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# Apache: Creating A Session-Aware Loadbalancer Using mod_proxy_balancer (Debian Etch)

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Since Apache 2.1, a new module called *mod_proxy_balancer* is available which lets you turn a system that has Apache installed into a loadbalancer. This loadbalancer retrieves requested pages from two or more backend webservers and delivers them to the user's computer. Users get the impression that they deal with just one server (the loadbalancer) when in fact there are multiple systems behind the loadbalancer that process the users' requests. By using a loadbalancer, you can lower the load average on your webservers. One important feature of *mod_proxy_balancer* is that it can keep track of sessions which means that a single user always deals with the same backend webserver. Most websites are database-driven nowadays with user logins etc., and you'd get weird results if a user logs in on one backend webserver, and then his next request goes to another backend webserver, meaning he'd get logged out again. You can avoid this by using *mod_proxy_balancer*'s session-awareness.

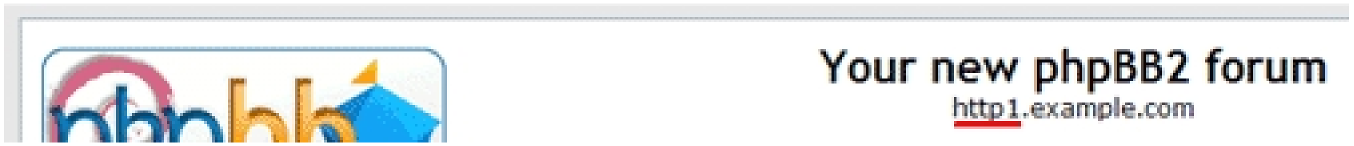
I do not issue any guarantee that this will work for you!

## 1 Preliminary Note

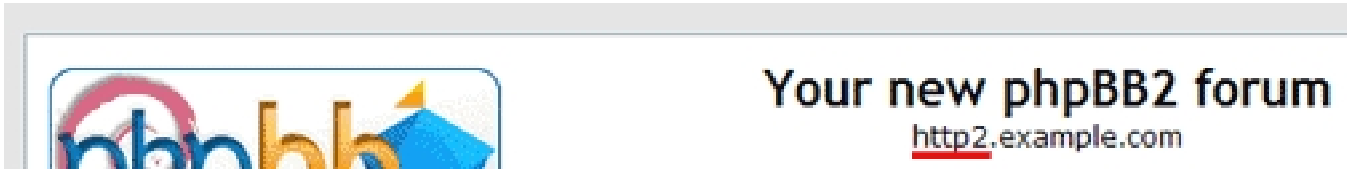
It should be noted that a loadbalancer can lower the load on your backend webservers, but it doesn't provide high-availability (as long as you use only one loadbalancer)! A single loadbalancer is s single point of failure (SPOF). If you need high-availability, you should use at least two loadbalancers (e.g. one as a hot-standby).

I will use three servers in this example: one loadbalancer with the address *www.example.com / example.com*, and two backend servers with the addresses *http1.example.com* and *http2.example.com*.

All three servers use Debian Etch as their operating system, and all three systems have Debian's Apache2 installed (its version is 2.2.3, so it comes with *mod_proxy_balancer* by default). On *http1.example.com* and *http2.example.com* I have installed a database-driven web application: **phpBB2**, a famous forum software. Both phpBB2 installations are identical and use the same database. For debugging purposes, I've built-in a small difference in both installations: if the page is delivered by *http1.example.com*, it shows *http1.example.com* in the header:



And if it's delivered by *http2.example.com*, it shows *http2.example.com*:



That way I can control if sessions are handled correctly by *mod_proxy_balancer*. Of course, on a production system both pages would be the same.

Session-tracking is a bit tricky in *mod_proxy_balancer* because it expects a certain cookie format, and the name of the session variable can differ from application to application. Fortunately I've found this page: **http://www.markround.com/archives/33-Apache-mod_proxy-balancing-with-PHP-sticky-sessions.html** which has a great and easy solution for this problem that I'm going to use here.

