

Introduction of **Linux**

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PART I

- Brief Introduction
- Basic Conceptions & Environment
- Install & Configure a Virtual Machine
- Basic Commands

PART II

- Shell Script
- Compile & Debug (for C)
- Text Editor (Vim, Sublime text, Atom)

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History

- 1969 - UNIX
- 1984 - GNU
- 1987 - MINIX
- 1995 - POSIX
- Internet

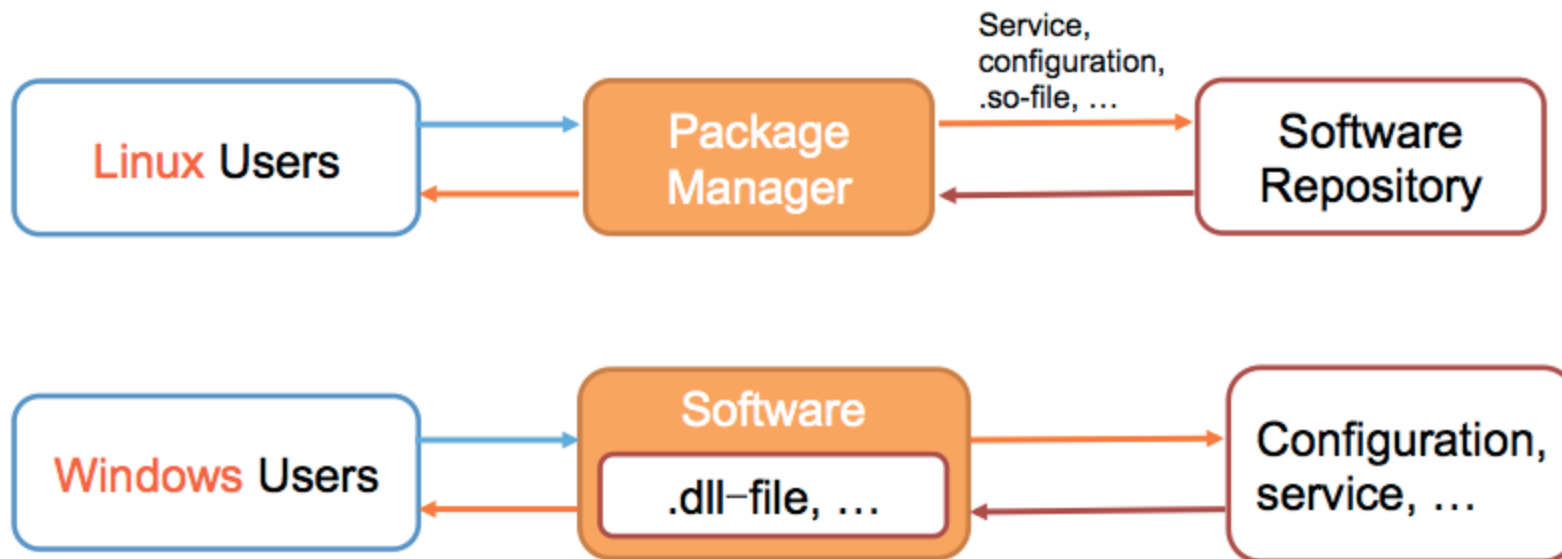
Distribution

- Ubuntu
- Debian
- CentOS
- Arch Linux
- Fedora
- ...

Features

- Protable
- Open source
- Security
- Shell
- ...

Linux vs Windows Software

















Linux install software

Package Manager: `apt-get` (Advanced Package Tool)

```
zheng@kernel:~$ sudo apt-get autoremove
Reading package lists... Done
Building dependency tree
Reading state information... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
zheng@kernel:~$ sudo apt-get install gcc
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  manpages-dev libc-dev-bin linux-libc-dev
Use 'apt-get autoremove' to remove them.
The following extra packages will be installed:
  binutils gcc-4.4 libc-dev-bin libgomp1 linux-libc-dev manpages-dev
Suggested packages:
  binutils-doc gcc-multilib autoconf automake1.9 libtool flex bison gdb
  gcc-doc gcc-4.4-multilib libmudflap0-4.4-dev gcc-4.4-doc gcc-4.4-locales
  libgcc1-dbg libgomp1-dbg libmudflap0-dbg libcloog-ppl0 libppl-c2 libppl7
Recommended packages:
  libc6-dev libc-dev
The following NEW packages will be installed:
  binutils gcc gcc-4.4 libc-dev-bin libgomp1 linux-libc-dev manpages-dev
0 upgraded, 7 newly installed, 0 to remove and 0 not upgraded.
Need to get 7,147kB of archives.
After this operation, 22.8MB of additional disk space will be used.
Do you want to continue [Y/n]?
```


Windows install software

msvcr80.dll

 msvcr80.dll	C:\Program Files\AliWangWang	612 KB
 msvcr80.dll	C:\Program Files\AliWangWang\7.21.18C	612 KB
 msvcr80.dll	C:\Program Files\AliWangWang\8.00.06C	612 KB
 msvcr80.dll	C:\Program Files\AliWangWang\8.00.08C	612 KB
 msvcr80.dll	C:\Program Files\AliWangWang\new	612 KB
 msvcr80.dll	C:\Program Files\Baidu\BaiduYun	618 KB
 msvcr80.dll	C:\Program Files\Baidu\BaiduYunGuanjia	618 KB
 msvcr80.dll	C:\Program Files\Tencent\Qzone	612 KB
 msvcr80.dll	C:\Program Files\Microsoft SQL Server\90\Setup Bootstrap	612 KB
 msvcr80.dll	C:\Program Files\Tencent\QQMusic\QzoneMusic	618 KB
 msvcr80.dll	C:\Program Files\Tencent\Qzone\Ver_247.311	612 KB
 msvcr80.dll	C:\Program Files\Tencent\QQMusic\QzoneMusic\QQMusicAd...	618 KB
 msvcr80.dll	C:\Program Files\Common Files\Tencent\QQMiniDL\41\BT	618 KB
 msvcr80.dll	C:\Program Files\Common Files\Tencent\QQMiniDL\41\eMule	618 KB

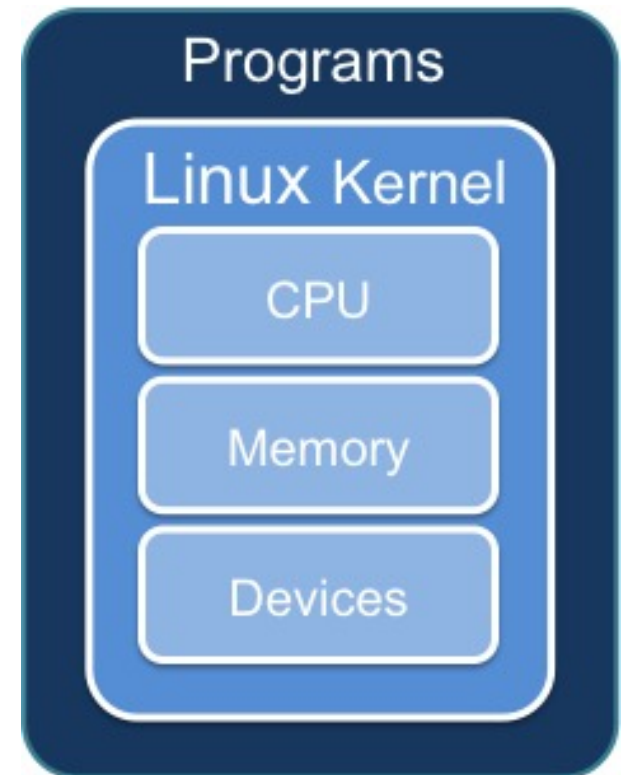
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Linux Kernel

The most important component of Linux OS, containing all the operating system's **core functions** and the **device drivers**.

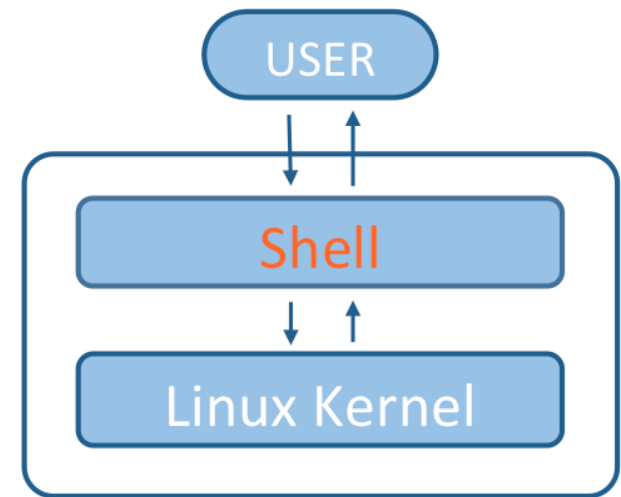
- memory management
- process scheduling
- file system
- ...



Shell (CLI shell)

Command Line Interface

A **program** which accepts commands as text input and **converts commands** to appropriate operating system functions.

