

# TUTORIAL LESSON

## Linux & Tools

# OUTLINE

Linux

Tools

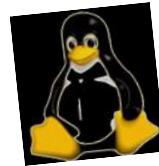
Linux

Tools

➤ Introduction  
Installation  
Shell

# BACKGROUND

- The History of Linux
  - Linus Torvalds, 1991
  - Based on POSIX and Unix
  - Multi-user task thread CPU
  - Unix-like Operating Systems
    - Heirs: **Linux**, **BSD**, **Solaris**, **MacOS X**, ...
    - Principle: **KISS**



**Keep It Simple, Stupid !**

# COMPARISON

- Differences between Windows and Linux
  - One Kernel and Multiple Distribution
    - 5.8.x kernel (latest stable: 5.8.9 2020-09-12)
    - RedHat / Fedora, Debian
    - Suse, Gentoo, Arch, Ubuntu, ...
  - Powerful Command Line Interface
  - Directories Organization
  - ...



redhat



fedora



ubuntu



openSUSE



Mandriva



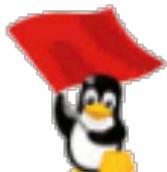
debian



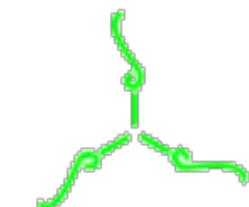
gentoo linux



slackware



红旗



Hiweed



KNOPPIX



CentOS

**Linux**

Tools

Introduction

➤ Installation

Shell

# INSTALL

- Step 0: How to find it ?
  - Ftp
    - [10.12.5.33/classes/19/计算机系统基础（上）/Materials](http://10.12.5.33/classes/19/计算机系统基础（上）/Materials) 目录下
  - Online: *get the official web-site by google*
  - e.g. Ubuntu

# INSTALL

- Step 1: Where to install it ?

- Windows subsystem Linux
    - Convenient, but no technical support

- on RAW machine

- Cool ! **Dangerous !**

- on VIRTUAL machine

- Safety! **Recommendation !**

**Tips:** virtual machine

## Definition

provides a complete system platform which supports the execution of a complete operating system

~~Java Runtime Environment~~

**Tips:** VirtualBox

**Benefit**

hosted, popular, graphic  
easy, stable, checkpointed

# INSTALL

- Step 2: Create VM
  - Create VM from ISO file
    - e.g. **ubuntu-20.04.7-desktop-amd64.iso**
  - Set name and location
  - Disk capacity
    - **20G** (engross on demand)
  - Network connection (customized)
    - **Bridge** (separate IP) or **NAT** (internal IP, **default**)

**Done !**

# INSTALL

- Step 3: Configure VM
  - Configure Hardware (Customized)
    - Memory Size
    - #CPU / #Core
    - Ethnet Mode
  - Power On

Let's go !

**Linux**

Tools

Introduction

Installation

➤ Shell

# SHELL

- Operating System Shell
  - Provide access to the services of a kernel
  - Command-Line Interface (CLI)
    - Unix Shell
      - e.g. Bounce-Again Shell, **bash**
    - Non-Unix Shell
      - e.g. DOS
  - Graphical User Interface (GUI)
    - Windows, X Window (KDE, GNOME, Xfce), Mac OS

# Commands

- MOST IMPORTANT
  - Search Path: /bin, /usr/bin, ...
  - Command is case sensitive
  - **man** – display the manual pages  
e.g. >man ls
  - **whatis** – search the whatis database for complete words  
e.g. >whatis passwd

# Commands

## File and Directory

- **ls** - list files/dirs e.g. >ls
- **mkdir** - create a dir e.g. >mkdir test
- **cd** - change dir e.g. >cd test
- **rm** - remove files/dirs e.g. >rm -f a.txt
- **cp** - copy files/dirs e.g. >cp a.txt b.txt
- **mv** - move files/dirs e.g. >mv a.txt c.txt
- **pwd** - show current path e.g. >pwd

# Commands

## File and Directory

- **chmod** – change mode of file/dir  
e.g. `>chmod 777 test`
- **chown** – change owner of file/dir  
e.g. `>chown ics edit`
- **chgrp** – change group of file/dir  
e.g. `>chgrp guest draft -R`

\$ ls -l						
duuugggooo	C	owner	group	size	date	name
drwxr--r--	1	peter	admin	4096	Mar 1 2007	drafts
-rw-r--r--	1	peter	admin	30405	Mar 1 2007	edition-32
-r-xr-xr-x	1	terry	admin	8460	Mar 1 2007	edit

r: read

w: write

x: execute

rwx=111=7

u: owner

g: user group

o: other users

# Commands

## ■ Search

- **whereis** - locate special files for a command  
(binary, src and manual file)  
e.g. >whereis cp
- **find** - search for files/dirs in a dir hierarchy  
e.g. >find . -name "c.txt"
- **locate** - locate files/dirs by name in system  
based on a database  
e.g. >locate test
- **grep** - text search utility  
e.g. >grep -r "abc" .

# Commands

## ■ User Account

- **useradd** – create a new user  
e.g. >useradd ics
- **userdel** – delete a user account  
e.g. >userdel ics
- **passwd** – set password for a user account  
based on a database  
e.g. >passwd ics
- **users** – print name of user currently logged  
e.g. >users

# Commands

## ■ Text

- **cat** – concatenate and print files  
e.g. `>cat b.txt`
- **head** – output the first part of files  
e.g. `>head -n 4 b.txt`
- **tail** – output the last part of files  
e.g. `>tail -c 50 b.txt`
- **wc** – print the number of newlines, words, and bytes in files  
e.g. `>wc b.txt`
- **cut** – remove sections from each line of files  
e.g. `>cut -c 4-10 b.txt`

# Commands

## ■ Misc

- **echo** – display a line of text  
e.g. `>echo $PATH`
- **mount** – mount a file system  
e.g. `>mount /dev/sda3 /mnt`
- **umount** – unmount a file system  
e.g. `>umount /mnt`
- **ping** – send ICMP ECHO\_REQUEST to network hosts  
e.g. `>ping 10.12.5.33`
- **date** – print or set the system date and time  
e.g. `>date '+%c'`
- **time** – time a simple command  
e.g. `>time ls`

# Commands

## ■ Misc

- ; - join two command in one line  
e.g. >echo \$PATH; whereis echo
- < > >> - redirect input and output  
e.g. >cat b.txt >> c.txt
- | - pipe the former output as the later input  
e.g. >cat b.txt | grep "abc"
- & - do command in new process  
e.g. >cat b.txt &

Linux

Tools

- Software Installer
- Compressing and Archiving
- Remote Login
- Text Editor
- Version Control

# Software Installer

- APT (Advanced Package Tools)
  - A management system for software packages
  - Package resource list for
    - */etc/apt/sources.list*

```
$ cat /etc/apt/source.list
```

```
...
```

deb	http://mirrors.163.com/debian/	jessie	main
dbe-src	http://mirrors.163.com/debian/	jessie	main
type	URI of source	dist	comp

URI type: http, ftp, cdrom, file, ssh ...

# Software Installer

- APT Advanced Package Tools
  - apt-get: *command-line tool*
    - **update** e.g. >apt-get update
    - **install** e.g. >apt-get install htop
    - **remove** e.g. >apt-get remove htop
    - **upgrade** e.g. >apt-get upgrade htop
  - apt-cache: *cache manipulator*
    - **search** e.g. >apt-cache search htop
    - **showpkg** e.g. >apt-cache showpkg htop

# Software Installer

- APT Advanced Packag Tools)
  - example: *install vim*
    - >su
    - >apt-get update
    - >apt-cache search vim
    - >apt-get install vim
    - >man vim

```
$ apt-cache search vim
...
vim   - Vi IMproved - enhanced vi editor
vim-doc - Vi IMproved - HTML documentation
...
```

Linux

Tools

Software Installer

➤ Compressing and  
Archiving

Remote Login

Text Editor

Version Control

# COMPRESSING

- GZIP (Gnu ZIP)
  - gzip file format
  - Compress just single file
  - Replace the original file with .gz file
  - e.g. >gzip test.txt
  - >gunzip test.txt.gz

# ARCHIVING

- **TAR** (**T**ape **A**Rchive)
  - **tar** file format
  - Suffix:
    - **.tar** e.g. >tar -cf src.tar src/
    - **.tgz/.tar.gz** e.g. >tar -zxf src.tar.gz
    - **.tbz/.tar.bz2** e.g. >tar -jcf src.tbz src/

# Tasks

Linux

Tools

Software Installer

Compressing and  
Archiving

➤ Remote Login

Text Editor

Version Control

# REMOTE LOGIN

- **SSH (Secure SHell)**
  - A Replacement for Telnet
    - Communication through a **secure** channel
  - Tatu Ylönen, 1995
  - OpenSSH (OpenBSD Secure Shell), 1999
  - e.g. `>ssh -l root 127.0.0.1`
- **SCP, A Replacement for FTP**
  - e.g. `>scp b.txt root@127.0.0.1:~/test/`  
`>scp root@127.0.0.1:~/test/b.txt ./`

# REMOTE LOGIN

- Remote Login from Windows
  - Command-Line Interface
    - **PuTTY**
      - act as a client for SSH and Telnet
      - Developed by Microsoft
  - Graphical User Interface
    - **VNC (Virtual Network Client)**
      - Platform Independent
      - Client-Server Model

