# FileMaker® Server 12

## Custom Web Publishing with XML

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# Preface

## About this guide

This guide assumes you are experienced with XML, developing websites, and using FileMaker® Pro to create databases. You should understand the basics of FileMaker Pro database design, and should understand the concepts of fields, relationships, layouts, portals, and containers. This guide provides the following information about Custom Web Publishing with XML on FileMaker Server:

- what is required to develop a Custom Web Publishing solution using XML
- how to publish your databases using XML
- what web users need to access a Custom Web Publishing solution
- how to obtain XML data from databases hosted by FileMaker Server

Important  You can download PDFs of FileMaker documentation from http://www.filemaker.com/documentation. Any updates to this document are also available from the website.

The documentation for FileMaker Server includes the following information:

| For information about | See |
|---|---|
| Installing and configuring FileMaker Server | *FileMaker Server Getting Started Guide*<br>FileMaker Server Help |
| Instant Web Publishing | *FileMaker Instant Web Publishing Guide* |
| Custom Web Publishing with PHP | *FileMaker Server Custom Web Publishing with PHP* |
| Custom Web Publishing with XML | *FileMaker Server Custom Web Publishing with XML* (this book) |
| Installing and configuring ODBC and JDBC drivers, and using ODBJ and JDBC | *FileMaker ODBC and JDBC Guide* |

# Chapter 1
# Introducing Custom Web Publishing

With FileMaker Server, you can publish your FileMaker database on the Internet or an intranet in these ways.

**Instant Web Publishing:** With Instant Web Publishing, you can quickly and easily publish your database on the web. You don't need to modify your database files or install additional software—with compatible web browser software and access to the internet or an intranet, web users can connect to your database to view, edit, sort, or search records, if you give them access privileges.

With Instant Web Publishing, the host computer must be running FileMaker Pro, FileMaker Pro Advanced, or FileMaker Server Advanced. The user interface resembles the desktop FileMaker Pro application. The web pages and forms that the web user interacts with are dependent on the layouts and views defined in the FileMaker Pro database. For more information, see *FileMaker Instant Web Publishing Guide***.**

**Static publishing:** If your data rarely changes, or if you don't want users to have a live connection to your database, you can use static publishing. With static publishing, you export data from a FileMaker Pro database to create a web page that you can further customize with HTML. The web page doesn't change when information in your database changes, and users don't connect to your database. (With Instant Web Publishing, data is updated in a web browser window each time the browser sends a request to FileMaker Server.) For more information, see *FileMaker Instant Web Publishing Guide*.

**Custom Web Publishing:** For more control over the appearance and functionality of your published database, use the Custom Web Publishing technologies available with FileMaker Server. FileMaker Server, which hosts the published databases, does not require FileMaker Pro to be installed or running for Custom Web Publishing to be available.

With Custom Web Publishing, you can:

- Integrate your database with another website
- Determine how users interact with data
- Control how data displays in web browsers

FileMaker Server provides two Custom Web Publishing technologies:

- Custom Web Publishing with PHP: Use the FileMaker API for PHP, which provides an object-oriented PHP interface to FileMaker Pro databases, to integrate your FileMaker data into a PHP web application. Because you code the PHP web pages yourself, you have complete control over the user interface and how the user interacts with the data.
- Custom Web Publishing with XML: Use XML data publishing to exchange FileMaker data with other websites and applications. By using HTTP URL requests with FileMaker query commands and parameters, you can query a database hosted by FileMaker Server, download the resulting data in XML format, and use the resulting XML data in whatever way you want.

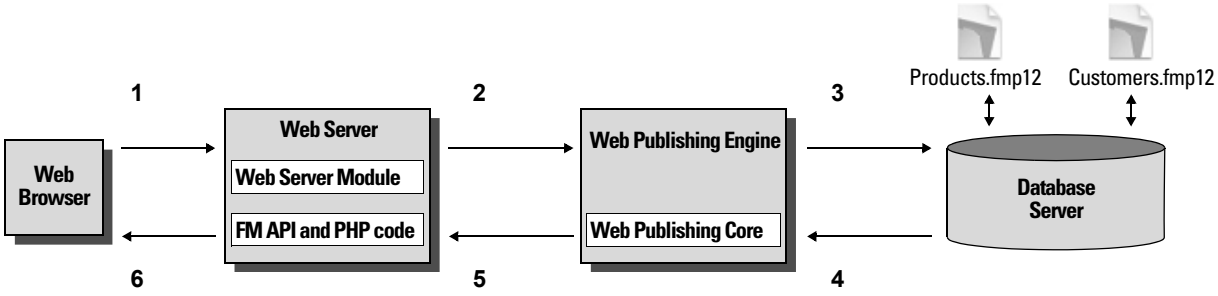
# About the Web Publishing Engine

To support Instant Web Publishing and Custom Web Publishing, FileMaker Server uses a set of software components called the *FileMaker Server Web Publishing Engine*. The Web Publishing Engine handles interactions between a web user's browser, your web server, and FileMaker Server.

**Custom Web Publishing with XML:** Web users access your Custom Web Publishing solution by clicking an HREF link or by entering a Uniform Resource Locator (URL) that specifies the web server address and a FileMaker query string request. The Web Publishing Engine returns the XML data specified in the query string request.

**Custom Web Publishing with PHP:** When a web user accesses your Custom Web Publishing solution, PHP on FileMaker Server connects with the Web Publishing Engine and responds through the FileMaker API for PHP.

**Using the FileMaker Server Web Publishing Engine for Custom Web Publishing**




## How a Web Publishing Engine request is processed

1. A request is sent from a web browser or application to the web server.
2. The web server routes the request through FileMaker's Web Server Module to the Web Publishing Engine.
3. The Web Publishing Engine requests data from the database hosted by the Database Server.
4. The FileMaker Server sends the requested FileMaker data to the Web Publishing Engine.
5. The Web Publishing Engine converts the FileMaker data to respond to the request.
   - For PHP requests, the Web Publishing Engine responds to the API request.
   - For XML requests, the Web Publishing Engine sends XML data directly to the web server.
6. The web server sends the output to the requesting web browser or program.

Important Security is important when you publish data on the web. Review the security guidelines in *FileMaker Pro User's Guide*, available as a PDF file from http://www.filemaker.com/documentation.

# Custom Web Publishing with PHP

The FileMaker API for PHP provides an object-oriented PHP interface to FileMaker databases. The FileMaker API for PHP enables both data and logic stored in a FileMaker Pro database to be accessed and published on the web, or exported to other applications. The API also supports complex and compound find commands for extracting and filtering data stored in FileMaker Pro databases.

Originally designed as a procedural programming language, PHP has been enhanced as an object-oriented web development language. PHP provides programming language functionality for constructing virtually any type of logic within a site page. For example, you can use conditional logic constructs to control page generation, data routing, or workflow. PHP also provides for site administration and security.

# Custom Web Publishing with XML

FileMaker Custom Web Publishing with XML enables you to send query requests to a FileMaker Pro database hosted by FileMaker Server, and display, modify, or manipulate the resulting data. Using an HTTP request with the appropriate query commands and parameters, you can retrieve FileMaker data as an XML document. You can then export the XML data to other applications.

# Comparing PHP to XML

The following sections provide some guidelines for determining the best solution for your site.

## Reasons to choose PHP

- PHP is a more powerful, object-oriented procedural scripting language, but is relatively easy to learn. There are many resources available for training, development, and support.
- The FileMaker API for PHP enables data and logic stored in a FileMaker Pro database to be accessed and published on the web, or exported to other applications.
- PHP lets you use conditional logic to control page construction or flow.
- PHP provides programming language functionality for constructing many types of logic on a site page.
- PHP is one of the most popular web scripting languages.
- PHP is an open source language, available at http://php.net.
- PHP enables access to a wide variety of third-party components that you can integrate into your solutions.

Note For more information about Custom Web Publishing with PHP, see *FileMaker Server Custom Web Publishing with PHP*.

## Reasons to choose XML

- FileMaker XML request parameter syntax is designed for database interaction, simplifying solution development.
- XML is a W3C standard.
- XML is a machine and human readable format that supports Unicode, enabling data to be communicated in any written language.
- XML is well-suited for presenting records, lists and tree-structured data.
- You can use FMPXMLRESULT for accessing XML data using Custom Web Publishing and for XML export from FileMaker Pro databases.

# Chapter 2
# About Custom Web Publishing with XML

## Creating dynamic websites with the Web Publishing Engine

The Web Publishing Engine provides Custom Web Publishing for FileMaker Server using XML data publishing. Custom Web Publishing provides several benefits:

- **Customization**: You can determine how web users interact with FileMaker data, and how the data displays in web browsers.
- **Data interchange**: By using FileMaker XML, you can exchange FileMaker data with other websites and applications.
- **Data integration**: You can integrate FileMaker data into other websites, with other middleware, and with custom applications. You can make the data look like it belongs to another website instead of displaying an entire FileMaker layout in the web browser.
- **Security**: The FileMaker Server administrator can individually enable or disable Instant Web Publishing or XML web publishing for all databases hosted by the server. As the FileMaker database owner, you can control web user access to Instant Web Publishing or XML web publishing for each database.
- **Control and filtering of published data**: You can control and filter the data and the type of database information you want to publish, which prevents unauthorized use of the database. You can also hide metadata, such as database and field names.
- **Based on an open standard**: You have more access to tools, resources and skilled personnel for Custom Web Publishing solutions. If you know standard XML, then you can start developing solutions after learning a few unique details about Custom Web Publishing with XML, such as the URL syntax and query parameters to use.

Custom Web Publishing with XML allows you to retrieve data from FileMaker databases, and easily use the data in other output formats. By using an HTTP request with the appropriate query commands and parameters, you can retrieve FileMaker data as an XML document. You can then use the XML data in other applications. See “Accessing XML data via the Web Publishing Engine” on page 24.

## Key features in Custom Web Publishing with XML

FileMaker Server Custom Web Publishing with XML provides several important features:

- Databases are hosted on FileMaker Server, and FileMaker Pro is not required to be running.
- You can use server-side processing of the XML using JavaScript.
- Like FileMaker Pro, access to data, layouts, and fields is based on the user account settings defined in the database’s access privileges. The Web Publishing Engine also supports several other security enhancements. See “Protecting your published databases” on page 14.
- Web users can perform complex, multi-step scripts. FileMaker supports about 65 script steps in Custom Web Publishing. See the section “FileMaker scripts and Custom Web Publishing” on page 17.

- You can pass a parameter value to a FileMaker script. For more information, see “–script.param (Pass parameter to Script) query parameter” on page 58, “–script.prefind.param (Pass parameter to Script before Find) query parameter” on page 59, and “–script.presort.param (Pass parameter to Script before Sort) query parameter” on page 59.
- The `fmresultset` XML grammar enables you to access fields by name and manipulate `relatedset` (portal) data.
- To access data in a database, you must specify a layout. See appendix A, “Valid names used in query strings.”

# Web publishing requirements

## What is required to publish a database using Custom Web Publishing

To publish databases using Custom Web Publishing with XML, you need:

- a FileMaker Server deployment that includes
  - a web server, either Microsoft IIS (Windows) or Apache (Mac OS X)
  - the FileMaker Database Server, enabled for Custom Web Publishing
  - the Web Publishing Engine, installed and configured
- one or more FileMaker Pro databases hosted by FileMaker Server
- the IP address or domain name of the host running the web server
- a web browser and access to the web server to develop and test your Custom Web Publishing solution

For more information, see *FileMaker Server Getting Started Guide.*

## What web users need to access a Custom Web Publishing solution

To access a Custom Web Publishing solution that uses XML, web users need:

- a web browser
- access to the Internet or an intranet and the web server
- the IP address or domain name of the host running the web server

If the database is password-protected, web users must also enter a user name and password for a database account.

## Connecting to the Internet or an intranet

When you publish databases on the Internet or an intranet, the host computer must be running FileMaker Server, and the databases you want to share must be hosted and available. In addition:

- Publish your database on a computer with a full-time Internet or intranet connection. You can publish databases without a full-time connection, but they are only available to web users when your computer is connected to the Internet or an intranet.

- The host computer for the web server that is part of the FileMaker Server deployment must have a dedicated *static* (permanent) IP address or a domain name. If you connect to the Internet with an Internet service provider (ISP), your IP address might be *dynamically allocated (*it is different each time you connect). A dynamic IP address makes it more difficult for web users to locate your databases. If you are not sure of the type of access available to you, consult your ISP or network administrator.

## Where to go from here

Here are some suggestions to get started developing Custom Web Publishing solutions:

- If you haven't already done so, use FileMaker Server Admin Console to enable Custom Web Publishing. See FileMaker Server Help and *FileMaker Server Getting Started Guide*.
- In FileMaker Pro, open each FileMaker database that you want to publish and make sure the database has the appropriate extended privilege(s) enabled for Custom Web Publishing. See "Enabling Custom Web Publishing in a database" on page 13.
- To learn how to access data in FileMaker databases using XML, see "Accessing XML data via the Web Publishing Engine" on page 24.

# Chapter 3
# Preparing databases for Custom Web Publishing

Before you can use Custom Web Publishing with a database, you must prepare the database and protect it from unauthorized access.

## Enabling Custom Web Publishing in a database

You must enable Custom Web Publishing with XML in each database you want to publish. If you don't enable Custom Web Publishing with XML in the database, web users won't be able to use Custom Web Publishing to access the database even if it is hosted by FileMaker Server that is configured to support a Web Publishing Engine.

To enable Custom Web Publishing for a database:

1. In FileMaker Pro, open the database you want to publish using an account that has the Full Access privilege set. Alternatively, you can open the database using an account that has the Manage Extended Privileges access privileges.
2. Assign the Custom Web Publishing with XML extended privilege by using this keyword: **fmxml**
3. Assign the privilege set(s) that include the Custom Web Publishing with XML extended privilege to one or more accounts, or to the Admin or Guest account.

Note When defining account names and passwords for Custom Web Publishing solutions, use printable ASCII characters, for example **a-z**, **A-Z**, and **0-9**. For more secure account names and passwords, include punctuation characters such as "**!**" and "**%**," but do not include colons. For information on setting up accounts, see FileMaker Pro Help.

## Accessing a protected database

When using a Custom Web Publishing solution to access a database, web users may be prompted for their account information. If the Guest account for the database is disabled or does not have a privilege set enabled that includes a Custom Web Publishing extended privilege, the Web Publishing Engine uses HTTP Basic Authentication to request authentication from web users. The web user's browser displays the HTTP Basic Authentication dialog box for the user to enter a user name and password for an account that has a Custom Web Publishing extended privilege.

The following list summarizes the process that occurs when a web user uses a Custom Web Publishing solution to access a database:

- If you have not assigned a password for an account, web users only specify the account name.
- If the Guest account is disabled, then users will be prompted for account name and password when they access the database. The account must have a Custom Web Publishing extended privilege enabled.

- If the Guest account is enabled and has a privilege set enabled that includes a Custom Web Publishing extended privilege, all web users automatically open the database with the access privileges assigned to the Guest account. If the Custom Web Publishing extended privilege is assigned to the Guest account:
  - Web users are not prompted for an account name and password when opening a file.
  - All web users will automatically log in with the Guest account and assume the Guest account privileges. You can let users change their login accounts from a web browser with the Re-Login script step (for example, to switch from the Guest account to an account with more privileges).
  - The default privilege set for Guest accounts provides “read-only” access. You can change the default privileges, including Extended Privileges, for this account. See FileMaker Pro Help.