## 2 Preparing The Backend Servers

First we must prepare our backend webservers *http1.example.com* and *http2.example.com*. We enable *mod_rewrite* like this:

http1.example.com / http2.example.com:

```
a2enmod rewrite
```

```
/etc/init.d/apache2 force-reload
```

Then we open the Apache vhost configuration of our phpBB2 site on `http1.example.com` and add the following lines to it:

http1.example.com:

```
[...]
RewriteEngine On
RewriteRule .* - [CO=BALANCEID:balancer.http1:.example.com]
[...]
```

(Make sure that you replace `http1` and `.example.com` according to your needs!)

Restart Apache afterwards:

```
/etc/init.d/apache2 restart
```

Now we do the same on `http2.example.com`:

http2.example.com:

```
[...]
RewriteEngine On
RewriteRule .* - [CO=BALANCEID:balancer.http2:.example.com]
[...]
```

(Make sure that you replace `http2` and `.example.com` according to your needs!)

Restart Apache afterwards:

```
/etc/init.d/apache2 restart
```

That's all we have to configure on the backend servers.

## 3 Configuring The Loadbalancer

On our loadbalancer `www.example.com` we must enable a few Apache modules:

www.example.com:

```
a2enmod proxy

a2enmod proxy_balancer

a2enmod proxy_http

a2enmod status
```

and then restart Apache:

```
/etc/init.d/apache2 force-reload
```

I'm assuming that we don't run any other websites on the loadbalancer, so we can use Debian's default document root `/var/www` for our loadbalancer.

*mod_proxy_balancer* comes with a "Balancer Manager", a small web interface where you can tweak a few settings. We create the directory */var/www/balancer-manager* for it which we password-protect so that only we have access to it:

```
mkdir /var/www/balancer-manager

htpasswd -c /var/.htpasswd admin
```

(You can replace *admin* with any username you like.)

```
vi /var/www/balancer-manager/.htaccess
```

```
AuthType Basic
AuthName "Members Only"
AuthUserFile /var/.htpasswd
<limit GET PUT POST>
require valid-user
</limit>
```

Now we come to the vhost configuration of the loadbalancer. Apache's default vhost configuration on Debian Etch is located in */etc/apache2/sites-available/default*, so we replace that with our own configuration:

```
cp /etc/apache2/sites-available/default /etc/apache2/sites-available/default_orig

cat /dev/null > /etc/apache2/sites-available/default

vi /etc/apache2/sites-available/default
```

```
NameVirtualHost *
<VirtualHost *>
        ServerName www.example.com
        ServerAlias example.com
        DocumentRoot /var/www/
        ProxyRequests Off

        <Proxy *>
          Order deny,allow
          Allow from all
        </Proxy>

        ProxyPass /balancer-manager !
        ProxyPass / balancer://mycluster/ stickysession=BALANCEID nofailover=On
        ProxyPassReverse / http://http1.example.com/
        ProxyPassReverse / http://http2.example.com/
        <Proxy balancer://mycluster>
          BalancerMember http://http1.example.com  route=http1
          BalancerMember http://http2.example.com  route=http2
          ProxySet lbmethod=byrequests
        </Proxy>

        <Location /balancer-manager>
          SetHandler balancer-manager

          Order deny,allow
          Allow from all
        </Location>
</VirtualHost>
```

It is very important that you set all slashes (/) EXACTLY as shown in this example, especially the trailing slashes!

Please make sure that the value of `stickysession` is the name of the cookie (`BALANCEID`) in our rewrite rules from chapter 2. Also, the values of `route` in the `BalancerMember` lines must be the respective value that we set in the rewrite rules (`http1` or `http2`). The `stickysession` and `route` values take care of the correct session handling of `mod_proxy_balancer`.

It's also important that you have as many `ProxyPassReverse` lines as you have `BalancerMember` lines (one `ProxyPassReverse` line for each `BalancerMember`).

The `ProxyPass /balancer-manager !` line makes sure that requests to `www.example.com/balancer-manager` aren't routed to the backend servers.

You can find more details about all settings and further fine-tuning options on **http://httpd.apache.org/docs/2.2/mod/mod_proxy.html#proxypass** and **http://httpd.apache.org/docs/2.2/mod/mod_proxy_balancer.html**.

