

FOF Developer's Guide

**The compact reference to Joomla!'s Rapid
Application Development framework**

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Chapter 1. Introducing FOF

1. Introduction

1.1. What is FOF

FOF (Framework on Framework) is a rapid application development framework for Joomla!. Unlike other frameworks it is not standalone. It extends the Joomla! Platform instead of replacing it, featuring its own forked and extended version of the MVC classes, keeping a strong semblance to the existing Joomla! MVC API. This means that you don't have to relearn writing Joomla! extensions. Instead, you can start being productive from the first day you're using it. Our goal is to always support the officially supported LTS versions of Joomla! and not break backwards compatibility without a clear deprecation and migration path.

FOF is compatible with the database technologies used by Joomla! itself: MySQL, SQL Server (and Windows Azure SQL), PostgreSQL. In most cases you can write a component in one database server technology and have it run on the other database server technologies with minimal or no effort.

FOF is currently used by free and commercial components for Joomla! by an increasing number of developers.

1.2. Free Software means collaboration

The reason of existence of FOSS (Free and Open Source Software) is collaboration between developers. FOF is no exception; it exists because and for the community of Joomla! developers. It is provided free of charge and with all of the freedoms of the GPL for you to benefit. And in true Free Software spirit, the community aspect is very strong. Participating is easy and fun.

If you want to discuss FOF there is a Google Groups mailing list [<https://groups.google.com/forum/?hl=en&fromgroups#!forum/frameworkonframework>]. This is a peer discussion group where developers working with FOF can freely discuss.

If you have a feature proposal or have found a bug, but you're not sure how to code it yourself, please report it on the list.

If you have a patch feel free to fork this project on GitHub [<https://github.com/akeeba/fof>] (you only need a free account to do that) and send a pull request. Please remember to describe what you intended to achieve to help me review your code faster.

If you've found a cool hack (in the benign sense of the word, not the malicious one...), something missing from the documentation or have a tip which can help other developers feel free to edit the Wiki. We're all grown-ups and professionals, I believe there is no need of policing the wiki edits. If you're unsure about whether a wiki edit is appropriate, please ask on the list.

1.3. Preface to this documentation

FOF is a rapid application development framework for Joomla!. Instead of trying to completely replace Joomla!'s own API (formerly known as the Joomla! Platform) it builds upon it and extends it both in scope and features. In the end of the day it enables agony-free extension development for the Joomla! CMS.

In order to exploit the time-saving capabilities of the FOF framework to the maximum you need to understand how it's organized, the conventions used and how its different pieces work together. This documentation attempts to provide you with this knowledge.

As with every piece of documentation we had to answer two big questions: where do we start and how do we structure the content. The first question was easy to answer. Having given the presentation of the FOF framework countless times we have developed an intuitive grasp of how to start presenting it: from the abstract to the concrete.

The second question was harder to answer. Do we write a dry reference to the framework or more of a story-telling documentation which builds up its reader's knowledge? Since we are all developers we can read the code (and DocBlocks), meaning that the first option is redundant. Therefore we decided to go for the second option.

As a result this documentation does not attempt to be a complete reference, a development gospel, the one and only source of information on FOF. On the contrary, this documentation aims to be the beginning of your journey, much like a travel guide. What matters the most is the journey itself, writing your own extensions based on FOF. As you go on writing software you will be full of questions. Most of them you'll answer yourself. Some of them will be already answered in the wiki. A few of them you'll have to ask on the mailing list. In the end of the day you will be richer in knowledge. If you do dig up a golden nugget of knowledge, please do consider writing a wiki page. This way we'll all be richer and enjoy our coding trip even more.

Have fun and code on!

2. Getting started with FOF

2.1. Download and install FOF

You can download FOF as an installable Joomla! library package from our repository [<https://www.akeebabackup.com/download/fof.html>]. You can install it like any other extension under Joomla! 2.x and later.

Using the latest development version

You can clone a read-only copy of the Git repository of FOF in your local machine. Make sure you symlink or copy the fof directory to your dev site's libraries/fof directory. Alternatively, we publish dev releases in the dev release repository [<https://www.akeebabackup.com/download/fof-dev.html>]. These are installable packages but please note that they may be out of date compared to the Git HEAD. Dev releases are not published automatically and may be several revisions behind the current Git master branch.

2.2. Using it in your extension

The recommended method for including FOF in your component, module or plugin is using this short code snippet right after your defined('_JEXEC') or die() statement (Joomla! 2.x and later):

```
if (!defined('FOF_INCLUDED'))
{
    include_once JPATH_LIBRARIES . '/fof/include.php';
}
```

Alternatively, you can use the one-liner:

```
require_once JPATH_LIBRARIES . '/fof/include.php';
```

From that point onwards you can use FOF in your extension.

2.3. Installing FOF with your component

Unfortunately, Joomla! doesn't allow us to version checking before installing a library package. This means that it's your responsibility to check that there is no newer version of FOF installed in the user's site before attempting to install

FOF with your extension. In the following paragraphs we are going to demonstrate one way to do that for Joomla! 2.x / 3.x component packages.

Include a directory called fof in your installation package. The directory should contain the files of the installation package's fof directory. Then, in your script.mycomponent.php file add the following method:

```
/**
 * Check if FOF is already installed and install if not
 *
 * @param object $parent class calling this method
 *
 * @return array          Array with performed actions summary
 */
private function _installFOF($parent)
{
    $src = $parent->getParent()->getPath('source');

    // Load dependencies
    JLoader::import('joomla.filesystem.file');
    JLoader::import('joomla.utilities.date');
    $source = $src . '/fof';

    if (!defined('JPATH_LIBRARIES'))
    {
        $target = JPATH_ROOT . '/libraries/fof';
    }
    else
    {
        $target = JPATH_LIBRARIES . '/fof';
    }
    $haveToInstallFOF = false;

    if (!is_dir($target))
    {
        $haveToInstallFOF = true;
    }
    else
    {
        $fofVersion = array();

        if (file_exists($target . '/version.txt'))
        {
            $rawData = JFile::read($target . '/version.txt');
            $info = explode("\n", $rawData);
            $fofVersion['installed'] = array(
                'version' => trim($info[0]),
                'date' => new JDate(trim($info[1]))
            );
        }
        else
        {
            $fofVersion['installed'] = array(
                'version' => '0.0',
                'date' => new JDate('2011-01-01')
            );
        }
    }
}
```

```
        );
    }

    $rawData = JFile::read($source . '/version.txt');
    $info     = explode("\n", $rawData);
    $fofVersion['package'] = array(
        'version' => trim($info[0]),
        'date'    => new JDate(trim($info[1]))
    );

    $haveToInstallFOF = $fofVersion['package']['date']->toUNIX() > $fofVersion['instal
}

$installedFOF = false;

if ($haveToInstallFOF)
{
    $versionSource = 'package';
    $installer = new JInstaller;
    $installedFOF = $installer->install($source);
}
else
{
    $versionSource = 'installed';
}

if (!isset($fofVersion))
{
    $fofVersion = array();

    if (file_exists($target . '/version.txt'))
    {
        $rawData = JFile::read($target . '/version.txt');
        $info     = explode("\n", $rawData);
        $fofVersion['installed'] = array(
            'version' => trim($info[0]),
            'date'    => new JDate(trim($info[1]))
        );
    }
    else
    {
        $fofVersion['installed'] = array(
            'version' => '0.0',
            'date'    => new JDate('2011-01-01')
        );
    }

    $rawData = JFile::read($source . '/version.txt');
    $info     = explode("\n", $rawData);
    $fofVersion['package'] = array(
        'version' => trim($info[0]),
        'date'    => new JDate(trim($info[1]))
    );
    $versionSource = 'installed';
}
```

```
    }

    if (!($fofVersion[$versionSource]['date'] instanceof JDate))
    {
        $fofVersion[$versionSource]['date'] = new JDate;
    }

    return array(
        'required' => $haveToInstallFOF,
        'installed' => $installedFOF,
        'version' => $fofVersion[$versionSource]['version'],
        'date' => $fofVersion[$versionSource]['date']->format('Y-m-d'),
    );
}
```

You need to call it from inside your `postflight()` method. For example:

```
/**
 * Method to run after an install/update/uninstall method
 *
 * @param object $type type of change (install, update or discover_install)
 * @param object $parent class calling this method
 *
 * @return void
 */
function postflight($type, $parent)
{
    $fofInstallationStatus = $this->_installFOF($parent);
}
```

Warning

Due to a bug/feature in Joomla! 1.6 and later, your component's manifest file must start with a letter before L, otherwise Joomla! will assume that `lib_fof.xml` is your extension's XML manifest and install FOF instead of your extension. We suggest using the `com_yourComponentName.xml` convention, e.g. `com_todo.xml`. There is a patch pending in Joomla!'s tracker for this issue, hopefully it will be accepted sometime soon.

Tip

Since FOF 2.4.0 you can create an installation script which extends `F0FUtilsInstallscript`, then put a copy of the latest stable build of FOF inside a top-level directory called `fof` in your installationpackage archive. `F0FUtilsInstallscript` will install FOF automatically for you. Check out the installation script in Akeeba Backup Core for a real-world example

2.4. Sample applications

FOF comes with two sample applications which are used to demonstrate its features, To-Do [<https://github.com/akeeba/todo-fof-example>] and Contact Us [<https://github.com/akeeba/contactus>]. These were conceived and developed in different points of FOF's development. As a result they are always in a state of flux and will definitely not expose all of FOF's features.

Another good way to learn some FOF tricks is by reading the source code of existing FOF-based components. Just remember that we are all real world developers and sometimes our code is anything but academically correct ;)

3. Key Features

Some of the key features / highlights of FOF:

Convention over configuration, Rails style.

Instead of having to painstakingly code every single bit of your component, it's sufficient to use our naming conventions, inspired by Ruby on Rails conventions. For example, if you have `com_example`, the foobar view will read from the `#__example_foobars` table which has a unique key named `example_foobar_id`. The default implementation of controllers, models, tables and views will also cater for the majority of use cases, minimising the code you'll need to write.

HMVC today, without relearning component development.

There's a lot of talk about the need to re-engineer the MVC classes in Joomla! to support HMVC. What if we could give you HMVC support using the existing MVC classes, today, without having to relearn how to write components? Yes, it's possible with FOF. It has been possible since September 2011, actually. And for those who mumble their words and spread FUD, yes, it IS HMVC by any definition. The very existence of the `FOFDispatcher` class proves the point.

Easy reuse of view template files without ugly `include()`.

More often than not you want to reuse view template files across views. The "traditional" way was by using `include()` or `require()` statements. This meant, however, that template overrides ceased working. Not any more! Using `FOFView::loadAnyTemplate()` you can load any view template file from the front- or back-end of your component or any other component, automatically respecting template overrides.

Automatic language loading and easy overrides.

Are you sick and tired of having to load your component's language files manually? Do you end up with a lot of untranslated strings when your translators don't catch up with your new features? Yes, that sucks. It's easy to overcome. FOF will automatically handle language loading for you.

Media files override (works like template overrides).

So far you knew that you can override Joomla!'s view template files using template overrides. But what about CSS or Javascript files? This usually required the users to "hack core", i.e. modify your views' PHP files, ending up in an unmaintainable, non-upgradeable and potentially insecure solution. Not any more! Using FOF's `FOFTemplateUtils::addCSS` and `FOFTemplateUtils::addJS` you can load your CSS and JS files directly from the view template file. Even better? You can use the equivalent of template overrides to let your users and template designers override them with their own implementations. They just have to create the directory `templates/your_template/media/com_example` to override the files normally found in `media/com_example`. So easy!

Automatic JSON and CSV views with no extra code (also useful for web services).

Why struggle to provide a remote API for your component? FOF makes the data of each view accessible as JSON feeds opening a new world of possibilities for Joomla! components (reuse data in mobile apps, Metro-style Windows 8 tiles, browser extensions, mash-up web applications, ...). The automatic CSV views work on the same principle but output data in CSV format, suitable for painlessly data importing to spreadsheets for further processing. Oh, did we mention that we already have an almost RESTful web services implementation?

No code view templates.

Don't you hate it that you have to write a different view template (in PHP and HTML) for each Joomla! version and, worse, each template out there? Don't you hate it having to teach non-developers how to not screw up your component with every update you publish? We feel your pain. That's why FOF supports the use of XML files as view templates, rendering them automatically to HTML. Not just forms; everything, including browse (multiple items) and single item views. Even better, you get to choose if you want to use traditional PHP/HTML view templates, XML view templates or a combination of both, even in the same view!

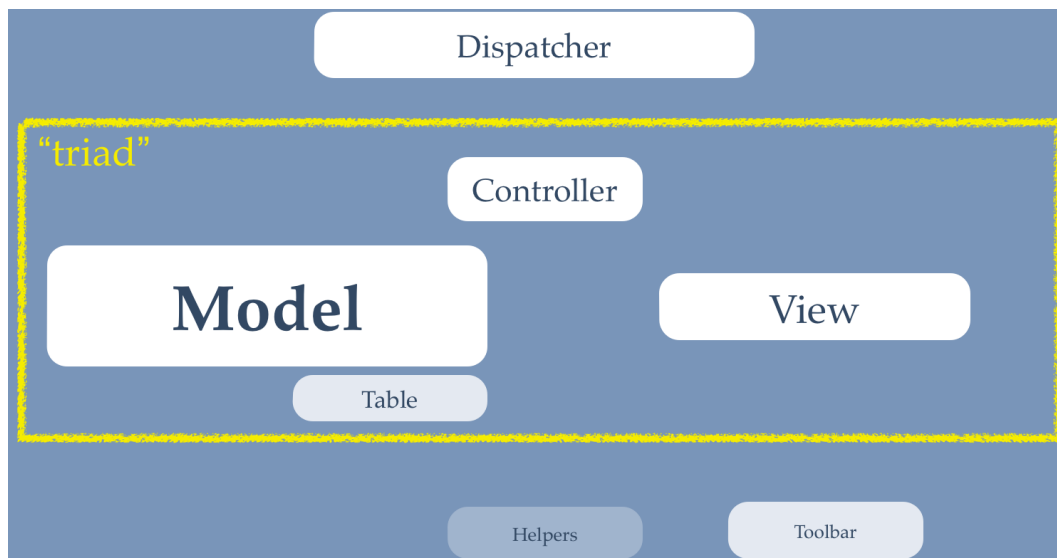
No code routing, ACL and overall application configuration.

Since FOF 2.1 you can define your application's routing, access control integration and overall configuration without routing any code, just by using a simple to understand XML file. It's now easier than ever to have Joomla! extensions with truly minimal (or no) PHP code.

Chapter 2. Component overview and reference

FOF is an MVC framework in heart and soul. It tries to stick as close as possible to the MVC conventions put forward by the Joomla! CMS since Joomla! 1.5, cutting down on unnecessary code duplication. The main premise is that your code will be DRY – not as the opposite of “wet”, but as in Don’t Repeat Yourself. Simply put: if you ever find yourself trying to copy code from a base class and paste it into a specialized class, you are doing it wrong.

In order to achieve this code isolation, FOF uses a very flexible structure for your components. A component's structure looks like this:



The Dispatcher is the entry point of your component. Some people would call this a "front Controller" and this is actually what it is. It's different than what we typically call a Controller in the sense that the Dispatcher is the only part of your component which is supposed to interface the underlying application (e.g. the Joomla! CMS) and gets to decide which Controller and task to execute based on the input data (usually this is the request data). No matter if you call it an entry point, front controller, dispatcher or Clint Eastwood its job is to figure out what needs to run and run it. We simply chose the name "Dispatcher" because, like all conventions, we had to call it something. So, basically, the Dispatcher will take a look at the input data, figure out which Controller and task to run, create an instance of it, push it the data and tell it to run the task. The Controller is expected to return the rendered data or a redirection which the Dispatcher will dully pass back to its caller.

Oh, wait, what is a Controller anyway?! Right below the Dispatcher you will see a bunch of stuff grouped as a "triad". The "triad" is commonly called "view" (with a lowercase v). Each triad does something different in your component. For example, one triad may allow you to handle clients, another triad allow you to handle orders and so on. Your component can have one or more triads. A triad usually contains a Controller, a Model and a View, hence the name ("triad" literally means "a bunch of three things"). The only mandatory member is the Controller. A triad may be reusing the Model and View from another triad – which is another reason why DRY code rocks– or it may even be view-less. So, a triad may actually be a bunch of one, two or three things, as long as it includes a Controller. Just to stop you from being confused or thinking about oriental organised crime and generally make your life easier we decided to call these "views" (with a lowercase v) instead of "triads". See? Now it is so much better.

FOF views follow the "fat Model - thin Controller" paradigm. This means that the Controller is a generally minimalist piece of code and the Model is what gets to do all the work. Knowing this very important bit of information, let's take a look at the innards of a view.

In the very beginning we have the Controller. The Controller has one or more tasks. Each task is an action of your component, like showing a list of records, showing a single record, publish a record, delete a record and so on. With a small difference. The Controller's tasks do not perform the actual work. They simply spawn an instance of the Model and push it the necessary data it needs. This is called "setting the state" of the Model. In most cases the Controller will also call a Model's method which does something. It's extremely important to note that the Controller will work with any Model that implements that method and that the Model is oblivious to the Controller. Then the Controller will create an instance of the View class, pass it the instance of the Model and tell it to go render itself. It will take the output of the View and pass it back to the Dispatcher.

Which brings us to the Model. The Model is the workhorse of the view. It implements the business logic. All FOF Models are passive Models which means that they are oblivious to the presence of the Controller and View. Actually, they are completely oblivious to the fact that they are part of a triad. That's right, Models can be used standalone, outside the context of the view or component they are designed to live in. The Model's methods will act upon the state variables which have already been set (typically, by the Controller) and will only modify the state variables or return the output directly. Models must never have to deal with input data directly or talk to specific Controllers and/or Views. Models are decoupled from everything, that's where their power lies.

Just a small interlude here. Right below the Model we see a small thing called a "Table". This is a strange beast. It's one part data adapter, one part model and one part controller, but nothing quite like any of this. The Table is used to create an object representing a single record. It is typically used to check the validity of a record before saving it to the database and post-process a record when reading it from the database (e.g. unserialise a field which contains serialised or JSON data).

The final piece of our view is the View class itself. It will ask the Model for the raw data and transform it into a suitable representation. Typically this means getting the raw records from the Model and create the HTML output, but that's not the only use for a View. A View could just as well render the data as a JSON stream, a CSV file, or even produce a graphic, audio or video file. It's what transforms the raw data into something useful, i.e. it's your presentation layer. Most often it will do so by loading view templates which are .php files which transform raw data to a suitable representation. If you are using the XML forms feature of FOF, the View will ask the Model to return the form definition and ask FOF's renderer to render this to HTML instead. Even though the actual rendering is delegated to the Renderer (not depicted above), it's still the View that's responsible for the final leg of the rendered data: passing it back to its caller. Yes, the View will actually neither output its data directly to the browser, nor talk to the underlying application. It returns the raw data back to its caller, which is almost always the Controller. Again, we have to stress that the View is oblivious to both the Controller and the Model being used. A properly written View is fully decoupled from everything else and will work with any data provider object implementing the same interface as a Model object and a caller which is supposed to capture its output for further consumption.

Important

All classes comprising a view are fully decoupled. None is aware of the internal workings of another object in the same or a different view. This allows you to exchange objects at will, promoting code reuse. Even though it sounds like a lot of work it's actually less work and pays dividends the more features you get to add to your components.

There's another bit mentioned below the triad, the Toolbar. The Toolbar is something which conceptually belongs to the component and only has to do with views being rendered as HTML. It's what renders the title in the back-end, the actions toolbar in the front- or back-end and the navigation links / menu in the back-end. In case you missed the subtle reference: FOFToolbar allows you to render an actions toolbar even in the front-end of your component, something that's not possible with plain old Joomla!. You will simply need to add some CSS to do it.

Finally we mention the Helpers. The Helpers are pure static classes implementing every bit of functionality that's neither OOP, nor can it be categorised in any other object already mentioned. For example, methods to render drop-down selection lists. In so many words, "Helper" is a polite way of saying "non-OOP cruft we'd rather not talk about". Keep your Helpers to a minimum as they're a royal pain in the rear to test.

Please do keep in mind that this is just a generic overview of how an FOF-based component works. The real power comes from the fact that you don't need to know the internal workings of FOF to use it, you don't need to copy and paste code from it (woe is the developer who does that) and quite possibly you don't even need to write any code. At all. It's all discussed later on.

1. Models

The Model is the workhorse. Business logic goes here. Models never interface input data directly or output data. They are supposed to read data from their state and push the results to their state.

Class and file naming conventions

The convention for naming the model classes is `ComponentModelView`, e.g. `TodoModelItems` for a component named `com_todo` and a view named `items`. The last part **SHOULD** be plural. Support for singular named models (such as `TodoModelItem`) will be dropped in a future version.

The model file **MUST** match the last part of the class name. This means that the file for `TodoModelItems` **MUST** be `items.php`, whereas the file for `TodoModelItem` **MUST** be `item.php`.

All Model files are located in your component's `models` directories, in the front-end and back-end. If a file is not present in the front-end, it will be attempted to be loaded from the back-end and vice versa. If the Model class is not loaded and a suitable file cannot be found FOF will fall back to one of the following, in this order:

1. The Default model. This is a special model class following the naming conventions `ComponentModelDefault`, e.g. `TodoModelDefault`, found in the `default.php` file inside your models directory.
2. If a default model is not found, FOF will fall back to creating a suitably configured instance of `FOFModel`, using convention over configuration (explained below) to determine what the model object should do.

Database table naming conventions

All FOF models connect, by default, to a database table. You can of course have a model whose corresponding table doesn't exist as long as you do not use its default data processing methods.

Database tables are named as `#__component_view`, e.g. `#__todo_items` for a component named `com_todo` and a view named `items`.

The auto increment field is named `component_view_id`, e.g. `todo_item_id` for a component named `com_todo` and a view named `items`. If your table does not have an auto incrementing field you will not be able to use the default implementation of FOF's data processing methods.

You can override defaults without copying & pasting code, ever. This is documented in [Configuring MVC](#).

Customising a specialised class

Unlike plain old Joomla! you are **NOT** supposed to copy and paste code when dealing with FOF. Our rule of thumb is that if you ever find yourself copying code from `FOFModel` into your extension's specialised model class you're doing it wrong.

FOF models can be customised very easily using the `onBeforeSomething` / `onAfterSomething` methods. The *Something* is the name of the model method they are related to. For example, `onBeforeSave` runs before the `save()` method executes its actions and `onAfterSave` runs right after the `save()` method executes its actions. Specific implementation notes for each case can be found in the docblocks of each event method.

Customising using plugin events

FOF models are designed to call certain plugin events (of "content" plugins) upon certain actions. The events are defined in the model's protected properties as follows:

`event_before_delete` (default: `onContentBeforeDelete`) is triggered before a record is deleted.

`event_after_delete` (default: `onContentAfterDelete`) is triggered after a record is deleted.

`event_before_save` (default: `onContentBeforeSave`) is triggered before a record is saved.

`event_after_save` (default: `onContentAfterSave`) is triggered after a record is saved.

`event_change_state` (default: `onContentChangeState`) is triggered after a record changes state, i.e. it's published, unpublished etc.

`event_clean_cache` (default: none; doesn't run) is triggered when FOF is cleaning the cache.

Moreover, if you are using XML forms you will also see the `onContentPrepareForm` event which runs when the form is being pre-processed before rendering.

These are the same as the standard Joomla! plugin events. This ensures that a plugin written for a core Joomla! component can easily be extended to handle FOF components as well.

Whenever Joomla! requires us to pass a context to the plugin events we use the conventions `component.view` e.g. `com_todo.items` for a component name `com_todo` and a model for the items `view`.

