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Universidad  
de Granada

SERVIDORES WEB DE ALTAS PRESTACIONES  
GRADO EN INGENIERÍA INFORMÁTICA

## Prácticas resueltas

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# Índice

1. Práctica 1	3
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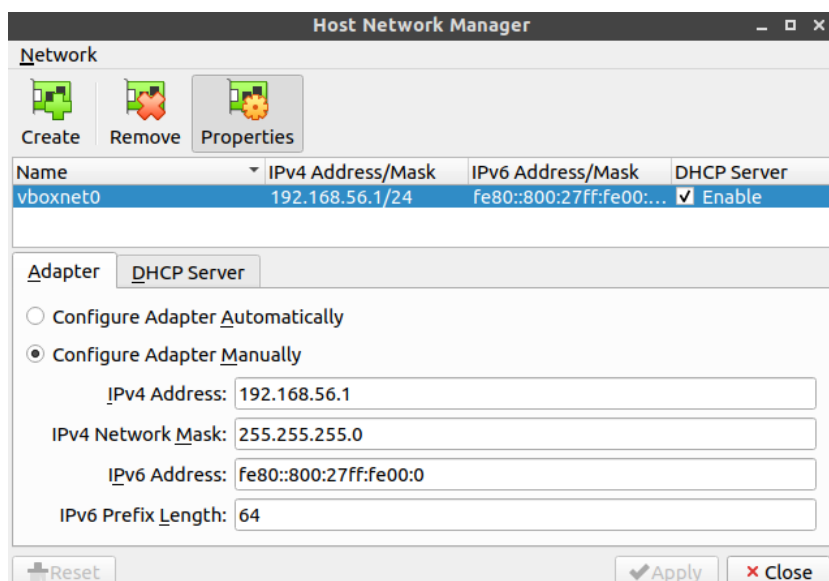
## Índice de figuras

# 1. Práctica 1

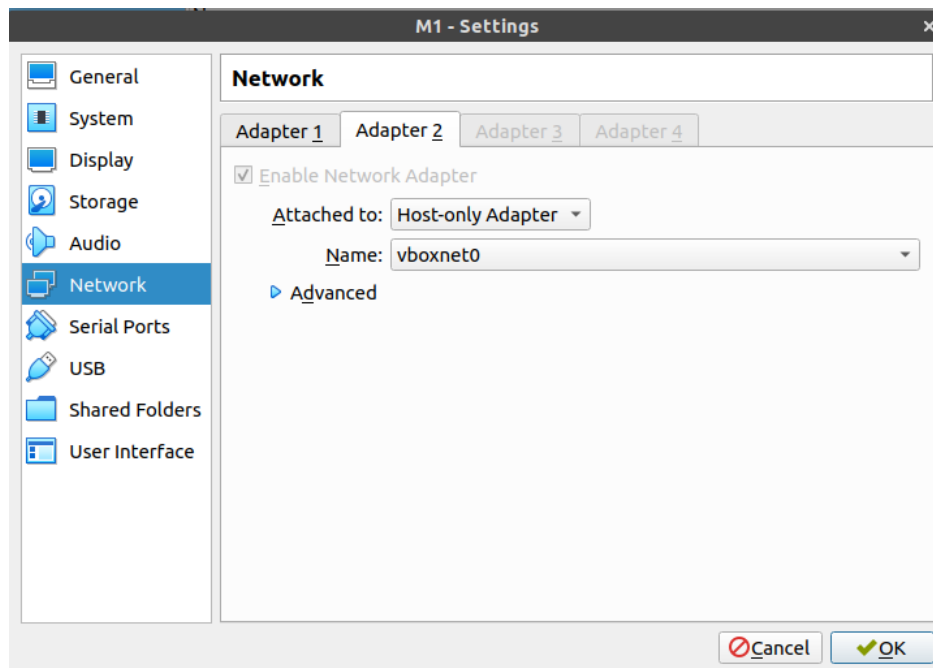
En esta práctica configuraremos dos máquinas virtuales (*M1* y *M2*). También crearemos una interfaz *host-only* para que las máquinas puedan conectarse entre ellas.

En esta guía configuraremos la interfaz sólo anfitrión manualmente en una máquina. En la otra dejaremos que el asistente de instalación lo haga por nosotros.

