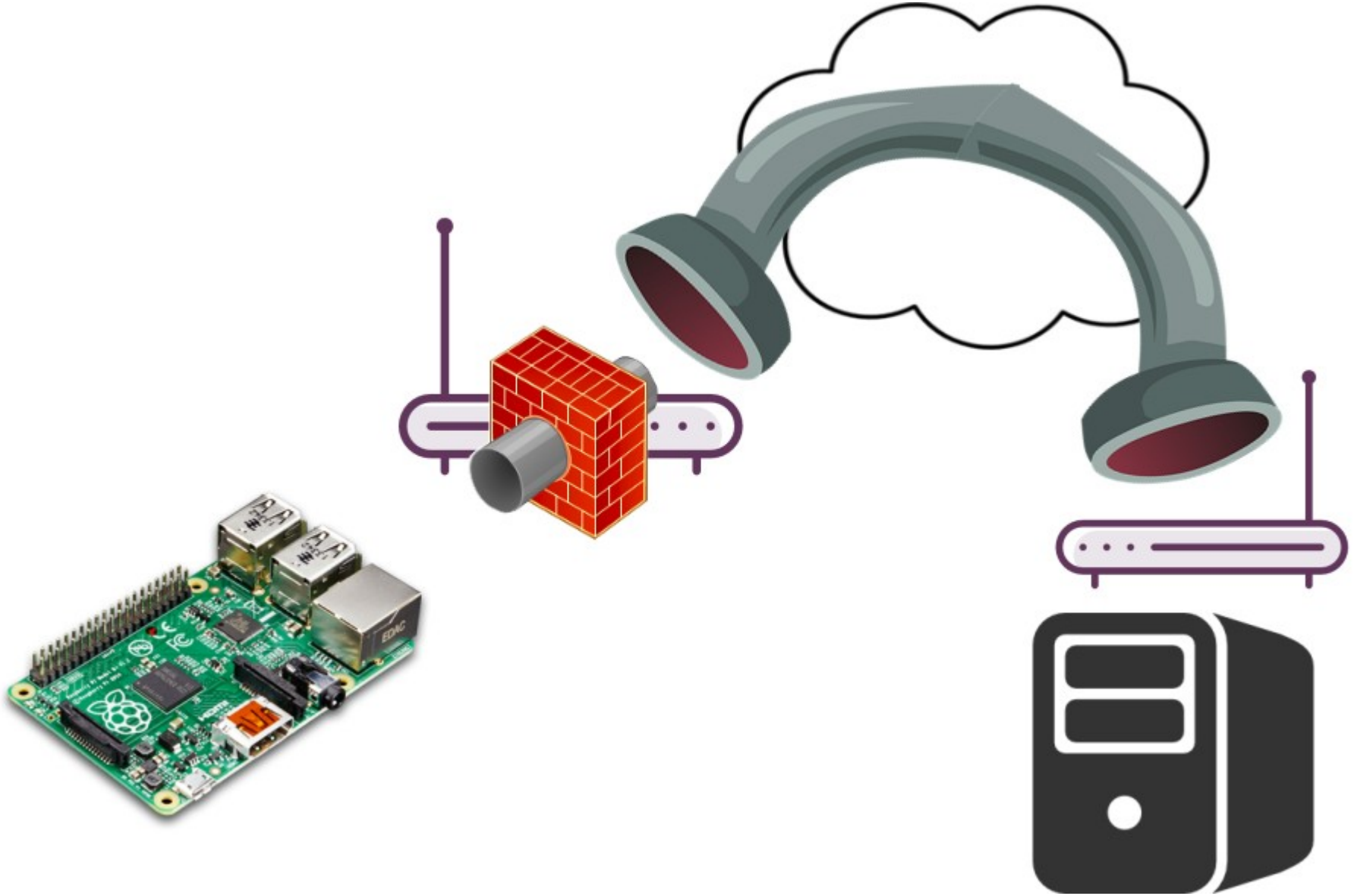
Sistema domòtic amb Internet de les Coses

Implementació d'un túnel SSH invers



Comunicacions amb Raspberry Pi

SSH

ssh -X pi@192.168.1.17

```
jordi@debianJB:~$ ssh -X pi@192.168.1.17
pi@192.168.1.17's password:

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the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

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permitted by applicable law.
Last login: Wed Nov 30 10:09:47 2016 from 192.168.1.12
pi@raspberrypi:~ $
```

L'opció -X ens permet poder executar remotament programes amb interfície gràfica d'usuari.