Linux

Tools

Software Installer

Compressing and  
Archiving

Remote Login

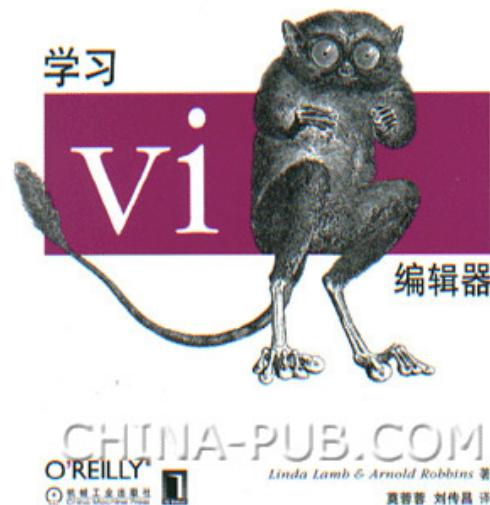
➤ Text Editor

Version Control

# TEXT EDITOR

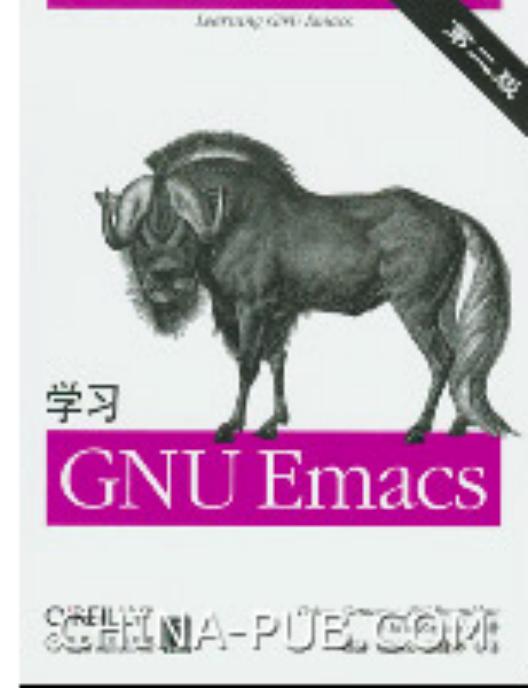
## ■ vi (Visual Editor)

- /'vi: 'ai/, not /'siks/ ☺
- Extension: vim, vile, xvi, ...
- Simple and Convenient
- BOOK: “*learning the vi editor*”  
<http://www.china-pub.com/computers/common/info.asp?id=9208>
- Cheat Sheet (*Chinese version*)  
<http://jserv.sayya.org/misc/vi-vim-cheat-sheet.png>
- “>vimtutor” to get a simple tutorial



# TEXT EDITOR

- Emacs (Editing MACroS)
  - /'imæks/
  - More powerful than IDE !
    - Emacs List
  - BOOK: "Learning GNU Emacs"  
<http://www.china-pub.com/computers/common/info.asp?id=13395>



Linux

Tools

Software Installer

Compressing and  
Archiving

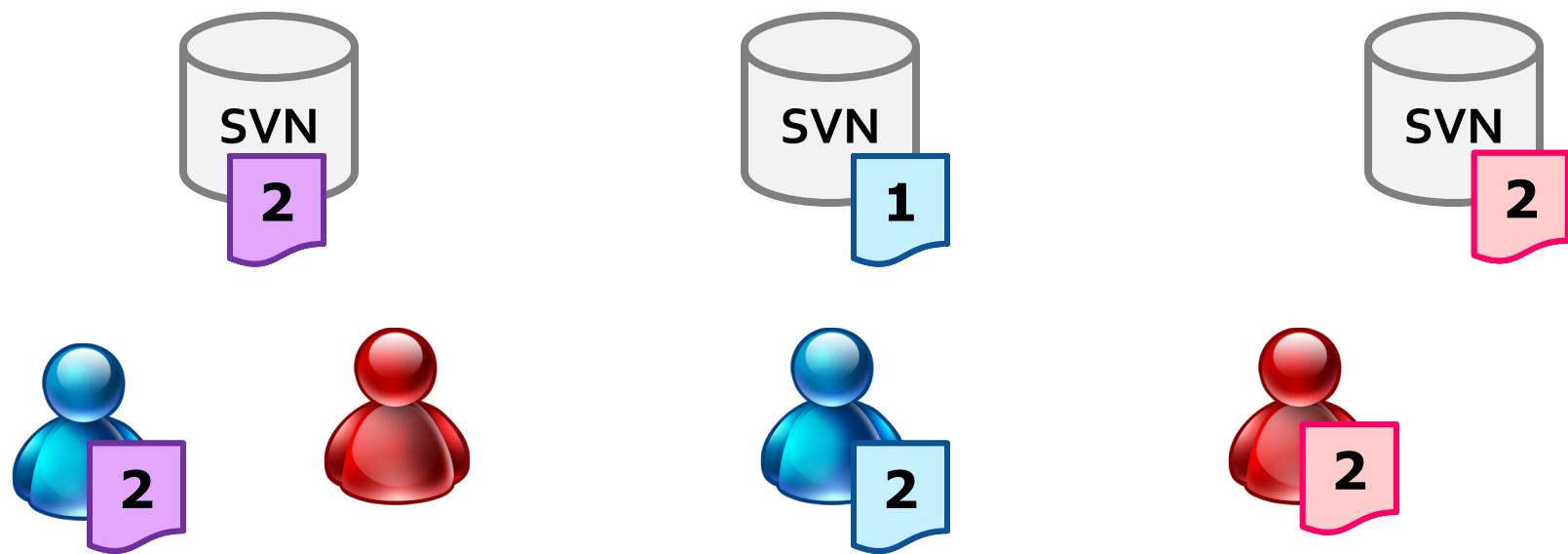
Remote Login

Text Editor

➤ Version Control

# VERSION CONTROL

- SVN (SubVersioN)
  - Maintain current and historical versions



# VERSION CONTROL

- **SVN (SubVersioN)**

- Client Command

- **checkout**

- e.g. >svn co svn://localhost/trunk trunk  
--username=liy

- **update**

- e.g. >svn update

- **commit**

- e.g. >svn ci a.c -message="..."

- **add file**

- e.g. >svn add b.c

- >svn ci b.c -message="..."

- **del file**

- e.g. >svn del b.c

- >svn ci b.c -message="..."

# VERSION CONTROL

- **SVN (SubVersioN)**
  - Client Command
    - **show status**      e.g. >svn status -q
    - **diff file**        e.g. >svn diff b.txt
    - **resolve**  
e.g. >vi a.c //manually remove conflict  
>svn resolved a.c

\*svn resource link: <http://subversion.tigris.org/>

Thanks

Thanks

# **UBUNTU 系统镜像获取**

# 下载Ubuntu镜像

- FTP获取
  - 10.12.5.33/classes/19/计算机系统基础（上）/Materials目录下
- 官网下载：  
<http://releases.ubuntu.com/16.04/>
- 镜像下载：
  - <http://mirrors.ustc.edu.cn/ubuntu-releases/16.04/> (中科大)
  - <https://mirror.tuna.tsinghua.edu.cn/ubuntu-releases/16.04/> (清华镜像)
- ubuntu-16.04.6-desktop-i386.iso (32位)
- ubuntu-16.04.7-desktop-amd64.iso (64位)

# **VMWARE激活（获取）**

在校园网的情况下进行

# 申请序列号

- 序列号申请网站:
  - <http://tac.fudan.edu.cn/thirds/vm.act>

VMware Global Education and Research Programs <a href="#">详情</a>	
说明	此处为序列号申请，可获得的产品包括： VMWare产品： <ul style="list-style-type: none"><li>VMware eLearning</li><li>VMware Workstation 15.x Pro</li><li>VMware Fusion 11.x Pro (for Intel-based Macs)</li><li>VMware vSphere 6.7 Enterprise Plus (仅教师)</li><li>VMware vCenter Server 6.7 Standard (仅教师)</li></ul>
	软件可前往 <a href="http://mvls.fudan.edu.cn/vmware">http://mvls.fudan.edu.cn/vmware</a> 下载
用户类型	硕士生
注册类型	VMware <input type="button" value="▼"/>
请输入你的email:	<input type="text"/> <small>(结尾必须为必须为@fudan.edu.cn或@shmu.edu.cn, 相关序列号会发送至该邮件地址)</small>
<input type="button" value="提交"/> <input type="button" value="还原"/>	

可以在获取序列号之后直接下载软件，也可以从官网下载

从官网下载需要注意版本

- Vmware Fusion: 11.x
- Vmware Workstation : 15.x

Vmware官网

- <https://www.vmware.com/cn.html>

## VMware

All



[VMware Fusion 11.x  
Pro \(for Intel-based  
Macs\)](#)



[VMware Workstation  
15.x Player](#)



[VMware Workstation  
15.x Pro](#)



[VMware vCenter  
Server 7.x Standard](#)



[VMware vRealize  
Suite 2019  
Enterprise](#)



[VMware vSAN 7.x  
Enterprise](#)



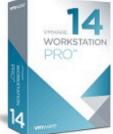
[VMware vSphere 7.x  
Enterprise Plus](#)



[VMware vCenter  
Server 6.x Standard](#)



[VMware Fusion 10.x  
Pro \(for Intel-based  
Macs\)](#)



[VMware Workstation  
14.x Pro](#)



[VMware vRealize  
Suite 7.0 Enterprise](#)



[VMware vSAN 6.x  
Enterprise](#)



[VMware vSphere 6.x  
Enterprise Plus](#)

## VMware Workstation 15.x Pro ▲



VMware Workstation Pro takes virtualization to the next level with the broadest operating system support, rich user experience, a comprehensive feature set and high performance.

