Debian/GNU Linux Remote Services

Secure Shell, Virtual Network Computing , Remote Desktops

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Agenda

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Remote Login Services

Application services to use remote hosts interactively

Scenario: remote host offers interesting services:

- Resources (CPU, memory, disk) provided by remote host
  - Compute servers: gonzales, roadrunner, popeye
- Files located on remote host
  - file server for home directories
  - scratch server for other files
- Programs installed on remote host
  - Mathematica, Maple on compute servers

Goal: use these remote services from local host

- Use local host as a terminal to login to remote host
- Run programs/commands on remote host
- See output on local host
  - Ascii terminal output
  - graphical output by X clients
  - some other way: vnc,rdp

Remote Login Services

Protocols, systems

Relevant protocols/systems:

- telnet/rlogin/rsh outdated !!
- SSH suite:
  - ssh - secure shell
  - slogin - secure login
- X-Windows X11
  - network-transparent GUI
  - too slow, not effective
- VNC - virtual network computing/console
- MS Windows Terminal Server
  - RDP - remote desktop protocol

The Remote Login Server - an application program

example : the SSH Server

Process

- Master server waits for new connection requests SSH: port 22
- For each connection, it spawns a slave server to handle the connection
- Multiple sessions (from the same or different clients) may be active at the same time
- Slave server handles the connection
  - transfers data from local keyboard to remote host and outputs data from remote host on the local display

Telnet is outdated
SSH is the successor

TELNET and Rsh/Rlogin outdated - because of security problems

- All data are transferred in clear text
- Any listener between client and remote server can read everything
  - True for any unencrypted connection, think on http !!!
- telnet-ssl replaces telnet/rlogin

Replacement: Secure Shell (ssh, slogin)

- SSH suite is the modern replacement of TELNET and rlogin
- standard protocols for secure remote access over IP networks (RFCs: 4251-5254)
- All data are encrypted before they are transferred via IP
- Free implementations: `www.openssh.org`, `www.putty.org`, `www.winscp.net`,etc.
- Commercial implementations: `www.ssh.com` (MS Windows)

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File Services

File transfer, File sharing

Application services to access files on remote hosts

- File transfer
  - Files are copied from one host to another
  - Command line tools: sftp (secure ftp), scp (secure remote copy)
  - Graphical tools: gftp, (kasablanca, etc.) FileZilla (multiplatform program)
- File sharing
  - Files are accessed from a central server
  - Files are stored and backuped on central file server
  - Client applications operate on remote files like on local files
  - Transparent file access is provided by network file systems
  - Realisation: NFS (Network File System), SMB (Server Message Blocks)

NFS (Network File System)

NFS: access to remote files

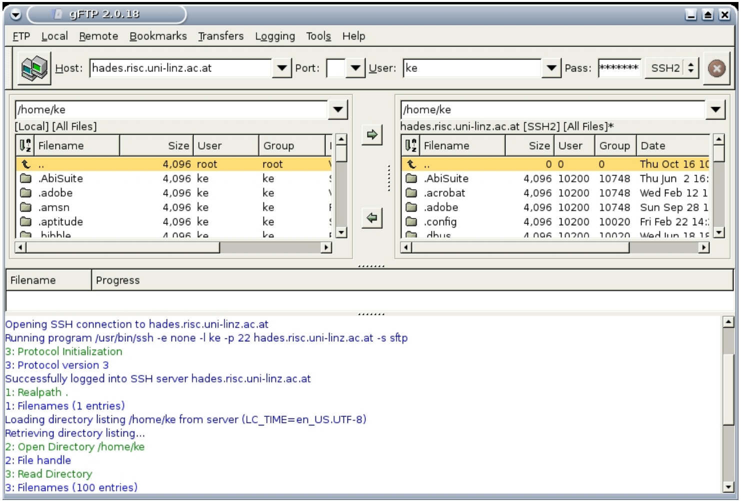
- Developed by Sun Microsystems
- Used in many Intranets to interconnect file systems
- Mainly for Unix/Linux computers
- Remote file system can be accessed like local files
  - A remote file system is mounted to an empty local directory
  - Files below this directory can be used like local files
  - No special file transfer commands needed, no file duplication arises
- Implemented on top of UDP

For security reasons, only used within an administrative domain

- administrativ domain:
  - an organisational unit managed by local system managers (e.g.: RISC)
  - only these managers have root access for the computer system

FTP with gftp

Always set the protocol to SSH2



Host: hades.risc.uni-linz.ac.at Port: User: ke Pass: ******** SSH2

/home/ke
[Local] [All Files]

Filename	Size	User	Group
..	4,096	root	root
.AbiSuite	4,096	ke	ke
.adobe	4,096	ke	ke
.amsn	4,096	ke	ke
.aptitude	4,096	ke	ke

/home/ke
hades.risc.uni-linz.ac.at [SSH2] [All Files]*

Filename	Size	User	Group	Date
..	0	0	0	Thu Oct 16 1
.AbiSuite	4,096	10200	10748	Thu Jun 2 16:
.acrobat	4,096	10200	10748	Wed Feb 12 1
.adobe	4,096	10200	10748	Sun Sep 28 1
.config	4,096	10200	10020	Fri Feb 22 14:

```
Opening SSH connection to hades.risc.uni-linz.ac.at
Running program /usr/bin/ssh -e none -l ke -p 22 hades.risc.uni-linz.ac.at -s sftp
3: Protocol Initialization
3: Protocol version 3
Successfully logged into SSH server hades.risc.uni-linz.ac.at
1: Realpath .
1: Filenames (1 entries)
Loading directory listing /home/ke from server (LC_TIME=en_US.UTF-8)
Retrieving directory listing...
2: Open Directory /home/ke
2: File handle
3: Read Directory
3: Filenames (100 entries)
```

