WebSphere MQ File Transfer Edition

IBM

Using the WebSphere MQ File Transfer Edition Web Gateway SupportPac

Version 1.0

WebSphere MQ File Transfer Edition

IBM

Using the WebSphere MQ File Transfer Edition Web Gateway SupportPac

Version 1.0

Contents

About this PDF

This PDF describes how to use the IBM WebSphere MQ File Transfer Edition Web Gateway SupportPac.

For information about WebSphere® MQ File Transfer Edition, refer to the online information center at: http://publib.boulder.ibm.com/infocenter/wmqfte/v7r0/index.jsp

The content of these topics is created for viewing online; you might find that the formatting and presentation of some figures, tables, examples, and so on are not optimized for the printed page. Text highlighting might also have a different appearance.

Terms used in this PDF

The term *WMQFTE* is used as an abbreviation for WebSphere MQ File Transfer Edition.

The term *agent* is used to refer to a WebSphere MQ File Transfer Edition agent.

The term *database logger* is used to refer to the WebSphere MQ File Transfer Edition database logger.

The term *Web Gateway* is used the refer to the WebSphere MQ File Transfer Edition Web Gateway SupportPac.

Figures

Tables

ix

Using the WebSphere MQ File Transfer Edition Web Gateway SupportPac

Using the Web Gateway

Use the WebSphere MQ File Transfer Edition Web Gateway SupportPac to transfer files to WebSphere MQ File Transfer Edition (WMQFTE) agents and retrieve the status of transfers using an HTTP client.

The Web Gateway is useful if you have files on a system where you do not want to run an agent but where you can use an HTTP client. For example, you can use the Web Gateway for the following tasks:

- Sending files to a WMQFTE agent, using a Web page that is running in a Web browser
- Monitoring the status of transfers, using a Web page that is running in a Web browser
- Sending files from a portable device that is not capable of running the WMQFTE infrastructure but has HTTP capabilities
- Sending files from an operating system that the WMQFTE agent is not supported on

How the Web Gateway fits into a WMQFTE network

Use the Web Gateway to extend an existing WMQFTE network to support clients that use the HTTP protocol. The Web Gateway provides a link from clients using the HTTP protocol into a WMQFTE network that already exists.

A Web Gateway consists of several parts as follows:

A Java Platform, Enterprise Edition 5-compliant application server
This application server hosts the Web Gateway application. HTTP requests from clients are directed to the application server, which passes the contents of the requests to the application.

The WMQFTE Web Gateway application
The Web Gateway application handles both file uploads and transfer status requests.

When a file is uploaded, the Web Gateway application writes the file data to a temporary store on the file system of the machine that the application is running on. The Web Gateway application then submits a file transfer request message to the WMQFTE agent, which is running on the same machine.

When a request for status information is received, the Gateway application connects to the WMQFTE database logger database (using the data access facilities provided by the application server) to retrieve the required information. The application then generates the response, which is passed to the client.

A WMQFTE agent

The Web Gateway requires a WMQFTE agent installed on the same machine as the application. This agent receives the file transfer request message described in the previous section. The request message refers to the file or files in the temporary store. The agent transfers the files to the specified destination agent in the WMQFTE network, reading the files from the file system store. The source disposition behavior is set to delete so that

the files are removed after the transfer successfully completes, see
fteCreateTransfer at: http://publib.boulder.ibm.com/infocenter/wmqfte/
v7r0/topic/com.ibm.wmqfte.admin.doc/start_new_transfer_cmd.htm for
more information.

You do not need to specially configure this agent, because the file transfer
request is an ordinary message and not specific to the Web Gateway.

The WMQFTE Database logger
To provide status information about transfers (whether the transfers are
started using the Web or by other means), the Gateway application must
be able to query a database that contains audit information for WMQFTE
activity. This database is populated by the database logger component
provided with the product. Database access is provided by the data access
facilities included in each application server. The database does not need to
be located on the same machine as the other components.
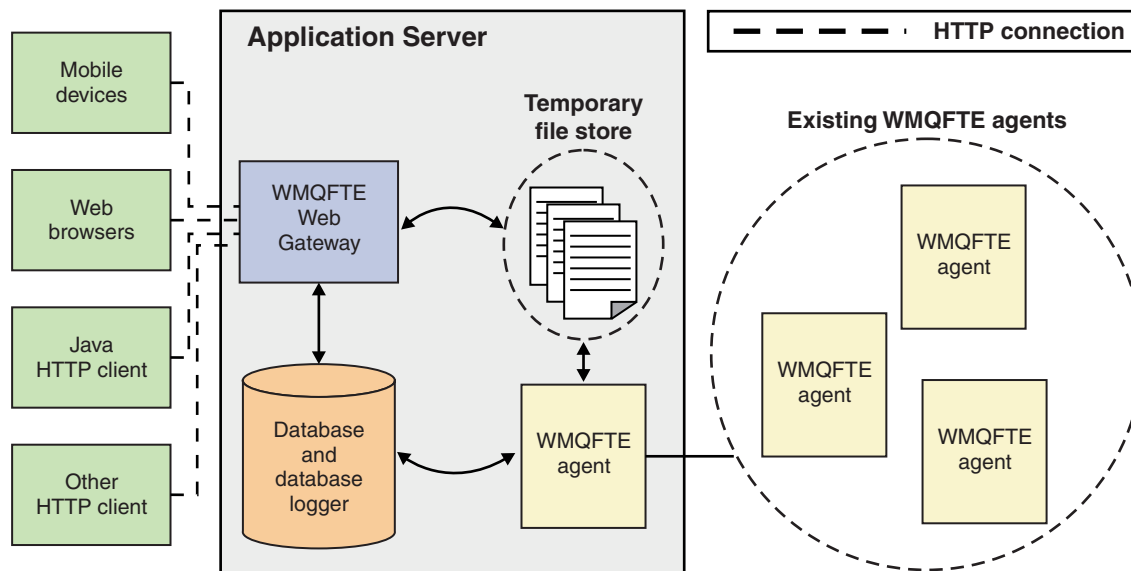
Figure 1. Overview of Web Gateway architecture

How to use the Web Gateway

On its own, the Web Gateway is not intended for use by end users. The Gateway
provides an application programming interface (API), which you can use to build a
customized application. There are three principal ways of building an application
to work with this API. These are:

Web application
You can write a set of Web pages or a Web application, which uses the
Web Gateway API to perform the file-related part of its function. A sample
application is shipped with the Web Gateway, which demonstrates one
way of doing this.

Client application
You can write a program using a language such as Perl, Ruby, or Python,
which runs on client machines and communicates with WMQFTE using
the Web Gateway API. Nearly all programming languages have HTTP

facilities available. The benefit of this approach is that it permits interaction with WMQFTE from platforms where the WMQFTE agent cannot be deployed.

System integration

This approach uses the same technology as the client application option, but to integrate different systems in the datacenter. HTTP provides a common denominator for communication between disparate tools and systems.

Web Gateway API reference

The WebSphere MQ File Transfer Edition Web Gateway SupportPac defines a RESTful HTTP application programming interface (API) for creating transfers and viewing the status of submitted transfers using HTTP requests and responses.

Resource types

The following WebSphere MQ File Transfer Edition object types are supported by this specification:

File   A file transferred to or from a WebSphere MQ File Transfer Edition agent.

Transfer
     An instance of a WebSphere MQ File Transfer Edition transfer.

HTTP verbs

The HTTP verbs in the following table are supported by this specification.

Table 1. The WebSphere MQ File Transfer Edition commands that map to the supported HTTP verbs.

HTTP verb	WMQFTE commands
POST	• Upload a file or files, and create a new transfer
GET	• Retrieve the status of a previous transfer

HTTP headers

You can customize a request to create or retrieve a resource using HTTP headers. Each header object maps to a property or function of WebSphere MQ File Transfer Edition.

