Apache mod_rewrite Introduction

Introduction

The Apache module mod_rewrite is a very powerful and sophisticated module which provides a way to do URL manipulations. With it, you can do nearly all types of URL rewriting that you may need. It is, however, somewhat complex, and may be intimidating to the beginner. There is also a tendency to treat rewrite rules as magic incantation, using them without actually understanding what they do.

This document attempts to give sufficient background so that what follows is understood, rather than just copied blindly.

Remember that many common URL-manipulation tasks don't require the full power and complexity of mod_rewrite. For simple tasks, see mod_alias and the documentation on mapping URLs to the filesystem.

Finally, before proceeding, be sure to configure mod_rewrite's log level to one of the trace levels using the LogLevel directive. Although this can give an overwhelming amount of information, it is indispensable in debugging problems with mod_rewrite configuration, since it will tell you exactly how each rule is processed.

Regular Expressions

mod_rewrite uses the Perl Compatible Regular Expression vocabulary. In this document, we do not attempt to provide a detailed reference to regular expressions. For that, we recommend the PCRE man pages, the Perl regular expression man page, and Mastering Regular Expressions, by Jeffrey Friedl.

In this document, we attempt to provide enough of a regex vocabulary to get you started, without being overwhelming, in the hope that RewriteRules will be scientific formulae, rather than magical incantations.

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Regex vocabulary

The following are the minimal building blocks you will need, in order to write regular expressions and RewriteRules. They certainly do not represent a complete regular expression vocabulary, but they are a good place to start, and should help you read basic regular expressions, as well as write your own.

Character	Meaning	Example
.	Matches any single character	c.t will match cat, cot, cut, etc.
+	Repeats the previous match one or more times	a+ matches a, aa, aaa, etc
*	Repeats the previous match zero or more times.	a* matches all the same things a+ matches, but will also match an empty string.
?	Makes the match optional.	colou?r will match color and colour.
^	Called an anchor, matches the beginning of the string	^a matches a string that begins with a
$	The other anchor, this matches the end of the string.	a$ matches a string that ends with a.
( )	Groups several characters into a single unit, and captures a match for use in a backreference.	(ab)+ matches ababab - that is, the + applies to the group. For more on backreferences see below.
[ ]	A character class - matches one of the characters	c[uoa]t matches cut, cot or cat.
[^]	Negative character class - matches any character not specified	c[^/]t matches cat or c=t but not c/t

In mod_rewrite the ! character can be used before a regular expression to negate it. This is, a string will be considered to have matched only if it does not match the rest of the expression.

Regex Back-Reference Availability

One important thing here has to be remembered: Whenever you use parentheses in *Pattern* or in one of the *CondPattern*, back-references are internally created which can be used with the strings $N and %N (see below). These are available for creating the strings *Substitution* and *TestString* as outlined in the following chapters. Figure 1 shows to which locations the back-references are transferred for expansion as well as illustrating the flow of the RewriteRule, RewriteCond matching. In the next chapters, we will be exploring how to use these back-references, so do not fret if it seems a bit alien to you at first.

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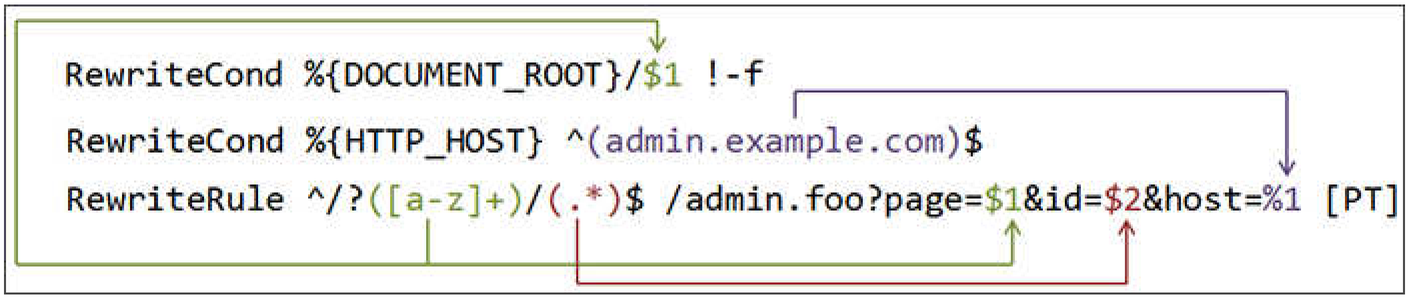

```
RewriteCond %{DOCUMENT_ROOT}/$1 !-f
RewriteCond %{HTTP_HOST} ^(admin.example.com)$
RewriteRule ^/?([a-z]+)/(.*)$ /admin.foo?page=$1&id=$2&host=%1 [PT]
```

Figure 1: The back-reference flow through a rule.
In this example, a request for /test/1234 would be transformed into /admin.foo?page=test&id=1234&host=admin.example.com.