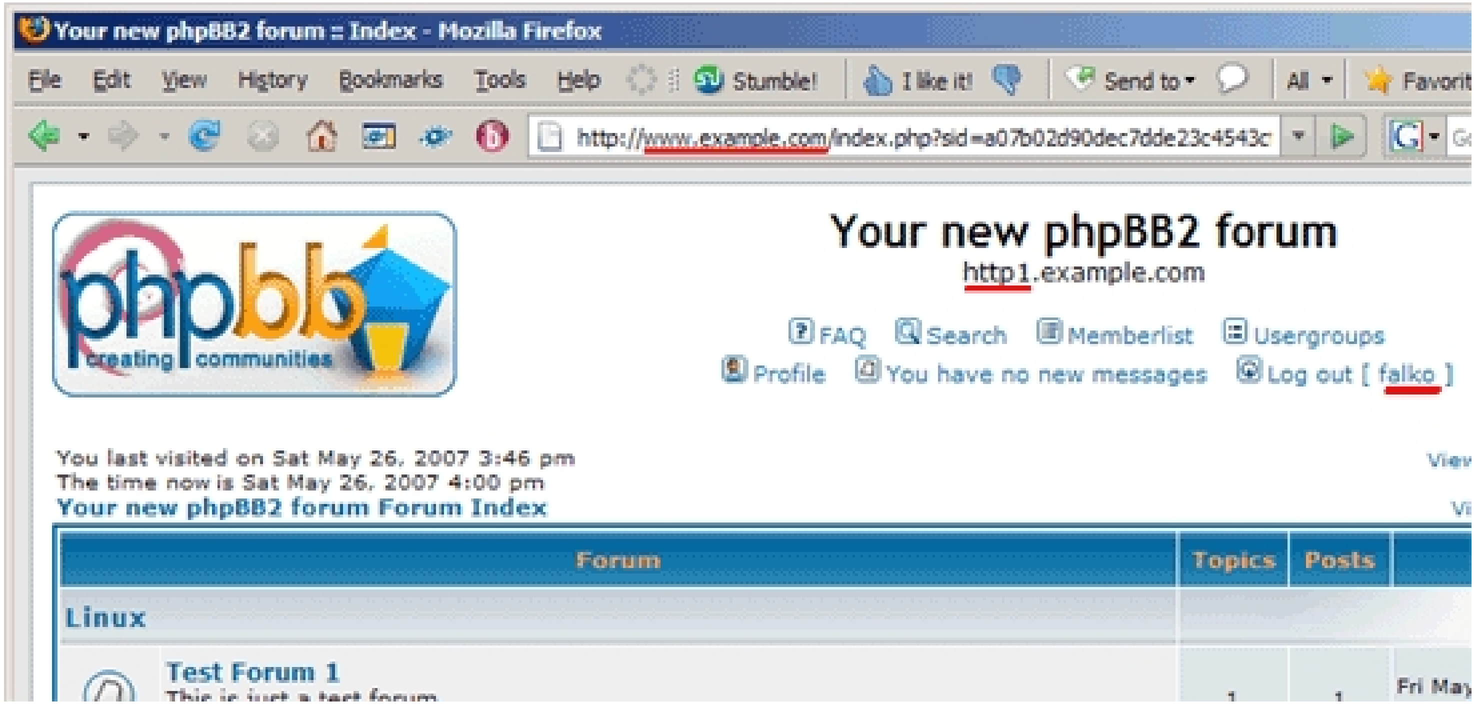
Now that we've finished the configuration, we must restart Apache:

```
/etc/init.d/apache2 restart
```

## 4 Testing Our Setup

Our setup is now ready to be used. To test if sessions are handled correctly, I open two browsers (because of the cookies), e.g. Firefox and Internet Explorer, and go to `http://www.example.com` or `http://example.com`. In both cases, you should see the phpBB2 forum, delivered by one of the backend servers (which you don't see, you should always have `www.example.com` or just `example.com` in the browser's address bar).