1.1. Model Behaviours

1.1.1. Introduction

Models can implement complex, reusable functionality using behaviours. Model Behaviors are a handy way to alter the workflow of a FOFModel. It's based upon the standard Joomla Event system.

Before and After certain actions (`onBefore*` / `onAfter*`) the model triggers an "event" which is propagated to each of the registered behaviors for that model. They can then, by registering to these events, alter the way the action itself is performed.

It's possible to register different behaviors per model; they can be added by default, or even on the fly, after the model is created.

FOF already provides a list of common behaviors, that can be used by any FOFModel object. The bundled behaviour classes are currently located inside FOF's `model/behavior` directory. By default, only the `filters` behaviour is being loaded.

1.1.2. FOF standard Behaviors

FOF comes with several built-in model behaviours. They are used to provide core functionality. By default only the "filters" behaviour is attached to a model for performance reasons. In this section we will discuss what each behaviour does.

You can combine multiple behaviours at once.

1.1.2.1. access

Adding this behaviour to a model object filters the front-end output by the viewing access levels the user has access to.

Important

This behaviour **REQUIRES** the `filters` behaviour. If you have not added the "filters" behaviour it will not have any effect on browse views. It will, however, work on edit and read views.

This behaviour requires the `access` magic field.

1.1.2.2. enabled

Adding this behaviour to a model object filters the front-end output to only items which are published (`enabled=1`).

Important

This behaviour requires the `enabled` magic field.

1.1.2.3. filters

Important

This behaviour only works on browse views.

Adding this behaviour to a model object allows FOF to magically apply filters based on the input data. For example, if you pass `&foobar=1` in the URL, or –more generally speaking– have a `foobar` state variable with a value of 1 then the SQL query used to fetch the items list will be filtered by the rows where the `foobar` column is set to 1.

The `filters` behaviour is smart enough to recognise the type of your table fields and apply the correct type filter each time. There are several different filtering methods per field type. Besides the default filtering method which is used when you only use a plain value in the state variable you can select a different method. To do that you need to pass a hash (keyed) array in the state variable like this `array('method' => 'between', 'from' => 1, 'to' => 10)` or, in URL query format, `&foobar[method]=between&foobar[from]=1&foobar[to]=10`.

So, let's discuss the available match types per field type.

Number fields

For numeric fields you can use the following filtering methods:

exact This is the default method. You can just pass the value you want to search. If you want to use the hash array format you have the following keys:

- `method` : *exact*
- `value` : the value you want to search

partial For numeric fields this is just an alias to *exact*.

between Returns records whose field value is inside the space between two numbers, inclusive. You have the following keys:

- `method` : *between*
- `from` : Left barrier of the number space
- `to` : Right barrier of the number space

For example `from=1` and `to=10` will search for any value between 1 to 10, including 1 and 10.

outside	<p>Returns records whose field value is outside the space between two numbers, exclusive. You have the following keys:</p> <ul style="list-style-type: none"> • <code>method</code>: <i>outside</i> • <code>from</code>: Left barrier of the number space • <code>to</code>: Right barrier of the number space <p>For example <code>from=1</code> and <code>to=10</code> will search for any value lower than 1 or greater than 10, excluding 1 and 10.</p>
interval	<p>Returns records whose field value is following an interval (arithmetical progression)</p> <ul style="list-style-type: none"> • <code>method</code>: <i>interval</i> • <code>value</code>: The starting value of the interval • <code>interval</code>: The interval period <p>For example <code>value=5</code> <code>interval=2</code> will search for values 5, 7, 9, 11 and so on.</p>

Boolean fields

For boolean (tiny integer) fields you can use the following methods:

exact	<p>This is the default method. You can just pass the value you want to search. If you want to use the hash array format you have the following keys:</p> <ul style="list-style-type: none"> • <code>method</code>: <i>exact</i> • <code>value</code>: the value you want to search
-------	--

Text fields

For text fields you can use the following methods:

partial	<p>This is the default method. You can just pass the value you want to search. The records returned have that value somewhere in their fields (partial text search). If you want to use the hash array format you have the following keys:</p> <ul style="list-style-type: none"> • <code>method</code>: <i>partial</i> • <code>value</code>: the partial phrase you want to search
exact	<p>Performs an exact search. The fields' values must be exactly equal to the value you use here. You have the following keys:</p> <ul style="list-style-type: none"> • <code>method</code>: <i>exact</i> • <code>value</code>: the exact phrase you want to search

Date fields

For date and date/time fields you can use the following methods:

exact	<p>This is the default method. Performs an exact search. The fields' values must be exactly equal to the value you use here. You have the following keys:</p>
-------	---

	<ul style="list-style-type: none"> • <code>method</code> : <i>exact</i> • <code>value</code> : the exact phrase you want to search
partial	<p>You can just pass the value you want to search. The records returned have that value somewhere in their fields (partial text search). If you want to use the hash array format you have the following keys:</p> <ul style="list-style-type: none"> • <code>method</code> : <i>partial</i> • <code>value</code> : the partial phrase you want to search
between	<p>Returns records whose field value is inside the space between two dates, inclusive. You have the following keys:</p> <ul style="list-style-type: none"> • <code>method</code> : <i>between</i> • <code>from</code> : Left barrier of the date space • <code>to</code> : Right barrier of the date space
outside	<p>Returns records whose field value is outside the space between two dates, exclusive. You have the following keys:</p> <ul style="list-style-type: none"> • <code>method</code> : <i>outside</i> • <code>from</code> : Left barrier of the number space • <code>to</code> : Right barrier of the number space
interval	<p>Warning</p> <p>This method currently only works with MySQL.</p> <p>Returns records whose field value is following an interval (arithmetical progression)</p> <ul style="list-style-type: none"> • <code>method</code> : <i>interval</i> • <code>value</code> : The starting value of the interval • <code>interval</code> : The interval period. The interval can either be a string or an array. As a string it contains a sign (+ to go to the future or - to go to the past), the numeric portion of the interval period and the actual interval (days, months, years, weeks). For example: <i>+1 month</i> to search for values every one month in the future or <i>-1 month</i> to search for values every one month in the past <p>As an array it can look like this <code>array('sign' => '+', 'value' => '1', 'unit' => 'month')</code></p>

1.1.2.4. language

Adding this behaviour to a model object filters the front-end output by language, displaying only the items whose language matches the currently enabled front-end language. Obviously this only has an effect on multi-lingual sites when the Joomla! language filter plugin is enabled.

Important

This behaviour requires the `language` magic field.

1.1.2.5. private

Adding this behaviour to a model object filters the front-end output by the created_by user, showing only items that have been created by the currently logged in user. Items not created by the current user will not be displayed.

Important

This behaviour requires the created_by magic field.

1.1.3. Adding an Existing Behavior to a Model

There are 5 ways to add a behavior to a model:

1. Using the default_behaviors property of the model. This property is an array of behavior names to load upon the model construction. By default it contains only the filters behavior. You can override it with your preferred behavior in your model class declaration:

```
class FoobarModelTodos extends FOFModel {  
  
    protected $default_behaviors = array('filters', 'access', 'enabled');  
  
}
```

2. Passing it into the *\$config* parameter for the constructor of your model class:

```
class FoobarModelTodos extends FOFModel {  
  
    public function __construct($config = array()) {  
        if (!isset($config['behaviors'])) {  
            $config['behaviors'] = array('filters', 'access', 'enabled');  
        }  
  
        parent::__construct($config);  
    }  
  
}
```

3. Passing it when you create the model instance through the *config* parameter:

```
$model = FOFModel::getTmpInstance('Todos', 'FoobarModel', array(  
    'behaviors' => array('filters', 'access', 'enabled'))  
);
```

4. Adding it dynamically using the method addBehavior

```
class FoobarModelTodos extends FOFModel {  
  
    public function __construct($config = array()) {  
        parent::__construct($config);  
  
        if ($iWantToAddIt) {  
            $this->addBehavior('enabled');  
        }  
    }  
  
}
```

```
}
```

5. Adding it on the view inside `fof.xml`

```
<?xml version="1.0" encoding="utf-8"?>
<fof>
  <frontend>
    <view name="todos">
      <config>
        <option name="behaviors">filter,access,enabled</option>
      </config>
    </view>
  </frontend>
</fof>
```

1.1.4. Creating a new Behavior

You can create custom behaviors for your component. It's very important how you name it, because FOF will search for your behaviors based on their name.

If you want to add a `bar` behavior in a `foo` component, FOF will search for it in the following order:

1. First look for `ComponentnameModelViewnameBehaviorName` (ie: `FoobarModelTodosBar`)

Caution, the `Viewname` part **MUST** be plural.

2. Then look for `ComponentnameModelBehaviorName` (ie: `FoobarModelBar`)

3. Then look for `F0FModelBehaviorBehaviorName` (ie: `F0FModelBehaviorBar`)

This allows you to create model specific behaviors and also component-wide ones.

It's also possible to override already existing behaviors, by naming them correctly (ie: you can override the `enabled` behavior by creating a new class called `FoobarModelBehaviorEnabled`).

Important

The behaviors are not automatically loaded, so you need to provide your own autoloader or simply load the classes in the constructor of your Model before calling `parent::__construct(...)`.

1.1.5. Available Events for Model Behaviors

In each model behavior you can inject into the workflow using these methods:

```
/**
 * This event runs before saving data in the model
 *
 * @param F0FModel &$model The model which calls this event
 * @param array    &$data   The data to save
 *
 * @return void
 */
public function onBeforeSave(&$model, &$data)
{
```

```

}

/**
 * This event runs before deleting a record in a model
 *
 * @param F0FModel &$model The model which calls this event
 *
 * @return void
 */
public function onBeforeDelete(&$model)
{
}

/**
 * This event runs before copying a record in a model
 *
 * @param F0FModel &$model The model which calls this event
 *
 * @return void
 */
public function onBeforeCopy(&$model)
{
}

/**
 * This event runs before publishing a record in a model
 *
 * @param F0FModel &$model The model which calls this event
 *
 * @return void
 */
public function onBeforePublish(&$model)
{
}

/**
 * This event runs before registering a hit on a record in a model
 *
 * @param F0FModel &$model The model which calls this event
 *
 * @return void
 */
public function onBeforeHit(&$model)
{
}

/**
 * This event runs before moving a record in a model
 *
 * @param F0FModel &$model The model which calls this event
 *
 * @return void
 */
public function onBeforeMove(&$model)

```



```

{
}

/**
 * This event runs before changing the records' order in a model
 *
 * @param FOFModel &$model The model which calls this event
 *
 * @return void
 */
public function onBeforeReorder(&$model)
{
}

/**
 * This event runs when we are building the query used to fetch a record
 * list in a model
 *
 * @param FOFModel      &$model The model which calls this event
 * @param JDatabaseQuery &$query The query being built
 *
 * @return void
 */
public function onBeforeBuildQuery(&$model, &$query)
{
}

/**
 * This event runs after saving a record in a model
 *
 * @param FOFModel &$model The model which calls this event
 *
 * @return void
 */
public function onAfterSave(&$model)
{
}

/**
 * This event runs after deleting a record in a model
 *
 * @param FOFModel &$model The model which calls this event
 *
 * @return void
 */
public function onAfterDelete(&$model)
{
}

/**
 * This event runs after copying a record in a model
 *
 * @param FOFModel &$model The model which calls this event
 *

```

```

    * @return void
    */
public function onAfterCopy(&$model)
{
}

/**
 * This event runs after publishing a record in a model
 *
 * @param FOFModel &$model The model which calls this event
 *
 * @return void
 */
public function onAfterPublish(&$model)
{
}

/**
 * This event runs after registering a hit on a record in a model
 *
 * @param FOFModel &$model The model which calls this event
 *
 * @return void
 */
public function onAfterHit(&$model)
{
}

/**
 * This event runs after moving a record in a model
 *
 * @param FOFModel &$model The model which calls this event
 *
 * @return void
 */
public function onAfterMove(&$model)
{
}

/**
 * This event runs after reordering records in a model
 *
 * @param FOFModel &$model The model which calls this event
 *
 * @return void
 */
public function onAfterReorder(&$model)
{
}

/**
 * This event runs after we have built the query used to fetch a record
 * list in a model
 *

```

```

* @param FOFModel      &$model  The model which calls this event
* @param JDatabaseQuery &$query  The model which calls this event
*
* @return void
*/
public function onAfterBuildQuery(&$model, &$query)
{
}

/**
* This event runs after getting a single item
*
* @param FOFModel &$model  The model which calls this event
* @param FOFTable &$record  The record loaded by this model
*
* @return void
*/
public function onAfterGetItem(&$model, &$record)
{
}

```

1.1.6. New Behavior Example: Published

Let's create a behavior for our component called Published, that will filter the items based on the publish_up and publish_down fields of a table.

```

class FOFModelBehaviorPublished extends FOFModelBehavior
{
    /**
    * Let's add the filter for the publish_up and publish_down fields here, after the query
    *
    * @param FOFModel      &$model  The model which calls this event
    * @param JDatabaseQuery &$query  The model which calls this event
    *
    * @return void
    */
    public function onAfterBuildQuery(&$model, &$query)
    {
        // This behavior only applies to the front-end.
        if (!FOFPlatform::getInstance()->isFrontend())
        {
            return;
        }

        // Get the name of the publish_up field (support for aliases)
        $table = $model->getTable();
        $publishUpField = $table->getColumnAlias('publish_up');

        // Get the name of the publish_down field (support for aliases)
        $publishDownField = $table->getColumnAlias('publish_down');

        // Make sure the fields actually exist
        $publishUpExists = in_array($publishUpField, $table->getKnownFields());
    }
}

```

```

$publishDownExists = in_array($publishDownField, $stable->getKnownFields());

// If they both do not exist, exit, we cannot apply the behavior
if (!$publishUpExists && !$publishDownExists)
{
    return;
}

// Get the current date
$now = new JDate()
$now = $now->toSql();

$db = JFactory::getDbo();

// Filter by publish up first
if ($publishUpExists) {
    $query->where($db->qn($publishUpField) . ' <= ' . $db->q($now));
}

// Filter by publish down
if ($publishDownExists) {
    $query->where($db->qn($publishDownField) . ' >= ' . $db->q($now));
}
}

/**
 * Voids the getItem result if the loaded item wasn't published
 *
 * @param FOFModel &$model The model which was called
 * @param FOFTable &$record The record loaded from the database
 *
 * @return void
 */
public function onAfterGetItem(&$model, &$record)
{
    if ($record instanceof FOFTable)
    {
        // This behavior only applies to the front-end.
        if (!FOFPlatform::getInstance()->isFrontend())
        {
            return;
        }

        // Get the name of the publish_up field (support for aliases)
        $publishUpField = $record->getColumnAlias('publish_up');

        // Get the name of the publish_down field (support for aliases)
        $publishDownField = $record->getColumnAlias('publish_down');

        // Make sure the fields actually exist
        $publishUpExists = in_array($publishUpField, $record->getKnownFields());

        $publishDownExists = in_array($publishDownField, $record->getKnownFields());
    }
}

```

```

        // If they both do no exist, exit, we cannot apply the behavior
        if (!$publishUpExists && !$publishDownExists)
        {
            return;
        }

        // Get the current date
        $now = new JDate()
        $now = $now->toSql();

        if ($publishUpExists) {
            $publish_up = new JDate($record->$publishUpField);
            if ($publish_up > $now) {
                $record = null;
                return;
            }
        }

        if ($publishDownExists) {
            $publish_down = new JDate($record->$publishDownField);
            if ($publish_down < $now) {
                $record = null;
                return;
            }
        }
    }
}
}
}
}
}

```

2. Tables

Tables are strange beasts. They are part data adapter, part model and part controller. Confused? They are used to create an object representing a single record of a database table. They're typically used to check the validity of a record before saving it to the database and post-process a record when reading it from the database (e.g. unserialise a field which contains serialised or JSON data). They can come in very handy to perform automated ("magic") actions when creating / modifying / loading a database record.

Class and file naming conventions

The conventions for naming the table classes is `ComponentTableView`, e.g. `TodoTableItem` for a component named `com_todo` and a view named `items`. The last part **MUST** be singular. It's logical: a table class operates on a single record, ergo it's singular.

The table file **MUST** match the last part of the class name. This means that the file for `TodoTableItem` **MUST** be `item.php`.

All Table files are located in your component's `tables` directories in the back-end. If the Table class is not loaded and a suitable file cannot be found FOF will fall back to creating a suitable configure instance of `FOFTable`, using convention over configuration (explained below) to determine what the table object should do.

Database table naming conventions

It's exactly as described in the Model reference.

Magic fields

Magic fields have special meaning for FOF. They are:

title	The title of an item. It's used for creating a slug.
slug	That's the alias of an item, typically used as part of generated URLs by your components. By default, it will be generated out of the title using a very basic transliteration algorithm.
enabled	Is this record published or not? It's like the published column in core Joomla! components, but usually it is only supposed to take values of 0 (disabled) and 1 (enabled).
ordering	The sort order of the record.
created_by	The ID of the user who created the record. Handled automatically by FOF.
created_on	The date when the record was created. Handled automatically by FOF.
modified_by	The ID of the user who last modified the record. Handled automatically by FOF.
modified_on	The date when the record was last modified. Handled automatically by FOF.
locked_by	The ID of the user who locked (checked out) the record for editing. Handled automatically by FOF.
locked_on	The date when the record was locked (checked out) for editing. Handled automatically by FOF.
hits	How many read hits this record has received. Handled automatically by FOF.
language	The language of the record if you want a multi-lingual site.
asset_id	The ID in the #__assets table for the record. Handled automatically by FOF. Only required if you want per item ACL privileges.
access	Viewing access level

You can always customise the magic fields' names in your Table class using the `setColumnAlias` method. For example, if your column is named `published` instead of `enabled`:

```
function __construct($table, $key, $db, $config)
{
    $this->setColumnAlias('enabled', 'published');

    parent::__construct($table, $key, $db, $config);
}
```

Now FOF will know that the `published` column contains the publish status of the record. This comes in handy when you're upgrading a component from POJ (plain old Joomla!) to FOF.

Important

We strongly suggest to set these alias inside the table constructor and more specifically **before** calling the parent constructor. In this way, FOF will know everything about your table and can set some automatic feature, like asset tracking.

Using joined tables

Quite often you can have tables that are linked together, while you can setup joins in the list view acting on the `buildQuery`, sometimes you need these joined fields while using the table.

To do that you can simply create the join query, pass it to the `F0FTable` in the construction and you're done! FOF will do the rest.

Let's see it in action with a real an example. Let's you have the table foo linked to the table bar:

Table 2.1. Table foo

foo_id	title
1	First row
2	Second row

Table 2.2. Table bar

bar_id	title	barfield	foo_id
1	Bar table title 1	Unique column name field 1	1
2	Bar table title 2	Unique column name field 2	2

In plain sql you should do something like this:

```
SELECT jos_foo.*, jos_bar.title as bar_title, barfield
FROM jos_foo
INNER JOIN jos_bar ON jos_bar.foo_id = jos_foo.foo_id
WHERE jos_foo.foo_id = 1
```

When setting up the table, FOF already does a query like this:

```
SELECT jos_foo.*
FROM jos_foo
WHERE jos_foo.foo_id = 1
```

So we just have to "inject" the join part. We can do that extending the `F0FTable`, creating a query using Joomla! object and then assigning it to the table:

```
<?php
class FoobarTableFoo extends F0FTable
{
    public function __construct($table, $key, &$amp;db)
    {
        $query = $db->getQuery(true)
            ->select(array($db->qn('#__bar').'.'. $db->qn('title').' as ' . $db->qn('ba
            ->select('barfield')
            ->innerJoin('#__bar ON #__bar.foo_id = #__foo.foo_id');

        $this->setQueryJoin($query);

        parent::__construct($table, $key, $db);
    }
}
```

As you can see, it's quite easy to setup: you just have to create a query with no from clause (FOF will use the current table one) and you are free to compose as you want. You can quote columns names, table names, using column or table alias (and quote them or not) and so on: it's just a regular query. FOF will now automatically know of all fields in your joined table query.

Customising a specialised class

Unlike plain old Joomla! you are NOT supposed to copy and paste code when dealing with FOF. Our rule of thumb is that if you ever find yourself copying code from `FOFTable` into your extension's specialised table class you're doing it wrong.

FOF tables can be customised very easily using the `onBeforeSomething` / `onAfterSomething` methods. The *Something* is the name of the table method they are related to. For example, `onBeforeBind` runs before the `bind()` method executes its actions and `onAfterBind` runs right after the `bind()` method executes its actions. Specific implementation notes for each case can be found in the docblocks of each event method.

Customising using plugins

You can customise the actions of tables by using standard "system" plugins. `FOFTable` will automatically create plugin events using a fixed naming prefix and appending them with the last part of the table's name. For example, if you have a table called `TodoTableItem` FOF will attempt to run a system plugin event called `onBeforeBindItem`. For the sake of documentation we will be using the suffix `TABLENAME`.

The obvious drawback is the possibility of naming clashes. For example, given two tables `TodoTableItem` and `ContactusTableItem` the event to be called before binding data to either table is called `onBeforeBindItem`. How can you distinguish between the two cases? The first parameter passed to the plugin event handler is a reference to the table object itself, by convention called `$table`. You can do a `$table->getTableName()` which returns something like `#__todo_items`. Just check if it's the database table you expect to be interacting with. If not, just return true to let FOF do its thing uninterrupted.

The complete list of events is:

<code>onBefore-BindTABLE-NAME</code>	is triggered before binding data from an array/object to the table object.
<code>onAfterLoad-TABLENAME</code>	is triggered after a record is loaded
<code>onBefore-StoreTABLE-NAME</code>	is triggered before a record is saved to the table
<code>onAfter-StoreTABLE-NAME</code>	is triggered after a record has been saved to the table
<code>onBefore-MoveTABLE-NAME</code>	is triggered before a single record is moved (reordered)
<code>onAfter-MoveTABLE-NAME</code>	is triggered after a single record is moved (reordered)
<code>onBeforeRe-orderTABLE-NAME</code>	is triggered before a new ordering is applied to multiple records of the table

<code>onAfterRe-orderTABLE-NAME</code>	is triggered before a new ordering is applied to multiple records of the table
<code>onBefore-DeleteTABLE-NAME</code>	is triggered before a record is deleted
<code>onAfter-DeleteTABLE-NAME</code>	is triggered after a record has been deleted
<code>onBeforeHit-TABLENAME</code>	is triggered before registering a read hit on a record
<code>onAfterHit-TABLENAME</code>	is triggered after registering a read hit on a record
<code>onBeforeCopy-TABLENAME</code>	is triggered before copying (duplicating) a record
<code>onAfterCopy-TABLENAME</code>	is triggered after copying (duplicating) a record
<code>onBeforePublishTABLENAME</code>	is triggered before publishing a record
<code>onAfterReset-TABLENAME</code>	is triggered after we have reset the table object's state
<code>onBeforeReset-TABLENAME</code>	is triggered before resetting the table object's state

If you return boolean false from an `onBefore` event the operation is cancelled.

As you can easily understand this is an extremely powerful feature as it allows end users and site integrators (of a power user level, granted) to modify or extend the behaviour of FOF-powered extensions with great ease.

2.1. Table Behaviors

2.1.1. Introduction

Tables can implement complex, reusable functionality using behaviours. Table Behaviors are an handy way to alter the workflow of a `FOFTable`. It's based upon the standard Joomla Event system.

Before and After certain actions (`onBefore*` / `onAfter*`) the table triggers an "event" which is propagated to each of the registered behaviors for that table. They can then, by registering to these events, alter the way the action itself is performed.

It's possible to register different behaviors per table; they can be added by default, or even on the fly, after the table is created.