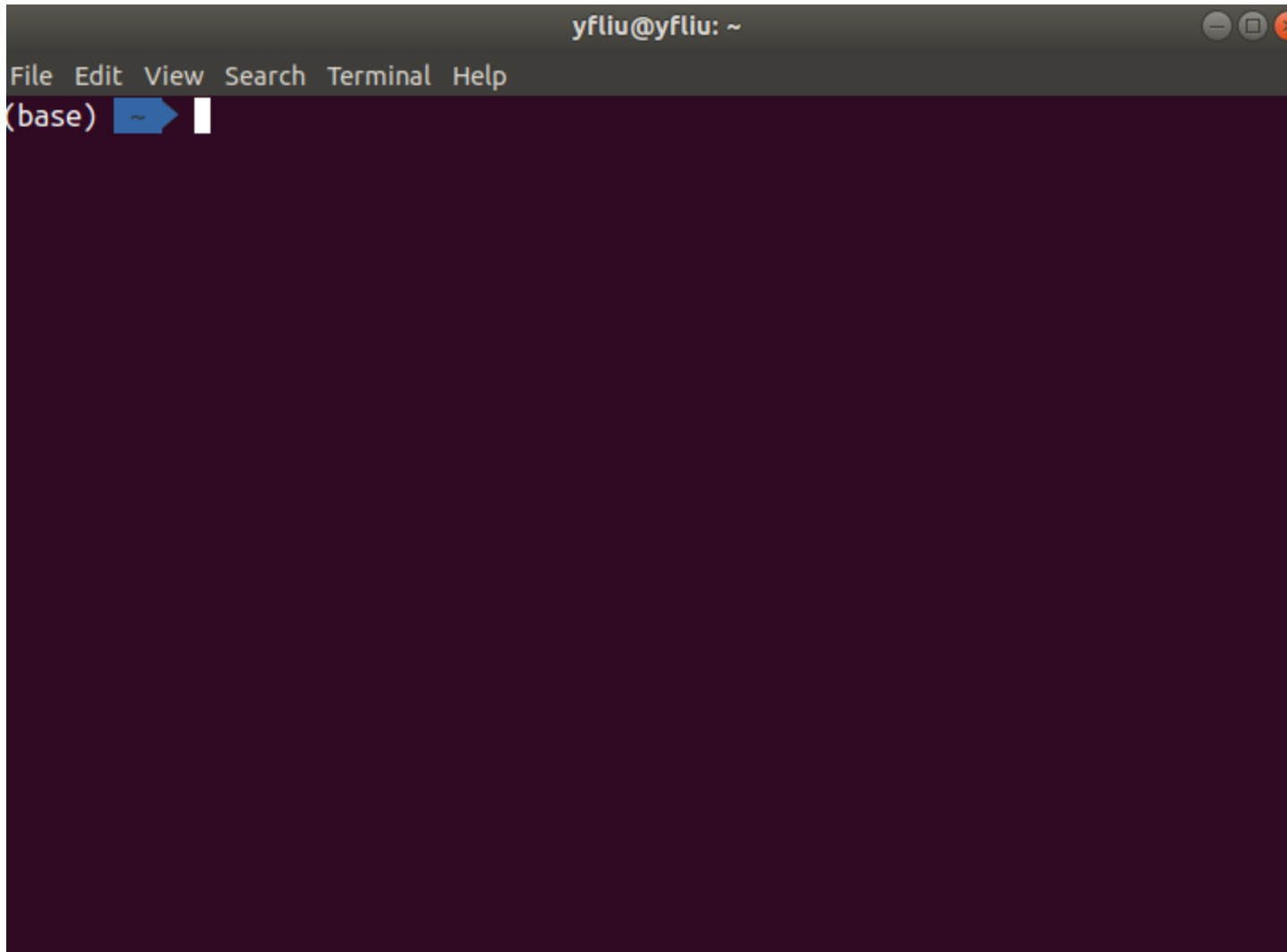


Terminal ↔ Shell

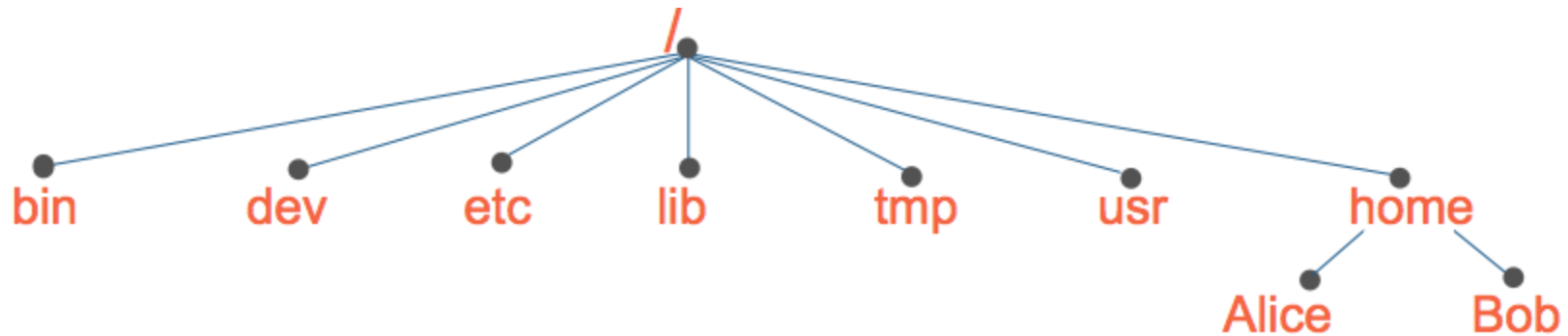
The terminal send information to the shell, receive and display the information from the shell.

Open Terminal

keyboard accelerators: CTRL+ALT+T



File System



Tree structure, with the root directory “/”

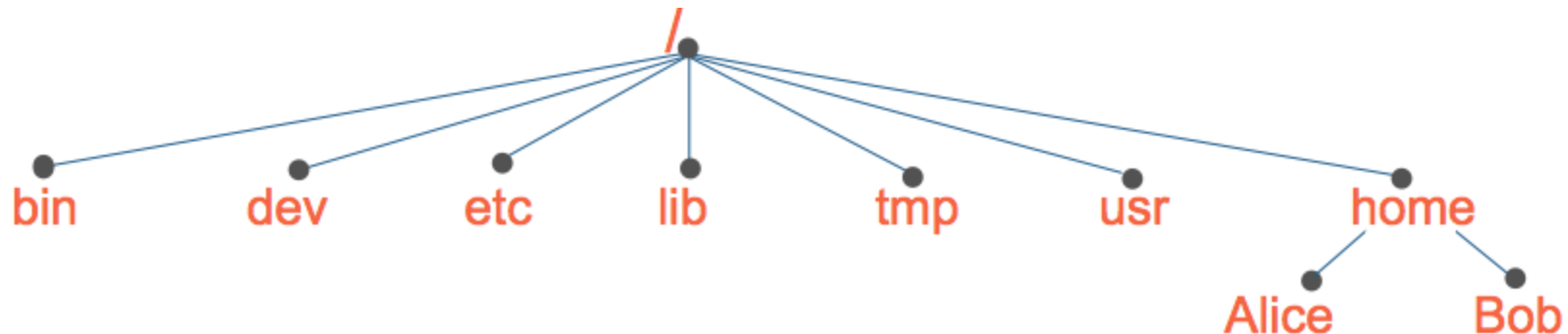
/home/oslab/...

~ = /home/oslab

.

..

File System



`/bin` : essential tools and other programs

`/dev` : files representing the system's hardware devices

`/etc` : system configuration files

`/home` : the home directory for all system's users

`/lib` : essential system library files

`/proc` : files that give information about current system

`/usr` : files related to user tools and applications

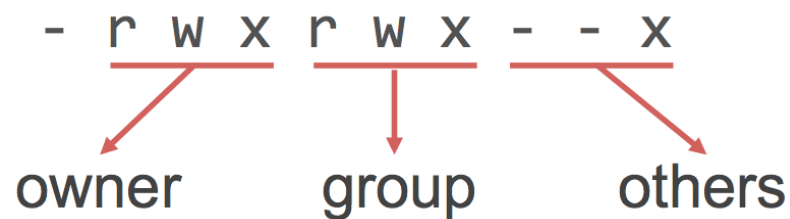
User & Group

The system determines whether or not a **user** or **group** can access a file or directory.

There is a special user called **Super User** or the **root** which has permission to access any file and directory.

Three **Permissions**:

- **r** = read
- **w** = write
- **x** = execute



Environment Variables

Environment variables are a **set of values** that can affect the way running processes will behave on a computer.

- `PATH` -- Contains a colon-separated list of directories that the shell searches for commands that do not contain a slash in their name.
- `HOME` -- Contains the location of the user's home directory.
- ...

Set The Environment Variables:

```
export VARIABLE = value      # temporary
/etc/profile                 # permanent, all users

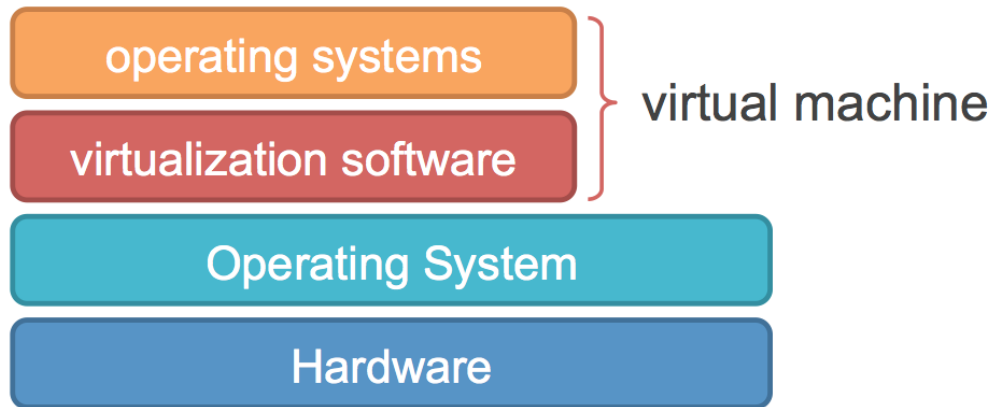
~/.profile                   # permanent, one user
~/.bashrc
```

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Virtual Machine

A virtual machine is an emulation of a particular computer system.



