

Introduction to UNIX

The word "UNIX" is written in a large, bold, black font. The letters are slightly slanted to the right. The background is a dark gray gradient.

Where there is a shell, there is a way.

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Consultant Clustercomputing



Outline

Introduction to UNIX

- What is UNIX?
- (Short) history of UNIX

Login to Lisa

- With username and password
- With a key pair

Hands on – Let's Play!

- Install UNIX tool on your laptop
- Create key pair
- Login to Lisa
- First step on a UNIX, or rather Linux, system

What is UNIX?

What is UNIX?

- Operating System
 - Program that controls all other parts of a computer system
 - Allocates computer's resources and schedules tasks
 - Allows the user to use the facilities provided by the system
 - Essential to all computer systems
- Multi-User, Multi-Tasking
 - Multiple users have multiple tasks running simultaneously
- Designed to be machine independent
- Setup as a software development environment

History of UNIX



Developed by AT&T Bell Labs, starting 1969

- Ken Thompson (sitting) and Dennis Ritchie – on a PDP-11

<https://www.youtube.com/watch?v=JoVQTPbD6UY>

Remote Login (SSH) to SURFsara

Authentication on (some) SURFsara systems

Lisa

- username/password
- key pair

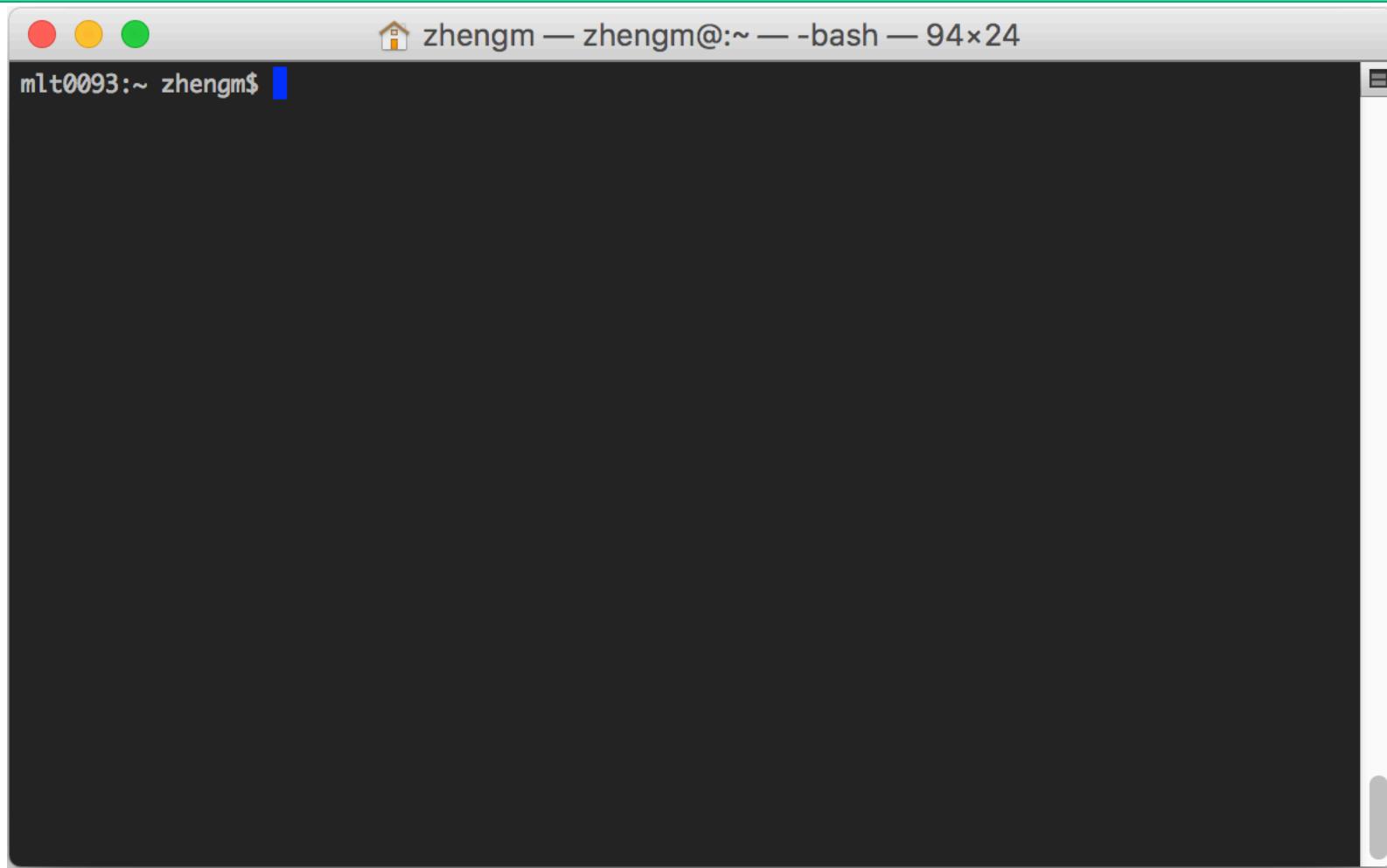
Cartesius

- username/password
- key pair

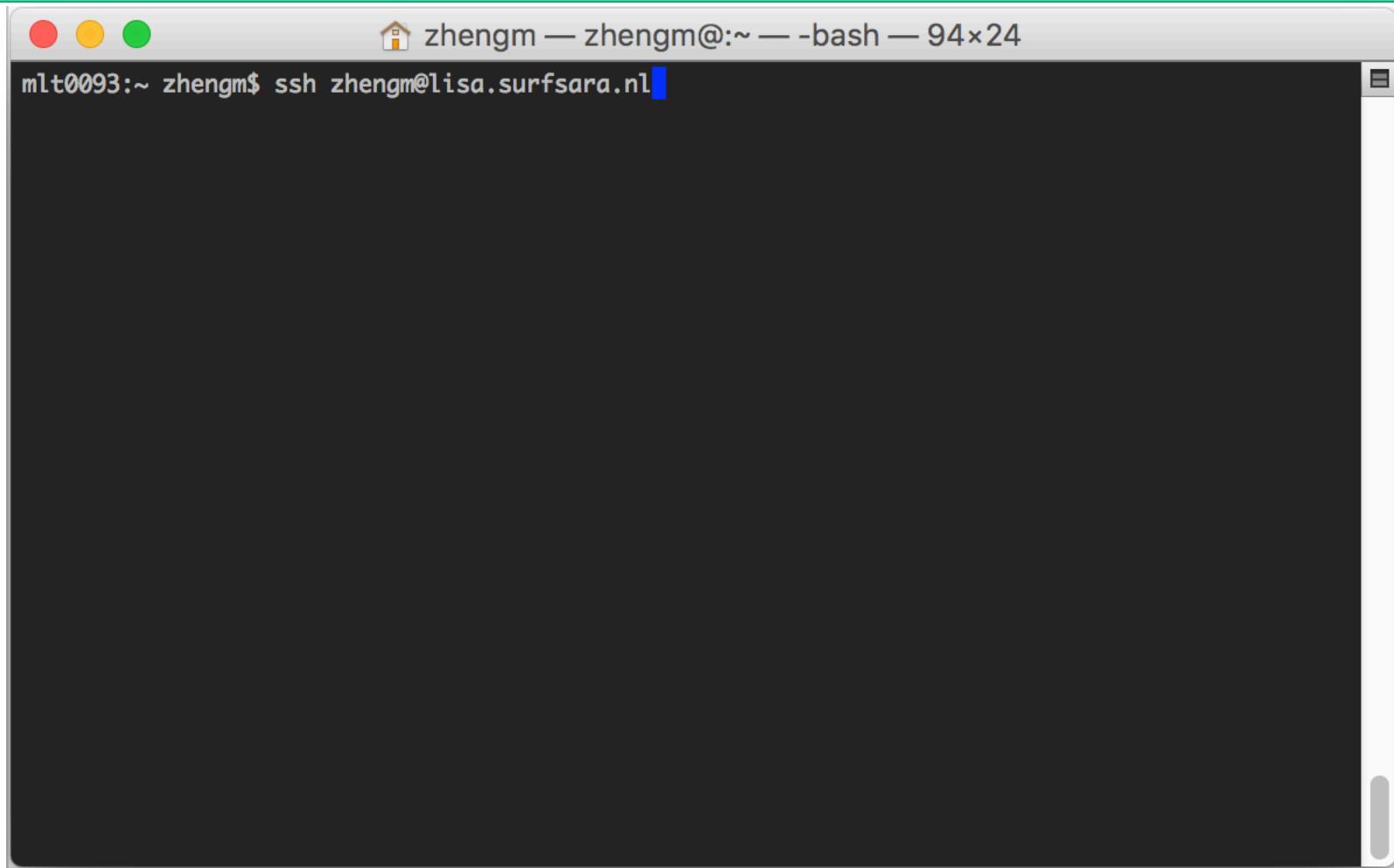
HPC Cloud

- key pair (only!)

