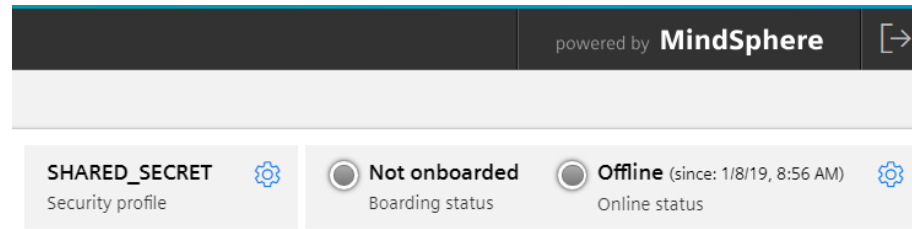
- 4. Under "node properties", type the desired "Name" of the node.

- For the "Profile" field, select an option from the drop-down list. This allows you to push data to the datapoints in MindSphere.

Note

Recommended option is "SHARED_SECRET".

- Navigate to the MindSphere account.
- Under your "Asset" name, go to "Mindconnect Lib".
- Click "Settings". The "Edit boarding configuration" dialog appears:



[← Back to configuration](#)

Edit boarding configuration

Boarding configuration

In order to use MindConnect Lib, you have to insert the generated onboarding key into your system.

Generate onboarding key

Copy to clipboard

Offboard MindConnect Lib

In case you don't want to use the onboarded MindConnect Lib you can offboard it.

Offboard

- Click "Generate onboarding key" and copy the key to the clipboard.
- Paste the "SHARED_SECRET" key in your "mindconnect" node.
- Click "Done". The "mindconnect" node is configured.
- Double-click the "function" node. The "Edit function node" dialog appears.
- In the "Function" field, type a function to send the Time-Series data in a specified format. For example, if you would like to send data to store temperature, pressure, and humidity, write the function providing specific "Datapoint Id" to the related data. This "Datapoint Id" correlates with the "Datapoints" created in the "Mindconnect Lib" linked to your "Assets".
- Click "Deploy" to send real-time Time-Series data to MindSphere.

6.7 Dashboard node

Introduction

IE Flow Creator Dashboard is a module that provides a set of nodes to quickly create a live data dashboard.

Prerequisites

The IE Flow Creator app is running on the Industrial Edge Device.

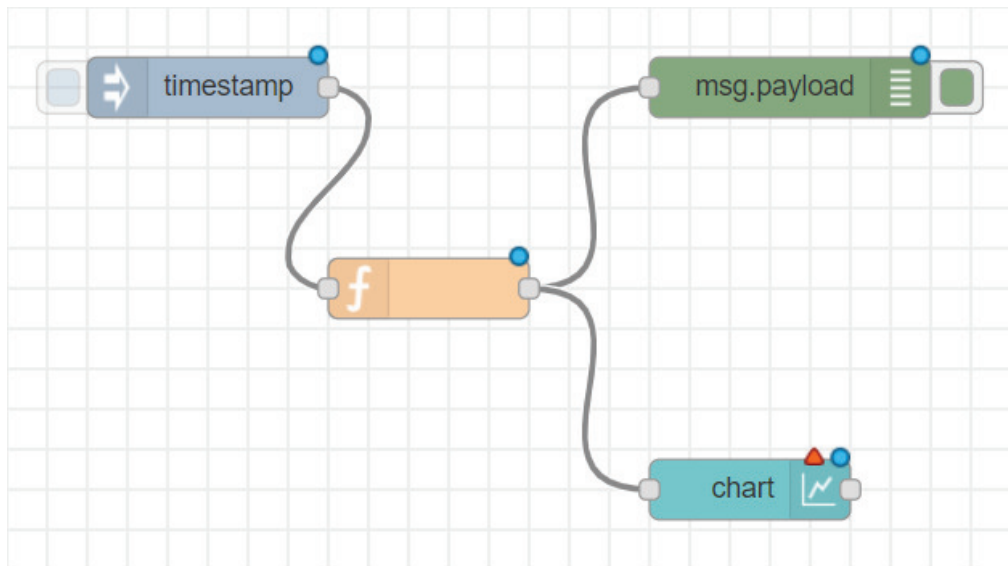
Configuration of a basic dashboard

To create a flow that sends a random number between 0 to 99 to a simple chart, you will need an inject node that inputs a number repeatedly every few seconds, a function node to generate a random number, a dashboard node -in this case a chart node:

1. Create a flow

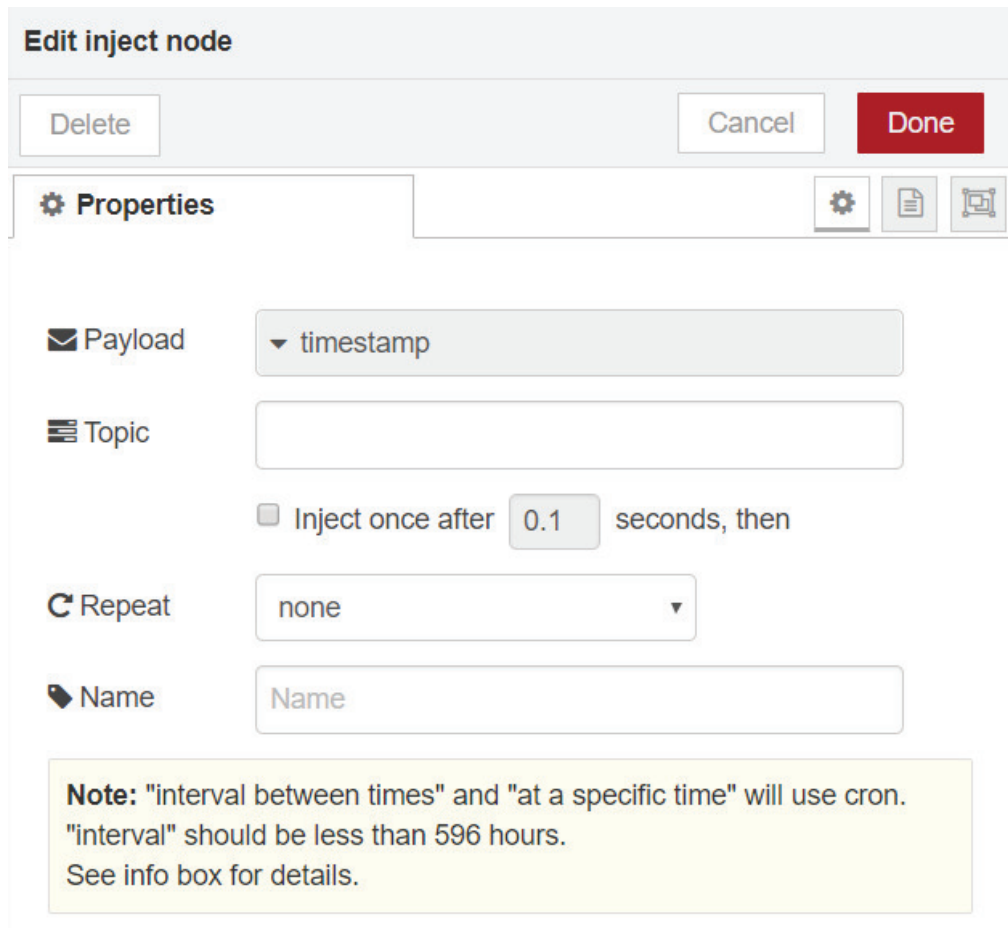
Drag-and-drop the following nodes from the palette into the workspace:

- "Inject" node
- "Function" node
- "Debug" node
- "Chart" node



2. Configure the "inject" node

1. Double-click the "inject" node. The "Edit inject node" dialog appears:



Edit inject node

Delete Cancel Done

Properties

Payload ▼ timestamp

Topic

Inject once after 0.1 seconds, then

Repeat none ▼

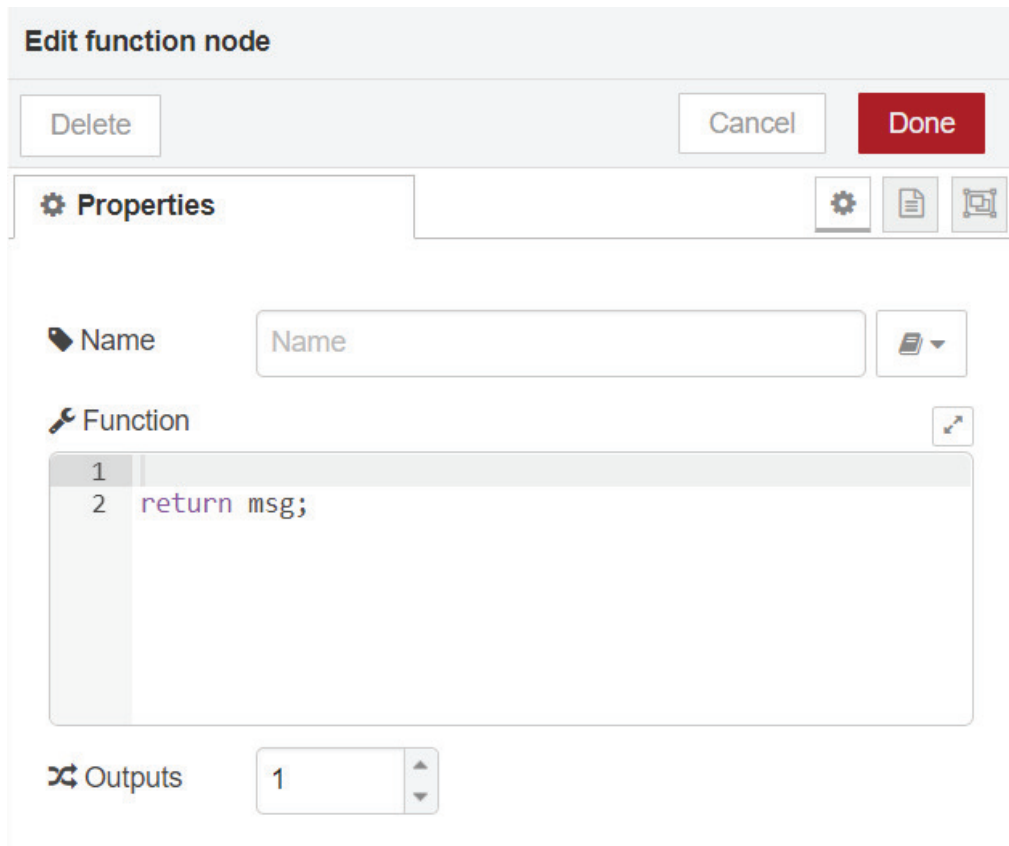
Name Name

Note: "interval between times" and "at a specific time" will use cron. "interval" should be less than 596 hours. See info box for details.

2. Select the "Payload" field as "timestamp" from the drop-down list.
3. Set "Repeat" field to an interval of every 5 seconds.
4. Click "Ok".

3. Configure the "function" node

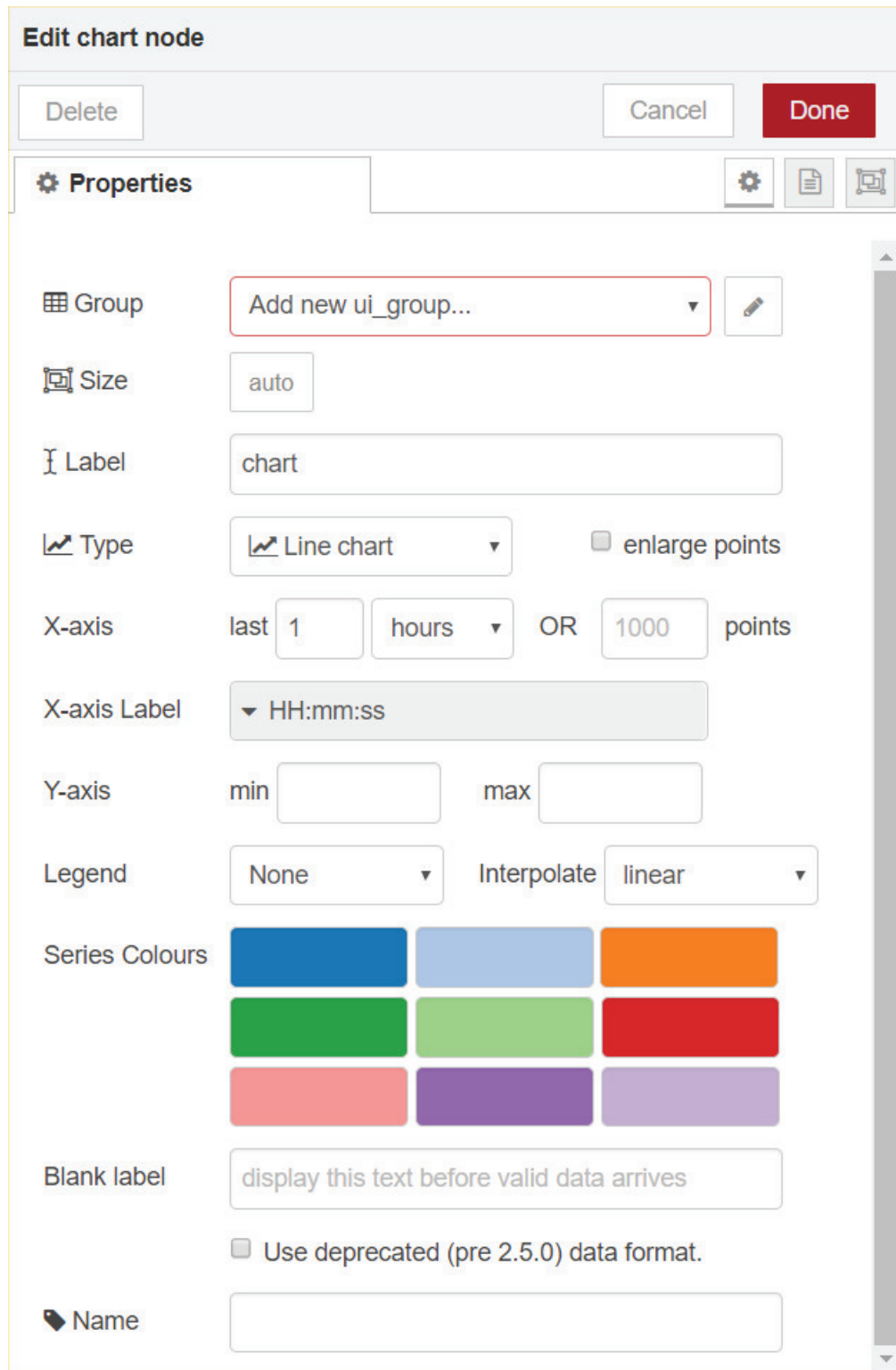
1. Double-click the "function" node. The "Edit function node" dialog appears:




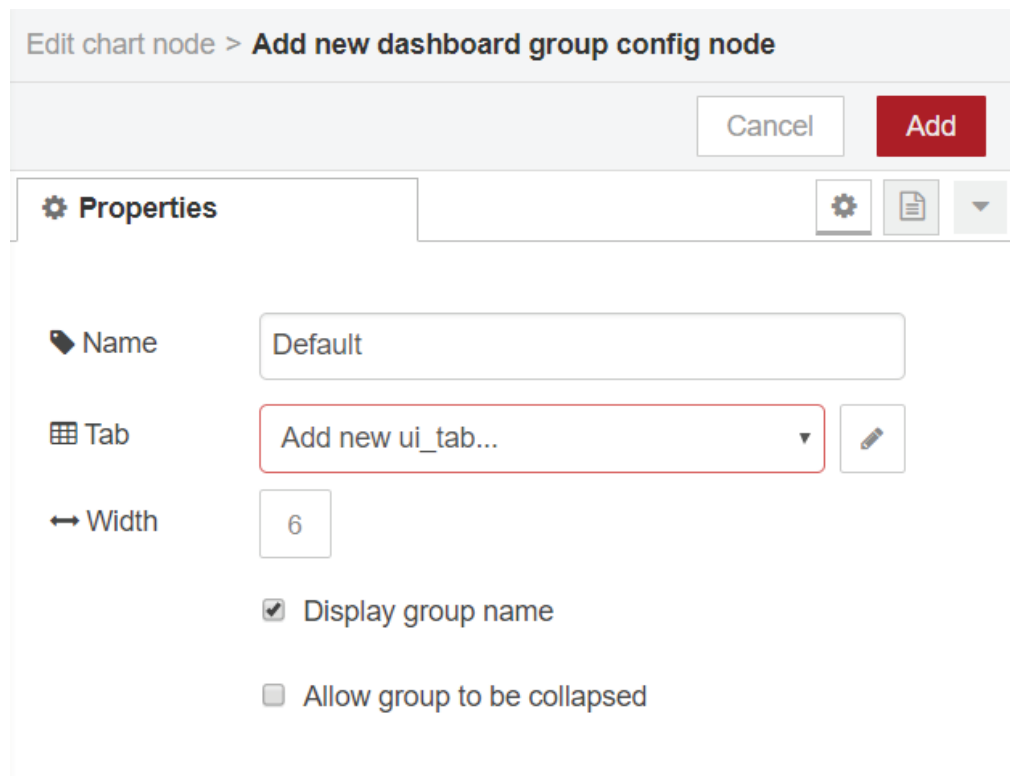
2. Type the "Name" as "Random number".
3. Type the JS math function into the "Function" field.
4. Click "Done".

4. Configure the "chart" node

1. Double-click the "chart" node. The "Edit chart node" dialog appears:



2. Click the  button next to the "Group" field. The "Add new dashboard group config node" dialog appears:



Edit chart node > Add new dashboard group config node

Cancel Add

Properties


Name Default

Tab Add new ui_tab...

