



FME[®] Server Training Manual

FME Server 2014-SP1 Edition



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Data Sources

City of Vancouver

Unless otherwise stated, the data used here originates from open data made available by the City of Vancouver, British Columbia (data.vancouver.ca). It contains information licensed under the Open Government License - Vancouver.

Others

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Digital Elevation Model: GeoBase®

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Revisions

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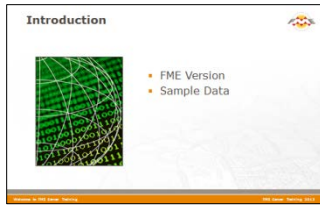
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Introduction



This document is the training manual for FME Server 2014

FME Version

This training material is designed specifically for use with FME2014. You may not have some of the functionality described if you use an older version of FME.

Sample Data

This sample data required for the exercises in this document can be obtained from:

www.safe.com/fmedata

Course Details



This is the workspace authoring training course for Safe Software's FME Server application.

Course Structure

This training material covers solely how to create FME translation models for use on FME Server.

It is comprised of the following sections:

1. Introduction to FME Server
2. Running Workspaces on FME Server
3. Self-Serve with FME Server
4. Real-Time with FME Server
5. Automation with FME Server

The content may be spread over several days, or your instructor may choose particular sections to be covered.

Training Philosophy

This training provides a framework for authoring workspaces for FME Server. We hope that you will learn all the tools upon which to base your work, and go home with many new FME ideas!

The training will introduce basic concepts and terminology, help you become an efficient FME Server user, and direct you to resources to help apply the product to your own needs.

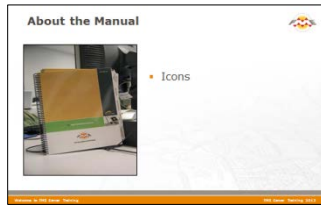
Prerequisites

This training material is intended for persons with some prior experience of using FME Workbench. The content assumes a basic familiarity with the concepts and practices covered of FME Desktop; at least to the extent covered by the FME Desktop Tutorial.

In particular it would be helpful to be familiar with:

- Parameters and published parameters
- Managing Readers, Writers and feature types in a workspace
- Using transformers similar in complexity to the Clipper and Joiner

About the Manual



The FME Server training manual is yours to keep. It includes detailed material to help you remember your training.

During training we suggest you pay close attention to your instructor; they may cover the course content in a different order than the manuals, and will skip or add new content to better customize the course to your needs.

You'll find most of the instructor's PowerPoint slides reproduced in your manuals, as above. This will help you relate the manual content to the topic the instructor is discussing.

Icons

In the training manual you may see the following icons...



Tip: Additional advice to help apply the knowledge you have learned.

Caution: A warning where misuse of FME could lead to difficulties.



Exercise: An exercise that the instructor will use to demonstrate a particular point or feature of FME. You may work through the exercise with the instructor or on your own.

Advanced Exercise: Extra challenges for students who are quick to finish and want to take an exercise a little bit further.



New: A feature new to, or significantly changed in, the most recent version of FME.

Q&A: Questions about the course content and how it is applied.



Important hints and tips appear in a box like this, to separate them from ordinary content.

Troubleshooting

Each chapter has a short appendix with troubleshooting suggestions; general hints to follow in case FME Server causes problems for you.

Course Resources



A number of sample datasets and workspaces will be used in this course.

On Your Training Computer

The following applications may already be installed, licensed, and located on your training computer (real or virtual):

- Java Virtual Machine
- Apache Tomcat
- FME Desktop Version 2014
- FME Server Version 2014
- FLEXlm License Manager

A collection of sample datasets and workspaces are available in **C:\FMEData2014**

The data used in this training course is based on open data from the City of Vancouver, Canada.

Most exercises ask you to assume the role of an analyst at an air photo reseller and to solve a particular problem using this data.

Throughout the manual people from the city of Interopolis pop up to give you advice and to dispense FME-related wisdom.



Amenities

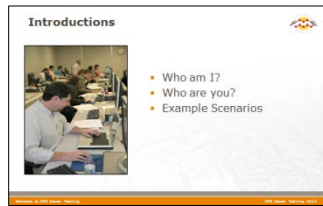
For in-person training, your instructor will explain the facilities and amenities available to you during the course.



Please respect other students' needs by keeping noise to a minimum when using a mobile phone or checking e-mail.



Introductions



Welcome to this FME Server training course.

Who Am I?

This is your instructor's chance to introduce her or himself.

Who Are You?

This is your chance to introduce yourself, and tell us about the following:

- Your organization
- Your planned use of FME Server

Introduction to FME Server

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What is FME Server?



FME Server is a powerful product for handling large volumes of data at the enterprise level.

FME Server Summarized

FME Server is a powerful product for handling large volumes of data at the enterprise level. It has three core capabilities: Self-Serve, Real-Time, and Automation.

Self-Serve

Self-Serve is the ability for the end-user to select and download the data they require, in the format and structure they require; or to upload data for validation. It eliminates the need for a data manager/analyst to carry out manual data distribution tasks.

Real-Time

Real-Time is the ability to react to real-time events and sensors, to carry out immediate updates, and to deliver instant notifications. It allows subscribers to have the most up-to-date information for their business decision making.

Automation

Automation is the ability to carry out data processing at a specific schedule, and to spontaneously move data through different systems and web services – even onto mobile platforms and devices. It allows data to move from anywhere, to anywhere, without manual intervention.

FME Server vs FME Desktop

FME Server expands on the local processing tools of FME Desktop by providing the same core data translations and transformations, but at an enterprise level, and with the above enterprise-level capabilities.

With these capabilities, FME Server can take advantage of a huge variety of different communication technologies. This means it can provide many different ways to:

- Start a workspace
- Structure a translation
- Deliver the output

FME Server does not include an authoring tool, so FME Desktop is used to create these workspaces.

The focus of this course is how to create these workspaces in ways that will take full advantage of FME Server's enterprise capabilities.



FME Server Roles



Different roles have different interests in FME Server

When using a product with the range and scope of FME Server, it's no surprise that there are a number of different roles available to different users.

Author

An author is someone who creates translations (workspaces) using FME Desktop and publishes them to FME Server for use by end-users. This particular role is the focus of these training materials.



Typically an author would work at the analyst level, and would be an experienced FME Desktop user with a good understanding of Readers, Writers, transformers, and other FME Workbench functionality.

User

A user is defined as a person who accesses data using an FME Server Service.

It is not expected that a user in this sense has, or needs to have, any experience of FME and does not even need to be aware of FME Desktop or FME Server.



The user might be someone like a CAD operator checking out spatial data, a business manager looking at corporate data in an FME Server client, or members of the public who want to download data for personal use.

Developer

FME Server can be used as the back-end to power other software applications.

A developer (in FME Server terms) is someone who creates applications that submit jobs to FME Server and then handle the results. This role is somewhat covered by these training materials.



Web developers may choose to include FME Server Services within their own web applications or create their own services using the FME Server API.

Administrator

An FME Server administrator is the person responsible for installing and maintaining FME Server and its related services.



The administrator's tasks include:

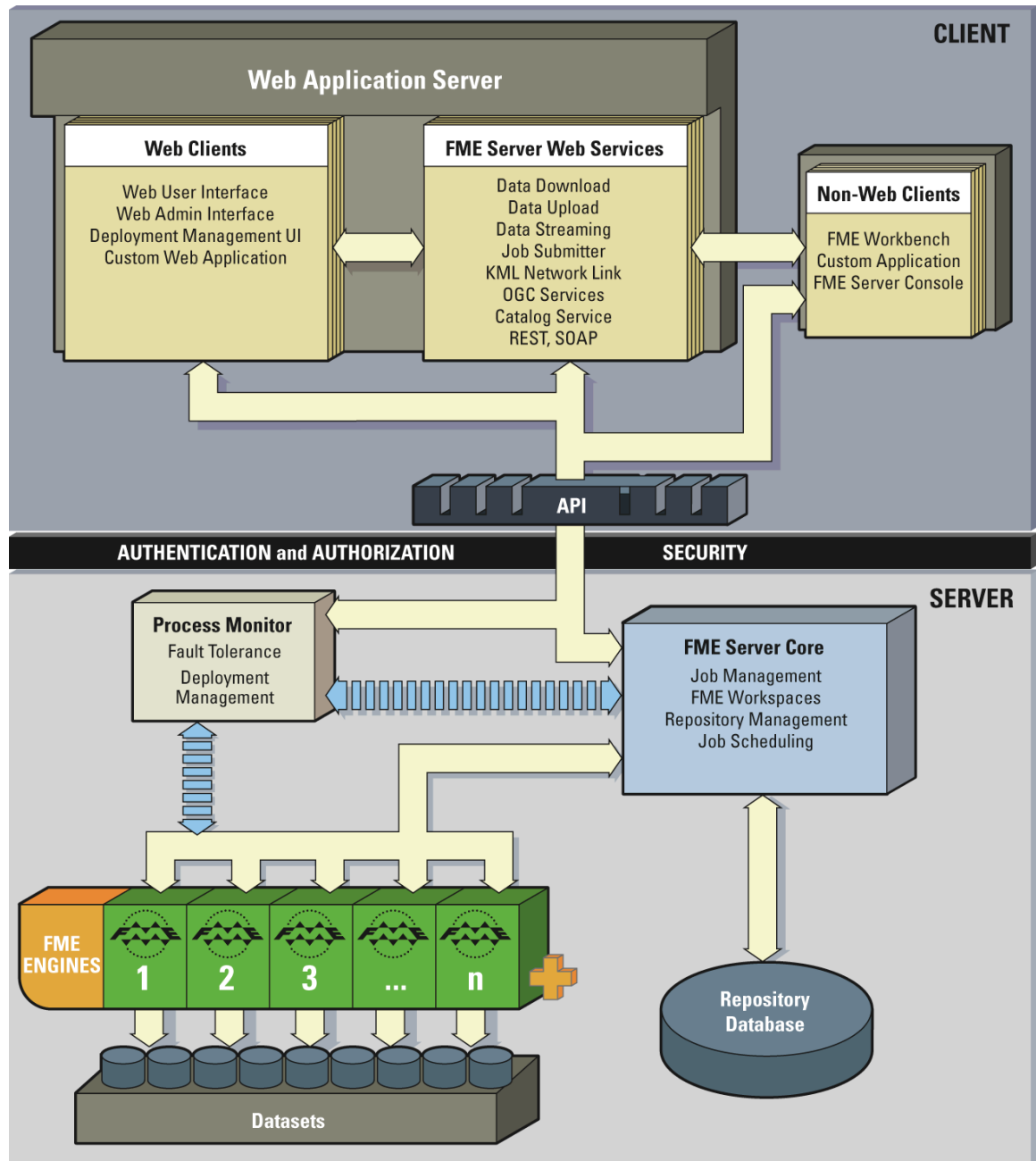
- Planning system architecture
- Installing prerequisite applications
- Installing and licensing FME Server
- Setting up FME Server services
- Monitoring FME Server services
- Troubleshooting
- Scaling FME Server

FME Server Architecture



FME Server consists of a number of different components.

The architecture of FME Server looks something like this:



FME SERVER ARCHITECTURE

FME Server Components

Don't worry about trying to understand the whole structure, just be aware of the main components of FME Server:

- **FME Engines:** To carry out data transformation processing
- **Server Core:** To queue jobs, handle scheduling, and manage load balancing
- **Web Services:** To handle networking capabilities

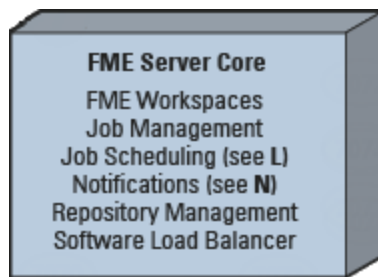
FME Engines

FME Engines process job requests by running FME Workspaces. This is the same core engine, carrying out the same processing, that is used by FME Desktop.



Each FME Engine processes a single request at a time.

FME Server processing can be scaled by adding FME Engines to the same computer or to separate computers within a distributed FME Server environment.



Server Core

The FME Server Core manages and distributes job requests (queuing, request routing, scheduling), the repository contents (workspaces, custom formats, custom transformers, data), and notification requests.

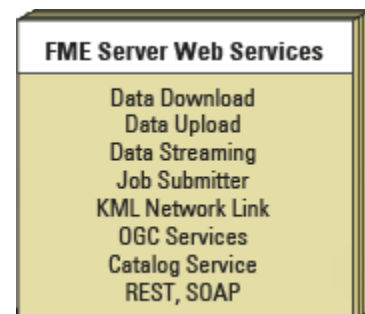
The FME Server Core contains a Software Load Balancer (SLB) that distributes jobs to FME Engines.

Web Services

Much of the FME Server networking capabilities are handled using what we call "Services". Services are software whose interface provides communication between server and clients.

FME Server has a number of services:

- Data Download
- Data Upload
- Data Streaming
- Job Submitter
- KML Network Link
- OGC Services (WFS and WMS)
- Catalog
- Token Security
- SOAP
- REST
- Notification



Some services (for example, Data Download) are "transformation" services that carry out data transformation, whereas others (for example, Catalog) are non-transforming "helper" services.

Deploying FME Server



FME Server can be deployed in a number of configurations

Platforms

FME Server can be deployed on a variety of platforms:

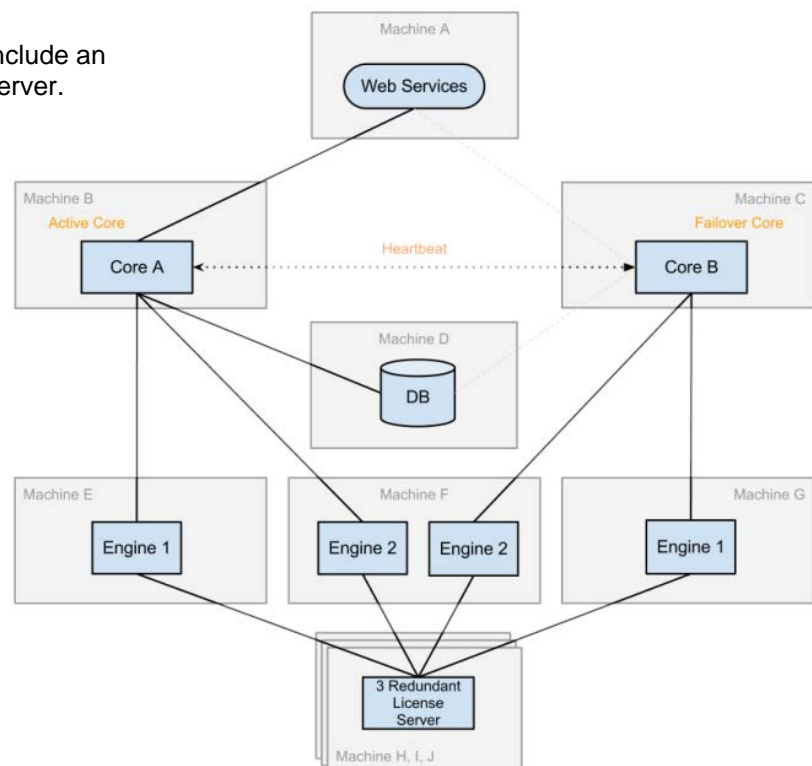
- Local Infrastructure (Physical Hardware)**
 This is the traditional platform where you purchase FME Server and install it on your own hardware systems.
- Infrastructure as a Service (Virtual Hardware)**
 This is where you purchase FME Server and install it on virtual hardware that is provided as service by a company such as Amazon.
- Platform as a Service (FME Cloud)**
 This is where FME Server is delivered pre-installed on an Amazon virtual computer, with the whole platform provided by Safe Software on a pay-as-you-go basis.

Distributed Systems

A distributed system is when different components of a system are located on separate, networked, computers.

In a distributed environment, FME Engines run on a computer or computers that are separate from the FME Server host. Administrators can configure the FME Engines to register with a failover FME Server host, which acts as a backup if the primary FME Server host fails.

Other failover mechanisms include an additional core and license server.





Exercise 1a: Exploring the Web User Interface	
Scenario	FME Server author, administrator, or end-user
Data	N/A
Overall Goal	Explore the FME Server web user interface
Demonstrates	Using the FME Server web user interface
Starting Workspace	None
Finished Workspace	None

Follow these steps to log into the FME Server web user interface and examine the available functionality.

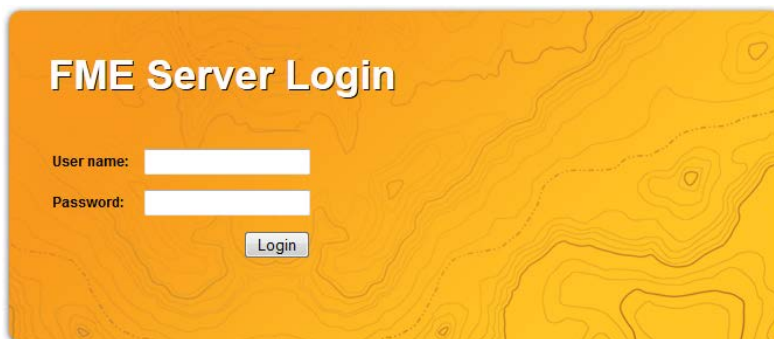
1) Connect to Server

In your web browser, enter the address to your FME Server.

When FME Server is installed on either physical or virtual hardware, the address is `http://<servername>/fmeserver`

If you are using FME Cloud, then the address is: `http://<server name>.fmecloud.com/fmeserver`

This will open the web user interface login screen for the FME Server being used. Bookmark this web address, since you will use this link quite often.

The image shows the FME Server Login web interface. It has an orange background with a topographic map pattern. The title "FME Server Login" is at the top left. Below it are two input fields: "User name:" and "Password:". A "Login" button is positioned below the password field.

2) Log In to Server

In the User Login dialog, enter a username and password for your FME Server account. A common username/password combination for a training installation is admin/admin

Click the Login button.

3) Examine User Interface.

Examine the user interface. This is your primary method for interacting with FME Server. Notice that the bottom-left corner shows which version and build of FME Server is being used by this instance:

Host: localhost
Port: 7071
FME Server 2014 - Build
14174 - linux-x84

FME © Server © 1994 -
2013
Safe Software Inc.

Engines

Engine1 (Build 14174) is running on host ip-10-73-189-162

Engine2 (Build 14174) is running on host ip-10-73-189-162

Engine3 (Build 14174) is running on host ip-10-73-189-162

Engine4 (Build 14174) is running on host ip-10-73-189-162

Also notice a section of the interface that shows how many engines are running:

4) Examine Repositories

Let's look first at the system's repositories. Check the list of items on the left-hand menu (this list will vary depending on what permissions you have) and click the link labelled Repositories.






This will open a page that shows a list of the available FME Server repositories. A repository is a method for storing and categorizing workspaces. It holds a number of workspaces in the same way that a folder holds a number of files.

In this case there will be a repository for Samples and one for Utilities.

Click on the Samples repository. A list of workspaces in that repository is shown. These are workspaces that have been loaded into FME Server and are available to run.





Home
Repositories
Jobs
Notifications
Schedules
Services
Monitoring
Mount Points

Quick Filter		
<input type="checkbox"/> Name ▲	Type	Last Updated
<input type="checkbox"/> austinApartments.fmw City of Austin: Apartments and other (ACAD 2 KML)		2012-11-26 07:51:13
<input type="checkbox"/> austinDownload.fmw City of Austin: Data Download		2012-12-17 04:12:41
<input type="checkbox"/> austinWFS.fmw City of Austin: Shape to GML (WFS)		2012-11-26 08:20:54
<input type="checkbox"/> austinWMS.fmw City of Austin: Shape to Image (WMS)		2012-11-26 08:59:28
<input type="checkbox"/> earthquakesextrusion.fmw Earthquakes: GeoJSON to KML Diagrams		2013-05-13 08:18:55

5) Examine Jobs

Now click on the Jobs entry on the menu. This tool shows you a list of jobs that have been run on the system, as well as jobs that are currently queued or currently running.

Completed Queued Running								
Remove		Remove All						
<input type="checkbox"/>	Id	Status	Engine	Time Started	Time Finished	Priority	Repository	Workspace
<input type="checkbox"/>	2	 SUCCESS	Engine1 on ip-10-73-189-162	2013-10-17 12:16:29	2013-10-17 12:16:30	100	Samples	austinDownload.fmw
<input type="checkbox"/>	1	 SUCCESS	Engine1 on ip-10-73-189-162	2013-10-17 12:16:22	2013-10-17 12:16:27	100	Samples	austinDownload.fmw
Page size: 100 Page 1 of 1 Displaying 1 - 2 of 2								

Jobs and Repositories are the two main menu items that you will use for basic FME Server use and administration.

FME Server Security



FME Server includes security to prevent unauthorized users from accessing services and other resources.

All security information for FME Server is stored in the repository database and is managed using the FME Server Web User Interface.

The key to setting up FME Server security is to have a clear plan on which services and accounts will be provided with open access, and which need to be restricted.






These policies are then set up using the Security section of the Web User Interface.





Home
Repositories
Jobs
Notifications
Schedules
Security ←
Services
Monitoring
Resources
Migration

Roles and Users

Security is implemented using a system of roles and users. A role is best described as a function of the person; for example user, author, or administrator. Each user account is associated with one or more roles.

A default set of roles and user accounts is defined when FME Server is installed:

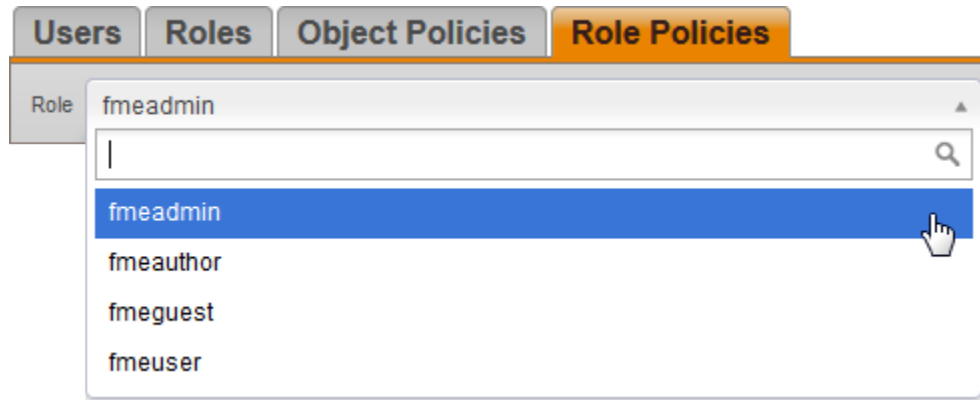
<input type="checkbox"/> Role
<input type="checkbox"/>  fmeadmin
<input type="checkbox"/>  fmeauthor
<input type="checkbox"/>  fmeguest
<input type="checkbox"/>  fmesuperuser
<input type="checkbox"/>  fmeuser

<input type="checkbox"/> User	Roles
<input type="checkbox"/>  admin	fmeadmin, fmesuperuser
<input type="checkbox"/>  author	fmeauthor
<input type="checkbox"/>  guest	fmeguest
<input type="checkbox"/>  user	fmeuser

For example, in the previous example, if you logged in using the *admin* account, then you have both the role of *fmeadmin* and *fmesuperuser*.

Rather than apply security settings to individual users, FME Server allows you to apply them to specific roles. That way the settings can be changed for multiple users at once.

The role is selected under the Role Policies tab:



Security Policies

There are various sections of security policies that can be set for each role.

General

These are general policies such as the ability to manage jobs, services, and security. For example, if you don't have the ability to manage security, that item will be missing from the main menu of the user interface.

Topics

Topics are related to Notifications, which we'll cover later. Different capabilities – read, write, publish, remove – can be assigned for each topic you create.

Resources









Resources are files and datasets stored on FME Server. Different permissions – read, write, upload, delete – can be assigned to each resource.




Services

Services are key items of functionality on FME Server. They are the different methods by which a workspace can be run and output data delivered. Each role can be allowed – or not – to use a particular service.

Repositories

As you know, repositories are a place to store and categorize workspaces. Each role can be given different permissions for each and every repository.

General	Allow
 Manage Engines	<input checked="" type="checkbox"/>
 Manage Jobs	<input checked="" type="checkbox"/>
 Manage Repositories	<input checked="" type="checkbox"/>
 Manage Schedules	<input checked="" type="checkbox"/>
 Manage Security	<input checked="" type="checkbox"/>
 Manage Services	<input checked="" type="checkbox"/>
 Manage Shared Resources	<input checked="" type="checkbox"/>
 Manage Notifications	<input checked="" type="checkbox"/>

Repositories	Download	Read	Publish	Run	Delete
 Samples	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
 Training	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
 Utilities	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>





Components

Components are different pieces of workspace functionality – Readers, Writers, and Transformers – that can be controlled through security settings.

For example, you may wish to prevent a particular role from running workspaces on Server using the FMEServerJobSubmitter transformer.

Applications

Applications are the different ways in which FME Server can be accessed. For example, it's possible to control access to the FME Server Web Interface for a specific role.

Applications	Allow
 FME Server Console	<input checked="" type="checkbox"/>
 FME Server Installation	<input checked="" type="checkbox"/>
 FME Server Web User Interface	<input checked="" type="checkbox"/>
 FME Workbench	<input checked="" type="checkbox"/>

Each security policy can be set for a particular role, meaning it is applied to all users who are assigned to that role. If one user needs a specific set of security settings, different to any other user in that role, then you simply create a new role to apply to them.

Other Security Functions

FME Security can be fully integrated with both Active Directory and Integrated Windows Authentication (IWA). The FME Server Administrators Guide explains how this can be achieved.

Encryption

FME Server also allows Secure Sockets Layer (SSL) connections in order to encrypt transaction data. This is most important for ensuring sensitive log in information is not exposed and is particularly important when you are using Active Directory.

Again, the FME Server Administrators Guide explains the steps needed to implement this. In brief the process consists of two steps:

- Modify web service URLs to use HTTPS instead of HTTP
- Enable SSL on the web and/or application server.



Judge GIS says...

'I am the law! The FMESuperUser role is the high court of FME Server and is granted all permissions on all security settings. What's more, these permissions cannot be revoked, unset, or appealed against!'

So, be sure not to assign accounts to the FMESuperUser role unless you really, really mean for them to be given that degree of power.'



Exercise 1b: Exploring Security Settings	
Scenario	FME Server administrator
Data	N/A
Overall Goal	Explore the FME Server Security Settings
Demonstrates	Using the FME Server web user interface Security Menu
Starting Workspace	None
Finished Workspace	None

Follow these steps to inspect different security settings.

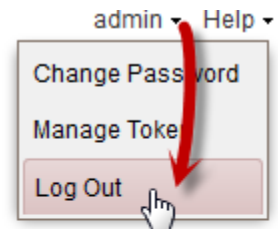
1) Connect to Server – 1

As in Exercise 1a, connect to the FME Server web user interface in your web browser.

If you are already logged in then log out using the tool in the top-right of the interface:

Now try to log in using the default guest account (Username:guest, Password: guest).

The log in will fail because – by default – this account does not have permission to access the web user interface.





You are not authorised to access this web application

2) Connect to Server – 2

Now log in using the default administrator account (Username: admin, Password: admin).

For the purposes of this exercise the account needs to be assigned to a role with permission to manage security. By default only the *fmeadmin* role has this capability, and the only account assigned to that role is *admin*.

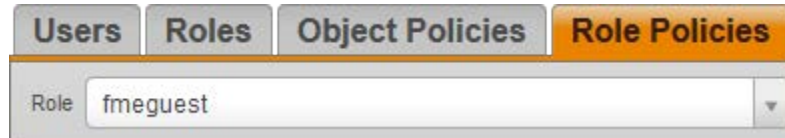
User	Roles
 admin	<i>fmeadmin, fmesuperuser</i>
 author	<i>fmeauthor</i>

3) Open Security Settings

Click the option labelled Security on the main user interface menu:

If you don't see an option for Security then the account you have chosen does not have permissions to access this functionality.

Click on the Role Policies tab and choose the role *fmeguest*







Home
Repositories
Jobs
Notifications
Schedules
Security ←
Services

4) Examine Security

Examine the different security options for the *fmeguest* role. Notice, for example, that it can read the Samples repository, and run a workspace within it, but cannot publish a new workspace and cannot delete an existing one.

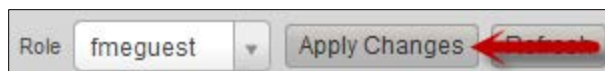
Near the top of the list of security settings, locate Manage Repositories. Put a checkmark to allow the guest role to carry out this function.

General	Allow
 Manage Engines	<input type="checkbox"/>
 Manage Jobs	<input type="checkbox"/>
 Manage Repositories	<input checked="" type="checkbox"/>
 Manage Schedules	<input type="checkbox"/>

Applications	Allow
 FME Server Console	<input type="checkbox"/>
 FME Server Installation	<input type="checkbox"/>
 FME Server Web User Interface	<input checked="" type="checkbox"/>
 FME Workbench	<input type="checkbox"/>

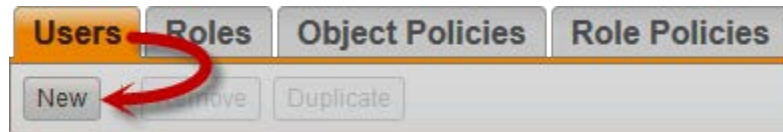
Scroll to the bottom of the list of security settings. Put a checkmark to allow the guest role to use the FME Server Web User Interface.

Click the Apply Changes button to apply the new security policies!



5) Create New User

Now let's create a new user account. Click on the Users tab and then on the New button:



When prompted, create a new user with the following parameters:

User Name: WebGuest
Full Name: Web Interface Account
Password: WebGuest1
Roles: fmguest

User Name:	<input type="text" value="Web Guest"/>
Full Name:	<input type="text" value="Web Interface Account"/>
Password:	<input type="password" value="....."/>
Confirm Password:	<input type="password" value="....."/>
Roles:	<input type="button" value="Select All"/> <input type="button" value="Deselect All"/>
	<input type="button" value="x fmguest"/>

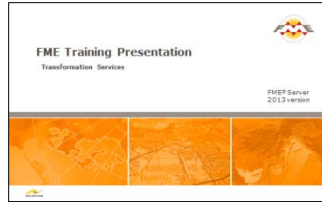
6) Log In as New User

Now log out of the web user interface and log in again using the WebGuest account. You should be able to log in, because the setting was changed to allow guest users access to the web user interface.

Home
Repositories

Notice that the menu options will be severely restricted for this user! Only the Home and Repositories items will be available, because repositories are the only feature this role is allowed to manage.

Troubleshooting for Administrators



This section shows a few basic troubleshooting techniques in case of emergency

Web User Interface

If you are unable to access the Web User Interface then the following suggestions may be of help.

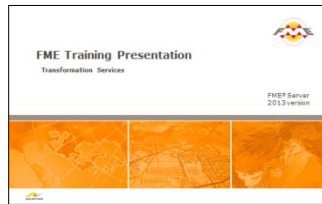
- Confirm that FME Server is installed and running!

The easiest way to be sure is to restart FME Server using *Start > Programs > FME Server > Windows Service > Restart*

- Check whether FME Server was installed using an application server port other than 80. For example, if port 80 was already being using the installer might have used a different port; 8080 is most common.

To check, try entering the URL with this syntax *http://<host>:<port>/fmeserver* - for example *http://localhost:8080/fmeserver*

Module Review



This module introduced you to FME Server and the Web user Interface used to access most of its functionality

What You Should Have Learned from this Module

The following are key points to be learned from this module.

Theory

- FME Server is a powerful product for handling large volumes of data at the **enterprise** level. It has three core capabilities: Self-Serve, Real-Time, and Automation.
- FME Server provides the **same processing core** as FME Desktop, but on the enterprise level. It does not include an authoring tool, for which FME Workbench is required.
- Someone who creates translations for use on FME Server is called an **author**.
- The three main components of FME Server are **FME Engines**, the **Server Core**, and **Web Services**
- FME Server can be implemented on **Physical hardware**, **Virtual hardware**, or under a product called **FME Cloud**.
- FME Server security is implemented using a system of **roles** and **users**.

FME Skills

- The ability to open the FME Server Web User Interface
- The ability to confirm the version of FME Server and check that FME core engines are available
- The ability to browse repositories
- The ability to check job status
- The ability to check and manage security settings

Running Workspaces on FME Server

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FME Workbench and FME Server

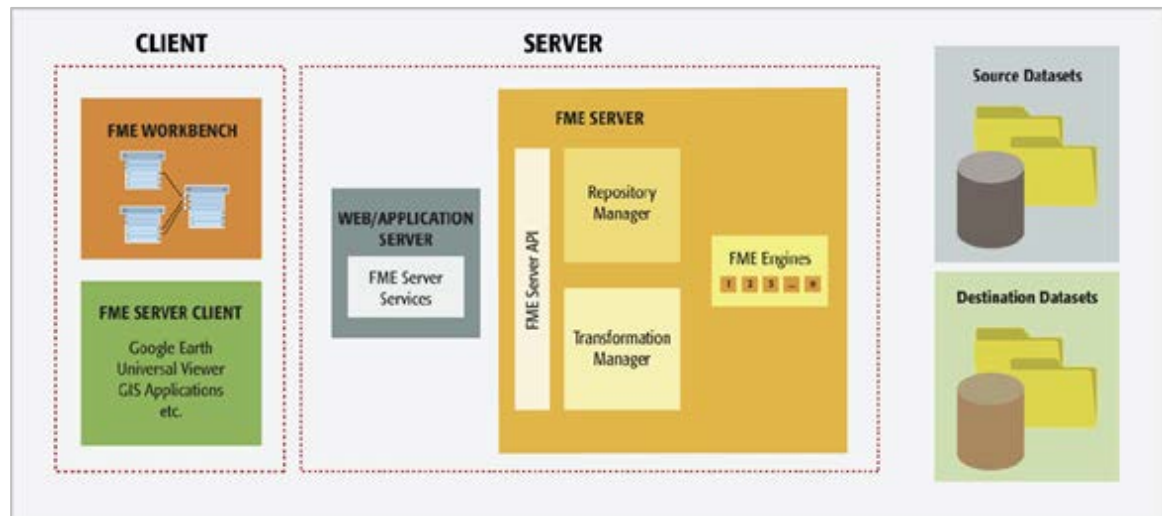


FME Workbench is the authoring environment for FME Server translations. It has functionality specifically for FME Server.

FME Desktop as an FME Server Authoring Tool

FME Server can be called a model-driven architecture, because the specification for a translation is expressed as a model. In FME, these models are better known as **Workspaces**.

Workspaces are created – we call it “authored” – using FME Desktop. In particular the **FME Workbench** application is used. FME Workbench is a client of FME Server, and so they form a *client-server pair*. However, both share the same core engine and process data the same way.



The Workspace Authoring Workflow

The four basic steps to creating and using a workspace on FME Server are:

- Author the workspace in FME Workbench.
- Publish the workspace from FME Workbench to FME Server.
- Run the workspace on FME Server.
- Maintain the workspace by downloading it from FME Server, making any required updates in FME Workbench, and re-publishing it back to FME Server.



Ms. Analyst says...

“Be aware that FME Workbench is part of the FME Desktop product and is not included as part of FME Server.”

Workspace Management



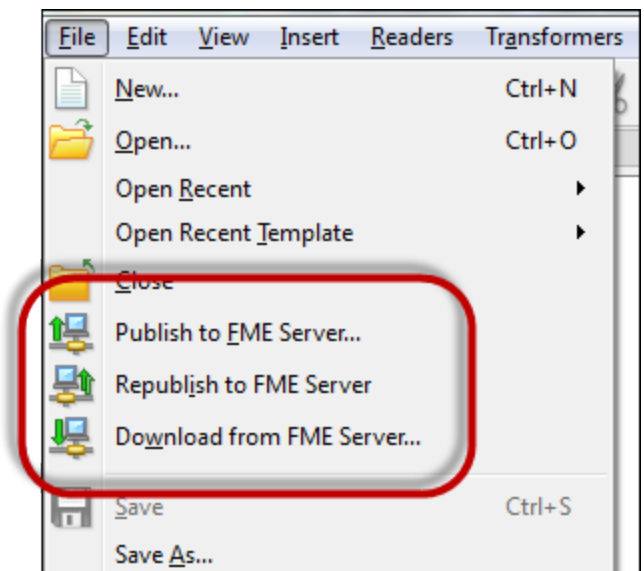
Because Workbench is a client of FME Server, workspaces may be transferred to and from an FME Server repository.

Transferring Workspaces

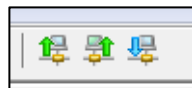
FME Workbench has the ability to:

- Publish a workspace to FME Server
- Republish a workspace to FME Server
- Download a workspace from FME Server

These three capabilities are accessed in FME Workbench either through the menubar...



...or the toolbar:



Professor Lynn Guistic says...

*“Published workspaces are held on FME Server in a file-based **repository**. Each FME Server may have multiple repositories, but any workspace can only belong to one of them.*

All metadata related to the workspace is held separately in FME Server's repository database. This metadata includes information about source and destination datasets, workspace feature types, and published parameters.”

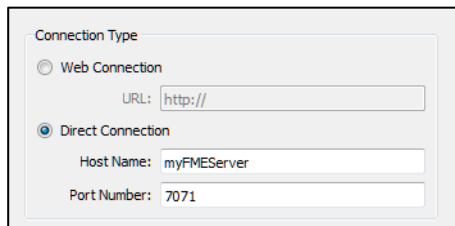
Publishing a Workspace

Once a workspace has been authored it is “published” to FME Server. A workspace is published using a simple wizard interface that connects using the FME Server REST API.

Connecting to Server

The first dialog in the publishing wizard is where a connection is defined.

Workbench can connect to either a local FME Server (Using TCP/IP) or to a remote – web-accessible – server (using HTTP and the REST API).

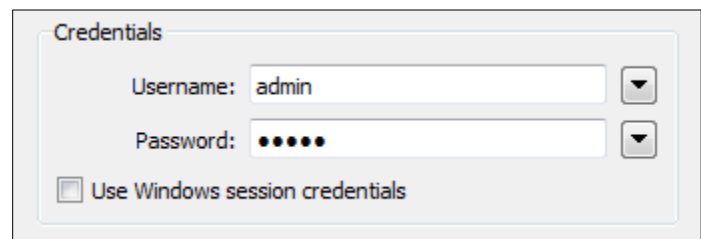


The dialog box shows two options: 'Web Connection' and 'Direct Connection'. 'Direct Connection' is selected. Below it, there are fields for 'Host Name' (myFMEServer) and 'Port Number' (7071). A 'URL' field is also present with the value 'http://'.

A Direct Connection requires the FME Server hostname and port number. The default port for TCP/IP is 7071. A Web Connection simply requires the URL of the Server.

HTTP is used when the FME Server is not on the same Local Area Network, but on a web-accessible server.

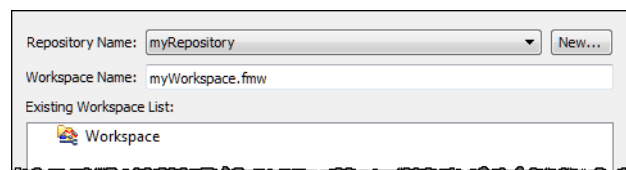
The dialog also provides fields in which to define connection credentials. Note the ability to save time by reusing Windows session credentials



The dialog box has fields for 'Username' (admin) and 'Password' (masked with dots). There is a checkbox labeled 'Use Windows session credentials' which is currently unchecked.

Repository Selection

The next dialog defines the repository for the workspace:

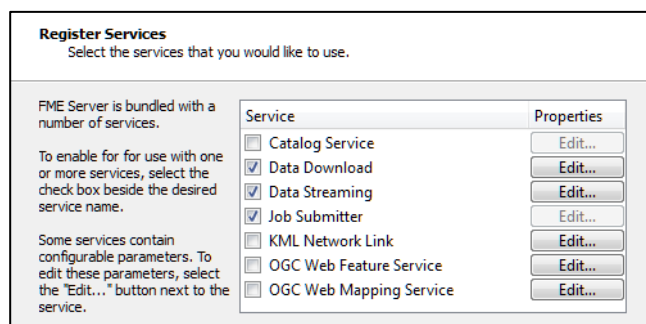


The dialog box shows a 'Repository Name' dropdown menu with 'myRepository' selected. There is a 'New...' button next to it. Below, there is a 'Workspace Name' field with 'myWorkspace.fmw' entered. At the bottom, there is a section titled 'Existing Workspace List' with a single entry 'Workspace'.

Either an existing repository can be used, or a new one created. The workspace name can also be edited, though it must always conclude with “.fmw”.

Workspace Registration

The final dialog defines which services the workspace is to be registered against.



The dialog box is titled 'Register Services' and has a subtitle 'Select the services that you would like to use.' It contains a list of services with checkboxes and 'Edit...' buttons. The services are: Catalog Service, Data Download (checked), Data Streaming (checked), Job Submitter (checked), KML Network Link, OGC Web Feature Service, and OGC Web Mapping Service. There is also a section on the left explaining that FME Server is bundled with a number of services and that some services contain configurable parameters.

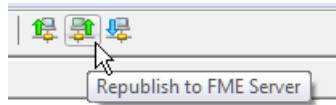
The Job Submitter service allows FME Server to run a workspace as-is. This is the closest to running a workspace on FME Desktop. All inputs and outputs are defined in the workspace so data is simply written out and not streamed or delivered in any other manner.

Job submission is ideal for testing workspaces, and for running large-scale and batch translations that make use of the server process queue.

Republishing a Workspace

Once a workspace has been published, the republish tool becomes active.

Further updates to the workspace (within the same session) can then be uploaded with a single click:

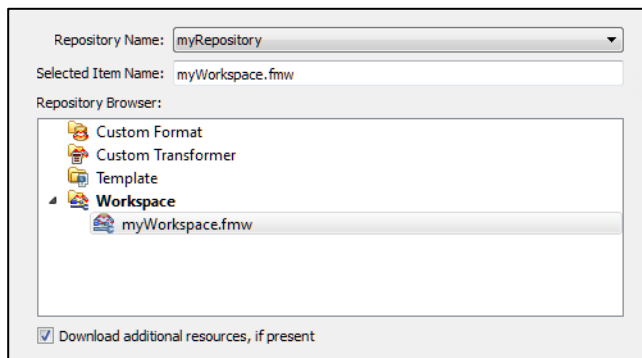


The same parameters are used as before. If changes need to be made to these parameters, then the full publishing wizard should be used.

Downloading a Workspace

Workbench can also “download” a workspace held in an FME Server repository. This is usually done in order to make edits to the workspace. Note that downloaded workspaces are copies of the original, which remains in the FME Server repository.

The downloading wizard begins with the same connection dialog as the publishing wizard. From there, the second – and final – dialog page is a repository and workspace selection tool:



The user is then prompted for a location to save the workspace. The default is <user>/FME/My FME Server Workspaces. The workspace – and resources – are then downloaded.

Once downloaded, the workspace is automatically opened within Workbench for editing.



To avoid entering the same parameters every time a connection is made, set the parameters, click the Defaults button, and select 'Save as My Defaults'. Now these parameter values will be used automatically every time the connection dialog is opened.



Ms. Analyst says...

“Besides workspaces, it’s also possible to publish/download FME custom transformers and custom formats to/from a server repository.”

Repositories

Repositories are storage facilities for FME Server workspaces.

You can think of each repository as being like a folder on a file-system. Like a folder, it stores workspace files. Also like a folder, access rights can be granted to individuals and groups.

Repositories can be accessed through the web user interface using the Repositories entry on the main menu:

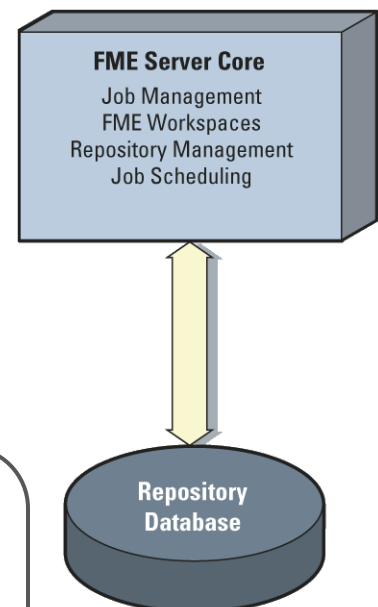


Although the workspaces are stored on the file-system (C:\apps\FME Server\Server\repository) information about each workspace is stored in an internal database within FME Server.

For interested experts, the FME Server core communicates with the database via JDBC over TCP/IP.

The contents of this database should **never** be edited directly.

Querying the database is permissible, although extracting repository information is more commonly achieved using the REST API.



Police Chief Webb-Mapp says...

"Security in FME Server is very important, and never more so than for repositories."

For each repository you create, check the security settings. If you don't then end-users may not get access to the repository!"



Exercise 2a: Publishing a Workspace	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Create a workspace, publish it to Server
Demonstrates	Publishing a workspace to FME Server
Starting Workspace	None
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise2a-Complete.fmw

This simple exercise will refresh your memory on FME Workbench and demonstrate how to publish a workspace. In this scenario you are an FME user working for a company producing and selling airphotos. You want to publish a workspace to FME Server to translate GeoTiff datasets to JPEG.

1) Generate Workspace

In the FME Workbench start screen, select the option to Generate Workspace

Alternatively you can select File > New > Generate from the menubar or use the shortcut Ctrl + G.

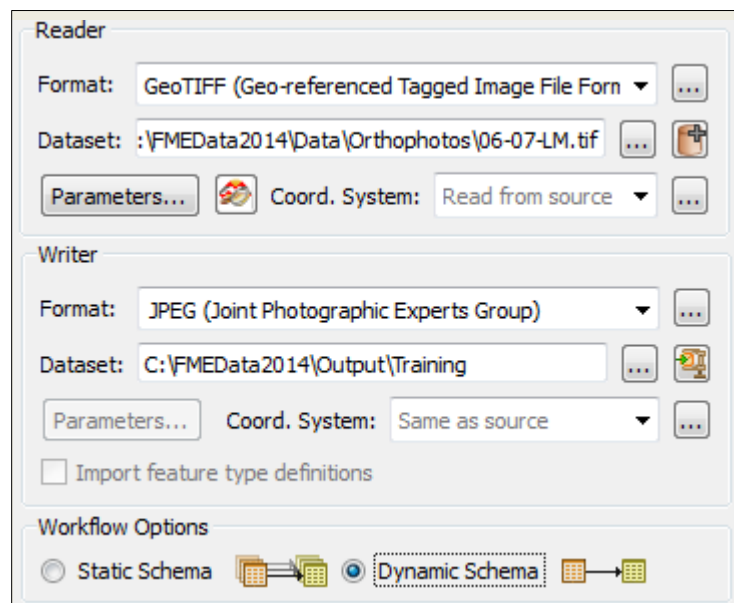


When prompted, set up the workspace using the following parameters:

Reader Format GeoTIFF (Geo-referenced Tagged Image File Format)
Reader Dataset C:\FMEData2014\Data\Orthophotos\06-07-LM.tif
Writer Format JPEG (Joint Photographic Experts Group)
Writer Dataset C:\FMEData2014\Output\Training

Before clicking OK, select the option for Dynamic Schema at the bottom of the dialog.

This will allow the workspace to process any GeoTiff file, not just the one originally chosen.



2. Save and Run Workspace

Save the workspace as Exercise2a.fmw (using File > Save from the menubar) and then run it (using File > Run). Browse through the file system to confirm that you have written a JPEG file to the output directory.



Professor Spatial says...

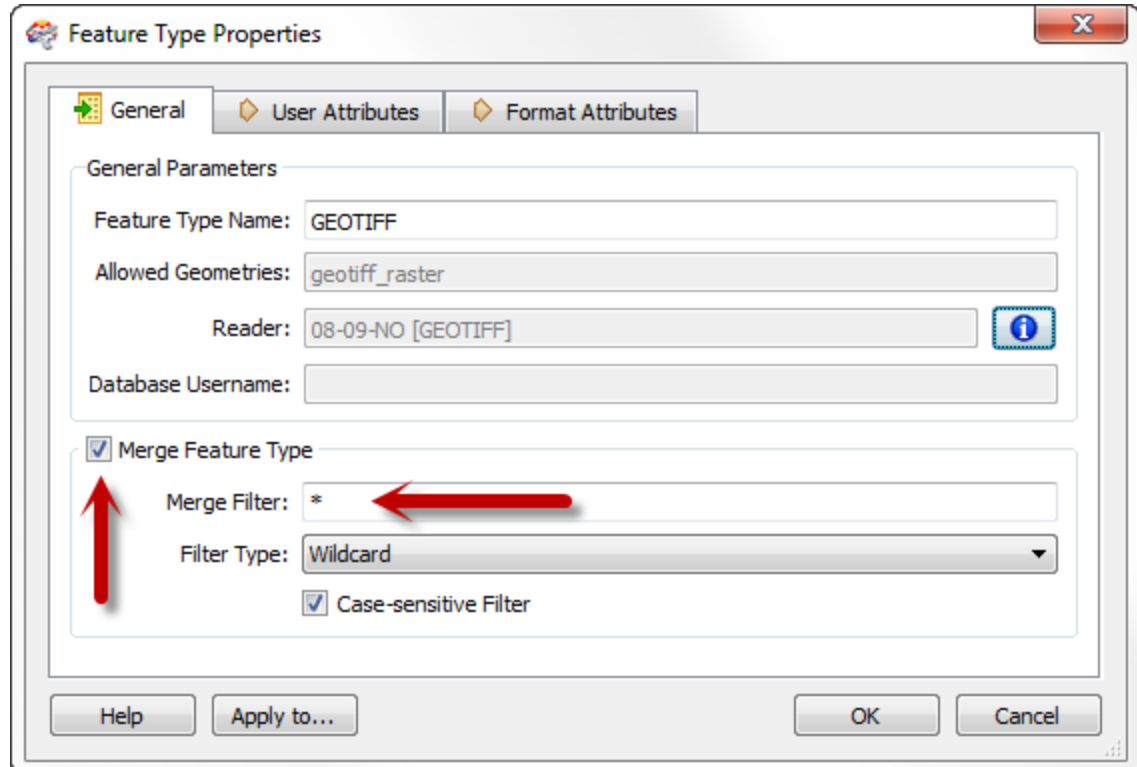
"You should always run your workspace first in Workbench, before publishing it to FME Server."

This is the easiest way to ensure the workspace functions as expected. If it fails in Workbench it won't suddenly work on FME Server!"

As a further test, run the workspace a second time but this time using File > Prompt and Run. This action prompts you to select the source and destination datasets, instead of simply using those defined in the workspace.

Select a different file this time (say, 08-09-NO.tif) and open the output to prove that the contents are different to before.

NB: If you missed setting a Dynamic Schema in step 1, you can either recreate the workspace (it will only take a minute) or – if you know how – open the Reader feature type properties dialog and set a merge filter.



3. Publish Wizard (Step 1)

Workspaces are published to FME Server using a wizard.

Choose File > Publish to FME Server from the menubar (or select the same tool on the toolbar).



In the first dialog of the wizard you are prompted to enter connection parameters to FME Server.