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SSH features
The SSH suite

SSH - a client-server solution for network security

- client-server solution for network security
  - encryption: all data will encrypted before sending from localhost to remote computer and vice verse
  - transparent for the user (does not notice background activities)
  - client side: login; authentication; data transfer, command execution

SSH features

- it is a protocol: describes how to conduct secure communication over a network
- full, secure replacement for FTP and Telnet and the UNIX r-series of commands: rlogin, rsh, rcp, rexec
  - creates a secure channel for running a shell on the remote computer
  - sftp, scp is integrated in the protocol
- supports more authentication methods: password, public key, certificate, smart card, PAM and SecurID

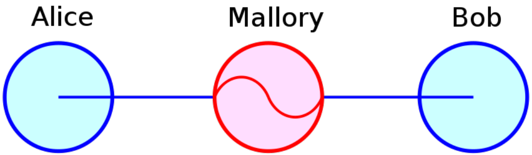
SSH features

Security

- uses multiple high security algorithms and strong authentication methods
  - prevents such security threats as identity spoofing and man-in-the-middle attacks
  - man-in-the-middle attack: changing the IP in the packet you communicate with the remote computer, stating: I'm the remote computer
  - man-in-the-middle attack details: next slide
- Transparent and automatic tunneling of X11 connections
- Port forwarding or SSH tunneling: for arbitrary TCP/IP-based applications, such as e-mail
- works as a proxy server, too: by the SOCKSv5 implemantation
- Multiple channels that allow to have multiple terminal windows and file transfers going through one secure and authenticated connection

SSH security

Man-in-the-middle attack - what it is



SSH security

Man-in-the-middle attack - conversation - I.

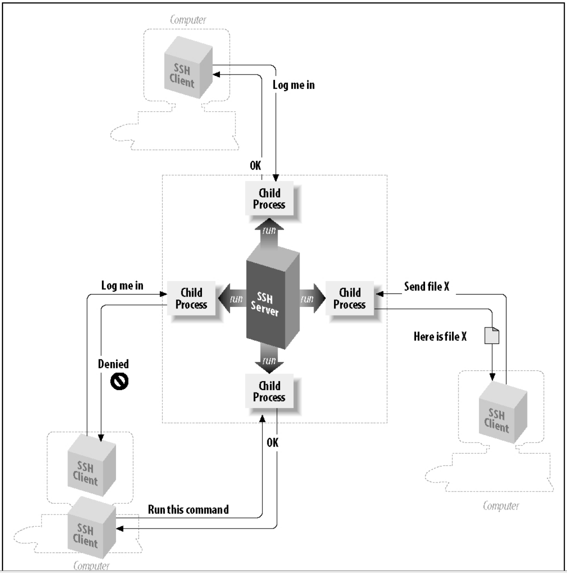
```
1. Alice sends a message to Bob, which is intercepted by Mallory:

     Alice "Hi Bob, it's Alice. Give me your key"-->  Mallory   Bob

2. Mallory relays this message to Bob; Bob can't tell it isn't really
   from Alice

     Alice      Mallory "Hi Bob, it's Alice. Give me your key"--> Bob

3. Bob responds with his encryption key:

     Alice      Mallory   <--[Bob's_key] Bob

4. Mallory replaces Bob's key with her own, and relays this to Alice,
claiming that it is Bob's key:

     Alice   <--[Mallory's_key] Mallory      Bob
```

SSH security

Man-in-the-middle attack - conversation II.

```
5. Alice encrypts a message with what she believes to be Bob's key,
thinking that only Bob can read it:

      Alice "Meet me at the bus stop!"[encrypted with Mallory's key]
      -->   Mallory      Bob

6. However, because it was actually encrypted with Mallory's key,
Mallory can decrypt it, read it, modify it (if desired), re-encrypt
with Bob's key, and forward it to Bob:

      Alice  Mallory "Meet me at 22nd Ave!"[encrypted with Bob's key]
      --> Bob

7. Bob thinks that this message is a secure communication from Alice.
```

The base services of SSH



Complete Structure of the SSH protocol

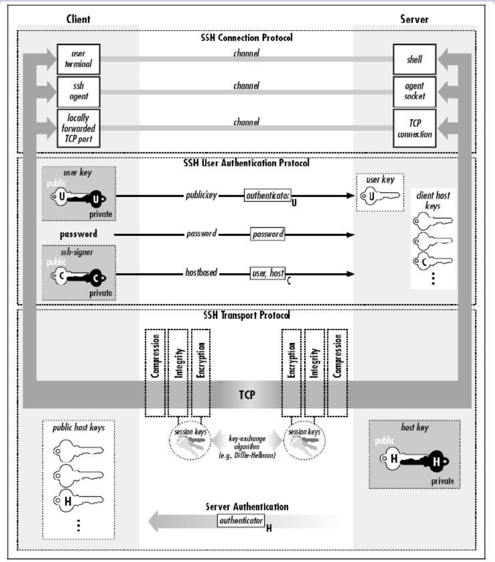


Figure 3-4. SSH-2 architecture

The structure of the SSH-2 Protocol

Very clean 3-layer internal architecture (RFC 4251)

- Transport Layer (RFC 4253)
  - initial key exchange, server authentication, data confidentiality, data integrity, compression, key re-exchange (algorithm negotiation, session-ID, privacy)
- User Authentication Layer (RFC 4252)
  - Client Authentication: provides various authentication methods (public key, host bases, password, etc.)
- Connection Layer (RFC 4254)
  - defines the logical channels and the requests to handle the services like: secure interactive shell session, X11 forwarding, TCP/IP forwarding (channel multiplexing, pseudo terminals, flow control, remote program execution, authentication agent forwarding, terminal handling, etc.)

