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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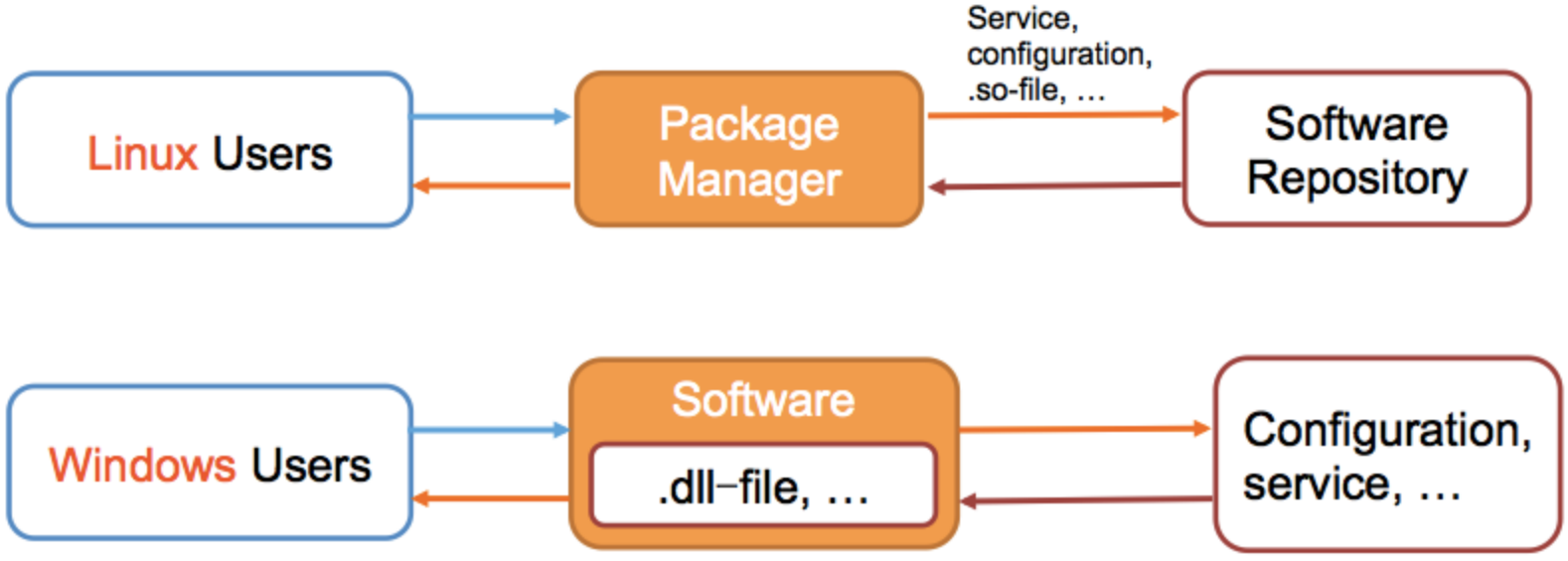
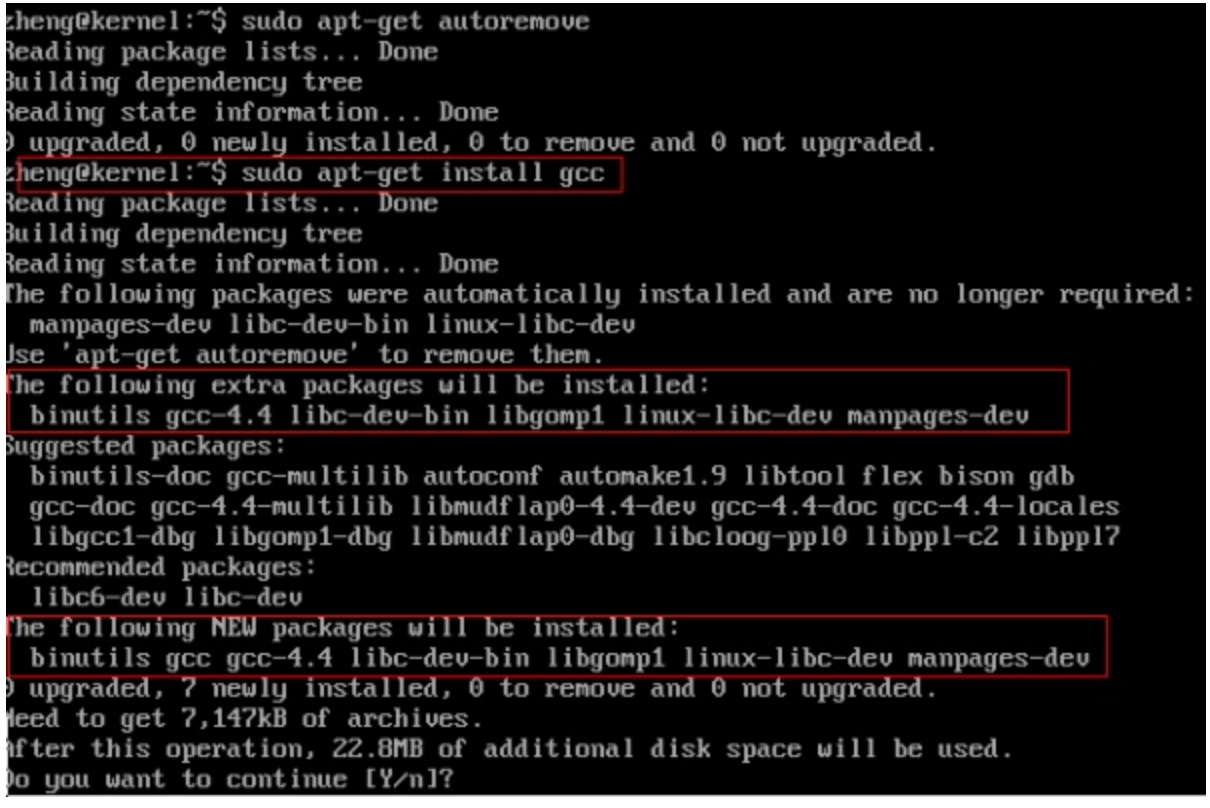
Linux vs Windows Software



Linux install software

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



Windows install software

msvcr80.dll

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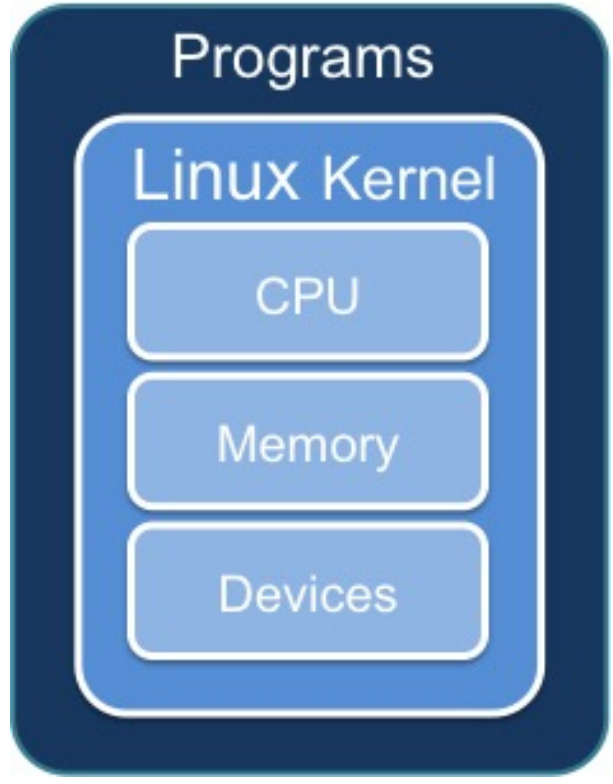
Linux Kernel

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

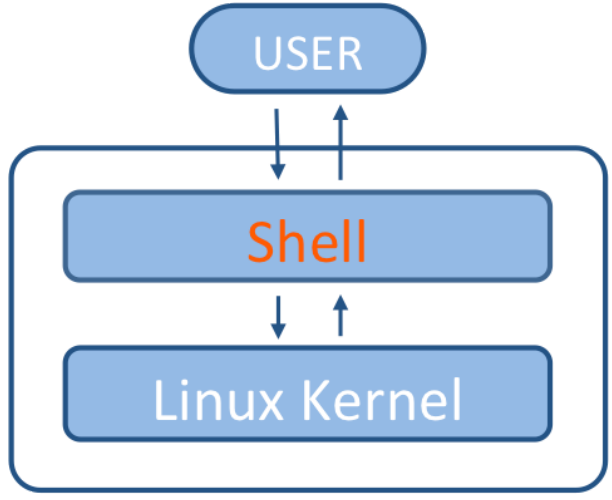
- memory management
- process scheduling
- file system
- ...



