



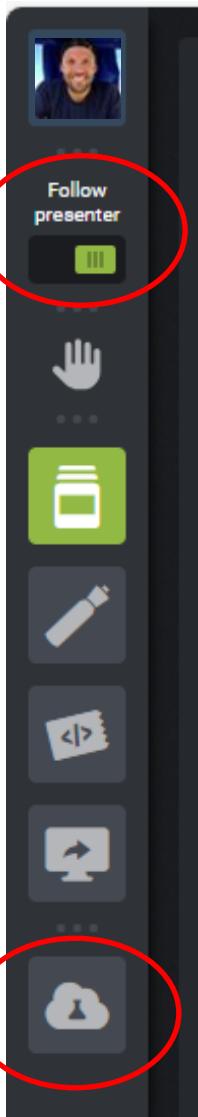
# FME Flow Training

## - Module S3

Administration – The Basics

The miso logo features the word "miso" in a large, lowercase, sans-serif font. A small graphic of a steaming bowl of soup is positioned above the letter "i".

# Training Environment



< keep 'Follow presenter' on

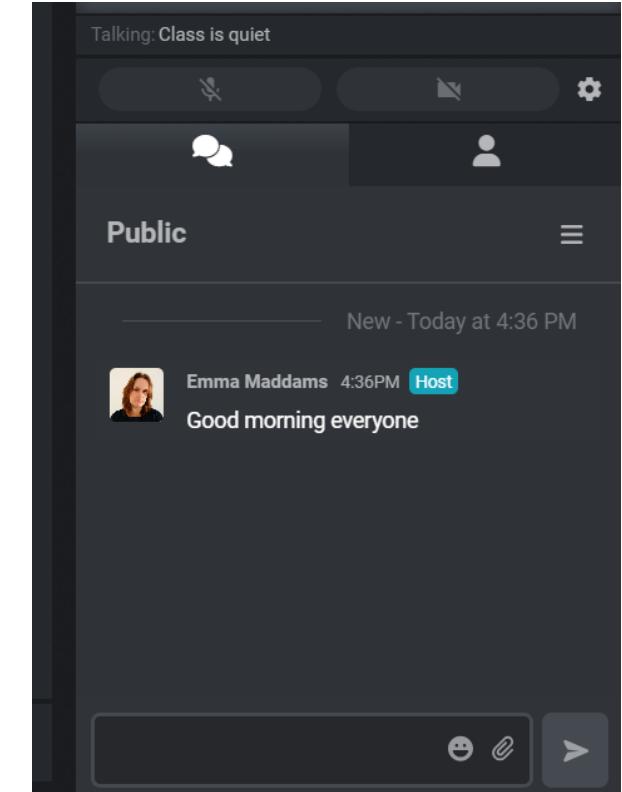
< Lab

need help when using your Lab  
Use either:

- 'Raise hand' or
- 'Lab Assistance'

## Chat

- to everyone
- to trainer



# Training Environment

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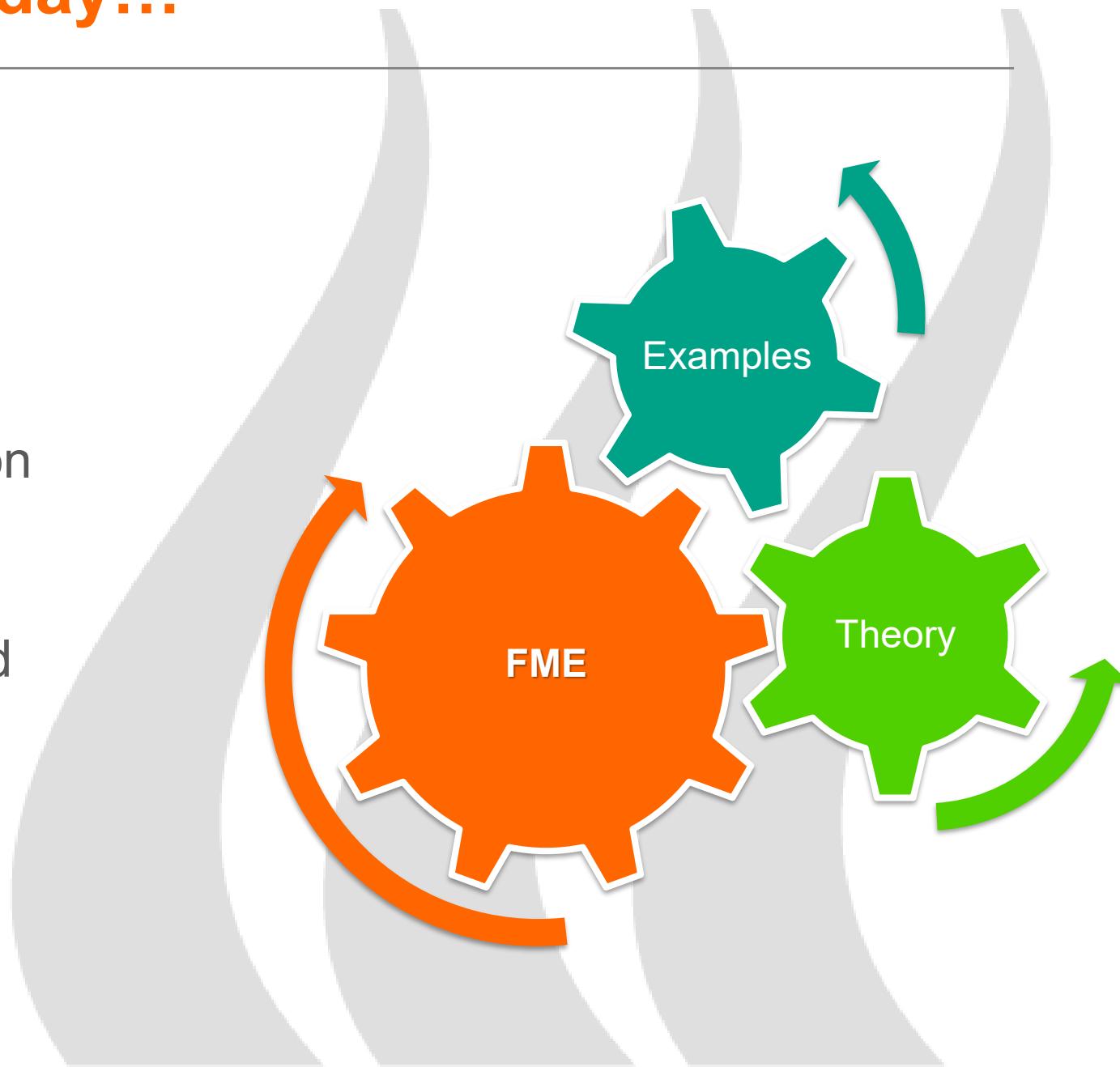
- Training resource folder located on a C-Drive
- Training data folders **C:\FMEFlowData**
  - Data
  - Output
  - Resources
  - Workspaces
- The workbook containing exercises – use download link from Trainer
- FME Flow (Server) Web UI credentials
  - Username: admin
  - Password: FMETraining1234

# What we'll be covering today...

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## Agenda

- FME Flow Overview
- Planning an FME Flow Installation
  - Deployment Type
  - Prerequisites & Considerations
- Post-installation Connectivity and Configuration



# A little bit of background...

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The word "miso" in a bold, orange, sans-serif font. A small grey bowl icon with orange steam is positioned above the letter "o".

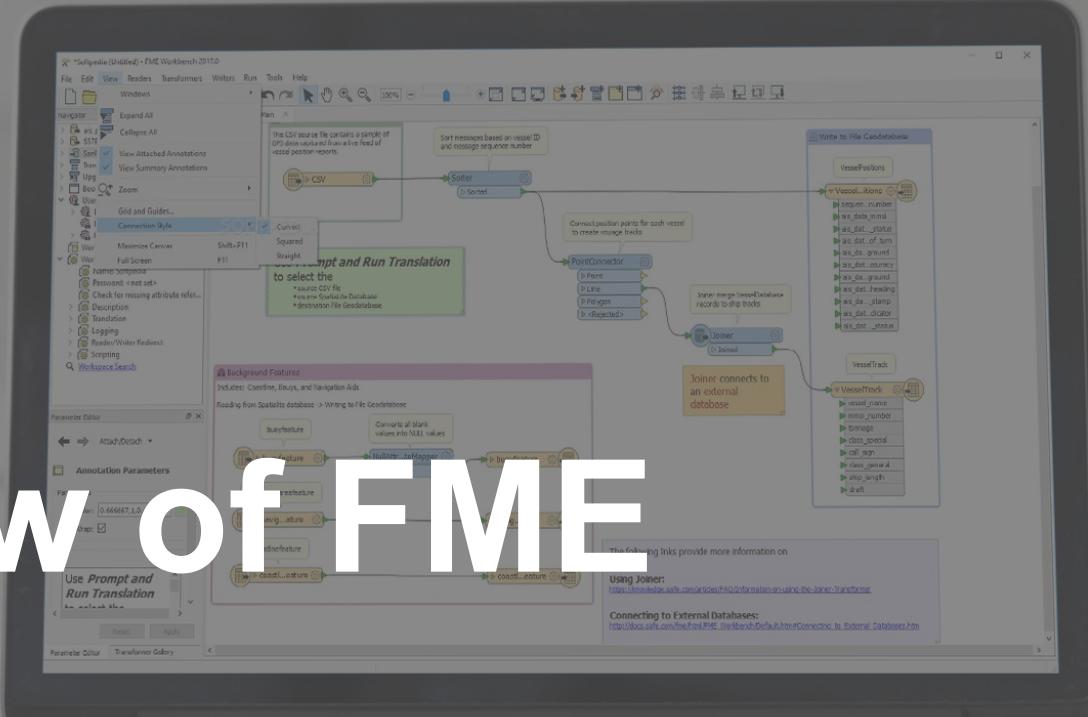
- Based in Birmingham
- Platinum partner
- Spatial data experts
- Provide training and consultancy in FME



The words "Safe Software" in a black, sans-serif font. The letter "o" in "Software" is replaced by a solid orange circle.

- Based in Canada
- Create FME product suite
- Continuously develop products

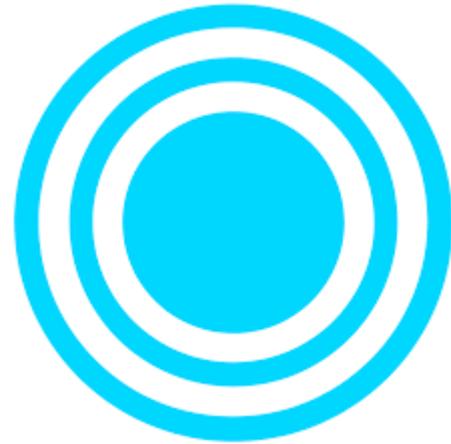
# Overview of FME



*Connect. Transform. Automate*

# FME Product Suite

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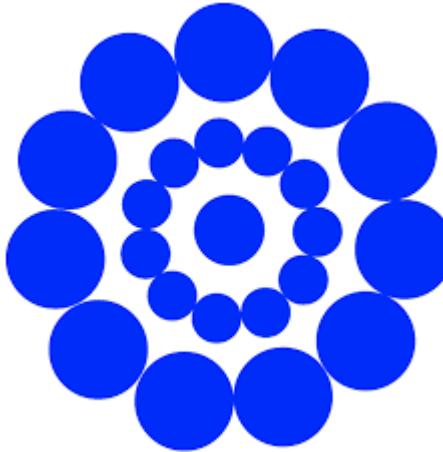


## FME Form

(formerly FME Desktop)

Authoring environment that enables you to create data integration workflows.

The FME Form Workbench is where these Workspaces are created and locally run.

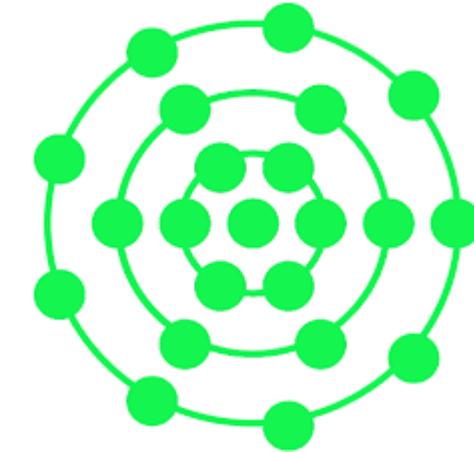


## FME Flow

(formerly FME Server)

The enterprise automation environment that enables you to run your data integration workflows on a schedule or in response to events or in real-time.

FME Flow enables users to integrate their data automatically and distribute it to any web, desktop, or mobile application. Users can set up event-driven workflows, send notifications to stakeholders, and provide self-serve data integration.



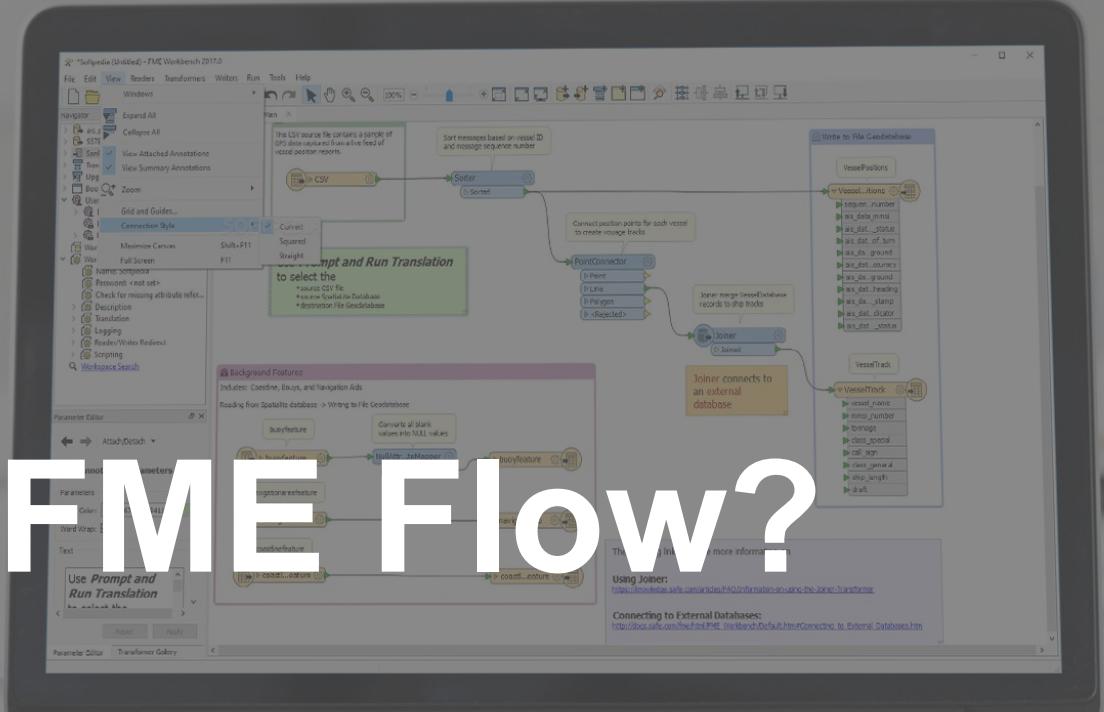
## FME Flow Hosted

(formerly FME Cloud)

FME Flow hosted in the cloud by Safe Software, where users pay only for the computing resources they use. It's scalable and uses a pay-as-you-go model.

Linux based; hosted on Amazon Web Services.

# What is FME Flow?



Connect. Transform. **Automate**

# FME Flow Architecture - Components



Client



Web Application Server

- incl. *FME Flow Web User Interface*



FME Flow Core

- manages content,  
engines, etc



FME Flow Database



FME Flow Engines

- carry out *data processing*



FME Flow System Share

- incl. *Workspace store*

# FME Flow Clients

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Some FME components are considered *Clients* of FME Flow



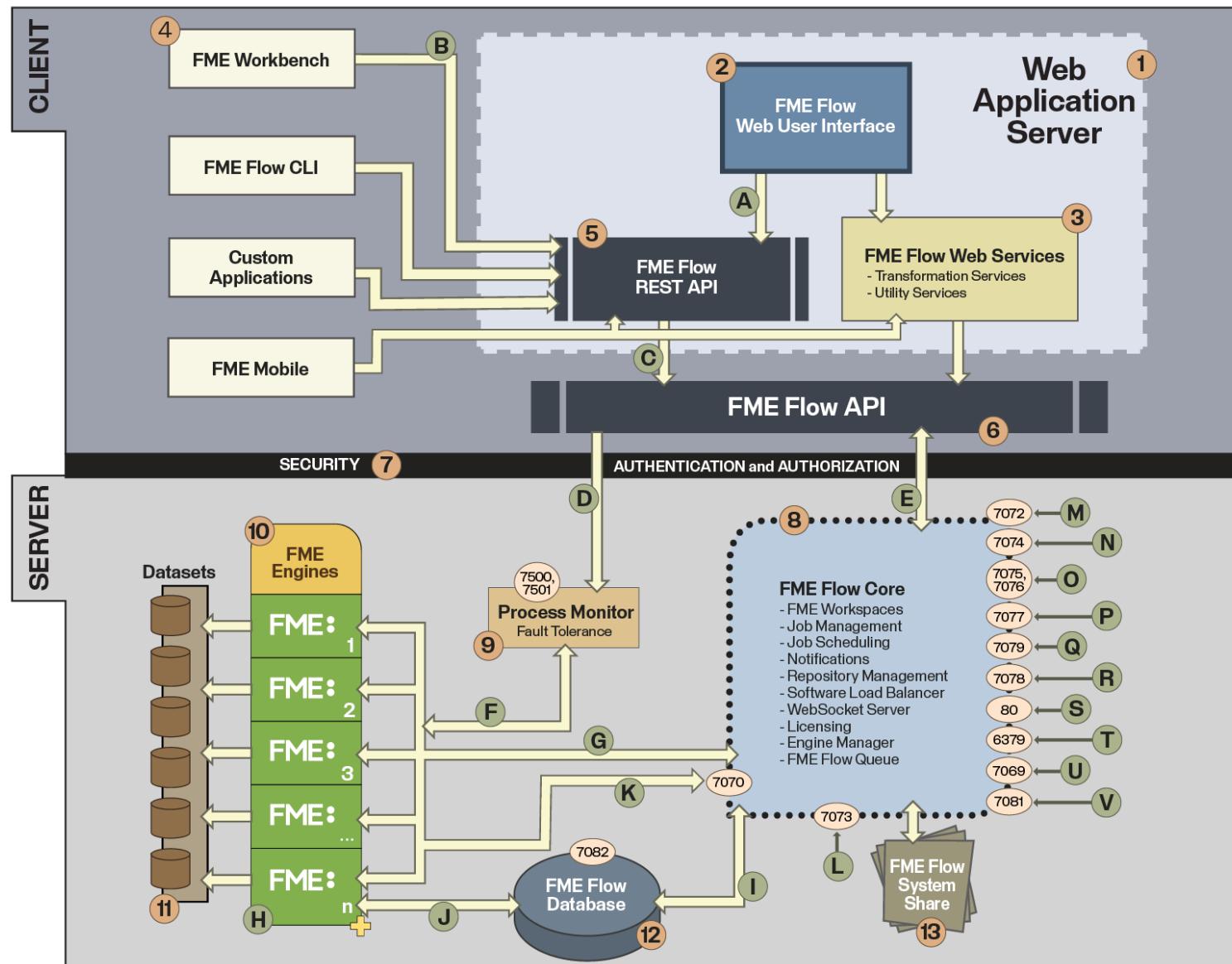
FME Flow Clients include:

- **FME Flow Web Services:**
  - Transformation Services - Job Submitter, Data Download and Data Streaming services.
  - Notification Service
  - Data Upload Service
- **Web Clients** of FME Flow such as the FME Flow Web Interface.
- **Non-Web** Clients of FME Flow:
  - FME Form Workbench
  - custom application that uses the FME Flow REST API

# FME Flow Architecture - Client



- 1. Web Application Server** - runs the FME Flow Web User Interface, FME Flow Services and any other web clients. (Apache Tomcat included with FME Flow)
- 2. FME Flow Web User Interface** – where users access FME Flow (Administrators, Authors and other End-users)
- 3. FME Flow Web Services** – predefined services to carry out common tasks (Transformation Services, Data Upload etc)
- 4. Non-Web Clients** – e.g. FME Workbench
- 5. REST API** - provides an underlying REST-based communication mechanism for client-service applications
- 6. FME Flow API** - All requests are sent to FME Flow through the low-level FME Flow API
- 7. Security** - FME Flow provides Authentication and Access Control using the Java Authentication and Authorization Service (JAAS) framework.



# FME Flow Architecture - Server



**8. FME Flow Core** - manages job requests, queues, scheduling, notifications, licensing, engine management and repository contents

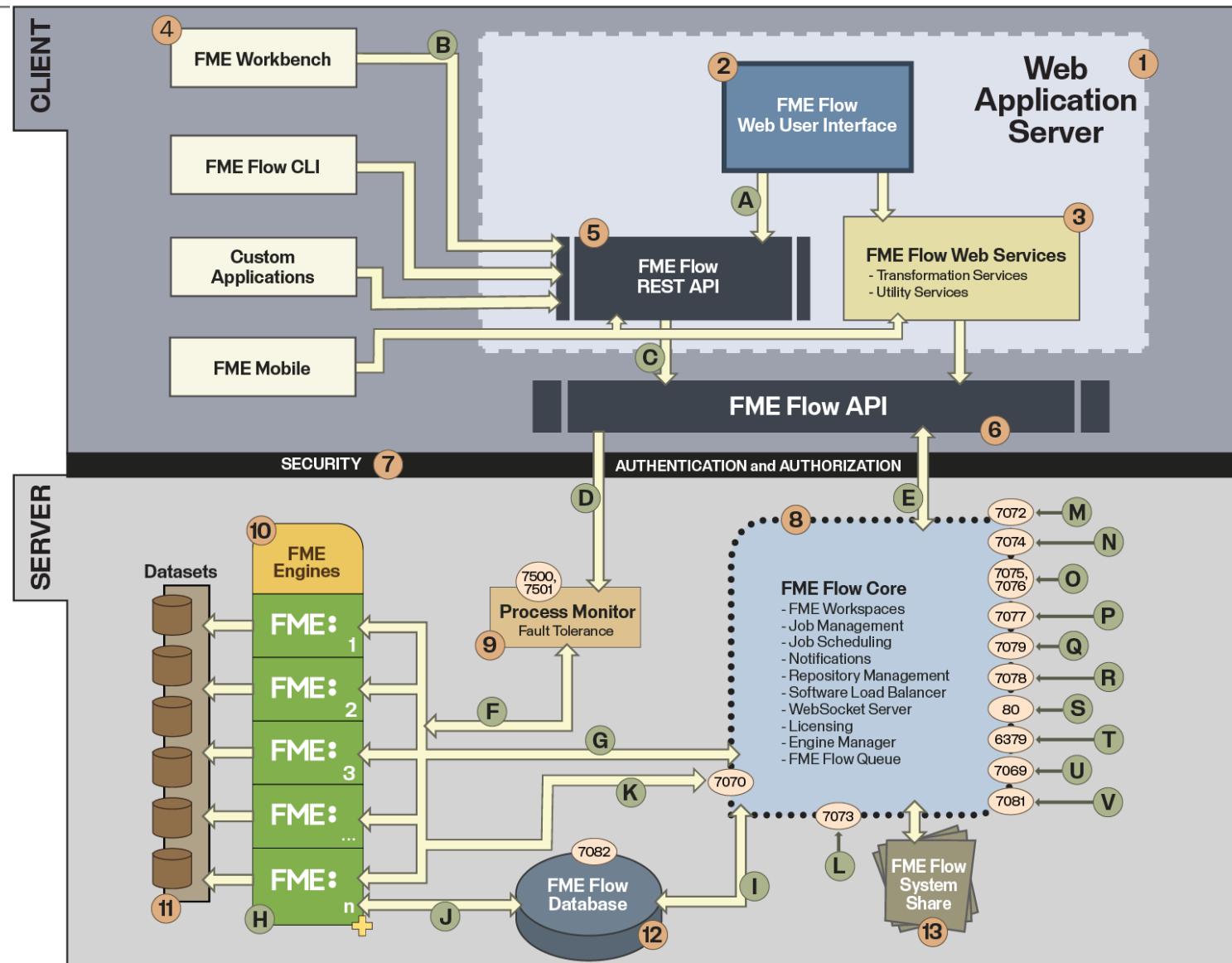
**9. Process Monitor** - provides fault tolerance functionality, ensuring that the FME Flow Core and FME Engines remain available to process requests.

**10. Engines** - process job requests by running FME Workspaces. Each FME Engine processes a single request at a time

**11. Datasets** - ensure that FME Engines have read & write access to datasets/databases/directories the workspaces write to.

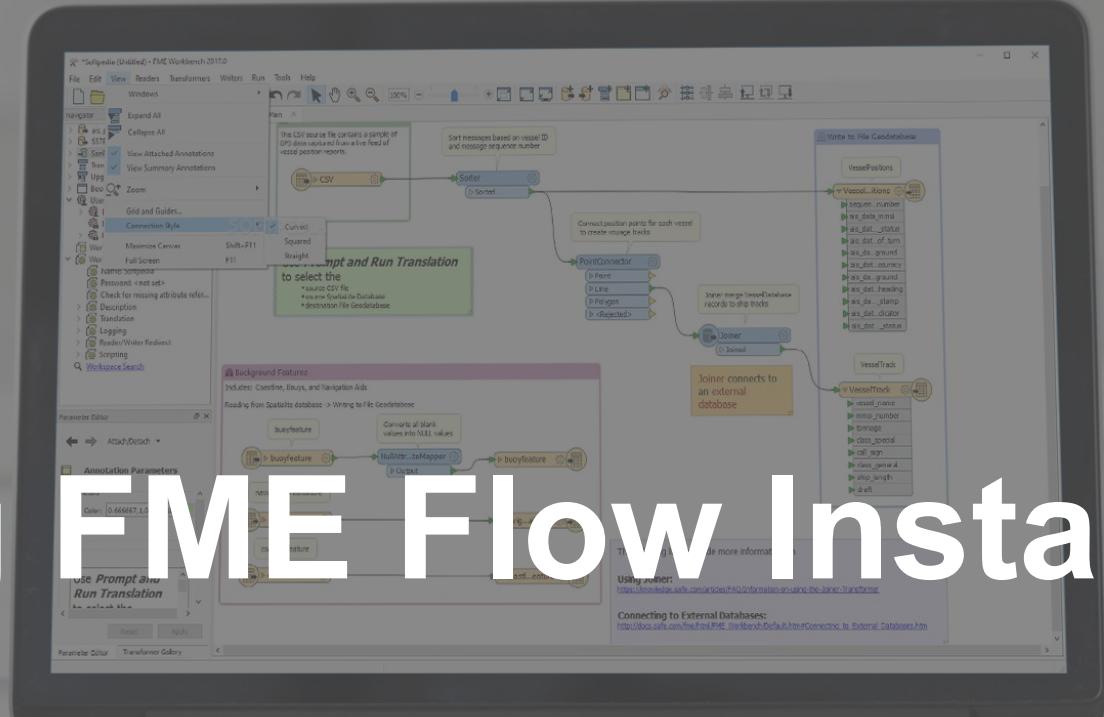
**12. FME Flow Database** - All information related to FME Flow is stored here including jobs, repositories, automations, users, and other data. The database should never be edited directly.