It's possible that the pages in both browsers are delivered by the same backend server - if that's the case, delete the cookies in your browsers or open another browser (Opera, Seamonkey, ...) and try again until you see that the pages in your two different browsers come from different backend servers (I can see it because I changed the header, as described in chapter 1). Then log in with two different users (e.g. `falko` and `till`) that you have created before and browse the forum with these two different users. In my case `falko`'s content is always delivered by `http1.example.com`:


Your new phpBB2 forum :: Index - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Stumble!
I like it!
Send to
All
Favorit
phpbb creating communities
FAQ Search Memberlist Usergroups
Profile You have no new messages Log out [ falko ]
View
Vi
Forum Topics Posts
Fri May

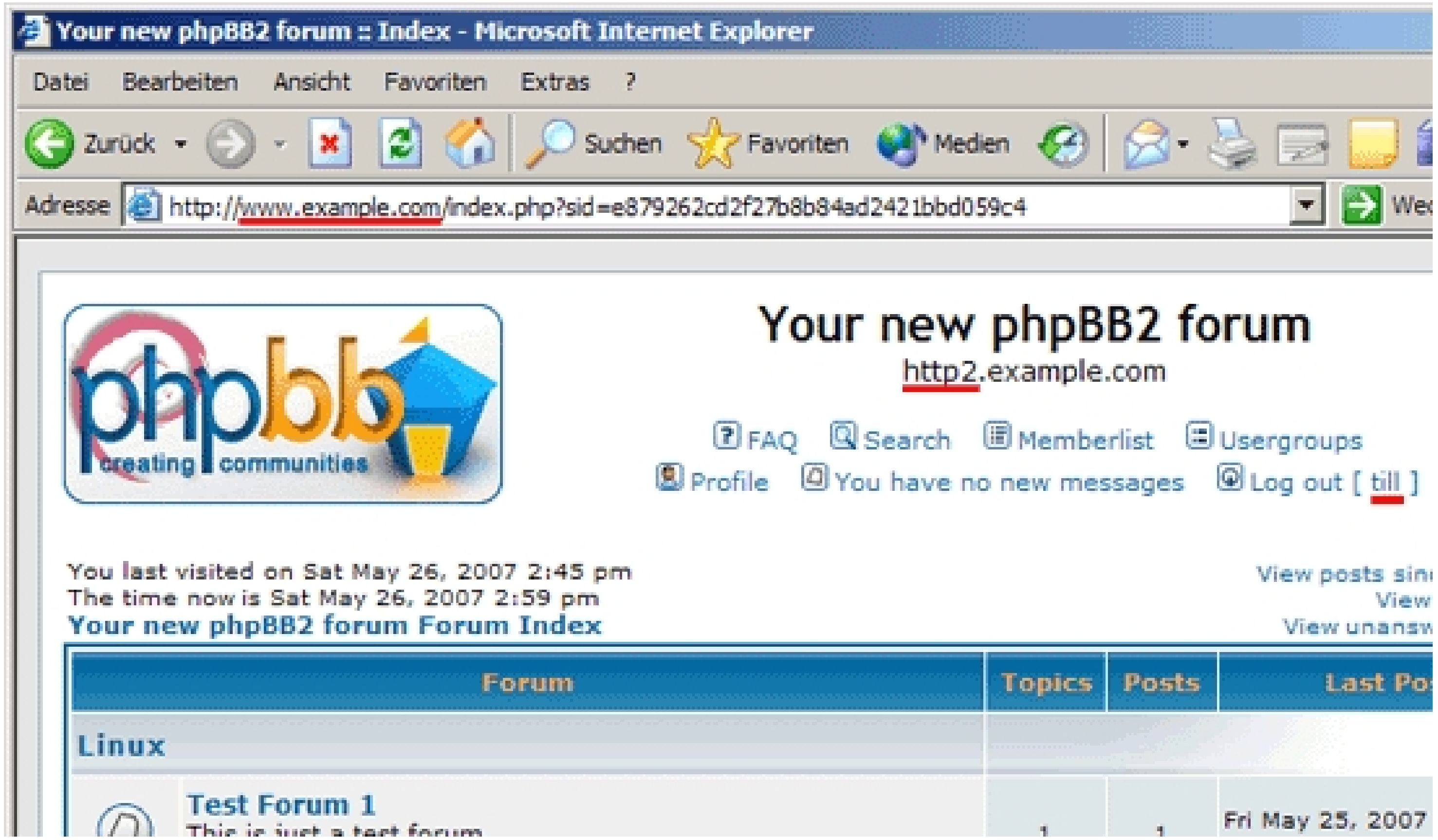
http://www.example.com/index.php?sid=a07b02d90dec7dde23c4543c

