



FME Server Architecture

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FME® Server enables organizations to quickly share spatial data using flexible web-based distribution and loading services.

Built on a services-oriented architecture (SOA), FME Server's spatial data services can help you securely convert, load and distribute large volumes of data so end users can access it where, when and how they need to.

Bringing the power of Safe Software's proven spatial data translation, transformation and integration technology from FME Desktop to enterprise server environments, FME Server enables organizations to take advantage of:

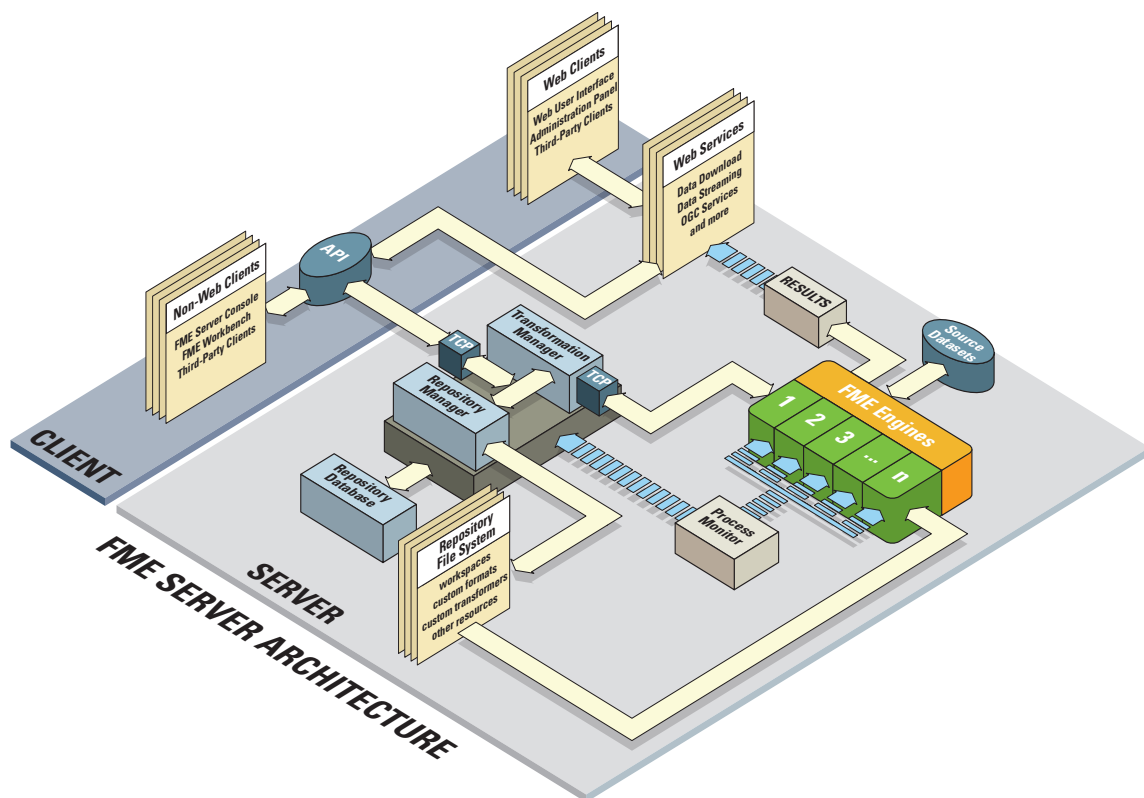
- Flexible spatial data distribution
- Scalable data loading and conversion

This paper will introduce you to the architectural components of FME Server and then describe a few sample usage scenarios. It will also provide an introduction to the performance, scalability and security offered by FME Server.

Before you read on, it is recommended that you have a solid understanding of spatial ETL (www.safe.com/SpatialETL) and FME technology (www.safe.com/FMETechnology) to get the most out of this paper.

Architectural Components of FME Server

FME Server consists of several major components as illustrated in the architecture diagram below. You may wish to reference this diagram as you read further details about the components and usage scenarios.