**13. FME Flow System Share** - stores workspaces files, log files, backup files and data shares (Repositories and Resources)

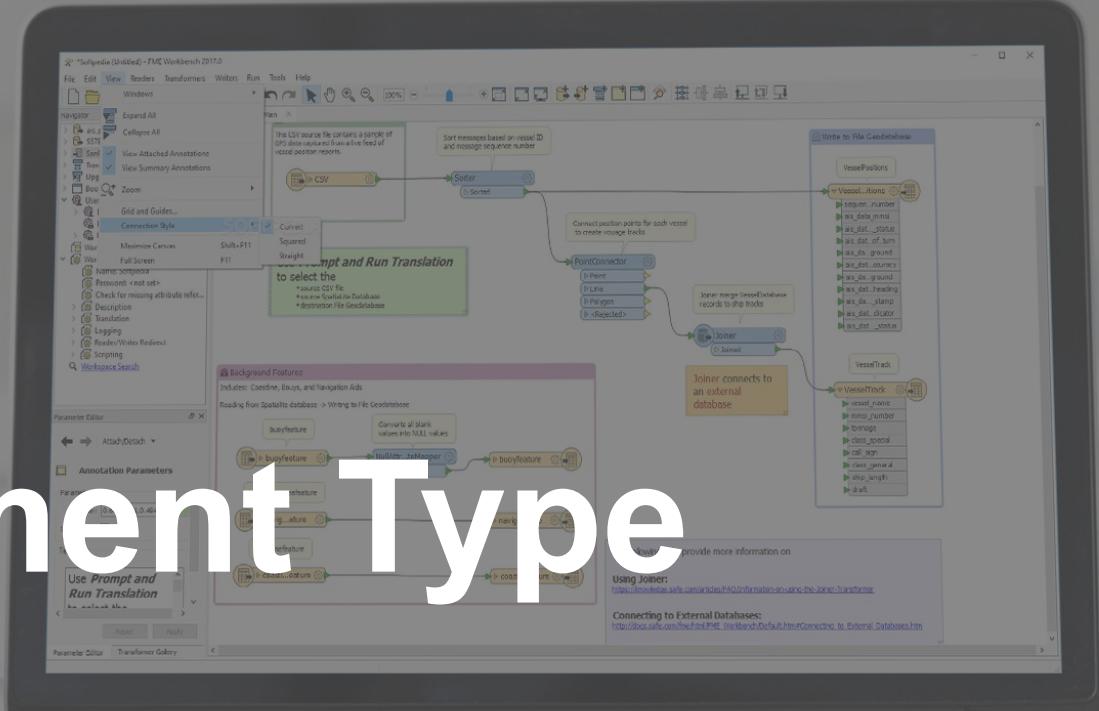


# Planning FME Flow Installations

Connect. Transform. **Automate**



# Deployment Type



Connect. Transform. **Automate**

# Its all about your Workspaces and Engines!

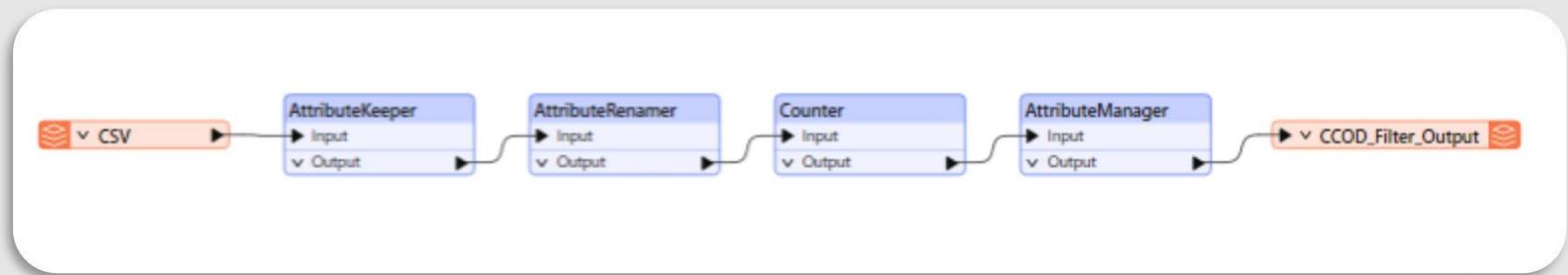
miso

FME's capabilities are delivered through two key Primary Components. A **Workspace** that defines the data process and an **Engine** that delivers this process.

## Workspace



A chain of transformers that define a data transformation process.



## Engine



A processing unit that delivers the design of the workspace.



Processes job requests.

Can be scaled, distributed or deployed remotely.

Licensed component of FME Flow.

# FME Flow Deployment Types

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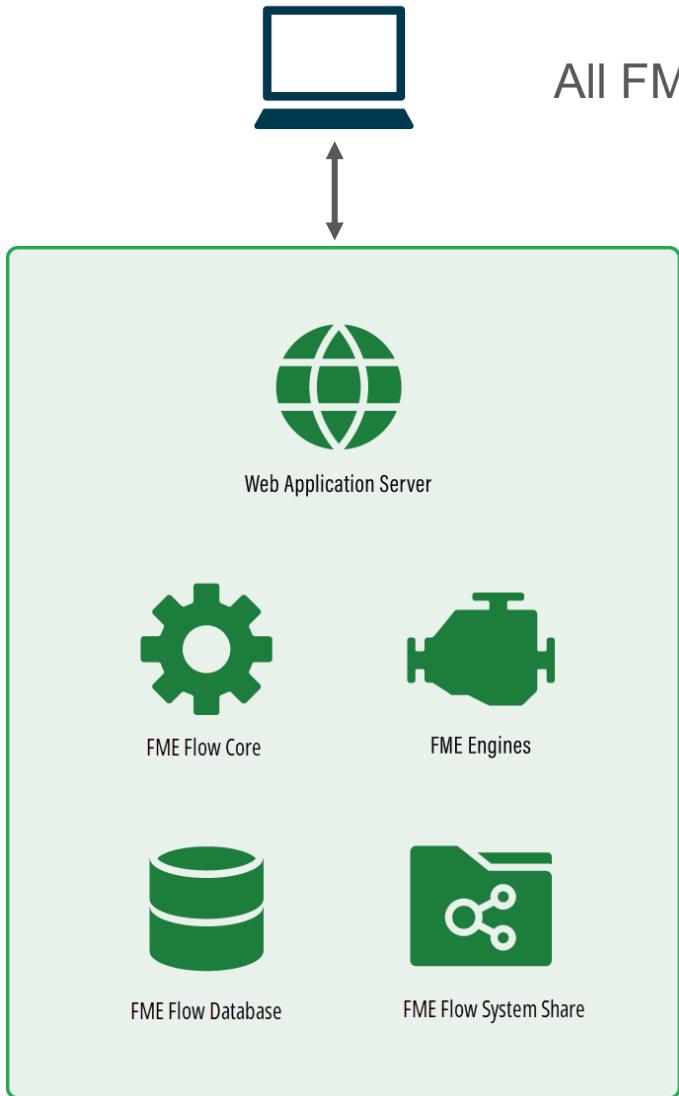


- **Express (standard)** - installs all components of FME Flow on a single host machine, and is the quickest and easiest way to get started with FME Flow
- **Distributed** - spreads components across a network to achieve a 2- or 3-tiered architecture.
- **Remote Engines** – *Introduced in FME Flow 2024*

Remote Engines can be installed on a different host to your FME Flow deployment, yet still link to it. This location may be on servers that are part of your network, outside your network on accessible endpoints, or in the Cloud, such as Azure Functions or Google Cloud Functions.

Remote Engines may be especially useful if you want to run jobs on servers outside your network, while maintaining your primary FME Flow installation behind a firewall.

# Express Deployment



## Benefits

- Quickest and easiest of deployment options to install
- Easiest of deployment options to configure
- Simple to manage
- Reduced infrastructure costs - only need to provide and manage a single server to host

## Limitations

- Lower compute power
- Less fault tolerance
- Cannot change to a 'Distributed' deployment retrospectively.  
Cannot separate the web and standard engine components.  
- but you can add Remote Engines if using FME Flow 2024 onwards!

# Remote Engines Deployment

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This is where things get exciting!

Remote Engine deployment involves installing a Remote Engine on a different host to your main FME Flow installation.

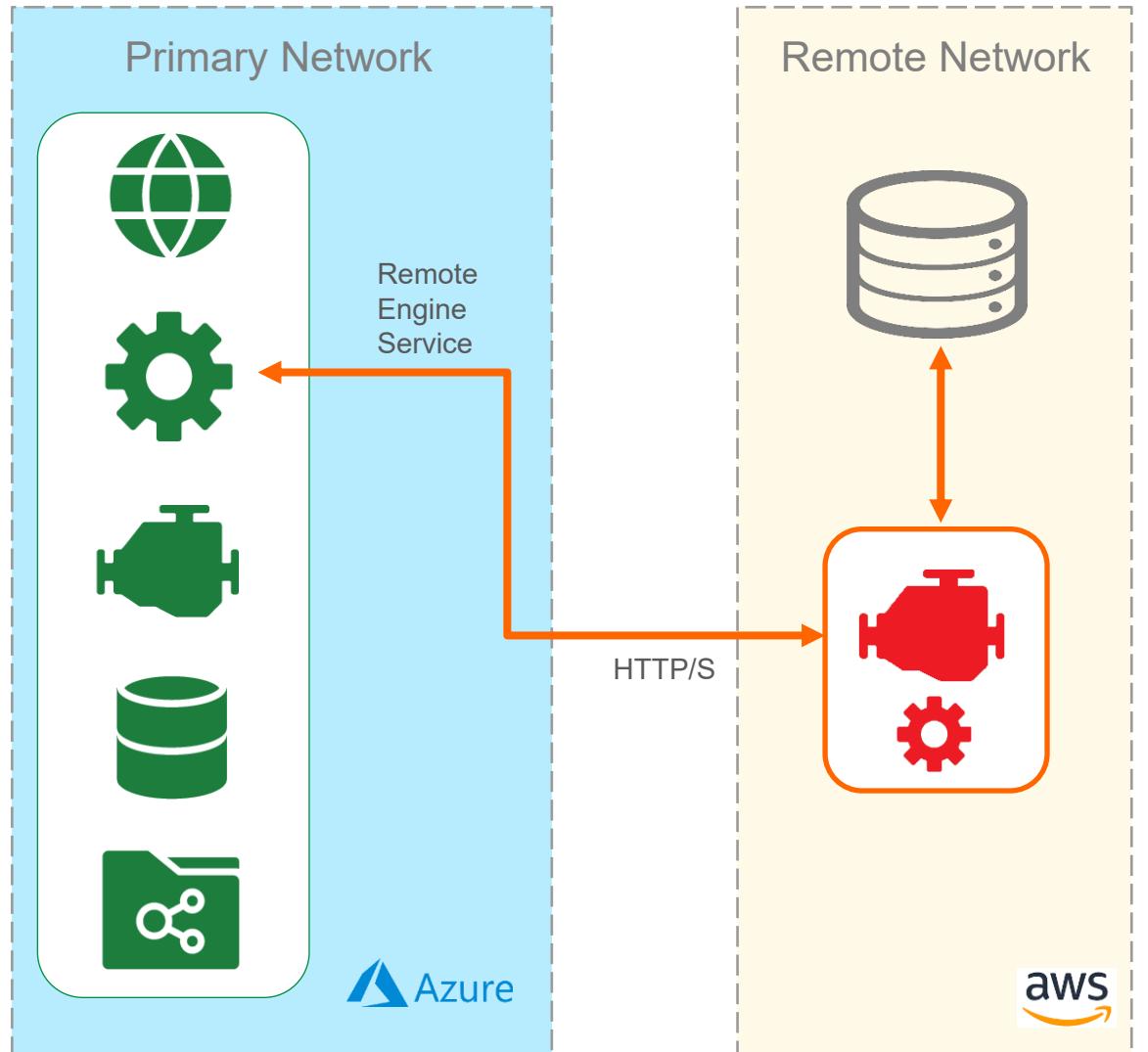
The Remote Engine has its own inbuilt ‘mini-core’ which links to your main FME Flow Core.

The Remote Engine location can even be outside of the primary network!

This location may be on servers that are part of your network, outside your network on accessible endpoints, or in the Cloud, such as Azure Functions or Google Cloud Functions.

Remote Engines may be especially useful if you want to run jobs on servers outside your network, while maintaining your primary FME Flow installation behind a firewall.

# Remote Engines Deployment



## Benefits

- Greater fault tolerance.
- Increased compute power.
- Improved transaction speed.
- Reduced/zero transaction costs for data operations.

## Limitations

- Networking and security requires consideration.
- Currently can only use Job Submitter service.

### Legend



Remote Corporate Data



FME Remote Engine



Primary FME Flow deployment

# Distributed Deployment

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A Distributed Installation allows you to distribute components physically into 3-tier or 2-tier configurations.

It is recommended that the FME Flow Web Application be installed on the same system with the FME Flow Core.

You can provide redundancy with some elements, but if you require high availability, consider a **fault-tolerant** architecture instead. If you are considering fault tolerance in the future, you should start with a distributed installation now for an easier transition.

The **Distributed Engine** installation allows you to build onto an existing FME Flow installation by Adding FME Engines on a Separate Machine. – this is NOT the same as a Remote Engine

Reasons you might want to provide a distributed engine include:

- Utilizing an Esri ArcGIS license on a separate host machine.
- Hosting FME Engines on a different OS than your web application server and FME Flow Core.
- Utilizing system resources of other machines.
- Placing FME Engines in close proximity to your data.

# Distributed Deployment



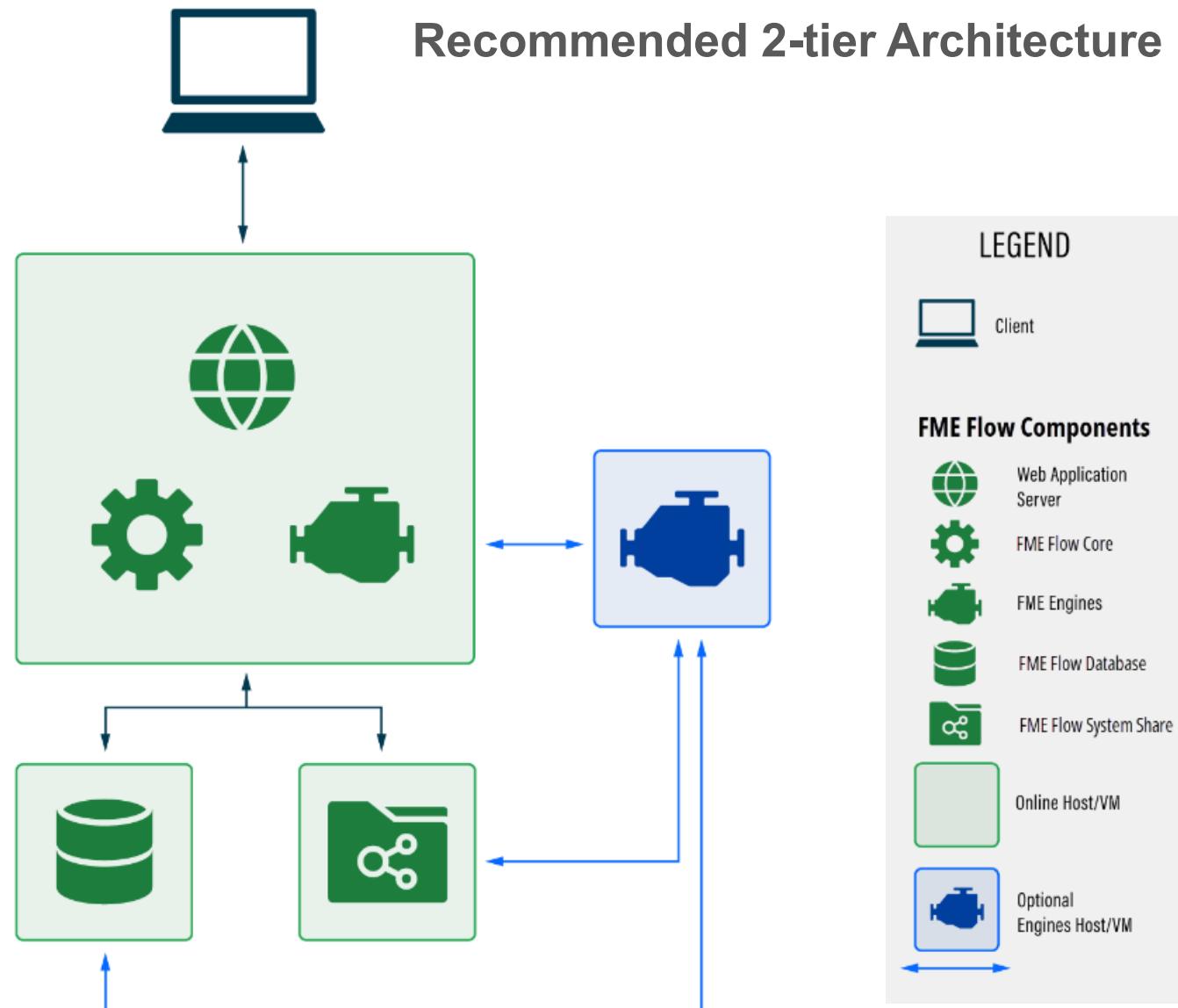
## Benefits

- Greater fault tolerance
- Increased compute power
- Allows Engines to be deployed easily with 3rd party Software

## Limitations

- Difficult to configure
- Cannot distribute outside single network

## Recommended 2-tier Architecture

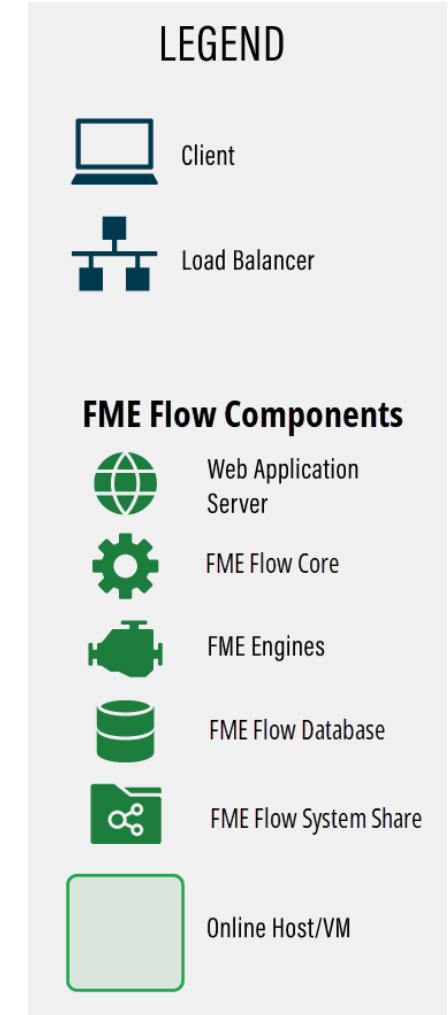
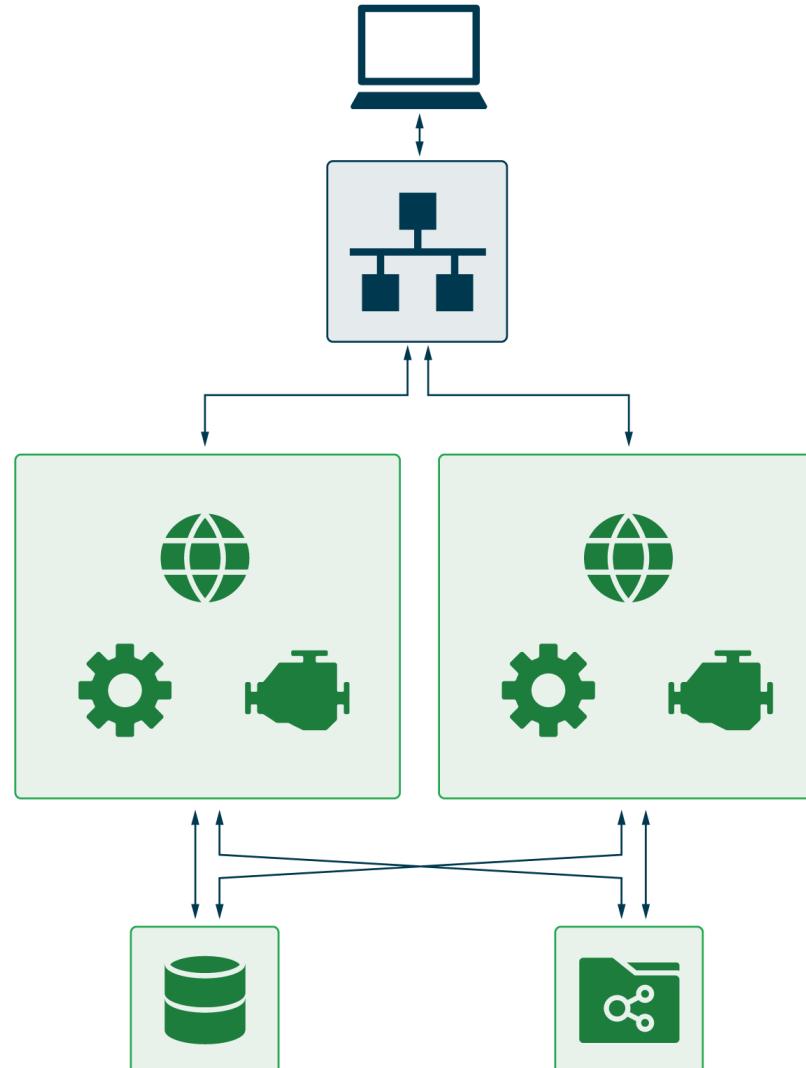


# Fault Tolerant Distributed Deployment



## Fault Tolerant Architecture - Example 1

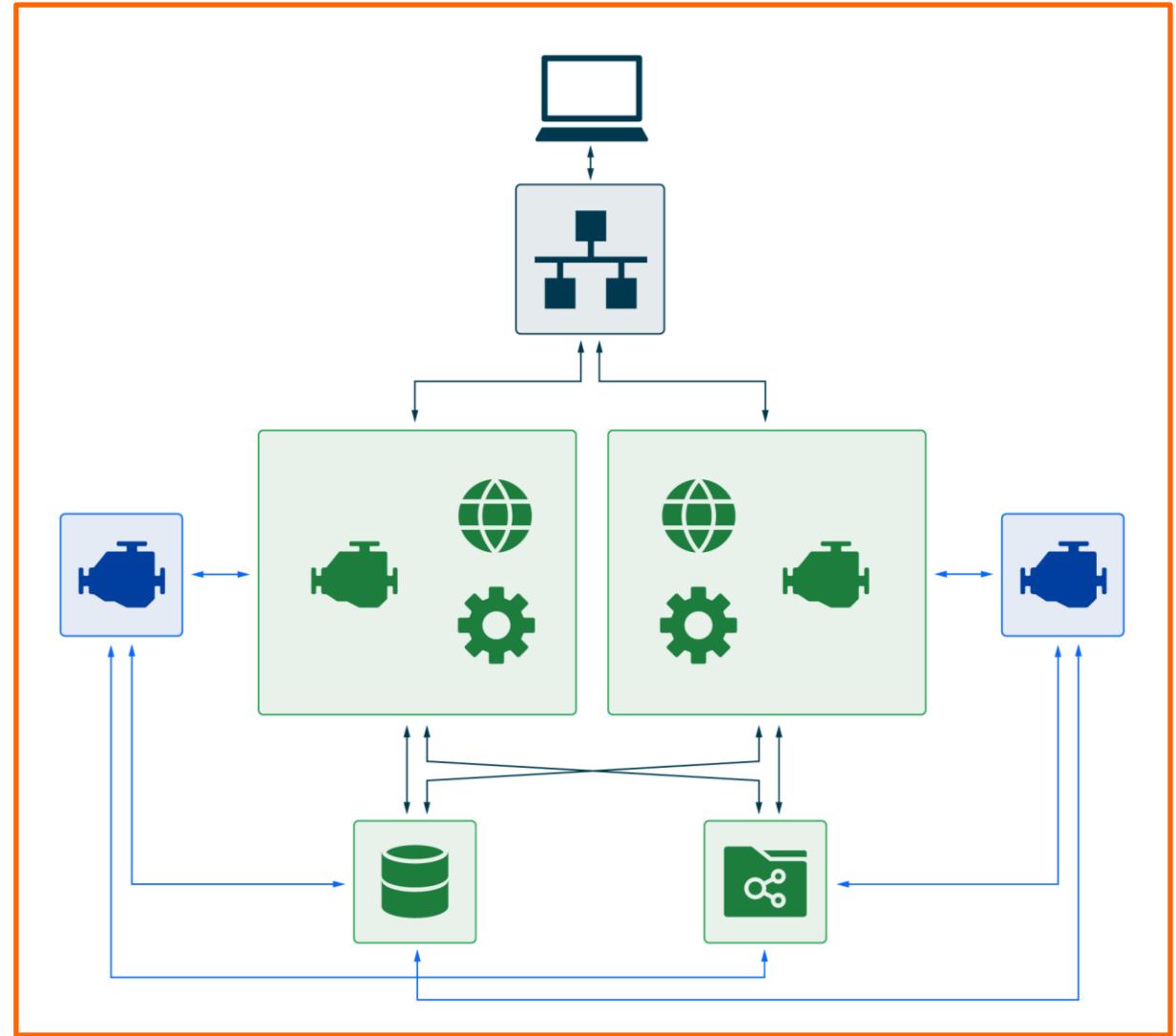
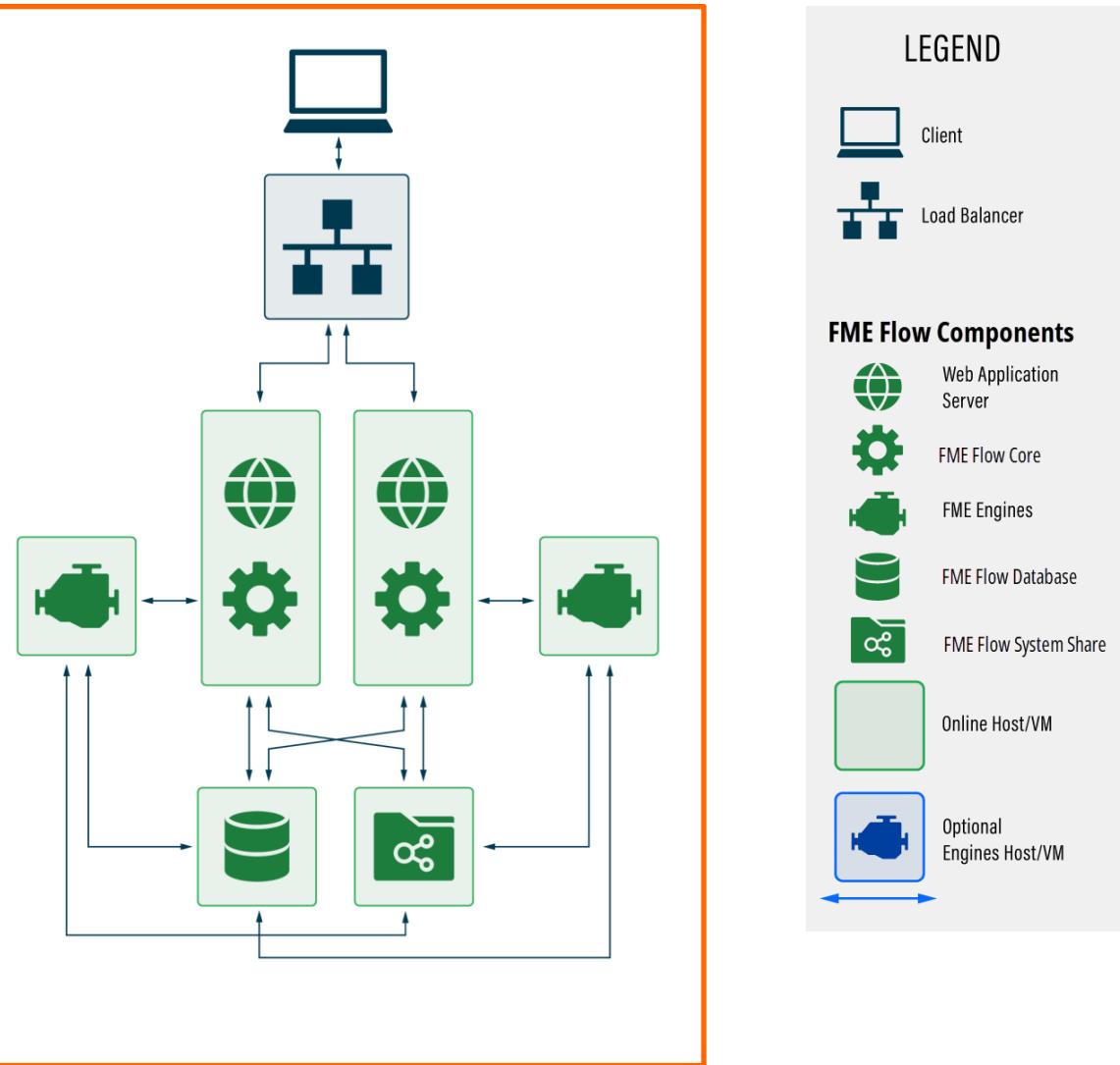
- The goal of a fault-tolerant environment is to ensure that if a hardware component fails, FME Flow remains online.
- This is achieved by using **multiple hosts** each with their own **FME Flow Cores & Web Services**.
- A third-party load balancer directs incoming traffic to one of the redundant FME Flow Web Services & Core.



