

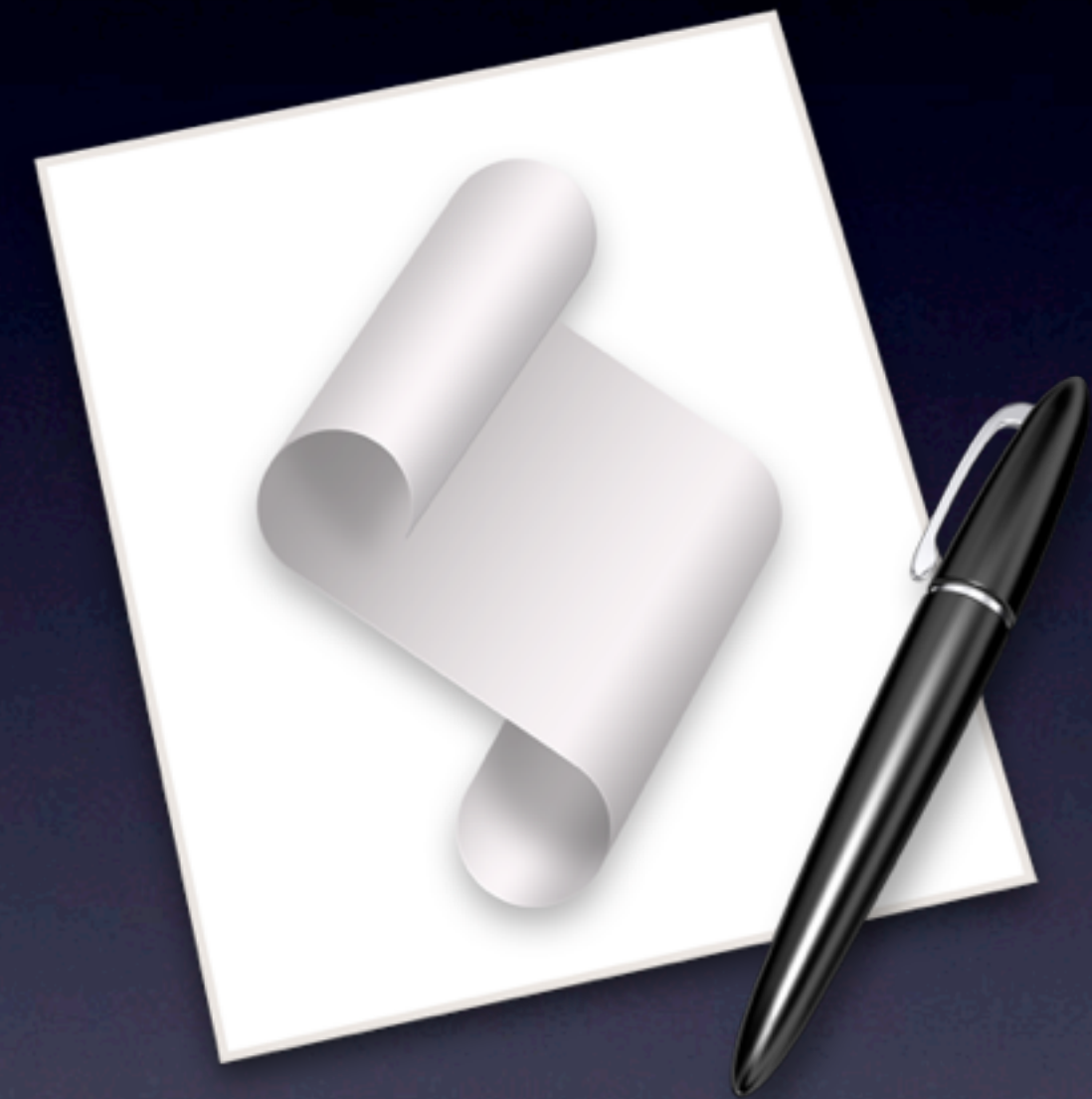


# Linux

Computer networks - Administration | DV202

# Configuration files

`/etc/hosts`  
`/etc/resolv.conf`  
`/etc/network/interfaces`



# /etc/hosts

```
127.0.0.1      localhost.localdomain  localhost
127.0.1.1    lokal.kalmar.se      lokal
10.0.0.1      server1.kalmar.se     server1
194.47.173.147 challenger.te.hik.se  challenger
```