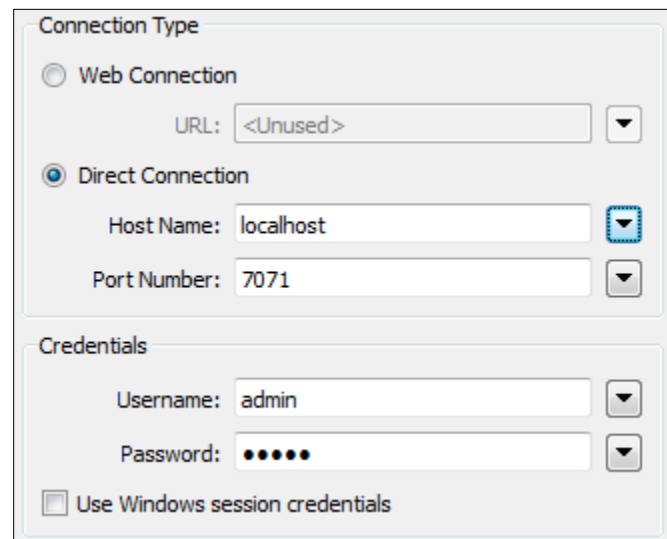
Enter the parameters provided by your training instructor.

In most cases the parameters will be as follows:

Connection Type
Direct Connection

Host Name: localhost
Port Number: 7071

Credentials
Username: admin
Password: admin



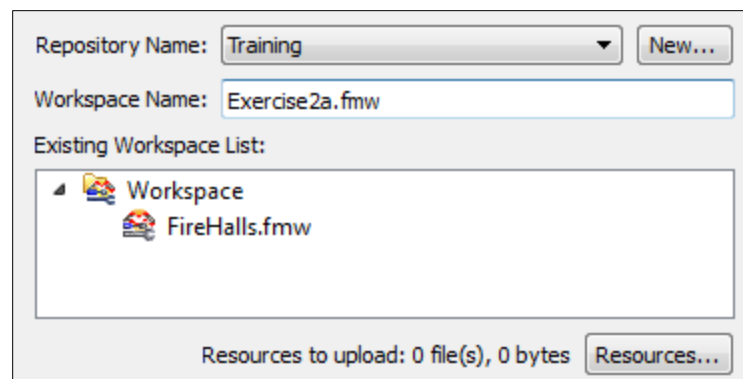
Click **Next** to continue. If the credentials are correct a connection will be made and you will move on to the next dialog in the wizard.

4. Publish Workspace (Step 2)

The next dialog prompts you to choose a repository in which to store the workspace.

For this exercise we'll create a new repository by clicking the New button. When prompted enter the name Training.

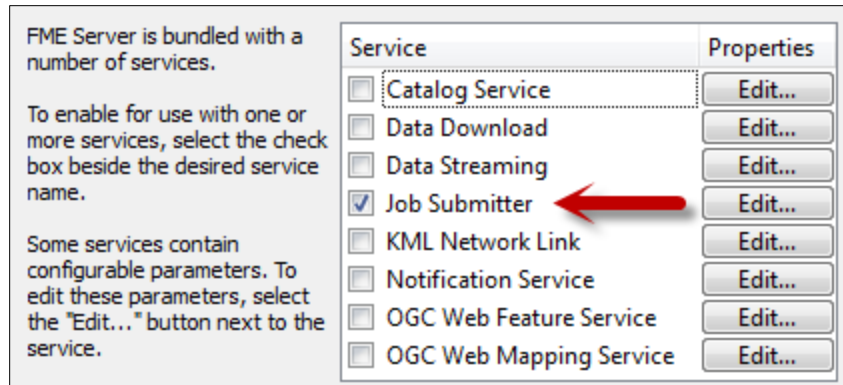
Click **OK** to close the Create New Repository dialog and then click **Next** to continue the wizard.



5. Publish Workspace (Step 3)

In the final screen of the wizard we can register the workspace for use with various services.

Select the Job Submitter service as this is the only service we are using for now and click **Publish** to complete publishing the workspace.



After a workspace is transferred to Server, the log window displays a message reporting which workspace has been published to which repository and for which services.

In this exercise, the workspace Exercise2a.fmw has been published to the Training repository for use in the Job Submitter service.

```
Successfully published to FME Server as 'Exercise2a.fmw'.
=====
                        Publish Summary
=====
Server Host       : localhost
Server Port      : 7071
Username         : admin
Repository       : Training
Target Name      : Exercise2a.fmw
Resources Uploaded : None
Services Registered : Job Submitter
=====
```

Congratulations! You have now created a workspace and published it to FME Server.

Advanced Task

Open the FME Server Web User Interface in a web browser and log in using the same connection parameters as you published the workspace with.

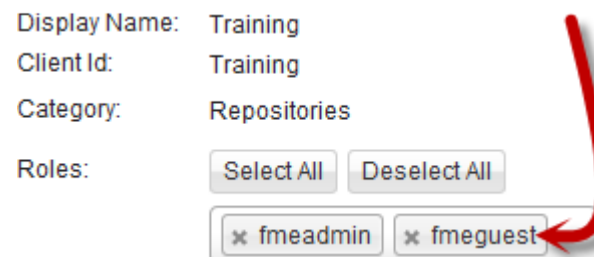
Click Security on the main menu to open security settings, and then click the Object Policies tab.

Locate the Training repository in the list of security objects. You should see that the roles allowed to make use of it is restricted to the one(s) to which the publisher's account belongs.

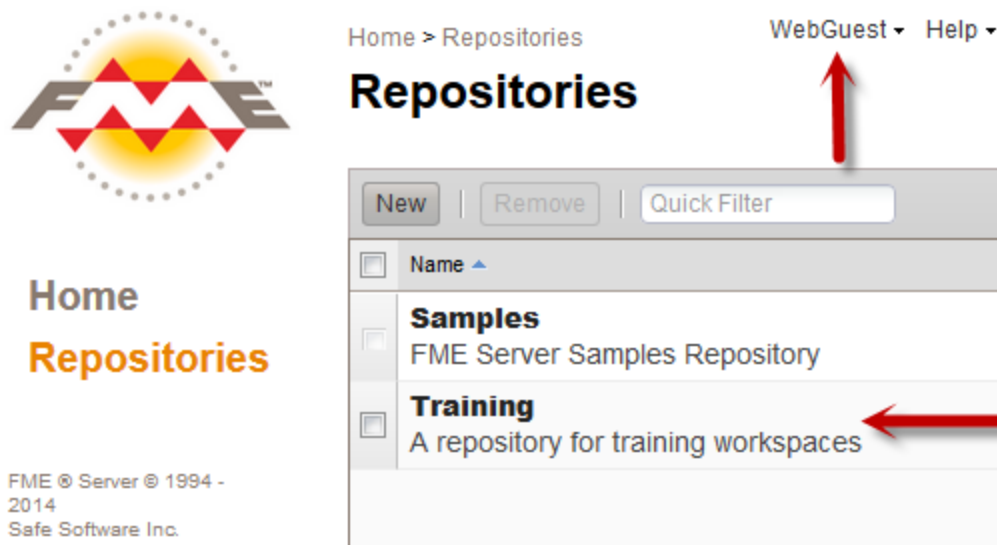
In this case the user was *admin*, which is associated with the *fmeadmin* role. Therefore only an administrator will be able to make use of the repository that we have just created.



Click on the repository object to open its security policies. Add the *fmguest* role so that users with a guest account can access this repository.



If you created a guest account (WebGuest) in Exercise 2b, then log out and log in again using that account, to prove that guests now have access to the repository.





Source Data Management



Source data may be published to FME Server and stored in a “Resources” folder, where it is available to any workspace

FME Server has several mechanisms for uploading and storing resources for workspaces to use in a translation; for example the source data for a translation.

One such mechanism – new for FME 2014 – is called “Resources” or “Resource Management”, and is accessed through the Web User Interface.

The advantage of these Resources, compared to other methods, is that data can be uploaded and referenced by any workspace, without having to upload it every time. This is particularly useful when access to the file system is restricted (like on an FME Cloud system).

If the workspace author does have access to the file system, then Resources are still useful, as a Resources folder can be mapped and shared among many users as a physical drive.

Accessing Resources

Resources are accessed through the “Resources” option on the main menu.

Home

Repositories

Jobs

Notifications

Schedules

Security

Services

Monitoring

Resources

Migration

Upload
New Folder
Download
Delete
Copy
Move

Name	Size	Date
Backup		2014-2-17 15:09:04
Data		2014-2-17 15:09:04
Engineering		2014-2-14 11:22:05
StreetLighting.dwg	2.45 MB	2014-2-14 11:22:05
StreetLighting.prj	0.41 KB	2014-2-14 11:22:05
StreetLightingDGN.dgn	2.00 MB	2014-2-14 11:22:05
TrafficSignals.dwg	34.81 KB	2014-2-14 11:22:05
TrafficSignals.prj	0.41 KB	2014-2-14 11:22:05
TrafficSignalsDGN.dgn	50.69 KB	2014-2-14 11:22:05
Parks.zip	5.17 KB	2014-2-14 11:20:04
Logs		2014-2-17 15:09:05
Temp		2014-2-17 15:09:05

Resource Functionality

The various resource functions are:

- Upload	- Download	- Copy
- New Folder	- Delete	- Move

More information on this functionality is provided in Chapter 3 under **Data Upload**.

Source Data Management

2-13

Exercise 2b: Uploading to a Resources Folder	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Uploading data to be used by the previous workspace
Demonstrates	FME Server resource management
Starting Workspace	n/a
Finished Workspace	n/a

In this exercise we'll upload some GeoTiff files as Resources on FME Server. This will make them available for use by a workspace, including the one published in Exercise 2a.

1. Open Web User Interface

In a web browser open the FME Server Web User Interface, as we did in Chapter 1, by entering `http://<servername>/fmeserver`

Alternatively use the Windows shortcut Start > Programs > FME Server > Web User Interface.

Login in using the credentials provided by the instructor, by default these will be

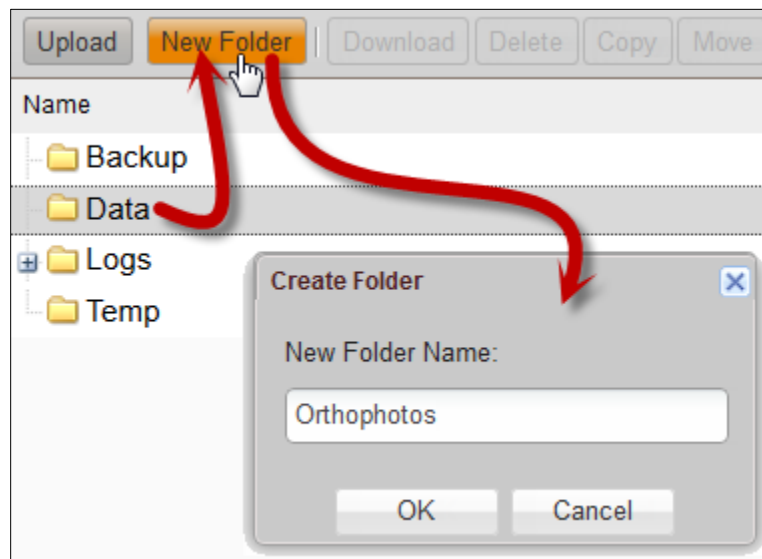
User admin
Password admin

2. Create New Resources Folder

Click the link labeled Resources on the left-hand menu.

Click on the Data Folder in the Resource Management dialog.

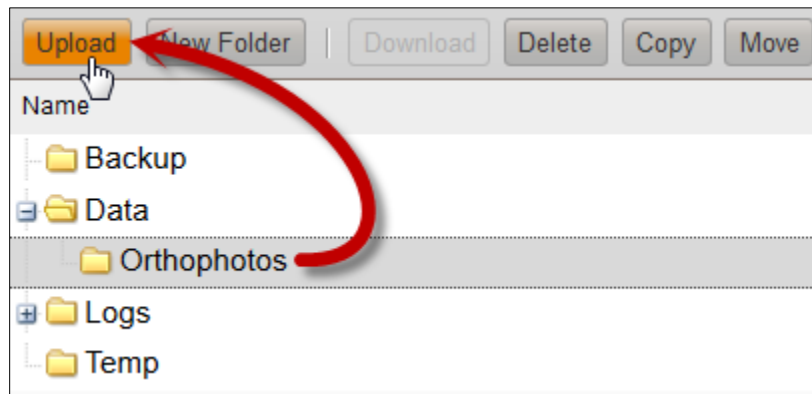
Click New Folder to create a new subfolder inside Data. Name the folder Orthophotos.



Home
Repositories
Jobs
Notifications
Schedules
Security
Services
Monitoring
Resources
Migration

3. Upload Image Data

Still in the Resources Management dialog, select the newly created Orthophotos folder. Click Upload.



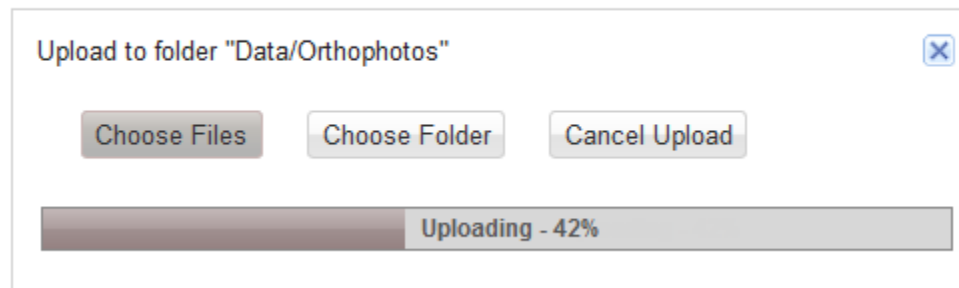
When prompted click **Choose Files** (as opposed to Choose Folder). A file browser window will open. Browse to the folder C:\FMEData2014\Data\Orthophotos and select the following GeoTiff files for upload.

08-09-NO.tif
08-09-LM.tif
06-07-NO.tif
06-07-LM.tif

NB: If you wish, you can choose **all** of the files; but they total 184mb in size, so uploads and downloads will take longer.

Click Open and the selected files will be uploaded.

Upload Files



Congratulations! You have uploaded a series of source datasets, which are now available for use in any FME Server Workspace.

Running a Workspace on FME Server



This section introduces running a workspace on FME Server

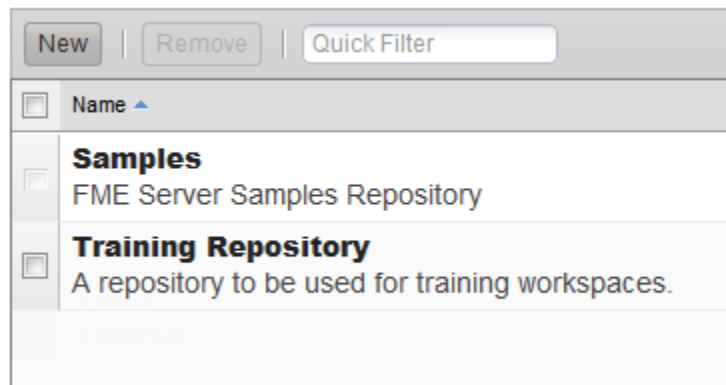
Once a workspace is uploaded to FME Server, it can be run on that server. There are several ways to run a workspace, the simplest being using the Job Submitter service. This service can be accessed either through the Web User Interface or via a URL.

Running the Job Submitter using the Web Interface

Using the web interface to run a workspace is very similar to running it in FME Workbench; you simply locate the workspace and click a Run button.

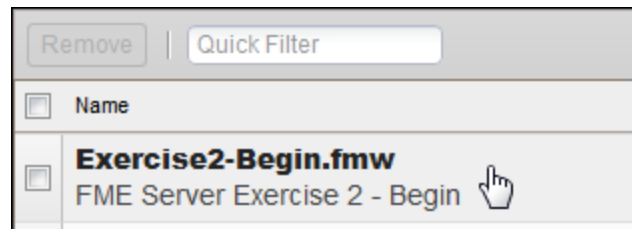
To locate a workspace first click on the Repositories entry in the main menu of the web interface.

Home
Repositories
Jobs
Notifications
Schedules
Security
Services



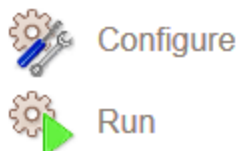
Secondly, click on the repository that contains the workspace to be run.

Next, click on the workspace itself.



Registered Services

Job Submitter



Finally you have the option to click Run to set the workspace running.

Configuring a Translation

Clicking the Configure button for a workspace is the equivalent to the Prompt and Run option in FME Workbench. You get to define what parameters are going to be set for the translation, such as Source Dataset Location, Destination Dataset to Write, Output Format, and Coordinate System.

For example, here the user is specifying a location available to FME Server where the FireHalls dataset is available:

Published Parameters

Source Geography Markup Language (GML) File(s):

Browse
Upload
Specify Location

Please enter Location:

FireHalls.gml

Destination Google Earth KML File:

C:\FMEData\Output\Tutorial\FireHalls.kml

OutPut Format:

Google Earth KML ▼

Coordinate System:

WGS84 datum, Latitude-Longitude; Degrees ▼

Show Developer Information
Reset Published Parameters
Run Workspace

If the FireHalls data was made available using Resources functionality, then the user would choose the Browse option to search for and select it:

Source Geography Markup Language (GML) File(s):

Browse
Upload
Specify Location

Name	Size	Date
Backup		2014-2-27 11:53:08
Data		2014-2-27 11:53:08
Engineering		2014-2-14 11:22:05
<input checked="" type="checkbox"/> FireHalls.gml	4.97 KB	2014-2-27 11:52:59
<input type="checkbox"/> FireHalls.xsd	2.05 KB	2014-2-27 11:52:59
<input type="checkbox"/> Parks.zip	5.17 KB	2014-2-14 11:20:04
Logs		2014-2-27 11:53:08
Temp		2014-2-27 11:53:08

Once the parameters are set, click the **Run Workspace** button to complete the process.

Running the Job Submitter using a URL

All job requests to an FME Server are a variation on an HTTP request. This makes running a workspace via a URL very simple, provided you know what form the request will take.

The easiest way to find that URL is through the Configure option in the FME Server web interface.

Notice the Configuration dialog includes a button labelled “Show Developer Information”. Once clicked an example URL and example form are displayed.

Show Developer Information

Refresh

Direct Url Example

[http://VASH:8080/fmejobsubmitter/Training/FireHalls.fmw?SourceDataset_GML=%22%24\(FME_SHAREDRESOURCE_DATA\)FireHalls.gml%22](http://VASH:8080/fmejobsubmitter/Training/FireHalls.fmw?SourceDataset_GML=%22%24(FME_SHAREDRESOURCE_DATA)FireHalls.gml%22)

Form Example

```
<form method="post" enctype="multipart/form-data" action="/fmeserver/invoke/fmejobsubmitter/Training/FireHalls.fmw">
  <p>
    Custom job request form for "Training/FireHalls.fmw" for service "fmejobsubmitter"
  </p>
  <!-- File upload inputs, replicate the file input lines below for as many as are necessary -->
  <p>
    Upload any files here:<br/>
    <input type="file" name="OPT_FileUpload"><br/>
    <input type="file" name="OPT_FileUpload"><br/>
  </p>
  Source Geography Markup Language (GML) File(s):
  <input type="text" name="SourceDataset_GML" value=""(FME_SHAREDRESOURCE_DATA)FireHalls.gml"" /><br/>
```

The URL shown uses a HTTP GET request whereas the HTML form uses a HTTP POST request.

This information is a useful tool for building your own web applications that access FME Server services, because you can copy the HTTP request and embed it on your own website or application.

You could also embed the URL or form into an email, or paste the URL directly into a web browser.



There are limits to the amount of data you can send in a GET request because URLs have length restrictions that vary depending on the browser being used. If you anticipate that your request parameters may include very long strings, use a POST request.



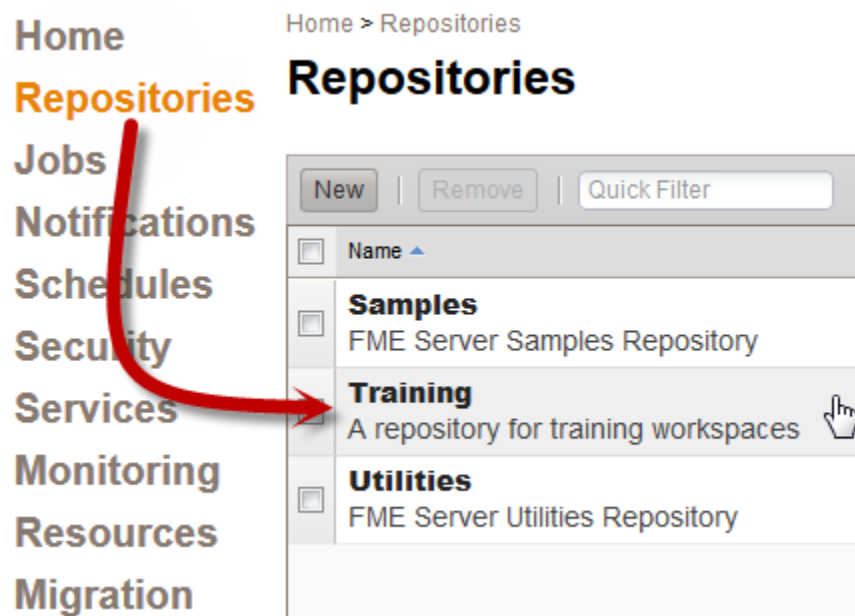
Exercise 2c: Running a Workspace	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Run the previously published workspace
Demonstrates	Running a workspace on FME Server
Starting Workspace	Exercise2a.fmw (in the Training repository on FME Server)
Finished Workspace	Exercise2a.fmw (in the Training repository on FME Server)

Now we have both a workspace and data on the server, we can run the workspace to translate the uploaded data.

1. Browse to the Workspace

Open the Web User Interface in a web browser (if it isn't already) and click **Repositories** on the left-hand menu. A list of available repositories now appears.

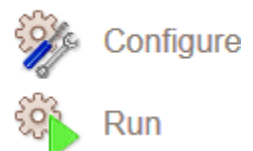
Click on the Training repository in the list; this was the repository we created when we published the workspace. This will cause a list of available workspaces in that repository to be displayed.



Now click on your workspace, Exercise2a.fmw, and two options will appear: Run and Configure.

The Run button would run the workspace with default parameters, but we wish to select specific source files, so click **Configure** instead.

Job Submitter



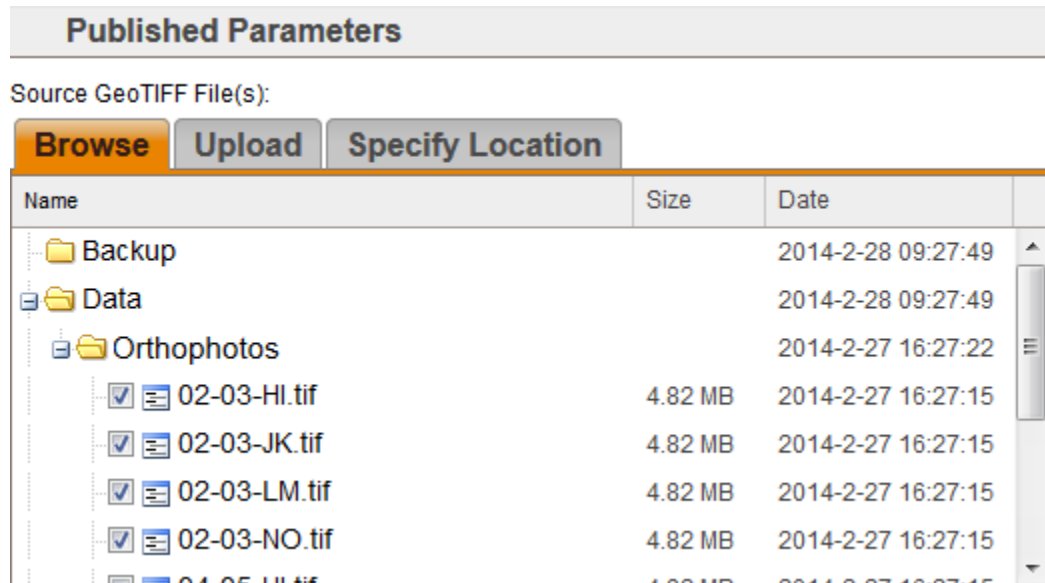
2. Select Source Data from Resources

The Configure page allows you to set any published parameters for a workspace, in the same way that using "Prompt and Run" would in FME Workbench.

Parameters which represent file sources are given special treatment to allow you to either *Browse* to a Resource dataset, *Upload* data or *Specify Location* of the data as a path on the file system.

Having already uploaded data to a Resources folder, we will Browse to those files.

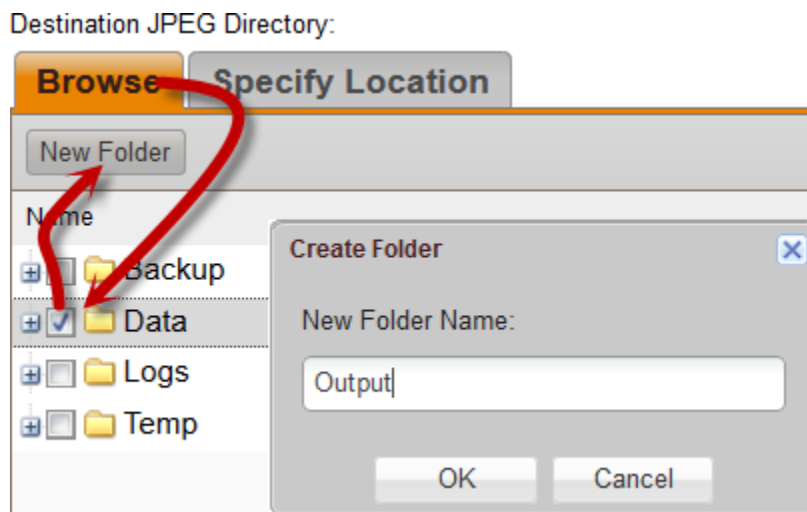
Click the Browse tab if it is not already highlighted and expand the Data and Orthophotos folders. Select all or some of your files. The other parameters can be left with their defaults.



3. Select Destination Folder

Once the source data is selected, we can now select an output location in the Resources folder.

Locate the Destination Dataset parameter and click the Browse tab if it is not already highlighted. Select the Data folder, click New Folder and create a new folder called Output.



The folder is created and automatically selected as the output location.

NB: Writing to a resource folder like this is important for when there is no local or network path for FME to write the output to.

4. Run the Workspace

Once you have selected some image files, click Run Workspace at the bottom-right of the configure page. This will submit the job with your parameters and an FME Engine will run the workspace.



The browser will wait until the job completes because it was submitted in mode known as synchronous. After a short time a Success message will appear with links to view or download the FME log file.

Exercise2a.fmw

Sending Job to Server

Time Elapsed: 3 seconds



Exercise2a.fmw

Success

Translation Successful

Job Id: 78

Number of Features Written: 4

Time Elapsed: 5 seconds

[View Log](#)

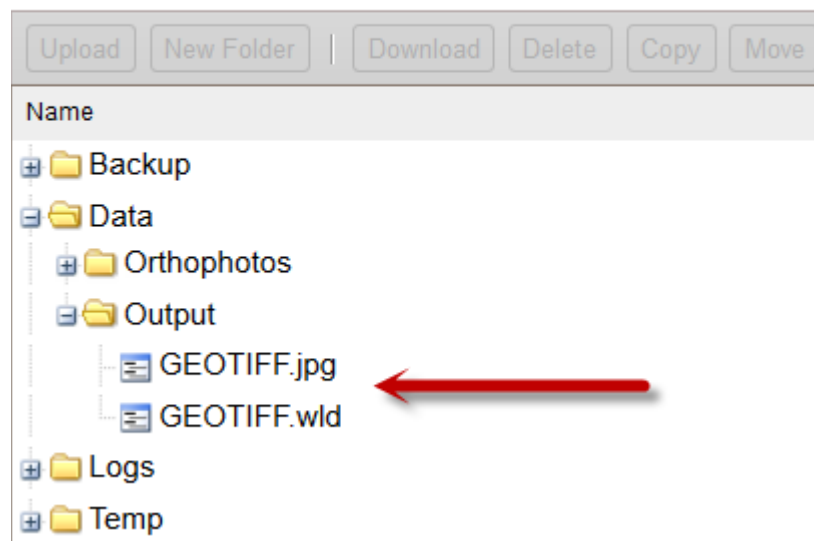
[Download Log](#)

5. Locate Output

When complete, browse to the Resources section of the interface and look in the Output folder. You should see the result of the translation written to this folder.

[Home](#) > [Resources](#)

Resource Management



Congratulations! You have now run a workspace with the Job Submitter service on FME Server.

Advanced Task

You can submit a job to the FME Server Job Submitter Service or any other service using a URL or by posting a form. The syntax is provided in the Configure page for your workspace, so let's give it a try.


1. Browse to the Workspace

Browse to your workspace again in the Web User Interface using Repositories > Training > Exercise2a.fmw > Configure.

Click the button at the bottom-left corner of the page labelled Show Developer Information

Host: localhost
Port: 7071
FME Server 2014 - Build
14234 - win32

FME © Server © 1994 -
2014
Safe Software Inc.


Show Developer Information

Reset Published Parameters

2. Run the Workspace

The Developer Info button opens up a section that shows how to run the workspace using a Direct URL (as a HTTP GET) and a web form (using HTTP POST).

Copy the Direct URL and paste it into the address bar of a new tab in your browser. Press enter to activate the URL and run the workspace.

You may be prompted to authenticate again in which case enter the same user and password as you did in Exercise 2a. The job will be submitted synchronously again although the results page will look different since it was not submitted via the web interface.

3. Change Parameters

Examine how the published parameters are set in the URL and try to change one of the source GeoTiff file names (to different ones in your Resources) before running the workspace again.

Translation Results



It's easy to check whether a workspace ran correctly or not

Translation Result

When the workspace has been run through the FME Server web user interface, you'll get a result that you can see immediately:

Here, for example, a workspace has been run and completed successfully.

MyWorkspace.fmw Success

Translation Successful

Job Id: 77

Number of Features Written: 0

Time Elapsed: 0 seconds

[View Log](#)

[Download Log](#)

Job Management

When you come back to check on a previous translation you can check the result by clicking on the Jobs item on the menu. There are tabs for Queued, Running, and Completed translations.

Here you can see that two workspaces have completed successfully, and two failed:

Home
Repositories
Jobs →
Notifications
Schedules
Security
Services





Completed

Queued

Running

Remove

Remove All

<input type="checkbox"/>	Id	Status	Engine
<input type="checkbox"/>	65	 SUCCESS	Engine1 on vash
<input type="checkbox"/>	64	 SUCCESS	Engine1 on vash
<input type="checkbox"/>	63	 FME_FAILURE	Engine2 on vash
<input type="checkbox"/>	62	 FME_FAILURE	Engine2 on vash

Log File

When you click on a job in the job queue it opens a dialog with more detailed information about the results of the job:

Status	Request Data	Result Data	Log
Parameter	Value		
Job Id	77		
Priority	100		
Subsection	JOB_SUBMITTER_SERVICE		
Submitted	2014-02-17 12:52:56		
Queued	2014-02-17 12:52:56		
Started	2014-02-17 12:52:56		
Finished	2014-02-17 12:52:56		
Delivered	2014-02-17 12:52:56		
Log File	fme_job_77.log		

You can then click the Log tab to check the log file and find even more information about the translation itself. This log is equivalent to the log shown in the FME Workbench log window:

Status

Request Data

Result Data

Log

Download Log

Quick Filter

Line #	Status	Duration	Elapsed	Time	Message
1	INFORM	0.0	0.0	2014-02-17 12:52:56	FME 2014 (20140120 - Build 14234 - WIN32)
2	INFORM	0.0	0.0	2014-02-17 12:52:56	FME_HOME is 'C:\apps\FMEServer\Server\fme\'
3	INFORM	0.0	0.0	2014-02-17 12:52:56	FME Engine (floating)
4	INFORM	0.0	0.0	2014-02-17 12:52:56	Permanent License.
5	INFORM	0.0	0.0	2014-02-17 12:52:56	Machine host name is: vash
6	INFORM	0.0	0.0	2014-02-17 12:52:56	START - ProcessID: 3812, peak process memory usage: 44460 kB

The log is obviously of most use where the translation has been flagged as failed:

Status	Request Data	Result Data	Log		
<div>Download Log</div> <div>Quick Filter</div>					
Line #	Status	Duration	Elapsed	Time	Message
78	ERROR	0.0	0.5	2014-02-13 16:55:55	A fatal error has occurred. Check the logfile above for details
79	INFORM	0.0	0.5	2014-02-13 16:55:55	FME Session Duration: 0.5 seconds. (CPU: 0.3s user, 0.1s system)
80	INFORM	0.0	0.5	2014-02-13 16:55:55	END - ProcessID: 19348, peak process memory usage: 91732 kB

There is also a button labelled **Download Log** where you can download the file if necessary.

Exercise 2d: Checking the Result	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Checking the previous translation
Demonstrates	FME Server translation results
Starting Workspace	n/a
Finished Workspace	n/a

Having run a workspace, now let's look at the job history details. This will confirm the workspace ran to completion and produced the correct results.

1) Examine the Job History

Click on the Jobs link in the Web User Interface main menu.

This will open a page with three tabs: Completed, Queued, and Running.

There should not be any queued or running jobs so click on the Completed tab to see a view of the latest completed jobs. Each job item represents one run of one workspace and includes details such a Status, Workspace Name etc.

Home
Repositories
Jobs
Notifications
Schedules
Security
Services
Monitoring
Resources
Migration

Home > Jobs
Jobs

Completed Queued Running

Remove Remove All

<input type="checkbox"/>	Id	Status	Engine	Time Started	Time Finished	Priority	Repository	Workspace
<input type="checkbox"/>	88	SUCCESS	Engine2 on vash	2014-02-28 09:48:37	2014-02-28 09:48:37	100	Training	Exercise2a.fmw
<input type="checkbox"/>	87	SUCCESS	Engine1 on vash	2014-02-28 09:48:09	2014-02-28 09:48:09	100	Training	Exercise2a.fmw
<input type="checkbox"/>	86	SUCCESS	Engine1 on vash	2014-02-28 09:47:56	2014-02-28 09:47:56	100	Training	Exercise2a.fmw
<input type="checkbox"/>	85	SUCCESS	Engine1 on vash	2014-02-28 09:47:42	2014-02-28 09:47:43	100	Training	Exercise2a.fmw

2. Examine Last Job

Click on the latest job which will be at the top of the list and should be the workspace you ran using the Job Submitter Service in Exercise 2c.

Information is available under one of a number of tabs: Status, Request Data, Result Data, Log.

Click on each tab in turn to inspect the information.

The Request Data tab shows the values used for each published parameter when the workspace was run.

Look at the values for the parameters DestDataset_JPEG and SourceDataset_GEOTIFF, both of which should point to the resource directory represented by an environment variable such as \$(FME_SHAREDRESOURCE_DATE)

SUCCESS

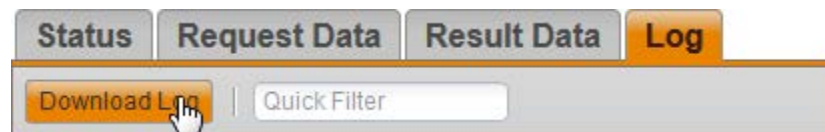
Features Written: 1

Status	Request Data	Result Data	Log
Parameter	Value		
Job Id	88		
Priority	100		
Subsection	JOB_SUBMITTER_SERVICE		
Submitted	2014-02-28 09:48:37		
Queued	2014-02-28 09:48:37		
Started	2014-02-28 09:48:37		
Finished	2014-02-28 09:48:37		
Delivered	2014-02-28 09:48:37		
Log File	fme_job_88.log		

3. Examine the FME Log File

Under the Log tab, click the **Download Log** button.

This will download the FME log to a file.



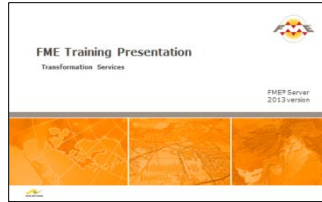
Examine the log to see how it compares to a log file generated by FME Workbench. It should look very similar. The main differences are the Command line arguments, which include parameters specific to FME Server.

4. Examine Output Folder

Under the Resources menu browse to the Output folder and confirm the data has been written.

Name	Size	Date
[-] Data		2014-4-17 13:27:20
[-] Orthophotos		2014-4-9 14:50:53
[-] Output		2014-4-9 15:28:52
[-] GEOTIFF.jpg	496.40 KB	2014-4-9 15:28:52
[-] GEOTIFF.wld	0.09 KB	2014-4-9 15:28:52

Troubleshooting for Administrators

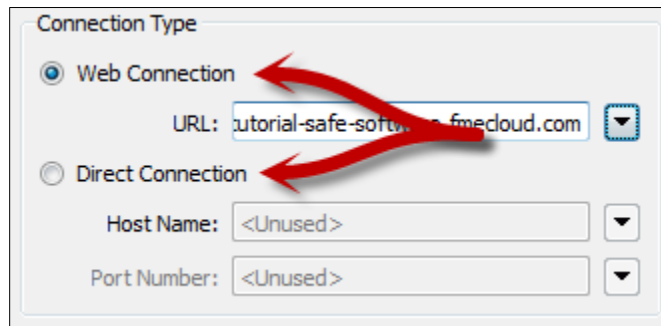


This section shows a few basic troubleshooting techniques in case of emergency

FME Workbench-FME Server Connection

If you are unable to connect from FME Workbench to FME Server then the following suggestions may be of help.

- Confirm the connection type. If FME Server is not on your Local Area Network, then you will need to use the Web Connection option, rather than the Direct Connection.



- Check if there is a firewall running on either your computer or the FME Server. If so, you must open port 7071 to use Direct Connection or port 80 to use the Web Connection.

Workspaces are Queued but not Run

If a workspace appears in the FME Server queue, but is never executed, then it may be because no engines are running.

- Check the Web User Interface to confirm engine status. If no engines are available check licensing and update as necessary. Restart FME Server once a proper licence is in place.

Engines

Engine1 (Build 14234) is running on host vash

Engine2 (Build 14234) is running on host vash

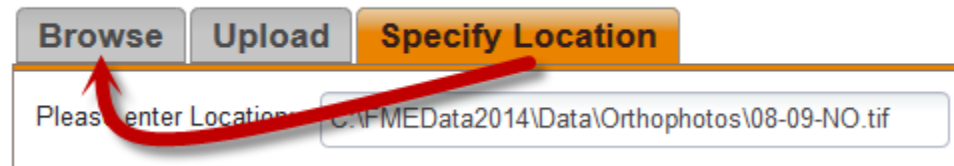
Workspaces Fail when Run

If a workspace fails when it is being run, then the following suggestions may help

- Run the workspace first on FME Desktop. If it does not work there, it will not work on FME Server.
- Check the FME log file using Jobs > Completed in the Web User Interface. This may help to explain why there is a problem.
- Commonly data paths cause problems when moving from a local Desktop machine to a Server environment. Check the dataset parameters (Reader and Writer) to ensure they are not referring to a local path that does not exist on the Server.

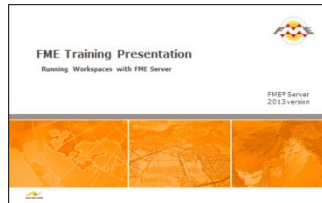
You may need to change the parameter to use the Resources dialog (Browse) and not a file path dialog (Specify Location).

Source GeoTIFF File(s):



- If you are trying to read data with a UNC path, ensure that the FME Server Windows Service is being run by a user with the proper domain access permissions.

Module Review



This module introduced you to running workspaces on FME Server.

What You Should Have Learned from this Module

The following are key points to be learned from this module.

Theory

- FME Server is a Model Driven Architecture – where workspaces are the models
- FME Desktop (particularly FME Workbench) is the authoring tool for FME Server workspaces
- FME workspaces are published from Desktop to Server and stored on FME Server in repositories
- Data (and other related files) can be uploaded and stored on FME Server as “Resources”. The output from a translation can be written to a Resources folder too.
- The Job Submitter service is for running a workspace “as-is”

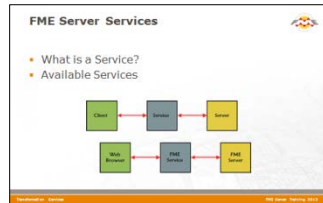
FME Skills

- Publish a workspace from FME Workbench to FME Server, creating a new repository if necessary
- Upload source data to a Resources folder on FME Server
- Run a workspace on FME Server – either through the web interface or via a URL – that makes use of datasets in a Resource folder
- Examine the results of the translation to see if it was successful

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Self-Serve with FME Server



Self-Serve takes the tedious tasks away from staff and leaves them to concentrate on more important things.

What is Self-Serve?

Self-Serve is the term for a system set up to allow the end user to carry out his own data translations and transformations. In this way routine data management tasks are offloaded from staff to the user, who is empowered to carry out processes at their own convenience.

Usually the system is set up in such a way that the end user needs no prior FME experience or training to carry out their goals; for example they can access the functionality through a web interface customized to their particular needs. In fact the user does not even need to know of FME, or that FME is the engine driving their applications!

Self-Serve Types

In general there are two types of self-serve systems.



Data Upload systems are where the user is able to upload their data to be processed on FME Server. A typical application would be a user uploading data to be validated. The data is run against a number of tests in an FME workspace and the results sent back to the user.

Data Download systems are where the user is able to serve themselves with data. A typical application would be an organization that frequently provides data to either staff or customers. With a Data Download system the user can fetch their own data, rather than having to be provided with it in a more manual way.



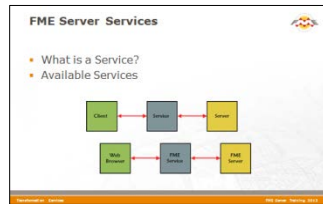
Self-Serve and Services

Self-Serve is implemented through a number of Services on FME Server. A Service is a particular method of communication between client and server. Different services allow different forms of data distribution to take place.

Self-Serve and Parameters

FME translations and transformations are controlled by Parameters. To enable users to select the requirements for their translation, FME includes functionality called Published Parameters. A parameter that is published becomes available for the end-user to set.

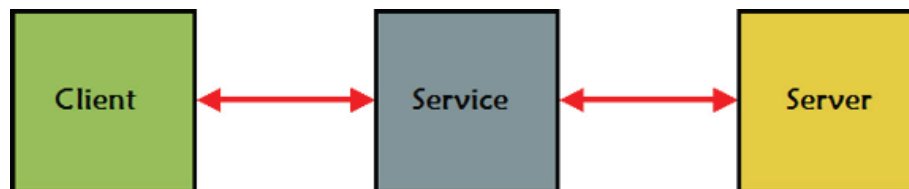
FME Server Services



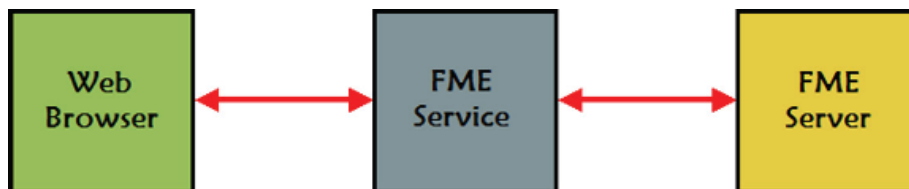
Many standard operations using FME Server take place using something called a 'service'. FME Server provides a wide range of services to carry out common tasks.

What is a Service?

In the simplest of terms, a service is a piece of software that handles communications between a client and a server. In other words, it's a tool that allows users to access complex functionality through a simplified interface.



In terms of FME Server, the client is often—but not always—a web browser that passes requests to FME Server using a service.



For FME Server, a service lets you send specific types of requests to FME Server and provide results to client applications in a specific way.

For example, instead of just running a workspace, you can have a web page ask for the results of the workspace as a package of data compressed in a zip file.



Professor Spatial F.M.E., E.T.L. says...

'Although the concept sounds complicated, a service is a simpler way of communicating requests to FME Server than using the API.'

Also, FME Server includes a number of predefined services that cover a lot of the functionality you are likely to need.'

Available Services

FME Server includes the following services:

OGC Web Feature Service (WFS)	OGC Services
OGC Web Mapping Service (WMS)	
Data Download Service	Transformation Services
Data Streaming Service	
Job Submitter Service	
KML Network Link Service	
Scheduler Service	
Catalog Service	Utility Services
Data Upload Service	
Token Service	
Web Connection (SOAP) Service	
REST Service	
Notification Service	Notification Services

Remember that services can communicate in both directions. Transformation services – for example Data Download – are primarily Self-Serve tools for Server to deliver data to the end user.

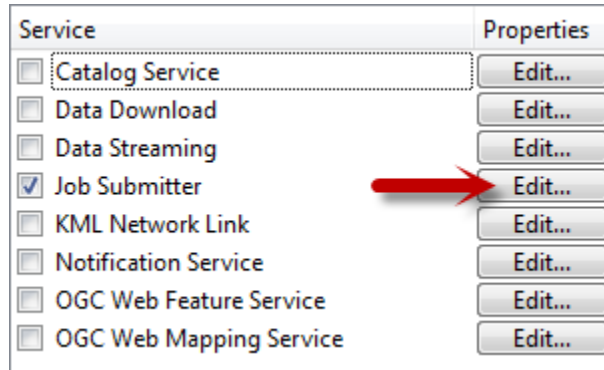
Utility services can be described as “helper” services. They interact with FME Server to assist in menial tasks such as uploading data or providing token security. In most cases these are facilities that an author or developer will be using in a way that’s hidden from the user.

The Notification Service is used for passing short messages into and out of FME Server. Incoming messages notify FME Server to take some action, whereas outgoing messages alert an end-user (or system) that some sort of event has occurred.

Workspaces and Services

When a workspace is published to FME Server it can be registered with a particular service.

The Job Submitter service is automatically selected in the FME Server publishing wizard, whenever a workspace is published, but many other services are available too.

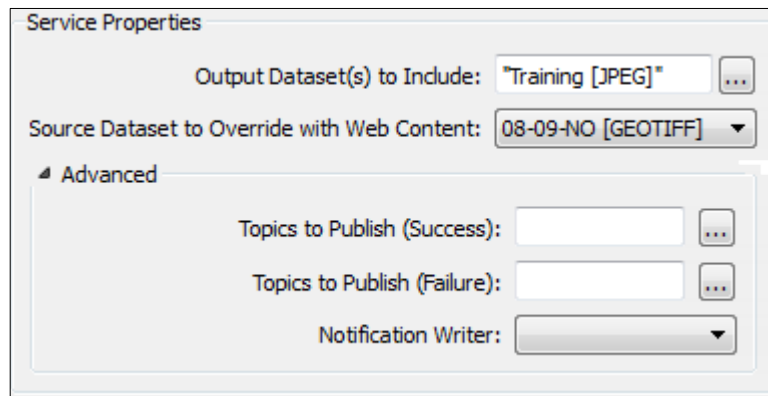


Registering a workspace with a service makes the workspace available for use in that service although, as you'll discover, not every workspace is capable of being used by every service.

Be aware of the Edit button to the right of each service.

Every service has a set of parameters available that determine how a workspace will be run with that service.

These parameters include ones for notification topics to trigger on completion of the workspace.

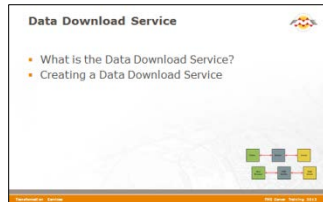


It's important to understand that a workspace may be registered against one service, many services, or no services at all.

When a workspace is not registered against a service, you can run it as a regular translation using the FME Server Console or the *FME Server Job Submitter* transformer in Workbench.

When a workspace is registered against a service, it can be used by that service and it's still available for use as a regular translation using FME Server Console.

Self-Serve and Parameters



Workspace parameters are the key to controlling Self-Serve and the Data Download service

What are Parameters?

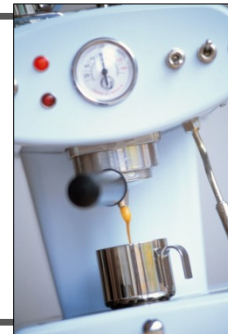
Parameters are what control a translation.



Chef Bimm says...

"Parameters in a translation are like the options when making coffee."

The machine can be set with the ingredients to be used, how they are combined, and what the end result of the process will be like."



In the hierarchy of different translation components, each different level of the hierarchy has a set of parameters that belong to it.

So there are:

- Workspace Parameters
- Reader Parameters
- Writer Parameters
- Feature Type Parameters

Published Parameters

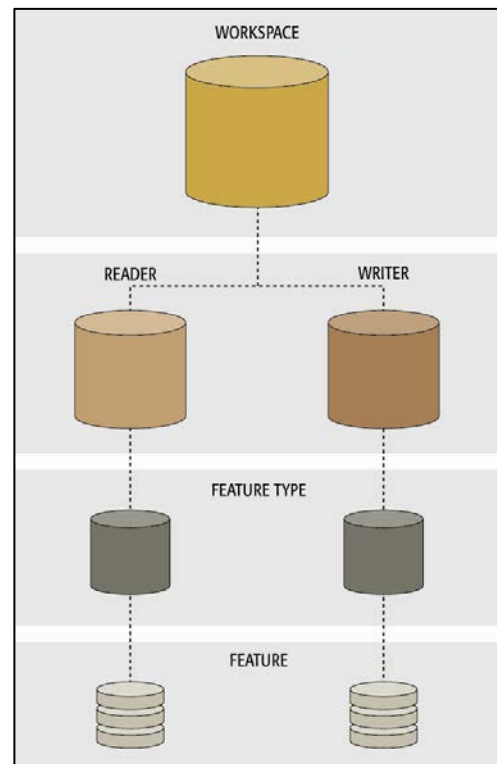
Published Parameters are those that have been exposed to the end-user, so they can set the values themselves. They are also called "User Parameters".

In a self-serve application, published parameters are important to let the end user control how the data is served in terms of style and structure.



Chef Bimm says...

"Published Parameters are like when you are given control of the machine to make your own coffee."



Parameter Uses in FME Server

For self-serve systems, parameters can be used to set:

- Coordinate System Selection
- Feature Types (Layers) to Read
- Geographic Area (Bounding Box or Area of Interest)
- Any other Reader, Writer, or Transformer parameters

With FME Server, the key to successful workspace authoring is flexibility. Workspaces need to be flexible to allow end-users to make choices without seeing all of the complexity of the workspace or the data behind it. Parameters are one way to accomplish this.

Data Uploads



Data Upload is a good way for a user to provide data to be processed

What is Data Upload?

As the name suggests, Data Upload allows a user to deliver data to FME Server for processing.

Data Upload can be used from any FME Server client, including:

- The Web User Interface
- An FME workspace
- A custom web application

Data Upload is often used for submitting data to an organization, for example a property developer submits a planning application containing a DWG dataset to a municipal planning department.

It is also often used for publishing data to be processed on FME Server, for example where FME Server is set up as a data validation web service and an end-user is uploading a set of data to be checked.

It's worth noting that data upload also includes other resources that may be required for a translation to run; for example custom transformers or text-file lookup tables may also be uploaded.

Implementing Data Upload

In FME2014 there are two forms of data upload: the **Data Upload Service** and the **Resource Folders**.

The Data Upload Service allows data to be uploaded to a particular workspace in a particular repository. The data is held temporarily for the workspace to be run.