Virtualization Software provide (hardware) resources virtually to the new OS.

- VMware
- Virtual Box
- Virtual PC

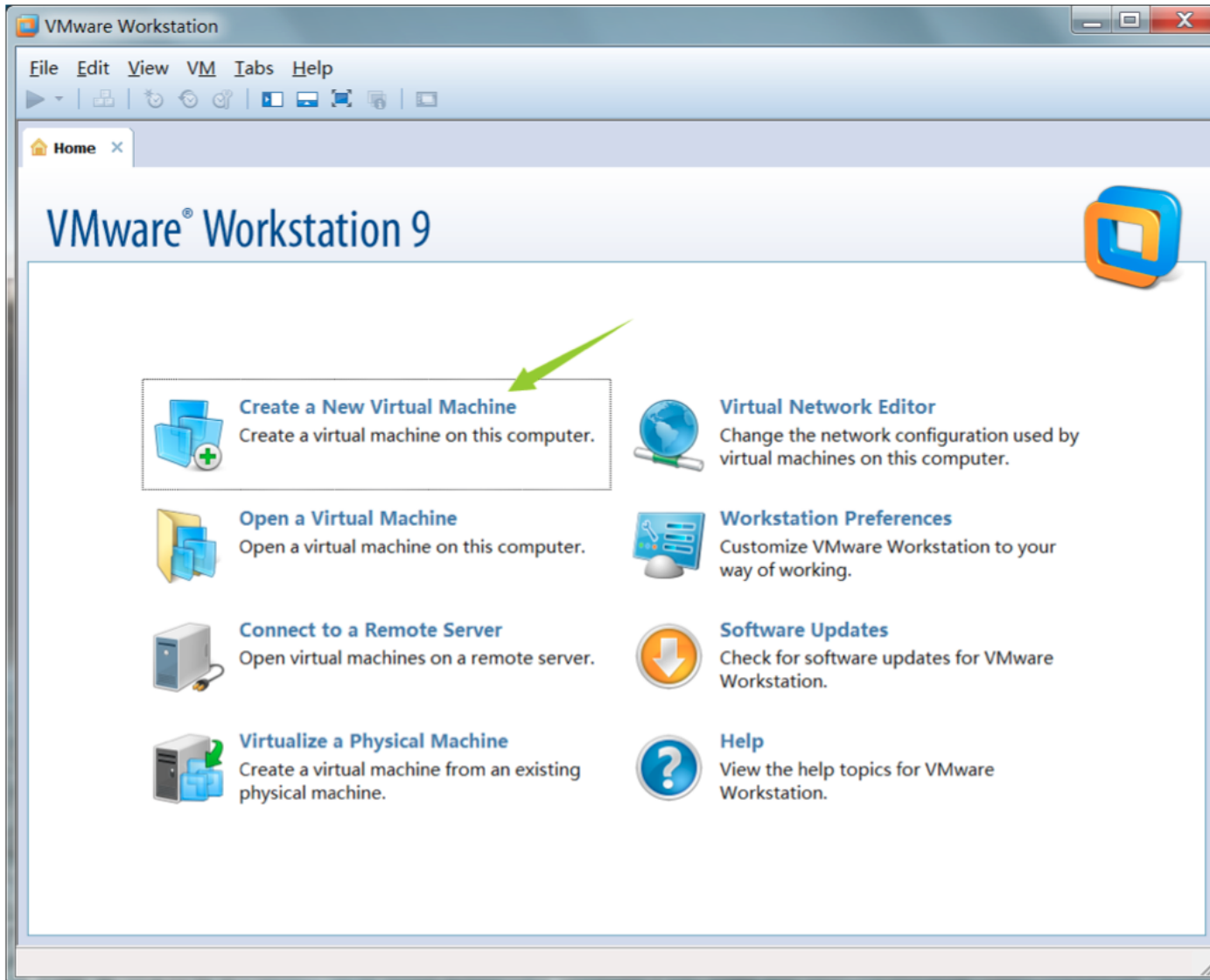
Install the Virtual Machine

VMware Workstation 9.0 + Ubuntu 14.04 LTS (kernel 3.19)

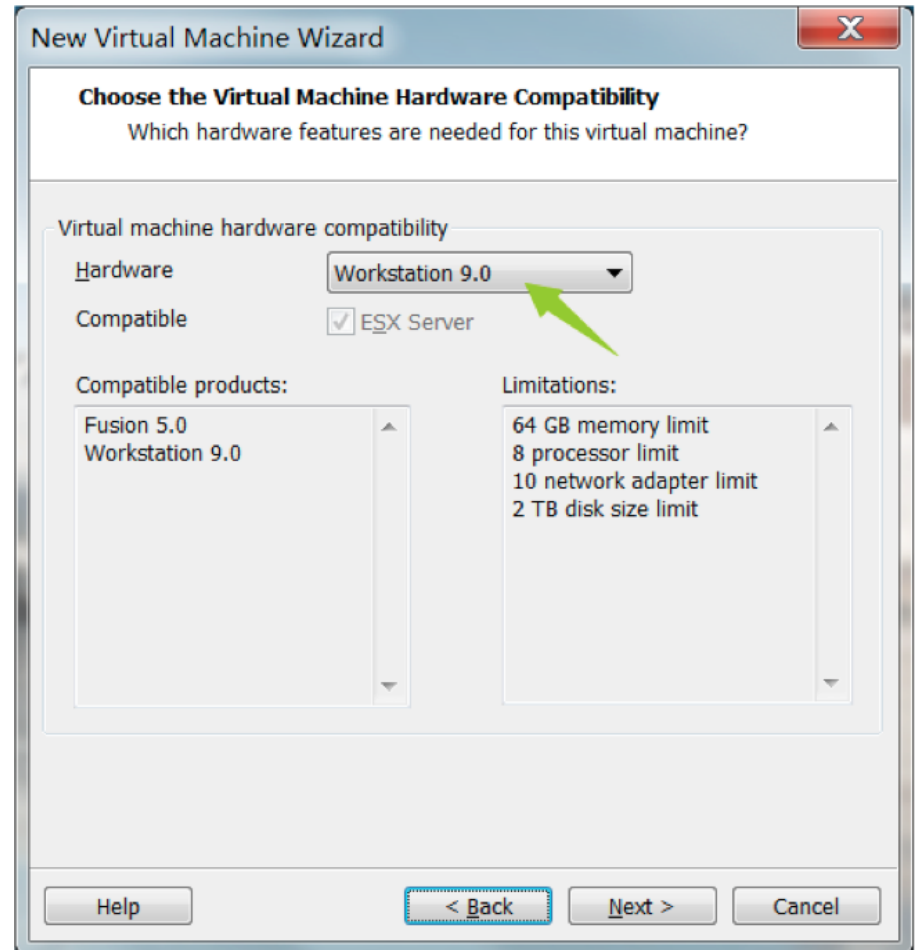
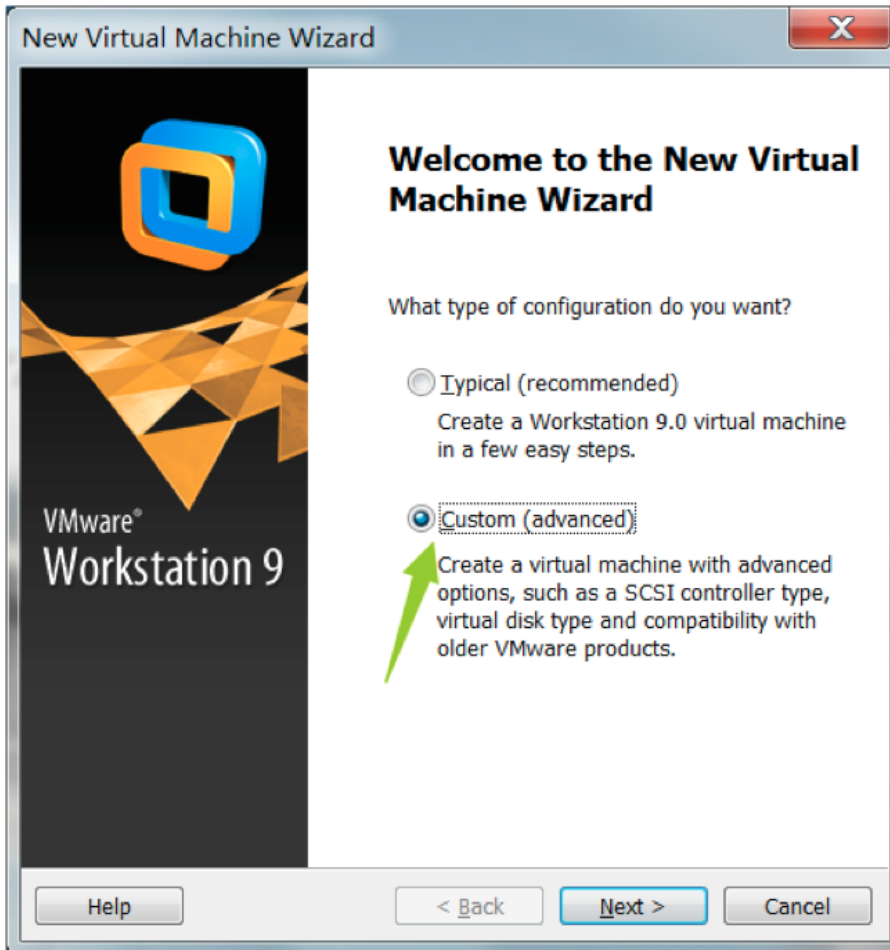


1. Download the Setup File of Vmware 9.0
2. Download the Ubuntu Ubuntu 14.04 LTS from the official website www.ubuntu.com/download/desktop
3. Install VMware 9.0
4. Create a Virtual Machine in the VMware