# Fault Tolerant Distributed Deployment



## Fault Tolerant Architecture – Other Examples



# Fault Tolerant Distributed Deployment

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## Benefits

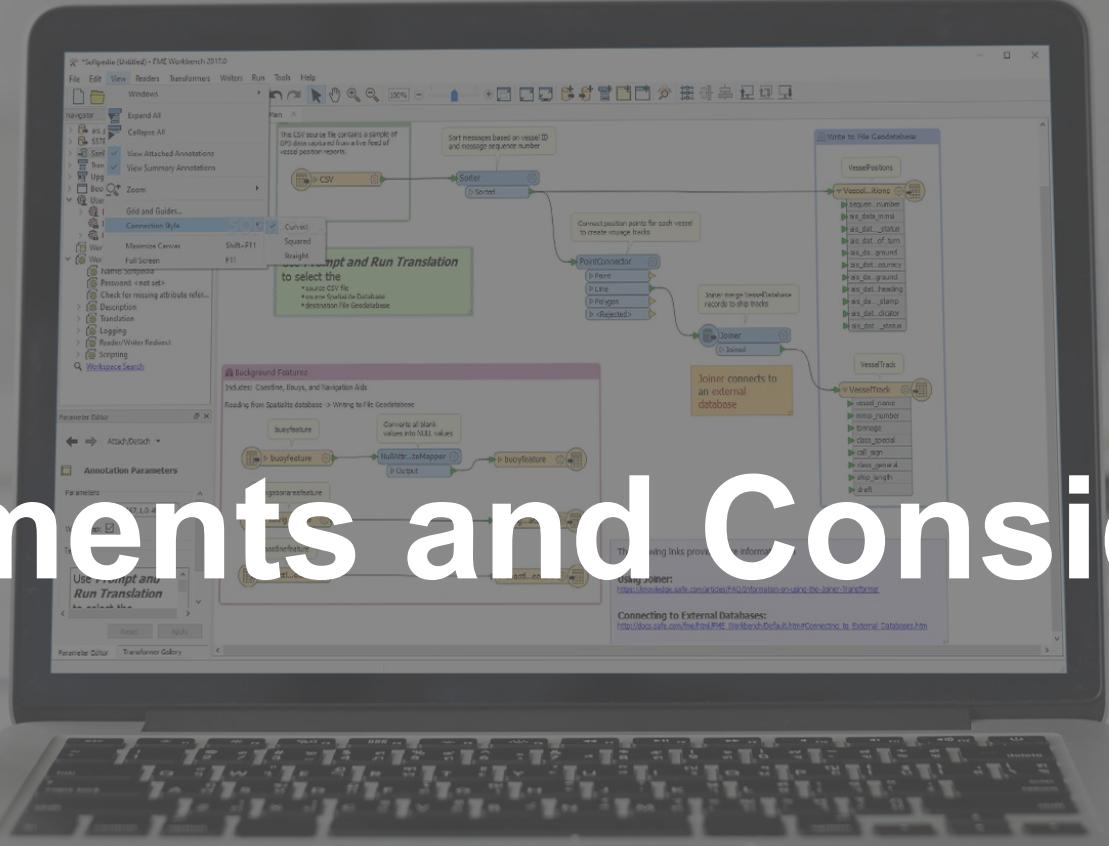
- Greater fault tolerance – especially useful if deployed on physical machines

## Limitations

- Expensive due to multiple Host and multiple FME Flow license costs
- Advanced skills required to deploy and maintain
- A third-party load balancer is required
- the Automations triggers UDP Message and Email – SMTP are not supported. To receive email messages, Email - IMAP trigger would need to be used instead.

# Requirements and Considerations

Connect. Transform. **Automate**



# Requirements and Considerations

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- Prerequisites & Operating Systems - <https://support.safe.com/hc/en-us/articles/25407433729933-FME-Platform-Technical-Specifications>
- Ports
- Accounts & Permissions
- FME Version
- Workspace Requirements
- 3<sup>rd</sup> Party

# Host Machine DNS

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It is important to know the name of your host computer when using FME Flow. During the installation, you will be prompted:

- To enter the hostname for connecting to FME Flow (with Express installation),
- To specify the host that will run the FME Flow Core (with Distributed installation), or
- To specify the name of the machine hosting the primary FME Flow Core (with Engine installation).

It is essential to make sure you have the correct hostname for proper control and management of FME Engines as changing this post-installation is currently only supported for the FME Flow Web Services.

**Do not use “localhost” as your hostname if you want FME Flow to be accessed remotely!**

# Firewall

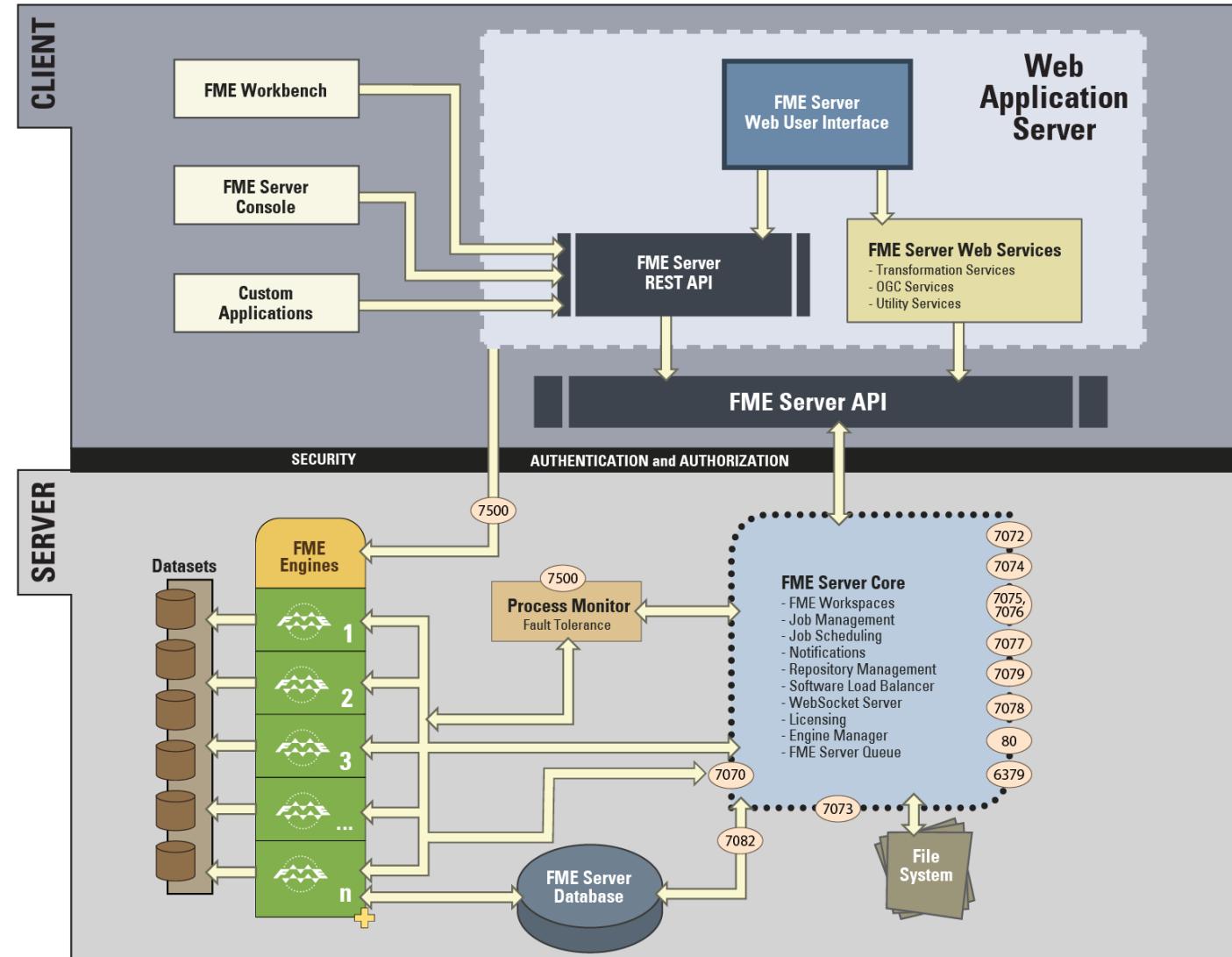


- FME Flow Web Services and other clients use the FME Flow API to communicate with the FME Flow Core over TCP/IP.
- Requests are sent to the FME Flow Core over port 7071. Result messages are returned to clients over a randomly assigned port created by the FME Flow Core.

Be sure to configure any firewall settings on the <webHost> with a rule to allow for full communication with the <coreHost> machines.

When specific ports are desired, the port should be made available and not blocked by firewall settings.

All ports are defined in Admin guide.





# Ports

- Ensure all requisite Firewall ports are open. They are used by the FME Flow Core. Also ensure correct configurations are established for both Inbound and Outbound ports:

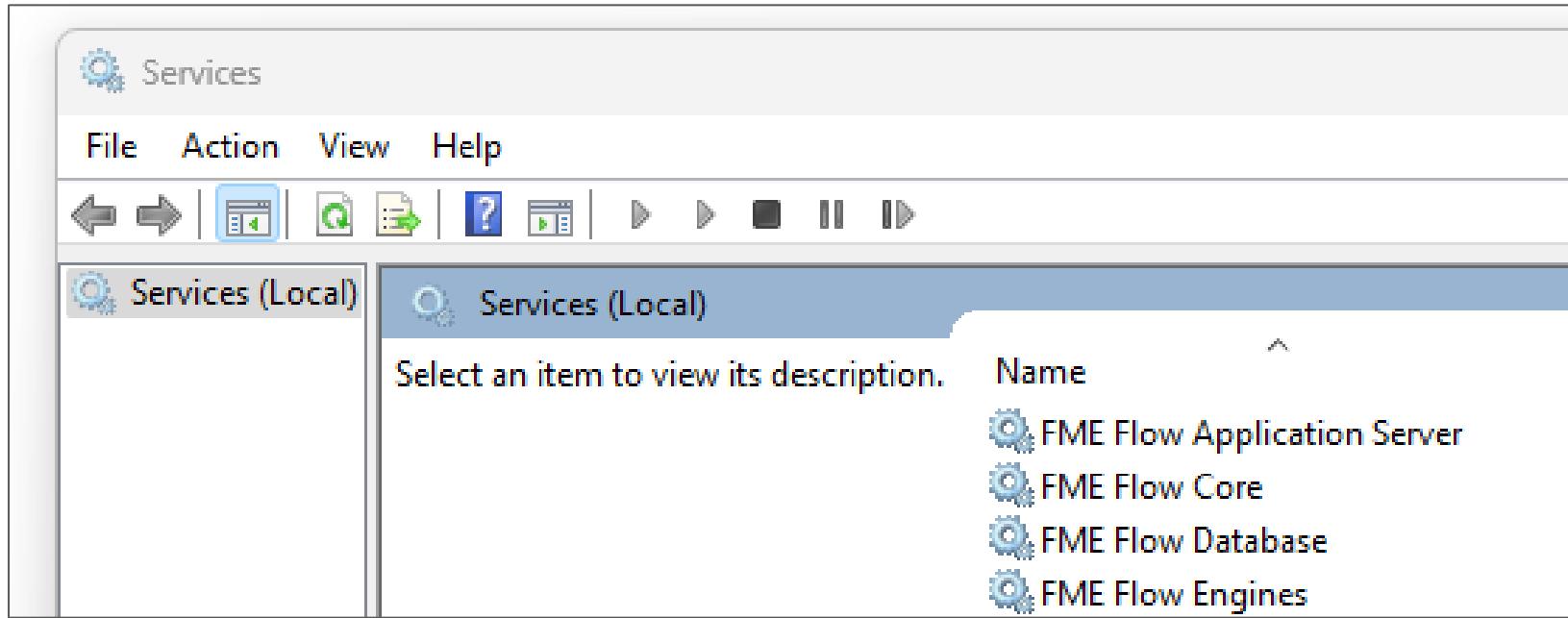
<b>25 (Windows), 7125 (Linux)</b>	SMTP Publisher (unsecured).		
<b>80</b>	Automatic (online) Licensing requests.	<b>7075</b>	Automations triggers and Notification Service publisher requests.
<b>445</b>	FME Flow System Share (for storing Repositories and Resources).	<b>7076</b>	Automations triggers and Notification Service publishers register on this port initially, after which they are assigned a dedicated port for communication.
<b>465</b>	SMTP Publisher (secured: Gmail, Yahoo)	<b>7077</b>	FME Flow configuration and Backup & Restore requests.
<b>587</b>	SMTP Publisher (secured: Outlook, Office365)	<b>7078</b>	WebSocket Server requests.
<b>6379</b>	FME Flow Queue, for managing Queue Control.	<b>7079</b>	Resources requests.
<b>7069</b>	Database Connections and Web Connections requests.	<b>7081</b>	System Cleanup requests.
<b>7070</b>	FME Engines register on this port initially, after which they are assigned a dedicated port for communication.	<b>7082</b>	Private port used by the PostgreSQL database server that hosts the FME Flow Database on an Express installation.
<b>7071</b>	Jobs, Projects, Workspaces, Licensing, and User Management requests.	<b>7500</b>	Manage FME Flow Core processes.
<b>7072</b>	Automations external actions and Notification Service subscriber requests.	<b>7501</b>	Manage FME Engines processes, cancel FME Engines, and add/remove FME Engines.
<b>7073</b>	Schedules requests.		
<b>7074</b>	Automations external actions and Notification Service subscribers register on this port initially, after which they are assigned a dedicated port for communication.		

Ports detailed here: <https://docs.safe.com/fme/html/FME-Flow/ReferenceManual/FME-Flow-Ports.htm>

# FME Flow Windows Services



FME Flow has four Windows Services:



By default, the **FME Flow Windows Services** run under the **Local System** account, which may not have **network permissions**.

# Running FME System Services under Different Accounts

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- The FME Flow Core, FME Flow Engines, and FME Flow Application Server Windows Services run under the "**Local System**" account.
- You can also run these services under different accounts, as long as they have **access to read and write** data to the **FME Flow System Share**.
- This is particularly in a distributed installation where these services are installed on separate machines.

Instructions for changing the service user can be found in the Administrator's Guide:

[https://docs.safe.com/fme/html/FME-Flow/AdminGuide/Running\\_System\\_Services\\_Under\\_Different\\_Accounts.htm](https://docs.safe.com/fme/html/FME-Flow/AdminGuide/Running_System_Services_Under_Different_Accounts.htm)

# Third-Party Applications

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1. **Database Connection Client** - Do the workspaces rely on third party applications for connecting to databases?  
E.g. Oracle client for connecting to an Oracle database.
2. **Database Connections using Windows Authentication** – If the database connections use database credentials, no other action is required (as connection details are published along with the workspace). However, if database connections uses a Windows Authentication configuration, it's important to note that the "Log On As" setting of the FME Flow Engine Service sets the user account under which workspaces are run.
3. **ESRI Licencing** - To read and write from Esri Geodatabase formats, like ArcSDE and File Geodatabase, FME Flow requires that ArcGIS Server software be installed and licensed on the same machine (with an exception for the File Geodatabase Open API Reader/Writer).  
The use of ArcGIS Desktop or ArcGIS Pro in a server context violates Esri's license terms:  
<https://support.safe.com/hc/en-us/articles/25407403131917-Using-FME-Flow-with-Esri-ArcGIS-Software>  
ESRI Versions and Compatibility:  
<https://support.safe.com/s/article/notes-on-fme-and-esri-versions-and-compatibility>
4. **Python Compatibility** - Is the default python interpreter being used? Are there any custom python modules that need installing? In this case, ensure the same Python interpreters are also available on FME Flow and correctly configured.

# Versioning of Form and Flow

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FME Form is used to author and publish the workspaces used by FME Flow.

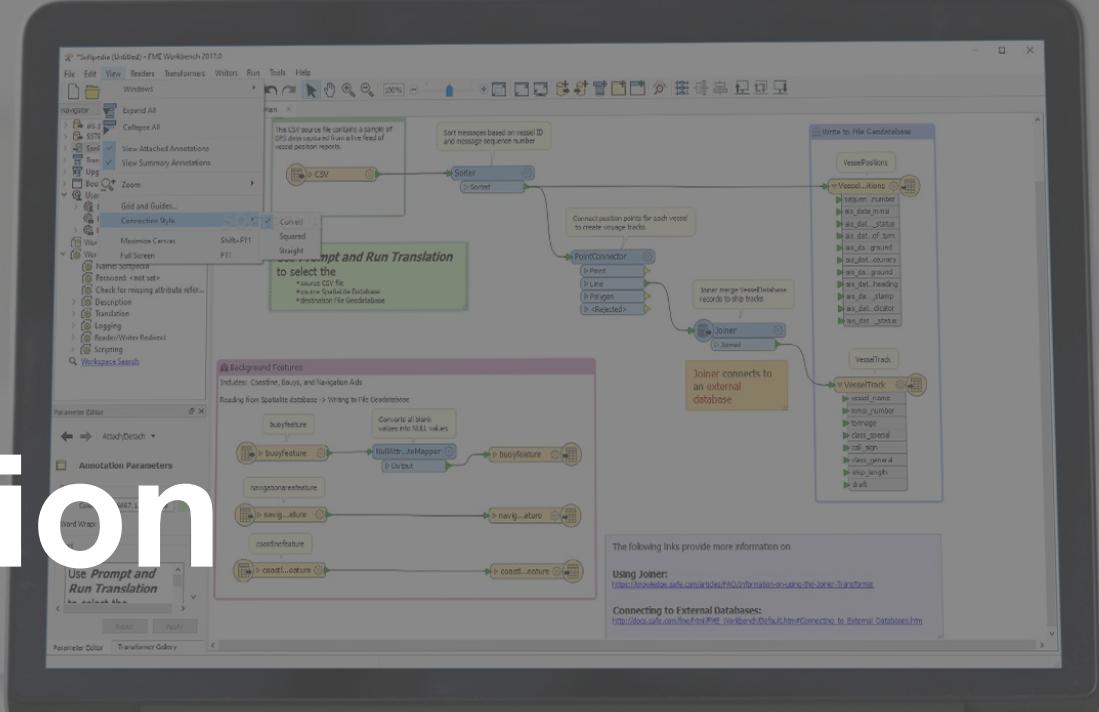
When a workspace runs on FME Flow, we need to make sure that FME Flow has access to the same functionality as FME Form

*- Readers/Writers and Transformers vary between versions of FME!*

Therefore, the **version of FME Form** you use **must match** the **FME Flow version** you have installed.

# Installation

Connect. Transform. **Automate**



# Installation Types



 FME Flow 2024.2.3 (Build 24825 - win64) Setup X

**Choose Setup Type**

**FME** :

Please choose setup type.

**Express**      Installs all required components, so you can get started quickly and easily with FME Flow. (Recommended)

**Distributed / Fault Tolerant**      Provides flexibility over which FME Flow components to install. Select this option for certain fault-tolerance scenarios, or if your organization's IT constraints require you to use existing components for the FME Flow database or web application server.

**Distributed Engine**      Allows you to build onto a current FME Flow installation by adding FME engines on a separate machine for fault tolerance and/or high capacity.

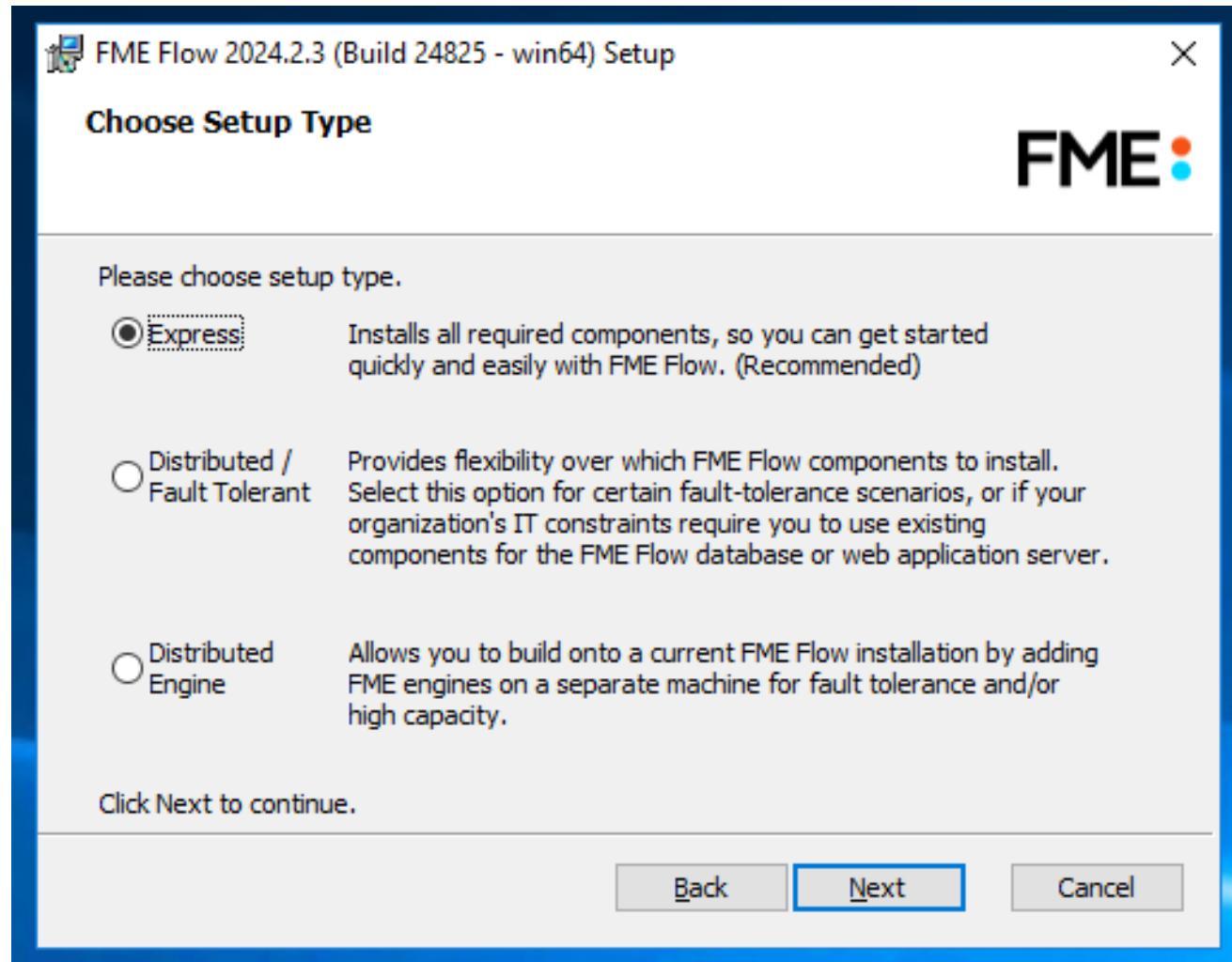
Click Next to continue.