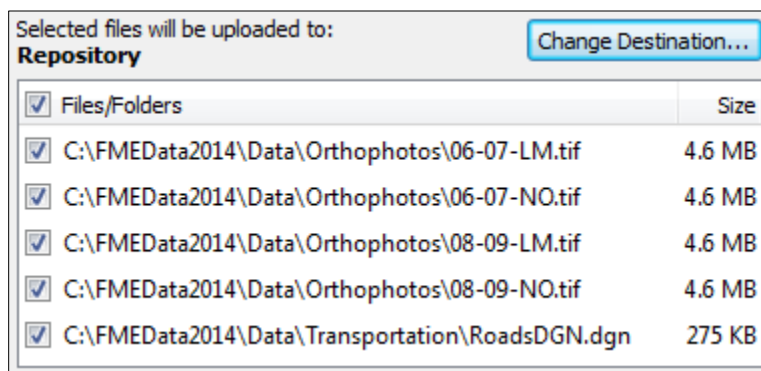
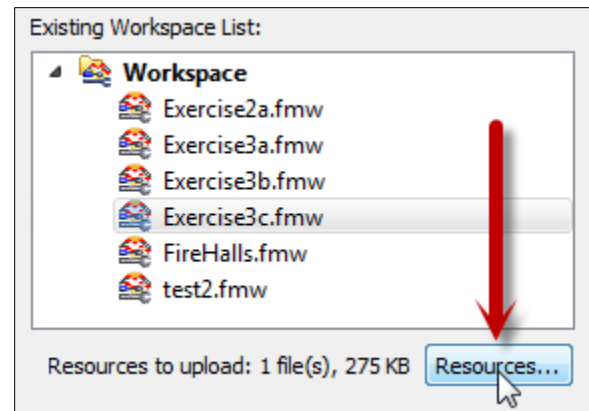
The Resource Folders allow data to be uploaded to a folder for use by any workspace in any repository. This upload is persistent and the data held there for as long as it required.

The Data Upload Service

The Data Upload Service allows data and other resource files to be uploaded to FME Server.

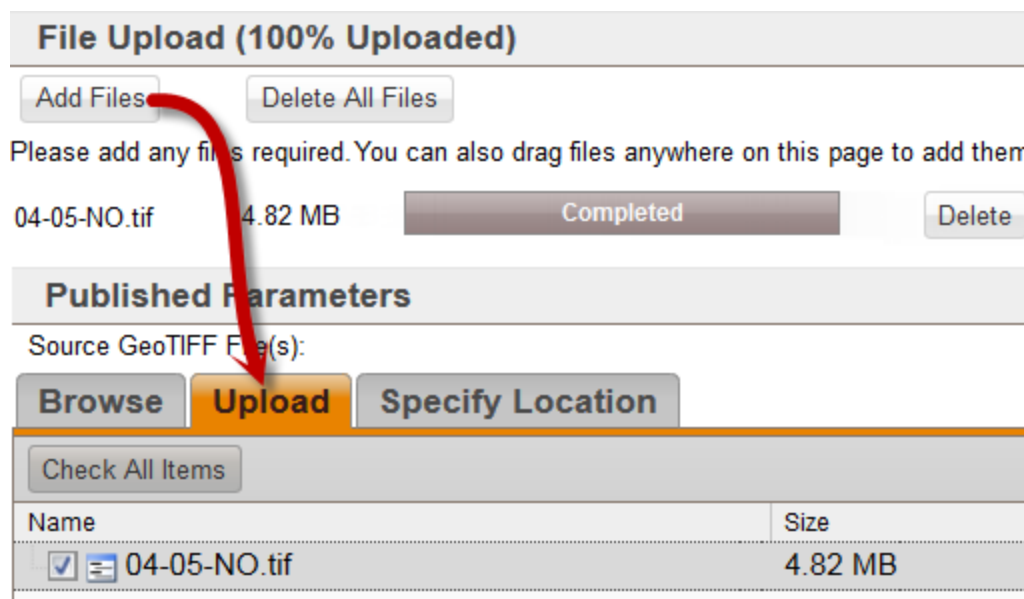
Files can be uploaded through the FME Server Publishing Wizard, when a workspace is published from Workbench to FME Server:

Clicking the Resources button opens a dialog that shows what data is being uploaded.



The upload of these files can be turned on and off as required, and you can also change the location to which data is uploaded – either to a repository (Data Upload) or to a Resource Folder.

The other way to upload data with this service is through the configure dialog when running a workspace. Use the Add Files button to upload the data, then the Upload button to select which files should be assigned to which published parameter:



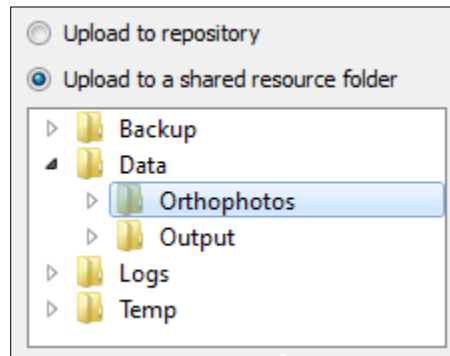
Be aware that data uploading with this service is only available with the chosen workspace. Also the data is stored only temporarily and will be deleted in – by default – 30 minutes time.



Resources Folders

Resource Folders are a more permanent and flexible way to upload data and resources to FME Server. They are new for FME2014.

Similarly to the Data Upload Service, files can be uploaded at the same time as a workspace.



When editing the resource info (in the publishing wizard) you would simply choose to upload the files as a **shared resource** (left). One other requirement is to select a location on the resources file system.

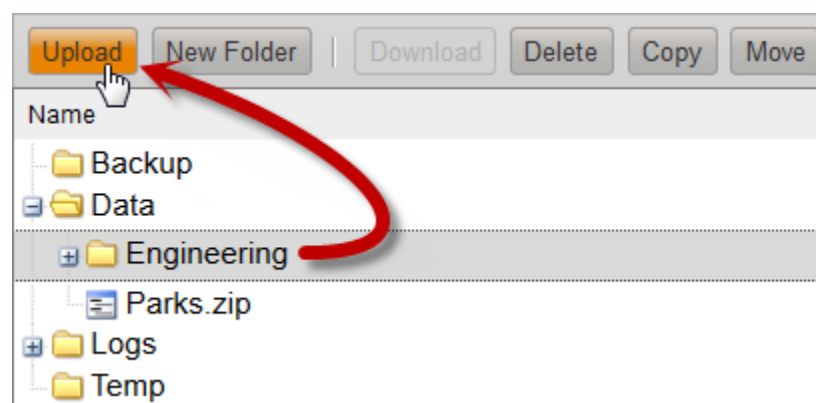
Another way to use this functionality is to use the Resources tool in the FME Server Web User Interface (below). Here you can upload, download, copy, move, and delete files; plus manage folders too.

Home
Repositories
Jobs
Notifications
Schedules
Security
Services
Monitoring
Resources
Migration

Upload New Folder Download Delete Copy Move		
Name	Size	Date
Backup		2014-2-17 15:09:04
Data		2014-2-17 15:09:04
Engineering		2014-2-14 11:22:05
StreetLighting.dwg	2.45 MB	2014-2-14 11:22:05
StreetLighting.prj	0.41 KB	2014-2-14 11:22:05
StreetLightingDGN.dgn	2.00 MB	2014-2-14 11:22:05
TrafficSignals.dwg	34.81 KB	2014-2-14 11:22:05
TrafficSignals.prj	0.41 KB	2014-2-14 11:22:05
TrafficSignalsDGN.dgn	50.69 KB	2014-2-14 11:22:05
Parks.zip	5.17 KB	2014-2-14 11:20:04
Logs		2014-2-17 15:09:05
Temp		2014-2-17 15:09:05

Resource Upload

To upload data simply click on a folder and then choose the Upload option:



Upload Files

The upload tool gives you the option to either upload a set of files, or an entire folder of data:

Upload to folder "Data/Engineering"
✕

Choose Files
Choose Folder

To upload a folder of data requires use of a browser – for example Google Chrome – that has folder upload capabilities. browser. At the time of writing, neither Firefox or IE have this ability.

Your browser does not support uploading folders. Please use [Google Chrome](#) if you require this functionality

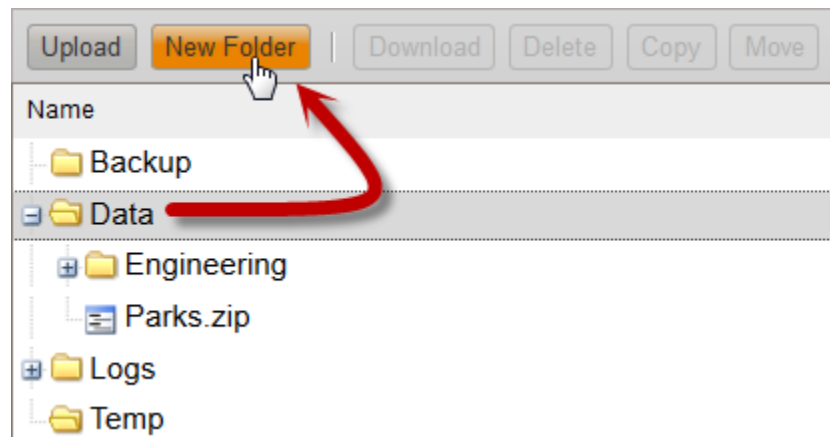
New Folder

The New Folder tool creates a new folder or sub-folder in the Resources mechanism.

For example, to create a sub-folder in the Data folder simply click on Data and then click New Folder:

You are prompted to enter a name for the new folder.

Enter a name, click OK, and the folder is created.



Name	Date modified	Type
Backup	03/02/2014 10:21 AM	File folder
Clients	03/02/2014 10:16 AM	File folder
Data	17/02/2014 3:21 PM	File folder
DefaultResults	03/02/2014 10:15 AM	File folder
Docs	03/02/2014 10:21 AM	File folder
Install	03/02/2014 10:15 AM	File folder
Logs	17/02/2014 12:51 PM	File folder
RequestData	13/02/2014 5:14 PM	File folder
Resources	03/02/2014 10:15 AM	File folder
Server	03/02/2014 10:20 AM	File folder
Temp	17/02/2014 3:21 PM	File folder

Besides those methods, folders in the Resources mechanism can be accessed – or created – in the server's file system.

For example, here are folders in C:\apps\FMEserver on a Windows file system.

Benefits

Resource Folders are more permanent because the data is not automatically deleted after a set time. Instead all uploaded files reside there until removed by a user/administrator.

Additionally, Resource Folders are more flexible for a number of reasons.

Firstly, you can access the files and manage them through a file system on the server. This is useful in itself, but it also allows the data to be accessed through UNC paths, which the Data Upload service does not.

Secondly, Resource Folders can be used for more than data upload.

It's also possible to write the results of a translation to a resource folder, as in this example. You would just set the output dataset parameter to a resource folder and enter a file name for it.





Destination Google Earth KML File:

Browse

Specify Location

Step 1. Choose Destination Folder

New Folder

Name	Size	Date
 Backup		2014-3-20 15:38:09
 Data		2014-3-20 15:38:09
 Logs		2014-3-20 15:38:09
 Temp		2014-3-20 15:38:09

Step 2. Choose Destination Name

Also, files inside a Resource Folder can be managed using the REST API too, with POST and GET functions for downloading files, creating folders, and copying files (for example). This gives control over these resources to any developer who wishes to create their own web applications.

resources : Shared Resource Manager

GET	/resources	Retrieve all shared resources
GET	/resources/< resource >	Retrieve shared resource details
POST	/resources/< resource >/commands/copy/< srcpath >	Copy files to another location
POST	/resources/< resource >/commands/move/< srcpath >	Move files to another location
GET	/resources/< resource >/filesystem/< path >	Download file
GET	/resources/< resource >/filesystem/< path >	Retrieve file or directory metadata
POST	/resources/< resource >/filesystem/< path >	Create a directory
POST	/resources/< resource >/filesystem/< path >	Upload multiple files
POST	/resources/< resource >/filesystem/< path >	Upload file
DELETE	/resources/< resource >/filesystem/< path >	Remove a file or directory



Exercise 3a: Data Upload	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Create a data upload service for validating spatial data
Demonstrates	Authoring for and Using the Data Upload Service
Starting Workspace	n/a
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3a-Complete.fmw

This time you wish to create a solution for data providers to automatically upload data to your system. Naturally you will wish to test data quality – in this case resolution – and reject any data that does not meet your standards.

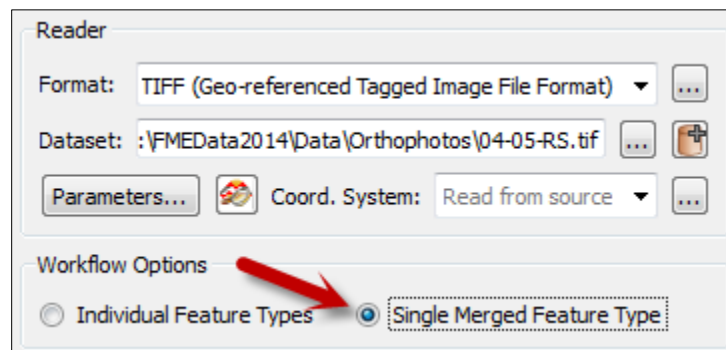
1. Start Workbench

Start Workbench (if necessary).

2. Add Reader

The first component required for Data Upload is a Reader, so select Readers > Add Reader from the menubar. When prompted add a Reader with the following parameters:

Reader Format GeoTIFF (Geo-referenced Tagged Image File Format)
Reader Dataset Any TIF file in C:\FMEData2014\Data\Orthophotos\
Workflow Options Single Merged Feature Type

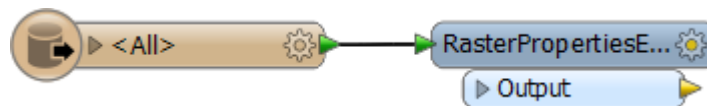


The workflow option is important because setting a merged feature type allows any TIFF file to enter the workspace. If it is not set then only the original file could ever be read.

3. Add RasterPropertiesExtractor

To test the quality of the incoming data we need to first extract some information about it. So, add a RasterPropertiesExtractor transformer. You can do this by clicking on a clear part of the canvas and typing *RasterPropertiesExtractor*. Drag a connection from the Reader to the transformer.

This will extract information about the incoming data and store it as attributes.

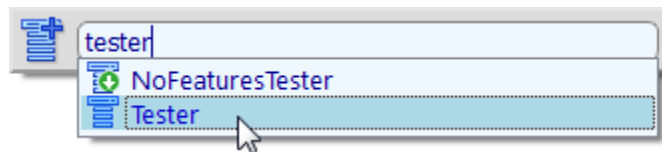


If you wish, you may connect a Logger transformer and run the workspace, just to see what the attributes look like.

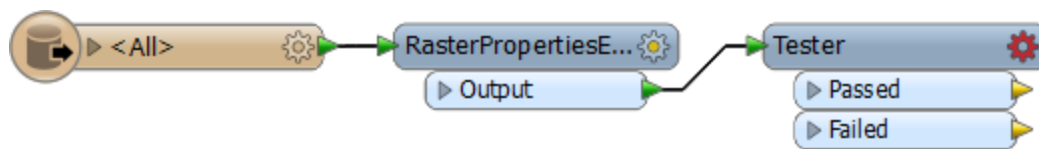
4. Add Tester

Now we will add a Tester transformer to test whether the properties of the data are a match for what we require.

Do this by clicking on the RasterPropertiesExtractor transformer and typing *Tester*. Then select Tester from the drop-down list of transformers.



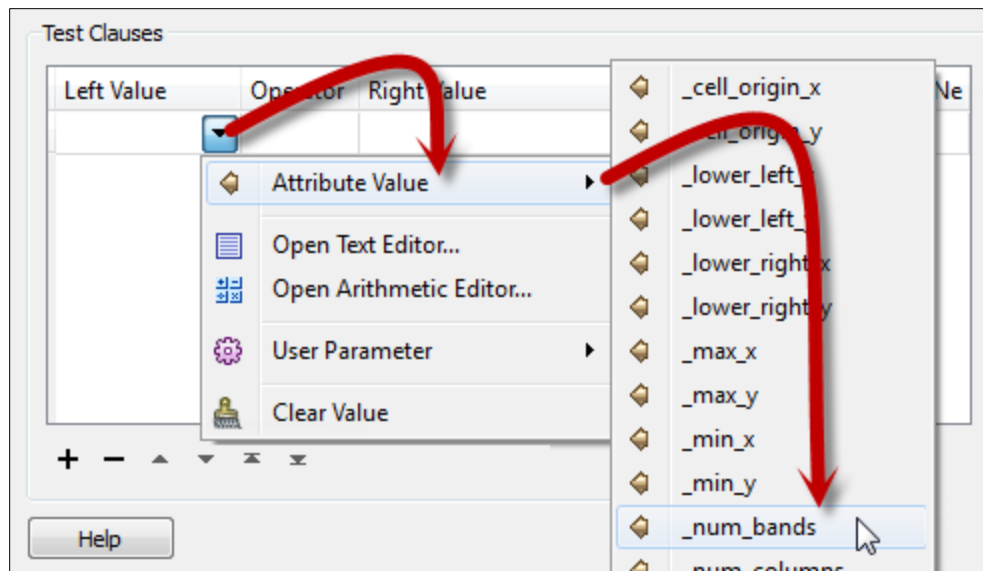
The workspace will now look like this:




5. Set Tester Parameters

Click on the red cogwheel icon on the Tester to open its parameters dialog.




In the dialog double-click in the Left Value field. From the drop-down list select Attribute Value > _num_bands. This attribute tells us how many bands are in the source data:



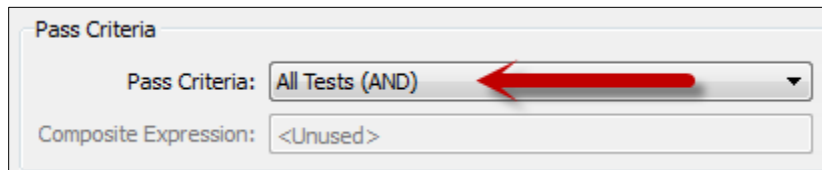
Set the Operator field to equals (=) and type the number 3 into the Right Value field:

	Left Value	Operator	Right Value	Negate	Mode
1	 _num_bands	=	3	<input type="checkbox"/>	Automatic
2		=		<input type="checkbox"/>	Automatic


Now repeat that process to test for `_spacing_x = 1` and `_spacing_y = 1`

	Left Value	Operator	Right Value	Negate	Mode
1	 <code>_num_bands</code>	=	<i>k</i> 3	<input type="checkbox"/>	Automatic
2	 <code>_spacing_x</code>	=	<i>k</i> 1	<input type="checkbox"/>	Automatic
3	 <code>_spacing_y</code>	=	<i>k</i> 1	<input type="checkbox"/>	Automatic

Finally, set the Pass Criteria parameter to All Tests (AND). If you don't then the incoming data will pass even if only one aspect of it is correct.



Pass Criteria

Pass Criteria: **All Tests (AND)** 

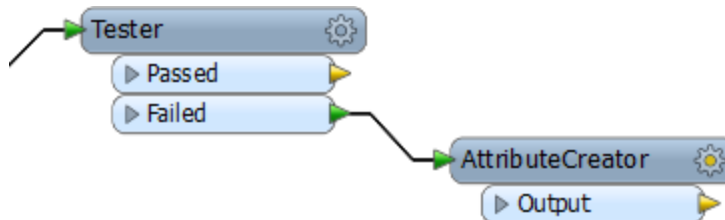
Composite Expression: `<Unused>`

Click OK to close the dialog. We now have a test to ensure the incoming data has the correct number of bands and the correct resolution.

6. Add AttributeCreator Transformers

We now have to decide how we are going to communicate the results of the translation to the end-user. The most effective way is perhaps to respond with a web page describing the results.

To generate some very simple HTML we'll use an AttributeCreator transformer. So add an AttributeCreator transformer and connect it to the Tester:Failed port:

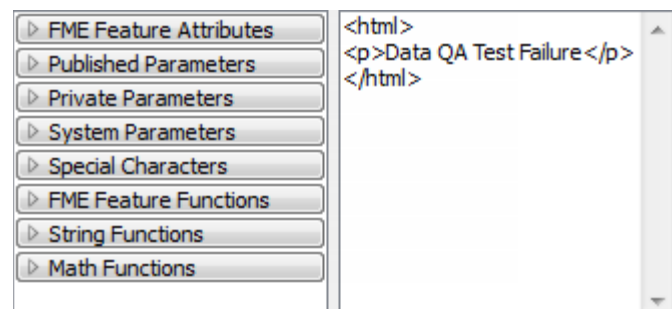


Now open the parameters for the AttributeCreator. Enter an attribute name of `text_line_data` (the name is important as we'll see shortly) and for the value click the [...] button to open a text editor.

In the text editor, just enter some simple HTML such as:

```
<html>
<p>Data QA Test Failure</p>
</html>
```

Click OK and then OK again to close the dialogs.



☐ FME Feature Attributes
☐ Published Parameters
☐ Private Parameters
☐ System Parameters
☐ Special Characters
☐ FME Feature Functions
☐ String Functions
☐ Math Functions

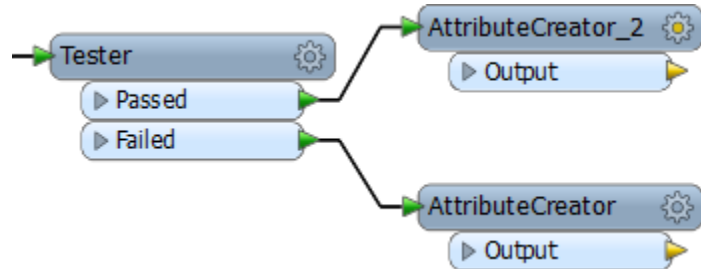
<html>
 <p>Data QA Test Failure</p>
 </html>

7. Duplicate AttributeCreator

Having created HTML for a failure we now need to do the same for a successful test. The simplest way to do this is select the existing AttributeCreator and press Ctrl+D to duplicate it (alternatively you can use Right Click > Duplicate).

Connect the new transformer to the Tester:Passed port.

Now open the parameters dialog and change the message inside from Failure to Success.



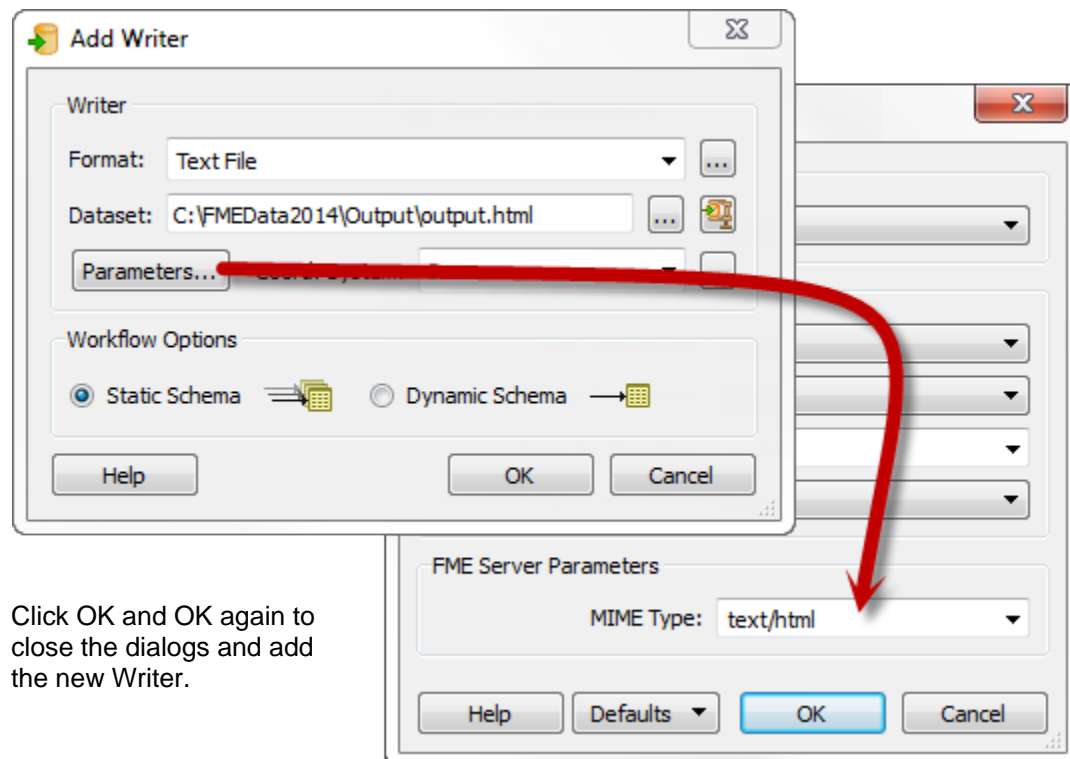
8. Add Writer

To output HTML in a way that will open automatically, we need to stream it through a Text File writer. So, select Writers > Add Writer from the menubar.

When prompted create a Writer as follows:

Reader Format	Text File
Reader Dataset	C:\FMEData2014\Output\output.html
Parameters	
MIME Type	text/html

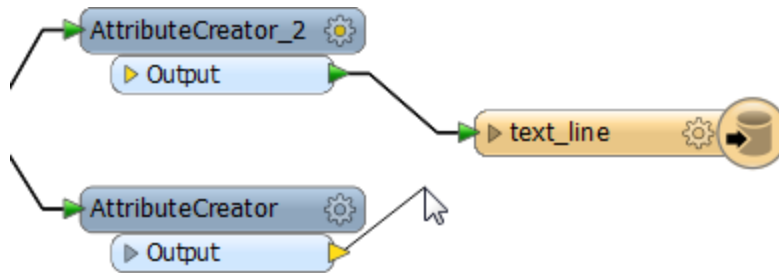
Really the output dataset is irrelevant here as it will never be used. The MIME type is set by clicking the Parameters button and using the setting inside that dialog.



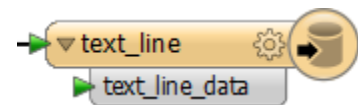
Click OK and OK again to close the dialogs and add the new Writer.

9. Connect Writer

Connect the Writer into the workspace by dragging connections from the output ports of both AttributeCreator transformers:



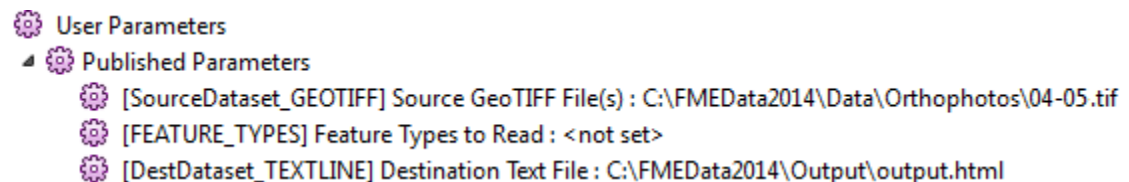
If you expand the text writer's attribute list you'll see it is expecting data to arrive in an attribute called text_line_data, which is why it was so important that the AttributeCreators create their attribute with that exact name.



10. Delete Existing Published Parameters

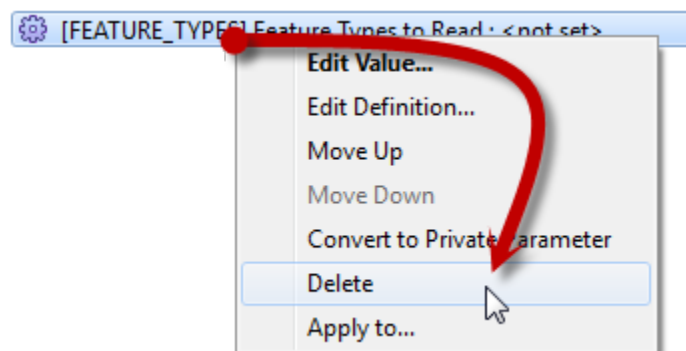
The workspace is now complete except for one thing, published parameters. Remember these are how the user is prompted to make a selection to control the translation.

In this case we wish for the user to be given the chance to upload data, but not anything else. However, if you look in the Navigator window of Workbench you'll see that some parameters in a workspace are published by default.



The source parameter is great, as it will let the user upload a source dataset; but the other parameters are not required. They will confuse the user and have no effect on the translation.

So delete these two parameters. You can either click them and press the delete key,



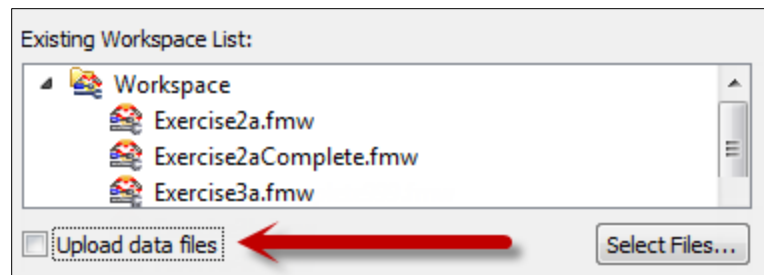
11. Test Run Workspace

Test run the workspace in FME Workbench to ensure it runs to completion. It will create a HTML file as output, though it won't open it automatically because only FME Server can do that.

12. Publish to FME Server

Save the workspace as Exercise3a.fmw. Then select File > Publish to FME Server from the menubar to start the publishing process.

As before (in Chapter 2) enter your connection parameters and then select the Training repository as the location to store the workspace. However, in that dialog be sure to uncheck the box labelled "Upload data files". The end-user will be uploading the files; we don't need to.



For the Service to register against, uncheck Job Submitter (and any other services) and check Data Streaming. We'll cover Data Streaming in more detail later in this chapter; for now just click **Publish** to finish publishing the workspace.

13. Run Workspace

Now – in the role of a data supplier – open the FME Server Web Interface in a web browser.

Browse to the newly uploaded workspace (Repositories > Training > Exercise3a.fmw) and click the Configure label:

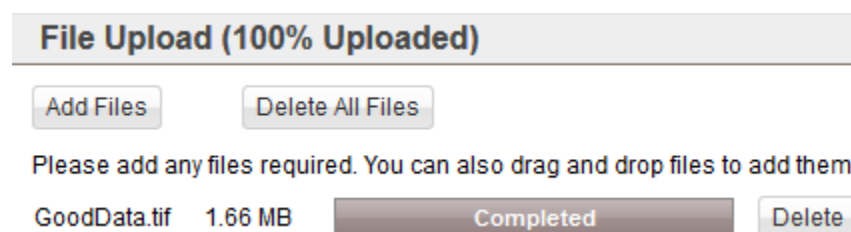
Home > Repositories > Training > Exercise3a.fmw

Registered Services

Data Streaming



In the configuration page select Add Files and add the file C:\FMEDData2014\Resources\Self-Serve\GoodData.tif. It will then be uploaded to FME Server and become available for use.



This is the key part of the process: the ability for an end-user to upload data to process.


Under Published Parameters click the Upload button for the source GeoTIFF data and select the newly uploaded *GoodData.tif*

Published Parameters

Source GeoTIFF File(s):

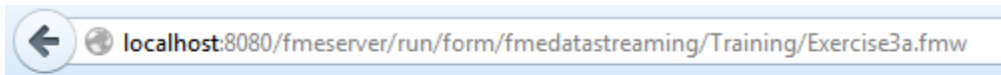
Browse **Upload** **Specify Location**

Check All Items

Name	Size
<input checked="" type="checkbox"/>  GoodData.tif	1.66 MB

Notice there are no other published parameters as there is nothing else we wish the end-user to have control over.

Now click the Run Workspace button. The translation should run to completion and a brief message given to alert us to the status of the dataset.



Data QA Test Success

You can now run the same process on the file *BadData.tif* to prove that it fails the tests.

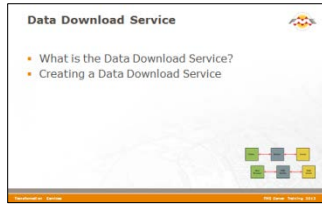


Sister Intuitive says...

'Yes, the output from this exercise is sinfully basic, but we're not here to teach you HTML! Now you know how to create a Data Upload service from the FME Server side you can apply your web skills to producing a more aesthetic result - and even a custom form for uploading the data.'

Additionally, you can add extra tests and functionality inside the FME workspace in order to carry out more QA. The GeometryValidator transformer is a great solution for dealing with vector data.'

Data Download Service



The Data Download service is the key tool for Self-Serve setups

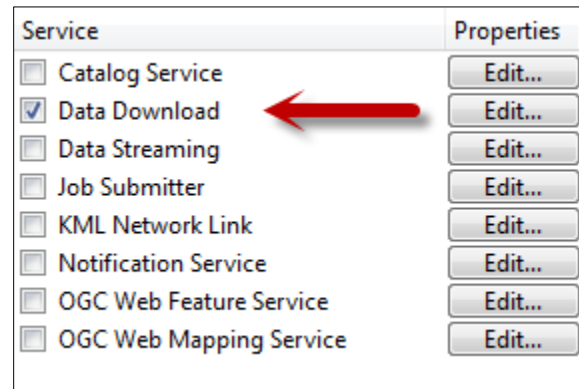
What is the Data Download Service?

When you run a workspace with the Job Submitter service (as in Chapter 2) the data is written to the location specified by the workspace; for example a file, directory, or database.

The Data Download service instead writes the output to a zip file and presents the user with a link to that file. This makes it ideal for self-serve, because the data is delivered directly to the user.

Creating a Data Download Service

A workspace becomes available for data download use when the author registers it against the Data Download service when publishing it to FME Server.



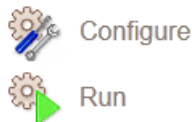
Home > Repositories > Samples > austinDownload.fmw

austinDownload.fmw

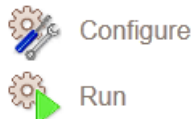
City of Austin: Data Download

Registered Services

Data Download



Job Submitter



Using a Data Download Service

Once registered this way, Data Download options become available in the FME Server Web interface for that particular workspace.

The workspace can be run through the web user interface, or using the developer URL information.



Monsieur D. Server says...

'Behind the scenes, the Data Download service overrides the Writer's destination parameter and writes a zip file to an internal folder, from where it can serve up the required data to the end-user in the form of a URL'



Exercise 3b: Data Download	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Create a data download service
Demonstrates	Authoring for and Using the Data Download Service
Starting Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3b-Begin.fmw
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3b-Complete.fmw

This exercise involves making orthophoto data available through a Data Download service. We will also mosaic the various files together and resample them to a lower resolution.

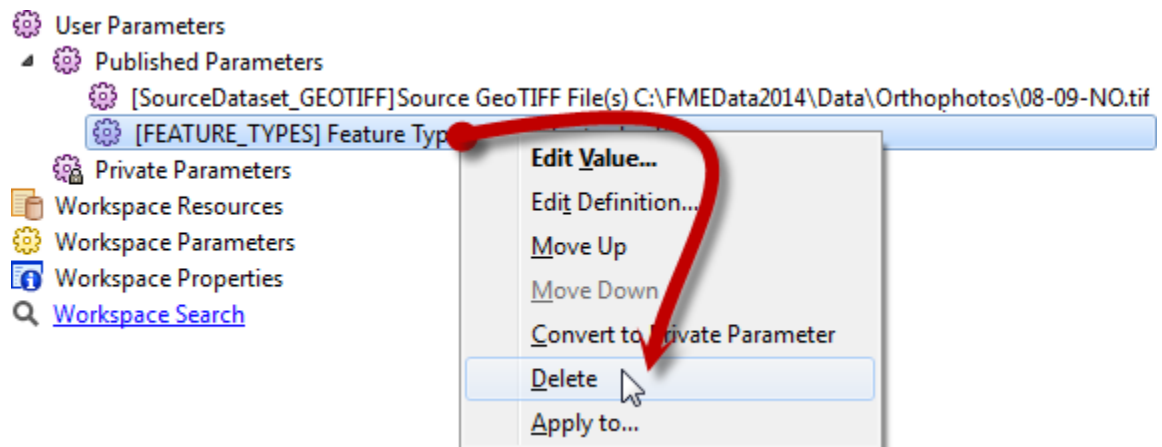
1. Start Workbench

Start Workbench (if necessary) and open the starting workspace for this Exercise. You will be familiar with it as it is the same workspace we created in Chapter 2.

2. Delete Existing Published Parameters

Some parameters in a workspace are published by default. This lets the user select the output dataset (for example) when the workspace is run. However, we don't need to let the user set any parameters and so best practice suggests we remove them.

Browse the Navigator window and expand the section labelled User Parameters - Published Parameters. Right-click and delete the Destination JPEG Directory and the Feature Types to Read parameters.



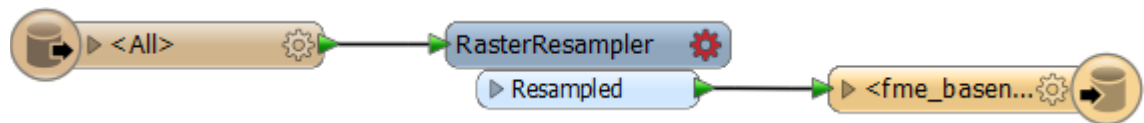
Only keep the published parameter for the source dataset.

3. Add a RasterResampler Transformer

Now we can add transformers to resample and mosaic the source data.

Click on the connection between the Reader and Writer feature types. Start typing “resampler”. A list of matching transformers will appear. When you see the RasterResampler transformer then select it.

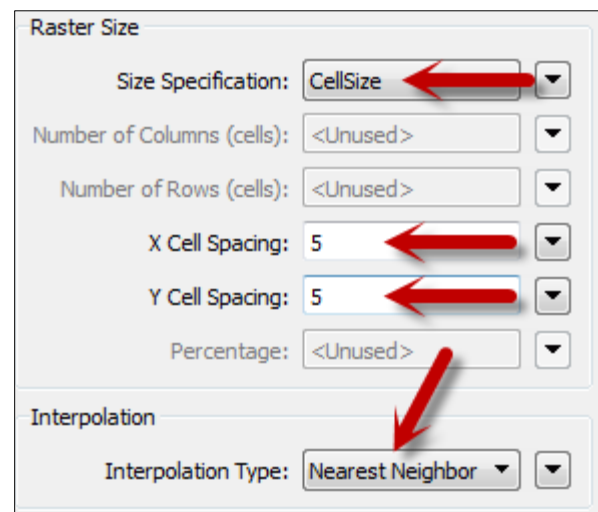
The transformer will now be added into the workspace.



Click the Red cog wheel icon on the RasterResampler to open the parameters dialog.

Set the following values to resample the images from 1 metre resolution to 5 metres.

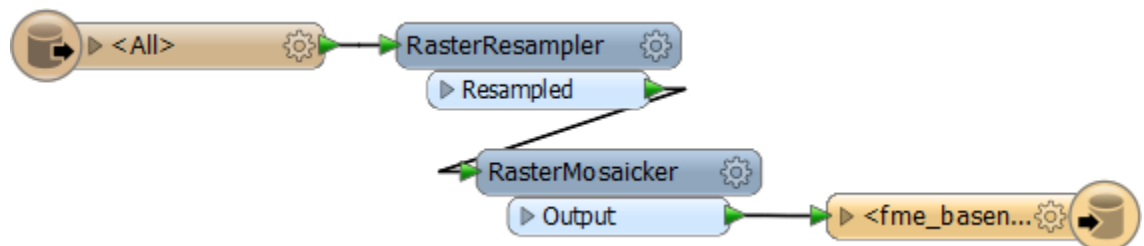
Size Specification:	Cell Size
X Cell Spacing:	5
Y Cell Spacing:	5
Interpolation Type:	Nearest Neighbor



4. Add a RasterMosaicker Transformer

Now repeat step 3, but this time adding a RasterMosaicker transformer between the RasterResampler and the Writer feature type.

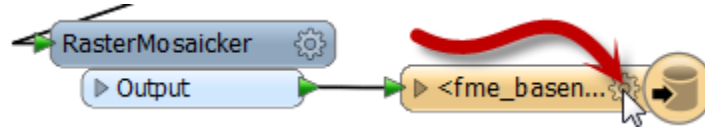
Open the parameters dialog as before, but now just click OK to accept the default values.



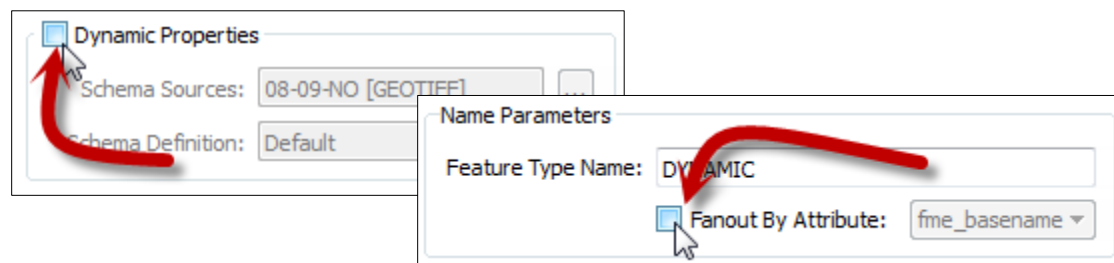
5. Modify the Destination Feature Type

In this scenario, we'll be writing a single (mosaicked) output file. This is at odds with the current dynamic settings that are part of the workspace.

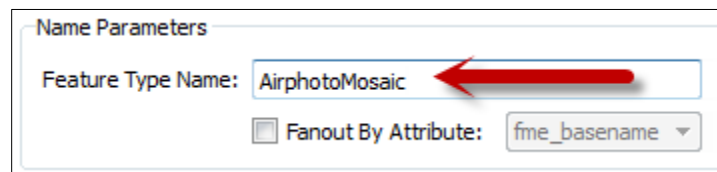
So, click the cog wheel icon on the Writer feature type to open the properties dialog.



In this dialog uncheck the Dynamic Properties parameter and then uncheck the Fanout By Attribute parameter.



Edit the Feature Type Name and give it a name for your output file, such as AirphotoMosaic, then click OK to close the dialog.



6. Publish the Workspace – Step 1

Save your workspace as Exercise3b.fmw

Start the “Publish to FME Server” process by using the toolbar button or File > Publish to FME Server from the menubar.

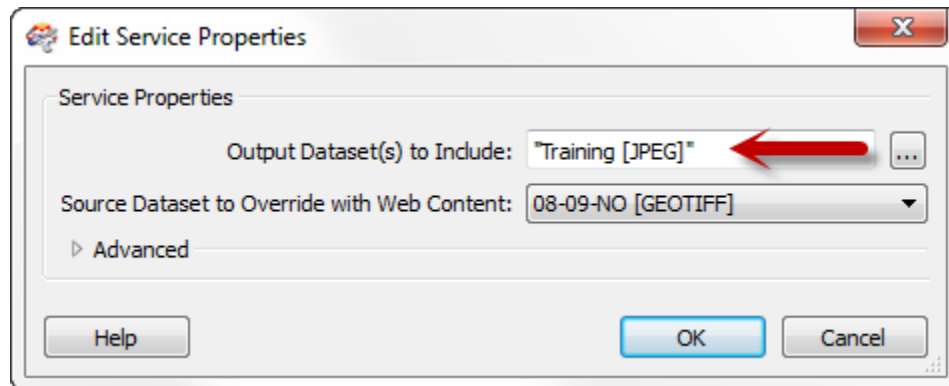
Enter the connection and credential settings and click **Next**. If you cannot remember them, or didn't save them as your defaults, refer to Exercise 2a for the required values.

For the repository select the Training repository you created in Exercise 2a. Click **Next**

7. Publish the Workspace – Step 2

In the last pane of the publish Wizard check the Data Download Service so that the workspace can be run with this service. You can also leave the Job Submitter Service checked so the workspace can be run via either service.

The default Data Download settings can be used but click the Edit button to review the possible settings anyway.



The Output Dataset parameter is very important if there is more than one Writer in the workspace, as it specifies which is to be output for download. In this case it should be set to the JPEG writer.

Click **OK** to close this dialog and then **Publish** to finish publishing the workspace.

8. Access the Data Download Service

Now your role switches to that of an end-user who wants to download some data.

Log in to the FME Server Web User Interface.
Use the menus and dialogs to navigate to Repositories > Training > Exercise3a.fmw

Notice that you can now run the workspace through either the Job Submitter or the Data Download Service.

Click the Configure button under Data Download.

Registered Services

Data Download



Configure



Run

Job Submitter



Configure



Run

9. Run the Workspace

Once again you are presented with a web form but this time the form is for running the workspace via the Data Download Service.

As you did in Exercise 2c, scroll down to the Source Geotiff parameter and click the Browse tab to browse to the image files you uploaded previously.

Select all of the images (or just a few that neighbor each other).

Click Run Workspace on the bottom right to submit the job via the Data Download Service.

Browse		Upload	Specify Location
Name			
<input type="checkbox"/>		06-07-JK.tif	
<input checked="" type="checkbox"/>		06-07-LM.tif	
<input checked="" type="checkbox"/>		06-07-NO.tif	
<input type="checkbox"/>		06-07-PQ.tif	
<input type="checkbox"/>		06-07-RS.tif	
<input type="checkbox"/>		08-09-HI.tif	
<input type="checkbox"/>		08-09-JK.tif	
<input checked="" type="checkbox"/>		08-09-LM.tif	
<input checked="" type="checkbox"/>		08-09-NO.tif	

10. Download the Output

After a short time a Success page will appear which now includes a Data Download URL link.

Success

Translation Successful

Job Id: 92

Number of Features Written: 1

Time Elapsed: 5 seconds

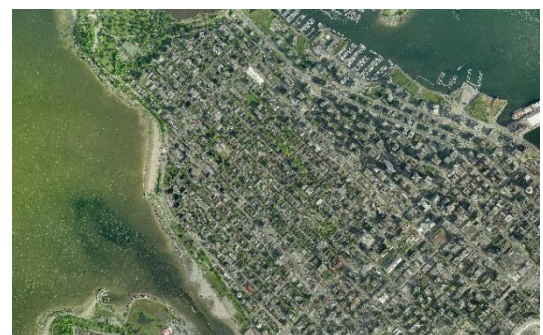
Data Download URL

http://VASH:8080/fmedatadownload/results/FME_686_640_5700.zip

Click the link and download the zip file to your computer. Extract the contents of the zip file.

Notice that you have downloaded a single mosaicked JPEG dataset which has been resampled from the original source GeoTiff files.

Congratulations! You have now created a self-serve data download service for airphotos, which can be used by your customers.



Miscellaneous Published Parameters



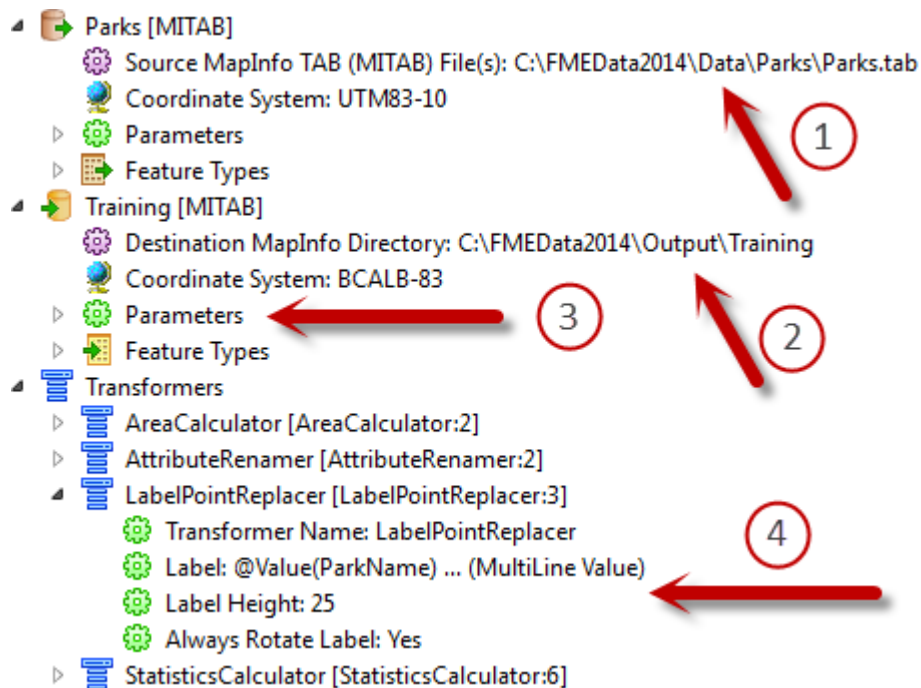
Self-Serve parameters can include any regular parameters, not just ones that are specific only to a Data Download setup.

Any parameter in FME can be published and presented to the user as a choice to be made when running a workspace. They don't have to be specifically related to the Data Download service.

Finding a Parameter

Parameters are located in the Navigator window (usually on the left-hand side of FME Workbench).

As you can see, there are parameters for the source data location (1) and the destination data dataset (2), which is the one that the Data Download service overrides. There are also general Reader and Writer parameters (3) and parameters for transformers (4)

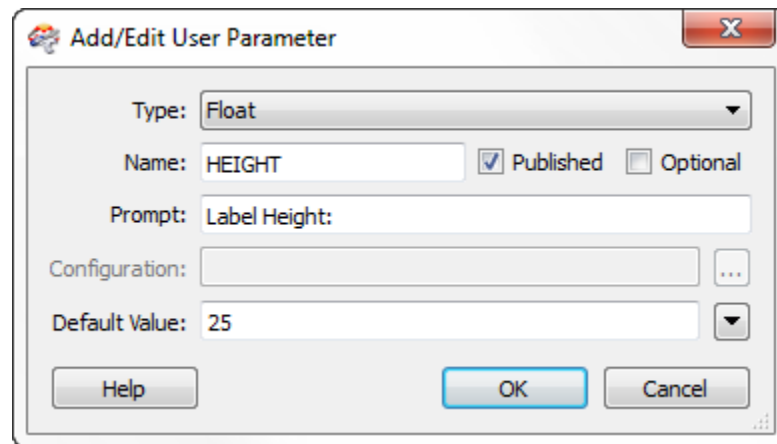
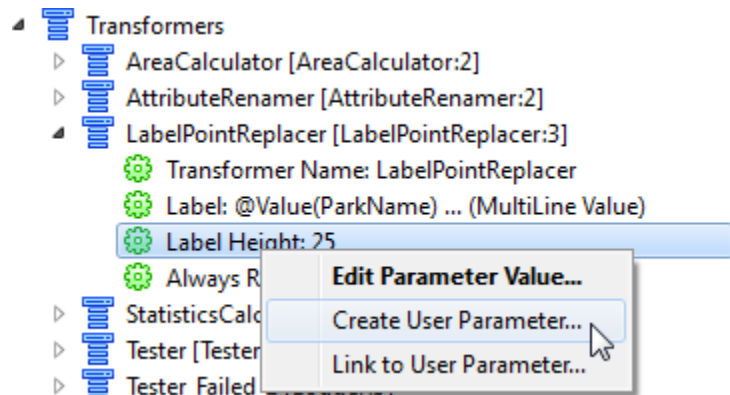


Publishing a Parameter

Parameters are published by right-clicking on them and choosing “Create User Parameter”.

For example, here a workspace author is about to publish a parameter on the LabelPointReplacer transformer.

When the workspace is run the end-user will now be able to decide what size they want labels to appear as.