Login to Lisa – with username (1)

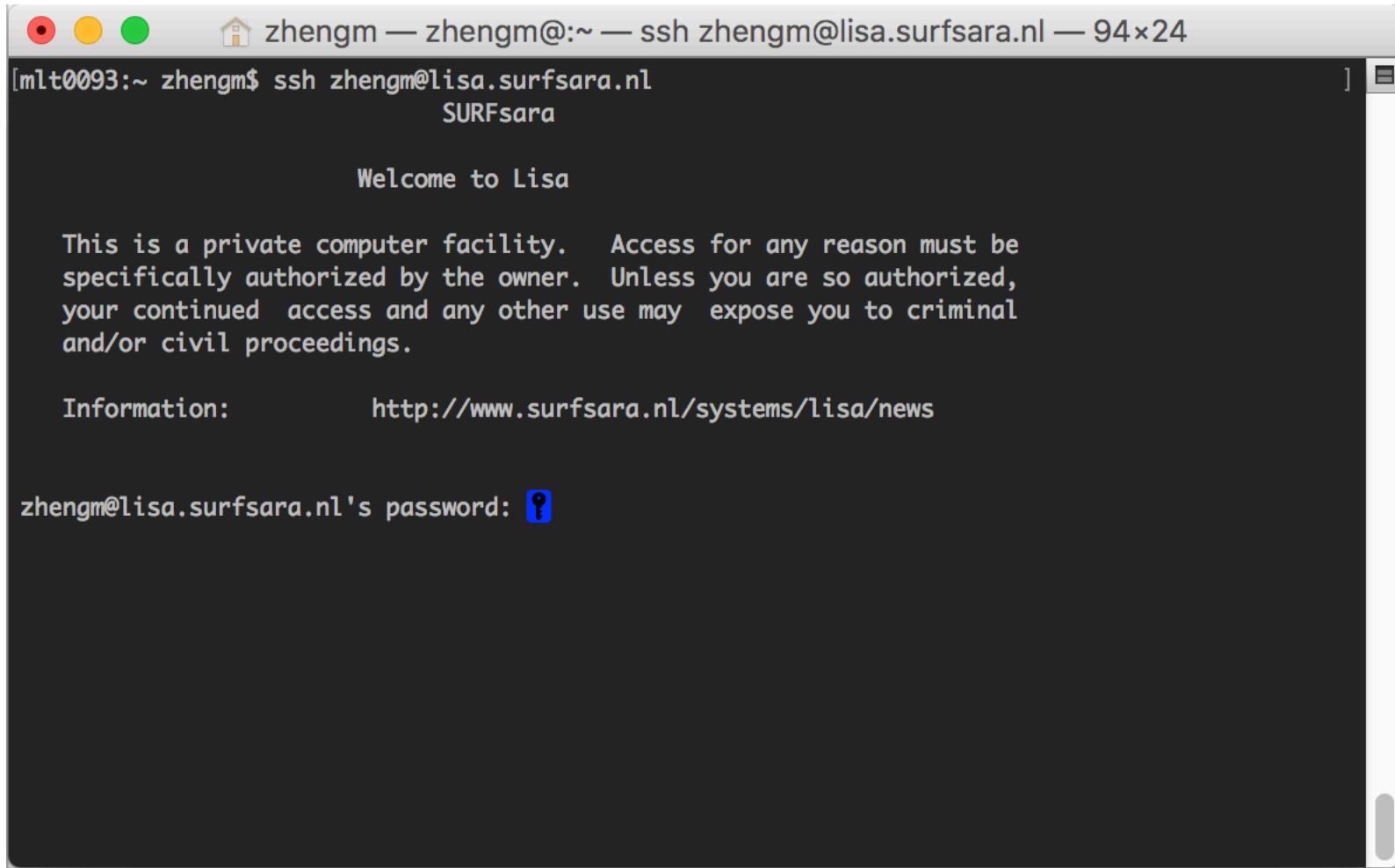


Login to Lisa – with username (2)



```
zhengm — zhengm@:~ — -bash — 94x24
mlt0093:~ zhengm$ ssh zhengm@lisa.surfsara.nl
```

Login to Lisa – with username (3)



A screenshot of a terminal window titled "zhengm — zhengm@:~ — ssh zhengm@lisa.surfsara.nl — 94x24". The window shows the following text:

```
[mlt0093:~ zhengm$ ssh zhengm@lisa.surfsara.nl
      SURFsara

      Welcome to Lisa

      This is a private computer facility. Access for any reason must be
      specifically authorized by the owner. Unless you are so authorized,
      your continued access and any other use may expose you to criminal
      and/or civil proceedings.

      Information: http://www.surfsara.nl/systems/lisa/news

      zhengm@lisa.surfsara.nl's password: 
```

The terminal window has a dark background with white text. It includes standard OS X window controls (red, yellow, green) and a scroll bar on the right.

