Apache NiFi 3

Using the NiFi User Interface

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Contents

Terminology

DataFlow Manager: A DataFlow Manager (DFM) is a NiFi user who has permissions to add, remove, and modify components of a NiFi dataflow.

FlowFile: The FlowFile represents a single piece of data in NiFi. A FlowFile is made up of two components: FlowFile Attributes and FlowFile Content. Content is the data that is represented by the FlowFile. Attributes are characteristics that provide information or context about the data; they are made up of key-value pairs. All FlowFiles have the following Standard Attributes:

- uuid: A Universally Unique Identifier that distinguishes the FlowFile from other FlowFiles in the system.
- filename: A human-readable filename that may be used when storing the data to disk or in an external service
- path: A hierarchically structured value that can be used when storing data to disk or an external service so that the data is not stored in a single directory

Processor: The Processor is the NiFi component that is used to listen for incoming data; pull data from external sources; publish data to external sources; and route, transform, or extract information from FlowFiles.

Relationship: Each Processor has zero or more Relationships defined for it. These Relationships are named to indicate the result of processing a FlowFile. After a Processor has finished processing a FlowFile, it will route (or "transfer") the FlowFile to one of the Relationships. A DFM is then able to connect each of these Relationships to other components in order to specify where the FlowFile should go next under each potential processing result.

Connection: A DFM creates an automated dataflow by dragging components from the Components part of the NiFi toolbar to the canvas and then connecting the components together via Connections. Each connection consists of one or more Relationships. For each Connection that is drawn, a DFM can determine which Relationships should be used for the Connection. This allows data to be routed in different ways based on its processing outcome. Each connection houses a FlowFile Queue. When a FlowFile is transferred to a particular Relationship, it is added to the queue belonging to the associated Connection.

Controller Service: Controller Services are extension points that, after being added and configured by a DFM in the User Interface, will start up when NiFi starts up and provide information for use by other components (such as processors or other controller services). A common Controller Service used by several components is the StandardSSLContextService. It provides the ability to configure keystore and/or truststore properties once and reuse that configuration throughout the application. The idea is that, rather than configure this information in every processor that might need it, the controller service provides it for any processor to use as needed.

Reporting Task: Reporting Tasks run in the background to provide statistical reports about what is happening in the NiFi instance. The DFM adds and configures Reporting Tasks in the User Interface as desired. Common reporting tasks include the ControllerStatusReportingTask, MonitorDiskUsage reporting task, MonitorMemory reporting task, and the StandardGangliaReporter.

Funnel: A funnel is a NiFi component that is used to combine the data from several Connections into a single Connection.

Process Group: When a dataflow becomes complex, it often is beneficial to reason about the dataflow at a higher, more abstract level. NiFi allows multiple components, such as Processors, to be grouped together into a Process Group. The NiFi User Interface then makes it easy for a DFM to connect together multiple Process Groups into a logical dataflow, as well as allowing the DFM to enter a Process Group in order to see and manipulate the components within the Process Group.

Port: Dataflows that are constructed using one or more Process Groups need a way to connect a Process Group to other dataflow components. This is achieved by using Ports. A DFM can add any number of Input Ports and Output Ports to a Process Group and name these ports appropriately.

Remote Process Group: Just as data is transferred into and out of a Process Group, it is sometimes necessary to transfer data from one instance of NiFi to another. While NiFi provides many different mechanisms for transferring data from one system to another, Remote Process Groups are often the easiest way to accomplish this if transferring data to another instance of NiFi.

Bulletin: The NiFi User Interface provides a significant amount of monitoring and feedback about the current status of the application. In addition to rolling statistics and the current status provided for each component, components are able to report Bulletins. Whenever a component reports a Bulletin, a bulletin icon is displayed on that component. System-level bulletins are displayed on the Status bar near the top of the page. Using the mouse to hover over that icon will provide a tool-tip that shows the time and severity (Debug, Info, Warning, Error) of the Bulletin, as well as the message of the Bulletin. Bulletins from all components can also be viewed and filtered in the Bulletin Board Page, available in the Global Menu.