The Components of the SSH suite

SSH binary programs, scripts

```
uhu:~> dpkg -L openssh-client | grep bin
/usr/bin
/usr/bin/ssh
/usr/bin/scp
/usr/bin/ssh-add
/usr/bin/ssh-agent
/usr/bin/ssh-keygen
/usr/bin/ssh-keyscan
/usr/bin/sftp
/usr/bin/ssh-vulnkey
/usr/bin/ssh-copy-id
/usr/bin/ssh-argv0
/usr/bin/slogin
uhu:~>
```

The Components of the SSH suite

SSH man page

```
uhu:~> ssh --help
usage: ssh [-1246AaCfgKkMNnqsTtVvXxY] [-b bind_address]
           [-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option]
           [-L [bind_address:]port:host:hostport] [-i identity_file]
           [-c cipher_spec]
           [-D [bind_address:]port] [-e escape_char] [-F configfile]
           [-p port]
           [-R [bind_address:]port:host:hostport] [-S ctl_path]
           [-w tunnel:tunnel] [user@]hostname [command]
uhu:~>
```

The SSH suite
SSH parameters

Parameter of SSH

- If command is specified, it is executed on the remote host instead of a login shell (s. example on next slide)
- default locations of configuration files
  - configuration file: ˜ /.ssh/config
  - private key: ˜ /.ssh/id_rsa ˜ /.ssh/id_dsa
- Parameters:
  - -l username (ssh -l sysadmin atlantis)
  - username@hostname (ssh sysadmin@atlantis)
  - -X (X11 forwarding: ssh -X sysadmin@gorilla)
  - -N do not execure command (is for port forwarding)
  - -f go into background
  - -L create tunnel (-L 1025:homer.risc.uni-linz.ac.at:25)
  - you can use more -L option in one command, (create more tunnels!)
  - -D works a SOCKSv5 proxy server
  - -v Verbose mode to debug problems and see the progress of connection (-vv, -vvv)

The SSH suite
SSH examples

```
hades:sysadmin!8> ssh ke@bullfinch
ke@bullfinch's password:
Linux bullfinch 2.6.24-etchnhalf.1-686 #1 SMP Thu Nov 5 02:25:56 UTC 20
......... deleted ........
No mail.
Last login: Sat Nov 21 17:45:11 2009 from hades.risc.uni-linz.ac.at
Sat Nov 21 17:45:12 CET 2009
bullfinch>
```

```
hades:sysadmin!12> ssh gonzales who
cschneid pts/2        Nov 18 12:11 (ozelot.risc.uni-linz.ac.at)
cschneid pts/3        Nov 19 15:33 (ozelot.risc.uni-linz.ac.at)
cschneid pts/4        Nov 18 13:52 (ozelot.risc.uni-linz.ac.at)
cdoench  pts/5        Nov 20 09:50 (dog.risc.uni-linz.ac.at)
mkauers  pts/6        Nov 21 12:01 (fennek.risc.uni-linz.ac.at)
hades:sysadmin!13>
```

Online presentation of the above commands

The SSH suite
ssh with command

X11 forwarding wird activated

```
hades:sysadmin!13> ssh -X gonzales
Linux gonzales 2.6.26-2-amd64 #1 SMP Thu Nov 5 02:23:12 UTC 2009 x86_64
Last login: Fri Nov 20 15:24:10 2009 from tc14.risc.uni-linz.ac.at
gonzales:sysadmin!1>
gonzales:sysadmin!1> mathematica &
[1] 18455
gonzales:sysadmin!2> kill -TERM 18455
gonzales:sysadmin!3>
```

Online presentation of invoking Mathematica remotely

Agenda

SSH tunneling

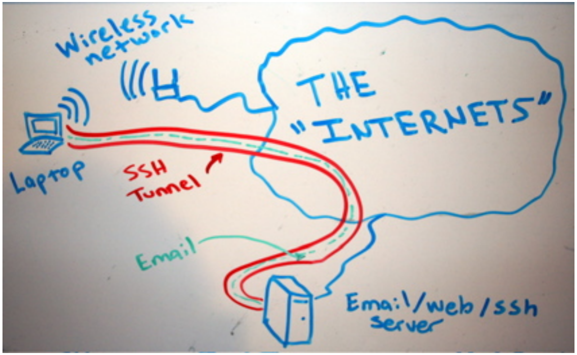
What is an SSH tunnel

- tunnel is a networking term, means a connection, usually encrypted
- connects two computers together across another usually untrusted network

Why do we need it - the Internet is very insecure !

- your laptop/home computer connects to another computer without encryption
- some protocols do have encryption built in, some do not
  - your email client, your ftp program, VNC client, etc.
- Never use clear text connections !
  - definitively not for login/password data!
- always configure SSH tunnel for your connections!

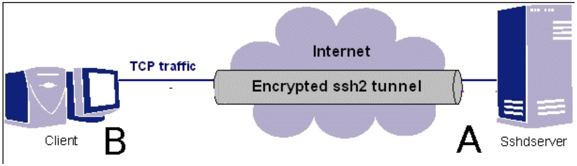
Secure WLAN connection through the Internet



SSH tunnel through the Internet

SSH Tunnel Topology

- Client B (laptop, PC at home, etc) connects using local ports
- Server A running the sshd server program
  - mail server: port 25 smtp; VNC server: port 5901
- through an SSH tunnel - encrypted connection !



How to make SSH tunnel in Linux

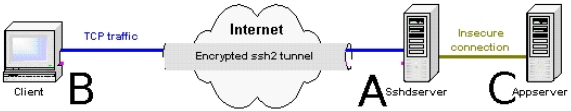
basic version:

- ssh -L localport:hostname:hostport hostname
  - Specifies that the given port (localport) on the local (the client) host is to be forwarded to the given host (hostname) and port (hostport) on the remote side (hostname).
  - ssh -L 22000:bullfinch.risc.uni-linz.ac.at:143 bullfinch.risc.uni-linz.ac.at
- ssh -L localport:hostname:hostport remotehost
  - Specifies that the given port (localport) on the local (the client) host is to be forwarded to the given host (hostname) and port (hostport) on the remote side (remotehost).
  - ssh -L 20000:grizzly.risc.uni-linz.ac.at:143 bullfinch.risc.uni-linz.ac.at
  - hostname and remotehost may be different !
  - the connection from localhost to remotehost is secure
  - the connection from remotehost to hostname is unsecure !!