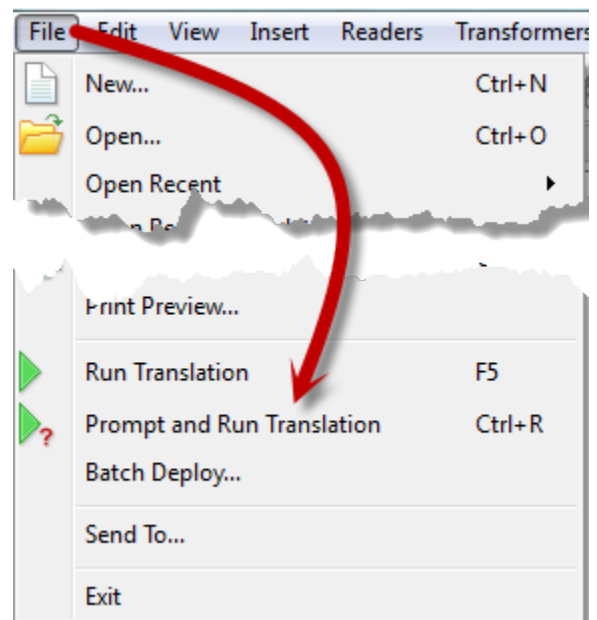
The author gets to choose the type of parameter (in this case a floating point number), the user prompt, and the default value.

Using a Parameter

A User Parameter that is published becomes available to the end-user at run-time.

In FME Workbench, you would select File > Prompt and Run from the menubar, to see these parameters. There is also a toolbar button and a keyboard shortcut (Ctrl+R).

In FME Server, these parameters become available on the Configuration page of a service, as seen in the Chapter 2 exercises.



Key Parameter Types

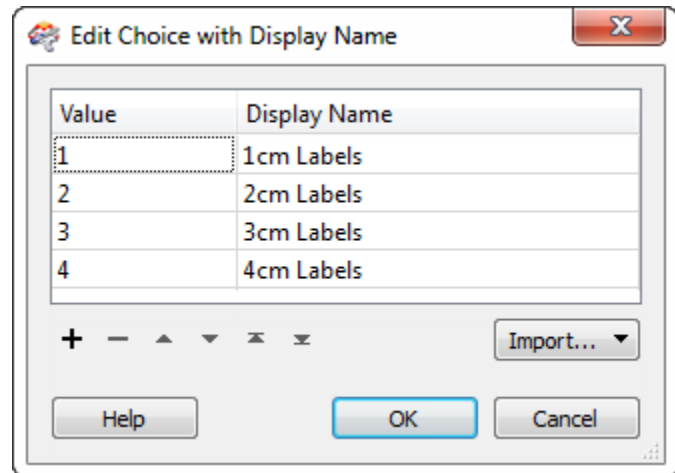
Two key parameter types for a self-serve setup are “Choice with Alias” and “Scripted”.

Choice with Alias parameters are where the user is presented with a choice, each of which returns a different value to FME.

For example, here the author wishes the user to select the height of labels to be created in the output dataset.

The user is presented with the list of (more intuitive) options on the right, but the value returned to FME will be the (more useful) number on the left.

This parameter type is also very useful for some Data Download specific tasks, as we’ll see shortly.



Scripted parameters are a way to incorporate a Python or Tcl script into the generation of a parameter value.

This script can include references to other user parameters, meaning one parameter value can be calculated based on the value of another. Parameters referred to in the scripts are generally published parameters that accept input from the user.

So, user input can be accepted from one parameter, and this input processed using a script, in order to produce the actual information required by the workspace.



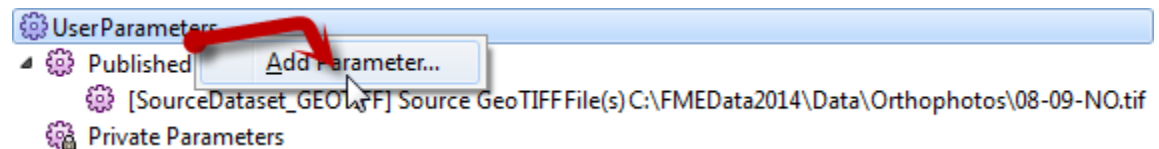
Exercise 3c: Data Download Parameters	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Improve the data download service
Demonstrates	Providing User Parameters in a Data Download service
Starting Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3c-Begin.fmw
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3c-Complete.fmw

The Data Download system from Exercise 3b works, but could be improved upon. In particular, it would be helpful for users to be able to choose the resolution and compression of the imagery they are downloading.

1. Create a Published Parameter for Resolution

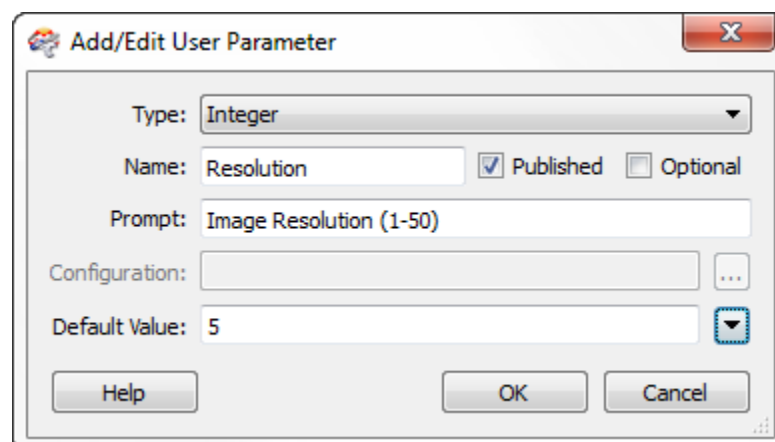
Start FME Workbench (if necessary). Open the workspace from Exercise 3b (or the start workspace for this exercise).

Locate the User Parameters section of the Navigator window. Right-click on the header for this section and choose Add Parameter.



This opens the Add/Edit User Parameter dialog. In this dialog enter the following values:

Type	Integer
Name	Resolution
Published	Yes (Checked)
Optional	No (Unchecked)
Prompt	Image Resolution (1-50)
Default Value	5



2. Apply Parameter to RasterResampler

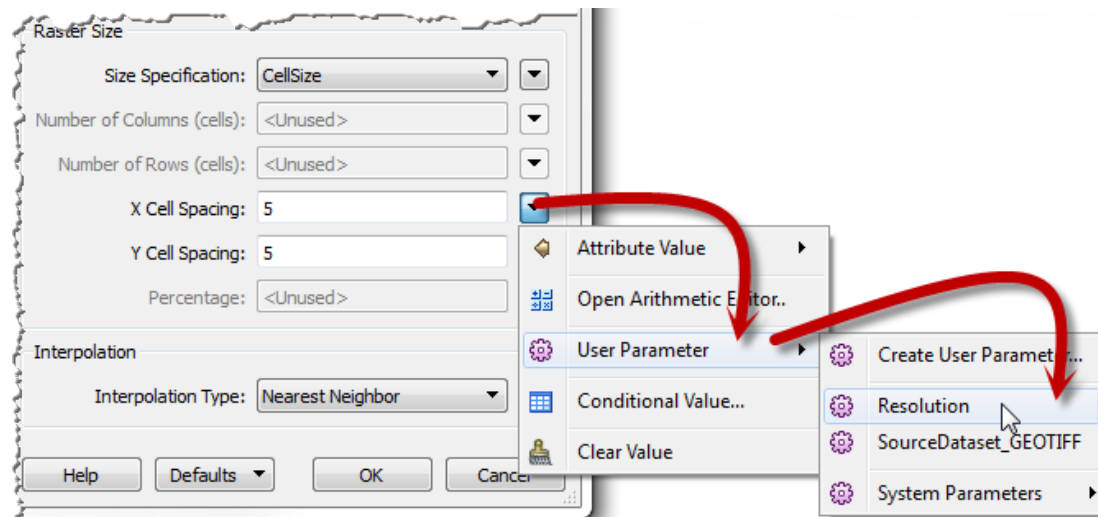
Having created the parameter we can get input from the end-user, but, as-yet, the workspace isn't doing anything with that input. We must now apply the input to the transformers.

Click the cog wheel icon to open the parameters dialog for the RasterResampler transformer.

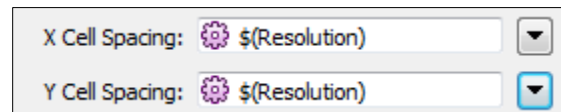
Notice that the X and Y Cell Spacing is currently hard-coded as 5.

Click the drop down arrow to the right of the X Cell Spacing parameter. Choose User Parameter > Resolution. This will apply the Resolution parameter you just created to this transformer.

Repeat the action for the Y Cell Spacing parameter.



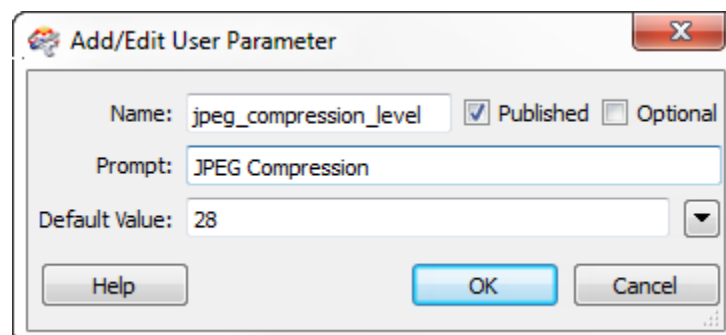
The transformer X/Y Cell parameters will now look like this:



3. Create a Published Parameter for JPEG Compression

Now we will create a parameter for the user to control the JPEG compression amount.

Open the properties dialog of the AirphotoMosaic feature type. Click on the Format Parameters tab.



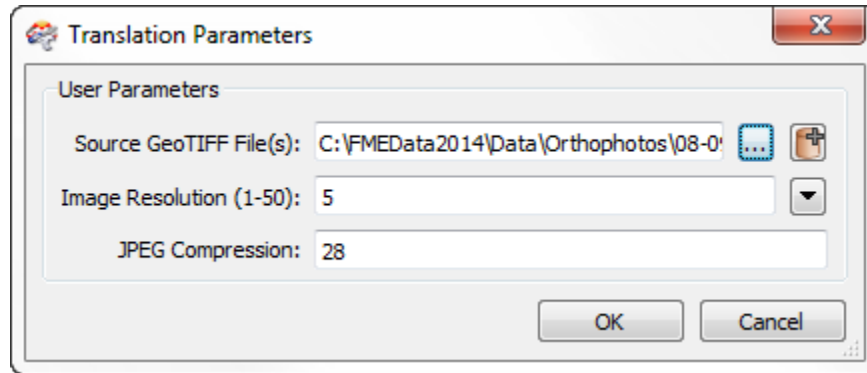
Click the drop down arrow beside Compression Level and choose User Parameter > Create User Parameter.

Change the prompt to JPEG Compression (0-100) and leave the default at 28.

4. Test your Workspace in FME Workbench

Save the workspace as Exercise3b.fmw.

As workspaces get more complex it is always a good idea to test them first in FME Desktop before publishing to FME Server. Use the menu File - Prompt and Run (or Cntrl+R) to see the parameters which are now available. You should see your new parameters.



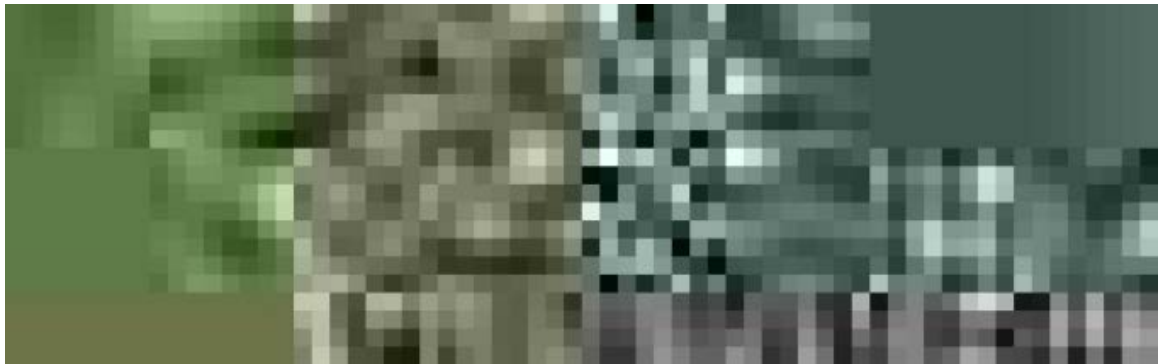
Click the file browse button and select some neighboring image files, for example 06-07-LM.tif and 06-07-NO.tif.

Enter some extreme values for your new parameters so it will be obvious that the output has been changed, for example:

Image Resolution	50
Compression Level	100

Click **OK** to run the workspace.

Check the output; you should have a single very low resolution, poor quality image.



If you ever need to change the parameter prompts or defaults then browse to the parameters in the Navigator window and right-click the one you want to change. Select Edit Definition and this will open a dialog in which to update the definition.

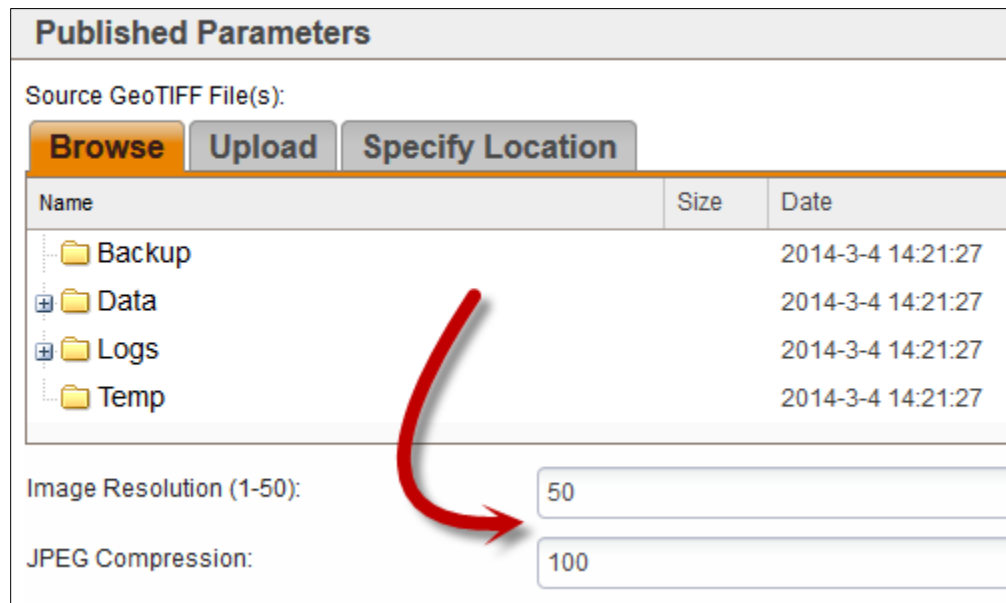
5. Publish the Workspace

Use the publish wizard to publish your workspace to FME Server. You don't need to upload any data (assuming you uploaded it in the earlier exercises), but be sure you check Data Download Service in the last window.

6. Run Data Download Using New Parameters

Acting as a user now, visit the Web User Interface and navigate to your workspace: Repositories > Training > Exercise3c.fmw > Data Download - Configure

Notice your new parameters are now shown automatically in the web form.



Name	Size	Date
Backup		2014-3-4 14:21:27
Data		2014-3-4 14:21:27
Logs		2014-3-4 14:21:27
Temp		2014-3-4 14:21:27

Image Resolution (1-50): 50

JPEG Compression: 100

As before, select some or all of the source image files under the Browse tab.

Scroll down and enter reasonable values for the Image Resolution and the JPEG Compression. Click **Run Workspace** on the bottom of the form.

7. Download the Output

The Success page will appear with a link to download the data. Download and extract the zip file contents to ensure it includes an image based on the specifications you entered in the web form.

Success

Translation Successful

Job Id: 95

Number of Features Written: 1

Time Elapsed: 1 second

Congratulations! You now have a Data Download Service where your customers can choose the resolution and compression for imagery they want to access.

Coordinate System Selection

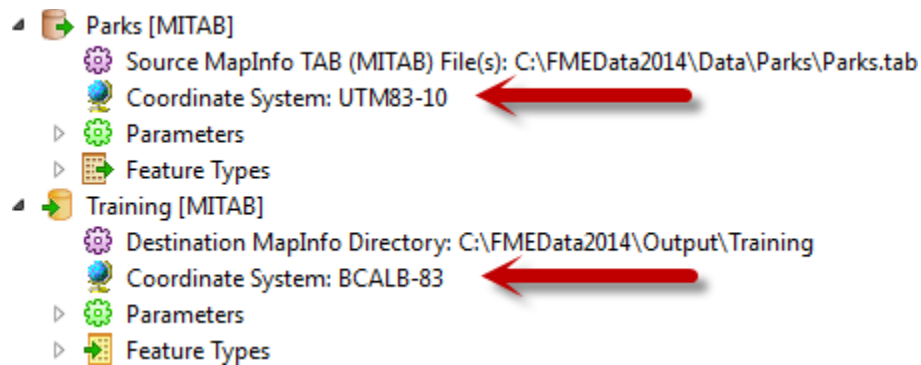


One of the most obvious requirements in Self-Serve is to be able to set the output coordinate system

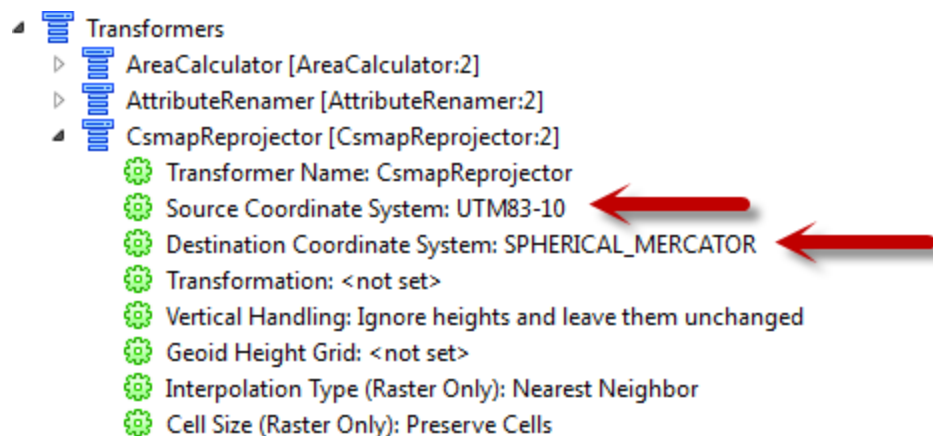
One of the most useful parameters in a self-serve system controls the output coordinate system. Publishing this parameter allows the end-user to receive data in a coordinate system of their choice.

Coordinate System Parameters

Coordinate system reprojection can be carried out by setting the parameters under the Reader/Writer in the Navigator window:



Alternatively, a transformer – such as the CSMAPReprojector – can be used, in which case the relevant parameters can be found under the Transformers section of the Navigator window:



The obvious advantage to using a transformer is that you have control over other reprojection factors, such as the geographic transformation and grid height.

Format Selection

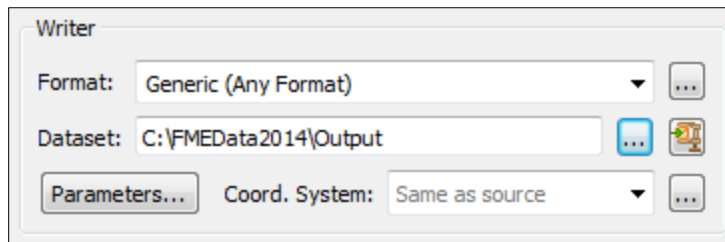


Another obvious requirements in Self-Serve is to be able to select the format of data to be downloaded

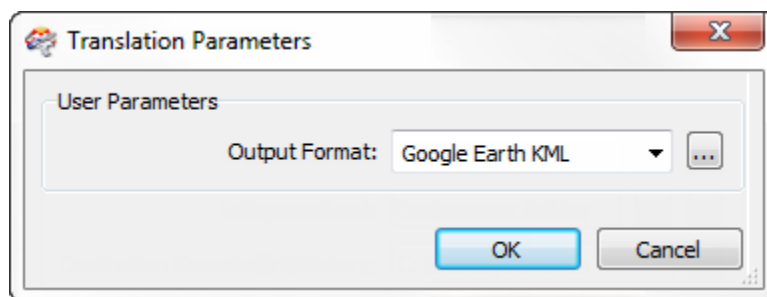
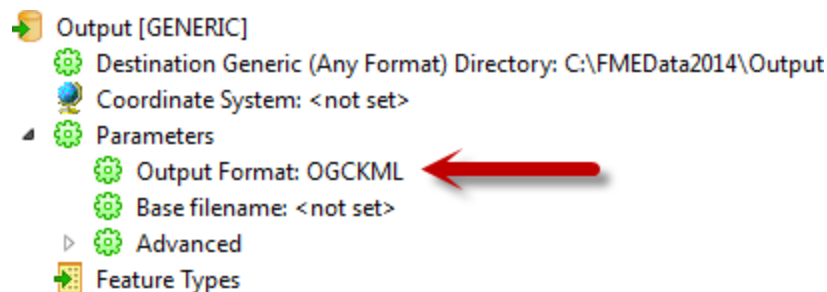
One of the most useful parameters in a self-serve system controls the output data format. With a simple Generic format, FME allows the end-user to select this format on the fly, without any format-specific setup from the workspace author.

The Generic Writer

The Generic writer is a way to write data in FME where the output format is chosen at run-time. This way a workspace may be created that can write to any format.



The output format is defined by a parameter so, by publishing the parameter, the user gets to choose the output format at run-time.



There are a couple of points to keep in mind when using the writer:

- The parameter for output format is automatically published, but in FME Server's interface it appears only as a text field that accepts FME's short form name for any format. Best practice decrees this should usually be replaced by a new Choice with Alias parameter; to reduce the list to a reasonable set of choices, with descriptive format names.
- Each writer format has its own specific parameters, and these may still need to be set when a generic writer is used. For example, a specific template file might need to be used when AutoCAD is chosen as the output format. This can be achieved by adding a writer of the same format and setting the parameters in that writer. The Generic writer will inherit the parameters of this dummy writer, even if no features are connected to it.



Exercise 3d: Data Download	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Improve the data download service
Demonstrates	Providing Coordinate System and Format Parameters in a Data Download service
Starting Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3d-Begin.fmw
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3d-Complete.fmw

The Data Download system from Exercise 3c is still lacking some important user options. Users have asked if they can set the destination coordinate system and data format in the Data Download service.

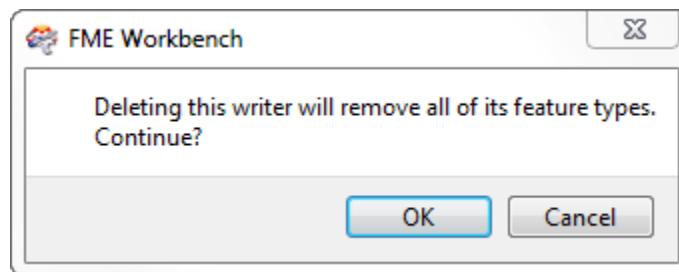
1. Start Workbench

Start FME Workbench (if necessary). Open the workspace from Exercise 3c (or the start workspace for this exercise).

2. Delete JPEG Writer

To allow selection of data format we'll need to remove the existing JPEG format Writer and replace with a Generic Writer.

Locate and click on the JPEG Writer in the Navigator window. Press the delete key to remove it. You will receive a prompt confirming your actions. Click OK to accept the deletion.



3. Add Generic Writer

Now the JPEG Writer is removed, we can add a Generic Writer.

Select Writer > Add Writer on the menubar. When prompted enter the following settings:

Format Generic (Any Format)
Dataset C:\FMEData2014\Output\Training

Click the **Parameters** button to ensure these are set. If no output format is already set then select a format (it doesn't matter what you choose) and click OK to close the dialog.

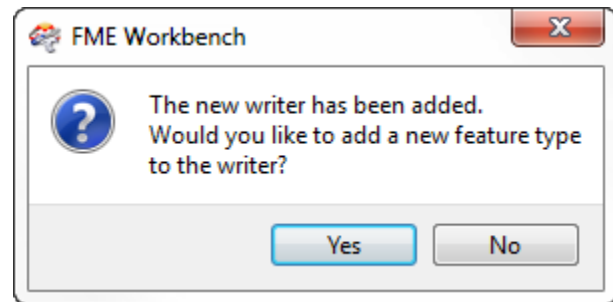
Click OK again to close the Add Writer dialog.

4. Add Feature Type


When a new Writer is added you are given the choice to create a new output feature type (layer).

When prompted click **Yes** to create a new feature type.

A new feature type will be added and the properties dialog opened.





Name Parameters

Feature Type Name: 

☐ Fanout By Attribute:

General Parameters

Allowed Geometries: 

Writer: 

Database Username:

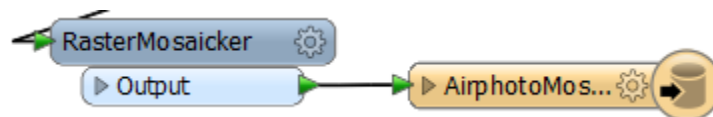
Give the feature type the name AirphotoMosaic as we did before.

For the Allowed Geometries select fme_raster from the dropdown.

Click OK to complete the feature type settings.

5. Connect Feature Type

In the workspace connect the new feature type to the RasterMosaicker Output port.



6. Create a Format Parameter

Now we've added a Generic format writer we should publish a parameter so that users can select the format to use. As in the previous example, right-click User Parameters in the Navigator window and select Add Parameter.


Use the following settings for your new parameter:

Type	Choice with Alias
Name	Format
Published	Yes
Optional	No
Prompt	Choose Format

Type:

Name: ☒ Published ☐ Optional

Prompt:

Configuration: 

Default Value:

7. Configure Parameter

To configure the parameter click the ellipsis [...] button next to the Configuration setting.

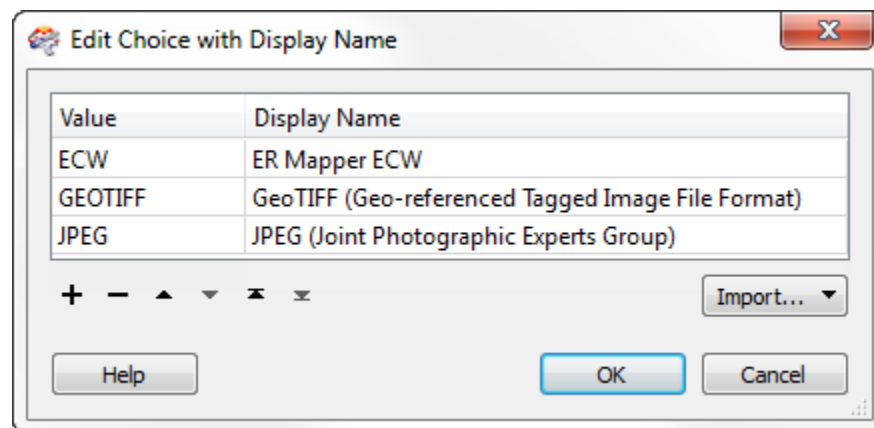
This will open a dialog in which to define the parameter configuration. Because this is a “Choice with Alias” parameter we need to define both values and a display name. However, since we are using this to select a format there is a nice shortcut that we can use to do so.

Click the Import drop-down and select Writer Format(s) from the menu. This provides a dialog with a list of Writer formats that we can add to our parameter.

Search for and add the following formats:

	Description	Short Name	Extensions
JPEG	<input checked="" type="checkbox"/> JPEG (Joint Photographic Experts Group)	JPEG	.jpg,.jpeg
ECW	<input checked="" type="checkbox"/> ER Mapper ECW	ECW	.ecw
GeoTiff	<input checked="" type="checkbox"/> GeoTIFF (Geo-referenced Tagged Image File Format)	GEOTIFF	.tiff,.ovr,.itiff,.tif

Then click **OK** to close this dialog and return to the configuration dialog. It should look like this:



Notice the Display Name column allows you to provide your users a description or alias for each entry. Edit these in any way you think makes them easiest to understand and click **OK**.

Choose any of formats as the default and click **OK** to create the parameter.

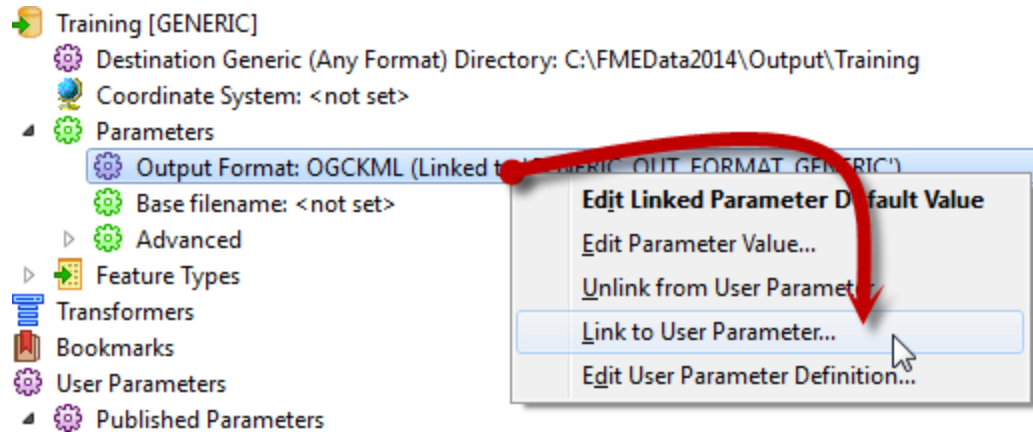
The following should now be the list of current published parameters:

- ⚙ User Parameters
 - ⚙ Published Parameters
 - ⚙ [SourceDataset_GEO TIFF] Source GeoTIFF File(s) : "C:\FMEDData2014\Data\Orthophotos\06-07-LM.tif"
 - ⚙ [Resolution] Image Resolution (1-50) : 50
 - ⚙ [DestDataset_GENERIC] Destination Generic (Any Format) Directory: C:\FMEDData2014\Output\Training
 - ⚙ [GENERIC_OUT_FORMAT_GENERIC] Output Format : OGCKML
 - ⚙ [Format] Choose Output Format : ER Mapper ECW

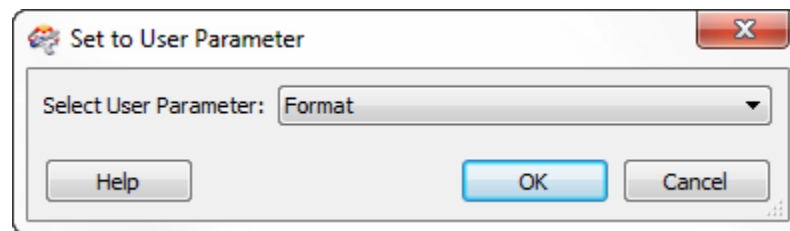
8. Link the Custom Format Parameter

Now the format user parameter must be linked to the appropriate FME parameter.

In the Navigator window, locate the Generic Writer and expand its list of parameters. Locate the parameter Output Format and right-click upon it. Choose Link to User Parameter:



This will pop-up a list of user parameters. Select the newly created Format from the list.



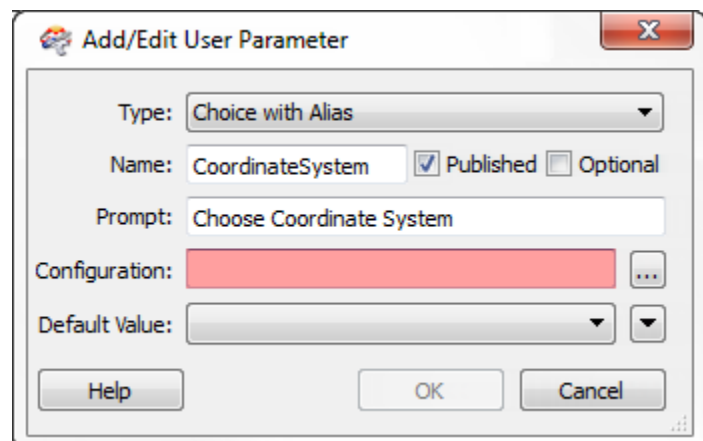
9. Create a Coordinate System Parameter

Now we can create a parameter to control coordinate system.

Once again in the Navigator window locate User Parameters and right-click to Add Parameter.

Use the following settings for your new parameter:

Type	Choice with Alias
Name	CoordinateSystem
Prompt	Choose Coordinate System
Published	Yes
Optional	No



10. Configure Parameter

To configure the parameter click the ellipsis [...] button next to the Configuration setting.

This will open a dialog in which to define the parameter configuration. Because this is a “Choice with Alias” parameter we need to define both values and a display name. However, since we are using this to select a coordinate system there is again a nice shortcut that we can use to do so.

Click the Import drop-down and select Coordinate System(s) from the menu. This provides a dialog with a list of coordinate systems that we can add to our parameter.

Search for and add the following coordinate systems:

	Name	Description	Group	Datum
LL84	<input checked="" type="checkbox"/> BCALB-83	Albers Equal Area, Province of British Columbia, C...	CANADA	NAD83
BCALB-83	<input type="checkbox"/> EPSG:26910	UTM with NAD83 datum, Zone 10, Meter; Central ...	UTM83	NAD83
UTM83-10	<input checked="" type="checkbox"/> LL84	WGS84 datum, Latitude-Longitude; Degrees [EPSG...	LL	WGS84
	<input checked="" type="checkbox"/> UTM83-10	UTM with NAD83 datum, Zone 10, Meter; Central ...	UTM83	NAD83

Then click **OK** to close this dialog and return to the configuration dialog. It should look like this:

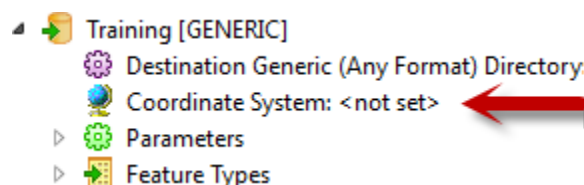
Value	Display Name
BCALB-83	Albers Equal Area, Province of British Columbia, Canada [EPSG #3005]
LL84	WGS84 datum, Latitude-Longitude; Degrees [EPSG #4326]
UTM83-10	UTM with NAD83 datum, Zone 10, Meter; Central Meridian 123d W [EPSG #26910]

Again, notice the Display Name column allows you to edit the display name to make it easier to recognize. Edit these in any way you think makes them easiest to understand, then click **OK**.

Choose any of coordinate systems as the default and click **OK** to create the parameter.

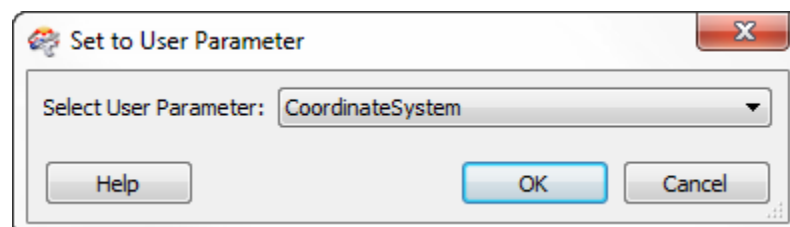
11. Link Custom Parameter

Now the coordinate system user parameter must be linked to the appropriate FME parameter.



In the Navigator window, locate the Generic Writer and expand its list of parameters. Locate the Coordinate System parameter and right-click upon it. Choose Link to User Parameter:

Choose CoordinateSystem from the list and click OK.



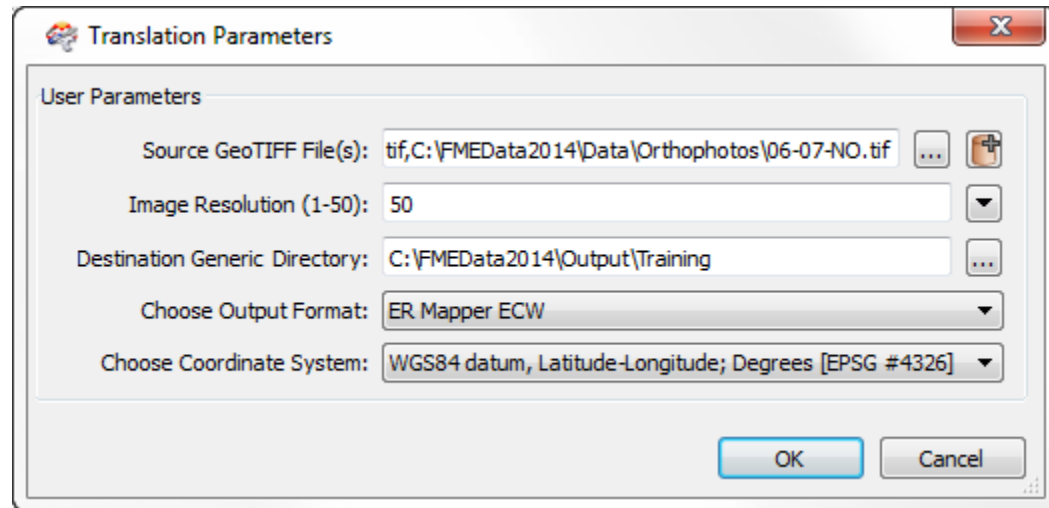
We now have user parameters set up for both coordinate system and format.

12. Run Workspace on FME Desktop

Save the workspace as Exercise3d.fmw.

Run the workspace using File > Prompt and Run Translation from the menubar.

The translation parameters dialog will open. Select a format and a coordinate system (and any existing parameters) and click **OK** to run the workspace.



Check the output folder (C:\FMEData\Output\Training) and inspect the datasets to ensure the translation is correct.



Judge GIS says...

“You can use the Data Inspector to check the output however the JPEG file will show the coordinate system as Unknown.”

13. Publish to FME Server

Use File > Publish to FME Server to publish the workspace.

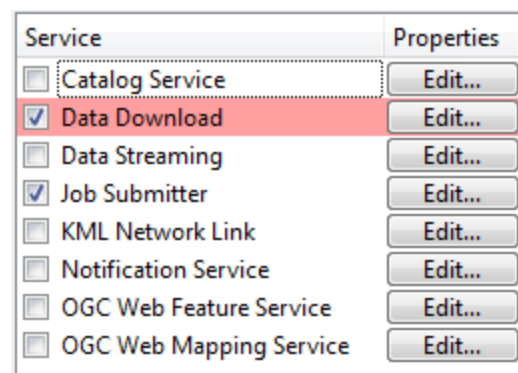
Publish it to the Training repository and register it with the Data Download service.

Notice that in the Register Services window the Data Download Service is highlighted red.

This occurs because we deleted the original JPEG writer to which data was being downloaded from.

We need to specify a Writer for the Service so click Edit and select “Training[Generic]” as the dataset to include for the Data Download Service.

Click Publish to finish publishing the workspace.



14. Run Workspace on FME Server

Changing once again to a user role, go to the Web User Interface and navigate to your workspace: Repositories > Training > Exercise3d.fmw > Data Download - Configure

Notice your new parameters for format and coordinate system. Again select some image files from the Browse tab and this time choose one of the new formats and a coordinate system.

Choose Output Format:

Choose Coordinate System:

Run the workspace and then download your data to confirm the results.

Congratulations! Your self-serve Data Download service can now accommodate customers who work with different formats and coordinate systems.



Sister Intuitive says...

"You might have noticed that we could just publish the Writer dataset and coordinate system parameters directly, instead of creating them manually and then linking the two.

This will work, but by using a Choice with Alias parameter we can restrict the list of formats/coordinate systems, use an alias, and also get them as a drop-down list in FME Server.

Otherwise they would be text-only parameters that would be unlimited in what formats and coordinate systems were available, as long as you could guess what value was required."

Layer Selection and Handling



Layer (Feature Type) flexibility can be achieved through the Feature Types to Read parameter.

There is no single method by which users might wish to select data or features. Every organization implementing FME Server lets users select data in different ways.

However, spatial data is often organized in layers (groups, classes, categories, feature types) and a common way that users will wish to choose data is on a layer-basis.

Selecting Layers

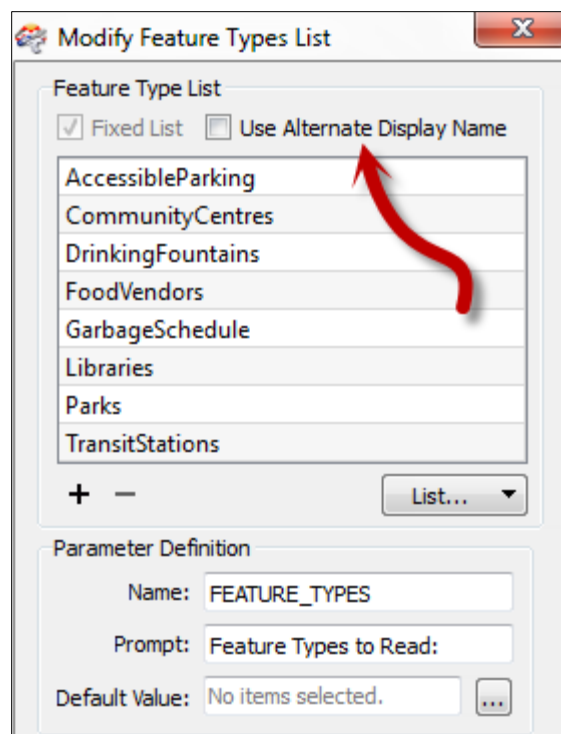
Allowing users to select data by layer is the simplest solution available in an FME Workspace, although in many situations users will wish to select data not just by layer, but by a mix of criteria.

Allowing choice by layer alone can be handled easily if the layers correspond to Feature Types in the source data.

Each reader in FME has a parameter called Feature Types to Read. When this parameter is published, the workspace will accept a list of layers to read from the user.

Parameters

- ⚙ Password for FME Table: *****
- ⚙ Character Encoding: <not set>
- ⚙ Advanced
 - ⚙ Minimum X: 0
 - ⚙ Minimum Y: 0
 - ⚙ Maximum X: 0
 - ⚙ Maximum Y: 0
 - ⚙ Clip to Search Envelope: No
 - ⚙ Network Authentication: <not set>
 - ⚙ Network Proxy: <not set>
 - ⚙ Search Envelope Coordinate System: <not set>
 - ⚙ Start Feature: <not set>
 - ⚙ Max Features to Read: <not set>
 - ⚙ Min Features to Read: <not set>
 - ⚙ Feature Types to Read: <not set>



The publishing dialog for Feature Types to Read is different because FME can automatically scan the workspace and provide a list of available feature types.

Additionally, the Use Alternate Display Name allows the author to publish alternate names (for example Road Centrelines instead of RdCtrLns) in a similar way to the "Choice with Alias" parameter.

Grouped Layers

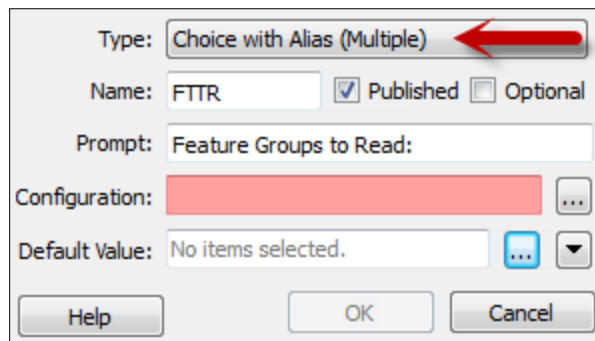
On some occasions the user does not need to be presented with a full list of layers. Instead they might need to see “groups” of layers.

For example, what is presented to the end-user as “Water” features may actually be made up of multiple source feature types such as Lakes, Rivers, and Streams.

This type of scenario can be achieved using a parameter of type “Choice with Alias (Multiple)”.

Here the author has eight feature types, but wishes to present them to the end-user as three groups of layers.

The first step is to create a parameter of type “Choice with Alias (Multiple)”:



Type: Choice with Alias (Multiple) →

Name: FTTR ☒ Published ☐ Optional

Prompt: Feature Groups to Read:

Configuration: ...

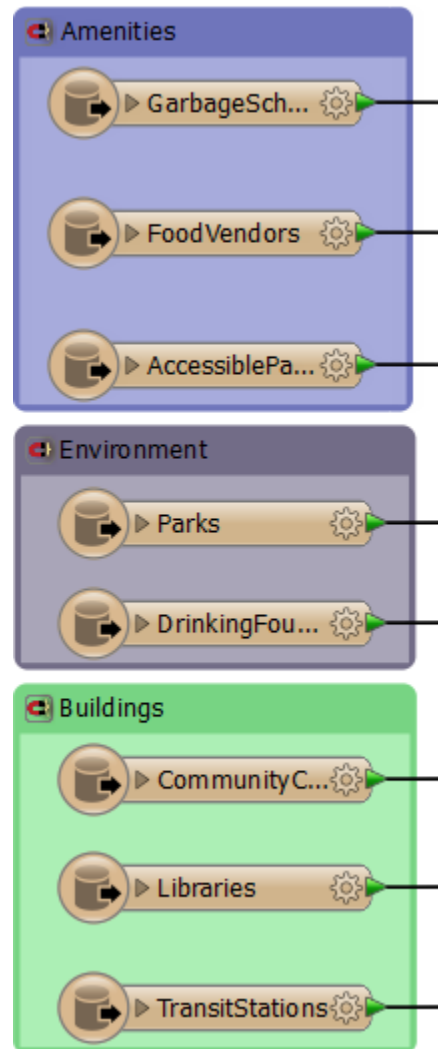
Default Value: No items selected. ▼

Help OK Cancel

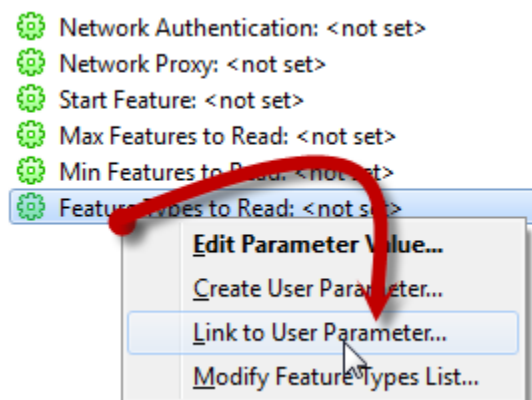
In the parameter configuration, all feature types from the same group are given the same display name:

Value	Display Name
Parks	Environment
DrinkingFountains	Environment
Libraries	Buildings
TransitStations	Buildings
CommunityCentres	Buildings
AccessibleParking	Amenities
GarbageSchedule	Amenities
FoodVendors	Amenities

Now when the workspace is run, the end-user is presented with a set of three options (Environment, Buildings, Amenities) that reflect a series of different layers/feature types.



Finally, the Feature Types to Read parameter is linked to the newly created Choice with Alias parameter:





Exercise 3e: Data Download	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Improve the data download service
Demonstrates	The Feature Types to Read parameter for layer selection
Starting Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3e-Begin.fmw
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3e-Complete.fmw

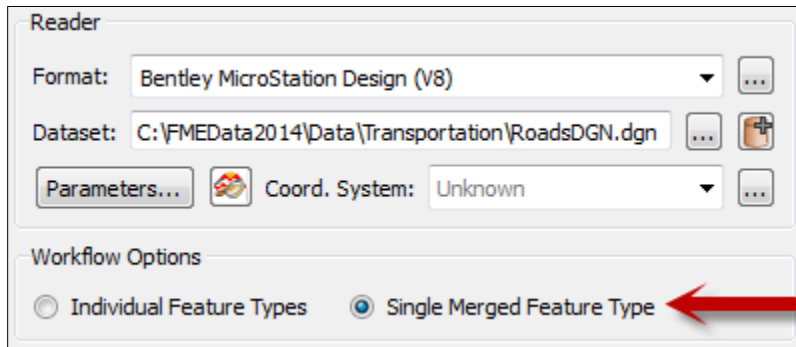
The task here is to update the current data download service to deliver a hybrid image of aerial photo and map data. We'll do this by adding a vector data Reader to the workspace and burning (stamping) it into the raster.

1. Start Workbench

Start FME Workbench (if necessary). Open the workspace from Exercise 3d (or the start workspace for this exercise).

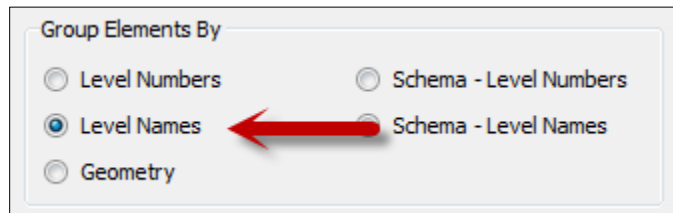
Select Reader > Add Reader from the menubar and add a new Reader for some roads data with the following parameters:

Reader Format Bentley MicroStation Design (V8)
Reader Dataset C:\FMEData2014\Data\Transportation\RoadsDGN.dgn
Workflow Options Single Merged Feature Type



Click **Parameters** to open the parameters dialog.

In the dialog check Group Elements by Level Names and click **OK**. This will ensure data is added with the correct level names (not numbers).



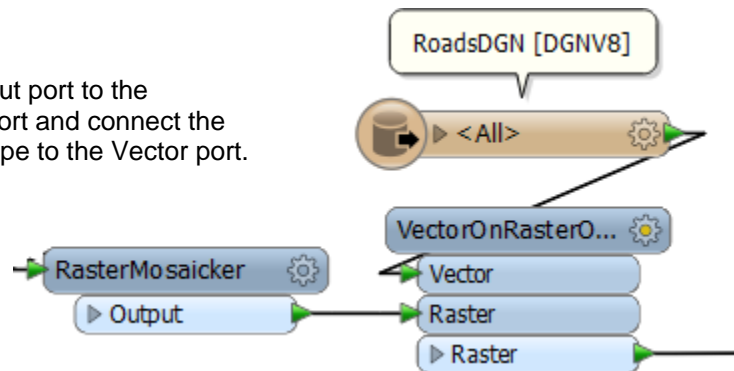

Click **OK** again to add the Reader. You will see a single source feature type which will allow any layer to pass through.

2. Merge Roads with Raster

Vector data can be added into a raster image by using the VectorOnRasterOverlayer transformer.


Place the transformer.

Connect the RasterMosaicker Output port to the VectorOnRasterOverlayer Raster port and connect the new MicroStation Reader feature type to the Vector port.



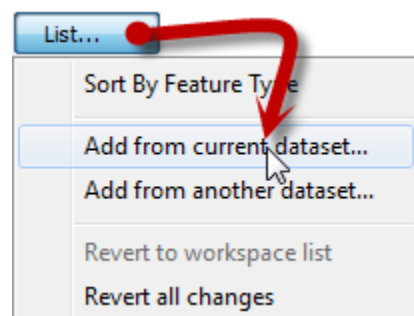
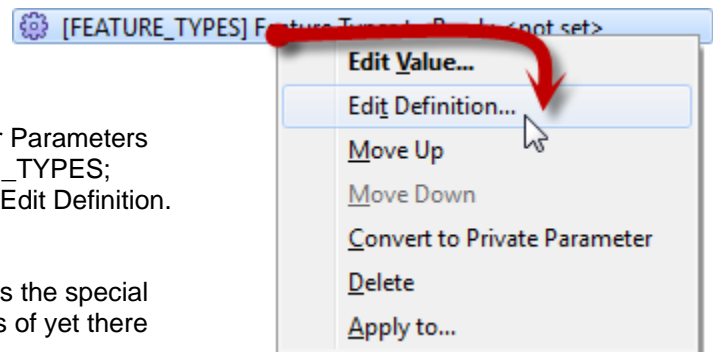
3. Modify the Feature Types to Read Parameter

When you added the MicroStation Reader a user parameter was automatically created to allow users to choose which level to read from the file.