Your new phpBB2 forum
http1.example.com

You last visited on Sat May 26, 2007 3:46 pm
The time now is Sat May 26, 2007 4:00 pm
Your new phpBB2 forum Forum Index

| Forum | Topics | Posts |
|---|---|---|
| Linux | | |
| Test Forum 1<br>This is just a test forum | 1 | 1 |

Whereas *`till`*'s content comes from *`http2.example.com`*:

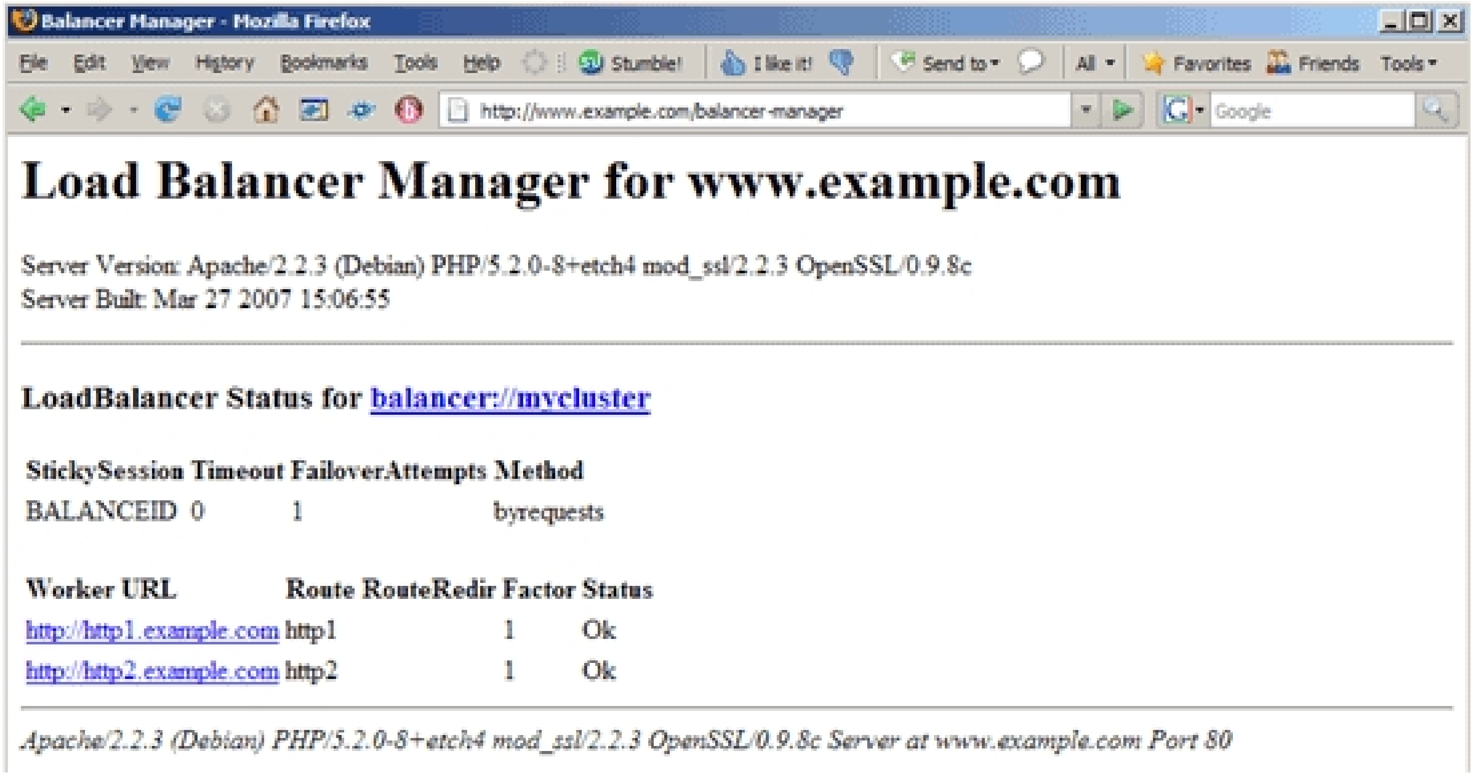

Your new phpBB2 forum :: Index - Microsoft Internet Explorer
Datei Bearbeiten Ansicht Favoriten Extras ?
Zurück
Suchen
Favoriten
Medien
Adresse
http://www.example.com/index.php?sid=e879262cd2f27b8b84ad2421bbd059c4
Your new phpBB2 forum
http2.example.com
FAQ
Search
Memberlist
Usergroups
Profile
You have no new messages
Log out [ till ]
You last visited on Sat May 26, 2007 2:45 pm
The time now is Sat May 26, 2007 2:59 pm
Your new phpBB2 forum Forum Index
Forum
Topics
Posts
Linux
Test Forum 1
Fri May 25, 2007