FOF already provides a list of common behaviors, that can be used by any `FOFTable` object. The bundled behaviour classes are currently located inside FOF's `table/behavior` directory. By default, only the `assets` and `tags` behaviour are being loaded

2.1.2. FOF Standard Behaviors

assets	This behavior (added by default by FOF) manages the assets for a resource if the <code>asset_id</code> field (or an alias for it) is set for the table
contenthistory	This behavior manages the content history related to the current resource

Important

This behavior requires a parameter `save_history` on your component parameters `config.xml`.

tags	This behavior (added by default by FOF) deals with tags related to the current resource. It will be applied only if the <code>hasTags</code> property is set to true.
------	---

2.1.3. Add an existing Behavior to a Table

There are 5 ways to add a behavior to a table:

- Using the `default_behaviors` property of the table. This property is an array of behavior names to load upon the table construction. By default it contains the tags and the assets behaviors. You can override it with your preferred behavior in your table class declaration:

```
class FoobarTableTodo extends FOFTable {  
  
    protected $default_behaviors = array('tags');  
  
}
```

- Passing it into the `$config` parameter for the constructor of your table class:

```
class FoobarTableTodo extends FOFTable {  
  
    public function __construct($config = array()) {  
        if (!isset($config['behaviors'])) {  
            $config['behaviors'] = array('tags');  
        }  
  
        parent::__construct($config);  
    }  
  
}
```

- Passing it when you create the table instance through the `config` parameter:

```
$model = FOFTable::getTmpInstance('Todo', 'FoobarTable', array('behaviors' => array('tags')));
```

- Adding it dynamically using the method `addBehavior`:

```
class FoobarTableTodo extends FOFTable {  
  
    public function __construct($config = array()) {  
        parent::__construct($config);  
  
        if ($iWantToAddIt) {
```

```

        $this->addBehavior('tags');
    }
}

```

- Adding it on the view inside `fof.xml`:

```

<?xml version="1.0" encoding="utf-8"?>
<fof>
    <common>
        <table name="todo">
            <behaviors>tags</behaviors>
        </table>
    </common>
</fof>

```

2.1.4. Creating a new Behavior

You can create custom behaviors for your component. It's very important how you name it, because FOF will search for your behaviors based on their name.

If you want to add a *bar* behavior, FOF will search for it in the following order:

- First look for `ComponentnameTableViewnameBehaviorName` (ie: `FooBarTableTodosBar`)

Caution, the `Viewname` part **MUST** be singular.

- Then look for `ComponentnameTableBehaviorName` (ie: `FooBarTableBar`)
- Then look for `F0FTableBehaviorBehaviorName` (ie: `F0FTableBehaviorBar`)

This allows you to create table specific behaviors and also component-wide ones.

It's also possible to override already existing behaviors, by naming them correctly (ie: you can override the `tags` behavior by creating a new class called `FooBarTableBehaviorTags`).

Important

The behaviors are not automatically loaded, so you need to provide your own autoloader or simply load the classes in the constructor of your Table before calling `parent::__construct(...)`.

2.1.5. Available Events for Table Behaviors

In each table behavior you can inject into the workflow using these methods:

```

/**
 * This event runs before binding data to the table
 *
 * @param F0FTable &$table The table which calls this event
 * @param array    &$data   The data to bind
 *
 * @return boolean True on success
 */
public function onBeforeBind(&$table, &$data)
{

```

```

        return true;
    }

/**
 * The event which runs after binding data to the table
 *
 * @param FOFTable &$table The table which calls this event
 * @param object|array &$src The data to bind
 *
 * @return boolean True on success
 */
public function onAfterBind(&$table, &$src)
{
    return true;
}

/**
 * The event which runs after loading a record from the database
 *
 * @param FOFTable &$table The table which calls this event
 * @param boolean &$result Did the load succeeded?
 *
 * @return void
 */
public function onAfterLoad(&$table, &$result)
{
}

/**
 * The event which runs before storing (saving) data to the database
 *
 * @param FOFTable &$table The table which calls this event
 * @param boolean $updateNulls Should nulls be saved as nulls (true) or just skipped o
 *
 * @return boolean True to allow saving
 */
public function onBeforeStore(&$table, $updateNulls)
{
    return true;
}

/**
 * The event which runs after storing (saving) data to the database
 *
 * @param FOFTable &$table The table which calls this event
 *
 * @return boolean True to allow saving without an error
 */
public function onAfterStore(&$table)
{
    return true;
}

```

```

/**
 * The event which runs before moving a record
 *
 * @param FOFTable &$table The table which calls this event
 * @param boolean $updateNulls Should nulls be saved as nulls (true) or just skipped o
 *
 * @return boolean True to allow moving
 */
public function onBeforeMove(&$table, $updateNulls)
{
    return true;
}

/**
 * The event which runs after moving a record
 *
 * @param FOFTable &$table The table which calls this event
 *
 * @return boolean True to allow moving without an error
 */
public function onAfterMove(&$table)
{
    return true;
}

/**
 * The event which runs before reordering a table
 *
 * @param FOFTable &$table The table which calls this event
 * @param string $where The WHERE clause of the SQL query to run on reordering (record
 *
 * @return boolean True to allow reordering
 */
public function onBeforeReorder(&$table, $where = '')
{
    return true;
}

/**
 * The event which runs after reordering a table
 *
 * @param FOFTable &$table The table which calls this event
 *
 * @return boolean True to allow the reordering to complete without an error
 */
public function onAfterReorder(&$table)
{
    return true;
}

/**
 * The event which runs before deleting a record
 *
 * @param FOFTable &$table The table which calls this event

```

```

* @param integer $oid The PK value of the record to delete
*
* @return boolean True to allow the deletion
*/
public function onBeforeDelete(&$table, $oid)
{
    return true;
}

/**
* The event which runs after deleting a record
*
* @param FOFTable &$table The table which calls this event
* @param integer $oid The PK value of the record which was deleted
*
* @return boolean True to allow the deletion without errors
*/
public function onAfterDelete(&$table, $oid)
{
    return true;
}

/**
* The event which runs before hitting a record
*
* @param FOFTable &$table The table which calls this event
* @param integer $oid The PK value of the record to hit
* @param boolean $log Should we log the hit?
*
* @return boolean True to allow the hit
*/
public function onBeforeHit(&$table, $oid, $log)
{
    return true;
}

/**
* The event which runs after hitting a record
*
* @param FOFTable &$table The table which calls this event
* @param integer $oid The PK value of the record which was hit
*
* @return boolean True to allow the hitting without errors
*/
public function onAfterHit(&$table, $oid)
{
    return true;
}

/**
* The even which runs before copying a record
*
* @param FOFTable &$table The table which calls this event
* @param integer $oid The PK value of the record being copied

```

```

*
* @return boolean True to allow the copy to take place
*/
public function onBeforeCopy(&$table, $oid)
{
    return true;
}

/**
 * The even which runs after copying a record
 *
 * @param FOFTable &$table The table which calls this event
 * @param integer $oid The PK value of the record which was copied (not the new one)
 *
 * @return boolean True to allow the copy without errors
 */
public function onAfterCopy(&$table, $oid)
{
    return true;
}

/**
 * The event which runs before a record is (un)published
 *
 * @param FOFTable &$table The table which calls this event
 * @param integer|array &$cid The PK IDs of the records being (un)published
 * @param integer $publish 1 to publish, 0 to unpublish
 *
 * @return boolean True to allow the (un)publish to proceed
 */
public function onBeforePublish(&$table, &$cid, $publish)
{
    return true;
}

/**
 * The event which runs after the object is reset to its default values.
 *
 * @param FOFTable &$table The table which calls this event
 *
 * @return boolean True to allow the reset to complete without errors
 */
public function onAfterReset(&$table)
{
    return true;
}

/**
 * The even which runs before the object is reset to its default values.
 *
 * @param FOFTable &$table The table which calls this event
 *
 * @return boolean True to allow the reset to complete
 */

```

```
public function onBeforeReset(&$table)
{
    return true;
}
```

2.2. Simple object relation mapping

Note

Available since FOF 2.2.0

A (very) naïve introduction to ORM – and why this FOF feature is not a proper ORM implementation

The most common use case for databases is storing data which is related to one another. This the cornerstone of relational database management systems (RDBMS) such as MySQL, PostgreSQL, Microsoft SQL Server and so on. Due to limitations of the shared hosting model we tend not to make full use of the relational features of modern databases, yet our field naming conventions do denote this aspect of our data. Think about a `#__foobar_comments` table having a key named `foobar_article_id`. You immediately understand that each comment record in that table is related to an article in a table called `#__foobar_articles`. That's why you end up writing code to fetch the comments of an article using `FOFModel` or the article a comment belongs to using `FOFTable`.

By doing that, you are implicitly mapping the raw data in the database to one or more PHP objects. This is a very primitive data mapping operation, as you are mapping scalar values (the raw data) into other scalar values (the PHP object's properties) through explicit mapping. When you want to map non-scalar values (like the comments of an article) you get to do that manually, essentially hardcoding this relation into your PHP code. An object-relational mapping (ORM, for short) does this automatically. It will map your scalar data, what is stored in your database tables, into objects which you can manipulate directly without worrying too much about how this data is actually stored.

On the flip side, by using a full blown ORM you are abstracting too much. The ORM has to map objects to database tables and the result is often unoptimised database tables. By going to the other extreme, manually handling all mapping, you are writing more code than you should and you make your architecture inflexible.

FOF follows a middle path. You can tell it how your database tables relate to each other and it will provide you with an interface to get related objects directly from a `FOFTable` object. It currently supports all three normalised relations:

- 1:n (one to many). One record of table A is related to zero or more records in table B. The easiest way to picture this is table A being articles and table B being comments. This relation can be expressed in different directions:
 - Parent. Given a record in table B you get the record in table A it belongs to.
 - Children. Given a record in table A you get the records in table B that belong to it.
 - Siblings. Given a record in table B you get all the records in table B that belong to the same record of table A that our current record in table B belongs to (it's the children of the parent – that's why they're called siblings)
- 1:1 (one to one). One record of table A is related to exactly zero or one records in table B. It's used mostly to extend a table without changing its schema, e.g. add more fields to the `#__users` table. This relation has no implicit directionality, but since it's the degenerate case of the 1:n relation for $n=1$ we consider that table A is the parent of table B, so this is implemented by defining a child relation on table A (or a parent or child relation on table B; it's up to you!).
- n:n (many to many). One or more records of table A are related to zero or more records in table B. The easiest way to picture this is table A being users and table B being user groups. One user can belong to multiple groups.

Many users can belong to the same group. The characteristic of this relation is that you need a pivot (a.k.a. "glue" or "map") table which tells us which record of table A relates to which record of table B. Quite obviously there is no directionality in this relation: given a record in table A you can get all related records in table B. Likewise, given a table in record B you can get all related records in table A through the same relation.

What does it mean to you?

Before this feature you would have to write this kind of code:

```
$article = FOFTable::getTmpInstance('Article', 'FoobarTable');
$article->load(1);

$model = FOFModel::getTmpInstance('Comments', 'FoobarModel');
$comments = $model->foobar_article_id($article->foobar_article_id)->getList();
foreach ($comments as $commentData)
{
    $commentTable = $model->getTable();
    $commentTable->bind($commentData);
    // Work with $commentTable
}
```

You can now write

```
$article = FOFTable::getTmpInstance('Article', 'FoobarTable');
$article->load(1);

foreach ($article->getRelations()->getChildren('comments') as $commentTable)
{
    // Work with $commentTable
}
```

All you need to do is define the relation, either in the constructor of your table class or in `fof.xml`.

Even better, relations returning many items use `FOFDatabaseIterator` which means that only one record is loaded in memory at a time. When sifting through copious amounts of records this decreases your memory consumption considerably.

The code savings are even more substantial for many-to-many relations, but we'll leave that as an exercise to the reader to find out why.

How do I use it?

Each table provides the `getRelations()` method which returns a `FOFTableRelations` object. By default it's populated with parent relations based on field names which follow the FOF naming conventions. At any time you can use the `add*Relation()` methods of `FOFTableRelations` to add any kind of relations. The docblocks in the methods explain to you exactly what each parameter does and through which method the related tables are made available. We suggest adding relations in the constructor (`__construct()` method) of your specialised table class. Alternatively, you can define the relations in `fof.xml`.

From that point you can use the relations anywhere you have an instance of that `FOFTable` object. The best methods for getting a `FOFTable` object are:

- Using `FOFModel`'s `getIterator`. **This is the preferred method.** Even if you only need the first item fetched by the model it is far better for performance and memory consumption to use:

```
// GOOD - Use this!
```

```
$iterator = $model->getIterator();
$myRecord = $iterator->current();
```

than using the next method presented below.

- Using FOFModel's `getFirstItem()`. This method is not recommended for performance / resource usage reasons. Keep in mind that FOFModel will load the ENTIRE record list, based on its state, in memory and return the first item fetched as a FOFTable. This can lead to bad performance and excessive memory consumption unless you are absolutely sure that FOFModel will only fetch one (or, at most, a handful) of items from the database. Example:

```
$myRecord = $model->getFirstItem();
```

- Using FOFTable::`getAnInstance()`. This method is not recommended due to the singleton caveat. Remember that the returned object is a singleton. If you need to load a new record you are required to clone that object, e.g. `$table = clone FOFTable::getAnInstance('Items', 'FoobarTable');`

```
// If you forget the clone you will spend some not-so-fun hours debugging erratic behavior
$myRecord = clone FOFTable::getAnInstance('Items', 'FoobarTable');
$myRecord->load(123);
```

- Using the `getTable()` method of a FOFModel object. This method is not recommended due to the singleton caveat. Likewise to FOFTable::`getAnInstance()` you get a singleton object for that model. Unless you want to operate on the last item fetched / saved in the model you need to clone it.

```
// If you forget the clone you will spend some not-so-fun hours debugging erratic behavior
// Also, are you sure that your code actually loaded anything in the table? Hm...
$myRecord = clone $model->getTable();
```

3. Controllers

The Controller is the orchestrator of each view. You can call a specific task of the Controller –based on the input variables you pass to it– causing it to execute a specific method. The Controller's job is to create a Model and View object, set the state of the Model based on the request and then either call a Model's method to perform an action (e.g. save a record) or pass the View the Model object and tell it to render itself.

Class and file naming conventions

The convention for naming the controller classes is `ComponentControllerView`, e.g. `TodoControllerItem` for a component named `com_todo` and a view named `items`. The last part **SHOULD** be singular. Support for plural named controllers (such as `TodoControllerItems`) will be dropped in a future version.

The controller file name **MUST** match the last part of the class name. This means that the file for `TodoControllerItem` **MUST** be `item.php`, whereas the file for `TodoControllerItems` **MUST** be `items.php`.

All Controller files are located in your component's controllers directories, in the front-end and back-end. If a file is not present in the front-end, it will be attempted to be loaded from the back-end and vice versa. If the Controller class is not loaded and a suitable file cannot be found FOF will fall back to one of the following, in this order:

1. The Default controller. This is a special controller class following the naming conventions *ComponentControllerDefault*, e.g. `TodoControllerDefault`, found in the `default.php` file inside your controllers directory.
2. If a default controller is not found, FOF will fall back to creating a suitably configured instance of `FOFController`, using convention over configuration to determine what the controller object should do.

View names and handling by a single controller

The convention in FOF is that the view name is plural when you are executing the `browse` method (which returns multiple records) and singular in all other cases. Both views are considered to be part of the same triad and are handled by the same controller. For example, let's consider a component named `com_todo` and a view called `items`. The view name will be `items` when you are producing a list of all items (`browse` task), but `item` in all other cases. Both views will be handled by the `TodoControllerItem` class. This is different than plain old Joomla!. You do not need a different "list" and "form" controller. There's one and only one controller per view.

Customising a specialised class

Unlike plain old Joomla! you are NOT supposed to copy and paste code when dealing with FOF. Our rule of thumb is that if you ever find yourself copying code from `FOFController` into your extension's specialised table class you're doing it wrong.

FOF controller can be customised very easily using the `onBeforeSomething` / `onAfterSomething` methods. The *Something* is the name of the controller task they are related to. For example, `onBeforeBrowse` runs before the `browse` task executes and `onAfterBrowse` runs right after the `browse` task executes. Returning false will result in a 403 Forbidden error. Specific implementation notes for each case can be found in the docblocks of each event method.

Extending your controllers with plugin events

As a developer you've probably found yourself in a position like this: a component you found does almost what you want. In order to make it do exactly what you want you need to change how a controller handles a specific task in a specific view. But if you modify the controller ("hack core") you have upgrade and maintenance issues. You can make a feature request to the developer but you don't know if and when the feature will be implemented. If you are the developer of the component you are faced with the dilemma: do I let this client down or do I implement a feature that doesn't quite fit my extension and will become a maintenance burden?

This is where FOF kicks in. Remember how you can customise a specialised class with `onBefore` / `onAfter` methods? Since FOF 2.1.0 you can handle these methods not only with a customised class but also with system plugin events. System plugins are always loaded early in the Joomla load process (as early as the `onAfterInitialise` call), making them an excellent choice for providing component customisation code, without the need to over-engineer FOF's handling of Controllers.

You will need to create a method named `onBeforeComponentControllerViewTask`, e.g. `onBeforeFooBarControllerItemsRead` to handle the `onBefore` event of `com_foobar`, `items` view, `read` task. Returning false will prevent the task from firing. You can do the same for the `onAfter` event. Do note that plugin events run after the code in your controller and not instead of it or before it. The events must be implemented in system plugins so that they always get loaded by Joomla! before any controller gets the chance to run (remember, HMVC, you may end up calling a controller from a module or plugin).

The signature for these plugins methods is like this:

```
public function onBeforeComponentControllerViewTask (FOFController &$controller, FOFInput &
```

Both parameters are passed by reference, meaning that you can modify them from your plugin. There's a caveat: by the time the `onBefore` plugin event is called the model and view instances have already been created with the previously existing `FOFInput` instance. If you need to modify the model's state you will have to do something like `$controller->getThisModel()->setState('foo', $myNewFooValue)`

```
public function onAfterComponentControllerViewTask (FOFController &$controller, FOFInput &
```

The *\$ret* parameter contains the return value of the task method. It is passed by reference and you can modify it from your plugin.

4. Views

The Views are the last wheel of an MVC triad. Their sole purpose in life is to render the data in a suitable representation that makes sense. Usually this means rendering to HTML but they can also be used to render the data as JSON, XML, CSV or even as images, sound and video. It's up to you to decide what a "suitable" representation means in the context of your application.

Class and file naming conventions

The convention for naming the view classes is *ComponentViewViewname*, e.g. *TodoViewItem* for a component named *com_todo* and a view named *item*. The last part **MUST** match the singular/plural name of the specific view you are rendering.

The view file name **MUST** follow the convention *view.format.php*, e.g. *view.html.php*. The *format* is the representation format rendered by this view class. The most common formats –for which FOF provides default implementations– are *html*, *json* and *csv*. The format **MUST** match the value of the "format" input variable. If none is specified, *html* will be assumed. Exception: there is a format called *form* which is an HTML rendering and will be loaded when the value of the format input variable is set to *html* (or not set at all) as long as there is an XML form for this view.

All View files are located in your component's views directories, in the respective front-end and back-end directory, inside the respective view subfolder. For example, if you have a component called *com_todo* and a back-end view named *items* the view file for the HTML rendering is *administrator/components/com_todo/views/items/view.html.php*

If a file is not present in the front-end, it will be attempted to be loaded from the back-end and vice versa. If the View class is not loaded and a suitable file cannot be found FOF will fall back to one of the following, in this order:

1. The Default view. This is a special controller class following the naming conventions *ComponentViewDefault*, e.g. *TodoViewDefault*, found in the *default/view.format.php* file inside your views directory.
2. If a default view is not found, FOF will fall back to creating a suitably configured instance of a *F0FView* format-specific class, using convention over configuration to determine what the model object should do. For example, if the current format is *html* FOF will create an instance of *F0FViewHtml*. If there is no suitable class found you will get an error as FOF has no idea what to render.

View template files and their location

FOF uses default names to generate a list or form to edit, these names are linked to the task being executed.

Table 2.3. View templates' locations

Task name	Filename	Description
browse	default.php OR form.default.xml	This is the file that shows the list page
edit	form.php OR form.form.xml	This is the file that shows the edit page
read	item.php OR form.item.xml	This is the file that shows the data of a single record without being able to edit the record

The location of the files is also pre-defined and based on the view name. This name comes in both singular and plural form where the singular name represents the edit page and the plural name represents the list page. Let's say our view is called `todo`, the template files can be found in the following location:

```
views
|-- todo
|   |-- tpl
|       form.php OR form.form.xml
|       item.php OR form.item.xml
|-- todos
|   |-- tpl
|       default.php OR form.default.xml
```

Customising a specialised class

Unlike plain old Joomla! you are NOT supposed to copy and paste code when dealing with FOF. Our rule of thumb is that if you ever find yourself copying code from any `FOFView` class into your extension's specialised table class you're doing it wrong.

FOF view can be customised very easily using the `onTask` methods. The *Task* here is the name of the controller task they are related to. For example, `onBrowse` runs when rendering the output of a browse task. There is a catch-all method called `onDisplay` which executes if no suitable method is found in the view class. Returning false from these methods will result in a 403 Forbidden error.

Layouts, sub-templates and template overrides

The default filename of the template file to be used can be overridden with the *layout* input variable. For example if you feed an input variable named `layout` with a value of `foobar` FOF will look for `form.foobar.xml` and `foobar.php` in the `tpl` directory.

You can also specify sub-templates using the *tpl* parameter when calling the `display()` method of your view class. By default FOF doesn't use it at all. You can only use it with custom controller tasks. In this case the *tpl* (a.k.a. subtemplate) will be appended to the layout name with an underscore in between. So for `layout=foo` and `tpl=bar` FOF will be looking for the `foo_bar.php` view template file.

All view template files are subject to template overrides. The view template will first be searched in the `templates/template/html/component/view` directory where *template* is the name of your template, *component* is the name of your component (e.g. `com_todo`) and *view* is the name of your view. This allows end users and site integrators to provide customised renderings suitable for their sites.

Joomla! version specific overrides

It is possible have different view templates per Joomla! version or version family. The correct view template is chosen automatically, without you writing a single line of code.

Let's say that you have a browse view with your lovely `default.php` view template file. And you want your component to work on Joomla! 2.5 and 3.x. Oh, the horror! The markup is different for each Joomla! version, Javascript has changed, different features are available... Well, no problem! FOF will automatically search for view template files (or XML forms) suffixed with the Joomla! version family or version number.

For example, if you're running under Joomla! 2.5, FoF will look for `default.j25.php`, `default.j2.php` and `default.php` in this order. If you're running under Joomla! 3.2, FOF will look for `default.j32.php`, `default.j3.php` and `default.php` in this order. This allows you to have a different view template file for each version family of Joomla! without ugly if-blocks and awkward code.

This feature also works with XML forms, e.g. on Joomla! 2.5 a browse form will be looked for in `form.default.j25.xml`, `form.default.j2.xml` and `form.default.xml` in this order.

Custom template view file to wrap an XML form

An XML form file is a great way to get started developing an application, but what if you want to add messages or render moduels at the top/bottom of the form, add a sidebar or in any other way add your own HTML around the rendered form? The answer is simple: you can use regular PHP-based view templates and XML forms side by side in the same view. Inside your `.php` file you can use `$this->getRenderedForm()` to return the XML form file rendered as HTML. This allows customising the layout (e.g. adding information before/after the form) while still using the XML file to render the actual form. For example, you could insert this code in your custom `.php` view template file:

```
<?php

// Show some stuff before the form
?><h1>Hello, world!</h1>
<p>This is printed above the form</p>

<?php
// Show the rendered form
echo $this->getRenderedForm();

// Show some stuff after the form
?>
<p>This is printed below the form</p>
```

This works with all forms (browse, edit, read). For example, if you want to customise a browse view template you will need to create both `form.default.xml` and `default.php` in the `tmpl` directory of your view.