The HTTP convention is to prefix custom headers with x- followed by a product-specific identifier. WebSphere MQ File Transfer Edition uses the product identifier fte-.

Table 2. HTTP headers and the WebSphere MQ File Transfer Edition command-line commands and properties that they map to

Header name	Supported object types and verbs	command-line command and property	Example usage
x-fte-action	File (POST)	fteCreateTransfer, -de	x-fte-action:error
x-fte-priority	File (POST)	fteCreateTransfer, -pr	x-fte-priority:5
x-fte-type	File (POST)	fteCreateTransfer, -t	x-fte-type:binary
x-fte-checksum	File (POST)	fteCreateTransfer, -cs	x-fte-checksum:MD5
x-fte-metadata	File (POST)	fteCreateTransfer, -md	x-fte-metadata:a=b,c=d,e=f
x-fte-jobname	File (POST)	fteCreateTransfer, -jn	x-fte-jobname:BatchOrder_1

Uniform Resource Identifier syntax

A WebSphere MQ File Transfer Edition Uniform Resource Identifier (URI) is distinguished from other WebSphere MQ URIs by the prefix `/fte`.

WebSphere MQ File Transfer Edition resources are distinguished from each other by their types. A resource is addressed by its resource type and an identifying token.

For example to POST a file resource to a destination agent called ACCOUNTS:

```
http://example.org/fte/file/agent/ACCOUNTS/
```

In this example
- `http://example.org` is the host system
- `/fte` indicates the URI is a WMQFTE URI
- `/file` indicates that the resource being addressed is a file resource
- `/agent/ACCOUNTS/` is the identifying token. This identifying token is a combination of the destination type, in this case agent, and a destination agent, in this case ACCOUNTS.

For example to address a transfer resource:

```
http://example.org/fte/transfer/
414d5120514d5f4c4d343336303920201159c54820027102
```

In this example
- `http://example.org` is the host system
- `/fte` indicates the URI is a WMQFTE URI
- `/transfer` indicates that the resource being addressed is a transfer resource
- `/414d5120514d5f4c4d343336303920201159c54820027102` is the identifying token, which in this case is the hexadecimal transfer ID

WMQFTE Uniform Resource Identifier syntax diagram
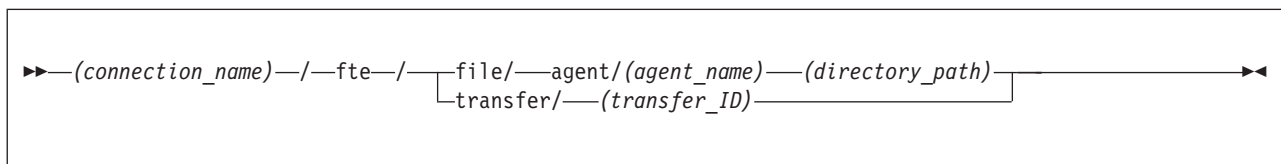
Parameters

(*connection_name***)**
> Required. Not case-sensitive. The host name and, optionally, the port of the server hosting the WebSphere MQ File Transfer Edition Web Gateway.

fte
> Required. Case-sensitive. Prefix indicating that the URI is addressed to the WebSphere MQ File Transfer Edition Web Gateway.

file
> Optional. Case-sensitive. Indicates that you are addressing a file resource.

agent
> Optional. Case-sensitive. Indicates that the type of destination is an agent.

(*agent_name***)**
>   Optional. Not case-sensitive, agent names are converted to uppercase. The name of the agent to send the file to.

(*directory_path***)**
>   Optional. Case-sensitive. The path of the directory on the destination agent file system that you are addressing. The directory path must contain only unreserved or escaped characters. The directory path is resolved relative to the root directory of the destination agent.

transfer
>   Optional. Case-sensitive. Indicates that you are addressing a transfer resource.

(*transfer_ID***)**
>   Optional. Not case-sensitive. The transfer ID is the unique 48 character hexadecimal string that identifies the transfer.

Content types

File transfer requests that you submit to the WebSphere MQ File Transfer Edition Web Gateway SupportPac must correspond to certain media types. Responses from the Web Gateway have a media type of `application/xml`.

Request

Content transferred to WebSphere MQ File Transfer Edition using HTTP must be in one of the formats in the following table.

Table 3. The WMQFTE resources and HTTP verbs that accept different media-types

Media-type	Valid WMQFTE resources	Allowed verbs
multipart/form-data	File (transfers of multiple files or transfers with metadata)	POST, GET, DELETE
application/xml	Transfer	POST, GET, DELETE

When you POST a file as part of a multipart request any media type can be used in each multipart boundary. The media type of the file determines whether the file transfer is in binary or text mode, unless the mode is overridden with the `x-fte-type` header.

Table 4. The transfer mode used by default for different media-types

Media-type	Transfer mode used
text/*	text
application/xml	binary
Any other media-type	binary

Response body

The Web Gateway returns a response with a media type of `application/xml` in response to both file upload requests (POST of a FILE resource) and transfer status requests (GET of a TRANSFER resource). You can find the XML schema in the `WebTransferStatus.xsd` file. This file is provided in the `schema` directory of the .zip file.

For examples of the XML returned by the Web Gateway, see the topics "Example: Sending a file using an HTTP request" on page 24 and "Example: Viewing the status of file transfers using an HTTP request" on page 25.

HTTP response codes

Status codes are returned in HTTP responses to requests made to the WebSphere MQ File Transfer Edition Web Gateway SupportPac

The header of a response returned by the WebSphere MQ File Transfer Edition Web Gateway contains an HTTP response code. The HTTP header in the following example contains HTTP response code 200 OK:

```
HTTP/1.1 200 OK
Server: WAS/6.0
Content-length: 0
```

The following table describes the possible values for the HTTP response code and the additional WebSphere MQ File Transfer Edition error codes that can be returned:

Table 5. HTTP response codes

HTTP response code	Associated WMQFTE error codes	Description
200 OK	None	A valid request has been handled correctly and optionally a response has been provided to the user.
202 Accepted	None	A valid request has been handled correctly but WebSphere MQ File Transfer Edition does not guarantee that the requested action has completed. For example, a file upload transfer request has been handled and submitted to a WMQFTE agent but the transfer has not yet taken place.

Table 5. HTTP response codes (continued)

HTTP response code	Associated WMQFTE error codes	Description
400 Bad Request	BFGWI0001	The URI is not valid because it is missing a resource type.
	BFGWI0002	The URI is not valid because it is missing a destination agent name.
	BFGWI0003	The URI is not valid because it is missing a destination file name or directory.
	BFGWI0004	The URI is not valid because it is missing a resource ID or query string.
	BFGWI0005	The URI is not valid because the resource ID is not valid.
	BFGWI0006	The request is incomplete, no source files are specified.
	BFGWI0007	The request is incomplete, no source file names are specified.
	BFGWI0008	The request body could not be parsed.
	BFGWI0009	A header or query parameter is not valid for this resource.
	BFGWI0010	A header or query parameter is not valid for this method.
	BFGWI0011	A header or query parameter value is not valid.
	BFGWI0012	A header or query parameter value is too long.
	BFGWI0022	The URI is not valid because the value of *x-fte-id* or *id* is not 48 characters long.
	BFGWI0023	The URI is not valid because the value of *x-fte-id* or *id* is not hexadecimal.
	BFGWI0024	The URI is not valid because the value of *x-fte-id* or *id* is not provided.
404 Not Found	BFGWI0015	The requested resource could not be found.
	BFGWI0025	There is no transfer information for the specified transfer ID.