**Choose a platform:**

Windows

[VMware Workstation 15.x Pro for Windows](#)

Free

Available to: Students

Workstation requires a 64-bit processor and 64-bit host operating system.

You will be able to place an order for this product again in 12 months after the initial order.

The license you will receive with this offering is valid 12 months starting with the 1st of the month the offering was ordered.

Add to Cart

Students

Faculty/Staff

VMware

More Software

Software

eLab eLearning

VMware Workstation Pro 15



Choose a plan

VMware Workstation Pro

Available to: Students

Workstation Pro

You will be able to

The license you

offering was

Added to Your Shopping Cart

x



By placing this order, you agree to all terms and conditions associated with its items. [View all terms and conditions.](#)

Back to Shopping

✓ Check Out

OnTheHub  
by Kivuto

Contact Us

Safe Shopping

Privacy Policy

Help

Shipping

Powered by  
**Kivuto**

SECURED BY  
RapidSSL www.rapidssl.com

## Details

- ✓ Your order has been placed and a confirmation email will be sent to you shortly. An invoice you can print is available [here](#). Detailed information about all of your orders can always be found under Your Account.

## Details (Order Number: 100694414449)

## Downloads



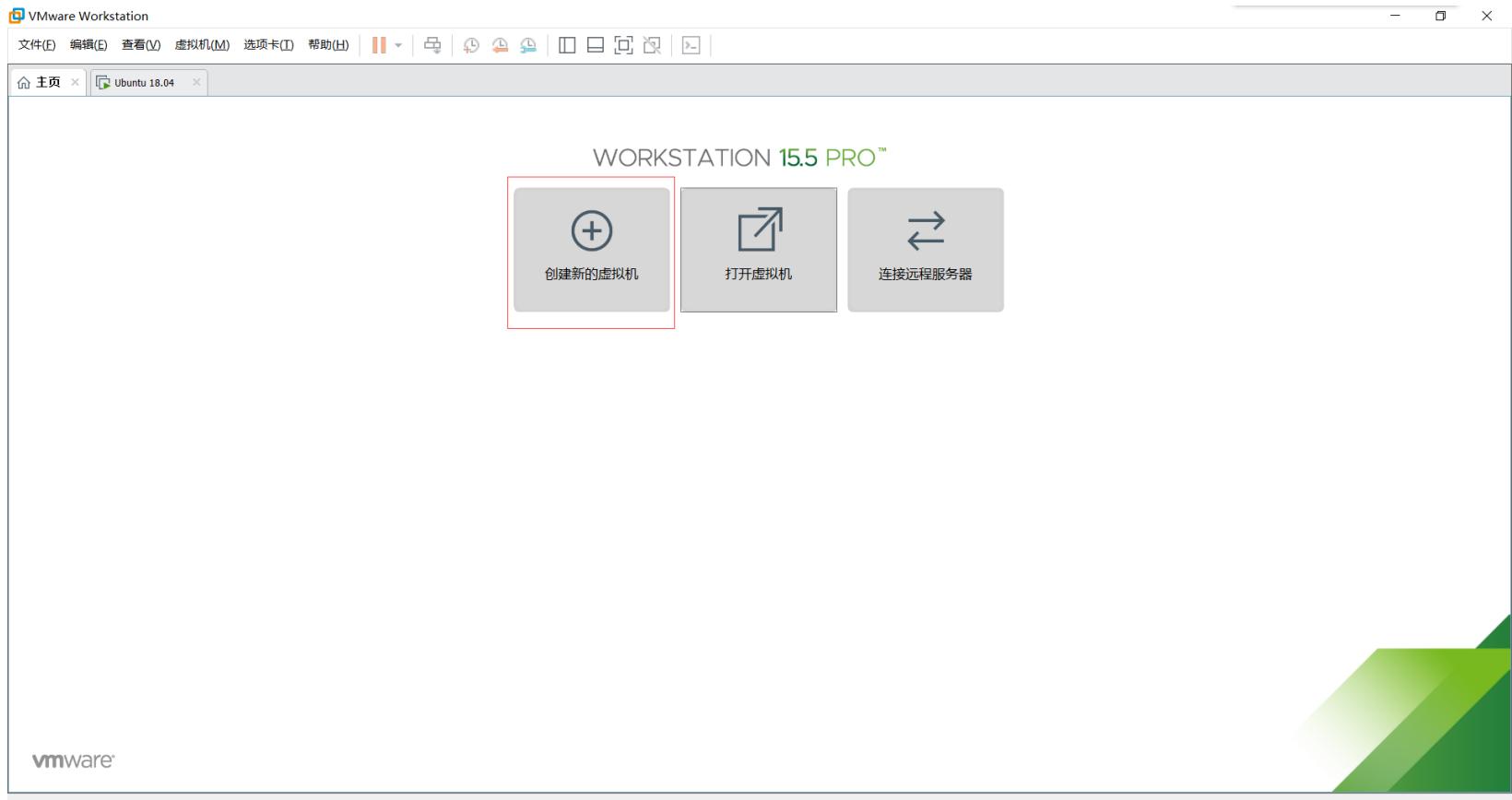
VMware Workstation 15.x Pro for Windows - Download

Serial Number: 