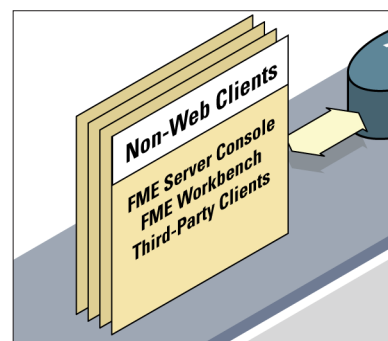
CLIENTS

Two types of clients can access FME Server: web and non-web.

FME Server includes a web user interface that runs in a web browser. In the simplest case, an end user can download data using the web pages provided with an FME Server installation. Users can also perform many other tasks from a web browser such as:

- Access data via the services offered by FME Server such as data download, data streaming, and OGC web services like WFS and WMS.
- Run workspaces that have been published to FME Server.
- View workspaces and repositories on FME Server.
- Manage published workspaces, custom formats, and custom transformers.

The FME Server web user interface doubles as a sample web application which demonstrates how to use many of the web components available to web developers. Throughout the interface, clearly marked “Show Request” buttons, when clicked, reveal the underlying syntax for sending a request to FME Server. The interface can therefore be used as a starting point for organizations that prefer to integrate FME Server services into their existing web applications.

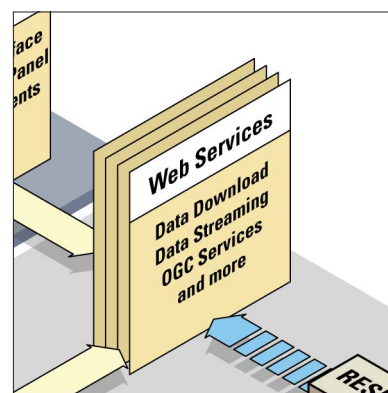


In addition to FME Server’s web user interface, other web clients can be used with FME Server including the FME Server Administration Panel and third-party applications that are capable of submitting URL requests, such as Google Earth.

Non-web clients can also interface with FME Server. They include FME Workbench, the FME Server Console, and third-party clients developed using the FME Server API. FME Workbench serves as the workspace authoring environment and enables authors to upload their workspaces to FME Server for use by end users; it can also be used to submit jobs to FME Server. The FME Server Console enables administrators to interact with FME Server using commands rather than the FME Server web user interface or FME Workbench. This command line interface also allows integrators to call FME Server services from their own applications.

WEB SERVICES

When a user accesses FME Server using a web client (as described above), the communication to FME Server is handled by one of FME Server’s web services. These web services are java servlets which enable end users to receive the data they need and/or upload their data to FME Server for transformation, validation and loading. Several services can be offered using FME Server including data download, data upload, data streaming, OGC web services, and more. These services can be configured to point to multiple failover FME Server machines, providing fault tolerance to ensure a robust, reliable system.



Learn more about these web services by reading the examples provided in the “Usage Scenarios” section below.

FME SERVER CORE COMPONENTS

The FME Server core components manage the jobs, workspaces and resources used by FME Server. They include the Repository, the Transformation Manager and the Process Monitor, each of which is described below.

TRANSFORMATION MANAGER

The Transformation Manager is responsible for accepting jobs from clients and distributing them to the first available FME Engine. Upon completion of the job, the Transformation Manager returns the results from the FME Engine to the client.



An underlying database stores the Transformation Manager's requests until they are passed to an FME Engine for processing. The Transformation Manager maintains a priority-based queue of all waiting requests and tracks the state of transformation requests before, during and after they are processed by an FME Engine. This enables the Transformation Manager to provide fault tolerance across system shutdowns and failures, preventing requests from being lost.