Shell (CLI shell)

Command Line Interface

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



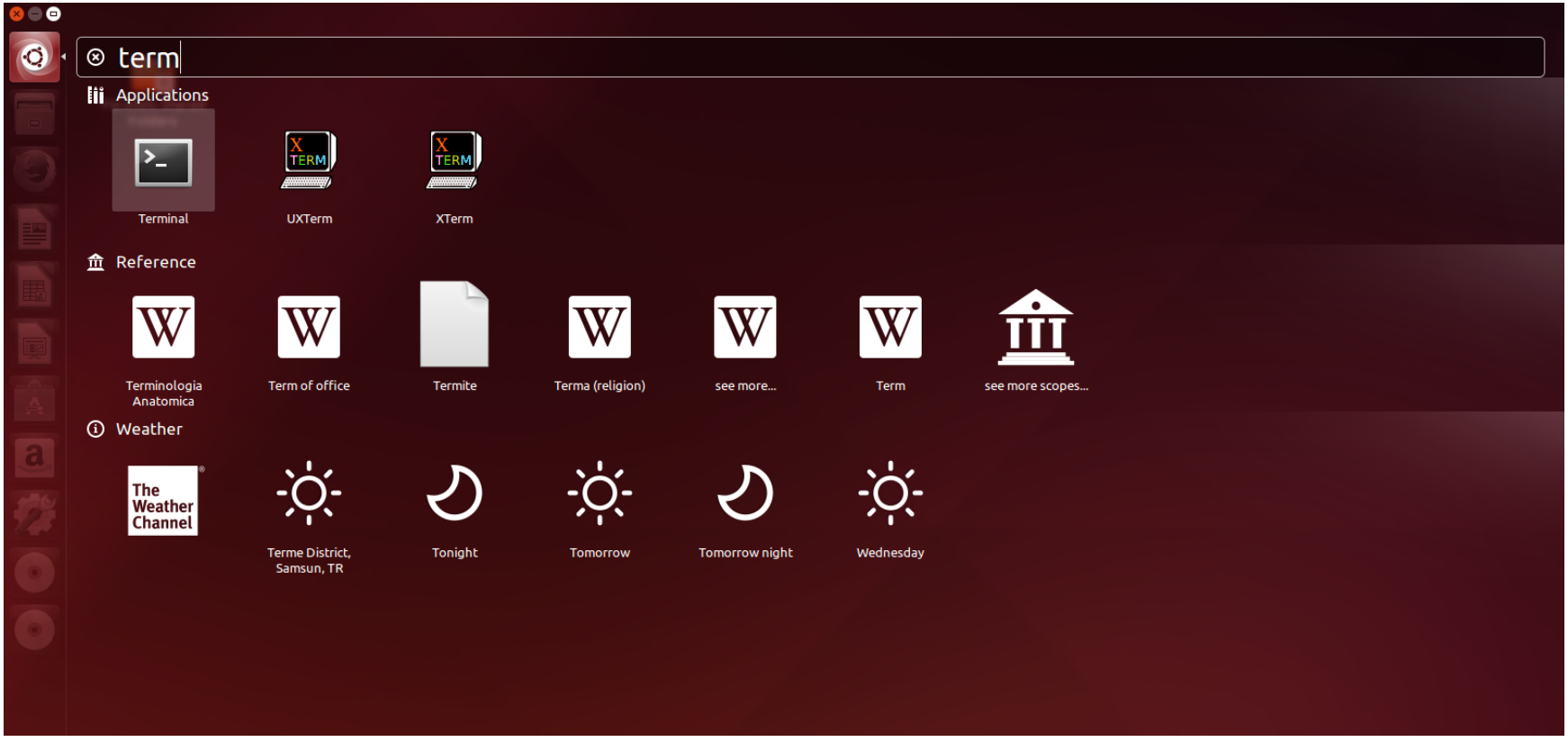
Terminal ↔ Shell

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

open Terminal

keyboard accelerators: `CTRL+ALT+T`

or search:



`cd` (change directory)

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

`pwd` (print working directory)

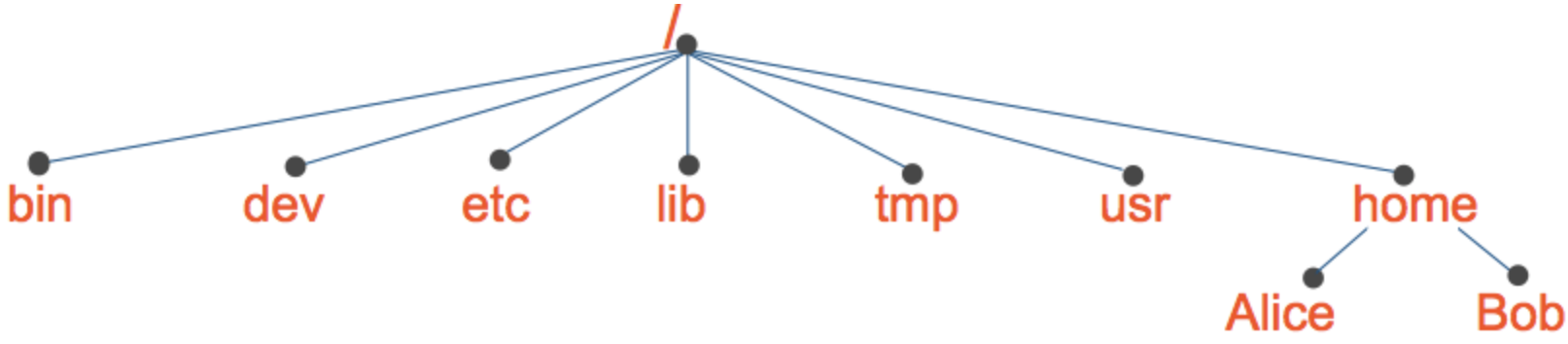
```
pwd
```

`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
...
```

File System



Tree structure, with the root directory " / "

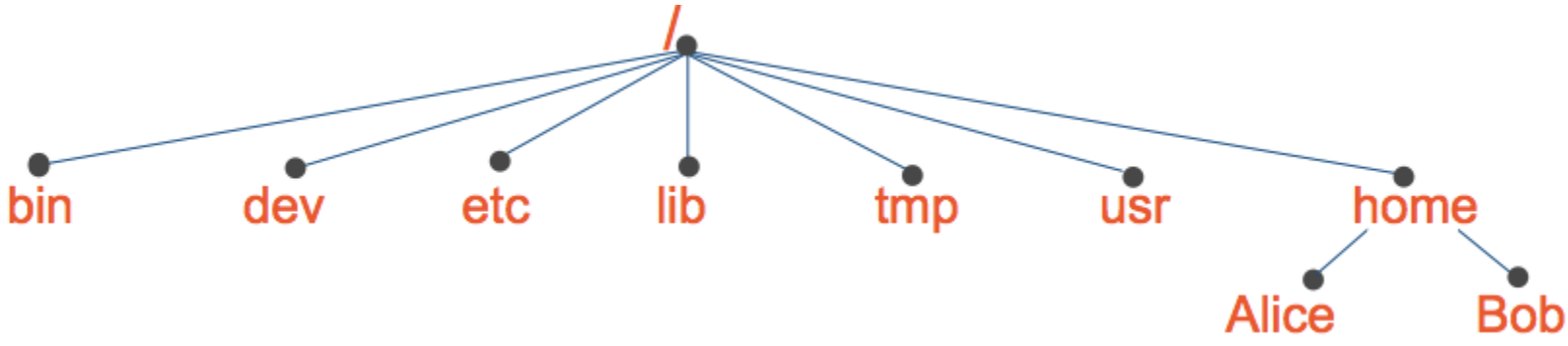
`/home/Alice/...`

`~` = `/home/Alice`

`.`

`..`

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

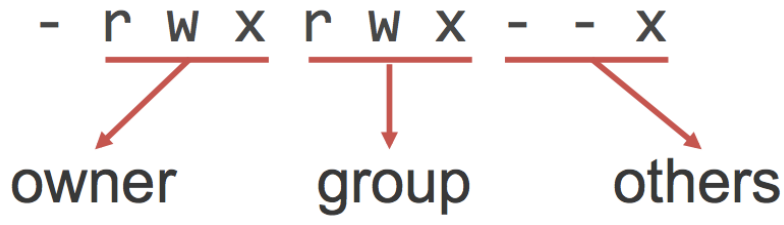
`/proc` : files that give information about current system

`/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



`sudo` (superuser do)

`groupadd`

```
sudo groupadd TA
sudo groupadd boys
sudo groupadd girls
```

`useradd`

```
sudo useradd jt  -m -g TA -G boys  -s /bin/bash
sudo useradd lyh -m -g TA -G girls -s /bin/bash
```

`passwd`

```
sudo passwd jt
sudo passwd lyh
```

`su` (switch user)

```
su jt
```

`chmod` (change mode)

```
chmod 660 class1.txt
chmod g-w class1.txt
```

`cat` (concatenate)