How to make SSH tunnel in Linux

full version

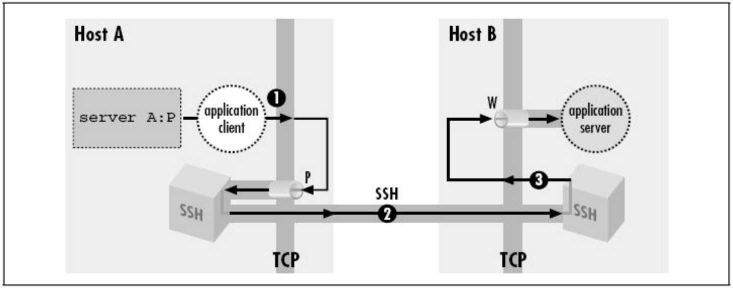
- ssh -f -N -L localport:host:hostport sshd-server-computer
  - B: local computer, C: host, A: sshd-server-computer
- -N is for portforwarding (do not execure command)
- -f go into background
- you can use more -L option in one command, (create more tunnels!)



SSH Tunnel - Port forwarding

Windows www.putty.org

Port forwarding



SSH Tunnel - Port forwarding

examples for more tunnels

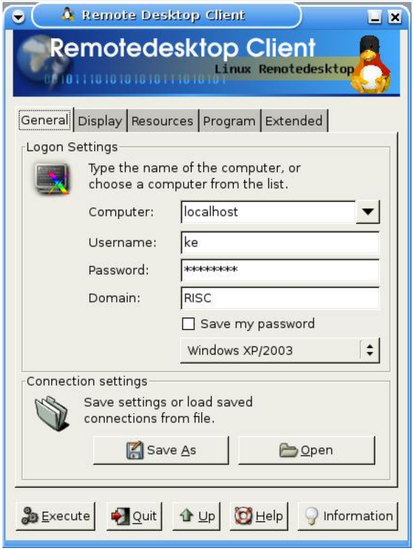
Tunnels for narwal (VNC) and crutch (RDP)

- shell aliases: narwal and crutch

```
uhu:~> which narwal
narwal:   aliased to
      ssh -f -N -L 5901:localhost:5901 narwal.risc.uni-linz.ac.at
uhu:~>

uhu:~> which crutch
crutch:   aliased to
      ssh -f -N -L 3389:crutch.risc.uni-linz.ac.at:3389
       homer.risc.uni-linz.ac.at
uhu:~>
```

SSH Tunnel - Port forwarding

examples: rdp tunneling from laptop to crutch though homer



Logon Settings

Type the name of the computer, or choose a computer from the list.

Computer:	localhost
Username:	ke
Password:	*********
Domain:	RISC

☐ Save my password

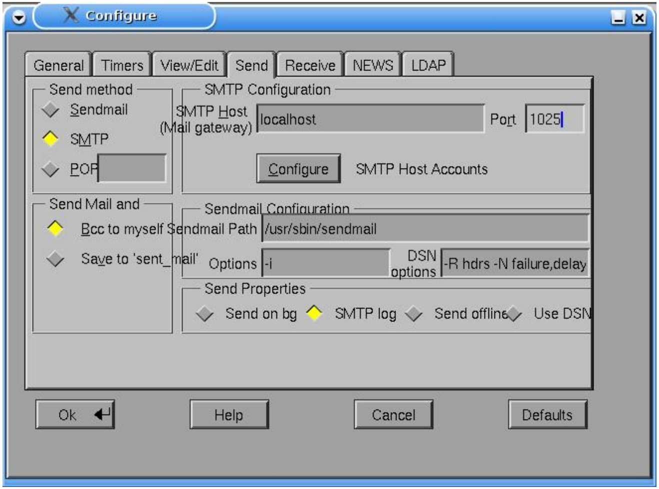
Windows XP/2003

Connection settings

Save settings or load saved connections from file.

SSH Tunnel - Port forwarding

examples: sending email with stmp by tunneling from laptop to homer



Send method: Sendmail [✓ SMTP] POP

SMTP Configuration

SMTP Host (Mail gateway): localhost Port: 1025

Configure SMTP Host Accounts

Send Mail and: [✓ Bcc to myself] Save to 'sent_mail'

Sendmail Configuration

Sendmail Path: /usr/sbin/sendmail

Options: -i DSN options: -R hdrs -N failure,delay

Send Properties: Send on bg [✓ SMTP log] Send offline Use DSN

SSH Tunnel - Port forwarding

examples for more tunnels

Tunnels

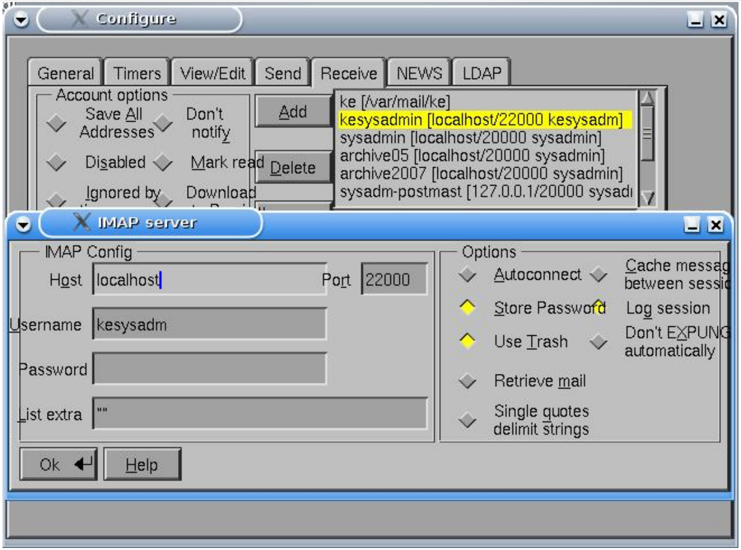
- shell alias: bt (bullfinch tunnel)

```
uhu:~> which bt
bt:      aliased to
     ssh -f -N
         -L 20000:grizzly.risc.uni-linz.ac.at:143
         -L 2222:bullfinch.risc.uni-linz.ac.at:995
         -L 1025:homer.risc.uni-linz.ac.at:25
         -L 4444:localhost:444
     bullfinch.risc.uni-linz.ac.at
```