Table 5. HTTP response codes (continued)

HTTP response code	Associated WMQFTE error codes	Description
405 Method Not Allowed	BFGWI0016	The requested resource does not support the HTTP verb that has been used in the request. For example, a GET has been used against a resource that only allows POST or DELETE.
413 Request Entity Too Large	BFGWI0026	The request contains a file that is too large to be handled by the server.
415 Unsupported Media Type	BFGWI0017	A request has been received with a media type, specified by the `Content-type` HTTP header, that is not supported.
500 Internal Server Error	BFGWI0018	An internal error has been encountered when handling the request. An FFDC or ABEND file has been produced.
502 Bad Gateway	BFGWI0019	The request could not be completed because an error occurred outside WebSphere MQ File Transfer Edition. For example, a WebSphere MQ queue manager is not available.
503 Service Unavailable	BFGWI0020	The destination is temporarily unavailable. For example, a WebSphere MQ queue is full.
504 Gateway Timeout	BFGWI0021	An attempt to complete the request has timed out because of time limits imposed by WebSphere MQ File Transfer Edition, or because of time limits imposed by the HTTP client.

Configuring the Web Gateway

You must configure the WebSphere MQ File Transfer Edition Web Gateway SupportPac to work with your existing WMQFTE environment. The process of configuration is specific to the application server you are using. This section describes the parameters that you can configure, and an example walk-through for two different application servers.

Preparing to deploy the Web Gateway

Before deploying the WebSphere MQ File Transfer Edition Web Gateway SupportPac, you need to set up your application server environment and dependent modules. This section describes the setup tasks for two different application servers.

Working with WebSphere Application Server Community Edition

Use these instructions to set up your environment before deploying the WebSphere MQ File Transfer Edition Web Gateway SupportPac enterprise application to WebSphere Application Server Community Edition. Customize the example deployment plan for your environment.

WebSphere Application Server Community Edition can be obtained from the following Web page: http://www.ibm.com/software/webservers/appserv/community

Before deploying the Web Gateway application, you must set up the dependent components. These components are the WebSphere MQ resource adaptor, a database written to by a WMQFTE database logger, a database connector, and a security realm. You must also update the web.xml file and the deployment plan for your environment.

1. Deploy the WebSphere MQ resource adapter, wmq.jmsra.rar.
   - To deploy the WebSphere MQ resource adapter into a WebSphere Application Server Community Edition that is running on the same system as the WebSphere MQ queue manager that you want to connect to, perform the following steps:
     a. Create a plan file that defines a connection to the WMQFTE source agent's queue manager. The following example plan file defines a connection to a queue manager, QM_JUPITER, that is located on the same system as WebSphere Application Server Community Edition.

```
<?xml version="1.0" encoding="UTF-8"?>
<connector xmlns="http://geronimo.apache.org/xml/ns/j2ee/connector">
  <resourceadapter>
    <resourceadapter-instance>
      <resourceadapter-name>WMQ</resourceadapter-name>
      <workmanager>
        <gbean-link>DefaultWorkManager</gbean-link>
      </workmanager>
    </resourceadapter-instance>
    <outbound-resourceadapter>
      <connection-definition>
        <connectionfactory-interface>javax.jms.ConnectionFactory</connectionfactory-interface>
        <connectiondefinition-instance>
          <name>jms/WMQHTTPJCAConnectionFactoryInstance</name>
          <config-property-setting name="queueManager">QM_JUPITER</config-property-setting>
          <config-property-setting name="transportType">BINDINGS</config-property-setting>
          <connectionmanager>
            <no-transaction />
            <no-pool/>
          </connectionmanager>
        </connectiondefinition-instance>
      </connection-definition>
    </outbound-resourceadapter>
  </resourceadapter>
</connector>
```

To use this plan file in your environment change QM_JUPITER to the name of your source agent's queue manager.

b. Open the WebSphere Application Server CE administration console

c. Click **Deploy New**

d. For the **Archive**, type *<mq-install-root>*/java/lib/jca/wmq.jmsra.rar

e. For the **Plan**, type the path to the plan file you created.

- To deploy the WebSphere MQ resource adapter into a WebSphere Application Server Community Edition that is running on a different system to the WebSphere MQ queue manager that you want to connect to, perform the following steps:

  a. Create a plan file that defines a connection to the WMQFTE source agent's queue manager. The following example plan file defines a connection to a queue manager, QM_SATURN, that is located on a different system to WebSphere Application Server Community Edition. The hostname of QM_SATURN is saturn.example.com. The port of QM_SATURN is 1415. The channel of QM_SATURN is SYSTEM.DEF.SVRCONN.

```
<?xml version="1.0" encoding="UTF-8"?>
<connector xmlns="http://geronimo.apache.org/xml/ns/j2ee/connector">
  <resourceadapter>
    <resourceadapter-instance>
      <resourceadapter-name>WMQ</resourceadapter-name>
      <workmanager>
        <gbean-link>DefaultWorkManager</gbean-link>
      </workmanager>
    </resourceadapter-instance>
    <outbound-resourceadapter>
      <connection-definition>
        <connectionfactory-interface>javax.jms.ConnectionFactory</connectionfactory-interface>
        <connectiondefinition-instance>
          <name>jms/WMQFTEJCAConnectionFactoryInstance</name>
          <config-property-setting name="channel">SYSTEM.DEF.SVRCONN</config-property-setting>
          <config-property-setting name="queueManager">QM_SATURN</config-property-setting>
          <config-property-setting name="hostName">saturn.example.com</config-property-setting>
          <config-property-setting name="port">1414</config-property-setting>
          <config-property-setting name="transportType">CLIENT</config-property-setting>
          <connectionmanager>
            <no-transaction />
            <no-pool/>
          </connectionmanager>
        </connectiondefinition-instance>
      </connection-definition>
    </outbound-resourceadapter>
  </resourceadapter>
</connector>
```

To use this plan file in your environment change QM_SATURN to the name of your source agent's queue manager. Change the value of the hostname, port and channel to the values for your source agent's queue manager.

b. Copy the file `<mq-install-root>`/java/lib/jca/wmq.jmsra.rar from the system where WebSphere MQ is installed to the system where WebSphere Application Server CE is installed.

c. Open the WebSphere Application Server CE administration console.

d. Click **Deploy New**.

e. For the **Archive**, type the path to the copy of the wmq.jmsra.rar file that you obtained.

f. For the **Plan**, type the path to the plan file you created.

2. For transfer status information, the Web Gateway application requires access to a database written by a WMQFTE database logger. For instructions on how to set up the database and use the database logger application, see . To access this database from within a WebSphere Application Server Community Edition environment a database connector must be defined. To define a database connector, perform the following steps from the WebSphere Application Server Community Edition administration console:

a. Select **Services > Database Pools** from the **Console Navigation**.

b. Create a database pool using the Geronimo database pool wizard. For **Name of Database Pool** type `jdbc/wmqfte-database`.

c. For the **Database Type** select either `DB2 XA` or `Oracle Thin`, as appropriate for your database.

d. Click **Next** and follow the instructions.

3. By default, for the Web Gateway application, a security realm called **WMQFTESecurityRealm** is required. Define the realm with groups named *admin*, *employees*, and *maintenance*. Define at least one user for each group. To define a security realm, from the WebSphere Application Server Community Edition administration console:

a. Select **Security > Security Realms** from the **Console Navigation**.

b. On the panel that is displayed, click **Add new security realm**.

c. For the **Name of Security Realm**, type `WMQFTESecurityRealm`.

d. For the **Realm Type**, select the value appropriate for your setup. If a simple setup is required then select **Properties File Realm**.

e. Click **Next** and follow the instructions that are displayed.

If you already have a suitable security realm defined you must define a deployment plan to reference this realm, as described in Step 5.