```
cat class1.txt
cat jt.txt
```

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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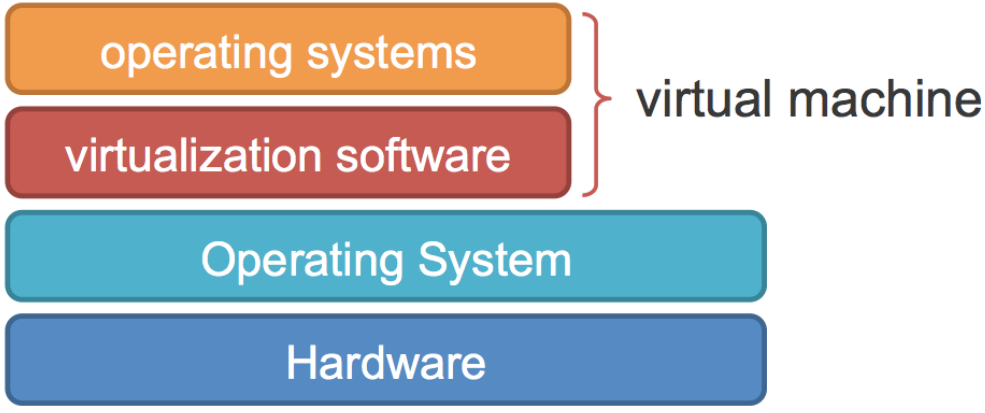
Virtual Machine

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



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

