

DATABASE SYSTEM PRINCIPLE - ENVIRONMENT FOR LAB

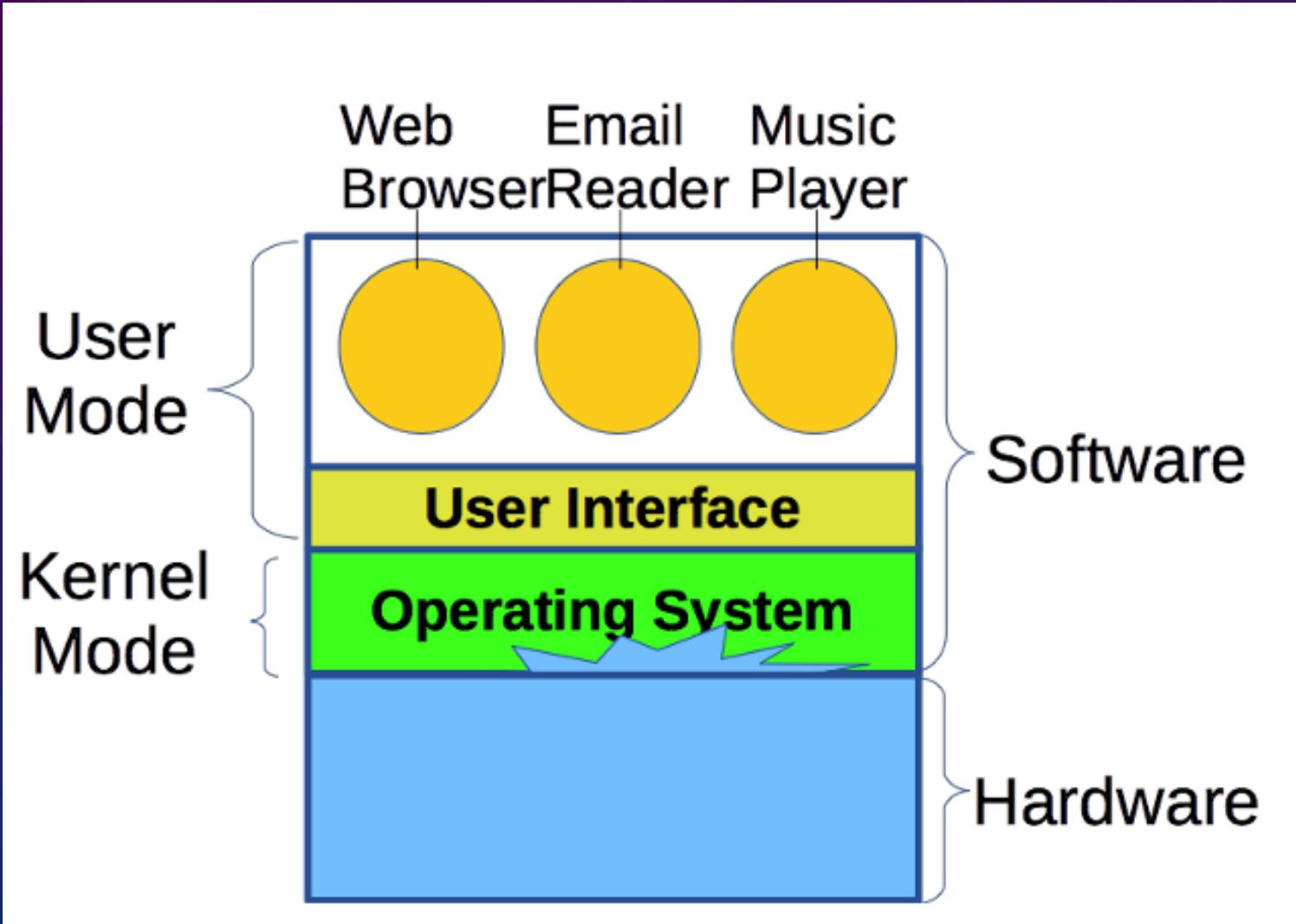
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LEEXUDONG@NANKAI.EDU.CN
NANKAI UNIVERSITY

OBJECTIVES

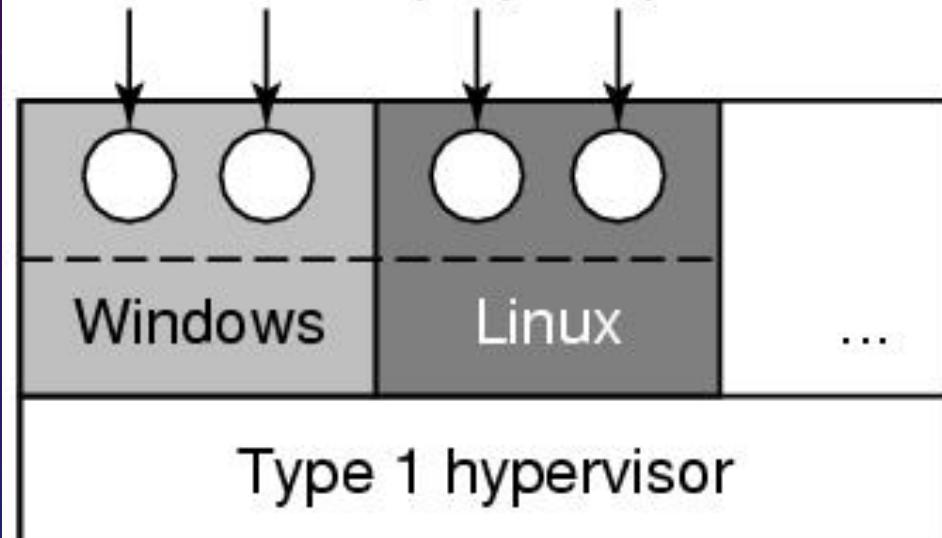
- Layers of Computer
- Virtual Machine
 - Host OS, Guest OS
- Enterprise Operating System
 - Linux kernel based OSes: Ubuntu
- DB Server
 - **MySQL, PostgreSQL, MongoDB**
- DB Client: python