# /etc/resolv.conf

```
domain kalmar.se  
search kalmar.se lnu.se  
nameserver 10.0.0.100  
nameserver 10.0.0.101  
sortlist 10.0.0.0 194.47.0.0
```

# /etc/network/interfaces

```
auto eth0
iface eth0 inet static
    address 192.168.0.2
    netmask 255.255.255.0
    broadcast 192.168.0.255
    gateway 192.168.0.1
```

```
auto eth1
iface eth1 inet dhcp
```



# ifconfig



ifconfig is used to modify all settings associated with a network card

```
ifconfig eth0 10.0.0.1 netmask 255.0.0.0 broadcast 10.255.255.255
```

# ifconfig



## List settings

```
ifconfig eth0
```

```
eth0  Link encap:Ethernet  HWaddr 00:10:5A:3E:E8:E5  
      inet addr:10.0.0.1  Bcast:10.255.255.255  Mask:255.0.0.0  
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
      RX packets:11076674  errors:0  dropped:0  overruns:0  frame:0  
      TX packets:12637568  errors:0  dropped:0  overruns:0  carrier:0  
      collisions:0  txqueuelen:1000  
      RX bytes:3314286277 (3.0 GiB)  TX bytes:4044937434 (3.7 GiB)  
      Interrupt:11  Base address:0xf400
```

# ifconfig

## Activate and deactivate NIC

```
ifconfig eth0 up  
ifconfig eth0 down
```

## Restart the network

```
/etc/init.d/networking restart
```



# NIC aliases

```
ifconfig eth0:0 172.16.0.12 netmask 255.255.255.0
```

Add eth0:0 to /etc/network/interfaces for the configuration to be persistent

# route

route

Kernel IP routing table

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.0.0	*	255.0.0.0	U	0	0	0	eth0
default	10.0.0.1	0.0.0.0	UG	0	0	0	eth0

```
route add default gw 10.0.0.254  
route del default gw
```

```
route add -net 192.168.0.0/24 gw 10.0.0.250  
route del -net 192.168.0.0/24 gw 10.0.0.250
```