Note By default, web users cannot modify their account password from a web browser. You can build this feature into a database with the Change Password script step, which allows web users to change their passwords from their browser. See FileMaker Pro Help.

## Protecting your published databases

When using Custom Web Publishing with XML, you can limit who can access your published databases.

- Assign passwords to database accounts that are used for Custom Web Publishing.
- Enable Custom Web Publishing with XML only in the privilege sets for accounts that you want to allow access to your published databases.
- To enable or disable a type of Custom Web Publishing technology for an individual database, set the extended privilege.
- Enable or disable a type of Custom Web Publishing technology for all Custom Web Publishing solutions in the Web Publishing Engine using FileMaker Server Admin Console. See FileMaker Server Help.
- Configure your web server to restrict the IP addresses that can access your databases via the Web Publishing Engine. For example, you can specify that only web users from the IP address 192.168.100.101 can access your databases. For information on restricting IP addresses, see the documentation for your web server.
- Use Secure Sockets Layer (SSL) encryption for communications between your web server and web users’ browsers. SSL encryption converts information exchanged between servers and clients into unintelligible information through using mathematical formulas known as ciphers. These ciphers are used to transform the information back into understandable data through encryption keys. For information on enabling and configuring SSL, see the documentation for your web server.

For more information on securing your database, see *FileMaker Pro User’s Guide*, available as a PDF file from http://www.filemaker.com/documentation.

# Web server support for Internet media types (MIME)

Your web server determines the support for the current MIME (Multipurpose Internet Mail Extensions) types registered for the Internet. The Web Publishing Engine does not change a web server's support for MIME. For more information, see the documentation for your web server.

# About publishing the contents of container fields on the web

The contents of a container field can be embedded in the database, linked by reference using a relative path, or stored externally.

## Container field objects embedded in a database

If a container field stores the actual files in the FileMaker database, then you don't need to do anything with the container field contents if the database file is properly hosted and accessible on FileMaker Server. See "About the URL syntax for FileMaker container objects in XML solutions" on page 23.

Note The Web Publishing Engine supports progressive download of audio files (.mp3), video files (.mov, .mp4, and .avi recommended), and PDF files for interactive containers. For example, a web user may start viewing a movie even if the entire movie file has not yet downloaded. To allow for progressive download, you may need to create the files using options that support streaming or that optimize for display on the web. For example, create PDF files using the "Optimize for Web Viewing" option.

## Container fields with referenced files

If a container field stores a file reference, then you must follow these steps to publish the referenced files using the Web Publishing Engine:

To publish container field objects that are stored as a file reference:

1. Store the container object files in the Web folder inside the FileMaker Pro folder.
2. In FileMaker Pro, insert the objects into the container field and select the **Store only a reference to the file** option.
3. Copy or move the referenced object files in the Web folder to the same relative path location in the root folder of the web server software.
   - **For IIS (Windows):** `<drive>:\Inetpub\wwwroot` where `<drive>` is the drive on which the Web Publishing Engine component of your FileMaker Server deployment resides.
   - **For Apache (Mac OS):** `/Library/WebServer/Documents`

**Notes**

- For container objects stored as file references, your web server must be configured to support the MIME (Multipurpose Internet Mail Extensions) types for the kinds of files you want to serve, such as movies. Your web server determines the support for the current MIME types registered for the Internet. The Web Publishing Engine does not change a web server's support for MIME. For more information, see the documentation for your web server.
- All QuickTime movies stored in a container field are stored by reference.

## Container fields with externally stored data

If a container field stores objects externally — that is, if you selected **Store container data externally** in the FileMaker Pro Field Options dialog box — then use the Upload Database assistant to transfer database files from the client file system to FileMaker Server. The Upload Database assistant transfers the database and the container field objects to the correct folders on your server for hosting. See FileMaker Server Help for more information on how to use the Upload Database assistant. See FileMaker Pro Help for information on setting up container fields to store data externally.

If you manually upload a database that uses a container field with externally stored objects, then you must follow these steps to publish the externally stored container objects using the Web Publishing Engine.

**To upload a database manually:**

1. Place the database file in the proper location on the server. Place the FileMaker Pro database files that you want FileMaker Server to open — or shortcuts (Windows) or aliases (Mac OS) to those files — in the following folders:
   - **Windows (32-bit):** `[drive]:\Program Files\FileMaker\FileMaker Server\Data\Databases\`
   - **Windows (64-bit):** `[drive]:\Program Files (x86)\FileMaker\FileMaker Server\Data\Databases\`
   - **Mac OS:** `/Library/FileMaker Server/Data/Databases/`

   Or you can place the files in an optionally specified additional database folder.
2. In the folder where you placed the database, create a folder named RC_Data_FMS, if it doesn't already exist.
3. In the RC_Data_FMS folder, create a folder with a name that matches the name of your database. For example, if your database is named Customers, then create a folder named Customers. Place the externally stored objects in the new folder you created.

   Note When databases are hosted on FileMaker Server, there is no way for multiple databases to share a common folder of container objects. The container objects for each database needs to be in a folder identified by that database's name.
4. For files that will be shared from Mac OS, change the files to belong to the **fmsadmin** group.

   For more information about manually uploading databases, see FileMaker Server Help.

Note The Web Publishing Engine supports progressive download of audio files (.mp3), video files (.mov, .mp4, and .avi recommended), and PDF files for interactive containers. For example, a web user may start viewing a movie even if the entire movie file has not yet downloaded. To allow for progressive download, you may need to create the files using options that support streaming or that optimize for display on the web. For example, create PDF files using the "Optimize for Web Viewing" option.

### How web users view container field data

When you publish a database using the Web Publishing Engine, the following limitations apply to container field objects:

- Web users cannot modify or add to the contents of container fields. Web users cannot use container fields to upload objects to the database.
- For databases that use a container field with thumbnails enabled, the Web Publishing Engine downloads the full file, not a thumbnail.

## FileMaker scripts and Custom Web Publishing

The Manage Scripts feature in FileMaker Pro can automate frequently performed tasks and combine several tasks. When used with Custom Web Publishing, FileMaker scripts allow web users to perform more tasks or a series of tasks.

FileMaker supports over 65 script steps in Custom Web Publishing. Web users can perform a variety of automated tasks when you use scripts in a query string for a URL. To see script steps that are not supported, select **Custom Web Publishing** from the **Show Compatibility** list in the Edit Script window in FileMaker Pro. Dimmed script steps are not supported for Custom Web Publishing. For information on creating scripts, see FileMaker Pro Help.

### Script tips and considerations

Although many script steps work identically on the web, there are several that work differently. See “Script behavior in Custom Web Publishing solutions” on page 18. Before sharing your database, evaluate all scripts that will be executed from a web browser. Be sure to log in with different user accounts to make sure they work as expected for all clients. Check the Web Publishing Engine log file (wpe.log) for any scripting-related errors; for more information, see “Using the Web Publishing Engine log” on page 40.

Keep these tips and considerations in mind:

- Use accounts and privileges to restrict the set of scripts that a web user can execute. Verify that the scripts contain only web-compatible script steps, and only provide access to scripts that should be used from a web browser.
- Consider the side effects of scripts that execute a combination of steps that are controlled by access privileges. For example, if a script includes a step to delete records, and a web user does not log in with an account that allows record deletion, the script will not execute the Delete Records script step. However, the script might continue to run, which could lead to unexpected results.
- In the Edit Script window, select **Run script with full access privileges** to allow scripts to perform tasks that you would not grant individuals access to. For example, you can prevent users from deleting records with their accounts and privileges, but still allow them to run a script that would delete certain types of records under conditions predefined within a script.

- If your scripts contain steps that are unsupported, for example, steps that are not web-compatible, use the **Allow User Abort** script step to determine how subsequent steps are handled.
  - If the **Allow User Abort** script step option is enabled (on), unsupported script steps stop the script from continuing.
  - If **Allow User Abort** is off, unsupported script steps are skipped and the script continues to execute.
  - If this script step is not included, scripts are executed as if the feature is enabled, so unsupported script steps stop scripts.

- Some scripts that work with one step from a FileMaker Pro client may require an additional **Commit Record/Request** step to save the data to the host. Because web users don't have a direct connection to the host, they aren't notified when data changes. For example, features like conditional value lists aren't as responsive for web users because the data must be saved to the host before the effects are seen in the value list field.
- Any script that modifies data should include the Commit Record/Request step, because data changes aren't visible in the browser until the data is saved or "submitted" to the server. This includes several script steps like Cut, Copy, Paste, and so on. Many single-step actions should be converted into scripts to include the Commit Record/Request step. When designing scripts that will be executed from a web browser, include the Commit Record/Request step at the end of a script to make sure all changes are saved.
- To create conditional scripts based on the type of client, use the Get(ApplicationVersion) function. If the value returned includes "Web Publishing Engine" then you know that the current user is accessing your database with Custom Web Publishing. For more information on functions, see FileMaker Pro Help.

## Script behavior in Custom Web Publishing solutions

The following script steps function differently on the web than in FileMaker Pro. For information on all script steps, see FileMaker Pro Help.

| Script step | Behavior in Custom Web Publishing solutions |
|---|---|
| Perform Script | Scripts cannot perform in other files, unless the files are hosted on FileMaker Server and Custom Web Publishing is enabled in the other files. |
| Exit Application | Logs off web users, closes windows, but does not exit the web browser application. |
| Allow User Abort | Determines how unsupported script steps are handled. Enable to stop scripts from continuing, and disable to skip unsupported steps. See "Script tips and considerations" on page 17 for more details.<br>Web users cannot abort Custom Web Publishing scripts, but this option allows unsupported script steps to stop the script from continuing. |
| Set Error Capture | This is always enabled with Custom Web Publishing. Web users cannot abort Custom Web Publishing scripts. |
| Pause/Resume script | Although this script is supported in Custom Web Publishing, you should avoid using it. When a Pause step is executed, the script pauses. Only a script containing the Resume script step can make it resume execution. If the script remains in a paused state until the session times out, then the script will not be completed. |
| Sort Records | You must save a sort order with the Sort Records script step to execute in Custom Web Publishing. |
| Open URL | This script step has no effect in a Custom Web Publishing solution. |

| Script step | Behavior in Custom Web Publishing solutions |
|---|---|
| Go to Field | You cannot use Go to Field to make a particular field active in the web browser, but you can use this script step in conjunction with other script steps to perform tasks. For example, you can go to a field, copy the contents, go to another field and paste the value. To see the effect in the browser, be sure to save the record with the Commit Record script step. |
| Commit Record/Request | Submits the record to the database. |

## Script triggers and Custom Web Publishing solutions

In FileMaker Pro, both scripts and user actions (such as the user clicking a field) can activate script triggers. But in Custom Web Publishing, only scripts can activate script triggers. For more information on script triggers, see FileMaker Pro Help.

Note For FileMaker Pro 12, the File Options dialog box has changed. As a result, to specify that you want a script performed when a file is opened, you need to use the OnFirstWindowOpen script trigger. Similarly, to specify that you want a script performed when a file is closed, you need to use the OnLastWindowClose script trigger.

# Chapter 4
# Accessing XML data with the Web Publishing Engine

You can obtain and update FileMaker data in Extensible Markup Language (XML) format by using the Web Publishing Engine. In the same way that HTML has become the standard display language for communication on the World Wide Web, XML has become the standard language for structured data interchange. Many individuals, organizations, and businesses use XML to transfer product information, transactions, inventory data, and other business data.

## Using Custom Web Publishing with XML

If you know standard XML, you can start using the Web Publishing Engine after learning a few unique details about Custom Web Publishing with XML, such as the URL syntax and query parameters to use.

By using HTTP URL requests with FileMaker query commands and parameters, you can query a database hosted by FileMaker Server and download the resulting data in XML format. For example, you can query a database for all records in a certain postal code, and use the resulting XML data in whatever way you want to.

For more general information on XML, additional examples that use XML, and links to XML resources, see the FileMaker website at http://www.filemaker.com.

Note The Web Publishing Engine generates XML data that is well-formed and compliant with the XML 1.0 specification. For details about the requirements for well-formed XML, see the XML specification, which is available at http://www.w3.org.

### Differences between the Web Publishing Engine and FileMaker Pro XML Import/Export

The Web Publishing Engine and FileMaker Pro both enable you to use XML data with FileMaker databases. There are, however, some important differences between the two methods:

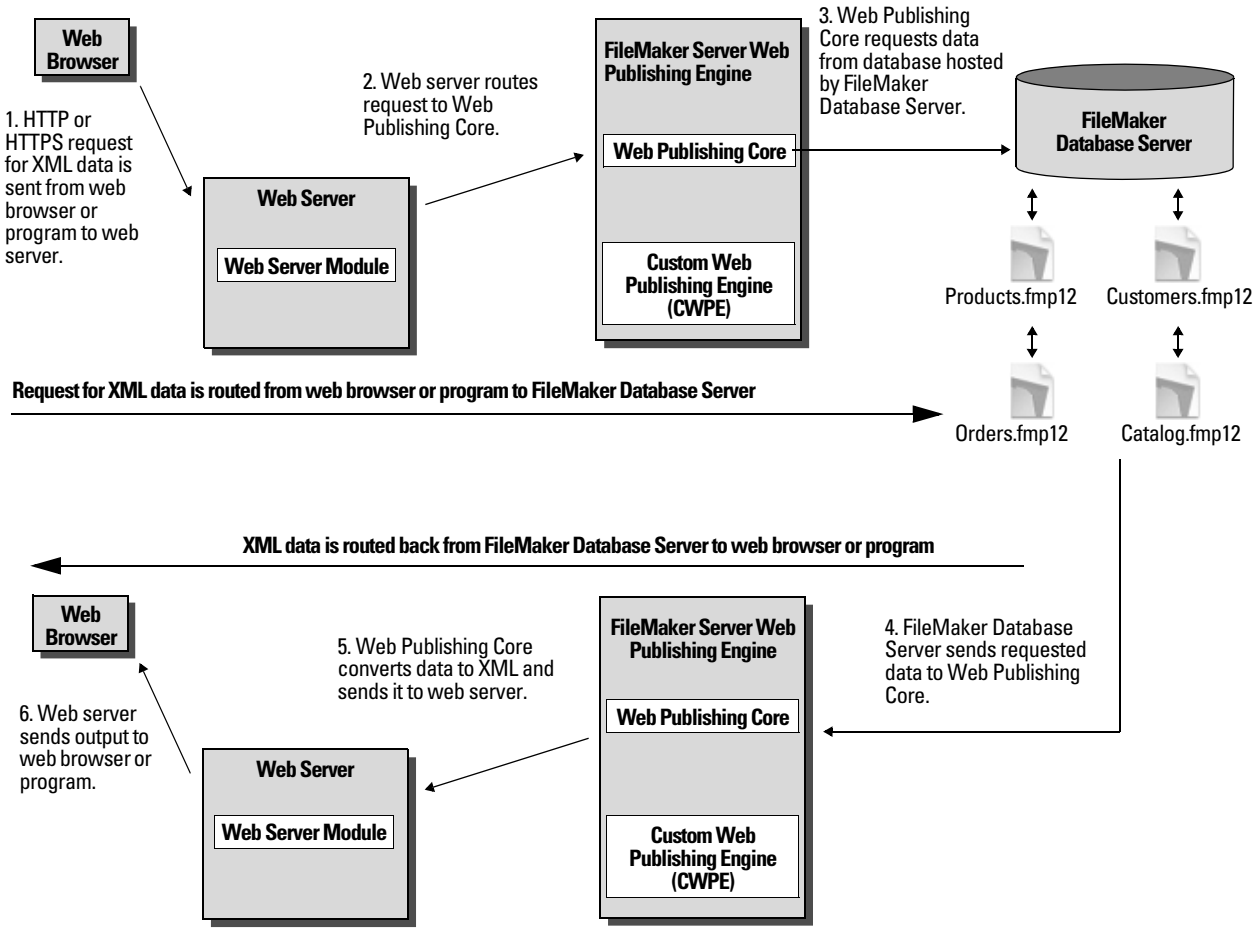
- For accessing XML data, the Web Publishing Engine supports the `fmresultset`, `FMPXMLRESULT`, and `FMPXMLLAYOUT` grammars. For XML import, FileMaker Pro uses the `FMPXMLRESULT` grammar, and for export, FileMaker Pro uses the `FMPXMLRESULT` grammar. See “Accessing XML data via the Web Publishing Engine” on page 24.
- To access XML data with the Web Publishing Engine, you use a Web Publishing Engine query string in a URL. To import and export XML with FileMaker Pro, you use FileMaker Pro menu commands or scripts.
- The Web Publishing Engine is server-based and can be installed on the same or a different host than FileMaker Server. FileMaker Pro XML import and export is desktop-based.
- You can dynamically access XML data from FileMaker databases by using URL requests with the Web Publishing Engine. The FileMaker Pro XML export feature generates a pre-specified XML data file.
- Working with XML data via the Web Publishing Engine is an interactive operation. FileMaker Pro XML import and export is a batch operation.