Width 6

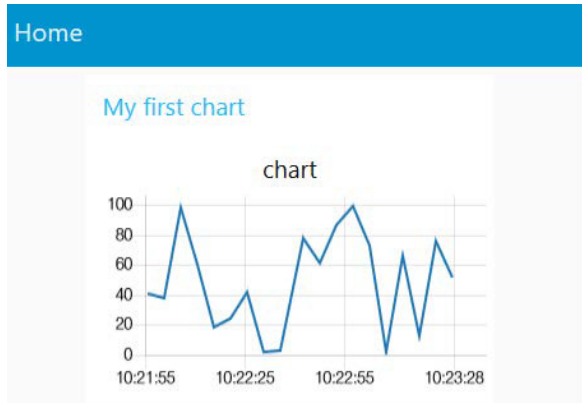
Display group name

Allow group to be collapsed

3. Enter the "Name".
You can set it to anything you like. For example, "My first dashboard".
4. Select the "Tab" field from the drop-down list. This option allows you to specify which tab of the UI page you will see the UI element on.
If you click the  button, you can create a new "Tab". The default tab is "Home", and you can use that for this example.
5. Click "Add". The "Edit chart node" dialog appears.
6. Select the "Line" chart for the "Type" of chart.
7. Fill the "X-axis" fields. This field defines how much data the chart should store and display. The longer the "Last" field is set to, the more data the chart displays.
For example, you can set it for 5 minutes.
8. Set the "Interpolate" type from the drop-down list. This field defines how the chart will interpolate the values in between the actual data value it receives.
For example, you can use the default "linear".
9. Click "Done".

5. Deploy the flow

1. Wire the nodes together.
2. Click "Deploy" and make sure the "debug" panel is displaying random numbers.
3. Navigate to your default dashboard page and view the results. The example chart appears as shown below:

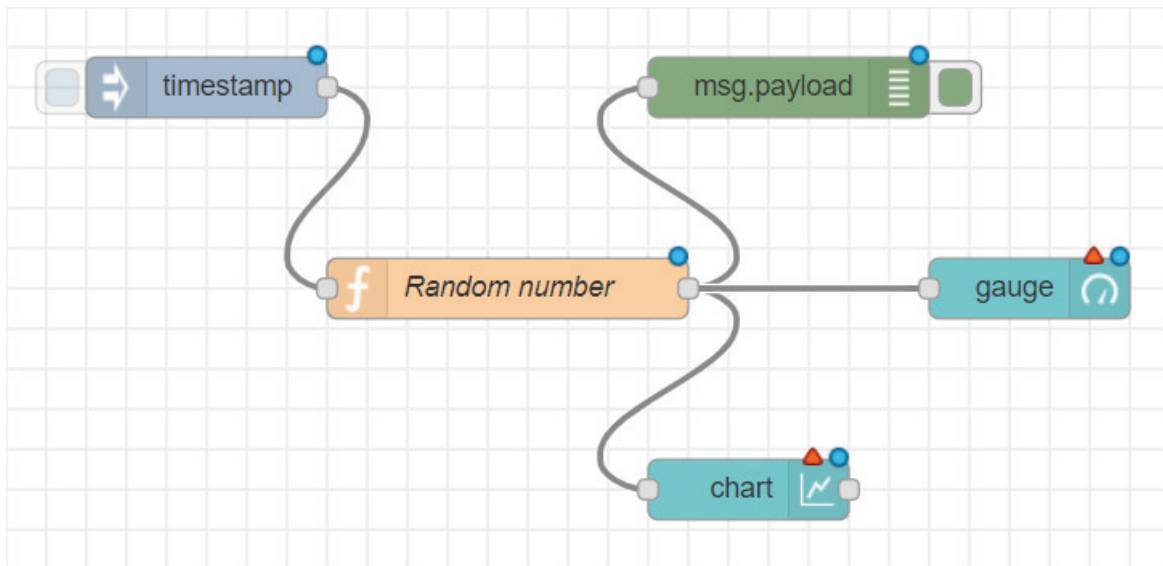


To access your dashboard UI page, search for the URL in the format **https://<IP of IE Flow Creator server>:<port>/ui**. You can configure the port number as desired when you launch IE Flow Creator.