- sysadmin:imap, kerdei:pop3s kerdei:smtp, sysadmin:apache2-ssl

SSH Tunnel - Port forwarding

examples: more IMAP connections through the same tunnel



ke [/var/mail/ke]
kesysadmin [localhost/22000 kesysadm]
sysadmin [localhost/20000 sysadmin]
archive05 [localhost/20000 sysadmin]
archive2007 [localhost/20000 sysadmin]
sysadm-postmast [127.0.0.1/20000 sysadı

IMAP Config

Host	localhost
Port	22000
Username	kesysadm
Password	
List extra	""

Options

- Autoconnect
- [✓ Store Password]
- [✓ Use Trash]
- Retrieve mail
- Single quotes delimit strings
- Cache messag between sessi
- Log session
- Don't EXPUNG automatically

SSH Clients - MS Windows

Use open source SSH programs

- www.putty.org
  - you can configure ssh tunnels with putty
- www.winscp.net

Agenda

Remote login without passwd by SSH

How to set up

Basics of the authentication

- SSH authentication methods
  - password authentication; private key authentication
- private key authentication
  - Create a private key - public key pair with ssh; set the passphrase for the private key !
  - Copy the public key to the remote computer
  - Configure the authentication agent: ssh-agent
  - use ssh-add command to add your identity to the `ssh-agent`
- Customizing the authentication
  - installing ssh-askpass
  - Starting `ssh-add` by an icon

Remote login with SSH
create a public key

Create public key

- Create a public key: ssh-keygen -t dsa
  - always USE a passphrase
  - without passphrase: if your private key is stolen your identity is stolen
  - choose it different from your password, choose a long one
  - it must as save as your password, it can be more save (less restriction)

```
sparrow:˜> ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ke/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/ke/.ssh/id_rsa.
Your public key has been saved in /home/ke/.ssh/id_rsa.pub.
The key fingerprint is:
5f:cb:bf:77:17:eb:82:f7:35:a1:c3:eb:32:d7:bd:af ke@sparrow
The key's randomart image is:
+--[ RSA 2048]----+
```

Remote login with SSH
copy public key

Copy public key

- copy the public key to the RISC computer
- add to .ssh/authorized_keys file

```
sparrow:~> cat .ssh/id_rsa.pub |
ssh narwal.risc.jku.at 'cat - >> .ssh/authorized_keys'

ke@narwal.risc.jku.at's password:
sparrow:~>
```

- you will be asked for your password on the remote computer
- check that it works:
  - ssh -X narwal.risc.uni-linz.ac.at
  - passphrase will be asked for

Remote login with SSH

ssh-add ssh-agent

ssh-agent

- Authentication agent, ssh-agent
  - saves the identity value (private key) in the memory
  - supports authentication requests from SSH
  - started by login in KDE, GNOME

ssh-add

- transfers the identification (.ssh/id_dsa) to ssh-agent
- asks for the passphrase, to decrypt the private key

```
sparrow:~> ssh-add .ssh/id_rsa
Enter passphrase for .ssh/id_rsa:
Identity added: .ssh/id_rsa (.ssh/id_rsa)
sparrow:~>
```

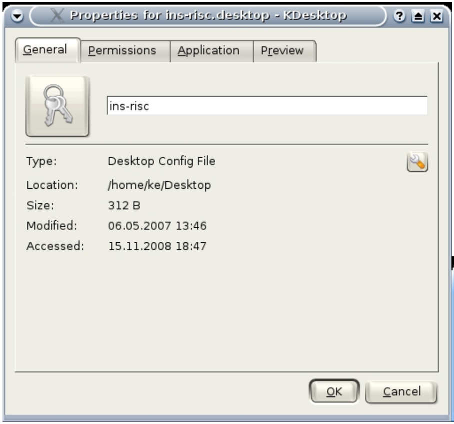
- will invoke ssh-askpass, if get a zero in standard input

Customizing ssh-add

icon for ssh-add

Create a small script in i.e. /usr/local/bin/ or ~ /bin

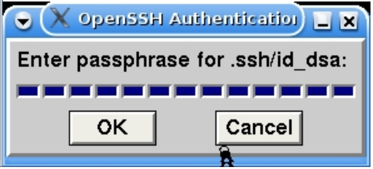
```
#!/bin/csh
cat /dev/null | ssh-add .ssh/id_dsa
```



Properties for ins-risc.desktop - KDesktop

ins-risc

Type: Desktop Config File
Location: /home/ke/Desktop
Size: 312 B
Modified: 06.05.2007 13:46
Accessed: 15.11.2008 18:47



OpenSSH Authenticatio

Enter passphrase for .ssh/id_dsa:

Important security tips
for using the Internet

for more security in the Internet

- always use Linux and not MS Windows
  - Linux has no viruses (only security holes)
  - Debian is more secure as Ubuntu (testing period half year only)
- never use Windows for internet banking
- never use smartphones for getting the mobile TAN
  - use old simple mobile phones
- always transport your identification on a secure way
  - through secure intranet (RISC) or by USB Sticks