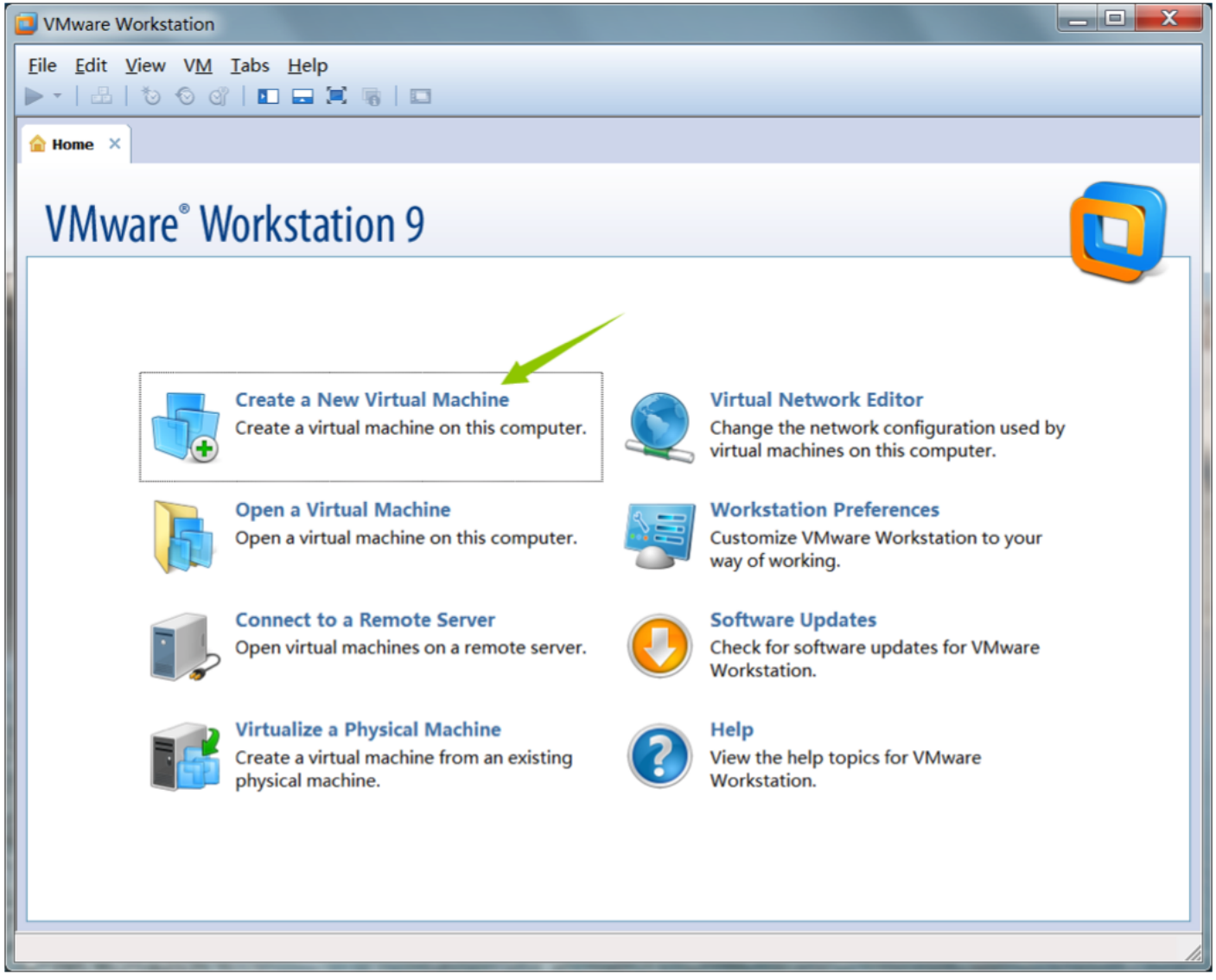
- VMware
- Virtual Box
- Virtual PC

Install the Virtual Machine

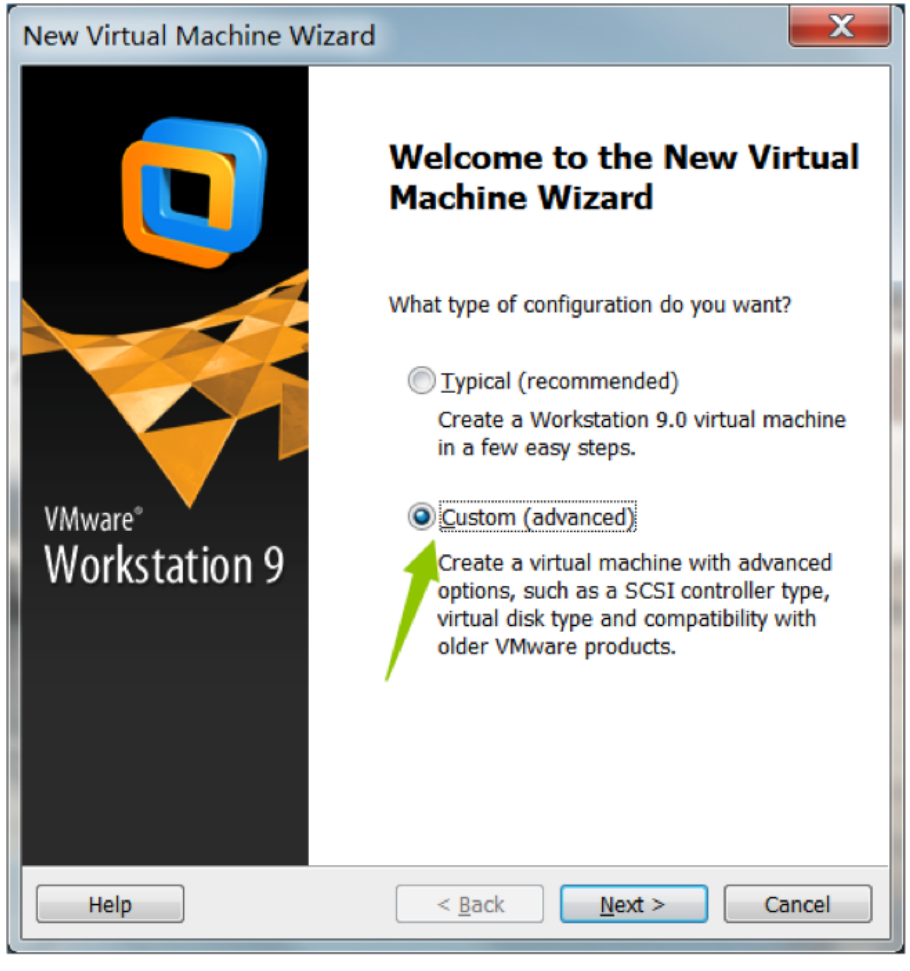
VMware Workstation 9.0 + Ubuntu 14.04 LTS (kernel 3.19)

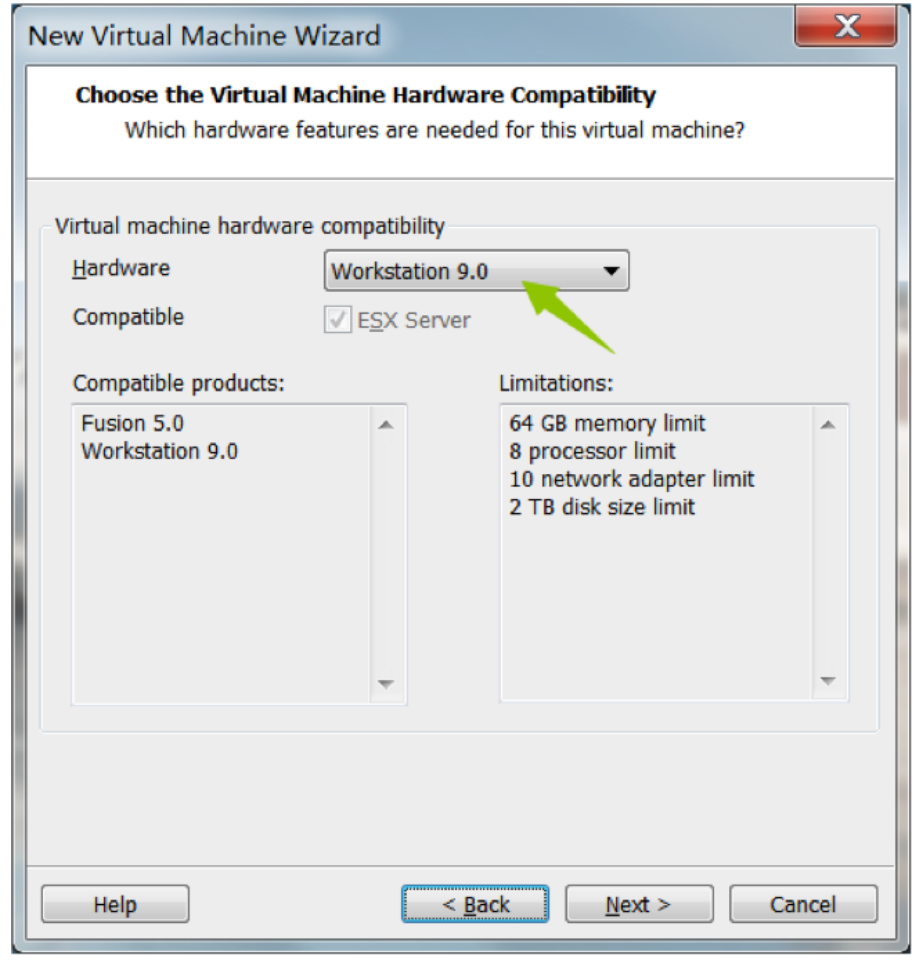
1. Download the Setup File of Vmware 9.0
2. Download the Ubuntu Ubuntu 14.04 LTS from the official website www.ubuntu.com/download/desktop