Template: Often times, a dataflow is comprised of many sub-flows that could be reused. NiFi allows DFMs to select a part of the dataflow (or the entire dataflow) and create a Template. This Template is given a name and can then be dragged onto the canvas just like the other components. As a result, several components may be combined together to make a larger building block from which to create a dataflow. These templates can also be exported as XML and imported into another NiFi instance, allowing these building blocks to be shared.

flow.xml.gz: Everything the DFM puts onto the NiFi User Interface canvas is written, in real time, to one file called the flow.xml.gz. This file is located in the nifi/conf directory by default. Any change made on the canvas is automatically saved to this file, without the user needing to click a "Save" button. In addition, NiFi automatically creates a backup copy of this file in the archive directory when it is updated. You can use these archived files to rollback flow configuration. To do so, stop NiFi, replace flow.xml.gz with a desired backup copy, then restart NiFi. In a clustered environment, stop the entire NiFi cluster, replace the flow.xml.gz of one of nodes, and restart the node. Remove flow.xml.gz from other nodes. Once you confirmed the node starts up as a one-node cluster, start the other nodes. The replaced flow configuration will be synchronized across the cluster. The name and location of flow.xml.gz, and auto archive behavior are configurable. See the *System Administration documentation* in the *Reference* section for further details.

NiFi User Interface

The NiFi UI provides mechanisms for creating automated dataflows, as well as visualizing, editing, monitoring, and administering those dataflows. The UI can be broken down into several segments, each responsible for different functionality of the application. This section provides screenshots of the application and highlights the different segments of the UI. Each segment is discussed in further detail later in the document.

When the application is started, the user is able to navigate to the UI by going to the default address of http:// <hostname>:8080/nifi in a web browser.

If you selected Knox as a dependency during the installation, then use the Knox URL to access NiFi and NiFi Registry. The default format for the Knox URL is:

• For NiFi:

```
https://<knox-gateway-hostname>:<knox-gateway-port>/gateway/cdp-proxy/
nifi-app/nifi/
```

• For NiFi Registry:

```
https://<knox-gateway-hostname>:<knox-gateway-port>/gateway/cdp-proxy/
nifi-registry-app/nifi-registry/
```

There are no permissions configured by default, so anyone is able to view and modify the dataflow. For information on securing the system, see the *System Administration documentation* in the *Reference* section.

When a DFM navigates to the UI for the first time, a blank canvas is provided on which a dataflow can be built:
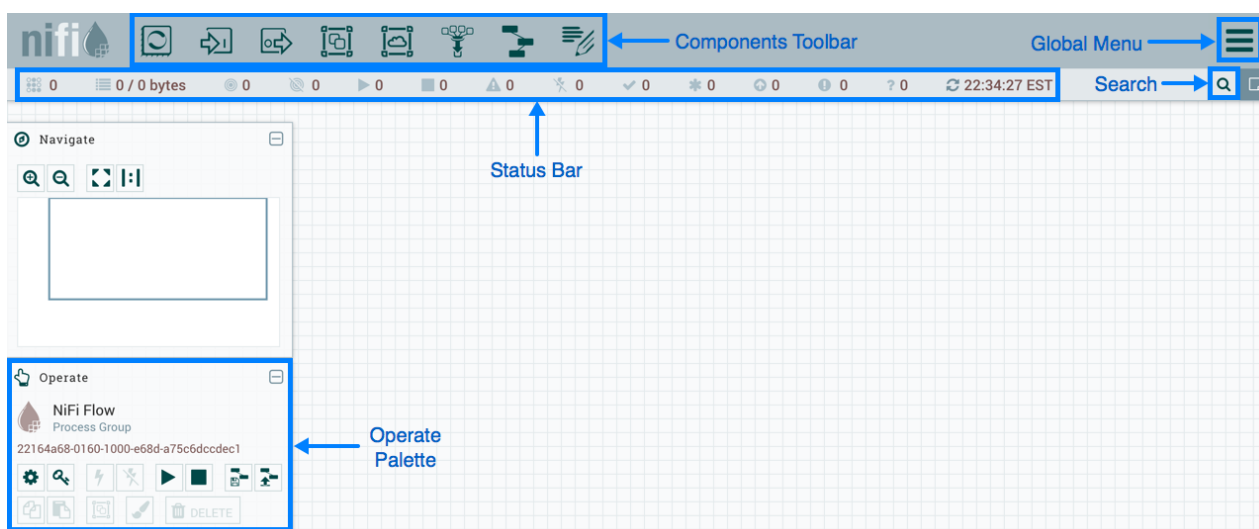
The Components Toolbar runs across the top left portion of your screen. It consists of the components you can drag onto the canvas to build your dataflow. Each component is described in more detail in Building a DataFlow.