LAYERS OF COMPUTER

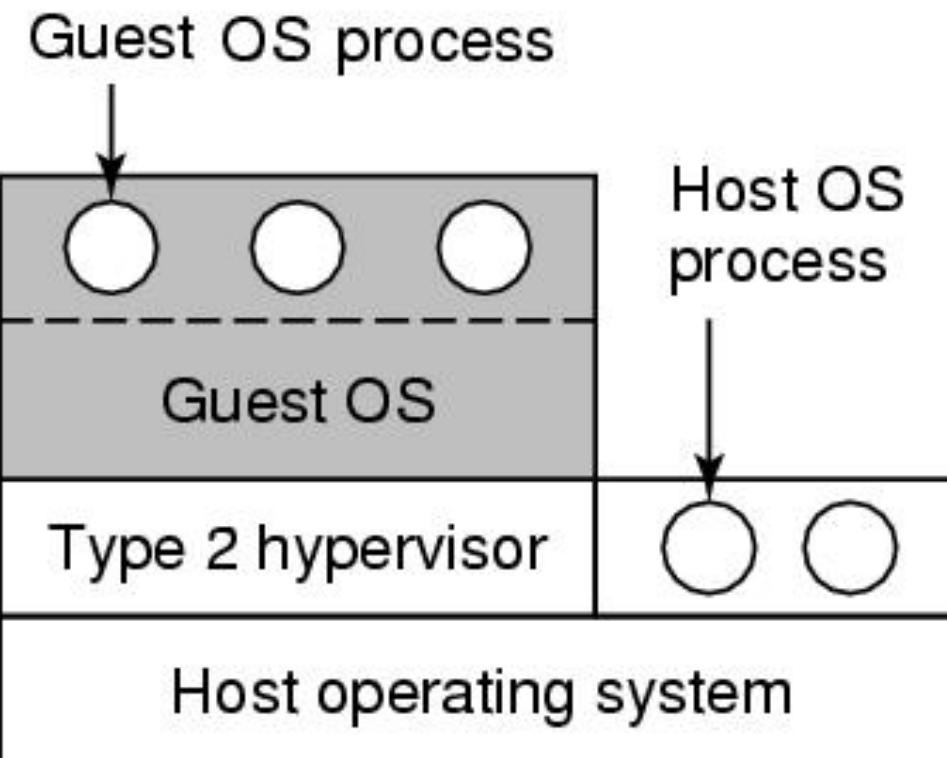


VIRTUAL MACHINE

Excel Word Mplayer Apollon



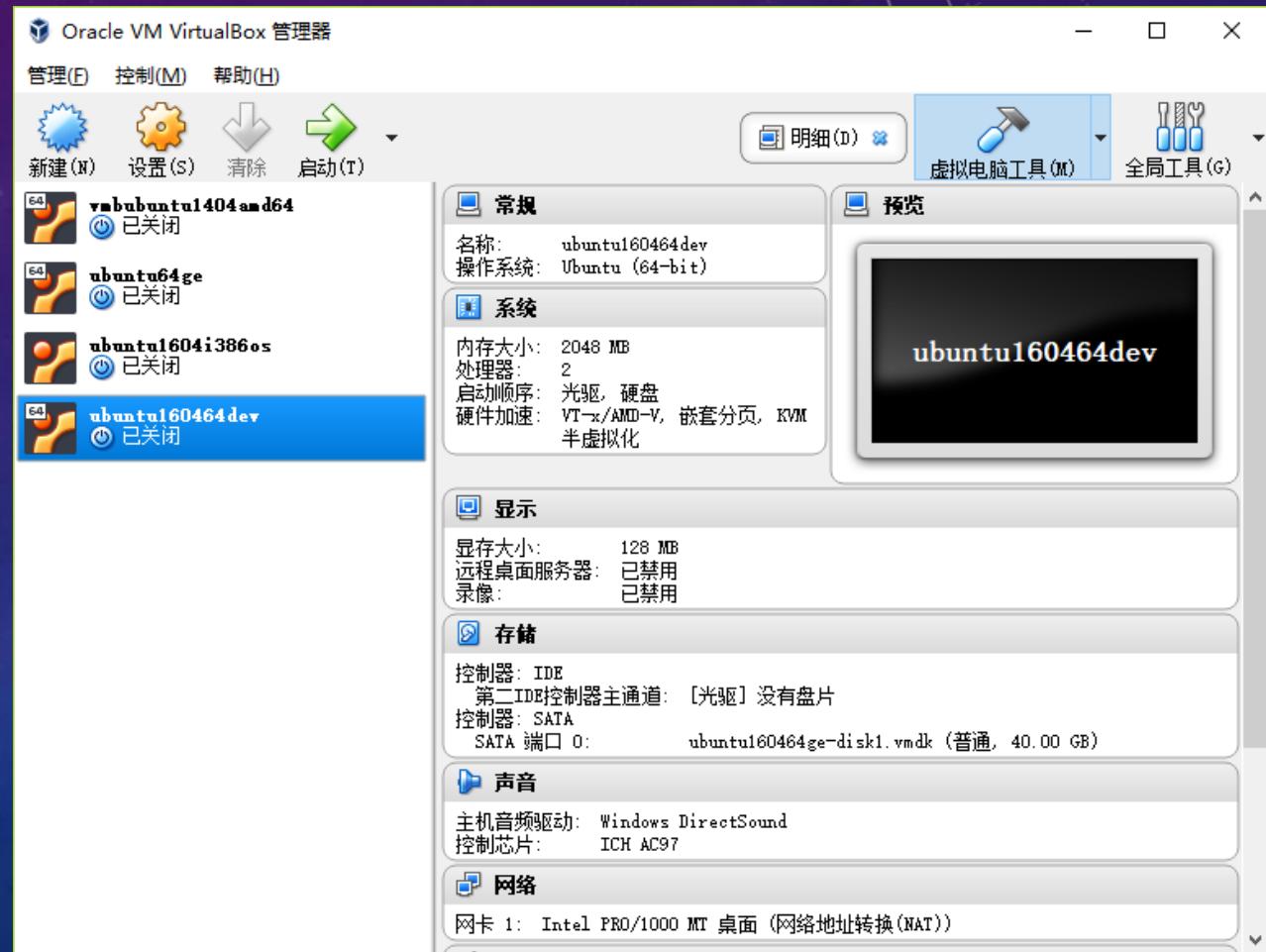
(a)



(b)

VIRTUAL MACHINE: HYPERVISOR

- Vmware
- Xen
- Linux KVM
- Virtualbox
 - <https://www.virtualbox.org/>
- ...



REAL FREE OSES

- FreeBSD
- Open Solaris
- Linux kernel based Oses
- ...

LINUX KERNEL

User mode	User applications	For example, bash , LibreOffice , GIMP , Blender , 0 A.D. , Mozilla Firefox , etc.			Graphics: Mesa , AMD Catalyst , ...	
	Low-level system components:	System daemons: systemd , runit , logind , networkd , PulseAudio , ...	Windowing system: X11 , Wayland , SurfaceFlinger (Android)	Other libraries: GTK+ , Qt , EFL , SDL , SFML , FLTK , GNUstep , etc.		
	C standard library	open() , exec() , sbrk() , socket() , fopen() , calloc() , ... (up to 2000 subroutines) glibc aims to be POSIX/SUS -compatible, uClibc targets embedded systems, bionic written for Android , etc.				
Kernel mode	Linux kernel	stat , splice , dup , read , open , ioctl , write , mmap , close , exit , etc. (about 380 system calls) The Linux kernel System Call Interface (SCI, aims to be POSIX/SUS -compatible)				
		Process scheduling subsystem	IPC subsystem	Memory management subsystem	Virtual files subsystem	Network subsystem
		Other components: ALSA , DRI , evdev , LVM , device mapper , Linux Network Scheduler , Netfilter Linux Security Modules: SELinux , TOMOYO , AppArmor , Smack				
Hardware (CPU , main memory , data storage devices , etc.)						

LINUX KERNEL BASED OSES

https://en.wikipedia.org/wiki/Comparison_of_Linux_distributions

- Slackware, CentOS, Chromium OS, Debian, Gentoo Linux, Fedora, Red Hat Enterprise Linux, Scientific Linux, SUSE Linux Enterprise, Tiny Core Linux, Ubuntu
- ...

UBUNTU



- Ubuntu is an open source software operating system that runs from the desktop, to the cloud, to all your internet connected things



UBUNTU

- <https://www.ubuntu.com/download/desktop>

ubuntu-16.04.4-desktop-amd64.iso

Download Ubuntu Desktop

Ubuntu 16.04.4 LTS

Download the latest LTS version of Ubuntu, for desktop PCs and laptops. LTS stands for long-term support — which means five years, until April 2021, of free security and maintenance updates, guaranteed.

[Download](#)

[Alternative downloads and torrents >](#)

[Ubuntu 16.04 LTS release notes ↗](#)

Recommended system requirements:

- ✓ 2 GHz dual core processor or better
- ✓ 2 GB system memory
- ✓ 25 GB of free hard drive space
- ✓ Either a DVD drive or a USB port for the installer media
- ✓ Internet access is helpful

UBUNTU: BITTORRENT

- <https://www.ubuntu.com/download/alternative-downloads>

BitTorrent

BitTorrent is a peer-to-peer download network that sometimes enables higher download speeds and more reliable downloads of large files. You will need to install a BitTorrent client on your computer in order to enable this download method.

Ubuntu 17.10.1

[Ubuntu 17.10.1 Desktop \(64-bit\)](#)

[Ubuntu 17.10.1 Server \(64-bit\)](#)

[Ubuntu 17.10.1 Server \(32-bit\)](#)

Ubuntu 16.04.4 LTS

[Ubuntu 16.04.4 Desktop \(64-bit\)](#)

[Ubuntu 16.04.4 Desktop \(32-bit\)](#)

[Ubuntu 16.04.4 Server \(64-bit\)](#)

[Ubuntu 16.04.4 Server \(32-bit\)](#)

Ubuntu 14.04.5 LTS

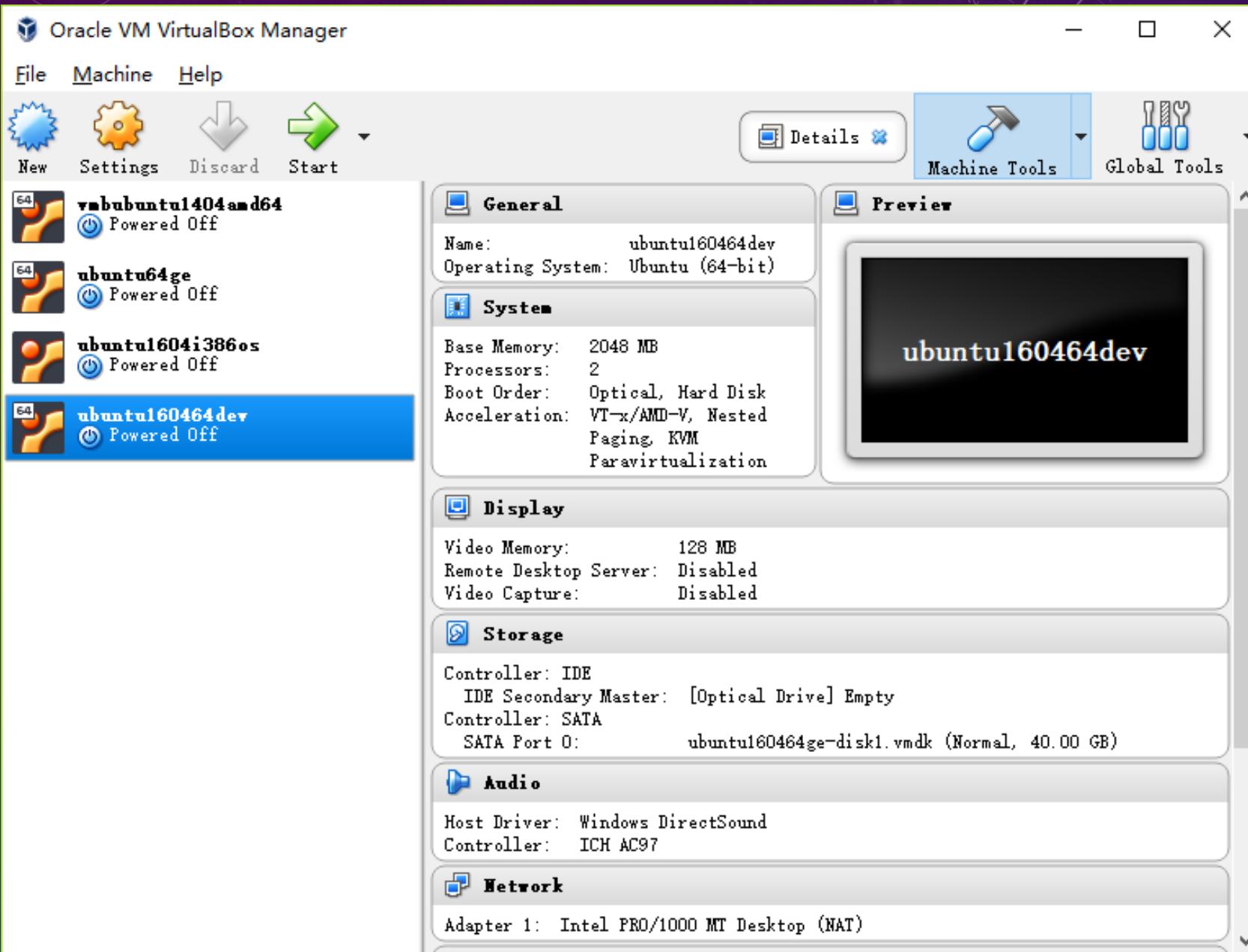
[Ubuntu 14.04.5 Desktop \(64-bit\)](#)