6.7.1 Adding elements to the dashboard

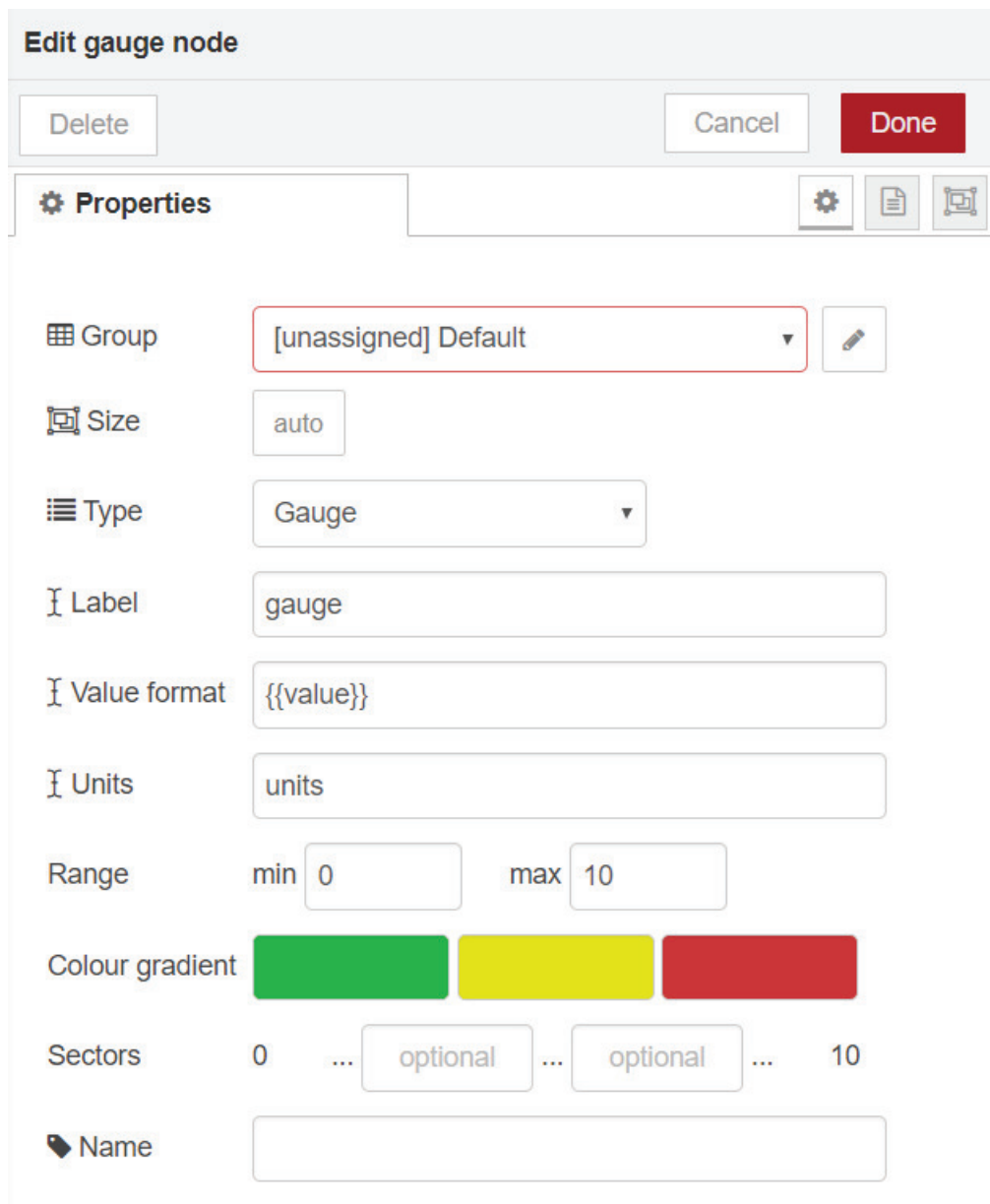
Step 1: Add a "gauge" node


1. Drag-and-drop a "gauge" node from the palette into the workspace.
2. Wire it to the "Random number" function node:



Step 2: Configure the "gauge" node

1. Double-click the "gauge" node. The "Edit gauge node" dialog opens:

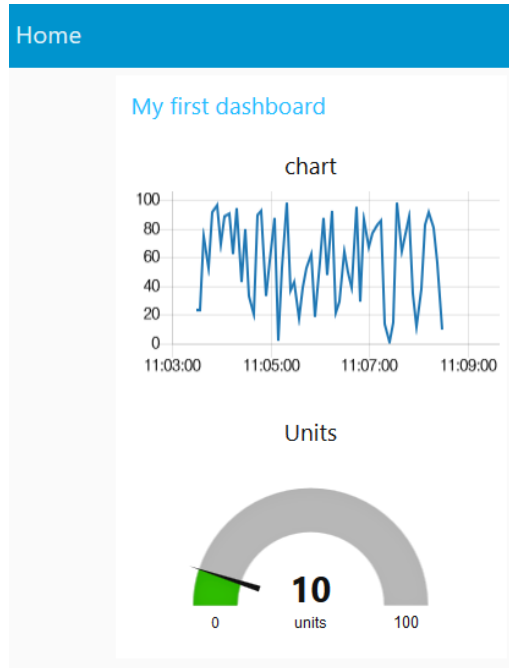


2. Click the  button next to the "Group" field. The "Edit dashboard group node" appears.
3. Set the "Tab" field to "Home" and enter the same name "My first dashboard".
4. Click "Update". The "Edit gauge node" dialog appears.
5. Enter the "Range" values. The "max" and "min" fields allow you to set the maximum and minimum values the gauge will display. Ensure the "Max" number is set to 100, as that is the maximum random number the function node will generate.