REPOSITORY

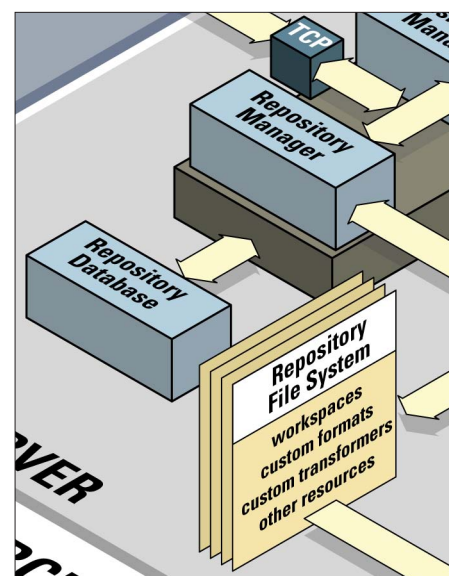
The FME Server repository serves as a catalog of workspaces and workspace resources which are used to provide services to users. The repository functionality in FME Server is comprised of several components: the Repository Manager, the Repository Database, and the Repository File System.

Each repository is a folder on the Repository File System which contains a folder for each published workspace and its custom transformers, formats, and resources such as source datasets.

The Repository database stores information about workspaces such as workspace parameters and feature types, as well as information about repositories. As an alternative to using the provided HSQLDB, you can choose to use Oracle, MySQL or SQL Server databases. Configuration instructions are provided in the FME Server Administrator's Guide (<http://docs.safe.com/fmeserver/pdf/FMEServerAdminGuide.pdf>).

The Repository Manager stores and serves this repository metadata to the clients. It supports the management of multiple repositories and allows for the creation and deletion of repositories.

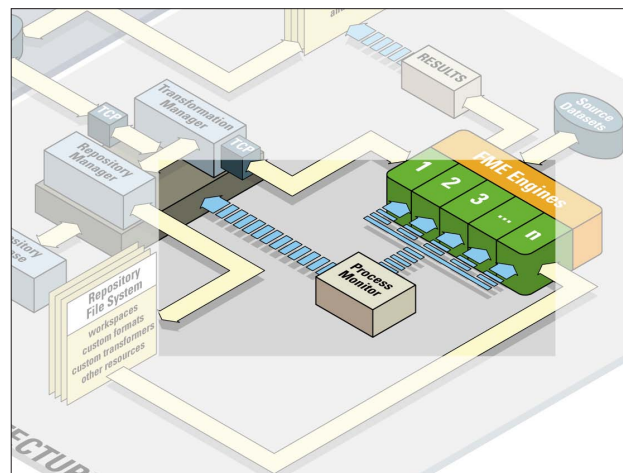
Each repository's contents can be uploaded, downloaded, created and deleted using any of the following tools: FME Workbench, the FME Server Console, or the Administrator's Web User Interface.



PROCESS MONITOR

The Process Monitor provides fault tolerance for FME Server and can restart any of the core components and FME Engines if necessary.

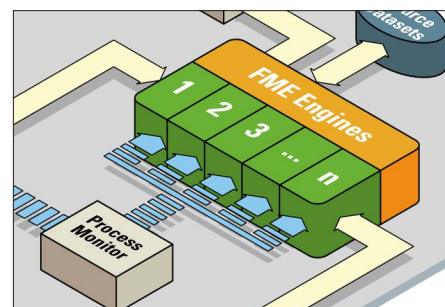
If you choose to run the FME Engines on a separate machine (or machines) from the rest of the FME Server core components (Transformation Manager and Repository Manager), a separate Process Monitor on each machine continues to provide fault tolerance for your components. For example, the Process monitor on a machine with FME Engines can point to multiple failover hosts (machines running the other FME Server core components), reducing single points of failure.



FME ENGINES

The spatial ETL processing capabilities of FME Server are provided by one or more FME Engines. These engines are built on FME technology, enabling them to run workspaces authored using FME Workbench.

The number of engines you choose to use is directly based on the processing power you require. Adding engines provides additional power for running more jobs at the same time. You will learn more about scalability in the section entitled "Performance and Scalability."



Because true enterprise software must be robust to handle the high volume demands of large organizations, FME Engines are fully configurable to provide failover protection.

