Deploying Oracle Application Server with ZXTM

Accelerating and managing an Oracle AS Cluster with ZXTM

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Introduction

This document describes how to configure ZXTM to manage a cluster of Oracle Application servers. We will discuss load balancing the cluster members for reliability, offloading SSL connections to ZXTM for speed and efficiency, using ZXTM to manage session persistence and securing the Oracle Enterprise Manager administration tool.

Prerequisites

- ZXTM version 4.0 or later is required
- Oracle Application Server 10g

This document will assume that you have already installed and configured your Oracle Application Server Cluster using the Oracle documentation[1] available from their web site. It is also assumed the reader has installed ZXTM on one or more machines in front of this cluster. For help with the initial set up of ZXTM you may refer to the getting started guide[2] available from the Zeus website.

[1] http://www.oracle.com/technology/documentation/appserver.html

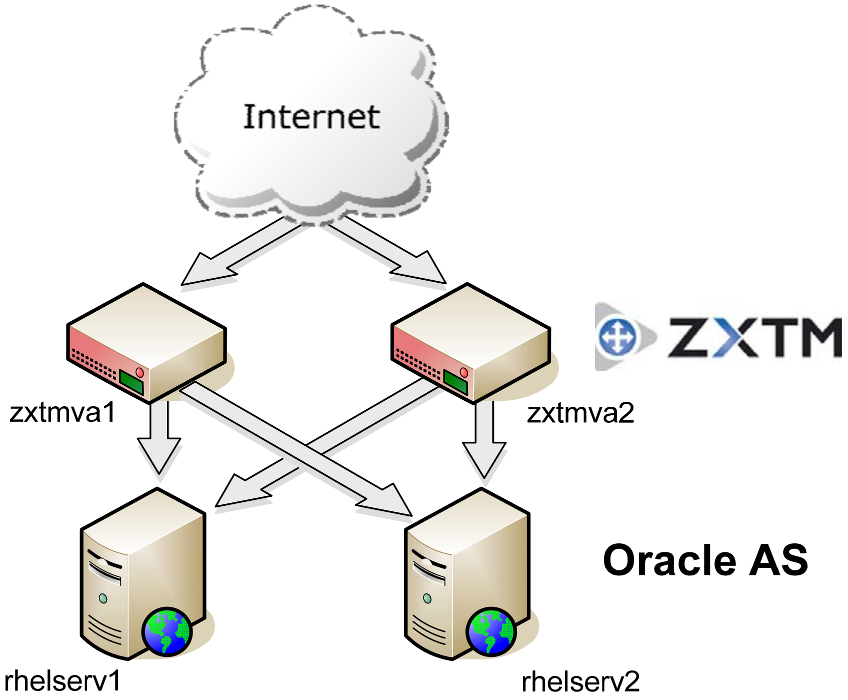
[2] http://knowledgehub.zeus.com/media/getting_started.pdf

Topology

Oracle clustering supports two high availability topologies. They are "Active – Active" and "Active – Passive". This guide will address the more scalable configuration of the "Active – Active" topology.

In the "Active – Active" scenario all Oracle cluster members are load balanced by ZXTM and will therefore require some session management. If your application does not make use of Oracle session replication, ZXTM can manage this for you using session persistence classes. The benefits of using ZXTM this way can be in speed and efficiency, because the application server does not need to replicate any state information. However a node failure will result in the loss of all sessions persisted to the node that failed.

In an "Active – Passive" scenario ZXTM will send all traffic to the active node and only fail over to the passive node when the active node fails. In this configuration Oracle recommend you use some form of shared storage which is mounted on the active node. You therefore need to have some way of remounting the shared storage on to the other node when a failure occurs. Please read the Oracle Application Server High Availability guide[3] for more information on "Active – Passive" topologies.



In our environment, we have two ZXTM appliances (zxtmva1 and zxtmva2). We also have two Oracle AS servers installed on a supported Linux platform (rhelserv1 and rhelserv2). We used the default install options and our Oracle HTTP Server is listening on TCP port 7777.