6. Use the "Colour gradient" fields to show different colours on the widget.
7. Click "Done".

Step 3: Deploy the flow

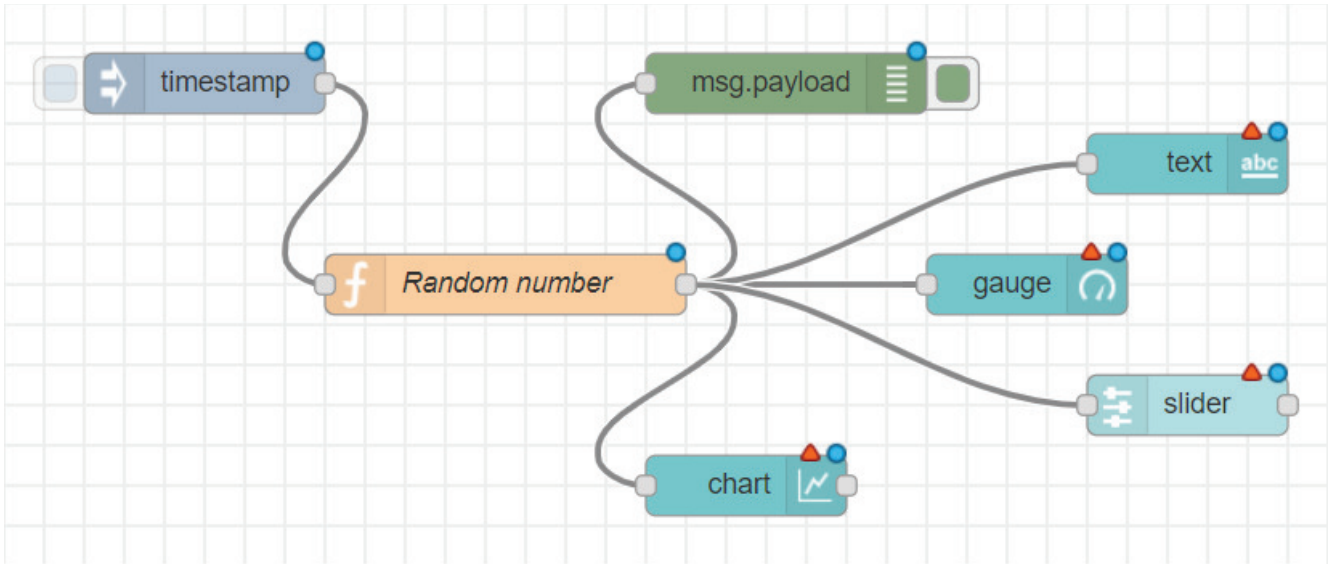
1. Click "Deploy".
2. Navigate to the dashboard to view the results:



The chart shows the last 5 minutes of data and the gauge displays the latest value.


Step 4: Add a "slider" node and a "text" node

1. Drag-and-drop a "slider" node and "text" node to the flow.
2. Connect the "function" node to the two new nodes:



Step 5: Configure the "slider" node


1. Double-click the "slider" node. The "Edit slider node" dialog appears:

2. Click the  button next to the "Group" field. The "Edit dashboard slider node" appears.
3. Type a name in the "Name" field. For example, use "new_group" as a name.
4. Set the tab at default "Home".
5. Click "Update". The "Edit slider node" dialog appears.

6. Set the "Range" value. Keep the maximum value at 100 as this is the last random number the "function" node generates.
This shows the correct position of the slider.
7. Click "Done".