 [FEATURE_TYPES] Feature Types to Read : <not set>

In the Navigator pane browse to User Parameters > Published Parameters > FEATURE_TYPES; right-click the parameter and choose Edit Definition.

This opens a dialog that demonstrates the special nature of this parameter. However, as of yet there is no content filled in.



Check the parameter marked Fixed List. Then click the dropdown menu labelled List and choose Add from Current Dataset. Select all of the available feature types in the dataset and click **OK**.

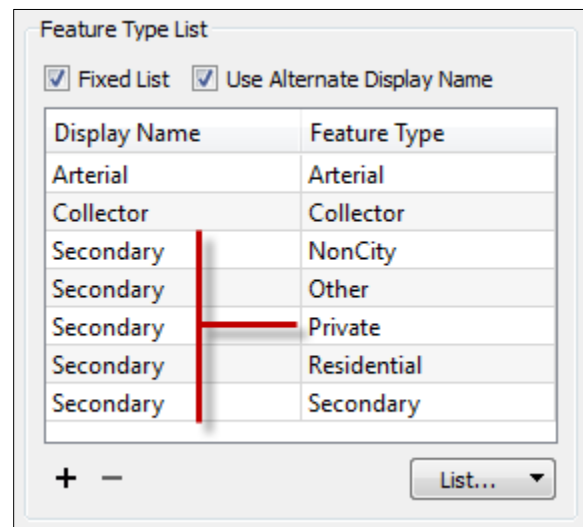
This will basically create a list of layers for the end-user to select from.

4. Set up Layer Groups

As a final step in modifying this parameter, check the parameter labelled Use Alternate Display Name. This allows you to enter groups and aliases.

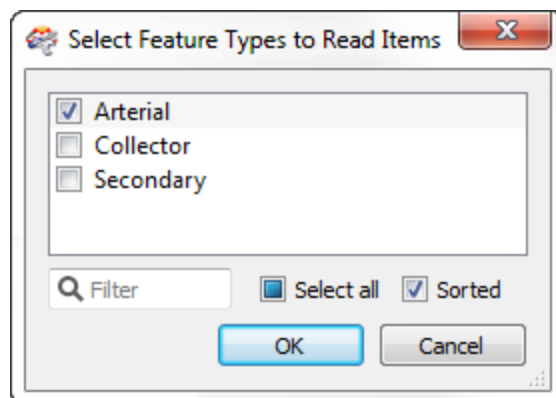
Edit the Display Names and give all the minor roads the name *Secondary* so that they become a group for the user.

Select Arterial as the default and click **OK** to close the dialog.



5. Run Workspace in FME Workbench

As always, confirm the parameters work as expected – and that the vector on raster overlay is working – by running the workspace using File > Prompt and Run in FME Workbench.



When you check the Feature Types To Read parameter, you'll notice that the options are Arterial (the default), Collector, and Secondary – the groups that you just created.

6. Delete the MicroStation Source Dataset Parameter

Your users do not need to know where the MicroStation file is coming from, nor do they need to see a parameter for it. By deleting the parameter we'll remove it from the user's view and ensure it gets uploaded to FME Server.

In the Navigator pane browse to User Parameters > Published Parameters > SourceDataset_DGNV8, right-click the parameter and choose the option to delete.

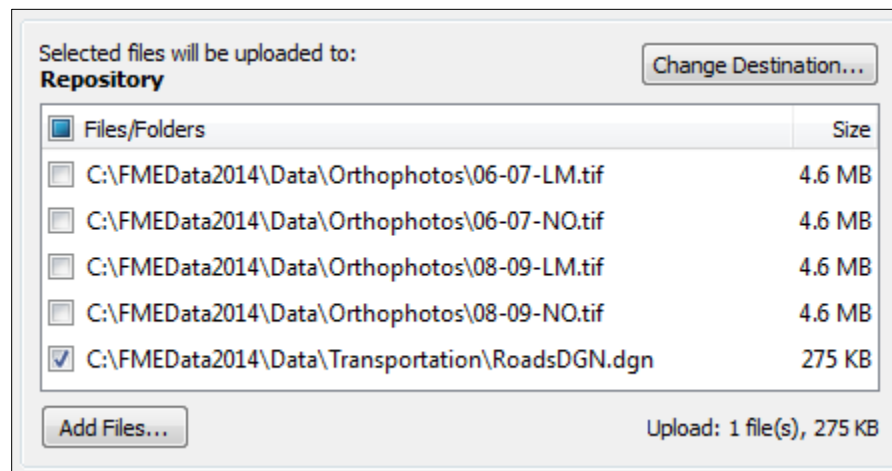
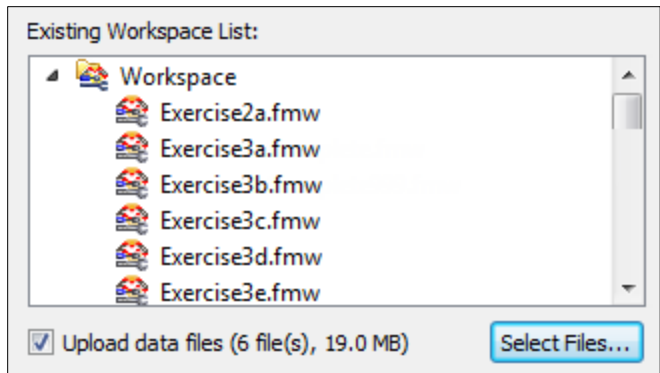
7. Publish to FME Server

Save the workspace as Exercise3e.fmw.

Select File > Publish to FME Server from the menubar to start the publishing process.

Fill in the connection details and credentials as usual and then click **Next** to continue.

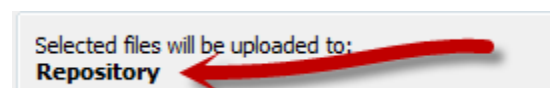
In the next dialog select Training as the repository to publish to. However, do not yet click Next. Instead, click on the button labelled **Select Files**.



The Resources dialog shows what resources – such as source data – are being upload to FME Server along with the workspace.

Remember all GeoTIFF orthophotos are already uploaded, so uncheck those files from the list

However we do want to upload the MicroStation DGN file. In this case we'll upload it to a repository (available only to this workspace) rather than to a Resources folder where it would be open to everyone.



Check to see where the file will be uploaded. If the dialog already says repository, then all is OK. Else click the button to change the location and set it to repository.

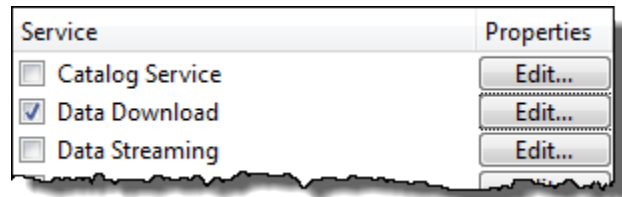
When you click **OK**, a warning message will alert you to the fact that the GeoTIFF files are being referenced but not uploaded. That's OK – we know the files already exist on the server – so simply click **OK** to dismiss the dialog.

Then click **Next** to pass on to the final dialog of the publishing wizard.

8. Register with Data Download Service

In the Register Services dialog check Data Download if it is not already.

Click the Edit button and confirm that the Output Dataset for the service is set to your Generic Writer.

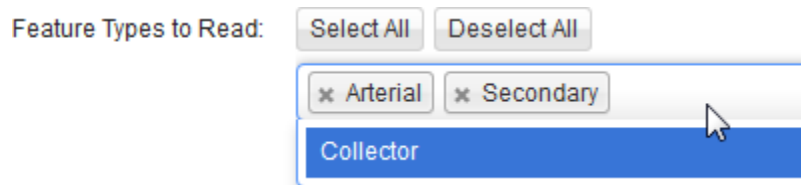


Click **OK** to close the dialog and **Publish** to complete the wizard and publish the workspace.

9. Run Workspace on FME Server

In the Web User Interface run your workspace using the Data Download Service as if you are a user, as we have been doing in the previous exercises.

Notice how the Feature Types to Read parameter is a selection parameter, like this:



...letting the user select which roads layers (if any) they would like overlaid on the imagery.

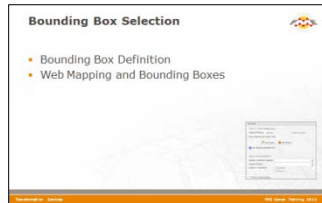


Monsieur D. Server says...

"Sadly the Feature Type grouping went a little sour in FME2014-SP1, and the Secondary category therefore may not work for you. However, rest assured we sent it back to the kitchen and got them to fix it for Service Pack 2."

Congratulations: Your Data Download service now lets the end-user retrieve data with a selection of required layers.

Geographic Selection



In most Self-Serve applications the user will need to be given a choice of geographic area of interest

Although most workspaces are designed around FME feature types, this may not be how the end-users see the data, or how they need to select it. An installation that provided selection only by layer (or even a group of layers) would be very limiting indeed.

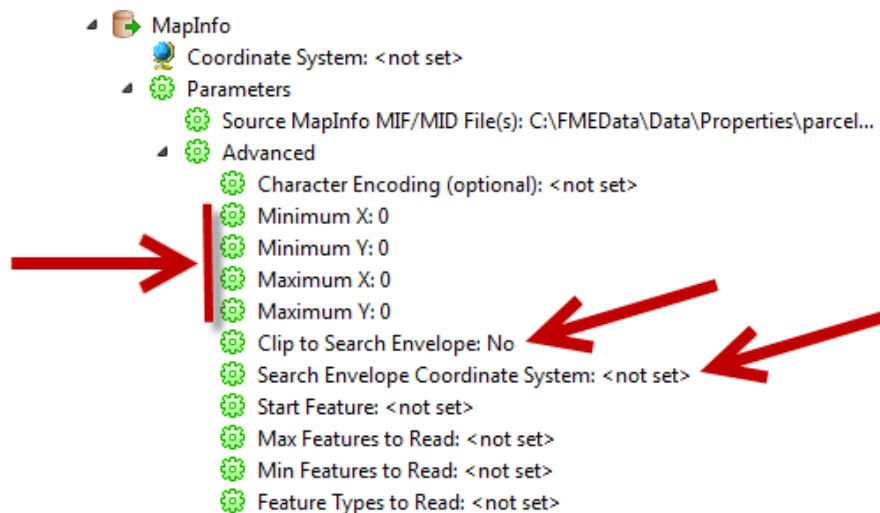
Besides layers, other methods of data selection revolve around spatially defining an area of interest. There are three obvious ways of doing so:

- A simple, rectangular bounding box
- An existing area such as a regional or municipal boundary
- An ad-hoc area (one drawn by the user on the fly)

Bounding Box

A bounding box can be defined in several ways, but the easiest is to use a set of parameters.

All FME readers have parameters to define the bounding box (envelope) of data that is being read. This is the most efficient method of selecting an area of interest because it means FME does not have to read the entire dataset first and then clip it to size; it can read only what data is necessary. It's particularly efficient if the source format has a spatial index, and it applies to both vector and raster datasets.



If these search envelope parameters are published, then the end-user is able to enter values that define the extent of the data he/she is interested in.

Besides the actual coordinates, there are two related parameters: “Clip to Search Envelope” and “Search Envelope Coordinate System”.

Clip to Search Envelope causes features that overlap the bounding box to be clipped and the outer part discarded. This will be the most common use for FME Server.

The Search Envelope Coordinate System means that the bounding box can have its own coordinate system, separate from the reader coordinate system. So the bounding box coordinates can be defined in a general coordinate system like Lat./Long, even if the data is UTM.

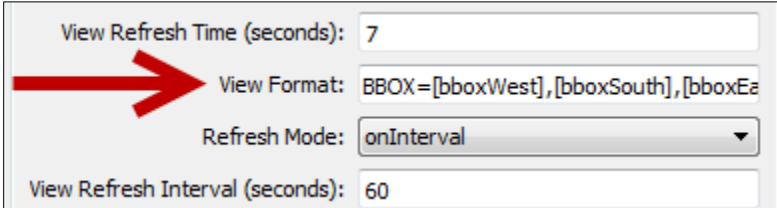
Web Mapping and Bounding Boxes

Bounding box parameters are particularly useful when a web mapping application (for example Google Earth) is requesting data. The application will provide the extents of the current map view and the workspace restricts itself to reading features within those extents.

This, of course, is done using published parameters. The parameters in the workspace need to be given specific names when published, as follows:

- bboxWest
- bboxEast
- bboxNorth
- bboxSouth

If given these names, both OGC services and the KML Network Link service can make use of these parameters. In fact, if you have used an OGC web service, or a KML Network Link service (as below), you might have noticed how these are used to pass information back to the workspace:



View Refresh Time (seconds): 7

View Format: BBOX=[bboxWest],[bboxSouth],[bboxEa

Refresh Mode: onInterval

View Refresh Interval (seconds): 60



Ms. Analyst says...

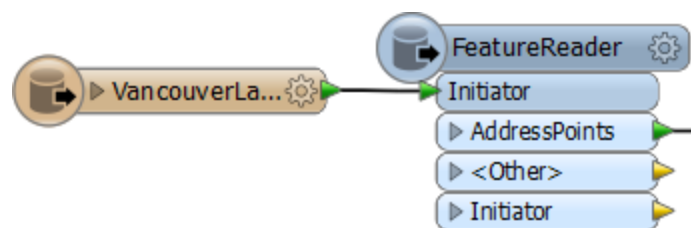
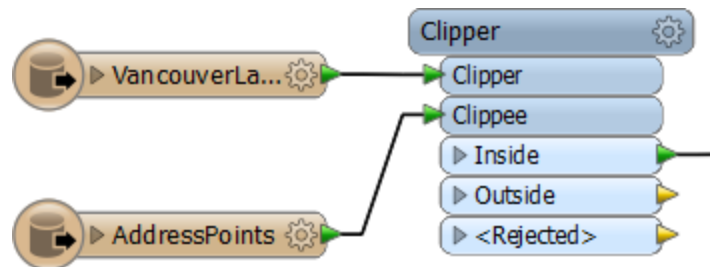
“Using reader parameters like this ensures the data is reduced in size at the earliest possible opportunity and so gives a better performance.”

Irregular Areas of Interest

An irregularly shaped area cannot be used as a clip boundary in a Reader's parameters. However, it can be used to clip data using either a Clipper transformer or a FeatureReader transformer.

The Clipper has an input port for the area of interest (Clipper) and one for the main dataset (Clippee).

For example, here the portal will deliver only addresses that fall inside the boundary of the city of Vancouver:



Here is the same result but using a FeatureReader transformer.

The FeatureReader reads the main dataset directly, executing out one of any number of spatial filters.

In general the FeatureReader is a better choice than a Clipper when using a database with a spatial index, or when the spatial predicate is other than a simple CONTAINS function.

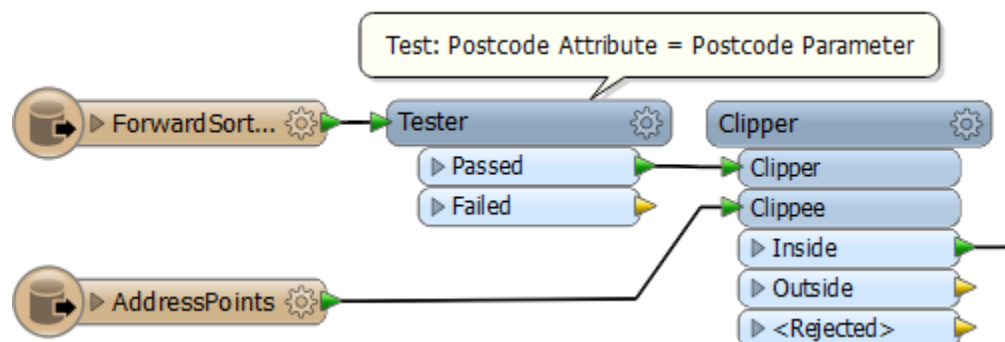
Existing Area of Interest

The main issue with an irregular area of interest is how to define that area. In some cases the feature is already defined as a known shape, such as an administrative or municipal boundary, and already exists in a spatial dataset.

In that case the area can simply be read from the dataset and routed into the appropriate input port of the Clipper/FeatureReader transformer.

If the source contains a number of features, then a published parameter can be used for the end-user to identify the area they want and for FME to filter other features out.

For example, this Self-Serve workspace uses a Clipper transformer to deliver only addresses that fall within a chosen postal code. The postal code is selected by the user through a published parameter. The Tester transformer filters out postal code boundaries that don't match the user's selection.

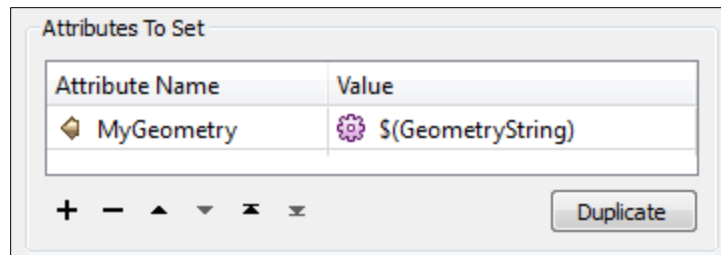


Ad Hoc Area of Interest

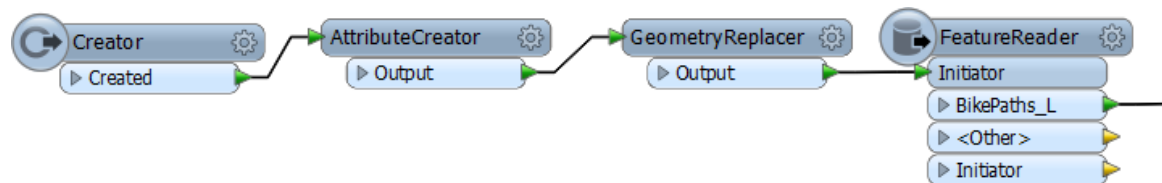
In the case that the area of interest is not a previously known shape – for example it is one defined entirely by the end user – then a different technique is needed.

This scenario needs a published parameter through which a geometry string can be provided. The geometry could be, for example, either WKT (Well-Known Text) or XML.

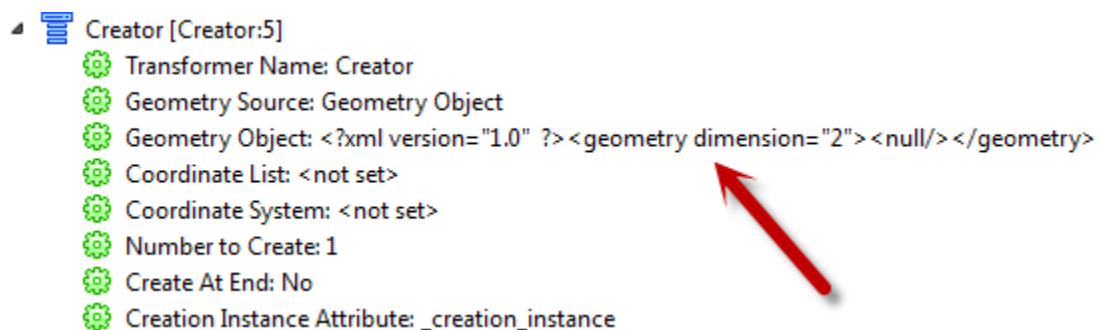
One simple method would be to use an AttributeCreator transformer and publish the Value part;



This could be used in a sequence like this, where the translation is triggered with a Creator, the geometry string retrieved with the AttributeCreator, the attribute contents converted into true geometry with a GeometryReplacer, and then the real data read with a FeatureReader:



To use XML you could also just publish the geometry parameter in a Creator transformer.



With these methods, a web mapping interface that allows the user to define their own custom area of interest can pass it to the FME workspace to be used as the area of interest in a Clipper or FeatureReader.



Exercise 3f: Data Download Area of Interest	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Improve the Data Download Service
Demonstrates	Selection of data via geographic area
Starting Workspace	C:\FMEDData2014\Workspaces\ServerManual\Exercise3f-Begin.fmw
Finished Workspace	C:\FMEDData2014\Workspaces\ServerManual\Exercise3f-Complete.fmw

The task here is to let the end user decide what area of data is to be delivered. For this exercise we'll let them choose which neighborhood of the city they wish the data for.

1. Start Workbench

Start FME Workbench (if necessary). Open the workspace from Exercise 3e (or the start workspace for this exercise).

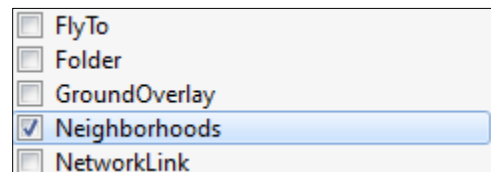
2. Add Reader

To filter by neighborhood we need to read a dataset of neighborhood boundaries.

Select Reader > Add Reader from the menubar and add a new Reader with the following parameters:

Reader Format Google Earth KML
Reader Dataset C:\FMEDData2014\Data\Boundaries\VancouverNeighborhoods.kml
Workflow Options Individual Feature Types

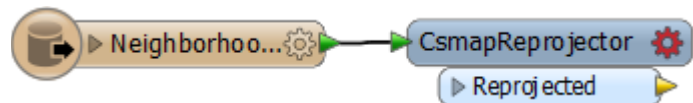
When prompted to select feature types to add to the workspace, simply deselect everything except the Neighborhoods layer



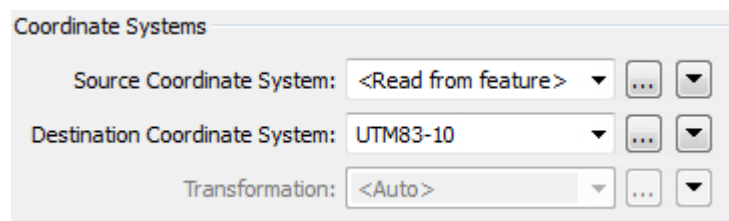
3. Add Reprojector

Being a KML dataset, this data is in a latitude-longitude coordinate system and must therefore be reprojected to match the UTM coordinate system of the raster data.

Add a CsmmapReprojector transformer to the workspace.



Connect it to the Neighborhood Reader feature type:



Open the transformer's parameters dialog.

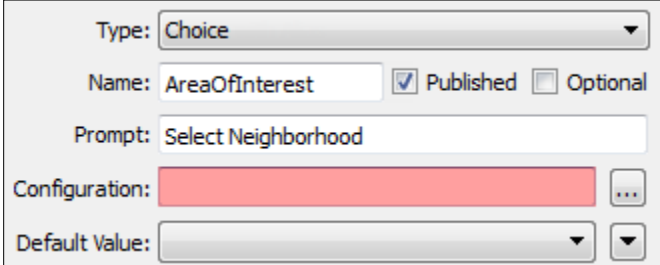
Leave the Source Coordinate System as <Read from feature> and set the Destination to UTM83-10

4. Add Parameter

Now let's add a custom parameter for the user to select which neighborhood to download.

Right-click on Published Parameters in the Navigator window and choose Add Parameter.
Add a parameter with the following settings:

Type	Choice
Name	AreaOfInterest
Prompt	Select Neighborhood
Published	Yes
Optional	No



Start to configure the parameter by clicking the [...] button for the Configuration parameter.

Instead of entering each neighborhood name separately, we'll import a list of them from the KML dataset. Start this process by clicking the Import button.

When prompted enter:

Reader Format Google Earth KML
Reader Dataset C:\FMEData2014\Data\Boundaries\VancouverNeighborhoods.kml

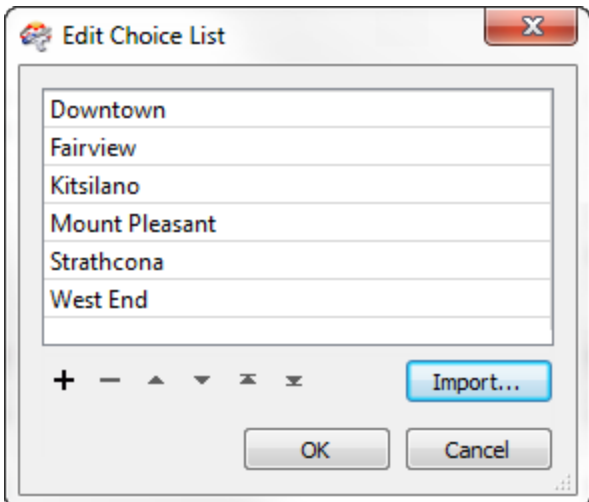
...and click **Next**. Select Neighborhoods as the Feature Type and click **Next**. Select NeighborhoodName as the attribute to import from and click **Next**.

The dataset will now be scanned for valid values. When it is complete click **Import**.

We now have a list of available neighborhoods to choose from.

Notice that the names are already complete so we don't need to use any sort of alias.

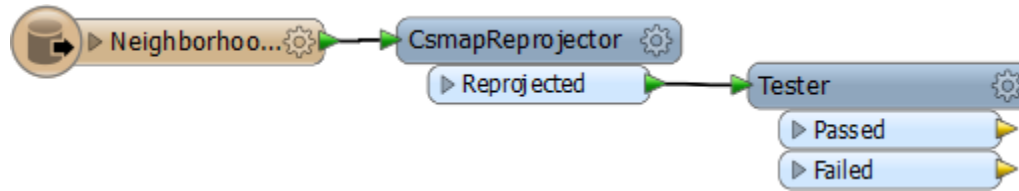
Click OK and OK again to close the parameter dialogs.



5. Add Tester

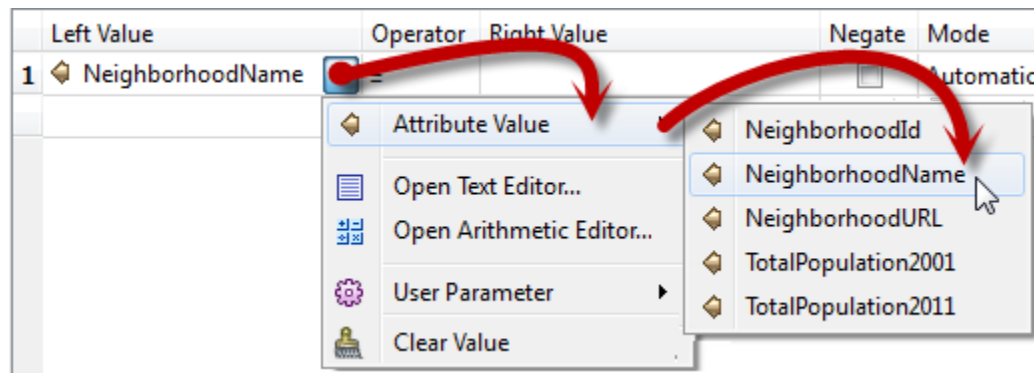
Now let's add a Tester transformer. This will filter out the neighborhoods that weren't selected.

Add a Tester and connect it to the CsmmapReprojector transformer:



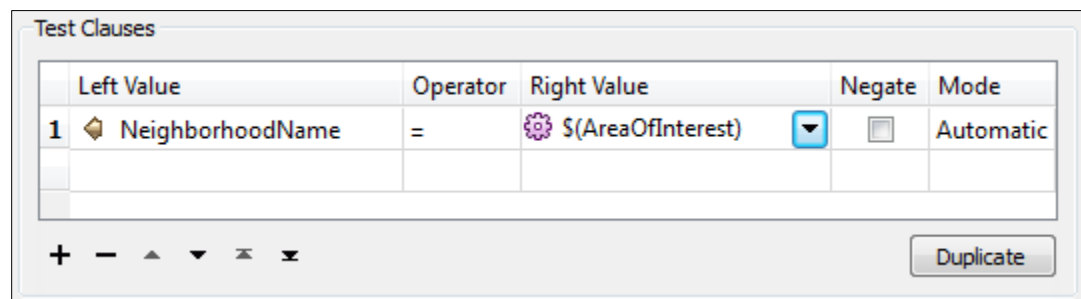
Open the Tester parameters dialog by clicking the red cog wheel button.

For the "Left Value" of the test, double-click in the field, click the drop-down arrow, and select Attribute Value > NeighborhoodName.



Set the Tester operator to equals (=).

For the Right Value double-click in the field, click the drop-down arrow, then select User Parameter > AreaOfInterest.



Click **OK** to close the dialog.

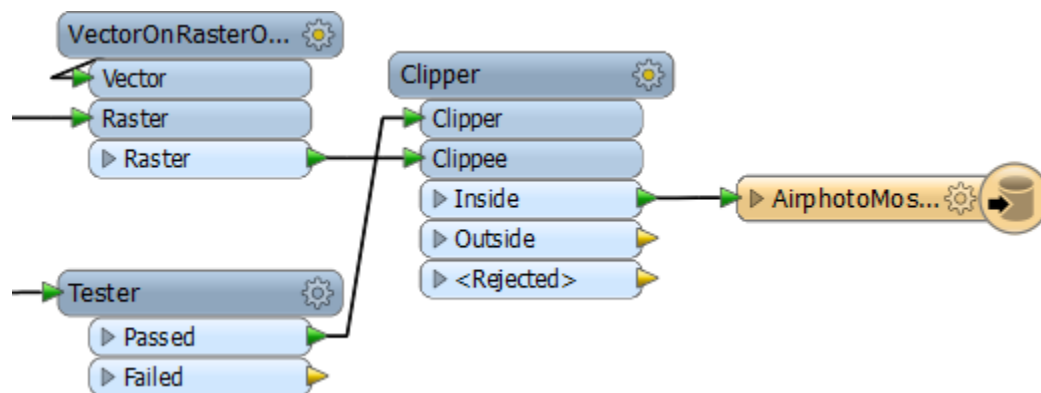
6. Add Clipper

We now have a test to check where the neighborhood is the one chosen by the user, but we haven't yet done anything with the result. We must use the chosen neighborhood as a boundary to clip the raster output.

Add a Clipper transformer.

Connect it up by connecting the Tester Passed port to the Clipper Clipper input port. Connect the VectorOnRasterOverlayer Raster port to the Clipper Clippee input port.

The Clipper:Inside port can be connected to the output feature type and any existing connector deleted. The workspace will now look like this:



7. Delete Parameter

As with the Roads data, the end-user does not need to see a parameter for the neighborhoods source, so locate the source Google Earth KML parameter and delete it.

8. Test Run Workspace

Save the workspace as Exercise3f.fmw

Run the workspace using File > Prompt and Run in FME Workbench.

For the source GeoTIFF files you'll want to select all of the files to ensure the neighborhood is covered fully.

Then select a neighborhood to view the data; West End or Downtown are good to use.



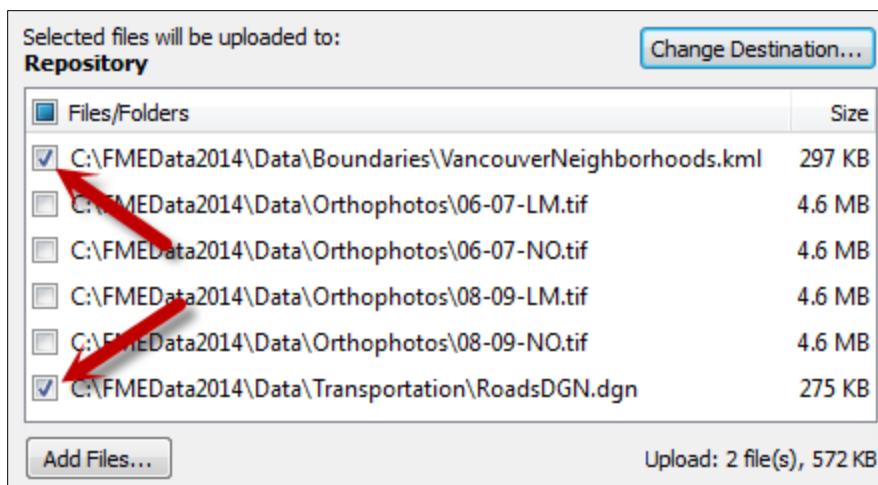
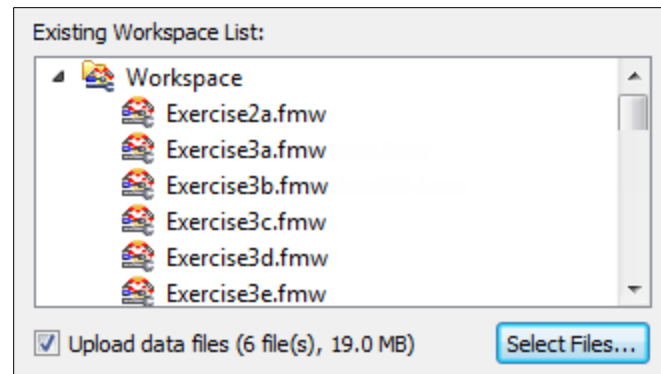
9. Publish to FME Server

Save the workspace as Exercise3e.fmw.

Select File > Publish to FME Server from the menubar to start the publishing process.

Fill in the connection details and credentials as usual and then click **Next** to continue.

In the next dialog select Training as the repository to publish to and, as before, click on the button labelled **Select Files**.



Ensure that both the MicroStation roads dataset, and the KML neighborhoods dataset, are being uploaded to the repository, but that the Orthophotos are not.

Again, a warning message will alert you to the fact that the GeoTIFF files are being referenced but not uploaded. Again, it's fine to simply click **OK** to dismiss the dialog.

Register the workspace with the Data Download service again.

10. Run Workspace on FME Server

In the Web User Interface run your workspace using the Data Download Service as if you are a user, as we have been doing in the previous exercises.

Notice the neighborhood is available as a dropdown list.

Select Neighborhood:

Mount Pleasant

Pick a neighborhood – and enough source files to cover it – and run the workspace.

Congratulations: Your Data Download service now lets the end-user retrieve data within a set geographic area.

Other Self-Serve Services



Data Download is not the only Self-Serve Service available.

Data Streaming

Whereas the Job Submitter service writes data, and the Data Download service returns a link to the data, a Data Streaming service returns a file of the data itself, streamed back to the client.

For example, the URL for the service can be posted into a web browser, and the data will be automatically downloaded and opened in the application associated with that file type.

Alternatively, the URL can be used directly as the source for a client application. When the client actively downloads the contents on a regular basis – as a GeoRSS reader would – then you have a feed, which is significantly different to a regular data download service.

Data Streaming is a slight misnomer in that a data streaming service does not supply a continuous stream of data; it merely provides a snapshot of the data at a particular point in time.

What Formats can be Streamed?

You can use any workspace with the data streaming service, provided it writes data in a format that is file-based or folder-based.

If an output dataset is comprised of more than one file, the service automatically creates a compressed (zip) folder out of the data. For example, AutoCAD DWG format could be streamed, whereas ESRI Shape would be returned in a zipped file.

The most popular formats to stream are those that have a suitable client to read the feed. Some of the main formats that are output using the data streaming services include:

- RSS
- GeoRSS
- GeoJSON
- KML
- HTML
- JSON

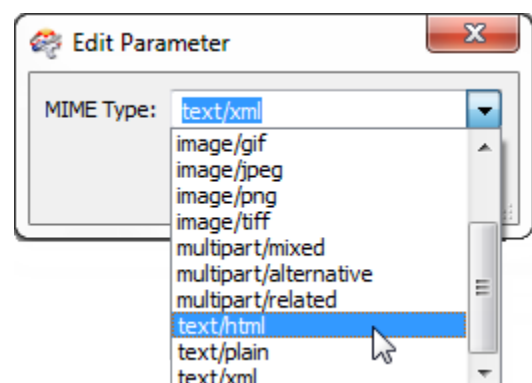
MIME Types in Workspaces

A MIME header is a component of a file or e-mail message that is capable of indicating the content type of the file; for example, Content-Type: text/plain indicates a simple text file.

The application that opens a streamed file will depend on the MIME type and file association on the client's system. MIME type is provided in FME by the first Writer added to the workspace.

The only Writers in FME with a MIME type setting are the TextLine (text file) and Data File Writers.

This parameter only appears when the Writer is added, and (for example) it allows the workspace author to set a MIME type of HTML and therefore stream data directly into a web browser.



KML Network Link

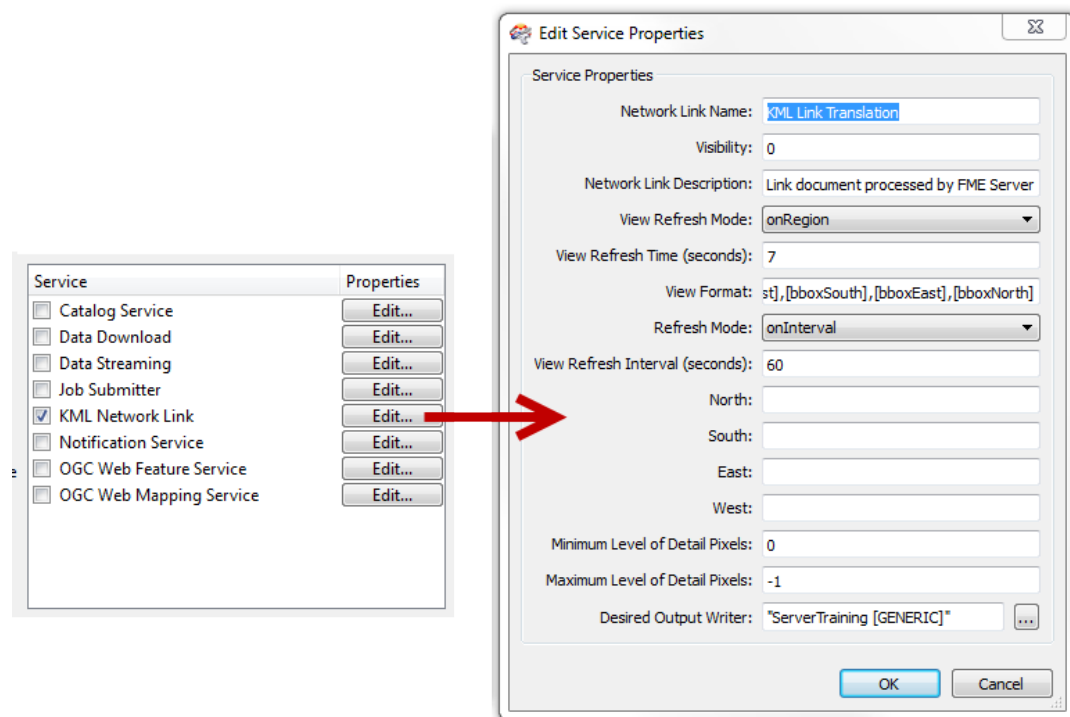
A KML Network Link service is when the output from an FME Server translation is a simple KMZ (zipped KML) file that contains solely a network link to reference the workspace on the server.

Whenever a KML browser (such as Google Earth) opens this dataset it follows the link, triggering FME Server to run the translation and return the true output data.

Because Google Earth permits a refresh rate for network links, the translation can be re-run at a user-defined interval. This way the results are always as up-to-date as the chosen interval.

Of course, in this scenario the output is never written to a permanent dataset; the resulting data is simply streamed to the browser, which writes it to a cache.

As with other services, a workspace becomes available for use as a KML Network Link service when the author checks the KML Network Link checkbox in the FME Server Publishing Wizard. The edit button provides a whole series of different parameters that control the refresh rate when the data is opened in Google Earth.





Exercise 3g: Data Streaming	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Create a Data Streaming Service
Demonstrates	Data Streaming
Starting Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3g-Begin.fmw
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise3g-Complete.fmw

Any exercises we've completed up until now could also be used with a simple Data Streaming service, just as easily as a Data Download service, and with very little editing.

This would allow customers to preview their downloads in a browser.

1. Open Starting Workspace

Start Workbench and open the starting workspace. Alternatively open the workspace from any of the previous exercises.

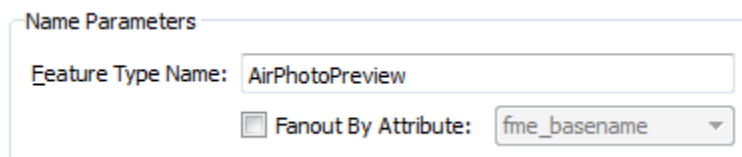
2. Add Writer

For data streaming it's important that we have a workspace with a JPEG writer, not Generic. Even if the Generic writer writes a JPEG file, it can't be streamed because the MIME type is unknown.

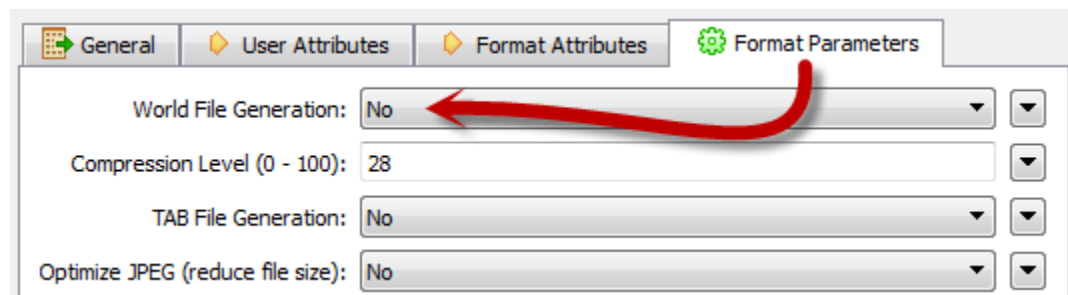
So, use Writers > Add Writer from the menubar. When prompted add a Writer as follows:

Writer Format JPEG (Joint Photographic Experts Group)
Writer Dataset C:\FMEData2014\Output\Training

Click OK to close the dialog. When prompted to add a new feature type, click Yes. In the Feature Type Properties dialog uncheck the fanout option and name the feature type as AirphotoPreview



Click the Format Parameters tab and check the parameter for World File Generation. It needs to be set to "No". If it is not "No" then multiple files will be output and streaming will fail.



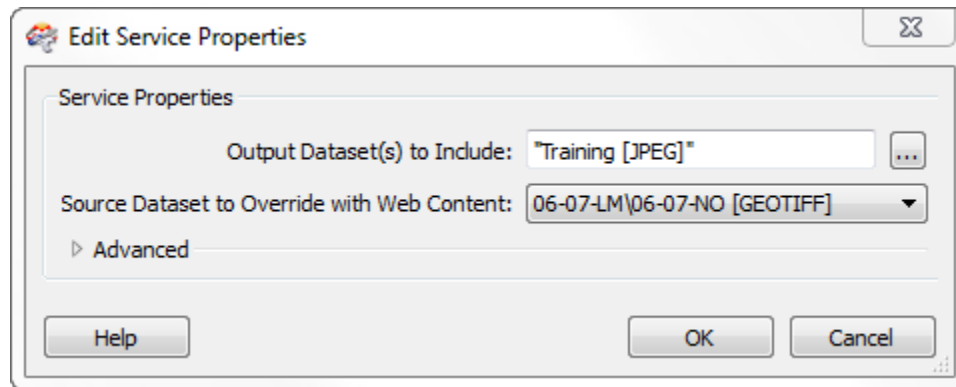
3. Publish the Workspace to the Data Streaming Service

Connect the newly created Feature Type to the RasterMosaicker Output port. Then select File > Publish to FME Server from the menubar to publish the workspace.

Save the workspace (as Exercise3g.fmw) and publish it to the Training repository again; but this time, register it with both the Data Download *and* Data Streaming services.

For the Data Download service click the Edit button to make sure the Output Dataset associated with the service is the Generic Writer.

For the Data Streaming service click the Edit button to make sure the Output Dataset associated with the service is the JPEG Writer, and *only* the JPEG writer.



4. Run the Workspace in the Data Streaming Service

Acting as a user now, go to the Web User Interface and navigate to your workspace: Repositories > Training > Exercise3g.fmw > Data Streaming - Configure

Enter some parameters. Data Download specific parameters like destination coordinate system and output format will not apply when streaming.

Click Run Workspace on the bottom of the form.

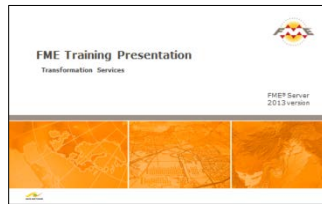
After a short time the resulting image will appear on the webpage. Your browser automatically displays the image because FME Server provided the MIME type image/jpeg in the headers of the page it returned.

Hopefully you see how this service could be incorporated into your self-server data sharing solution so users can preview the data they want to download at lower resolutions first.



Congratulations! You have now created a Data Streaming service for your customers.

Troubleshooting for Administrators



This section shows a few basic troubleshooting techniques in case of emergency

Data Download: No Output

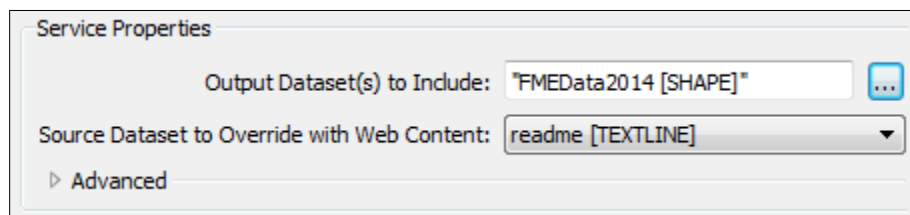
If no zip file is output at the end of a Data Download process then the following suggestions may be of help.

- Run the workspace on FME Desktop to confirm that it does actually write some data. If there is no output data then no zip file will be delivered.
- Check that the FME Server has access to the source data. If the source data is not available to FME Server then there will be no output.
- On FME Server check the log file using Jobs > Completed to confirm that the process did actually try to write some data. If not an error message may help to indicate why.

Data Download: Empty Output

If an empty zip file is output at the end of a Data Download process then the following may be of help.

- Ensure that when you publish the workspace to FME Server you check the Data Download parameters and choose an output dataset to be associated with the Service. If you don't, then FME has no way to determine which Writer will provide the output.



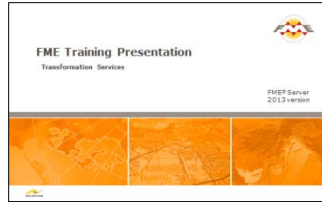
Data Streaming: Zipped Output

If the Data Streaming service does not provide a dataset, but a zip file, then the following may be of help.

- If the output format is one composed of a number of files – for example Esri Shape – then the Data Streaming service will create a zip of the output.

Often raster Writers will write an additional world file, and vector Writers a prj file, in order to preserve coordinate system information, and this can unexpectedly cause this issue. In most cases wld/prj file creation can be turned off with either Writer or Feature Type parameters.

Module Review



This module introduced you to FME Server's Self-Serve Services and related functionality in FME Workbench

What You Should Have Learned from this Module

The following are key points to be learned from this module.

Theory

- Services handle communication between FME Server and its clients. Each workspace published to FME Server can be registered with any number of services.
- The Data Download service overrides the destination dataset parameter and presents data to the end-user as a link to a zip file
- Parameters control the different actions of a Data Download system, including the output coordinate system.
- The Generic Writer is a writer whose format is only defined at run time. This can be provided by the user through a published parameter.
- Selection of source data by layer is achieved using the Feature Types to Read parameter
- Selection of source data by area can be achieved using Bounding Box parameters, or a transformer such as the Clipper or FeatureReader
- Other FME Services allow data to be streamed live into a suitable application

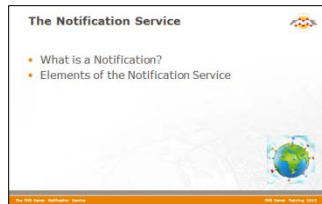
FME Skills

- The ability to publish a workspace and register it to the FME Server Data Download service
- The ability to create and use published parameters
- The ability to give the end-user control over format, coordinate system, layers, and area of interest.
- The ability to use Data Streaming and KML Network Link services

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Real-Time with FME Server



Real-Time systems are those that act on events as they happen, and send information as it becomes available.

What is Real-Time?

In real-time FME Server is either set up to receive incoming information in the form of notifications, messages, and alerts, or to send information in a similar format.



Real-time is often implemented to monitor sensor networks, run event-driven processing, and/or to send alerts to mobile devices such as cell phones.

Therefore real-time is usually related to small amounts of information, rather than large datasets, which can arrive either individually or as a continuous communication stream.

Real-world examples include processing simple location data from a vehicle tracking system, or handling a continuous stream of data from a temperature sensor or lightning detector. A simpler example would be sending email to a system administrator in response to database table updates.

Real-time data in FME is handled in two ways: **Notifications** and **Message Streams**.

Notifications

Notifications are how FME Server handles individual messages and alerts.

FME Server has a specific Notification Service that can be set up to listen for an incoming message from outside of FME, and trigger a certain action in response; or that can be set up to send a single alert in response to an event that takes place on FME Server.

Protocols supported include email, websockets, and notifications for Apple and Android devices.

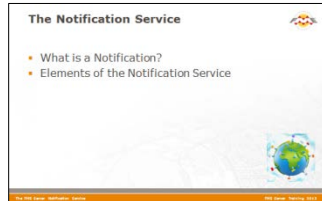
Message Streams

Message Streams are how FME Server handles a continuous flow of information; literally thousands of messages per second.

Rather than use the Notification service, message streams are handled by a number of transformers. A workspace is set up to run continuously and the transformers within it listen for, and dispatch, messages on a number of different protocols.

Protocols supported include TCP, JMS, and HTML5 WebSockets.

The Notification Service



The Notification Service is a way for data to be pushed to and from FME Server in the form of short messages.

What is a Notification?

A notification is a simple message (sometimes called an “alert”) that informs someone or something that a particular event has happened.

Notifications on FME Server can occur in two different forms; incoming and outgoing.

Incoming notifications alert FME Server to an event that has taken place elsewhere.

Outgoing notifications alert users to an event that has taken place on FME Server.

In this way, FME Server can take action in response to an event notification, or a user can take action in response to a notification from FME Server.



The **Notification Service** is the part of the FME Server architecture that handles incoming and outgoing notifications.

When to Use Notifications

Notifications should be used when you want to trigger an FME workspace in response to an event that is reported from outside of FME. The event should not be a continuous series of messages; if there is more than one message per second you should consider using Message Streaming techniques instead.

Notifications are also for when you want to send a message about something that happened on FME Server, to an outside subscriber. Again, if there is likely to be more than one message per second you should consider using Message Streaming.

In either case a notification is for sending a brief message, usually in order to trigger an action from the recipient. It's not intended to be used for transmitting large amounts of spatial data. At most you should use it for a single geographic feature such as a point location.