Login to Lisa – with username (4)

```
zhengm — zhengm@:~ — ssh zhengm@lisa.surfsara.nl — 94x24
* Information at: http://www.surfsara.nl/systems/lisa *
*
* Ganglia (host/job) monitoring at: http://ganglia.surfsara.nl/
*****
* - Please use /scratch as scratch (output) space for jobs *
* - Processes on the login nodes that consume more than 15 minutes cputime *
* or 1GB resident memory will be automatically killed. Certain system and *
* login programs are excluded from this, such as ssh and scp. *
*****
*
* Questions?
* Call or email your advisor, or contact our helpdesk: helpdesk@surfsara.nl. *
*
*****
* Due to maintenance the archive filesystems will not be available on *
* November 8th from 9:00 until 14:00. *
*
*****
***** last modified: 02/11/16,11:09 ***

```

Filesystem	Quota	Used	Avail	Use%	Server
/home/zhengm	200.0 GB	3.71 GB	196.29 GB	1%	fs12

```
zhengm@login2:~$
```

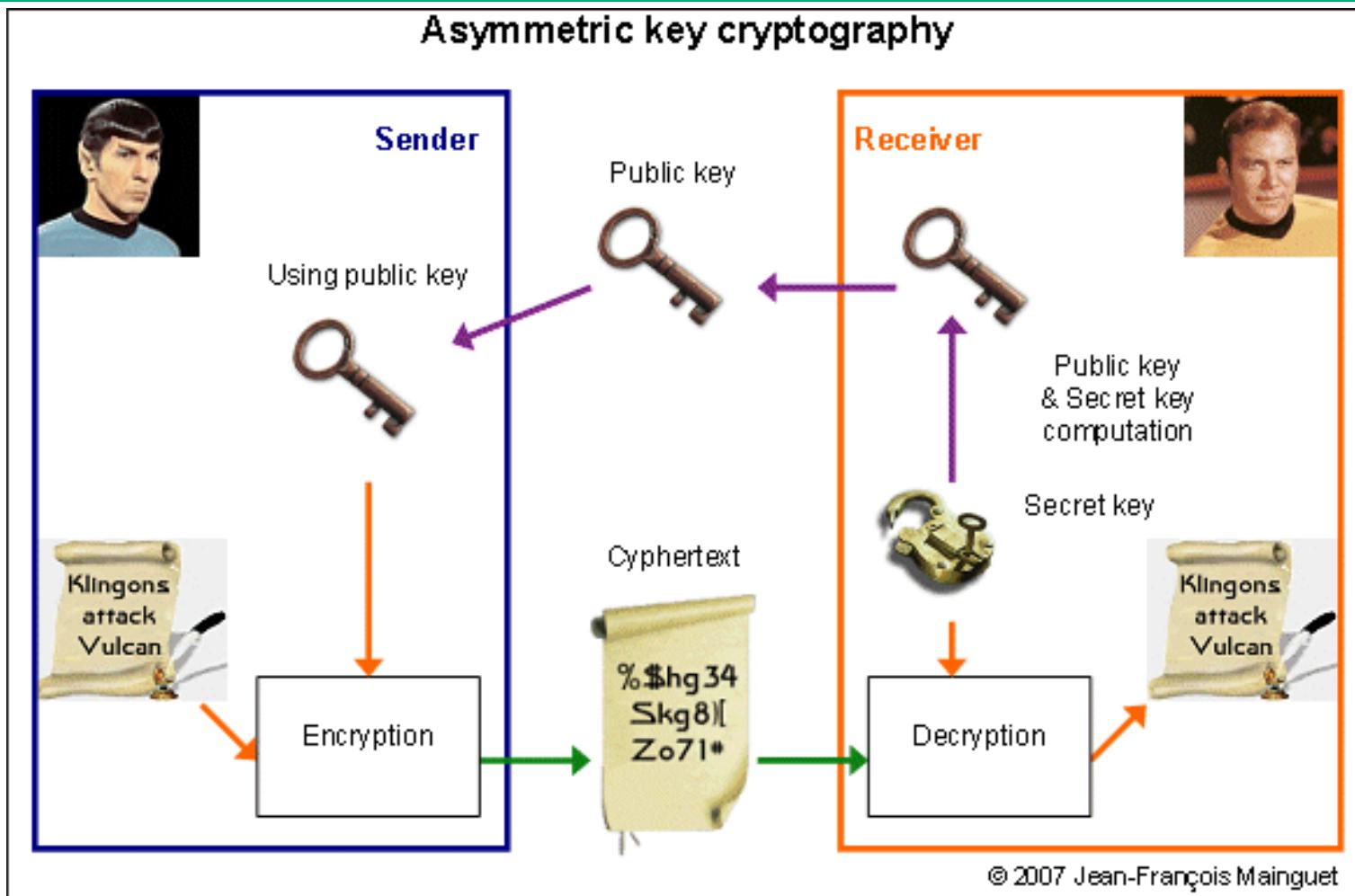
Asymmetric Encryption – key pair (1)



