Advanced OpenSSH

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Advanced OpenSSH

- Basic Usage
- Authentication Methods
- Keys and Agents
- Remote X Windows
- Tunnels and Port Forwarding
- Client Configuration
- Server Configuration

Basic Usage

Secure access to remote command-line

- Replaces telnet, rlogin, and rsh
- Requires support on remote end

Remote shell on a firewall or "jump host"

```
ssh hostname
```

If at first you don't succeed...

```
ssh -v user@hostname
```

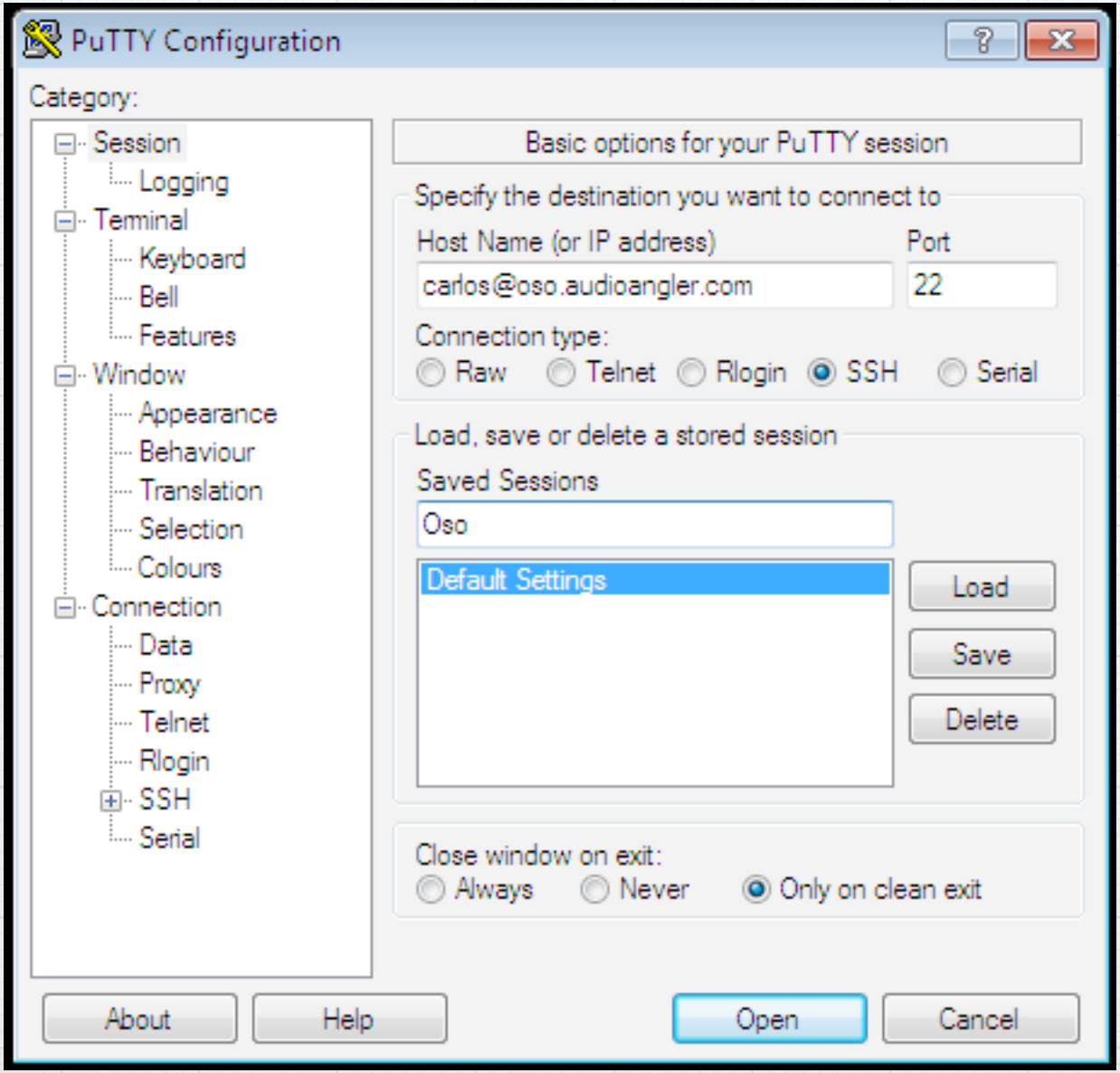
Escape Sequence

`ssh -e <char> user@hostname`

Default escape character is the tilde: ~

```
~.   - terminate connection
~^Z  - suspend ssh
~#   - list forwarded connections
~&   - background ssh
~?   - this message
~~   - send the escape character
       "upstream" by typing it twice
```