# Bridging networks

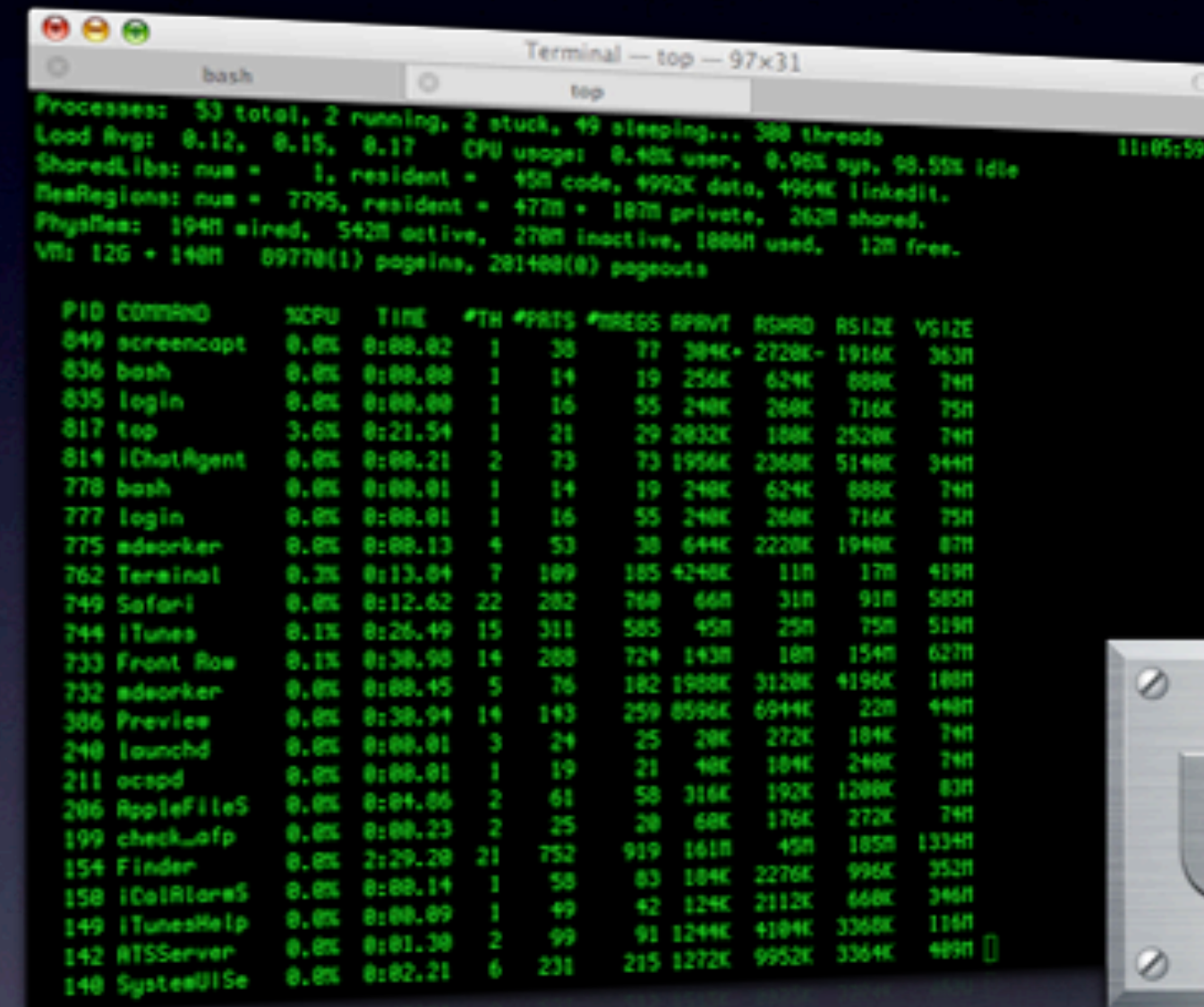
```
apt-get install bridge-utils
```

```
auto lo  
iface lo inet loopback
```

```
auto eth0  
auto eth1  
auto br0  
iface br0 inet static  
    address 192.168.0.10  
    network 192.168.0.0  
    netmask 255.255.255.0  
    broadcast 192.168.0.255  
    gateway 192.168.0.1  
    bridge_ports eth0 eth1 eth2 eth3 eth4 eth5
```