Back Next Cancel

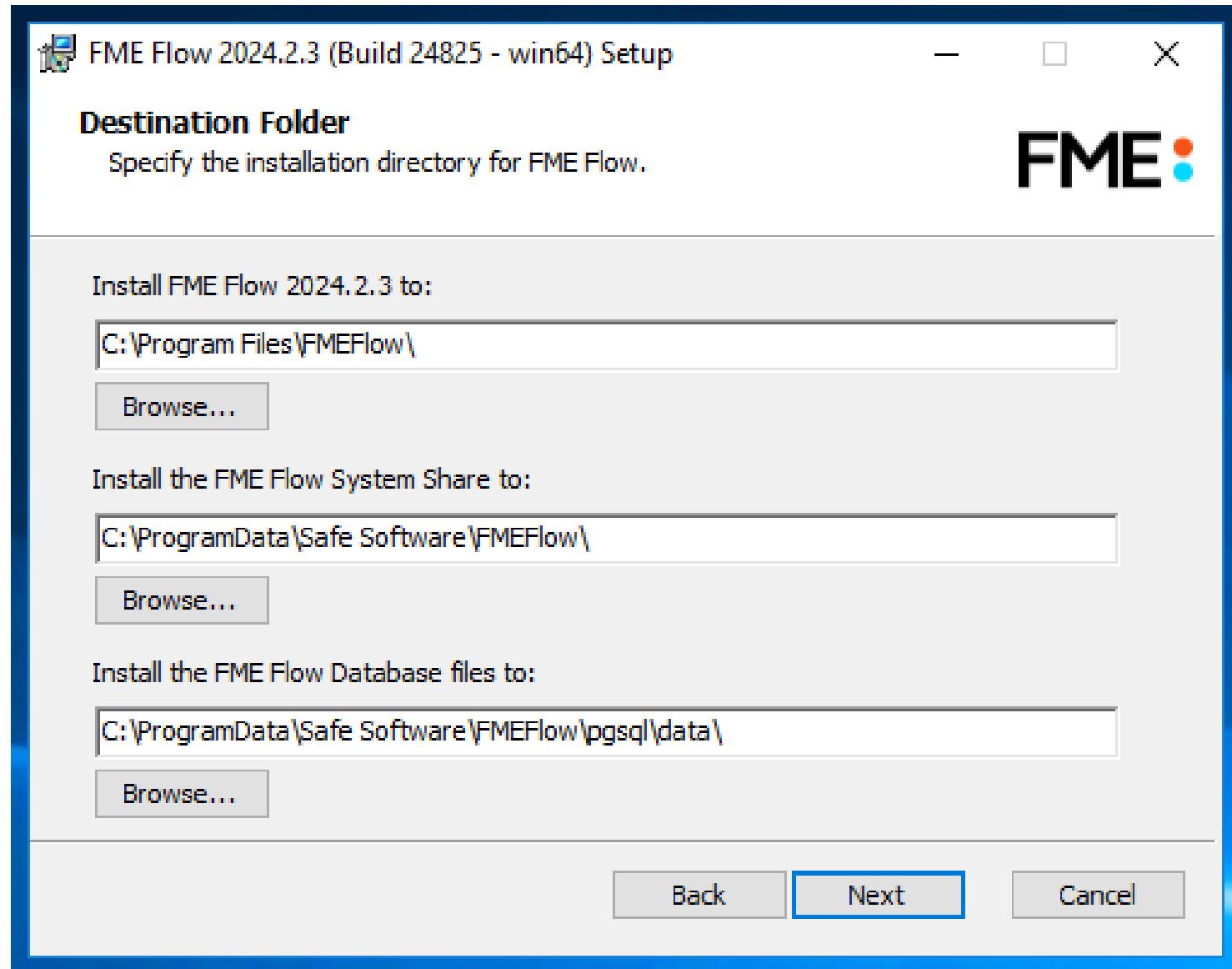
# Installation - Express



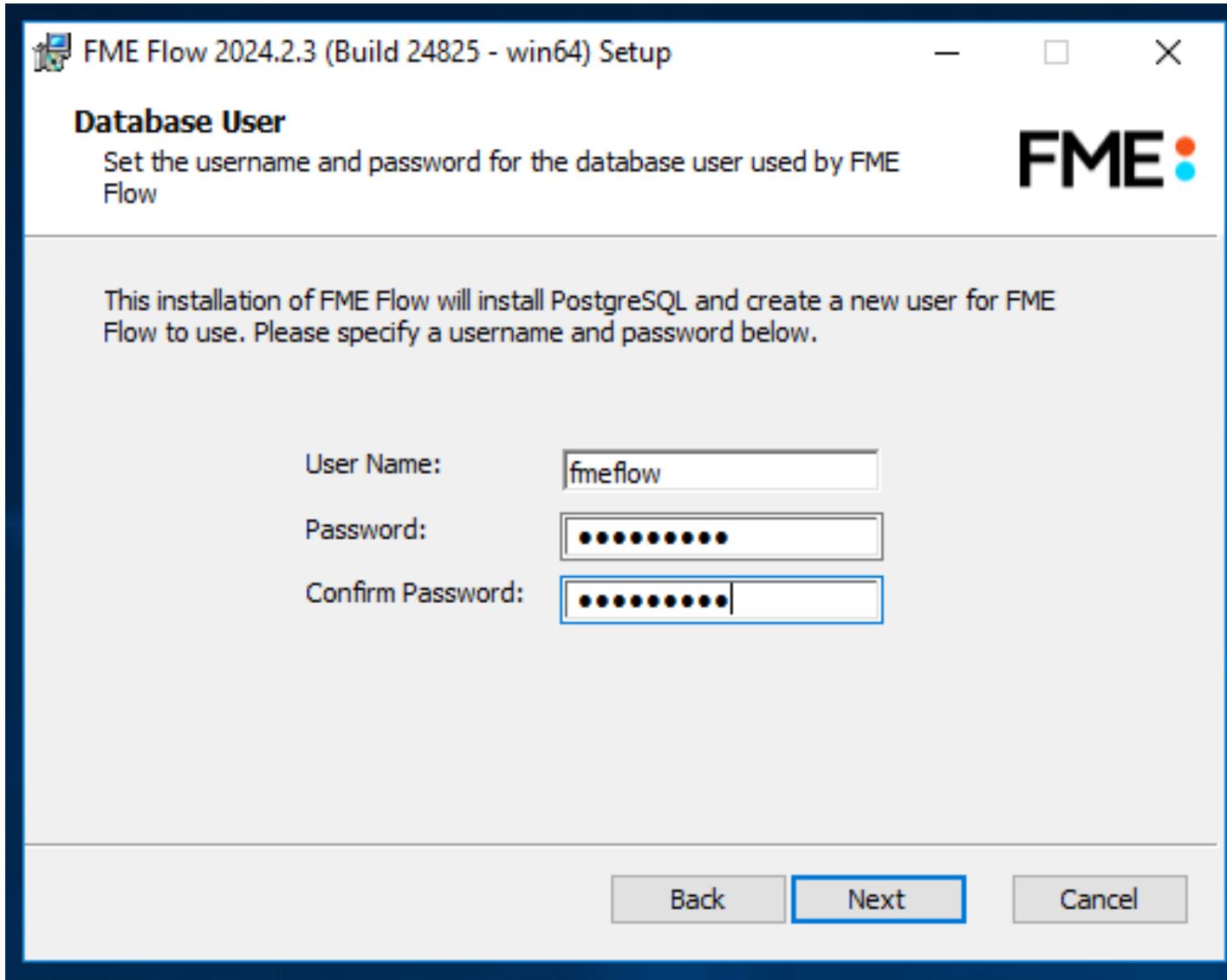
- **Express** installation is the recommended method and covers most users



# Installation - Folders



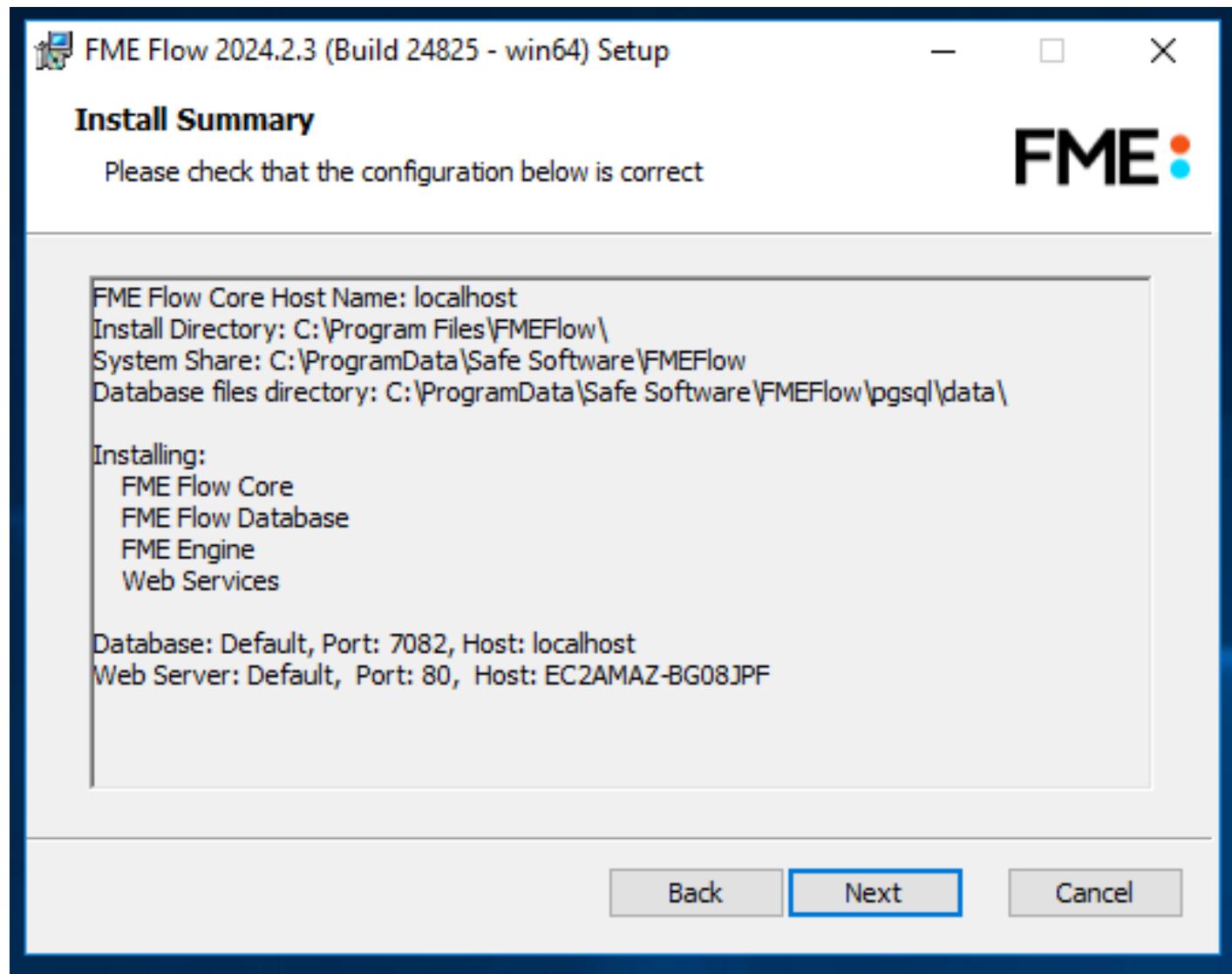
# Installation – Database User



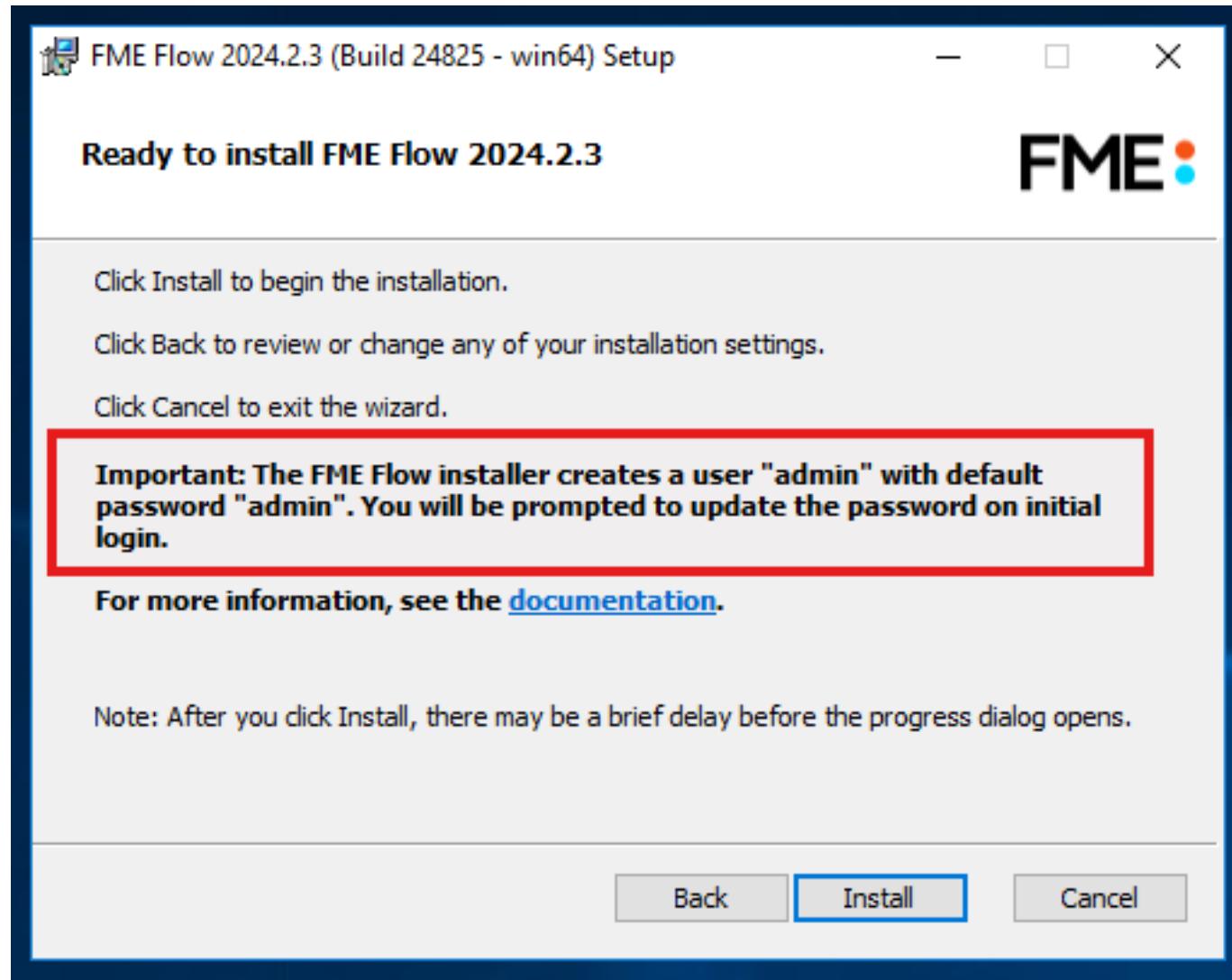
When setting the database password, do NOT use special characters

As these are not supported, and may prevent the installation of the database element

# Installation – Summary

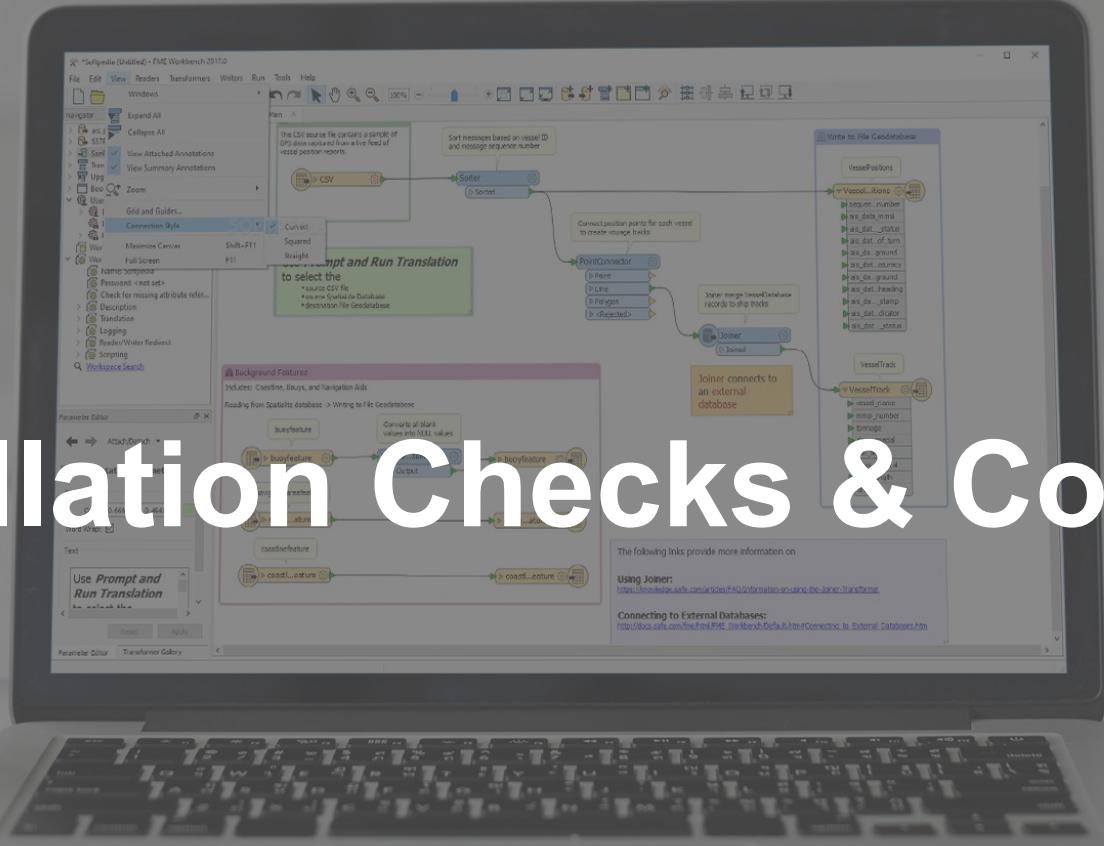


# Installation – Admin User



# Post-Installation Checks & Configuration

Connect. Transform. **Automate**



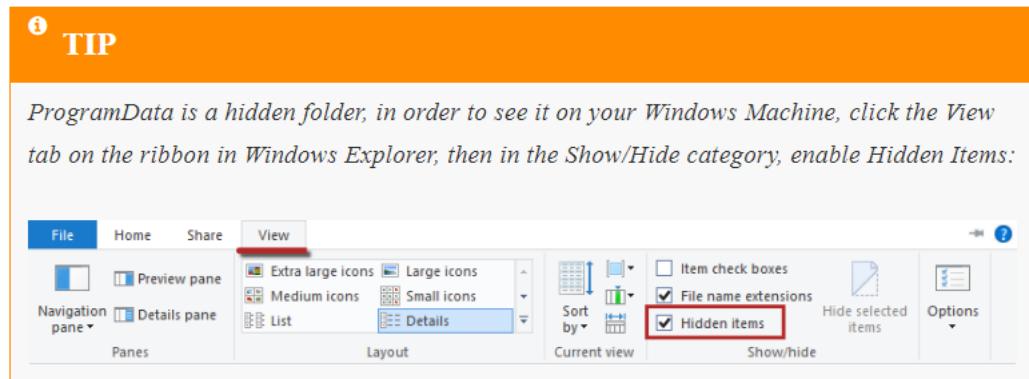
# FME Flow default file locations



- FME Flow installation directory: **C:\Program Files\FMEFlow\**
  - Config files

<b>FME Flow Core</b>	fmeFlowConfig.txt fmeCommonConfig.txt fmeFlowWebApplicationConfig.txt fmeWebSocketConfig.txt	<FMEFlowDir>\Server\
<b>FME Engines</b>	fmeEngineConfig.txt	<FMEFlowDir>\Server\
<b>FME Flow Database</b>	fmeDatabaseConfig.txt	<FMEFlowDir>\Server\
<b>FME Flow Web Services</b>	propertiesFile.properties	<WebAppDir>/<FMEFlowService>/WEB-INF/conf/
<b>Process Monitoring</b>	processMonitorConfigCore.txt processMonitorConfigEngines.txt	<FMEFlowDir>\Server\
<b>FME Flow Console</b>	FMEFlowConsoleConfig.txt	<FMEFlowDir>\Clients\FMEServerConsole\

- FME Flow System Share: **C:\ProgramData\Safe Software\FME Flow\**
  - Resource directories
  - Repositories
  - Logs
  - etc



# Post-Installation Configuration



Once installed you will need to verify and test the installation:

## 1. FME Services are running

On windows these should start automatically. Open Windows “services” Desktop application to check that the 4 FME Flow services are running. If not, user the Restart FME Flow or start/stop services manually.

## 2. Web UI is active

Open the FME Flow Web Interface in a web browser, set during installation. E.g <http://localhost:8080/fmeserver> . This should load up the login page.

## 3. Engines are running and working

Run one of the sample workspace from the “Run a Workspace” page. Safe usually recommend the `austinApartment.fmw`

## 4. FME Flow is available from Form (Desktop) Workbench

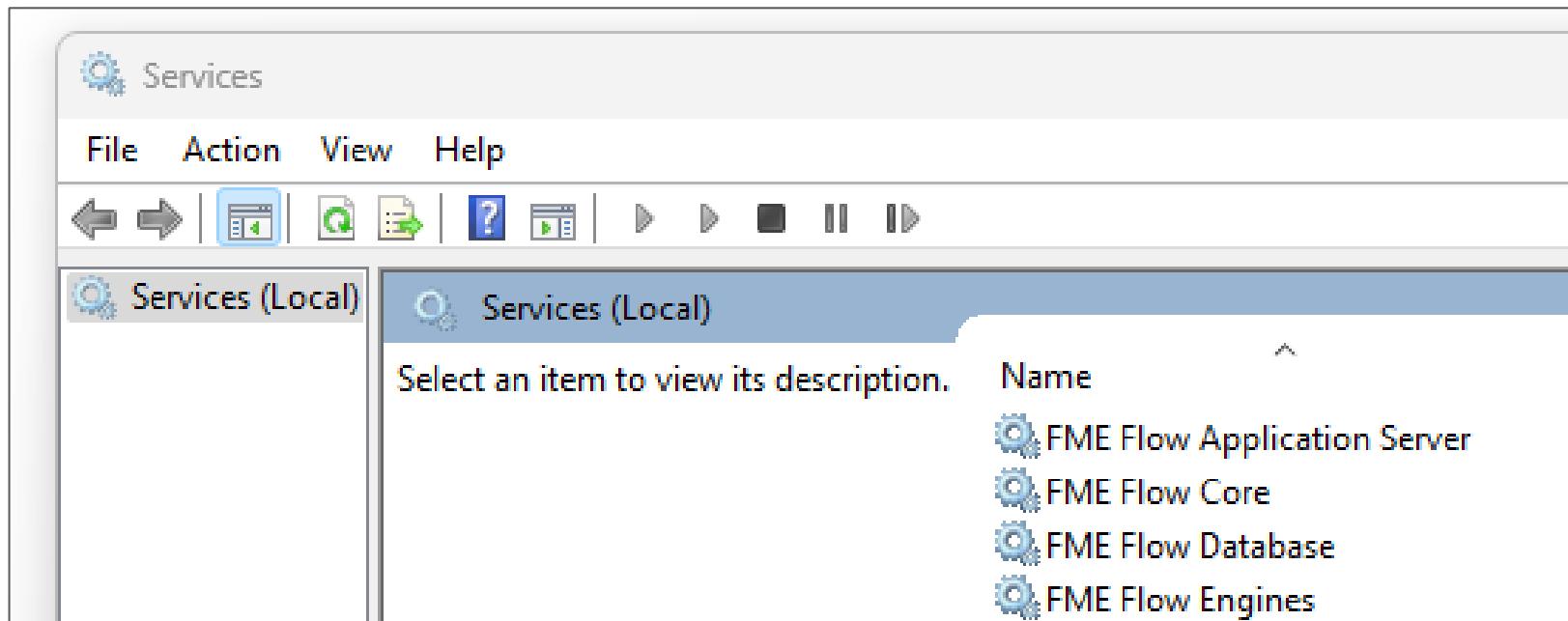
Log in to the Web Interface with the username and password admin/admin. If you are able to log in, it confirms that FME Flow is installed and running



# FME Flow Windows Services



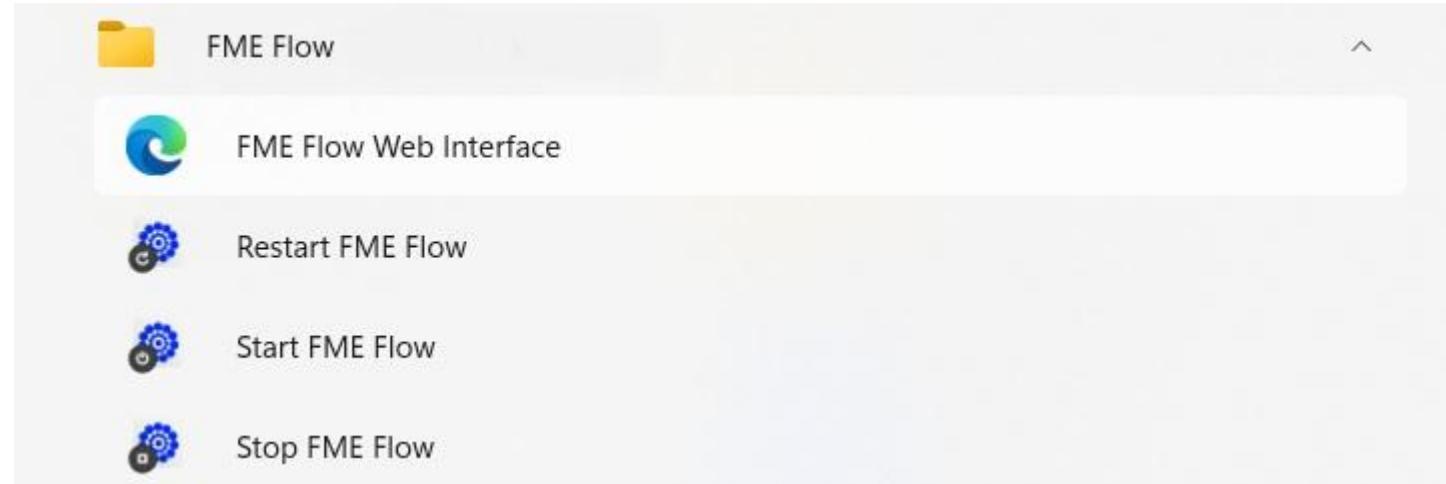
- You can check if FME Flow's services are running in **Windows Services**



# Restarting and Stopping FME Flow



- Do NOT manually start and stop the services there because the order they start in is important
- Unless specifically targeting a single Service, always Use the FME Flow Management options to do this. ***Start > All Programs > FME Flow:***
  - Restart FME Flow
  - Start FME Flow
  - Stop FME Flow



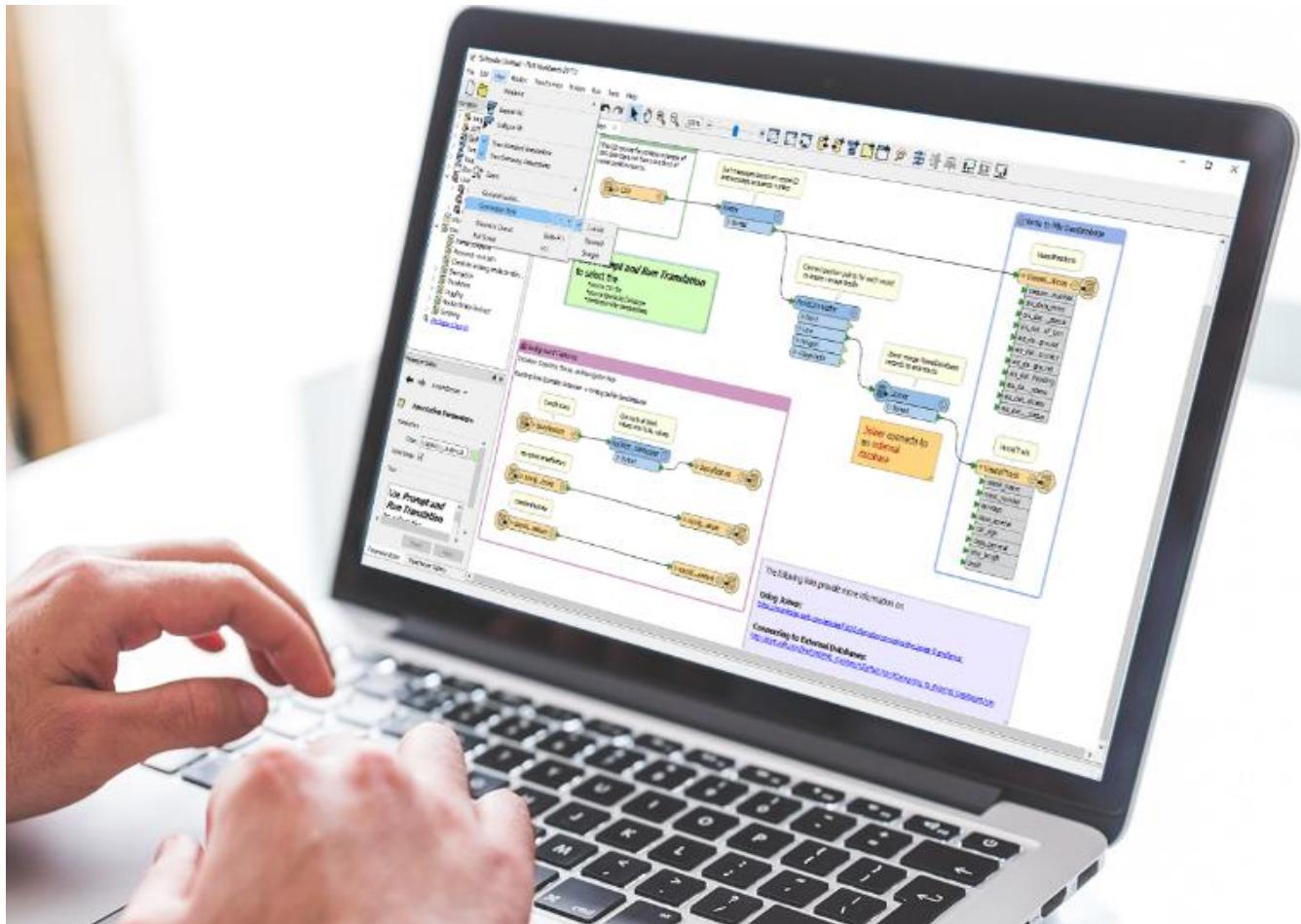
# Exercise 3.1



## FME Flow Services

Although the FME Flow System Services start automatically, you can start and stop the services. But it's important that it's done correctly.