4. Update the WebSphere MQ File Transfer Edition Web Gateway application `web.xml` file for your environment, using a Java™ SDK jar utility to complete the following steps:

a. Extract the Web Gateway application from the supplied EAR file, `com.ibm.wmqfte.web.ear`, by running the following command:

```
jar -xf fo02.ear com.ibm.wmqfte.web.war
```

b. Extract the `WEB-INF/web.xml` file from the previously extracted Web Gateway application, `com.ibm.wmqfte.web.war`, by running the following command:

```
jar -xf com.ibm.wmqfte.web.war WEB-INF/web.xml
```

c. Use a text editor to edit the extracted `WEB-INF/web.xml`. Change the following parameters:

agentName
> The name of the WMQFTE agent that acts as the source for Web Gateway-initiated transfers. This agent must be installed on the same system as the application server where you are deploying the Web Gateway application.

configurationDirectory
> The absolute file path to the configuration directory of your WMQFTE installation. This directory must be accessible to the user who is running WebSphere Application Server Community Edition.

propertySet
> The name of the set of configuration options, within the **configurationDirectory**, that is used to create file transfers. The name of the set of configuration options is the name of the directory that contains the properties files used by your WMQFTE agent. If you leave the value of this parameter blank then the default configuration options of your WMQFTE installation are used.

d. Update the Web Gateway application with the modified `WEB-INF/web.xml`, by running the following command:

```
jar -uf com.ibm.wmqfte.web.war WEB-INF/web.xml
```

e. Update the supplied ear file with the updated Web Gateway application, by running the following command:

```
jar -uf fo02.ear com.ibm.wmqfte.web.war
```

5. If you must deploy the Web Gateway for a non-default environment or are using your own security realm, you must either update the supplied deployment plan or provide a separate deployment plan. The supplied deployment plan is in the Web Gateway application file: `com.ibm.wmqfte.web.war`, in file: `WEB-INF/geronimo-web.xml`. Update the supplied deployment plan for your environment, using a Java SDK jar utility to complete the following steps:

   a. Extract the Web Gateway application from the supplied EAR file, `com.ibm.wmqfte.web.ear`, by running the following command:

      ```
      jar -xf fo02.ear com.ibm.wmqfte.web.war
      ```

   b. Extract the `WEB-INF/geronimo-web.xml` file from the previously extracted Web Gateway application, `com.ibm.wmqfte.web.war`, by running the following command:

      ```
      jar -xf com.ibm.wmqfte.web.war WEB-INF/geronimo-web.xml
      ```

   c. Use a text editor to edit the extracted `WEB-INF/geronimo-web.xml`. The following example deployment plan shows a sample security configuration for WebSphere Application Server Community Edition:

```xml
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<web:web-app xmlns:app="http://geronimo.apache.org/xml/ns/j2ee/application-2.0"
             xmlns:client="http://geronimo.apache.org/xml/ns/j2ee/application-client-2.0"
             xmlns:conn="http://geronimo.apache.org/xml/ns/j2ee/connector-1.2"
             xmlns:dep="http://geronimo.apache.org/xml/ns/deployment-1.2"
             xmlns:ejb="http://openejb.apache.org/xml/ns/openejb-jar-2.2"
             xmlns:name="http://geronimo.apache.org/xml/ns/naming-1.2"
             xmlns:pers="http://java.sun.com/xml/ns/persistence"
             xmlns:pkgen="http://openejb.apache.org/xml/ns/pkgen-2.1"
             xmlns:sec="http://geronimo.apache.org/xml/ns/security-2.0"
             xmlns:web="http://geronimo.apache.org/xml/ns/j2ee/web-2.0.1">
  <dep:environment>
    <dep:moduleId>
      <dep:groupId>com.ibm.wmqfte</dep:groupId>
      <dep:artifactId>fte</dep:artifactId>
      <dep:version>1.0</dep:version>
      <dep:type>car</dep:type>
    </dep:moduleId>
    <dep:dependencies>
      <dep:dependency>
        <dep:artifactId>wmq.jmsra.rar</dep:artifactId>
        <dep:type>rar</dep:type>
      </dep:dependency>
    </dep:dependencies>
  </dep:environment>
  <web:context-root>/wmq</web:context-root>

<!--       Sample security configuration for WAS CE deployment            -->

 <!-- With the following settings, WAS must be configured as follows:     -->
 <!-- 1 - A security realm must be defined called 'WMQFTESecurityRealm'    -->
 <!-- 2 - Groups must be defined in that realm named 'admin', 'employees' -->
 <!--     and 'maintenance'                                               -->

  <web:security-realm-name>WMQFTESecurityRealm</web:security-realm-name>
  <sec:security>
    <sec:role-mappings>
      <sec:role role-name="wmqfte-admin">
        <sec:principal class="org.apache.geronimo.security.realm.providers.GeronimoGroupPrincipal" name="admin"/>
      </sec:role>
      <sec:role role-name="wmqfte-transfer">
        <sec:principal class="org.apache.geronimo.security.realm.providers.GeronimoGroupPrincipal" name="employees"/>
      </sec:role>
      <sec:role role-name="wmqfte-status">
        <sec:principal class="org.apache.geronimo.security.realm.providers.GeronimoGroupPrincipal" name="maintenance"/>
      </sec:role>
    </sec:role-mappings>
  </sec:security>
</web:web-app>
```

   If you are using your own security realm update the deployment plan `web:security-realm-name` element to reference that realm and update the roles to reference a group name that is defined for the realm.

   d. Update the Web Gateway application with the modified `WEB-INF/geronimo-web.xml`, by running the following command:

```
jar -uf com.ibm.wmqfte.web.war WEB-INF/geronimo-web.xml
```

e. Update the supplied ear file with the updated Web Gateway application, by running the following command:

```
jar -uf fo02.ear com.ibm.wmqfte.web.war
```

You can now deploy the Web Gateway EAR file to the application server. Carry out the steps in the topic "Deploying with WebSphere Application Server Community Edition" on page 20.

Working with WebSphere Application Server Version 7.0

Use these instructions to set up your environment before deploying the WebSphere MQ File Transfer Edition Web Gateway SupportPac enterprise application to WebSphere Application Server Version 7.0. You will need to customize the example deployment plan for your environment.

Before deploying the Web Gateway application, you need to carry out the following tasks to set up the application server environment. For transfer status information the Web Gateway application requires access to a database that is written to by a WMQFTE database logger. See Using the WebSphere MQ File Transfer Edition database logger for instructions on how to set up the database and use the database logger application. To access this database from within a WebSphere Application Server Version 7.0 environment you need to define a Java Database Connectivity (JDBC) provider and data source.

1. Define a JDBC provider:
   a. Select **Resources -> JDBC -> JDBC Providers** from the WebSphere Application Server Version 7.0 administration console navigation.
   b. Create a new JDBC provider using the console wizard, by clicking the **New** button.
   c. At Step 1 of the wizard, select the **Database type**, **Provider type** and **Implementation type** as required for either DB2 or Oracle, and click **Next**.
   d. At Step 2 of the wizard, ensure that the directory location of the required database jar files is set correctly, and click **Next**.
   e. Click **Finish** on the summary page to create the JDBC provider.
2. Define a data source:
   a. Select **Resources -> JDBC -> Data sources** from the WebSphere Application Server Version 7.0 administration console navigation.
   b. Create a new data source using the console wizard, launched by clicking the **New** button.
   c. At Step 1 of the wizard, enter a **Data source name** of `wmqfte-database` and a **JNDI name** of `jdbc/wmqfte-database`, and click **Next**.
   d. At Step 2 of the wizard, use the **Select an existing JDBC provider** drop-down list to select the JDBC provider created in the above steps, and click **Next**.
   e. At Step 3 of the wizard, enter the required values for **Driver type**, **Database name**, **Server name** and **Port number**, and click **Next**.
   f. At Step 4 of the wizard, if you have configured the authentication on your database, supply the required **Component-managed authentication alias** and **Container-managed authentication alias** in the respective drop-down boxes, and click **Next**.
   g. Click **Finish** on the summary page to create the data source.
3. Optional: If you have already configured your database you can verify the configuration of the data source:

a. Select **Resources -> JDBC -> Data sources** from the WebSphere Application Server Version 7.0 administration console navigation.

b. Click the **Test Connection** button.