# SSH

OpenSSH

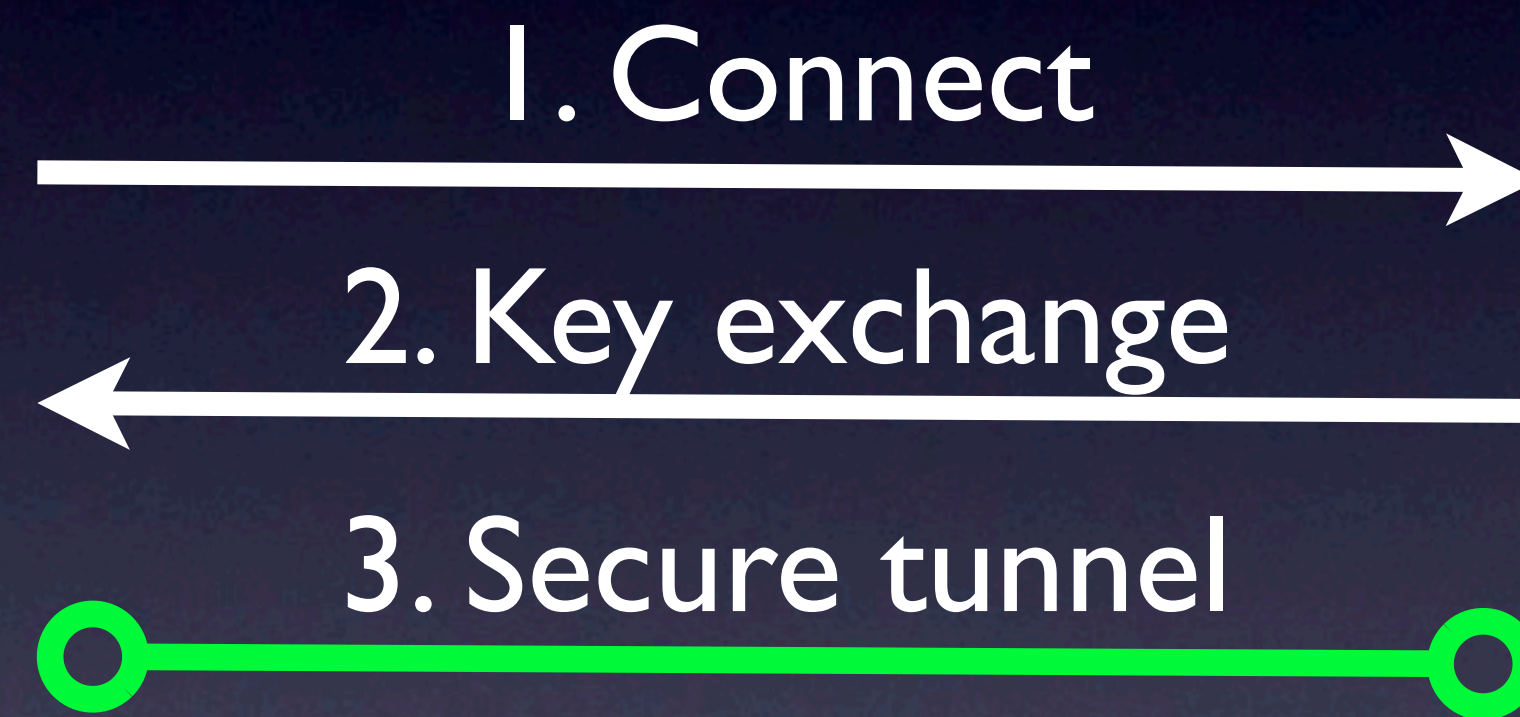


```
Terminal - top - 97x31
bash
Processes: 53 total, 2 running, 2 stuck, 49 sleeping..., 308 threads
Load Avg: 0.12, 0.15, 0.17  CPU usage: 0.10% user, 0.90% sys, 98.99% idle
SharedLibs: num = 1, resident = 45K code, 4992K data, 496K linkedit.
MemRegions: num = 7795, resident = 477M + 107M private, 262M shared.
PhysMem: 194M wired, 542M active, 278M inactive, 1006M used, 12M free.
VM: 12G + 140M 09778(1) pageins, 20140(0) pageouts
11:05:59

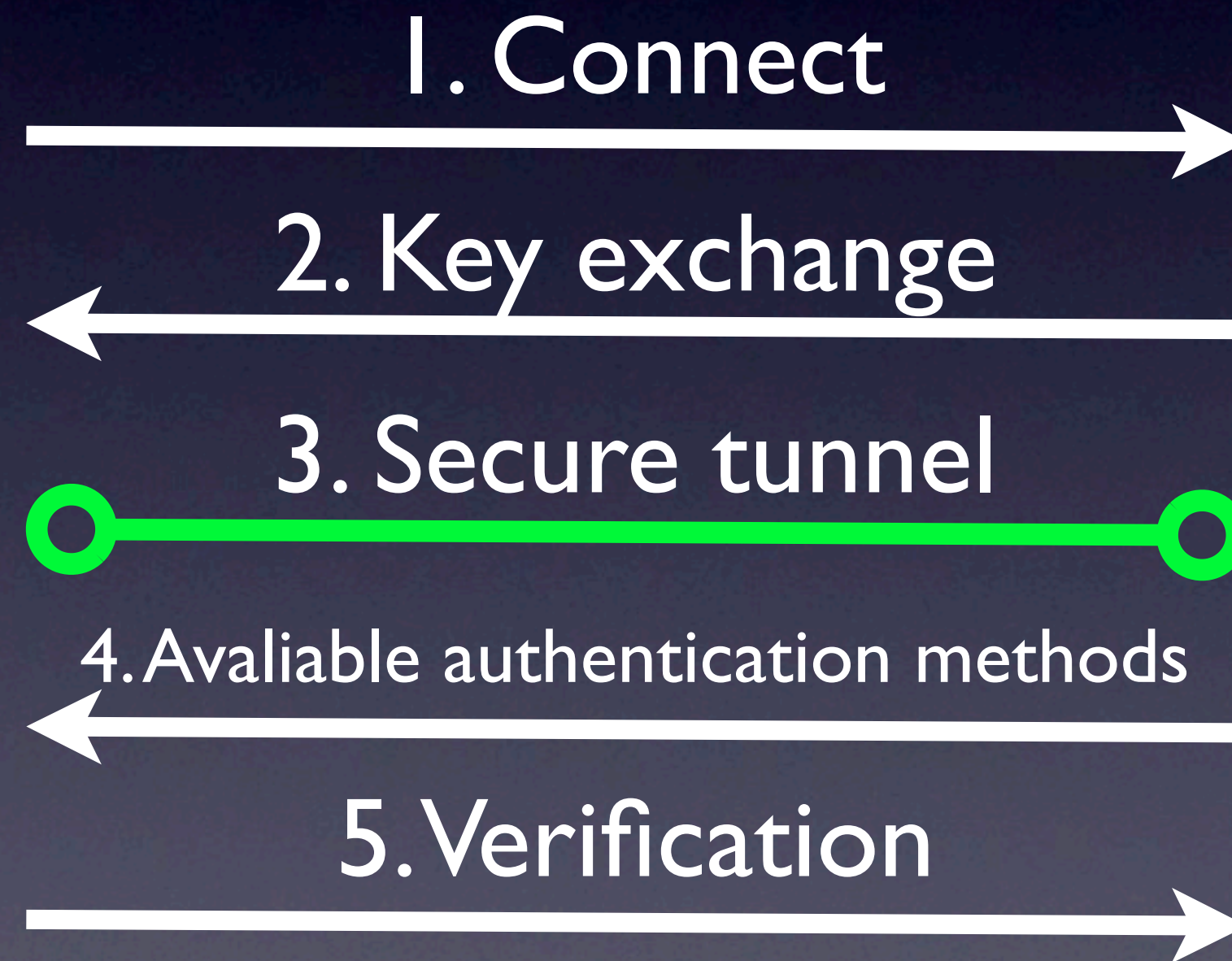
PID COMMAND %CPU TIME #TH #PRTS #RRESS #PRVT #DRRD #S1ZE #V1ZE