RewriteRule Basics

A RewriteRule consists of three arguments separated by spaces. The arguments are

1. *Pattern*: which incoming URLs should be affected by the rule;
2. *Substitution*: where should the matching requests be sent;
3. *[flags]*: options affecting the rewritten request.

The *Pattern* is a regular expression. It is initially (for the first rewrite rule or until a substitution occurs) matched against the URL-path of the incoming request (the part after the hostname but before any question mark indicating the beginning of a query string) or, in per-directory context, against the request's path relative to the directory for which the rule is defined. Once a substitution has occurred, the rules that follow are matched against the substituted value.

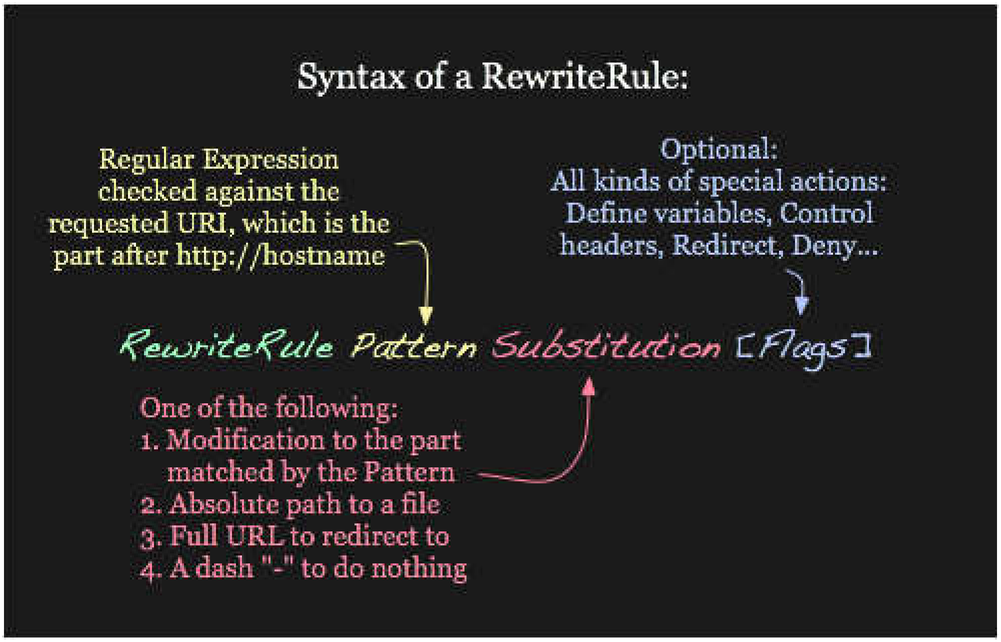
Syntax of a RewriteRule:
Regular Expression checked against the requested URI, which is the part after http://hostname
Optional: All kinds of special actions: Define variables, Control headers, Redirect, Deny...
RewriteRule Pattern Substitution [Flags]
One of the following:
1. Modification to the part matched by the Pattern
2. Absolute path to a file
3. Full URL to redirect to
4. A dash "-" to do nothing

Figure 2: Syntax of the RewriteRule directive.

The *Substitution* can itself be one of three things:

A full filesystem path to a resource

```
RewriteRule ^/games /usr/local/games/web
```

This maps a request to an arbitrary location on your filesystem, much like the Alias directive.

A web-path to a resource

```
RewriteRule ^/foo$ /bar
```

If DocumentRoot is set to /usr/local/apache2/htdocs, then this directive would map requests for http://example.com/foo to the path /usr/local/apache2/htdocs/bar.

An absolute URL

```
RewriteRule ^/product/view$ http://site2.example.com/seeproduct.html [R]
```

This tells the client to make a new request for the specified URL.

The *Substitution* can also contain *back-references* to parts of the incoming URL-path matched by the *Pattern*. Consider the following:

```
RewriteRule ^/product/(.*)/view$ /var/web/productdb/$1
```

The variable $1 will be replaced with whatever text was matched by the expression inside the parenthesis in the *Pattern*. For example, a request for http://example.com/product/r14df/view will be mapped to the path /var/web/productdb/r14df.