[Ubuntu 14.04.5 Desktop \(32-bit\)](#)

[Ubuntu 14.04.5 Server \(64-bit\)](#)

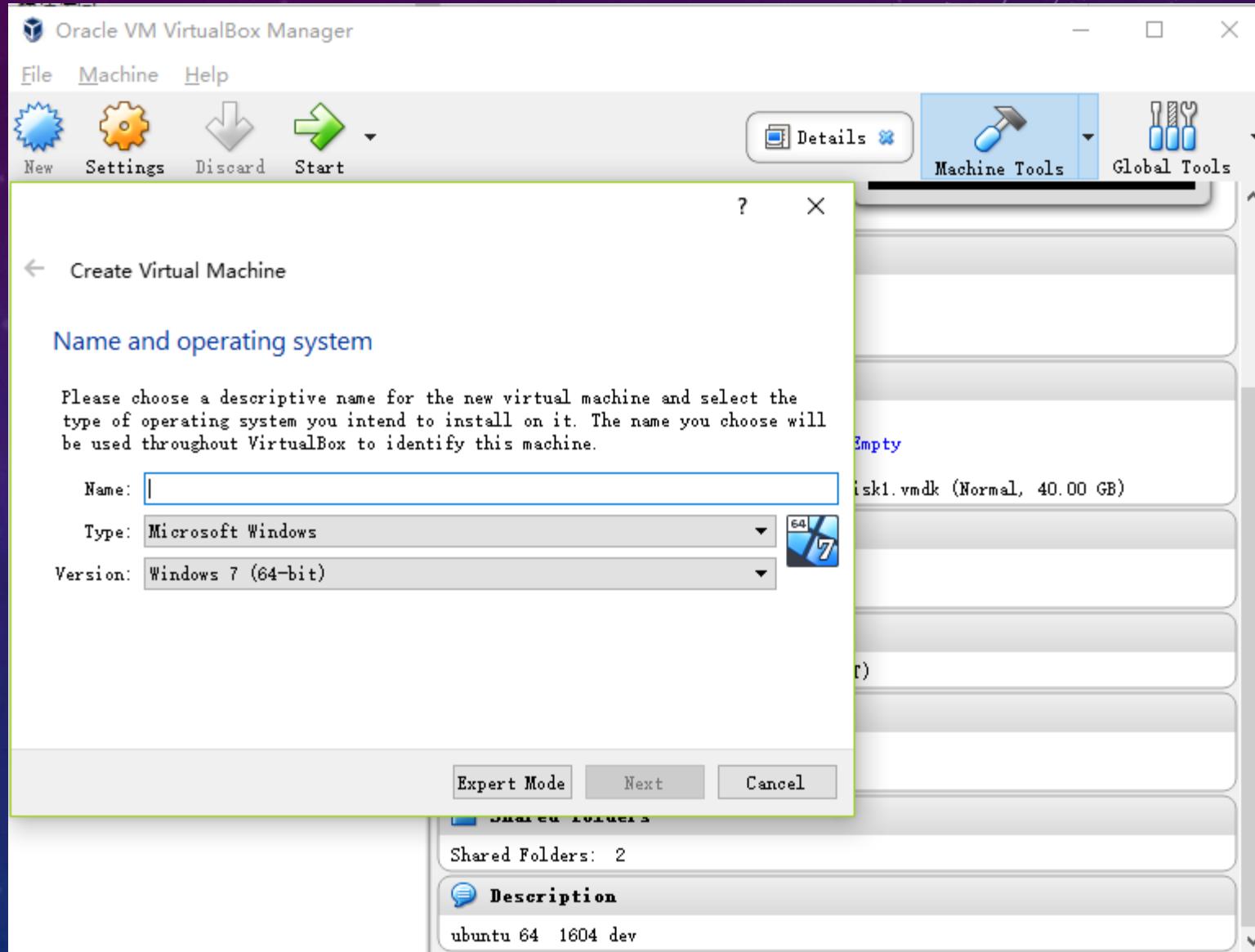
[Ubuntu 14.04.5 Server \(32-bit\)](#)

CREATE A GUEST UBUNTU OS IN VIRTUALBOX



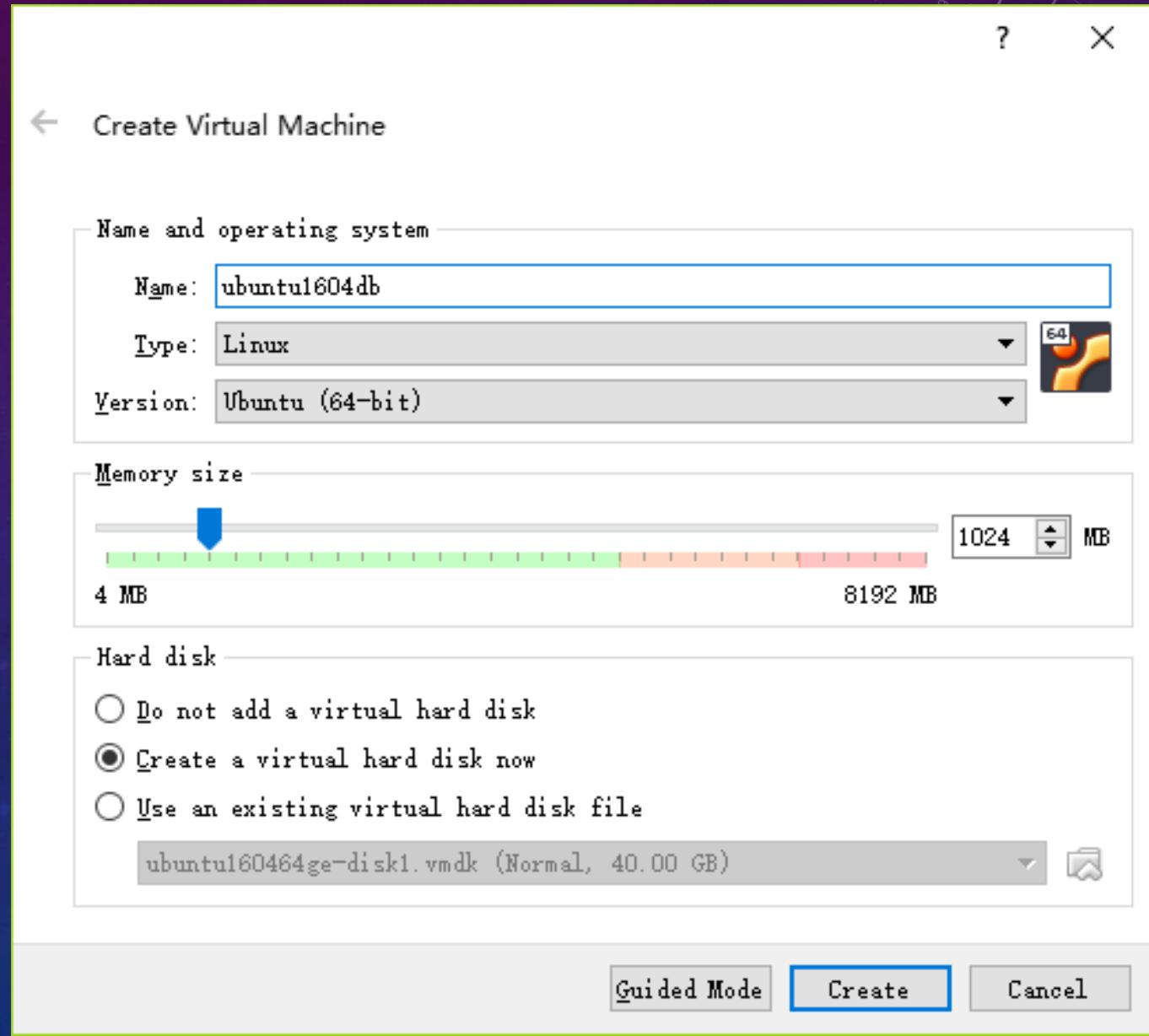
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