Automatic views and web services

FOF can automatically render your component's output in JSON and CSV formats. You do not have to write any code whatsoever. Just pass on an input variable named `format` with a value of `json` or `csv` respectively. In the typical case where you get the input variables from the request this means appending `&format=json` or `&format=csv` respectively. You can, of course, customise the output of either format using view classes if you need to.

The JSON format can be used to provide web services with integrated hypermedia (following the HAL specification). All you need to do is to tell `F0FViewJson` to use hypermedia, either by setting `$this->useHypermedia = true;` in your specialised JSON view class or, much easier, using the `fof.xml` configuration file.

Custom render classes ("renderers")

FOF uses the `Render` package to convert XML forms into HTML and handle things such as submenus. It ships with render classes suitable for use on regular Joomla! 2.5, regular Joomla! 3.2 and one for when using Akeeba Strapper. The correct render class is chose automatically, via environment detection. However, you may want to implement a custom render class. Having to put it inside FOF's library directory would be in violation of best coding practices. Even worse, it would affect all views in all FOF-powered components on the site which is a terrible idea. That's why the `View` constructor allows you to instantiate and attach a custom render class. You will need to specialise the `__construct` method of your `View` class like this:

```
function __construct($config = array())
{
    parent::__construct($config);
}
```

```
$customRenderer = new YourCustomRenderClass();
self::registerRenderer($customRenderer);
}
```

This View will now use the custom renderer to display itself.

5. Dispatcher

The Dispatcher is what handles the request on behalf of your component (be it a web request or an HMVC request). Its primary job is to decide which controller to create and which task to run. Its secondary job is to handle transparent authentication which comes in really handy if you want to perform remote requests to your component, interacting with access-restricted data or actions (viewing items protected behind a login, performing privileged operations such as creating / editing / deleting records and so on).

Class and file naming conventions

The convention for naming the dispatcher classes is *ComponentDispatcher*, e.g. *TodoDispatcher* for a component named *com_todo*. The last part **MUST** be *Dispatcher*.

The controller file name **MUST** be *dispatcher.php*. All Dispatcher files are located in your component's main front-end or back-end directories. If a file is not present in the front-end, it will be attempted to be loaded from the back-end but NOT vice versa. If the Dispatcher class is not loaded and a suitable file cannot be found FOF will fall back to creating a suitably configured instance of *F0FDispatcher*, using convention over configuration to determine what the Dispatcher object should do.

Customising a specialised class

Unlike plain old Joomla! you are NOT supposed to copy and paste code when dealing with FOF. Our rule of thumb is that if you ever find yourself copying code from *F0FDispatcher* into your extension's specialised table class you're doing it wrong.

FOF dispatcher can be customised very easily using the *onBeforeDispatch* / *onAfterDispatch* methods. *onBeforeDispatch* runs before the dispatcher executes and *onAfterDispatch* runs right after the dispatcher executes. Returning false will result in a 403 Forbidden error. Specific implementation notes for each case can be found in the docblocks of each event method.

5.1. Transparent authentication

Transparent authentication allows FOF to authenticate a user using Basic Authentication or URL parameters. This allows you to create web services or directly access pages which require a logged in users without using Joomla! session cookies.

The authentication credentials can be provided via two methods: Basic Authentication or a URL parameter. The authentication credentials can either be a username and password pair transmitted in plaintext (not recommended unless you are forcibly using HTTPS with a commercially signed SSL certificate) or encrypted. The encrypted information uses Time-Based One Time Passwords (TOTP) to allow you to communicate the credentials securely, without the burden of public key cryptography, while at the same time maintaining an intrinsically very narrow window of opportunity. Furthermore, since the effective encryption key is modified every few seconds it makes an attack against it slightly harder than using regular symmetric AES-128 cryptography.

Transparent authentication is enabled by default, but doesn't use TOTP.

Setting it up

Setting up transparent authentication requires you to modify your component's Dispatcher class, namely its `__construct()` method, to change the values of some protected fields.

The available fields are:

\$_fofAuth_timeStep The time step, in seconds, for the time based one time passwords (TOTP) used for encryption. The default value is 6 seconds. The window of opportunity for an attacker is 2x-3x as much, i.e. 12-18 seconds using the default value. This is adequately high to be practical and too low to allow a realistic attack by a hacker.

Important

If you change this option you have to notify the consumers of the service to make the same change, otherwise your TOTP's will be vastly different and communication will fail.

\$_fofAuth_Key The Base32 encoded key for TOTP. Please note that this is Base32, not Base64. Only required if you're going to use encryption.

\$_fofAuth_Formats Which result formats should be handled by the transparent authentication. This is an array, by default `array('json', 'csv', 'xml', 'raw')`. We recommend only using non-HTML formats in here.

\$_fofAuth_LogoutOnDefault If it's true and it means that once the component finishes executing, FOF will log out the user it authenticated using transparent authentication. This is a precaution against someone intercepting and abusing the session cookie Joomla! will be sending back to the client, as well as preventing the sessions table from filling up.

\$_fofAuth_AuthMethods Array of supported authentication methods. Only use the ones that make sense for your application. Avoid using the *_Plaintext ones, please. The possible values in the array are:

- **HTTPBasicAuth_TOTP** HTTP Basic Authentication using encrypted information protected with a TOTP (the username must be `"_fof_auth"`)
- **QueryString_TOTP** Encrypted information protected with a TOTP passed in the `_fof_authentication` query string parameter
- **HTTPBasicAuth_Plaintext** HTTP Basic Authentication using a username and password pair in plain text
- **QueryString_Plaintext Plaintext** JSON-encoded username and password pair passed in the `_fof_authentication` query string parameter

When you are using the `QueryString_TOTP` method you can pass your authentication information as GET or POST variable called `_fof_authentication` with the value being the URL encoded cryptogram of the authentication credentials (see further down).

How to get a TOTP key

Any Base32 string can be used as a TOTP key as long as it expands to exactly 10 characters. If you don't feel like guessing, you can simply do:

```
$totp = new FOFEncryptTotp();  
$secret = $totp->generateSecret();
```


You have to share this secret key with all clients wishing to connect to your component via a secure channel. This secret key must also be set in the `_fofAuth_Key` variable.

How to construct and supply an authentication set

The authentication set is a representation of the username and password of the user you want FOF to log in using transparent authentication. Its format depends on the authentication method.

Before going into much detail, we should consider an FOF authentication key to be a JSON-encoded object containing the keys username and password. E.g.:

```
{ "username": "sample_user", "password": "$3Cr3+" }
```

This is used with all but one authentication methods. Encryption of the FOF authentication key, used with all `*_TOTP` methods, is discussed further down this document.

If you are using `HTTPBasicAuth_Plaintext` method, you have to supply your username and password using HTTP Basic Authentication. The username is the username of the user you want to log in and the password is the password of the user you want to log in. This is the easiest and most insecure authentication method.

If you are using the `HTTPBasicAuth_TOTP` method, you have to supply a username of `_fof_auth` (including the leading underscore) and as the password enter the encrypted FOF authentication key.

If you are using the `QueryString_Plaintext` method you have to supply a GET or POST query parameter with a name of `_fofauthentication` (including the leading underscore). Its value must be the URL encoded FOF authentication key.

If you are using the `QueryString_TOTP` method you have to supply a GET or POST query parameter with a name of `_fofauthentication` (including the leading underscore). Its value must be the URL encoded FOF authentication key.

Encrypting the FOF authentication key

Assuming you are doing this from a FOF-powered component, you can do something like this:

```
$timeStep = 6; // Change this if you have a different value in your Dispatcher
$authKey = json_encode(array(
    'username' => $username,
    'password' => $password
));
$totp = new FOFEncryptTotp($timeStep);
$otp = $totp->getCode($secretKey);
$cryptoKey = hash('sha256', $this->_fofAuth_Key.$otp);
$aes = new FOFEncryptAes($cryptoKey);
$encryptedAuthKey = $aes->encryptString($authKey);
```

If you can get your hands on a TOTP and AES-256 implementation for your favourite programming language you can use talk to FOF-powered components through transparent authentication. Tip: TOTP libraries are usually labelled as being Google Authenticator libraries. Google Authenticator simply uses TOTP with a temp step of 30 seconds. Most such libraries are able to change the time step, thus possible to use with FOF. In fact, that's how FOF's TOTP library was derived.

6. Toolbar

The Toolbar is the part of your components which handles the display of the component's title and toolbar buttons, as well as the toolbar submenu (links or tabs under the toolbar). While usually used in the back-end of your site, FOF

components can readily render a toolbar in the front-end part of the component as well. Do note that you will need to provide your own CSS to style the toolbar in the front-end as Joomla! templates lack such a styling.

Class and file naming conventions

The convention for naming the toolbar classes is *ComponentToolbar*, e.g. *TodoToolbar* for a component named *com_todo*. The last part **MUST** be *Toolbar*.

The controller file name **MUST** be *toolbar.php*. All *Toolbar* files are located in your component's main directory, in the front-end and back-end. If a file is not present in the front-end, it will be attempted to be loaded from the back-end. If the *Toolbar* class is not loaded and a suitable file cannot be found FOF will fall back to creating a suitably configured instance of *FOFToolbar*, using convention over configuration to determine what the controller object should do.

Customising a specialised class

FOF toolbar can be customised very easily using methods following one of the following conventions, from most specific to least specific:

<i>onView-nameTaskname</i>	for example <i>onItemsBrowse</i> . The name consists of the word <i>on</i> in lowercase, followed by camel cased view and task names, in this order. When the task is <i>Browse</i> the view name MUST be plural. For any other task the view name MUST be singular. For example: <i>onItemsBrowse</i> and <i>onItemAdd</i>
<i>onViewname</i>	for example <i>onItems</i> . The name consists of the word <i>on</i> in lowercase, followed by camel cased view name.
<i>onTaskname</i>	for example <i>onBrowse</i> . The name consists of the word <i>on</i> in lowercase, followed by camel cased task name.

The method to be called is selected from the most to the least specific. For example, if you have a component named *com_todo* and a view named *items*, with the task *browse* being called FOF will search for the following method names, in this order: *onItemsBrowse*, *onItems*, *onBrowse*

Please note that any of these methods should only modify the toolbar and not perform any other kind of data processing.

Customising the link bar

The link bar is the area normally displayed right below the toolbar in the back-end of the site. It is usually rendered as flat links (Joomla! 2.5), a left-hand sidebar (Joomla! 3.0 and later) or tabs (when using Akeeba Strapper). The exact rendering depends on the template. The interesting thing is how these links are populated, described below.

Automatically populated link bar

FOF will normally look inside your component's views directory and look for plural views. These views are automatically added to the link bar in alphabetical order. Exception: a view called *cpanel* will always be added to the link bar.

If you want a view to not be included in the link bar, please create a file named *skip.xml* and put it inside its directory. FOF will see that and refrain from adding this view to the link bar.

If you want to modify the ordering of a view you have to create or modify the *metadata.xml* file inside your view's directory. The *<foflib>* section inside the *metadata.xml* file is read by FOF. For example:

```
<?xml version="1.0" encoding="utf-8"?>
```

```
<metadata>
  <foflib>
    <ordering>12</ordering>
  </foflib>
  <view title="COM_FOOBAR_VIEW_ITEMS_TITLE">
    <message><![CDATA[COM_FOOBAR_VIEW_ITEMS_DESC]]></message>
  </view>
</metadata>
```

tells FOF that this view should be the 12th link in the link bar.

If you're not using a `metadata.xml` file and have a view called `cpanel` or `cpanels` then it will always be reordered to the top of the link bar list.

Fully customised link bar

The automatically generated link bar is usually enough, but sometimes you want a more complex presentation. For example, you want to show different link bars depending on a configuration setting (e.g. a "Power user" switch in your component's options), or a drop-down menu. To this end, `FOFToobar` provides the following methods.

```
public function clearLinks()
```

Removes all links from the link bar, allowing you to start from a clean slate.

```
public function &getLinks()
```

Returns the raw data for the links in the link bar. We recommend against using it as the internal data structure may change in the future.

```
public function appendLink($name, $link = null, $active = false, $icon = null, $parent = ''
```

Appends a link to the link bar. If you use the last option (`$parent`) you are creating a submenu item whose parent is the `$parent` item. You reference the parent item by its name (i.e. the `$name` parameter you used in the parent element). Drop-downs only work in a. Joomla! 3.0 and later without any additional requirements; or b. Joomla! 2.5 but only when using the optional Akeeba Strapper package which back ports jQuery and Bootstrap to Joomla! 2.5 sites.

In order to use these methods you will have to override the `renderSubmenu` method in `FOFToobar`.

When the link bar is rendered

The link bar is rendered in all HTML views, unless you have an input variable named `tmpl` with a value of `component`. Typically, this means that you are passing a query string parameter `&tmpl=component` to the URL of your component.

You can force the entire toolbar (and, by extent, the link bar) to be displayed or hidden using the `render_toolbar` input variable. When you set it to 0 the toolbar and link bar will not be displayed. When you set it to 1 the toolbar and link bar will be displayed (even when you use `tmpl=component`).

7. HMVC

Before we say anything else, let's define what HMVC means in the context of FOF. The H stands for "Hierarchical". That is to say there's a hierarchy of MVC calls. In very simple terms, HMVC allows you to call an MVC triad from anywhere else.

Practical uses:

- Showing a component's view inside a module, without having to rewrite the model and view logic inside the module.
- Allowing a plugin (e.g. a system or content plugin) to use the rendered output of a component and inject it to the output of the page or send it as an email.
- Displaying a view of the same or a different component within a component.

The possibilities are endless.

How to use it?

You already know it, you just didn't realise it. Here's the secret sauce:

```
F0FDispatcher::getTmpInstance('com_foobar', 'items', array('layout' => 'fancy'))->dispatch()
```

You are simply creating an instance of the dispatcher of the component you want, telling it which view to render and giving it an option configuration array (the last argument in the method call). Then you just call the `dispatch()` method and let it render.

If you want to get the output in a variable you have to do something like this:

```
@ob_start();
F0FDispatcher::getTmpInstance('com_foobar', 'items', array('layout' => 'fancy'))->dispatch()
$result = ob_end_clean();
```

If you need to pass input variables to the dispatcher you can do something like this:

```
F0FDispatcher::getTmpInstance('com_foobar', 'items', array('input' => $input))->dispatch()
```

where `$input` can be an indexed array, a `stdClass` object or –preferred– a `F0FInput` or `JInput` instance. For example:

```
$inputvars = array(
    'limit'           => 10,
    'limitstart'      => 0,
    'foobar'          => 'baz'
);
$input = new F0FInput($inputvars);
F0FDispatcher::getTmpInstance('com_foobar', 'items', array('input' => $input))->dispatch()
```

And, of course, you can mix and match all of the above ideas to something like:

```
$inputvars = array(
    'limit'           => 10,
    'limitstart'      => 0,
    'format'          => 'json'
);
$input = new F0FInput($inputvars);
@ob_start();
F0FDispatcher::getTmpInstance('com_foobar', 'items', array('input' => $input))->dispatch()
$json = ob_end_clean();
```

See the awesome thing we just did? We got the first 10 items of `com_foobar` in JSON format in the `$json` variable. Just a side note. This example also screws up the document MIME type if you use it in an HTML view. Be warned.

8. ACL configuration

Another key feature of FOF are automatic ACL checks: before an user is going to do anything, a permission check is made. For example, before browsing a list of records, FOF checks for `core.browse` permission or when we're trying to save a record, permission `core.edit` is checked.

Adding ACL support in your extension

In these sections we will analyze our example component To-Do List and we will retrace the steps needed in order to add and manage ACL inside the extension.

What we want to achieve is a permission system based on two levels: we will define global wide permissions, then we will add "exceptions" to single records. For example, we need that Registered users can always edit records, but we want to prevent them from editing on a single record only because is very important for us.

Defining the actions

First of all, we have to define the actions that an user could perform, so create the file `access.xml` inside your extension backend directory and add the following lines:

```
<?xml version="1.0" encoding="utf-8"?>
<access component="com_todo">
  <section name="component">
    <action name="core.admin" title="JACTION_ADMIN" description="JACTION_ADMIN_COMPO" />
    <action name="core.manage" title="JACTION_MANAGE" description="JACTION_MANAGE_COM" />
    <action name="core.create" title="JACTION_CREATE" description="JACTION_CREATE_COM" />
    <action name="core.delete" title="JACTION_DELETE" description="JACTION_DELETE_COM" />
    <action name="core.edit" title="JACTION_EDIT" description="JACTION_EDIT_COMPONE" />
    <action name="core.edit.own" title="JACTION_EDITOWN" description="JACTION_EDITOWN_C" />
    <action name="core.edit.state" title="JACTION_EDITSTATE" description="JACTION_EDITSTA" />
  </section>

  <section name="unit">
    <!-- Actions to be used in for unit -->
    <action name="core.delete" title="JACTION_DELETE" description="JACTION_DELETE_COMPONENTEN" />
    <action name="core.edit" title="JACTION_EDIT" description="JACTION_EDIT_COMPONENT_DESC" />
    <action name="core.edit.own" title="JACTION_EDITOWN" description="JACTION_EDITOWN_COMP" />
    <action name="core.edit.state" title="JACTION_EDITSTATE" description="JACTION_EDITSTAT" />
  </section>
</access>
```

As you can see, there are two sections: one for the whole component and another related to single records.

Important

FOF will assume that the following permissions are defined inside your component: `core.admin`, `core.manage`, `core.create`, `core.delete`, `core.edit`, `core.edit.own`, `core.edit.state`.

In order to fully take advantage of FOF features, we strongly suggest you to define the above actions.

Editing component permissions

In your `config.xml` file you have to add the following lines:

```
<fieldset name="permissions" label="JCONFIG_PERMISSIONS_LABEL" description="JCONFIG_PERMIS
  <field name="rules" type="rules"
    label="JCONFIG_PERMISSIONS_LABEL"
    class="inputbox"
    filter="rules"
    component="com_todo"
    section="component" />
</fieldset>
```

In this way Joomla! will render a Permissions tab inside your component options.

Editing record permissions

First of all we have to add a column to our table, as per FOF convention its name should be `asset_id` (however you could setup an alias):

```
ALTER TABLE `#__todo_items` ADD `asset_id` INT NOT NULL ;
```

Then you have to add two fields on your XML form: the saved `asset_id` and the rule field, that is used to set the permissions to each user group:

```
<fieldset name="rules">
  <field name="asset_id" type="hidden" emptylabel="true" filter="unset" />

  <field name="rules"
    type="rules"
    emptylabel="true"
    translate_label="false"
    filter="rules"
    validate="rules"
    class="inputbox"
    component="com_todo"
    section="unit" />
</fieldset>
```

Important

At the timing of this writing (2013-12-03), the Joomla! "rules" field is buggy. If you want add per item ACL privileges you *must* use FOF XML forms, since we found a workaround for this issue.

Finally, you have update your table class and add new method, named `getAssetParentId`. You have to do that since when we have to tell Joomla! what's the parent of our asset record, in this case it would be the component itself:

```
public function getAssetParentId($table = null, $id = null)
{
    $db = JFactory::getDbo();

    $query = $db->getQuery(true)
        ->select($db->qn('id'))
        ->from($db->qn('#__assets'))
        ->where($db->qn('name').' = '.$db->q('com_todo'))
        ->where($db->qn('parent_id').' = 1')
        ->where($db->qn('level').' = 1');
    $parent_id = $db->setQuery($query)->loadResult();
}
```

```
if(!$parent_id)
{
    return parent::getAssetParentId($table, $id);
}
else
{
    return $parent_id;
}
}
```

And that's it! Now enjoy the ACL in your extension.

9. The database cursor iterator (FOFDatabaseIterator)

Note

Available since FOF 2.2.0

In many cases you have to sift through a large number of database records and you want to use the magic of FOFTable. The traditional way to do that was to use FOFModel::getItemList to get a big array of stdClass objects, iterate through it with foreach, mapping each stdClass object to your FOFTable instance. This is a performance and resource nightmare. PHP has to retrieve the entire list of records from the database and cast it to stupid stdClass objects, then you have to remap them one by one as FOFTable instances. The time and memory required to do that makes it impractical for lists over a few dozen records.

Enter the FOFDatabaseIterator. This is a regular, non-resettable and non-seekable PHP iterator. This means that you can only fetch its current record or proceed to the next one. You cannot scroll back to the beginning and you cannot move to an arbitrary location within the iterator (unlike an array). However, it will only load one record in memory at a time and deliver it to you as a FOFTable object. The magic behind it lies in the way it is implemented: it is given a database cursor (pretty much, a resource pointing to the result set of a database query) and it uses standard PHP features to only ever fetch the next item from this cursor. Behind the scenes it will get a new instance of the FOFTable class and use its bind() method to bind the data to it, then return you the table object. Since it's an Iterator you can use it in a foreach statement to iterate through the entire list of records, one FOFTable object at a time.

Even though you can create a FOFDatabaseIterator directly, you will hardly ever need to do so. A FOFTableIterator is returned by FOFModel's getIterator() method and the FOFTableRelations' methods which return multiple records. You are advised to use the iterator whenever you reasonably expect to deal with large numbers of database records, especially if you need to act upon them.

The only drawback is that by using FOFModel's getIterator the onProcessList method, which is used for record list post-processing, is never called. This is actually a good thing. You can migrate that logic into the onBeforeBind() method of your table, where it belongs architecturally. After all, you are post-processing a list of records, one record at a time. What is more natural than doing so in the one class dedicated to handling one record at a time?

10. Utility classes

FOF comes with certain classes that are designed to make your life as a Joomla! extensions developer much easier. They handle things like installation, updates and database schema management. This code has been battle tested in our own components over the years.

10.1. The installation script helper

Note

Available since FOF 2.3.0

A FOF component usually needs to pack and install several things. At the very least it includes the component itself and a copy of the FOF library. Joomla! offers a method for installing multiple extensions at once, called the "package" extension type. However, "package" extensions are all or nothing: you either install everything included in your package or nothing at all. Quite obviously this can't be used to prevent installing an old version of FOF on top of a new one. FOF itself is of the "library" extension type. You'd think that a "library" package is checked for its version so that old versions can't be installed on top of new ones. Wrong. You might think that the "library" package can have an installation script, like components and plugins, to determine if it can be installed, preventing an old version of the library overwriting a new one. Wrong, again. Joomla!'s extensions installer is coded in the most short-sighted way possible. All is lost?

Not so fast! We have a few aces up our sleeves. The solution we've been using in our company over the years is a "component" package with a smart installer script which can install our component, any modules and plugins we may be including with it and FOF (and, possibly, Akeeba Strapper) if it's not installed or out-of-date. The "secret sauce" of our installer script is now inside FOF 2.3.0 and later, in the `FOFUtilsInstallscript` class. Here we are going to explain how to use it.

Package layout

The contents of your package need to follow a specific folder layout. Here's the proposed layout:

```
<root>
+-- backend    Component files under site's "administrator" directory
+-- frontend   Component files under site's root director
+-- media      OPTIONAL. Component media files, under site's "media" directory
+-- cli        OPTIONAL. Component CLI script installed under site's "cli" directory
+-- language   OPTIONAL. Language files for your component.
+-- fof        FOF installation files (extract FOF's library package in here)
+-- strapper   OPTIONAL. Akeeba Strapper (extract Strapper's package in here)
+-- modules    OPTIONAL. Modules bundled with the component
|   +-- admin   Administrator (back-end) modules
|   |   +-- mymodule  Installation files for mod_mymodule admin module
|   +-- site    Site (front-end) modules
|   |   +-- mymodule  Installation files for mod_mymodule site module
+-- plugins    OPTIONAL. Plugins bundled with the component
|   +-- system  System plugins
|   |   +-- foobar  Installation files for plg_system_foobar plugin
+-- whatever   Plugins installed in the "whatever" plugin folder
|   +-- baz     Installation files for plg_whatever_baz plugin
```

The backend, frontend, media and language directories can have any name you want as they are NOT handled by the installation script. They are defined in your component's XML manifest and it's up to Joomla! to decide what to do with them. The other directories, however, do play an important role.