849 screencapt 0.0% 0:00.02 1 30 77 304K 2720K 1916K 363M
836 bash 0.0% 0:00.00 1 14 19 256K 624K 800K 74M
835 login 0.0% 0:00.00 1 16 55 240K 260K 716K 75M
817 top 3.6% 0:21.54 1 21 29 2032K 100K 2520K 74M
814 iChatAgent 0.0% 0:00.21 2 73 73 1956K 2360K 5140K 344M
778 bash 0.0% 0:00.01 1 14 19 240K 624K 800K 74M
777 login 0.0% 0:00.01 1 16 55 240K 260K 716K 75M
775 adworker 0.0% 0:00.13 4 53 30 644K 2220K 1940K 87M
762 Terminal 0.3% 0:13.04 7 109 105 4240K 11M 17M 419M
749 Safari 0.0% 0:12.62 22 202 760 66M 31M 91M 505M
744 iTunes 0.1% 0:26.49 15 311 505 45M 25M 75M 519M
733 Front Row 0.1% 0:30.90 14 200 724 143M 10M 154M 627M
732 adworker 0.0% 0:00.45 5 76 102 1900K 3120K 4196K 100M
306 Preview 0.0% 0:30.94 14 143 259 0596K 6944K 22M 440M
240 launchd 0.0% 0:00.01 3 24 25 20K 272K 104K 74M
211 occpd 0.0% 0:00.01 1 19 21 40K 104K 240K 74M
206 AppleFileS 0.0% 0:04.06 2 61 50 316K 192K 1200K 83M
199 check_afp 0.0% 0:00.23 2 25 20 60K 176K 272K 74M
154 Finder 0.0% 2:29.20 21 752 919 161M 45M 105M 1334M
150 iCalRomeS 0.0% 0:00.14 1 50 03 104K 2276K 996K 352M
149 iTunesHelp 0.0% 0:00.09 1 49 42 124K 2112K 660K 346M
142 RTSServer 0.0% 0:01.30 2 99 91 1244K 4104K 3300K 116M
140 SystemDISE 0.0% 0:02.21 6 231 215 1272K 9952K 3364K 409M
```



