

BALANCEADORES DE CARGA Y ALGORITMOS DE BALANCEO

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INTRODUCCIÓN

✖ Se estudiarán distintos balanceadores de carga software (open source) con especial relevancia en la actualidad.

- + Nginx
- + ZenLoadBalancer
- + Octopus Load Balancer

BALANCEADORES DE CARGA SOFTWARE


✕ Algoritmos

- + Round Robin
- + Menor número de conexiones (Least Connections)
- + Ponderación (Weight)
- + Prioridad
- + Tiempo de respuesta
- + Combinación

PRODUCTOS SOFTWARE

- ✖ Linux Virtual Server
- ✖ BalanceNG
- ✖ Haproxy
- ✖ Crossroads Load Balancer
- ✖ Distributor Load Balancer

ESCENARIO

- ✖ 1 máquina balanceadora (nginx, ZenLoad, Octopus)  512 MB RAM
- ✖ 4 servidores finales (back-end)

Ubuntu Server 12.04

- ✖ 512 MB RAM
- ✖ 512 MB RAM
- ✖ 256 MB RAM
- ✖ 128 MB RAM

NGINX

Instalación

- ✗ Importar la clave del repositorio.
 - + `cd /tmp/`
 - + `wget http://nginx.org/keys/nginx_signing.key`
 - + `apt-key add /tmp/nginx_signing.key`
 - + `rm -f /tmp/nginx_signing.key`
- ✗ • Anadir el repositorio al fichero `/etc/apt/sources.list`
 - + `echo "deb http://nginx.org/packages/ubuntu/ lucid nginx" >> /etc/apt/sources.list`
 - + `echo "deb-src http://nginx.org/packages/ubuntu/ lucid nginx" >> /etc/apt/sources.list`
- ✗ • Instalar el paquete de nginx
 - + `apt-get update`
 - + `apt-get install nginx`

NGINX

✗ Configuración

+ Algoritmo basado en ponderación (pesos, weight)

UbuntuBalanceador_Nginx - VMware Player (Non-commercial use only)

File Virtual Machine Help

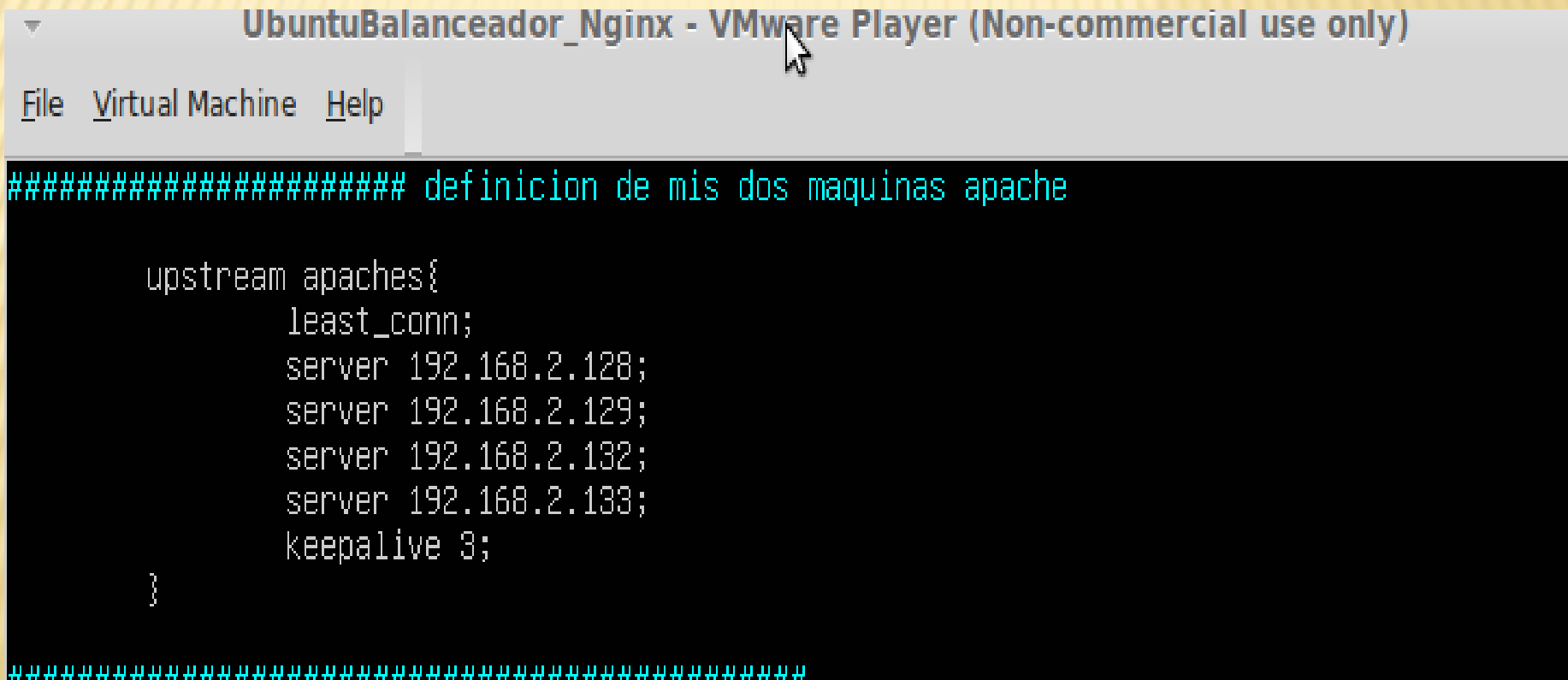
```
##### definicion de mis dos maquinas apache
```

```
    upstream apaches{
        server 192.168.2.128 weight=4;
        server 192.168.2.129 weight=4;
        server 192.168.2.132 weight=2;
        server 192.168.2.133 weight=1;
        keepalive 3;
    }
```

```
#####
```