Tip

If you don't like our naming conventions you can choose different names for the top-level directories by specialising the `FOFUtilsInstallscript` class. More on that later on!

Tip

Feel lost? You may want to see how we do this in our own components. A great place where the full power of the installation script helper is put to action is Akeeba Subscriptions [<https://github.com/akeeba/akeeba-subscriptions/blob/development/component/script.akeebasubs.php>].

The **fof** directory is the one you **MUST** have. It contains a copy of FOF's installation files. Just extract the latest FOF library package in there.

The **strapper** directory can contain a copy of Akeeba Strapper, our Bootstrap 2.x compatibility layer, if you are using it in your component. In this case just extract the Strapper library into this directory.

The **cli** directory contains command-line scripts which will be copied to your site's "cli" directory. They are typically used to set up CRON jobs for housekeeping or other lengthy operations.

The **modules** directory contains all the modules you want to bundle with your extension. The suggested directory layout is having two sub-directories called `admin` and `site` containing the administrator (back-end) and public (front-end) modules respectively. Each module's installation file go inside a sub-directory of the `admin` or `site` directories depending on where it should be installed. The name of the module's directory must match its extension name as set in the XML manifest. You can also skip the `admin` or `site` directories and put everything under `modules` but we have found that this will make your life much harder as your extension starts growing bigger. Trust us on that.

The **plugins** directory contains all the plugins you want to bundle with your extension. You need to have one sub-directory for each Joomla! plugin folder, e.g. `system`, `content`, `user` etc or even custom plugin folders such as `akeebasubs`, `ats`, `whatever`, ... Inside each sub-directory create one directory per plugin.

Important note about XML manifests

A few notes on XML manifests. Please note that due to one of the myriads of JInstaller's bugs and limitations your component's XML manifest **SHOULD** be placed in the package's root and **MUST** begin with a letter before "L". We recommend using the following naming convention to prevent package installation problems due to Joomla! being outright silly in its handling of manifests:

- Components: `com_something.xml`
- Plugins: `plg_something.xml`
- Modules: `mod_something.xml`
- Libraries: `lib_something.xml`
- Files: `files_something.xml`

Using this convention you ensure that when you list all XML manifests in the package and sort them alphabetically the component's manifest will show up first. This is exactly how Joomla! decides which XML manifest to use for installing a package: list all of them, alpha-sort them and pick the first one.

Creating your installation script

Let's say your component is called Foobar and its Joomla! name is `com_foobar`. You need to create the file `script.foobar.php` and place it in the root of your package. The file name and location of the script are extremely important! They are defined in your XML manifest, using a line like this:

```
<scriptfile>script.foobar.php</scriptfile>
```

You are advised to follow this naming convention and place the script in your package's root to avoid nasty surprises.

Next up, you need to put the following contents in your script file:

```
<?php
// no direct access
defined('_JEXEC') or die;

// Load FOF if not already loaded
if (!defined('F0F_INCLUDED'))
{
    $paths = array(
        (defined('JPATH_LIBRARIES') ? JPATH_LIBRARIES : JPATH_ROOT . '/libraries') . '/f0f/inc
        __DIR__ . '/f0f/include.php',
    );

    foreach ($paths as $filePath)
    {
        if (!defined('F0F_INCLUDED') && file_exists($filePath))
        {
            @include_once $filePath;
        }
    }
}

class Com_FoobarInstallerScript extends F0FUtilsInstallscript
{
    protected $componentName = 'com_foobar';
    protected $componentTitle = 'Foobar Component';
}
```

Let's analyse this script. We begin by preventing direct access to the file in the standard Joomla! way:

```
// no direct access
defined('_JEXEC') or die;
```

Then we have to load FOF. We need to do that because the F0FUtilsInstallscript which powers our installation script is part of FOF. However FOF might not be already installed on the site. In this case we'll be loading it from our installation directory. Speaking of which, an important note to understand why this works.

Important

Your installation script is loaded from the component's installation directory, typically a temporary directory created by the Joomla! extensions installer. It is loaded BEFORE Joomla! installs / updates / uninstalls your component. This is very important to keep in mind, especially if you are going to work with relative directories in your customised installation script.

So here we go loading FOF:

```
// Load FOF if not already loaded
if (!defined('F0F_INCLUDED'))
{
    $paths = array(
        (defined('JPATH_LIBRARIES') ? JPATH_LIBRARIES : JPATH_ROOT . '/libraries') . '/f0f/inc
        __DIR__ . '/f0f/include.php',
    );
}
```

```
foreach ($paths as $filePath)
{
    if (!defined('FOF_INCLUDED') && file_exists($filePath))
    {
        @include_once $filePath;
    }
}
```

Please note that if the FOF directory in your package has a different name you will need to modify `__DIR__ . '/fof/include.php'` to reflect the name you chose and nothing else at all in this block of code.

Next up we define our installation script class for Joomla! to find it:

```
class Com_FoobarInstallerScript extends FOFUtilsInstallscript
```

Warning

Naming your installation class is **EXTREMELY IMPORTANT**. If you do not follow the naming convention **TO THE LETTER** Joomla! will not "see" your installation script. This results to immense amounts of hair pulling as Joomla! throws no error whatsoever when you tell it to use an installation script and it doesn't find one.

The naming is extremely important. The name must begin with the Joomla! name of your component, with the Com and extension name capitalised, i.e. `Com_Foobar`. If you use something like `com_foobar`, `Com_foobar`, `com_Foobar`, `COM_Foobar`, `COM_FOOBAR` etc Joomla! **WILL NOT BE ABLE TO FIND YOUR INSTALLATION SCRIPT AND WILL NOT RUN IT AT ALL**. Then it must be followed by exactly `InstallerScript`. Again, case matters. If you use `installerScript`, `installerscript` etc Joomla! will **NOT** be able to find your installation script. Mind your case!

The final few lines tell the installation script the component name and the human-readable title.

```
{
    protected $componentName = 'com_foobar';
    protected $componentTitle = 'Foobar Component';
}
```

As is, the installation script will do the following:

1. Make sure your component is being installed on Joomla! 2.5.6 or later using PHP 5.3.3 or later
2. Install or update your database tables using the XML schema files (see the database schema installer / updater / removal class)
3. Install or update FOF if the version bundled with your component is newer than the installed one
4. Install or update Akeeba Strapper if the version bundled with your component is newer than the installed one
5. Work around known Joomla! bugs affecting the generation / update of administrator menu items for newly installed and update components
6. Display an installation overview page, letting the user of what was installed on their site

When uninstalling the component, the installation script as is right now will do the following:

1. Remove your database tables using the XML schema files (see the database schema installer / updater / removal class)
2. Display an uninstallation overview page, letting the user of what was removed from their site

Warning

NEVER, EVER uninstall FOF or Akeeba Strapper when uninstalling your component. Joomla! does not provide a way to track dependencies. As a result you can never know if anything else installed on your client's site is using FOF or Akeeba Strapper, making their removal problematic (you could break another developer's perfectly working code). If any developer is caught doing that we will have to put them on a blacklist and take action against their software.

Customising the installation script

All customisation can be done by overriding the protected properties and methods of `FOFUtilsInstallscript`. The properties are:

<code>componentName</code>	MANDATORY. The component's name, e.g. 'com_foobar'. You absolutely need to set this, otherwise
<code>componentTitle</code>	MANDATORY. The component's human readable title, e.g. 'My Foobar Component'. This is shown in the installation and uninstallation overview page.
<code>installation_queue</code>	The list of extra modules and plugins to install on component installation / update and remove on component uninstallation. This is an array which looks like this:

```
protected $installation_queue = array(
    // modules => { (folder) => { (module) => { (position), (published) } } * }
    'modules' => array(
        'admin' => array(
            'adminmodule' => array('cpanel', 1),
        ),
        'site' => array(
            'mymodule' => array('position-1', 0),
            'othermodule' => array('position-2', 1),
        )
    ),
    // plugins => { (folder) => { (element) => (published) } * }
    'plugins' => array(
        'system' => array(
            'foobar' => 1,
            'baz' => 0
        ),
    )
);
```

The **modules** key is an array containing exactly two keys, `admin` and `site`, both being arrays containing the list of administrator (back-end) and site (front-end) modules to be installed respectively.

Each module definition consists of a key which is the module name and its content is an array with two values. The first value is the position the module should be installed to and the second value indicated whether the module will be published by default.

In the example above the `adminmodule` is an administrator module which will be placed in the `cpanel` module position and published whenever the component is installed or updated.

The **plugins** key is an array containing one or more keys. Each key is the name of a Joomla! plugins folder and its contents is an array containing the list of plugins to install.

Each plugin definition consists of a key which is the plugin name and its content is a value which indicates whether the plugin will be published by default.

In the example above the `plg_system_foobar` plugin will be published whenever the component is installed or updated. The `plg_system_baz` plugin, however, will not be published or unpublished whenever the component is installed or updated.

`uninstallation_queue` The list of obsolete extra modules and plugins to uninstall on component upgrade / installation. Please note that this IS NOT used when uninstalling the component. When you uninstall the component all the plugins and modules listed in `$installation_queue` will be removed automatically. The reason of `$uninstallation_queue`'s existence is a simple way to uninstall obsolete plugins and modules when you update a component. It is an array like this:

```
protected $uninstallation_queue = array(
    // modules => { (folder) => { (module) }* }*
    'modules' => array(
        'admin' => array(
            'adminobsolete'
        ),
        'site' => array()
    ),
    // plugins => { (folder) => { (element) }* }*
    'plugins' => array(
        'system' => array(
            'obsoleteplugin'
        ),
    )
);
```

The **modules** key is an array containing exactly two keys, `admin` and `site`, both being arrays containing the list of administrator (back-end) and site (front-end) modules to be uninstalled respectively.

Each module definition consists of a single value which is the module name to be uninstalled.

In the example above the `adminobsolete` is an administrator module which will be uninstalled when you install or upgrade the component.

The **plugins** key is an array containing one or more keys. Each key is the name of a Joomla! plugins folder and its contents is an array containing the list of plugins to uninstall.

Each plugin definition consists of a single value which is the plugin name.

In the example above the `plg_system_obsoleteplugin` plugin will be uninstalled whenever the component is installed or updated.

`removeFilesFree` Obsolete files and folders to remove from the free version only. This is used when you move a feature from the free version of your extension to its paid version (`$isPaid` is true). If you don't have such a distinction you can ignore this and use the `$removeFilesAllVersion` option instead. The format is:

```
protected $removeFilesFree = array(
    'files' => array(
        'administrator/components/com_foobar/helpers/whatever.php'
    ),
);
```

```
'folders' => array(
    'administrator/components/com_foobar/baz'
)
);
```

The array has exactly two keys. The **files** key is an array containing a list of files to be removed on installation / update. The **folders** key is an array containing a list of folders to be recursively removed on installation / update. Files and folders are given as paths relative to the site's root.

removeFilesAllVersions	Obsolete files and folders to remove from both paid and free releases. This is used when you refactor code and some files inevitably become obsolete and need to be removed. These files are always removed, no matter what the \$isPaid value is Its format is the same as removeFilesFree.
cliScriptFiles	A list of all CLI scripts to be copied to the "cli" directory of the site. These are copied from the package directory defined in \$cliSourcePath. Its format is a simple array listing the names of the files to be copied.
cliSourcePath	The path inside your package where cli scripts are stored. Please remember that this is the path inside your package, NOT the path inside your user's site.
fofSourcePath	The path inside your package where FOF is stored. Please remember that this is the path inside your package, NOT the path inside your user's site.
strapperSourcePath	<p>The path inside your package where Akeeba Strapper is stored. Please remember that this is the path inside your package, NOT the path inside your user's site.</p> <p>Installing Akeeba Strapper with your component is optional. If this path does not exist Akeeba Strapper will simply not be installed.</p>
modulesSourcePath	<p>The path inside your package where modules to be installed are stored. Please remember that this is the path inside your package, NOT the path inside your user's site.</p> <p>Installing modules with your component is optional. If this path does not exist no module will be installed.</p>
pluginsSourcePath	<p>The path inside your package where extra plugins are stored. Please remember that this is the path inside your package, NOT the path inside your user's site.</p> <p>Installing plugins with your component is optional. If this path does not exist no plugin will be installed.</p>
schemaXmlPathRelative	Is the schemaXmlPath class variable a relative path? If set to true the schemaXmlPath variable contains a path relative to the component's back-end directory. If set to false the schemaXmlPath variable contains an absolute filesystem path. This is used when installing / updating / removing your database tables using the XML schema files.
schemaXmlPath	<p>The path where the schema XML files are stored. Its contents depend on the schemaXmlPathRelative variable above</p> <ul style="list-style-type: none"> • true. schemaXmlPath contains a path relative to the component's back-end directory • false. schemaXmlPath contains an absolute filesystem path
minimumPHPVersion	The minimum PHP version required to install this extension. If it's empty no minimum version check will be performed. You are advised to not set it to a version lower than what FOF requires (5.3.3)

mini-mumJoomlaVersion	The minimum Joomla! version required to install this extension. If it's empty no minimum version check will be performed.
maxi-mumJoomlaVersion	The maximum Joomla! version this extension can be installed on. If it's empty no maximum version check will be performed.
isPaid	Is this the paid version of the extension? This only determines which files / extensions will be removed. This is strictly optional.

As for the methods you can consult the docblocks in `F0FUtilsInstallscript`.

10.2. The database schema installer / updater / removal class

Note

Available since FOF 2.3.0

One of the most important operations in managing a component is being able to install, update and remove its database schema. Normally you do that using the relevant sections in your extension's manifest file. The big problem with this approach is that you are using the short-sighted code in Joomla!'s own extensions installer. The Achilles' heel in Joomla!'s code is that database installation and updates depend solely on the contents of the `#__schemas` table. If no version is recorded there, Joomla! is using your installation SQL file. If it contains a version it will try to run all SQL scripts with a name which indicates a version later than the one recorded in the schemas table. This leaves a lot of room for spectacular failures in the following cases, which happen far more frequently than you'd imagine:

- The `#__schemas` entry is empty but (some of) the database tables already exist, for example is the user is transferring tables manually, upgrading from an earlier Joomla! version using a third party tool, a previous installation has gone wrong etc
- The `#__schemas` entry is out of date, e.g. the installer timed out before updating it
- A previous installation resulted in a SQL error

In all of the above cases Joomla! will throw a SQL error and your clients will think that you are a moron who can't even install their own component's database properly. Well, it's time to claim your power over Joomla! thanks to FOF!

FOF 2.3.0 and later comes with the `F0FDatabaseInstaller` class. Unlike Joomla!, it doesn't base its actions on unreliable version numbers. Instead, it will run SQL commands based on whether tables / fields exist, the reported type of fields or the result of custom SQL commands. It goes even further than that by letting YOU, the developer, to choose if the failure of executing a particular SQL command should raise a blocking SQL error or be silently ignored. This is database schema management on steroids.

The schema files are provided in XML format. You only need one XML file per database technology. By default these files are stored in the back-end of your component, under the `sql/xml` directory. This is something you can override through the `$config` array you pass to the class constructor. The recognised parameters are:

input	The <code>F0FInput</code> object, used only when <i>option</i> is not specified to figure out which component we are referring to. You are advised to use the <code>dbinstaller_directory</code> parameter instead.
db	The database object used to execute the SQL commands. If none is specified the default system-wide database object will be used.

option	The name of the component, e.g <code>com_foobar</code> . This is used to determine the default location of the XML schema files if <code>dbinstaller_directory</code> is not defined. If not specified it will be read from the <code>option</code> key of the <code>input</code> object.
dbinstaller_directory	The absolute filesystem path where the XML schema files are located. If not specified we will use the <code>sql/xml</code> directory at the back-end of the component.
dbinstaller_files	A comma-separated list or array of the base names of the schema files we will be looking for. The default value is: <code>array('mysql', 'mysqli', 'postgresql', 'sqlsrv', 'mssql')</code> Please note that the name of the file doesn't have to be the same as the database technology you are using. See further below for the format of the SQL file.

The class provides two methods you can use *anywhere in your component*:

```
public function updateSchema()
```

It creates or updates the tables of your component in the database. You are suggested to call this in two places: in your installation script and in the main back-end page of your component. The latter place is not very obvious, but it allows your component to update its tables even without going through the installer. You will thank yourself for doing that when an installation fails due to a timeout error (resulting in an inconsistency between schema and code) and when you pull a Git repository on a test server. No need to run SQL commands manually, just visit your component's back-end page and presto! The database schema is updated. You're welcome.

```
public function removeSchema()
```

It removes (drops) the tables of your component. You are recommended to only use it in the uninstallation script of your component. Beware! It really does what it says on the tin. It will remove all database tables you mention in your XML schema file without any further warning. One line and the data dies, permanently.

Format of the XML schema files

```
<?xml version="1.0" encoding="UTF-8"?>
<schema>
  <!-- Metadata -->
  <meta>
    <!-- Supported driver types -->
    <drivers>
      <driver>mysql</driver>
      <driver>mysqli</driver>
    </drivers>
  </meta>

  <!-- SQL commands to run on installation and update -->
  <sql>
    <!-- Create the #__foobar_profiles table if it's missing -->
    <action table="#__foobar_profiles" canfail="0">
      <condition type="missing" value="" />
      <query><![CDATA[
CREATE TABLE `#__foobar_profiles` (
`foobar_profile_id` int(10) unsigned NOT NULL AUTO_INCREMENT,
`description` varchar(255) NOT NULL,
`params` longtext,
PRIMARY KEY (`id`)
) DEFAULT CHARACTER SET utf8;
]]></query>
```



```
</action>
<action table="#__foobar_profiles" canfail="0">
  <condition type="missing" value="params" />
  <query><![CDATA[
ALTER TABLE `#__foobar_profiles` ADD `params` longtext AFTER `description`;
  ]]></query>
</action>
</sql>
</schema>
```

As you can see the file has the root element `<schema>` and consists of two sections.

The `<meta>` section

This section has a lone element, `<drivers>`, which tells FOF which database technologies this XML schema file applies to. Put one driver name in each `<driver>` child element. The driver names recognised are those that Joomla! supports. By the latest count they are: mysql, mysqli, postgresql, sqlsrv, sqlazure

Warning

Joomla! seems to only be tested properly against the mysql and mysqli drivers. We have been observing inconsistent behaviour with the other drivers. You are advised AGAINST supporting these database technologies unless you enjoy receiving bug reports which you can't fix because the problem is in Joomla!, not your code.

The `<sql>` section

This is where all the action takes place. And that's why you have one or more `<action>` tags. Each `<action>` tag defines SQL commands which should run when one or more conditions are met. Each tag has the following attributes:

table	REQUIRED. The table this action operates on, e.g. <code>#__foobar_categories</code>
canfail	(optional) If it's set to 0 (default) if any SQL command in this action tag fails the error will bubble up and throw a system error, preventing further execution. If it's set to 1 all SQL errors are ignored. This setting can be overridden in each <code><query></code> tag.

Let's start with the **conditions**. They are defined by one or more `<condition>` tags. All `<condition>` tags accept the *operator* attribute which can have one of the following values:

and	(default) This condition must be true
not	This condition must be false
or	Either this condition or its previous conditions must be true
nor	Either this condition must be false or its previous conditions must be true
xor	Either this condition or its previous conditions must be true, but not both
maybe	Equivalent to "or"

Any other value is treated as "and". As you may have noticed this is straightforward Boolean algebra.

The kind of check performed by a `<condition>` tag is determined by its *type* attribute:

missing	Checks if a table or a field of the table is missing. This depends on the <i>value</i> of the value attribute of the tag:
---------	---

- If it's empty FOF will check if the table defined by the *table* attribute of the `<action>` tag exists.
- If it's not empty FOF will check if the field whose name you've put in the *value* attribute exists in the table defined by the *table* attribute of the `<action>` tag.

This is useful to install tables if they are missing or add missing fields to tables.

type FOF checks if the type of a database field matches what you expect. The field will be searched in the *table* attribute of the `<action>` tag. It requires two attributes:

- *value*. The name of the field.
- *coltype*. The expected field type (case insensitive). Please note that this expects the full field type definition, e.g. "VARCHAR(255) NULL" and NOT just "VARCHAR". This is a limitation of Joomla!'s database drivers.

equals FOF checks the result of a SQL query against the *value* attribute. In this case the content of the `<condition>` tag gives the SQL query to execute. For example:

```
<action table="#__admintools_profiles" canfail="1">
  <condition type="equals" operator="not" value="1"><![CDATA[
SELECT COUNT(*) FROM `#__admintools_profiles` WHERE `id` = 1;
]]></condition>

  <query canfail="1"><![CDATA[
INSERT IGNORE INTO `#__admintools_profiles`
(`id`,`description`,`configuration`,`filters`) VALUES
(1,'Default PHP Change Scanner Profile','','');
]]></query>
</action>
```

In this case we are checking if the COUNT query returns "1". If not (due to the "not" operator) we will run the INSERT IGNORE query.

true Always returns true. Useful to run index creation as indices cannot be reliably detected across all database types (again, a limitation of Joomla!'s database drivers...).

Next up you have one or more `<query>` tags. When the conditions are met they will all execute. The only attribute you can have is *canfail* and it's optional. If you skip it FOF will use the *canfail* attribute of the `<action>` tag.

As you see this feature is extremely simple and extremely powerful. If you use it wisely it will make your component's database installation and maintenance seem to take place magically!

10.3. The update model helper

Note

Available since FOF 2.3.0

Joomla! comes with an extensions updater feature. That said, its API is hard to use and leads to a lot of code repetition. Even worse, trying to use the support for commercial extensions is even worse. This is why FOF comes with the `FOFUtilsUpdate` model class.

This class is not designed to be used on its own. You will need to create a Model in your extension extending from this class. For example:

```
class FoobarModelUpdates extends FOFUtilsUpdate {}
```

As is it won't help you much. At the very least you have to tell it which component this model refers to. You can do so in your constructor. For example:

```
class FoobarModelUpdates extends FOFUtilsUpdate {
    public function __construct($config = array())
    {
        $config['update_component'] = 'com_foobar';

        parent::__construct($config);
    }
}
```

You can now get the updates to your component by doing

```
$updateInfo = FOFModel::getTmpInstance('Updates', 'FoobarModel')->getUpdates();
```

This will return an array with the following keys:

hasUpdate	Boolean. True if there is an updated version available.
version	String. The version number of the updated version available.
infoURL	String. The optional information URL as found in the extension's update XML stream.

If you want to find out the current version of your extension you can do:

```
$currentVersion = FOFModel::getTmpInstance('Updates', 'FoobarModel')->getVersion();
```

And now you have all the update information you might need.

In order to modify the update site and/or use the Joomla! 3.2 or later support for paid extensions you need to first define a few things in your constructor:

```
class FoobarModelUpdates extends FOFUtilsUpdate {
    public function __construct($config = array())
    {
        $config['update_component'] = 'com_foobar';
        $config['update_sitename'] = 'Foobar updates';
        $config['update_site'] = 'http://www.example.com/updates/com_foobar.xml';
        $config['update_extraquery'] = 'authorisation=mySuperSecretCode';

        parent::__construct($config);
    }
}
```

The parameters you are setting are:

update_sitename	The name of the update site, as stored in Joomla!'s #__update_sites table and used... nowhere at all (typical Joomla)!
update_site	The URL to the update XML file for this extension

`update_extraquery` Something to be appended to the download URL. The idea is that you'll be using this to authenticate your clients to your site and allow them to download your commercial extension. It's a good idea to never hardcode this parameter but read it from your component's configuration.