You can now deploy the Web Gateway EAR file to the application server. Carry out the steps in the topic "Deploying with WebSphere Application Server Version 7.0" on page 21.

Deploying

The WebSphere MQ File Transfer Edition Web Gateway SupportPac must be deployed to a Java Platform, Enterprise Edition 5-compliant application server. The deployment process for different application servers varies. This section outlines the deployment process for two application servers.

Deploying with WebSphere Application Server Community Edition

Use these instructions to deploy the WebSphere MQ File Transfer Edition Web Gateway SupportPac enterprise application to WebSphere Application Server Community Edition. Customize the example deployment plan for your environment.

Before deploying the Web Gateway application, you need to carry out the tasks described in the topic "Working with WebSphere Application Server Community Edition" on page 13.

To deploy the EAR file to the application server, carry out the following steps from the WebSphere Application Server Community Edition administration console.

1. Select: **Applications > Deploy New** from the **Console Navigation**.
2. For the **Archive**, specify the EAR file: `fo02.ear`
3. For the **Plan**, either specify your own deployment plan file, or leave the value blank to choose the default deployment plan `WEB-INF/geronimo-web.xml`.
4. Ensure the **Start application after install** box is checked.
5. Click **Install**. The Web Gateway application is installed and started.

You can now start to use the Web Gateway, for example by deploying a Web application that uses the Web Gateway API to submit file transfers and transfer status requests. To use the sample application provided with the Web Gateway, follow the instructions in the topic "Sample Web page" on page 26.

Deploying with WebSphere Application Server Version 7.0

Use these instructions to deploy the WebSphere MQ File Transfer Edition Web Gateway SupportPac enterprise application to WebSphere Application Server Version 7.0.

Before deploying the Web Gateway application, you need to follow the instructions in the topic "Working with WebSphere Application Server Version 7.0" on page 17 to set up the application server environment.

For more information about how the Web Gateway works with other WebSphere MQ File Transfer Edition components, see the topic "Using the Web Gateway" on page 3.

1. Select **Applications -> New Application** from the administration console.
2. Select **New Enterprise Application** from the options list.
3. On the **Preparing for the application installation** page, choose the `com.ibm.wmqfte.web.ear` file from the local file system, and click **Next**.
4. On the following screen, select **Detailed** (to show all installation options and parameters), and click **Next**.
5. Click **Next** through wizard steps 1 - 5 to accept the default values.
6. For wizard **Step 6: Initialize parameters for servlets**, supply the required values for the following parameters:

   agentName
   > The name of the WMQFTE agent that acts as the source for Web Gateway-initiated transfers. This agent must be installed on the same system as the application server where you are deploying the Web Gateway application.

   configurationDirectory
   > The absolute file path to the configuration directory of your WMQFTE installation. This directory must be accessible to the user who is running WebSphere Application Server version 7.0.

   propertySet
   > The name of the set of configuration options, within the **configurationDirectory**, that is used to create file transfers. The name of the set of configuration options is the name of the directory that contains the properties files used by your WMQFTE agent. If you leave the value of this parameter blank then the default configuration options of your WMQFTE installation are used.

7. Click **Next**.
8. Click **Next** through wizard steps 7 - 11 to accept the default values.
9. If you are running with application server security enabled, use wizard **Step 12: Map security roles to users or groups** to map the required users or groups to the roles defined in the enterprise application, and click **Next**.
10. Click **Next** through wizard Step 13 to accept the default values.
11. Click **Finish** on the summary page to install the enterprise application.
12. You can now start the application from the WebSphere Application Server Version 7.0 administration console:

    a. Select **Applications -> Application Types -> WebSphere enterprise applications** from the console navigation.
    b. Select the checkbox for the **fo02** enterprise application from the collection table, and click the **Start** button.

You can now start to use the Web Gateway, for example by deploying a Web application that uses the Web Gateway API to submit file transfers and transfer status requests. To use the sample application provided with the Web Gateway, follow the instructions in the topic "Sample Web page" on page 26.

Securing the Web Gateway

WebSphere MQ File Transfer Edition defines a number of roles which are specific to using the Web Gateway. When deploying the Web Gateway to an application server these roles can be mapped to users and groups which exist in the application server security realm.

For example, if your application server defines the groups 'administrator', 'monitor' and 'employee', the wmqfte-status role which is used to restrict access to content and resources under the /fte/transfer/ URI address space could be mapped to the 'monitor' group. Users who are in the 'monitor' group will be authorized to access the /fte/transfer/ namespace, but other users will not.

WebSphere MQ File Transfer Edition defines the following roles:
- wmqfte-admin
- wmqfte-transfer
- wmqfte-status

WMQFTE roles for the Web Gateway

WebSphere MQ File Transfer Edition has defined several different roles that control the actions a user can take.

The following table lists the different roles and the level of access each of them has:

Table 6. Roles and associated permissions

Role	Description
wmqfte-admin	• Can upload files • Can view transfers started by other users
wmqfte-transfer	• Can upload files
wmqfte-status	• Can view transfers started by other users

Example HTTP flows

You can construct HTTP requests and submit them to the WebSphere MQ File Transfer Edition Web Gateway SupportPac. These examples show you sample requests and the corresponding HTTP responses from the Web Gateway.

You can use various technologies to submit requests to, and interpret responses from, the Web Gateway. For example, you can write a Web application (see the topic "Sample Web page" on page 26 for details of the example Web application which is included with the Web Gateway).

If you want to communicate with the Web Gateway using a Web application, you can use either HTML forms or the XMLHttpRequest function in Javascript. To upload a file, you must use an HTML form, because for security reasons browsers prevent Javascript from accessing files from the local system. The form can be controlled and submitted by Javascript if you prefer. To request the status of a transfer, XMLHttpRequest is most likely to be appropriate, although other techniques are possible (for example loading content into an invisible iFrame).

You can also write a client application in a language such as Ruby or Perl to communicate with the Web Gateway API.

Example: Sending a file using an HTTP request

You can send a single text file to a destination file system by submitting a request through the WebSphere MQ File Transfer Edition Web Gateway SupportPac.

Transfer a text file to the destination file path `<destination-root-path>`/temp and destination file name `myfile.txt` on the destination agent ACCOUNTS. Use an MD5 checksum to check the integrity of the transferred file. The content of the file is:

```
Account No, Balance
123456, 100.00
234567, 1022.00
345678, 2801.00
456789, 16.75
```

The server hosting the WebSphere MQ File Transfer Edition Web Gateway is `example.com`.

1. Create an HTTP request with this format:
```
POST HTTP/1.1 /fte/file/agent/ACCOUNTS/temp
Host: example.com
Content-Type: multi-part/form-data; boundary=Aa6b74
x-fte-checksum: MD5


--Aa6b74
Content-Disposition: form-data; name="files"; filename="myfile.txt"
Content-Type: text/plain

Account No, Balance
123456, 100.00
234567, 1022.00
345678, 2801.00
456789, 16.75
--Aa6b74
```
2. Submit the request to the Web Gateway. The Web Gateway returns an HTTP response with this format.
```
HTTP/1.1 200 OK
Server: WAS/6.0
Content-Length: 0
x-fte-id: 4d63c28ae6e72eb9c51cd812736acd4362ef5

<transfers>
 <submission id="4d63c28ae6e72eb9c51cd812736acd4362ef5">
 </submission>
</transfers>
```

The value of `x-fte-id` is the transfer ID.