The most UNSECURE internet mediums are:

- public WLAN hotspots
- cable networks of the internet providers

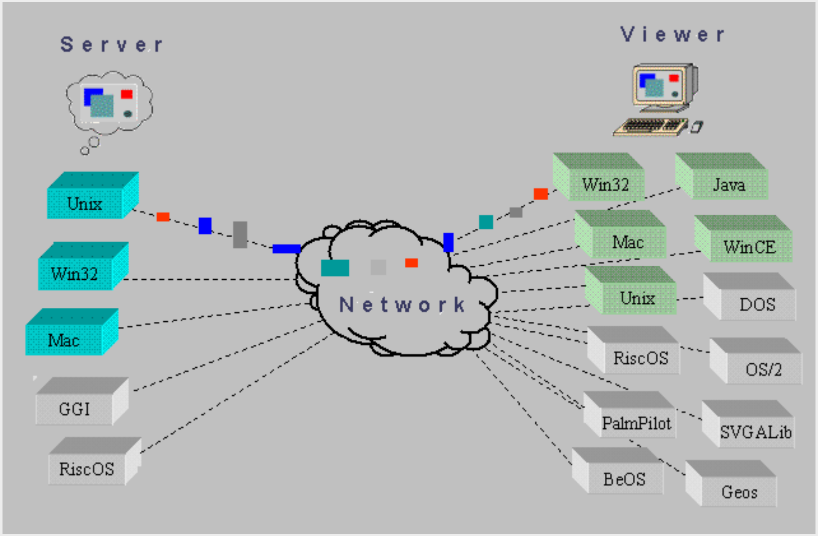
The most secure internet connections are:

- UMTS networks

Agenda

VNC (Virtual Network Computing)

referred as Virtual Network Console, too



VNC - Virtual Network Computing

Basic Features

VNC is a free platform-independent application

- is a Client-Server architecture based on the RFB protocol
- is a graphical desktop sharing system
  - without the need of X on the client side
- transmits the keyboard and mouse events from one computer to another
- relays the graphical screen updates back in the other direction
- is not a secure protocol
  - passwords are not sent in plain-text
  - crack could be successful if both the encryption key and encoded password are sniffed from a network
- always use VNC through an SSH tunnel !
- Open source tool: `http://www.realvnc.com`

VNC - Virtual Network Computing

Basic terminology

Framebuffer (FB)

- is a video output device that drives a video display from a memory buffer containing a complete frame of data
- the information in the buffer consists of color values for every pixel on the screen
- total memory required for the FB depends on the resolution, and on the color depth
- a FB device driver was created for X11: XF86 FBDev as standard part of XFree86
- FBDev is basic driver in X, without using the features of the GPU

VNC - Virtual Network Computing
RFB Protocol

Remote Framebuffer (RFB) protocol

- is a simple protocol for remote access to graphical user interfaces
- it works at the framebuffer level, it is applicable to all windowing systems and applications, including X11, Windows and Macintosh.
- to the basic features a lot of extensions added
  - file transfers
  - more sophisticated compression
  - security techniques
- seamless cross-compatibility
  - between the many different VNC client and server implementations
- clients and servers negotiate using
  - the best RFB version
  - most appropriate compression and security options

RealVNC, Ltd.

- continues development of VNC and to maintain the RFB protocol

VNC - Virtual Network Computing

VNC Server

VNC Server features

- runs on the remote computer !
- does not have a physical display! (does not bind to a display)
- consists of two servers on Linux/Unix OS
  - Framebuffer Server: to communicate remotely with the VNC client
  - X Server: to communicate locally (on the remote computer) with the X-clients, presenting itself as a real X-Server
  - the X-server part fills up the framebuffer with the output from the X-clients
  - the FB-server part transfers the content of the FB to VNC-client(s)
- the session information will be kept in the server side
  - if you disconnect from the VNC server it will not close the session
  - Disconnecting from VNC server behaves like locking the session and switching off the monitor
- you have explicitly kill the VNC server after your work !

VNC - Virtual Network Computing
VNC Server II

VNC Server features

- by default uses TCP ports 5900 through 5906
  - each port corresponds to a separate screen (:0 to :6)
- uses ports 5800 through 5806 for java connections
  - allowing clients to interact through a Java-enabled web browser
  - (be careful using Java - security holes)
- Xvnc is the Unix VNC server, it is based on standard X server
- any number of Xvnc server can be started (think on resources!)
  - choose a simple desktop - save resources
- more clients can connect to the same server
- VNC need more/high bandwidth because of tranferring screenshots

VNC - Virtual Network Computing
Starting the VNC Server

Starting the VNC server

- log in by ssh to a RISC computer, e.g. beagle:
  - ssh -l username beagle.risc.uni-linz.ac.at
  - uhu> ssh -l username beagle.risc.uni-linz.ac.at
- start the VNC server by the command:
  - beagle:1> vncserver -geometry 1024x768 -depth 24
- You will see something similar in the screen (it just ask a session password at the first run):

```
You will require a password to access your desktops.
Password:
Verify:
New 'X' desktop is beagle:1
Starting applications specified in /etc/X11/Xsession
Log file is /home/yourusername/.vnc/beagle:1.log
```

- The VNC server password must be same secure as your login password ! It gives access to your home directory.