1. Comenzaremos creando las máquinas virtuales desde VirtualBox. Las proveeremos de al menos 512MB de RAM y 10GB de disco duro.
2. Descargamos la imagen ISO de Ubuntu Server 18.04 y la montamos en la unidad de disco de la primera máquina.
3. Arrancamos la máquina e iniciamos el asistente de instalación. Establecemos nuestro nombre de usuario de GitHub como *username* y *m1* como nombre del servidor. La clave será *Swap1234*
4. Cuando termine la instalación apagamos la máquina.
5. En VirtualBox abrimos el administrador de redes sólo anfitrión (dentro del menú Archivo).
6. Creamos un adaptador y activamos DHCP para que asigne una IP a nuestra máquina.



7. Vamos a los ajustes de red de la máquina y conectamos<sup>el</sup> adaptador que acabamos de crear.



8. Arrancamos la máquina. Ejecutamos el siguiente comando para ver las interfaces conectadas:

```
m1> sudo ifconfig -a
```

```
csp98@m2:~$ sudo ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::a00:27ff:fe7a:4726 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:7a:47:26 txqueuelen 1000 (Ethernet)
    RX packets 33 bytes 10975 (10.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 40 bytes 4642 (4.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4098<BROADCAST,MULTICAST> mtu 1500
    ether 08:00:27:4b:e5:bc txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 172 bytes 15276 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 172 bytes 15276 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

csp98@m2:~$ _
```

9. Vemos que tenemos una nueva interfaz (*enp0s8*) pero no tiene IP asignada. Para arreglar esto usaremos *netplan*.
10. Creamos un archivo de configuración para ella:

```
m1> sudo nano /etc/netplan/host-only.yaml
```

11. Introducimos este contenido en el archivo. Debemos usar espacios en vez de tabuladores.

```

network:
  version: 2
  renderer: networkd
  ethernets:
    enp0s8:
      dhcp4: true

```

12. Guardamos los cambios y los aplicamos con el comando

```
m1> sudo netplan apply
```

13. Ejecutamos *sudo ifconfig -a* y comprobamos que ya tenemos IP asignada:

```

csp98@m2:~$ sudo ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
    inet6 fe80::a00:27ff:fe7a:4726  prefixlen 64  scopeid 0x20<link>
    ether 08:00:27:7a:47:26  txqueuelen 1000  (Ethernet)
    RX packets 48  bytes 13110 (13.1 KB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 63  bytes 6831 (6.8 KB)
    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 192.168.56.103  netmask 255.255.255.0  broadcast 192.168.56.255
    inet6 fe80::a00:27ff:fe4b:e5bc  prefixlen 64  scopeid 0x20<link>
    ether 08:00:27:4b:e5:bc  txqueuelen 1000  (Ethernet)
    RX packets 2  bytes 1180 (1.1 KB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 13  bytes 1530 (1.5 KB)
    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
    inet 127.0.0.1  netmask 255.0.0.0
    inet6 ::1  prefixlen 128  scopeid 0x10<host>
    loop txqueuelen 1000  (Local Loopback)
    RX packets 172  bytes 15276 (15.2 KB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 172  bytes 15276 (15.2 KB)
    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

csp98@m2:~$ _

```

14. Instalamos la pila LAMP:

```

m1> sudo apt install -y openssh-server openssh-client
↪ apache2 mysql-server mysql-client