- The Web Publishing Engine can access XML data from a FileMaker portal, but FileMaker Pro cannot.
- The Web Publishing Engine can access data in a container field, but FileMaker Pro cannot.
- The Web Publishing Engine provides real-time access to FileMaker data via HTTP or HTTPS, but FileMaker Pro cannot.

Note For information on using FileMaker Pro to import and export data in XML format, see FileMaker Pro Help.

## How the Web Publishing Engine generates XML data from a request

After a request for XML data is sent to the web server, the Web Publishing Engine queries the FileMaker database and returns the data as an XML document.



# General process for accessing XML data from the Web Publishing Engine

Here is an overview of the process for using the Web Publishing Engine to access XML data in a FileMaker database:

1. In the FileMaker Server Admin Console, make sure XML Publishing is enabled. See FileMaker Server Help.
2. In FileMaker Pro, open each FileMaker database that you're publishing and make sure the database has the **fmxml** extended privilege enabled for XML Custom Web Publishing. See "Enabling Custom Web Publishing in a database" on page 13.

   To access XML data in a portal, set the view for the database layout to **View as Form** or **View as List**. If a user or script changes the view of the database layout to **View as Table**, only the first related record (first row of the portal) is accessible as XML data.

   The XML data is output in an order that corresponds to the order in which field objects were added to the layout. If you want the XML data order to match the order in which fields appear on the screen (top-to-bottom, left-to-right order), then select all fields, group them, and then ungroup them. This procedure resets the layout order to match the screen order.
3. Send an HTTP or HTTPS request in the form of a URL that specifies the FileMaker XML grammar, one query command, and one or more FileMaker query parameters to the Web Publishing Engine through an HTML form, an HREF link, or a script in your program or web page. You can also type the URL in a web browser.

   For information on specifying the URL, see the next section, "About the URL syntax for XML data and container objects." For information on query commands and parameters, see "Using FileMaker query strings to request XML data" on page 34, and appendix A, "Valid names used in query strings."
4. The Web Publishing Engine uses the grammar you specified in the URL to generate XML data containing the results of your request, such as a set of records from the database, and returns it to your program or web browser.
5. The web browser, if it has an XML parser, displays the data, or the program uses the data in the way you specified.

# About the URL syntax for XML data and container objects

This section describes the URL syntax for using the Web Publishing Engine to access XML data and container objects from FileMaker databases.

## About the URL syntax for XML data

The URL syntax for using the Web Publishing Engine to access XML data from FileMaker databases is:

```
<scheme>://<host>[:<port>]/fmi/xml/<xml_grammar>.xml[?<query string>]
```

where:

- `<scheme>` can be the HTTP or HTTPS protocol.
- `<host>` is the IP address or domain name of the host where the web server is installed.
- `<port>` is optional and specifies the port that the web server is using. If no port is specified, then the default port for the protocol is used (port 80 for HTTP, or port 443 for HTTPS).

- <xml_grammar> is the name of the FileMaker XML grammar. Possible values are fmresultset, FMPXMLRESULT, or FMPXMLLAYOUT. See “Using the fmresultset grammar” on page 26 and “Using other FileMaker XML grammars” on page 29.
- <query string> is a combination of one query command and one or more query parameters for FileMaker XML publishing. (The -dbnames command doesn’t require any parameters.) See “Using FileMaker query strings to request XML data” on page 34, and appendix A, “Valid names used in query strings.”

Note The URL syntax, including the names of the query command and parameters, is case sensitive except for portions of the query string. The majority of the URL is in lowercase, with the exception of the two uppercase grammar names: FMPXMLRESULT and FMPXMLLAYOUT. For information on the rules for case sensitivity of the query string, see “Guidelines for using query commands and parameters” on page 43.

Here are two examples of URLs for accessing XML data via the Web Publishing Engine:

```
http://server.company.com/fmi/xml/fmresultset.xml?-db=products&-lay=sales
&-findall
```

```
http://192.168.123.101/fmi/xml/FMPXMLRESULT.xml?-db=products&-lay=sales
&-findall
```

## About the URL syntax for FileMaker container objects in XML solutions

In a generated XML document for an XML solution, the syntax used to refer to a container object is different for container fields that store the actual object in the database, as opposed to container fields that store a reference to the object.

### If a container field stores the actual object in the database

The container field’s <data> element uses the following relative URL syntax to refer to the object:

```
<data>/fmi/xml/cnt/data.<extension>?<query string></data>
```

where <extension> is the filename extension identifying the type of object, such as .jpg. The filename extension sets the MIME type to allow the web browser to properly identify the container data. For information on <query string>, see the previous section, “About the URL syntax for XML data.”

For example:

```
<data>/fmi/xml/cnt/data.jpg?-db=products&-lay=sales&-field=product_image(1)
&-recid=2</data>
```

Note In the generated XML for a container field, the value for the -field query parameter is a fully qualified field name. The number in the parentheses indicates the repetition number for the container field, and is generated for both repeating and non-repeating fields. See “About the syntax for a fully qualified field name” on page 45.

To retrieve the container data from the database, use the following syntax:

```
<scheme>://<host>[:<port>]/fmi/xml/cnt/data.<extension>?<query string>
```

For information about <scheme>, <host>, or <port>, see the previous section, “About the URL syntax for XML data.”

For example:

```
http://www.company.com/fmi/xml/cnt/data.jpg?-db=products&-lay=sales
&-field=product_image(1)&-recid=2
```

#### If a container field stores a file reference instead of an actual object

The container field's `<data>` element contains a relative path that refers to the object. For example:

```
<data>/images/logo.jpg</data>
```

Note The referenced container object must be stored in the FileMaker Pro Web folder when the record is created or edited, and then copied or moved to a folder with the same relative location in the root folder of the web server software. See "About publishing the contents of container fields on the web" on page 15.

#### If a container field is empty

The container field's `<data>` element is empty.

### About URL text encoding

The URLs for accessing XML data and container objects must be encoded in UTF-8 (Unicode Transformation 8 Bit) format. See "About UTF-8 encoded data" on page 34.

For example, to set the value of the "info" field to `fiancée`, you could use the following URL:

```
http://server.company.com/fmi/xml/fmresultset.xml?-db=members
&-lay=relationships&-recid=2&info= fianc%C3%A9e&-edit
```

In this example URL, `%C3%A9` is the URL encoded UTF-8 representation of the `é` character.

For more information on URL text encoding, see the URL specification, which is available at http://www.w3.org.

## Accessing XML data via the Web Publishing Engine

To access XML data via the Web Publishing Engine, you use a URL that specifies the name of the FileMaker grammar to use, one FileMaker query command, and one or more FileMaker query parameters. The Web Publishing Engine generates XML data from your database that is formatted by one of the following types of XML grammars:

- **fmresultset**: This is the recommended grammar for the Web Publishing Engine for accessing XML data. It is flexible and is optimized for easier field access by name and for easier manipulation of `relatedset` (portal) data. This grammar is also more directly linked to FileMaker terminology and features such as global storage options and identification of summary and calculation fields. To facilitate web publishing, this grammar is designed to be more verbose than the `FMPXMLRESULT` grammar. See "Using the fmresultset grammar" on page 26.
- **FMPXMLRESULT and FMPXMLLAYOUT:** You can also use the `FMPXMLRESULT` and `FMPXMLLAYOUT` grammars with the Web Publishing Engine for accessing XML data. To use one stylesheet for both XML export and Custom Web Publishing, you must use the `FMPXMLRESULT` grammar. To access value lists and field display information in layouts, you must use the `FMPXMLLAYOUT` grammar. See "Using other FileMaker XML grammars" on page 29.

Depending on the grammar you specify in the URL request, the Web Publishing Engine will generate an XML document using one of the grammars. Each XML document contains a default XML namespace declaration for the grammar. See the next section, “About namespaces for FileMaker XML.” Use one of these grammars in your document or web page to display and work with FileMaker data in XML format.

Note XML data generated by the Web Publishing Engine is encoded using UTF-8 format (Unicode Transformation Format 8). See “About UTF-8 encoded data” on page 34.

## About namespaces for FileMaker XML

Unique XML namespaces help distinguish XML tags by the application they were designed for. For example, if your XML document contains two <DATABASE> elements, one for FileMaker XML data and another for Oracle XML data, the namespaces will identify the <DATABASE> element for each.

The Web Publishing Engine generates a default namespace for each grammar.

| For this grammar | This default namespace is generated |
|---|---|
| fmresultset | xmlns="http://www.filemaker.com/xml/fmresultset" |
| FMPXMLRESULT | xmlns="http://www.filemaker.com/fmpxmlresult" |
| FMPXMLLAYOUT | xmlns="http://www.filemaker.com/fmpxmllayout" |

## About FileMaker database error codes

The Web Publishing Engine returns an error code in the error code elements at the beginning of each XML document that represents the error, if any, in the execution of the most recently executed query command. A value of zero (0) is returned for no error.

| For this grammar | This syntax is used |
|---|---|
| fmresultset | <error code="0"></error> |
| FMPXMLRESULT | <ERRORCODE>0</ERRORCODE> |
| FMPXMLLAYOUT | <ERRORCODE>0</ERRORCODE> |

The error code element in the XML document indicates errors related to the database and query strings. See appendix B, “Error codes for Custom Web Publishing.”

## Retrieving the document type definitions for the FileMaker grammars

You can retrieve the document type definitions (DTDs) for the FileMaker grammars by using an HTTP request.

| For this grammar | Use this HTTP request |
|---|---|
| fmresultset | http://<host>[:<port]/fmi/xml/fmresultset.dtd |
| FMPXMLRESULT | http://<host>[:<port]/fmi/xml/FMPXMLRESULT.dtd |
| FMPXMLLAYOUT | http://<host>[:<port]/fmi/xml/FMPXMLLAYOUT.dtd |

# Using the fmresultset grammar

The XML element names in this grammar use FileMaker terminology, and the storage of fields is separated from the type of fields. The grammar also includes the ability to identify summary, calculation, and global fields.

To use the `fmresultset` grammar, specify the following name of the `fmresultset` grammar in the URL requesting the XML document from the Web Publishing Engine:

```
fmresultset.xml
```

For example:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=family
&-findall
```

Note When specifying the `fmresultset` grammar, be sure to use lowercase.

The Web Publishing Engine will generate an XML document using the `fmresultset` grammar. In the XML document, the Web Publishing Engine will reference the document type definition for the `fmresultset` grammar in the `<!DOCTYPE>` instruction in the second line of the document, immediately after the `<?xml...?>` instruction. The `<!DOCTYPE>` instruction specifies the URL for downloading the DTD for the `fmresultset` grammar.

## Description of elements in the fmresultset grammar

The `fmresultset` grammar consists primarily of the `<datasource>` element, the `<metadata>` element, and the `<resultset>` element.

### <datasource> element

In the `fmresultset` grammar, the `<datasource>` element contains the table, layout, date-format, time-format, timestamp-format, total-count, and database attributes.

- The date-format attribute of the `<datasource>` element specifies the format of dates in the XML document:

  ```
  MM/dd/yyyy
  ```

  where:

  - `MM` is the 2-digit value for the month (01 through 12, where 01 is January and 12 is December)
  - `dd` is the 2-digit value for the day of the month (01 through 31)
  - `yyyy` is the 4-digit value for the year
- The time-format attribute of the `<datasource>` element specifies the format of times in the XML document:

  ```
  HH:mm:ss
  ```

  where:

  - `HH` is the 2-digit value for hours (00 through 23, for the 24-hour format)
  - `mm` is the 2-digit value for minutes (00 through 59)
  - `ss` is the 2-digit value for seconds (00 through 59)

- The timestamp-format attribute of the <datasource> element combines the formats of date-format and time-format into one timestamp:

```
MM/dd/yyyy HH:mm:ss
```

### <metadata> element

The <metadata> element of the fmresultset grammar contains one or more <field-definition> and <relatedset-definition> elements, each containing attributes for one of the fields of the result set.

The <field-definition> attributes specify:

- whether the field is an auto-enter field (“yes” or “no”)
- whether the field is a four-digit-year field (“yes” or “no)
- whether it is a global field (“yes” or “no”)
- the maximum number of repeating values (max-repeat attribute)
- the maximum number of characters allowed (max-characters attribute)
- whether it is a not-empty field (“yes” or “no”)
- whether it is for numeric data only (“yes” or “no”)
- result (“text”, “number”, “date”, “time”, “timestamp”, or “container”)
- whether it is a time-of-day field (“yes” or “no”)
- type (“normal”, “calculation”, or “summary”)
- and the field name (fully qualified as necessary)

The <relatedset-definition> element represents a portal. Each related field in a portal is represented by the <field-definition> element contained within the <relatedset-definition> element. If there are multiple related fields in a portal, the field definitions for the related fields are grouped within a single <relatedset-definition> element.

### <resultset> element

The <resultset> element contains the <record> elements returned as the result of a query and an attribute for the total number of records found. Each <record> element contains the field data for one record in the result set—including the mod-id and the record-id attributes for the record, and the <data> element containing the data for one field in the record.

Each record in a portal is represented by a <record> element within the <relatedset> element. The count attribute of the <relatedset> element specifies the number of records in the portal, and the table attribute specifies the table associated with the portal.

## Example of XML data in the fmresultset grammar

The following is an example of XML data generated with the `fmresultset` grammar.

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE fmresultset PUBLIC "-//FMI//DTD fmresultset//EN"
""http://localhost:80/fmi/xml/fmresultset.dtd">
  <fmresultset xmlns="http://www.filemaker.com/xml/fmresultset" version="1.0">
  <error code="0" />
  <product build="12/31/2012" name="FileMaker Web Publishing Engine"
version="0.0.0.0" />
 <datasource database="art" date-format="MM/dd/yyyy" layout="web3" table="art"
time-format="HH:mm:ss" timestamp-format="MM/dd/yyyy HH:mm:ss" total-count="12"
/>
  <metadata>
  <field-definition auto-enter="no" four-digit-year="no" global="no" max-
repeat="1" name="Title" not-empty="no" numeric-only="no" result="text" time-of-
day="no" type="normal" />
  <field-definition auto-enter="no" four-digit-year="no" global="no" max-
repeat="1" name="Artist" not-empty="no" numeric-only="no" result="text" time-
of-day="no" type="normal" />
  <relatedset-definition table="artlocations">
  <field-definition auto-enter="no" four-digit-year="no" global="no" max-
repeat="1" name="artlocations::Location" not-empty="no" numeric-only="no"
result="text" time-of-day="no" type="normal" />
  <field-definition auto-enter="no" four-digit-year="no" global="no" max-
repeat="1" name="artlocations::Date" not-empty="no" numeric-only="no"
result="date" time-of-day="no" type="normal" />
  </relatedset-definition>
  <field-definition auto-enter="no" four-digit-year="no" global="no" max-
repeat="1" name="Style" not-empty="no" numeric-only="no" result="text" time-of-
day="no" type="normal" />
  <field-definition auto-enter="no" four-digit-year="no" global="no" max-
repeat="1" name="length" not-empty="no" numeric-only="no" result="number" time-
of-day="no" type="calculation" />
  </metadata>
  <resultset count="1" fetch-size="1">
  <record mod-id="6" record-id="14">
  <field name="Title">
  <data>Spring in Giverny 3</data>
  </field>
  <field name="Artist">
  <data>Claude Monet</data>
  </field>
  <relatedset count="0" table="artlocations" />
  <field name="Style">
  <data />
  </field>
  <field name="length">
  <data>19</data>
```

```
</field>
</record>
</resultset>
</fmresultset>
```

# Using other FileMaker XML grammars

The other FileMaker XML grammars contain information about field types, value lists, and layouts. FMPXMLRESULT is functionally equivalent to fmresultset. To access value lists and field display information in layouts, you must use the FMPXMLLAYOUT grammar. The FMPXMLRESULT and FMPXMLLAYOUT grammars are more compact for data interchange.

