Plugin Infrastructure

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1 Overview

Forrest can be extended with the addition of plugins. This document describes what a plugin is and outlines the plugin infrastructure so that you can start building your own Forrest extensions.

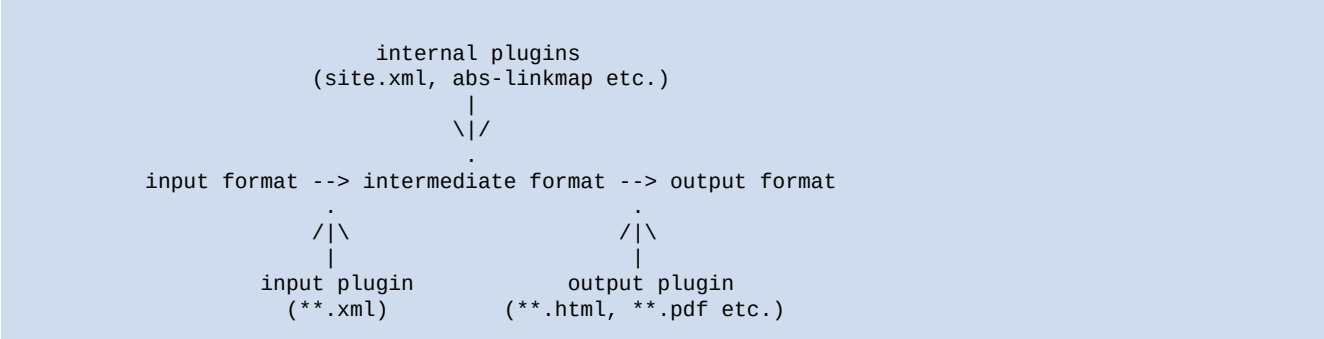
2 What is a Forrest Plugin?

A Forrest plugin is a set of resources and configuration files that extend the functionality of Forrest. They will typically consist of a sitemap, zero or more stylesheets and zero or more schemas.

The plugins sitemap is mounted by Forrest's sitemap after the project specific sitemap but before the Forrest default matchers. This allows a plugin to override/extend default Forrest behaviour. By adopting a plugin model we can keep the core of Forrest tightly focused on the basic functionality, whilst still facilitating extensions to suit individual projects needs.

2.1 Types of Plugin

There are three types of plugin, `input`, `output` and `internal`. Each plugin has a specific role to play and extends a different part of Forrest:



The name of the sitemap will reflect the type of plugin in use. That is, an internal plugin will have a sitemap called `internal.xmap`, an output plugin has `output.xmap` and an input plugin has `input.xmap`. In addition, an input plugin can optionally provide a `resources.xmap`.

2.1.1 Input Plugins

Input plugins provide a new source format. For example, the OpenOffice.org plugin extends Forrest to allow the use of OpenOffice.org Application file formats.

An input plugin provides an `input.xmap` file. This provides the source matchers (i.e. **.xml), it is mounted in forrest.xmap before the default forrest **.xml behaviour and therefore can override that default behaviour but it will not interfere with any internal Forrest infrastructure matches, or any other plugins infrastructure matches.

An input plugin may also provide a `resources.xmap` file. This can be used to match additional resources that are not stored in XML files, for example, javascript files.

2.1.2 Output Plugins

Output plugins provide a new output format. For example, the s5 plugin extends Forrest to produce HTML slides from Forrest documents.

An output plugin provides an `output.xmap` file. This provides the relevant output matchers (i.e. **.html, **.pdf, **.slides), it is mounted before any of the default matchers for Forrest and so can override this default behaviour.

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2.1.3 Internal Plugins

Internal plugins are for advanced use only. They provide ways of extending or overriding Forrest's internal operations. For example, the IMSManifest plugin allows Forrest projects to use an IMS Manifest file instead of a site.xml and tabs.xml configuration files.

Internal plugins provide an `internal.xmap` file. This provides the infrastructure matchers (i.e. site.xml, faq.xml, issues.xml), and will be mounted before *any* of the Forrest matches. This sitemap can override any behaviour within Forrest and so developers of these plugins must be especially careful with the construction of their matchers, since they will be processed before any other matchers and consequently can easily break existing functionality. You must only do a <map:generate ...> if you are certain you are going to process the full result.

2.2 Naming Conventions

Technically you can name a plugin anything you like with one small restriction (see below). However, we do have some naming conventions that we recomend you follow. This is to minimise the chances of collision between plugins from different developers.

The name should be structured like a java package name, and should include a relevant reverse domain name. For example:

```
org.apache.forrest.plugin.PLUGIN_TYPE.PLUGIN_NAME

net.sf.forrestPlugins.PLUGIN_TYPE.PLUGIN_NAME
```

Where `PLUGIN_TYPE` is either "internal", "input" or "output" and `PLUGIN_NAME"` is a suitable name chosen by yourself.