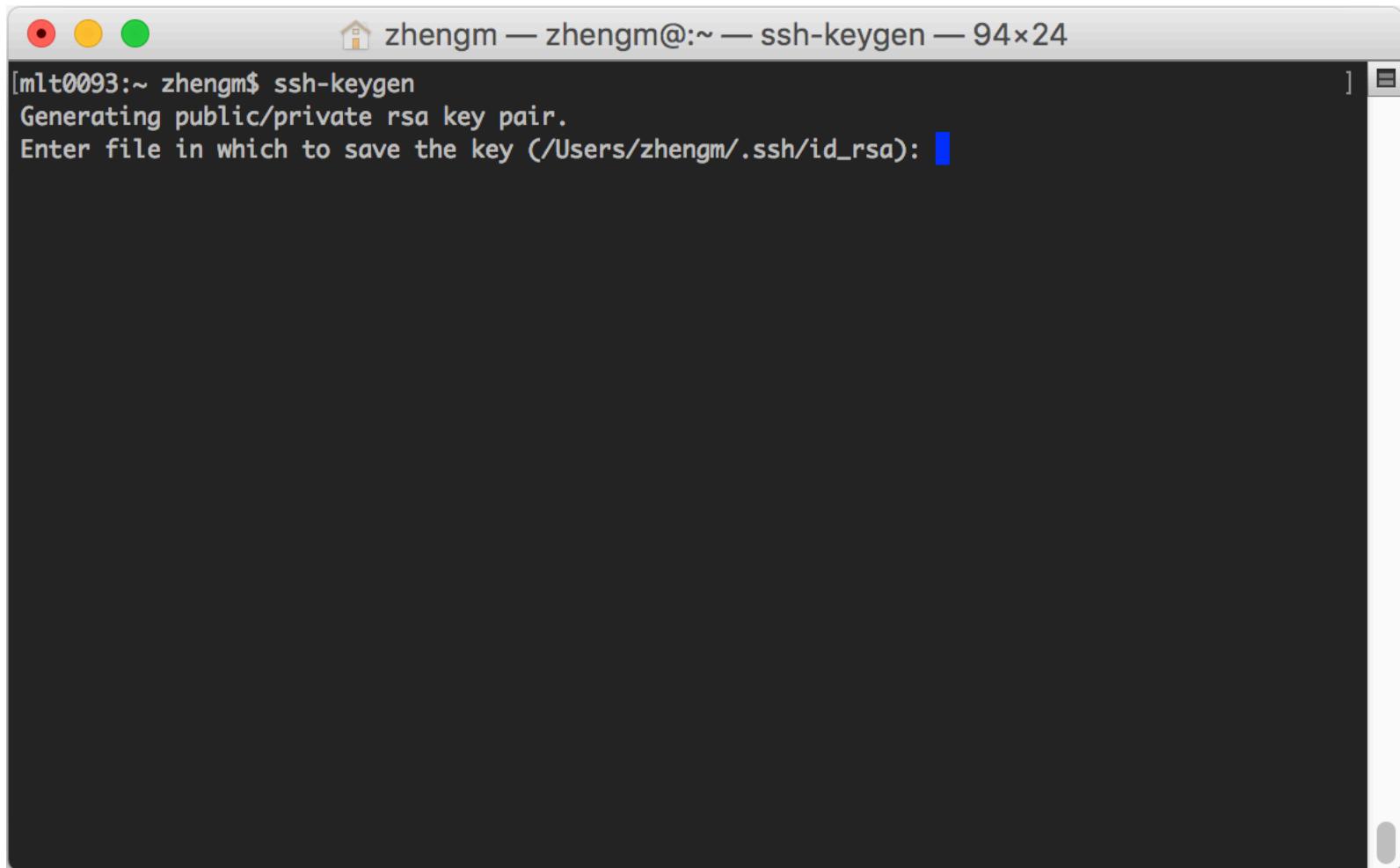
Creating Private and Public Keys



Asymmetric Encryption – key pair (2)