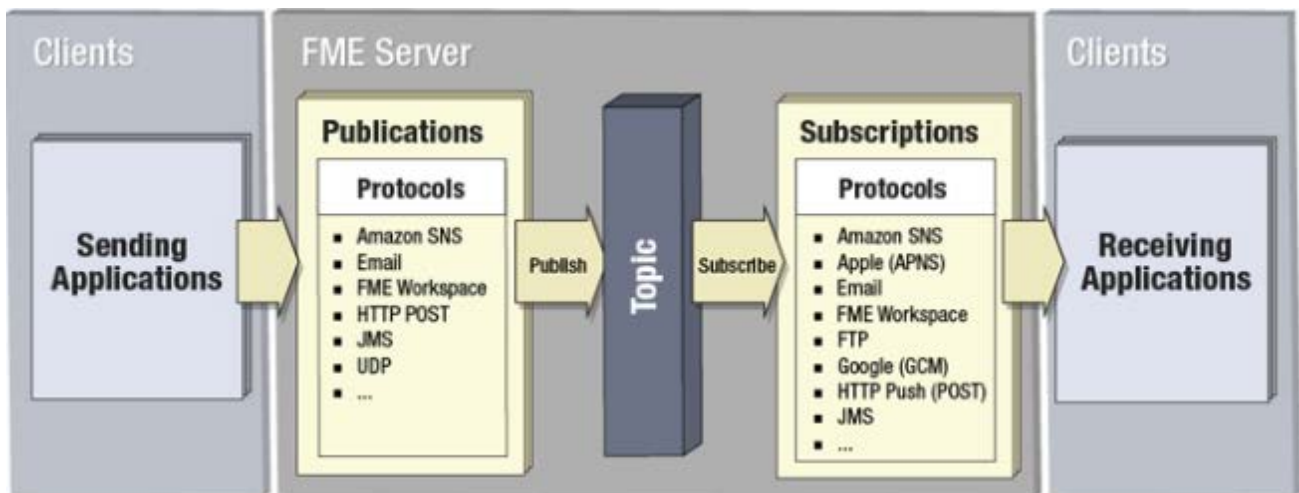
Elements of the Notification Service

The Notification Service includes a number of different components.

- Clients An external user or system that sends or receives a notification
- Publications An event handler that listens for incoming notifications
- Subscriptions An event handler that dispatches outgoing notifications
- Topics A subject that describes what the notification is about
- Protocols Methods by which FME Server can receive or send notifications

Although the diagram below shows a continuous process, from a sending client through FME Server to a receiving client, it is not necessary for all of these components to be used in a setup.

If the system is designed for FME Server to only receive notifications, then only the publications side of the diagram is relevant. Likewise, if the system is intended for FME Server to only send notifications, then only the subscriptions side of the diagram applies.



Clients

A client is a user or system that **sends** or **receives** a notification. The client may be a physical person, or may just be a component in a computer system.

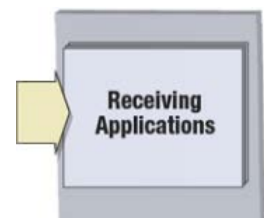


For example, a database update might cause a trigger to **send** a notification to FME Server, in which case the database system is the client. But a client could also be a person who, for example, triggers a notification by sending an email to FME Server.

Since they are sending information these clients are called “**Publishers**”.

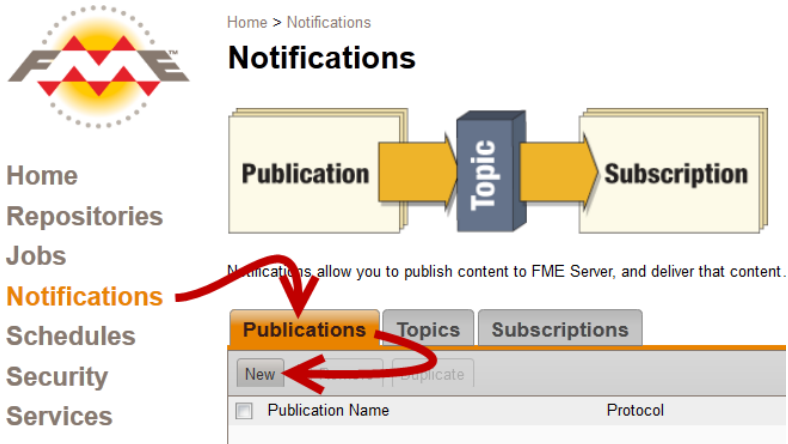
Likewise, FME Server can send a notification for another client system to **receive**. Alternatively this client can also be a real person, who might receive a notification in the form of an email.

Since they are receiving information, these clients are called “**Subscribers**”.



Publications

A Publication is a component that receives **incoming** notifications *from* a client.



To receive notification in FME Server a user must create a new Publication.

A Publication is created in the FME Server Web User Interface under the Notifications section.

Topics

A Topic is a component that acts as a mediator for messages and defines the message content. Think of it as a subject line for notifications.



Like Publications, a Topic is created in the FME Server Web User Interface, under the Notifications section.

All Publications are linked to one (or more) Topics, so that when an incoming message is received it is categorized and the related Topic is triggered.

Because a Publication can be linked to multiple Topics, each incoming message can trigger multiple actions to occur. Additionally, multiple Publications can trigger the same topic.

For example, a lightning strike sensor might publish to the topics *WeatherEvent* and *AircraftAlerts*, whereas a flood sensor might publish to the topics *WeatherEvent* and *RoadConditions*.



Daily Interop Reporter, Chad Pugh-Litzer says...

"It's like when I write a news article. I publish the article to the Daily Interop web site, tagged with a number of topics to describe it.

For example, a report about a soccer team's tax return would be filed under both 'Financial' and 'Sports' because it relates to both.

But other reporters might also file articles under the same topics."

Subscriptions

A Subscription is a component that sends **outgoing** notifications to a client.



Home > Notifications

Notifications



Notifications allow you to publish content to FME Server, and deliver that content

Publications	Topics	Subscriptions
New		
<input type="checkbox"/>	Subscription Name	Protocol
<input type="checkbox"/>	DataDownload_Email_JobFailure	email
<input type="checkbox"/>	DataDownload_Email_JobSuccess	email
<input type="checkbox"/>	JobSubmitter_Email_JobFailure	email
<input type="checkbox"/>	JobSubmitter_Email_JobSuccess	email

To send a notification in FME Server a user must create a new Subscription.

A Subscription is created in the FME Server web interface under the Notifications section.

As with Publications, each Subscription is also tied to one (or more) Topics, and each Topic can be subscribed to by multiple Subscriptions.

For example, a police headquarters might subscribe to the *RoadConditions* topic, to receive notifications on that subject. The local TV weather channel also subscribes to the *RoadConditions* topics, but in addition subscribes to *WeatherEvent* to hear about those particular events.



InteropGeek68 says...

"I subscribe to articles published on the Daily Interop web site according to their topic."

"For example, I subscribe to reports on technology and gaming, whereas my friend - InteropJock72 - subscribes to sports articles"

*Although the actions seem odd in regard to the name - Publications receive messages, Subscriptions send them - it is correct. The name refers to the **Client**, not the Server.*

So FME Server receives a Publication because the client is publishing it. Likewise, FME Server sends a Subscription because the client is subscribing to it.

Protocols

A protocol is a system of data exchange between FME Server and a client. It is the **method** by which FME Server receives notifications from a client and sends notifications to a client.

E-mail is a messaging protocol, as are Apple and Android alerts.

Each Publication and Subscription must be defined using a particular communication protocol. An e-mail Publication – for example – will accept notifications via an incoming email message. An Apple Subscription will send notifications to an Apple mobile device.

Protocols are pre-defined components in the FME Server architecture and do not need to be defined in the Web User Interface.

However, a number of fields are made available to configure them when a Publication or Subscription chooses to make use of that protocol.

For example, here are the parameters for an e-mail Subscription.

These parameters must be set when the Subscription is created as they are needed in order to be able to send out a notification using the e-mail protocol.

Protocol:	<input type="text" value="Email"/>
SMTP Server ?:	<input type="text"/>
SMTP Server Port ?:	<input type="text" value="25"/>
SMTP Account ?:	<input type="text"/>
SMTP Password ?:	<input type="password"/>
Connection Security ?:	<input type="text" value="None"/>
Email To ?:	<input type="text" value="recipient@example.com"/>
Email Cc ?:	<input type="text" value="fmeserver@example.com"/>
Email From ?:	<input type="text" value="fmeserver@example.com"/>
Email Subject ?:	<input type="text"/>
Email Format ?:	<input type="text" value="Text"/>
Email Template ?:	<input type="text"/>

An Introduction to Email Notifications



Email is probably the most commonly used notification protocol

It's important to cover email notifications in some detail because they are the most commonly used type of notification on FME Server.

“Email” is actually a protocol used by Publication and Subscription components. Email Publications receive incoming email and Email Subscriptions send outgoing email.

Email Protocols

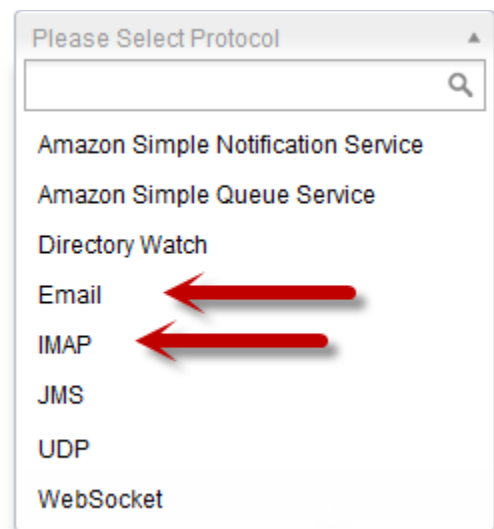
FME Server can make use of email messages as both an incoming and outgoing notification protocol.

There are two email-related protocols available in FME Server: “SMTP” and “IMAP”.

The SMTP protocol is the ability to directly send or receive an email through an email server built into FME Server.

The IMAP protocol acts a little differently. It is an indirect process that connects to an email account on a server elsewhere.

When that account receives an email the IMAP protocol passes it on to FME Server.



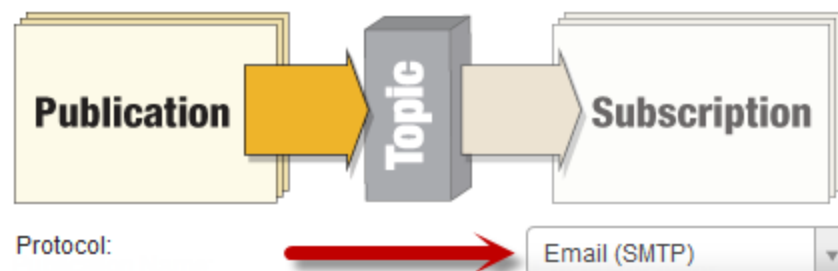
SMTP Publications

SMTP Publications are when data is published to FME Server via a direct email. FME Server receives an email and triggers a Topic in response.

Setting up an Email Publication

Creating an SMTP publication is done in the Notifications section of the Web User Interface, by choosing the Email (SMTP) protocol for a new Publication, like so:

Create a New Publication



Publication Name:

Topics to Publish To:

Protocol:

Email User Name [?]:

Once the protocol type is selected, the publication must also be given a name and an existing topic chosen to be triggered.

The final parameter is the Email User Name; in this example it is set up to be *RoadInfo*.

Notice the author is suffixing the publication and topic names with *_In* so that there is no confusion over which topics are being used for incoming notification and which ones for outgoing.

Now, whenever an email is sent to *RoadInfo@serverhost.com* – for example someone is sending an email to report snow on the road – the *RoadConditions_In* topic is triggered.

Setting up the Email Server

Email Publications are possible with minimal setup because FME Server includes an in-built email server as one of its components. However, this does require some minimal setup, plus it does require that the server itself has a domain name registered with a DNS name server.

The steps to set up the email server for notifications are documented in the FME Server Reference Manual (FME Server Reference Manual > FME Server Services > Notification Service > Email Publisher Settings) and also in the following exercise.



Sister Intuitive says ...

“FME Cloud instances are automatically configured for email notification, and have a public domain name too, so you don’t need to do any additional setup.”

IMAP Publications

IMAP (Internet Message Access Protocol) is a variation on email for incoming (Publication) notifications.

Instead of using the in-built email server, an IMAP Publication connects to another email server and monitors it for incoming email. When an email arrives in that account then the Topic to which it is tied becomes triggered.

Setting up an IMAP Publication






Like the SMTP protocol, IMAP Publications are set up in the Notifications section of the Web User Interface, by creating a new Publication and choosing the Email (IMAP) protocol.

Here are the parameters for an IMAP Publication:





Notice that most parameters are for defining the IMAP (Email) server connection.

Two important parameters let you decide the interval to check for emails (here every 15 minutes) and decide whether to fetch all unread emails or new emails only.

There is also a parameter to select an FME Server resource location in which to store any email attachments:

Publication Name:	<input type="text"/>
Topics to Publish To:	<input type="button" value="Select All"/> <input type="button" value="Deselect All"/> <input type="button" value="Click to Select"/>
Protocol:	<input type="text" value="IMAP"/>
IMAP Server Host: 	<input type="text"/>
IMAP Server Port: 	<input type="text" value="993"/>
IMAP Email Account :	<input type="text"/>
IMAP Email Password :	<input type="password"/>
Connection Security: 	<input type="text" value="SSL"/>
Poll Interval(minutes): 	<input type="text" value="15"/>
Emails to Fetch: 	<input type="text" value="New Emails Only"/>

Download Attachments To:

Browse		Specify Location	
Name	Size	Date	
 Backup		2014-3-18 09:59:27	
 Data		2014-3-18 09:59:27	
 Logs		2014-3-18 09:59:27	
 Temp		2014-3-18 09:59:27	



Monsieur D. Server says ...

"Most email servers support IMAP functionality, as do the majority of cloud-based email providers such as Gmail, Outlook.com, Yahoo!, etc; so it's very easy to have FME Server scan a Gmail account for incoming mail, and then act on its contents."



Exercise 4a: Basic Notifications and Email Subscription	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Provide email-driven self-serve access to image files
Demonstrates	Email Publications and Topic Notification
Starting Workspace	n/a
Finished Workspace	n/a

This exercise is the first part in setting up a system that provides email-driven access to image files. In this part we'll concentrate on setting up a Topic and Publication.

For this setup you may use either the SMTP or IMAP protocol for email.

For SMTP, this exercise requires your FME Server to have a DNS record and SMTP configured.

For IMAP, this exercise requires access to an email server that supports the IMAP protocol. Gmail, Outlook, and Yahoo! all are acceptable web-based solutions.

1. Create a Topic

The first step is to create a topic that will be triggered by the email.

Open the Web User Interface in a web browser by visiting <http://<servername>/fmeserver>

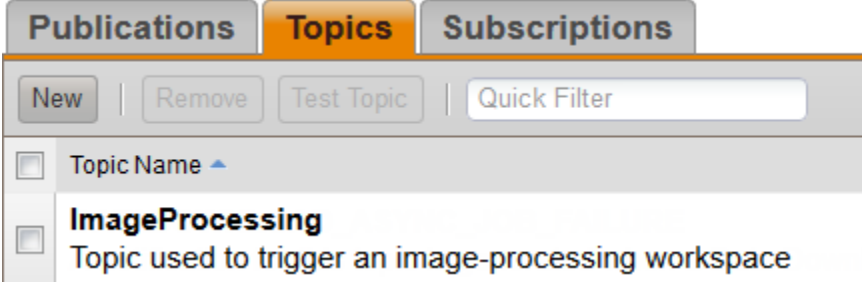
Click on the menu item labelled Notifications and then click the tab labelled Topics.

Click New and enter a topic name such as ImageProcessing.

Enter a description such as "Topic used to trigger an image processing workspace".

Click OK to close the dialog and create the Topic.

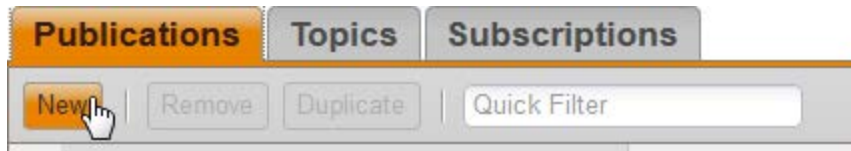
Home
Repositories
Jobs
Notifications ←
Schedules



The screenshot shows the 'Topics' tab selected in the FME Server Web User Interface. At the top, there are tabs for 'Publications', 'Topics' (which is active), and 'Subscriptions'. Below the tabs, there are buttons for 'New', 'Remove', 'Test Topic', and a 'Quick Filter' input field. A list of topics is displayed below, with the first topic being 'ImageProcessing' with the description 'Topic used to trigger an image-processing workspace'.

2. Create a Publication

In the Notifications part of the web interface click on the Publications tab. Click the New button to create a new Publication.



The new publication can be created to use either the Email protocol or the IMAP protocol.

Email Protocol


Enter *Email Receiver* as the new publication's name. Then click in the text box labelled *Click to Select* besides *Topics to Publish To*. Select the newly created ImageProcessing topic from the drop-down list.

Publication Name:

Topics to Publish To:

Now select Email (SMTP) as the Publication Protocol. This will open the Email User Name parameter. Enter a name for receiving email, for example in the format *FirstnameLastname*

This will create an email address <name>@<hostname>
The hostname is assumed, so you don't need to enter it yourself.

Email User Name 

The user name of the e-mail address on the FME Server host system that receives the notification e-mail. For example if the e-mail address is user@serverhost.com, enter user.

Now all emails sent to that address will trigger the ImageProcessing topic.

IMAP Protocol

IMAP is the easier way to handle incoming email where computers might not have a proper DNS record, such as on an internal network.



InteropGeek68 says ...

"If you don't have access to a web-based email account, use fmeserver2014@gmail.com with the password lizardisland."

Enter IMAP Email as the new publication's name.

Next, click in the text box labelled *Click to Select* besides *Topics to Publish To*. Select the newly created ImageProcessing topic from the drop-down list.

Publication Name:

Topics to Publish To:

Now select Email (IMAP) as the Publication Protocol. This will open a number of other parameters. Enter them according to your email account:

Protocol:

IMAP Server Host:

IMAP Server Port:

IMAP Email Account:

IMAP Email Password:

Connection Security:

Poll Interval(minutes):

Emails to Fetch:

In case it is of use, the usual server information is as follows:

	Gmail	Outlook	Yahoo!
IMAP Server Host	imap.gmail.com	imap-mail.outlook.com	imap.mail.yahoo.com
IMAP Server Port	993	993	993
IMAP Email Account	<email address>	<email address>	<email address>
IMAP Email Password	<password>	<password>	<password>
Connection Security	SSL	SSL	SSL

Set the Poll Interval to 1 minute and Emails to Fetch to *New Emails Only*.

Select a Resource Folder for attachments to be saved to and click **OK** to close the dialog and create the new Publication.

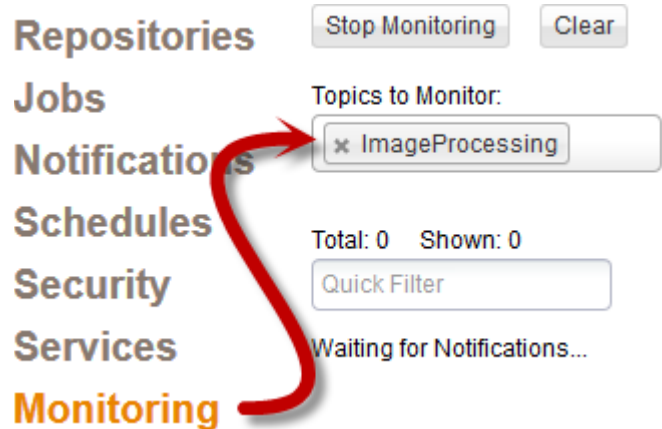


3. Start Monitoring Topic

A new monitoring tool in FME Server 2014 lets you know when a notification is received.

NB: To use monitoring requires the WebSocket port (usually 7078) to be open. This should automatically be the case on FME Cloud, but other systems may require some manual firewall configuration.

Click the menu item labelled Monitoring and select ImageProcessing as the topic to monitor:



4. Send an Email

Now let's test the setup so far by sending an email to FME Server. At the moment you can use any subject line or contents for the email, as FME is not yet using them to do anything.

If you chose the SMTP protocol then the email should be sent to <emailname>@<hostname>.

For example an FME Cloud address would be like this:

MyName@server-tutorial.safe-software.fmecloud.com

And an Amazon AWS machine would have an address like this:

MyName@ec2-54-224-106-213.compute-1.amazonaws.com

If you used the IMAP protocol then send an email to the account you chose in the Publication.

For IMAP there will probably be a slight delay because FME is only checking for email every minute, plus it will take a short while for the email to arrive. However, shortly the email will be recognized by FME Server, the notification topic triggered, and the activity reported by the monitor:

ImageProcessing arrived a few seconds ago at 14:15:03

Congratulations!

You have now triggered an FME Server notification using email.

```
{
  "imap_publisher_content{0}": "This is a test notification #wafclrn",
  "imap_publisher_sent": "Wed Apr 16 14:14:02 CDT 2014",
  "imap_publisher_content_type{1}": "TEXT/HTML; charset=UTF-8",
  "imap_publisher_from": "Mark Ireland <mark.ireland@safe.com>",
  "imap_publisher_to": "mark@markireland.ca",
  "imap_publisher_content{1}": "<html><head><meta http-equiv='Co",
  "imap_publisher_received": "Wed Apr 16 14:14:04 CDT 2014",
  "imap_publisher_subject": "Test Notification",
  "imap_publisher_content_type{0}": "TEXT/PLAIN; charset=UTF-8",
  "fns_type": "imap_publisher"
}
```

Notifications and Workspaces



Workspaces are what make FME Server the ideal engine for Spatial Data notifications

Message Transformation

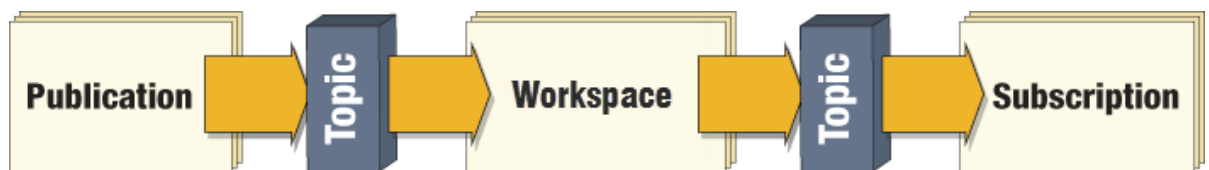
As shown in the previous exercise, the simplest setup for the FME Server Notification Service is an incoming message (Publication) tagged with a specific topic, that gets passed as an outgoing message to any Subscription registered with that topic:



However, that scenario does not include any transformation – restructuring – of the message contents. If the message needs to be processed in some way then an FME workspace can be employed between Publication and Subscription.

A workspace is the key functionality of FME and with one you can read spatial data from a message, in almost any format, carry out spatial transformations on that data, and then pass on the results to a set of subscribers.

This blend of live messaging with Spatial ETL is unique.



In this scenario a workspace is literally a Subscriber to the incoming Publication, and receives the message content from it. The workspace then acts as a Publisher, sending an outgoing message to any Subscribers.

Of course, the above diagram shows the full potential of a notification system. It would be just as appropriate to have a system that triggered a workspace in response to a Publication, but without the workspace sending an outgoing message:



For example, FME might listen for a message from a database trigger, and run a workspace in response.

The workspace just writes output and does not need to send any outgoing message.

Similarly, it's just as appropriate to have a workspace that is run by some other means, and which sends an outgoing message to a Subscription when it is complete:

For example, a workspace might be started as a scheduled task.

When the task is complete FME sends a notification email to inform an administrator.



Workspaces as a Subscription

When a workspace needs to react to an incoming notification it is done by connecting the workspace to a particular topic. The workspace is run in response to that topic being triggered by a Publication.

In effect, the workspace is subscribing to that topic.

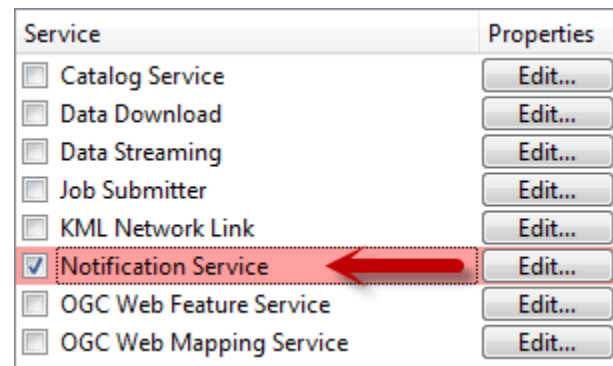
In this case the message is received and passed into the workspace for processing.



Registering a Workspace

A workspace is set up to receive messages when it is published to FME Server and registered with the Notification service.

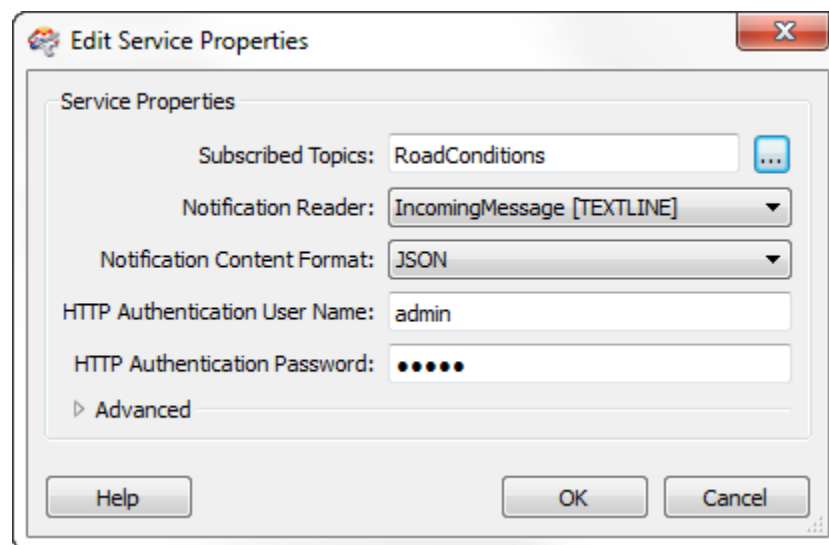
The Service is initially highlighted in red because there are several parameters that need to be set before it can be used.



Two important parameters are Subscribed Topics and Notification Reader

Subscribed Topics tells FME which notification topics should trigger the workspace.

Notification Reader tells FME which Reader should receive the notification content.



In this example any incoming message that is flagged under *RoadConditions* will cause the workspace to run. The message content will be funneled through a plain text Reader called – appropriately enough – *IncomingMessage*.

Managing Workspace Subscription

Once a workspace is published and registered with the notification server as a subscriber it appears in the Notification section of the Web user interface.

Publications Topics Subscriptions		
<input type="button" value="New"/> <input type="button" value="Remove"/> <input type="button" value="Duplicate"/> <input type="text" value="Quick Filter"/>		
<input type="checkbox"/> Subscription Name ▲	Protocol	Topics Subscribed To
<input type="checkbox"/> admin.Testing.ServerParksFolderDemo	push	<i>ParksUpdater</i>

The workspace appears as a Subscription because it is literally subscribed to the topic(s) shown.

It is listed with the protocol "push" because FME Server is pushing a notification using HTTP post to run the workspace.

Clicking on the subscription allows you to make edits to the notification without having to republish the workspace; for example topics can be added or removed.

Topics Subscribed To:	<input type="button" value="Select All"/> <input type="button" value="Deselect All"/>
	<div> <div>×</div> <div>ParksUpdater</div> </div>
Protocol:	<div>Push</div>
Target URL [?] :	<div>http://ASH:8080/fmenotification/Testing/ServerParksFolder</div>
HTTP Authentication User Name [?] :	<div>admin</div>
HTTP Authentication Password [?] :	<div>.....</div>
Content Format [?] :	<div>JSON</div>
Topics Triggered on Success [?] :	<div></div>
Topics Triggered on Failure [?] :	<div></div>



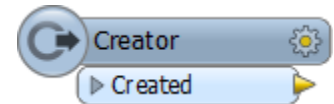
Exercise 4b: Basic Notifications and Email Subscription	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Provide email-driven self-serve access to image files
Demonstrates	Email Publications and Topic Notification
Starting Workspace	n/a
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise4b-Complete.fmw

This exercise continues setting up a system that provides email-driven access to image files. In this part we'll create a workspace that will run in response to the incoming notification.

1. Create a Workspace

Now we have a Publication and a Topic that it will trigger when FME Server discovers a new email in the defined email account. However, at the moment there is nothing subscribed to that publication to act upon it. We'll handle that part of the solution with a workspace.

Start FME Workbench. Begin with a blank canvas and simply add a Creator transformer. This will give us a workspace to run in response to an email; albeit one that doesn't do much yet.

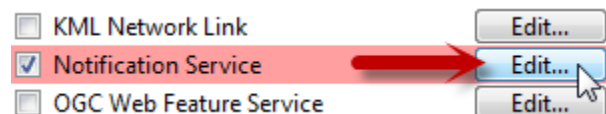


Save the workspace as Exercise4b.fmw

2. Publish Workspace

Now let's publish the workspace to FME Server. Start the Publishing Wizard using File > Publish to Server on the menubar. When prompted enter the same connection parameters as before. Publish the workspace to the Training repository. There are no data files that need to be published along with the workspace.

In the services dialog put a checkmark in the Notification Service's box. Click **Edit** to see the Service Properties for this service.



Click the [...] button next to Subscribed Topics to retrieve a list of available topics from the server.

Select the ImageProcessing topic created in exercise 4a.

All other parameters can be left as they are, so simply click **OK** to close the dialog.

Then click **Publish** to finish publishing the workspace.

3. Confirm Subscription

Remember, the workspace is now effectively a subscriber to the email publication. To confirm this, return to the web interface. Select Notifications on the menu and then click the Subscriptions tab.

You should see a push subscription for your workspace associated with the topic ImageProcessing. Click on the subscription to view the details.

Publications		Topics		Subscriptions	
New		Remove		Duplicate	
<div>Quick Filter</div>					
<input type="checkbox"/>	Subscription Name ▲	Protocol		Topics Subscribed To	
<input type="checkbox"/>	admin.Training.Exercise4a	push		ImageProcessing	


Click Cancel as we don't need to make any changes to this component.

4. Send an Email

As before, send an email to trigger the notification and monitor the topic to ensure that it arrives.

5. Confirm Notification

To confirm the notification has caused the workspace to run, open the web interface to FME Server and click the Jobs option on the main menu. You should see a completed job for workspace Exercise4b.fmw, where FME ran the workspace in response to the email you just sent.

Completed			Queued			Running		
Remove			Remove All					
<input type="checkbox"/>	Id	Status	Engine	Time Started	Time Finished ▼	Repository	Workspace	
<input type="checkbox"/>	1	 SUCCESS	Engine2	2014-03-20 20:49:55	2014-03-20 20:49:56	Training	Exercise4a.fmw	

Congratulations! You have now triggered an FME Server notification using email.



Mr. Flibble says ...

"If you're using IMAP then this is probably a good point to go back to Notifications > Subscriptions, select the Exercise4b push subscription, and unsubscribe it from the ImageProcessing topic.

If you don't do this, then forever more any incoming email to your account will trigger this workspace! And any attachments would get stored in the Resources folder. Wouldn't that be funny! Ha ha!"

Message Content

The ability to interpret and process message content is a key reason for using FME workspaces as a subscriber. They can receive the message and then transform it in whatever way is required.

Content is received in a workspace by a Reader.

When the workspace is run (in response to a message) the notification content is substituted in place of the source dataset for a Reader feature type, so that a feature emerges from that reader with the message content attached as an attribute.

Content Format

Notification content can be read by a workspace in one of the following formats:

- JSON (Javascript Object Notation)
- XML (Extensible Markup Language)

For example, here a workspace has a Reader that will receive the message content.



Notice that the above workspace uses a Text File Reader.

Reading the incoming message as plain text is the most flexible method because the message is kept intact inside a single attribute and not processed into features. It would also allow you to create one workspace that could deal with both content formats.

The message can then be scanned and processed with a number of different transformers. If the messages are in JSON format there are transformers such as the JSONExtractor and JSONFlattener. Similarly there are XMLFlattener and XMLFragmenter transformers for XML content.

Handling Email Publications in a Workspace

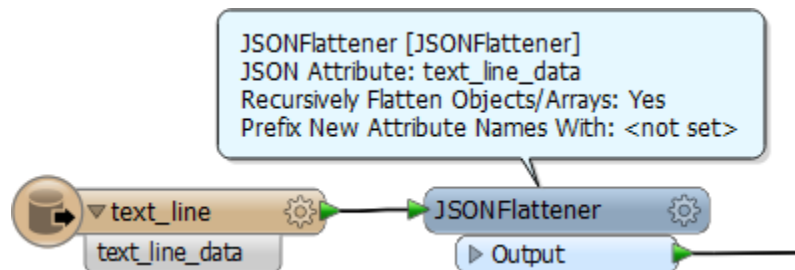
As previously described, content from a notification will be passed into the workspace to a Reader, usually a plain text Reader, and stored in an attribute.

For a JSON email the content will look like this:

```
{
  "fns_type": "email_publisher",
  "email_publisher_to": "demo@somehost.com",
  "email_publisher_subject": "MIME message from sender",
  "email_publisher_content{0}": "Testing Email",
  "email_publisher_content_type{0}": "text/plain",
  "email_publisher_from": "sender@somehost.com",
  "email_publisher_received": "Thu May 17 11:15:46 PDT 2012",
  "email_publisher_sent": "Thu May 17 11:15:46 PDT 2012",
  "email_publisher_attachment{0}": "C:\\Temp\\demo246129673106713_canada.xsd"
}
```

Notice how it includes the email from and to fields, plus the content itself. If there are attachments they will be stored on the file system and a path substituted into the JSON content.

This content can be converted into FME attributes using the JSONFlattener transformer:



The result – as shown in the FME Data Inspector – will look something like this:

Feature Information	
Features Selected: 1 of 1	
Property	Value
Properties	
Feature Type	JSONFlattener_Output
Coordinate System	Unknown
Attributes	
14 attribute(s)	
_creation_instance	0
email_publisher_attachment{0} (utf-8)	C:\Temp\demo246129673106713_canada.xsd
email_publisher_content_type{0} (utf-8)	text/plain
email_publisher_content{0} (utf-8)	Testing Email
email_publisher_from (utf-8)	sender@somehost.com
email_publisher_received (utf-8)	Thu May 17 11:15:46 PDT 2012
email_publisher_sent (utf-8)	Thu May 17 11:15:46 PDT 2012
email_publisher_subject (utf-8)	MIME message from sender
email_publisher_to (utf-8)	demo@somehost.com

Now the content is available to the workspace and can be processed as required.



Exercise 4c: Basic Notifications and Email Publication	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Provide email-driven self-serve access to image files
Demonstrates	Email Publications and Topic Notification
Starting Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise4c-Begin.fmw
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise4c-Complete.fmw

Having already set up a solution for incoming email notifications (in Exercise 4b) we can now expand upon that to let the user select a neighborhood in the email subject line. This neighborhood will be used to select a feature to clip the data with.

1. Open the Starting Workspace

In FME Workbench open the starting workspace for this exercise.

You **must** open this workspace as the exercise does not continue on from Exercise 4b. This workspace has more content and is similar to those created in Chapter 3; it reads and resamples raster data, clips it to a boundary, and writes it to a JPEG file.

2. Add a Text File (TEXTLINE) Reader

To read information into a workspace, from a notification, requires the use of a Reader. In this case we'll use a Text File Reader.

Select Readers >Add Reader from the menubar and add a Text File reader using the following settings:

Source Format: Text File
Source Dataset: C:\FMEData2014\Resources\emailIMAP.json

Parameters:
Read Whole File at Once: Yes

The *Read Whole File* parameter is VERY important! Click **OK** and **OK** again to add the Reader.

The file being read here is provided because all Readers need a source dataset, but also as an example of what Notification Service sends to a workspace when FME Server receives an email.

Examine the file in a text editor. It contains JSON content. You can see a number of JSON attributes available, which come from an email, and you will be able to read and use any of these in a workspace. In this exercise we'll be using the Subject of the email.

Because you set the Parameter to read the whole file at once, all of the contents will be read into a single attribute in a single feature, rather than creating multiple features.

```
"imap_publisher_sent": "Tue Mar 18 11:57:23 CET 2014",
"imap_publisher_from": "Ken Bragg <ken.bragg@safe.com>",
"imap_publisher_content_type{1}": "TEXT/HTML; charset=ISO-8859-1",
"imap_publisher_subject": "West End",
```

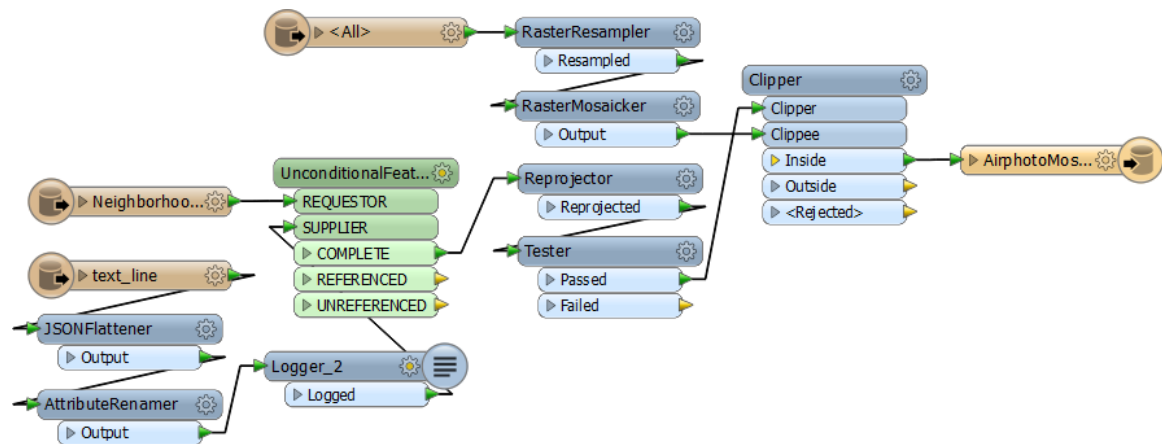
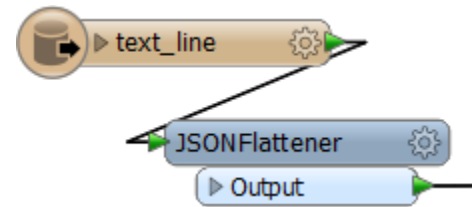
3) Process the JSON Message

Back in the workspace, connect the Text Line source feature type to the JSONFlattener already in the workspace.

Click the cog wheel icon to open the parameters dialog for the JSONFlattener.

Examine the parameters. This transformer flattens the JSON attributes into FME attributes and exposes all of them.

Browse through the rest of the workspace. It also reads a KML dataset of neighborhood polygons and then filters the neighborhood by the subject of the email to clip by that neighborhood. The UnconditionalFeatureMerger is a custom transformer (available on the FME Store) that simply merges data together without any matching key.



4) Test the Workspace in FME Workbench

Test the workspace by running it in FME Workbench.

This will work because the text file contains a sample email where the neighborhood is coming from the *email_publisher_subject* attribute. If you wish, you can edit the file and use either "Downtown" or "West End" as the neighborhood.

Inspect the output. It should look like this:

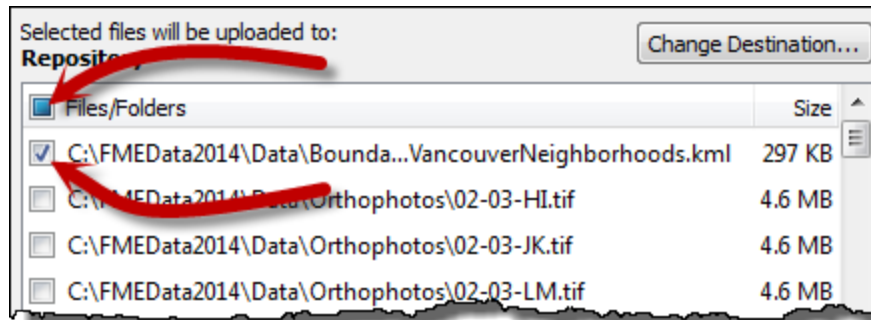


5) Publish to FME Server (Step 1)

Start the Publish Wizard from the menu or toolbar and enter the connection parameters when prompted. Select the Training repository to store the workspace, as usual.

Click the **Select Files** button in the dialog and ensure that **only** the KML dataset VancouverNeighborhoods.kml gets uploaded to the repository.

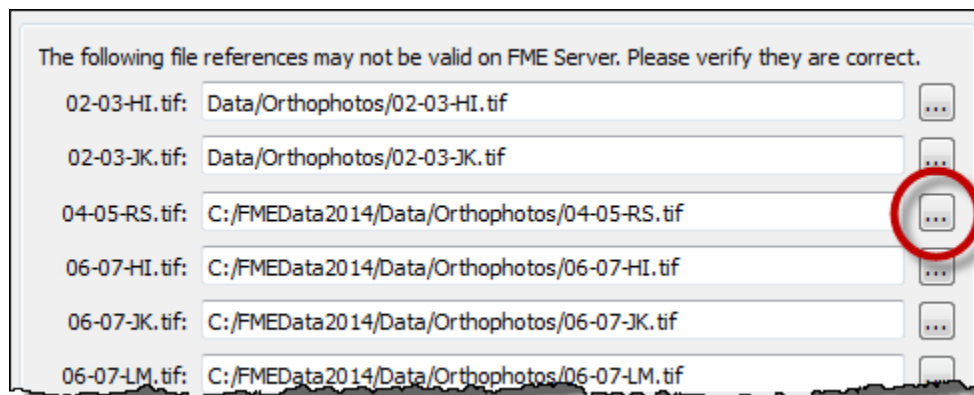
The easiest way to do this is to click the Files/Folders box to turn off ALL files, and then simply turn the neighborhoods file back on:



Uncheck the GeoTIFF files if they are checked because they are already available in the FME Server Repository.

However, you will still need to point the file location from the workspace to the resource location. This is necessary because there is no end-user to set this – for example in a published parameter.

Therefore, click **OK**. A dialog will appear in which you are warned that the file references are not valid. For each of the Orthophoto references, click the [...] ellipsis button and browse to the true file location in the resources folder.

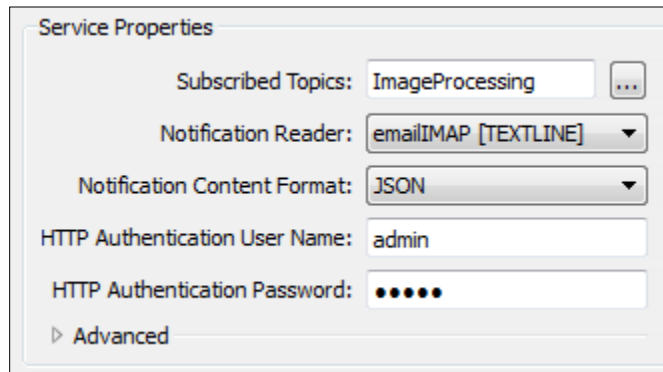


When a reference is fixed then it will show as pointing to the resources folder; for example *Data/Orthophotos/02-03-HI.tif*

Once complete for all files, click **OK** and then click **Next** to go on to the next publishing stage.

6) Publish to FME Server (Step 2)

In the Services dialog check the Notification Service and click **Edit** to open the Service Properties.



The Service Properties dialog box is shown with the following settings:

- Subscribed Topics: ImageProcessing
- Notification Reader: emailIMAP [TEXTLINE]
- Notification Content Format: JSON
- HTTP Authentication User Name: admin
- HTTP Authentication Password: (masked with dots)
- Advanced: (collapsed)

Choose the topic *ImageProcessing* you created in the previous exercise as the Subscribed Topic.

The Notification Reader should be set to the Reader (emailIMAP[TEXTLINE]).

This way the content of any incoming email will be passed directly to that Reader.

Click **OK** and then **Publish** to complete the wizard.

7) Send an Email to FME Server

As before, use any method you like to send an email to your FME Server.

Use the email address you used in Exercise 4a/4b. Enter either Downtown or West End as the subject of the email.

8) Confirm your Workspace was Triggered

Again, if you are using IMAP it may take a couple of minutes until FME Server is notified.

Open the Web User Interface and click on the Jobs link and to view the Jobs history. Look for a completed job where FME Server ran Exercise4c.fmw in response to the email. Check the Resources/Data/Output directory for your imagery.

Congratulations! Now users can email your FME Server with specific information on how to run a workspace - this is truly Self-Serve! In this next exercise you will configure FME Server to email the user back a result.



Mr. Flibble says ...

“Again, you’ll probably want to unsubscribe Exercise4c from the ImageProcessing topic if you’re using IMAP. Unless you want all incoming emails to keep triggering this workspace again and again and again and again and again and again ...”

Email Subscriptions

Email Subscriptions are when FME Server sends an email in response to a Topic. The in-built mail server in FME Server is only for incoming mail, and so messages need to be sent via an existing SMTP email server.

Setting up an Email Subscription

Creating an Email subscription is done in the Notifications section of the Web User Interface, by choosing the email protocol for a new Subscription.

Here, for example, the author has chosen the Email protocol for a new Subscription.

The Subscription is given a name and an existing topic chosen to be triggered.

There are many more parameters for outgoing mail because the full SMTP server connection parameters need to be defined.

Now when the RoadConditions_Out topic is triggered, an email is sent to recipient@example.com

However, the various fields for the email itself (From, To, Subject, Template) do not need to be hard-coded and can be passed through to the Subscription from a workspace.

One other important parameter is the Email Format. This can either be plain text or HTML.

Subscription Name:	<input type="text" value="RoadConditionReports_Out"/>
Topics Subscribed To:	<input type="button" value="Select All"/> <input type="button" value="Deselect All"/> <input type="button" value="x RoadConditions_Out"/>
Protocol:	<input type="text" value="Email"/>
SMTP Server [?] :	<input type="text" value="MyMailServer"/>
SMTP Server Port [?] :	<input type="text" value="25"/>
SMTP Account [?] :	<input type="text" value="MyMailAccount"/>
SMTP Password [?] :	<input type="password" value="....."/>
Connection Security [?] :	<input type="text" value="SSL"/>
Email To [?] :	<input type="text" value="recipient@example.com"/>
Email Cc [?] :	<input type="text" value="fmeserver@example.com"/>
Email From [?] :	<input type="text" value="fmeserver@example.com"/>
Email Subject [?] :	<input type="text"/>
Email Format [?] :	<input type="text" value="Text"/>
Email Template [?] :	<div style="border: 1px solid #ccc; height: 150px;"></div>

Workspaces as a Publication

When a workspace acts as a Publication, it triggers a topic when it is run.

In effect, the workspace is publishing to that topic.



In this case the message is constructed in the workspace and passed onto the Subscription.

Publishing notification messages from FME is useful for both sending messages containing content from the data being processed, and for reporting the status of a translation, such as whether it has run successfully or ended in a failure.

Message Content

The ability to construct message content from a variety of sources – including spatial – is a key reason for using FME workspaces as a publisher. Workspaces can transform data in multiple ways, use it to construct a message, and then dispatch that message to users as a notification.

Content is sent from a workspace by a Writer.

When the workspace is run the notification message is constructed as an attribute and sent to a Writer feature type. The output from that feature type is used by the notification service as the content of the publication.

Content Format

For the purposes of FME notifications, the content of a workspace publication can be in any format. It does not necessarily need to be either JSON or XML, though obviously it would have to be if any client who subscribes to the notifications requires it in that format.

For example, here a workspace constructs a plain-text weather (lightning) alert using an AttributeCreator:



Now the message attribute is connected to a Text File Writer in order to provide a means for publishing the outgoing message.

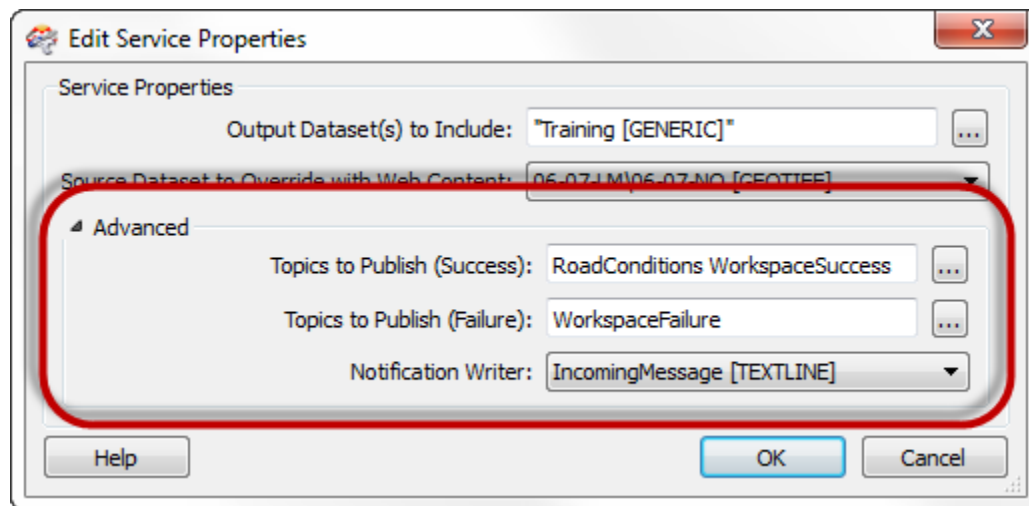


Registering a Workspace

Setting up a workspace to communicate notifications is achieved when the workspace is published to FME Server.

Notifications are sent once the workspace is complete. The way in which the workspace is run is not important. Notifications can be sent for workspaces run using the Job Submitter Service, or the Data Download Service, or any other service.

In other words, a workspace that sends notifications doesn't need to be published to the Notification service; it should be published to the service under which it is to be run. Under the properties for that service will be advanced parameters for setting the notification.



In this example the author is publishing a workspace to the Data Download service and has opened the properties dialog for that service. There are two parameters for controlling the topics – one for success and one for failure – and a parameter for specifying the Writer to use.

Having two Topic parameters is useful because different notifications can be sent depending on whether the workspace succeeds or fails.

In this case, when the workspace runs to completion it will trigger the *RoadConditions* and *WorkspaceSuccess* topics. If the workspace fails to complete it will trigger a topic called *WorkspaceFailure*.

Either way, the outgoing message is set to be output via a TextLine Writer defined in the workspace.



Ms. Analyst says...

“Four Topics are pre-installed with FME Server to handle workspace notifications. There are two topics for the Job Submitter Service (one for success, one for failure) and two for the Data Download Service (again, one for success, one for failure).

These topics are triggered automatically by FME Server so a system administrator – for example – could subscribe to these topics to receive notifications from all workspaces”

Handling Email Subscriptions in a Workspace

As previously described, content being sent to a notification will be passed out of the workspace using a Writer, usually a plain text Writer that is passed the message in an attribute.

Therefore, to create the content requires only the construction of the attribute with transformers.