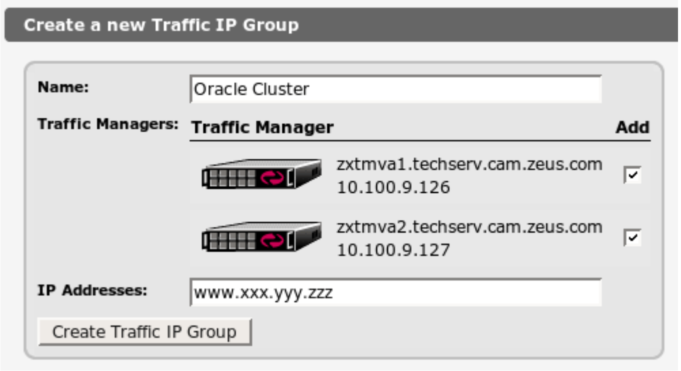
[3] http://download-uk.oracle.com/docs/cd/B31017_01/core.1013/b28941/toc.htm

Basic Configuration

To set up a simple service to load balance traffic across your Oracle Cluster, you would perform the following actions:

1. Create a traffic IP group. This is a group of IP address(s) which will be used to host the web application.
2. Create a new service for your Oracle AS cluster using the Traffic IP group .

Create a Traffic IP Group



Create a new Traffic IP Group

Name: Oracle Cluster

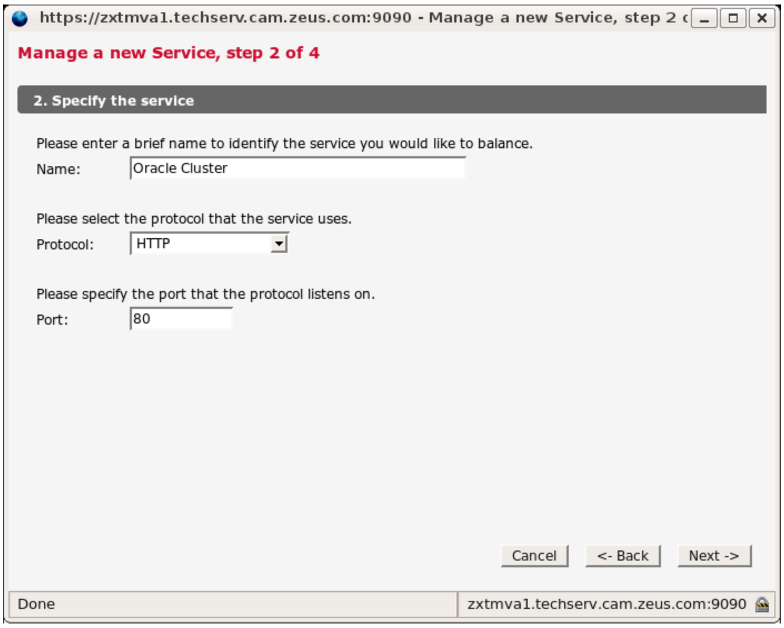
Traffic Managers:

Traffic Manager	Add
zxtmva1.techserv.cam.zeus.com 10.100.9.126	☑
zxtmva2.techserv.cam.zeus.com 10.100.9.127	☑

IP Addresses: www.xxx.yyy.zzz

Go to Services -> Traffic IP Group, and create a new traffic IP group, containing the external IP address(es) to which the host names of your websites resolve. The example group is named "Oracle Cluster".

Create a new service



https://zxtmva1.techserv.cam.zeus.com:9090 - Manage a new Service, step 2 c

Manage a new Service, step 2 of 4

2. Specify the service

Please enter a brief name to identify the service you would like to balance.

Name: Oracle Cluster

Please select the protocol that the service uses.