Basic PuTTY


PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
Telnet
Rlogin
SSH
Serial
Basic options for your PuTTY session
Specify the destination you want to connect to
Host Name (or IP address)
Port
carlos@oso.audioangler.com
22
Connection type:
Raw
Telnet
Rlogin
SSH
Serial
Load, save or delete a stored session
Saved Sessions
Oso
Default Settings
Load
Save
Delete
Close window on exit:
Always
Never
Only on clean exit
About
Help
Open
Cancel

Authentication Methods

- Password *
- Public Key Exchange *
- GSSAPI (Kerberos)
- Host equivalence
- Challenge/Response

Remote host handles authentication

Private and Public Keys

New "Key Pair" Creation:

```
ssh-keygen -t rsa -b 2048
```

* Choose a memorable passphrase!!
    - Private key is used by client
        Default is ~/.ssh/id_rsa
    - Public key is copied to remote servers
        Default is ~/.ssh/id_rsa.pub

Public Keys

Public Keys in Linux and UNIX:

`~/.ssh/known_hosts`

and

`~/.ssh/authorized_keys`

are checked by sshd on incoming connections

- Client presents a checksum based on private key
- Server uses public key to validate checksum

Authentication Agents

- Many different ways of doing agent-based auth
  - `ssh-agent` in Linux and UNIX
  - Pageant for PuTTY on Windows
  - Some keychain facilities provide ssh agents
  - Can use one or many keys for different uses
- Even sudo supports it now: pam_ssh_agent_auth

Linux Agent Authentication

The agent itself is a background process, invoked as

```
% eval `ssh-agent -s`
```

Runs ssh-agent, which forks and outputs shell commands to set up the environment for `ssh -A`

`ssh-add` to add key(s)