The Status Bar is under the Components Toolbar. The Status bar provides information about the number of threads that are currently active in the flow, the amount of data that currently exists in the flow, how many Remote Process Groups exist on the canvas in each state (Transmitting, Not Transmitting), how many Processors exist on the canvas in each state (Stopped, Running, Invalid, Disabled), how many versioned Process Groups exist on the canvas in each state (Up to date, Locally modified, Stale, Locally modified and stale, Sync failure) and the timestamp at which all of this information was last refreshed. Additionally, if the instance of NiFi is clustered, the Status bar shows how many nodes are in the cluster and how many are currently connected.

The Operate Palette sits to the left-hand side of the screen. It consists of buttons that are used by DFMs to manage the flow, as well as by administrators who manage user access and configure system properties, such as how many system resources should be provided to the application.

On the right side of the canvas is Search, and the Global Menu. You can use Search to easily find components on the canvas and to search by component name, type, identifier, configuration properties, and their values. The Global Menu contains options that allow you to manipulate existing components on the canvas:
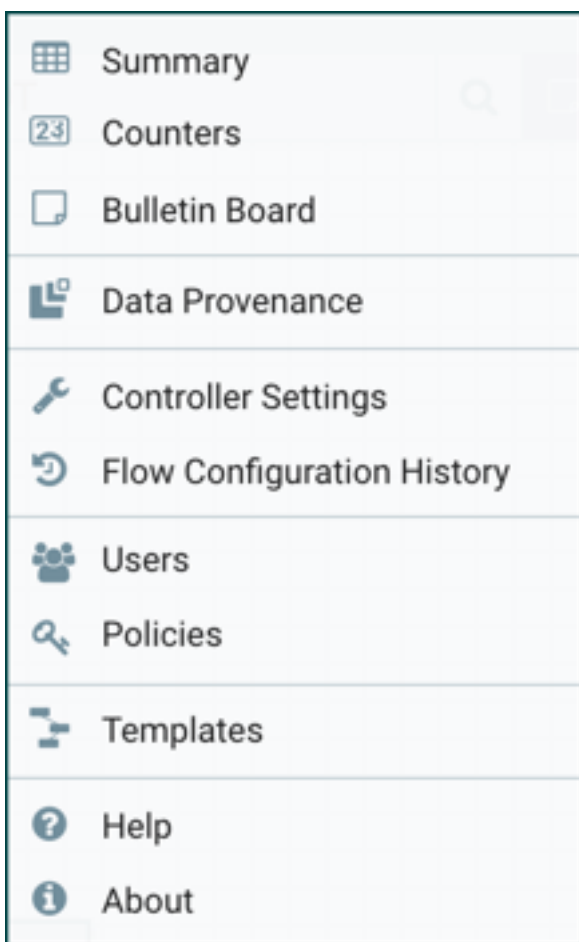
Additionally, the UI has some features that allow you to easily navigate around the canvas. You can use the Navigate Palette to pan around the canvas, and to zoom in and out. The "Birds Eye View" of the dataflow provides a high-level view of the dataflow and allows you to pan across large portions of the dataflow. You can also find breadcrumbs along the bottom of the screen. As you navigate into and out of Process Groups, the breadcrumbs show the depth in the flow, and each Process Group that you entered to reach this depth. Each of the Process Groups listed in the breadcrumbs is a link that will take you back up to that level in the flow.
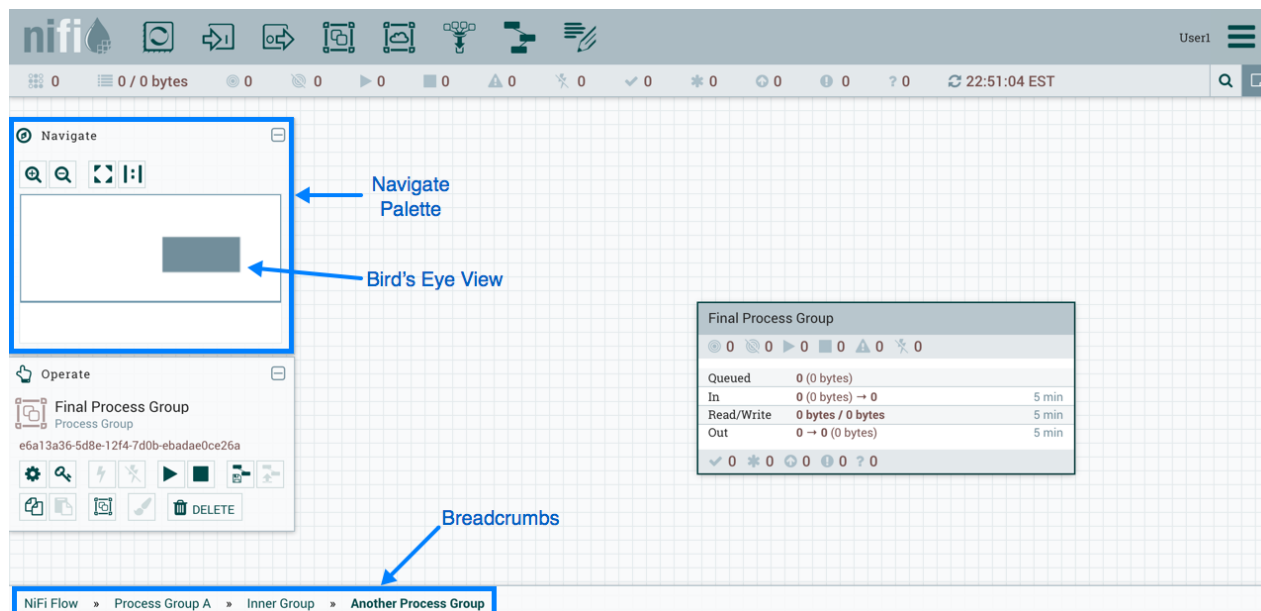
Accessing the UI with Multi-Tenant Authorization