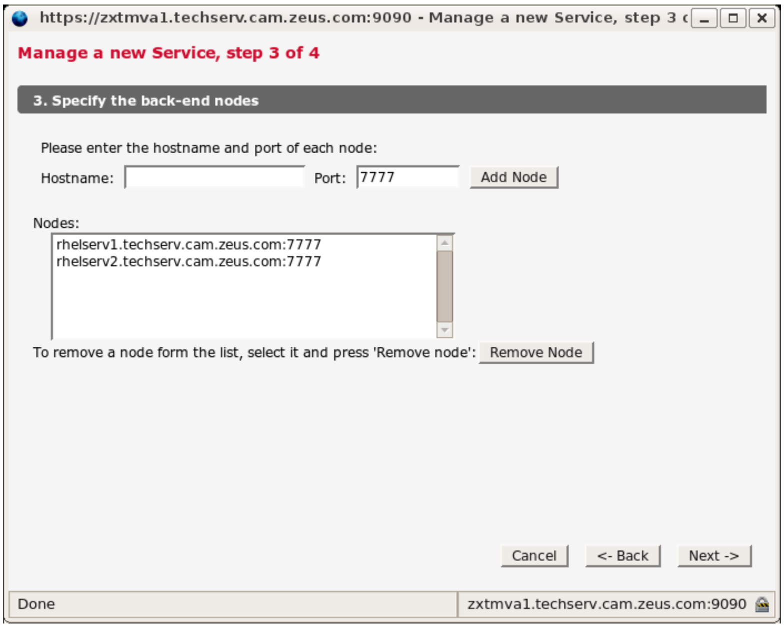
Protocol: HTTP

Please specify the port that the protocol listens on.

Port: 80

We will use the “Manage a new service” wizard to manage a new virtual server and pool.

We want to manage a new service using protocol HTTP and port 80. We can call this service “Oracle cluster”.



https://zxtmva1.techserv.cam.zeus.com:9090 - Manage a new Service, step 3 c

Manage a new Service, step 3 of 4

3. Specify the back-end nodes

Please enter the hostname and port of each node:

Hostname: Port: 7777

Nodes:

rhelserv1.techserv.cam.zeus.com:7777
rhelserv2.techserv.cam.zeus.com:7777

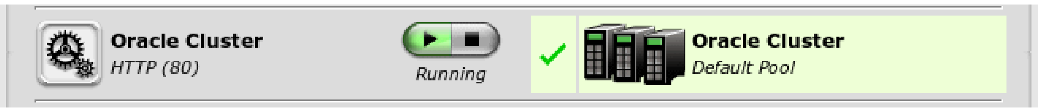
To remove a node form the list, select it and press 'Remove node':

On the next screen we need to add all the Oracle AS cluster members as nodes.

Click “Next” to review the configuration and finish the set up.

You will then need to go to Services -> Virtual Servers -> Oracle Cluster and bind the service to the Traffic IP Group created earlier.

Your Oracle Cluster service should now be running. You can return to the home page of the ZXTM and the green play button should be highlighted next to your new service.



Passing the client IP to Oracle

In order to have the Oracle application server log the real IP of the client and make that IP available to standard J2EE methods such as getRemoteAddress you will need to configure the OHS to retrieve the client IP address from a CLIENTIP host header. To do this you need to set the following directive in your httpd.conf:

```
UseWebCacheIP On
```

Once that is set you can use the following TrafficScript^{TM} rule to add this header to all incoming connections.

```
# Set the remote address in the CLIENTIP header.

http.setHeader("CLIENTIP", request.getRemoteIP() );
```

Enabling Session Persistence

Oracle application server can manage session replication internally within the cluster. To make use of this you should follow the J2EE specifications and refer to the instructions in the Oracle enterprise manager (ascontrol) when deploying your application.

If for some reason you can not make use of Oracles' internal session management or you chose not to use it for reasons of efficiency or speed, you can use ZXTM to ensure clients with sessions are always directed to the same server. The best method for doing this with Oracle AS is using a combination of the following persistence classes:

1. Monitor Application Cookie
2. URL rewriting

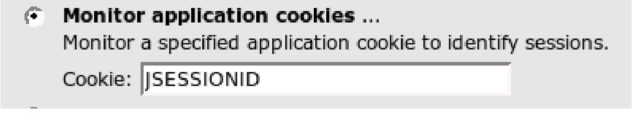
This combination is suggested because it will catch clients both with and without cookies enabled.

Note: This will only work for browsers without cookies if you use are using the J2EE encodeURL() method from the HTTPServletResponse class to generate your URLs. This method will detect clients with cookies disabled and encode the session information inside the URL it generates. When you create a session the application server will set a JSESSIONID cookie which can be used by ZXTM to ensure that all requests with this session are sent back to the same node. If the client does not accept the cookie, encodeURL() will append the jsessionid to the URL and separate it from the real path by using a colon, e.g. http://some.web.server/some/path;jsessionid=xxxxxxxxx

Monitoring Application Cookies

Go to Services -> Pools -> [your Oracle AS cluster] and click on the "Session Persistence" link. Click the "Create New Session Persistence Class" link, and create a class named "jsessionid_cookie".

Set this class to "Monitor Application Cookies" and set the cookie name to "JSESSIONID".