```

15. Pasamos ahora a la configuración de *m2*. Para ello seguimos los pasos anteriores. Como el adaptador sólo anfitrión ya está creado, el asistente de instalación lo configurará automáticamente. Lo único que tenemos que hacer es conectarlo.<sup>a</sup> la máquina como hicimos antes.
16. Cuando termine la instalación, ejecutamos el comando anterior para instalar la pila LAMP.
17. Probamos la conexión SSH conectando las máquinas entre sí. Para facilitar las conexiones podemos guardar las IPs en variables:

```
M1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

command 'lconfig' from deb ipmitool
command 'iwconfig' from deb wireless-tools

Try: sudo apt install <deb name>

csp98@m1:~$ ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::a00:27ff:fe90:bc8b prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:90:bc:8b txqueuelen 1000 (Ethernet)
    RX packets 24752 bytes 36303433 (36.3 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 2341 bytes 154241 (154.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 192.168.56.100 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:fe28:9232 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:28:92:32 txqueuelen 1000 (Ethernet)
    RX packets 73 bytes 15087 (15.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 71 bytes 8695 (8.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 352 bytes 31248 (31.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 352 bytes 31248 (31.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

csp98@m1:~$ echo "M2_IP=192.168.56.103" >> .bashrc ; source .bashrc
csp98@m1:~$ echo $M2_IP
192.168.56.103
csp98@m1:~$ _

M2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

csp98@m2:~$ ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::a00:27ff:fe7a:4726 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:7a:47:26 txqueuelen 1000 (Ethernet)
    RX packets 52 bytes 13410 (13.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 68 bytes 7201 (7.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 192.168.56.103 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:fe4b:e5bc prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:4b:e5:bc txqueuelen 1000 (Ethernet)
    RX packets 2 bytes 1180 (1.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 14 bytes 1600 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 172 bytes 15276 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 172 bytes 15276 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

csp98@m2:~$ echo "M1_IP=192.168.56.100" >> .bashrc ; source .bashrc
csp98@m2:~$ echo $M1_IP
192.168.56.100
csp98@m2:~$ _
```

```
M1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

csp98@m1:~$ ssh $M2_IP
csp98@192.168.56.103's password:
Welcome to Ubuntu 18.04.4 LTS (GNU/Linux 4.15.0-88-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Thu Mar 12 16:26:12 UTC 2020

System load:  0.0          Processes:      93
Usage of /:   33.1% of 9.78GB  Users logged in: 1
Memory usage: 16%          IP address for enp0s3: 10.0.2.15
Swap usage:  0%            IP address for enp0s8: 192.168.56.103

 * Latest Kubernetes 1.18 beta is now available for your laptop, NUC, cloud
   instance or Raspberry Pi, with automatic updates to the final GA release.

   sudo snap install microk8s --channel=1.18/beta --classic

 * Multipass 1.1 adds proxy support for developers behind enterprise
   firewalls. Rapid prototyping for cloud operations just got easier.

   https://multipass.run/

15 packages can be updated.
8 updates are security updates.

Last login: Thu Mar 12 16:13:02 2020
csp98@m2:~$

M2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

csp98@m2:~$ ssh $M1_IP
The authenticity of host '192.168.56.100 (192.168.56.100)' can't be established.
ECDSA key fingerprint is SHA256:s8dN2A80vTwbIEb67TmC9EMUTvzrh97J1+SIGb7GM.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.56.100' (ECDSA) to the list of known hosts.
csp98@192.168.56.100's password:
Welcome to Ubuntu 18.04.4 LTS (GNU/Linux 4.15.0-88-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Thu Mar 12 16:26:23 UTC 2020

System load:  0.08         Processes:      94
Usage of /:   33.0% of 9.78GB  Users logged in: 1
Memory usage: 16%          IP address for enp0s3: 10.0.2.15
Swap usage:  0%            IP address for enp0s8: 192.168.56.100

 * Latest Kubernetes 1.18 beta is now available for your laptop, NUC, cloud
   instance or Raspberry Pi, with automatic updates to the final GA release.

   sudo snap install microk8s --channel=1.18/beta --classic

 * Multipass 1.1 adds proxy support for developers behind enterprise
   firewalls. Rapid prototyping for cloud operations just got easier.

   https://multipass.run/

14 packages can be updated.
4 updates are security updates.

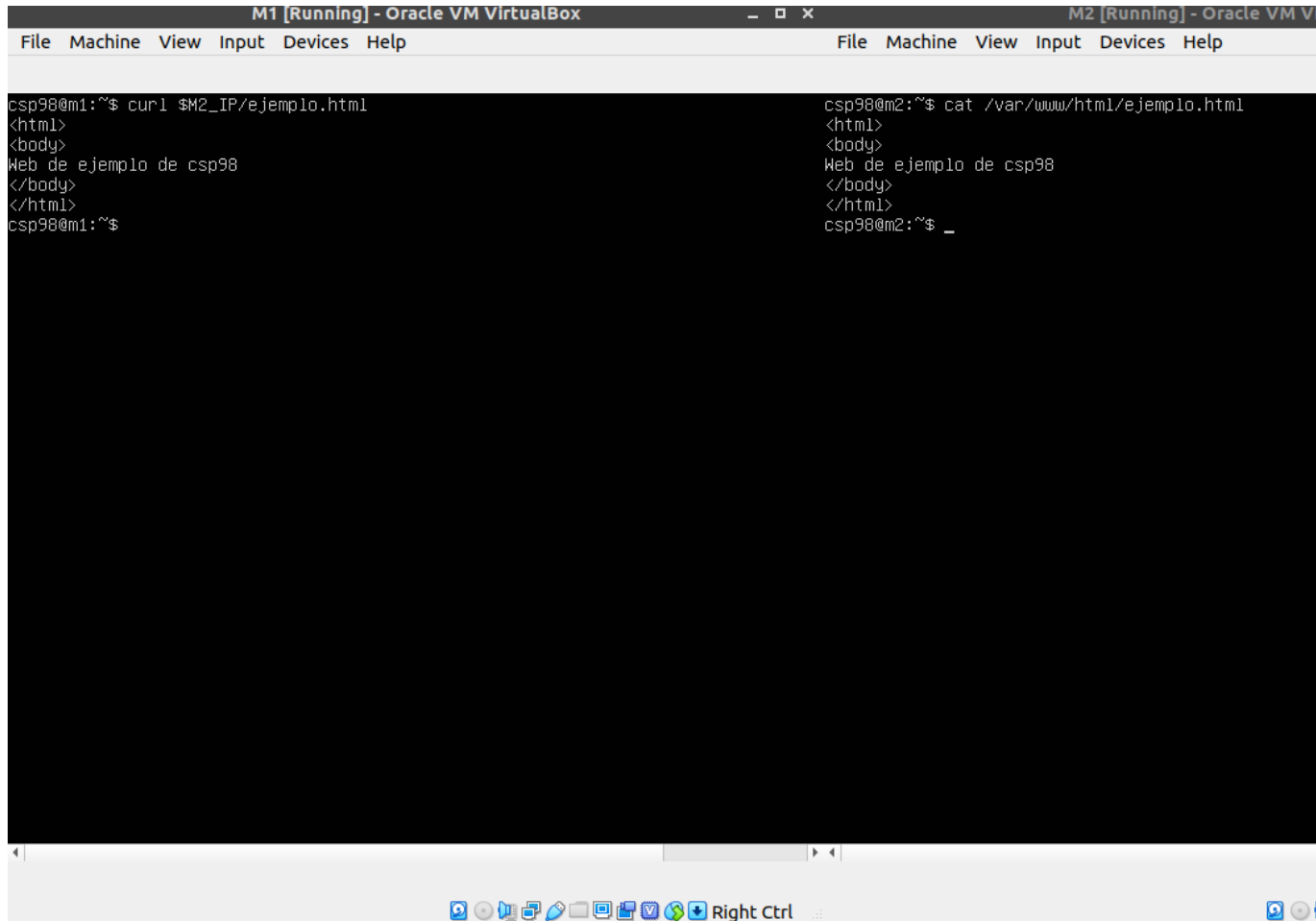
Last login: Thu Mar 12 15:52:08 2020
csp98@m1:~$
```