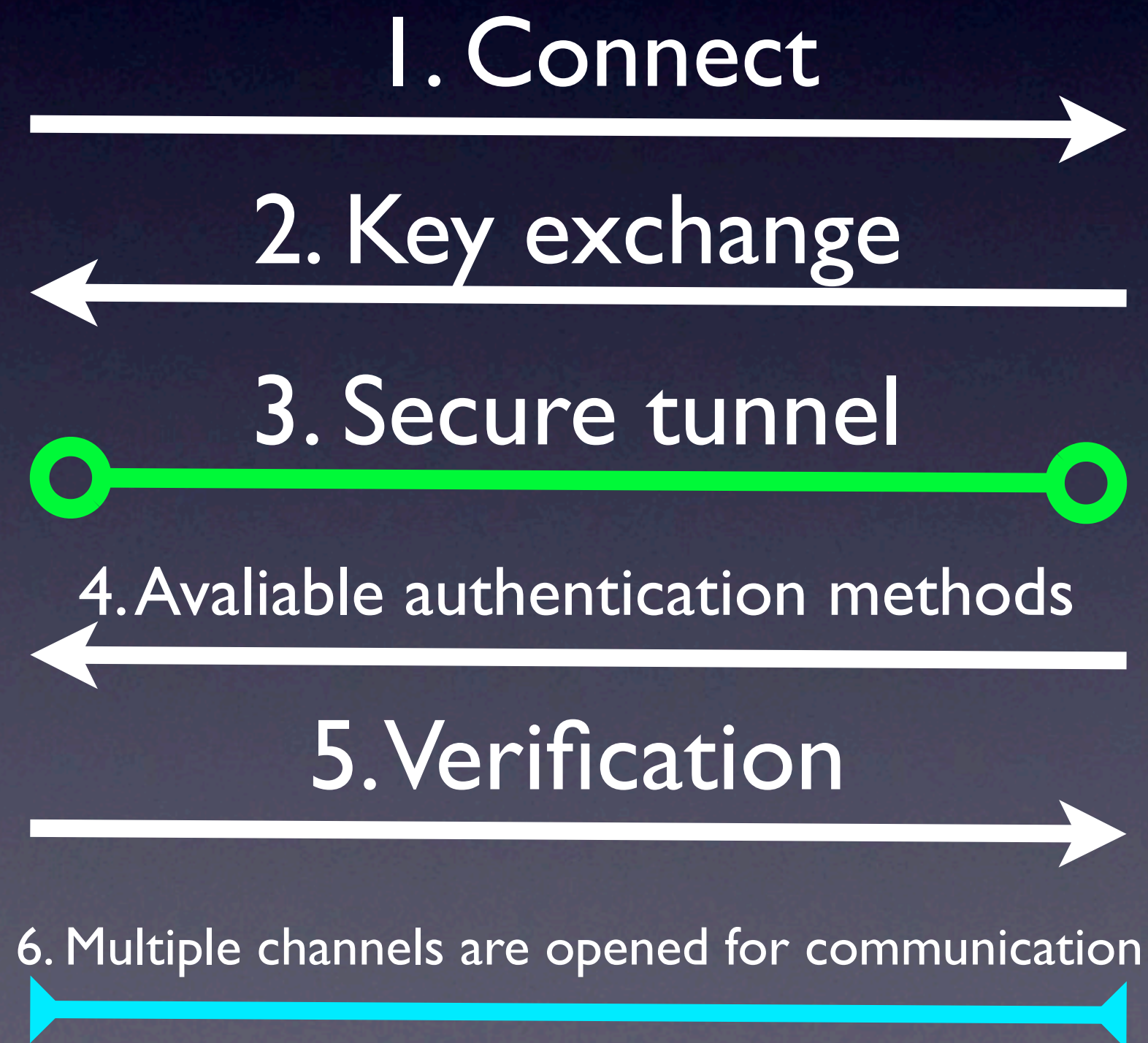
# SSH - Transport layer



# SSH - Verification layer



# SSH - Anslutningslagret



# Configure SSH

/etc/ssh/sshd\_config

port  
HostKey  
KeyRegenerationInterval  
ListenAddress  
PermitRootLogin  
AllowGroups  
AllowUsers  
Banner

```
port 22  
HostKey /etc/ssh/ssh_host_key  
KeyRegenerationInterval 3600  
ListenAddress 10.0.0.1  
PermitRootLogin yes  
AllowGroups students teachers  
AllowUsers kalle nisse@challenger  
Banner /etc/ssh/warning
```



# SSH verification

hosts.equiv/shosts.equiv  
Public key for client computer  
Public key for user  
Username and password

**sshd\_config**

# host.equiv / shosts.equiv

/etc/hosts.equiv  
/etc/shosts.equiv  
.rhosts  
.shosts

challenger

sshd\_config

RhostAuthentication no  
IgnoreRhosts yes

# Public key for client computer

`/etc/ssh_known_hosts`

```
ssh-keyscan -t rsa klient.kalmar.se
```

`sshd_config`

```
HostbasedAuthentication yes
```

# Public key for user

Log in to the client

```
ssh-keygen -q -t rsa -f ~/.ssh/id_rsa
```

```
scp ~/.ssh/id_rsa.pub 10.0.0.1:~/.ssh/id_rsa.client
```

Log in to the server

Go to ~/.ssh verify that the file called id\_rsa.client is there

```
cat id_rsa.client >> authorized_keys
```

## sshd\_config

```
PubkeyAuthentication yes
```

# Password authentication

sshd\_config

PasswordAuthentication yes

# SSH client

PuTTY (Windows)  
ssh (Linux/Unix)

```
ssh 10.0.0.1
```

```
/etc/ssh/ssh_config
```

# Commands using SSH

## scp - Secure Copy

```
scp marcus@challenger:~/list.txt marcus@voyager:~/  
scp ~/list.txt marcus@voyager:~/
```

## sftp - Secure FTP

# DHCP

- Dynamic Host Configuration Protocol
- Internet Software Consortium
- `apt-get install dhcpd`



<https://www.isc.org/software/dhcp>



# dhcpcd.conf

## Parameters

Controls the way tasks are executed  
Must be terminated with ;