> **Warning:**
> Plugin names cannot have a '-' character in them. This character is used to indicate the start of a version number when defining a plugin to be used. See Using Plugins for more information.

2.3 An Example Plugin

In order to fully understand the applicability of Forrest Plugins we will consider an extension to the way in which Forrest defines the structure of the site. By default Forrest uses a site.xml file to define navigation through the site and a tabs.xml file to define the tabs across the top of the page. But what if we want to use a different file to describe site structure? For example, what if we want to use an IMS Manifest file from the SCORM content package standards (http://www.adlnet.org/).

An IMS Manifest file describes the structure of a site. It is also possible to define a set of rules for extracting tab information from such a file. Consequently, it is possible to use an IMSManifest file to create Forrest's site.xml and tabs.xml files. The advantage would be that we can then use SCORM compliant content objects within Forrest.

Unfortunately, IMS Manifests are much more complex than site.xml and tabs.xml files. Therefore, not all users will want to use them. Adding the functionality as an optional plugin seems to be the ideal solution.

3 What Does a Forrest Plugin Look Like?

Plugins will need to conform to a specified directory structure. This mirrors the default forrest directory structure:

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```
[plugin_name]
  |
  |-- config files (xmap, skinconf etc.)
  |
  |-- resources
      |
      |-- schema
      |   |
      |   |-- catalog.xcat
      |   |
      |   |-- dtd (DTDs etc.)
      |
      |-- stylesheets (XSLs etc.)
```

3.1 The IMS Manifest Plugin

If we consider the IMS Manifest Plugin described above, we see that we will need the following files and directory structure:

```
org.apache.forrest.plugin.internal.IMSManifest
  |
  |-- internal.xmap
  |
  |-- resources
      |
      |-- stylesheets
                    |
                    |- imsmanifest2site.xsl
                    |- imsmanifest2tabs.xsl
                    |- pathutils.xsl
                    |- repositoryUtils.xsl
```

The internal.xmap file will override the default behaviour for the navigation generation matchers in Forrest, for example, it contains a matcher as follows:

```
<map:match pattern="abs-menulinks">
  <map:select type="exists">
    <map:when test="{properties:content.xdocs}imsmanifest.xml">
       <map:generate src="{properties:content.xdocs}imsmanifest.xml" />
       <map:transform src="resources/stylesheets/imsmanifest2site.xsl"/>
       <map:transform src="{forrest:forrest.stylesheets}/absolutize-linkmap.xsl" />
       <map:transform src="{forrest:forrest.stylesheets}/site2site-normalizetabs.xsl" />
     <map:serialize type="xml"/>
   </map:when>
   <map:when test="{properties:content.xdocs}site.xml">
      <map:generate src="{properties:content.xdocs}site.xml" />
      <map:transform src="{forrest:forrest.stylesheets}/absolutize-linkmap.xsl" />
      <map:transform src="{forrest:forrest.stylesheets}/site2site-normalizetabs.xsl" />
      <map:transform src="{forrest:forrest.stylesheets}/normalizehrefs.xsl"/>
    <map:serialize type="xml"/>
  </map:when>
  </map:select>
</map:match>
```

> **Note:**
>
> Note that this matcher will default to the behaviour provided by Forrest if there is no imsmanifest.xml file present in the project. At present it is necessary to copy this default behaviour from the original Forrest *.xmap files. We hope to improve on this in the future.

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4 How does Installation work?

When Forrest installs a plugin it downloads a zip of the plugin code and extracts it into the `plugins` directory of Forrest and an entry is made in `src/plugins/[input|internal|output].xmap` (recall the actual sitemap name is dependant on the type of plugin it belongs to. For example, installing the IMSManifest plugin described above will result in the following entry being added to the plugin sitemap:

```
<map:select type="exists">
  <map:when test="input.xmap">
    <map:mount uri-prefix=""
      src="sitemap.xmap"
      check-reload="yes"
      pass-through="true"/>
  </map:when>
</map:select>
```

Installed plugins are managed by the FORREST_INSTALL_DIR/build/plugins/sitemap.xmap file. This file is mounted by the main Forrest sitemap with the following code:

```
       <map:pipeline internal-only="false">
          <map:mount uri-prefix=""
                     src="{forrest:forrest.plugins}/sitemap.xmap"
                     check-reload="yes"
                     pass-through="true"/>
       </map:pipeline>
```

> **Note:**
> The above plugin sitemap.xmap file is automatically managed by Forrest, the end user need never edit this file.

5 Further Reading

If you want to build a plugin you might like to start with our HowTo on Building Plugins.

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