To use the FMPXMLRESULT grammar, specify the following grammar name in the URL requesting the XML document from the Web Publishing Engine:

```
FMPXMLRESULT.xml
```

For example:

```
http://192.168.123.101/fmi/xml/FMPXMLRESULT.xml?-db=employees&-lay=family
&-findall
```

To use the FMPXMLLAYOUT grammar, specify the following grammar name with the -view query command in the URL requesting the XML document from the Web Publishing Engine:

```
FMPXMLLAYOUT.xml
```

For example:

```
http://192.168.123.101/fmi/xml/FMPXMLLAYOUT.xml?-db=employees&-lay=family
&-view
```

Note When specifying the FMPXMLRESULT and FMPXMLLAYOUT grammars, be sure to enter the grammar name in uppercase.

In the generated XML document, the Web Publishing Engine will reference the document type definition for the grammar in the <!DOCTYPE> instruction in the second line of the document, immediately after the <?xml . . . ?> instruction. The <!DOCTYPE> instruction specifies the URL for downloading the DTD for the grammar.

## Description of elements in the FMPXMLRESULT grammar

In the FMPXMLRESULT grammar, the <DATABASE> element contains the NAME, RECORDS, DATEFORMAT, LAYOUT, and TIMEFORMAT attributes.

The DATEFORMAT attribute of the <DATABASE> element specifies the format of dates in the XML document. The TIMEFORMAT attribute of the <DATABASE> element specifies the format of times in the XML document. The date and time formats for the FMPXMLRESULT and the fmresultset grammars are the same. See the tables in “Description of elements in the fmresultset grammar” on page 26.

The <METADATA> element of the FMPXMLRESULT grammar contains one or more <FIELD> elements, each containing information for one of the fields/columns of the result set—including the name of the field as defined in the database, the field type, the Yes or No allowance for empty fields (EMPTYOK attribute) and the maximum number of repeating values (MAXREPEAT attribute). Valid values for field types are TEXT, NUMBER, DATE, TIME, TIMESTAMP, and CONTAINER.

The <RESULTSET> element contains all of the <ROW> elements returned as the result of a query and an attribute for the total number of records found. Each <ROW> element contains the field/column data for one row in the result set. This data includes the RECORDID and MODID for the row (see “–modid (Modification ID) query parameter” on page 55), and the <COL> element. The <COL> element contains the data for one field/column in the row where multiple <DATA> elements represent one of the values in a repeating or portal field.

## Example of XML data in the FMPXMLRESULT grammar

The following is an example of XML data generated with the FMPXMLRESULT grammar.

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE FMPXMLRESULT PUBLIC "-//FMI//DTD FMPXMLRESULT//EN"
""http://localhost:80/fmi/xml/FMPXMLRESULT.dtd">
<FMPXMLRESULT xmlns="http://www.filemaker.com/fmpxmlresult">
  <ERRORCODE>0</ERRORCODE>
  <PRODUCT BUILD="12/31/2012" NAME="FileMaker Web Publishing Engine"
VERSION="0.0.0.0" />
  <DATABASE DATEFORMAT="MM/dd/yyyy" LAYOUT="web" NAME="art" RECORDS="12"
TIMEFORMAT="HH:mm:ss" />
  <METADATA>
    <FIELD EMPTYOK="YES" MAXREPEAT="1" NAME="Title" TYPE="TEXT" />
     <FIELD EMPTYOK="YES" MAXREPEAT="1" NAME="Artist" TYPE="TEXT" />
    <FIELD EMPTYOK="YES" MAXREPEAT="1" NAME="Image" TYPE="CONTAINER" />
  </METADATA>
  <RESULTSET FOUND="1">
  <ROW MODID="6" RECORDID="15">
  <COL>
    <DATA>Spring in Giverny 4</DATA>
  </COL>
  <COL>
    <DATA>Claude Monet</DATA>
  </COL>
  <COL>
    <DATA>/fmi/xml/cnt/data.jpg?-db=art&-lay=web&-recid=15&-
field=Image(1)</DATA>
  </COL>
  </ROW>
  </RESULTSET>
</FMPXMLRESULT>
```

The order of the <COL> elements corresponds with the order of the <FIELD> elements in the <METADATA> element—for example, where the “Title” and “Artist” fields are listed in the <METADATA> element, “Village Market” and then “Camille Pissarro” are listed in the same order in the <RESULTSET> and <ROW> elements.

## Description of elements in the FMPXMLLAYOUT grammar

In the FMPXMLLAYOUT grammar, the <LAYOUT> element contains the name of the layout, the name of the database, and <FIELD> elements for each field found in the corresponding layout in the database. Each <FIELD> element describes the style type of the field, and contains the VALUELIST attribute for any associated value list of the field.

The <VALUELISTS> element contains one or more <VALUELIST> elements for each value list found in the layout—each including the name of the value list and a <VALUE> element for each value in the list.

Depending on the options selected in the **Specify Fields for Value List** dialog box in the FileMaker database, the <VALUE> element contains a DISPLAY attribute that contains the value in the first field only, the second field only, or both fields of a value list. For example, suppose the first field in a value list stores the art style’s ID number (such as “100”), and the second field displays the art style’s associated name (such as “Impressionism”). Here is a summary of the contents of the DISPLAY attribute when the various combinations of options are selected in the **Specify Fields for Value List** dialog box:

- If **Also display values from second field** is not selected, the DISPLAY attribute contains the value in the first field of a value list only. In the following XML data example, the DISPLAY attribute contains the art style’s ID number only:

```
<VALUELISTS>
      <VALUELIST NAME="style">
        <VALUE DISPLAY="100">100</VALUE>
        <VALUE DISPLAY="101">101</VALUE>
        <VALUE DISPLAY="102">102</VALUE>
      </VALUELIST>
</VALUELISTS>
```

- If **Also display values from second field** and **Show values only from second field** are both selected, the DISPLAY attribute contains the value in the second field only. In the following XML data example, the DISPLAY attribute contains the art style’s name only:

```
<VALUELISTS>
      <VALUELIST NAME="style">
        <VALUE DISPLAY="Impressionism">100</VALUE>
        <VALUE DISPLAY="Cubism">101</VALUE>
        <VALUE DISPLAY="Abstract">102</VALUE>
      </VALUELIST>
</VALUELISTS>
```

- If **Also display values from second field** is selected and **Show values only from second field** is not selected, the DISPLAY attribute contains the values in both fields of a value list. In the following XML data example, the DISPLAY attribute contains both the art style's ID number and the art style's name:

```
<VALUELISTS>
      <VALUELIST NAME="style">
        <VALUE DISPLAY="100 Impressionism">100</VALUE>
        <VALUE DISPLAY="101 Cubism">101</VALUE>
        <VALUE DISPLAY="102 Abstract">102</VALUE>
      </VALUELIST>
</VALUELISTS>
```

For date, time, and timestamp fields, data for value lists are formatted using the "fm" format for that field type. The "fm" formats are `MM/dd/yyyy` for date, `HH:mm:ss` for time, and `MM/dd/yyyy HH:mm:ss` for timestamp. For example, if a "birthdays" value list is used for a pop-up menu on a "birthdate" field of a layout, and the "birthdate" field is of type date, then the values output for that value list will all be in the "fm" date format.

Note If two fields with different field types on a layout share the same value list, the first field's type determines the format of the value list data.

## Example of XML data in the FMPXMLLAYOUT grammar

The following is an example of XML data generated with the `FMPXMLLAYOUT` grammar.

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE FMPXMLLAYOUT PUBLIC "-//FMI//DTD FMPXMLLAYOUT//EN"
""http://localhost:80/fmi/xml/FMPXMLLAYOUT.dtd">
  <FMPXMLLAYOUT xmlns="http://www.filemaker.com/fmpxmllayout">
  <ERRORCODE>0</ERRORCODE>
  <PRODUCT BUILD="12/31/2012" NAME="FileMaker Web Publishing Engine"
VERSION="0.0.0.0" />
  <LAYOUT DATABASE="art" NAME="web2">
  <FIELD NAME="Title">
    <STYLE TYPE="EDITTEXT" VALUELIST="" />
  </FIELD>
  <FIELD NAME="Artist">
    <STYLE TYPE="EDITTEXT" VALUELIST="" />
  </FIELD>
  <FIELD NAME="Image">
    <STYLE TYPE="EDITTEXT" VALUELIST="" />
  </FIELD>
  <FIELD NAME="artlocations::Location">
    <STYLE TYPE="EDITTEXT" VALUELIST="" />
  </FIELD>
  <FIELD NAME="artlocations::Date">
    <STYLE TYPE="EDITTEXT" VALUELIST="" />
  </FIELD>
  <FIELD NAME="Style">
    <STYLE TYPE="POPUPMENU" VALUELIST="style" />
  </FIELD>
  </LAYOUT>
    <VALUELISTS>
      <VALUELIST NAME="style">
        <VALUE DISPLAY="Impressionism">100</VALUE>
        <VALUE DISPLAY="Cubism">101</VALUE>
        <VALUE DISPLAY="Abstract">102</VALUE>
      </VALUELIST>
    </VALUELISTS>
  </FMPXMLLAYOUT>
```

## About UTF-8 encoded data

All XML data generated by the Web Publishing Engine is encoded in UTF-8 (Unicode Transformation 8 Bit) format. This format compresses data from the standard Unicode format of 16 bits to 8 bits for ASCII characters. XML parsers are required to support Unicode and UTF-8 encoding.

UTF-8 encoding includes direct representations of the values of 0-127 for the standard ASCII set of characters used in English, and provides multibyte encodings for Unicode characters with higher values.

Note Be sure to use a web browser or text editor program that supports UTF-8 files.

The UTF-8 encoding format includes the following features:

- All ASCII characters are one-byte UTF-8 characters. A legal ASCII string is a legal UTF-8 string.
- Any non-ASCII character (any character with the high-order bit set) is part of a multibyte character.
- The first byte of any UTF-8 character indicates the number of additional bytes in the character.
- The first byte of a multibyte character is easily distinguished from the subsequent byte, which makes it is easy to locate the start of a character from an arbitrary position in a data stream.
- It is easy to convert between UTF-8 and Unicode.
- The UTF-8 encoding is relatively compact. For text with a large percentage of ASCII characters, it is more compact than Unicode. In the worst case, a UTF-8 string is only 50% larger than the corresponding Unicode string.

## Using FileMaker query strings to request XML data

To request XML data from a FileMaker database, you use the FileMaker query commands and parameters in a query string. For example, you can use the `-findall` query command in the following query string in a URL to request a list of all products in a FileMaker database named “products”:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=products-lay=sales&-findall
```

A query string must contain only one query command, such as `-new`. Most query commands also require various matching query parameters in the query string. For example, all query commands except `-dbnames` require the `-db` parameter that specifies the database to query.

You can also use query commands and parameters in a URL.

This section contains a summary of the FileMaker query commands and parameters. For more information about using them in a query string, see “Valid names used in query strings” on page 43.

| Use this query command name | To execute this command |
|---|---|
| `-dbnames` | Retrieve names of all hosted and web-shared databases. |
| `-delete` | Delete record. |
| `-dup` | Duplicate record. |
| `-edit` | Edit record. |
| `-find` | Find record(s). |
| `-findall` | Find all records. |

| Use this query command name | To execute this command |
|---|---|
| -findany | Find a random record. |
| -findquery | Perform complex or compound find request. |
| -layoutnames | Retrieve names of all available layouts for a hosted and web-shared database. |
| -new | Add new record. |
| -scriptnames | Retrieve names of all available scripts for a hosted and web-shared database. |
| -view | Retrieves layout information from a database if the FMPXMLLAYOUT grammar is specified. Retrieves <metadata> section of XML document and an empty recordset if the fmresultset or FMPXMLRESULT grammar is specified. |

| Use these query parameter names | With these query commands |
|---|---|
| -db (database name) | Required with all query commands except -dbnames |
| -delete.related | Optional with -edit |
| -field | Required to specify a field in a URL for container requests. See “About the URL syntax for FileMaker container objects in XML solutions” on page 23. |
| fieldname | At least one field name is required with -edit. Optional with -find. See “fieldname (Non-container field name) query parameter” on page 52. |
| fieldname.op (operator) | Optional with -find |
| -lay (layout name) | Required with all query commands, except -dbnames, -layoutnames, and -scriptnames |
| -lay.response (switch layout for XML response) | Optional with all query commands, except -dbnames, -layoutnames, and -scriptnames |
| -lop (logical operator) | Optional with -find |
| -max (maximum records) | Optional with -find, -findall, and -findquery |
| -modid (modification ID) | Optional with -edit |
| -query | Required with -findquery compound find requests |
| -recid (record ID) | Required with -edit, -delete, -dup. Optional with -find |
| -relatedsets.filter | Optional with -find, -findall, -findany, -edit, -new, -dup, and -findquery |
| -relatedsets.max | Optional with -find, -edit, -new, -dup, and -findquery |
| -script (perform script) | Optional with -find, -findall, -findany, -new, -edit, -delete, -dup, -view, and -findquery |
| -script.param (pass a parameter value to the script specified by -script) | Optional with -script and -findquery |
| -script.prefind (perform script before -find, -findany, and -findall) | Optional with -find, -findany, -findall, and -findquery |
| -script.prefind.param (pass a parameter value to the script specified by -script.prefind) | Optional with -script.prefind and -findquery |
| -script.presort (perform script before sort) | Optional with -find, -findall, and -findquery |
| -script.presort.param (pass a parameter value to the script specified by -script.presort) | Optional with -script.presort and -findquery |
| -skip (skip records) | Optional with -find, -findall, and -findquery |

| Use these query parameter names | With these query commands |
|---|---|
| `-sortfield.[1-9]` (sort field) | Optional with `-find`, `-findall`, and `-findquery` |
| `-sortorder.[1-9]` (sort order) | Optional with `-find`, `-findall` |

## Switching layouts for an XML response

The `-lay` query parameter specifies the layout you want to use when requesting XML data. Often, the same layout is appropriate for processing the data that results from the request. In some cases, you might want to search for data using a layout which contains fields that, for security reasons, don't exist in another layout you want to use for displaying the results. (To do a search for data in a field, the field must be placed on the layout you specify in the XML request.)

To specify a different layout for displaying an XML response than the layout used for processing the XML request, you can use the optional `-lay.response` query parameter.

For example, the following request searches for values greater than 100,000 in the "Salary" field on the "Budget" layout. The resulting data is displayed using the "ExecList" layout, which does not include the "Salary" field.

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=Budget&Salary=100000&Salary.op=gt&-find&-lay.response=ExecList
```

## Understanding how an XML request is processed

There are several query parameters that affect the processing of an XML request and the generation of an XML document.