En sistemes operatius Windows existeix el programa putty (http://www.putty.org/)

Comunicacions amb Raspberry Pi

Accés SSH sense contrasenya

https://docs.webfaction.com/user-guide/access.html

Genereu una clau al vostre ordinador (si no existeix `~/.ssh/id_rsa.pub`):

1- Obriu una sessió de terminal.
2- Creeu la carpeta `~/.ssh`, en cas de que no existeixi. (`mkdir -p $HOME/.ssh`)
3- Aneu al directori `~/.ssh` (`cd ~/.ssh` i premeu `Enter`)
4- Genereu les vostres claus (`ssh-keygen -t rsa`)
5- Premeu `Enter` per a contestar totes les preguntes per defecte.

Desplegueu la clau a la Raspberry Pi

1- Copieu la clau a la Raspberry Pi. Entreu `scp ~/.ssh/id_rsa.pub pi@192.168.1.17:temp_id_rsa_key.pub (canvieu 192.168.1.17 per la IP de la vostra Raspberry Pi) i premeu Enter.`
Entreu la contrasenya quan us ho demani (la contrasenya per defecte és `raspberry`).

```
jordi@debianJB:~$ scp ~/.ssh/id_rsa.pub pi@192.168.1.17:temp_id_rsa_key.pub
pi@192.168.1.17's password:
id_rsa.pub                                    100%  396     0.4KB/s   00:00
jordi@debianJB:~$
```

Comunicacions amb Raspberry Pi

Accés SSH sense contrasenya

Desplegueu la clau a la Raspberry Pi

2- Obriu una sessió SSH a la vostra Raspberry Pi des del vostre ordinador. Entreu **`ssh pi@192.168.1.17`** (canvieu `192.168.1.17` per la IP de la vostra Raspberry Pi) i premeu `Enter`. Entreu la contrasenya quan us ho demani (la contrasenya per defecte és **`raspberry`**).

```
jordi@debianJB:~$ ssh pi@192.168.1.17
pi@192.168.1.17's password:

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Last login: Wed Nov 30 10:18:28 2016 from 192.168.1.12
pi@raspberrypi:~ $
```

3- Creeu la carpeta `~/.ssh`, en cas de que no existeixi. (`mkdir -p $HOME/.ssh`)

4- Afegiu la vostra clau a l'arxiu `authorized_keys` . Entreu **`cat ~/temp_id_rsa_key.pub >> ~/.ssh/authorized_keys`** i premeu `Enter`.

```
pi@raspberrypi:~ $ cat ~/temp_id_rsa_key.pub >> ~/.ssh/authorized_keys
```

Comunicacions amb Raspberry Pi

Accés SSH sense contrasenya

Desplegueu la clau a la Raspberry Pi

5- Esborreu l'arxiu amb la clau tempral. Feu `rm temp_id_rsa_key.pub` i premeu `Enter`.

```
pi@raspberrypi:~ $ rm temp_id_rsa_key.pub
```

6- Protegiu l'arxiu de claus SSH. Entreu-hi `chmod 600 ~/.ssh/authorized_keys` i premeu `Enter`.

```
pi@raspberrypi:~ $ chmod 600 ~/.ssh/authorized keys
```

7- Protegiu el directori SSH. Entreu-hi `chmod 700 ~/.ssh` i premeu `Enter`.

```
pi@raspberrypi:~ $ chmod 700 ~/.ssh
```

8- Protegiu el vostre directori d'usuari. Entreu-hi `chmod go-w $HOME` i premeu `Enter`.

```
pi@raspberrypi:~ $ chmod go-w $HOME
```

9- Tanqueu la sessió SSH.