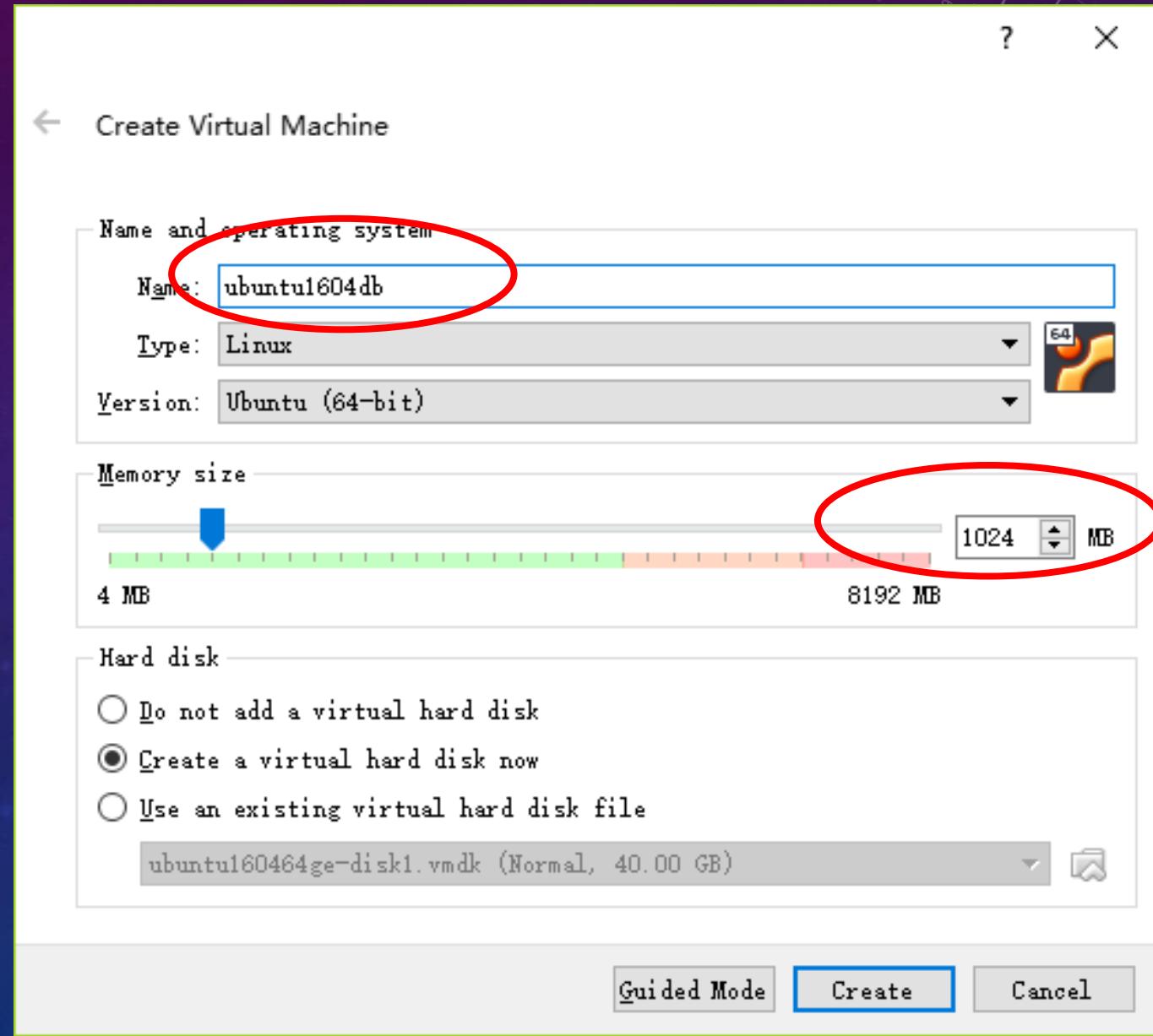
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



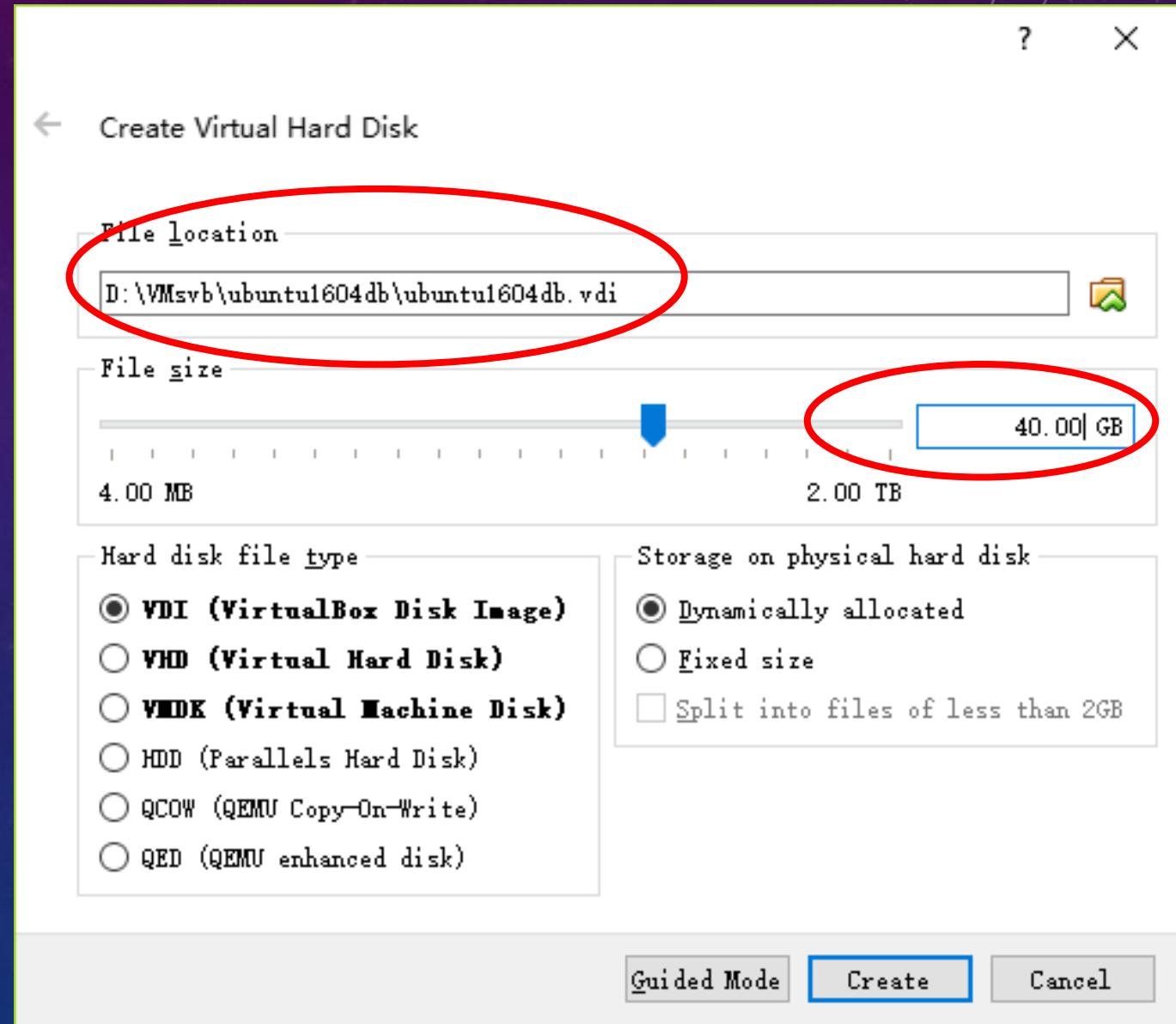
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