Create a Virtual Machine

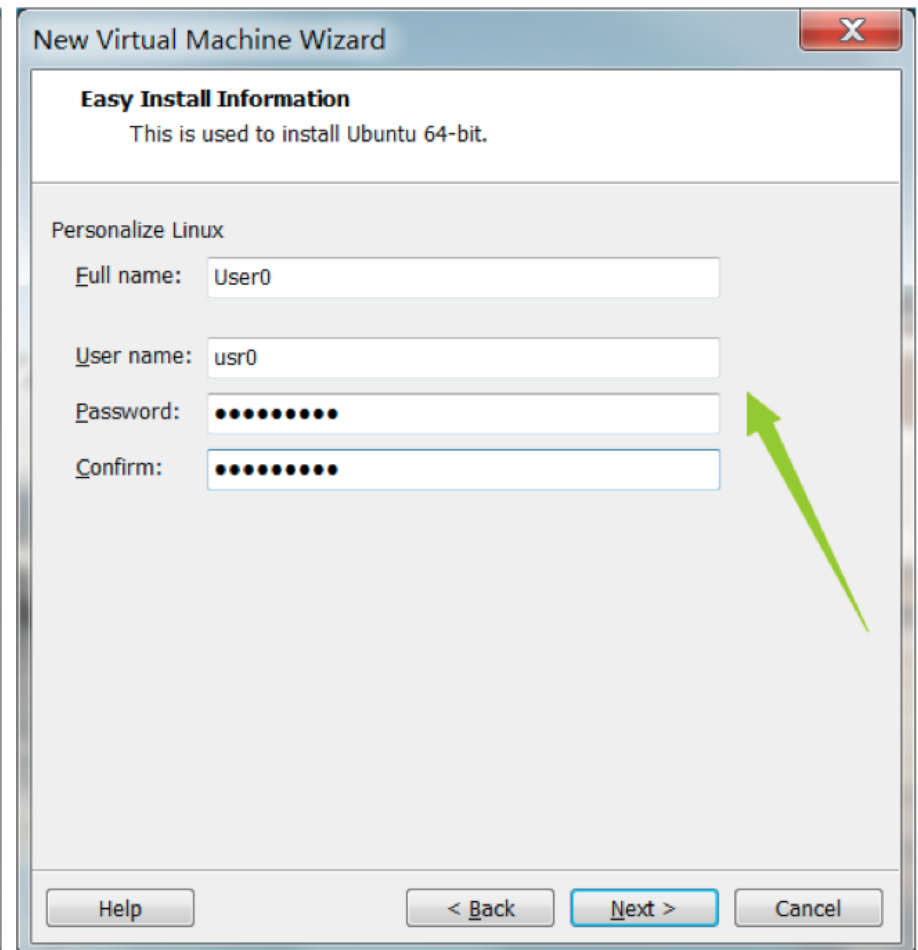
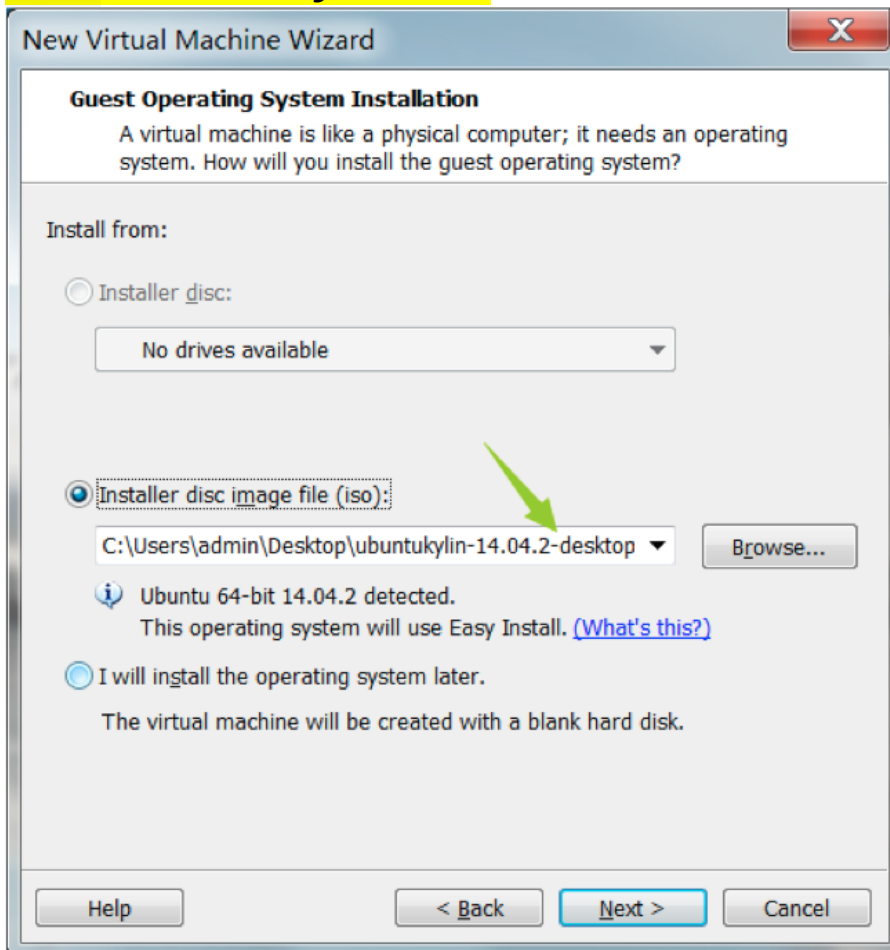


Create a Virtual Machine



Create a Virtual Machine

In the computers in our computer room, our .iso-file lies on path E:/ of the system.



Create a Virtual Machine

New Virtual Machine Wizard

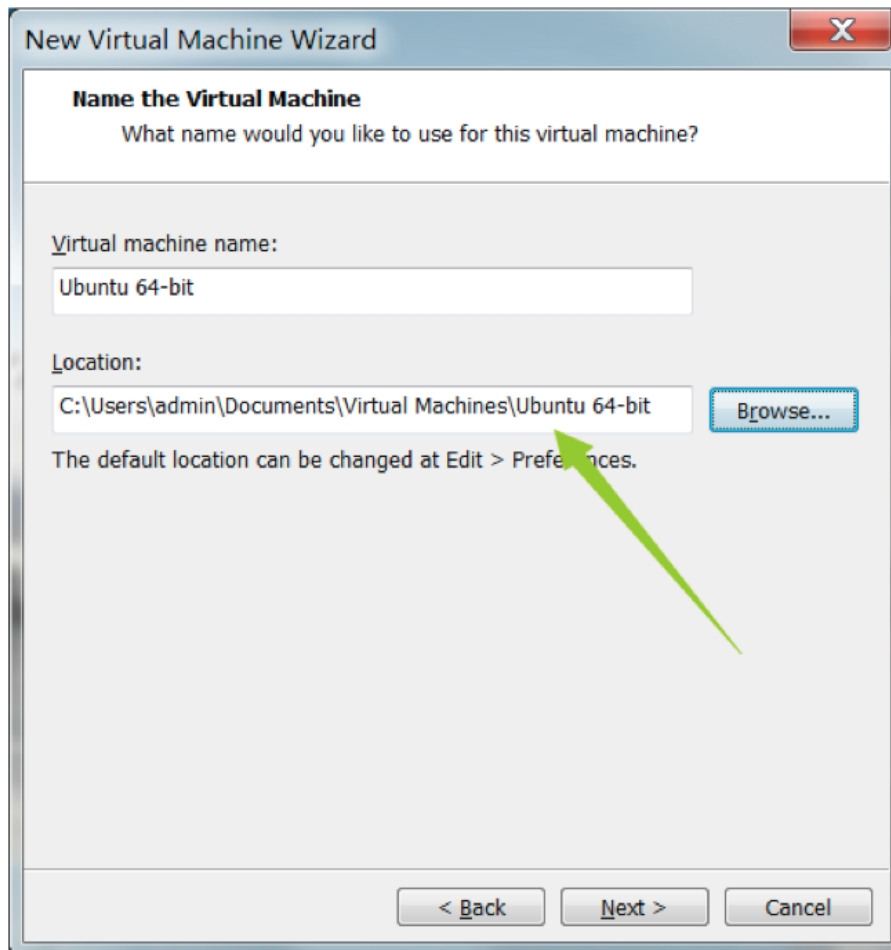
Name the Virtual Machine
What name would you like to use for this virtual machine?

Virtual machine name:
Ubuntu 64-bit

Location:
C:\Users\admin\Documents\Virtual Machines\Ubuntu 64-bit Browse...

The default location can be changed at Edit > Preferences.

< Back Next > Cancel



New Virtual Machine Wizard

Processor Configuration
Specify the number of processors for this virtual machine.