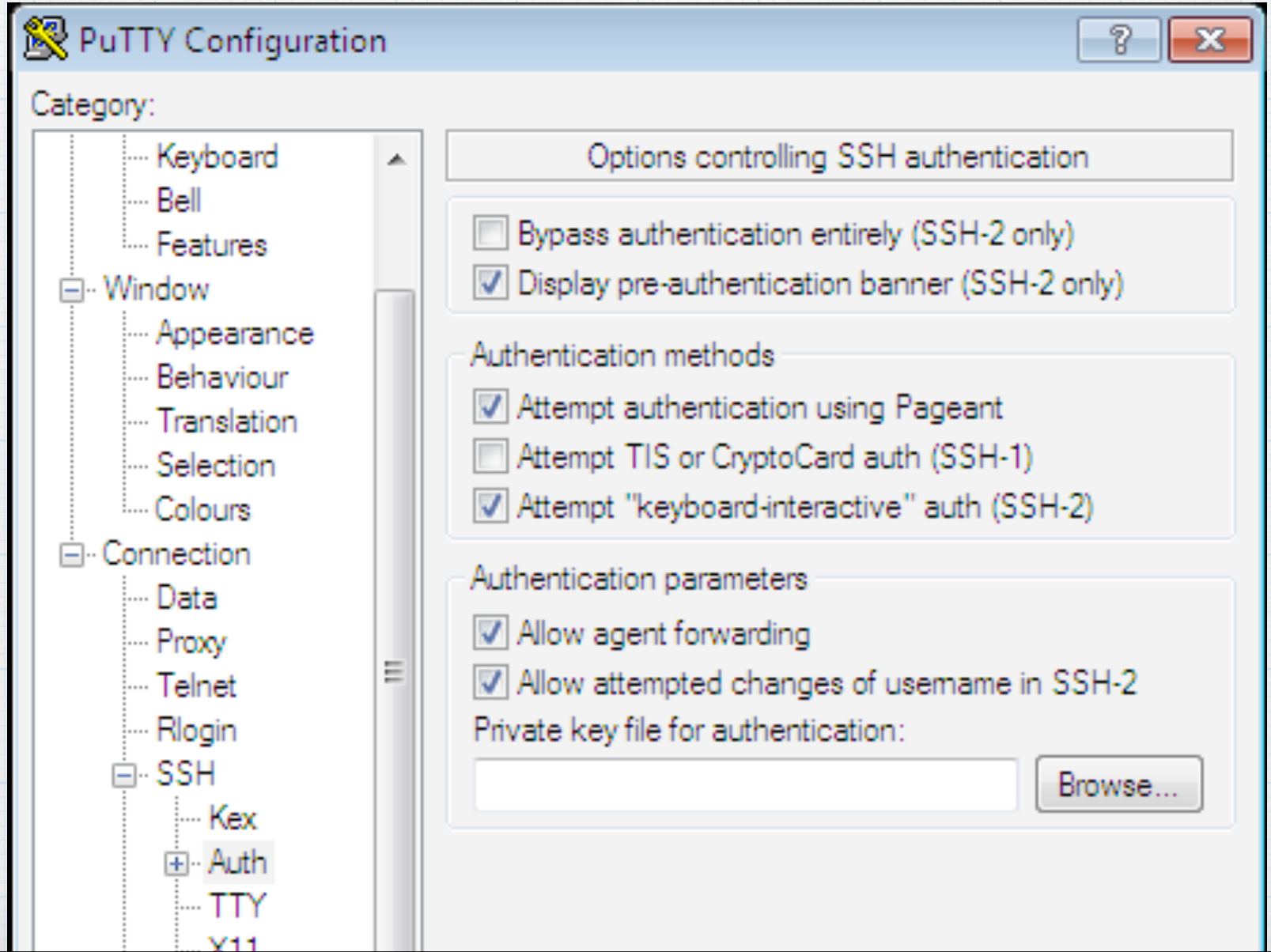
`ssh-add -l` to list active keys

Then, subsequent ssh authentication is relegated back "up the chain" to the originating ssh client

PuTTY Agent Authentication

- PuTTY and WinSCP both use Pageant for agent auth
- Pageant idles in the system tray until a private key is loaded
- You can load multiple keys, but they have to be .ppk
- Puttygen is used to import an OpenSSH rsa key
  - It's harder to go the other way!

PuTTY Agent Authentication



Port Forwarding

- SSH "tunnel" encapsulates traffic
  - Encryption
  - Compression
- Remote X Windows
- VNC example (Linux and putty)
- Database server example (cmd line)

X11 Forwarding

X11 support is built into OpenSSH

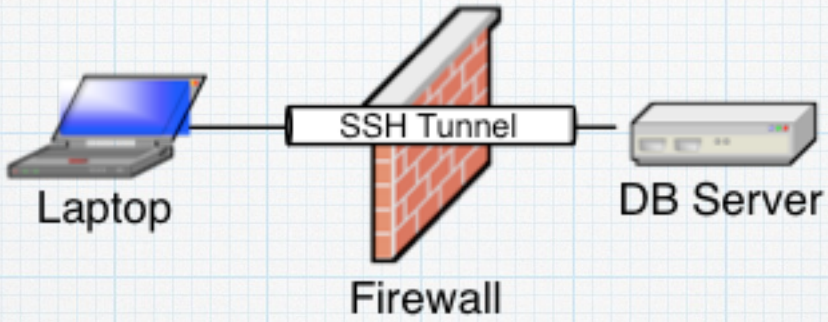
ssh -X user@host

The client's DISPLAY environment variable is passed along to remote shell

ssh provides a "proxy" X server to forward remote display traffic through the tunnel

ssh also creates an Xauthority cookie and validate that the forwarded traffic uses this token, not the "real" Xauth cookie