NGINX

- ✗ Algoritmo basado en menor número de conexiones



```
##### definicion de mis dos maquinas apache

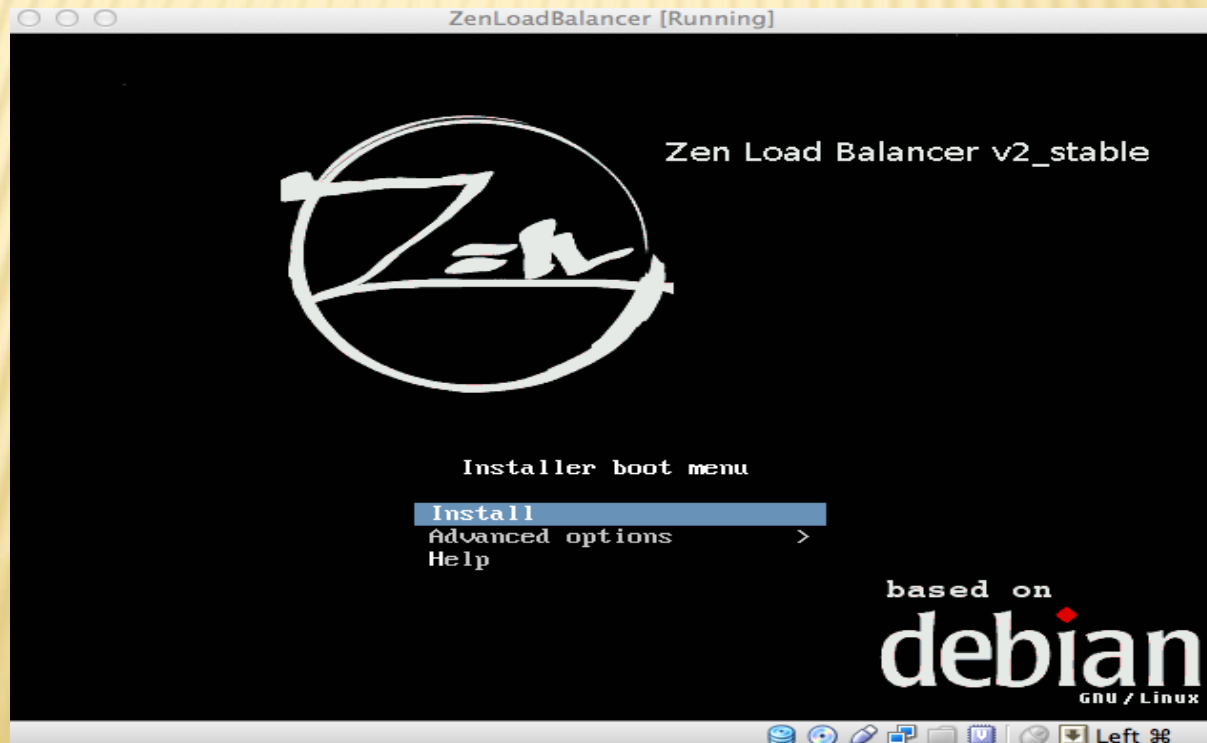
    upstream apaches{
        least_conn;
        server 192.168.2.128;
        server 192.168.2.129;
        server 192.168.2.132;
        server 192.168.2.133;
        keepalive 3;
    }

#####
```


ZEN LOAD BALANCER

✖ Instalación

- + ISO montado sobre Debian
- + Paquete tar.gz



ZEN LOAD BALANCER

✕ Configuración

- + Se accede a través de un navegador web, a través de la dirección IP de la maquina balanceadora y el puerto 444, siendo user y password, por defecto, admin.
- + En la pestaña Manage → Farms, se establecerá la maquina balanceadora así como los demás servidores finales que formaran la granja web.

ZEN LOAD BALANCER

← → ↻ ⬆ ~~https://~~192.168.2.134:444/index.cgi?id=1-2 ☆ ABP

Esta página está escrita en ¿Quieres traducirla? Configuración ▾

Load Balancer
Community Edition

Hello admin | Cluster: Not configured. [How to eliminate this single point of failure](#) | Host: zenloadbalancer | Date: Mon May 18 18:54:18 2015 | Logout

Manage Monitoring Settings About

Manage::Farms














Farms table									
Name	Virtual IP	Virtual Port(s)	Pending Conns	Established Conns	Closed Conns	PID	Status	Profile	Actions
GranjaZen	192.168.2.134	80	0	0	0	1218		tcp	

ZEN LOAD BALANCER

- ✗ Sobre el balanceador, en la opción “Editar” (segundo icono de “Actions”), se especifican los servidores que forman la granja web







The screenshot shows the ZEN Load Balancer GUI v3.05 in a Chromium browser. The address bar displays the URL <https://192.168.2.134:444/index.cgi?id=1-2&action=editfarm&farmname=GranjaZen>. The page has a language dropdown set to 'inglés' and a 'Configuración' button.

Edit real IP servers configuration

Server	Address	Port	Max connections	Weight	Priority	Actions
0	192.168.2.128	80	1000	4	0	  
1	192.168.2.129	80	1000	4	0	  
2	192.168.2.132	80	1000	2	0	  
3	192.168.2.133	80	1000	1	0	  
						

[Cancel](#)

Farms table

Name	Virtual IP	Virtual Port(s)	Pending Conns	Established Conns	Closed Conns	PID	Status	Profile	Actions
GranjaZen	192.168.2.134	80	0	0	0	1218		tcp	   
									

[Return to all Farms](#)

Zen Load Balancer is created under GNU/LGPL License Copyright (C) 2014 SOFINTEL IT ENGINEERING SL