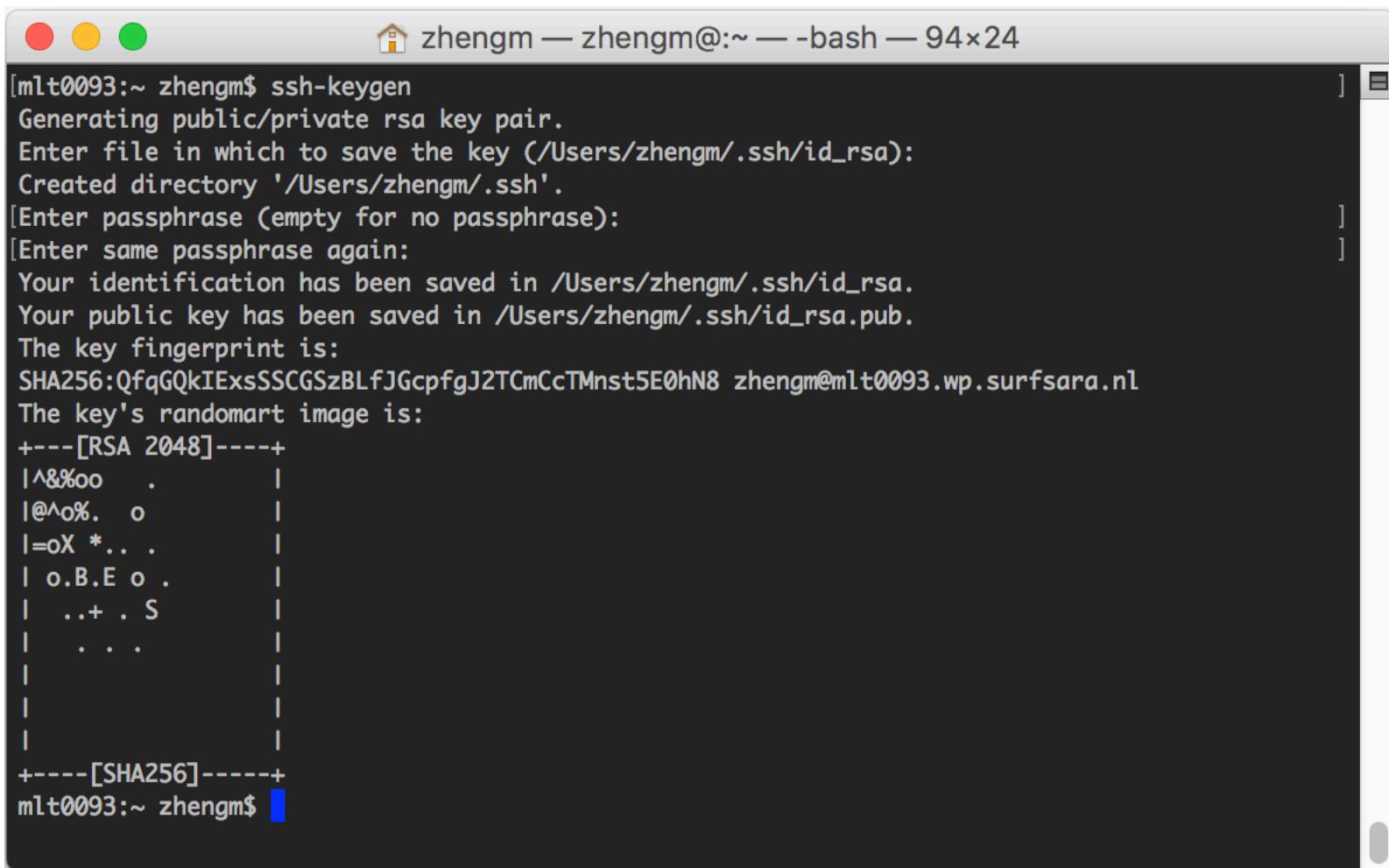
Login to Lisa – with key pair (1)



A screenshot of a terminal window titled "zhengm — zhengm@:~ — ssh-keygen — 94x24". The window shows the command "ssh-keygen" being run, which generates a public/private RSA key pair. The user is prompted to enter a file path to save the key, with the default path "/Users/zhangm/.ssh/id_rsa" displayed. The terminal has a dark background and light-colored text.

```
[mlt0093:~ zhengm$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/Users/zhangm/.ssh/id_rsa): ]
```