3. Install VMware 9.0
4. Create a Virtual Machine in the VMware

Create a Virtual Machine



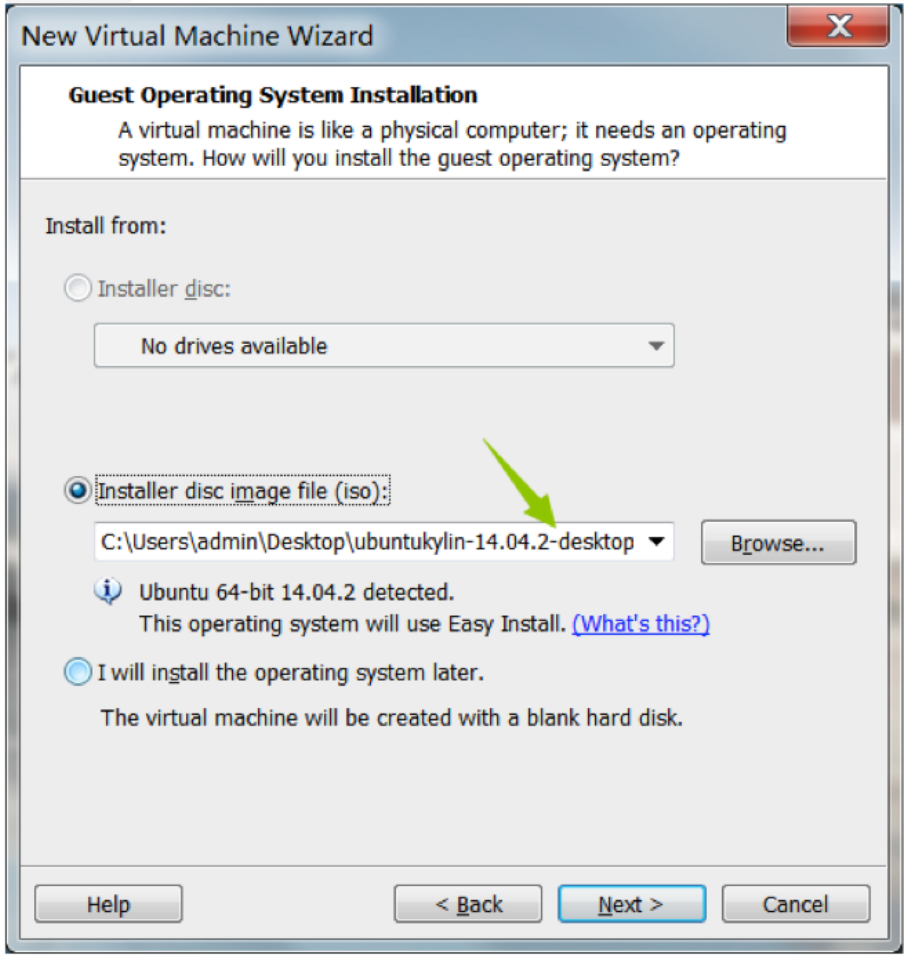
Create a Virtual Machine

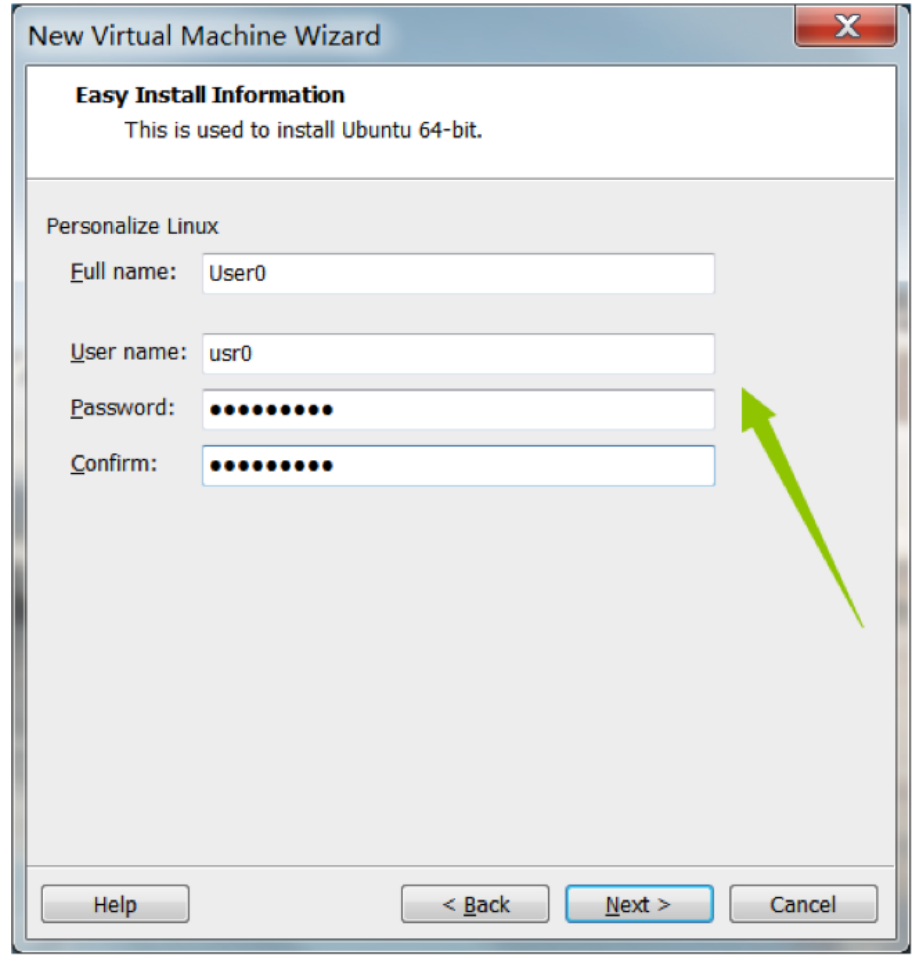




Create a Virtual Machine

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