Download

**使用VMWARE WORKSTATION安装  
UBUNTU系统**

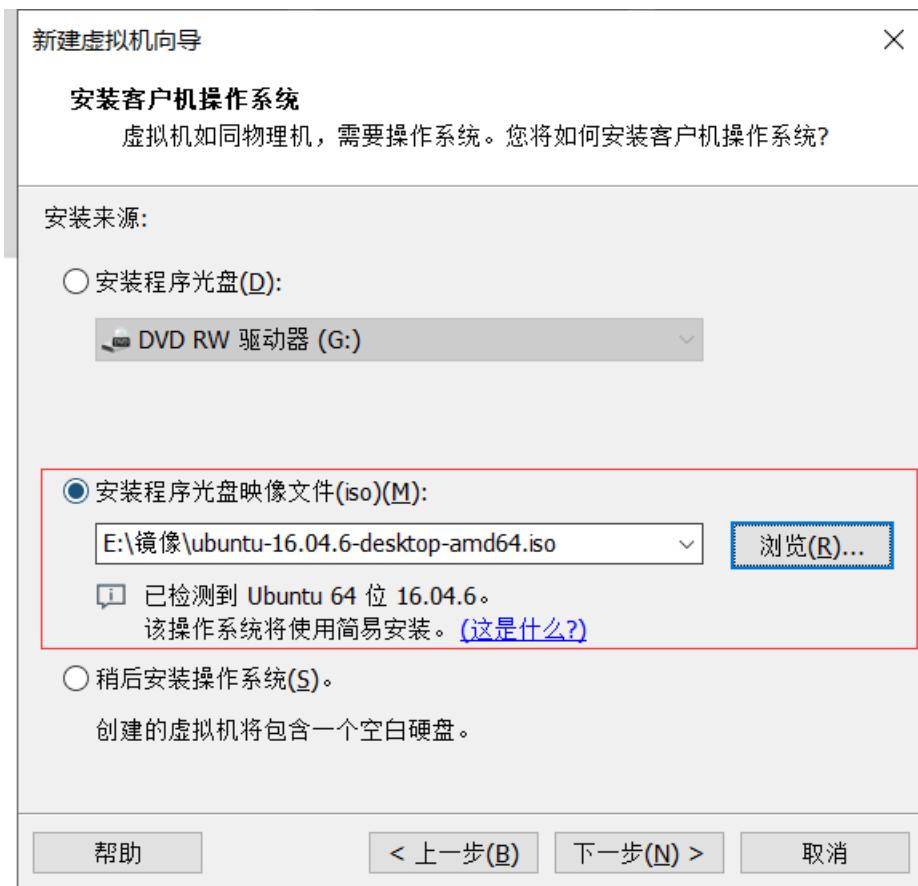
# 创建新虚拟机



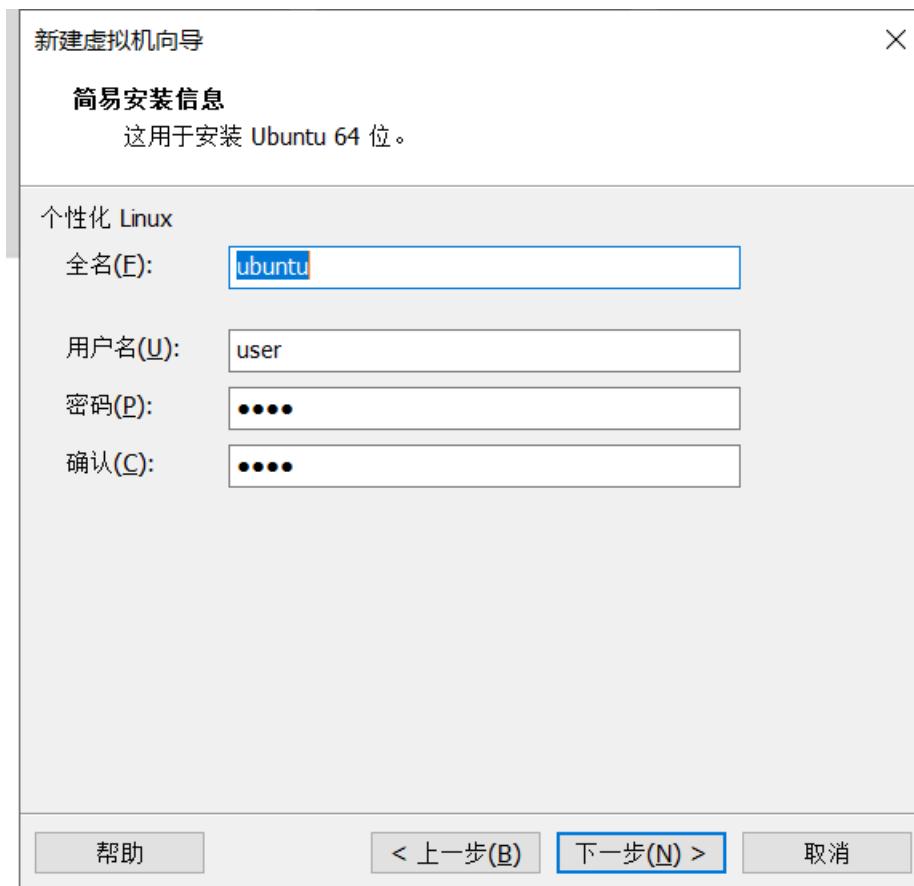




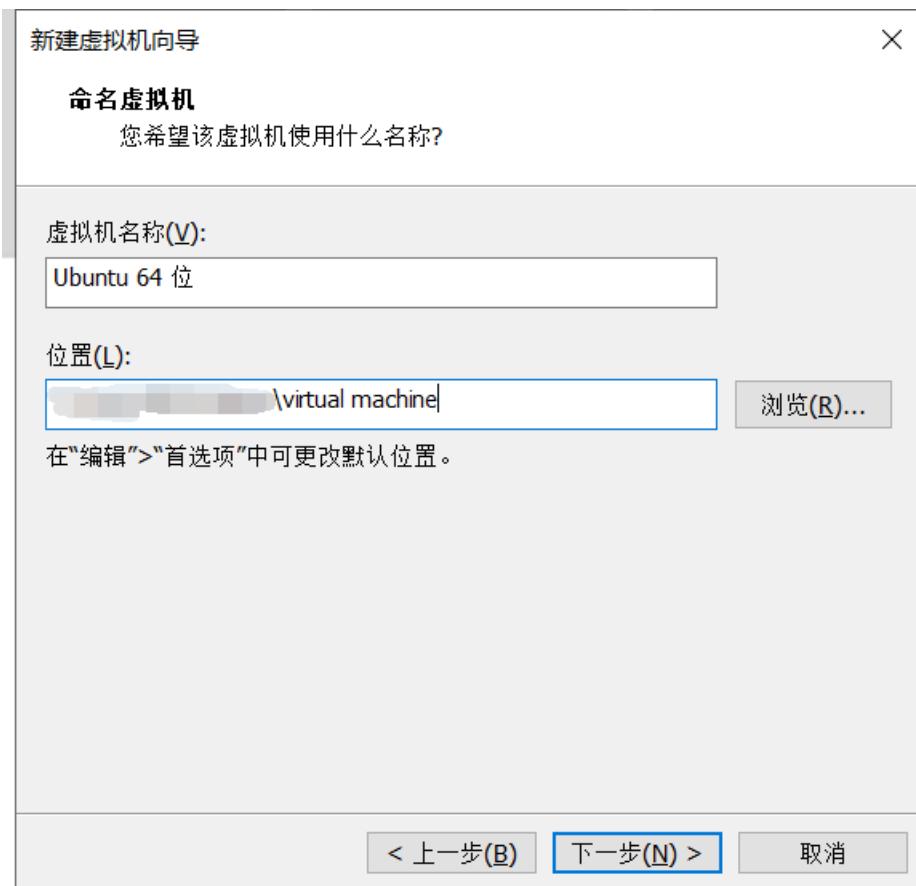
# 选择安装程序光盘映像文件，也就是刚刚下载的那个Ubuntu

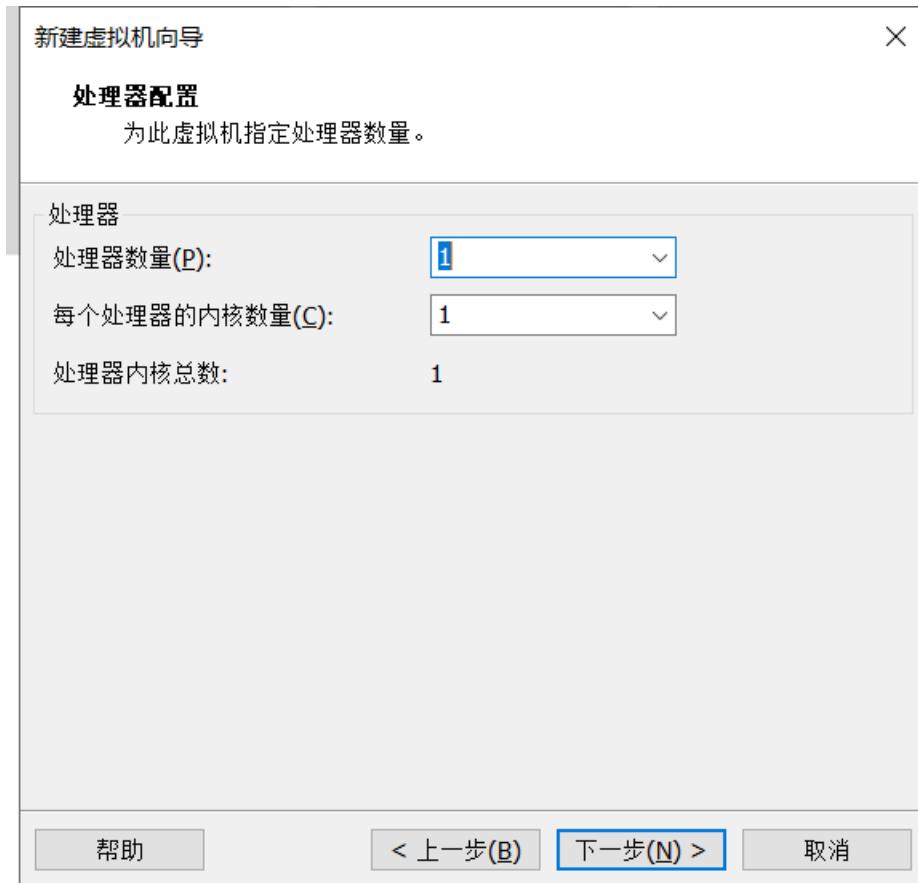


# 设置个人信息

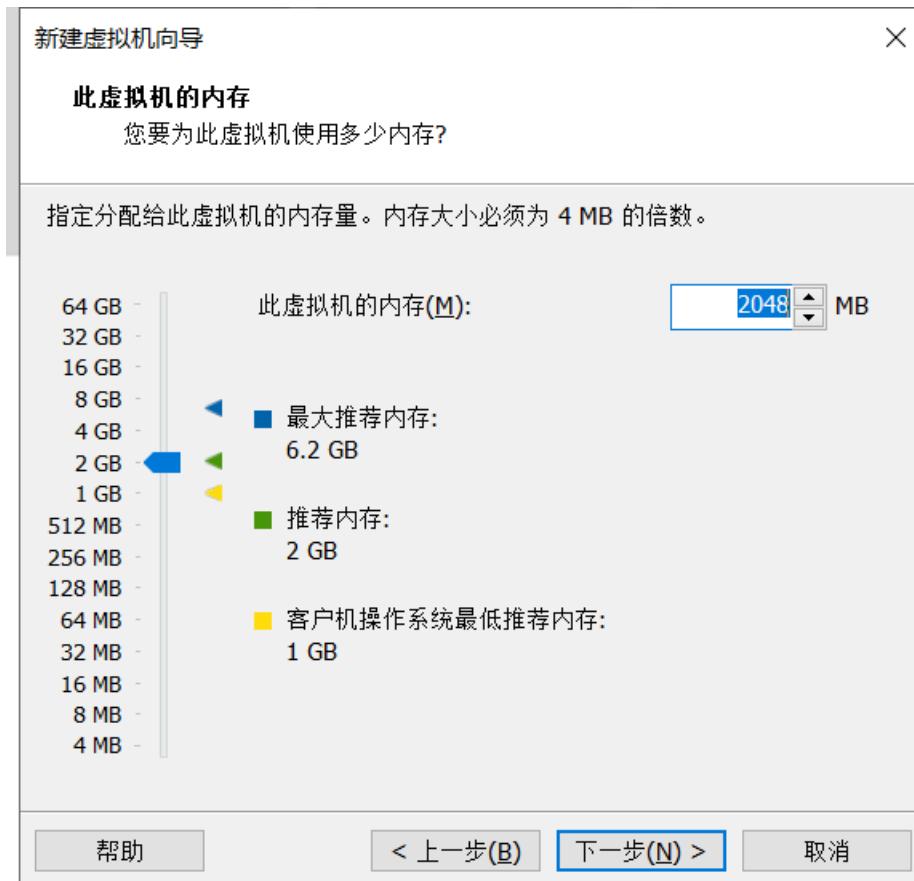


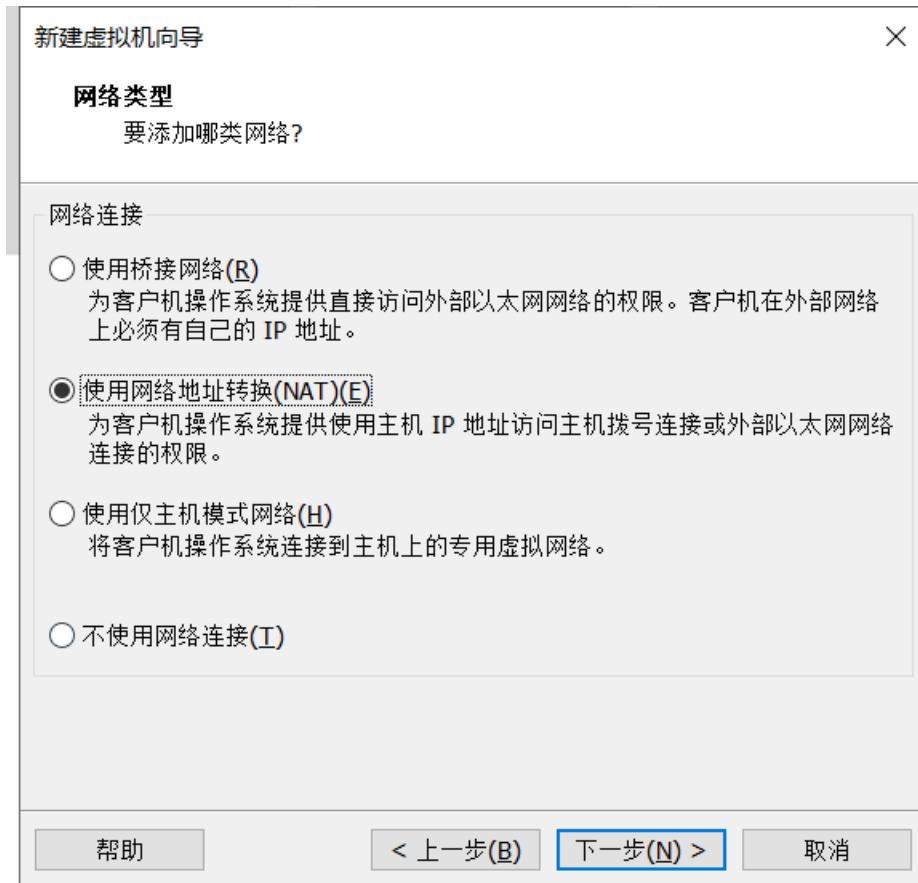
选择虚拟机存储的位置，建议不要  
存在C盘

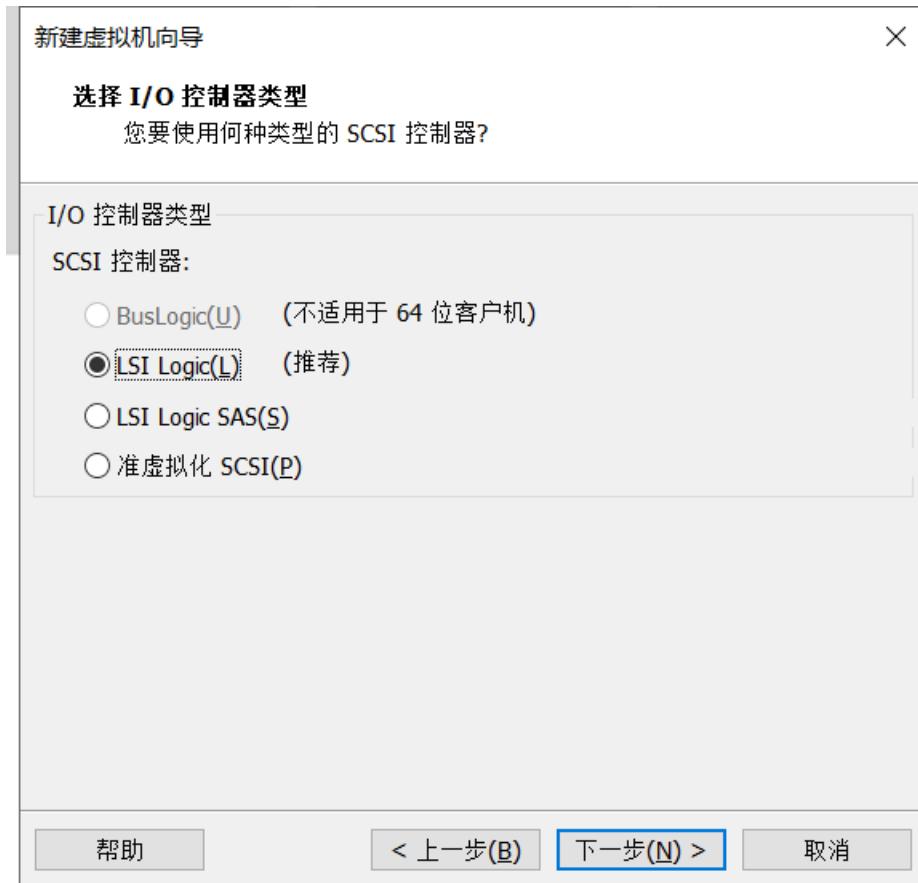


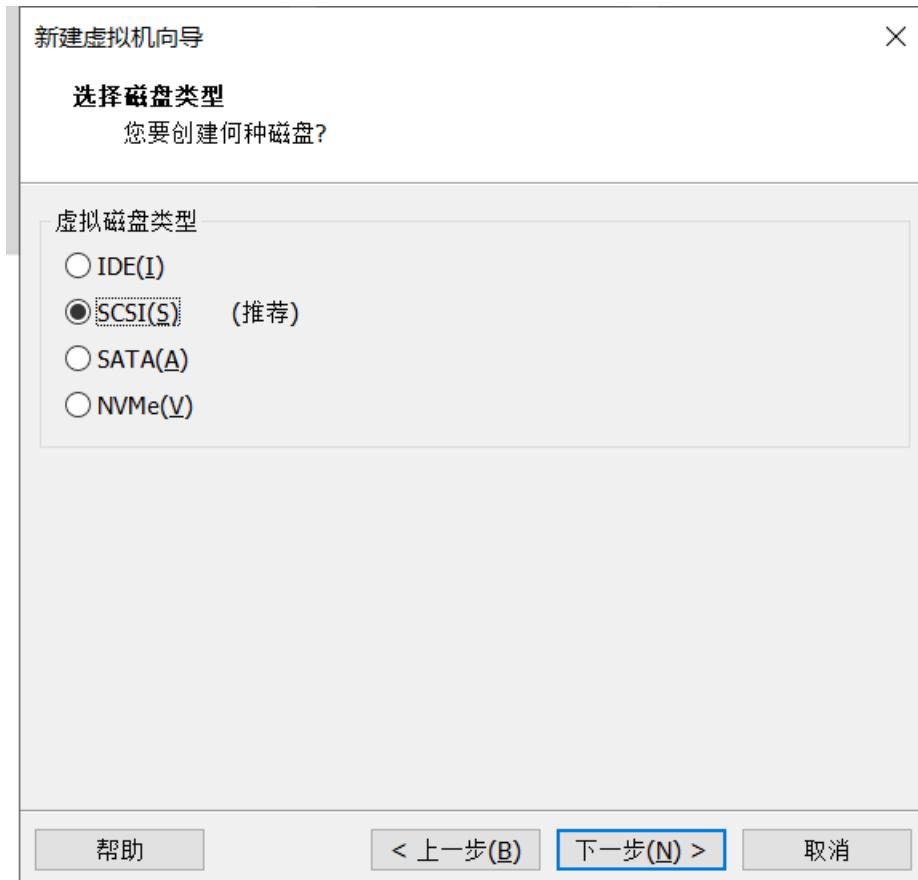