So sessions are handled correctly by *`mod_proxy_balancer`*!

## 5 The Balancer Manager

Direct your browser to *`http://www.example.com/balancer-manager`* or *`http://example.com/balancer-manager`*. You will be prompted for a username and password (the username and password you've created in chapter 3).

After the login you will see a simple web interface for managing the loadbalancer:


Balancer Manager - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://www.example.com/balancer-manager

Load Balancer Manager for www.example.com

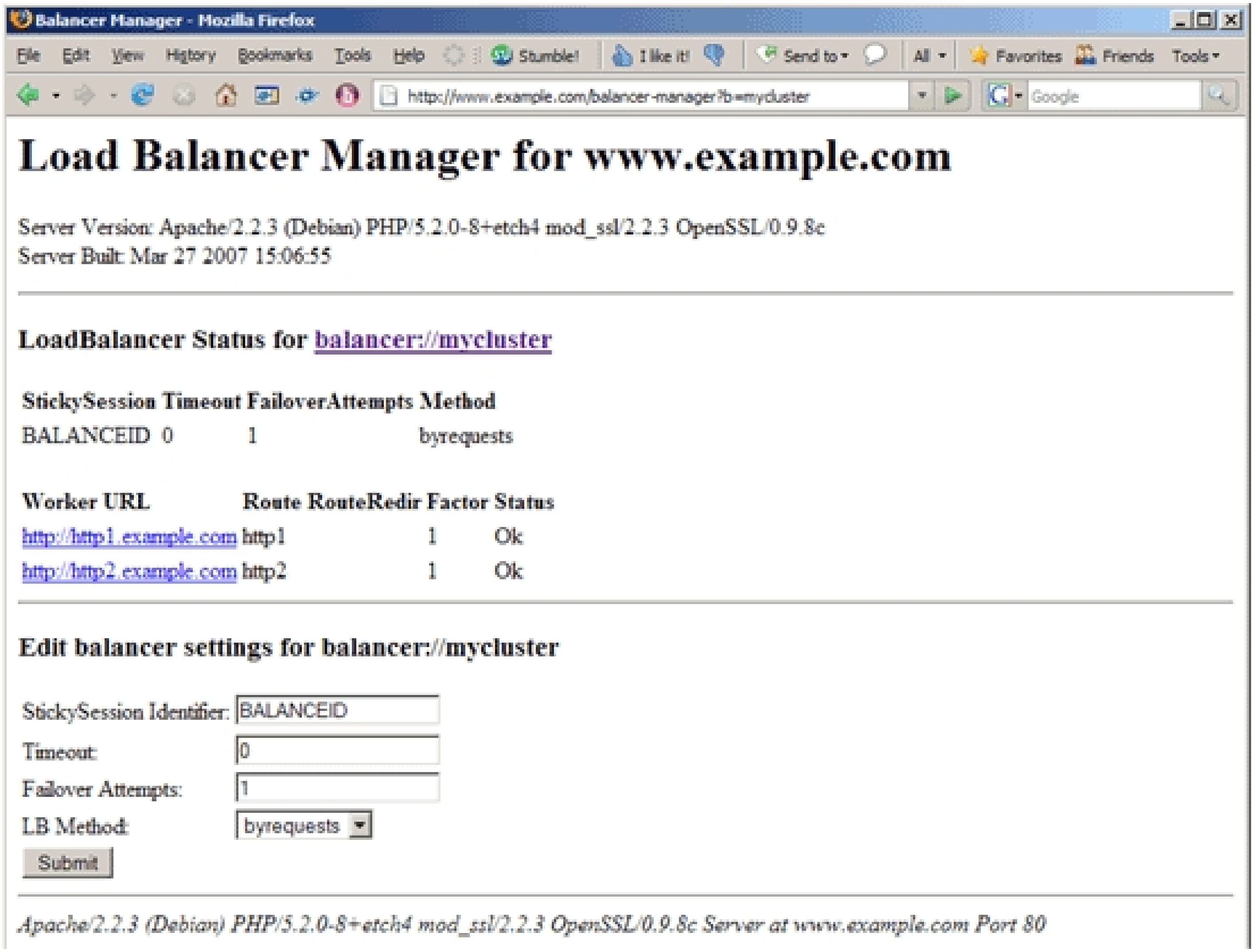
Server Version: Apache/2.2.3 (Debian) PHP/5.2.0-8+etch4 mod_ssl/2.2.3 OpenSSL/0.9.8c
Server Built: Mar 27 2007 15:06:55