Here is the order in which FileMaker Server and the Web Publishing Engine process an XML request:

**1.** Process the `-lay` query parameter.

**2.** Set the global field values specified in the query (the "`.global=`" portion of a URL).

**3.** Process the `-script.prefind` query parameter, if specified.

**4.** Process the query commands, such as `-find` or `-new`.

**5.** Process the `-script.presort` query parameter, if specified.

**6.** Sort the resulting data, if a sort was specified.

**7.** Process the `-script` query parameter, if specified.

**8.** Process the `-lay.response` query parameter to switch to a different layout, if this is specified.

**9.** Generate the XML document.

If one of the above steps generates an error code, the request processing stops; any steps that follow are not executed. However, any prior steps in the request are still executed.

For example, consider a request that deletes the current record, sorts the records, and then executes a script. If the `-sortfield` parameter specifies a non-existent field, the request deletes the current record and returns error code 102 ("Field is missing"), but does not execute the script.

# Troubleshooting XML document access

If you have trouble accessing XML documents with the Web Publishing Engine, verify that:

- The extended privileges in the database are set for XML Custom Web Publishing and assigned to a user account. See “Enabling Custom Web Publishing in a database” on page 13.
- The database is hosted on the Database Server component of the FileMaker Server deployment, and is opened by FileMaker Server. See FileMaker Server Help.
- The database account name and password you are using, if any, are correct.
- The web server component of the FileMaker Server deployment is running.
- The Web Publishing Engine component of the FileMaker server deployment is running.
- XML Publishing is enabled in the Web Publishing Engine component. See FileMaker Server Help.

# Chapter 5
# Staging, testing, and monitoring a site

This chapter provides instructions for staging and testing a Custom Web Publishing site before deploying it in a production environment. Instructions are also provided for using log files to monitor the site during testing or after deployment.

## Staging a Custom Web Publishing site

Before you can properly test your site, you must copy or move the required files to the correct locations on the staging server(s).

To stage your site and prepare it for testing:

1. Complete all of the steps outlined in chapter 3, “Preparing databases for Custom Web Publishing.”
2. Check that XML has been enabled and properly configured in the FileMaker Server Admin Console.

   Note For instructions, see FileMaker Server Help.

3. Verify that the web server and the Web Publishing Engine are running.
4. Copy or move any referenced container objects to the web server machine.
   - If the database file is properly hosted and accessible on the Database Server component of the FileMaker Server deployment, and the container fields store the actual files in the FileMaker database, then you don’t need to relocate the container field contents.
   - If a database container field stores a file reference instead of an actual file, then the referenced container object must be stored in the FileMaker Pro Web folder when the record is created or edited. To stage your site, you must copy or move the referenced containers to a folder with the same relative location in the root folder of the web server software.
   - If a database container field stores the container object externally, then use the Upload Database assistant to transfer the database file and container field objects from your computer’s file system to FileMaker Server. If you manually upload a database that uses a container field with externally stored objects, then you must copy or move the referenced objects into a subfolder of the RC_Data_FMS folder, as described in “Container fields with externally stored data” on page 16.
5. Copy any additional components of your web application to the web server machine. Your web application processes the XML data before sending it to another application or to the client.

## Testing a Custom Web Publishing site

Before notifying users that your Custom Web Publishing site is available, verify that it looks and functions as you expect.

- Test features like finding, adding, deleting, and sorting records with different accounts and privilege sets.
- Verify that privilege sets are performing as expected by logging in with different accounts. Make sure unauthorized users can't access or modify your data.
- Check all scripts to verify that the outcome is expected. See "FileMaker scripts and Custom Web Publishing" on page 17 for information on designing web-friendly scripts.
- Test your site with different operating systems and web browsers.

Note If you don't have a network connection and you have installed FileMaker Server using a single machine deployment—with the web server, Web Publishing Engine, and Database Server on one computer—then you can test your Custom Web Publishing site by using http://127.0.0.1/ in the URL. For information on the URL syntax, see "About the URL syntax for XML data and container objects" on page 22.

## Examples of stylesheets for testing XML output

Here are two examples of XSLT stylesheets that are useful for testing XML output.

- The following stylesheet example outputs the requested XML data without doing any transformation. This stylesheet is useful for displaying the actual XML data that the Web Publishing Engine is using.

```
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet version="1.0"
    xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
    xmlns:fmrs="http://www.filemaker.com/xml/fmresultset">
    <xsl:output method="xml"/>
    <xsl:template match="/">
        <xsl:copy-of select="."/>
    </xsl:template>
</xsl:stylesheet>
```

- When debugging a stylesheet, you can use the following example of an HTML <textarea> tag to display the XML source document that was accessed via the stylesheet in a scrolling text area.

```
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet version="1.0"
    xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
    xmlns:fmrs="http://www.filemaker.com/xml/fmresultset">
    <xsl:output method="html"/>
<html>
    <body>
    <xsl:template match="/fmrs:fmresultset">
        <textarea rows="20" cols="100">
```

```
            <xsl:copy-of select="."/>
        </textarea><br/>
    </xsl:template>
    </body>
</html>
</xsl:stylesheet>
```

# Monitoring your site

You can use the following types of log files to monitor your Custom Web Publishing site and gather information about web users who visit your site:

- Web server access and error logs
- Web Publishing Engine log
- Web Server Module error log
- Tomcat logs

## Using the web server access and error logs

IIS (Windows): The Microsoft IIS web server generates an access log file and displays errors in the Windows Event Viewer instead of writing them to a log file. The access log file, which is in the W3C Extended Log File Format by default, is a record of all incoming HTTP requests to the web server. You can also use the W3C Common Logfile Format for the access log. For more information, see the documentation for the Microsoft IIS web server.

Apache (Mac OS): The Apache web server generates an access log file and an error log file. The Apache access log file, which is in the W3C Common Logfile Format by default, is a record of all incoming HTTP requests to the web server. The Apache error log is a record of problems involving processing HTTP requests. For more information on these log files, see the documentation for the Apache web server.

For information on the W3C Common Logfile Format and the W3C Extended Log File Format, see the World Wide Web Consortium website at http://www.w3.org.

## Using the Web Publishing Engine log

By default, the Web Publishing Engine generates a log file called wpe.log that contains a record of any Web Publishing Engine errors that have occurred, including application errors, usage errors, and system errors. You can also have the Web Publishing Engine include information related to Custom Web Publishing, such as end-user XML requests to generate web publishing output or changes to the Custom Web Publishing settings.

The wpe.log file is located on the Web Publishing Engine component of the FileMaker Server deployment:

- **IIS (Windows):**
  `<drive>:\Program Files\FileMaker\FileMaker Server\Logs\wpe.log`
  where `<drive>` is the primary drive from which the system is started.
- **Apache (Mac OS):** `/Library/FileMaker Server/Logs/wpe.log`

### Web Publishing Engine log settings

The wpe.log file is generated if the **Enable logging for Custom Web Publishing** option is enabled in the Admin Console.

| Logging option enabled | Information recorded in wpe.log |
|---|---|
| Error level messages | Any Web Publishing Engine errors that have occurred, including application errors, usage errors, and system errors. |
| Info and Error Level messages | Any errors as described above, and information about access to the Web Publishing Engine. It contains a record of all end-user XML requests to generate Custom Web Publishing output. |

The **Error level messages** setting is enabled by default. For information on setting these options using the Admin Console, see FileMaker Server Help.

Note For Custom Web Publishing with FileMaker Server 12, the wpe.log file replaces the wpc_access_log.txt and pe_application_log.txt files used in previous releases.

Important Over time, the wpe.log file may become very large. Use the Admin Console to set the maximum size for the wpe.log file. When the wpe.log file reaches this maximum size, the Web Publishing Engine copies the wpe.log file to a single backup file, wpe.log.1, and creates a new wpe.log file. You may wish to save an archive of the wpe.log.1 file on a regular basis, if you want more than one backup copy.

### Web Publishing Engine log format

The wpe.log file uses the following format for each entry:

```
[TIMESTAMP_GMT] [WPC_HOSTNAME] [CLIENT_IP:PORT] [ACCOUNT_NAME] [MODULE_TYPE]
[SEVERITY] [FM_ERRORCODE] [RETURN_BYTES] [MESSAGE]
```

where:

- `[TIMESTAMP_GMT]` is the date and time of the entry, in Greenwich Mean Time (GMT).
- `[WPC_HOSTNAME]` is the machine name for the machine where the Web Publishing Engine is installed.
- `[CLIENT_IP:PORT]` is the IP address and port of the client where the XML request originated.
- `[ACCOUNT_NAME]` is the account name used for logging into the hosted FileMaker database.
- `[MODULE_TYPE]` is either: XML, for Custom Web Publishing with XML requests, or PHP, for Custom Web Publishing with PHP requests.
- `[SEVERITY]` is either INFO, indicating an informational message, or ERROR, indicating an error message.
- `[FM_ERROR_CODE]` is the error number returned for an error message. The error number may be an error code for FileMaker databases (see “Error code numbers for FileMaker databases” on page 48).

  In addition, the error number may be an HTTP error number, prefixed by an “HTTP:” string.
- `[RETURN_BYTES]` is the number of bytes returned by the request.
- `[MESSAGE]` provides additional information about the log entry.

### Web Publishing Engine log message examples

The following examples show the types of messages that may be included in the wpe.log file:

- When the Web Publishing Engine starts and stops

```
2012-06-02 15:15:31 -0700 - - - - INFO - - FileMaker Server
Web Publishing Engine started.
2012-06-02 15:46:52 -0700 - - - - INFO - - FileMaker Server
Web Publishing Engine stopped.
```

- Successful or failed XML query requests

```
2012-06-02 15:21:08 -0700 WPC_SERVER 192.168.100.101:0 jdoe XML
INFO 0 3964 "/fmi/xml/fmresultset.xml?-db=Contacts&-
lay=Contact_Details&-findall"
2012-06-02 15:26:31 -0700 WPC_SERVER 192.168.100.101:0 jdoe XML
ERROR 5 596 "/fmi/xml/fmresultset.xml?-db=Contacts&-
layout=Contact_Details&-findall"
```

- Scripting errors

```
2012-06-02 17:33:12 -0700 WPC_SERVER 192.168.100.101:0 jdoe - ERROR
4 - Web Scripting Error: 4, File: "10b_MeetingsUpload", Script: "OnOpen",
Script Step: "Show Custom Dialog"
```

- Changes to the Custom Web Publishing settings

```
2012-06-09 10:59:49 -0700 WPC_SERVER 192.168.100.101:0 jdoe - INFO
- - XML Web Publishing Engine is enabled.
```

- System errors

```
2012-06-02 15:30:42 -0700 WPC_SERVER 192.168.100.101:0 jdoe XML
ERROR - - Communication failed
```

## Using the Web Server Module error log

If the web server is unable to connect to the Web Publishing Engine, the Web Server Module generates a log file that records any errors with its operation. This file is called web_server_module_log.txt and is located in the Logs folder in the FileMaker Server folder on the web server host.

## Using the Tomcat logs

When FileMaker Server has a problem caused by an internal web server error, you may find it helpful to view the Tomcat logs. The Tomcat logs are located on the web server component of the FileMaker Server deployment:

- **IIS (Windows):** `<drive>:\Program Files\FileMaker\FileMaker Server\Admin\admin-master-tomcat\logs\`
  where `<drive>` is the primary drive from which the system is started.
- **Apache (Mac OS):** `/Library/FileMaker Server/Admin/admin-master-tomcat/logs/`

# Appendix A
# Valid names used in query strings

This appendix describes the valid names of query commands and parameters you can use in a query string when accessing FileMaker data using the Web Publishing Engine.

## About the query commands and parameters

The following is a complete list of the query command names and query parameter names:

| Query command names | Query parameter names |
|---|---|
| `-dbnames` (See page 48.) | `-db` (See page 51.) |
| `-delete` (See page 48.) | `-field` (See page 52.) |
| `-dup` (See page 48.) | `fieldname` (See page 52.) |
| `-edit` (See page 48.) | `fieldname.op` (See page 53.) |
| `-find`, `-findall`, `-findany` (See page 49.) | `-lay` (See page 54.) |
| `-findquery` (See page 49.) | `-lay.response` (See page 54.) |
| `-layoutnames` (See page 50.) | `-lop` (See page 54.) |
| `-new` (See page 50.) | `-max` (See page 54.) |
| `-scriptnames` (See page 50.) | `-modid` (See page 55.) |
| `-view` (See page 51.) | `-query` (See page 55.) |
| | `-recid` (See page 56.) |
| | `-relatedsets.filter` (See page 57.) |
| | `-relatedsets.max` (See page 57.) |
| | `-script` (See page 58.) |
| | `-script.param` (See page 58.) |
| | `-script.prefind` (See page 58.) |
| | `-script.prefind.param` (See page 59.) |
| | `-script.presort` (See page 59.) |
| | `-script.presort.param` (See page 59.) |
| | `-skip` (See page 60.) |
| | `-sortfield.[1-9]` (See page 60.) |
| | `-sortorder.[1-9]` (See page 61.) |

Important The `-lay` parameter for specifying a layout is required with all query commands except `-dbnames`, `-layoutnames`, and `-scriptnames`.

### Guidelines for using query commands and parameters

When using query commands and parameters in a query string, keep the following guidelines in mind:

- A query string must contain only one query command; no more and no less. For example, a query string can contain `-new` to add a new record, but it can't contain `-new` and `-edit` in the same query string.
- Most query commands require various matching query parameters in the query string. For example, all query commands except `-dbnames` require the `-db` parameter that specifies the database to query. See the table of required parameters in "Using FileMaker query strings to request XML data" on page 34.

- For query parameters and field names, specify the particular value you want to use, such as `-db=employees`. For query commands, don't specify an "=" sign or a value after the command name, such as `-findall`.
- The Web Publishing Engine converts all reserved words to lowercase, including query commands, query parameters, and command values where specific values are expected (for example: `-lop=and`, `-lop=or`, `-sortorder=ascend`, `-sortorder=descend`, `-max=all`).
- Database names, layout names, and field names used in query strings are case insensitive, such as using `-lay=mylayout` to specify the layout name `MyLayout`.
- It is not recommended to use periods or parentheses in field names. In some cases, field names with periods may work, but field names with the following exceptions can never be used:
  - The period cannot be followed by a number. For example, `myfield.9` is an invalid field name.
  - The period cannot be followed by the text string `op` (the two letters "op"). For example, `myfield.op` is an invalid field name.
  - The period cannot be followed by the text string `global` (the word "global"). For example, `myfield.global` is an invalid field name.