If there is more than one expression in parenthesis, they are available in order in the variables $1, $2, $3, and so on.

Rewrite Flags

The behavior of a RewriteRule can be modified by the application of one or more flags to the end of the rule. For example, the matching behavior of a rule can be made case-insensitive by the application of the [NC] flag:

```
RewriteRule ^puppy.html smalldog.html [NC]
```

For more details on the available flags, their meanings, and examples, see the Rewrite Flags document.

Rewrite Conditions

One or more RewriteCond directives can be used to restrict the types of requests that will be subject to the following RewriteRule. The first argument is a variable describing a characteristic of the request, the second argument is a regular expression that must match the variable, and a third optional argument is a list of flags that modify how the match is evaluated.

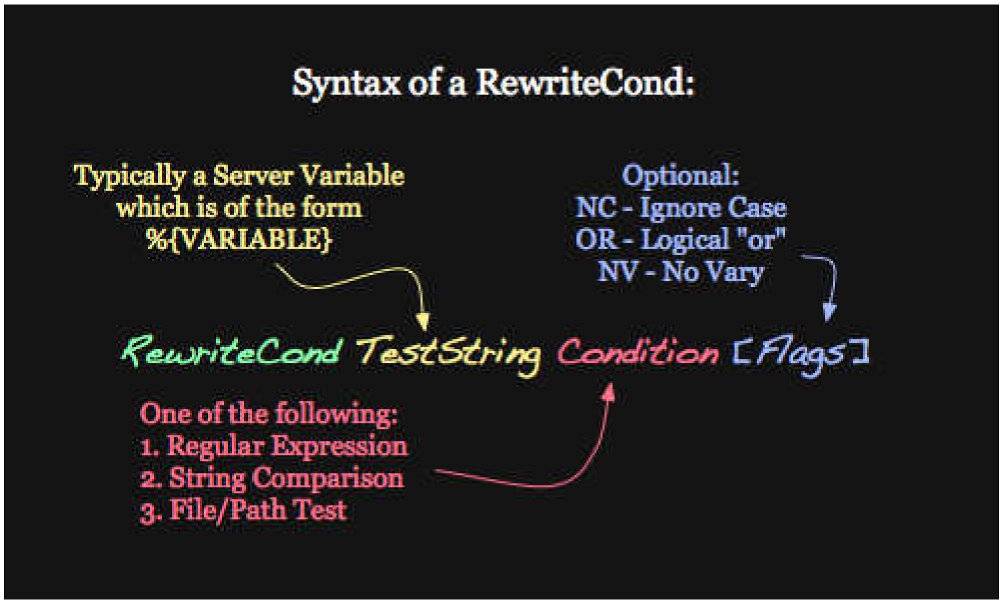

Figure 3: Syntax of the RewriteCond directive

For example, to send all requests from a particular IP range to a different server, you could use:

```
RewriteCond %{REMOTE_ADDR} ^10\.2\.
RewriteRule (.*) http://intranet.example.com$1
```

When more than one RewriteCond is specified, they must all match for the RewriteRule to be applied. For example, to deny requests that contain the word "hack" in their query string, unless they also contain a cookie containing the word "go", you could use:

```
RewriteCond %{QUERY_STRING} hack
RewriteCond %{HTTP_COOKIE} !go
RewriteRule . - [F]
```

Notice that the exclamation mark specifies a negative match, so the rule is only applied if the cookie does not contain "go".

Matches in the regular expressions contained in the RewriteConds can be used as part of the *Substitution* in the RewriteRule using the variables %1, %2, etc. For example, this will direct the request to a different directory depending on the hostname used to access the site:

```
RewriteCond %{HTTP_HOST} (.*)
RewriteRule ^/(.*) /sites/%1/$1
```

If the request was for http://example.com/foo/bar, then %1 would contain example.com and $1 would contain foo/bar.

Rewrite maps

The RewriteMap directive provides a way to call an external function, so to speak, to do your rewriting for you. This is discussed in greater detail in the RewriteMap supplementary documentation.

.htaccess files

Rewriting is typically configured in the main server configuration setting (outside any <Directory> section) or inside <VirtualHost> containers. This is the easiest way to do rewriting and is recommended. It is possible, however, to do rewriting inside <Directory> sections or .htaccess files at the expense of some additional complexity. This technique is called per-directory rewrites.

The main difference with per-server rewrites is that the path prefix of the directory containing the .htaccess file is stripped before matching in the RewriteRule. In addition, the RewriteBase should be used to assure the request is properly mapped.