**Goal – Use FME Flow FME Flow Management options to correctly stop and restart FME Flow Services**

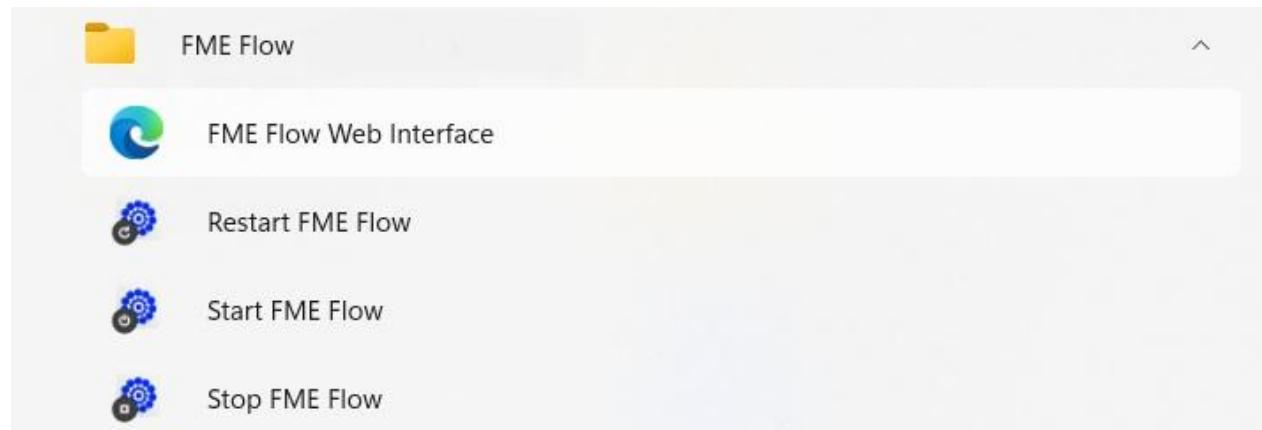


# Accessing FME Flow Web Interface



The web interface is accessed either:

- through a URL: ***http://<host>:<port>/fmeserver***
  - It's not necessary to specify the port number if using port 80: *http://<Host>/fmeserver*
  - If you're using a port other than 80 (e.g. 8080): *http://<Host>:8080/fmeserver*
  - when working locally, you can reference your FME Flow using 'localhost'
- through the start menu *Start > All Programs > FME Flow > FME Flow Web Interface*



# FME Flow Web Interface



FME:Flow

- Run Workspace
- Automations
- Streams
- Flow Apps
- Schedules
- Jobs
- Workspaces
- Projects
- Connections & Parameters
- Resources

ADMIN

- Analytics
- User Management
- System Configuration
- Backup & Restore
- Engine Management

FME Flow 2024.2  
Build 24783 - win64

Safe Software  
Copyright (c) 1994 - 2024

## Dashboard

Create Automation + Create Workspace App + Create Schedule + Create Project +

### Last Published Workspaces

Customer\_email.fmw  
3 weeks ago

Customer\_delete.fmw  
3 weeks ago

easyTranslator.fmw  
13 weeks ago

earthquake\_union.fmw  
13 weeks ago

austinDownload.fmw  
13 weeks ago

### Favorites

You don't have any favorites.

### Last Updated Items

### Resources

Hyatt Regency Seattle  
Early Bird pricing is now in effect until February 28, 2024!  
The Desk of Data

# Licensing FME Flow

---



There are two modes for licencing FME Flow:

- **Online** – the fastest and easiest method for licensing FME Flow
- **Offline** – if the machine hosting the installation of FME Flow is disconnected from the internet, or if firewall rules prevent your machine from communicating with Safe Software's back-end database, then there is an offline method for retrieving an FME Flow license file.

Each licence is locked to the instance of FME Flow – this is done via the machine key which is prepopulated

# Licensing FME Flow - Online



- Licenses are requested in the *Engines & Licensing* tab of FME Flow.
- Requests are sent over HTTP/HTTPS to retrieve the license file from Safe Software's back-end databases.
- By default, license files are installed to *C:\ProgramData\Safe Software\FME Flow\licenses*.
- Serial numbers will be sent over via your miso Account Manager.

The screenshot shows the FME Flow application window. On the left is a dark sidebar menu with various options like Run Workspace, Automations, Streams, Flow Apps, Schedules, Jobs, Workspaces, Projects, Connections & Parameters, Resources, Analytics, User Management, System Configuration, Licensing, Security, Network & Email, System Cleanup, System Events, and Broadcast Messages. The 'Licensing' option under 'System Configuration' is highlighted. To the right of the sidebar, a modal dialog box titled 'Request a New License' is open. The dialog has fields for First Name, Last Name, Business Email, Company (optional), Industry (optional), Job Title (optional), Machine Key (containing '3538910818'), and Serial Number. Below these fields is a note: 'Only one serial number per license is supported.' At the bottom of the dialog are two buttons: 'Automatic' (which is selected) and 'Manual'. A note below says 'Automate license installation over the internet.' There is also a checkbox for 'Send me updates from Safe Software (I can unsubscribe any time - [Privacy Policy](#))'. At the very bottom right of the dialog are 'Cancel' and 'OK' buttons.

# Licensing FME Flow - Offline



- Click the option for Request New License.
- Under *Licensing Mode* select ‘Manual’
- Complete the form as before, click OK and this will download a JSON file to your local file system. .JSON file generation can take up anywhere from seconds to 15mins depending on the size and age of the server
- Forward this file to Safe Software ([codes@safe.com](mailto:codes@safe.com)) or to miso where an automatic process will return a valid license file to you after a few minutes..
- This license file can then be drag-and-dropped onto the Engines & Licensing page to license FME Flow.

The screenshot shows a dialog box with the following fields and options:

- Machine Name:** A text input field containing "MISOSERVER".
- Serial Number:** A text input field.
- Licensing Mode:** A button labeled "Manual" is selected, while "Automatic" is unselected.
- Description:** Text explaining the manual licensing process: "License FME Flow without using an internet connection. A \"License Request File\" will download. Please email this file to [codes@safe.com](mailto:codes@safe.com)".
- Checkboxes:** A checkbox labeled "Send me updates from Safe Software (I can unsubscribe any time - [Privacy Policy](#))".
- Buttons:** "Cancel" and "OK" buttons at the bottom right.

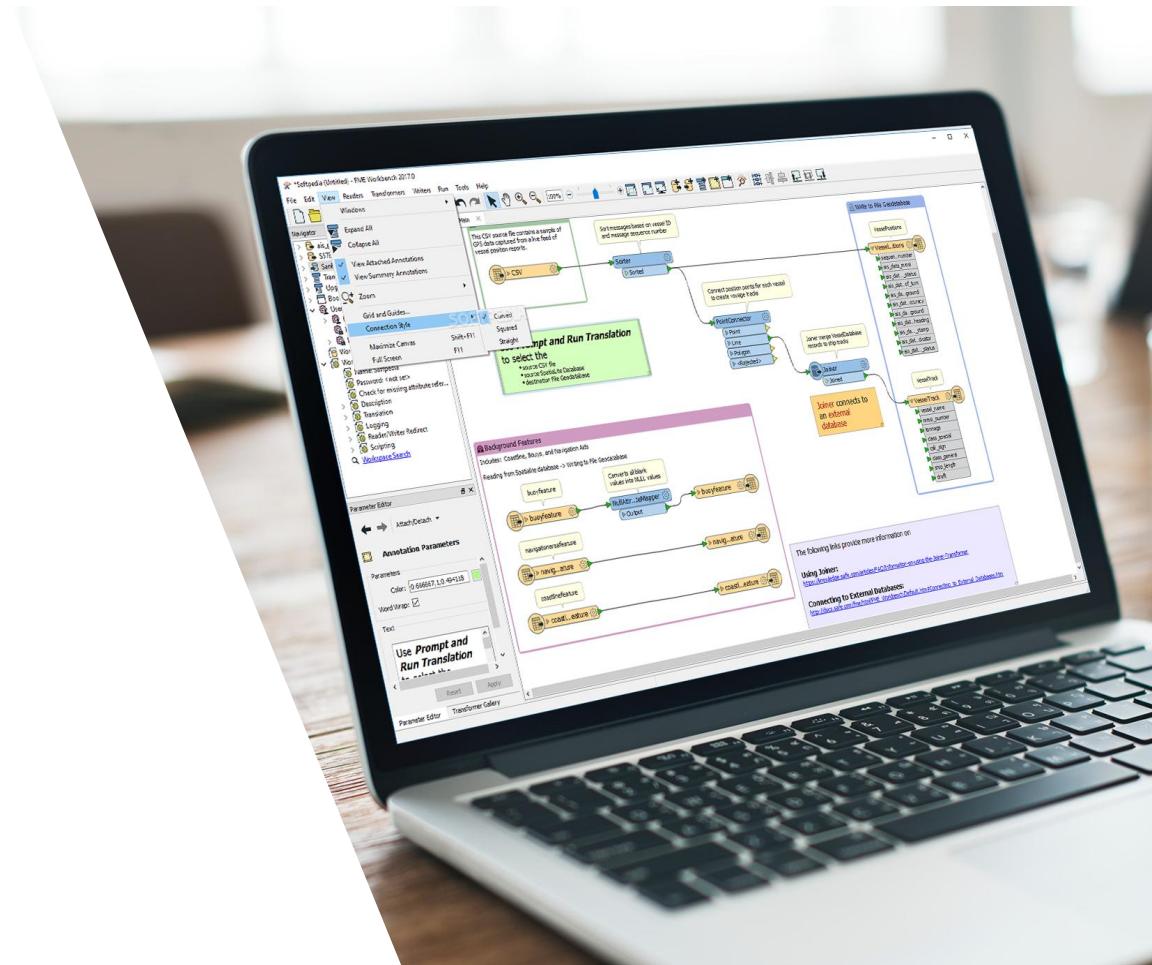
# Exercise 3.2



## Post Installation Checks

Once installed you will need to verify and test the FME Flow installation:

- FME Flow Services are running – we've *already checked this*.
- FME Flow Web UI is active
- Engines are running and working – *test with Sample workspace*
- FME Flow is available from Form Workbench



# Accessing the FME Flow Database



FME Flow comes equipped with a PostgreSQL Database completely configured and ready for use.

If you wish to access this, use the following details:

The screenshot shows the 'fmeserver\_local' configuration screen. The 'Connection' tab is selected. The details are as follows:

- Host name/address: localhost
- Port: 7082
- Maintenance database: postgres
- Username: fmeserver
- Kerberos authentication? (checkbox): Unchecked
- Role: (empty input field)
- Service: (empty input field)

At the bottom are buttons for Help, Close, Reset, and Save.

Note the port!

The screenshot shows the pgAdmin 4 Object Explorer. The tree view shows the following structure:

- Servers (2)
  - datapublisher
  - localhost
    - Databases (2)
      - fmeflow
        - Casts
        - Catalogs
        - Event Triggers
        - Extensions
        - Foreign Data Wrappers
        - Languages
        - Publications
        - Schemas
        - Subscriptions

The Password was set during the FME Flow installation

# Accessing the FME Flow Database



## Tables (161)

fme\_action  
fme\_active\_aggregate\_ref  
fme\_aggregator  
fme\_app\_automations  
fme\_app\_automations\_params  
fme\_app\_dependencies  
fme\_app\_suites  
fme\_app\_suites\_links  
fme\_appto\_dependencies  
fme\_appresource  
fme\_appresource\_assigned\_role  
fme\_apps  
fme\_apps\_params  
fme\_apps\_styling  
fme\_attribute  
fme\_automation  
fme\_automation\_dependencies  
fme\_automation\_key  
fme\_automation\_link  
fme\_automation\_log  
fme\_automation\_log\_stats  
fme\_automation\_metrics  
fme\_automation\_node  
fme\_automation\_parameter  
fme\_automation\_port  
fme\_automation\_status  
fme\_automation\_tag  
fme\_automation\_tag\_name  
fme\_azure\_ad\_role

fme\_azure\_ad\_tenant  
fme\_azure\_ad\_user  
fme\_azure\_login\_state  
fme\_broadcast  
fme\_category  
fme\_category\_assigned\_role  
fme\_category\_permission  
fme\_cleanup\_config  
fme\_cleanup\_task  
fme\_clientsession  
fme\_clientsession\_props  
fme\_commits  
fme\_config  
fme\_config\_node  
fme\_config\_props  
fme\_core\_node  
fme\_dataset  
fme\_dataset\_props  
fme\_default\_tag  
fme\_deployment  
fme\_engine\_tags  
fme\_engineassignrules  
fme\_engineassignrules\_props  
fme\_engineassignrules\_tags  
fme\_engines  
fme\_favorite\_item  
fme\_feature\_type  
fme\_featuretype\_props  
fme\_item  
fme\_item\_props

fme\_item\_res  
fme\_item\_service  
fme\_item\_version  
fme\_job\_history  
fme\_job\_stat  
fme\_jobrouterules  
fme\_jobs  
fme\_ldap\_role  
fme\_ldap\_server  
fme\_ldap\_server\_property  
fme\_ldap\_user  
fme\_legacy\_engineassignrules  
fme\_legacy\_jobrouterules  
fme\_lock  
fme\_migration\_jobs  
fme\_nc\_keyvalues  
fme\_nc\_namedconnections  
fme\_nc\_version  
fme\_nc\_webservices  
fme\_node  
fme\_node\_health  
fme\_notification\_reqtracker  
fme\_oauthvone  
fme\_parameter  
fme\_password\_history  
fme\_password\_reset  
fme\_permission  
fme\_permission\_assigned\_action  
fme\_processconfig  
fme\_project\_app\_automations  
fme\_project\_app\_suites

fme\_project\_apps  
fme\_project\_automations  
fme\_project\_cleanup\_tasks  
fme\_project\_named\_connections  
fme\_project\_projects  
fme\_project\_publications  
fme\_project\_repositories  
fme\_project\_repository\_items  
fme\_project\_roles  
fme\_project\_schedule\_tasks  
fme\_project\_shared\_res\_paths  
fme\_project\_shared\_resources  
fme\_project\_streams  
fme\_project\_subscriptions  
fme\_project\_topics  
fme\_project\_user\_accounts  
fme\_project\_user\_tokens  
fme\_projects  
fme\_publication  
fme\_publication\_props  
fme\_publication\_topic  
fme\_publisher  
fme\_publisher\_node  
fme\_publisher\_props  
fme\_qrtz\_blob\_triggers  
fme\_qrtz\_calendars  
fme\_qrtz\_cron\_triggers  
fme\_qrtz\_fired\_triggers  
fme\_qrtz\_job\_details  
fme\_qrtz\_locks  
fme\_qrtz\_paused\_trigger\_grps

fme\_qrtz\_scheduler\_state  
fme\_qrtz\_simple\_triggers  
fme\_qrtz\_simprop\_triggers  
fme\_qrtz\_triggers  
fme\_queue\_nodes  
fme\_registerednodes  
fme\_repositoryinfo  
fme\_role  
fme\_samlconfig  
fme\_schedule\_dependencies  
fme\_schedule\_task  
fme\_service  
fme\_service\_props  
fme\_sharedres  
fme\_sharedres\_props  
fme\_sharedres\_type  
fme\_spring\_session  
fme\_spring\_session\_attributes  
fme\_stream\_dependencies  
fme\_streams  
fme\_subscriber  
fme\_subscriber\_props  
fme\_subscription  
fme\_subscription\_props  
fme\_subscription\_topic  
fme\_suite\_dependencies  
fme\_sysevent\_config  
fme\_sysevent\_config\_props  
fme\_sysevent\_history  
fme\_tags

fme\_topic  
fme\_topic\_active\_aggregate  
fme\_topic\_aggregator  
fme\_user\_config  
fme\_useraccount  
fme\_useraccount\_assigned\_role  
fme\_usertoken  
fme\_usertoken\_assigned\_role  
fme\_version\_control  
fme\_workspace\_dependencies

# Changing the Database Provider

---



FME Flow comes equipped with a PostgreSQL Database completely configured and ready for use.

However, you may want to leverage a system that is already established or is required by your company policies. To do this we perform an “in-place” backup and restore procedure:

1. Backup your FME Flow configuration.
2. Configure the new database server.
3. Update the database connection settings in the `fmeCommonConfig.txt` file.
4. Restart the FME Flow Core service.
5. Restore your FME Flow configuration.
6. Remove previous FME Flow Database dependency, disable, and stop the previous database service.

FME Flow supports PostgreSQL, Microsoft SQL Server, or Oracle databases.

# Changing the Database Provider - Resources

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Appropriate section in Administrator Guide:

[https://docs.safe.com/fme/html/FME-Flow/AdminGuide/Changing\\_Database\\_Provider.htm](https://docs.safe.com/fme/html/FME-Flow/AdminGuide/Changing_Database_Provider.htm)

Configure the New Database Server – to run the necessary database configuration scripts and post-configuration scripts. Follow the steps in here:

[https://docs.safe.com/fme/html/FME-Flow/AdminGuide/Configure-FME-Flow-Database-on-Separate\\_Server-2-Tier.htm](https://docs.safe.com/fme/html/FME-Flow/AdminGuide/Configure-FME-Flow-Database-on-Separate_Server-2-Tier.htm)

# Adding Engines

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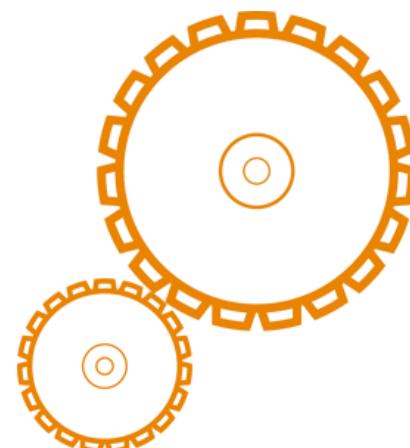
Additional Engines can be added to an FME Flow installation to increase processing power.

The rule of thumb is to have no more than one engine per CPU core.

To an Express installation you can add:

- **more standard Engines** onto the same machine as your FME Flow deployment
- Add **Distributed Engine** on a different machine inside your network
- Connect to **Remote Engines** installed on a different machine - either inside or outside your network
- **CPU Usage (Dynamic Engine)**

*Use Job Queues to configure specific jobs to run on the new engine.  
You can then use this to direct the jobs to the correct bit engine.*



# Configuring FME Flow for HTTPS

---



- HTTPS ensures that communication between the client and server is encrypted, so that if it is intercepted, the third party cannot easily view or use the information.
- You may wish to configure your FME Flow for HTTPS so that communication between the client and server is encrypted - to ensure that sensitive login information is not exposed.
- **HTTPS setup requires you to:**
  - Carry out **manual edits** of some of the FME Flow **Config files** – *using text editor*
  - **Import a certificate** into your FME Flow Web Application Server – *using web browser and Command Prompt*
  - It also means a **port change** from **80 to 443** – *config file change using text editor*
  - Modify the **Service URLs** from **HTTP** to **HTTPS** – *via the ADMIN > System Configuration > Network & Email section of FME Flow Web UI*

# Configuring FME Flow for HTTPS - continued

---



- Reach out to your IT team to see what certificate options are available to you as this will determine which set of instructions to follow.
- Safe Software have provided configuration steps for three certificate types:

<https://support.safe.com/hc/en-us/articles/25407415461517-Configuring-FME-Flow-for-HTTPS>

- **Using a PFX or P12 Certificate** – This is the easiest, and recommend method. It uses a pfx or .p12 cerfiticate already provided by your IT team. If you have been given a certificate with another extension type, such as .pem or .pb7 you'll need to convert it to .pfx before following these instructions.
- **Using a CA Certificate (.cer or .crt)** – This alternative method requires you to generate a certificate signing request from FME Flow, which can then be used by your IT team to create a CA certificate with the .cer or .crt extensions.
- **Using a Self-signed Certificate** - Lastly, if you do not have access to an authorized certificate you can configure your FME Flow to use a self-signed certificate instead. Please note that we do not recommend this option if you are working with a production environment.

There is also a handy how-to video for this option: <https://www.youtube.com/watch?v=qpmbyuStrO0>

# Configuring FME Flow for HTTPS - more



## Tips:

- you must perform the **Command Prompt** tasks as **Administrator**
- Take **backup of original config files** before applying changes to implement HTTPS:  
*server.xml, web.xml, context.xml*

## Updating an Expired Certificate

- All certificates have an expiration date and once this has passed, you will still be able to access FME Flow via HTTPS however you will not be able to submit jobs to run via the Web UI.  
<https://support.safe.com/hc/en-us/articles/25407555701773-Configuring-FME-Flow-for-HTTPS-Updating-an-expired-Certificate>

# HTTPS – Upgrading FME Flow

---



- The HTTPS configuration is **not included in the backup/restore**, therefore when upgrading FME Flow you'll need to **repeat this configuration** from scratch following the article relevant to your certificate type.
- Before uninstalling FME Flow make a copy of the files manually altered during HTTPS configuration. These files should **not be used again** but are a helpful reference.

```
<FMEFlowDir>\Utilities\tomcat\conf\server.xml  
<FMEFlowDir>\Utilities\tomcat\conf\web.xml  
<FMEFlowDir>\Utilities\tomcat\conf\context.xml  
<FMEFlowDir>\Server\fmeWebSocketConfig.txt
```



FME Flow encrypts data in the FME Flow Database, as well as passwords and tokens of FME Flow configuration backups.

You can choose to use your own custom encryption on the database and additionally encrypt the password in the configuration used to access the database.

## Using Custom Encryption Keys

- Do not lose track of any custom keys you generate. Data that is encrypted under a lost key **cannot** be accessed.
- When performing a Backup & Restore of an FME Flow configuration, you must restore to an FME Flow that uses the same custom encryption key as the backup.
- Only members of the **fmesuperuser** role can enable this feature.

# FME Flow Encryption – Custom Keys



- Only members of the **fmesuperuser** role can enable this custom encryption feature.
- You can stop using custom encryption in the future by setting the encryption mode back to **Secure (Default)**.

## System Configuration

General | Networking

### General

>Password Policy  >

Reset Password  >

System Email  >

System Encryption  ▾

Encryption Mode:

WARNING: Generating or uploading a new key will replace the existing key.

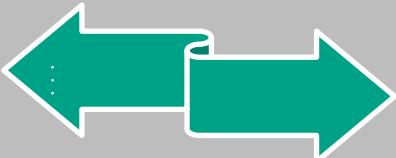
# Outgoing and Inbound Proxies



## Outgoing: Forward Proxy

A proxy for both the FME Flow Core and FME Engines can be configured through the Web UI.

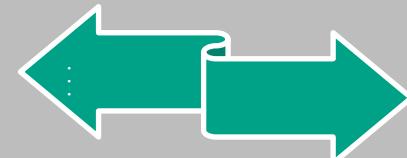
System Configuration > Networking > Proxy and enter your proxy information



## Inbound: Reverse Proxy

FME Flow is designed to use a third-party load balancer in a fault tolerant installation.

Even if you choose not to install a fault tolerant setup FME Flow can use a load balancer as a reverse proxy. For example, Nginx.



# CORS



- Cross-Origin Resource Sharing (CORS) allows you to specify websites hosted on other domains that can access resources from the FME Flow through Ajax requests.
- CORS is enabled by default to allow any host to access FME Flow resources.

System Configuration

General Networking

Networking ⓘ

Services >

Topic Monitoring >

Configure Cross-origin Resource Sharing (CORS) ⓘ

Load Template ▾

Allowed Origins ⓘ \*

Allowed Methods ⓘ HEAD, DELETE, POST, GET, OPTIONS, PUT

Allowed Headers ⓘ authorization, cookie, content-disposition, origin, x-requested-with, access-control-request-headers, content-type, access-control-request-

Exposed Headers ⓘ

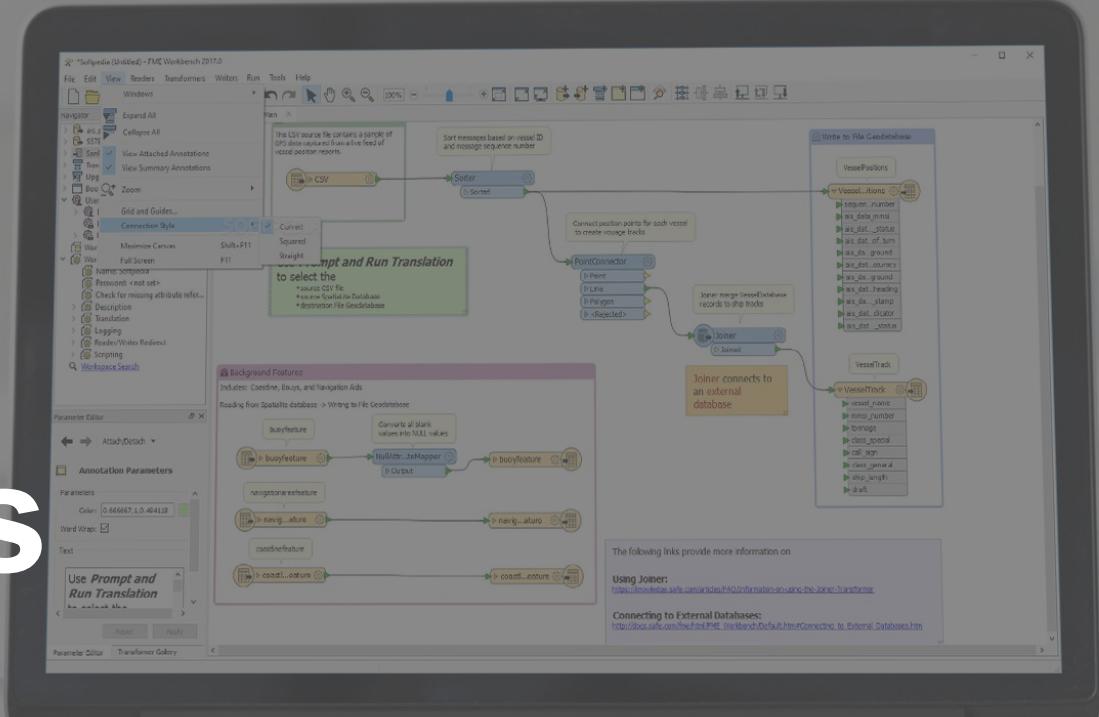
Pre-flight Max Age ⓘ 1800

Supports Credentials ⓘ False

Revert Save

\*

# Backups



Connect. Transform. **Automate**

# Backups – what's included

---



- ✓ Repositories and the items stored in them, including workspaces, custom transformers, custom formats, templates, and resources.
- ✓ FME Flow Services.
- ✓ Notifications components, including Topics, Subscriptions, and Publications.
- ✓ FME Flow Apps.
- ✓ Automations & Schedules
- ✓ Security configuration, including Users, Roles, tokens, and Active Directory.
- ✓ System Events.
- ✓ Job Queues.
- ✓ Resources, which include the following:
  - Resources whose definitions and files are both stored within FME Flow, and are configured for migration. By default, the DATA, ENGINE, and DASHBOARD Resources are configured for migration.
  - Online resources whose definitions are stored within FME Flow, but whose files are stored outside FME Flow. For example, Amazon Web Service (AWS) S3 bucket connection definitions are migrated (such as bucket names and authentication parameters). The files contained within these resources are not stored on FME Flow so will not be backed up.
- ✓ Database Connections and Web Connections.

# Backups – what is NOT included

---



## X Job Logs

- X **Job ID**, these will start again from 0 on a new install.
- X **Version Control**: If the FME Flow you are backing up has Version Control enabled the x versioning information will not be migrated. If Versioning is important ensure to keep this information in a Remote Repository like GitHub.
- X **Configuration Files**: Any changes to FME Flow that are made through configuration files, like HTTPS/SSL, will not be migrated.