● **Monitor application cookies ...**
Monitor a specified application cookie to identify sessions.
Cookie: JSESSIONID

Leave the failure mode set to "choose a new node to use". This will cause ZXTM to send the request to a different node if the persistent node isn't available.

URL Rewriting Persistence

Configuring URL Rewriting Persistence is a two stage process. First, a persistence class using "Universal Session Persistence" must be created, and then two TrafficScript rules written that detect a rewritten URL, extract the JSESSIONID from it and persist on this ID.

To create the session persistence class, go to Catalogs -> Persistence and create a new class called "url_rewriting". Set this class to use the "Universal Session Persistence" method and failure mode of "choose a new node to use", and click "Update" to finish. (Note that you should not associate the url_rewriting class with any particular pool - the TrafficScript rule below will associate it with a request as and when it is required.)

Now, go to Services -> Virtual Servers -> [your Oracle AS Cluster] -> Rules and click the "Manage Rules in Catalog" link in the "Add New Request Rule" section. Create a new TrafficScript rule called "url_rewriting_persistence", and paste the following into the rule's text box, and click "Update". Note that the argument to `connection.setPersistence` *must* match the name of the persistence class you created above.

```
# Don't need to do this if we can persist on a cookie
$cookie = http.getCookie( "JSESSIONID" );
if( $cookie ) break;

$url = http.getpath();
if (string.regexmatch($url, ".*;JSESSIONID=([\\w.]*).*", "i")) {
        $sessionid = $1;
        connection.setPersistence( "url_rewriting" );
        connection.setPersistenceKey( $sessionid );
}
```

Finally, create a new response rule. Go to Services -> Virtual Servers -> [your Oracle AS Cluster] -> Rules and click the "Manage Rules in Catalog" link in the "Add New Response Rule" section. Create a new TrafficScript rule called "url_rewriting_response", cut and paste the following into the rule's text box, and click "Update".

```
# We're only interested in intercepting html responses
$contenttype = http.getResponseHeader( "Content-Type" );
if( ! string.startsWith( $contenttype, "text/html" ) ) break;

# Don't need to do this if we can persist on a cookie
$cookie = http.getCookie( "JSESSIONID" );
if( $cookie ) break;

$body = http.getresponsebody();
if (string.regexmatch($body, ".*;JSESSIONID=([\\w.]*).*", "i")) {
        $sessionid = $1;
        connection.setPersistence( "url_rewriting" );
        connection.setPersistenceKey( $sessionid );
}
```

As mentioned above, you can safely use (and we recommend that you use) the Monitor Application Cookies and URL Rewriting methods together to ensure that session persistence works regardless of whether or not clients have cookies enabled.

Load Balancing Algorithms

By default, a newly created pool will use a simple round robin algorithm. This takes no account of the load on the back-end servers, and so it is recommended that one of the more sophisticated algorithms is used. The optimal choice will depend on the application being run. See section 5.2.1 of the ZXTM User Manual for details of each algorithm.

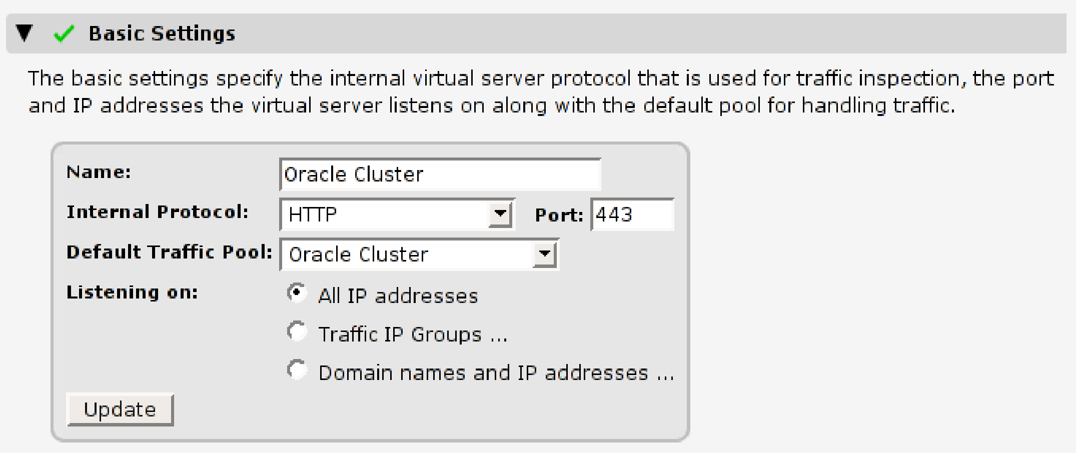
The “Least Connections” algorithm is a sensible default for a typical Oracle AS deployment; set it on the Services -> Pool -> [Your Oracle Cluster Pool] -> Load Balancing page.