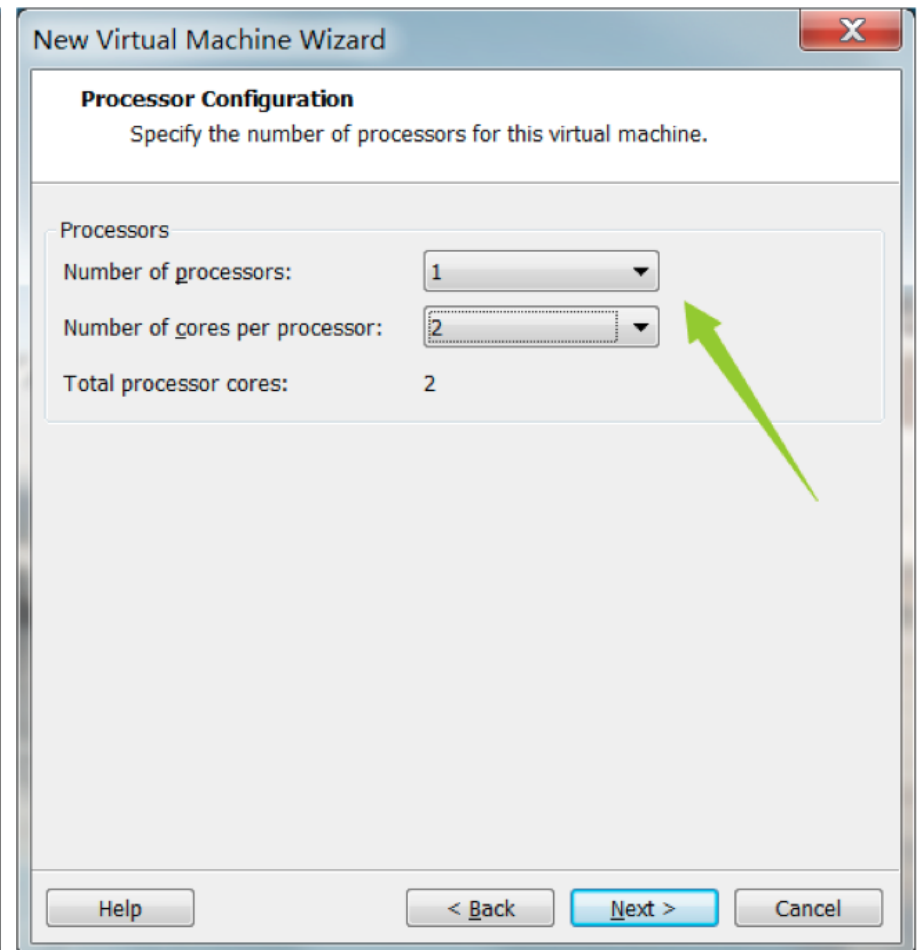
Processors

Number of processors: 1

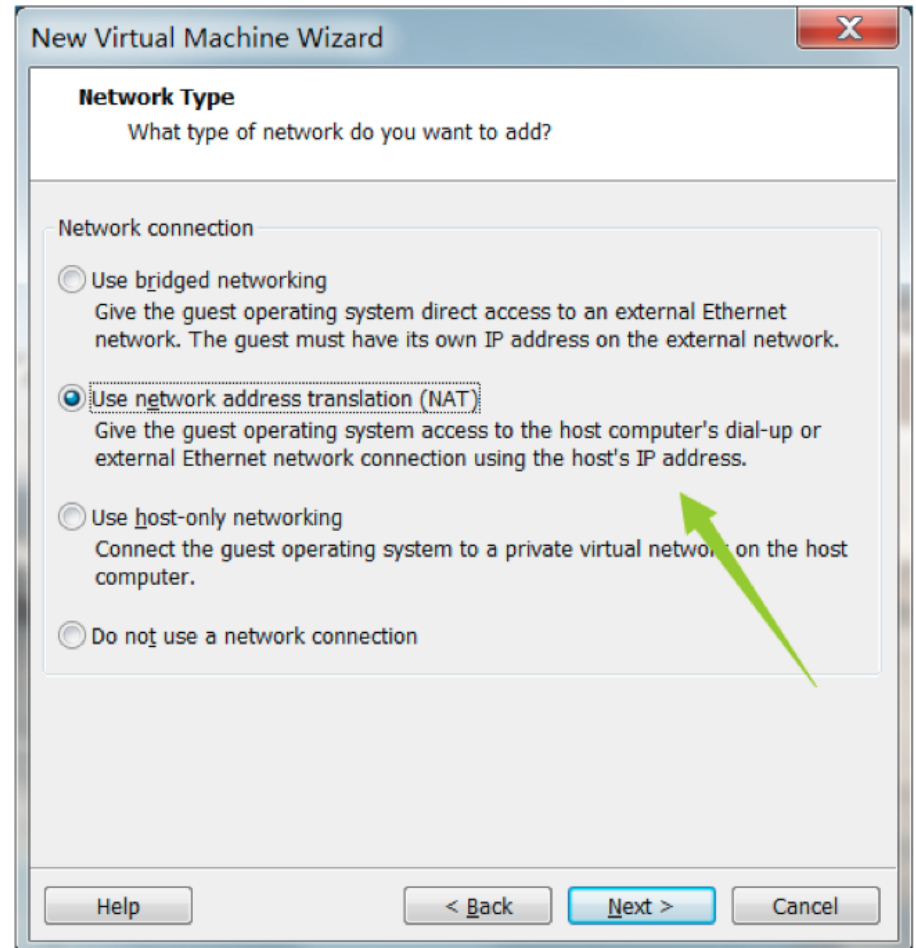
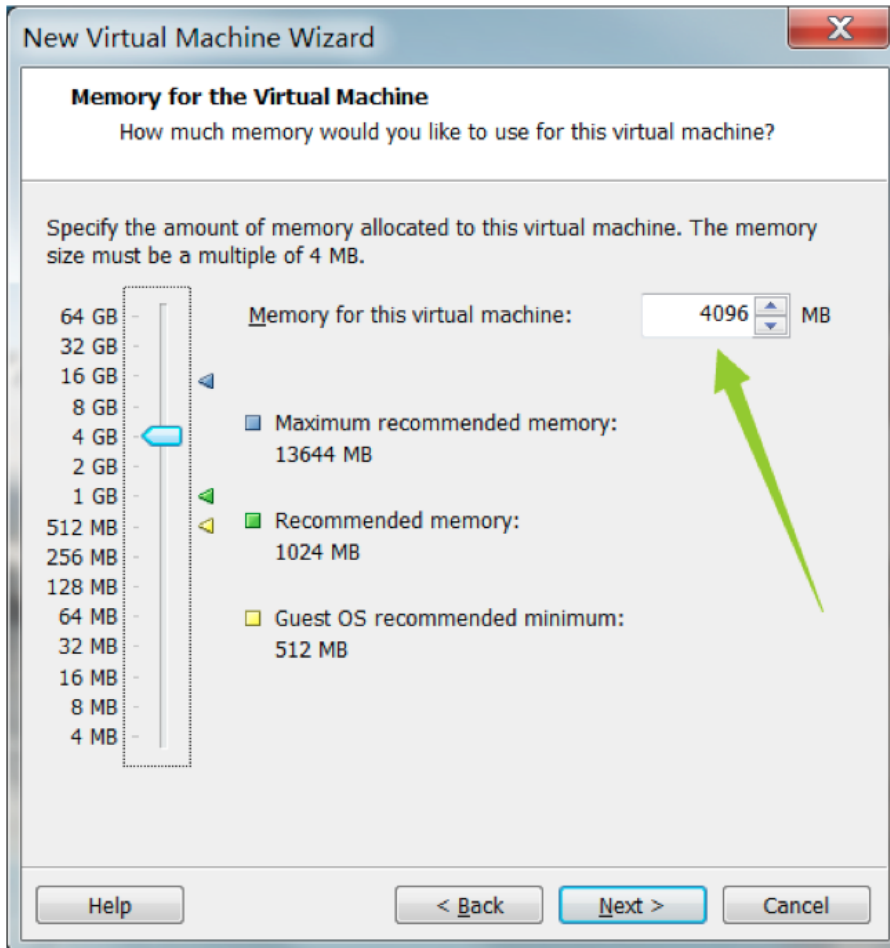
Number of cores per processor: 2