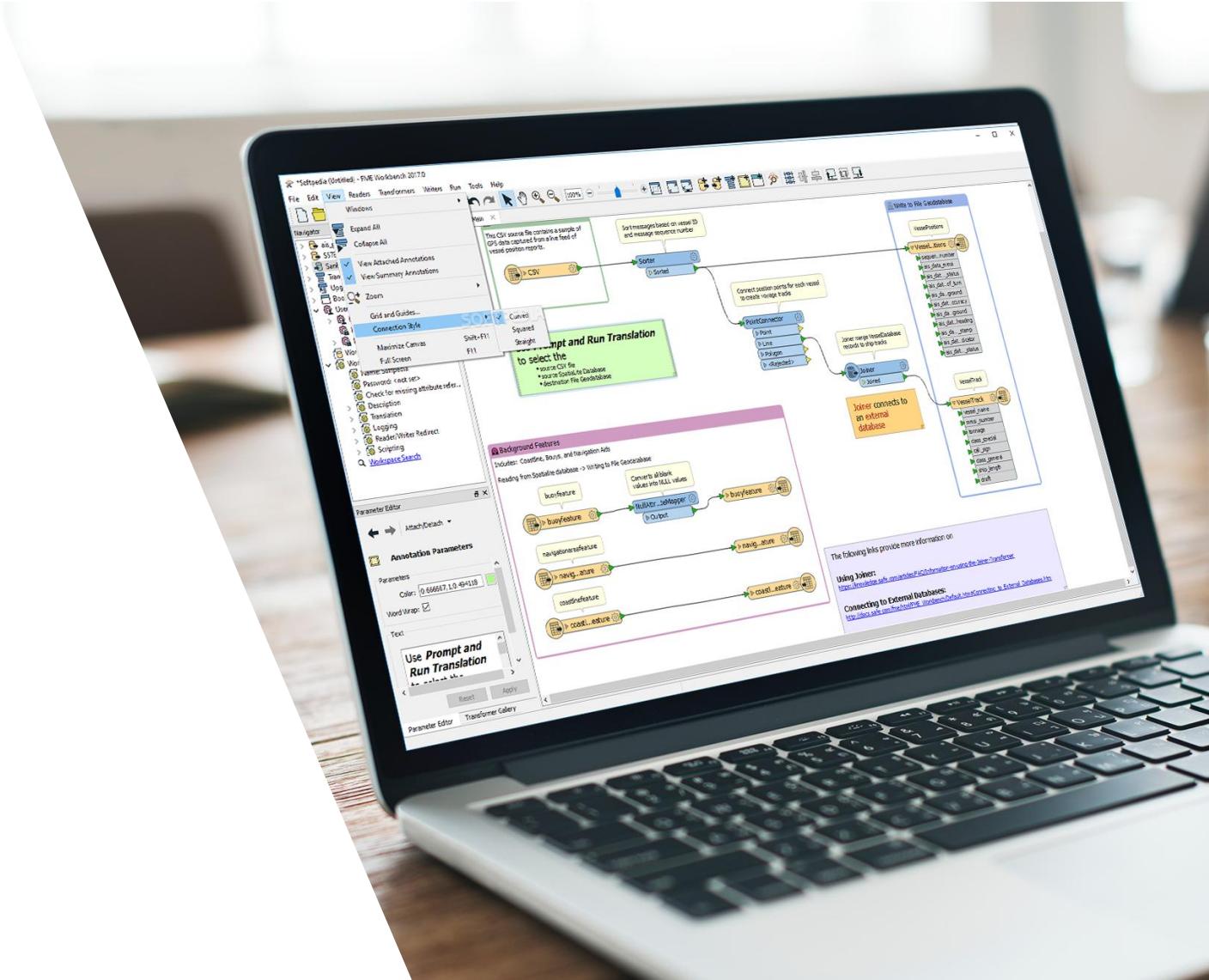
# Exercise 3.3



## Enable Backups

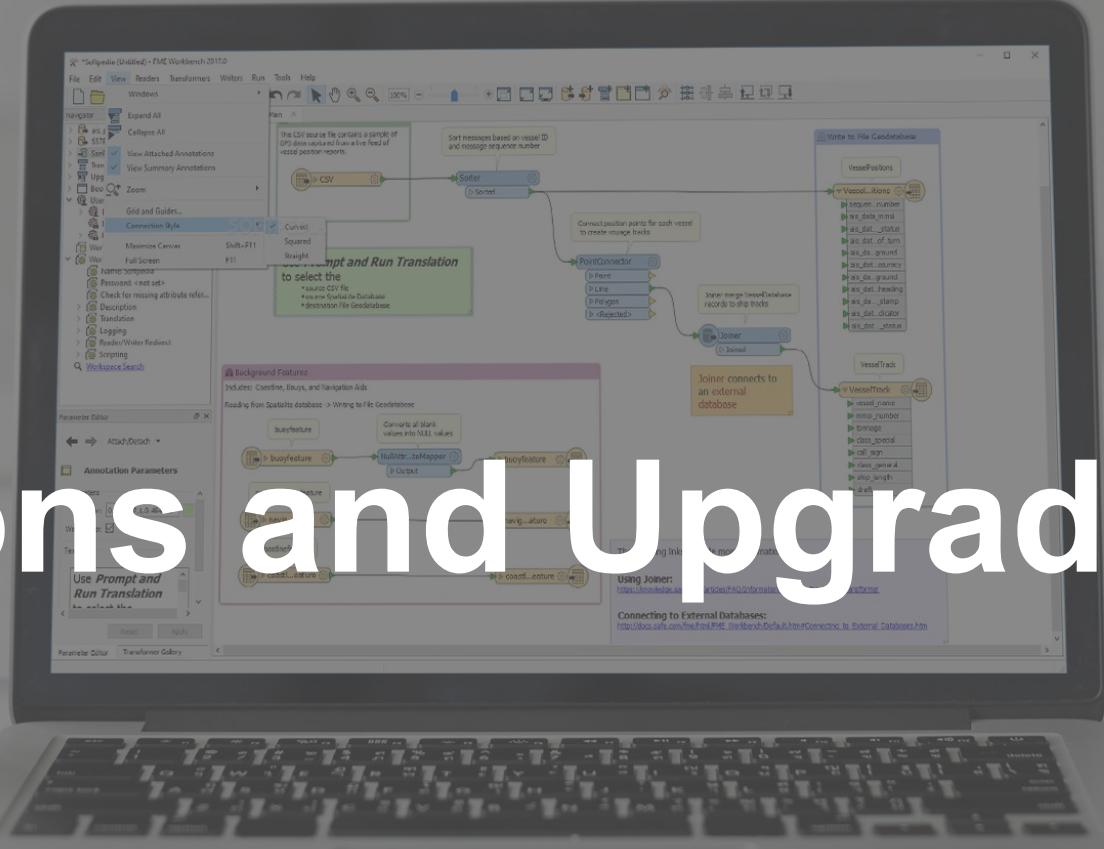
Following the recent installation of FME Flow, as the FME Flow Administrator you are responsible for activating and maintaining the Backup operations.

**Goal** – Activate scheduled Backup and perform a manual Backup



# Migrations and Upgrades

Connect. Transform. **Automate**



# FME Flow Migration / Upgrade

---



- A migration is achieved by performing a backup of FME Flow then restoring the backup on a different system.
- A backup is carried out using the tools on the Backup & Restore page of the FME Flow web interface.

# Backup for Migration

---



You will also need to **manually** back up the FME Flow **configuration files** to a location outside of your FME Flow installation directory in case you need to refer to them later. These configurations are **not included in the primary backup procedure**.

## What is **NOT** included in the Backup:

- ✖ Job Logs
- ✖ Job ID, these will start again from 0 on a new install.
- ✖ Version Control: If the FME Flow you are backing up has Version Control enabled the versioning information will not be migrated. If Versioning is important ensure to keep this information in a Remote Repository like GitHub.
- ✖ Configuration Files: Any changes to FME Flow that are made through configuration files, like HTTPS/SSL, will not be migrated.

# Backup Configuration Files



These files contain configurations for the FME Flow Database, HTTPS, and miscellaneous settings for the Transformation and Repository Managers.

They are not included in the primary backup procedure.

Depending on the level of customization of your FME Flow system you may not need to backup any of these configuration files.

Example File	Usage
<FMEFlowDir>\Server\processMonitorConfigEngines.txt	Sets the default Engines to start, manages engine upgrades, and port numbers for Engine Management requests.
<FMEFlowDir>\Server\fmeFlowConfig.txt	Configures the FME Flow repositories, shared resources, notifications, logs, failover clustering, and others.
FMEFlowDir>\Server\fmeCommonConfig.txt	Configures the FME Flow security and the database used by FME Flow.

# Upgrading FME Flow



	Upgrading to a Second Machine, Using a Different Host Name	Upgrading to a Second Machine, Using the Same Host Name	Upgrading In-Place, on the Same Machine
Does the FME Flow configuration remain available from the old installation?	Yes, any configurations can still be accessed.	Yes, any configurations can still be accessed.	No, the previous installation is uninstalled, any configurations are also removed.
Does the existing FME Flow installation remain accessible without interruption?	Yes, users can still access it while the new FME Flow is set up.	Yes, users can still access it while the new FME Flow is set up.	No, users will experience down time while the new FME Flow is installed and configured.
Is DNS entry modification required?	Yes. As FME Flow is installed using the different hostname, users will be able to access it using the new hostname.	Yes, you may require DNS entry modification to ensure that the correct FME Flow will be accessed.	No, users will be able to access it using the original hostname.



- Projects bring together FME Flow items into groups that share a common solution, or 'project,' in your organization.
- By grouping items in projects, you can reference them as one easy object. You can also export projects and import them to another instance of FME Flow.
- You can download a project from FME Hub and import it to your FME Flow, or export and upload a project that you wish to share.

## Projects can include:

- ✓ Workspaces, custom formats, custom transformers, and templates
- ✓ Automations & Schedules
- ✓ Repositories
- ✓ Topics, subscriptions, and publications
- ✓ Resources & Resource Connections
- ✓ Clean-up Tasks
- ✓ Database connections and web connections
- ✓ Users
- ✓ Other projects

# Resources

---



Community pages and  
forums



Knowledge Base



Each Other

# Thanks for joining



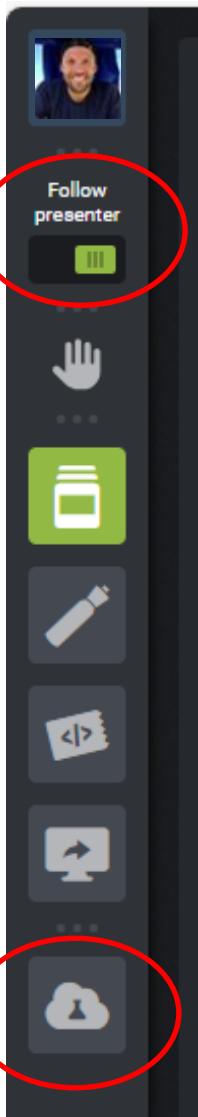


# FME Flow Training

## - Module S4

Administration – Customisation and Maintenance

# Training Environment



< keep 'Follow presenter' on

< Lab

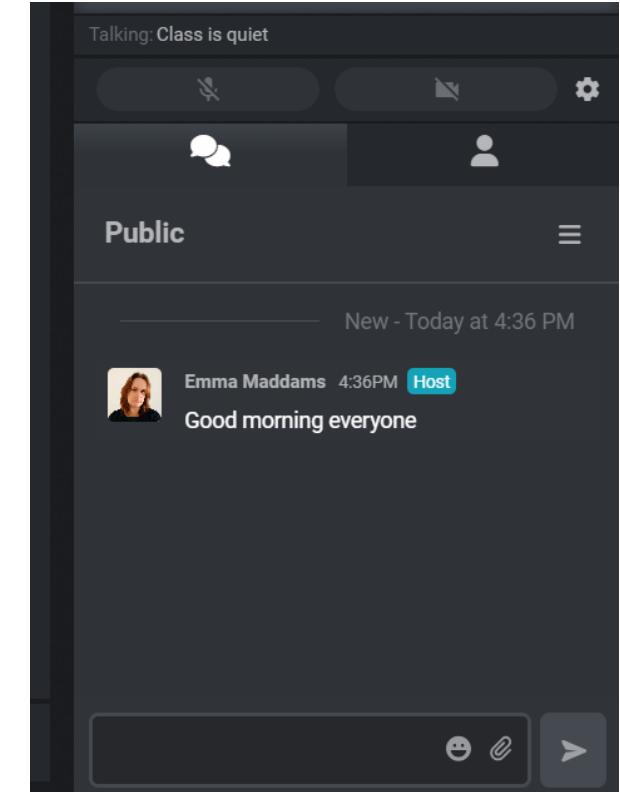
need help when using your Lab

Use either:

- 'Raise hand' or
- 'Lab Assistance'

## Chat

- to everyone
- to trainer



# Training Environment

---



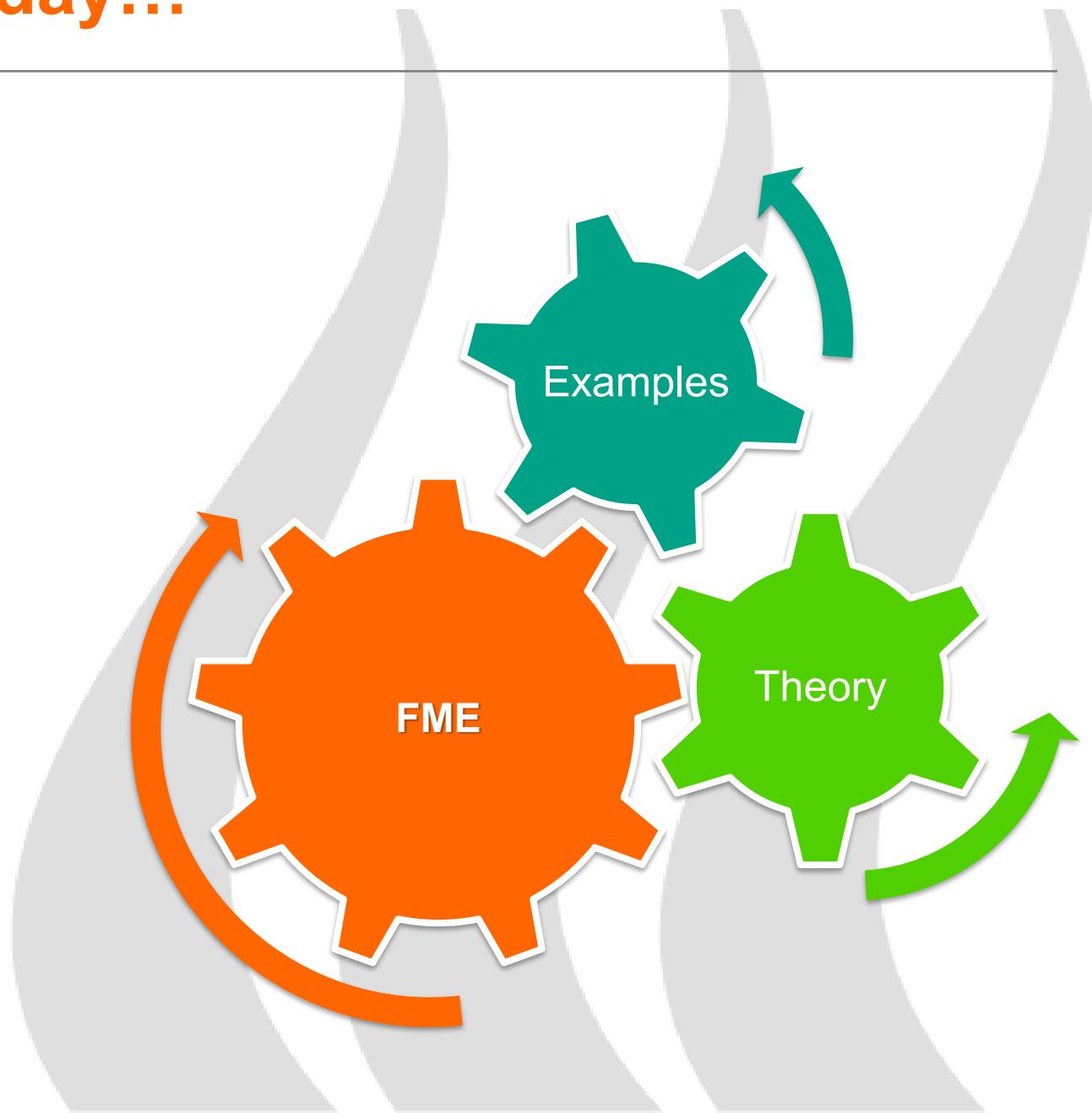
- Training resource folder located on a C-Drive
- Training data folders **C:\FMEFlowData**
  - Data
  - Output
  - Resources
  - Workspaces
- The workbook containing exercises – use download link from Trainer
- FME Flow Web UI credentials
  - Username: admin
  - Password: FMETraining1234

# What we'll be covering today...

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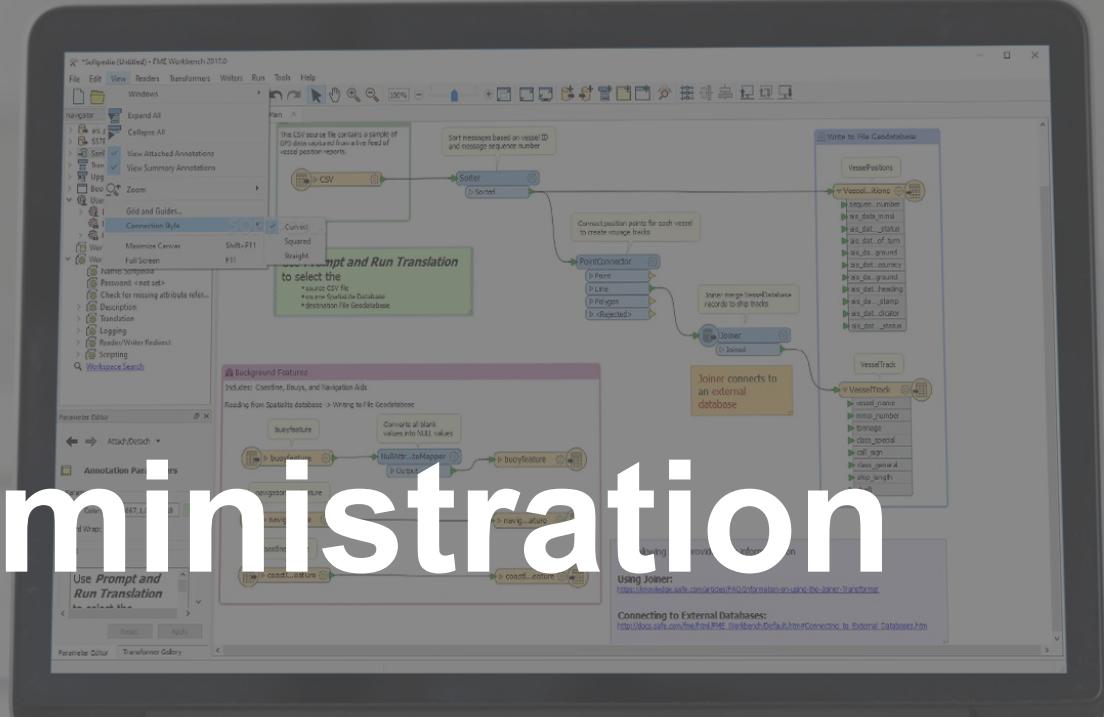
## Agenda

- User Administration
  - User Authentication
  - Management & Permissions
- Job Scalability and Management
  - Performance
  - Job Routing, Queues and Engine Assignment
- Customization and Monitoring
  - System Email
  - Workspace Version Control
  - Dashboards & Analytics
  - System Events
  - System Cleanup
- Other Resources



# User Administration

Connect. Transform. **Automate**



# Users and Roles



## Default User Accounts:

- **admin**: Assigned to the fmesuperuser and fmisAdmin roles
- **author**: Assigned to the fmAuthor role
- **user**: Assigned to the fmUser role
- **guest**: Assigned to the fmGuest role

## Default Roles:

- **fmesuperuser**: *For users with unlimited access to the system*
- **fmisAdmin**: *For users who need to carry out specific administration tasks*
- **fmAuthor**: *For users who are authoring workspaces to run on FME Flow*
- **fmUser**: *For users who need to run (but not author) workspaces*
- **fmGuest**: *For temporary users who need a minimal set of permissions*

You can create any role necessary for your system, assign any specific security settings to it, and create any number of users assigned to that role.

# Administrator and FME Super User

---



The FME Flow Superuser shares duties and responsibilities with the FME Flow Admin, but has additional or elevated permissions for some features related to licensing and security, and to "backup and restore" processes.

For a medium-sized organization, there are one or few FME Flow Superusers.

It is not possible to map an Active Directory user account or security group to this role in the same manner as other roles. We will cover Active Directories in more detail later...

*By default installations come with the user **admin** (password "admin") that has this fmesuperuser role. This account allows you to get started setting up FME Flow after installation, but should be changed after you have configured the server for users.*

# Security Policies



Security policies can be applied to each Item, Role or User.

Also, permissions/access to features & functionality in the FME Flow web interface are managed by the Access, Create or Manage privileges.

Security

Users | Roles | Items

Edit User "admin"

Full Name: Administrator

Sharing Enabled:

Email: \*recommended

Assigned Security Roles (optional): fmadmin, fmesuperuser

Change Password

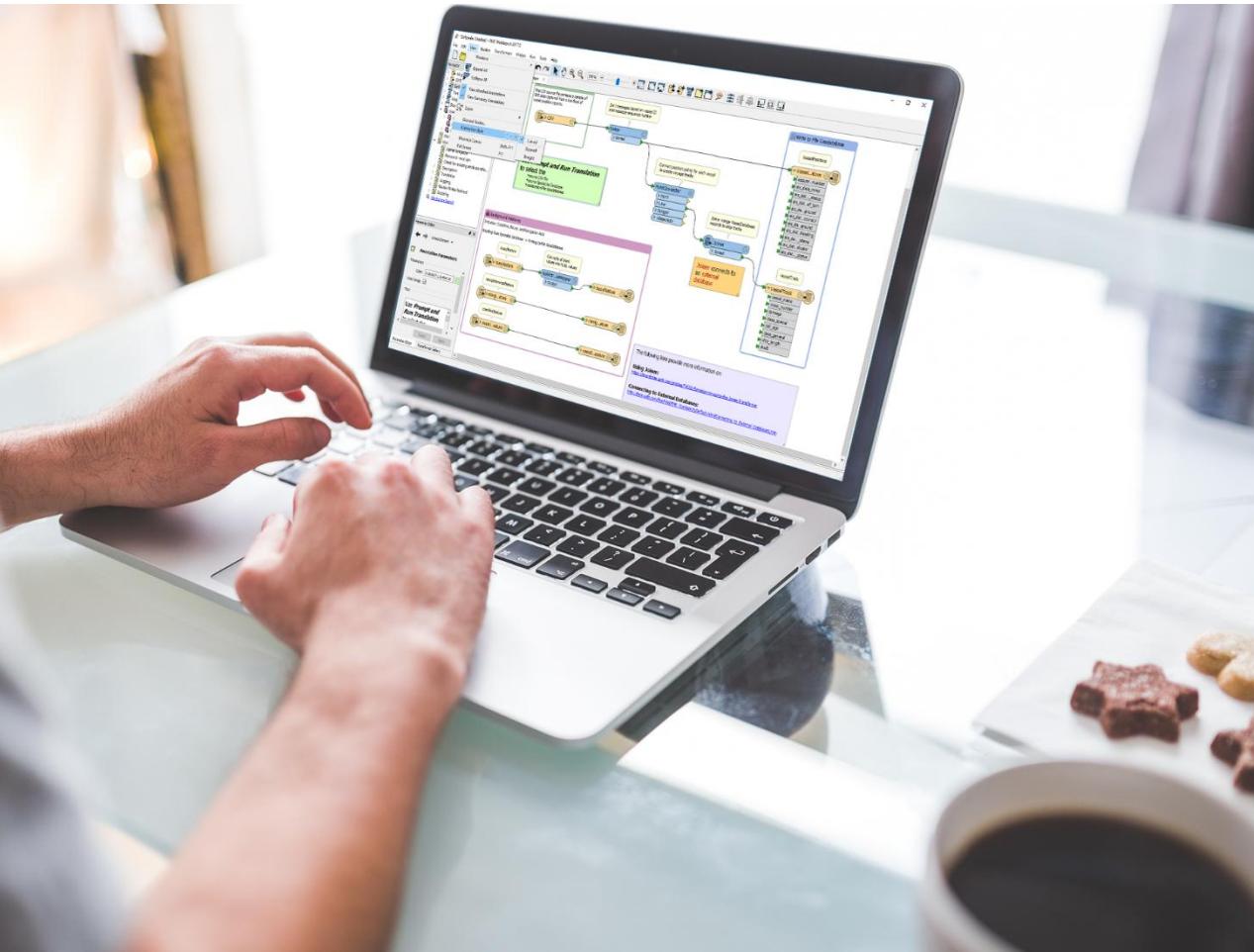
Permissions

Feature	Access	Create	Manage	Advanced
Run Workspace	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Jobs	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Automations	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Schedules	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Repositories	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Workspace Viewer	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Server Apps	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Publications	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Subscriptions	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Topics	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Resources	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Connections	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Projects	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Dashboards	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Engines & Licensing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Security	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
System Cleanup	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Metrics	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Services	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
System Events	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Packages	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Load Template

Cancel OK

# Exercise 4.1



## User Management & Permissions

Your company has recently hired a new analyst who will be accessing FME Flow. The new employee doesn't quite fit into the current FME Flow Roles you have in place so you need to create a new role for them.

**Goal** - Create a new user with limited privileges in the FME Flow web interface.

# Running Services without Authentication

---



A special account can be used to provide unauthenticated access to any component of FME Flow. This is referred to as the **trusted user account**.

By default, this trusted account is named **guest** and is assigned to the **fmeguest** role.

The fmeguest role is configured to allow unauthenticated access to the FME Flow Web Services.

This means it is possible to invoke a service URL without providing any credentials.

For example, a contractor running a workspace or uploading data.

# Password Management

---



## User Password Resets

Users can reset their own password provided that:

- Reset Password is enabled (see below).
- A 'System Email' account has been configured.
- The user has provided their correct email address associated with their account.
- The user is not an Active Directory User - if your FME Flow is configured for Active Directory, then the password will need resetting in the AD instead

## Password Policy

Password Policies can be configured to include:

- Minimum character limit.
- Must contain uppercase letter.
- Must contain lowercase letter.
- Must contain a digit or special character.

# Active Directory and Authentication

---



FME Flow users can be integrated with both Active Directory and Integrated Windows Authentication.

## Active Directory

- Connect to an existing AD / LDAP server and incorporate available users and groups.
- Passwords and membership will continue to be managed by the AD server.
- FME Flow roles can contain both System (FME Flow) and AD users.
- Connect to any number of Active Directory connections; these can be across multiple domains.

FME Flow only has read permission on any connected Active Directory listing

## Integrated Windows Authentication

- Enable the users imported from AD to integrate their Windows login credentials with FME Flow for “single sign-on”.
- There is no need to log in to the FME Flow web interface.
- No need to log in to FME Flow when using FME Workbench to publish a workspace.



# Token Management

## API Tokens

- API Tokens allow you to give access to FME Flow Apps and Workspaces without passing the username and password in the URL or headers of a request.
- These can be sent to other users or third-parties.
- Once created you can assign it permissions, enable, disable, duplicate or remove them from the Token Management page.

## Session Tokens

- A 30 minute Session Token is created each time a user logs into the Web Interface. This is automatically extended if the user stays logged in.
- The Token Management dashboard will detail which users have Active Session Tokens
- These can be enabled, disabled or removed. If you disable or remove the current Session Token you will be prompted to log in to FME Flow again.