# 设置虚拟机的内存大小



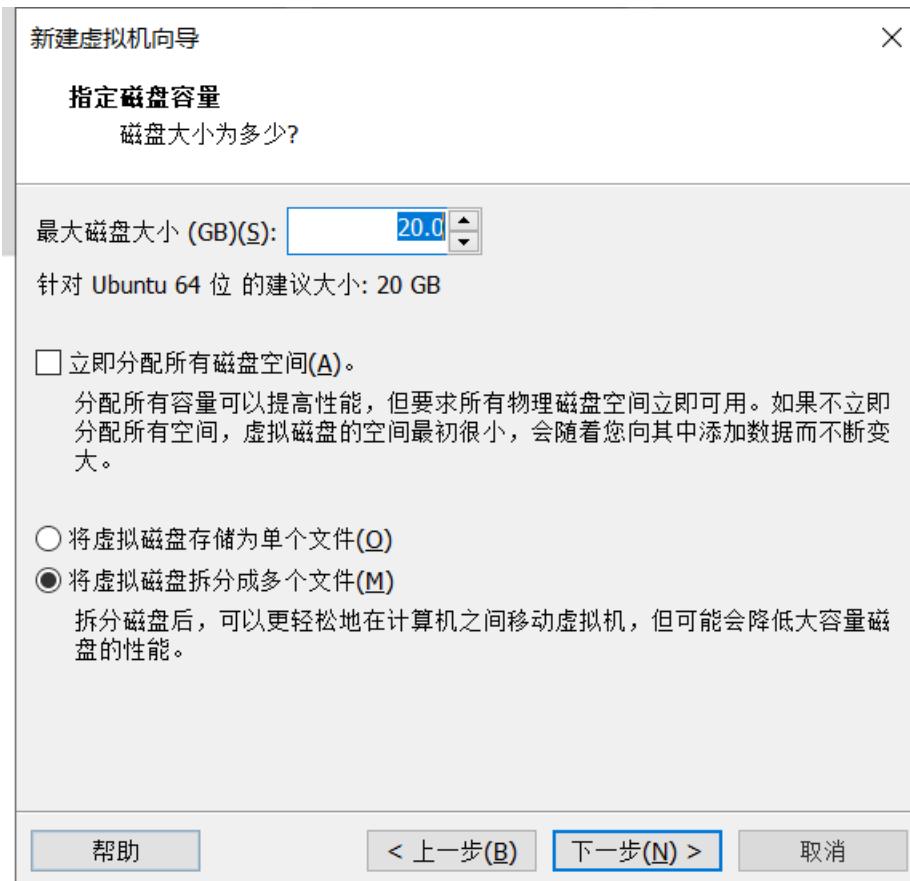


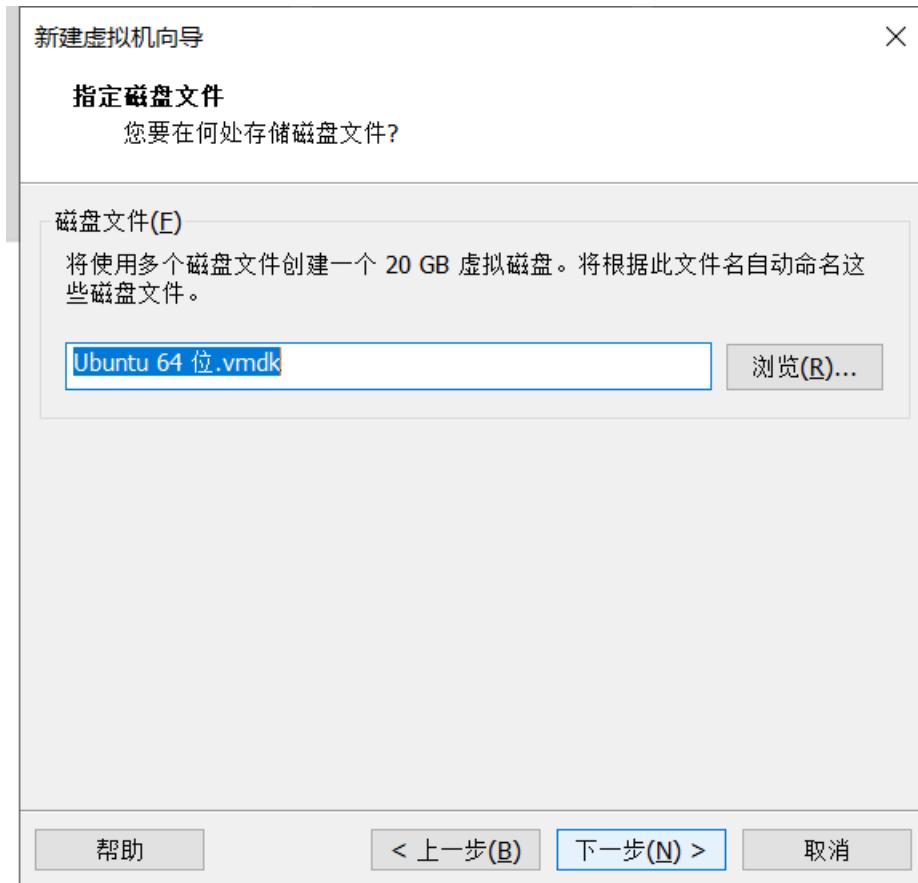






# 设置虚拟机的磁盘大小







# 使用VMWARE FUSION安装 UBUNTU系统

将下载好的ubuntu镜像拖入红框



## 选择安装方法



从光盘或映像中安装

将您的 ISO 文件拖到此处以开始安装



迁移您的 PC



从恢复分区中安装 macOS



导入现有虚拟机



从 Boot Camp 安装



创建自定虚拟机



在远程服务器上创建虚拟机



取消

继续



# 创建新的虚拟机

该助理将指导您在 Mac 上的虚拟机中安装 Windows 或其他操作系统。

选择光盘或映像

配置

完成

选择操作系统安装光盘或映像:



ubuntu-16.04.7-desktop-amd64.iso

[在 Finder 中显示](#)

Ubuntu 64 位 16.04.7

[使用其他光盘或光盘映像...](#)



取消

返回

继续

## 填写相关信息



# Linux 快捷安装

通过快捷安装，VMware Fusion 将根据此处提供的信息自动从安装光盘安装 Ubuntu 64 位 16.04.7，并安装驱动程序以优化您的虚拟机。



使用快捷安装

显示名称:

帐户名:

密码:

确认密码:

在虚拟机中访问个人文件夹

虚拟机能够



取消

返回

继续

如果不使用它初始化的虚拟机设置，可以选择自定设置虚拟机。



# 完成

虚拟机配置已完成。  
下一步是安装 Linux。

选择光盘或映像

配置

完成

## 虚拟机摘要

客户机操作系统 Ubuntu 64 位 16.04.7

快捷安装帐户名 ubuntu create

安装光盘 ubuntu-16.04.7-desktop-amd64.iso

新硬盘 容量 20 GB

内存 2 GB

网络连接 与我的 Mac 共享 (NAT 模式)