FME Engines communicate with the Transformation Manager using TCP/IP, allowing multiple FME Engines to be registered with the same Transformation Manager. This also means that the Transformation Manager and FME Engines can be run on one system or they can be distributed across many machines.

Usage Scenarios

FME Server offers flexible spatial data distribution services which allow you to share your spatial data with users, and provides scalable data loading and conversion services to enable efficient validating, loading, and conversion of large volumes of data.

Flexible Spatial Data Distribution Services

To help you automate data sharing, FME Server includes two flexible spatial data distribution services:

- Spatial Data Download Service
- Spatial Data Streaming Service

Scalable Data Loading and Conversion Services

FME Server offers powerful spatial data loading and conversion services to help you support high volume spatial data access requirements, including:

- Spatial Data Upload and Validation (Data Upload Service)
- Server-Based Spatial Data Conversion (Job Submitter Service)

Usage Scenarios Included in this Paper

To give you an understanding of the inner workings of FME Server, this paper includes descriptions of the following three usage scenarios, describing an overview of both what the end user experiences and what FME Server components perform in the background:

- Publishing and Updating Workspaces
- Downloading and Streaming Spatial Data
- Performing Server-Based Spatial Data Conversion

While many more use cases are possible, these three scenarios are broad reaching and may inspire further thoughts as to how FME Server can be best used to achieve your data access goals.

PUBLISHING & UPDATING WORKSPACES

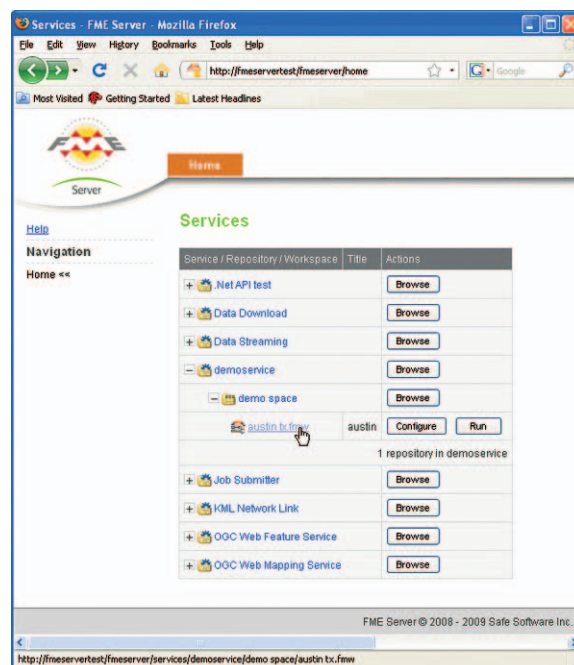
FME Server is all about making spatial data available to the people who need it, without requiring them to be familiar with data transformation processes. Using FME Server, people who require data can now access it where, when and how they need to without having to contact an FME expert.

Any workspace authored using FME Workbench can be uploaded to FME Server, giving end users access to the full power of FME. Best of all, they don't need to know anything about workspaces, data conversion or FME Workbench.

Workspace authors can give end users flexible choices when they run a task by simply publishing parameters within their workspaces. For example, authors can allow a user to choose the coordinate system for their data download.

Published parameters can be simple text entry boxes, file pickers, choice controls, multiple selection lists, password fields, etc. and display as input fields to users of the FME Server web user interface.

Workspace authors who have created and tested a workspace can publish it to FME Server directly from FME Workbench by simply clicking the Publish button. The Publish Wizard opens, in which the repository and services options can be selected. The workspace and any required resources can then be uploaded to FME Server and placed in the specified repository by the FME Server components.



Published workspaces are available to be run by users under the service(s) they've been published to

Behind the scenes, when a workspace author performs this task, the FME Workbench client passes the workspace through the FME Server API and the Repository Manager into the Repository Database.

Published workspaces can be updated at any time by simply downloading them, updating them, and re-publishing them to FME Server. When a user downloads a published workspace, the Repository Manager pulls the workspace from the Repository Database through the FME Server API and into the FME Workbench client.