Example: Viewing the status of file transfers using an HTTP request

You can view the status of your file transfers by submitting a request through the WebSphere MQ File Transfer Edition Web Gateway SupportPac. The Web Gateway returns XML describing the current status of the specified transfer.

A successful request returns an HTTP status code of 200 and an XML payload that describes the current status of the transfer. You can use this XML to view details of the transfer including the status of the transfer, the transfer ID, source and destination agent details, and information on the transfer's source and destination files. You can write a Web application to parse the content of the XML response and display it in an appropriate format to a Web user.

The following steps describe how to submit a request. In this example, the server hosting the WebSphere MQ File Transfer Edition Web Gateway is `example.com` and the HTTP request is submitted using a web browser which identifies itself as `mozilla`.

1. Create an HTTP request with the following format:
```
GET HTTP/1.1 /fte/transfer/transfer-ID
Host: example.com
User-Agent: mozilla
```

The value of *transfer-ID* must be a valid 48-character hexadecimal WebSphere MQ File Transfer Edition transfer ID.
2. Submit the request to the Web Gateway. The Web Gateway returns an HTTP response with the following format:

```
HTTP/1.1 200 OK
Server: WAS/6.0
Content-Length: 1664
Content-type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<transfers>
 <transfer start-time="2010-04-01T13:10:04.209+01:00" status="Complete"
  id="414d51205245444841542e434f4f5244ed60b44b03310020">
  <source>
   <agent qmgr="REDHAT.SOURCE.QM" name="REDHAT.SOURCE.AGENT" />
   <metadata>
    <key value="REDHAT.SOURCE.AGENT" name="com.ibm.wmqfte.SourceAgent" />
    <key value="REDHAT.DEST.AGENT" name="com.ibm.wmqfte.DestinationAgent" />
    <key value="192.168.243.133" name="com.ibm.wmqfte.OriginatingHost" />
    <key value="fteuser" name="com.ibm.wmqfte.MqmdUser" />
    <key value="414d51205245444841542e434f4f5244ed60b44b03310020"
     name="com.ibm.wmqfte.TransferId" />
    <key value="fteuser" name="com.ibm.wmqfte.OriginatingUser" />
   </metadata>
  </source>
  <destination>
   <agent qmgr="REDHAT.SOURCE.QM" name="REDHAT.SOURCE.AGENT" />
   <metadata>
    <key value="REDHAT.SOURCE.AGENT" name="com.ibm.wmqfte.SourceAgent" />
    <key value="REDHAT.DEST.AGENT" name="com.ibm.wmqfte.DestinationAgent" />
    <key value="fteuser" name="com.ibm.wmqfte.MqmdUser" />
    <key value="192.168.243.133" name="com.ibm.wmqfte.OriginatingHost" />
    <key value="fteuser" name="com.ibm.wmqfte.OriginatingUser" />
    <key value="414d51205245444841542e434f4f5244ed60b44b03310020"
     name="com.ibm.wmqfte.TransferId" />
   </metadata>
  </destination>
   <stats retry-count="0" file-warnings="0" file-failures="0"
     bytes-transferred="67" />
   <transfer-set>
    <file result-code="0" mode="text">
      <source-file name="/opt/IBM/WMQFTE/install.properties">
   <attribute-values last-modified="2010-03-17T16:55:17.000Z"
        file-size="67" disposition="leave" checksum-method="none" />
      </source-file>
      <destination-file name="/tmp/install.properties">
        <attribute-values last-modified="2010-04-01T13:10:04.000+01:00"
          file-size="67" exists-action="error" checksum-method="none" />
      </destination-file>
    </file>
   </transfer-set>
  </transfer>
</transfers>
```

An invalid request returns an HTTP error code and a WMQFTE error message. To identify the cause of the error, see the Troubleshooting the Web Gateway topic.

Sample Web page

WebSphere MQ File Transfer Edition Web Gateway SupportPac provides a sample Web page. This sample uses the Web Gateway API to submit a file transfer and view the status of file transfers.

The sample application file name is fo02.samples.war. You can find this WAR file in the root directory of the Web Gateway .zip file.

Setting up the sample

Before setting up the sample, you must have the Web Gateway application deployed and running in an application server. For instructions, see the topics "Deploying with WebSphere Application Server Version 7.0" on page 21 and "Deploying with WebSphere Application Server Community Edition" on page 20.

You then must deploy the sample application into an application server.

If you deploy the sample into WebSphere Application Server Version 7.0 you are asked during deployment to define a context root for the application. For example, if you use a context root of `/wmq/fte/samples` then the sample Web page is accessible through the URI `/wmq/fte/samples/fileUpload.html`.

If you deploy the sample into WebSphere Application Server Community Edition you are not asked to define a context root for the application. The application will use the context root defined in the `geronimo-web.xml` deployment plan that is located in the Web Gateway SupportPac EAR file.

The sample Web page has been tested in the following Web browsers:
* Mozilla Firefox version 3.0.1.9
* Google Chrome 4.1

Running the sample

To run the sample take the following steps:
1. Open a Web browser and type in the URI of the sample, based on the context root that you defined when deploying the sample. The following Web page is displayed:
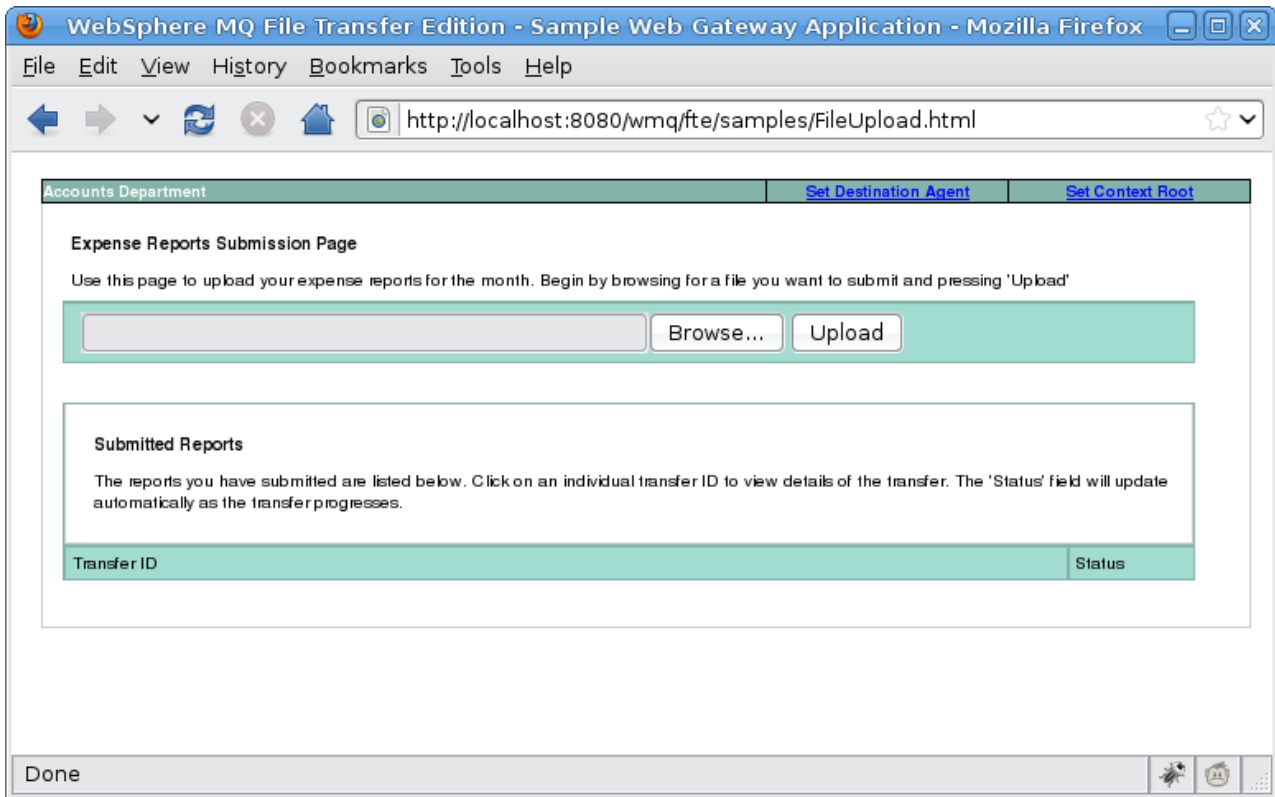
Figure 2. First screen capture of the sample

2. Configure the Web page before submitting a file transfer.

   a. Click **Set destination agent**. A new window opens.

   b. Type the name of the destination agent for the transfer into the new window.

   c. Optional: If you defined a context root other than /wmq/fte/samples for the application, set the context root.