VNC - Virtual Network Computing
Starting the VNC server

Starting Server

- You have to memorize the server name and the screen number - after the computer name (in this case it is ":1")
  - The port number will be 5901 (5900+screen number)
- You have to shutdown the VNC server, after you do not need it:
  - beagle:3> vncserver -kill :1

    ```
    Killing Xvnc4 process ID 2693
    beagle:4>
    ```
- The configuration and log data for the VNC server are stored in the
  - /home/<username>/.vnc/ directory
- The VNC server asks for the password at the first time only
- If you forgot the password for the VNC server, remove or change it:
  - rm /home/<username>/.vnc/passwd
  - vncpasswd /home/<username>/.vnc/passwd

VNC - Virtual Network Computing

Starting the VNC client

Starting the VNC Client

- create an ssh tunnel on your local computer to the vnc server:

```
     ssh -f -l username -N -L 5901:localhost:5901 srvname
uhu> ssh -f -l username -f -N -L 5901:localhost:5901 beagle.risc.un
```

- start the VNC client on your local computer

```
uhu> xvncviewer localhost:1
```

- best solution is to use a shell alias, e.g. for the tcsh in /home/username/.cshrc :
  - beagle alias "ssh -f -l username -N -L 5901:localhost:5901 beagle.risc.uni-linz.ac.at "
  - source /home/username/.cshrc
  - activate the tunnel in the command line by beagletunnel
- Security Risk
  - your password can be stolen using xvncclient without ssh tunnel !
  - hacker get full access to your home directory

VNC - Virtual Network Computing

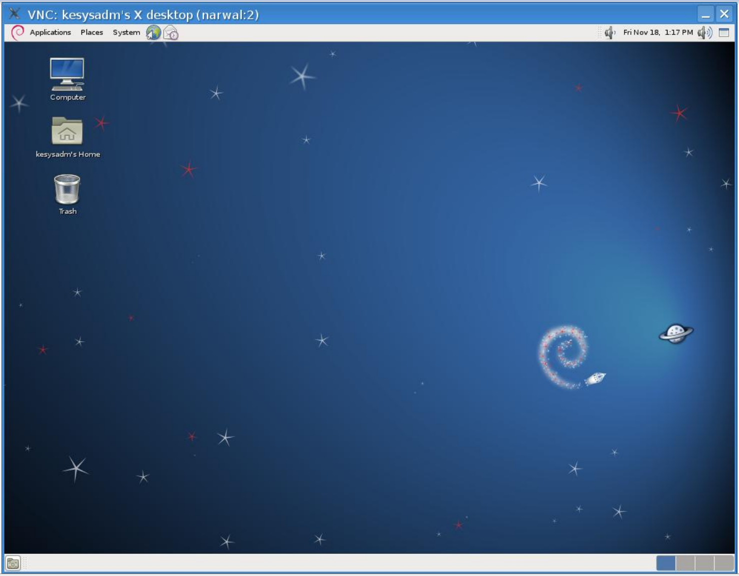
VNC server and client starting

Configuration of the `vncserver` at RISC

- the vncservers at RISC are configured with option -localhost
    - this means, that the vncserver accepts connections only from localhost (127.0.0.1)
    - with other words: you MUST use ssh tunnel to the host where the vncserver is running (otherwise you'll get error: connection refused).
- example: assumed, you started the vncserver on the computer speedy.risc.uni-linz.ac.at, you need the follwoing ssh-tunnel:
    - `ssh -f -l username -N -L 5901:localhost:5901 speedy.risc.uni-linz.ac.at`
    - localhost will be replaced by 127.0.0.1, and this is the IP from which the vncserver accepts connections.

VNC - Virtual Network Computing

VNC Client - xnvcviewer



VNC - Virtual Network Computing

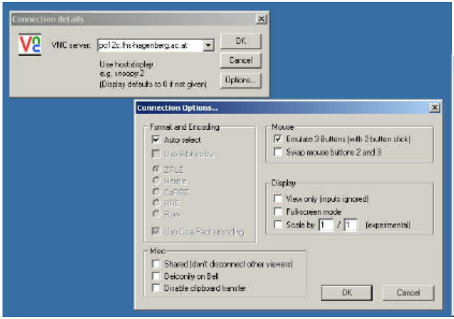
VNC Server - default xstartup file

xstartup file: /home/user/.vnc/xstartup

```
#!/bin/sh

xrdb $HOME/.Xresources
xsetroot -solid grey
#x-terminal-emulator -geometry 80x24+10+10 -ls -title "$VNCDESKTOP Desk
#x-window-manager &
# Fix to make GNOME work
export XKL_XMODMAP_DISABLE=1
/etc/X11/Xsession
```

Real VNC

Using VNC under MS Windows



Connection details

VNC server: pc12c.fhs-hagenberg.ac.at

Use host:display
e.g. snoopy:2
(Display defaults to 0 if not given)

OK | Cancel | Options...

Connection Options...

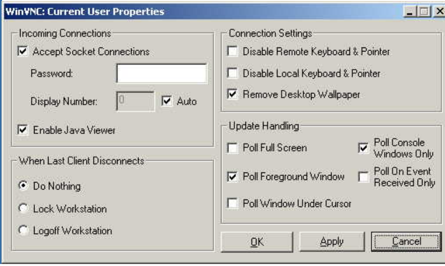
Format and Encoding
- [✓] Auto select
- [ ] Use 8-bit colour
- (●) ZRLE
- ( ) Hextile
- ( ) CoRRE
- ( ) RRE
- ( ) Raw
- [✓] Use CopyRect encoding

Mouse
- [✓] Emulate 3 Buttons (with 2-button click)
- [ ] Swap mouse buttons 2 and 3

Display
- [ ] View only (inputs ignored)
- [ ] Full-screen mode
- [ ] Scale by 1 / 1 (experimental)

Misc
- [ ] Shared (don't disconnect other viewers)
- [ ] Deiconify on Bell
- [ ] Disable clipboard transfer

OK | Cancel



WinVNC: Current User Properties

Incoming Connections
- [✓] Accept Socket Connections
- Password:
- Display Number: 0 [✓] Auto
- [✓] Enable Java Viewer

When Last Client Disconnects
- (●) Do Nothing
- ( ) Lock Workstation
- ( ) Logoff Workstation