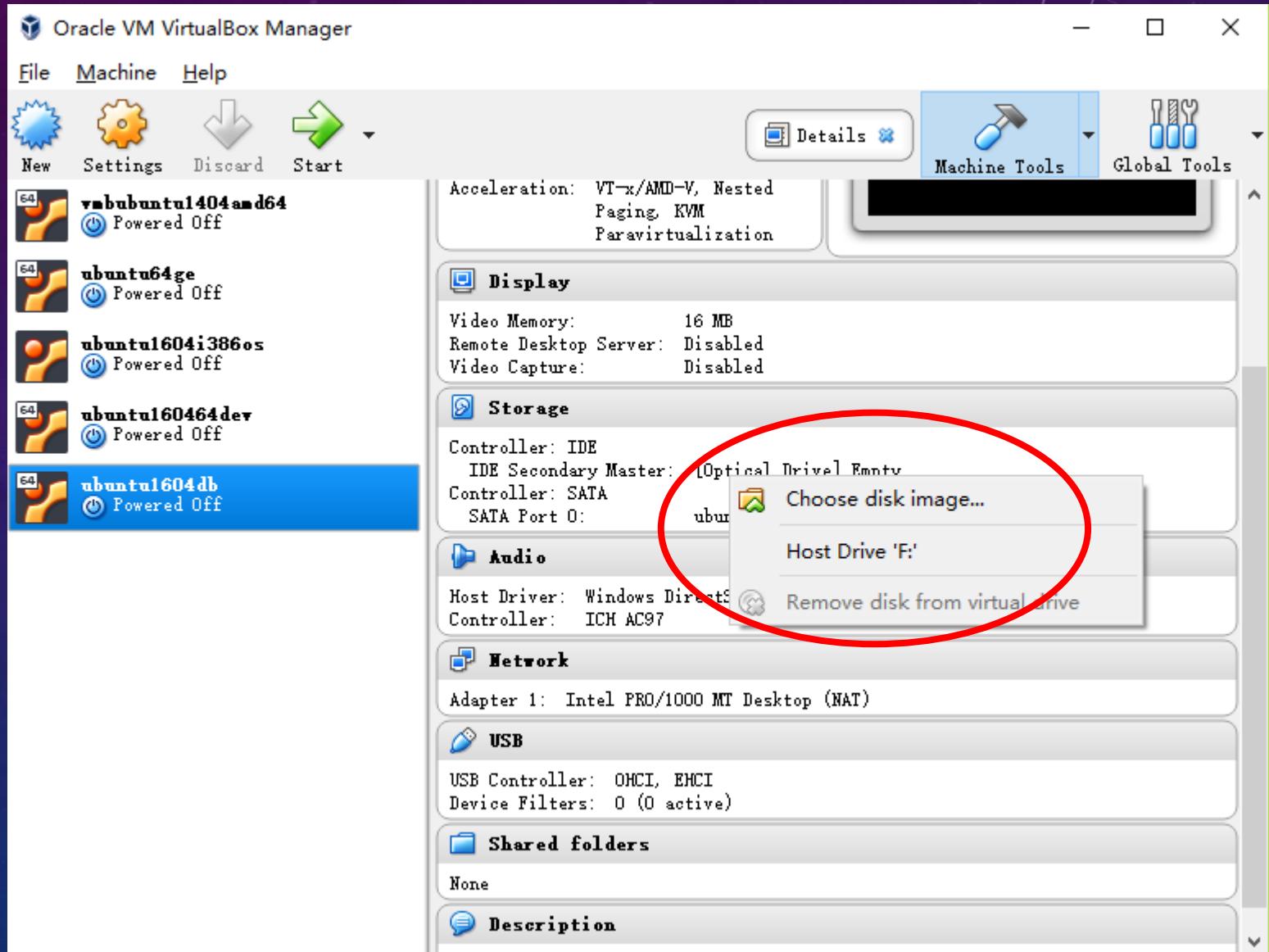
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



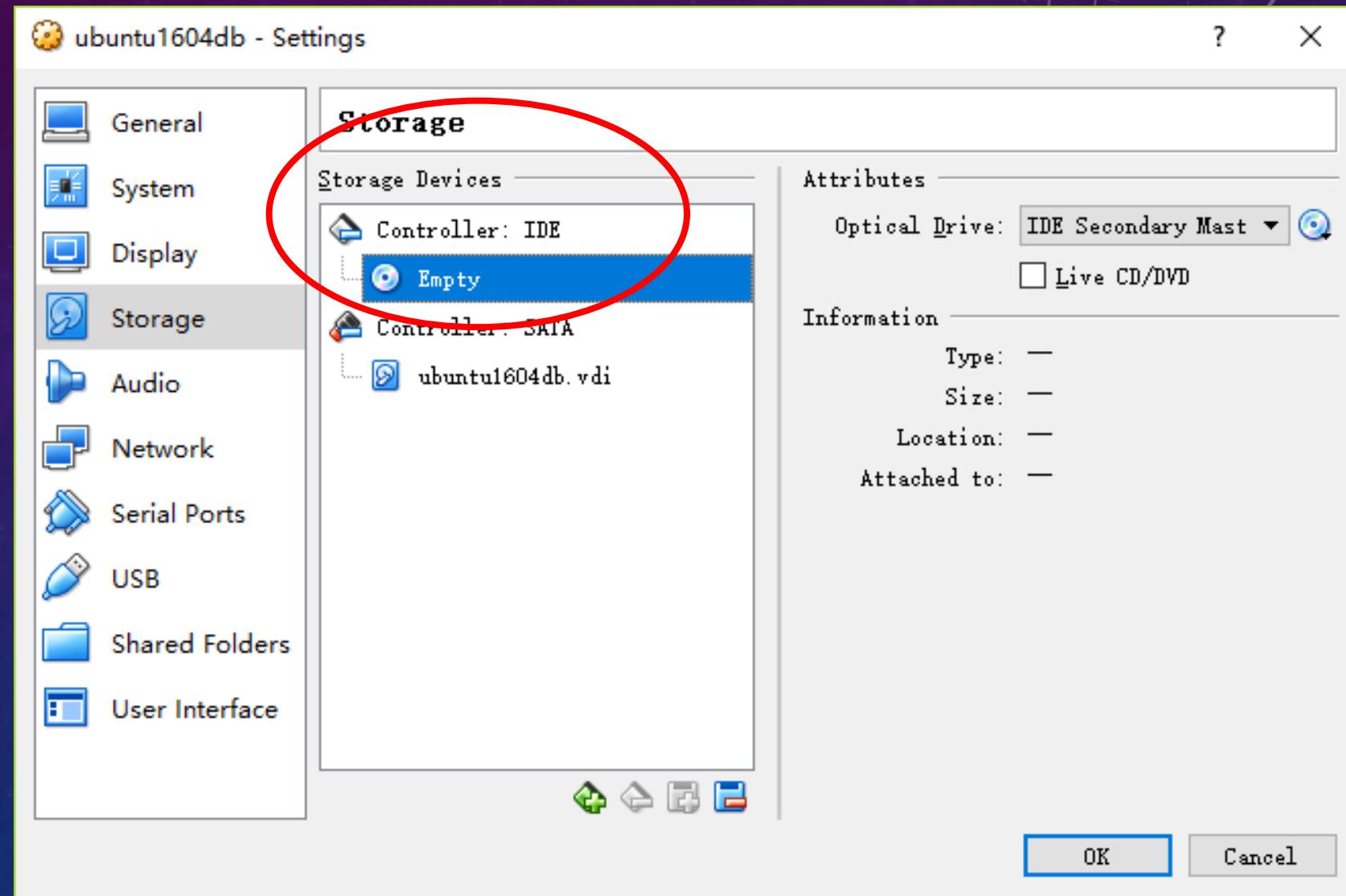
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



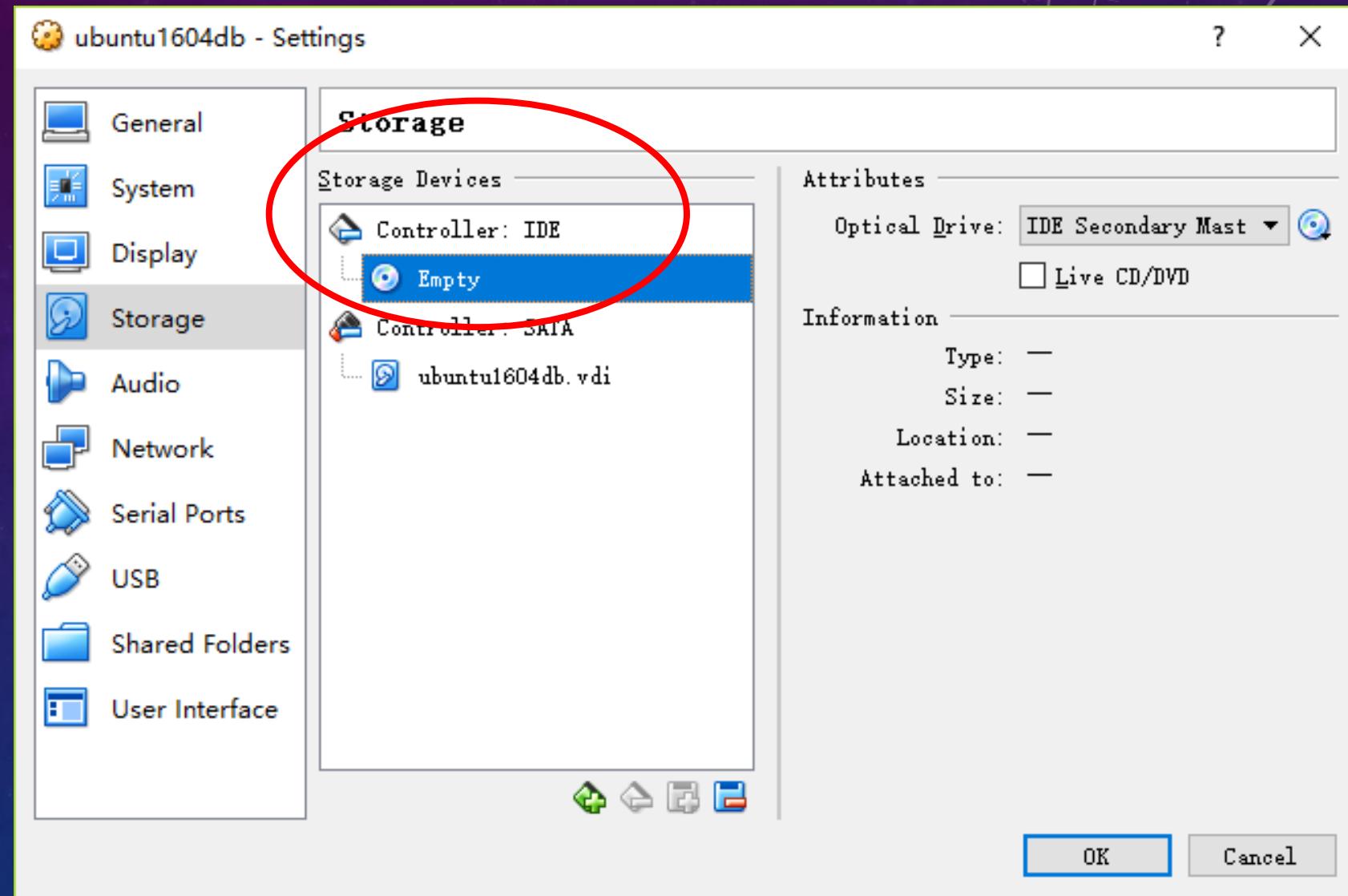
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