设备摘要 CD/DVD, USB 控制器, 打印机, 声卡

要更改默认虚拟机设置，请点按“自定设置”。要立即运行虚拟机，请点按“完成”。

自定设置

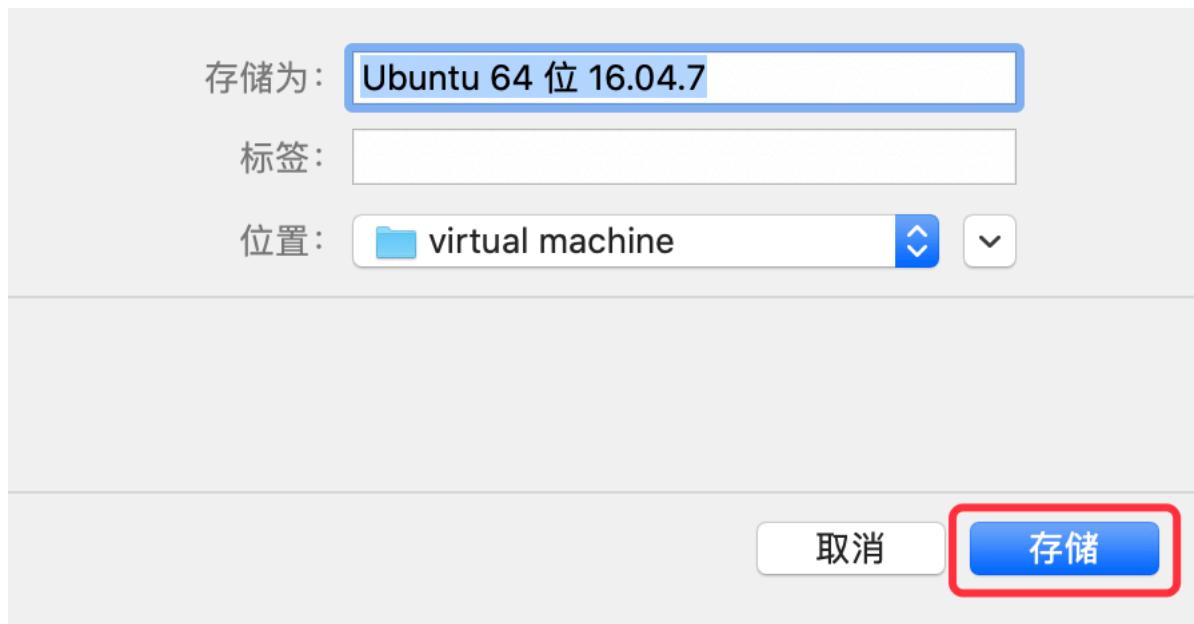


取消

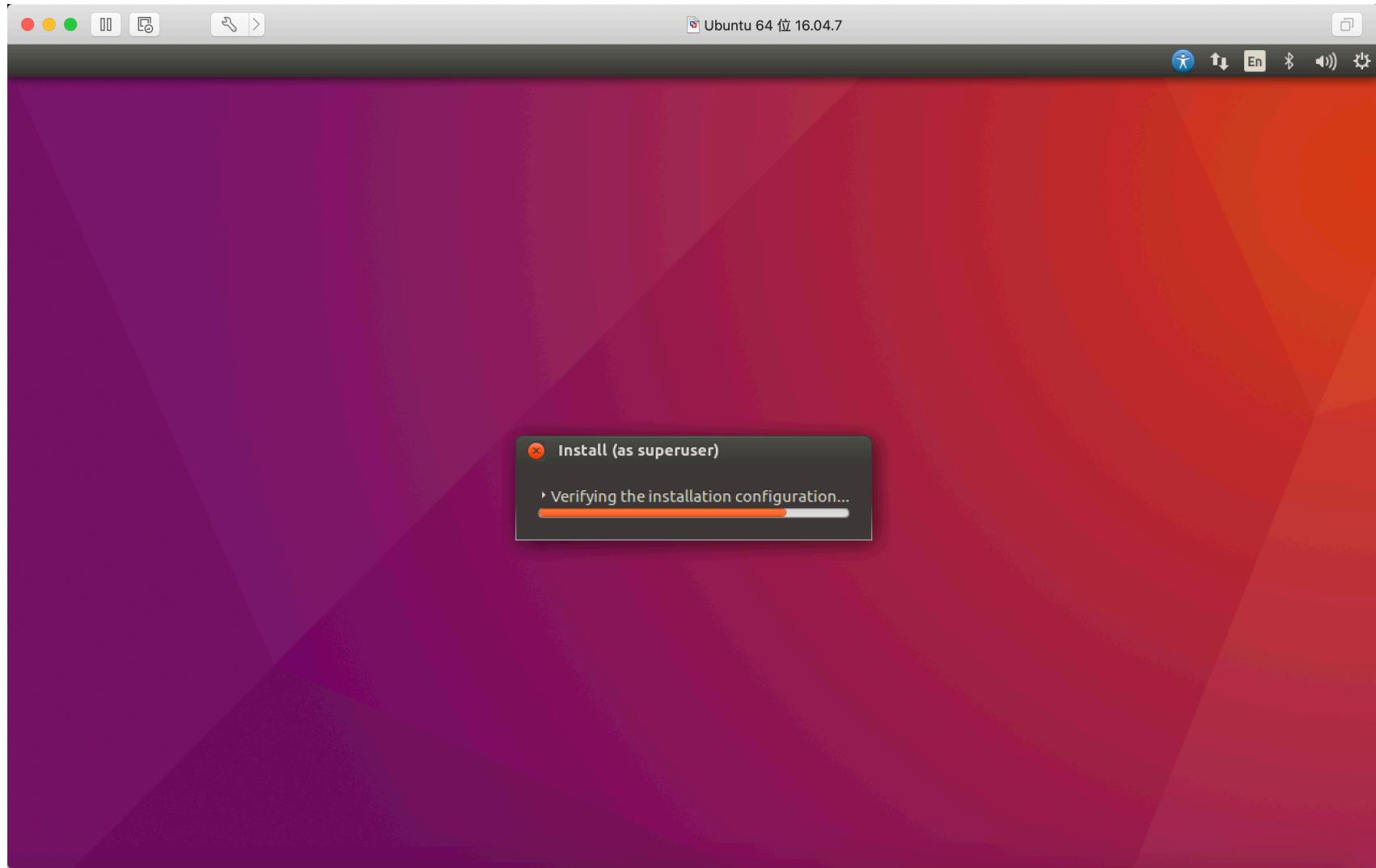
返回

完成

## 选择存储的位置



等待ubuntu初始化完成



# 使用 VIRTUAL BOX 安装 UBUNTU 系统

# 下载VirtualBox

- FTP获取
  - 10.12.5.33/classes/19/计算机系统基础（上）/Materials目录下
- 官网下载：
- [https://www.virtualbox.org/wiki/Download\\_Old\\_Builds\\_5\\_2](https://www.virtualbox.org/wiki/Download_Old_Builds_5_2)
- VirtualBox 5.2.44

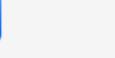


## 虚拟电脑名称和系统类型

请选择新虚拟电脑的描述名称及要安装的操作系统类型。此名称将用于标识此虚拟电脑。

名称:

类型:  

版本:  

专家模式

返回

继续

取消

## 内存大小

选择分配给虚拟电脑的内存大小(MB)。

建议的内存大小为 **1024 MB**。



4 MB

16384 MB

1024   MB

返回

继续

取消

## 虚拟硬盘

你可以添加虚拟硬盘到新虚拟电脑中。新建一个虚拟硬盘文件或从列表或用文件夹图标从其他位置选择一个。

如果想更灵活地配置虚拟硬盘，也可以跳过这一步，在创建虚拟电脑之后在配置中设定。

建议的硬盘大小为 **10.00 GB**。

- 不添加虚拟硬盘
- 现在创建虚拟硬盘
- 使用已有的虚拟硬盘文件

没有盘片



返回

创建

取消

## 虚拟硬盘文件类型

请选择您想要用于新建虚拟磁盘的文件类型。如果您不需要其他虚拟化软件使用它，您可以让此设置保持不更改状态。

- VDI (VirtualBox 磁盘映像)
- VHD (虚拟硬盘)
- VMDK (虚拟机磁盘)

专家模式

返回

继续

取消

## 存储在物理硬盘上

请选择新建虚拟硬盘文件是应该为其使用而分配(动态分配)，还是应该创建完全分配(固定分配)。

动态分配的虚拟磁盘只是逐渐占用物理硬盘的空间 (直至达到 分配的大小), 不过当其内部空间不用时不会自动缩减占用的物理硬盘空间。

固定大小的虚拟磁盘文件可能在某些系统中要花很长时间来创建，但它往往使用起来较快。

- 动态分配
- 固定大小

返回

继续

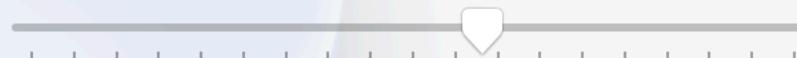
取消

## 文件位置和大小

请在下面的框中键入新建虚拟硬盘文件的名称，或单击文件夹图标来选择创建文件要保存到的文件夹。

选择虚拟硬盘的大小。此大小为虚拟硬盘文件在实际硬盘中能用的极限大小。



4.00 MB

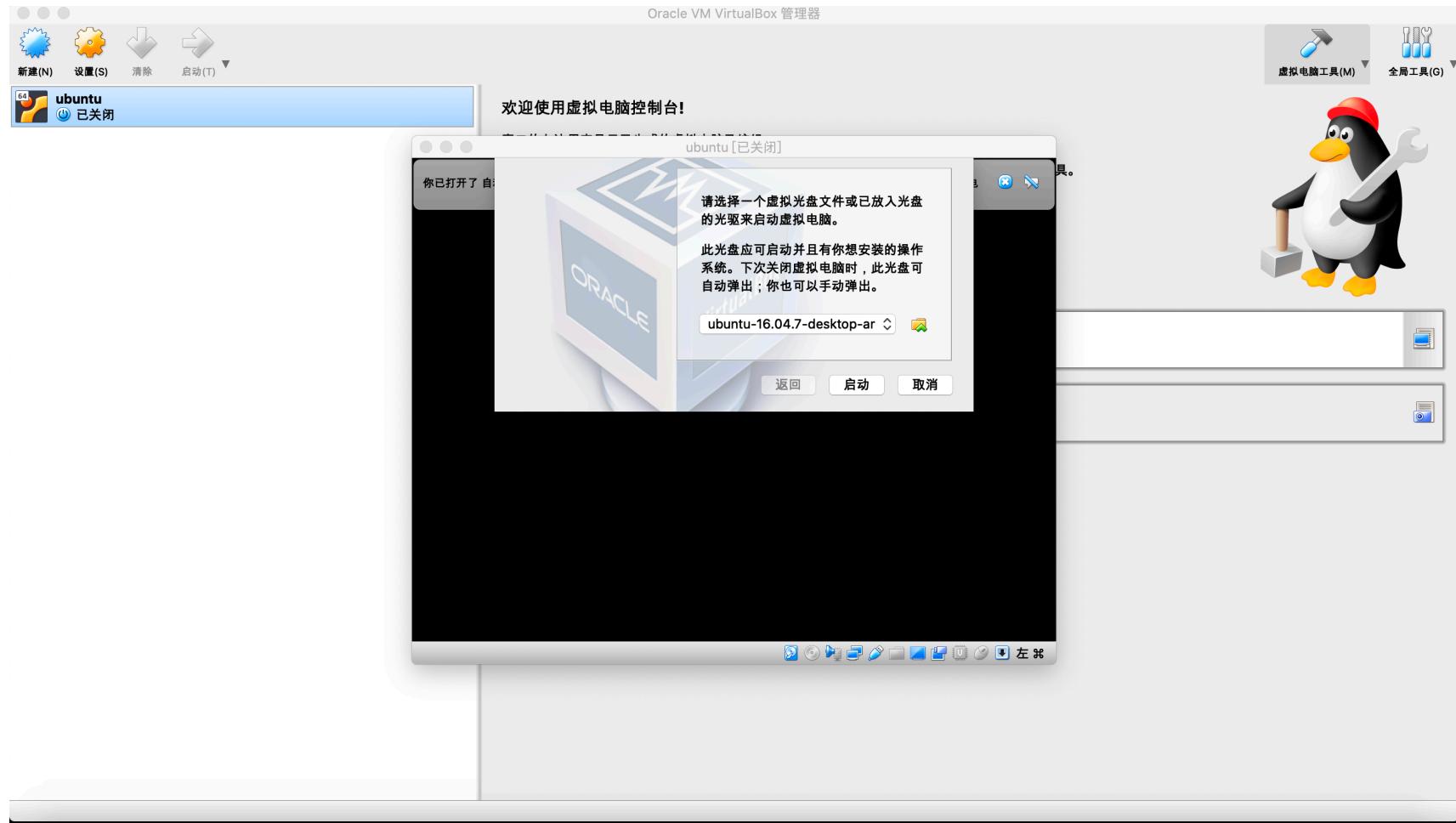
2.00 TB

返回

创建

取消







Install (as superuser)