  Field names containing any of these exceptions cannot be accessed via XML using an HTTP query. These constructs are reserved for record IDs, as described in the section, "About the syntax for a fully qualified field name," below.
- For the `-find` command, the value of a field is case insensitive. For example, you can use `Field1=Blue` or `Field1=blue`. For the `-new` and `-edit` commands, the case you use in the value of a field is preserved and stored in the database exactly as you specify in the query string. For example, `LastName=Doe`.

## Query command parsing

The Web Publishing Engine parses query commands in the following order, and stops parsing XML queries with the first error. If an error code is returned, the error code returned matches the first error that is identified.

**1.** Does the query have a command and is the query command valid?

It is an error if the query is missing the command or uses an unknown command. For example: `-database`

**2.** Does the query have two commands?

For example: `-find&-edit`

**3.** Does the query have an invalid value for a command or parameter?

For example: `-lop=amd`

**4.** Is the query missing the required database name parameter (`-db` parameter)?

**5.** Is the query missing the required layout name parameter (`-lay` parameter)?

**6.** Does the query have an invalid sort?

**7.** Does the query have invalid field parameters?

Note If a query contains valid but extraneous information, the query is processed without an error. For example, if you specify the `-lop` parameter on a `-delete` command, the `-lop` parameter is ignored because it does not cause the query to be invalid or ambiguous.

For information about specific error codes returned, see appendix B, “Error codes for Custom Web Publishing.”

## About the syntax for a fully qualified field name

A fully qualified field name identifies an exact instance of a field. Because fields with common names can be based on different tables, you must use fully qualified names, in some cases, to avoid errors.

The syntax for specifying a fully qualified field name is:

```
table-name::field-name(repetition-number).record-id
```

where:

- `table-name` is the name of the table that contains the field. The table name is only required if the field is not in the underlying table of the layout specified in the query string.
- `field-name(repetition-number)` is the specific value in a repeating field, and is only required for repeating fields. The repetition number starts counting at the numeral 1. For example, `field-name(2)` refers to the second value in the repeating field. If you don’t specify a repetition number for a repeating field, the first value in the repeating field is used. The repetition-number is required for the `-new` and `-edit` query commands involving repeating fields, but it is not required for the `-find` command.
- `record-id` is the record ID, and is only required if you are using a query string to add or edit records in portal fields. See the following sections “Adding records to a portal,” and “Editing records in a portal.” The `record-id` is required for the `-new` and `-edit` query commands involving portal fields, but it is not required for the `-find` command.

Note To be accessible, fields must be placed on the layout you specify in the query string.

## Using query commands with portal fields

The following sections describe how query commands work with portal fields.

### Adding records to a portal

To add a new record to a portal at the same time you add a parent record, use the `-new` query command and do the following in query string for the request:

- Use the fully qualified field name for the related portal field.
- Specify 0 as the record ID after the name of the related portal field.
- Specify at least one of the fields for the parent record before specifying the related portal field.
- Specify the data for the match field (key field) in the parent record.

For example, the following URL adds a new parent Employee record for John Doe, and a new related record for Jane in the portal at the same time. The name of the related table is Dependents, and the name of the related field in the portal is Names. The match field, ID, stores an employee ID number.

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=family&FirstName=John&LastName=Doe&ID=9756&Dependents::Names.0=Jane&-new
```

Note You can only add one related record to a portal per request.

### Editing records in a portal

To edit one or more records in a portal, use the `-edit` command and a record ID to specify the parent record that contains the portal records you want to edit. Specify the particular portal record to edit by using its record ID in a fully qualified field name. You can determine a record ID from the record ID attribute of the `<record>` element in the `<relatedset>` element in the XML data. See “Using the fmresultset grammar” on page 26.

For example, the following URL edits a record in a portal where the parent record has the record ID of 1001. Dependents is the name of the related table, Names is the name of the related field in the portal, and the 2 in Names.2 is the record ID of a portal record.

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=family
&-recid=1001&Dependents::Names.2=Kevin&-edit
```

Here is an example of how to use one request to edit multiple portal records via the parent record:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=family
&-recid=1001&Dependents::Names.2=Kevin&Dependents::Names.5=Susan&-edit
```

You can also use the `-edit` command and specify 0 as the portal record ID to add a new related record in the portal for an existing parent record. For example:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=family
&-recid=1001&Dependents::Names.0=Timothy&-edit
```

### Deleting portal records

To delete portal records, use the `-delete.related` parameter with the `-edit` command rather than using the `-delete` command.

For example, the following URL deletes record “1001” from the table “employees”:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=family
&-recid=1001&-delete
```

But the following URL deletes a portal record with a record ID of “3” from the related table called “Dependents”, with the parent record ID of “1001”.

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=family
&-recid=1001&-delete.related=Dependents.3&-edit
```

For more information, see “–delete.related (Portal records delete) query parameter” on page 51.

### Querying portal fields

In a solution that has many related records, querying and sorting portal records can be time consuming. To restrict the number of records and rows to display in a related set, use the `-relatedsets.filter` and `-relatedsets.max` parameters with find requests. For more information, see “–relatedsets.filter (Filter portal records) query parameter” on page 57 and “–relatedsets.max (Limit portal records) query parameter” on page 57.

## About the syntax for specifying a global field

The syntax for specifying a global field is:

```
table-name::field-name(repetition-number).global
```

where `global` identifies a field as using global storage. For information about `table-name` and `field-name(repetition-number)`, see “About the syntax for a fully qualified field name” on page 45. For information on global fields, see FileMaker Pro Help.

You must use the `.global` syntax to identify a global field in a query string. The Web Publishing Engine sets the parameter values for global fields before performing the query command or setting any other parameter values in the query string. For direct XML requests, the global values expire immediately after the request is made.

If you don’t use the `.global` syntax to identify a global field in a query string, the Web Publishing Engine evaluates the global field along with the remainder of the query string without setting the global field value first.

For example:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=departments
&Country.global=USA&-recid=1&-edit
```

# Query command reference

This section contains information about the query commands available for XML requests.

## -dbnames (Database names) query command

Retrieves the names of all databases that are hosted by FileMaker Server and enabled for Custom Web Publishing with XML.

**Required query parameters:** (none)

**Example:**

To retrieve the database names:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-dbnames
```

## -delete (Delete record) query command

Deletes the record as specified by `-recid` parameter

**Required query parameters:** `-db`, `-lay`, `-recid`

**Optional query parameter:** `-script`

**Example:**

To delete a record:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-recid=4&-delete
```

## -dup (Duplicate record) query command

Duplicates the record specified by `-recid`

**Required query parameters:** `-db`, `-lay`, `-recid`

**Optional query parameter:** `-script`

**Example:**

To duplicate the specified record:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-recid=14&-dup
```

## -edit (Edit record) query command

Updates the record specified by the `-recid` parameter, populating the fields with the contents of any field name/value pairs. The `-recid` parameter indicates which record should be edited.

**Required query parameters:** `-db`, `-lay`, `-recid`, one or more field name(s)

**Optional query parameter:** `-modid`, `-script`, field name

Note For information on editing records in a portal, see “Editing records in a portal” on page 46.

**Example:**

To edit a record:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-recid=13&Country=USA&-edit
```

## -find, -findall, or -findany (Find records) query commands

Submits a search request using defined criteria

**Required query parameters:** `-db`, `-lay`

**Optional query parameters:** `-recid`, `-lop`, `-op`, `-max`, `-skip`, `-sortorder`, `-sortfield`, `-script`, `-script.prefind`, `-script.presort`, field name

**Examples:**

To find a record by field name:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=family&Country=USA&-find
```

Note Specifying a field name multiple times in a single request is not supported; FileMaker Server parses all of the values, but uses only the last value parsed.

To find a record by record ID:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=family
&-recid=427&-find
```

To find all records in the database, use `-findall`:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=family
&-findall
```

To find a random record, use `-findany`:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-lay=family
&-findany
```

## -findquery (Compound find) query command

Submits a search request using multiple find records and omit records requests.

**Required query parameters:** `-db`, `-lay`, `-query`

**Optional query parameters:** `-max`, `-skip`, `-sortorder`, `-sortfield`, `-script`, `-script.prefind`, `-script.presort`

**Example:**

Find records for cats or dogs that are not named “Fluffy.”

```
http://host/fmi/xml/fmresultset.xml?-db=vetclinic&-lay=animals
&-query=(q1);(q2);!(q3)&-q1=typeofanimal&-q1.value=Cat&-q2=typeofanimal
&-q2.value=Dog&-q3=name&-q3.value=Fluffy&-findquery
```

### Using the -findquery command for compound finds

A `-findquery` statement consists of four parts, in the following order:

- The `-query` parameter
- The query request declarations, consisting of the query identifier declarations and request operations.

- The search field and value definitions for each query identifier.
  - Define query identifiers. A query identifier is the letter "q" followed by a number. For example: `-q1`
  - Define query identifier values with the parameter. For example: `-q1.value=fieldvalue`
  - Define query identifier operators by including it as part of the `fieldvalue` expression. For example, to use an asterisk as a “begins with” operator: `-q1.value=fieldvalue*`
- The `-findquery` command, at the end of the complete statement.

For more information on using the `-query` parameter, see “–query (Compound find request) query parameter” on page 55.

## -layoutnames (Layout names) query command

Retrieves the names of all available layouts for a specified database that is hosted by FileMaker Server and enabled for Custom Web Publishing with XML.

**Required query parameters:** `-db`

**Example:**

To retrieve the names of available layouts:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-layoutnames
```

## -new (New record) query command

Creates a new record and populates that record with the contents of any field name/value pairs.

**Required query parameters:** `-db`, `-lay`

**Optional query parameter:** one or more field name(s), `-script`

Note For information on including new data for a portal, see “Adding records to a portal” on page 46.

**Example:**

To add a new record:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&Country=Australia&-new
```

## -scriptnames (Script names) query command

Retrieves the names of all available scripts for a specified database that is hosted by FileMaker Server and enabled for Custom Web Publishing with XML.

**Required query parameters:** `-db`

**Example:**

To retrieve the names of all scripts:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees&-scriptnames
```

### -view (View layout information) query command

If the `FMPXMLLAYOUT` grammar is specified, retrieves layout information from a database and displays it in the `FMPXMLLAYOUT` grammar. If a data grammar (`fmresultset` or `FMPXMLRESULT`) is specified, retrieves the metadata section of XML document and an empty recordset.

**Required query parameters:** `-db`, `-lay`

**Optional query parameter:** `-script`

**Examples:**

To retrieve layout information:

```
http://192.168.123.101/fmi/xml/FMPXMLLAYOUT.xml?-db=employees
&-lay=departments&-view
```

To retrieve metadata information:

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-view
```

## Query parameter reference

This section contains information about the query parameters available for XML requests.

### -db (Database name) query parameter

Specifies the database that the query command is applied to

**Value is:** Name of the database, not including the filename extension if any

Note When specifying the name of the database for the `-db` parameter in query strings, do not include a filename extension. The actual database filename can optionally include an extension, but extensions are not allowed as a value for the `-db` parameter.

**Required with:** All query commands except `-dbnames`

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-findall
```

### -delete.related (Portal records delete) query parameter

Deletes a record from a portal field.

**Optional with:** `-edit` query command

**Requires:** A related table name and a record id

**Example:**

The following example deletes a portal record with a record ID of “20” from the related table called “jobtable”, with a parent record ID of “7”.

```
http://host/fmi/xml/fmresultset.xml?-db=career&-lay=applications&-recid=7
&-delete.related=jobtable.20&-edit
```

## -field (Container field name) query parameter

Specifies the name of a container field.

**Required with:** request for data in a container field

See “About the URL syntax for XML data and container objects” on page 22.

## fieldname (Non-container field name) query parameter

Field names are used to control criteria for the `-find` query command, or to modify the contents of a record. When you need to specify a value for a non-container field for a query command or parameter, use the field name without the hyphen (`-`) character as the name portion of the name/value pair.

**Name is:** Name of the field in the FileMaker database. If the field is not in the underlying table of the layout specified in the query string, the field name must be fully qualified.

It is not recommended to use periods or parentheses in field names. In some cases, field names with periods may work, but field names with the following exceptions can never be used:

- The period cannot be followed by a number. For example, `myfield.9` is an invalid field name.
- The period cannot be followed by the text string `op` (the two letters “op”). For example, `myfield.op` is an invalid field name.
- The period cannot be followed by the text string `global` (the word “global”). For example, `myfield.global` is an invalid field name.

Field names containing any of these exceptions cannot be accessed via XML using an HTTP query. These constructs are reserved for record IDs, as described in the section, “About the syntax for a fully qualified field name” on page 45.

**Value is:** For the `-new` and `-edit` query commands, specify the value you want to store in the field in the current record. For the `-find` query commands, specify the value you want to search for in the field. When you specify the value for a date, time, or timestamp field, specify the value using the “fm” format for that field type. The “fm” formats are `MM/dd/yyyy` for date, `HH:mm:ss` for time, and `MM/dd/yyyy HH:mm:ss` for timestamp.

**Required with:** `-edit` query command

**Optional with:** `-new` and `-find` query commands

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-op=eq&FirstName=Sam&-max=1&-find
```

Note Specifying a field name multiple times in a single request is not supported; FileMaker Server parses all of the values, but uses only the last value parsed.

## fieldname.op (Comparison operator) query parameter

Specifies the comparison operator to apply to the field name that precedes the operator. Comparison operators are used with the `-find` query command.

**Value is:** The operator you want to use. The default operator is “begins with”. Valid operators are as follows:

| Keyword | FileMaker Pro equivalent operator |
|---|---|
| `eq` | **=word** |
| `cn` | ***word*** |
| `bw` | **word*** |
| `ew` | ***word** |
| `gt` | **> word** |
| `gte` | **>= word** |
| `lt` | **< word** |
| `lte` | **<= word** |
| `neq` | **omit, word** |

**Optional with:** `-find` query command

**Requires:** A field name and a value

The syntax for specifying a comparison operator is:

```
table-name::field-name=value&table-name::field-name.op=op-symbol
```

where:

- `table-name` is the table that contains the field and is only required if the field is not in the source table of the layout specified in the query string.
- `op-symbol` is one of the keywords in the preceding table, such as `cn`.

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&name=Tim&name.op=cn&-find
```

You can use any FileMaker Pro find operator by specifying the `bw` keyword. For example, to find a range of values using the range operator (...), you would specify the `bw` keyword and then you would place the characters “...” before the search criteria.

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&IDnum=915...925&IDnum.op=bw&-find
```

For more information on the operators you can use to find text, see FileMaker Pro Help.

## -lay (Layout) query parameter

Specifies the database layout you want to use

**Value is:** Name of the layout

**Required with:** All query commands except `-dbnames`, `-layoutnames`, and `-scriptnames`.

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-view
```

## -lay.response (Switch layout for response) query parameter

Specifies that FileMaker Server should use the layout specified by the `-lay` parameter when processing a request, and switch to the layout specified by the `-lay.response` parameter when processing the XML response.

If you don't include the `-lay.response` parameter, FileMaker Server uses the layout specified by the `-lay` parameter when processing both the request and the response.

You can use the `-lay.response` parameter for XML requests.

**Value is:** Name of the layout

**Optional with:** All query commands except `-dbnames`, `-layoutnames`, and `-scriptnames`.

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=Budget&Salary=100000&Salary.op=gt&-find&-lay.response=ExecList
```

## -lop (Logical operator) query parameter

Specifies how the find criteria in the `-find` query command are combined as either an "and" or an "or" search

**Value is:** `and` or `or`
If the `-lop` query parameter is not included, then the `-find` query command uses the "and" value.

**Optional with:** `-find` query command

Note Not supported by `-findquery` query command.

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&Last+Name=Smith&Birthdate=2/5/1972&-lop=and&-find
```

## -max (Maximum records) query parameter

Specifies the maximum number of records you want returned

**Value is:** A number, or use the value `all` to return all records. If `-max` is not specified, all records are returned.