ZEN LOAD BALANCER

- ✖ En la opción Manage → Farms, en el icono Editar, estableceremos el algoritmo de balanceo.
- ✖ Round Robin
 - + El parámetro “Weight” se ajusta automáticamente al valor 1.
- ✖ Pesos*
 - + Zen lo ejecuta como una combinación de pesos y menor carga de trabajo.
 - + Establecemos pesos de:
 - ✖ 4 para los servidores con 512 MB de RAM
 - ✖ 2 para el servidor de 256 MB de RAM
 - ✖ 1 para el servidor de 128 MB de RAM

ZEN LOAD BALANCER

✖ Round Robin

The screenshot displays the ZEN Load Balancer GUI v3.05 in a Chromium browser window. The browser's address bar shows the URL `https://192.168.2.134:444/index.cgi?id=1-2&action=editfarm&farmname=GranjaZen`. The page title is "ZEN Load Balancer GUI v3.05 on zenloadbalancer - Chromium". The browser's tab bar includes "Google", "Ingreso en el Cuerpo", "plb - Pure Load Balan", "ZLB Administration G", "Index of /", "Support Programs - 2", and "ZEN Load Balancer G". The browser's language bar indicates the page is in English and offers translation options. The GUI itself has a navigation bar with "Manage", "Monitoring", "Settings", and "About". The main content area is titled "Manage::Farms::tcp::GranjaZen" and contains a section for "Edit GranjaZen Farm global parameters". This section includes several configuration fields, each with a "Modify" button: "Farm's name" (GranjaZen), "Load Balance Algorithm" (Round Robin: equal sharing), "Enable client ip address persistence through memory" (unchecked), "Max number of clients memorized in the farm" (2049), "Backend response timeout secs." (5), "Max number of simultaneous connections that manage in Virtual IP" (257), and "Max number of real ip servers" (10). The bottom of the browser window shows a download bar with a file named "bok%3A978-1-....pdf" and a link to "Mostrar todas las descargas...".

ZEN Load Balancer GUI v3.05 on zenloadbalancer - Chromium

Google x Ingreso en el Cuerpo x plb - Pure Load Balan x ZLB Administration G x Index of / x Support Programs - 2 x ZEN Load Balancer G x

← → ↻ ⌂ <https://192.168.2.134:444/index.cgi?id=1-2&action=editfarm&farmname=GranjaZen> ☆ ABP ≡

Esta página está escrita en inglés ¿Quieres traducirla? Traducir No No traducir nunca del inglés Configuración x

Community Edition

Manage Monitoring Settings About

Manage::Farms::tcp::GranjaZen

Edit GranjaZen Farm global parameters

Farm's name *service will be restarted.

Load Balance Algorithm.
Round Robin: equal sharing

☐ Enable client ip address persistence through memory.

Max number of clients memorized in the farm *service will be restarted.
 client-time(sec, 0=always)

Backend response timeout secs.

Max number of simultaneous connections that manage in Virtual IP *service will be restarted.

Max number of real ip servers *service will be restarted.

bok%3A978-1-....pdf Mostrar todas las descargas... x

ZEN LOAD BALANCER

✖ Pesos*

ZEN Load Balancer GUI v3.05 on zenloadbalancer - Chromium

Google Ingreso en el Cuerpo plb - Pure Load Balan ZLB Administration G Index of / Support Programs - Z ZEN Load Balancer G

← → ↻ ⬆ ~~https://~~192.168.2.134:444/index.cgi?id=1-2&action=editfarm&farmname=GranjaZen ☆ ABP ≡

Esta página está escrita en inglés ¿Quieres traducirla? Traducir No No traducir nunca del inglés Configuración ×

Farm's name *service will be restarted.

Load Balance Algorithm.

☐ Enable client ip address persistence through memory.

Max number of clients memorized in the farm *service will be restarted.
 client-time(sec, 0=always)0

Backend response timeout secs.

Max number of simultaneous connections that manage in Virtual IP *service will be restarted.

Max number of real ip servers *service will be restarted.

☐ Add X-Forwarded-For header to http requests.

Frequency to check resurrected backends secs.

☐ Use FarmGuardian to check Backend Servers.
Check every secs.
Command to check
☐ Enable farmguardian logs

Farm Virtual IP and Virtual port *service will be restarted.

OCTOPUS LOAD BALANCER

✕ Instalación

- + ./configure --disable-snmp (sin soporte SNMP)
- + make
- + make install



OCTOPUS LOAD BALANCER

✗ Configuración

+ A través del fichero /usr/local/etc/octopuslb.conf

- ✗ binding_port=80
- ✗ algorithm=RR
- ✗ default_maxc=1000
- ✗ shm_run_dir=/var/run/octopuslb
- ✗ log_file=/var/log/octopuslb.log

- ✗ [granja-nodo-128]
- ✗ ip=192.168.2.128
- ✗ port=80
- ✗ maxc=1000
- ✗ status=enabled
- ✗ clone=false
- ✗ [/]