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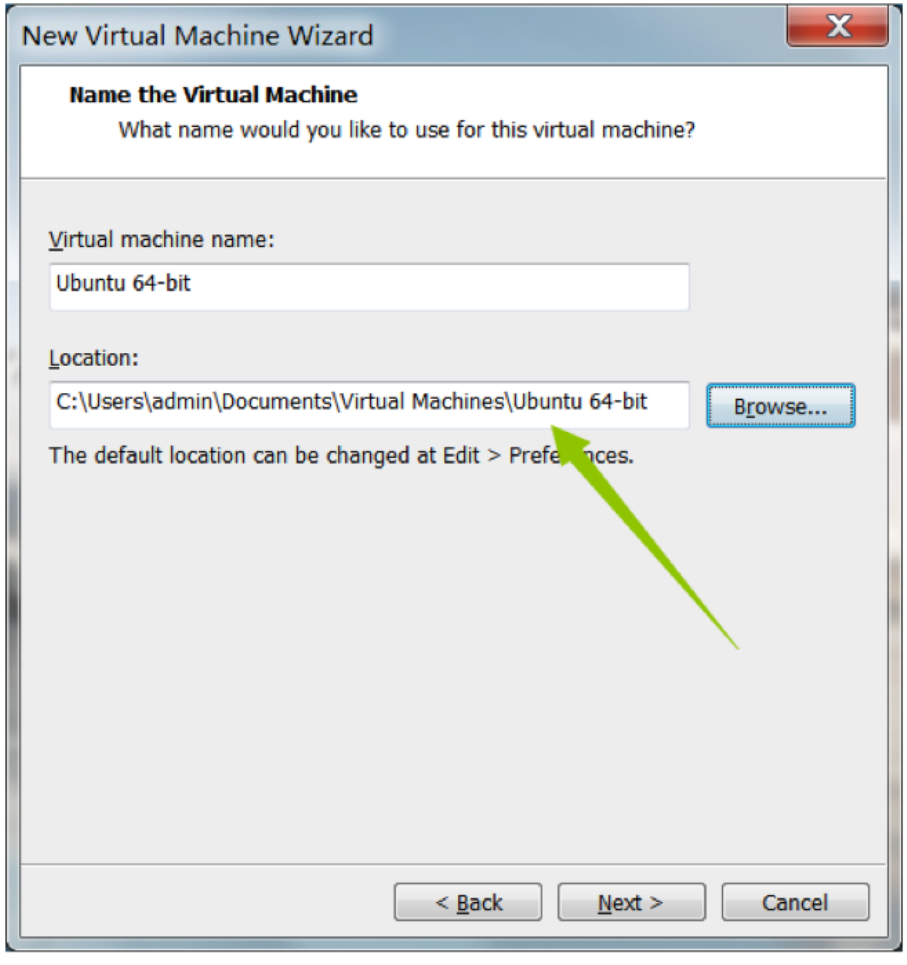
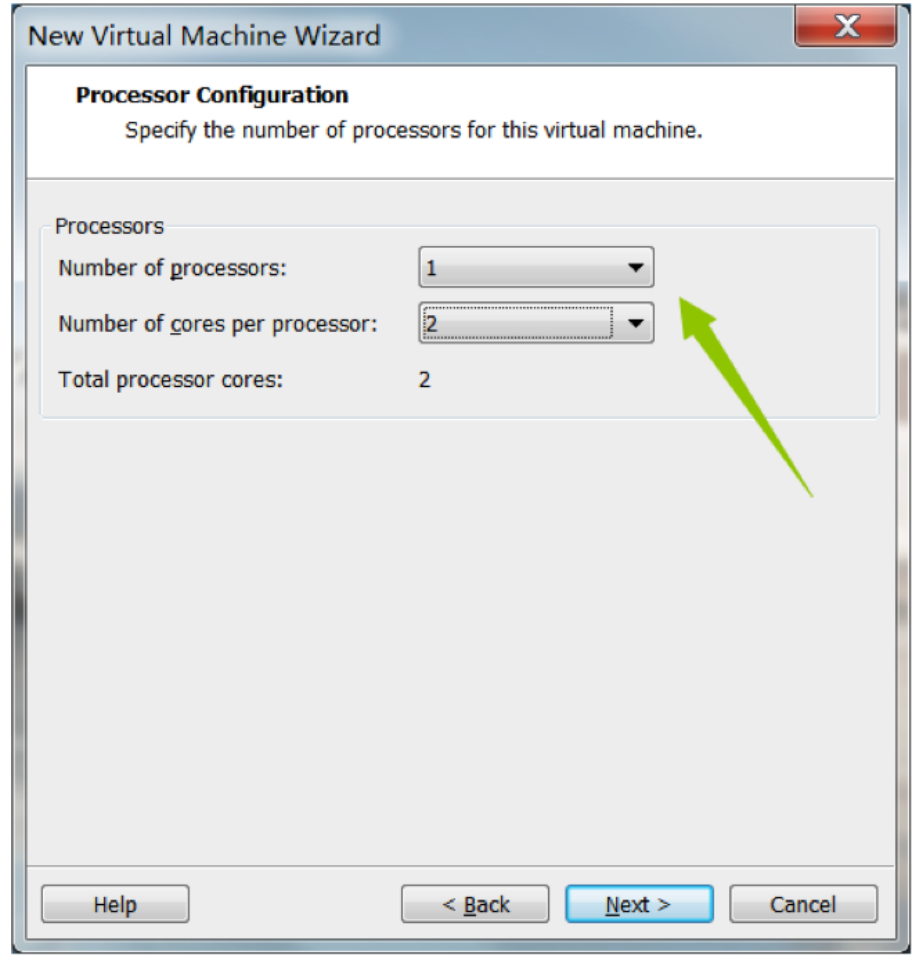
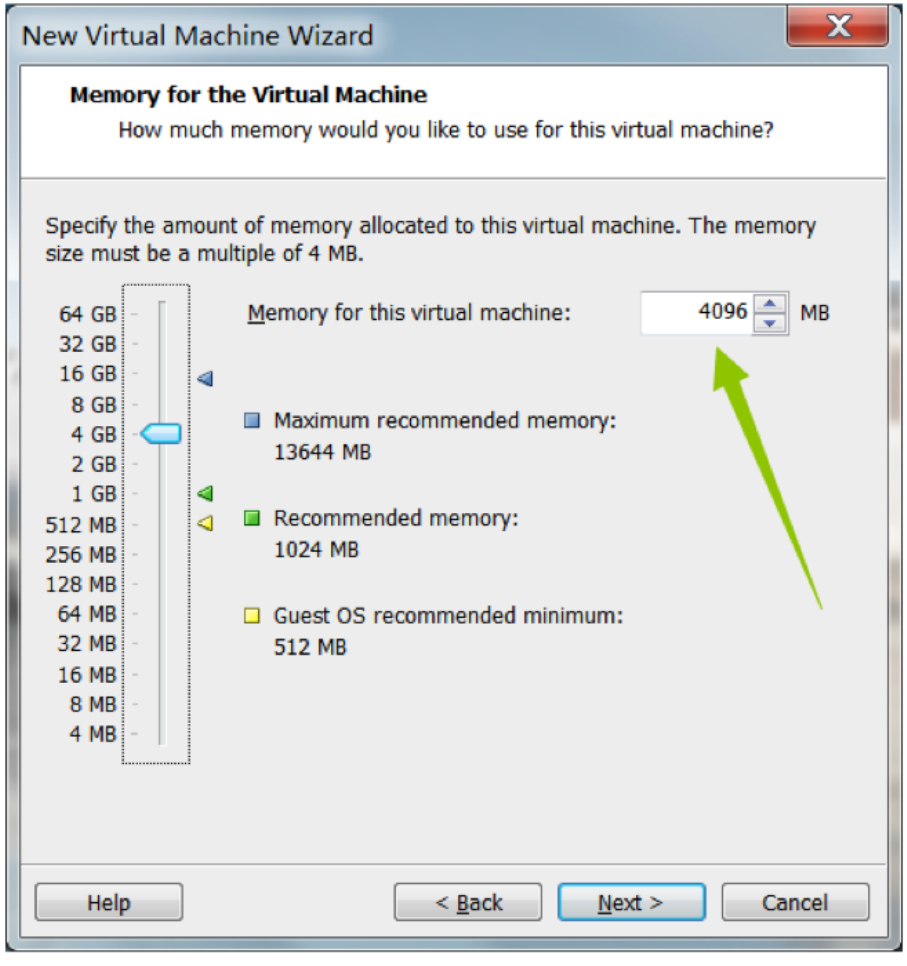
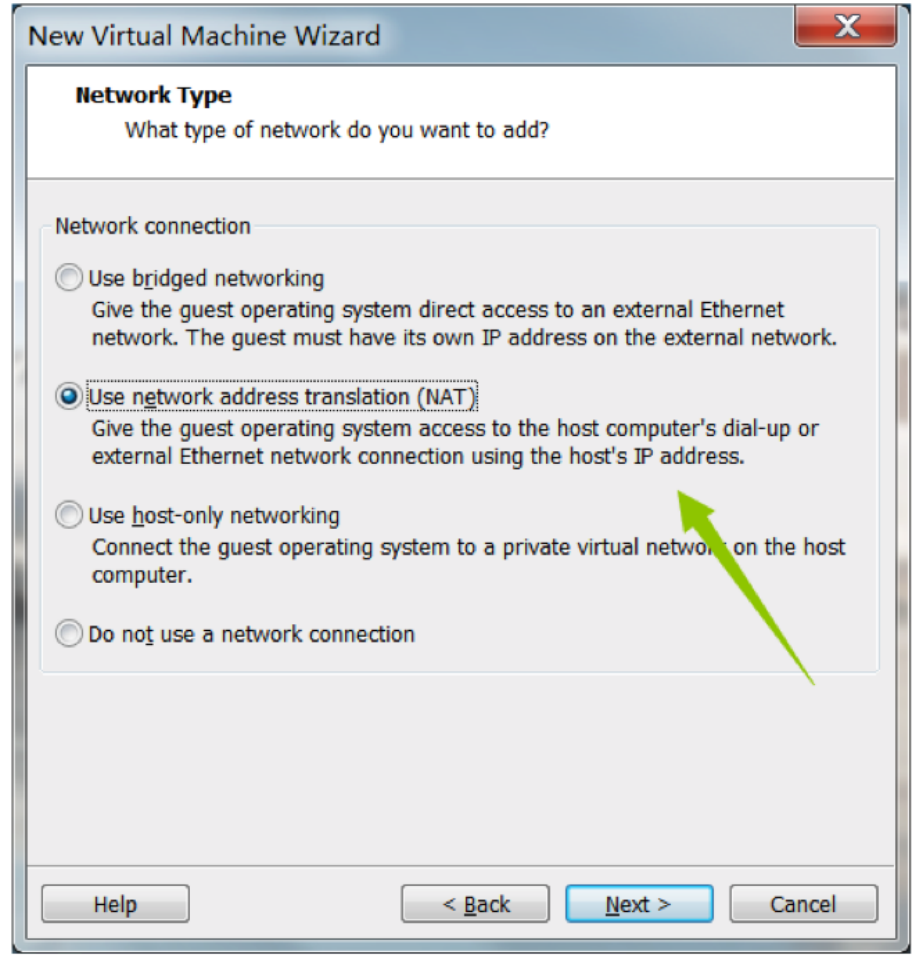


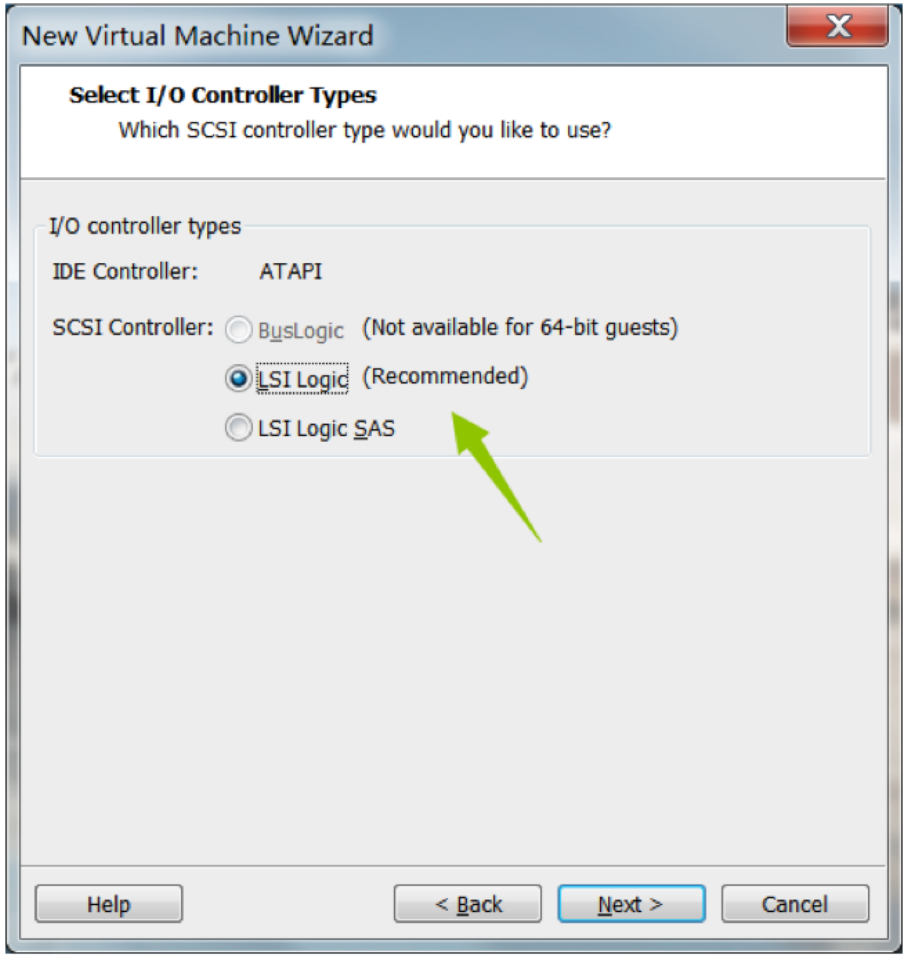


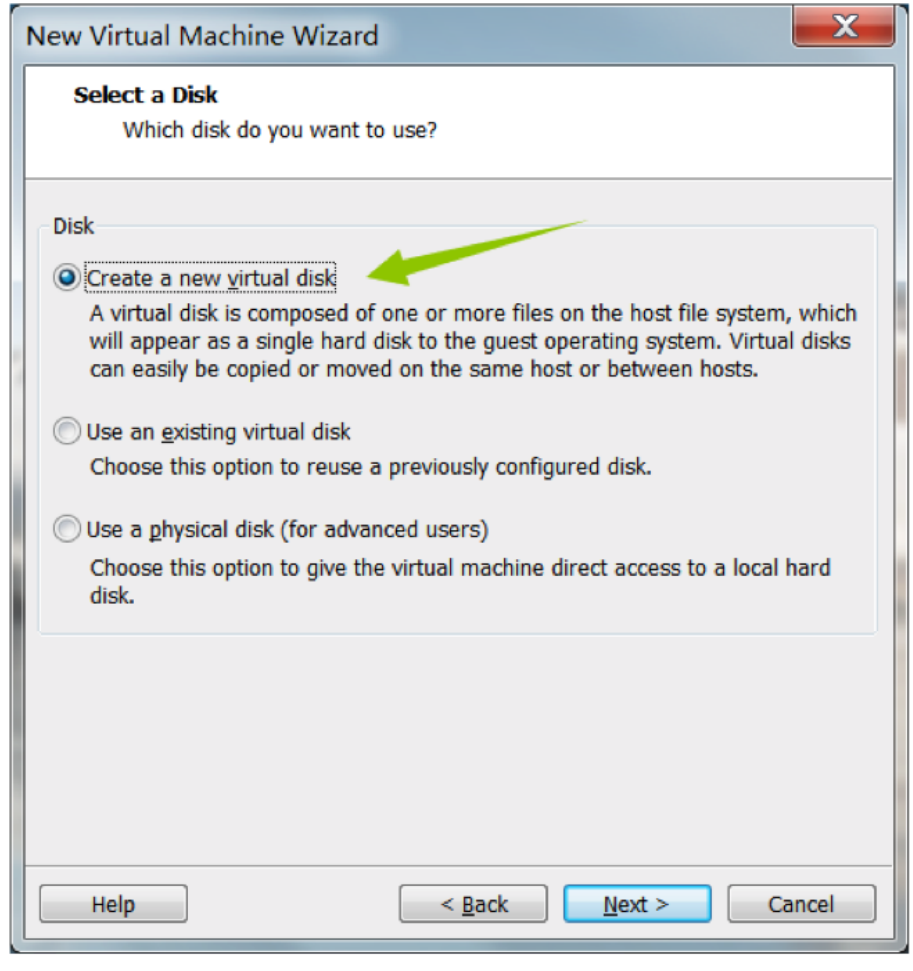
Create a Virtual Machine