Total processor cores: 2

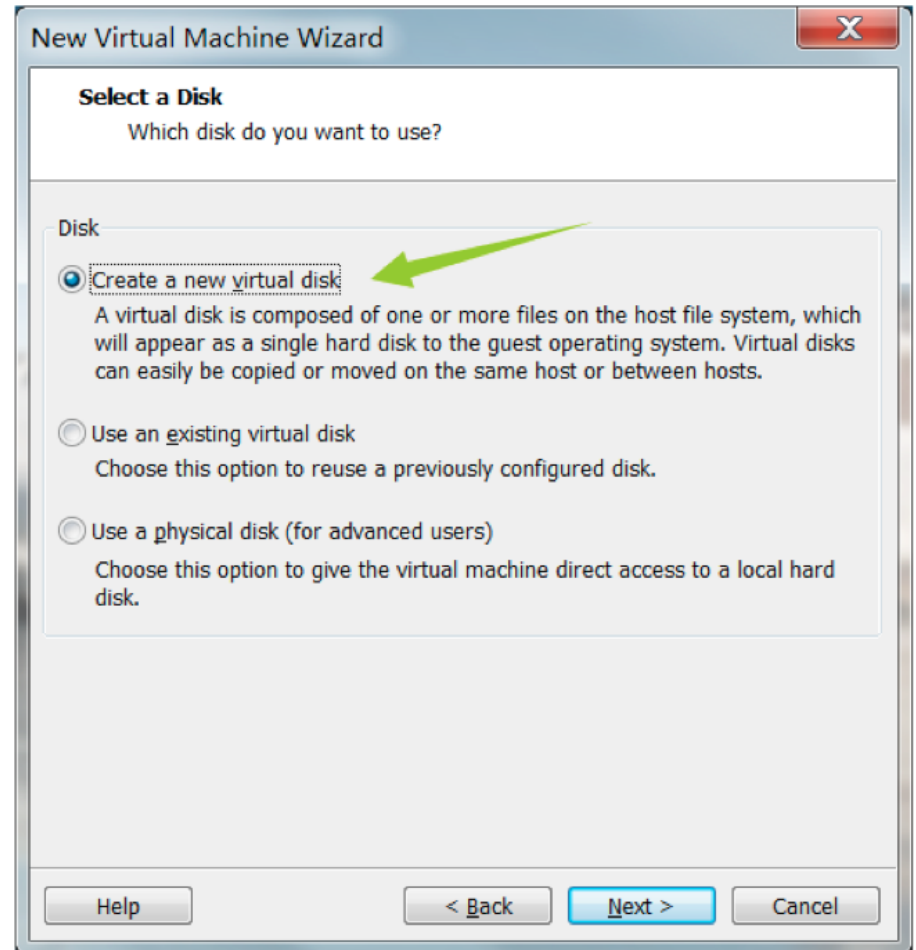
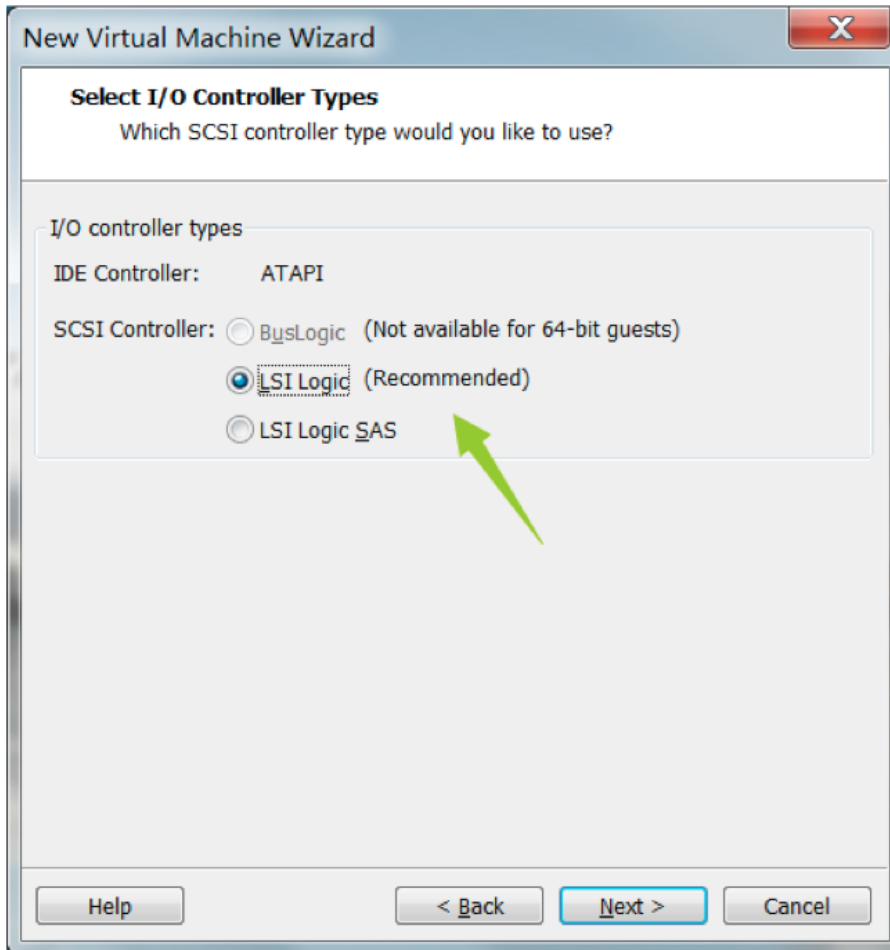
Help < Back Next > Cancel



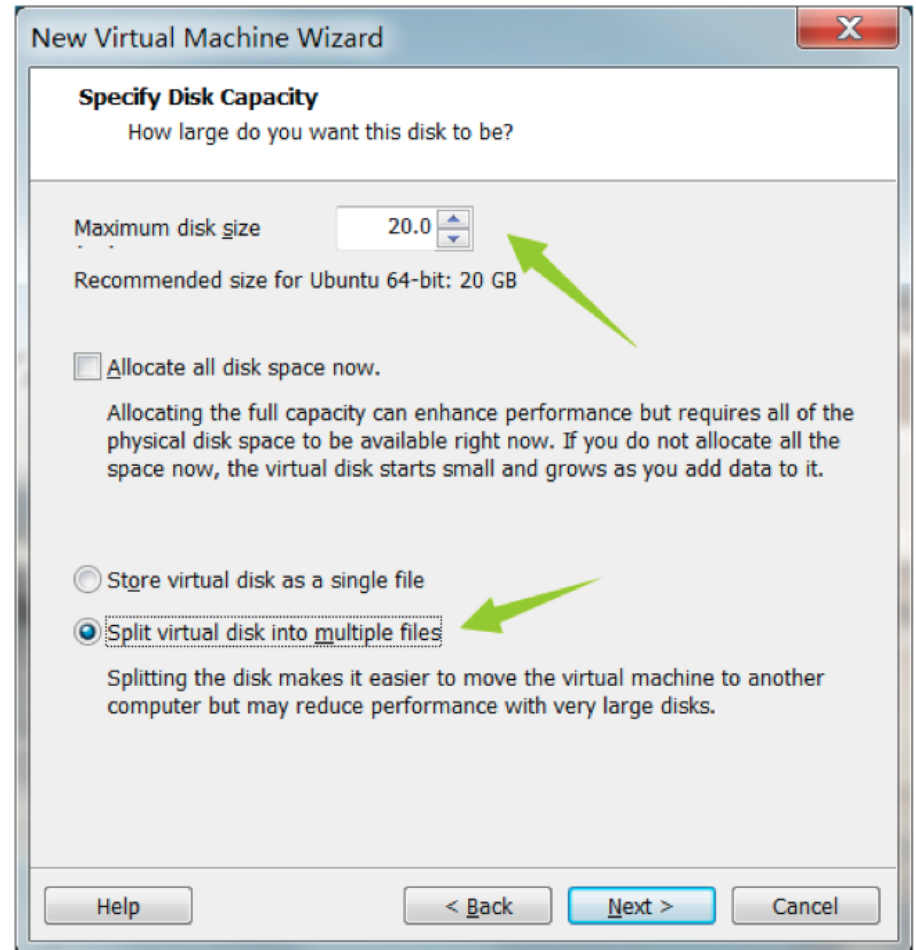
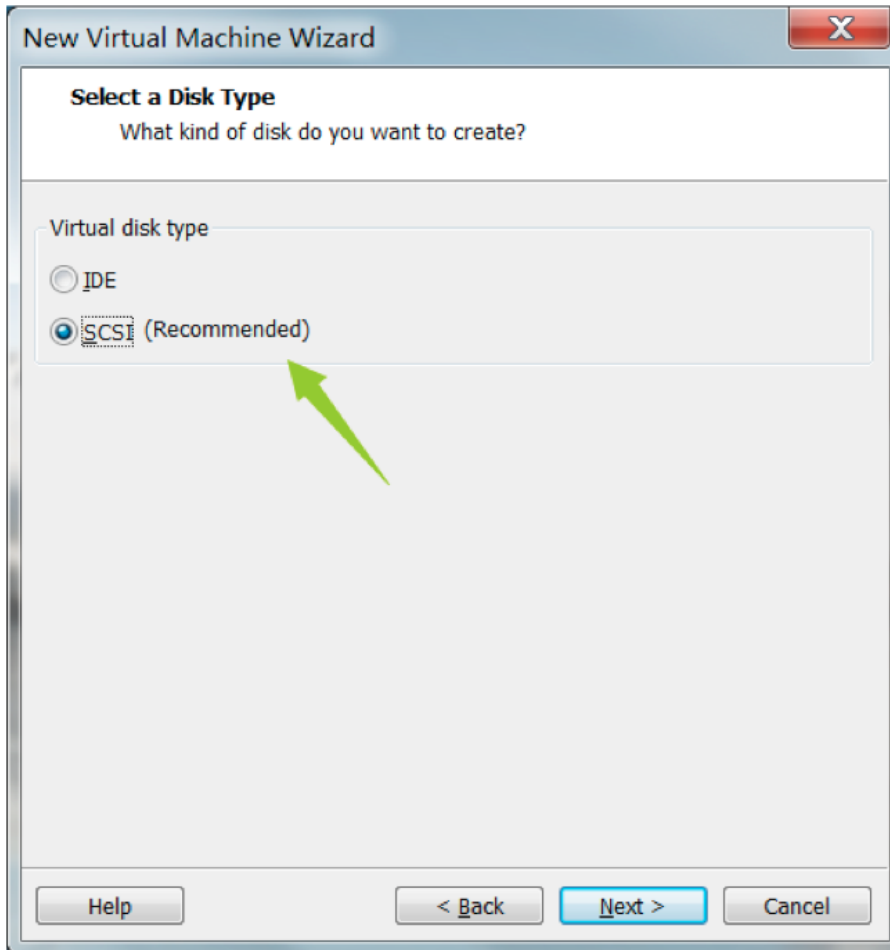
Create a Virtual Machine