SSH Tunnel for VNC Remote

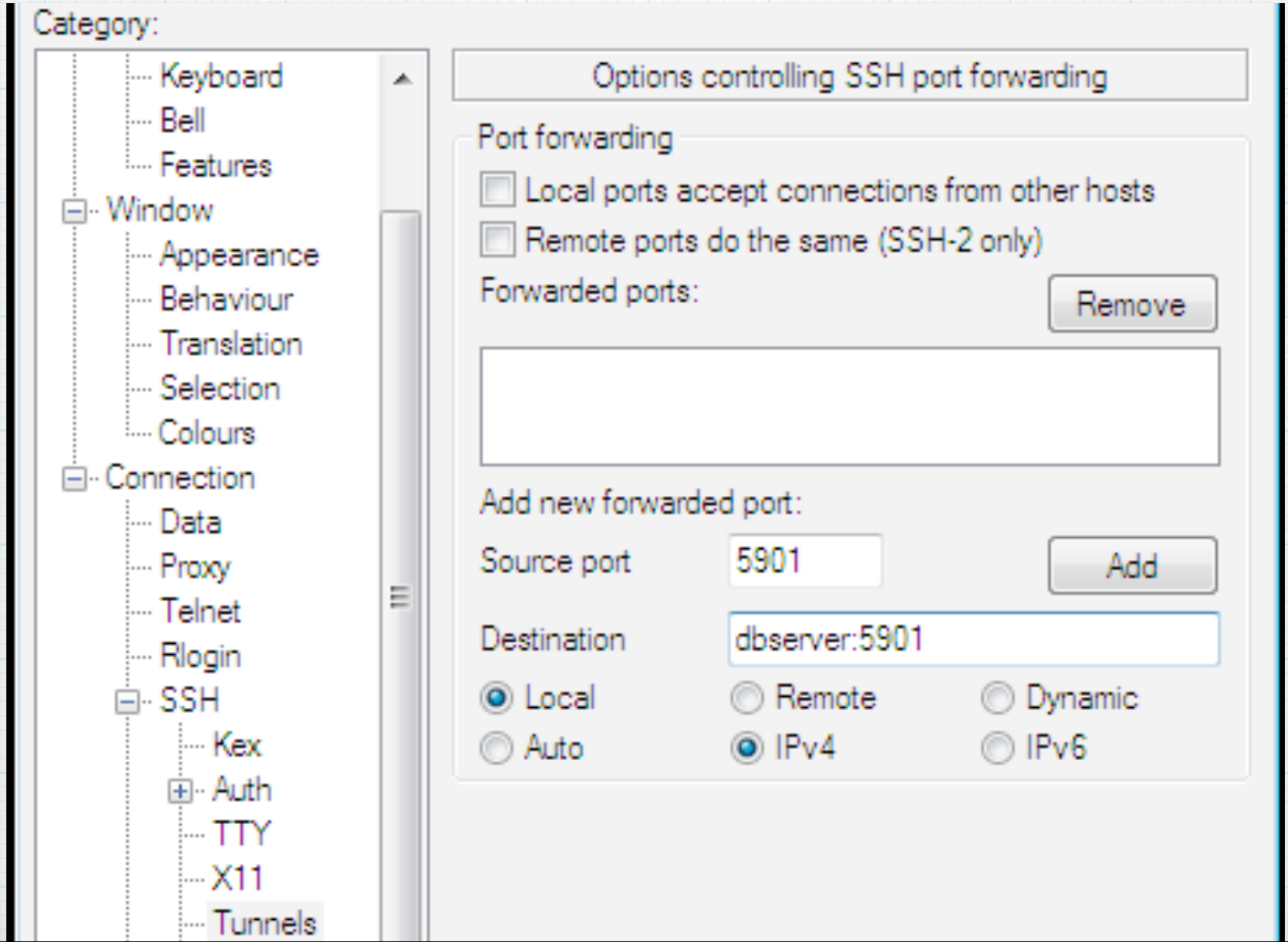


Laptop vncviewer connecting to Firewalled Server

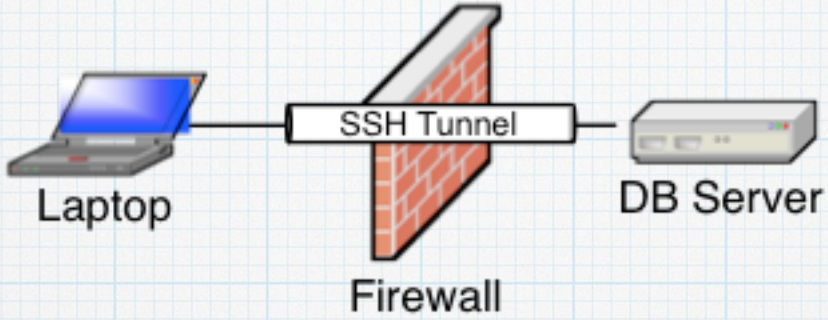
```
laptop% ssh -L 5901:localhost:5901 user@dbserv

    dbserv% vncserver :1 -localhost

laptop% vncviewer localhost:5901 &
```

Note: TigerVNC's vncviewer includes ssh support, `-via` flag

PuTTY Tunnel for VNC



Local Tunnel for DB



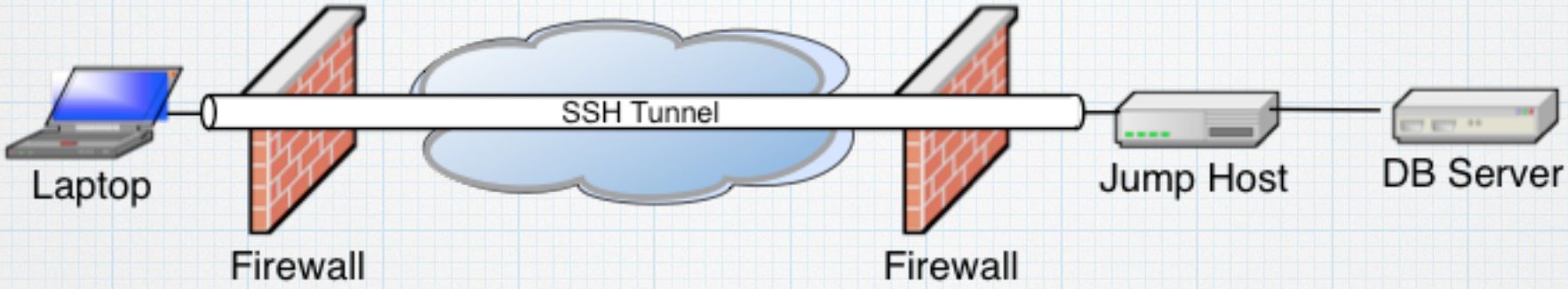
Example: Laptop to DB Server via port-forwarding

```
ssh -L 3306:localhost:3306 dbuser@dbserv
```

Now we make a "local" connection to mysql

```
mysql -h localhost -u dbuser dbname
```

Remote Tunnel for DB



Ex. 1: Jump host to DB Server

```
ssh -L 3306:localhost:3306 dbuser@dbserv
mysql -h localhost -u dbuser dbname
```

Ex. 2: Remote Laptop to DB Server

```
ssh -L 3306:dbserv:3306 user@jumphost
mysql -h localhost -u dbuser dbname
```

scp and sftp

Secure remote copy over an ssh tunnel

- Replaces rcp and ftp

Supports compression, as in, `ssh -C`

`scp` *`files hostname`*`:`*`remote-dir`*

`scp -rC` *`dir hostname`*`:remote-`*`dir`*

Many GUI clients enable drag-n-drop

- WinSCP for Windows, Cyberduck for Mac

Client Configuration

A great many ssh client options can be set in

`~/.ssh/options`

or `/etc/ssh/ssh_config`

Examples:

```
ForwardAgent yes
KeepAlive    yes
ServerAliveInterval 12
RSAAuthentication yes
GSSAPIAuthentication no
ForwardX11 no
```

Server Configuration

Again, many sshd options can be set in

`/etc/ssh/sshd_config`

Examples:

```
Protocol 2
PermitRootLogin no
PasswordAuthentication yes
GSSAPIAuthentication no
X11Forwarding no
TCPKeepAlive yes
```

References

- http://www.openssh.org

  man pages, RFC's, history, etc.

- SSH Mastery: OpenSSH, PuTTY, Tunnels, and Keys

  by Michael W Lucas

- http://www.evans.io/posts/ssh-agent-for-sudo-authentication/

Time For Your Questions

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