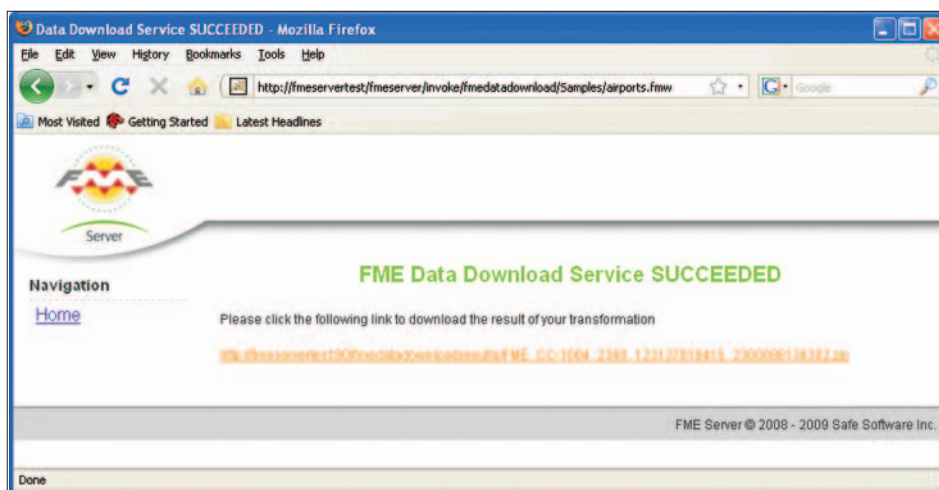
Once published to FME Server, workspaces can be run by any authenticated user with a web browser, as described in the following two use cases.

Custom formats and custom transformers can also be published, stored and updated in the same manner.

DOWNLOADING AND STREAMING SPATIAL DATA

FME Server enables end users to download data by providing a workspace's output dataset via FME Server services.

Using the FME Server web user interface, end users simply choose the Data Download or Data Streaming service and the repository which the workspace is assigned to, and then select the workspace. Then they enter their specifications in the published parameter input fields, and run the workspace.



When the email notification is not selected, the Data Download service returns completed task results information to the end user directly in the browser window along with a link to download the resulting zip file.

The resulting dataset is provided as a zip file for download (data download), or the data is returned directly to the web client (data streaming).

On the back end, FME Server is essentially running workspaces over the web. The FME Server web user interface client accesses the appropriate service – either Data Download or Data Streaming – which then pushes the request through the API into the Transformation Manager. Then the Transformation Manager sends the data conversion job to the appropriate FME Engine(s) for processing.

Once complete, the next step for the FME Engine(s) depends on the selected service. For the Data Download service, the FME Engine(s) write the resulting data into a web directory, zip all of the output files together and send the conversion results information to the Data Download service. If the email notification option is used, the service then emails the results information to the user and a link to download the zip file dataset. If email notification is not used, the service displays the results information and a link for downloading the zip file to the user in the FME Server web user interface client.

For the Data Streaming service, the FME Engine(s) write the resulting data into a temporary destination directory and send the conversion results information to the Data Streaming service. The service then returns the resulting data to the user's client application.

FME Server's KML Network Link Streaming service works very similarly to the data streaming service, but uses Google Earth as the user's client. The service provides a KML file for use in Google Earth that contains a network link to the FME Server Data Streaming Service. When accessed, this link returns the resulting data from FME Server directly into Google Earth.