**Optional with:** `-find`, `-findall`, and `-findquery` query commands

Note The `-max` query parameter does not affect the values returned for portal records. To limit the number of rows returned for portal records, see "–relatedsets.max (Limit portal records) query parameter" on page 57.

**Examples:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-max=10&-findall
```

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-max=all&-findall
```

## -modid (Modification ID) query parameter

The modification ID is an incremental counter that specifies the current version of a record. By specifying a modification ID when you use an `-edit` query command, you can make sure that you are editing the current version of a record. If the modification ID value you specify does not match the current modification ID value in the database, the `-edit` query command is not allowed and an error code is returned.

**Value is:** A modification ID, which is a unique identifier for the current version of a record in a FileMaker database.

**Optional with:** `-edit` query command

**Requires:** `-recid` parameter

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-recid=22&-modid=6&last_name=Jones&-edit
```

## -query (Compound find request) query parameter

Specifies the query names and search criteria for a compound find request. See “–findquery (Compound find) query command” on page 49.

**Value is:** A query expression.

**Required with:** `-findquery` query command

The syntax for a compound find request is:

```
-query=<request-declarations><request-definitions>&-findquery
```

Where:

`<request-declarations>` is two or more request declarations.

- Each request declaration is composed of one or more query identifiers separated by commas, and enclosed in parentheses. A query identifier is the letter “q” followed by a number. For example: `q1`
- Enclosed in parentheses, the multiple queries act as logical AND searches that narrow the found set. For example, `(q1, q2)` returns records that match `q1` and `q2`.

  Note It is not recommended to use the same fields for multiple `q` variables in the same “and” search criteria.

- As with FileMaker Pro, each request can be either a find request or an omit request. A find request adds the matching records to the found set; an omit request removes the matching records from the found set. The default is a find request. For an omit request, put an exclamation point (!) in front of the opening parenthesis.

  For example: `(q1);!(q2)`

  In this example, `q1` is a find request; `q2` is an omit request because it is preceded by an exclamation point.
- Requests are separated by semicolons. Multiple find requests act as logical OR searches that broaden the found set. For example, `(q1);(q2)` returns records that match `q1` or `q2`. Omit requests do not act as logical OR searches because omit requests remove records from the found set.
- Requests are executed in the order specified; the found set includes the results of the entire compound find request.

`<request-definitions>` is a request definition for each request declaration. Each request definition consists of a search field and value definition. A minus (-) sign starts the request definition.

Syntax:

```
-<query-id>=<fieldname>&-<query-id>.value=<value>
```

For example:

```
-q1=typeofanimal&-q1.value=Cat
-q2=name&-q2.value=Fluffy
```

**Example:**

Find records of gray cats that are not named “Fluffy.”

```
http://host/fmi/xml/fmresultset.xml?-db=petclinic&-lay=Patients
&-query=(q1, q2);!(q3)&-q1=typeofanimal&-q1.value=Cat&-q2=color
&-q2.value=Gray&-q3=name&-q3.value=Fluffy&-findquery
```

## -recid (Record ID) query parameter

Specifies the record you want processed. Used mainly by the `-edit`, and `-delete` query commands. Used by the `-view` command to retrieve related value list data in the FMPXMLLAYOUT grammar.

**Value is:** A record ID, which is a unique specifier to a record in a FileMaker database

**Required with:** `-edit`, `-delete`, and `-dup` query commands

**Optional with:** `-find` query and `-view` commands

**Example 1:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-recid=22&-delete
```

**Example 2:**

```
http://localhost/fmi/xml/FMPXMLLAYOUT.xml?-db=test&-lay=empty&-view&-recid=9
```

## -relatedsets.filter (Filter portal records) query parameter

Specifies whether to filter the portal records to be returned in the results for this query.

**Value is:** `layout` or `none`

- If `-relatedsets.filter` is set to `layout`, then the **Initial row** setting specified in the FileMaker Pro Portal Setup dialog box is respected.
  - If the **Show vertical scroll bar** setting is enabled in the Portal Setup dialog box, then use the `-relatedsets.max` option to specify the maximum number of records to be returned. See "–relatedsets.max (Limit portal records) query parameter" below.
  - If the **Show vertical scroll bar** setting is disabled or the `-relatedsets.max` option is not used, then the **Number of rows** setting in the Portal Setup dialog box determines the number of portal records to be returned.
- The default value is `none` if this parameter is not specified. If `-relatedsets.filter` is set to `none`, then the Web Publishing Engine returns all records in the portal. The values for **Initial row** and **Number of rows** specified in the Portal Setup dialog box are ignored.

**Notes:**

- The `-relatedsets.filter` parameter has no impact on how portal records are sorted in XML queries. The sort specified in FileMaker Pro is respected whether the `-relatedsets.filter` parameter value is `layout` or `none`.
- The **Filter portal records** setting in the Portal Setup dialog box is not supported for XML queries. Any calculation specified for the **Filter portal records** setting is ignored.

**Optional with:** `-find`, `-edit`, `-new`, `-dup`, and `-findquery`.

**Examples:**

```
http://localhost/fmi/xml/fmresultset.xml?-db=FMPHP_Sample&-lay=English
&-relatedsets.filter=none&-findany
http://localhost/fmi/xml/fmresultset.xml?-db=FMPHP_Sample
&-lay=English&relatedsets.filter=layout&-relatedsets.max=all&-findany
http://localhost/fmi/xml/fmresultset.xml?-db=FMPHP_Sample&-lay=English
&-relatedsets.filter=layout&-relatedsets.max=10&-findany
```

## -relatedsets.max (Limit portal records) query parameter

Specifies the maximum number of portal records to return in the results for this query.

**Value is:** an integer, or `all`.

- The `-relatedsets.max` parameter is respected only if the **Show vertical scroll bar** setting is enabled in the FileMaker Pro Portal Setup dialog box and the `-relatedsets.filter` parameter is `layout`.
  - If the `-relatedsets.max` parameter specifies an integer, then the Web Publishing Engine returns that number of portal records starting with the initial row.
  - If the `-relatedsets.max` parameter specifies `all`, then the Web Publishing Engine returns all portal records.

Note For information on filtering portal records, see "–relatedsets.filter (Filter portal records) query parameter" above.

**Optional with:** `-find`, `-edit`, `-new`, `-dup`, and `-findquery`.

**Examples:**

```
http://localhost/fmi/xml/fmresultset.xml?-db=FMPHP_Sample
&-lay=English&relatedsets.filter=layout&-relatedsets.max=all&-findany
http://localhost/fmi/xml/fmresultset.xml?-db=FMPHP_Sample&-lay=English
&-relatedsets.filter=layout&-relatedsets.max=10&-findany
```

## -script (Script) query parameter

Specifies the FileMaker script to run after the query command and sorting are executed. See “Understanding how an XML request is processed” on page 36.

**Value is:** Script name

**Optional with:** all query commands except `-dbnames`, `-layoutnames`, and `-scriptnames`

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-script=myscript&-findall
```

## -script.param (Pass parameter to Script) query parameter

Passes a parameter to the FileMaker script specified by `-script`

**Value is:** A single text parameter.

- To pass in multiple parameters, you can create a string delimiting the parameters and have your script parse out the individual parameters. For example, pass “`param1|param2|param3`” as a list with the “`|`” character URL-encoded as this: `param1%7Cparam2%7Cparam3`
- To treat the text parameter as a value that is not text, your script can convert the text value. For example, to convert the text value to a number, your script could include the following: `GetAsNumber(Get(ScriptParam))`
- If your query contains `-script.param` without `-script`, then `-script.param` is ignored.
- If your query contains more than one `-script.param`, then the Web Publishing Engine uses the last value that it parses.

**Optional with:** `-script`

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-script=myscript&-script.param=Smith%7CChatterjee%7CSu
&-findall
```

## -script.prefind (Script before Find) query parameter

Specifies the FileMaker script to run before finding and sorting of records (if specified) during processing of the `-find` query command

**Value is:** Script name

**Optional with:** all query commands except `-dbnames`, `-layoutnames`, and `-scriptnames`

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-script.prefind=myscript&-findall
```

## -script.prefind.param (Pass parameter to Script before Find) query parameter

Passes a parameter to the FileMaker script specified by `-script.prefind`

**Value is:** A single text parameter.

- To pass in multiple parameters, you can create a string delimiting the parameters and have your script parse out the individual parameters. For example, pass "`param1|param2|param3`" as a list with the "`|`" character URL-encoded as this: `param1%7Cparam2%7Cparam3`
- To treat the text parameter as a value that is not text, your script can convert the text value. For example, to convert the text value to a number, your script could include the following: `GetAsNumber(Get(ScriptParam))`
- If your query contains `-script.prefind.param` without `-script.prefind`, then `-script.prefind.param` is ignored.
- If your query contains more than one `-script.prefind.param`, then the Web Publishing Engine uses the last value that it parses.

**Optional with:** `-script.prefind`

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-script.prefind=myscript&-script.prefind.param=payroll
&-findall
```

## -script.presort (Script before Sort) query parameter

Specifies the FileMaker script to run after finding records (if specified) and before sorting records during processing of the `-find` query command

**Optional with:** all query commands except `-dbnames`, `-layoutnames`, and `-scriptnames`

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-script.presort=myscript&-sortfield.1=dept
&-sortfield.2=rating&-findall
```

## -script.presort.param (Pass parameter to Script before Sort) query parameter

Passes a parameter to the FileMaker script specified by `-script.presort`

**Value is:** A single text parameter.

- To pass in multiple parameters, you can create a string delimiting the parameters and have your script parse out the individual parameters. For example, pass "`param1|param2|param3`" as a list with the "`|`" character URL-encoded as this: `param1%7Cparam2%7Cparam3`
- To treat the text parameter as a value that is not text, your script can convert the text value. For example, to convert the text value to a number, your script could include the following: `GetAsNumber(Get(ScriptParam))`
- If your query contains `-script.presort.param` without `-script.presort`, then `-script.presort.param` is ignored.
- If your query contains more than one `-script.presort.param`, then the Web Publishing Engine uses the last value that it parses.

**Optional with:** `-script.presort`

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-script.presort=myscript&-script.presort.param=18%7C65
&-sortfield.1=dept&-sortfield.2=rating&-findall
```

## -skip (Skip records) query parameter

Specifies how many records to skip in the found set

**Value is:** A number. If the value is greater than the number of records in the found set, then no record is displayed. The default value is 0.

**Optional with:** `-find` query command

In the following example, the first 10 records in the found set are skipped and records 11 through 15 are returned.

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=departments&-skip=10&-max=5&-findall
```

## -sortfield (Sort field) query parameter

Specifies the field to use for sorting

**Value is:** field name

**Optional with:** `-find` or `-findall` query commands

The `-sortfield` query parameter can been used multiple times to perform multiple field sorts. The syntax for specifying the precedence of the sort fields is:

```
-sortfield.precedence-number=fully-qualified-field-name
```

where the `precedence-number` in the `-sortfield.precedence-number` query parameter is a number that specifies the precedence to use for multiple sort fields. The value for `precedence-number`:

- must start from 1.
- must increment sequentially.
- must not be greater than 9.

In the following example, the “dept” field is sorted first, and then the “rating” field is sorted. Both fields are sorted in ascending order because the `-sortorder` query parameter is not specified.

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=performance&-sortfield.1=dept&-sortfield.2=rating&-findall
```

## -sortorder (Sort order) query parameter

Indicates the direction of a sort

**Value is:** The sort order. Valid sort orders are as follows, where `<value-list-name>` is a value list name such as `Custom`:

| Keyword | FileMaker Pro Equivalent Operator |
|---|---|
| `ascend` | Sort a to z, -10 to 10 |
| `descend` | Sort z to a, 10 to -10 |
| `<value-list-name>` | Sort using the specified value list associated with the field on the layout |

**Optional with:** `-find` or `-findall` query commands

**Requires:** `-sortfield` query parameter

The `-sortorder` query parameter can been used with the `-sortfield` query parameter to specify the sort order of multiple sort fields. The syntax for specifying the sort order of a sort field is:

```
-sortorder.precedence-number=sort-method
```

where:

- `precedence-number` in the `-sortorder.precedence-number` parameter is a number from 1 to 9 that specifies the `-sortfield` query parameter that the `-sortorder` query parameter applies to.
- `sort-method` is one of the keywords in the preceding table to specify the sort order, such as ascend

In the following example, the sort order of the highest precedence sort field (dept) is ascend, and the sort order of the second highest precedence sort field (rating) is descend. The `precedence-number` 2 in `-sortorder.2` specifies that the query parameter `-sortorder.2=descend` applies to the `-sortfield.2=rating` query parameter.

**Example:**

```
http://192.168.123.101/fmi/xml/fmresultset.xml?-db=employees
&-lay=performance&-sortfield.1=dept&-sortorder.1=ascend&-sortfield.2=rating
&-sortorder.2=descend&-findall
```

Note If a `-sortorder` query parameter is not specified for a sort field, the default ascending sort is used.

# Appendix B
# Error codes for Custom Web Publishing

The Web Publishing Engine generates error codes for database and query string errors that may occur during an XML data request.

This appendix lists the error codes known at the time this document was published. For a list of updated error codes, see the FileMaker Knowledge Base (http://help.filemaker.com).

## Error code numbers in XML format

The Web Publishing Engine generates an error code for databases published in XML format whenever data is requested. This type of error code value is inserted at the beginning of the XML document in the `<error code>` element for the `fmresultset` grammar, or in the `<ERRORCODE>` element for the `FMPXMLRESULT` or `FMPXMLLAYOUT` grammars. An error code of 0 indicates that no error has occurred.

Here is an example of the database error code in the `fmresultset` grammar:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE fmresultset PUBLIC "-//FMI//DTD fmresultset//EN"
"/fmi/xml/fmresultset.dtd">
<fmresultset xmlns="http://www.filemaker.com/xml/fmresultset" version="1.0">
    <error code="0"></error>
```

Here is an example of the database error code in the `FMPXMLRESULT` grammar:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE FMPXMLRESULT PUBLIC "-//FMI//DTD FMPXMLRESULT//EN"
"/fmi/xml/FMPXMLRESULT.dtd">
<fmpxmlresult xmlns="http://www.filemaker.com/fmpxmlresult">
    <ERRORCODE>0</ERRORCODE>
```

It is up to you, as the developer of the Custom Web Publishing solution, to check the value of the `<error code>` or `<ERRORCODE>` element and handle it appropriately. The Web Publishing Engine does not handle database errors.