## Declarations

Describes the network topology  
Enclosed with {}

# Global parameters

```
option routers 10.0.0.1;
```

```
host challenger {
```

```
    option routers 10.0.0.254;
```

```
    hardware ethernet 00:05:02:a7:76:da;
```

```
    fixed-address 10.0.0.100;
```

```
}
```

# Parameters

default-lease-time  
max-lease-time  
range  
hardware  
server-name  
boot-unknown-clients  
fixed-address  
use-host-decl-names

```
default-lease-time 3600;  
max-lease-time 7200;  
range 10.0.0.10 10.0.0.20;  
hardware ethernet 00:0c:29:e6:a1:54;  
server-name kvarnholmen;  
fixed-address 10.0.0.30;  
boot-unknown-clients true;  
use-host-decl-names true;
```

# DHCP options

domain-name  
domain-name-servers  
subnet-mask  
time-offset  
routers  
broadcast-address

```
option domain-name "kalmar.se";  
option domain-name-servers dns1.kalmar.se, dns2.kalmar.se;  
option subnet-mask 255.0.0.0;  
option time-offset 3600;  
option routers 10.0.0.5;  
option broadcast-address 10.255.255.255;
```

# subnet

```
subnet 10.0.0.0 netmask 255.0.0.0 {  
    # Parametrar  
}
```



# range and host

range

```
subnet 10.0.0.0 netmask 255.0.0.0 {  
    range 10.0.0.10 10.0.0.20;  
}
```

host

```
host challenger {  
    # Parametrar  
}
```

# Static leases

```
default-lease-time 7200;  
  
subnet 10.0.0.0 netmask 255.0.0.0 {  
    range 10.0.0.10 10.0.0.20;  
}  
  
host challenger {  
    hardware ethernet 00:0c:29:e6:a1:54;  
    fixed-address 10.0.0.30;  
}
```

# Group based configuration

```
group {  
    # Parametrar  
}
```

```
group {  
  
    subnet 192.168.0.0 netmask 255.255.255.0 {  
  
        range 192.168.0.10 192.168.0.20;  
        option routers 192.168.0.254;  
        option domain-name "kalmar.se";  
        option domain-name-servers 192.168.0.1;  
        option time-offset 3600; # Swedish time  
  
    }  
  
    host voyager {  
        option host-name "voyager.kalmar.se";  
        hardware ethernet 00:A0:78:8E:9E:AA;  
        fixed-address 192.168.0.4;  
  
    }  
  
    host challenger {  
        option host-name "challenger.kalmar.se";  
        hardware ethernet 00:A1:DD:74:C3:F2;  
        fixed-address 192.168.0.6;  
  
    }  
  
}
```



# dhcpcd.leases

```
lease 192.160.0.2 {  
  starts 6 2004/04/18 17:40:39;  
  ends 6 2004/04/18 18:40:39;  
  binding state active;  
  next binding state free;  
  hardware ethernet 00:08:02:67:34:D2;  
  uid 01:00:08:02:67:34:D2;  
  client-hostname "challenger";  
}
```

# dhcpcd.conf

```
default-lease-time 3600;
max-lease-time 7200;

option domain-name "kalmar.se";
option domain-name-servers dns1.kalmar.se, dns2.kalmar.se;
option routers 10.0.0.254;

subnet 10.0.0.0 netmask 255.0.0.0 {
    range 10.0.0.10 10.0.0.20;
    option subnet-mask 255.0.0.0;
    option broadcast-address 10.255.255.255;
}

group {
    option routers 10.0.0.253;

    host challenger {
        fixed-address 10.0.0.30;
        hardware ethernet 00:0c:f3:23:1d:32;
    }
}
}
```

# Start the service

```
/etc/init.d/isc-dhcp-server start
```

# Configure the network

`/etc/network/interfaces`

```
auto eth0  
iface eth0 inet dhcp
```