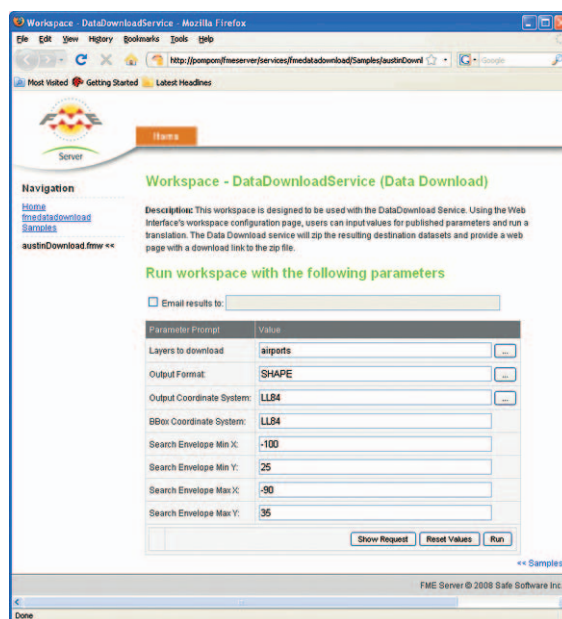
For workspace authors, FME Server simplifies the task of creating efficient services by providing a set of template workspaces that make it easier to design a workspace for the data download and data streaming services.

PERFORMING SERVER-BASED SPATIAL DATA CONVERSION

In some cases, end users don't require a destination dataset to be returned to them or viewed by them – they simply need to perform a conversion on a set of spatial data. For example, a user may simply need to upload a dataset for conversion and submission into a centralized database.

These users simply access the FME Server web user interface, select the Job Submitter service and the repository which the workspace is assigned to, and then select the workspace. Once the published parameters have been satisfied and any required data has been uploaded by the end user, the spatial ETL task runs and the web page displays the results.

Behind the scenes, the FME Server web user interface client accesses the Job Submitter service which pushes the request through the API into the Transformation Manager. Then the Transformation Manager sends the data conversion job to the appropriate FME Engine(s) for processing. Once complete, the FME Engine(s) deposit the resulting data in the destination dataset and send the conversion results information to the user's web client through the Job Submitter service. The service then displays it to the user in the FME Server web user interface client.

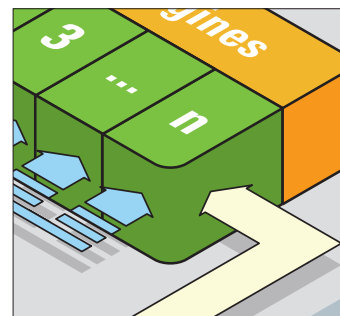


If parameters have been published in a workspace, users can click the Config button in the FME Server web user interface to be prompted with the available published parameters, sometimes thought of by users as configuration options

Performance and Scalability

One of the driving forces behind the design of FME Server is performance and scalability. Built for high performance, FME Engines can process even small jobs very quickly as there is no startup or shutdown time for each job as it is run.

FME Server is also designed to scale with the growth of an organization's needs. Built to support both large and small installations, FME Server allows many FME Engines to be added to the system. As your organization grows, the spatial ETL capabilities of the system grow by simply adding more engines to the FME Server installation.



To support this capability further, FME Server enables organizations to dynamically add or remove engines from the processing pool at any time. Organizations can also move or re-deploy engine licenses to different hardware while the system is still running. With FME Server, organizations are able to keep their critical systems running even while they are changing the configuration of their FME Server installation.

Security in FME Server

FME Server comes equipped with security, freeing you to share your spatial data with authorized users while preventing unauthorized access. Its flexible security framework is designed to integrate with your existing environment.

With security enabled, all FME Server activities are secured. FME Server's role-based authentication framework supports LDAP-based Microsoft Active Directory integration, enabling administrators to specify exactly who has permission to use and manage their FME Server deployment. Additionally, administrators can turn on SSL in FME Server to ensure that communication between web clients and FME Server is encrypted for maximum control.

FME Server has been designed to meet the most common security needs of enterprise organizations everywhere. However, some organizations may prefer to implement more granular security measures. To support this, FME Server includes an API that enables organizations to customize FME Server security.

Find out more in the FME Server Security spotlight by visiting www.safe.com/Security.

Learn More

This paper has just skimmed the surface of the possibilities FME Server has to offer. You can learn more by visiting www.safe.com/FMEServer to access the brochures, demos, specifications information, and more.

Request a personalized web demo by contacting your account manager today. Email sales@safe.com or phone (604)501-9985 x287.