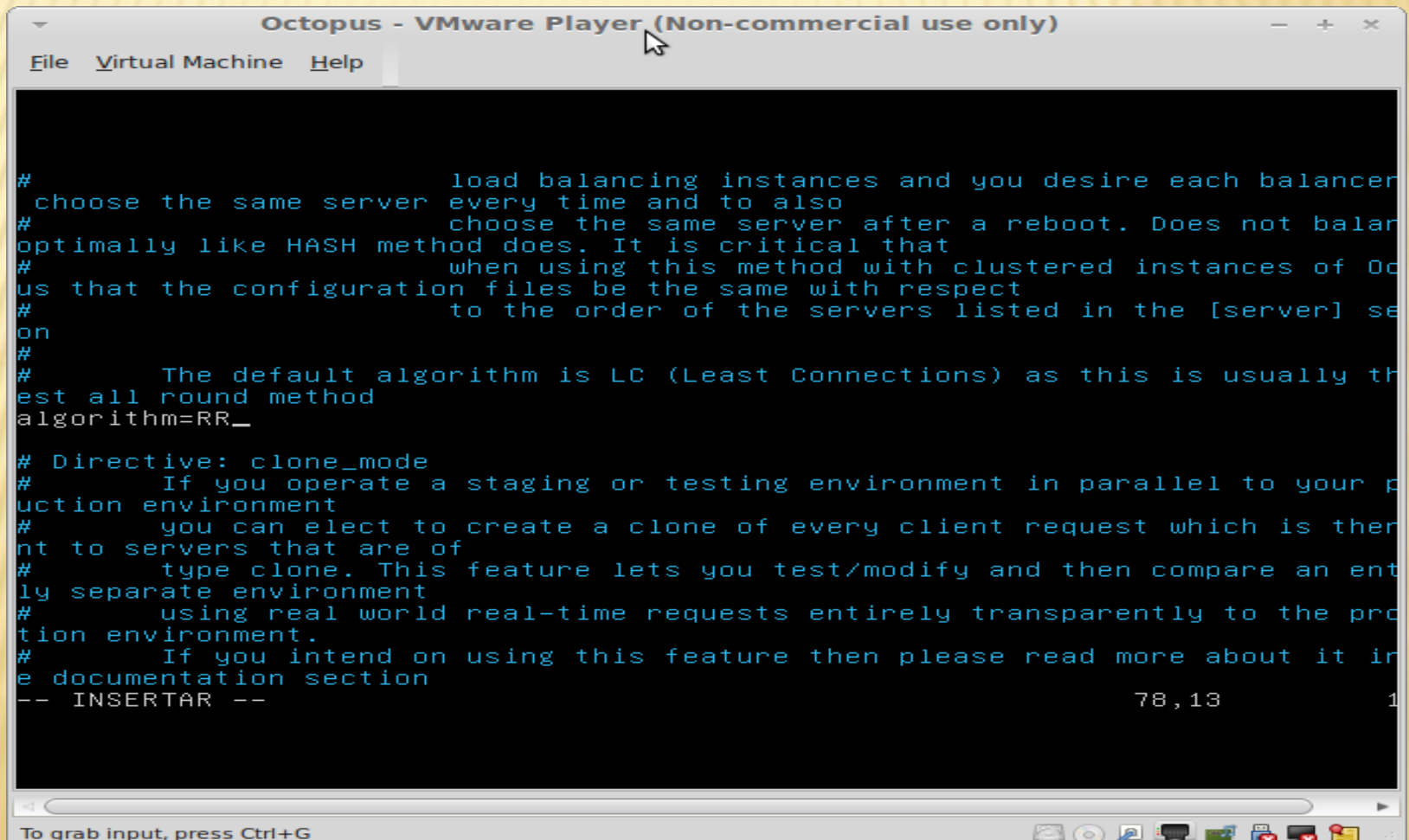
.

.

.(resto de nodos)

OCTOPUS LOAD BALANCER

✗ Round Robin



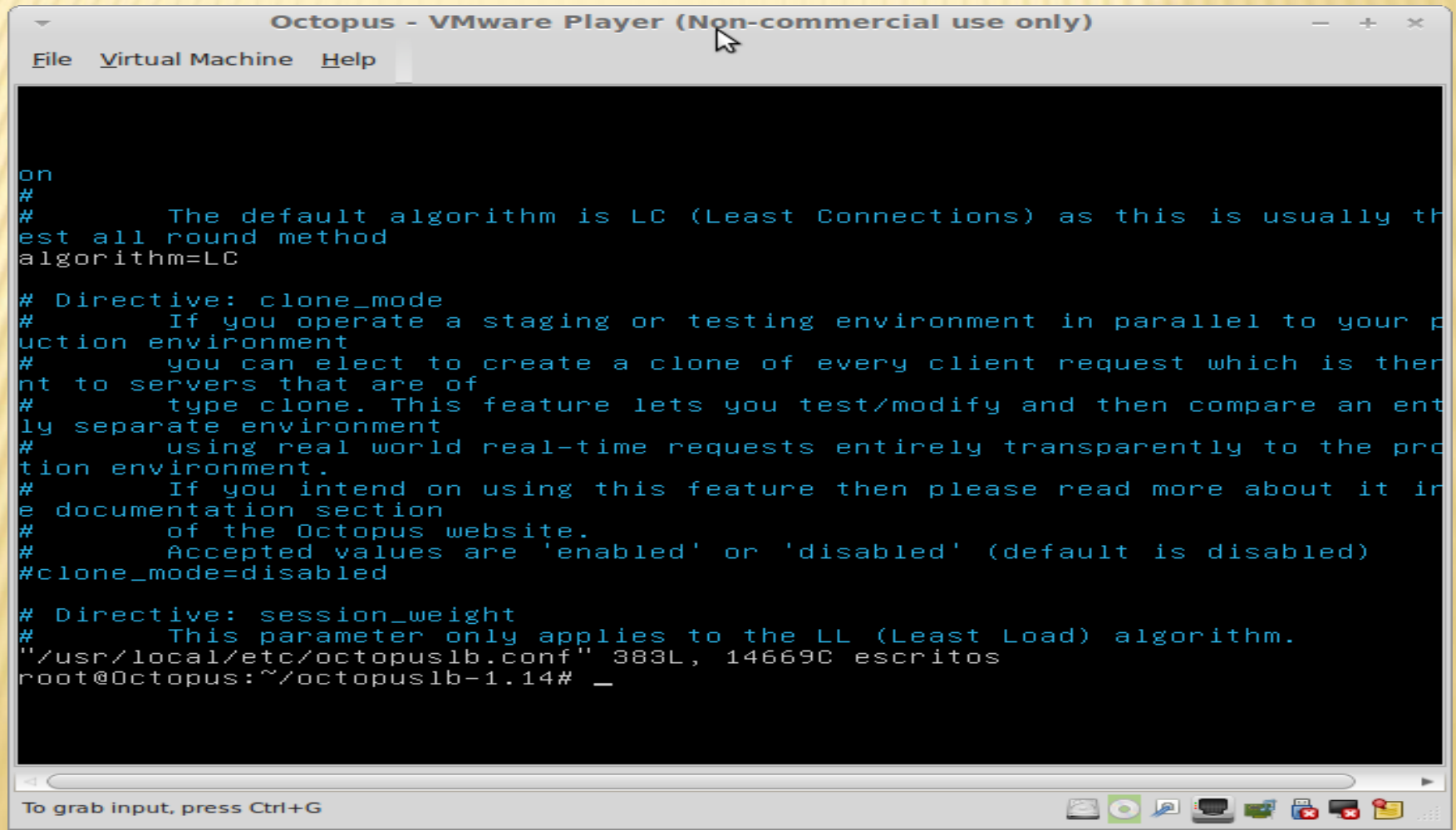
```
# load balancing instances and you desire each balancer
# choose the same server every time and to also
# choose the same server after a reboot. Does not balance
# optimally like HASH method does. It is critical that
# when using this method with clustered instances of Octopus
# us that the configuration files be the same with respect
# to the order of the servers listed in the [server] section
#
# The default algorithm is LC (Least Connections) as this is usually the best
# test all round method
algorithm=RR_

# Directive: clone_mode
# If you operate a staging or testing environment in parallel to your production
# environment you can elect to create a clone of every client request which is then
# sent to servers that are of type clone. This feature lets you test/modify and then compare an entirely
# separate environment using real world real-time requests entirely transparently to the production
# environment.
# If you intend on using this feature then please read more about it in the
# documentation section
-- INSERTAR --
```