Comunicacions amb Raspberry Pi

Accés SSH sense contrasenya

Desplegueu la clau a la Raspberry Pi

```
pi@raspberrypi:~ $ cat ~/temp_id_rsa_key.pub >> ~/.ssh/authorized_keys
pi@raspberrypi:~ $ rm temp_id_rsa_key.pub
pi@raspberrypi:~ $ chmod 600 ~/.ssh/authorized_keys
pi@raspberrypi:~ $ chmod 700 ~/.ssh
pi@raspberrypi:~ $ chmod go-w $HOME
pi@raspberrypi:~ $ exit
logout
Connection to 192.168.1.17 closed.
jordi@debianJB:~$
```

Verifiqueu que ja podeu accedir mitjançant SSH sense que us pregunti la contrasenya

```
jordi@debianJB:~$ ssh pi@192.168.1.17

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Last login: Wed Nov 30 11:03:54 2016 from 192.168.1.12
pi@raspberrypi:~ $
```
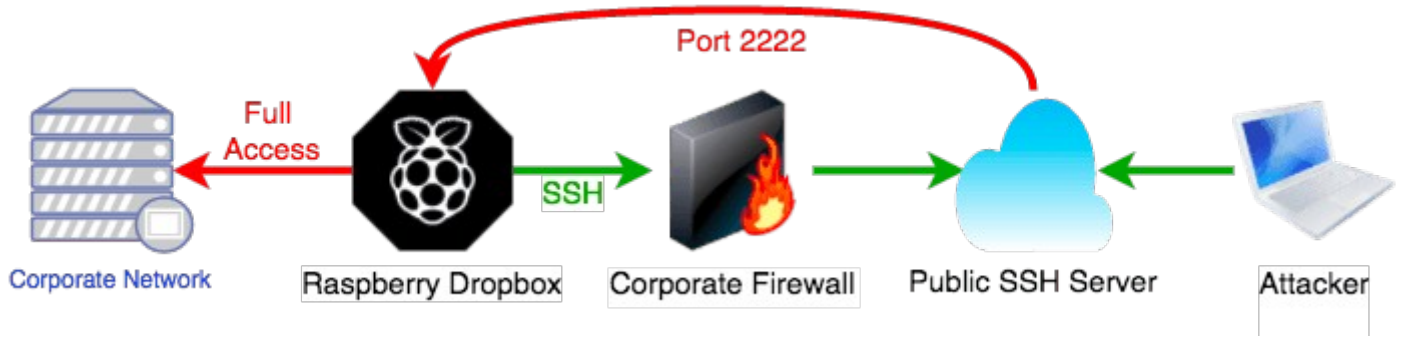

Comunicacions amb Raspberry Pi

Túnel SSH invers

http://jerrygamblin.com/2016/04/23/persistent-reverse-ssh-tunnels-on-a-raspberrypi/



Comunicacions amb Raspberry Pi

Túnel SSH invers

jordi@debianJB: ~

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```
pi@raspberrypi:~ $ ssh -R 12345:localhost:22 jordi@192.168.1.12
The authenticity of host '192.168.1.12 (192.168.1.12)' can't be established.
ECDSA key fingerprint is 01:eb:89:96:25:8b:48:22:e9:a7:ed:5e:d4:98:c4:ac.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.1.12' (ECDSA) to the list of known hosts.
jordi@192.168.1.12's password:

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individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes wi
permitted by applicable l
jordi@debianJB:~$
```

pi@raspberrypi: ~

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```
jordi@debianJB:~$ ssh -p 12345 pi@127.0.0.1
The authenticity of host '[127.0.0.1]:12345 ([127.0.0.1]:12345)' can't be establ
ished.
ECDSA key fingerprint is db:79:95:3e:5d:97:96:cd:ce:57:64:96:63:82:15:e2.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[127.0.0.1]:12345' (ECDSA) to the list of known host
s.

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Last login: Wed Nov 30 23:46:52 2016 from 192.168.1.12
pi@raspberrypi:~ $
```

Comunicacions amb Raspberry Pi

autoSSH

Si el túnel deixa de funcionar (acostuma a ocórrer en xarxes molt ocupades o d'escasa qualitat, com el 3G), es pot utilitzar el paquet autossh en lloc de l'ssh per a establir la connexió que s'encarregarà de mantenir el túnel obert reiniciant automàticament la connexió.

```
pi@raspberrypi:~ $ autossh -M 65500 -o ServerAliveInterval=20 -R 19994:localhost:22 ecat@web398.webfaction.com
```