Create a Virtual Machine





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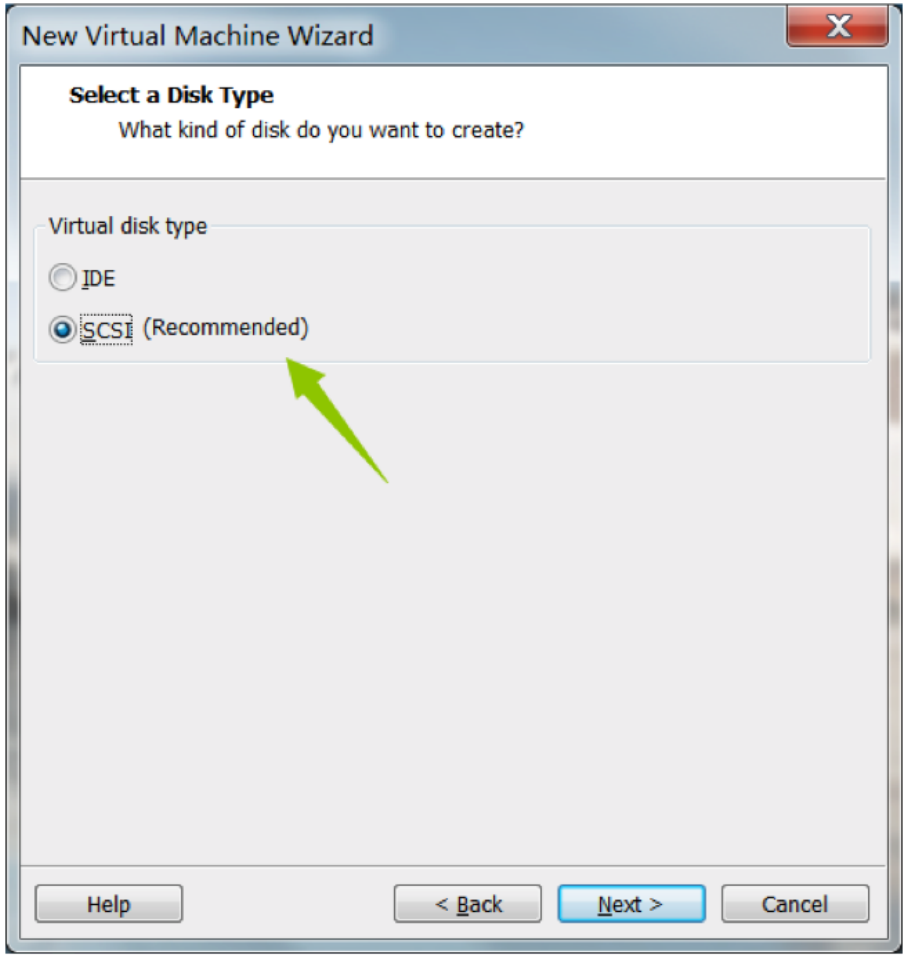

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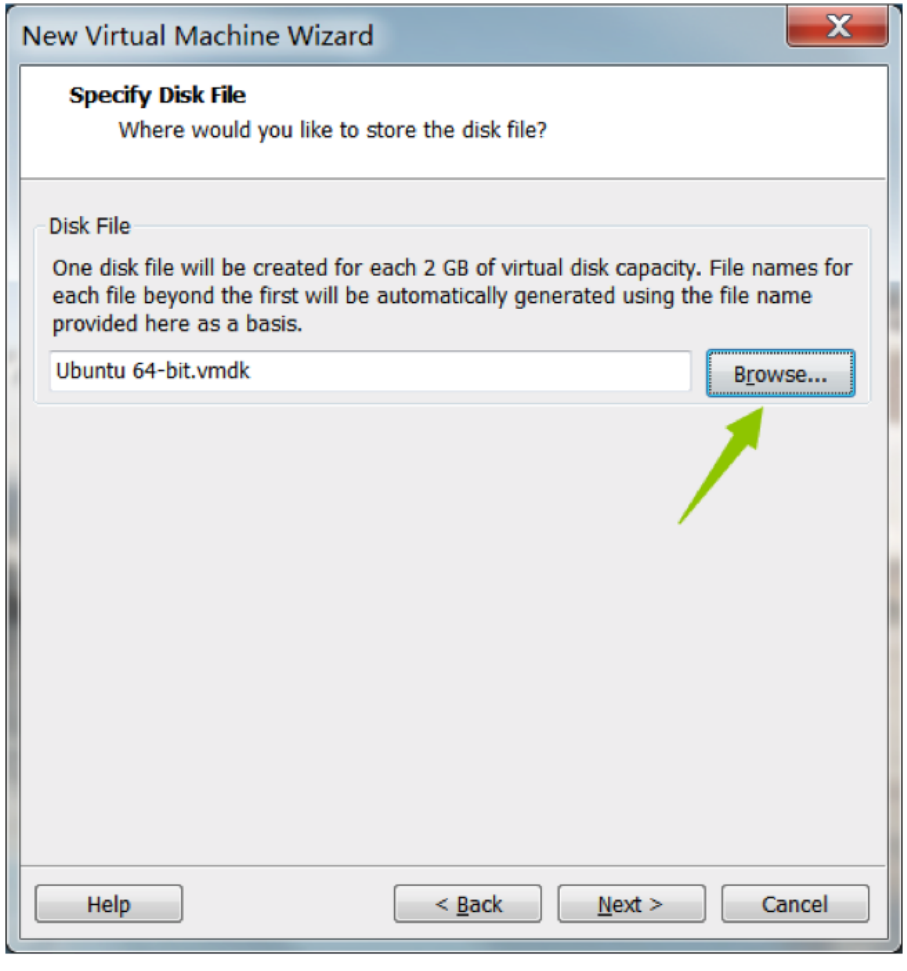

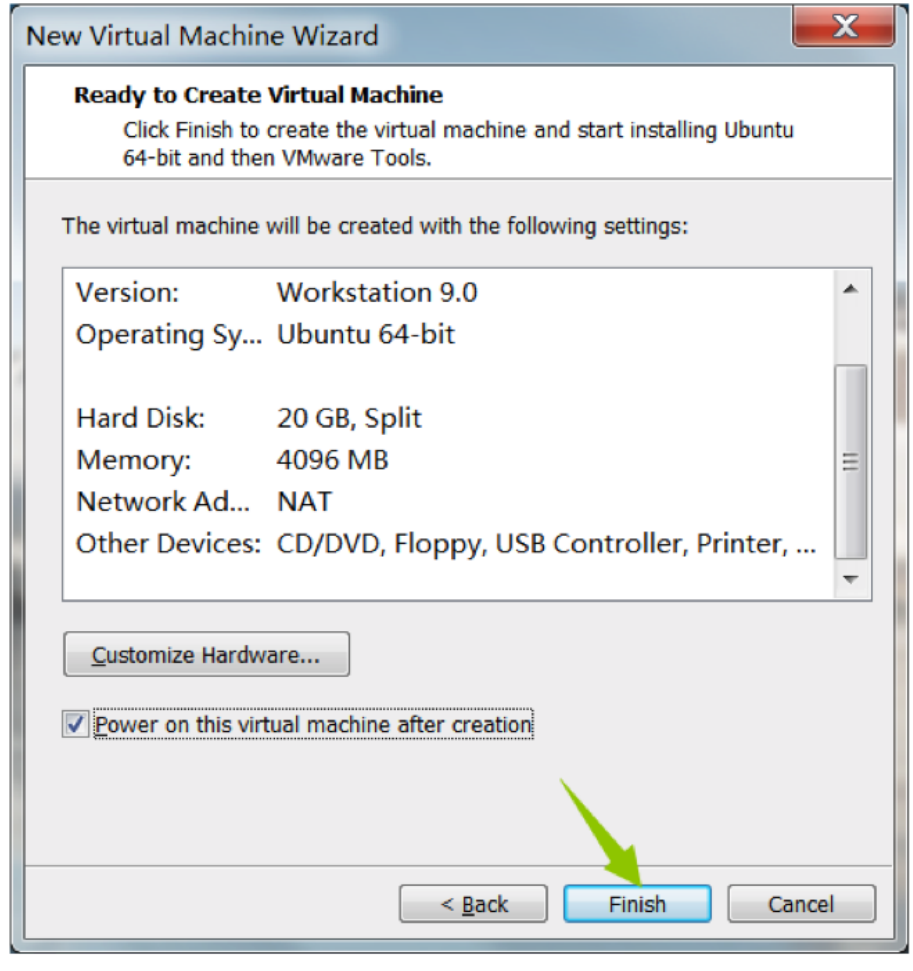

Create a Virtual Machine (Mac)

Mac Virtual Machine -- Parallels desktop