To grab input, press Ctrl+G

OCTOPUS LOAD BALANCER

✗ Menor número de conexiones



```
on
#
#       The default algorithm is LC (Least Connections) as this is usually the
#       best all round method
algorithm=LC

# Directive: clone_mode
#       If you operate a staging or testing environment in parallel to your p
#       uction environment
#       you can elect to create a clone of every client request which is then
#       sent to servers that are of
#       type clone. This feature lets you test/modify and then compare an ent
#       ly separate environment
#       using real world real-time requests entirely transparently to the pro
#       duction environment.
#       If you intend on using this feature then please read more about it in
#       the documentation section
#       of the Octopus website.
#       Accepted values are 'enabled' or 'disabled' (default is disabled)
#clone_mode=disabled

# Directive: session_weight
#       This parameter only applies to the LL (Least Load) algorithm.
"/usr/local/etc/octopuslb.conf" 383L, 14669C escritos
root@Octopus:~/octopuslb-1.14# _
```

To grab input, press Ctrl+G

OCTOPUS LOAD BALANCER

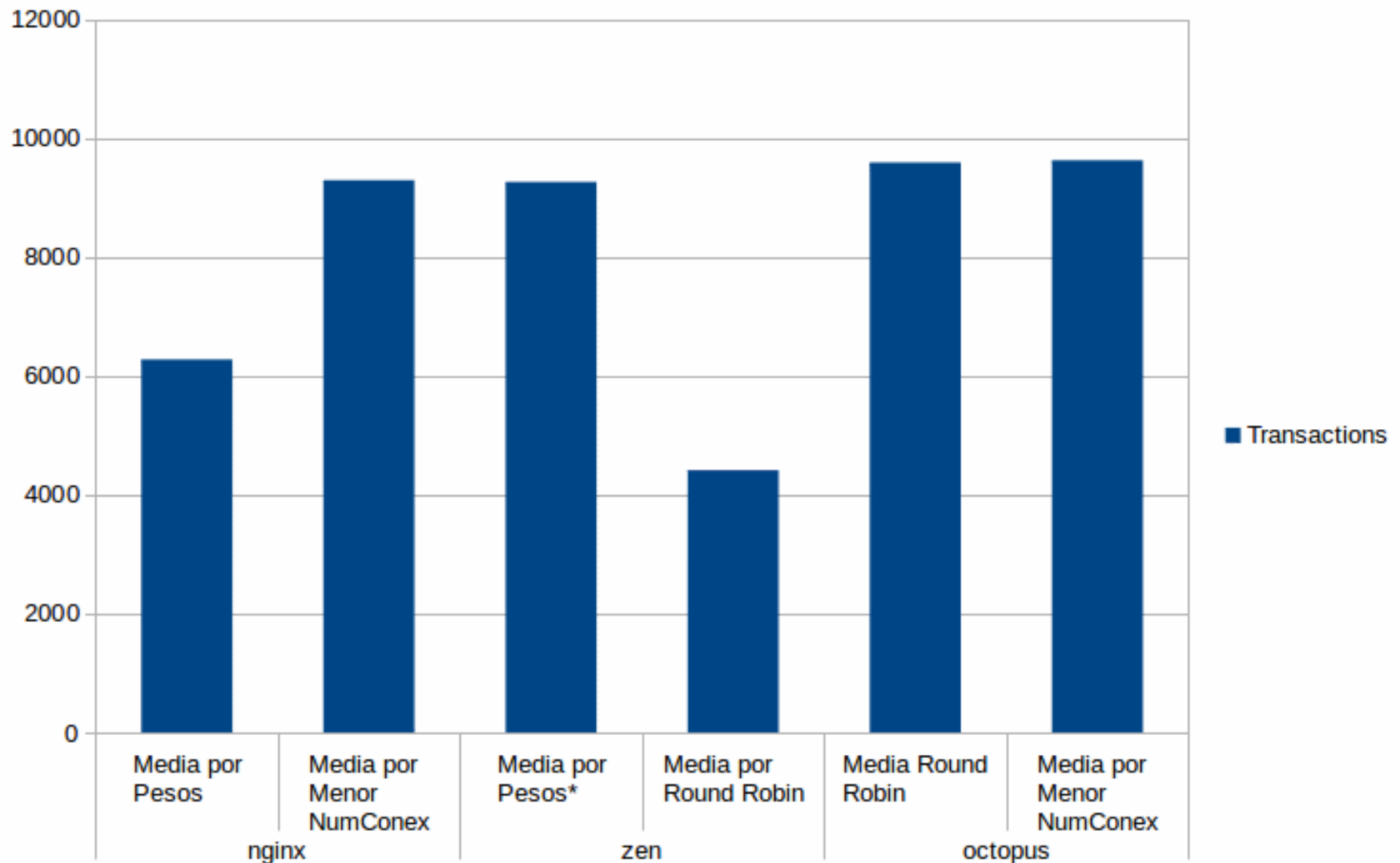
✕ Una vez realizados los ajustes deseados en el fichero de configuración, arrancamos el servicio con:

+ `octopuslb-server -c /usr/local/etc/octopuslb.conf`

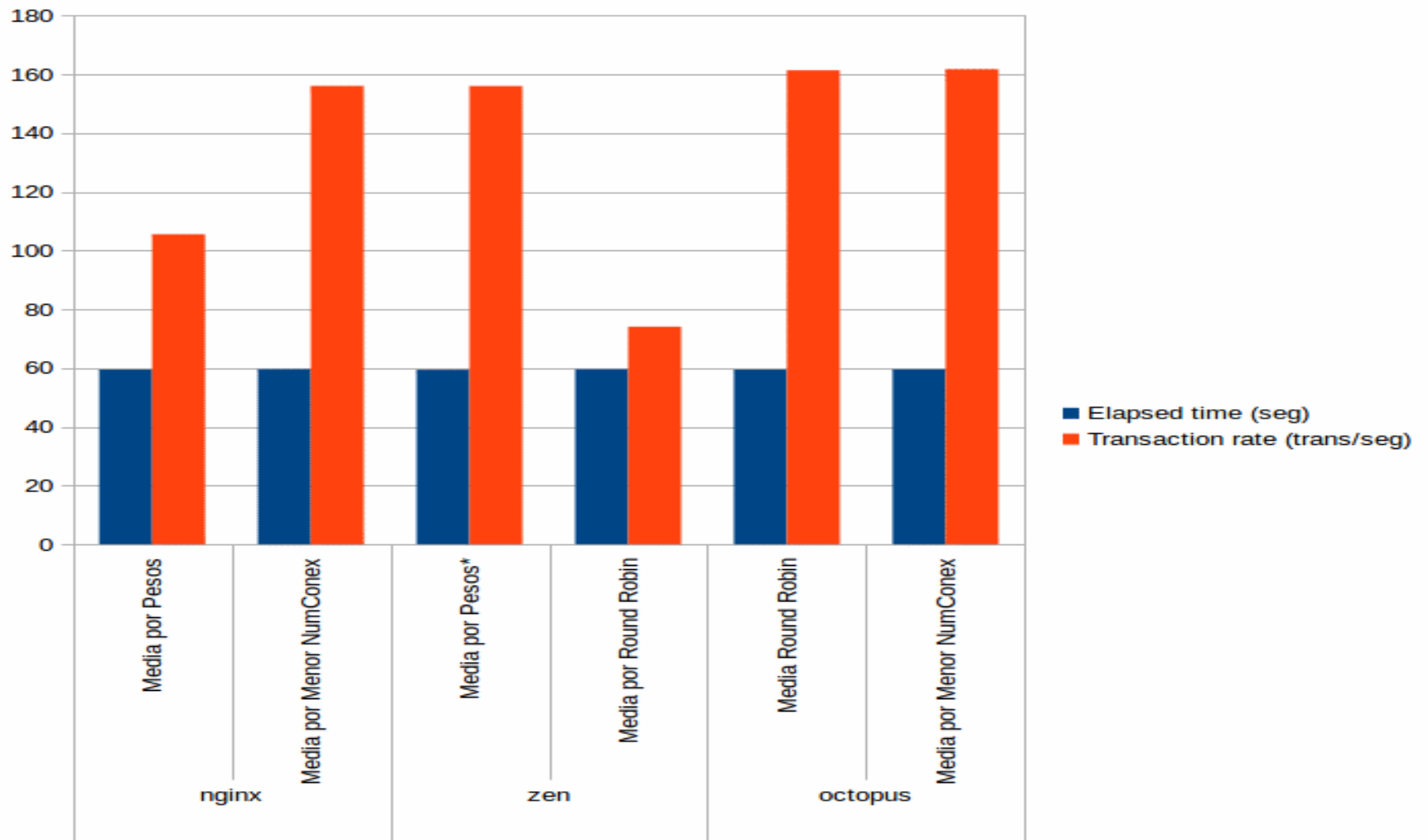
COMPARATIVA

- ✗ ZenLoad tiene una instalación y configuración realmente sencillas. La interfaz gráfica de configuración es su “plus”.
- ✗ En cuanto a servicios que ofrecen:
 - + Nginx: Round Robin, menor conexiones, ip-hash, pesos.
 - + ZenLoad: Round Robin, hash, pesos*, prioridad.
 - + Octopus: Round Robin, menor conexiones, menor carga, http URI hashing, static URI hashing.