Then, somewhere in your component, you need to run:

```
$currentVersion = F0FModel::getTmpInstance('Updates', 'FoobarModel')->refreshUpdateSite();
```

It's a good idea to put that in your component's control panel controller, in the `onBeforeBrowse()` method.

Chapter 3. Features reference

1. Configuring MVC

All MVC and associated classes in FOF (Dispatcher, Controller, Model, View, Table, Toolbar) come with a default behavior, for example where to look for model files, how to handle request data and so on. While this is fine most of the times –as long as you follow FOF’s conventions– this is not always desirable.

For example, if you are building a CCK (something like K2) you may want to look for view templates in a non-standard directory in order to support alternative “themes”. Or, maybe, if you're building a contact component you only want to expose the add view to your front-end users so that they can file a contact request but not view other people's contact requests. You get the idea.

The traditional approach to development prescribes overriding classes, even to the extent of copying and pasting code. If you've ever attended one of my presentations you've probably figured that I consider copying and pasting code a mortal sin. You may have also figured that, like all developers, I am lazy and dislike writing lots of code. Naturally, FOF being a RAD tool it provides an elegant solution to this problem. The `$config` array and its sibling, the `fof.xml` file.

1.1. The `$config` array

You may have observed that FOF’s MVC classes can be passed an optional array parameter `$config`. This is a hash array with configuration options. It is being passed from the Dispatcher to the Controller and from there to the Model, View and Table classes. Essentially, this is your view (MVC triad) configuration. Setting its options allows you to modify FOF’s internal workings without writing code.

The various possible settings are explained in The configuration settings section below.

1.2. The `fof.xml` file

The `$config` array is a great idea but has a major drawback: you have to create one or several `.php` files with specialized classes to use it. Remember the FOF promise about not having to write code unless absolutely necessary? Yep, this doesn’t stick very well with that promise. So the `fof.xml` file was born in FOF 2.1.

The `fof.xml` file is a simple XML file placed inside your component's back-end directory, e.g. `administrator/com_example/fof.xml`. It contains configuration overrides for the front-end, back-end and CLI parts of your FOF component.

A sample `fof.xml` file

```
<?xml version="1.0" encoding="UTF-8"?>
<fof>
  <!-- Common settings -->
  <common>
    <!-- Table options common to all tables -->
    <table name="*">
      <field name="locked_by">checked_out</field>
      <field name="locked_on">checked_out_time</field>
      <relation type="children" name="items" />
      <relation type="multiple" name="transactions" localKey="foobar_order_id"
        ourPivotKey="foobar_order_id" theirPivotKey="foobar_transaction_id"
        remoteKey="foobar_transaction_id">
```

```
        pivotTable="#__foobar_orders_transactions" default="true" />
    </table>
    <!-- Table options for a specific table -->
    <table name="item">
        <field name="enabled">published</field>
    </table>
</common>

<!-- Component back-end options -->
<backend>
    <!-- Dispatcher options -->
    <dispatcher>
        <option name="default_view">items</option>
    </dispatcher>
</backend>

<!-- Component front-end options -->
<frontend>
    <!-- Dispatcher options -->
    <dispatcher>
        <option name="default_view">item</option>
    </dispatcher>
    <!-- Options common for all views -->
    <view name="*">
        <!-- Per-task ACL settings. The star task sets the default ACL privileges for
        <acl>
            <task name="*">false</task>
        </acl>
    </view>
    <view name="item">
        <!-- Task mapping -->
        <taskmap>
            <task name="list">browse</task>
        </taskmap>
        <!-- Per-task ACL settings. An empty string removes ACL checks. -->
        <acl>
            <!-- Everyone, including guests, can access dosomething -->
            <task name="dosomething"></task>
            <!-- Only people with the core.manage privilege can access the somethingel
            <task name="somethingelse">core.manage</task>
        </acl>
        <!-- Configuration options for the model and view -->
        <config>
            <option name="behaviors">filter,access</option>
        </config>
    </view>
</frontend>
</fof>
```

The `fof.xml` file has an `<fof>` root element. Inside it you can have zero or one tags called `<frontend>`, `<backend>` and `<cli>` which configure FOF for front-end, back-end and CLI access respectively. You may also have a tag named `<common>` which defines settings applicable for any mode of access. These common settings will be overridden by the corresponding settings defined in the `<frontend>`, `<backend>` and `<cli>`. Please note that the CLI is yet another special case: it will mix the common, back-end and CLI settings to derive the final configuration.

In the other two cases (front- or back-end access) only the common and the configuration for this specific mode of access will be used.

1.2.1. Dispatcher settings

You can configure the way the Dispatcher works using the `<dispatcher>` tag. Inside it you can have one or more `<option>` tags. The name attribute defines the name of the configuration variable to set, while the tag's content defines the value of this configuration variable.

The available variables are:

<code>default_view</code>	Defines the default view to show if none is defined in the input data. By default this is <code>cpanel</code> . In the example above we set it to <code>items</code> in the back-end and <code>item</code> in the front-end.
---------------------------	--

1.2.2. Table settings

The table settings allow you to set up table options, in case you do not wish to use the default conventions of FOF. You define the table the options apply to using the name attribute of the view tag. Please note that this is the name used in the class, not in the database. So, if you have a database table named `#__example_items` and your class is named `ExampleTableItem` you must use `name="item"` in the `fof.xml` file.

The settings of each table are isolated from the settings of every other table, with one notable exception: the star table, i.e. `name="*"`. This is a placeholder table that defines the default settings. These settings are applied to all tables. If you also have a table tag for a view, the default settings (from the star table) and the settings for the particular table are merged together. This applies to all settings described below.

Field map settings

The field map settings allow you to map specific magic field names to your table's fields, in case you do not use FOF's contentions. It works the same way as adding setting the `_columnAlias` array in your specialized Table class.

The field map is enclosed inside the `<table>` tag itself. It consists of one or more `<field>` tags. The name attribute defines the name of the magic (FOF convention) field to map, whereas the content of the tag defines the name of the field in your database table.

Relation settings

Note

Available since FOF 2.2.0

The relation settings allow you to define the table relations used by the ORM-like feature introduced in FOF 2.2.0.

One or more `<relation>` fields are enclosed inside the `<table>` tag itself. The attributes available are:

<code>type</code>	One of <code>parent</code> , <code>child</code> , <code>children</code> , <code>multiple</code> and determines the relation type
<code>name</code>	How this relation will be known to <code>FOFTable</code>
<code>localKey</code>	The key in our table which holds the foreign key value. For the <code>multiple (n:n)</code> relation this is the value of the <code>ourPivotKey</code> field in the <code>pivotTable</code> . For other relations it is the value held by the foreign table's <code>remoteKey</code> field.
<code>remoteKey</code>	The key in the foreign table which holds the foreign key value. For the <code>multiple (n:n)</code> relation this is the value of the <code>theirPivotKey</code> field in the <code>pivotTable</code> . For other relations it is foreign table's <code>remoteKey</code> field which must match the value of our <code>localKey</code> to satisfy the relationship.

<code>ourPivotKey</code>	Only valid for <code>multiple (n:n)</code> relations. The field name in the <code>pivotTable</code> which must have the same value as <code>our localKey</code> to satisfy the relation.
<code>theirPivotKey</code>	Only valid for <code>multiple (n:n)</code> relations. The field name in the <code>pivotTable</code> which must have the same value as the foreign table's <code>remoteKey</code> to satisfy the relation.
<code>pivotTable</code>	Only valid for <code>multiple (n:n)</code> relations. The name of the pivot (a.k.a. "glue" or "map") table which maps our table's records with the foreign table's records, e.g. <code>#__foobar_articles_comments</code>
<code>tableClass</code>	The <code>FOffsetTable</code> class name of the foreign table, e.g. <code>FoobarTableItems</code> . This is not required if <code>remoteKey</code> and the table class follow the FOF naming conventions, i.e. <code>foobar_item_id</code> is understood to belong to <code>#__foobar_items</code> which maps to the <code>FOffsetTable</code> class <code>FoobarTableItems</code> . The table class doesn't need to exist (you don't need to specialise <code>FOffsetTable</code> to define a relation). If the class is not found a properly configured <code>FOffsetTable</code> object is created automatically.
<code>default</code>	0 or 1 (or yes/no, or true/false). If you have multiple relations of the same type in a table, one of them can be set up as the default. If you don't specify a relation name when calling a method to retrieve related item(s) FOF will always the default relation. If you set up multiple default relations of the same type only the LAST relation will become the default. You are advised not to rely on default relations and name them explicitly in your code to avoid "interesting" bugs when refactoring your code a few weeks (or, worse, months) down the line.

1.2.3. View settings

There are several options that are applied per view. In the context of the `fof.xml` file, a “view” actually refers to an MVC triad, not just the View part of the triad. In so many words, the options affect the Controller, Model and View used to render this particular component view. You define the view the options apply to using the `name` attribute of the `view` tag.

The settings of each view are isolated from the settings of every other view, with one notable exception: the star view, i.e. `name="*"`. This is a placeholder view that defines the default settings. These settings are applied to all views. If you also have a `view` tag for a view, the default settings (from the star view) and the settings for the particular view are merged together. This applies to all settings described below.

Task map settings

The task map settings allow you to map specific tasks to specific Controller methods. Other frameworks would call this the “routing” feature. It works the same way as adding `running registerTask` in your specialized Controller class.

The task map is enclosed inside a single `<taskmap>` tag. You can have exactly zero or one `<taskmap>` tags inside each `view` tag.

Inside the `<taskmap>` tag you can have one or more `<task>` tags. The `name` attribute defines the name of the task to map, whereas the content of the tag defines the controller’s method which will be called for this task.

ACL settings

The ACL settings can be used to override or fine-tune the access control for each task of the particular view. Even though FOF comes with default ACL mappings for its basic tasks, these are not always sufficient or appropriate for all situations. Normally this is achieved by overriding the `onBefore` methods in the Controller, e.g. `onBeforeSave` to set up the ACL checks for the save task. You can use the ACL mappings in the `fof.xml` instead of such checks. You can even use the ACL mapping in `fof.xml` for custom tasks for which no `onBefore` method exists.

The ACL settings are enclosed inside a single `<acl>` tag. You can have exactly zero or one `<acl>` tags inside each `view` tag.

Inside the `<acl>` tag you can have one or more `<task>` tags. The `name` attribute defines the name of the task to apply the access control, whereas the content of the tag defines the Joomla! ACL privilege required to access this task. You can use any core ACL privilege or any custom ACL privilege defined in your component's `access.xml` file. If you leave the content blank then no ACL check is performed (the task is always accessible by all users). If you use the special value `false` then the ACL privilege is always going to fail, i.e. the task will not be accessible by any user.

Option settings

The configuration options of views and models can be modified directly from the view definition of `fof.xml`. The configuration settings are enclosed inside a single `<config>` tag. Inside it you can have one or more `<option>` tags. Each tag is equivalent to passing a value in the `$config` array. The `name` attribute defines the name of the configuration setting you want to modify. The content of the tag is the value of this setting. See the Configuration settings section below for more information on what each setting is supposed to do.

1.3. Configuration settings

The following settings can be used either in the `$config` array passed to a Dispatcher, Controller, Model or View class or in the `fof.xml` file's `<option>` tags inside the `<view>` tags.

autoRouting	<p>A bit mask which defines the automatic URL routing of redirections.</p> <p>A value of 1 means that front-end redirections will be put through Joomla!'s <code>JRoute::_()</code>.</p> <p>A value of 2 means that back-end redirections will be put through Joomla!'s <code>JRoute::_()</code>.</p> <p>You can combine multiple values by adding them together.</p>
asset_key	<p>The key to be used for ACL assets. This is typically in the form <code>component.view</code>, e.g. <code>com_example.item</code>. This is only used for per-item ACL privileges. If you do not specify an asset key, the default <code>component.view</code> convention will be used instead.</p>
base_path	<p>The base path of the component.</p> <ul style="list-style-type: none">• In <code>\$config</code>: Specify the absolute path.• In <code>fof.xml</code>: Specify a path relative to the site's root.
behaviors	<p>Add model behaviours. See the FOFModel documentation for more information on behaviours.</p> <ul style="list-style-type: none">• In <code>\$config</code>: An array containing the names of model behaviours to add• In <code>fof.xml</code>: A comma separated list with the names of model behaviours to add
cacheableTasks	<p>A comma separated list of tasks which support Joomla!'s caching.</p>
cid	<p>Define a comma separated list of item IDs to limit the view on. Normally this is empty. Only use when you want to limit a view to very specific items. Only valid in the <code>fof.xml</code> file.</p>
csrf_protection	<p>Should we be doing a token check for the tasks of this view? The possible values are:</p> <ul style="list-style-type: none">• 0 - no token checks are performed• 1 - token checks are always performed• 2 - token checks are always performed in the back-end and in the front-end, but only when the request format is <code>html</code> (default setting)• 3 - token checks are performed only in the back-end

default_task	The task to execute if none is defined. The default value is <code>display</code> .
defaultPageTitle	Only taken into account when <code>setFrontendPageTitle</code> is also enabled. This is the translation key of the page's title which will be used in the front-end. You can override this behaviour by specialising the <code>setPageTitle</code> method of your <code>F0FView</code> class.
event_after_delete	The content plugin event to trigger after deleting the data. Default: <code>onContentAfterDelete</code>
event_after_save	The content plugin event to trigger after saving the data. Default: <code>onContentAfterSave</code>
event_before_delete	The content plugin event to trigger before deleting the data. Default: <code>onContentBeforeDelete</code>
event_before_save	The content plugin event to trigger before saving the data. Default: <code>onContentBeforeSave</code>
event_change_state	The content plugin event to trigger after changing the published state of the data. Default: <code>onContentChangeState</code>
event_clean_cache	The content plugin event to trigger when cleaning cache. There is no default value.
helper_path	<p>The path where the View will be looking for helper classes. By default it's the helpers directory inside your component's directory.</p> <ul style="list-style-type: none">• In <code>\$config</code>: Specify an absolute path.• In <code>f0f.xml</code>: Specify a path relative to the component's directory.
id	Define an item ID to limit the view on. Normally this is empty. Only use when you want to limit a view to one single item. Only valid in the <code>f0f.xml</code> file.
ignore_request	Set to 1 to prevent the Model's <code>populateState()</code> method from running. By default the method is empty and does nothing, as the Model is supposed to be decoupled from the request information, having the Controller push state variables to it.
layout	The default layout to use for this view. This is normally determined automatically based on the task currently being executed.
model_path	<p>The path where the Controller will be looking for Model class files. By default it's the models directory of the component's directory.</p> <ul style="list-style-type: none">• In <code>\$config</code>: Specify an absolute path.• In <code>f0f.xml</code>: Specify a path relative to the component's directory.
model_prefix	The naming prefix for the Model to be loaded by the Controller. The default option is <code>ComponentnameModel</code> where <i>Componentname</i> is the name of the component without the <code>com_</code> prefix.
modelName	The name of the Model class to load. Automatically defined based on the component and view names.
searchpath	<p>The path where Controller classes will be searched for. By default it's the controllers directory inside your component's directory.</p> <ul style="list-style-type: none">• In <code>\$config</code>: Specify the absolute path.• In <code>f0f.xml</code>: Specify a path relative to the component's root directory.

setFrontend-PageTitle	When enabled, FOF will set the page title and metadata in the front-end. You can enable this option by setting it to 1, yes, true or on. When this setting is not set, the default behaviour of Joomla! is to set the page title to the name of the currently active menu item. The default Joomla! behaviour ignores the Include Site Name in Page Titles setting in the site's Global Configuration (it's a Joomla! bug), but the code in FOF which runs when this setting is enabled does honour that Global Configuration setting.
table_path	<p>The path where the Model will be looking for table classes. By default it's the tables directory inside your component's directory.</p> <ul style="list-style-type: none">• In <code>\$config</code>: Specify an absolute path.• In <code>fof.xml</code>: Specify a path relative to the component's directory.
table	Set the name of the table class the Model will use. Please note that the the component name is added to this name automatically. For example, given a component <code>com_example</code> and a table setting of <code>foobar</code> the actual table class which will be used will be <code>ExampleTableFoobar</code> .
tbl	The name of the database table to use in the table class of this view. It is in the format of <code>#__table-name</code> , e.g. <code>#__example_items</code>
tbl_key	The name of the key field of the database table to use in the table class of this view. It is in the format of <code>component_view_id</code> , e.g. <code>example_item_id</code> .
template_path	<p>The path where the View will be looking for view template (.php) or form (.xml) files. By default it's the <code>tmpl</code> directory inside the current view's directory.</p> <ul style="list-style-type: none">• In <code>\$config</code>: Specify an absolute path.• In <code>fof.xml</code>: Specify a path relative to the component's directory.
use_table_cache	<p>By default FOF caches the names of the tables in the database and their field definitions in the file <code>JPATH_CACHE/fof/cache.php</code>, where <code>JPATH_CACHE</code> is usually the cache directory in the front- or back-end of your site respectively. If you've set <i>Debug System</i> to Yes in your site's Global Configuration then by default the cache is not used.</p> <p>You can override this behaviour per view / for all views of a component using this parameter. Set to 0 to force the cache to never be used or set it to 1 to force the cache to always be used (even when your site is in debug mode).</p>
view_path	<p>The path where the Controller will be looking for View class files. By default it's the views directory inside your component's directory.</p> <ul style="list-style-type: none">• In <code>\$config</code>: Specify an absolute path.• In <code>fof.xml</code>: Specify a path relative to the component's directory.
viewName	The name of the View class to load. Automatically defined based on the component and view names.

2. XML Forms

Traditionally, creating view templates involves a .php file where PHP and HTML code are intermixed to create the appropriate representation of the data to be served to a web browser. While this gives maximum flexibility to the developer it is also a drag, requiring you to write a lot of repetitive code.

Joomla! 1.6 and later is providing a solution to this problem, at least for edit views: JForm. With it it's possible to create an XML file which defines the controls of the form and have JForm render it as HTML.

Pros:

- The view templates are easier to read
- The HTML generation is abstracted, making it easier to upgrade to newer versions of Joomla! using a different HTML structure

Cons:

- You need to change your Controllers, Models and Views to cater for and display the forms
- They only apply to edit views

FOF takes this concept further with the FOFForm package. Not only can you create edit views, but you can also create browse (records listing) and read (single record display) views out of XML forms. Moreover, the forms are handled automatically by the FOF base MVC classes without requiring you to write any additional code. If you want you can always combine a traditional .php view template with a form file for maximum customisation of your view.

2.1. Form types

2.1.1. The different form types

As implied above, there are three types of XML forms available in FOF: Browse, Read and Edit. Each one follows slightly different conventions and is used in different tasks of each MVC triad. In this section we are going to present what each of those types does and what is its structure.

There are a few things you should know before we go into more details.

All form files are placed in your view's `tmpl` directory, e.g. `components/com_example/views/items/tmpl`.

All form files' names begin with `form.` and end with `.xml`. This is required for Joomla! to distinguish them from view metadata XML files. The middle part of their name follows the same convention as the regular view template files, i.e. "default" for browse tasks, "form" for edit tasks and "item" for read tasks.

For example, the browse form for `com_example`'s items view is located in `components/com_example/views/items/tmpl/form.default.xml` whereas the form for editing a single item is located in `components/com_example/views/item/tmpl/form.form.xml`

2.1.2. Browse forms

Browse forms are used to create a records list view. They are typically used in the back-end to allow the user to view and manipulate a list of records. A typical browse form looks like this:

```
<?xml version="1.0" encoding="utf-8"?>
<form
  lessfiles="media://com_todo/css/backend.less|media://com_todo/css/backend.css"
  type="browse"
  show_header="1"
  show_filters="1"
  show_pagination="1"
  norows_placeholder="COM_TODO_COMMON_NORECORDS"
>
  <headerset>
```

```
<header name="ordering" type="ordering" sortable="true" tdwidth="1%" />
<header name="todo_item_id" type="rowselect" tdwidth="20" />
<header name="title" type="fieldsearchable" sortable="true"
    buttons="yes" buttonclass="btn"
/>
<header name="due" type="field" sortable="true" tdwidth="12%" />
<header name="enabled" type="published" sortable="true" tdwidth="8%" />
</headerset>

<fieldset name="items">
    <field name="ordering" type="ordering" labelclass="order"/>

    <field name="todo_item_id" type="selectrow"/>

    <field name="title" type="text"
        show_link="true"
        url="index.php?option=com_todo&view=item&id=[ITEM:ID]"
        class="todoitem"
        empty_replacement="(no title)"
    />

    <field name="due" type="duedate" />

    <field name="enabled" type="published"/>
</fieldset>
</form>
```

You **MUST** have exactly one `<headerset>` and one `<fieldset>` tag. The name attribute of the `<fieldset>` **MUST** always be `items`. Extra tags and/or `<fieldset>` tags with different name attributes (or no name attributes) will be ignored.

2.1.2.1. Form attributes

The enclosing `<form>` tag **MUST** have the following attributes:

type It must be always set to `browse` for FOF to recognise this as a Browse form

The enclosing `<form>` tag **MAY** have one or more of the following attributes:

lessfiles FOF allows you to include LESS files to customise the styling of your components. You can give a comma separated list of LESS files' identifiers (see the "Media files identifiers" section below) to be loaded by FOF. For example `media://com_example/less/backend.less`

Compiled LESS files are cached in the `media/lib_fof/compiled` directory for efficiency reasons, using a mangled filename for privacy/security reasons. They are not written in your site's cache or administrator/cache directory as these directories are not supposed to be web-accessible, whereas the compiled CSS files, by definition, need to be web-accessible.

Since LESS files require a lot of memory and time to compile you can also provide an alternative pre-compiled CSS file, separated from your LESS file with two bars. For example: `media://com_example/less/backend.less || media://com_example/css/backend.css`

cssfiles This works in the same manner as the `lessfiles` directive, but you are only supposed to specify standard CSS files. The CSS files are defined using identifiers, too. For example: `media://com_example/css/backend.css`

	Please note that media file overrides rules are in effect for these CSS files.
jsfiles	Works the same way as cssfiles, but it's used to load Javascript files. The Javascript files are defined using identifiers, too. For example: <code>media://com_example/js/backend.js</code>
	Please note that media file overrides rules are in effect for these Javascript files.
show_header	Should we display the header section of the browse form? This is the place where the field titles are displayed.
show_filters	Should we show the filter section of the browse form? On Joomla! 2.5 this is the area below the header where the user can filter the display based on his own criteria. On Joomla! 3.0 and later this area is rendered in the sidebar, at the left hand side of the records list.
show_pagination	Should we show the pagination results? That's the links to the first, second, third, ..., last page and the drop-down for the number of items per page. It is displayed below the list of records.
norows_placeholder	A translation key displayed instead of a records list when the current view contains no records, e.g. the table is empty or the filters limit display to zero records.

2.1.3. Read forms

While browse views display a list of records, read forms will display just a single record. These are nowhere near as powerful as hand-coded PHP-based view templates but can be used to get a quick single item output in a snatch when prototyping a component or when your data is really simple. A typical read form looks like this:

```
<?xml version="1.0" encoding="utf-8"?>
<form
  lessfiles="media://com_todo/css/frontend.less||media://com_todo/css/frontend.css"
  type="read"
>
  <fieldset name="a_single_item" class="todo-item-container form-horizontal">
    <field name="title" type="text"
      label=" "
      class="todo-title-field"
      size="50"
    />

    <field name="due" type="duedate"
      label="COM_TODO_ITEMS_FIELD_DUE"
      labelclass="todo-field"
      size="20"
      default="NOW"
    />
    <field name="description" type="editor"
      label=" "
    />
  </fieldset>
</form>
```

You **MUST** have at least one `<fieldset>` tag. The name attribute of the `<fieldset>` is indifferent.