L'autossh no funciona com s'espera si al connectar la Raspberry Pi no hi ha connexió a Internet. Per a evitar això, primer verifiquem la connectivitat fent un ping.

```
jordi@debianJB:~$ ssh ecat@web398.webfaction.com
ecat@web398.webfaction.com's password:
Last login: Wed Nov 30 23:21:27 2016 from 62.83.215.143
[ecat@web398 ~]$ ssh -p 19994 pi@localhost
pi@localhost's password:

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Last login: Thu Dec  1 00:24:02 2016 from localhost
pi@raspberrypi:~ $
```

Sistema domòtic amb Internet de les Coses

Aplicació pràctica – Control domòtic

```
pi@rpi-ecat00:~/codis $ cat /home/pi/codis/sshRemot.sh
#!/bin/bash

ORDRE="autossh -f -nNT -M 61100 -o ServerAliveInterval=20 -R 12346:localhost:22 ecat@web577.webfaction.com"
#echo $ORDRE
timeout 2 ssh -o ServerAliveInterval=20 ecat@web577.webfaction.com "netstat -putan | grep -v grep | grep 12346"
if [ $? -ne 0 ]; then
        timeout 2 $ORDRE
        echo $ORDRE
else
        echo "autossh amb webfaction en marxa"
fi
timeout 2 ps aux | grep autossh | grep 18880:localhost:1883
if [ $? -ne 0 ]; then
        timeout 2 autossh -f -nNT -M 59900 -o ServerAliveInterval=20 -R 18880:localhost:1883 ecat@web577.webfaction.com
fi

ORDRE="autossh -f -nNT -M 58800 -o ServerAliveInterval=20 -R 12336:localhost:22 popotamo@popotamo.binefa.cat -p 2244"
```

```
pi@rpi-ecat01:~/codis $ cat sshRemot.sh
#!/bin/bash

ORDRE="autossh -f -nNT -M 60000 -o ServerAliveInterval=20 -R 12347:localhost:22 ecat@web577.webfaction.com"
#echo $ORDRE
timeout 2 ssh -o ServerAliveInterval=20 ecat@web577.webfaction.com "netstat -putan | grep 12347"
if [ $? -ne 0 ]; then
        timeout 2 $ORDRE
        echo $ORDRE
else
        echo "autossh en marxa"
fi
```

Aplicació pràctica – Control domòtic

```
[ecat@web577 bin]$ cat /home/ecat/bin/tunel/estableix03.sh
#!/bin/bash

timeout 2 ssh -p 12346 pi@localhost "ls"
if [ $? -eq 0 ]; then
        echo "Hi ha connexió amb la RPi pel port 12346"
        ps aux | grep 13769:localhost:1880 | grep -v grep
        if [ $? -ne 0 ]; then
                ssh -N -o ServerAliveInterval=20 -L *:13769:localhost:1880 pi@localhost -p 12346 &
                echo $! > /home/ecat/bin/tunel/rt.pid
        else
                echo "Túnel 13769 [wf] <--> 1880 [RPi] establert"
        fi
else
        echo "No hi ha connexió amb la RPi pel port 12346"
        ps aux | grep 13769:localhost:1880 | grep -v grep
        if [ $? -ne 0 ]; then
                echo "Tampoc ha quedat el túnel 13769 [wf] <--> 1880 [RPi] establert"
        else
                echo "Túnel 13769 [wf] <--> 1880 [RPi] establert en segon terme. El matem."
                kill `cat /home/ecat/bin/tunel/rt.pid`
        fi
fi


[ecat@web577 bin]$ cat /home/ecat/bin/tunel/estableix04.sh
#!/bin/bash

timeout 2 ssh -p 12347 pi@localhost "ls"
if [ $? -eq 0 ]; then
        echo "Hi ha connexió amb la RPi pel port 12347"
        ps aux | grep 20271:localhost:8081 | grep -v grep
        if [ $? -ne 0 ]; then
                ssh -N -o ServerAliveInterval=20 -L *:20271:localhost:8081 pi@localhost -p 12347 &
                echo $! > /home/ecat/bin/tunel/rt04.pid
        else
                echo "Túnel 20271 [wf] <--> 8081 [RPi] establert"
        fi
else
```