Connection Settings
- [ ] Disable Remote Keyboard & Pointer
- [ ] Disable Local Keyboard & Pointer
- [✓] Remove Desktop Wallpaper

Update Handling
- [ ] Poll Full Screen
- [✓] Poll Console Windows Only
- [✓] Poll Foreground Window
- [ ] Poll On Event Received Only
- [ ] Poll Window Under Cursor

OK | Apply | Cancel

Demonstration VNC client

Now make a short demonstration

how VNC works through a tunnel

Agenda

Remote Desktop Protocol
Microsoft Windows

Windows NT/2000: Terminal Services extension

- Remote Desktop Protocol (RDP) developed in the mid 1990's by Microsoft
    - RDP client computer (Windows/Unix) opens a remote desktop session on a Windows NT/2000 server with terminal services extension
    - In client window, user sees another desktop running on the server
    - Introduced by Windows NT Terminal Server Edition
    - Installed at RISC in 1999 for MS Office Compatibility goals
    - The first MS Windows Multiuser OS !
- Windows XP:
    - Provides builtin RDP service functionality
- Windows 2003 Server: successor of NT/2000 Terminal Server Editon

Remote Desktop Protocol
crutch - the RISC Windows 2003 server

crutch: Linux - Windows integration

- Supporting the RISC users for some MS Windows applications
  - for software available only on MS Windows
- Microsoft Software
  - OpenOffice and MS-Office are not fully compatible
  - MS Office is available in the (near) last version on crutch
- Adobe Software
  - Adobe Acrobat 9 Pro Extended (2 concurrent licenses)
  - Adobe Photoshop Lightroom 2.1 (1 concurrent license)
- Other Software
  - ACDSee 8 (image management and manipulation sw)
  - Canon DPP (Digital Photo Professional, for Canon DSLR RAW images)
- Configuration of crutch
  - the riscwide home directory is available (scratch,too)

Remote Desktop Protocol

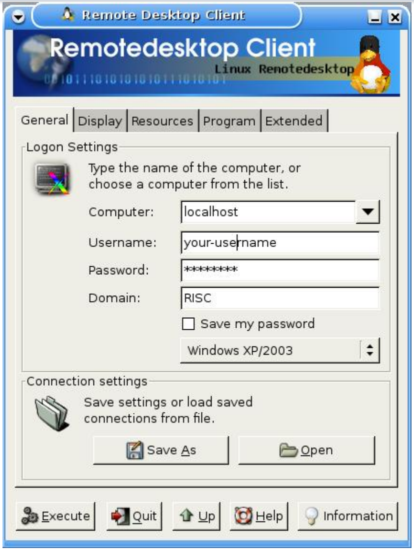
crutch - the RISC Windows 2003 server

RDP ports, connections

- How to connect through an SSH tunnel to crutch
  - RDP uses the port 3389
  - the Windows-2003 server has no SSH server implementation
  - you have to connect to a Linux computer at RISC with SSH and make the tunnel through this computer to crutch
- ssh -l username -f -N -L 3389:crutch.risc.uni-linz.ac.at:3389 beagle.risc.uni-linz.ac.at
  - this is an SSH connection from your computer to beagle
  - the tunnel runs from your computer through beagle to crutch
  - the tunnel section between beagle and crutch is not secure
- Configuration of grdesktop
  - define localhost in the General options for the field Computer

GRDesktop - Configuration

Gnu RDP Client



Logon Settings

Type the name of the computer, or choose a computer from the list.

Computer:	localhost
Username:	your-username
Password:	*********
Domain:	RISC

☐ Save my password

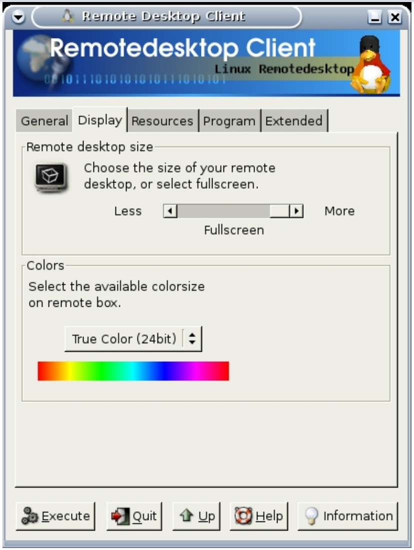
Windows XP/2003

Connection settings

Save settings or load saved connections from file.

GRDesktop - Configuration

Gnu RDP Client



Remote desktop size

Choose the size of your remote desktop, or select fullscreen.

Less [slider] More

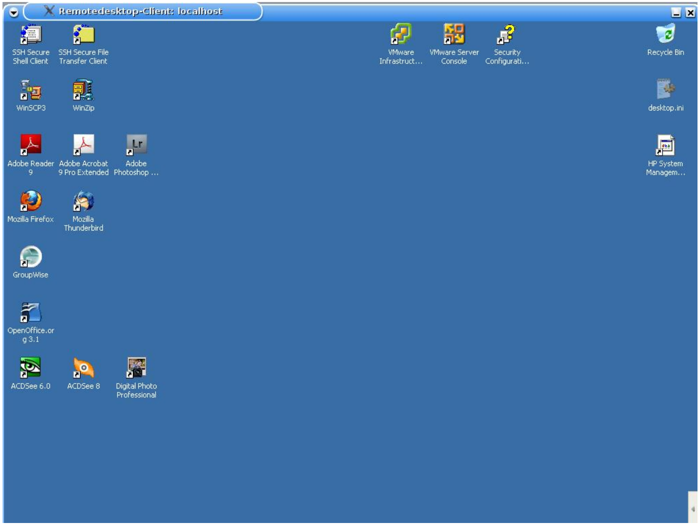
Fullscreen

Colors

Select the available colorsize on remote box.

True Color (24bit)

GRDesktop
Main screen



End of Remote Services, Desktops

Thanks for your attention !