2.1.3.1. Form attributes

The enclosing `<form>` tag **MUST** have the following attributes:

type It must be always set to read for FOF to recognise this as a Read form

The enclosing `<form>` tag MAY have one or more of the following attributes:

lessfiles FOF allows you to include LESS files to customise the styling of your components. You can give a comma separated list of LESS files' identifiers (see the "Media files identifiers" section below) to be loaded by FOF. For example: `media://com_example/less/backend.less`

Compiled LESS files are cached in the `media/lib_fof/compiled` directory for efficiency reasons, using a mangled filename for privacy/security reasons. They are not written in your site's `cache` or `administrator/cache` directory as these directories are not supposed to be web-accessible, whereas the compiled CSS files, by definition, need to be web-accessible.

Since LESS files require a lot of memory and time to compile you can also provide an alternative pre-compiled CSS file, separated from your LESS file with two bars. For example: `media://com_example/less/backend.less || media://com_example/css/backend.css`

cssfiles This works in the same manner as the `lessfiles` directive, but you are only supposed to specify standard CSS files. The CSS files are defined using identifiers, too. For example: `media://com_example/css/backend.css`

Please note that media file overrides rules are in effect for these CSS files.

jsfiles Works the same way as `cssfiles`, but it's used to load Javascript files. The Javascript files are defined using identifiers, too. For example: `media://com_example/js/backend.js`

Please note that media file overrides rules are in effect for these Javascript files.

2.1.4. Edit forms

Edit forms are used to edit a single record. They are typically used in the back-end. If you want to use an Edit form in the front-end you will need to specialise your `Toolbar` class to render a front-end toolbar in the edit task of this specific view, otherwise the form will not be able to be submitted (unless you do other tricks, outside the scope of this developers' documentation).

An edit form looks like this:

```
<?xml version="1.0" encoding="utf-8"?>
<form
  lessfiles="media://com_todo/css/backend.less || media://com_todo/css/backend.css"
  validate="true"
>
  <fieldset name="basic_configuration"
    label="COM_TODO_ITEMS_GROUP_BASIC"
    description="COM_TODO_ITEMS_GROUP_BASIC_DESC"
    class="span6"
  >
    <field name="title" type="text"
      class="inputbox"
      label="COM_TODO_ITEMS_FIELD_TITLE"
      labelclass="todo-label todo-label-main"
      required="true"
      size="50"
    />
```

```
<field name="due" type="calendar"
  class="inputbox"
  label="COM_TODO_ITEMS_FIELD_DUE"
  labelclass="todo-label"
  required="true"
  size="20"
  default="NOW"
/>
<field name="enabled" type="list" label="JSTATUS"
  labelclass="todo-label"
  description="JFIELD_PUBLISHED_DESC" class="inputbox"
  filter="intval" size="1" default="1"
>
  <option value="1">JPUBLISHED</option>
  <option value="0">JUNPUBLISHED</option>
</field>
</fieldset>
<fieldset name="description_group"
  label="COM_TODO_ITEMS_GROUP_DESCRIPTION"
  description="COM_TODO_ITEMS_GROUP_DESCRIPTION_DESC"
  class="span6"
>
  <field name="description" type="editor"
    label=""
    class="inputbox"
    required="false"
    filter="JComponentHelper::filterText" buttons="true"
  />
</fieldset>
</form>
```

2.1.4.1. Form attributes

The enclosing `<form>` tag MAY have one or more of the following attributes:

lessfiles FOF allows you to include LESS files to customise the styling of your components. You can give a comma separated list of LESS files' identifiers (see the "Media files identifiers" section below) to be loaded by FOF. For example: `media://com_example/less/backend.less`

Compiled LESS files are cached in the `media/lib_fof/compiled` directory for efficiency reasons, using a mangled filename for privacy/security reasons. They are not written in your site's cache or administrator/cache directory as these directories are not supposed to be web-accessible, whereas the compiled CSS files, by definition, need to be web-accessible.

Since LESS files require a lot of memory and time to compile you can also provide an alternative pre-compiled CSS file, separated from your LESS file with two bars. For example: `media://com_example/less/backend.less | media://com_example/css/backend.css`

cssfiles This works in the same manner as the `lessfiles` directive, but you are only supposed to specify standard CSS files. The CSS files are defined using identifiers, too. For example: `media://com_example/css/backend.css`

Please note that media file overrides rules are in effect for these CSS files.

jsfiles	Works the same way as <code>cssfiles</code> , but it's used to load Javascript files. The Javascript files are defined using identifiers, too. For example: <code>media://com_example/js/backend.js</code> Please note that media file overrides rules are in effect for these Javascript files.
validation	Set it to <code>true</code> to have Joomla! load its unobtrusive Javascript validation script. Please note that FOF does perform some automatic, generic server-side validation checks where possible. We strongly recommend you to implement more thorough, customised validation in your specialised Table class and its <code>check()</code> method where possible, especially in front-end facing MVC triads.

2.1.5. Formatting your forms

OK, granted, the automatically rendered forms are a timesaver but, by default, they look terrible. This is quite expected. It's like comparing a rug churned out by a mechanised production line (the automatically rendered form) and a hand-stitched persian rug (the hand-coded PHP-based view template). The good news is that, unlike rugs, there's some room of improvement with XML forms.

For starters, the `<fieldset>`s of Edit and Read forms, as well as the fields themselves, can be assigned CSS classes and IDs which can help you provide a custom style. Moreover, you can mix XML forms and PHP-based view templates to further customise the display of your forms.

In this section we will cover both customisation methods. If this doesn't sound enough for your project you can always use hand-coded PHP-based view templates, much like how you did since Joomla! 1.5.0. It's up to you to decide which method is best for your project!

2.1.5.1. Using Bootstrap-powered tabs

Important

Available since FOF 2.3.0.

This feature simply emits Bootstrap 2.x compatible HTML markup, therefore only works with Bootstrap-powered templates. This means that you will need to be using Akeeba Strapper (Joomla! 2.5 and 3.x are supported) or Joomla! 3.x with a Bootstrap-powered template.

If you have a long form you may want to provide tabs to let the user access different sections of the form. In order to do that, you first have to set the `tabbed` attribute of your form to `true`, `yes`, `1` or `on`. For example:

```
<?xml version="1.0" encoding="utf-8"?>
<form tabbed="1">
```

Each `fieldset` which will be part of the tab set must include `tab-pane` in its `class` attribute. Moreover, it **MUST** have non-empty `label` and `name` attributes. For example:

```
<fieldset name="basic_configuration"
label="COM_FOOBAR_ITEMS_GROUP_BASIC"
class="tab-pane active another-class"
>
```

Please note that *exactly one* of your `fieldsets` must have `active` added to its `class` attribute. This will be the tab which will be open by default. If you forget to set an active tab the tab pane will render with no tab active by default which is confusing for your users!

2.1.5.2. Assigning classes and IDs to `<fieldset>`s

Each `fieldset` of a Read and Edit form can have the following optional attributes:

class	One or more CSS classes to be applied to the generated <div> element.
name	The value of this attribute is applied to the id attribute of the generated <div> element.
label	The value of this attribute is rendered as a level 3 heading (<h3>) element at the top of the generated <div> element.

If you are using Joomla! 3 (which has Bootstrap by default) or Joomla! 2.5 together with the optional Akeeba Strapper package (which back ports Bootstrap to Joomla! 2.5) you can use Bootstrap's classes to create visually interesting interfaces. For example, using `class="span6 pull-left"` will create a half-page-wide left floating sidebar out of your field set.

2.1.5.3. Mixing XML forms with PHP-based view templates

Inside your .php view template file you can use `$this->getRenderedForm()` to return the XML form file rendered as HTML. This allows you to customise the layout (e.g. adding information before/after the form) while still using the XML file to render the actual form.

To use this approach, simply insert this code in your custom .php template file:

```
<?php
$viewTemplate = $this->getRenderedForm();
echo $viewTemplate;
?>
```

2.2. Header fields type reference

2.2.1. How header fields work

A header field has two distinct functions:

- It is used to render headers in list views which are used to label the columns of the display and optionally allow you to sort the table by a specific field
- It is used to render filtering widgets (drop-down lists and search boxes). In Joomla! 2.5 you can only render filtering widgets *directly below* a header field in a list table and you can only have up to as many filtering widgets as your fields. In Joomla! 3.x and above the filtering widgets are rendered either *above* the header fields (search boxes) or in the left-hand column (drop-down lists). As in Joomla! 3.x and above the filters are detached from the header fields you can have as many filters as you want, even more than the number of fields you are displaying in the filter list.

A header field can render only a header, only a filter or both. Most of the header field types render both. Those whose name starts with `filter` will only render a filtering widget, but not a header field. As a result these header fields will only work on Joomla! 3.x and later.

2.2.2. Common fields for all types

For all following fields you can set the following attributes:

- **name** The name of the header field. This has to match the table field name in the model.

If you want to create a header for a calculated field or for a column that doesn't correspond to a table field please use a name that doesn't overlap with the name of a column in the table. If you want to list a field many times (e.g. display a row selection checkbox and the record ID at the same time) you will have to use the same name in both headers, but use a different `id` attribute.

- **type** The header type. See below for the available field types, as well as the options which can be specified in each one of them.
- **label** The language string which will be used for the label of the header; this is a language string that will be fed to `JText::_()` for translation.
- **id** The `id` attribute for this header. Skip it to have FOF create one based on the field name.

If none is provided FOF will automatically create one using the convention `component_modelname_fieldname_LABEL` where `component` is the name of your component, `modelname` is the name of your model (usually equals to the view name) and `fieldname` is the name of the field. For example, for a component `com_foobar`, a view named `items` and a field named `baz` we get the language string `COM_FOOBAR_ITEMS_BAZ_LABEL`.

- **tdwidth** The width of this column in the list table. You can use percentile or pixel units, i.e. `tdwidth="10%"` or `tdwidth="120px"`
- **sortable** Set to "true" if you want to be able to sort the table by this field.
- **filterclass** The CSS class for the filtering widget
- **onchange** The Javascript code to be executed when the filtering widget's value is modified

2.2.2.1. Additional attributes for search box filtering widgets

The following attributes apply to all header fields rendering a search box filtering widget:

- **searchfieldname** The name of the field that will be searchable. If omitted it will be the same as the `name` attribute.
- **placeholder** The placeholder text when the field is empty. Useful to explain what kind of information this search field is supposed to be searching in.
- **size** The size (in characters) of the search box
- **maxlength** The maximum length in characters which is allowed to be entered in the field
- **buttons** Set to true (or skip) to show Go and Reset buttons next to the text field. Set to "false" to hide those buttons. The user can still press Enter to submit the form.
- **buttonclass** The CSS class of the Go and Reset buttons

2.2.2.2. Additional attributes for drop-down list filtering widgets

This element has `<option>` sub-elements defining the available options. Please consult Joomla!'s own `list` field type for more information.

Since FOF 2.1.0 we allow you to use a programmatically generated data source instead of the hard-coded `<option>` tags. This can be used when you need your code to generate options based on some configuration data, data from the database and so on. You do that by supplying the name of a PHP class and a static method on that class which returns the data. The data must be returned in an indexed array where the key is the key of the drop-down list item and the value is the description (translation key or string). You may also use a simple array containing indexed arrays by using the `source_key` and `source_value` attributes.

The following additional attributes apply to all header fields rendering a drop-down list filtering widget.

- **source_file** (optional) The PHP file which provides the class and method. It is given in the pseudo-URL format e.g. `admin://components/com_foobar/helpers/mydata.php` or `site://compo-`

nents/com_foobar/helpers/mydata.php for a file relative to the administrator or site root directory respectively.

- **source_class** (required) The name of the PHP class to use, e.g. FoobarHelperMydata
- **source_method** (required) The static method of the PHP class to use, e.g. getSomeFoobarData
- **source_format** (optional) The format of the returned data of the static method. Set to optionsobject if the method returns a pre-generated options object.
- **source_key** (optional) If you are using an array of indexed arrays, this is the key of the indexed array that contains the key of the drop-down option.
- **source_value** (optional) If you are using an array of indexed arrays, this is the key of the indexed array that contains the value (description) of the drop-down option.
- **source_translate** (optional) By default all values are being translated, i.e. fed through JText::_(). If you don't want that, set this attribute to "false".

2.2.3. Field Types

2.2.3.1. accesslevel

Displays a header field with a viewing access level drop-down filtering widget.

There are no additional attributes to set.

2.2.3.2. field

Displays a header field, without any filtering widget.

There are no additional attributes to set.

2.2.3.3. fielddate

Displays a header field with a date selection search box filtering widget.

The additional attributes you can set are:

- **readonly** Set to true to make the search box read only
- **disabled** Set to true to disable the search box (it displays but you can't click on it)
- **filter** Skip to show the date/time as entered. Set to SERVER_UTC to convert a date to UTC based on the server timezone. Set to USER_UTC to convert a date to UTC based on the user timezone.

2.2.3.4. fieldsearchable

Displays a header field with a search box filtering widget.

There are no additional attributes to set.

2.2.3.5. fieldselectable

Displays a header field with a drop-down list filtering widget.

There are no additional attributes to set.

2.2.3.6. fieldsql

Displays a header field with a drop-down list filtering widget. The source of the filter values comes from an SQL query.

The additional attributes are:

- **key_field** the table field to use as key
- **value_field** the table field to display as text
- **query** the actual SQL query to run

We recommend avoiding this field type as the query is specific to a particular database server technology. Using the `model` or `fieldselectable` type with a programmatic data source is strongly encouraged.

2.2.3.7. filterdate

This is the same as `fielddate` but no header is rendered. Only the filtering widget is rendered. This header field type only works on Joomla! 3.x and later.

2.2.3.8. filtersearchable

This is the same as `fieldsearchable` but no header is rendered. Only the filtering widget is rendered. This header field type only works on Joomla! 3.x and later.

2.2.3.9. filterselectable

This is the same as `fieldselectable` but no header is rendered. Only the filtering widget is rendered. This header field type only works on Joomla! 3.x and later.

2.2.3.10. filtersql

This is the same as `fieldsql` but no header is rendered. Only the filtering widget is rendered. This header field type only works on Joomla! 3.x and later.

The same warning applies to using this field type.

2.2.3.11. language

Displays a header field with a drop-down list containing the languages installed on your site.

The additional attributes are:

- **client** If set to "site" displays a list of installed front-end languages. If set to "administrator" displays a list of installed back-end languages. Default: site.

2.2.3.12. model

Similar to the `fieldselectable` header, but gets the options from a `F0FModel` descendant.

You can set the following attributes on top of those of the 'fieldselectable' field type's:

- **model** The name of the model to use, e.g. `FooBarModelItems`
- **key_field** The name of the field in the model's results which is used as the key value of the drop-down
- **value_field** The name of the field in the model's results which is used as the label of the drop-down

- **translate** Should the value field's value be passed through `JText::_()` before being displayed?
- **apply_access** Should we respect the view access level, if an access field is present in the model
- **none** The placeholder to be shown if the value is not found in the data returned by the model. This placeholder goes through `JText`, so you can use a language string if you like.

In order to filter the model you can specify `<state>` sub-elements in the format:

```
<state key="state_key">value</state>
```

Where `state_key` is the key of a state variable and `value` is its value. For instance, you could have something like:

```
<state key="foobar_category_id">123</state>
```

2.2.3.13. ordering

Displays a header field which allows reordering of your data.

On Joomla! 2.5 it displays the name of the field followed by a disk icon which saves the ordering.

On Joomla! 3.x and later it displays an "up and down triangle" icon. When clicked the AJAX-powered reordering handles in the list view become enabled.

There are no additional attributes.

2.2.3.14. published

Displays a header field and a drop-down filtering field for Published / Unpublished and related publishing options.

The additional attributes are:

- **show_published** Should we show the Published status in the filter? Default: true
- **show_unpublished** Should we show the Unpublished status in the filter? Default: true
- **show_archived** Should we show the Archived status in the filter? Default: false
- **show_trash** Should we show the Trashed status in the filter? Default: false
- **show_all** Should we show the All status in the filter? Default: false. You actually don't need this as no selection results in all records, irrespective of their publish state, to be displayed.

2.2.3.15. rowselect

Displays a checkbox which, when clicked, automatically selects all the row selection checkboxes in the list.

There are no additional attributes.

2.3. Form fields type reference

2.3.1. Common fields for all types

For all following fields you can set the following attributes:

- **name** The name of the field. This has to match the table field name in the model.

If you want to create a header for a calculated field or for a column that doesn't correspond to a table field please use a name that doesn't overlap with the name of a column in the table. If you want to list a field many times (e.g. display a row selection checkbox and the record ID at the same time) you will have to use the same name in both fields, but use a different `id` attribute.

- **type** The field type. See below for the available field types, as well as the options which can be specified in each one of them.
- **label** The language string which will be used for the label of the field; this is a language string that will be fed to `JText::_()` for translation. If you leave it empty FOF will automatically generate a language string using the convention `COMPONENTNAME_VIEWNAME_FIELDNAME_LABEL`.
- **id** The `id` attribute for this field. Skip it to have FOF create one based on the field name.

If none is provided FOF will automatically create one using the convention `component_modelname_fieldname_LABEL` where `component` is the name of your component, `modelname` is the name of your model (usually equals to the view name) and `fieldname` is the name of the field. For example, for a component `com_foobar`, a view named `items` and a field named `baz` we get the language string `COM_FOOBAR_ITEMS_BAZ_LABEL`.

- **emptylabel** Set this to 1 if you intend to have a field without a label. In this case you must NOT define the `label` attribute.
- **description** The language string which will be used for the label of the field; this is a language string that will be fed to `JText::_()` for translation.
- **tooltip** The language string which will be used for the tooltip of the field; this is a language string that will be fed to `JText::_()` for translation.
- **required** Set it to 1, yes or true to make this a required field. If you use the form validation then the form cannot be submitted unless this value is filled in.

Important

The automatic label and description only apply if you are using Akeeba Strapper or if you are using Joomla! 3.0 and later. If you are using FOF on plain old Joomla! 2.5 you must provide the `label` and `description` attributes manually.

2.3.2. Field types

2.3.2.1. accesslevel

This will display a select list with existing Joomla! Access Levels.

You can set the following attributes:

- **class** CSS class (default "")

2.3.2.2. button

This will display an input button.

You can set the following attributes:

- **class** CSS class (default "")

- **icon** Bootstrap icon to add to the button (default "")
- **onclick** "onclick" attribute to add to the button (default "")
- **url** URL template for each element (use [ITEM:ID] as a placeholder for the item id) (default "")
- **html element** The HTML used tag, allowed: button, a (default 'button')
- **text** Button text value; this is a language string that will be fed to JText::_() for translation

2.3.2.3. cachehandler

This will display a select list with available Joomla! cache handlers

You can set the following attributes:

- **class** CSS class (default "")

2.3.2.4. calendar

This will display a calendar/date field.

You can set the following attributes:

- **class** CSS class (default "")
- **format** (defaults '%Y-%m-%d')
- **filter** can be one the following:
 - **SERVER_UTC** convert a date to UTC based on the server timezone
 - **USER_UTC** convert a date to UTC based on the user timezone

2.3.2.5. captcha

This will display a captcha input.

You can set the following attributes:

- **plugin** The name of the CAPTCHA plugin to use. Leave empty to use whatever is the default on in the Global Configuration of the Joomla! site

2.3.2.6. checkbox

This will display a single checkbox input.

You can set the following attributes:

- **class** CSS class (default "")
- **value** the input value
- **checked** the default status for input
- **disabled** Is this a disabled form element?

2.3.2.7. components

This will display a select with a list of installed Joomla! components

You can set the following attributes:

- **class** CSS class (default "")
- **client_ids** comma separated list of applicable client ids (note: 0 = admin, 1 = site)
- **readonly** is this a read only field?
- **disabled** Is this a disabled form element?
- **multiple** Should we allow multiple selections?
- **onchange** onchange JavaScript event

2.3.2.8. editor

This will display a WYSIWYG edit area field for content creation and formatted HTML display.

You can set the following attributes:

- **class** CSS class (default "")
- **rows** How many rows the generated <textarea> will have, typically used when Javascript is disabled on the browser
- **cols** How many columns the generated <textarea> will have, typically used when Javascript is disabled on the browser
- **height** The height of the editor (default: 250)
- **width** The width of the editor (default: 100%)
- **asset_field** The name of the asset_id field in the form (default: asset_id)
- **created_by_field** The name of the created_by field in the form
- **asset_id** The Joomla! asset ID for this record. Leave empty to let FOF use the value of the asset field defined by asset_field.
- **buttons** Which buttons should we show (rendered by editor-xtd plugins)? Use 0, false or no to show now buttons, otherwise provide a comma separated list of button plugin names
- **hide** Which buttons should we hide? Similar to above.

2.3.2.9. email

This will display a text input which expects a valid e-mail address.

You can set the following attributes:

- **class** CSS class (default "")
- **show_link** if true put a mailto: link around the address (default false)

- **size** Size of the text input in characters
- **maxlength** Maximum length of the input in characters
- **readonly** Is this a read only field?
- **disabled** Is this a disabled form element?
- **onchange** onchange Javascript event

2.3.2.10. groupedbutton

This will display a group of button.

You can set the following attributes:

- **class** CSS class (default "")

This element supports sub-elements organised in `<button>` tags. For more information please consult the `button` element.

2.3.2.11. groupedlist

This will display a grouped drop down list.

You can set the following attributes:

- **class** CSS class (default "")

This element supports sub-elements organised in `<group>` and `<option>` tags. For more information please consult the documentation of Joomla!'s `JFormFieldGroupedList` element.

2.3.2.12. hidden

This will display a hidden input.

You can set the common attributes. Moreover, to make sure this field is rendered properly, you **MUST** define the attribute `emptylabel="1"` and **NOT** assign a label attribute at all.

2.3.2.13. image

This is an alias for the "media" field type (see below).

2.3.2.14. imagelist

This will display a media selection field showing images from a specified folder.

You can set the following attributes:

- **class** CSS class
- **directory** folder to search the images in
- **style** inline style
- **width** HTML width attribute

- **height** HTML height attribute
- **align** HTML align attribute
- **rel** HTML rel attribute
- **title** image title
- **filter** The filtering string for filenames to show. Default: `\.png$|\.gif$|\.jpg$|\.bmp$|\.ico$|\.jpeg$|\.psd$|\.eps$`

2.3.2.15. integer

This will display a text input which expects a valid integer value.

You can set the following attributes:

- **class** CSS class (default "")
- **first** Starting number
- **last** Last number to show
- **step** Step for increasing the numbers

For example, when using first=10, last=20 and step=2 you get a list of 10, 12, 14, 16, 18, 20.

2.3.2.16. language

This will display a select input of all available Joomla! languages

You can set the following attributes:

- **class** CSS class (default "")
- **client** Can take the values of 'site' or 'administrator' to show the available languages for the front- and back-end respectively.

2.3.2.17. list

This will display a select input of generic options.

IMPORTANT The following attributes apply to all field types that present a drop-down list; they all descend from this field type.

You can set the following attributes:

- **class** CSS class (default "")
- **readonly** Is this a read-only field?
- **disabled** Is this a disabled form element?
- **multiple** Should we allow multiple selections?
- **onchange** The onChange Javascript event
- **url** URL template for each element (use [ITEM:ID] as a placeholder for the item id)

- **show_link** if true, adds a link around each item based on the "url" attribute (default false)

This element has `<option>` sub-elements defining the available options. Please consult Joomla!'s own element of the same type for more information.