LoadBalancer Status for balancer://mycluster

| StickySession | Timeout | FailoverAttempts | Method |
|---|---|---|---|
| BALANCEID | 0 | 1 | byrequests |

| Worker URL | Route | RouteRedir | Factor | Status |
|---|---|---|---|---|
| http://http1.example.com | http1 | | 1 | Ok |
| http://http2.example.com | http2 | | 1 | Ok |

*Apache/2.2.3 (Debian) PHP/5.2.0-8+etch4 mod_ssl/2.2.3 OpenSSL/0.9.8c Server at www.example.com Port 80*


Balancer Manager - Mozilla Firefox
File Edit View History Bookmarks Tools Help Stumble! I like it! Send to All Favorites Friends Tools
http://www.example.com/balancer-manager?b=mycluster
Google

Load Balancer Manager for www.example.com

Server Version: Apache/2.2.3 (Debian) PHP/5.2.0-8+etch4 mod_ssl/2.2.3 OpenSSL/0.9.8c
Server Built: Mar 27 2007 15:06:55

LoadBalancer Status for balancer://mycluster

| StickySession | Timeout | FailoverAttempts | Method |
|---|---|---|---|
| BALANCEID | 0 | 1 | byrequests |

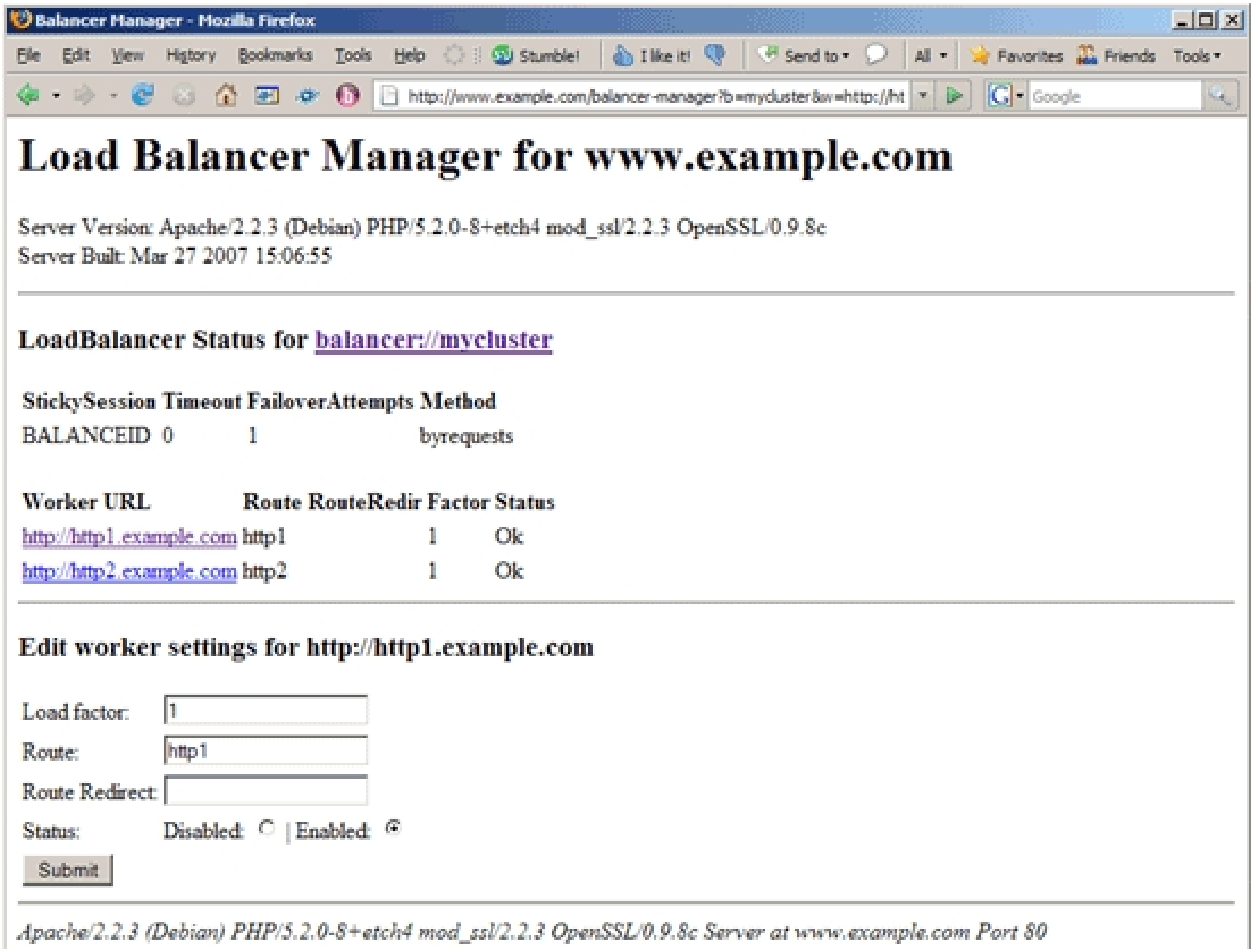
| Worker URL | Route | RouteRedir | Factor | Status |
|---|---|---|---|---|
| http://http1.example.com | http1 | | 1 | Ok |
| http://http2.example.com | http2 | | 1 | Ok |