# API Token Management



## Token Management ?



API Tokens Session Tokens

New Actions ▼ [edit icon]

<input type="checkbox"/> Name	Description	Created	Expiration	Enabled
<input type="checkbox"/> SharedWorkspace - austinApartments from Samples - 814c3c87-cbd8-f39d-aabd-2996e4af43f2	Allow users to run Samples/austinApartments without logging in	2019-5-22 09:10:00	2020-5-22 00:00:00	<span>✓</span>
<input type="checkbox"/> SharedWorkspace - BCPNP_notifications from Jen - c24278bd-51cb-0a94-a7ba-eacba05e7f0d	Allow users to run Jen/BCPNP_notifications without logging in	2019-5-13 15:26:57	2020-5-13 00:00:00	<span>✓</span>
<input type="checkbox"/> SharedWorkspace - wahwahwaah from Jen - 35dff9dd-0180-f0b4-8b9b-3ee2a8930846	Allow users to run Jen/wahwahwaah without logging in	2019-5-22 09:07:49	2020-5-22 00:00:00	<span>✓</span>

◀ ◀ 1 ▶ ▶ 20 ▾

Displaying 1 - 3 of 3

Expired Tokens >

# Session Token Management



## Token Management ⓘ



API Tokens | Session Tokens

Actions ▾



<input type="checkbox"/> Name	Description	Created	Expiration	Enabled
<input type="checkbox"/> Web Application Login - 93df4ce5-2e8b-4a11-8f52-42d70449cbb8	User Login	Yesterday at 13:01:02	Today at 17:40:27	

|◀ ◀ 1 ▶▶| / 1

20 ▼

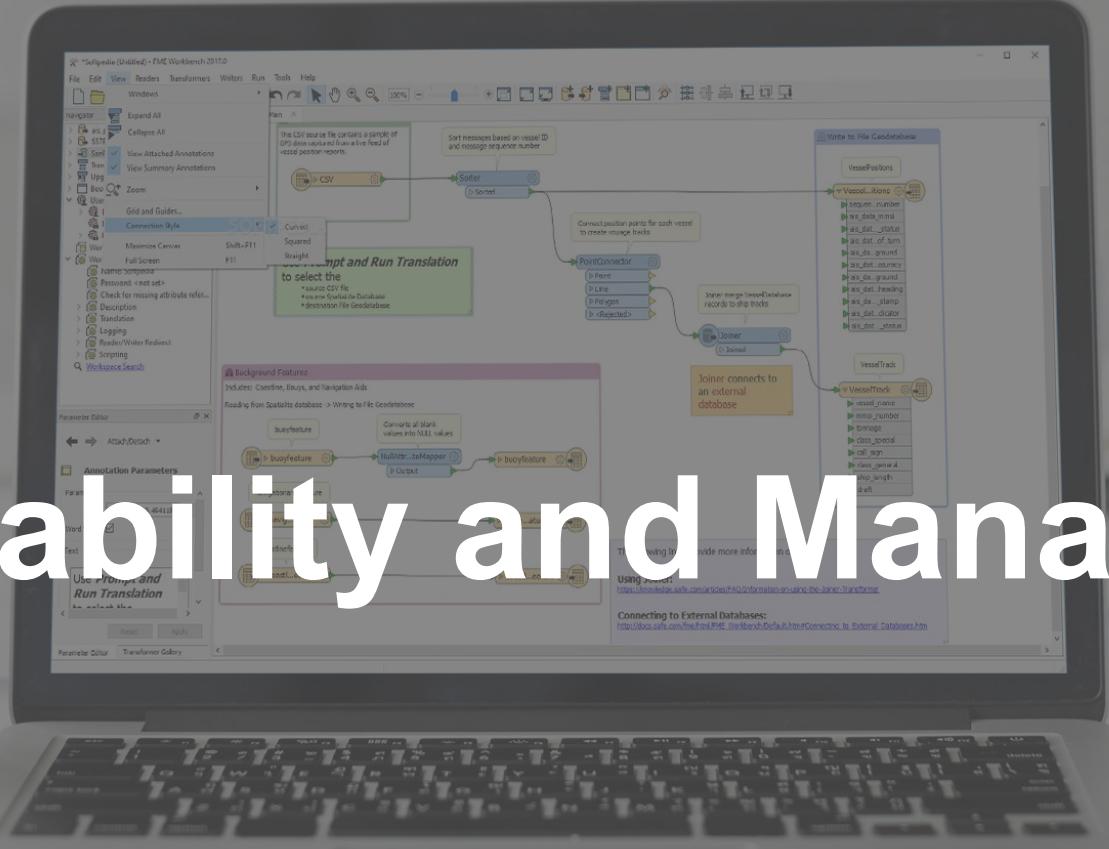
Displaying 1 - 1 of 1

Expired Tokens



# Job Scalability and Management

Connect. Transform. **Automate**



# Performance

---



## 1. Adding Engines to an Existing Engine Machine

- Allows more jobs to be processed simultaneously
- Engines can be added or removed almost immediately depending on the number allowed by the licence
- Engine size can be scaled up or down based on needs
- The number of engines should not exceed the number of CPU cores.

## 2. Managing Job Queues

- Jobs can be sent to specific engines based on the machine environment (third-party extensions and licences)
- Send jobs to FME Engines that are 'closer' to the data
- Reserve FME Engines for a scheduled task or quick jobs
- Reserve FME Engines for important or production critical jobs
- Assign priority to Job Queues

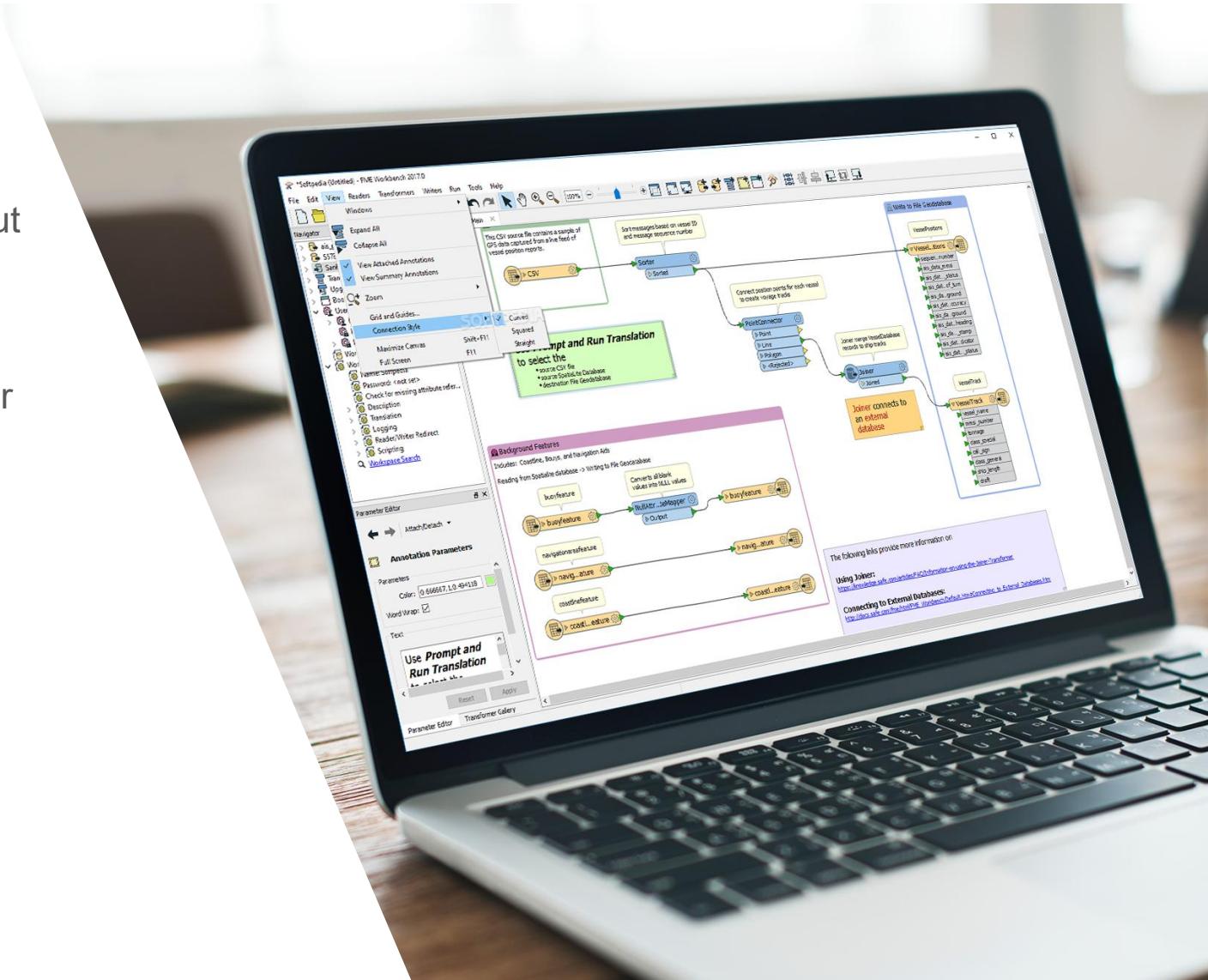
# Exercise 4.2



## Job Queues

Your GIS department is using FME Flow and carrying out jobs with the web interface. However, jobs are always being queued, even the quick translations. You are wondering if there is a way to set aside one of the FME Flow Engines for quick translations, so that you and your fellow technical analysts do not have to wait too long for your smaller jobs to complete.

**Goal** - Send a job through a specific FME Engine



# Remote Engines

---



**Remote Engines** Services allow you to use **Queues** to run jobs on separate, specialized installations of FME Flow that may be closer to your data

You can install Remote Engine Services and connect to them on servers that are part of your network, available outside your network on accessible endpoints, or in the Cloud, such as Azure Functions or Google Cloud Functions.

Remote Engine Services may be especially useful if you want to:

- run jobs on servers outside your network, while maintaining your primary FME Flow installation behind a firewall
- Spin-up/retire temporary VMs for specific projects

# Remote Engines



FME remote engines reduce latency, improve security, increase processing speed, and reduce cloud transfer costs.



## Reduce Latency

Minimises data transfer delays by running processes closer to the data source, improving real-time efficiency.



## Environment Agnostic

Works seamlessly across cloud, hybrid, and on-premises environments, offering maximum flexibility.



## Speed Up Processing

Accelerates data processing by reducing network bottlenecks and enhancing performance through localised execution.



## Reduce Transfer Costs

Cuts costs by avoiding unnecessary data movement between different environments, particularly with large datasets.



## Reduce Complexity

Simplifies workflows by processing data where it resides, eliminating the need for complicated data transfers.

# Remote Engines



## Deployment

The installation refers to fme-flow-remote-engine-\*.



### Compatibility Across Environments:

The remote engine supports all major environments, including on-premises deployments. Given its large installation size, the remote engine is designed to operate independently, without external dependencies once installed.

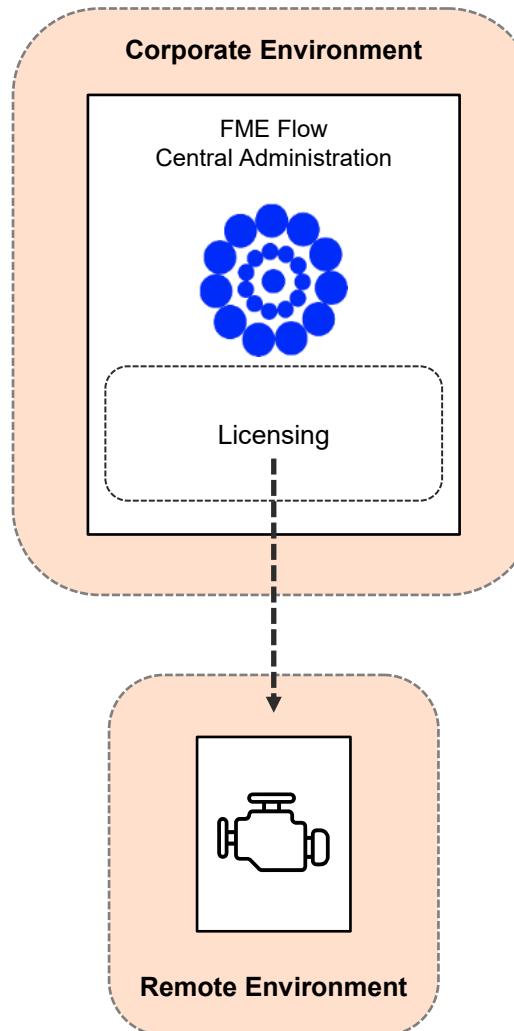


**Licensing:** The Remote Engine leverages existing licences tied to the primary FME Flow deployment. Alternatively, it can utilise CPU engines.



**Remote Installations:** All communication between the remote engine and FME Flow occurs over HTTPS. The engine also supports proxy configurations, making it adaptable to various network architectures and security policies.

Minimum Version Requirement: FME Flow 2023.0



## Centralised Queue Management

The remote engine is managed through the FME Flow Dashboard, allowing for centralised control. Management of tasks is done via queues and workspaces, enabling structured and prioritised job handling.



**Offline Capability:** Even when offline, the remote engine continues to function, and Flow will continue to queue jobs for the engine until connection is re-established.



**Standard Workspaces:** The remote engine supports the execution of standard workspaces, ensuring broad compatibility with typical FME workflows.



### Supports:

- Job Submitter Service
- Automations
- Workspace Apps
- Schedules

## Restrictions

The remote engine does not support the following:

- Data Download Service
- Data Streaming Service
- KML Network Link
- Notification Service
- Custom Formats
- Linked Transformers

# CPU Usage Engines

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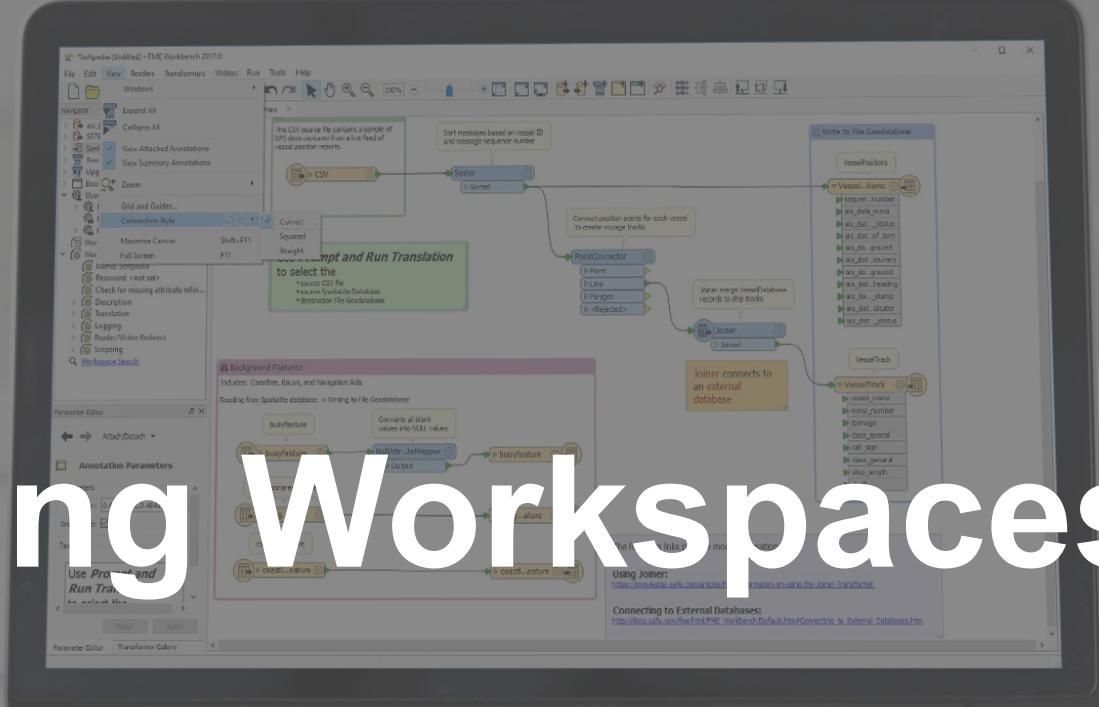
**CPU-Usage Engines** allow you to purchase “engine CPU time” as credits, where you only pay for the work that is done.

This is based on usage instead of number of engines, so you are able to launch as many or as few CPU-Usage Engines as you want.

Scenarios where CPU-Usage Engines could be useful:

- Helping to alleviate demand spikes from popular FME Flow Apps
- Supporting complex and mission-critical Enterprise Integration workflows
- As a cost-effective solution for low capacity or variable rate job streams
- Enabling data-driven parallel processing for tasks requiring 100's of engines
- To give extra capacity to handle peaks in data processing.

# Versioning Workspaces



Connect. Transform. **Automate**

# Workspace Versioning



- FME Flow installations are often used in both Production and Development environments.
- Workspace Versioning allows the user to access previous versions of repository files. This is controlled through the System Configuration page.
- Optionally, this can be connected to a remote Git repository, so users can access previous versions of files from all members of their team who commit to the same repository.

The screenshot shows the FME:Flow Admin interface. On the left, there is a dark sidebar with the following navigation items:

- Analytics
- User Management
- System Configuration (selected)
- Licensing
- Security
- Network & Email
- System Cleanup
- System Events
- Broadcast Messages
- Version Control

The main content area is titled "Version Control". It has a "Enabled" toggle switch which is turned on (blue). Below it is a section titled "Remote Settings (optional)" with two buttons: "Push To Remote" and "Fetch From Remote". There are two input fields: "Remote Repository URL" (with a placeholder "(optional)") and "Remote Token" (with a placeholder "\*\*\*"). A "Save" button is located at the bottom right of this section.

## Exercise 4.3



### Versioning a Workspace

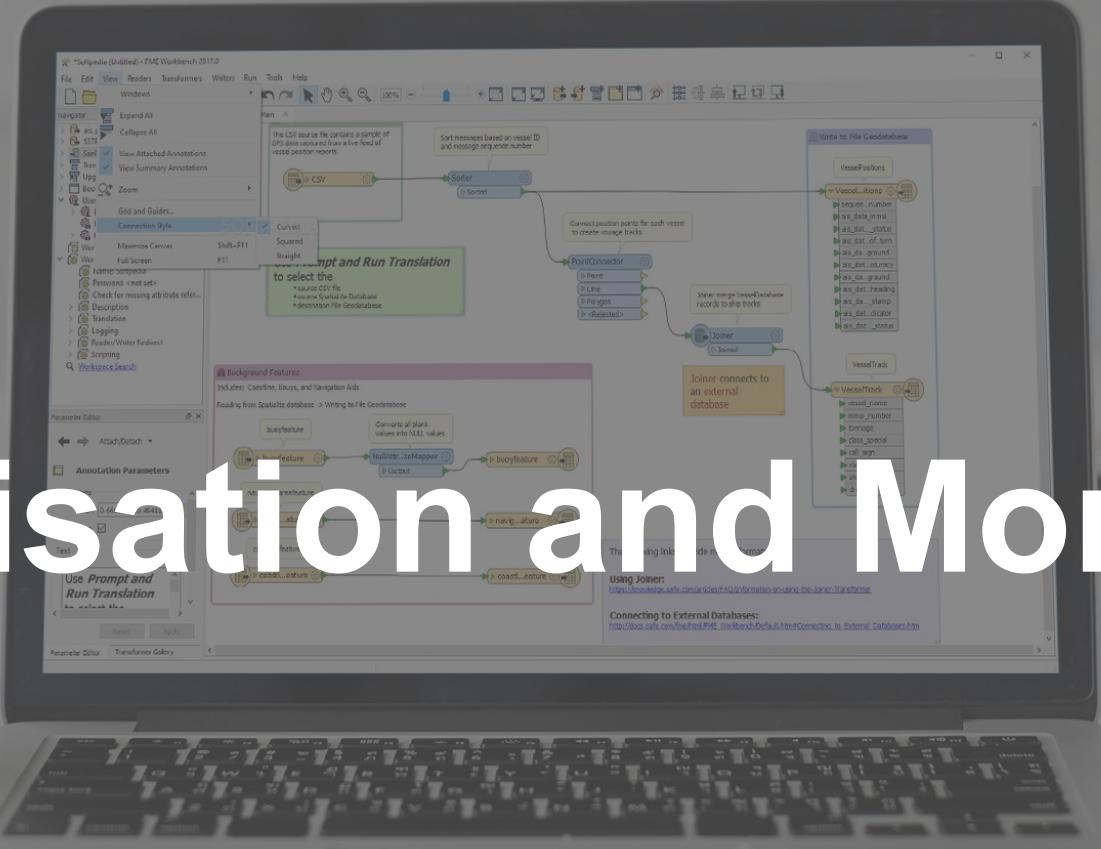
Your GIS department has two staff members that regularly author and make changes to their own workspaces and others when necessary. On a few occasions, changes were made to workspaces that caused a workspace to fail after the edit was made. The original working workspace was not backed up and was lost. This resulted in extra time to uncover the cause and restore the previous working workspace.

Your task is to enable Version Control and ensure it is functioning correctly.

**Goal - Version a Workspace.**

# Customisation and Monitoring

Connect. Transform. **Automate**



# Dashboards



The FME Flow Dashboards panel is used to display reports that show the general health of the FME Flow installation. There are 5 default reports that allow you to check the overall health of FME Flow:

FME Flow

- Run Workspace
- Automations
- Streams
- Flow Apps
- Schedules
- Jobs**
  - Completed
  - Queued
  - Running
  - Dashboards**
- Workspaces
- Projects
- Connections & Parameters
- Resources

Dashboard\*

AverageRunningTime

Average Run Time Per Workspace

Top 20 Longest Running Workspaces (Apr 10, 2025 - May 08, 2025)

Workspace	Average Run Time in Seconds
Housing Slo...EPC.map.fmw	10.5
Polygon Submitter.fmw	10.0
Customer_U...noemail.fmw	8.0
OpenWeather.fmw	4.0
austinApartments.fmw	3.0
backupConfiguration.fmw	3.0

Dashboard\*

AverageRunningTime

Search

AverageRunningTime

DailyAverageQueuedTime

DailyTotalJobs

DailyTotalRunningTime

FailuresByWorkspace

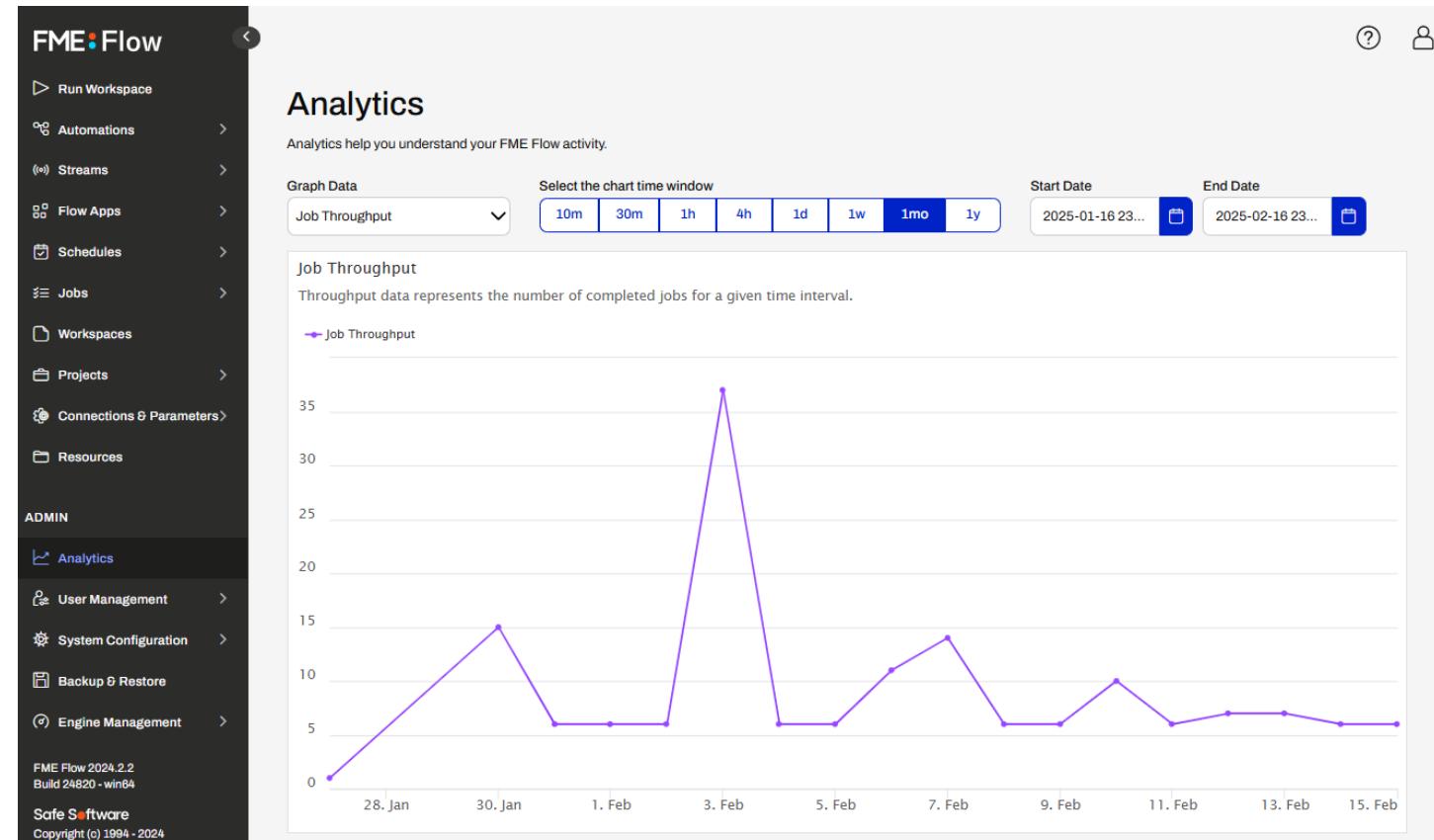
# Server Analytics



Analytics help you understand your FME Flow activity.

View the Jobs load on your FME Flow, within a specified time period, by:

- Job Throughput
- Queue Throughput
- Engine Throughput



This information can help you balance when and how to run jobs, particularly through Schedules and Automations, so that FME Flow operates more efficiently

# System Email



FME Flow can send reset password messages and send messages about significant events through System Events. This is done using a System Email account specified for these purposes.

System Email is configured under the menu item *System Configuration > Network & Email*.

The screenshot shows the FME Flow application's sidebar on the left and a configuration dialog on the right. The sidebar includes options like Run Workspace, Automations, Streams, Flow Apps, Schedules, Jobs, Workspaces, Projects, Connections & Parameters, Resources, and Admin sections for Analytics, User Management, System Configuration, Licensing, Security, and Network & Email. The Network & Email dialog is open, titled 'Network & Email'. It contains a 'System Email' section with 'Email Settings' and a 'Load Template' button. Below this are fields for 'SMTP Server\*', 'SMTP Server Port\*' (set to 25), 'SMTP Account', 'SMTP Password' (with a redacted value), and 'Connection Security\*' (set to SSL/TLS). An 'Email From\*' field is also present at the bottom.

# System Events



FME Flow is able to publish messages about significant events related to administrative tasks as a System Event:

- Database Web Connection create/update/delete
- Error or Warning in the fmeserver.log file
- FME Flow start up
- Login success/fail
- License expiry
- Project import/export
- Repository create/delete
- Repository item create/update/delete/download
- System backup/update
- User create/update/delete

## System Events

System Events allow you to control how FME Flow publishes messages about significant events on the server that are triggered by your users, such as when objects are created or a licensing issue is pending.