```
magnet:?
xt=urn:btih:5EE7E1DC3E01F362B0E53BFEE9E4D6DCDEDAD61B
```

Create a Virtual Machine (Mac)

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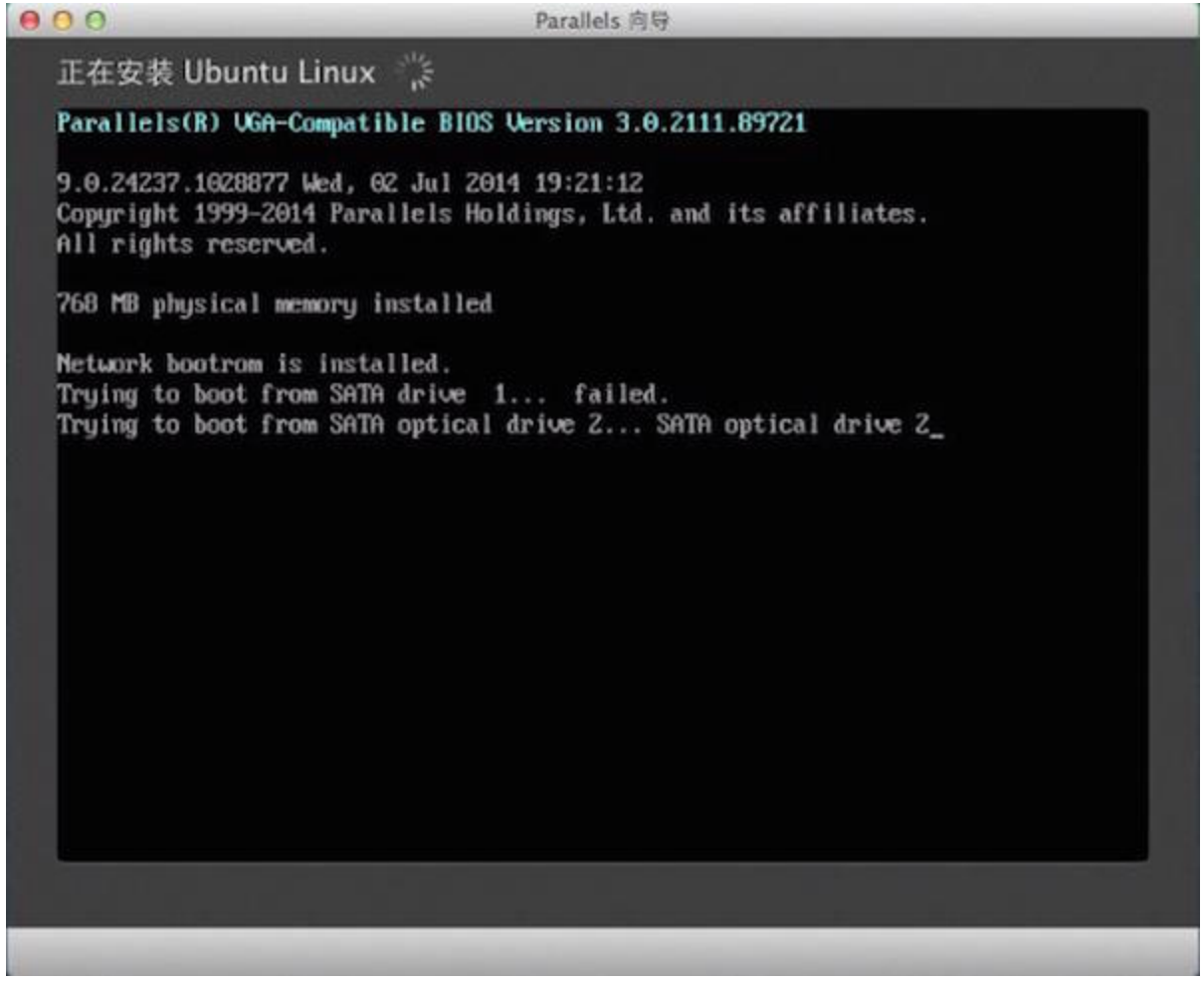

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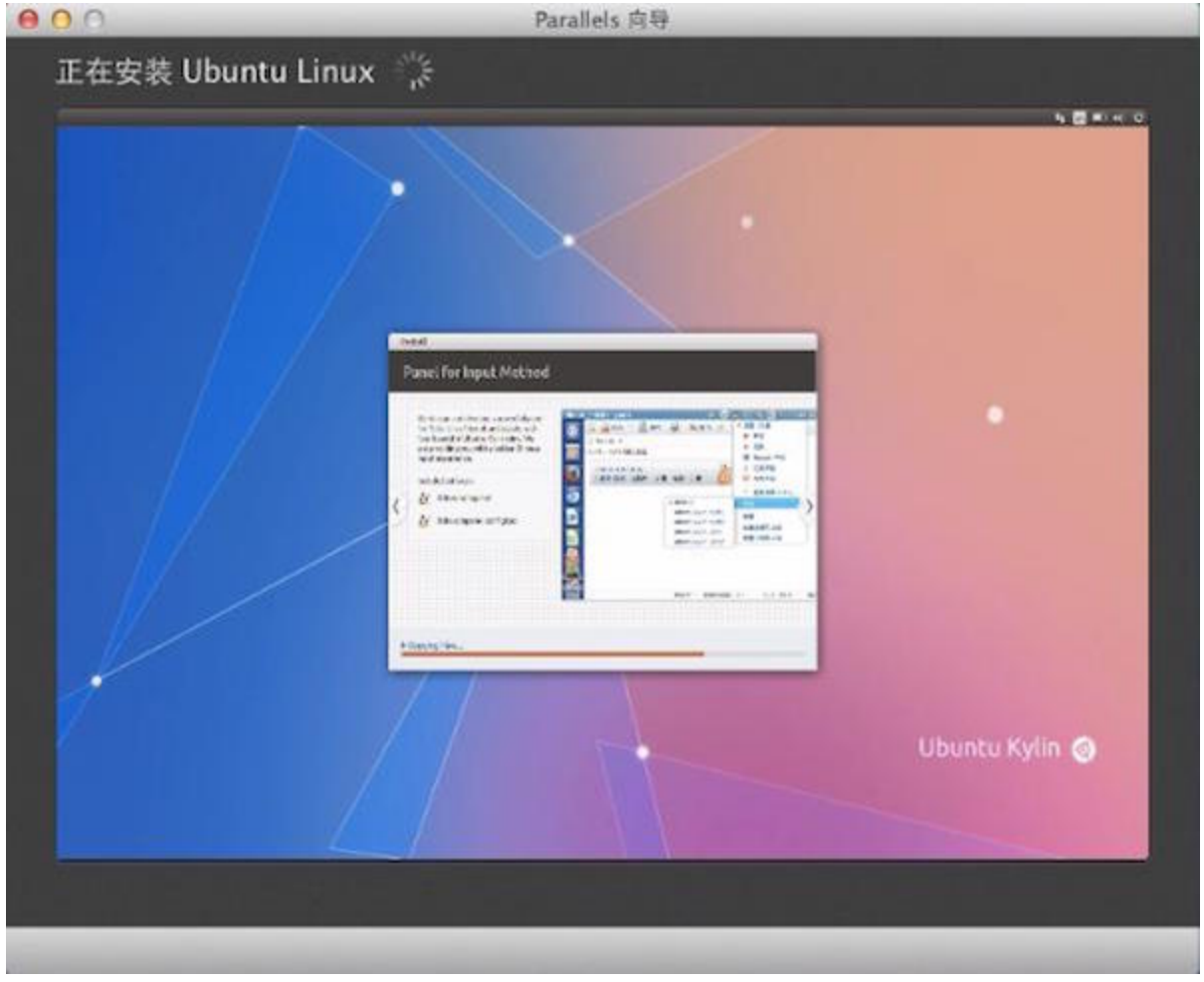

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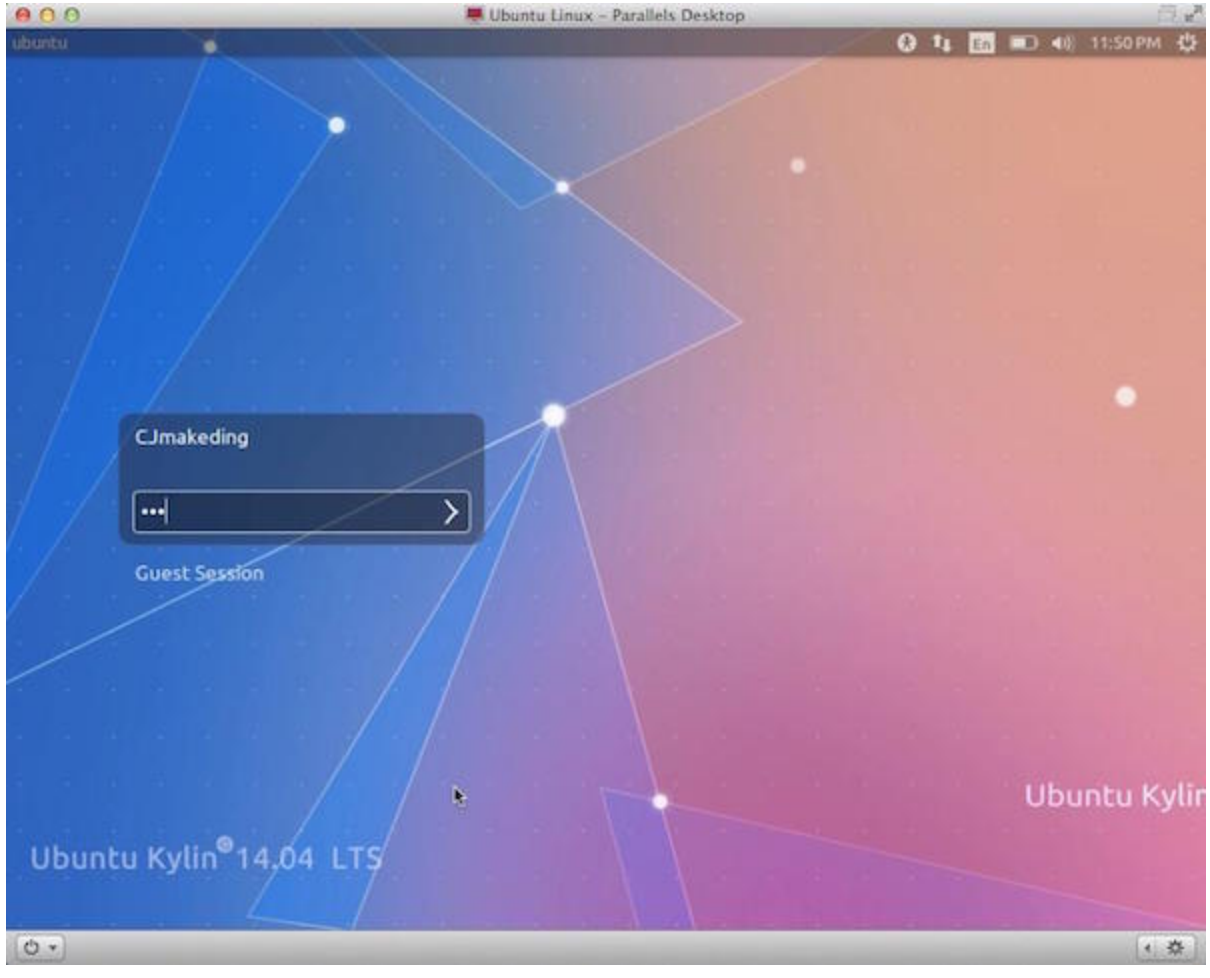

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Basic Commands

> command [-options] [arguments]

- `touch` `rename` `mv` `cp`
- `mkdir` `rmdir` `rm`
- `find` `grep`
- `>` `>>` `|` `xargs`
- `awk`
- `man` `help` `--help`

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

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