## Error code numbers for FileMaker databases

| Error Number | Description |
|---|---|
| -1 | Unknown error |
| 0 | No error |
| 1 | User canceled action |
| 2 | Memory error |
| 3 | Command is unavailable (for example, wrong operating system, wrong mode, etc.) |
| 4 | Command is unknown |
| 5 | Command is invalid (for example, a Set Field script step does not have a calculation specified) |
| 6 | File is read-only |

| Error Number | Description |
|---|---|
| 7 | Running out of memory |
| 8 | Empty result |
| 9 | Insufficient privileges |
| 10 | Requested data is missing |
| 11 | Name is not valid |
| 12 | Name already exists |
| 13 | File or object is in use |
| 14 | Out of range |
| 15 | Can’t divide by zero |
| 16 | Operation failed, request retry (for example, a user query) |
| 17 | Attempt to convert foreign character set to UTF-16 failed |
| 18 | Client must provide account information to proceed |
| 19 | String contains characters other than A-Z, a-z, 0-9 (ASCII) |
| 20 | Command or operation cancelled by triggered script |
| 100 | File is missing |
| 101 | Record is missing |
| 102 | Field is missing |
| 103 | Relationship is missing |
| 104 | Script is missing |
| 105 | Layout is missing |
| 106 | Table is missing |
| 107 | Index is missing |
| 108 | Value list is missing |
| 109 | Privilege set is missing |
| 110 | Related tables are missing |
| 111 | Field repetition is invalid |
| 112 | Window is missing |
| 113 | Function is missing |
| 114 | File reference is missing |
| 115 | Menu set is missing |
| 116 | Layout object is missing |
| 117 | Data source is missing |
| 118 | Theme is missing |
| 130 | Files are damaged or missing and must be reinstalled |
| 131 | Language pack files are missing (such as template files) |
| 200 | Record access is denied |
| 201 | Field cannot be modified |
| 202 | Field access is denied |

| Error Number | Description |
|---|---|
| 203 | No records in file to print, or password doesn't allow print access |
| 204 | No access to field(s) in sort order |
| 205 | User does not have access privileges to create new records; import will overwrite existing data |
| 206 | User does not have password change privileges, or file is not modifiable |
| 207 | User does not have sufficient privileges to change database schema, or file is not modifiable |
| 208 | Password does not contain enough characters |
| 209 | New password must be different from existing one |
| 210 | User account is inactive |
| 211 | Password has expired |
| 212 | Invalid user account and/or password. Please try again |
| 213 | User account and/or password does not exist |
| 214 | Too many login attempts |
| 215 | Administrator privileges cannot be duplicated |
| 216 | Guest account cannot be duplicated |
| 217 | User does not have sufficient privileges to modify administrator account |
| 218 | Password and verify password do not match |
| 300 | File is locked or in use |
| 301 | Record is in use by another user |
| 302 | Table is in use by another user |
| 303 | Database schema is in use by another user |
| 304 | Layout is in use by another user |
| 306 | Record modification ID does not match |
| 307 | Transaction could not be locked because of a communication error with the host |
| 308 | Theme is in use by another user |
| 400 | Find criteria are empty |
| 401 | No records match the request |
| 402 | Selected field is not a match field for a lookup |
| 403 | Exceeding maximum record limit for trial version of FileMaker Pro |
| 404 | Sort order is invalid |
| 405 | Number of records specified exceeds number of records that can be omitted |
| 406 | Replace/Reserialize criteria are invalid |
| 407 | One or both match fields are missing (invalid relationship) |
| 408 | Specified field has inappropriate data type for this operation |
| 409 | Import order is invalid |
| 410 | Export order is invalid |
| 412 | Wrong version of FileMaker Pro used to recover file |
| 413 | Specified field has inappropriate field type |
| 414 | Layout cannot display the result |

| Error Number | Description |
|---|---|
| 415 | One or more required related records are not available |
| 416 | A primary key is required from the data source table |
| 417 | Database is not a supported data source |
| 500 | Date value does not meet validation entry options |
| 501 | Time value does not meet validation entry options |
| 502 | Number value does not meet validation entry options |
| 503 | Value in field is not within the range specified in validation entry options |
| 504 | Value in field is not unique as required in validation entry options |
| 505 | Value in field is not an existing value in the database file as required in validation entry options |
| 506 | Value in field is not listed on the value list specified in validation entry option |
| 507 | Value in field failed calculation test of validation entry option |
| 508 | Invalid value entered in Find mode |
| 509 | Field requires a valid value |
| 510 | Related value is empty or unavailable |
| 511 | Value in field exceeds maximum number of allowed characters |
| 512 | Record was already modified by another user |
| 600 | Print error has occurred |
| 601 | Combined header and footer exceed one page |
| 602 | Body doesn't fit on a page for current column setup |
| 603 | Print connection lost |
| 700 | File is of the wrong file type for import |
| 706 | EPSF file has no preview image |
| 707 | Graphic translator cannot be found |
| 708 | Can't import the file or need color monitor support to import file |
| 709 | QuickTime movie import failed |
| 710 | Unable to update QuickTime file reference because the database file is read-only |
| 711 | Import translator cannot be found |
| 714 | Password privileges do not allow the operation |
| 715 | Specified Excel worksheet or named range is missing |
| 716 | A SQL query using DELETE, INSERT, or UPDATE is not allowed for ODBC import |
| 717 | There is not enough XML/XSL information to proceed with the import or export |
| 718 | Error in parsing XML file (from Xerces) |
| 719 | Error in transforming XML using XSL (from Xalan) |
| 720 | Error when exporting; intended format does not support repeating fields |
| 721 | Unknown error occurred in the parser or the transformer |
| 722 | Cannot import data into a file that has no fields |
| 723 | You do not have permission to add records to or modify records in the target table |
| 724 | You do not have permission to add records to the target table |

| Error Number | Description |
|---|---|
| 725 | You do not have permission to modify records in the target table |
| 726 | There are more records in the import file than in the target table. Not all records were imported |
| 727 | There are more records in the target table than in the import file. Not all records were updated |
| 729 | Errors occurred during import. Records could not be imported |
| 730 | Unsupported Excel version (convert file to Excel 2000 format or a later supported version and try again) |
| 731 | File you are importing from contains no data |
| 732 | This file cannot be inserted because it contains other files |
| 733 | A table cannot be imported into itself |
| 734 | This file type cannot be displayed as a picture |
| 735 | This file type cannot be displayed as a picture. It will be inserted and displayed as a file |
| 736 | There is too much data to be exported to this format. It will be truncated. |
| 737 | Bento table you are importing is missing |
| 800 | Unable to create file on disk |
| 801 | Unable to create temporary file on System disk |
| 802 | Unable to open file.<br>This error can be cause by one or more of the following:<br>▪ Invalid database name<br>▪ File is closed in FileMaker Server<br>▪ Invalid permission |
| 803 | File is single user or host cannot be found |
| 804 | File cannot be opened as read-only in its current state |
| 805 | File is damaged; use Recover command |
| 806 | File cannot be opened with this version of FileMaker Pro |
| 807 | File is not a FileMaker Pro file or is severely damaged |
| 808 | Cannot open file because access privileges are damaged |
| 809 | Disk/volume is full |
| 810 | Disk/volume is locked |
| 811 | Temporary file cannot be opened as FileMaker Pro file |
| 813 | Record Synchronization error on network |
| 814 | File(s) cannot be opened because maximum number is open |
| 815 | Couldn’t open lookup file |
| 816 | Unable to convert file |
| 817 | Unable to open file because it does not belong to this solution |
| 819 | Cannot save a local copy of a remote file |
| 820 | File is in the process of being closed |
| 821 | Host forced a disconnect |
| 822 | FMI files not found; reinstall missing files |
| 823 | Cannot set file to single-user, guests are connected |
| 824 | File is damaged or not a FileMaker file |

| Error Number | Description |
|---|---|
| 825 | File is not authorized to reference the protected file |
| 826 | File path specified is not a valid file path |
| 850 | Path is not valid for the operating system |
| 851 | Cannot delete an external file from disk |
| 852 | Cannot write a file to the external storage |
| 900 | General spelling engine error |
| 901 | Main spelling dictionary not installed |
| 902 | Could not launch the Help system |
| 903 | Command cannot be used in a shared file |
| 904 | Command can only be used in a file hosted under FileMaker Server |
| 905 | No active field selected; command can only be used if there is an active field |
| 906 | Current file is not shared; command can be used only if the file is shared |
| 920 | Can’t initialize the spelling engine |
| 921 | User dictionary cannot be loaded for editing |
| 922 | User dictionary cannot be found |
| 923 | User dictionary is read-only |
| 951 | An unexpected error occurred |
| 954 | Unsupported XML grammar |
| 955 | No database name |
| 956 | Maximum number of database sessions exceeded |
| 957 | Conflicting commands |
| 958 | Parameter missing in query |
| 959 | Custom Web Publishing technology is disabled |
| 960 | Parameter is invalid |
| 1200 | Generic calculation error |
| 1201 | Too few parameters in the function |
| 1202 | Too many parameters in the function |
| 1203 | Unexpected end of calculation |
| 1204 | Number, text constant, field name or "(" expected |
| 1205 | Comment is not terminated with "*/" |
| 1206 | Text constant must end with a quotation mark |
| 1207 | Unbalanced parenthesis |
| 1208 | Operator missing, function not found or "(" not expected |
| 1209 | Name (such as field name or layout name) is missing |
| 1210 | Plug-in function has already been registered |
| 1211 | List usage is not allowed in this function |
| 1212 | An operator (for example, +, -, *) is expected here |
| 1213 | This variable has already been defined in the Let function |

| Error Number | Description |
|---|---|
| 1214 | AVERAGE, COUNT, EXTEND, GETREPETITION, MAX, MIN, NPV, STDEV, SUM and GETSUMMARY: expression found where a field alone is needed |
| 1215 | This parameter is an invalid Get function parameter |
| 1216 | Only Summary fields allowed as first argument in GETSUMMARY |
| 1217 | Break field is invalid |
| 1218 | Cannot evaluate the number |
| 1219 | A field cannot be used in its own formula |
| 1220 | Field type must be normal or calculated |
| 1221 | Data type must be number, date, time, or timestamp |
| 1222 | Calculation cannot be stored |
| 1223 | Function referred to is not yet implemented |
| 1224 | Function referred to does not exist |
| 1225 | Function referred to is not supported in this context |
| 1300 | The specified name can’t be used |
| 1400 | ODBC client driver initialization failed; make sure the ODBC client drivers are properly installed |
| 1401 | Failed to allocate environment (ODBC) |
| 1402 | Failed to free environment (ODBC) |
| 1403 | Failed to disconnect (ODBC) |
| 1404 | Failed to allocate connection (ODBC) |
| 1405 | Failed to free connection (ODBC) |
| 1406 | Failed check for SQL API (ODBC) |
| 1407 | Failed to allocate statement (ODBC) |
| 1408 | Extended error (ODBC) |
| 1409 | Extended error (ODBC) |
| 1410 | Extended error (ODBC) |
| 1411 | Extended error (ODBC) |
| 1412 | Extended error (ODBC) |
| 1413 | Extended error (ODBC) |
| 1414 | SQL statement is too long |
| 1450 | Action requires PHP privilege extension |
| 1451 | Action requires that current file be remote |
| 1501 | SMTP authentication failed |
| 1502 | Connection refused by SMTP server |
| 1503 | Error with SSL |
| 1504 | SMTP server requires the connection to be encrypted |
| 1505 | Specified authentication is not supported by SMTP server |
| 1506 | Email message(s) could not be sent successfully |
| 1507 | Unable to log in to the SMTP server |
| 1550 | Cannot load the plug-in or the plug-in is not a valid plug-in |

| Error Number | Description |
|---|---|
| 1551 | Cannot install the plug-in. Cannot delete an existing plug-in or cannot write to the folder or disk |
| 1626 | Protocol is not supported |
| 1627 | Authentication failed |
| 1628 | There was an error with SSL |
| 1629 | Connection timed out; the timeout value is 60 seconds |
| 1630 | URL format is incorrect |
| 1631 | Connection failed |

# Appendix C
# XML query changes in FileMaker 12

This appendix lists syntactic and semantic changes to the XML query commands and parameters for FileMaker 12.

## XML query changes in syntax

The following query commands have been deleted for FileMaker 12:

- `-process`

The following query parameters have been deleted for FileMaker 12:

- `-encoding`
- `-grammar`
- `-stylehref`
- `-styletype`
- `-token.[string]`

## XML query changes in semantics

### Differences in query parsing

The Web Publishing Engine for FileMaker 12 has significant changes to the order in which query commands are parsed. See “Query command parsing” on page 44 for information on the query command parsing order.

For example, as a result of the query command parsing order change, FileMaker 12 does not support using a `-find` query with no find criteria, even if you include a `-script` parameter that specifies the find criteria. For example, the following query command would work in FileMaker 11, assuming the script `performFind` specifies the find criteria:

```
-db=Customers&-lay=account&-script=performFind&-find
```

But in FileMaker 12, this example returns error code 400 (Find criteria are empty). In FileMaker 12, you may include `-findall` as the find criteria:

```
-db=Customers&-lay=account&-findall&-script=performFind
```

In addition, the Web Publishing Engine for FileMaker 12:

- Ignores valid commands or parameters that are extraneous in a query. For example, in the following query, the `-lop` parameter is a valid parameter, but it is extraneous in the `-delete` command:

  ```
  -db=test&-lay=test&-recid=82&-delete&f1=hi&-lop=and
  ```

  Because the `-lop` parameter uses the valid argument `and`, it is ignored, and no error is returned.

- Ignores the same command passed more than once. For example: `-dbnames&-dbnames`

  However, the Web Publishing Engine does return an error if you specify more than two different commands in the same query. For example: `-find&-edit`
- Ignores double ampersands or empty parameters in a query request. FileMaker 11 returns an error.
- Converts all reserved words to lowercase. FileMaker 11 returns errors for uppercase reserved words in some cases.
- Ignores the `field.op` parameter for a query that is not a `-find` query. FileMaker 11 replaces the field with the `field.op` parameter.
- Ignores all non-global fields passed in for `-findany`, `-findall`, `-find` with recid, `-findquery`, `-delete`, and `-dup` commands.
- Requires global fields to be appended with the "`.global`" suffix.

## Differences in query processing

The Web Publishing Engine for FileMaker 12:

- Edits global fields for `-findall`, `-findany`, `-find`, `-findquery`, `-new`, `-edit`, and `-dup` commands.
- Resets global fields that are edited manually back to their original values after the query is processed and results are returned. Global fields that are edited through a script are not reset.
- Returns all records that satisfy the find criteria for a `-find` query with `field-name.op` set to `neq` and `-lop` set to `or`. FileMaker 11 does not process this query correctly.
- Returns all records that have a value for each field parameter passed as an empty string for a `-find` query. FileMaker 11 removes each empty string field from the search criteria.
- Returns decimal seconds for date, time, and timestamp fields. FileMaker 11 returns integer seconds.
- For value lists defined with the setting **Include only related values starting from**, returns no values unless a recid is included. FileMaker 11 returns the values related to the first record.

## Differences in error codes returned

| Error condition | FileMaker 11 error code | FileMaker 12 error code |
|---|---|---|
| Invalid max or skip values. Example: `-db=basicfinds&-lay=layoutone&-max=-1&-findall` | 5 (Command is invalid) | 960 (Parameter is invalid) |
| Sort order number is missing or invalid Example: `-db=basicsorts&-lay=layoutone &-sortfield.=textfield&-findall` | 5 (Command is invalid) | 404 (Sort order is invalid) |
| Invalid related table specified. Example: `-db=relfinds &-lay=layoutone &aliasdoesntexist::relatedtextfield=sometext&-find` | 102 (Field is missing) | 106 (Table is missing) |
| An empty sort field in a query. Example: `-db=basicsorts&-lay=layoutone&-sortfield.1= &-findall` | Ignored. No error code. | 102 (Field is missing) |
| –find query submitted without any fields. Example: `-db=basicedits&-lay=layoutone&-find` | No error. FileMaker 11 returns all records. | 400 (Find criteria are empty) |
| –find query submitted with only global fields. Example: `-db=basicfinds&-lay=layoutone &globaltextfield.global=sales&-find` | No error. FileMaker 11 returns all records. | 400 (Find criteria are empty) |

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