SSL Offload

You may use ZXTM to terminate (off-load) any incoming SSL connections. This reduces the load on your application server by making use of the highly optimised SSL engine of ZXTM. A potential issue with this solution arises when you want your application to know when the connection is secured. Oracle HTTP Server provides a module called mod_certheaders which can be used to tell your application the link between ZXTM and the client was secure.

Enabling SSL decryption on ZXTM

ZXTM can support HTTPS as the internal protocol, but when you are using SSL Offloading ZXTM will still process the encapsulated HTTP. For this reason a SSL offloading service should be created in the same way you created the HTTP service, using the HTTP protocol, but port 443 instead of 80. You can either create a new virtual server which uses the same pool as the HTTP server, or if you want all traffic over HTTPS you can modify the previously created “Oracle Cluster” virtual server to use the HTTPS port (443).



▼ ✓ Basic Settings

The basic settings specify the internal virtual server protocol that is used for traffic inspection, the port and IP addresses the virtual server listens on along with the default pool for handling traffic.

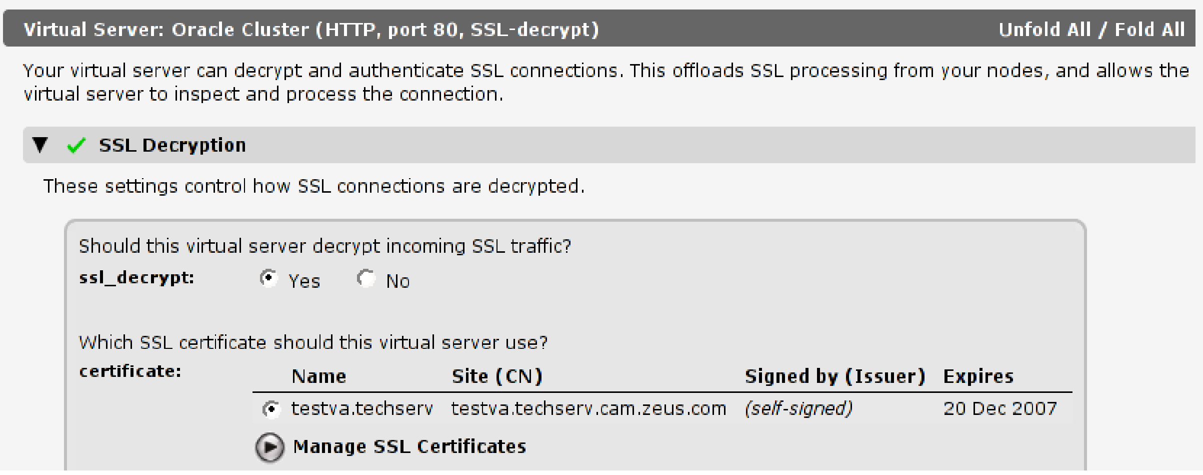
Name: Oracle Cluster

Internal Protocol: HTTP **Port:** 443

Default Traffic Pool: Oracle Cluster

Listening on: ● All IP addresses ○ Traffic IP Groups ... ○ Domain names and IP addresses ...

Once you have modified the port and clicked on the update button at the bottom of the page you will want to enable SSL decryption. This is under its own heading on the same virtual server page.



Virtual Server: Oracle Cluster (HTTP, port 80, SSL-decrypt)

Your virtual server can decrypt and authenticate SSL connections. This offloads SSL processing from your nodes, and allows the virtual server to inspect and process the connection.

▼ ✓ SSL Decryption

These settings control how SSL connections are decrypted.

Should this virtual server decrypt incoming SSL traffic?

ssl_decrypt: ● Yes ○ No

Which SSL certificate should this virtual server use?

certificate:

	Name	Site (CN)	Signed by (Issuer)	Expires
●	testva.techserv	testva.techserv.cam.zeus.com	*(self-signed)*	20 Dec 2007

Once you click update, your virtual server is setup and ready to decrypt incoming SSL connections. If you also want to pass on SSL variables, you can do this by setting the ssl_headers option to “yes” in the “SSL Decryption” section.