Multi-tenant authorization enables multiple groups of users (tenants) to command, control, and observe different parts of the dataflow, with varying levels of authorization. When an authenticated user attempts to view or modify a NiFi resource, the system checks whether the user has privileges to perform that action. These privileges are defined by policies that you can apply system wide or to individual components. What this means from a Dataflow Manager perspective is that once you have access to the NiFi canvas, a range of functionality is visible and available to you, depending on the privileges assigned to you.

The available global access policies are:

Policy	Privilege
view the UI	Allows users to view the UI
access the controller	Allows users to view and modify the controller including reporting tasks, Controller Services, and nodes in the cluster
query provenance	Allows users to submit a provenance search and request even lineage
access restricted components	Allows users to create/modify restricted components assuming other permissions are sufficient. The restricted components may indicate which specific permissions are required. Permissions can be granted for specific restrictions or be granted regardless of restrictions. If permission is granted regardless of restrictions, the user can create/modify all restricted components.
access all policies	Allows users to view and modify the policies for all components
access users/groups	Allows users to view and modify the users and user groups
retrieve site-to-site details	Allows other NiFi instances to retrieve Site-To-Site details
view system diagnostics	Allows users to view System Diagnostics
proxy user requests	Allows proxy machines to send requests on the behalf of others
access counters	Allows users to view and modify counters

The available component-level access policies are:

| Policy	Privilege
view the component	Allows users to view component configuration details
modify the component	Allows users to modify component configuration details
view provenance	Allows users to view provenance events generated by this component
view the data	Allows users to view metadata and content for this component in flowfile queues in outbound connections and through provenance events
modify the data	Allows users to empty flowfile queues in outbound connections and submit replays through provenance events
view the policies	Allows users to view the list of users who can view and modify a component
modify the policies	Allows users to modify the list of users who can view and modify a component

Policy	Privilege
retrieve data via site-to-site	Allows a port to receive data from NiFi instances
send data via site-to-site	Allows a port to send data from NiFi instances

If you are unable to view or modify a NiFi resource, contact your System Administrator or see *Configuring Users and Access Policies* in the *System Administration documentation* in the *Reference* section for more information.