Edit balancer settings for balancer://mycluster

| | |
|---|---|
| StickySession Identifier: | BALANCEID |
| Timeout: | 0 |
| Failover Attempts: | 1 |
| LB Method: | byrequests |

Submit

*Apache/2.2.3 (Debian) PHP/5.2.0-8+etch4 mod_ssl/2.2.3 OpenSSL/0.9.8c Server at www.example.com Port 80*


Balancer Manager - Mozilla Firefox
File Edit View History Bookmarks Tools Help Stumble! I like it! Send to All Favorites Friends Tools
http://www.example.com/balancer-manager?b=mycluster&w=http://ht
Google

Load Balancer Manager for www.example.com

Server Version: Apache/2.2.3 (Debian) PHP/5.2.0-8+etch4 mod_ssl/2.2.3 OpenSSL/0.9.8c
Server Built: Mar 27 2007 15:06:55

LoadBalancer Status for balancer://mycluster

| StickySession | Timeout | FailoverAttempts | Method |
|---|---|---|---|
| BALANCEID | 0 | 1 | byrequests |

| Worker URL | Route | RouteRedir | Factor | Status |
|---|---|---|---|---|
| http://http1.example.com | http1 | | 1 | Ok |
| http://http2.example.com | http2 | | 1 | Ok |

Edit worker settings for http://http1.example.com

| | |
|---|---|
| Load factor: | 1 |
| Route: | http1 |
| Route Redirect: | |
| Status: | Disabled: ○ \| [✓ Enabled: ●] |

Submit

*Apache/2.2.3 (Debian) PHP/5.2.0-8+etch4 mod_ssl/2.2.3 OpenSSL/0.9.8c Server at www.example.com Port 80*

You can find an overview of possible configuration options on **http://httpd.apache.org/docs/2.2/mod/mod_proxy.html#proxypass**.

## 6 Links

- Apache: **http://httpd.apache.org**
- mod_proxy: **http://httpd.apache.org/docs/2.2/mod/mod_proxy.html**
- mod_proxy_balancer: **http://httpd.apache.org/docs/2.2/mod/mod_proxy_balancer.html**
- Apache mod_proxy balancing with PHP sticky sessions:
**http://www.markround.com/archives/33-Apache-mod_proxy-balancing-with-PHP-sticky-sessions.html**
- Debian: **http://www.debian.org**