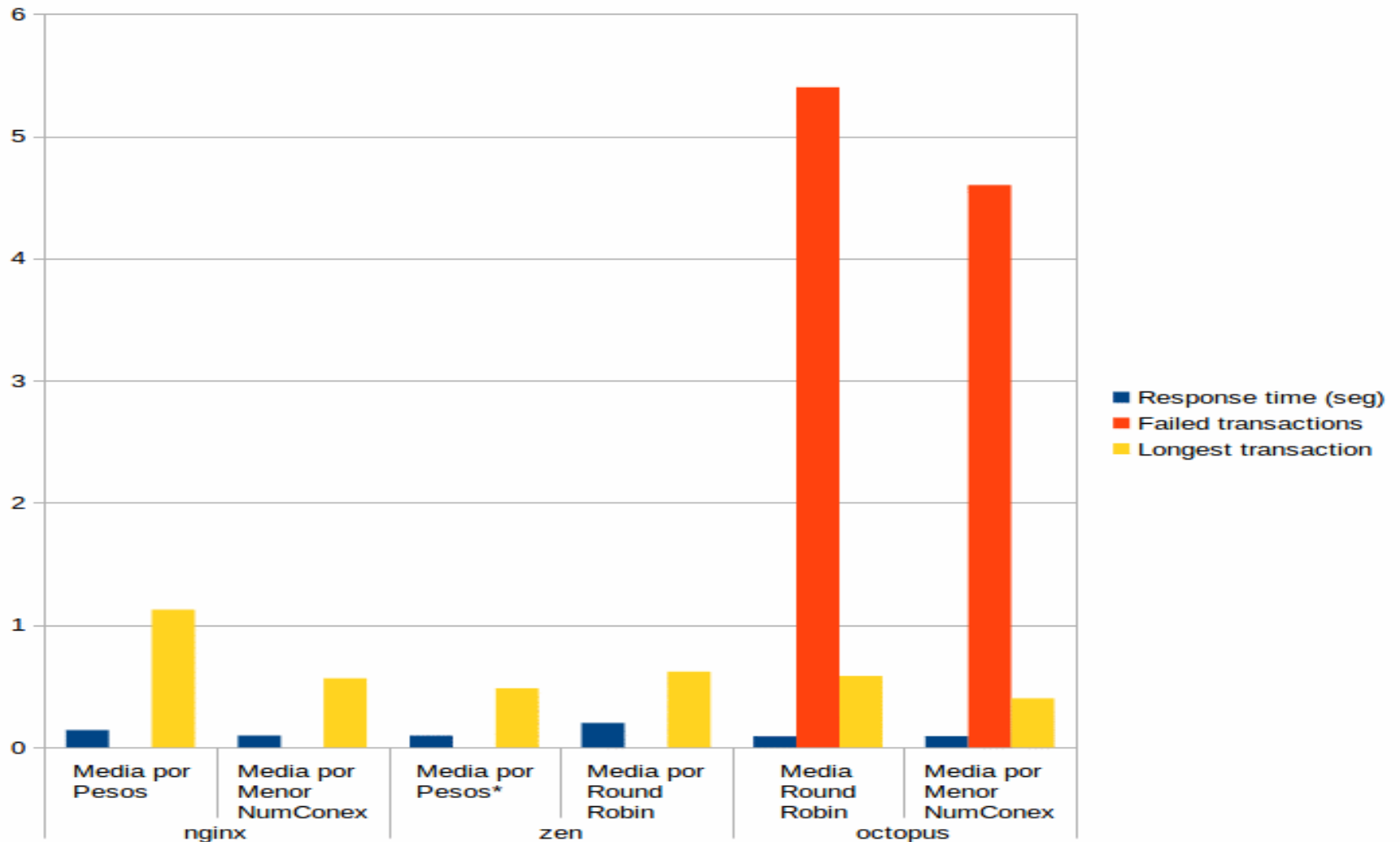
MEDIDAS CON SIEGE



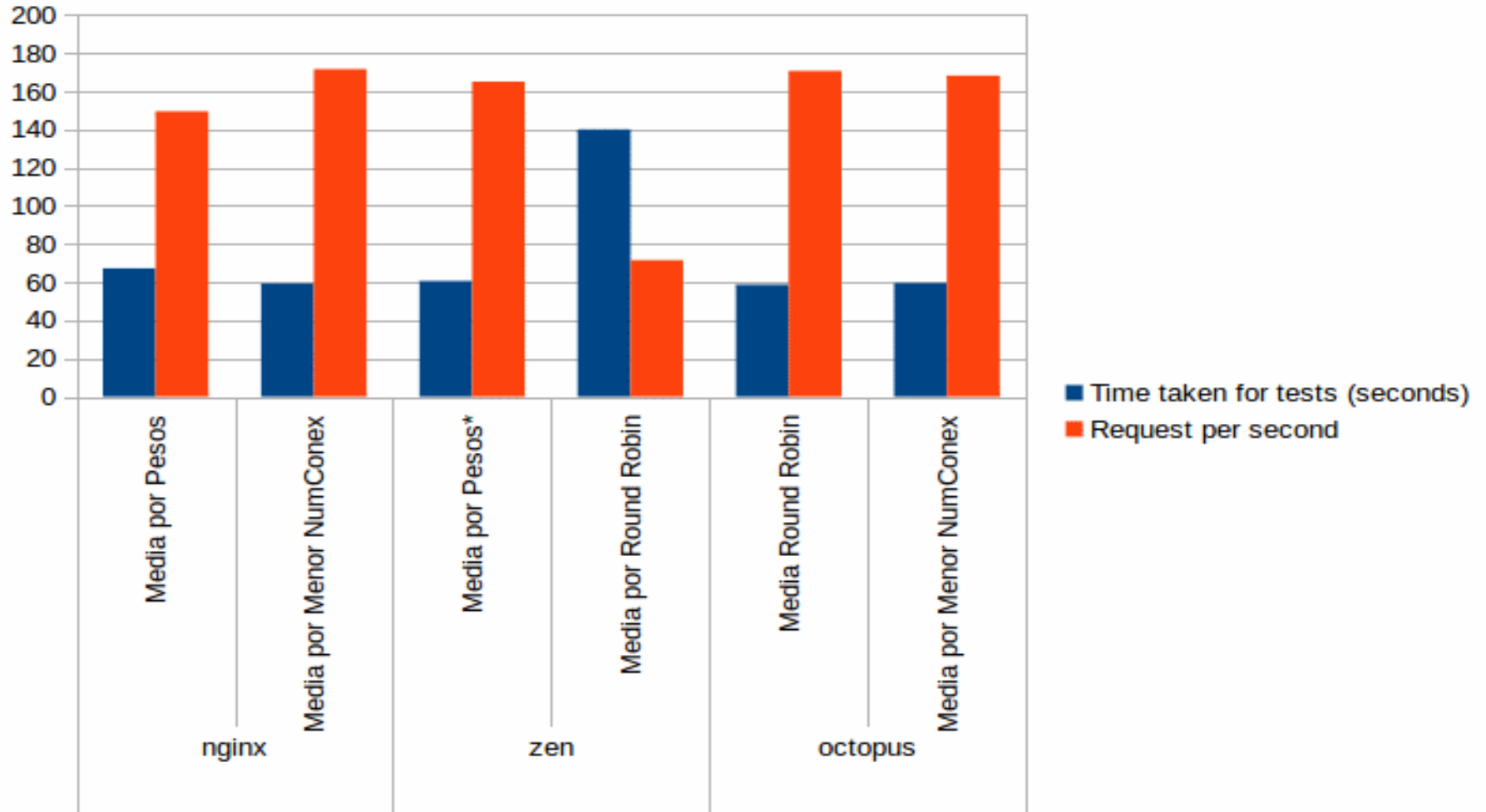
MEDIDAS CON SIEGE



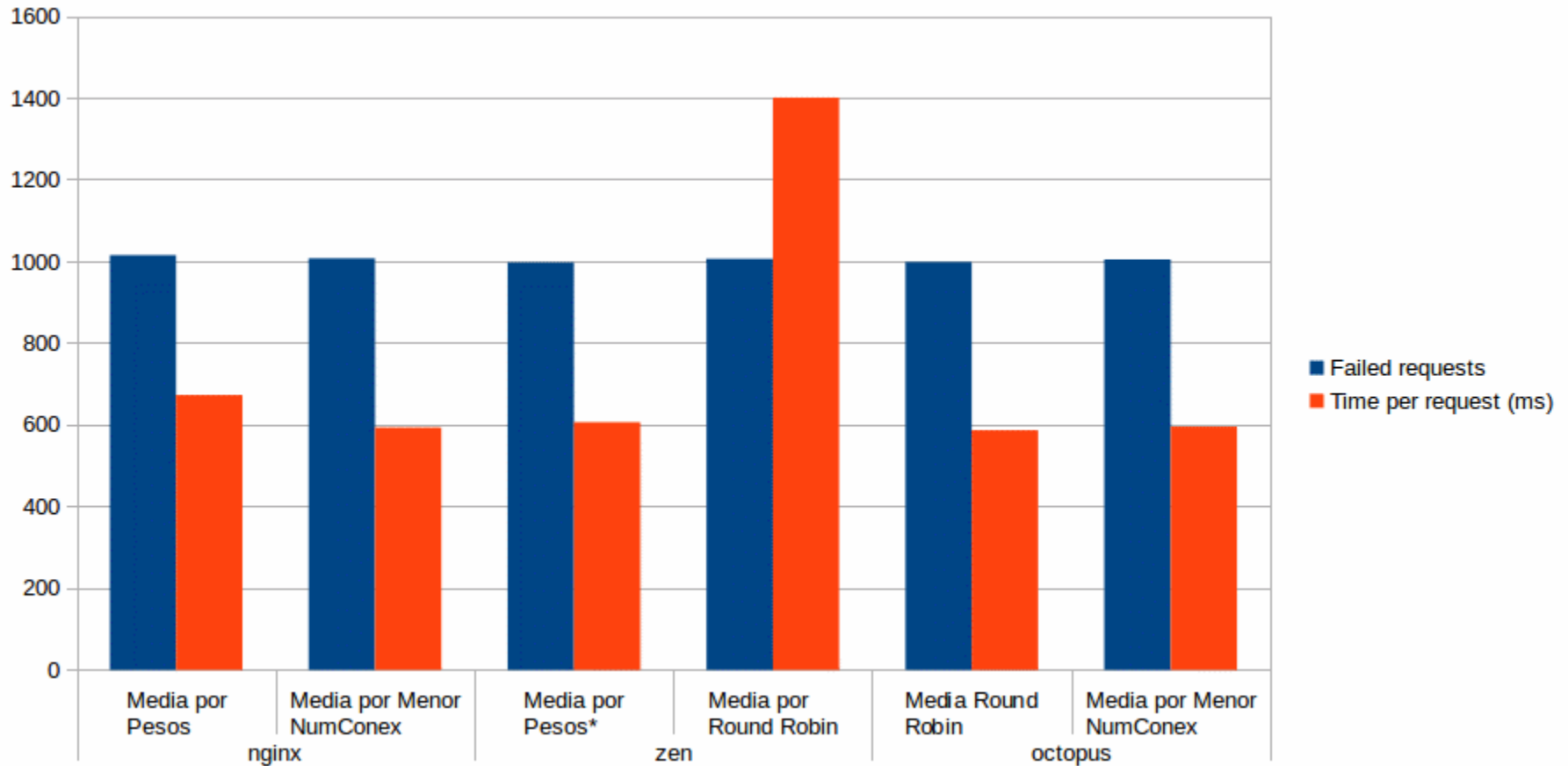
MEDIDAS CON SIEGE



MEDIDAS CON APACHE BENCHMARK



MEDIDAS CON APACHE BENCHMARK



BIBLIOGRAFÍA

- ✖ ZenLoadBalance – www.zenloadbalancer.com
- ✖ Nginx - <http://nginx.org>
- ✖ Octopus -
<http://sourceforge.net/projects/octopuslb/>
- ✖ Documentación de la asignatura de Servidores Web de Altas Prestaciones de la Universidad de Granada.