For a JSON email you would construct an attribute like this:

```
{
  "email_to" : "notifications@enduser.com",
  "email_cc" : "",
  "email_from" : "notifications@fmeserver.com",
  "email_replyto" : "",
  "email_subject" : "Notification Subject",
  "subscriber_content" : "Notification Content"
}
```

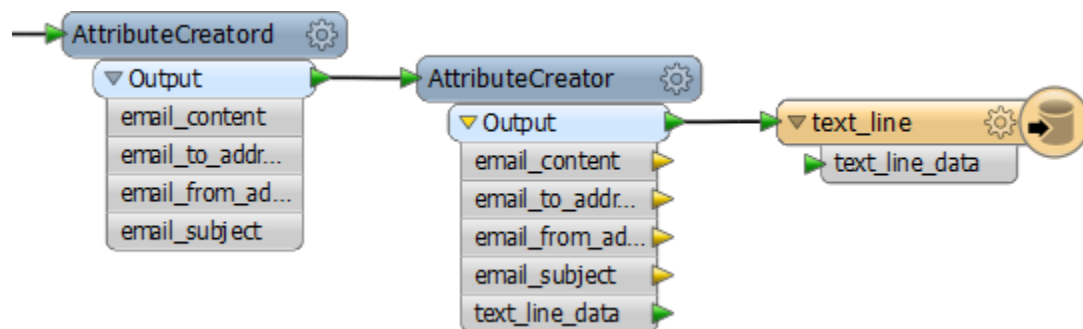
This could be created using an AttributeCreator transformer, where the email addresses and content can be substituted as required, and would look like this:

```
{
  "email_to" : "@Value(email_to_address)",
  "email_cc" : "",
  "email_from" : "@Value(email_from_address)",
  "email_replyto" : "",
  "email_subject" : "@Value(email_subject)",
  "subscriber_content" : "@Value(email_content)"
}
```

If the Email format is set to HTML in the Notification GUI, then the email content could be constructed as HTML too, for example:

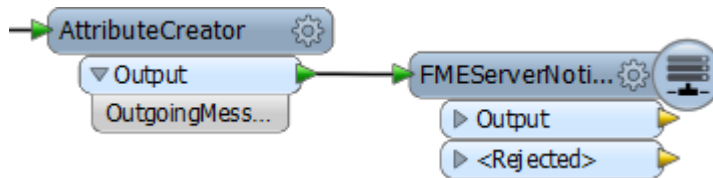
```
<h1 style="font-family:Arial; color:#801020; background: #000; padding: 5px;">FME Lizard Spotted</h1>
<p style="font-family:Arial;">
Reports indicate that the <a href="https://twitter.com/FMELizard">FME Lizard</a> has been spotted
near <a href="https://maps.google.com/maps?q=@Value(LizardLocation)">$(LizardLocation)</a>. </p>
```

The workspace in such a case might look like this:



Publishing with a Transformer

Instead of using a Writer and sending a notification at its completion, a workspace can send a notification through a special transformer called the FMEServerNotifier.

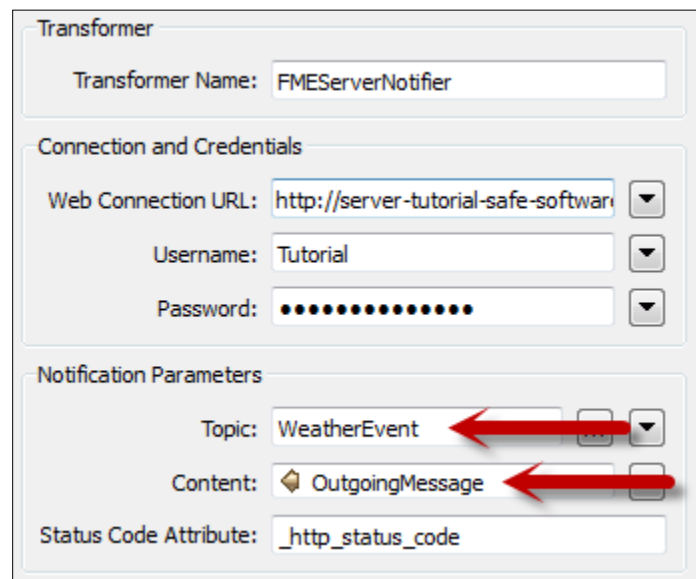


This workspace will trigger the notification wherever it is run.

Notification properties are set in the transformer parameters dialog itself.

The transformer parameters include those for connecting to FME Server, and ones for the topic to post to and the message to be included.

Here the author intends to publish the contents of an attribute called *OutgoingMessage* to a topic called *WeatherEvent*.



There are two advantages to issuing a notification this way, over using a Writer:

- The workspace can issue a notification *during* a translation, rather than at the end of it.
- The workspace does not need to be run on FME Server to generate an FME Server notification. It will produce the same notification when run using FME Desktop.



Aunt Interop says...

"If you only want to trigger the notification once, then add a Sampler transformer before the FMEServerNotifier and set it up to filter out all but one feature.

*Otherwise a notification is triggered for **every** feature!"*

Workspaces as a Subscription AND a Publication

A system that needs to both receive and send notifications looks like this:



In this scenario the same workspace receives an incoming notification sends an outgoing notification. It is registered with the notification service (in order to receive incoming notifications) and the notification parameters set on a different service (in order to send outgoing notifications).

For example, details of a lightning strike are received via a *LightningStrike* topic. The workspace then processes the information – for example it determines which state/province/county the strike occurred in – creates a new message and dispatches it to subscribers via a *WeatherAlert* topic.

The important thing to notice is that the scenario involves two different topics, here Topic I and Topic II.

A major problem occurs if you set up such a scenario but only use one topic



That's because for every notification the workspace receives it will publish back to the same topic, triggering itself again and causing an infinite loop of messages.



Daily Interop Reporter, Chad Pugh-Litzer says ...

“Using the same topic for incoming and outgoing notifications is like setting up your email to forward all incoming messages to yourself. You’ll end up with a loop that continues until you crash the email system!”

*To avoid confusion it’s a good idea to clarify which topics are for in and out communication through their names. For example, use *LightningStrike_In* and *LightningStrike_Out* to differentiate topics that are triggered by incoming alerts and those triggered by outgoing alerts”*



Exercise 4d: Email Subscriptions	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Provide email-driven self-serve access to image files
Demonstrates	Email Subscriptions
Starting Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise4d-Begin.fmw
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise4d-Complete.fmw

Having already set up a solution for incoming email notifications (in Exercise 4b) and used that information to select an area of interest (Exercise 4c) we can now expand upon that to return an email containing the data chosen by the user.

1. Open the Starting Workspace

In FME Workbench open the starting workspace for this exercise.

You **must** open this workspace as it is slightly modified from the one in Exercise 4c. A UUIDGenerator transformer and a dataset fanout has been added so that the output JPEG file has a unique name and is written to the FME Server Resources/Data/Output directory.

2. Create an Email Topic

Remember, it's important for a setup like this to use different topics for incoming and outgoing notifications; otherwise the process will end up in an infinite loop.

So open the Web User Interface and click the Notifications link on the left. In the Topics tab click **New** to create a new Topic. Enter the name *sendemail*. Enter some text in the description to say "Use this topic to trigger an email using an Email Subscription".

Topic Name:

Description:

Helveticaneue
B
I
U
A
A
A
ab

Use this topic to trigger an email using an Email Subscription

3. Create an Email Subscription

Continue in the Notifications part of the Web User Interface. Click the **Subscriptions** tab and then click New.

Enter EmailSender as the subscription name and choose the sendemail topic created in step 2.

Subscription Name:

Topics Subscribed To:

4. Enter Email Settings

Select email as the protocol for the new subscription.

Use the table below to enter your email settings depending on your email service. Please note that if you are using your own internal email system the settings may differ and you may need to ask your IT provider.

	Gmail	Outlook	Yahoo!
SMTP Server	smtp.gmail.com	smtp.live.com	smtp.mail.yahoo.com
SMTP Server Port	465	25	465
SMTP Account	<email address>	<email address>	<email address>
SMTP Password	<password>	<password>	<password>
Connection Security	SSL	TLS	SSL

The following settings are same regardless of email service:

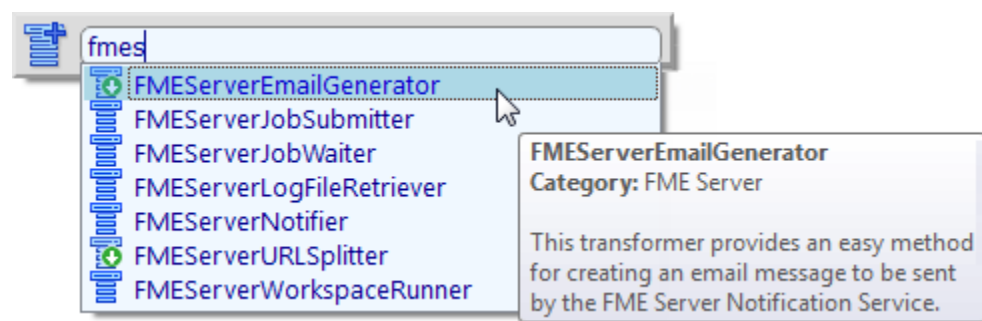
Email to: <leave blank>
 Email cc: <leave blank or enter an admin cc email address>
 Email from: <your email address>
 Email Subject: Your Data is Attached
 Email Format: TEXT
 Email Template: <leave blank>

We can leave some of these fields empty because they will be populated from the workspace when we send the email notification message.

Click OK to accept the settings and create the new Subscription.

5. Add FMEServerEmailGenerator

Back in FME Workbench, click on the workspace canvas and start typing “FMEServer” to locate and add an *FMEServerEmailGenerator* transformer.

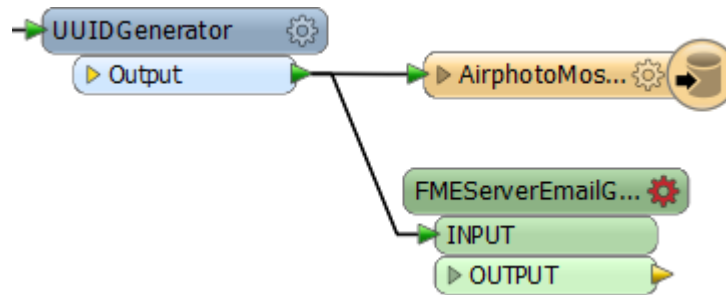


This is a Custom Transformer that will be downloaded from the FME Store – as denoted by the small arrow on its icon in the Quick Add dialog.

The transformer is designed to be a quick and easy way to set up an outgoing email.

6. Connect Custom Transformer

Connect the newly placed custom transformer on a new connection from the UUIDGenerator:



DO NOT connect it between the UUIDGenerator and the Writer feature type.

We'll shortly add a new Writer to connect it to.

7. Set Transformer Parameters

Click on the red cog-wheel icon to open the parameters dialog for the FMEServerEmailGenerator transformer. As you'll see, there are many parameters to help us create the JSON message we will be sending to the email Subscription.

The important parameters should be set as follows:

To: Click the drop-down arrow to the right and select Attribute Value > clipper_email_publisher_from. This attribute contains the address the incoming email was received from and therefore should be used for who the outgoing email will be sent to.



Attachments: Click the drop-down arrow to the right and select Open Text Editor. This value will be slightly more complex than an attribute and we need to construct it with an editor such as this.

Enter the following into the text editor field:

`$(FME_SHAREDRESOURCE_DATA)/Output/@Value(_uuid)/AirphotoMosaic.jpg`

`$(FME_SHAREDRESOURCE_DATA)/Output/@Value(_uuid)/AirphotoMosaic.jpg`

This tells FME to use the data created by the JPEG writer as an attachment to the outgoing email message. Click OK to close the dialog.

The other fields can be set as follows:

CC:	blank
From:	blank
Reply to:	blank
Subject:	Your Image Order is Attached
Message:	Please find attached the image you requested.

Note that the blank parameters will come from the Email Subscription we set up in Step 1

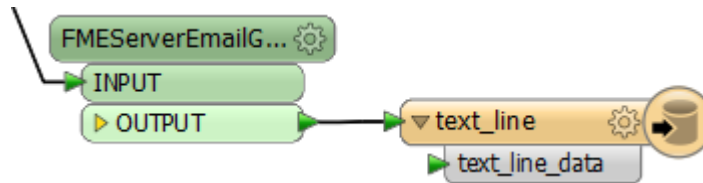
8. Add a Notification Writer

Having created the email to send we now need to add a Writer to pass it to the Notification service.

Select Writers > Add Writer from the menubar. Create a writer with the following parameters:

Writer Format: Text File
Writer Dataset: C:\FMEData2014\Output\Email.json

Once added, connect the FMEServerEmailGenerator transformer to the new feature type.



The transformer automatically generates the *text_line_data* attribute required by this Writer.

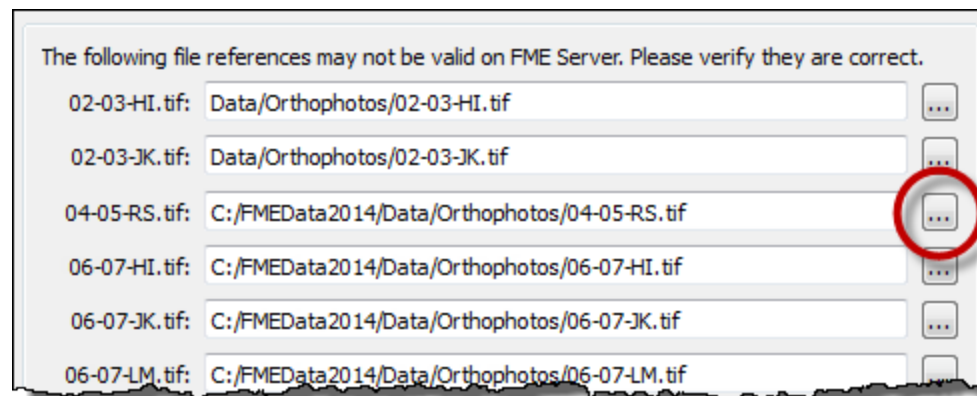
9. Publish the Workspace (Step 1)

This workspace is the heart of a system of incoming and outgoing notification messages; therefore it needs to be published to FME Server as both a Publication and Subscription!

As always, start the Publish Wizard, enter the connection parameters, and choose the Training repository to store the workspace.

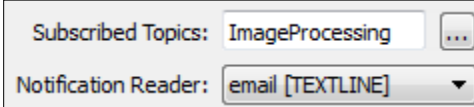
As in Exercise 4c, click the **Select Files** button to ensure that the VancouverNeighborhoods.kml file will be uploaded to the repository, and that the image data is not.

Again as in Exercise 4c, click **OK** and then – when warned about invalid references – for each of the Orthophoto references, click the [...] ellipsis button and browse to the true file location in the resources folder.



10. Publish the Workspace (Step 2)

In the Services dialog check the Notification Service and click its Edit button.

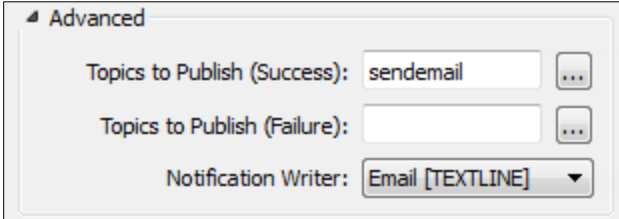


Again select *ImageProcessing* as the Subscribed Topic, and set the Notification Reader to the email[TEXTLINE] **Reader**.

In the same Edit Service Properties dialog scroll down and expand the Advanced settings.

Set Topics to Publish (Success) to the *sendemail* topic you previously created.

Set the Notification Writer should be set to your Email[TEXTLINE] **Writer**.



Leave Topics to Publish (Failure) blank, but notice this is where you could handle a failure in workspace if you wanted to.

Click **OK** and then **Publish** to complete the wizard.

11. Send an Email to FME Server

Again send an email to your FME Server using the email address you have been using, and entering either *Downtown* or *West End* as the subject of the email.

After a minute or two you will receive an email back with the image attached. The image will be an orthophoto clipped to the neighbourhood you entered in the subject line.

Congratulations! *Without writing any code you have set-up and email ordering system for imagery.*



Mr. Flibble says ...

“Exercise4d. As with 4b and 4c, unsubscribe it from the notification if you are using IMAP and don’t want all incoming emails to keep triggering the workspace.”

Notifications Protocols









Different notification protocols need different parameters and set up.

Available Protocols

A protocol is a method of communication. There are many different protocols available in FME Server; some of them are only for use on Publications, some are only for Subscriptions, and some of them can be used with both notification types.

This table lists the different Publication and Subscription protocols and the following pages go into detail on some of the most important, excluding email, which we have already covered.

Protocol		Description	Publications	Subscriptions
Amazon SNS		Communication w/ Amazon's Simple Notification Service	✓	✓
Amazon SQS		Communication w/ Amazon's Simple Queue Service	✓	✓
Amazon S3		Communication w/ Amazon's Simple Storage Service		✓
Apple Push Notification		Sending Alerts to Apple mobile devices		✓
Directory Watch		Monitoring a folder for new files as a trigger mechanism	✓	
Email		Communication via email	✓	✓
FME Workspaces		Publication via a transformer. Subscription via Job Submitter service	✓	✓
FTP		Writing to an FTP site		✓
Google Cloud Messaging		Sending Alerts to Android mobile devices		✓
IMAP		Monitoring an email account for new emails	✓	
JMS		Communication with a Java Message Service	✓	✓
Logger		Output to a simple log file		✓
Push		Pushing notifications via HTTP requests	✓	✓
UDP		Communication via a User Datagram Protocol port	✓	
WebSockets		Communication via a WebSockets channel	✓	✓

Directory Watch Notifications

Directory Watch is another Publication-only notification protocol.

Similar to IMAP it monitors for a new object, but instead of email it is monitoring a directory for new files to be added. When a file appears in that directory then the Topic to which it is tied becomes triggered.

The directory being monitored is one of the FME Server resources folders, and this is basically the only parameter you need to set for this notification:

Protocol: Directory Watch

Directory to Watch:

Browse
Specify Location

Name	Size	Date
<input type="checkbox"/> Backup		2014-3-18 10:39:21
<input type="checkbox"/> Data		2014-3-18 10:39:22
<input checked="" type="checkbox"/> Emergency		2014-1-17 19:30:58
<input type="checkbox"/> Tutorial		2014-3-4 18:19:03
<input type="checkbox"/> Logs		2014-3-18 10:39:22
<input type="checkbox"/> Temp		2014-3-18 10:39:22

Watch Subdirectories: No

This Directory Watch notification monitors the *Emergency* folder for new files.

It will not scan subdirectories because the parameter Watch Subdirectories is set to No.

Because FME Server resource folders can be accessed through the file system, it's possible to put new files into a folder directly, rather than having to upload them via the Web User Interface.

As usual, the notification will be passed into a workspace through a Reader, often a plain text Reader. The result will be a notification that a new (or updated) file exists, with the name of that file:

```
{
  "dirwatch_publisher_content": "ENTRY_MODIFY C:\\apps\\FMEServer\\Data\\Emergency\\NewFile.shp\\n",
  "fns_type": "dirwatch_publisher"
}
```

If the filename is already known then the workspace could just read from it directly (it would also need a textfile Reader to accept the notification, even if the content is not used) or it can extract the file name using a JSON transformer and read content from the file using a FeatureReader transformer:



For an example of using the Directory Watch tool, see the exercise in Chapter 5.

Mobile Notifications

Mobile Notifications are Subscription-only protocols that send notifications to mobile devices. The two protocols available are:

- Apple Push Notification
- Google Cloud Messaging

Apple Push Notifications

The Apple Push Subscriber allows delivery of messages to an Apple iOS device, like an iPhone. Messages are sent from FME Server to the device via a cloud service called the Apple Push Notification service (APNs).

The FME Server Reference Manual explains how to set up such a notification and what is required in terms of Apple “SSL Keystore” and device tokens.

Two free FME apps on the iTunes store exist to provide a starting point for mobile apps; they are the FME Reporter and FME Alerts.



The FME Reporter is a Publication tool used for sending location from a device's GPS to a notification topic on FME Server. Technically it's not a Subscriber so it won't be using the Apple Push Notification protocol.

FME Alerts is a Subscriber tool for receiving notifications from an FME Server using the Apple Push Notification protocol. Location is also sent to the FME Server to allow spatial-based filtering to occur. For example, you can push alerts on local traffic based on the GPS location.

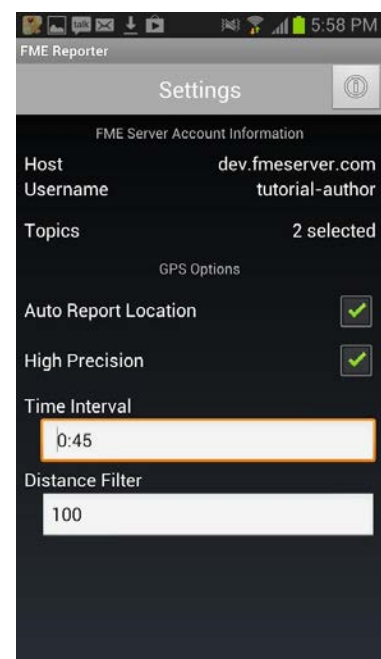


The source code for both apps is made available from Safe Software, so that they can be used as prototypes for your own custom applications.

Google Cloud Messaging

Google Cloud Messaging is the Android equivalent to Apple notifications. Again they involve sending content to a mobile device from an FME Publication.

There are also two free FME apps on the Google Play store to experiment with and use.



Message Streaming



Whereas Notifications are one-off messages, Message Streaming involves a continuous flow of information

What is Message Streaming?

Message Streaming is a real-time technique that involves a continuous flow of information.

For our purposes, “continuous” means messages arrive at the FME Server at a faster rate than the notification service could handle; say more than one message per second.

At rates faster than this the notification service does not have time to start and run a workspace to process each message. However, a message stream uses a workspace that is constantly running, and doesn’t need to be started for each message, and so can process data at a much faster rate.

When used in this way we call it *High Capacity Message Streaming*, as thousands of messages can be processed every second.

Elements of a Message Stream

Like Notifications, Message Streams can be either into or out of FME, or both:



However, rather than use the Notification service with Readers and Writers, Message Streams are handled by a number of **transformers**. A workspace is set up to run continuously and the transformers within it listen for, and dispatch, messages on a number of different protocols.

Key protocols supported include:

Protocol

JMS (Java Messaging Service)
HTML5 WebSockets
TCP

Transformers

JMSReceiver, JMSSender
WebSocketReceiver, WebSocketSender
TCPIPRceiver, TCPIPSEnder

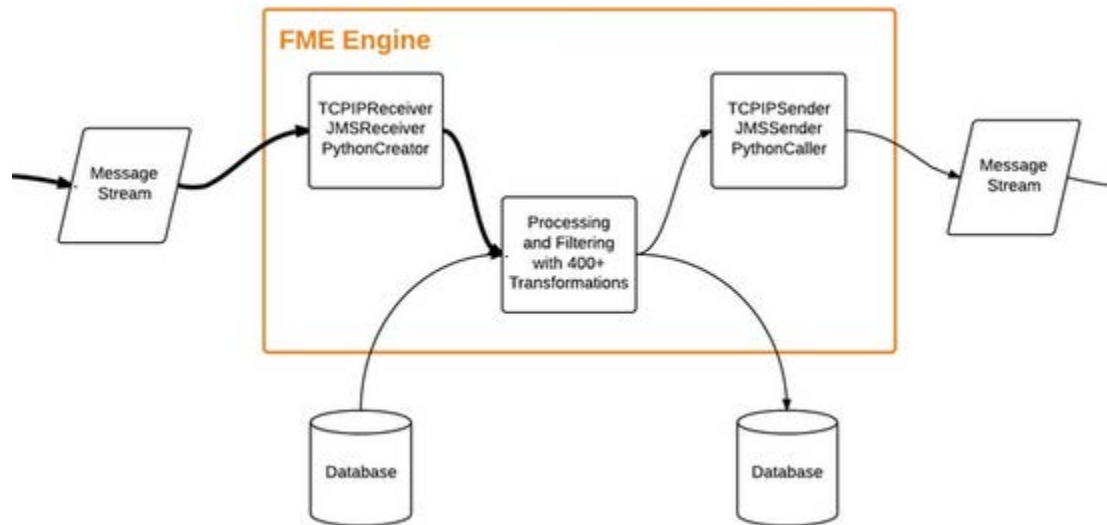
A workspace containing any of the Message Streaming transformers will run continuously because the transformer itself is designed to run continuously.

Receiver transformers will emit a feature in response to an incoming message, but will then return to waiting for more messages. Even if no messages are instantly available, it will not terminate.

Sender transformers will send a message in response to an incoming feature, but will then return to wait for more features. Again it will not terminate until the workspace is deliberately stopped.

Message Streaming Architecture

A Message Streaming architecture that both receives and sends messages looks like this:



- A stream of messages is read into the workspace via one of the available transformers, for example the JMSReceiver.
- Data is processed by any of the available FME transformers, according to the needs of the setup.
- A stream of messages is sent out of the workspace via one of the available transformers, for example the TCPIPSender.

The Database components in this diagram are optional, but probably usual.

Data read from the database is intended to be used to process the incoming message. For example perhaps the message represents a point feature (maybe a vehicle location) that is used to filter database data (maybe traffic conditions) against.

Data written to the database is usually to record a stream of message information. For example, perhaps each incoming message represents a point feature (a lightning strike) that needs to be recorded in a database.



Ms. Analyst says ...

"Writing to a database requires that the transaction interval is set to 1. Otherwise messages won't get committed as they arrive."

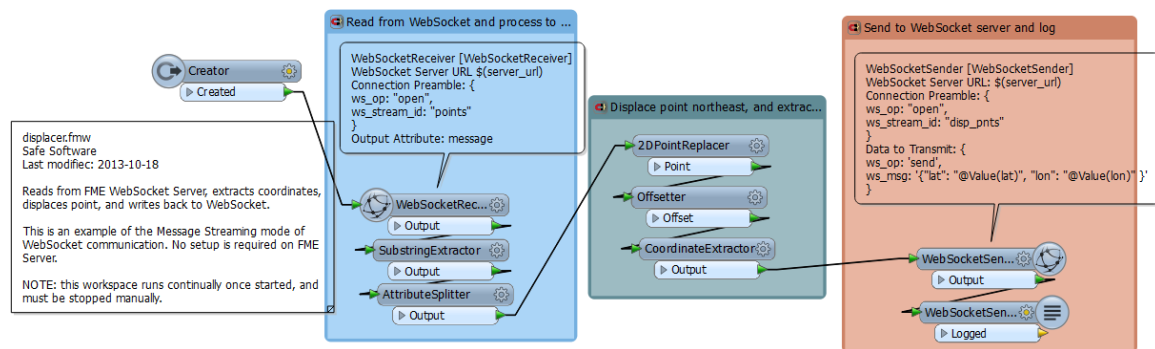


Exercise 4e: Message Streaming	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Web Map Application with WebSockets
Demonstrates	WebSockets
Starting Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise4e-Begin.fmw C:\FMEData2014\Workspaces\ServerManual\Exercise4e-Begin-Advanced.fmw
Finished Workspace	n/a

This exercise uses FME Server's WebSockets service and WebSockets transformers to power a Web Map application. The method shown here is suitable for high frequency messaging in excess of 1 message per second.

1. Open the Starting Workspace

In FME Workbench open the starting workspace Exercise4d.fmw

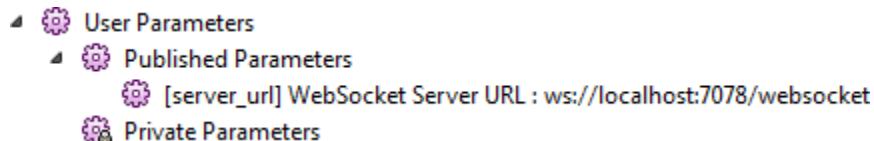


Notice that it contains two WebSocket transformers – one for receiving and one for sending. The workspace will listen for information coming through the WebSockets channel. Incoming data will be processed with an offset in its coordinates, and then sent back. The workspace will run continuously, processing each incoming message, until stopped manually.

2. Update Server Name

The first task is to update the hostname for the server to match the one you are using.

Locate the published parameter `server_url` in the Navigator window.



Double-click the parameter to open it for editing and replace the host with your own FME Server host name and port. It will need a “ws” prefix to denote the WebSockets protocol.

If you are working on the same machine as your FME Server you can use localhost for example:
ws://localhost:7078/websocket

3. Examine the WebSocketReceiver and WebSocketSender Transformers

Open the parameters dialog for the WebSocketReceiver transformer.

Notice that the Server URL is being obtained from the published parameter you just updated.

Click the [...] button to open the Connection Preamble parameter.

What this means is that the transformer will make a connection to the specified FME Server and listen for features coming through a WebSocket stream called "points".

```
{
  ws_op: "open",
  ws_stream_id: "points"
}
```

```
{
  ws_op: "open",
  ws_stream_id: "disp_pnts"
}
```

If you open the parameters for the WebSocketSender transformer, you'll see it sends features back using a stream id called "disp_pnts".

The data being sent back through the WebSocket channel is the amended lat/long coordinates of the feature being processed.

```
{
  ws_op: 'send',
  ws_msg: '{"lat": "@Value(lat)", "lon": "@Value(lon)"}'
}
```

4. Start the Workspace

Run the workspace and notice the initial connection messages printed to the log window. Also notice that the workspace keeps running, waiting for messages via the WebSocket stream it is listening to.

5. Edit the Web Map Application

In order to test this setup, a basic web mapping application has been provided in *C:\FMEData2014\Resources\WebSockets*

Some minor updates will be needed before we can use this. In a text editor open the main HTML file *C:\FMEData2014\Resources\WebSockets\www\index.html*

Find the two lines below which define the host WebSockets connections for the application. If you are using localhost you can leave this as is, otherwise replace localhost with your own hostname.

```
var sendconn = new WebSocket('ws://localhost:7078/websocket');
var rcvconn = new WebSocket('ws://localhost:7078/websocket');
```

Now find the block of code starting with the comment
 /*** connect to server input stream ***/

Notice that the web application is sending points to FME Server using the stream id "points" – the same one that the workspace is currently listening to.

```
connmsg = '{ ws_op : "open", ws_stream_id : "points" }';
```

If you look you'll also find a block of code that listens for data using the stream id "disp_pnts"

```
connmsg = '{ ws_op : "open", ws_stream_id : "disp_pnts" }';
```

Save the file index.html if you have made any edits.

6. Run the Web Application

Open the index file that we've just inspected in a web browser.

As the Web map loads you will see two message sections logging messages sent to and from the FME Workspace:

Messages sent

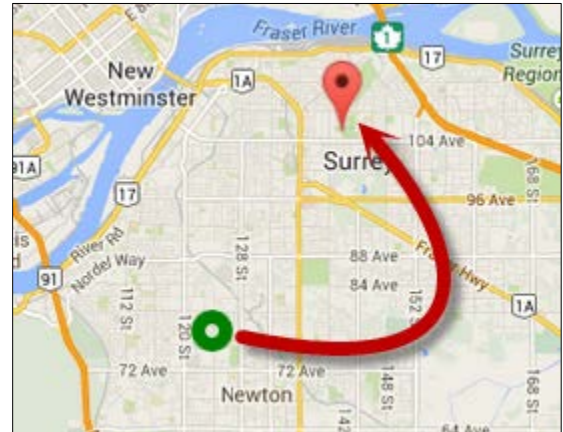
Clear log

Messages received

Clear log

Click on any point of the map.

Notice that immediately the point is recorded and returned with a random offset applied (it doesn't matter what happens here, just the fact that something does).



Also notice that messages to and from the workspace are being logged.

11:28:21 AM

```
{ ws_op : "send", ws_msg : "(49.14353776699441, -122.87933349609375)" }
```

11:28:21 AM

```
{"lat": "49.1935377669944", "lon": "-122.829333496094" }
```

If you switch back to the workspace you'll notice that not only is it still running, but a feature was logged as it was received via the WebSocketReceiver, displaced and transmitted out via the WebSocketSender.

```
+++++
Feature Type: `WebSocketSender_Output_LOGGED'
Attribute(encoded: utf-8): `_substring' has value `49.143, -122.879'
Attribute(string)       : `_z' has value `-9999'
Attribute(string)       : `fme_geometry' has value `fme_point'
Attribute(string)       : `fme_type' has value `fme point'
Attribute(64 bit real)  : `lat' has value `49.193'
Attribute(encoded: utf-8): `latlon{0}' has value `49.143'
Attribute(encoded: utf-8): `latlon{1}' has value `-122.879'
Attribute(64 bit real)  : `lon' has value `-122.829'
Attribute(encoded: utf-8): `message' has value `(49.143, -122.879)'
Geometry Type: Point (1)
Number of Coordinates: 1 -- Coordinate Dimension: 2 -- Coordinate System: ``
(-122.829333496094,49.1935377669944)
=====
```

7. Publish the Workspace to FME Server

Up to now we've just run the workspace on FME Desktop, but it can also be run on FME Server.

Stop the workspace in FME Desktop if it is still running and publish the workspace to FME Server into the Training repository. Simply register the workspace with the Job Submitter Service.


8. Run the WebSockets Workflow on FME Server

In the Web User Interface browse to the workspace in its repository, choose the Job Submitter and click **Run**

The workspace will keep running indefinitely and FME Server's job recovery functionality will restart the job if it ever fails.

Try placing a few more points on the web map application to confirm that points are being displaced. This time the process is being carried out by FME Server.

Go back to the Web User Interface and click on Jobs and then click the Running tab where you will see your workspace running.

<input type="checkbox"/>	Id	Status	Engine	Time Started	Priority	Repository	Workspace
<input type="checkbox"/>	120	 RUNNING	Engine1 on vash	2014-03-21 11:37:09	100	Training	Exercise4dWebSockets.fmw

Click on the job and then on the Log tab. You'll see the log of the workspace as it is running and can examine it to see your last few map clicks passing through the workspace as features.



Police Chief Webb-Mapp says ...

"The ability to view a log file while the translation is still in progress is a new feature of FME Server 2014"

Advanced Tasks (Exercise 4f)

The use of a continuously running workspace has advantages and disadvantages.

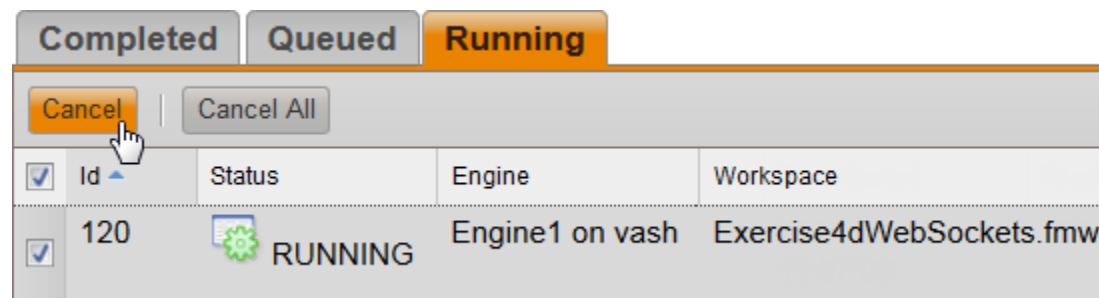
On the plus side, it can process many messages – several thousand – per second. However, it does take up an FME Server engine on a continuous basis too.

If the same workflow was configured to run using the Notification Service it would not use an FME Engine at all times; however it would not be suitable for systems with multiple messages per second.

As an optional task, let's try configuring the system to use notifications instead of WebSockets.

1. Cancel the Job from the Above Exercise

Under Jobs > Running in the Web User Interface, put a checkmark next to the job and press the Cancel button. This will stop the existing job from running, as we no longer need it.



2. Add a Topic

In the Notification part of the Web User Interface, add a Topic named *points*.

3. Add a Web Sockets Publication

Now add a new Publication with the following settings:

Publication Name	MapPoints
Topics to Publish To	points
Protocol	WebSocket
Target Url	ws://localhost:7078/websocket (or use your own host)
Stream ID	sample_stream_in

Publication Name:	<input type="text" value="MapPoints"/>
Topics to Publish To:	<input type="button" value="Select All"/> <input type="button" value="Deselect All"/> <input type="text" value="x points"/>
Protocol:	<input type="text" value="WebSocket"/>
Target URL	<input type="text" value="ws://localhost:7078/websocket"/>
Stream ID	<input type="text" value="sample_stream_in"/>

4. Edit the Web Map Application

In a text editor open the file *C:\FMEData2014\Resources\WebSockets\www\index.html*

Comment out the default send connection message (line 86) and uncomment the one below:

```
//connmsg = '{ ws_op : "open", ws_stream_id : "points" }';
connmsg = '{ ws_op : "open", ws_stream_id : "sample_stream_in" }';
```

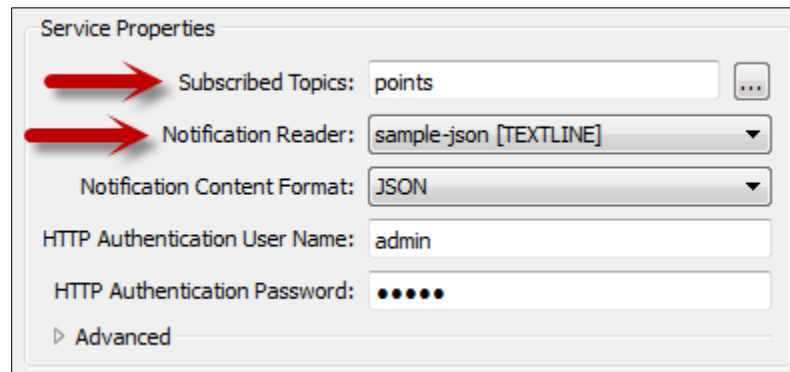
Save the updated file.

5. Open the Advanced Workspace

Open the workspace *Exercise4d-Begin-WebSockets-Advanced.fmw* and edit the *server_url* parameter if necessary.

Publish this workspace to FME Server and register it with the Notification Service.

In the service settings set the workspace to subscribe to the topic points and ensure the Notification Reader is set to the TEXTLINE reader.



The image shows the 'Service Properties' dialog box. It has several fields: 'Subscribed Topics' with a text input containing 'points' and a red arrow pointing to it; 'Notification Reader' with a dropdown menu showing 'sample-json [TEXTLINE]' and a red arrow pointing to it; 'Notification Content Format' with a dropdown menu showing 'JSON'; 'HTTP Authentication User Name' with a text input containing 'admin'; and 'HTTP Authentication Password' with a masked input showing five dots. There is also an 'Advanced' link at the bottom.

Click **OK** to close the dialog and **Publish** to finish publishing the workspace.

6. Use the Web Application in Notification Mode

Reload the web application in your browser or simply reopen the file *index.html*.

Click some points on the map to ensure they are being processed and offset.

Examine the Jobs history in Web User Interface. You will see a job is run each time you click.





Completed

Queued

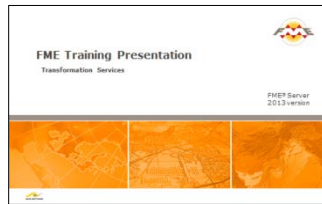
Running

Remove

Remove All

<input type="checkbox"/>	Id	Status	Engine	Workspace
<input type="checkbox"/>	127	 SUCCESS	Engine1 on vash	Exercise4dAdvancedWebSockets.fmw
<input type="checkbox"/>	126	 SUCCESS	Engine1 on vash	Exercise4dAdvancedWebSockets.fmw
<input type="checkbox"/>	125	 SUCCESS	Engine1 on vash	Exercise4dAdvancedWebSockets.fmw
<input type="checkbox"/>	124	 SUCCESS	Engine2 on vash	Exercise4dAdvancedWebSockets.fmw

Troubleshooting for Administrators



This section shows a few basic troubleshooting techniques in case of emergency

FME Server Fails to Receive Email

If you are unable to receive email on FME Server then the following suggestions may be of help.

- Ensure you carry out the post-installation configuration steps as noted in the reference manual. Without this only local mail could be delivered.
- Is the FME Server's email SMTP port open? Typically this will be port 25 or 465.
- Does your FME Server have a DNS name that is available on an internet name server or your local DNS setup? Email cannot be delivered to it if it cannot be found!
- For IMAP, is the FME Server's IMAP port open? Typically this will be port 993.

FME Server Fails to Send Email

If you are unable to send email on FME Server then the following suggestions may be of help.

- Have you created and properly configured the Email Subscriber? The Data Download and Job Submitter services have pre-defined Subscribers, but they will need to be properly configured.
- Is the FME Server's email SMTP port open? Typically this will be port 25 or 465.
- Does the FME Server have an internet connection?

Email Uses Defaults

If email sent by FME Server uses default parameters instead of those you had configured, then the following suggestions may be of help.

- If you are sending an email using the FMEServerNotifier transformer ensure that the Content parameter is set to an attribute that contains the email message information in JSON format (use the custom transformer FMEServerEmailGenerator)
- If you are sending an email from a completed workspace using the Notification Service and Topics to Notify (Success) ensure the Notification Writer is set to the Text File writer which is writing the email information.

Cannot Connect to WebSockets Server

If you cannot connect to a WebSockets server then the following may be of help.

- Ensure the FME Server's WebSockets port (default 7078) is open.
- Ensure you are using the correct *stream_id* for sending and receiving between your applications

Workspace Subscription is not Triggered by Topic

If a workspace set to subscribe to a topic is not triggered by it, then the following suggestions may be of help.

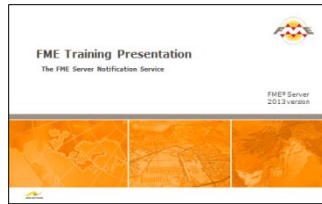
- Check the Push subscription for the workspace in the Web User Interface and make sure the required Topic is in the list of Topics subscribed to.
- Check the Push subscription for the workspace in the Web User Interface and confirm the username and password for the subscription. If you have changed your password recently the password for the subscription needs to be changed as well

Topic Monitoring Fails

If topic monitoring fails then the following may be of help.

- Monitoring requires the use of WebSockets, so ensure the FME Server's WebSockets port (default 7078) is open.

Module Review



This module introduced you to FME Server's Notification Services.

What You Should Have Learned from this Module

The following are key points to be learned from this module.

Theory

- Real-time systems are message driven and involve small amounts of information. They can be either **Notifications** or **Message Streams**.
- The Notification Service handles individual messages. Topics are keywords that define a notification subject.
- Incoming Notification messages are received from Publishers, outgoing messages are sent to Subscribers
- Protocols are the method of communication (e.g. email, SMS, JMS, etc)
- Message Streams are set up using transformers and involve a workspace that runs continuously receiving/sending messages

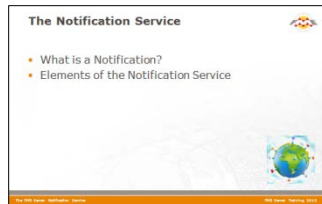
FME Skills

- The ability to create Topics, Publications, and Subscriptions
- The ability to use the Email protocol for Publishing and Subscribing
- The ability to create a workspace for handling a message stream

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Automation with FME Server



Automation involves workspaces processing data without a user having to manually initiate the process.

What is Automation?

Automation is the ability for FME Server to run a workspace without any user intervention or initiation.

For example, a system administrator sets up a workspace to do a daily update of a corporate database from file-based field updates. The translation can either be set up to start at the same time every weekday, or in response to files being deposited in a folder; and can be set up to run a series of workspaces according to logic inside a control workspace.

These automations are handled in three ways: **Scheduling**, **Automated Data Processing**, and **Workflow Management**.

Scheduling

Scheduling is the ability to initiate a workspace based on a particular time and/or date.

Schedules can be very simple – for example a one-off translation at a set date/time – or can be more complex and involve setting regular repetition, job priorities, and selection of a particular engine.

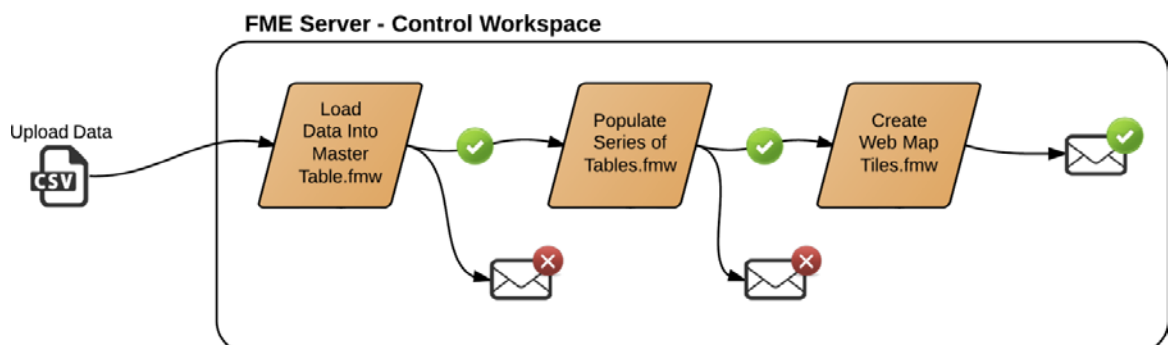
Automated Data Processing

Automated Data Processing is simply starting a workspace in response to an event.

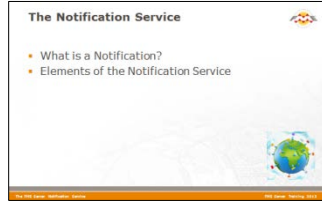
For example, a workspace might be started in response to an email from an administrator, or by connecting FME Server to a cloud automation service such as IFTTT or Zapier.

Workflow Management

Workflow Management is the ability to create a branched translation, where a control workspace automatically determines other workspaces to run based on a set of inbuilt logic.



Scheduling



Scheduled Translations are the best way to kick off a workspace at a particular time or date

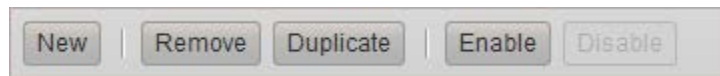
What is Scheduling?

Scheduling is the ability to program FME Server to run a workspace in a repository, at a specific time in the future. The schedule can cause the workspace to run once or on a repeating basis.

Managing Scheduled Tasks

Scheduled tasks are set up in a special section of the Web User Interface.

The interface allows the expected methods of handling schedules:



- The ability to create a scheduled task
- The ability to delete a scheduled task
- The ability to create a copy of an existing task
- The ability to enable a task
- The ability to disable a task

Home

Repositories

Jobs

Notifications

Schedules ←

Security

Services

Monitoring

Resources

Migration

Creating a Scheduled Task

There are a number of parameters involved in creating a scheduled task

The first parameters are very simple ones for naming and describing the schedule.

Notice that each schedule can be assigned to a particular category.

There is also a parameter for deciding whether the schedule will be enabled straight away.

Overview

Name:	<input type="text" value="Pipeline Update Processing"/>
Category:	<input type="text" value="Utilities"/> ▼
Description:	<input type="text" value="Daily processing of pipeline updates"/>
Enabled ?:	<input checked="" type="checkbox"/> true

The next few parameters concentrate on the workspace to be run. If there are any published parameters they will be made available once the workspace has been selected:

Workspace Executed

Repository:

Workspace:


Source Esri Shape File(s):


Browse **Specify Location**

Please enter Location:

There are also optional parameters for notification topics to trigger on completion of the scheduled task. These could be used to inform an administrator of the success or failure of the translation.


Topics to Publish to on



Success :

Failure :

The key parameters, of course, are for setting the actual schedule. Here the workspace is set to run from 19th March to 2nd April, once per day.

Schedule

Start Date : ☐ Immediately

Repeats: ☒ Interval Based



☐ CRON Expression

☐ Only Occur Once

Repeat Unit:

Interval:

End Date: ☐ Never

Finally there are miscellaneous parameters for how the translation is to be handled:

Transformation Manager Directives

Job Priority (1-100, 1 is highest) [?]:

Job Routing Tag [?]:





Queued Job Expiry Time (seconds) [?]:

Setting a priority allows one job to take precedence over another, for when it is more important that it is completed.

The Job Routing Tag parameter allows the user to assign this task to a particular engine. This could be important for a number of reasons; for example only that particular engine supports the required format being processed, or perhaps that engine is being reserved for large-scale jobs.

The Job Expiry parameter is for jobs that are time sensitive. If the job is held in the queue – say by more important translations – to the point that it would no longer be useful, then processing can be avoided.

Once the parameters are set for a scheduled task, it is added to the main Scheduling interface.

<input type="button" value="New"/> <input type="button" value="Remove"/> <input type="button" value="Duplicate"/> <input type="button" value="Enable"/> <input type="button" value="Disable"/> <input type="text" value="Quick Filter"/>							
<input type="checkbox"/>	Name ^	Category	Start Time	End Time	Recurrence	Workspace	Status
<input type="checkbox"/>	Backup_Configuration	Utilities	2012-01-01 02:00:00	N/A	DAY * 1	backupConfiguration.fmw	
<input checked="" type="checkbox"/>	Pipeline Update Processing	Utilities	2014-03-19 02:00:00	2014-04-02 02:00:00	DAY * 1	PipelineProcessing.fmw	
<input type="checkbox"/>	Purge_Jobs	Utilities	2014-02-03 10:22:19	N/A	DAY * 1	purgeJobs.fmw	
<input type="checkbox"/>	Purge_Logs	Utilities	2014-02-03 10:22:19	N/A	DAY * 1	purgeLogs.fmw	

Notice that there are a number of pre-defined jobs, automatically installed with FME Server for the purpose of backing-up and maintaining various components.



Exercise 5a: Scheduling	
Scenario	City of Austin
Data	Apartment Data
Overall Goal	Schedule a Translation
Demonstrates	Automated Scheduling
Starting Workspace	n/a
Finished Workspace	n/a

This is a simple exercise to schedule a workspace to translate data.

1. Open Web User Interface

Open the FME Server Web User Interface and log in.

2. Select Schedules

Select Schedules from the main menu on the left hand side.

Schedules ←

3. Create Schedule

Click **New** on the schedules menu to start creating a new schedule.

Home > Schedules

Schedules



New | Remove | Duplicate | Enable | Disable | Quick Filter

Overview

Name:

Category:

Enter a name for the schedule (something like *ApartmentSchedule*) and enter a name for a new category (like *MySchedules*)

For the workspace to execute select the repository called Samples and in there select the workspace austinApartments.fmw

Workspace Executed

Repository:

Workspace:

4. Set Schedule

For the schedule itself, use the following settings:

Start date: Check *Immediately* in order to verify that the schedule works.
 Repeats: Interval Based.
 Repeat Unit: Minute
 Interval: 1
 End Date: Choose a date 5 minutes in the future.

Be aware that times are in the 24-hour clock and are in the same time zone as the client.

Click OK to create the schedule.

Schedule

Start Date (?): ☒ Immediately

2014-03-22 02:00

Repeats: ☒ Interval Based
☐ CRON Expression
☐ Only Occur Once

Repeat Unit: MINUTE






Interval: 1

End Date: ☐ Never

2014-03-21 14:17

5. Check Results

Click on the Jobs menu entry and the Completed tab. You will see the results of the completed scheduled jobs occurring at one minute intervals.

Completed Queued Running					
Remove Remove All					
<input type="checkbox"/>	Id	Status	Time Started	Repository	Workspace
<input type="checkbox"/>	132	 SUCCESS	2014-03-21 14:22:54	Samples	austinApartments.fmw
<input type="checkbox"/>	131	 SUCCESS	2014-03-21 14:21:54	Samples	austinApartments.fmw
<input type="checkbox"/>	130	 SUCCESS	2014-03-21 14:20:54	Samples	austinApartments.fmw
<input type="checkbox"/>	129	 SUCCESS	2014-03-21 14:19:54	Samples	austinApartments.fmw
<input type="checkbox"/>	128	 SUCCESS	2014-03-21 14:18:54	Samples	austinApartments.fmw

Advanced Task

As an advanced (and optional) task, why not try to issue a notification for when a workspace fails.