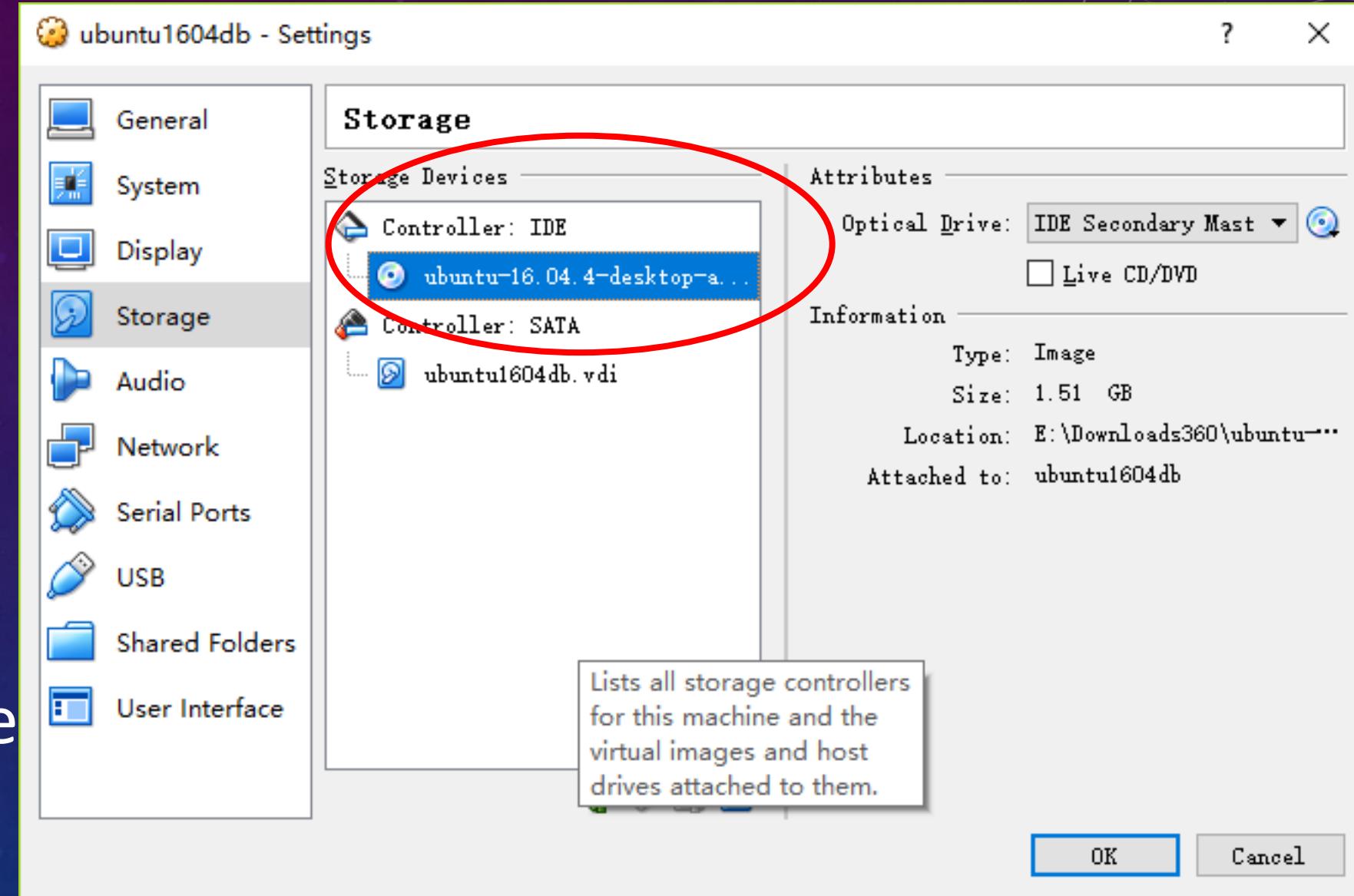
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



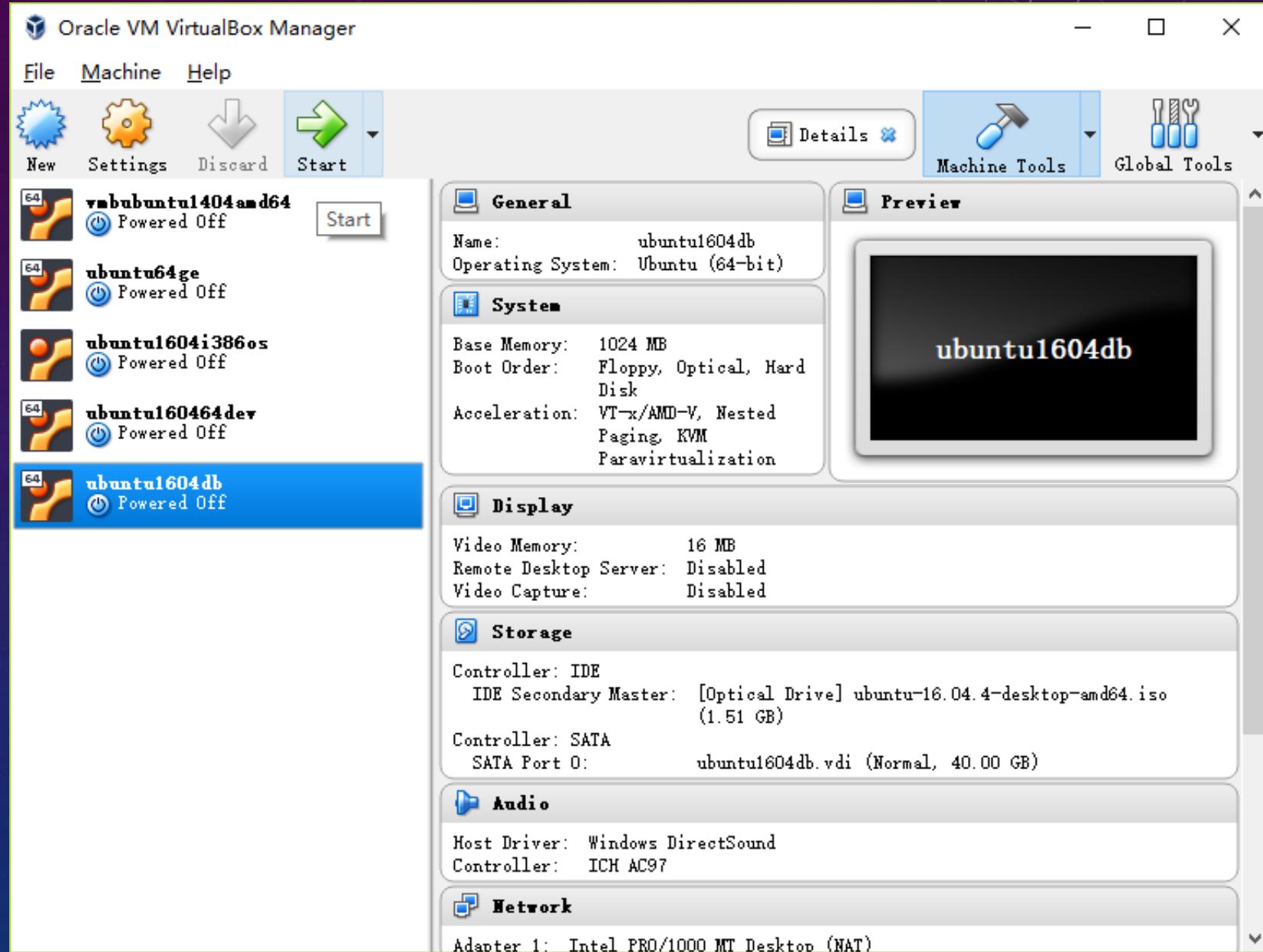
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode

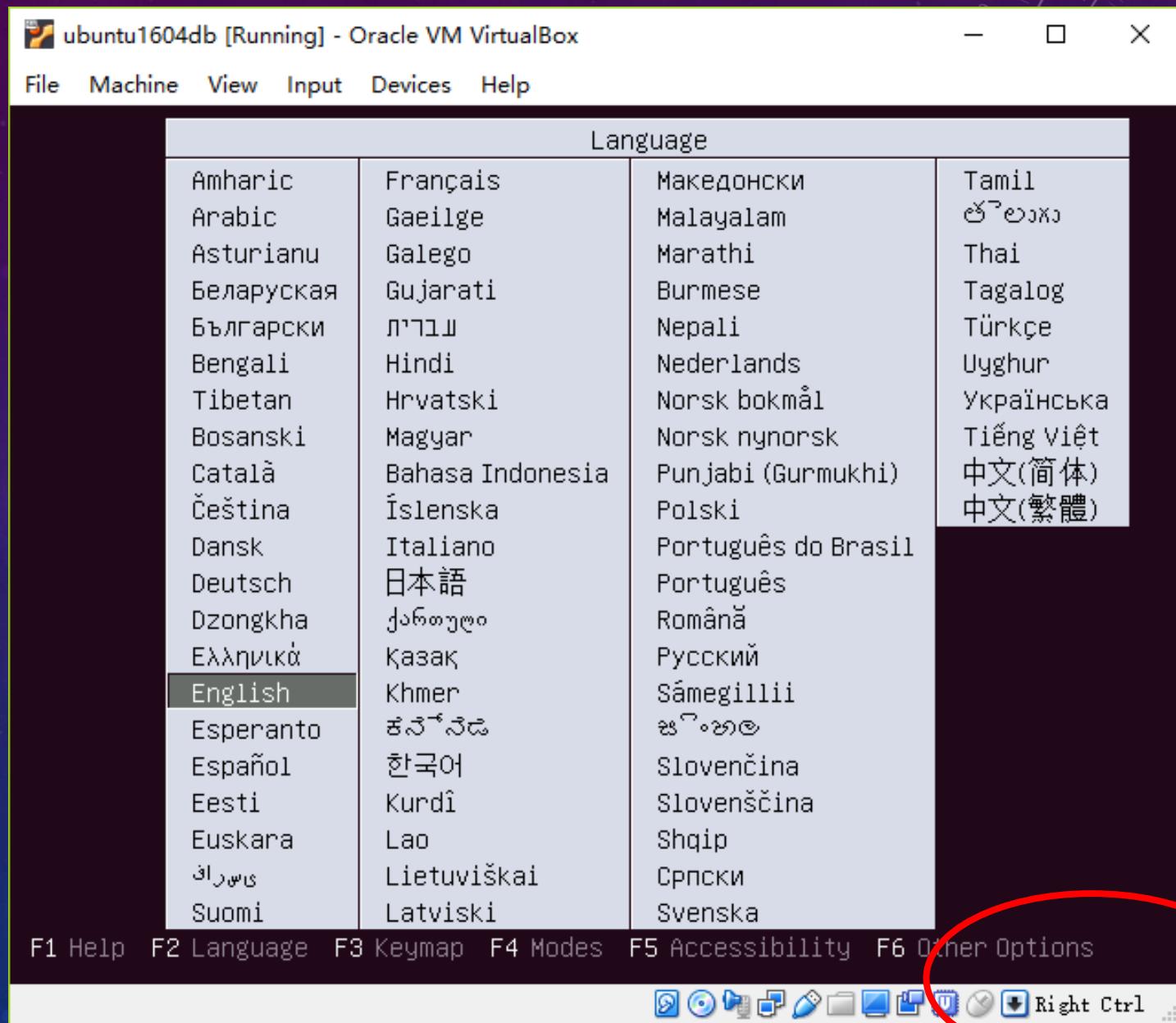


INSTALLING UBUNTU

- Installing Ubuntu
- Post-Installation Configuration

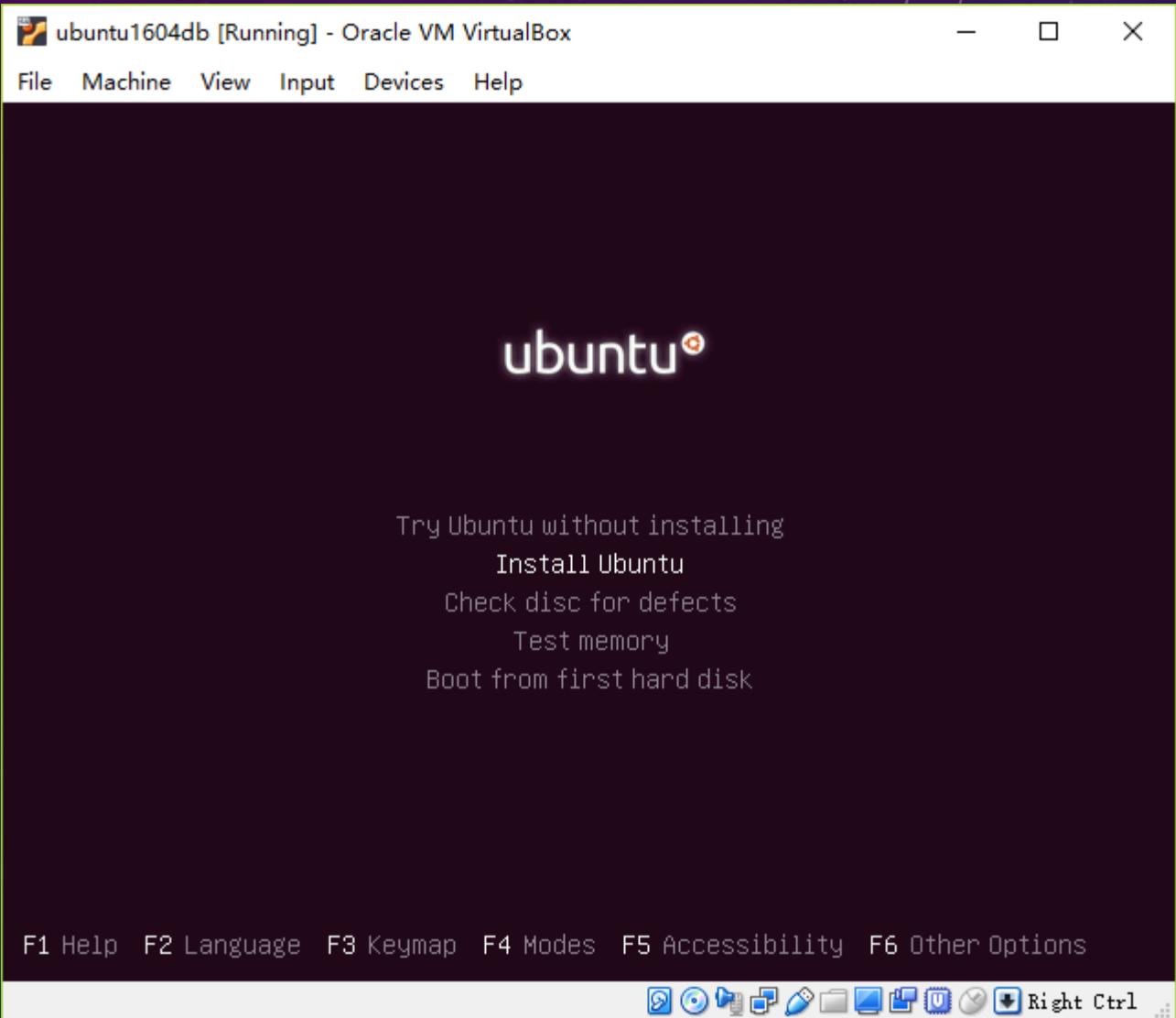
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Hot key
 - Right Ctrl