Since FOF 2.1.0 we allow you to use a programmatically generated data source instead of the hard-coded `<option>` tags. This can be used when you need your code to generate options based on some configuration data, data from the database and so on. You do that by supplying the name of a PHP class and a static method on that class which returns the data. The data must be returned in an indexed array where the key is the key of the drop-down list item and the value is the description (translation key or string). You may also use a simple array containing indexed arrays by using the `source_key` and `source_value` attributes.

The relevant attributes are:

- **source_file** (optional) The PHP file which provides the class and method. It is given in the pseudo-URL format e.g. `admin://components/com_foobar/helpers/mydata.php` or `site://components/com_foobar/helpers/mydata.php` for a file relative to the administrator or site root directory respectively.
- **source_class** (required) The name of the PHP class to use, e.g. `FoobarHelperMydata`
- **source_method** (required) The static method of the PHP class to use, e.g. `getSomeFoobarData`
- **source_format** (optional) The format of the returned data of the static method. Set to `optionsobject` if the method returns a pre-generated options object.
- **source_key** (optional) If you are using an array of indexed arrays, this is the key of the indexed array that contains the key of the drop-down option.
- **source_translate** (optional) By default all values are being translated, i.e. fed through `JText::_()`. If you don't want that, set this attribute to "false".

2.3.2.18. media

This will display a media selection field.

You can set the following attributes:

- **class** CSS class
- **style** inline style
- **width** HTML width attribute
- **height** HTML height attribute
- **align** HTML align attribute
- **rel** HTML rel attribute
- **title** image title
- **asset_field** The name of the `asset_id` field in the form (default: `asset_id`)
- **created_by_field** The name of the `created_by` field in the form
- **asset_id** The Joomla! asset ID for this record. Leave empty to let FOF use the value of the `asset` field defined by `asset_field`.

- **link** The link to a media management component to use. Skip this to use Joomla!'s own com_media (strongly recommended!)
- **size** Field size in characters
- **onchange** The onChange Javascript event
- **preview** Should we show a preview of the selected media file?
- **preview_width** Maximum width of preview in pixels
- **preview_height** Maximum height of preview in pixels
- **directory** Directory to scan for images relative to site's root. Skip to use the site's images directory.

2.3.2.19. model

Similar to the list field, but gets the options from a FOFModel descendant.

You can set the following attributes on top of those of the 'list' field type's:

- **model** The name of the model to use, e.g. FoobarModelItems
- **key_field** The name of the field in the model's results which is used as the key value of the drop-down
- **value_field** The name of the field in the model's results which is used as the label of the drop-down
- **translate** Should the value field's value be passed through JText::_() before being displayed?
- **apply_access** Should we respect the view access level, if an access field is present in the model
- **none** The placeholder to be shown if the value is not found in the data returned by the model. This placeholder goes through JText, so you can use a language string if you like.
- **format** See the text field type
- **show_link** See the text field type
- **url** See the text field type

In order to filter the model you can specify <state> sub-elements in the format:

```
<state key="state_key">value</state>
```

Where state_key is the key of a state variable and value is its value. For instance, you could have something like:

```
<state key="foobar_category_id">123</state>
```

2.3.2.20. ordering

This will display an ordering field for your list, both in traditional Joomla! method and with a new ajax drag'n'drop method. We recommend placing this field first on your form, to respect Joomla! 3.0 and later's JUI (Joomla! User Interface) guidelines.

You can set the following attributes:

- **class** CSS class
- **readonly** Is this a read-only field?

- **disabled** Is this a disabled form element?
- **onchange** The onChange Javascript event
- **ordertitle** The field name used to display the options title (if not set it will use the magic `title` field)

2.3.2.21. password

This will display a password input field.

You can set the following attributes:

- **class** CSS class
- **size** Size of the field in characters
- **maxlength** Maximum length of the input in characters
- **autocomplete** Should we allow browser autocomplete of the password field?
- **readonly** Is this a read only field?
- **disabled** Is this a disabled form element?
- **strengthmeter** Should we show a password strength meter?
- **threshold** What is the minimum password strength we are supposed to accept in order to validate the field (default: 66)?

2.3.2.22. plugins

This will display a select input with a list of all installed Joomla! package.

You can set the following attributes:

- **class** CSS class
- **folder** The plugin type to load, e.g. "system", "content" and so on.

The list field type's attributes apply as well.

2.3.2.23. published

This will display a status toggle input field (each time you click on it it changes the status).

You can set the following attributes:

- **show_published** if true, the "published" status will be included in the toggle cycle (default true)
- **show_unpublished** if true, the "unpublished" status will be included in the toggle cycle (default true)
- **show_archived** if true, the "archived" status will be included in the toggle cycle (default false)
- **show_trash** if true, the "trash" status will be included in the toggle cycle (default false)
- **show_all** if true, all the available status will be included in the toggle cycle (default false)

The list field type's attributes apply as well.

2.3.2.24. radio

This will display a radio selection input.

You can set the following attributes:

- **class** CSS class

2.3.2.25. rules

Displays the ACL privileges setup user interface.

Please consult the documentation of JFormFieldRules for more information.

2.3.2.26. selectrow

Displays a checkbox to select the entire row for toolbar button operations such as edit, delete, copy etc.

2.3.2.27. sessionhandler

This will display a Joomla! session handler selection input.

You can set the following attributes:

- **class** CSS class

Please refer to Joomla!'s JFormFieldSessionHandler for more information.

2.3.2.28. spacer

This will display a spacer (static element) between form elements.

You can set no attributes.

2.3.2.29. sql

This will display a select input based on a custom SQL query

You can set the following attributes:

- **class** CSS class
- **key_field** the table field to use as key
- **value_field** the table field to display as text
- **query** the actual SQL query to run

We recommend avoiding this field type as the query is specific to a particular database server technology. Using the `model` or `list` type with a programmatic data source is strongly encouraged.

2.3.2.30. tel

This will display a text input which expects a valid telephone value.

You can set the following attributes:

- **class** CSS class (default "")

- **show_link** if true, a "tel:" link will be appended around the field value (default false)
- **empty_replacement** a string to show in place of the field when it's empty

The text field type's attributes apply as well.

2.3.2.31. text

This will display a single line text input.

You can set the following attributes:

- **class** CSS class (default "")
- **url** URL template for each element (use [ITEM:ID] as a placeholder for the item id). This goes through the field tag replacement (see below)
- **show_link** if true, a "tel:" link will be appended around the field value (default false)
- **empty_replacement** a string to show in place of the field when it's empty
- **size** The size of the input in characters
- **maxlength** The maximum acceptable input length in characters
- **readonly** Is this a read-only field?
- **disabled** Is this a disabled form field element?
- **format_string** A string or translation key used to format the text data before it is displayed. Uses the format() PHP function's syntax.
- **format_if_not_empty** Should we apply the format string even when the field is empty? Default: true
- **parse_value** If set to true, the value of the field will go through the field tag replacement (see below) Default: false

2.3.2.31.1. Field tag replacement for text fields

You can reference values from other fields inside your text. You can do that using the square bracket tag syntax, i.e. [ITEM:fieldname] is replaced with the value of the field `fieldname`. The tag must open with a square bracket, followed by the uppercase word ITEM, followed by a colon, the field name and closing with a square bracket. You must not use spaces in the tag.

FOF also recognises the special tag [ITEM: ID], replacing it with the value of the key field of the table.

2.3.2.32. textarea

This will display a textarea input.

You can set the following attributes:

- **class** CSS class (default "")
- **disabled** Is this disabled form element?
- **cols** Number of columns
- **rows** Number of rows

- **onchange** The onChange Javascript event

2.3.2.33. title

This is like a text field. On list views it will display a second line containing secondary information, e.g. the alias (slug) of the record.

The following attributes are used on top of the text field's attributes:

- **slug_field** The name of the field containing the slug or other secondary information to display. Default: slug
- **slug_format** The format string (string or translation key) for the secondary information line. Default: (%s)
- **slug_class** The CSS class of the secondary information line. Default: small

2.3.2.34. timezone

This will display a select list with all available timezones.

You can set the following attributes:

- **class** CSS class (default "")

2.3.2.35. url

This will display a text input which expects a valid URL.

You can set the following attributes:

- **class** CSS class (default "")
- **show_link** if true, an <a> link will be added around the field value (default false)
- **empty_replacement** a string to show in place of the field when it's empty

The text field type's attributes apply as well.

2.3.2.36. user

This will display a select list with all available Joomla! users.

You can set the following attributes:

- **class** CSS class (default "")
- **show_username** if true, show the username (default true)
- **show_email** if true, show the email (default true)
- **show_name** if true, show the full name (default true)
- **show_id** if true, show the id (default true)
- **show_link** if true, add a link around the field value (default false)
- **show_avatar** if true, show the avatar (user picture). Default false.
- **avatar_size** size of the image in the avatar (avatars are square, so this is both the width and height of the avatar)

- **avatar_method** if set to "plugin" use FOF plugins, else fall back to a Gravatar based on the user's email address

Chapter 4. Tips and tricks

There are some features in FOF that allow to perform neat time saving tips. As these topics are not exactly library reference we've put them in this chapter. Consider it a grab-bag of FOF tricks!

You can view all tips and tricks on-line at <https://github.com/akeeba/fof/wiki/Tips%20and%20Tricks>

1. Creating a slug from multiple columns

Sometimes, you want to be combine multiple columns from a table to create the default 'slug' for the records. A typical example is a table recording 'people', where you want the slug to be firstname-lastname. to achieve this, simply override the table class for your table, with the following method:

```
public function check()
{
    $slug          = $this->getColumnAlias('slug');
    $this->setColumnAlias('title', 'lastname'); // this is needed to trigger the unicity c
    if (!$this->$slug)
    {
        $this->$slug = !$this->firstname ? $this->lastname : $this->firstname .' '. $this->
        $this->$slug = FOFStringUtils::toSlug($this->$slug);
    }
    return parent::check();
}
```

2. One to many database table relationship deletion

Q: How to delete all rows in a child table when the parent table's record is deleted in FoF? A: Some code in the model file.

```
CREATE TABLE IF NOT EXISTS `#__foobar_items` (
  `foobar_item_id` bigint(20) unsigned NOT NULL AUTO_INCREMENT, *
  `title` varchar(255) NOT NULL,
  `description` mediumtext,
  PRIMARY KEY (`foobar_item_id`)
) ENGINE = INNODB DEFAULT CHARSET=utf8;
```

```
CREATE TABLE IF NOT EXISTS `#__foobar_childs` (
  `foobar_child_id` bigint(20) unsigned NOT NULL AUTO_INCREMENT,
  `foobar_item_id` bigint(20) unsigned NOT NULL, *
  `description` mediumtext,
  PRIMARY KEY (`foobar_child_id`)
) ENGINE = INNODB DEFAULT CHARSET=utf8;
```

You could assume that the way to do delete child records when a parent record is deleted is to use MySQL's "ON DELETE CASCADE". Wrong! You could try using a MySQL trigger to effect the cascade deletion. Wrong (let alone most hosts won't allow you to create a trigger)!

Assuming your deletion occurs in the front-end, you'll create a new site/components/com_foobar/models/items.php:

```
defined('_JEXEC') or die();
```

```
class FoobarModelItems extends FOFModel
{
  /**
   Delete all related records in the child table "__foobar_childs" when the parent table
   is deleted
   */

  protected function onBeforeDelete($id, $table){
    $result = parent::onBeforeDelete($id, $table);
    if($result) {
      $table->load($id);
      $childids = FOFModel::getTmpInstance('childs', 'FoobarModel')->limit(0)->limits
      if(!empty($childids)){
        foreach($childids as $childid){
          FOFModel::getTmpInstance('childs', 'FoobarModel')->setId($childid->foob
        }
      }
    }
    return $result;
  }
}
```

It's easier than you may have thought.

If you have a one-to-one relationship, then you'll have:

```
class FoobarModelItems extends FOFModel
{
  /**
   Delete all related records in the child table "__foobar_childs"
   when the parent table's record is deleted
   */

  protected function onBeforeDelete($id, $table){
    $result = parent::onBeforeDelete($id, $table);
    if($result) {
      $table->load($id);
      FOFModel::getTmpInstance('childs', 'FoobarModel')->setId($table->load($id))->de
    }
    return $result;
  }
}
```

3. Creating a bare view (a view without a database table)

By default every view needs a corresponding database table. What to do when you have a view with no table associated because it is not a list or edit form?

Setup the controller

In the controller we force the edit task by adding the following code:

```
public function execute($task) {
```

```
parent::execute('edit');
}
```

Setup the model

In the model we need to add 2 overrides.

Override the constructor

```
public function __construct($config = array()) {
    // This is a dirty trick to avoid getting warning PHP messages by the
    // JDatabase layer
    $config['table'] = 'shops';
    parent::__construct($config);
}
```

First we override the constructor because we need to specify a table, this to make sure the system can read some table but no data will be taken from the table.

Override the getItem() method

```
public function getItem($id = null) {
    return null;
}
```

We need to override the getItem() method because we are not actually getting any data. By returning a null value, the system is happy because a value is returned.

Setup the view

In the view you can do what you like by using the onAdd() method override.

4. Transparent authentication

Transparent authentication allows FOF to authenticate a user using Basic Authentication or URL parameters. This allows you to create web services or directly access pages which require a logged in users without using Joomla! session cookies.

The authentication credentials can be provided via two methods: Basic Authentication or a URL parameter. The authentication credentials can either be a username and password pair transmitted in plaintext (not recommended unless you are forcibly using HTTPS with a commercially signed SSL certificate) or encrypted. The encrypted information uses Time-Based One Time Passwords (TOTP) to allow you to communicate the credentials securely, without the burden of public key cryptography, while at the same time maintaining an intrinsically very narrow window of opportunity. Furthermore, since the effective encryption key is modified every few seconds it makes an attack against it slightly harder than using regular symmetric AES-128 cryptography.

Transparent authentication is enabled by default, but doesn't use TOTP.

Setting it up

Setting up transparent authentication requires you to modify your component's Dispatcher class, namely its __construct(), to change the values of some protected fields.

The available fields are:

\$fofAuth-timeStep	The time step, in seconds, for the time based one time passwords (TOTP) used for encryption. The default value is 6 seconds. The window of opportunity for an attacker is 2x-3x as much, i.e. 12-18 seconds using the default value. This is adequately high to be practical and too low to allow a realistic attack by a hacker. WARNING! If you change this option you have to notify the consumers of the service to make the same change, otherwise your TOTP's will be vastly different and communication will fail.
\$fofAuthKey	The Base32 encoded key for TOTP. Please note that this is Base32, not Base64. Only required if you're going to use encryption.
\$fofAuthFormats	Which result formats should be handled by the transparent authentication. This is an array, by default array('json', 'csv', 'xml', 'raw'). We recommend only using non-HTML formats in here.
\$fofAuthLogoutOnReturn	By default it's true and it means that once the component finishes executing, FOF will log out the user it authenticated using transparent authentication. This is a precaution against someone intercepting and abusing the session cookie Joomla! will be sending back to the client, as well as preventing the sessions table from filling up.
\$fofAuthAuth-Methods	<p>An array of supported authentication methods. Only use the ones that make sense for your application. Avoid using the *_Plaintext ones, please. The possible values in the array are:</p> <ul style="list-style-type: none"> • HTTPBasicAuth_TOTP HTTP Basic Authentication using encrypted information protected with a TOTP (the username must be "fofauth") • QueryString_TOTP Encrypted information protected with a TOTP passed in the _fofauthentication query string parameter • HTTPBasicAuth_Plaintext HTTP Basic Authentication using a username and password pair in plain text • QueryString_Plaintext Plaintext, JSON-encoded username and password pair passed in the _fofauthentication query string parameter <p>When you are using the QueryString_TOTP method you can pass your authentication information as GET or POST variable called _fofauthentication with the value being the URL encoded cryptogram of the authentication credentials (see further down).</p>

How to get a TOTP key

Any Base32 string can be used as a TOTP key as long as it expands to exactly 10 characters. If you don't feel like guessing, you can simply do:

```
$totp = new FOFEncryptTotp();
$secret = $totp->generateSecret();
```

You have to share this secret key with all clients wishing to connect to your component via a secure channel. This secret key must also be set in the fofAuthKey variable.

How to construct and supply an authentication set

The authentication set is a representation of the username and password of the user you want FOF to log in using transparent authentication. Its format depends on the authentication method.

Before going into much detail, we should consider an FOF authentication key to be a JSON-encoded object containing the keys username and password. E.g.:

```
{ "username": "sample_user", "password": "$3Cr3+" }
```

This is used with all but one authentication methods. Encryption of the FOF authentication key, used with all *_TOTP methods, is discussed further down this document.

If you are using HTTPBasicAuth_Plaintext method, you have to supply your username and password using HTTP Basic Authentication. The username is the username of the user you want to log in and the password is the password of the user you want to log in. This is the easiest and most insecure authentication method.

If you are using the HTTPBasicAuth_TOTP method, you have to supply a username of fofauth (including the leading underscore) and as the password enter the encrypted FOF authentication key.

If you are using the QueryString_Plaintext method you have to supply a GET or POST query parameter with a name of _fofauthentication (including the leading underscore). Its value must be the URL encoded FOF authentication key.

If you are using the QueryString_TOTP method you have to supply a GET or POST query parameter with a name of _fofauthentication (including the leading underscore). Its value must be the URL encoded FOF authentication key.

Encrypting the FOF authentication key

Assuming you are doing this from a FOF-powered component, you can do something like this:

```
$timeStep = 6; // Change this if you have a different value in your Dispatcher
$authKey = json_encode(array(
    'username' => $username,
    'password' => $password
));
$totp = new FOFEncryptTotp($timeStep);
$otp = $totp->getCode($secretKey);
$cryptoKey = hash('sha256', $this->_fofAuth_Key.$otp);
$aes = new FOFEncryptAes($cryptoKey);
$encryptedAuthKey = $aes->encryptString($authKey);
```

If you can get your hands on a TOTP and AES-256 implementation for your favourite programming language you can use talk to FOF-powered components through transparent authentication. Tip: TOTP libraries are usually labelled as being Google Authenticator libraries. Google Authenticator simply uses TOTP with a temp step of 30 seconds. Most such libraries are able to change the time step, thus possible to use with FOF. In fact, that's how FOF's TOTP library was derived.

5. Creating a cpanel (control panel) view

If you want to create an Administrator CPanel view in your component as the Default view follow the following steps:

Create a controller at <administrator>/controllers/cpanel.php

```
class COMPONENT_NAMEControllerCpanel extends FOFController
{
    public function execute($task)
    {
        parent::execute('browse');
    }
}
```

Create a view at <administrator>/views/cpanel/tmpl/default.php. If you use Akeeba Strapper you can easily create icons:

```
<?php
// Protect from unauthorized access
defined('_JEXEC') or die;

JHtml::_('behavior.framework');
JHtml::_('behavior.modal');

$option = 'com_COMPONENT_NAME';
?>

<div id="cpanel" class="span12">
  <div class="icon">
    <a href="index.php?option=<?php echo $option ?>&view=THE_VIEW">
      " />
      <span>
        <?php echo JText::_('COM_COMPONENT_NAME_CPANEL_ICON_1') ?><br/>
      </span>
    </a>
  </div>
  [...]
</div>
```

Customize the Cpanel toolbar creating a <administrator>/toolbar.php file with:

```
class COMPONENT_NAMEToolbar extends F0FToolbar
{
  /**
   * Prepares the toolbar for Cpanel view
   *
   * @return void
   */
  public function onCpanelsBrowse()
  {
    // Set the toolbar title
    JToolBarHelper::title(JText::_('COM_COMPONENT_NAME_CPANEL_TITLE_DASHBOARD'), 'COMPONENT_

    // Add Components options (see config.xml)
    JToolBarHelper::preferences('com_COMPONENT_NAME');
  }
}
```

6. Automatic field validation

You can perform automatic table checks based on database schema. Let's say you have a table like this:

```
CREATE TABLE IF NOT EXISTS `#__foobar_bars` (
  `foobar_bar_id` int(11) NOT NULL AUTO_INCREMENT,
  `required_field` varchar(50) NOT NULL,
  `optional_field` varchar(50) DEFAULT NULL,
```



```
PRIMARY KEY (`foobar_bar_id`)
);
```

As you can see, the `optional_field` is nullable, while the required one is not. To activate this feature, set the `_autoChecks` flag to true in your table constructor:

```
class FoobarTableBar extends FOFTable
{
    function __construct($table, $key, $db)
    {
        parent::__construct($table, $key, $db);

        $this->_autoChecks = true;
    }
}
```

In this way, when you're going to save your table, FOF will check every field; if it's not-nullable and it's empty, the check fails and an error message is enqueued. FOF will create a token string that will be parsed by JText, following this convention: `COM_<TABLENAME>_ERR_<FIELDNAME>`

If you use the previous table, you'll have something like this:

```
COM_FOOBAR_BAR_ERR_REQUIRED_FIELD
```

If you want to skip any field from these automatic checks, simply use this syntax in your table constructor:

```
$this->setSkipChecks(array('my_field_1', 'my_field_2'));
```

7. Ordering submenu items without writing any code

In the backend of your component, FoF creates automatically a submenu with links to all your views.

Normally they are sorted alphabetically, but you can add ordering information by placing a `metadata.xml` file in each view folder. E.g. `/components/com_todo/views/item/metadata.xml`

The xml should be like the following:

```
<metadata>
    <foflib>
        <ordering>123</ordering>
    </foflib>
</metadata>
```

Appendix A. Definitions

1. Media file identifiers

FOF expects you to give an abstracted path to your media (CSS, Javascript, image, ...) files, also called an "identifier". It allows it to perform media file overrides very easily, in a fashion similar to how Joomla! performs template overrides for view files. This section will help you understand how they are used and how media file overrides work.

Media file identifiers are in the form:

```
area://path
```

Where the **area** can be one of:

media : The file is searched inside your site's media directory. FOF will also try to locate it in the media overrides directory of your site, e.g. `templates/your_template/media` where `your_template` is the name of the currently active template on your site.

In this case the **path** is the rest of the path relative to the media or media override directory. The first part of your path **SHOULD** be your extension's name, e.g. `com_example`.

Example: `media://com_example/css/style.css` will look for the file `templates/your_template/media/com_example/css/style.css` or, if it doesn't exist, `media/com_example/css/style.css`

admin : The file is searched for in the administration section of your extension. The first part of the path **MUST** be your extension's name. The file is first searched for in your template override directory.

Example: `admin://com_example/assets/style.css` will look for the file `administrator/templates/your_template/com_example/assets/style.css` or, if it doesn't exist, `administrator/components/com_example/assets/style.css`

site : The file is searched for in the front-end section of your extension. The first part of the path **MUST** be your extension's name. The file is first searched for in your template override directory.

Example: `site://com_example/assets/style.css` will look for the file `templates/your_template/com_example/assets/style.css` or, if it doesn't exist, `components/com_example/assets/style.css`

Important

FOF cannot know what is the other side's template. Let's put it simply. If you are in the front-end, your template is called "foobar123" and you use the identifier `admin://com_example/assets/style.css`, FOF will look for the template override in `administrator/templates/foobar123/com_example/assets/style.css`. Of course this is incorrect, but there is no viable way to know what the back-end template in use is from the site's front-end and vice versa. As a result, we strongly recommend only using `media://` identifiers for media files.

On top of that there is a security aspect as well. The front-end of your component should never try to load media files from the back-end of the component. Many web masters choose to conceal the fact that they are using Joomla! by means of password protection or redirection of the `administrator` directory.