1. Add Topic

Under the Notification dialogs add a new Topic called *schedule_notification*

2. Add Subscription

Now add a new Subscription called *schedule_notification_email*. It should be an email protocol and it should be subscribed to the *schedule_notification* topic

Use the same email (SMTP) details as you used in the Chapter 4 exercises. The other fields should be as follows:

Email To: <Your own email address>
 Email CC: <Leave empty>
 Email Subject: Schedule Failed
 Email Template: <Leave empty>

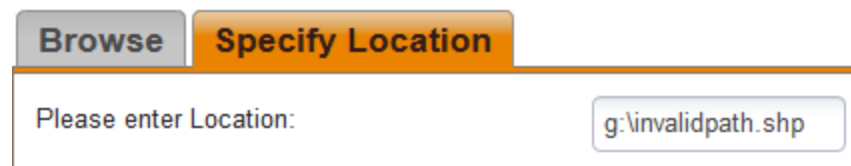
3. Create Schedule

Return to the Schedules dialogs. Create a new schedule with a name and category of your choosing. Select the Samples repository and choose the workspace *easyTranslator.fmw*

When you select a workspace with published parameters – like this one – they will now appear in the Schedules dialog. They can therefore be set at this time.

To force this workspace to fail, we'll deliberately set an incorrect parameter. Locate the Source File parameter and click **Specify Location**. In the location field enter *g:\invalidpath.shp*. As this file does not exist it will cause the workspace to fail when run.

Source File:



Topics to Publish to on

Under the setting *Topics to Publish to on Failure* select the topic *schedule_notification*

Success ?:

Click to Select

Failure ?:

× schedule_notification

Schedule

Start Date ?:

☒ Immediately

2014-03-22 02:00

Repeats:

☐ Interval Based

☐ CRON Expression

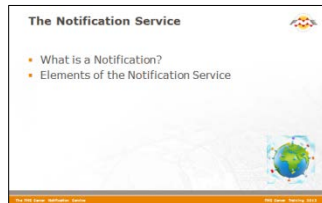
☒ Only Occur Once

For the schedule itself set the Start Date to Immediately and the Repeat to Only Occur Once.

We're only testing this so there's no need to set up a repeating one.
 4. Accept Schedule

Click OK to create the schedule, which should run immediately. The job will fail – as will be confirmed on the Jobs page. You should shortly afterwards receive an email reporting the error.

Automated Data Processing



Automated Data Processing is an unscheduled, but automatic, workspace process.

What is Automated Data Processing?

Automated Data Processing is when a workspace is run in response to an event, rather than on a schedule. Because the time of the event cannot be predicted, the workspace is not run at a set time. It is automatic, but unscheduled.

Setting up Automated Data Processing

There are two common methods by which to automate FME Server in response to an event:

- Notifications
- REST API

Automated Data Processing with Notifications

If you've just finished Chapter 4 – which covered notifications – the most obvious way to set up Automated Data Processing will be through a notification.

In this scenario, a Publication is set up to trigger a topic. The workspace is tied to the topic so that it is run as the topic is triggered.



Although the workspace can also send an outgoing notification, here we're concentrating on the idea of starting the workspace, not what it does.

Here we aren't really talking about events that need to be processed; this is more the case that a given event starts a larger processing task.

For example, a system administrator might send an email to FME Server to inform it a daily update of database tables is ready to run. The content of the email isn't important, just the fact that it is triggering a translation.

In this way a workspace can be started through protocols such as Email, Directory Watch, or JMS.



Ms. Analyst says...

"Even if you just want a notification to start a workspace, you'll need a Reader in there to handle that notification."

The Reader can be connected to nothing, and do nothing, but it needs to be there and selected when publishing the workspace."

Automated Data Processing with the REST API

Outside of the FME Server Web User Interface, it's possible to run a workspace using a URL (obtained from the Developer Info) or the REST API.

Therefore, any other application or web service that can issue a HTTP request can be used to automate an FME Server translation.

Database Triggers

A database trigger is an action (or piece of code) that is carried out in response to an event, such as a new record being added or an existing one being modified.

If the trigger were to send an HTTP request to FME Server then it could be made to run a workspace – or other tasks – in response to the database trigger.

For example, Oracle triggers use PL/SQL, which can be made to send a HTTP callout using the UTL_HTTP package. Therefore FME Server workspaces can be executed in response to events that occur on an Oracle database.



Mrs. Dee B. Emess says...

"You can set up a trigger to call FME Server for each individual addition/edit to a record, or you can use a Bulk Mode, which is useful when a large number of edits are made that can be processed by a single workspace."

FMEpedia has some great examples of Single and Bulk processing for Oracle. SOI. Server. and PostGres/PostGIS."

Web Automation Services

Web Automation Services are those such as IFTTT and Zapier, which tie together different web-based applications using conditional statements.

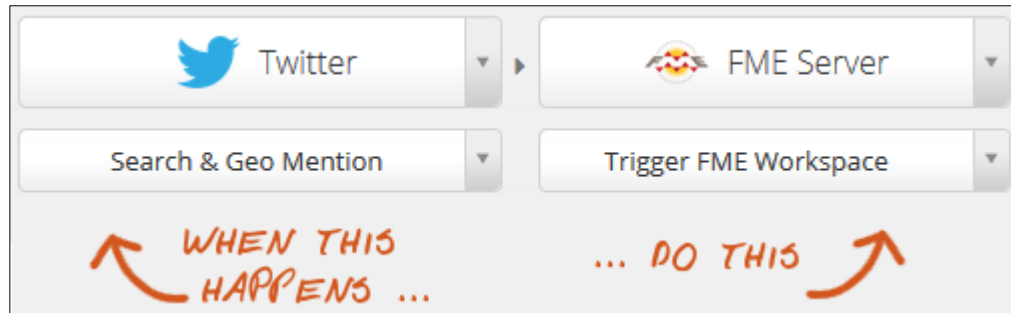
Such services allow you to define a statement using a trigger (the If part) and an action (That).

For example, here is a pre-defined IFTTT "recipe" to send an email when congress is about to vote on a bill.



Typically intended to support tools like Gmail, Dropbox, and Facebook; it's also possible to connect FME Server into a workflow like this.

For example, a Zapier “zap” looks like this:



Here, whenever a tweet with a specific keyword and location is discovered, a workspace is run on FME Server.

In this example the search term is for the word “earthquake” and the location is defined (not shown here) as within 50km of the city of Vancouver, BC.

Search Term **(required)**
Can be a generic search term like "internet" or a screen name like "@Zapier".


The FME workspace being run is called EarthquakeResponse.fmw and the Text File Reader within it is being fed the coordinates of the tweet:

FME Server Workspace **(required)**
The workspace that is to be triggered.

Source Dataset Textline **(required)**
Source Text File(s):

 fields"/>

Now Zapier will check for such a tweet (by default every 15 minutes) and run the workspace on FME Server in response:

Completed				Queued	Running
<input type="checkbox"/>	Id		Status	Engine	Workspace
<input type="checkbox"/>	883		 SUCCESS	Engine4 on ip-10-239-7-209	EarthquakeResponse.fmw

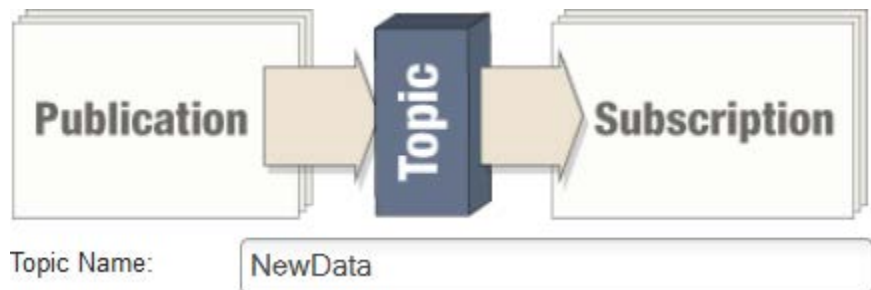


Exercise 5b: Automated Data Processing	
Scenario	Airphoto Data Vendor
Data	GeoTIFF Orthophotos
Overall Goal	Run a translation workspace whenever new data is added
Demonstrates	Automated Data Processing
Starting Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise5b-Begin.fmw
Finished Workspace	C:\FMEData2014\Workspaces\ServerManual\Exercise5b-Complete.fmw

As a member of the Airphoto Data team, you would like to have FME start processing data once an update becomes available, and an email to be sent to alert you of this. Availability of new data will be denoted by new files in a folder. The Directory Watcher protocol can be used to do this.

1. Create New Topic

In the Notifications dialog create a new Topic called *NewData*.



2. Create a New Publication

Now create a new Publication. Use the following settings:

Publication Name: New Data Watcher
Topic to Publish to: NewData (the topic you created in step 1)
Protocol: Directory Watch
Directory to Watch: Browse to Data\Orthophotos and check it

Publication Name:

Topics to Publish To:

NewData

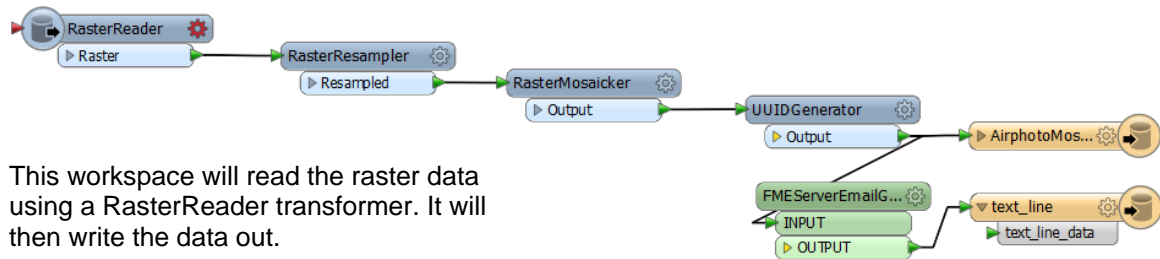
Protocol:

Directory to Watch:

Name	Size	Date
<input type="checkbox"/> Backup		2014-3-21 15:19:43
<input type="checkbox"/> Data		2014-3-21 15:19:43
<input checked="" type="checkbox"/> Orthophotos		2014-3-20 10:09:52
<input type="checkbox"/> Logs		2014-3-21 15:19:43
<input type="checkbox"/> Temp		2014-3-21 15:19:43

3. Open Workspace

In FME Workbench open the starting workspace.



This workspace will read the raster data using a RasterReader transformer. It will then write the data out.

Notice the workspace also creates an email to send as an output notification.

4. Add a Text File (TEXTLINE) Reader

Select Readers > Add Reader from the menubar to add a Text File Reader. This Reader is necessary to receive the incoming information from the Directory Watcher. Use the settings:

Reader Format: Text File
Reader Dataset: C:\FMEData2014\Resources\NewFile.json

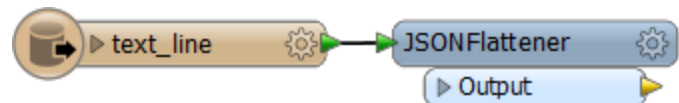
Parameters:
Read Whole File at Once: Yes

Click **OK** and then **OK** again to add the reader. Don't connect it to anything in the workspace.

This JSON file is provided as example of what the Notification Service sends to a workspace when the Director Watcher picks up a change to the directory. You can examine the JSON file in a text editor to see how the message is structured.

5. Add JSONFlattener

Add a JSONFlattener transformer and connect it to the Text File feature type.





Edit the properties of the transformer as follows:

JSON Attribute: text_line_data
Recursively Flatten Objects/Arrays: Yes
Prefix New Attribute Names With: <Leave blank>
Attributes to Expose: Type in the following two entries onto two lines:
fns_type
dirwatch_publisher_content

6. Test for New Entries

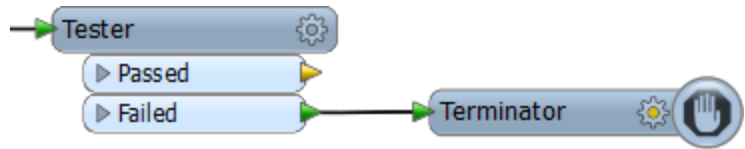
We only want to continue for new files. Add a Tester after the JSONFlattener and configure the following test:

dirwatch_publisher_content Contains ENTRY_CREATE.

Left Value	Operator	Right Value	Negate	Mode
1  dirwatch_publisher_content	Contains	 ENTRY_CREATE	<input type="checkbox"/>	Automatic

7. Add Terminator

Add a Terminator transformer to the Failed port of the Tester. This will prevent the workspace from continuing and sending an email if the change in the directory was something other than a new file arriving.

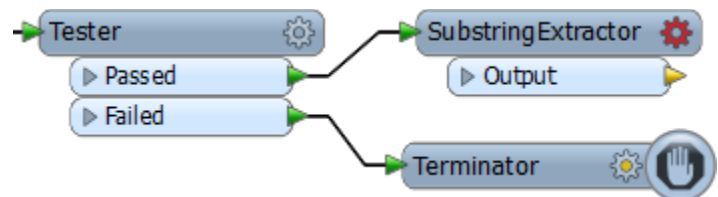


8. Format the File Name for Joining

The attribute *dirwatch_publisher_content* now looks something like this:
ENTRY_CREATE C:\apps\FMEServer\Data\Orthophotos\10-11-JK.tif\n

We need to format this attribute in order to extract the file path.

Add a SubstringExtractor transformer, to the Tester Passed port



Open the parameters dialog and set the following:

Source Attribute: dirwatch_publisher_content
Start Index: 13
End Index: -2
Result Attribute: Path

Parameters

Source Attribute:

dirwatch_publisher_content

Start Index:

13

End Index:

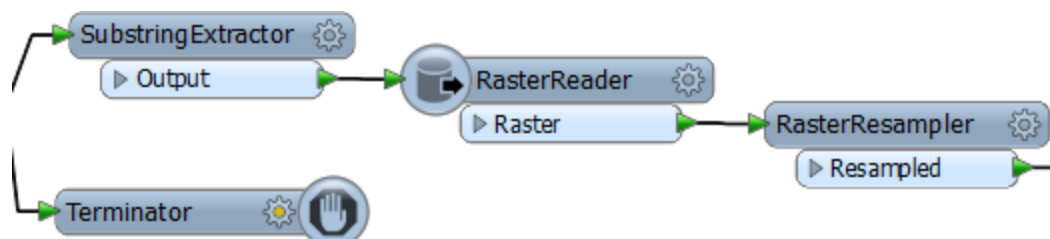
-2

Result Attribute:

Path

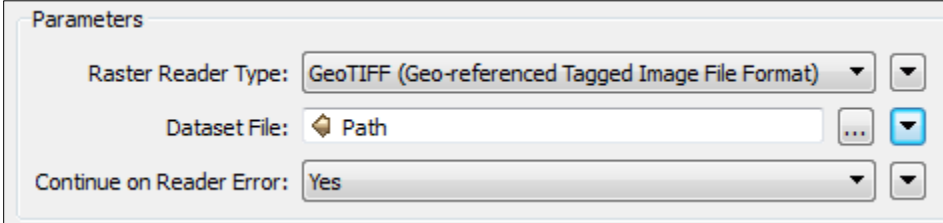
9. Read the New File

Connect the SubstringExtractor transformer to the RasterReader that already existed in the workspace.



10. Set RasterReader Parameters

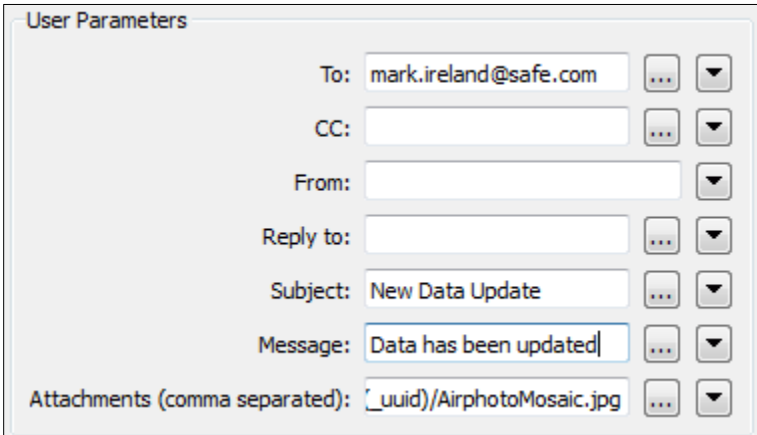
Open the RasterReader parameters dialog. Ensure that the Raster Reader Type is set to *GeoTIFF* and that the Dataset File parameter is set to the value of the *Path* attribute:



11. Set the Email Address

In this case the emails will only go to you or another manager so you can set a fixed email address. Open the parameters dialog of the *FME Server EmailGenerator* and enter your address in the To: field.

Change the subject and message fields as well so they tell you this is new data and not a data order.



12. Publish the Workspace (Step 1)

Start to publish the workspace to FME Server. As usual use the same connection parameters and select the Training repository.

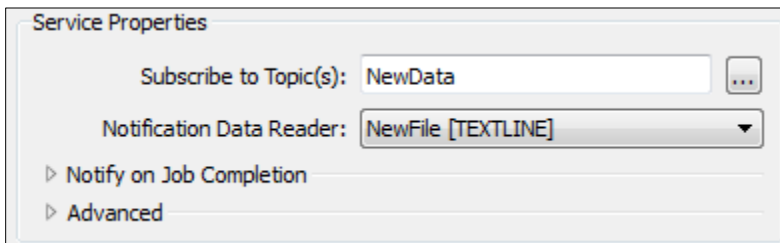
Uncheck the Upload Data Files checkbox to ensure that no files will be uploaded to the repository and click **OK** and **Next**.



13. Publish the Workspace (Step 2)

In the Services dialog check the Notification Service. Open the Service Properties dialog and choose the Topic *NewData* that was created earlier.

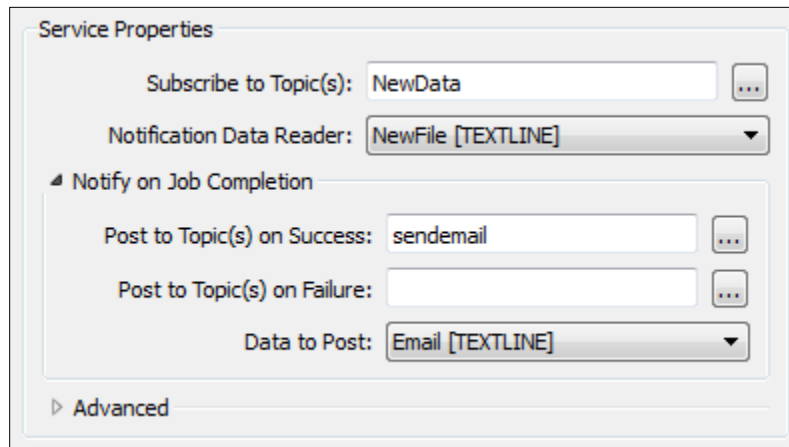
Make sure the Notification Reader is set to your *NewFile[TEXTLINE]* Reader only.



In the same Edit Service Properties dialog expand the Notify on Job Completion settings and set Topics to Publish (Success) to the *sendemail* topic created in a previous exercise.

The Notification Writer should be set to your Email[TEXTLINE] writer.

Leave Topics to Publish (Failure) blank, but notice this is where you could handle a failure in the workspace if you needed to.



Click **OK** and **Publish** to complete the wizard.

14. Add some New Data

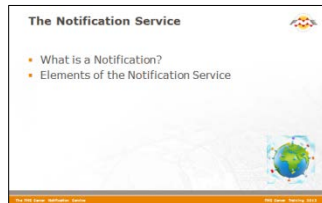
Use the Web User interface to add a new orthophoto file to the Resources folder.

To do so, click the link labeled Resources and expand the Data > Orthophotos folder. Browse to the folder C:\FMEData2014\Data\Orthophotos and select another GeoTIFF file for upload, for example 08-09-PQ.tif

After a few minutes you should receive an email with the resampled image attached.

Congratulations! You have created a solution that automatically processes new data files and alerts users to their presence through an email notification.

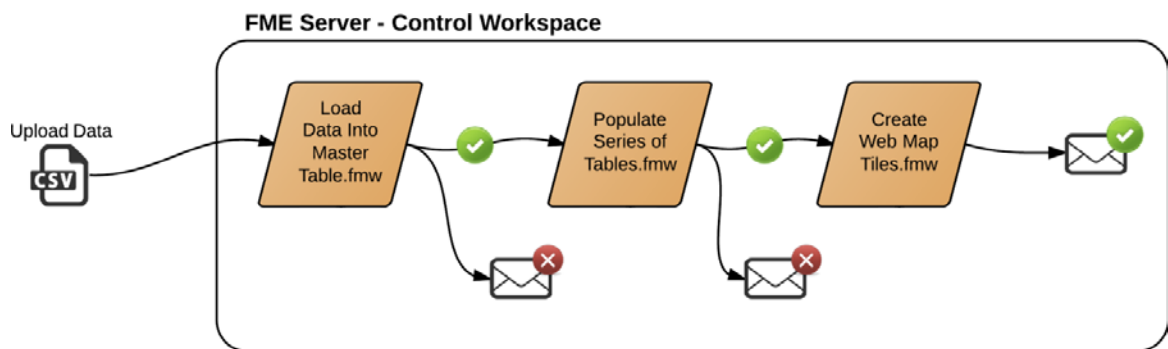
Workflow Management



Workflow Management is great for controlling workspaces in sequence or branching with in-built logic

What is Workflow Management?

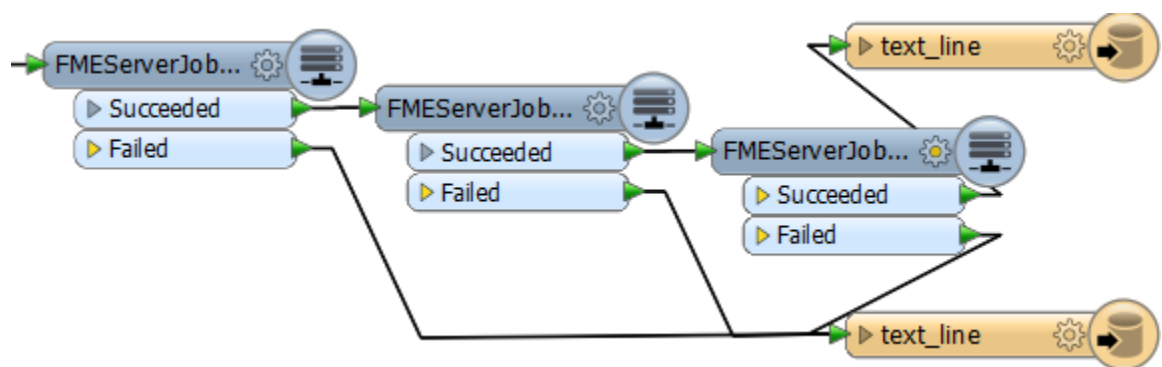
Workflow Management is a technique where a set of workspaces can be run in a particular sequence, and where branching can take place to run one workspace or another depending on the result of a set of pre-defined decisions.



Workflows like this are set up using a control (parent) workspace, which defines the logic for any decisions that needs to be made, and runs subsequent (child) workspaces according to that logic.

Implementing Workflow Management

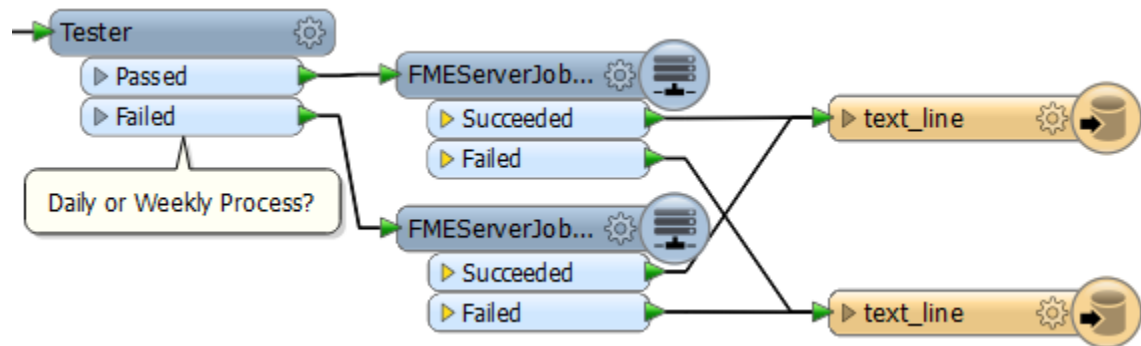
A master workspace calls other workspaces by using one of a number of transformers. For FME Server the most commonly used transformer is the FMEServerJobSubmitter.



Here a control workspace is using the FMEServerJobSubmitter to run three further FME workspaces. Maybe each workspace is a separate step in a database update process.

If a particular task fails then the output is routed to a text file Writer – meaning this could be used in a notification system to send an email to an administrator alerting them to the failure.

If there are several workspaces, but only one of which should be run, then the logic for deciding which one can be made using a Tester, or other filter transformer.



For example, here an organization runs a daily process to upload field updates into a database. However, once a week the process needs to carry out extra actions; such as archiving the source files to Dropbox, or exporting the database contents to Shape files for use by another team.

Each process is defined in a separate workspace, which is called by an FMEServerJobSubmitter transformer.

The Tester transformer prior to the FMEServerJobSubmitters contains the logic over which process is to be carried out. For example it may be testing which day of the week it is.

If it is Monday to Thursday then the test passes and it will run the usual daily update process. If it is a Friday then the test fails and it will run the weekly update process with the extra tasks.

Again, text file writers are being used to record the result of the translation and whether it was a success or failure. If necessary these could be used to send notifications to a system administrator.



Monsieur D. Server says...

“The Control Workspace may start with a Reader that reads a source dataset, where each source feature triggers the job submitter. For example, the source data may be a list of files that are to be translated.

But more often just a single feature is needed to trigger the child process once. In this case a Creator transformer can be used instead of a Reader.”



Exercise 5c: Workflow Management	
Scenario	Airphoto Data Vendor
Data	GeoTiff Orthophotos
Overall Goal	Chain Three Workspaces Together
Demonstrates	Workflow Management
Starting Workspace	C:\FMEData2014\Workspaces\ServerTraining\Exercise5c-Begin-Data-Load.fmw C:\FMEData2014\Workspaces\ServerTraining\Exercise5c-Begin-Data-Process.fmw C:\FMEData2014\Workspaces\ServerTraining\Exercise5c-Begin-Data-Rasterize.fmw
Finished Workspace	C:\FMEData2014\Workspaces\ServerTraining\Exercise5c-Complete-Control1.fmw C:\FMEData2014\Workspaces\ServerTraining\Exercise5c-Complete-Control2.fmw C:\FMEData2014\Workspaces\ServerTraining\Exercise5c-Complete-Control3.fmw

This example shows how to chain together 3 separate workspaces into a complete workflow. The workflow loads data, performs a join and then creates web map tiles in three separate steps.

1. Publish Workspaces

The three workspaces that are to be chained together already exist and need to be published to FME Server. So create a new repository called `workflow_management` and publish the following three workspaces:

- `workflow_management_load_data.fmw`
- `workflow_management_process_data.fmw`
- `workflow_management_rasterize_data.fmw`

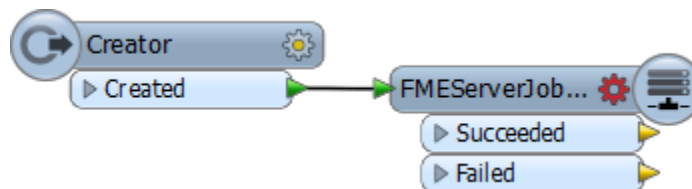
They can simply be published with no resources and registered only with the Job Submitter.

2. Create Control Workspace

Now we can create a control workspace to manage the three child workspaces.

Start with an empty canvas in Workbench and add a Creator transformer. A Creator will simply create a single non-geometry feature that can be used to trigger the rest of the workspace.

Now add an `FMEServerJobSubmitter` transformer after the Creator:



Save the workspace as `workflow_management_controller.fmw`

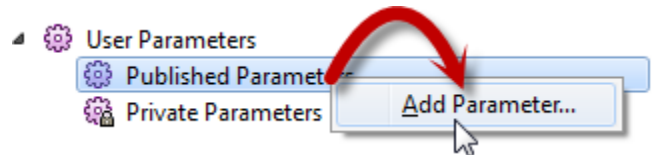
3. Add Published Parameters

Published Parameters are how information can be passed from a master workspace to a child workspace. The child workspace has existing parameters and new ones can be created in the master in order to receive information that is to be passed in.

The first child workspace (for loading data) has two Readers to read two input datasets; therefore we can specify the source data using published parameters.

In the Navigator window locate the section named Published Parameters.

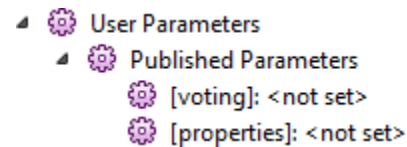
Right-click on Published Parameters and choose Add Parameter.



Create two new parameters:

A. Type: Filename (Existing)
 Name: voting
 Prompt: voting
 Configuration: Description: shapefile,
 Filter: *.shp

B. Type: Filename (Existing)
 Name: properties
 Prompt: properties
 Configuration: Description: shapefile,
 Filter: *.shp



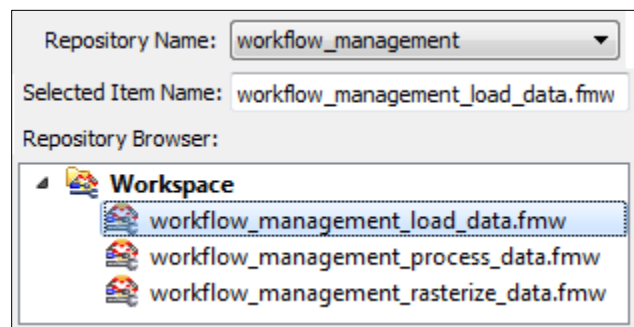
4. Set FMEServerJobSubmitter Parameters

Open the parameters dialog for the FMEServerJobSubmitter. Here we can define the workspace that is to be run by this master process.

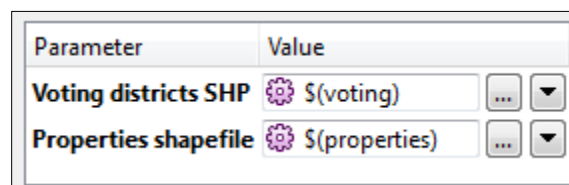
Enter the usual connection parameters.

For the workspace to run choose the *workflow_management* repository and from there select the workspace *workflow_management_load_data.fmw*.

Click **Next** to continue.



Set Wait for Server Job to Complete to Yes.



For the first published parameter, click the drop-down arrow (to the right) and choose User Parameter > voting

For the second, click the drop-down arrow and choose User Parameter > properties

Click **Finish** to close the parameters dialog.

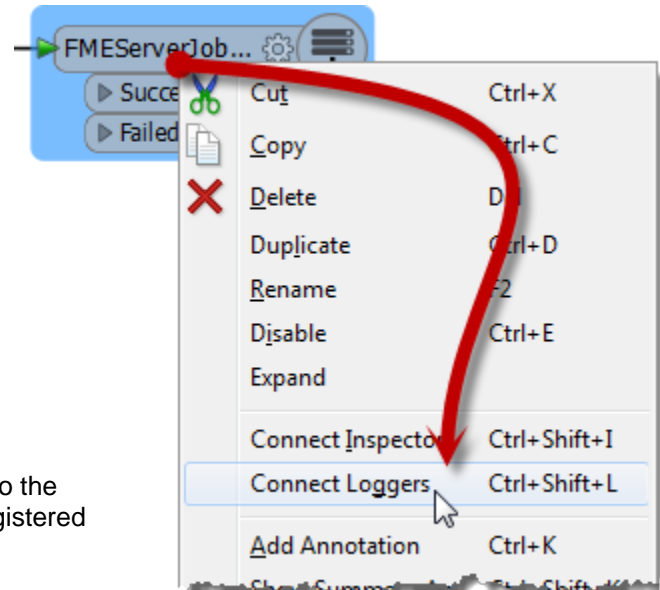
5. Add Logger Transformers

Right click the FMEServerJobSubmitter and select Connect Loggers.

This will add Logger transformers to the workspace so we will know the status of the completed jobs.

6. Publish the Workspace

Publish the workspace to FME Server, into the workflow_management repository and registered with the job_submitter service.



7. Run Workspace

Locate the workspace in its repository in the web interface. Select Job Submitter > Configure

Use the File Upload "Add Files" button to upload the files:

C:\FMEData2014\Resources\workflow_management\parcels_downtown.zip and
C:\FMEData2014\Resources\workflow_management\voting_downtown.zip files

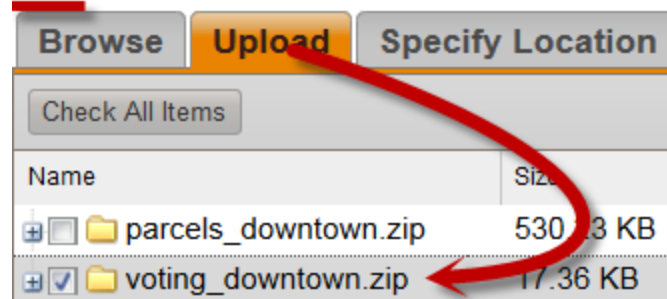
File Upload (100% Uploaded)

Add Files
Delete All Files

Please add any files required. You can also drag files anywhere on this page to add them.

parcels_downtown.zip	530.23 KB	Completed	Delete
voting_downtown.zip	17.36 KB	Completed	Delete

voting:



For the two published parameters, first click the Upload tab.

Then, for the voting parameter, choose the newly uploaded dataset voting_downtown.zip

For the properties parameter choose parcels_downtown.zip

Click **Run Workspace** to run the workspace.

8. View Log

Once the workspace completes click the View Log button.

Scroll down the log until you see the logged feature.

If you see the Feature Type of the logged feature reported as FMEServerJobSubmitter_Succeeded_LOGGED then you know the child workspace was successfully triggered.

Success

Translation Successful

Job Id: 134

Number of Features Written: 0

Time Elapsed: 2 seconds

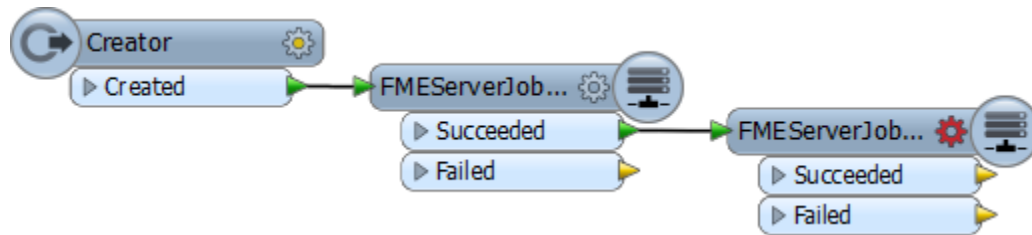
View Log

Download Log

9. Chain Workspaces – Part 1

Now we can start to chain multiple workspaces together.

Go back to FME Workbench where the control workspace is open. Delete the Logger transformers and then add a second FMEServerJobSubmitter transformer. It should be connected to the Succeeded port of the first FMEServerJobSubmitter transformer.



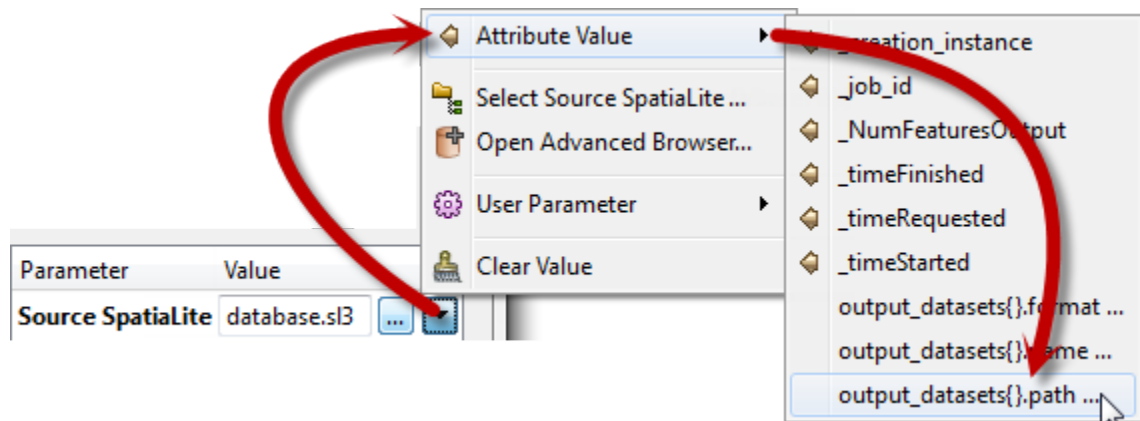
Open the parameters dialog of the newly added FMEServerJobSubmitter and enter the usual connection details. This transformer will be used to execute the second workspace of the three, so select *workflow_management_process_data.fmw* as the workspace to run.

Again, Set Wait for Server Job to Complete to Yes.

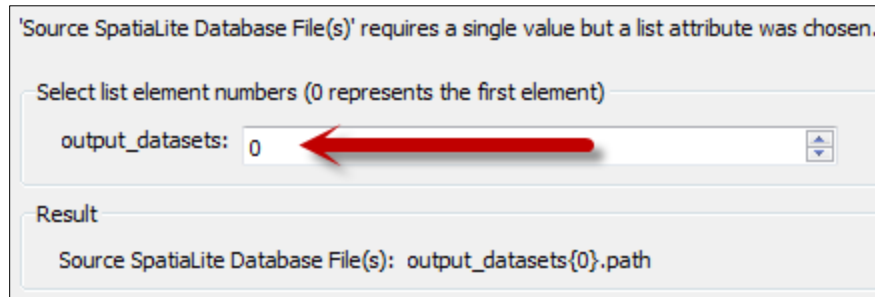
This is where it gets interesting. One of the attributes added to the features output from an FMEServerJobSubmitter transformer records the path to the dataset written by that workspace.

In other words, the first child process returned information about where it wrote its output data, and we can use that information to provide the input for the second child process.

In the Source SpatialLite Database File(s) parameter, click the drop-down arrow. Select Attribute Value > output_datasets{}.path



Because this is a list attribute – i.e. there may be more than one value – you'll be asked which value you want to use. It will be the first one; element 0



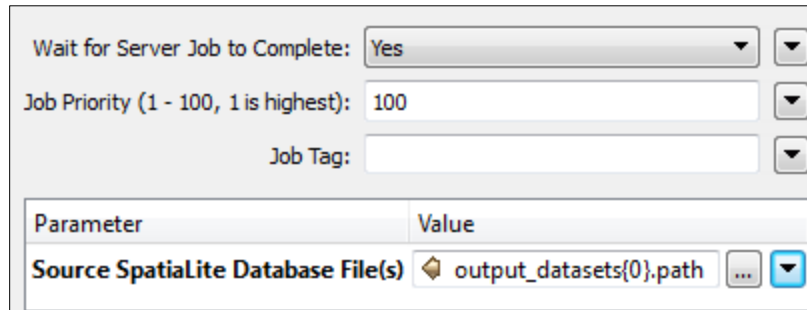
So select 0 (if it isn't already) click **OK** to close this dialog, and **Finish** to close the main dialog.

9. Chain Workspaces – Part 2

Now add a third FMEServerJobSubmitter transformer – again connected to the Succeeded port of the previous – in order to run the third child workspace.

Again enter the connection properties and again choose the same repository as before. This time the workspace to select is *workflow_management_rasterize_data.fmw*

Again, set Wait for Server Job to Complete to Yes and set the source Spatialite Database to use the output_dataset{}.path parameter (element 0).



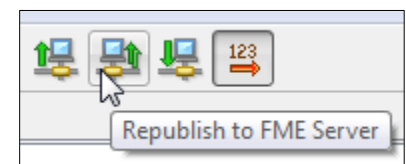
Once more, click **Finish** to close the main transformer parameters dialog.

Then add some Logger transformers again, so we can keep track of the results.

10. Publish Workspace

Publish the workspace back to FME Server, again into the *workflow_management* repository and registered with the Job Submitter service.

In fact, since no service changes need to be made, you can simply use the Republish button.



11. Run Workspace

Run the workspace in the Web Interface, as in step 7. Because the data is being stored to the repository, not a Resource Folder, you will have to upload the data again.

Remember to assign the uploaded data to the two published parameters.

12. View Log

Once the workspace completes, click the button **View Log**

Again you should be able to find the same success message, indicating all three child workspaces have run to completion.

The final output datasets (web map tiles) were written to a folder, and again the output location is specified by an attribute. But it would be more useful to move the files to a permanent location, which could be a resources folder, an FTP site, Amazon S3 or even as email attachments.

13. Copy Output

To better handle the output let's move these files to the Temp resources folder so that they can be accessed via the web interface and REST API.

Go back to the control workspace and delete the Logger transformers.

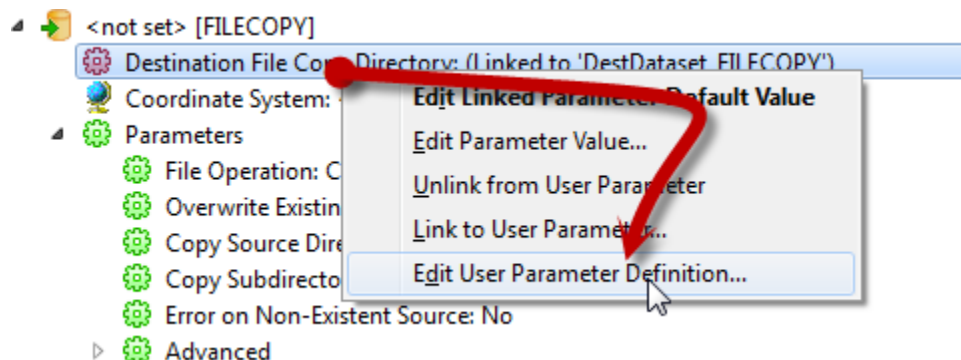
Now select Writers > Add Writer from the menubar and add a writer with the following parameters:

Writer Format: File Copy
Writer Dataset: <leave blank>

A FileCopy Writer is one that moves existing files around in a file system.

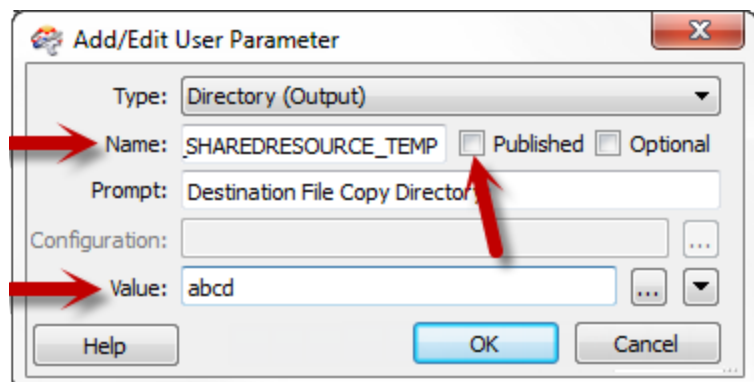
14. Set up Copy

In the Navigator window locate the File Copy writer and expand its list of parameters. Right click the parameter called Destination File Copy Directory and select the option Edit User Parameter Definition



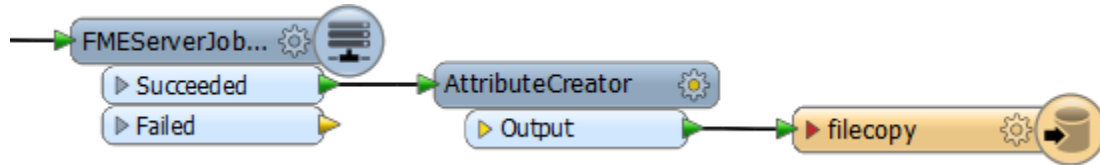
When prompted change the name parameter to: FME_SHAREDRESOURCE_TEMP
Also uncheck the option for Published. Enter a value (anything, it doesn't matter).

FME Server will substitute the *FME_SHAREDRESOURCE_TEMP* value with the actual path to the Temp resources folder.



15. Add AttributeCreator

Now we need an *AttributeCreator* to create an attribute to tell the FileCopy Writer where the data is to be read from. So, add an AttributeCreator after the last FMEServerJobSubmitter transformer and connect it to the File Copy Writer.



Open the AttributeCreator transformer parameters dialog and create an attribute named: *filecopy_source_dataset* by typing it into the Attribute Name field.

For the value field, click the drop-down list, select Attribute Value and choose the attribute *output_dataset{}.path*. As before, when prompted choose element 0.

Attributes To Set	
Attribute Name	Value
filecopy_source_dataset	output_datasets{0}.path

16. Publish the Workspace

Publish the workspace back to the FME Server *workflow_management* repository, again registered with the Job Submitter service.

17. Run the Workspace

Browse to the workspace again in the Web User Interface. Select Job Submitter > Configure.

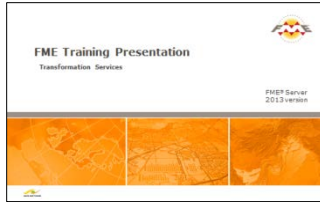
As before, upload the source data and associate it with the published parameters.

Now run the workspace.

Once complete, click **Resources** on the sidebar menu and expand the Temp directory. You will see the five PNG files that were created by this workflow.

You can now download these files and access them via the REST API.

Troubleshooting for Administrators



This section shows a few basic troubleshooting techniques in case of emergency

A Scheduled Workspace Fails to Run

If a scheduled workspace appears to have not been run at the expected time, then the following suggestions may be of help.

- Ensure an engine is available, and that the scheduled job is not in a queue.
- Check the date and time **very** carefully to ensure the correct values were entered
- Check the timezone is correct. The web interface operates on local timezone, which is not necessarily the same timezone as the server is physically located.

A Notification Fails to Start a Workspace

If a notification fails to start a workspace as expected then check the troubleshooting suggestions at the end of chapter 4 (Real-Time).

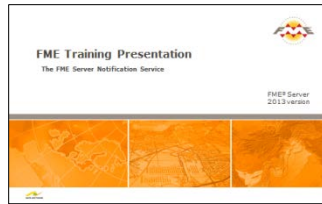
The REST API Fails to Start a Workspace

If a workspace fails to run using the REST API then check the troubleshooting suggestions at the end of chapter 2 (Running Workspaces).

The FMEServerJobSubmitter Fails to Start a Workspace

If a workspace fails to run using the FMEServerJobSubmitter transformer then check the troubleshooting suggestions at the end of chapter 2 (Running Workspaces).

Module Review



This module introduced you to FME Server's Automation Functionality.

What You Should Have Learned from this Module

The following are key points to be learned from this module.

Theory

- Automation is the ability for FME Server to run a workspace without any user intervention or initiation.
- Scheduling is the ability to program FME Server to run a workspace in a repository, at a specific time in the future.
- Automated Data Processing is when a workspace is run in response to an event, rather than on a schedule.
- Workflow Management is a technique where a set of workspaces can be run in a particular sequence, and where branching can take place to run one workspace or another depending on the result of a set of pre-defined decisions.

FME Skills

- The ability to schedule a workspace to run at a particular time or date, either once or on a repeating schedule.
- The ability to start a workspace automatically with either a Notification or through the REST API
- The ability to create a parent workspace to control and execute a set of child processes

Course Wrap-Up

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Product Information and Resources



Although your FME training is now at an end, there is a good supply of expert information available for future assistance.

Safe Software Web Site

Our web site is the official information source for all things FME. It includes information on FME products, Safe Software services, FME solutions, FME support and Safe Software itself.



Safe Support Team

Behind FME are passionate, fun, and knowledgeable experts, ready to help you succeed, with a support and services philosophy built on the principle of knowledge transfer.



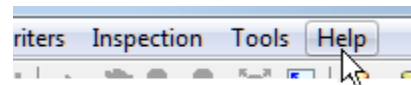
Safe Software Blog

The Safe Software blog provides thoughts on spatial data interoperability from the folks who make it their passion.

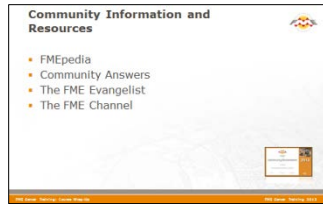


FME Manuals and Documentation

Use the Help function in FME Workbench to access context-sensitive help, and various manuals and documentation for FME Desktop.



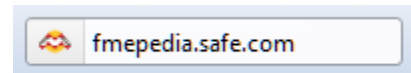
Community Information and Resources



Safe Software actively promotes users of FME to become part of the FME Community.

FMEpedia

FMEpedia is our community web site - a one-stop shop for all community resources, plus tools for browsing documentation and downloads.



FME Knowledge Base

The FME Knowledge Base contains a wealth of information; including tips, tricks, examples, and FAQs. There are sections on both FME Desktop and FME Server, with articles on topics from installation and licensing to the most advanced translation and transformation tasks.

FME Community Answers

FME community members post FME related messages and questions and share in answering other users' questions. Top users are known as "heroes". Come and see how they can help with your FME projects!

The FME Channel

This FME YouTube channel is for those demos that can only be properly appreciated through a screencast or movie. Besides this there are a host of explanatory and helpful movies, including recordings of most training and tutorials.



Course Feedback



The format of this training course undergoes regular changes prompted by comments and feedback from previous courses.



There's one final Q+A to go – and this time you'll be telling us the answers!

Safe Software Inc. greatly values feedback from training course attendees. This is your chance to tell us what you really think about how well we're meeting your training goals.

The current course structure has been determined by attendee comments and we appreciate your feedback more than ever.

You'll be sent a link to a feedback form after your course.

FME Training Feedback Form

Please take a moment to fill in the survey below. Your feedback allows us to continually improve our courses to meet the needs of our customers.

Course Details

FME Desktop, Online | November 17th-18th

Attendee Information

Name: (optional) Company: (optional)

General Feedback

I can apply the course content to my job. Please Select... <input type="text"/>	The exercises were directly applicable to the material covered. Please Select... <input type="text"/>
The course length was adequate to cover the content. Please Select... <input type="text"/>	The graphics and overheads were clear and concise. Please Select... <input type="text"/>
There was an appropriate balance between lecture and lab. Please Select... <input type="text"/>	

What did you think?

Overall course rating <input type="text"/>	Sometimes we like to use comments for promotional purposes. Please let us know if we can use yours. <input type="radio"/> Yes <input type="radio"/> No Would you recommend this course to other FME users? <input type="radio"/> Yes <input type="radio"/> No
Overall instructor rating <input type="text"/>	
Overall classroom environment <input type="text"/>	
Overall usability of FME <input type="text"/>	
What was the most impressive aspect of this course? <input type="text"/>	
What was the least impressive aspect of this course? <input type="text"/>	
I would have preferred to spend more time discussing: <input type="text"/>	
and less time discussing: <input type="text"/>	
Additional Comments: <input type="text"/>	

If you have comments or concerns on items not covered by the feedback form then please contact our [Training Manager](#) directly.

Certificates



All FME training course attendees receive a certificate.

Congratulations!

With the presentation of your certificate of achievement, you have now officially completed the FME Server 2014 Training Course.



Thank You



Thank you for attending this FME training course.

All of us piratical types at Safe Software Inc. wish you good luck and fair winds with your FME voyage of discovery.



Congratulations!



Judge GIS says...

"As a reward for reading this far, here's a small puzzle for you to try out. Let's say it should be easy to figure out who this is!"

[illegible]