      1) Click **Set context root**. A new window opens.

      2) Type the context root for the application into the new window.

3. Use the Web form to submit a file.

   a. Click **Browse...**. A new window opens where you can select a file from the file system.

   b. Select the file you want to transfer.

   c. Click **Upload**. The file is submitted for transfer.

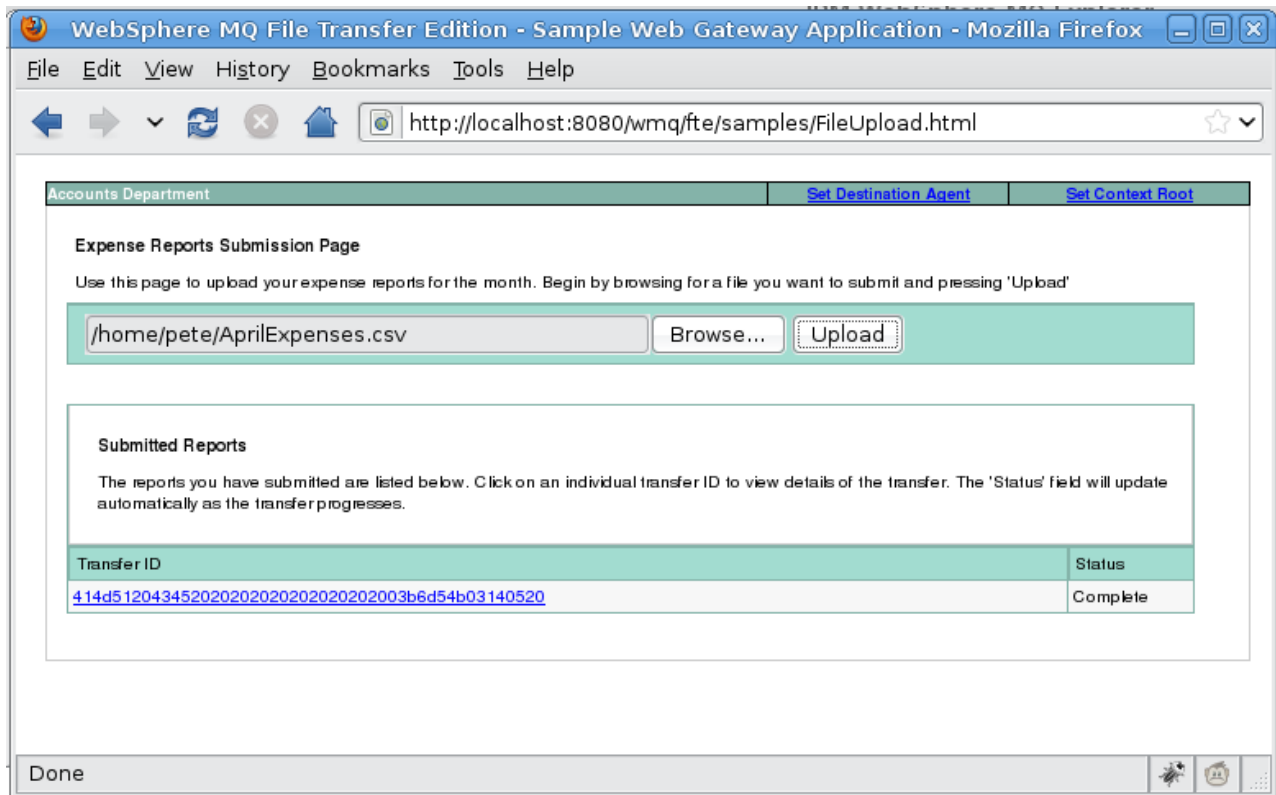4. Use the Submitted Reports section of the Web page to monitor your file transfer.

Figure 3. Second screen capture of the sample

> **Note:** Do not refresh the page. The Web page updates automatically every 4 seconds. If you refresh the page you will no longer be able to see the status of the file transfer.

5. Click the transfer ID. A window opens that displays the transfer information XML.

Additions to message formats for Web-based transfers

The Started and Completed log messages from a transfer that was requested through the WebSphere MQ File Transfer Edition Web Gateway SupportPac include extra metadata. This metadata contains information about the HTTP request and about the application server hosting the Web Gateway.

Definitions of Web metadata

com.ibm.wmqfte.web.request.authtype
     The method of authorization used by the user who submits the request to the Web Gateway.

com.ibm.wmqfte.web.request.locale
     The locale of the user who submits the request to the Web Gateway.

com.ibm.wmqfte.web.appsrv.type
     The type of application server that hosts the Web Gateway.

com.ibm.wmqfte.web.appsrv.host
     The host name or IP address of the system where the application server that hosts the Web Gateway is running.

com.ibm.wmqfte.web.appsrv.port
> The port number that the application server that hosts the Web Gateway is listening on.

The metadata that is included in the log messages for a transfer that was requested through the Web Gateway is highlighted in the examples below.

Single file transfer - success

```
<?xml version="1.0" encoding="UTF-8"?>
<transaction version="1.00"
 ID="414d5120514d31202020202020202020207e970d4920008202" agentRole="sourceAgent"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:noNamespaceSchemaLocation="TransferLog.xsd">
 <action time="2008-11-02T21:20:37.578Z">started</action>
 <sourceAgent agent="FTEAGENT" QMgr="QM1">
  <systemInfo architecture="x86" name="Windows XP"
   version="5.1 build 2600 Service Pack 2" />
 </sourceAgent>
 <destinationAgent agent="FTEAGENT" QMgr="QM1" />
 <originator>
  <hostName>requestor.example.com</hostName>
  <userID>USER1    </userID>
  <mqmdUserID>USER1</mqmdUserID>
 </originator>
 <transferSet startTime="2008-11-02T21:20:37.593Z" total="1">
  <metaDataSet>
   <metaData key="com.ibm.wmqfte.web.request.authtype">BASIC</metaData>
   <metaData key="com.ibm.wmqfte.web.request.locale">en_GB</metaData>
   <metaData key="com.ibm.wmqfte.web.appsrv.type">
    Apache Geronimo (Embedded Tomcat/6.0.20-20090724)
   </metaData>
   <metaData key="com.ibm.wmqfte.web.appsrv.port">8080</metaData>
   <metaData key="com.ibm.wmqfte.web.appsrv.host">gateway.example.com</metaData>
  </metaDataSet>
 </transferSet>
</transaction>
```