Configuring Oracle to recognise SSL Offloading

In your Oracle HTTP server configuration you need to add the following directive (for Unix)

```
LoadModule certheaders_module libexec/mod_certheaders.so
```

Or (for Windows)

```
LoadModule certheaders_module modules/ApacheModuleCertHeaders.dll
```

Then in the main server config, virtual host or location, you need to add the following directive:

```
AddCertHeader HTTPS
```

Note: This information was taken from the Oracle HTTP server administrator's guide[4] *(OAS version 10G,Release 2) section 8.11 (mod_certheaders). In more recent versions of the library the information appears to be missing. However the functionality is still available in OAS version 10G,Release 3.*

Once that is done you need to add some TrafficScript to your ZXTM so that it adds a header to requests which come in over SSL.

```
# Set the SSL-HTTPS header so that Oracle knows this request came in over SSL
if ( ssl.isSSL() ) {
        http.setheader("SSL-HTTPS", "true");
} else {
        http.removeheader("SSL-HTTPS");
}
```

Using and protecting Enterprise Manager

The main server in the Oracle HTTP Server runs the Oracle Enterprise Manager (EM) and any security conscious administrator will want to restrict who can access that service. ZXTM can allow you to access the enterprise manager through ZXTM while protecting it from unauthorized users or, if you prefer, deny access completely.

Denying access is simple; however, if you want to allow restricted access to the console we have to overcome a few hurdles first.

[4] http://download-uk.oracle.com/docs/cd/B14099_19/web.1012/b14007/confmods.htm

The Enterprise Manager only runs on one of the cluster members so our service must ensure we always connect to that node. The Enterprise Manager will also send redirects if the HTTP host header does not match the server name. So we also need to ensure we use the correct host name when we connect to it. Before we discuss how to achieve that we will discuss the simpler option of denying access completely.

Deny All Access to the EM console

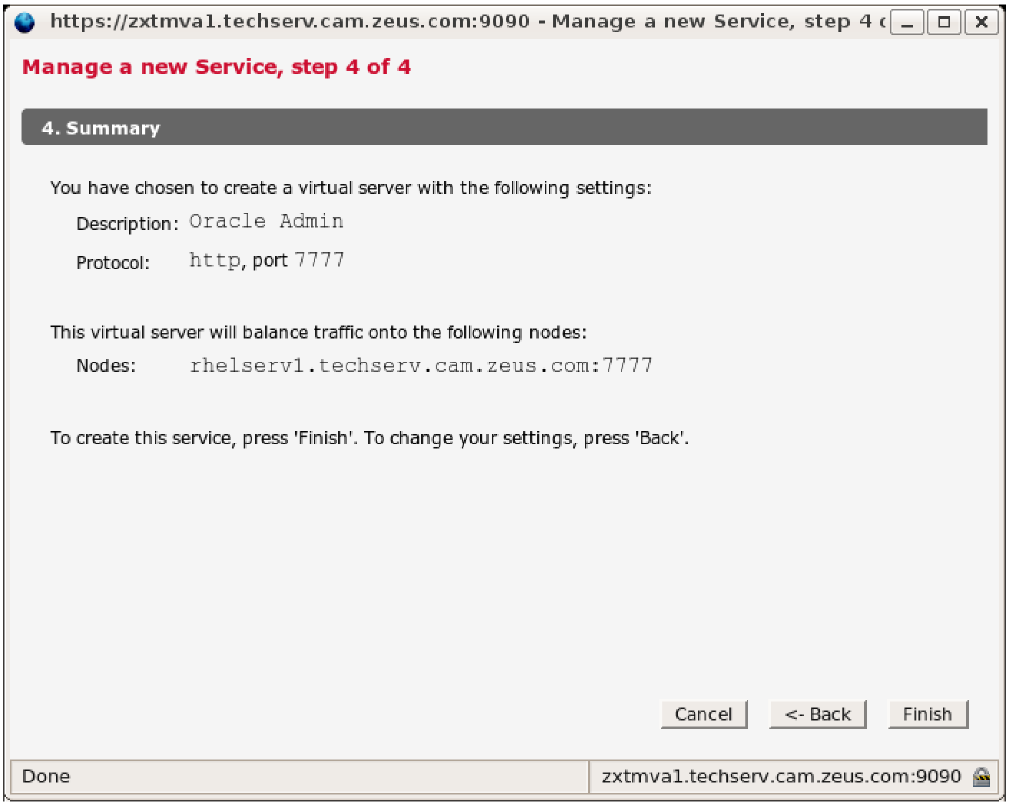
If you don't require access to ascontrol through the ZXTM you can simply deny access to that path with the following TrafficScript:

```
$path = http.getPath();
if ( string.startsWith($path,"/em/") )
{
   connection.close("401 Denied\r\n");
}
```