## Welcome

English

Español

Esperanto

Euskara

Français

Gaeilge

Galego

Hrvatski

Íslenska

Italiano

Kurdî

Latviski

Lietuviškai

Magyar

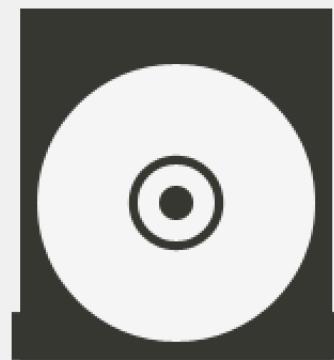
Nederlands

Norsk bokmål

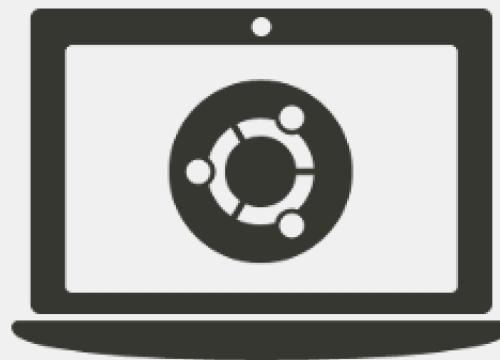
Norsk nynorsk

Polski

Português



Try Ubuntu



Install Ubuntu

You can try Ubuntu without making any changes to your computer, directly from this CD.

Or if you're ready, you can install Ubuntu alongside (or instead of) your current operating system. This shouldn't take too long.

You may wish to read the [release notes](#).



## Install (as superuser)

# Preparing to install Ubuntu

- Download updates while installing Ubuntu

This saves time after installation.

- Install third-party software for graphics and Wi-Fi hardware, Flash, MP3 and other media

This software is subject to license terms included with its documentation. Some is proprietary.

Fluendo MP3 plugin includes MPEG Layer-3 audio decoding technology licensed from Fraunhofer IIS and Technicolor SA.

Quit

Back

[Continue](#)



## Install (as superuser)

### Installation type

This computer currently has no detected operating systems. What would you like to do?

Erase disk and install Ubuntu

**Warning:** This will delete all your programs, documents, photos, music, and any other files in all operating systems.

Encrypt the new Ubuntu installation for security

You will choose a security key in the next step.

Use LVM with the new Ubuntu installation

This will set up Logical Volume Management. It allows taking snapshots and easier partition resizing.

Something else

You can create or resize partitions yourself, or choose multiple partitions for Ubuntu.

Quit

Back

Install Now



Install (as superuser)

## Installation type

This computer currently has no detected operating systems. What would you like to do?

- Erase disk and install Ubuntu

Warning: This will delete all your programs, documents, photos, music, and any other files in all operating systems.

Write the changes to disks?

If you continue, the changes listed below will be written to the disks. Otherwise, you will be able to make further changes manually.

The partition tables of the following devices are changed:

SCSI3 (0,0,0) (sda)

The following partitions are going to be formatted:

partition #1 of SCSI3 (0,0,0) (sda) as ext4

partition #5 of SCSI3 (0,0,0) (sda) as swap

Go Back

Continue

Back

Install Now



Install (as superuser)

Where are you?



Shanghai

Back

Continue



Install (as superuser)

## Keyboard layout

Choose your keyboard layout:

- English (Ghana)
- English (Nigeria)
- English (South Africa)
- English (UK)
- English (US)**
- Esperanto
- Estonian
- Faroese
- Filipino

- English (US)**
- English (US) - Cherokee
- English (US) - English (Colemak)
- English (US) - English (Dvorak alternative international no dead keys)
- English (US) - English (Dvorak)
- English (US) - English (Dvorak, international with dead keys)
- English (US) - English (Macintosh)
- English (US) - English (Programmer Dvorak)
- English (US) - English (US, alternative international)

 Type here to test your keyboard Detect Keyboard Layout Back Continue

## Install (as superuser)

## Who are you?

Your name:  ✓

Your computer's name:  ✓  
The name it uses when it talks to other computers.

Pick a username:  ✓

Choose a password:  Fair password

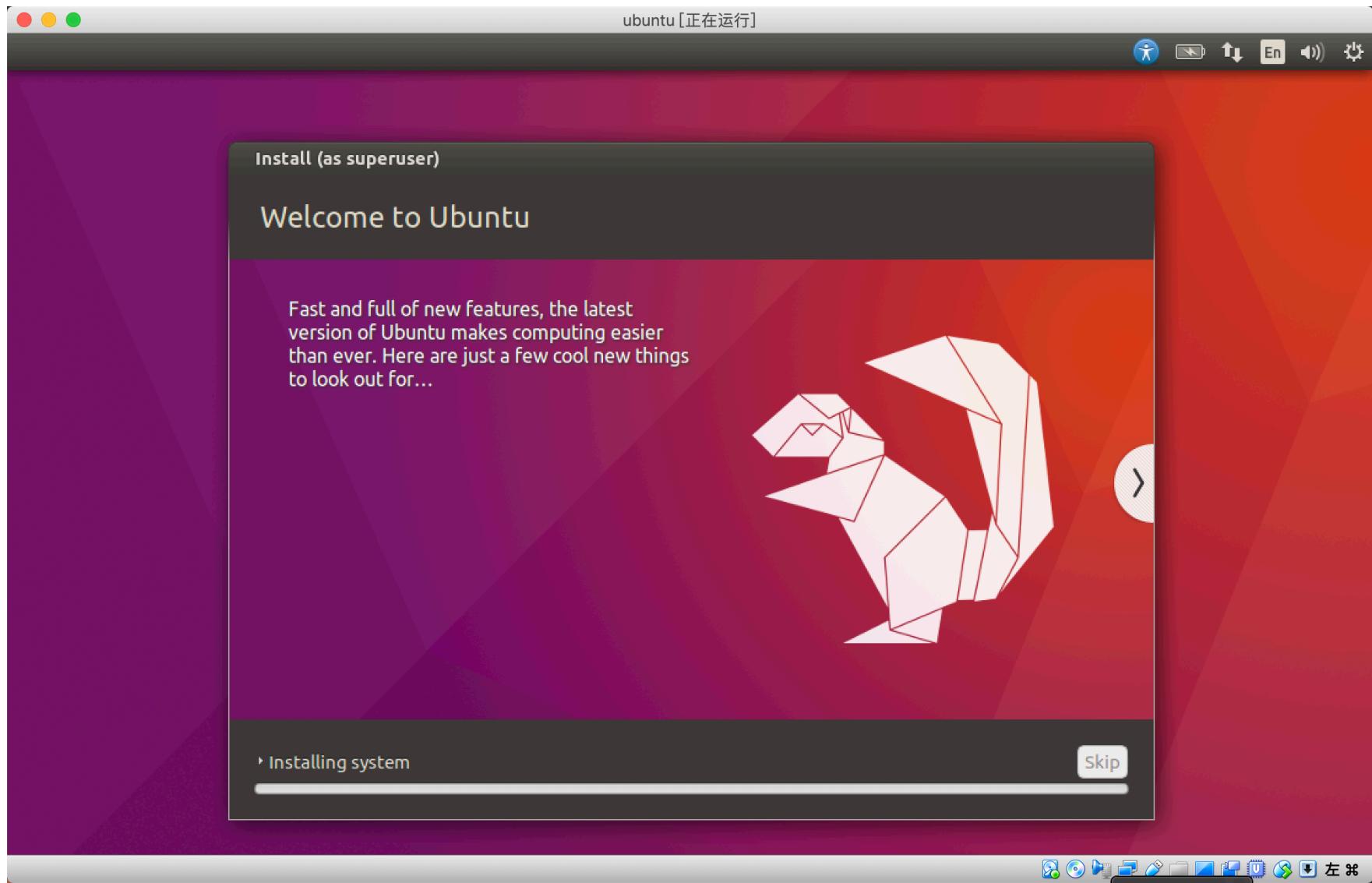
Confirm your password:  ✓

Log in automatically  
 Require my password to log in  
 Encrypt my home folder

Back

Continue





等待下载。

下载完毕后选择重启。

如果重启了之后遇到了这个问题——点击enter移除下载的ubuntu时，直接将虚拟机强制关闭，然后再重启便不会有问题是了