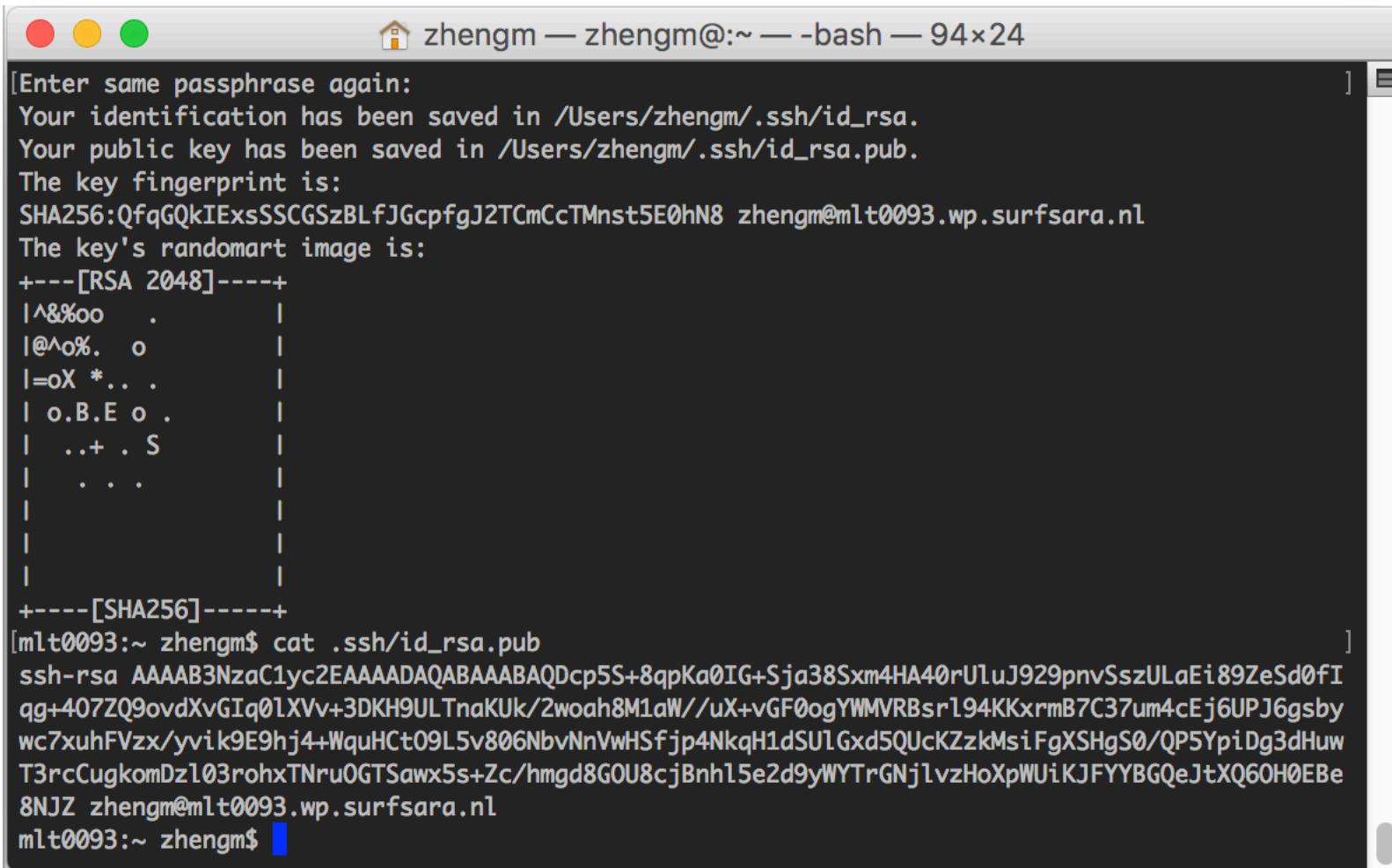
Login to Lisa – with key pair (2)



A screenshot of a terminal window titled "zhengm — zhengm@:~ — -bash — 94x24". The window shows the output of the "ssh-keygen" command. The text output is as follows:

```
[mlt0093:~ zhengm$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/Users/zhengm/.ssh/id_rsa):
Created directory '/Users/zhengm/.ssh'.
[Enter passphrase (empty for no passphrase):
[Enter same passphrase again:
Your identification has been saved in /Users/zhengm/.ssh/id_rsa.
Your public key has been saved in /Users/zhengm/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:QfqGQkIExsSSCGSzBLfJGcpfgJ2TCmCcTMnst5E0hN8 zhengm@mlt0093.wp.surfsara.nl
The key's randomart image is:
+---[RSA 2048]---+
| ^ & o o . |
| @ ^ o % . o |
| = o X * . . |
| o . B . E o . |
| .. + . S |
| . . . |
| . . . |
+---[SHA256]---+
mlt0093:~ zhengm$
```

Login to Lisa – with key pair (3)