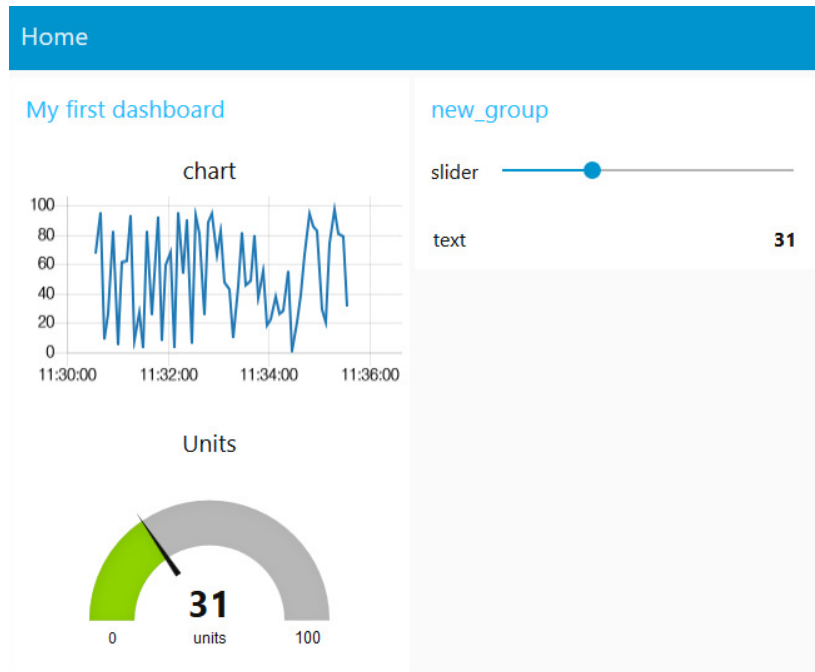
Step 6: Configure the "text" node

1. Double-click the "text" node. The "Edit text node" dialog appears:

2. Click the  button next to the "Group" field. The "Edit dashboard text node" appears.
3. Type a name in the "Name" field. For example, use "new_group" as a name.
4. Set the tab at default "Home".
5. Click "Update". The "Edit text node" dialog appears.
6. Click "Done".

Step 7: Deploy the flow

1. Click "Deploy".
2. Navigate to your dashboard to view the UI. The dashboard appears as shown below:



6.7.2 Viewing dashboard

In the "dashboard" tab beside your "debug" tab, you can also set the theme and order of the elements.

If you do not see the "dashboard" tab, navigate to "Menu > View > Dashboard".

The screenshot displays the configuration panel for a Node-RED Dashboard node. At the top, there is a title bar with the text 'dashboard' and a set of icons including information, refresh, zoom, chart, settings, and database. Below the title bar are three tabs: 'Layout', 'Site', and 'Theme'. The 'Site' tab is selected, and an external link icon is visible to its right.

The configuration options are organized into sections:

- Title:** A text input field containing 'Node-RED Dashboard'.
- Options:** Four dropdown menus:
 - Show the title bar
 - Click to show side menu
 - No swipe between tabs
 - Node-RED theme everywhere
- Date Format:** A text input field containing 'DD/MM/YYYY' and an information icon.
- Sizes:** A table with two columns: 'Horizontal' and 'Vertical'.

Sizes	Horizontal	Vertical
1x1 Widget Size	48	48
Widget Spacing	6	6
Group Padding	0	0
Group Spacing	6	6

You can see all the widgets and tabs shown in a tree structure.

Drag the elements to change the order they are seen in.

Reference

For more details on Dashboard nodes, visit Node-RED Official Dashboard Documentation (<https://flows.nodered.org/node/node-red-dashboard>).

Additional Information

7.1 Data Persistency

The IE Flow Creator app supports the Data Persistency. This means all the user configured data like the flows and database is restored even if the app is upgraded to a new version. It is recommended to use "Projects" option to store the flows.

But, if you perform a firmware upgrade or an app re-deployment, the user configured data, like flows and database on the device is lost and cannot be restored.

Appendix

A.1 References

For further information about the functionalities of Industrial Edge Management, refer to the manual "Industrial Edge Management - Getting Started".

A.2 Known Issues

In the current version of the IE Flow Creator application, the known issues are as follows:

Limitation of one server to one port

IE Flow Creator allows only one server to be connected to a port. When one server is deployed at a port, the port cannot support a second server. When you try to attach a second server at the same port, IE Flow Creator automatically exits.

Error messages in debug panel

IE Flow Creator nodes often print error messages in the "debug" panel even after the configuration nodes are deleted from the flow. To delete the nodes properly:

1. Delete the nodes from the flow.
2. Deploy the flow.
3. Go to "config nodes" in the sidebar.
4. Double-click the required node and click "Delete".
5. Deploy the flow.

SSH key functionality

The SSH key functionality works in the open network.

Add user in User Management

The IED maintains single user entry with unique email address for entire system (IED and Apps). When a user is already registered with IED and admin tries to create a new user using User Management in IE Flow Creator application:

- If admin provides similar email address and password as the registered user, then IED registers this user to the IE Flow Creator application by providing the permissions that are specified in User Management.
- If admin provides similar email address and but different password, then the login to IE Flow Creator fails.