18. Creamos en *M2* un documento HTML (*/var/www/html/ejemplo.html*) con el siguiente contenido:

```
<HTML>
<BODY>
Web de ejemplo de <nombre usuario> para SWAP
</BODY>
```

</HTML>

19. Hacemos *curl* desde la otra máquina y comprobamos que recibimos la respuesta esperada:



The image shows two side-by-side terminal windows from Oracle VM VirtualBox. The left window, titled 'M1 [Running] - Oracle VM VirtualBox', shows a user running the command `curl $M2_IP/ejemplo.html`. The output is an HTML document with a body containing the text 'Web de ejemplo de csp98'. The right window, titled 'M2 [Running] - Oracle VM VirtualBox', shows a user running the command `cat /var/www/html/ejemplo.html`, which displays the same HTML content. Both windows have a menu bar with 'File', 'Machine', 'View', 'Input', 'Devices', and 'Help'. At the bottom of the windows is a taskbar with various icons and a 'Right Ctrl' label.

```
M1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

csp98@m1:~$ curl $M2_IP/ejemplo.html
<html>
<body>
Web de ejemplo de csp98
</body>
</html>
csp98@m1:~$

M2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

csp98@m2:~$ cat /var/www/html/ejemplo.html
<html>
<body>
Web de ejemplo de csp98
</body>
</html>
csp98@m2:~$ _
```