The screenshot shows a macOS terminal window titled "zhengm — zhengm@:~ — -bash — 94x24". The window contains the following text output from an SSH session:

```
[Enter same passphrase again:  
Your identification has been saved in /Users/zhangm/.ssh/id_rsa.  
Your public key has been saved in /Users/zhangm/.ssh/id_rsa.pub.  
The key fingerprint is:  
SHA256:QfqGQkIExsSSCGSzBLfJGcpfgJ2TCmCcTMnst5E0hN8 zhangm@mlt0093.wp.surfsara.nl  
The key's randomart image is:  
+---[RSA 2048]---+  
| ^&%oo . |  
| @^o%. o |  
| =oX *... . |  
| o.B.E o . |  
| ..+ . S |  
| . . . |  
| |  
| |  
+---[SHA256]---+  
[mlt0093:~ zhangm$ cat .ssh/id_rsa.pub]  
ssh-rsa AAAAB3NzaC1yc2EAAAQABAAQDcp5S+8qpKa0IG+Sja38Sxm4HA40rUluJ929pnvSszULaEi89ZeSd0fI  
qg+407ZQ9ovdXvGIq0lXVv+3DKH9ULTnaKUk/2woah8M1aW//uX+vGF0ogYWMVRBsr194KKxrmB7C37um4cEj6UPJ6gsby  
wc7xuhFVzx/yvik9E9hj4+WquHCt09L5v806NbVnVwHSfjp4NkqH1dSULGxd5QUckZzkMsiFgXSHgS0/QP5YpiDg3dHuw  
T3rcCugkomDz103rohxTNru0GT Sawx5s+Zc/hmgd8GOU8cjBnh15e2d9yWYTrGNjlrvzHoXpWUiKJFYBGQeJtXQ60H0EB  
8NJZ zhangm@mlt0093.wp.surfsara.nl  
mlt0093:~ zhangm$
```

Login to Lisa – with key pair (4)

- Go to portal.surfsara.nl
- Login with your sdemo account and password

The screenshot shows the SURF SARA portal interface. At the top left is the SURF SARA logo. To its right, a welcome message reads "Welcome, you are currently logged in as Zheng Meyer-Zhao (uid: zhengm)". On the far left is a vertical sidebar with navigation links: Home, Your Profile, Accounting, Public ssh keys (which is highlighted in green), Change password, Helpdesk, and Logout. The main content area has a title "Manage your SSH keys". Below the title, a note says "Here you can manage your public ssh keys. Please note that these keys are **not** used by the git server." There are two columns: "Title" and "Fingerprint". A green "Add key" button is located at the bottom left of the main content area.

Login to Lisa – with key pair (5)

SURF SARA

Welcome, you are currently logged in as Zheng Meyer-Zhao (uid: zhengm)

[Home](#)

[Your Profile](#)

[Accounting](#)

[Public ssh keys](#)

[Change password](#)

[Helpdesk](#)

[Logout](#)

Manage your SSH keys

SSH key
ssh-rsa AAAAB3NzaC1yc2EAAAQABAAQDcp5S+8qpKa0IG+Sja38Sxm4HA40rUluJ929pnvSszULaEi89ZeSd0flqg+4O 7ZQ9ovdXvGlq0IXVv+3DKH9ULTnaKUk/2woah8M1aW//uX+vGF0ogYWMVRBsrI94KKxrmB7C37um4cEj6UPJ6gsbywc 7xuhFVzx/yvik9E9hj4+WquHCtO9L5v806NbvNnVwHSfp4NkqH1dSUIGxd5QUcKZzkMsiFgXSHgS0/QP5YpiDg3dHuwT 3rcCugkomDzl03rohxTNruOGTSawx5s+Zc/hmgd8GOU8cjBnhl5e2d9yWYTrGNjlvzHoXpWUiKJFYBBGQeJtXQ6OH0EB e8NJZ zhengm@mlt0093.wp.surfsara.nl

CUA password

Add sshkey



Login to Lisa – with key pair (6)



Welcome, you are currently logged in as Zheng Meyer-Zhao (uid: zhengm)

[Home](#)

[Your Profile](#)

[Accounting](#)

[Public ssh keys](#)

[Change password](#)

[Helpdesk](#)

[Logout](#)



Manage your SSH keys

Here you can manage your public ssh keys. Please note that these keys are **not** used by the git server.

Key has been stored succesfully

Title

Fingerprint

zhengm@mlt0093.wp.surfsara.nl

0f:15:a6:f3:e4:94:1d:73:3c:2e:c6:b7:f5:91:62:65

[Delete key](#)

[Add key](#)

Questions



Install UNIX tool on your laptop

Windows

- MobaXterm (<http://mobaxterm.mobatek.net>)

Mac OSX

- Terminal (pre-installed in /Applications/Utilities)
- XQuartz (<http://www.xquartz.org>)

Linux

- You are already well equipped!

Let's play!

- Go to Hands-on page <http://bit.ly/2t0TQDz>
- Generate an SSH Key Pair

| Generate SSH key on your laptop and upload the public key to portal.surfsara.nl

```
$ cd                               # change directory to home directory  
$ ssh-keygen                      # generate SSH key pair  
$ cat .ssh/id_rsa.pub              # view contents of public key
```

- MobaXterm user can find the generated key-pair at
My Documents -> MobaXterm -> home -> .ssh

Hands on – Permission bits explained