Logging In

If NiFi is configured to run securely, users will be able to request access to the DataFlow. For information on configuring NiFi to run securely, see the *NiFi Security documentation*. If NiFi supports anonymous access, users will be given access accordingly and given an option to log in.

Clicking the 'login' link will open the log in page. If the user is logging in with their username/password they will be presented with a form to do so. If NiFi is not configured to support anonymous access and the user is logging in with their username/password, they will be immediately sent to the login form bypassing the canvas.
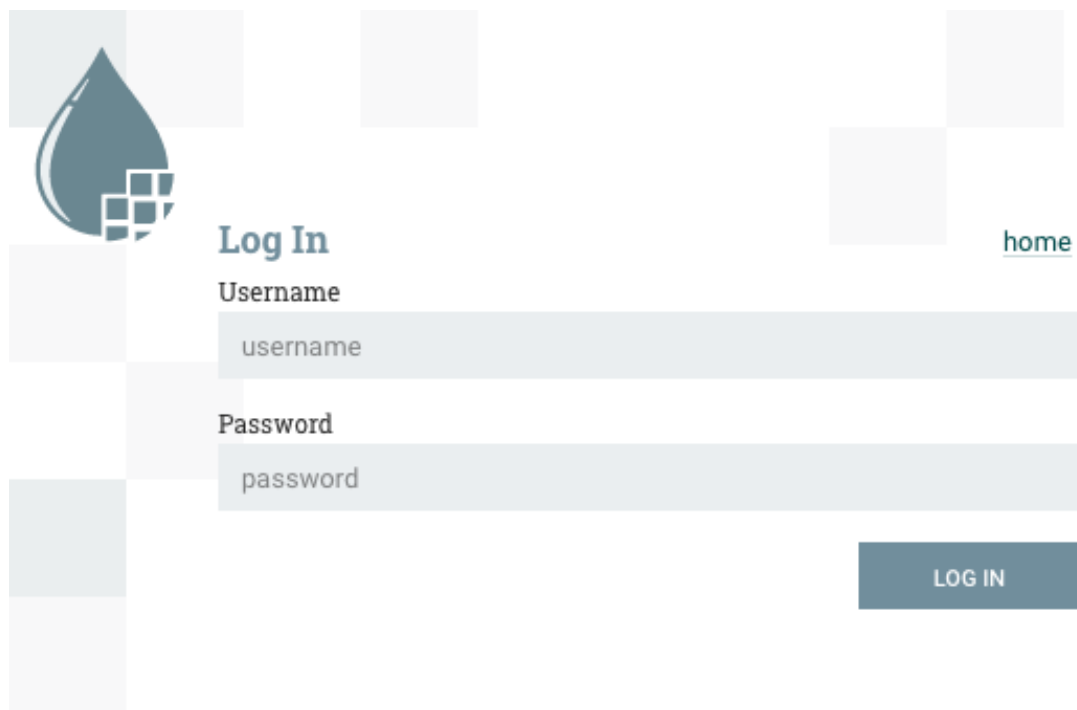
Browser Support

Browser	Version
Chrome	Current and Current - 1
FireFox	Current and Current - 1
Edge	Current and Current - 1
Safari	Current and Current - 1

Current and Current - 1 indicates that the UI is supported in the current stable release of that browser and the preceding one. For instance, if the current stable release is 45.X then the officially supported versions will be 45.X and 44.X.

For Safari, which releases major versions much less frequently, Current and Current - 1 simply represent the two latest releases.

The supported browser versions are driven by the capabilities the UI employs and the dependencies it uses. UI features will be developed and tested against the supported browsers. Any problem using a supported browser should be reported to Apache NiFi.

Unsupported Browsers

While the UI may run successfully in unsupported browsers, it is not actively tested against them. Additionally, the UI is designed as a desktop experience and is not currently supported in mobile browsers.

Viewing the UI in Variably Sized Browsers

In most environments, all of the UI is visible in your browser. However, the UI has a responsive design that allows you to scroll through screens as needed, in smaller sized browsers or tablet environments.

In environments where your browser width is less than 800 pixels and the height less than 600 pixels, portions of the UI may become unavailable.