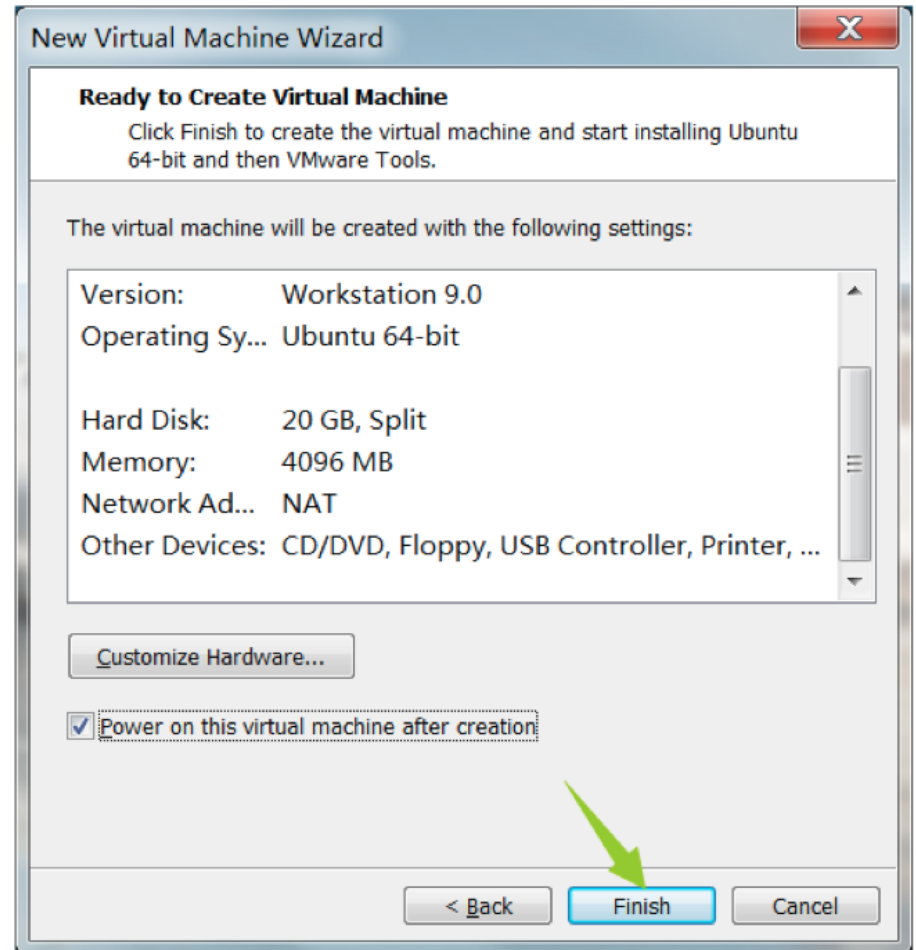
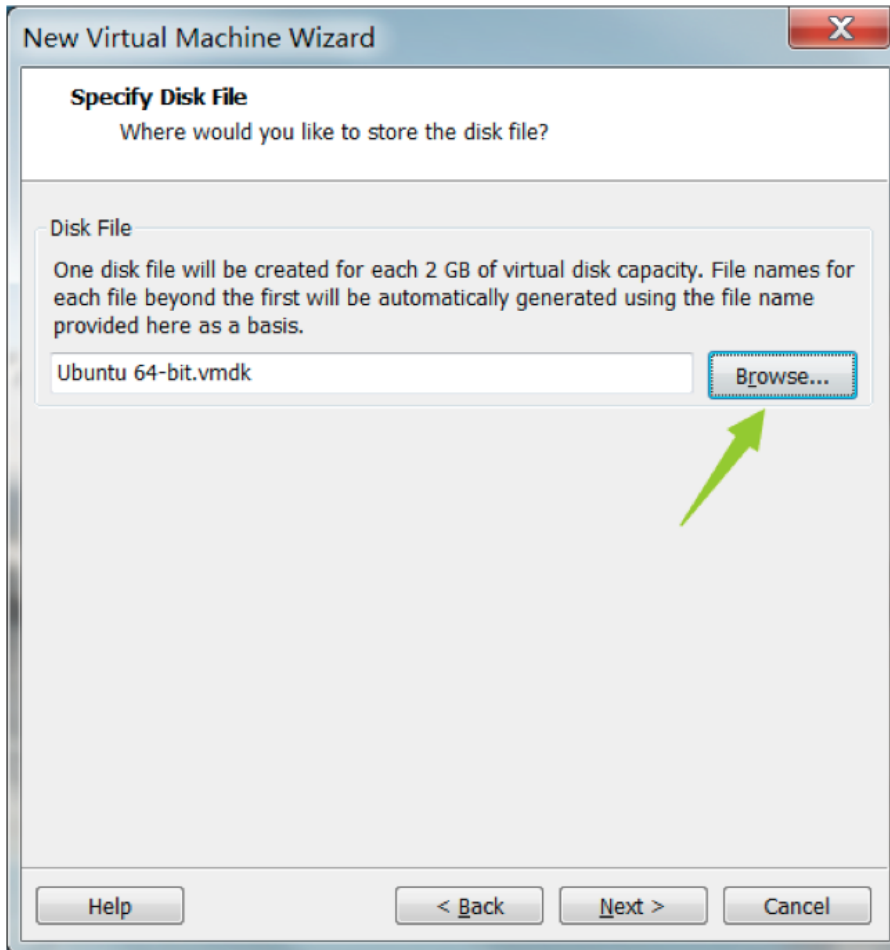
Create a Virtual Machine



Create a Virtual Machine



Create a Virtual Machine



Create a Virtual Machine (Mac)

Mac Virtual Machine -- Parallels desktop

Ubuntu14.iso-> magnet:?

xt=urn:btih:5EE7E1DC3E01F362B0E53BFEE9E4D6DCDEDAD61B

Parallels desktop-> [http://xclient.info/s/parallels-desktop.html?](http://xclient.info/s/parallels-desktop.html?t=2c5f238779ee02ff6e1b5cda873deeacaeabc304)

t=2c5f238779ee02ff6e1b5cda873deeacaeabc304

Create a Virtual Machine (Mac)



Create a Virtual Machine (Mac)



Create a Virtual Machine (Mac)

Parallels 向导

Linux 用户名和密码

☒ 快速安装

姓名: Cjmakeding

用户名: makeding

密码:

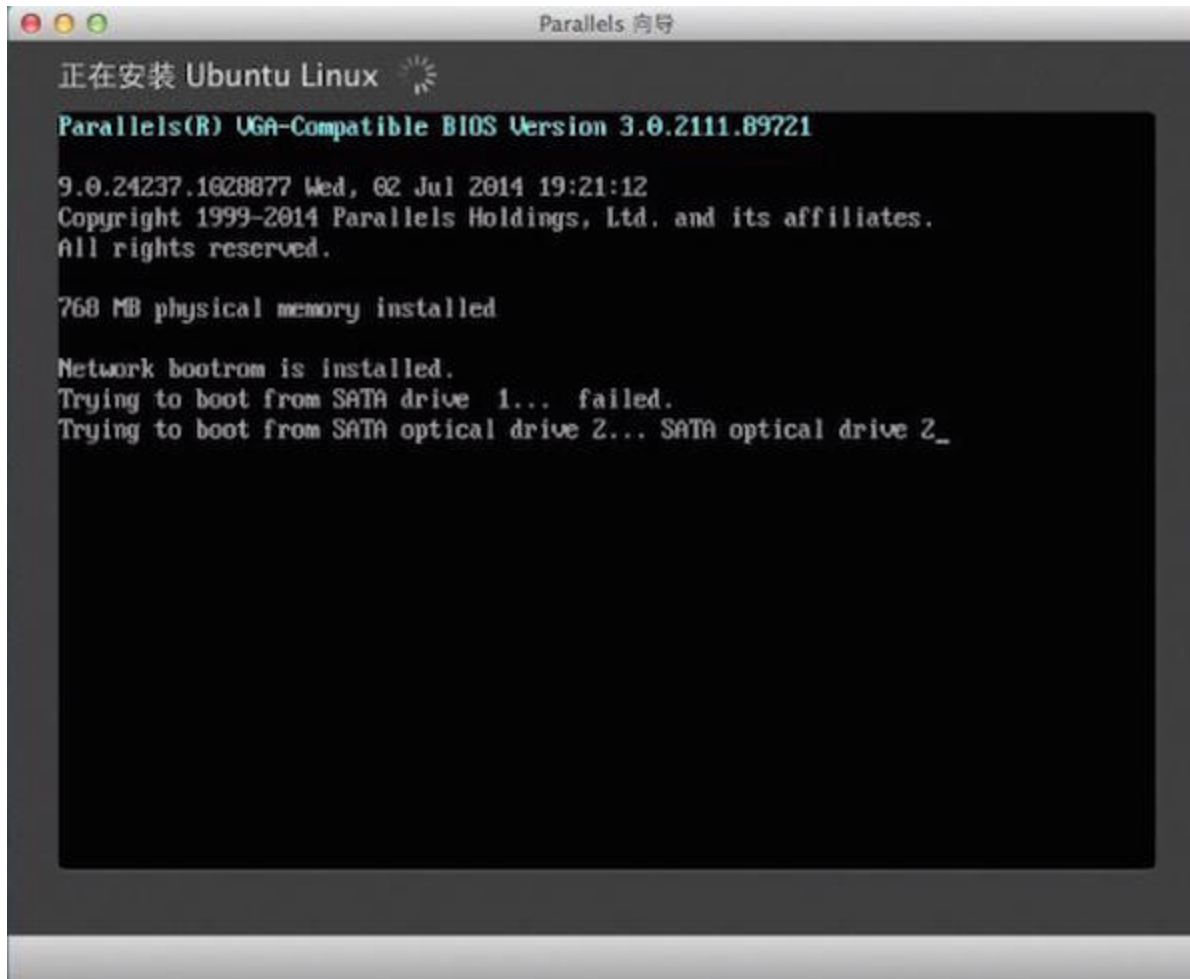
验证密码:

后退 继续

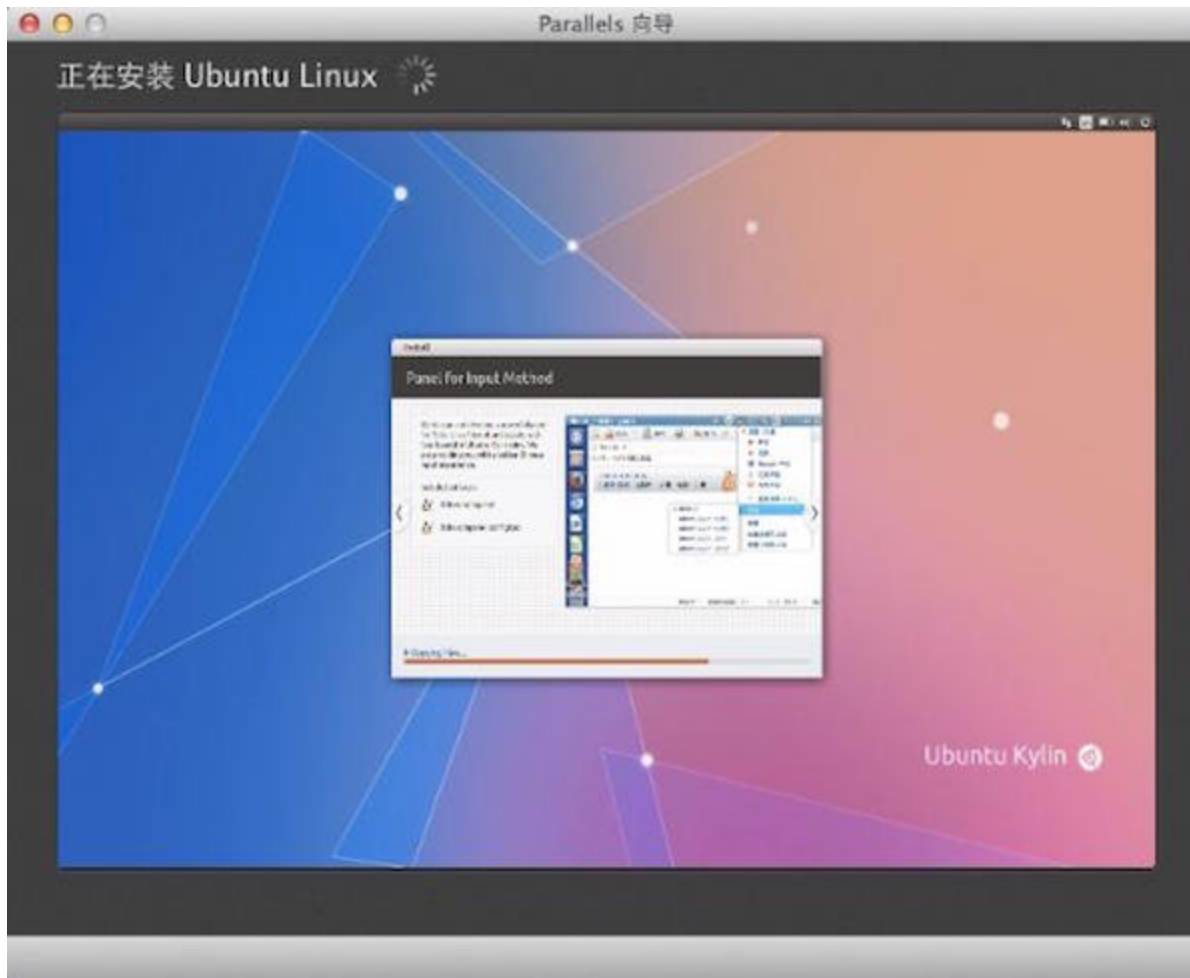
Create a Virtual Machine (Mac)



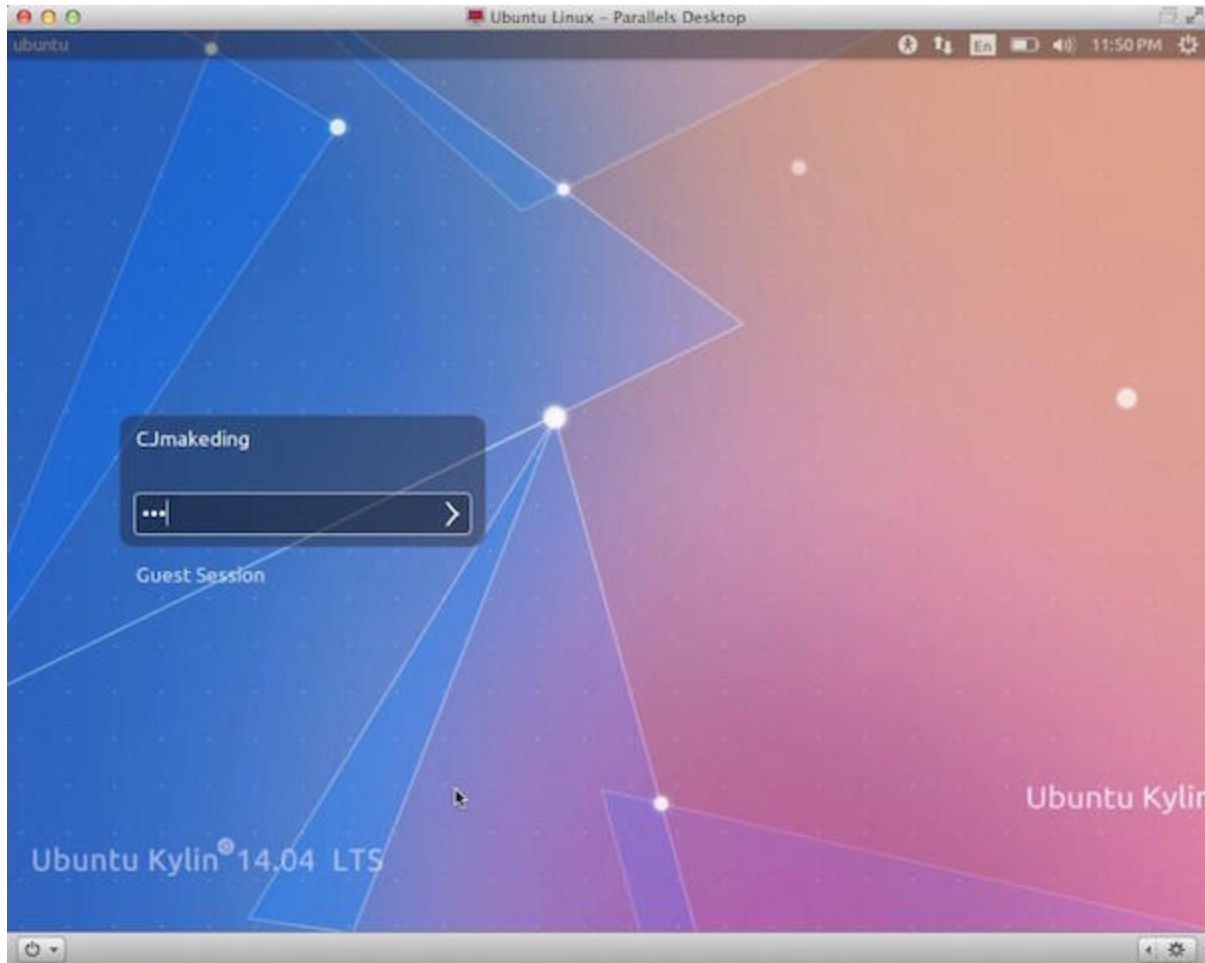
Create a Virtual Machine (Mac)



Create a Virtual Machine (Mac)



Create a Virtual Machine (Mac)



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Basic Commands

| command [-options] [arguments]

- cd pwd ls
- su chmod cat
- touch rename mv cp
- mkdir rmdir rm
- find grep
- > >> | xargs
- awk
- man help --help

cd (change directory)

```
cd  
cd ~  
cd -  
cd ..
```

pwd (print working directory)

```
pwd
```

ls (list segment)

- l long - Displaying long format
- a all - Lists all files in the given directory
- R recursive - Recursively lists subdirectories.
- d directory - Shows information about a directory

```
ls
ls -l
ls -a
ls -R
ls -d
ls -la
ls -ld
...
```


su (switch user)

```
su xiaoming
```

chmod (change mode)

```
chmod 660 class1.txt  
chmod u-r class1.txt
```

cat (concatenate)

```
cat class1.txt  
cat xiaoming.txt
```

touch

```
touch class1.txt
```

rename

```
rename 's/oslab/oslab0/' o*b?.txt
```

mv (move)

```
mv oslab.txt oslab1.txt  
mv oslab01.txt oslab02.txt /home/oslab
```

cp (copy)

```
cp oslab03.txt /home/oslab
```

mkdir (make directory)

```
mkdir Lesson1/rename
```

rmdir (remove empty directory)

```
rmdir empty_directory
```

rm (remove)

-r	recursive
-i	interactive
-f	force

```
rm -rf ~/Lesson1/*  
rm -i oslab04.txt
```

find

```
find ~ -name "*.txt"
```

grep

globally search a regular expression and print

```
grep match_pattern file_name  
grep apple oslab05.txt  
grep -i apple oslab05.txt
```

> & >> (redirection)

```
cat oslab06.txt oslab07.txt > oslab08.txt  
cat oslab06.txt oslab07.txt >> oslab08.txt
```

| (pipeline)

```
command1 | command2  
cat oslab09.txt | grep jt
```

xargs

```
cat oslab09.txt | ls -l  
cat oslab09.txt | xargs ls -l
```

awk (Aho, Weinberg & Kernighan)

AWK is a programming language designed for text processing and typically used as a data extraction and reporting tool.

pattern { action }

BEGIN、 regular expression、 END

{ function calls, variable assignments, calculations }

```
awk 'BEGIN { print "Hello, world!" }'
```

man (manual)

```
man ls
```

help

```
help cd
```

--help

```
ls --help
```

Wikipedia

<https://en.wikipedia.org/wiki/AWK>