[History](#) | Configurations

Type

Choose a type

ID TYPE CONTENTS DATE

329	Repository Item Published	Repository/Item Name: WFS/generic-wfs-edit.fmwEvent Description: Triggered whenever an item is published to a repository. Performed By: adminRepository Action (Create/Publish/Download/Remove): SYSTEMEVENT_REPOSITORY_ITEM_CREATEEvent Title: Repository Item Published	Today at 12:19:31
328	Repository Item Published	Repository/Item Name: WFS/generic-wfs-edit.fmwEvent Description: Triggered whenever an item is published to a repository. Performed By: adminRepository Action (Create/Publish/Download/Remove): SYSTEMEVENT_REPOSITORY_ITEM_CREATEEvent Title: Repository Item Published	Today at 12:16:03

These events can be viewed in the History tab of System Configuration > System Events

# System Events as Emails



You have the option to send email notifications relating to these System Events.

Enabling email notifications will then allow you to configure:

- Who will receive the notification
- The email subject
- The email format (Text/HTML)
- The email body

The screenshot shows a 'Text Editor' interface with two main sections. On the left, a sidebar lists event details: General, Event ID, Event Time, Event Type, and a expanded section for 'System Event: Database Connection'. The expanded section includes fields for Connection Action (Add/Update/Re), Name, Type, Performed By, Event Title, and Event Description. On the right, the main content area contains an email template with placeholder variables. The template starts with 'Hi Administrator,' followed by '{source} occurred at {time}'. Below that is another line: 'The {databaseConnection.event} was performed by {user}'.

Text Editor

General

Event ID

Event Time

Event Type

System Event: Database Connection

Connection Action (Add/Update/Re)

Name

Type

Performed By

Event Title

Event Description

Hi Administrator,

{source} occurred at {time}.

The {databaseConnection.event} was performed by {user}.

# System Events as Triggers



System Events are also available to administrators as a Trigger in Automations.

This allows flexibility for configuring a response to System Events by connecting any of the available Actions to a System Event Trigger.

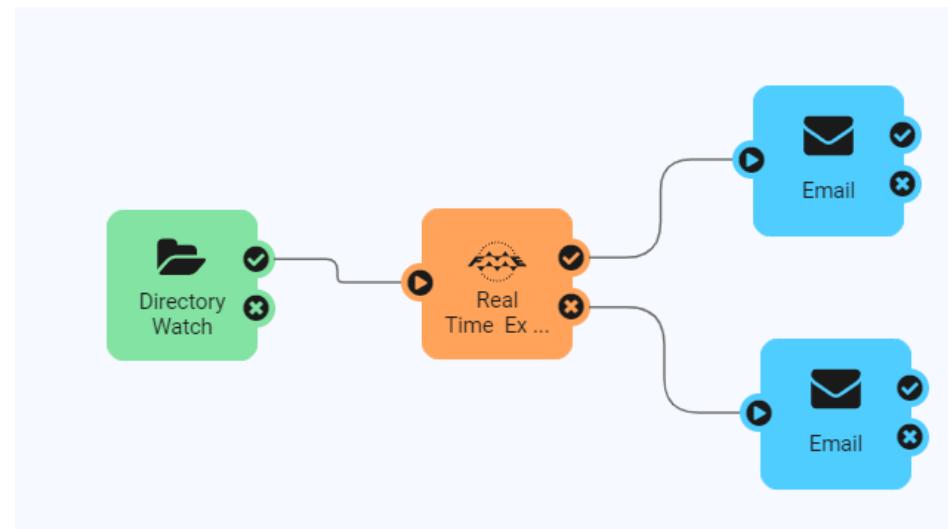
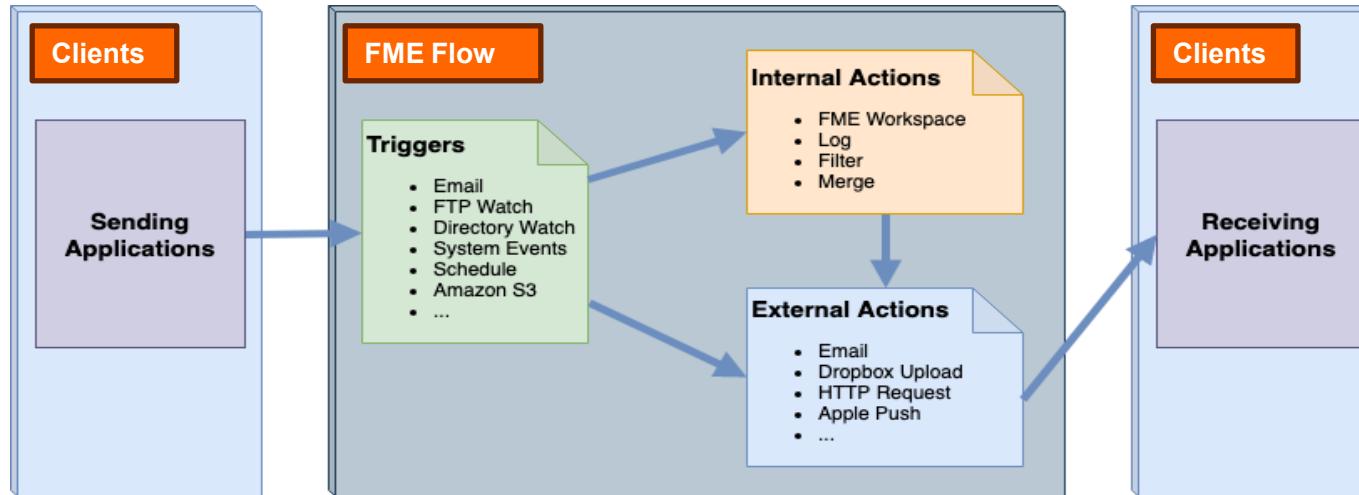
The screenshot shows a configuration dialog titled 'Trigger Details'. The 'Trigger' dropdown is set to 'System Event received'. Below it, there are two tabs: 'Parameters' and 'Output Keys', with 'Output Keys' currently selected. Under the 'Events' section, a dropdown menu is open, showing a list of system events. The event 'License Expiry' is highlighted with a green background and a checkmark icon, indicating it is selected. Other listed events include 'Database Connection Create', 'Database Connection Delete', 'Database Connection Update', 'Error Logs', and 'Failed Login'.

Event
License Expiry
Database Connection Create
Database Connection Delete
Database Connection Update
Error Logs
Failed Login

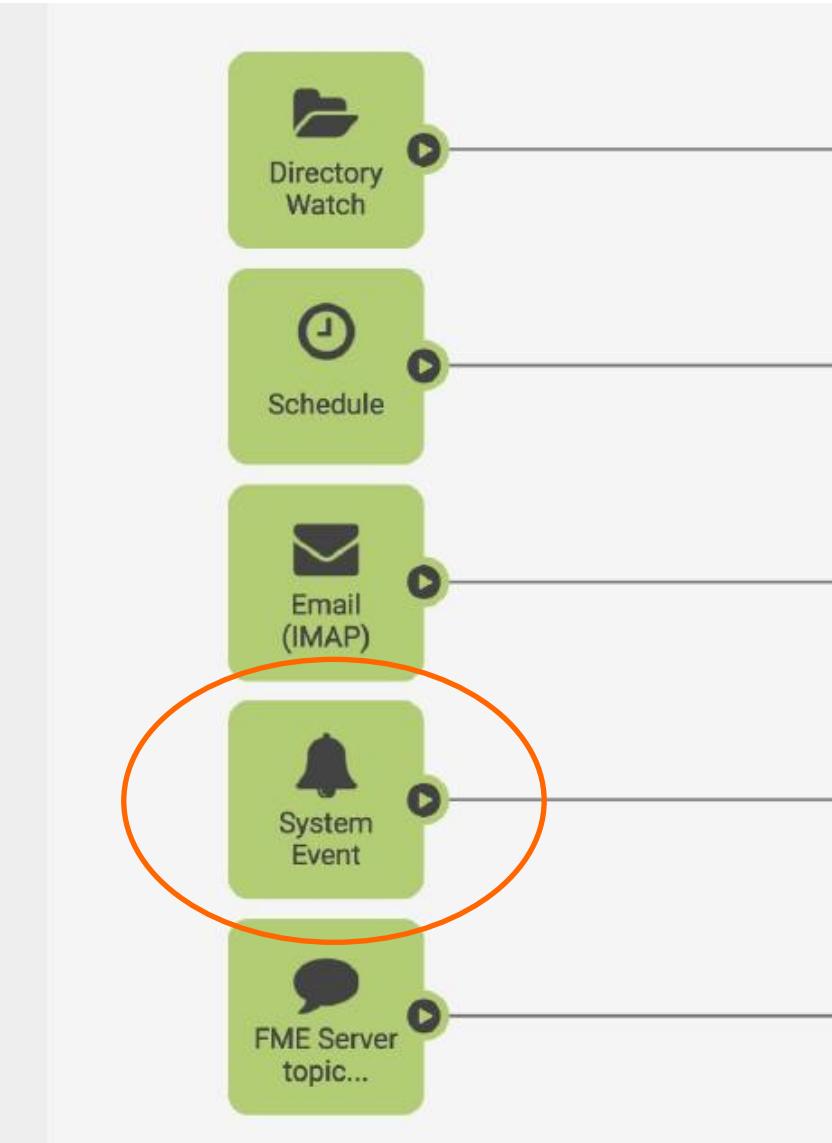
# Recap - What is an Automation?



Automations in FME Flow are made up of a variety of triggers and actions into a single workflow.



# Recap - What is an Automation?



# System Cleanup



When FME Flow is used heavily for a long period of time, a number of files can build up and use system resources. These files are either resource files (including multiple types of log files) or job history records.

Both of these are cleaned up automatically by FME Flow using tasks defined on the *System Cleanup* page of the FME Flow web interface.

The screenshot shows the FME Flow web interface with the 'System Cleanup' page selected. The left sidebar includes links for 'workspaces', 'Projects', 'Connections & Parameters', 'Resources', 'Analytics', 'User Management', 'System Configuration' (which is expanded), 'Licensing', 'Security', 'Network & Email', 'System Cleanup' (which is selected and highlighted in blue), 'System Events', 'Broadcast Messages', and 'Version Control'. The main content area has a title 'System Cleanup' and a subtitle 'Manage the cleanup of resource files and jobs.' Below this are three tabs: 'Tasks' (selected), 'Scheduled Cleanups', and 'Configuration'. A search bar and several action buttons ('Create', 'Duplicate', 'Remove', 'Enable', 'Disable', and a trash bin icon) are at the top of the table. The table lists five scheduled cleanup tasks:

	NAME ^	CATEGORY	SOURCE	MAX AGE	FILTER	ENABLED
<input type="checkbox"/>	Delete_Automation_Debug_Temp_Files	Utilities	\$(FME_SHAREDRESOURCE_SYSTEM)temp/automations	2 weeks	None	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Delete_Automation_Download_Logs	Utilities	\$(FME_SHAREDRESOURCE_LOG)core/current/automations	2 weeks	None	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Delete_Automation_Production_Logs	Utilities	\$(FME_SHAREDRESOURCE_LOG)automations/old	1 week	None	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Delete_Core_Logs	Utilities	\$(FME_SHAREDRESOURCE_LOG)core/old	1 week	None	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Delete_Broadcast_Records	Utilities	\$(FME_SHAREDRESOURCE_BROADCAST)core/old	31 days	None	<input checked="" type="checkbox"/>

# System Cleanup – Delete Old Back-UP files



An example of a new System Cleanup task that you may want to create, is to delete old BackUp files.

BackUp files created by a Schedule will build up over time, unless you actively choose to delete old ones.

## System Cleanup

Manage the cleanup of resource files and jobs.

Tasks | Scheduled Cleanups | Configuration

<input type="checkbox"/>	Name ^	Category	Source	Max Age	Filter	Enabled
<input checked="" type="checkbox"/>	_Delete_Old_BackUp_files	Utilities	\$(FME_SHAREDRESOURCE_BACKUP)/	3 weeks	None	
<input type="checkbox"/>	Delete_Automation_Debug_Temp_Files	Utilities	\$(FME_SHAREDRESOURCE_SYSTEM)temp/automations	2 weeks	None	
<input type="checkbox"/>	Delete_Automation_Download_Logs	Utilities	\$(FME_SHAREDRESOURCE_LOG)core/current/automations	2 weeks	None	
<input type="checkbox"/>	Delete_Automation_Production_Logs	Utilities	\$(FME_SHAREDRESOURCE_LOG)automations/old	1 week	None	

Search  Create Duplicate Remove Enable Disable

## System Cleanup

Manage the cleanup of resource files and jobs.

Tasks | Scheduled Cleanups | Configuration

System Cleanup > New Cleanup Task

### Create New Cleanup Task

#### Task Details

Name\*

Category\*

Description

Source Folder\*

Enabled

#### Filter Settings

Filter Type\*

Pattern\*  Specify a file name-ending string to include or exclude from the task.

Remove Files Older Than\*  Weeks

# Custom Formats for Workspaces

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Workspaces that are run from FME Flow can use custom formats, custom transformers, and custom coordinate systems, in the same way that FME Workbench does.

The most common ones are:

- **Custom Coordinate Systems** – these can be uploaded to the Resources folder along with the workspace to make them available to all users.
- **Python Interpreter and Modules** - the interpreter is determined by the setting of the Python Compatibility parameter which is set within FME Form. This will be published along with the workspace but also needs to be installed on the machine housing FME Flow.
- **R** – Workspaces containing R scripts can only run on an FME Engine machine that already has R installed along with the sqldf package for R.

# Shared Resources

---



The Resources page is a convenient way to store and access the following:

- FME Flow backup files.
- HTML reports generated for Dashboards.
- Data files that can be shared between different workspaces, regardless of the repository.
- FME Engine Resources, including custom formats, custom transformers, custom coordinate systems, and custom Java and Python modules.
- FME Flow and database log files.
- Connections to your own network resources and Amazon Web Services (AWS) S3 buckets.
- Temporary files created by FME Flow.

Access to resources can be controlled on both a *user* and *role* level through the Resources Dashboard.

# Database & Web Connections



Many workspaces that are run from FME Flow require you to connect to and authenticate a database service or web connection. FME Flow allows you to store these authentication parameters as self-contained objects. This means you can reference the connection name, rather than re-entering the connection parameters.

The connections can be created manually or uploaded along with a workspace.

Run Workspace

Training/DatabaseConnection\_TestConnection

Repository: Training

Workspace: DatabaseConnection\_TestConnection.fmw

Service: Job Submitter

Email results to:

Published Parameters

Connection: Training

Reset

Database Connections > Training

Editing "Training"

Type: PostgreSQL

Host: postgis.train.safe.com

Port: 5432

Database: fmedata

Username: fmedata

Password (optional):  •••

Cancel OK

# Database & Web Connections



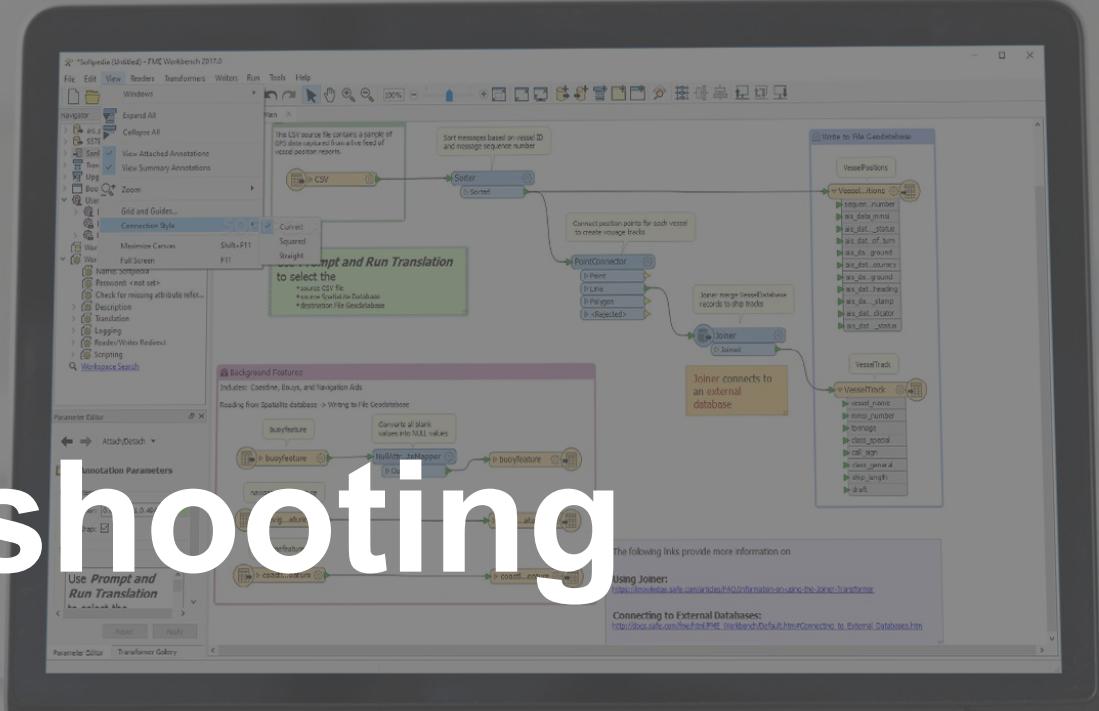
## Database Connections



New   Duplicate   Remove

Search			
<input type="checkbox"/>	Name	Database Type	Owner
<input type="checkbox"/>	Training	PostgreSQL	admin
<input type="checkbox"/>	1	/1	Displaying 1 - 1 of 1

# Troubleshooting



*Connect. Transform. Automate*

# Initial Troubleshooting

---



Common initial troubleshooting steps that an administrator may try:

- Check the failed Job and workspace – *check Job Log*
- Look for Orphan Processes – such as when chaining parent/child process ends or crashes/hangs.
- Restart FME Flow – make sure that all Services and engines are running
- Check FME Flow Log files (*see next slide*)
- Verify connections between components – check firewall and port settings
- Revert and changes – check if there have been any recent updates, changes to configuration files or added hardware. Reverting the system may resolve these issues

The FME Community has a series of FME Flow Troubleshooting Guides designed to make it easier for administrators to get their FME Flow up-and-running again.

# FME Flow Log Files



The Log files are a good place to look first, and any error messages can be searched on the FME Community.

FME Flow Logs are split into 4 folders – which can be accessed via either the FME Flow Web Interface, or File Explorer on the host machine:

**Core** - This contains logs about the core functionality and configurations of FME Flow. It also contains logs for the Publishers, Subscribers and tasks (migration).

**Engine** - Contains job logs, as well as logs for every engine. If a workspace fails, check here.

**Queue** - Contains a log file relating to the FME Flow queue.

**Service** - Contains log files relating to FME Flow services.

**Tomcat** - Contains log files generated by the FME Web Application Server (Tomcat).

Resources

Resources store important files for running FME Flow

Resources > Logs

Search

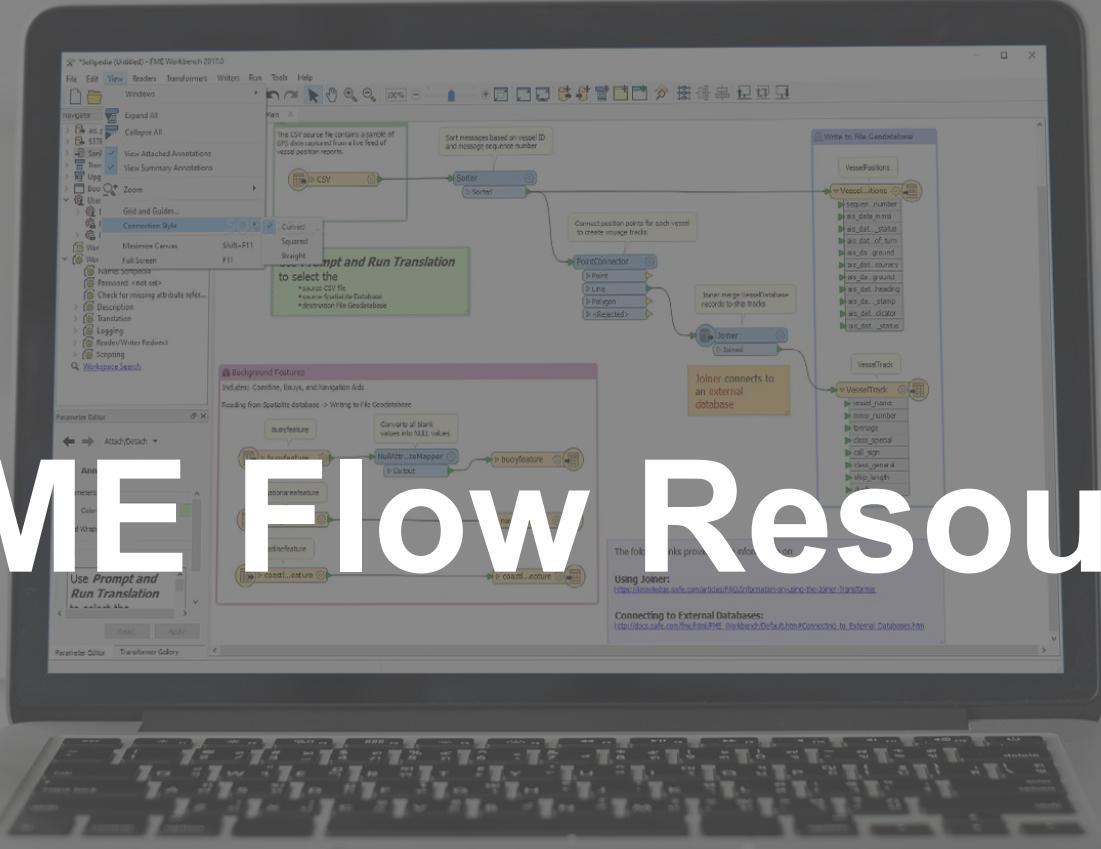
NAME
automations
core
engine
queue
service
tomcat

OS (C:) > ProgramData > Safe Software > FMEFlow > resources > logs

Name
automations
core
engine
queue
service
tomcat

# Other FME Flow Resources

Connect. Transform. **Automate**





**FME:Flow**    **FME Flow REST API V3**     **Get Token**

[Overview](#)    [API](#)    [Migrating From REST API V2](#)    [Published Parameter Data Model](#)    [FME Flow Documentation](#)    [Other Resources](#)

## FME Flow REST API V3

FME Flow REST API V3 is our stable REST API.

### What is a REST API?

REST APIs allow you to interact with a server or another node on a web network using the simplicity of the HTTP protocol. The REST concept is not a standard, but rather a set of guidelines that promote simple, easy-to-use web APIs.

The guidelines include using:

- HTTP URLs to identify resources (for example, `http://example.com/software/fme`); and
- HTTP methods (DELETE, GET, POST, PUT) to perform actions on resources.

The main difference between a REST API and a CGI or SOAP API are the simple, native HTTP methods for identifying resources and performing actions on them. In contrast, CGI and SOAP APIs reinvent these two key pieces, which adds complexity to implementation and usage. With a REST API, all you need to perform an action is a tool that can send an HTTP request, such as a web browser, JavaScript, all modern programming languages, and FME Transformers.

# What can you do with the FME Flow REST API

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The FME Flow REST API provides methods to control a range of FME Flow functionality, including:

- Sending, receiving and modifying notifications
- Running jobs and viewing job history
- Managing user accounts, roles, and policies
- Licensing FME Flow
- Performing backup and restore operations
- Managing cleanup tasks
- Scheduling jobs
- Managing user settings and favorites
- Uploading and managing file resources
- Publishing workspaces and managing published parameters

# FME Flow REST API



**FME:Flow** FME Flow REST API V3

Enter API Token  Get Token

Published Parameter Data Model FME Flow Documentation Other Resources

Overview API Migrating From REST API V2

automations : Automation Manager	Show/Hide   List Operations   Expand Operations
cleanup : Cleanup Manager	Show/Hide   List Operations   Expand Operations
healthcheck : Health check on FME Flow	Show/Hide   List Operations   Expand Operations
info : Information about FME Flow	Show/Hide   List Operations   Expand Operations
licensing : FME Flow Licensing	Show/Hide   List Operations   Expand Operations
metrics : Metrics Manager	Show/Hide   List Operations   Expand Operations
migration : Backup and Restore FME Flow Configuration	Show/Hide   List Operations   Expand Operations
notifications : Notification Manager	Show/Hide   List Operations   Expand Operations
projects : Projects Manager	Show/Hide   List Operations   Expand Operations
repositories : Repository Manager	Show/Hide   List Operations   Expand Operations
resources : Resource Manager	Show/Hide   List Operations   Expand Operations
schedules : Task Scheduling Manager	Show/Hide   List Operations   Expand Operations
security : FME Flow Security	Show/Hide   List Operations   Expand Operations
systemevents : System Events Manager	Show/Hide   List Operations   Expand Operations
tokens : Token Manager	Show/Hide   List Operations   Expand Operations
transformations : Transformation Manager	Show/Hide   List Operations   Expand Operations
user : User Settings	Show/Hide   List Operations   Expand Operations

## automations : Automation Manager

Show/Hide | List Operations | Expand Operations

## cleanup : Cleanup Manager

Show/Hide | List Operations | Expand Operations

**GET** /cleanup/configuration

Get cleanup configuration

**PUT** /cleanup/configuration

Update cleanup configuration

**POST** /cleanup/configuration/reset

Reset cleanup configuration

**GET** /cleanup/tasks

List cleanup tasks

**GET** /cleanup/tasks/automationLogs

List automation logs cleanup tasks

**GET** /cleanup/tasks/clientsessions

List client session cleanup tasks

**DELETE** /cleanup/tasks/details/{category}/{name}

Remove cleanup task

**GET** /cleanup/tasks/details/{category}/{name}

Cleanup task details

**PUT** /cleanup/tasks/details/{category}/{name}

Update task details

**PUT** /cleanup/tasks/details/{category}/{name}/enabled

Enable/disable cleanup task

**GET** /cleanup/tasks/files

List file system cleanup tasks

**POST** /cleanup/tasks/files/

Create file cleanup task

**GET** /cleanup/tasks/jobs

List job history cleanup tasks

**GET** /cleanup/tasks/systemEvent

List system event cleanup tasks

**GET** /cleanup/tasks/tokens

List token cleanup tasks

## healthcheck : Health check on FME Flow

Show/Hide | List Operations | Expand Operations

# FME Flow Demos



Safe Software have a selection of interactive demos to explore:

<https://fme.safe.com/demos/>

The screenshot shows the 'Interactive Demos' section of the FME website. At the top, there's a navigation bar with links for 'Platforms', 'FME in Action', 'Pricing', 'Partners', 'Security', 'FME Resources', and a 'Get Started' button. Below the navigation, a main heading reads 'Interactive demos to help you learn and unlock FME's full potential.' A subtext below it says, 'Explore the demos below to learn how FME can help power your organization's data. Use the sample files and tutorials to build and implement real-world solutions that work for you.' To the right, there's a dark background with abstract white shapes. In the center, a call-to-action text says 'Make your data do more: explore our interactive FME demos.' Below this, there are two rows of three demo cards each. Each card has a thumbnail image, a title, and a circular arrow icon.

Thumbnail	Title	Icon
	Data Converter	↗
	Data Validation Reporting	↗
	Indoor Mapping with Augmented Reality	↗
	Map Based Data Distribution (FME Server Apps)	↗
	Real-Time Situational Awareness (Flood Monitoring)	↗
	Video Georeferencing	↗
	Visualizations in Cesium	↗

# Resources

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Community pages and  
forums



Knowledge Base



Each Other

A blurred background image of a person in a light blue shirt speaking into a black microphone at a podium. A white wristwatch is visible on their left wrist. In the foreground, a wooden desk holds a laptop, a water bottle, and two paper cups.

# Good luck with FME