Allow restricted access to EM console

If you would like to allow access through the ZXTM, but protect the service with a protection class, you would perform the following actions:

Create a new service on port 7777


https://zxtmva1.techserv.cam.zeus.com:9090 - Manage a new Service, step 4 c

Manage a new Service, step 4 of 4

4. Summary

You have chosen to create a virtual server with the following settings:

Description: Oracle Admin

Protocol: http, port 7777

This virtual server will balance traffic onto the following nodes:

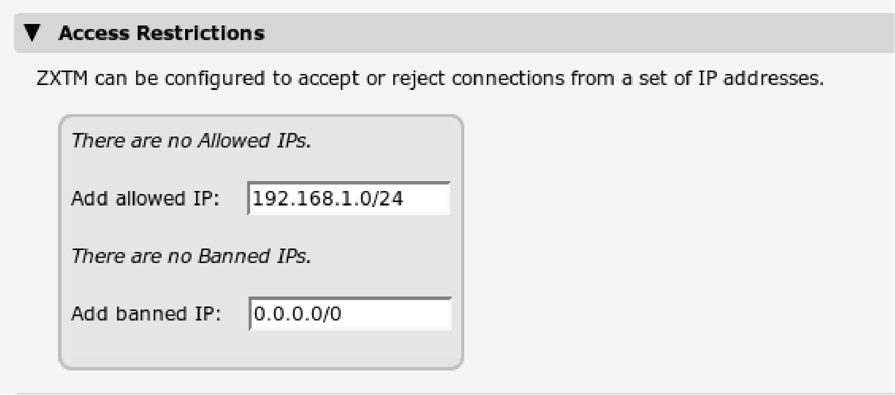
Nodes: rhelserv1.techserv.cam.zeus.com:7777

To create this service, press 'Finish'. To change your settings, press 'Back'.

Cancel
<- Back
Finish
Done
zxtmva1.techserv.cam.zeus.com:9090

This service should only have one node, your cluster manager.

Create a new protection class



▼ Access Restrictions

ZXTM can be configured to accept or reject connections from a set of IP addresses.

There are no Allowed IPs.

Add allowed IP: 192.168.1.0/24

There are no Banned IPs.

Add banned IP: 0.0.0.0/0

Create a connection class called “Oracle Admin” and in Access restrictions add 0.0.0.0/0 to the banned list. Then add IP addresses you want to allow into the allowed list.

Redirect /em to the new virtual server

You now need to redirect all requests for the path /em to go to the new virtual server running on port 7777. To do this, simply create a TrafficScript rule on the Oracle Cluster virtual server to send a HTTP redirect.

```
$path = http.getPath();
if ( string.startswith($path, "/em/" ) )
{
   $hostheader = http.getHostHeader();
   http.redirect("http://".$hostheader.":7777/em/");
}
```

Rewrite incoming host header

For the enterprise manager to work, the incoming request needs to have a host header that matches the server name of the Oracle server, if it does not you will need to use TrafficScript to rewrite the host header on the Oracle Admin service.

```
# Set the host header to the name of the Oracle cluster controller.
http.setHeader("Host","rhelserv1.techserv.cam.zeus.com");
```

Further protection options

The Protection classes available in ZXTM can use more than just IP addresses to make access decisions. You could use a TrafficScript rule to decide if the access should be granted. For example you could write a script to only allow access if the Host header matches a certain string. You would then add a hosts entry on the client for “my-secret-server-host-name-string” that resolves to the virtual server IP address.

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Contact Information

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Our web site contains a wealth of information on our products, services and solutions, as well as customer case studies and press information. For more information, please visit http://www.zeus.com/.

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The ZXTM KnowledgeHub is a key resource for developers and system administrators wishing to learn about ZXTM and Zeus' Traffic Management solutions. It is located at http://knowledgehub.zeus.com/.