Single file transfer success - completed

```
<?xml version="1.0" encoding="UTF-8"?>
<transaction version="1.00"
 ID="414d5120514d31202020202020202020207e970d4920008202" agentRole="sourceAgent"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:noNamespaceSchemaLocation="TransferLog.xsd">
 <action time="2008-11-02T21:20:38.234Z">completed</action>
 <sourceAgent agent="FTEAGENT" QMgr="QM1">
  <systemInfo architecture="x86" name="Windows XP"
   version="5.1 build 2600 Service Pack 2" />
 </sourceAgent>
 <destinationAgent agent="FTEAGENT" QMgr="QM1">
  <systemInfo architecture="x86" name="Windows XP"
   version="5.1 build 2600 Service Pack 2" />
 </destinationAgent>
 <originator>
  <hostName>requestor.example.com</hostName>
  <userID>USER1</userID>
  <mqmdUserID>USER1    </mqmdUserID>
 </originator>
 <transferSet startTime="2008-11-02T21:20:37.593Z" total="1">
  <metaDataSet>
   <metaData key="com.ibm.wmqfte.web.request.authtype">BASIC</metaData>
   <metaData key="com.ibm.wmqfte.web.request.locale">en_GB</metaData>
   <metaData key="com.ibm.wmqfte.web.appsrv.type">
    Apache Geronimo (Embedded Tomcat/6.0.20-20090724)
   </metaData>
   <metaData key="com.ibm.wmqfte.web.appsrv.port">8080</metaData>
   <metaData key="com.ibm.wmqfte.web.appsrv.host">gateway.example.com</metaData>
  </metaDataSet>
 </transferSet>
</transaction>
```

Troubleshooting the Web Gateway

Requests to theWebSphere MQ File Transfer Edition Web Gateway SupportPac can return error codes or messages.

Use the following examples and reference information to help you diagnose errors returned from the Web Gateway.

Invalid requests for uploading files

When you are submitting a request through the Web Gateway to upload a file, you might receive an HTTP error code and a WebSphere MQ File Transfer Edition error message. The following example shows the result of requesting a file upload without providing a destination agent name.

1. This HTTP request submits a request to upload a file without specifying a destination agent:

```
POST HTTP/1.1 /fte/file/agent/
Host: example.com
User-Agent: mozilla
Content-Type: multi-part/form-data; boundary=Aa6b74
x-fte-checksum: MD5


--Aa6b74
Content-Disposition: form-data; name="files"; filename="myfile.txt"
Content-Type: text/plain

Account No, Balance
123456, 100.00
234567, 1022.00
345678, 2801.00
456789, 16.75
--Aa6b74
```

2. The Web Gateway returns an HTTP response with the following format:

```
HTTP/1.1 400 Bad Request
Server: WAS/6.0
Content-length: 62
Content-type: text/plain

BFGWI0002E: URI is incomplete: missing destination agent name.
```

To make the request valid specify the destination agent name in the URI of the request, as shown in the following example:

1. ```
POST HTTP/1.1 /fte/file/agent/ACCOUNTS
Host: example.com
User-Agent: mozilla
Content-Type: multi-part/form-data; boundary=Aa6b74
x-fte-checksum: MD5

--Aa6b74
Content-Disposition: form-data; name="files"; filename="myfile.txt"
Content-Type: text/plain

Account No, Balance
123456, 100.00
234567, 1022.00
345678, 2801.00
456789, 16.75
--Aa6b74
```

## Invalid requests for monitoring transfer status

When you are submitting a request through the Web Gateway to monitor the status of a file transfer, you might receive an HTTP error code and a WebSphere MQ File Transfer Edition error message. The following example shows the result of requesting the status of an invalid transfer ID.

1. This HTTP request submits a transfer ID which has been truncated:

```
GET HTTP/1.1 /fte/transfer/414d51204d554e474f2
Host: example.com
User-Agent: mozilla
```

2. The Web Gateway returns an HTTP response with the following format:

```
HTTP/1.1 400 Bad Request
Server: WAS/6.0
Content-length: 64
Content-type: text/plain

BFGWI0022E: The supplied transfer ID did not have a length of 48 characters.
This is not a valid transfer ID.
```

If you receive an HTTP response with a status code other than 200, use the following information to identify the cause of the error.

Table 7. Error codes returned when requesting transfer status through the Web Gateway

HTTP status code	Explanation
400 (Bad Request)	The specified transfer ID in your HTTP request is invalid. Check that you provided a transfer ID, that the ID is the correct length (48 characters) and that it only contains hexadecimal characters.
404 (Not Found)	The specified transfer does not exist. The transfer ID is in the correct format (48 hexadecimal characters) but does not match any transfer IDs in the database.
405 (Method Not Allowed)	You have specified a method other than GET (for example POST or PUT) in your HTTP request. The only valid method for a status request is GET.

Case-sensitivity

The URI of a request through the Web Gateway has some parts that are case-sensitive and some parts that are not case-sensitive. For more information, see "Uniform Resource Identifier syntax" on page 7. The following example shows the result of addressing a *transfer* resource using uppercase in the URI.

1. This HTTP request submits a request for information about a transfer:

```
GET HTTP/1.1 /fte/TRANSFER/414d51204d554e474f4e474f4d55474d512474f4e4ca74f2
Host: example.com
User-Agent: mozilla
```

2. The Web Gateway returns an HTTP response with the following format:

```
HTTP/1.1 404 Not Found
Content-Type text/html;charset=ISO-8859-1
Content-Language en-US
Content-Length 97
Connection Close
Date Wed, 28 Apr 2010 15:34:28 GMT
```

```
Server WebSphere Application Server/7.0
Error 404: SRVE0190E:
File not found: /TRANSFER/414d51204d554e474f4e474f4d55474d512474f4e4ca74f2
```

The error message is returned from the application server. The exact wording of the error message depends on the application server that you have deployed the Web Gateway into.

To make the request valid specify the resource name in the URI of the request in lowercase, as shown in the following example:

1. ```
GET HTTP/1.1 /fte/transfer/414d51204d554e474f4e474f4d55474d512474f4e4ca74f2
Host: example.com
User-Agent: mozilla
```

If you receive an HTTP response with a status code other than 200, see the HTTP Response Codes topic for more information.

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan Ltd.
1623-14, Shimotsuruma, Yamato-shi
Kanagawa 242-8502 Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM United Kingdom Laboratories
Mail Point 151
Hursley Park
WINCHESTER
Hampshire
SO21 2JN
United Kingdom

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

Trademarks

The following are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both.

IBM	ibm.com	SupportPac	WebSphere

A current list of IBM trademarks is available on the Web at "Copyright and trademark information" www.ibm.com/legal/copytrade.shtml.

Java and all Java-based trademarks and logos are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Other product and service names might be trademarks of IBM or other companies.

Sending your comments to IBM

If you especially like or dislike anything about this book, please use one of the methods listed below to send your comments to IBM®.

Feel free to comment on what you regard as specific errors or omissions, and on the accuracy, organization, subject matter, or completeness of this book.

Please limit your comments to the information in this book and the way in which the information is presented.

To make comments about the functions of IBM products or systems, talk to your IBM representative or to your IBM authorized remarketer.

When you send comments to IBM , you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate, without incurring any obligation to you.

You can send your comments to IBM in any of the following ways:
- By mail, to this address:

  User Technologies Department (MP095)
  IBM United Kingdom Laboratories
  Hursley Park
  WINCHESTER,
  Hampshire
  SO21 2JN
  United Kingdom
- By fax:
  - From outside the U.K., after your international access code use 44-1962-816151
  - From within the U.K., use 01962-816151
- Electronically, use the appropriate network ID:
  - IBM Mail Exchange: GBIBM2Q9 at IBMMAIL
  - IBMLink: HURSLEY(IDRCF)
  - Internet: idrcf@hursley.ibm.com

Whichever method you use, ensure that you include:
- The publication title and order number
- The topic to which your comment applies
- Your name and address/telephone number/fax number/network ID.

IBM®