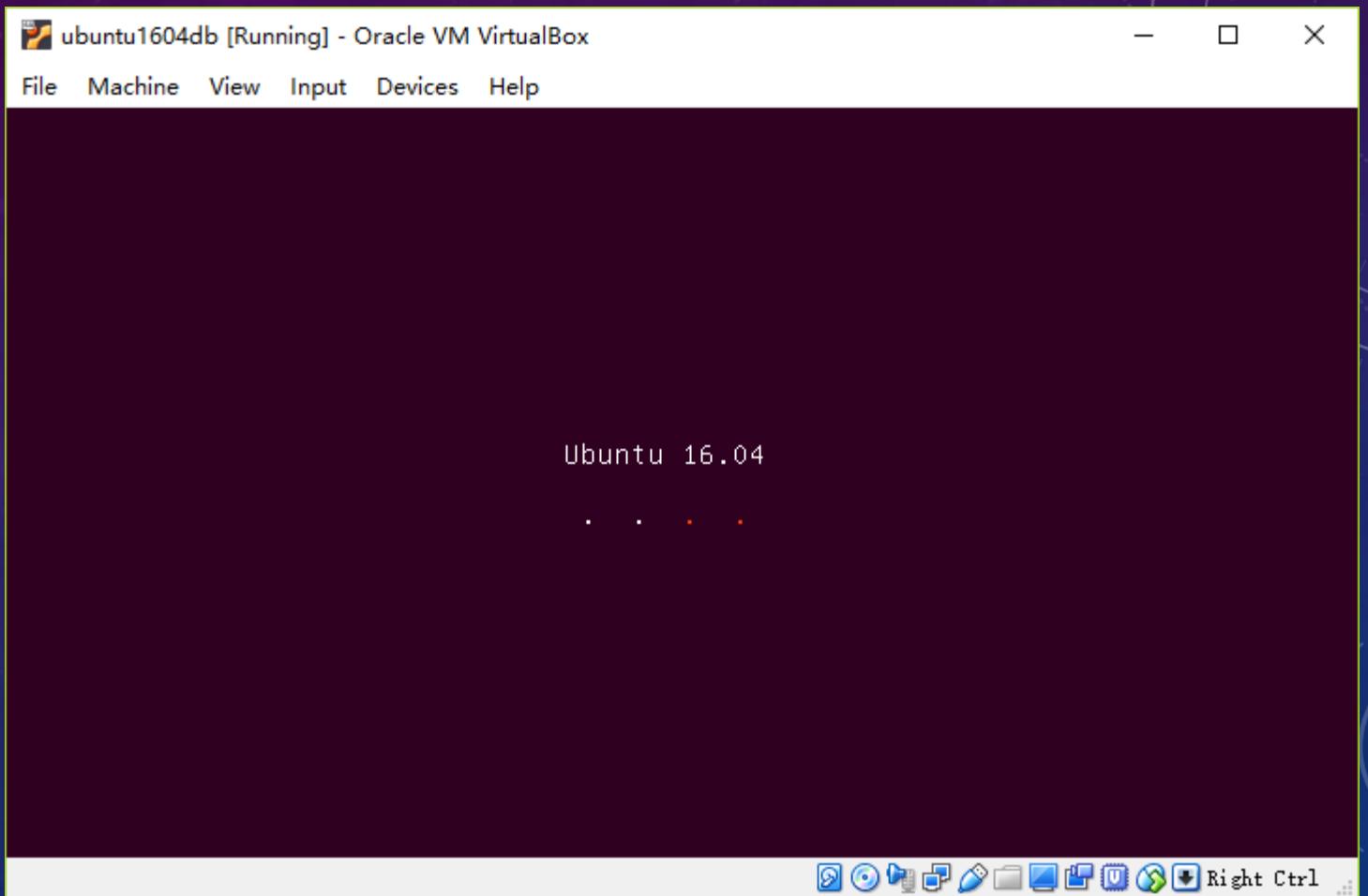


INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Select the second line

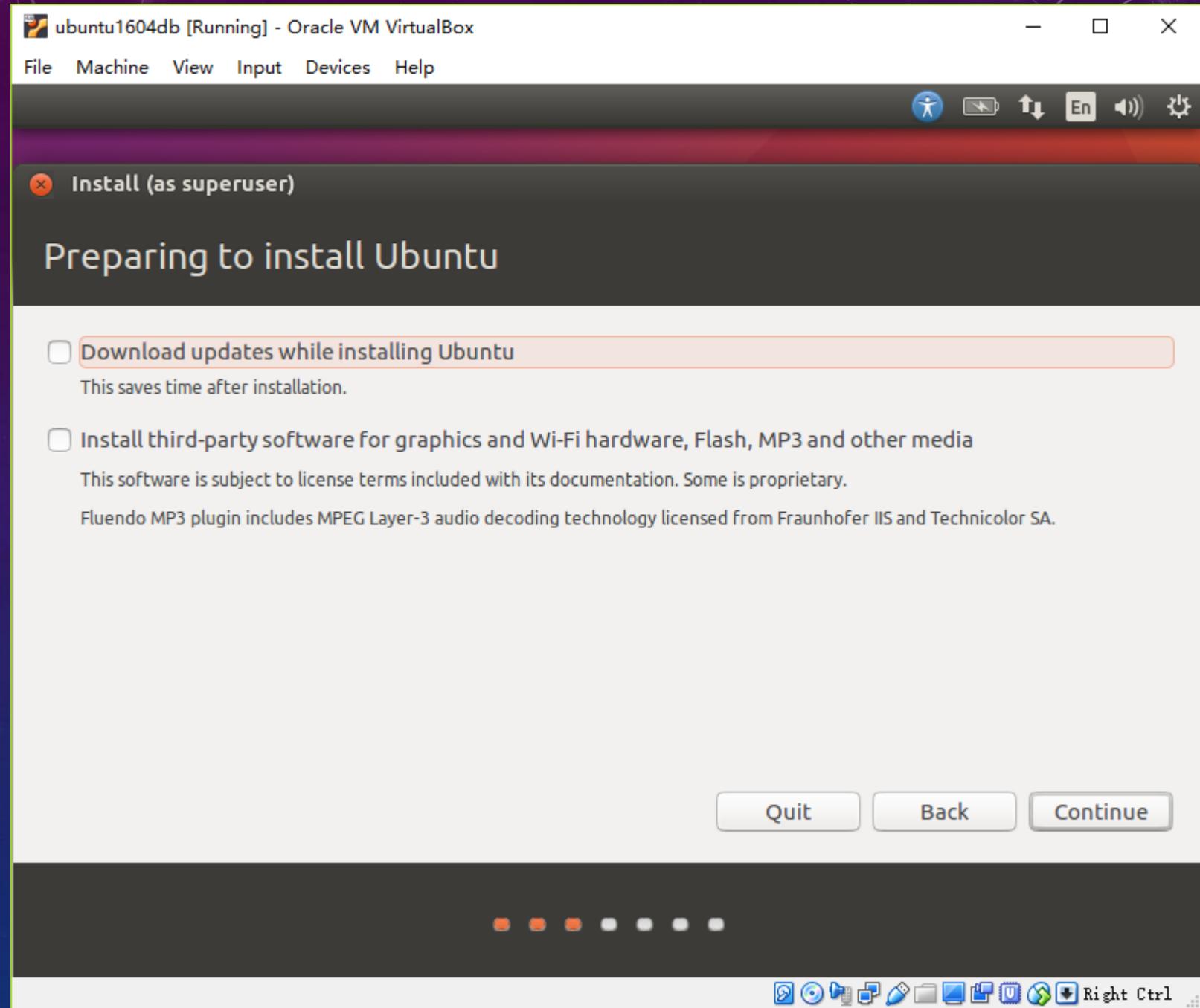


INSTALL A GUEST UBUNTU OS IN VIRTUALBOX



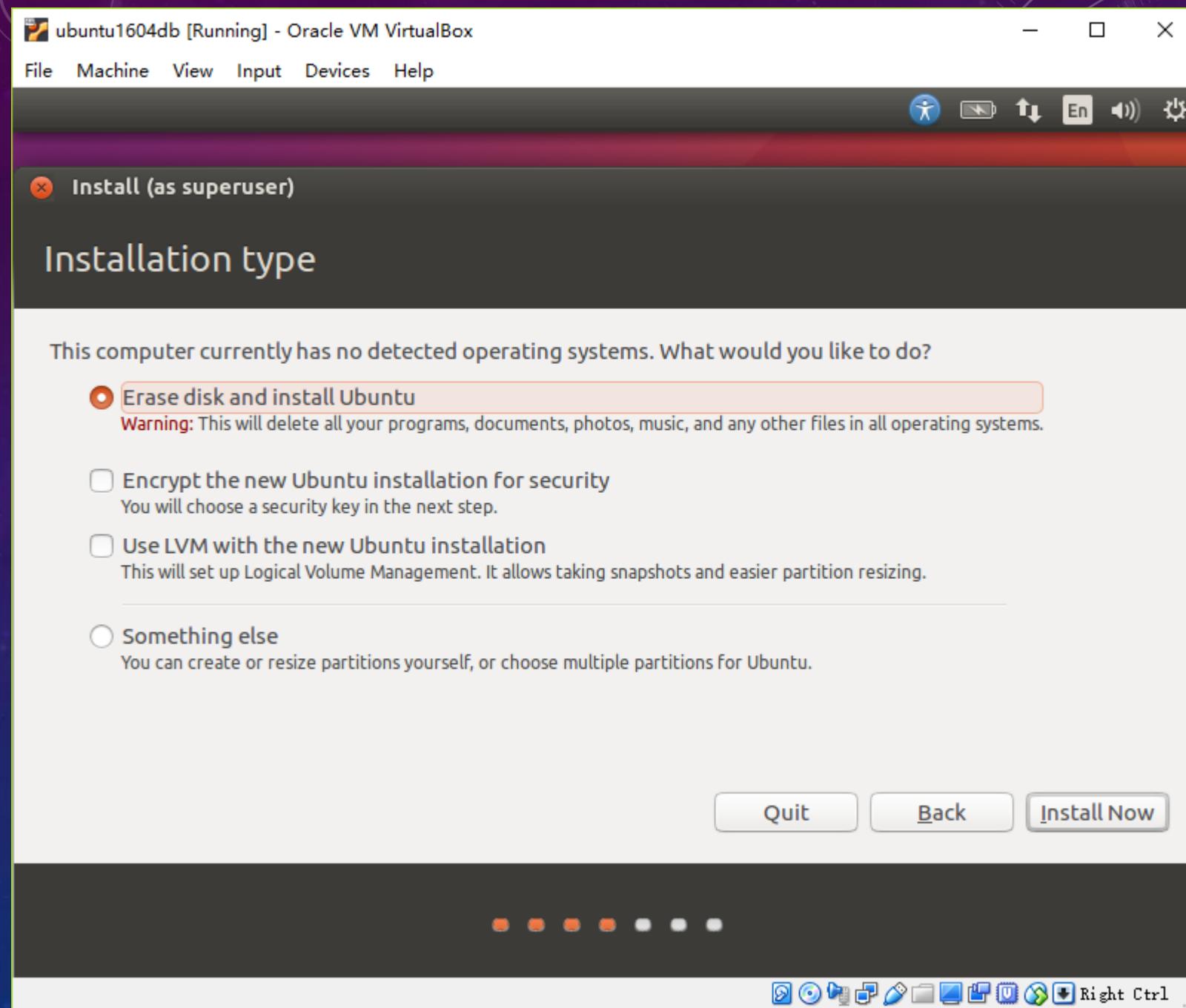
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



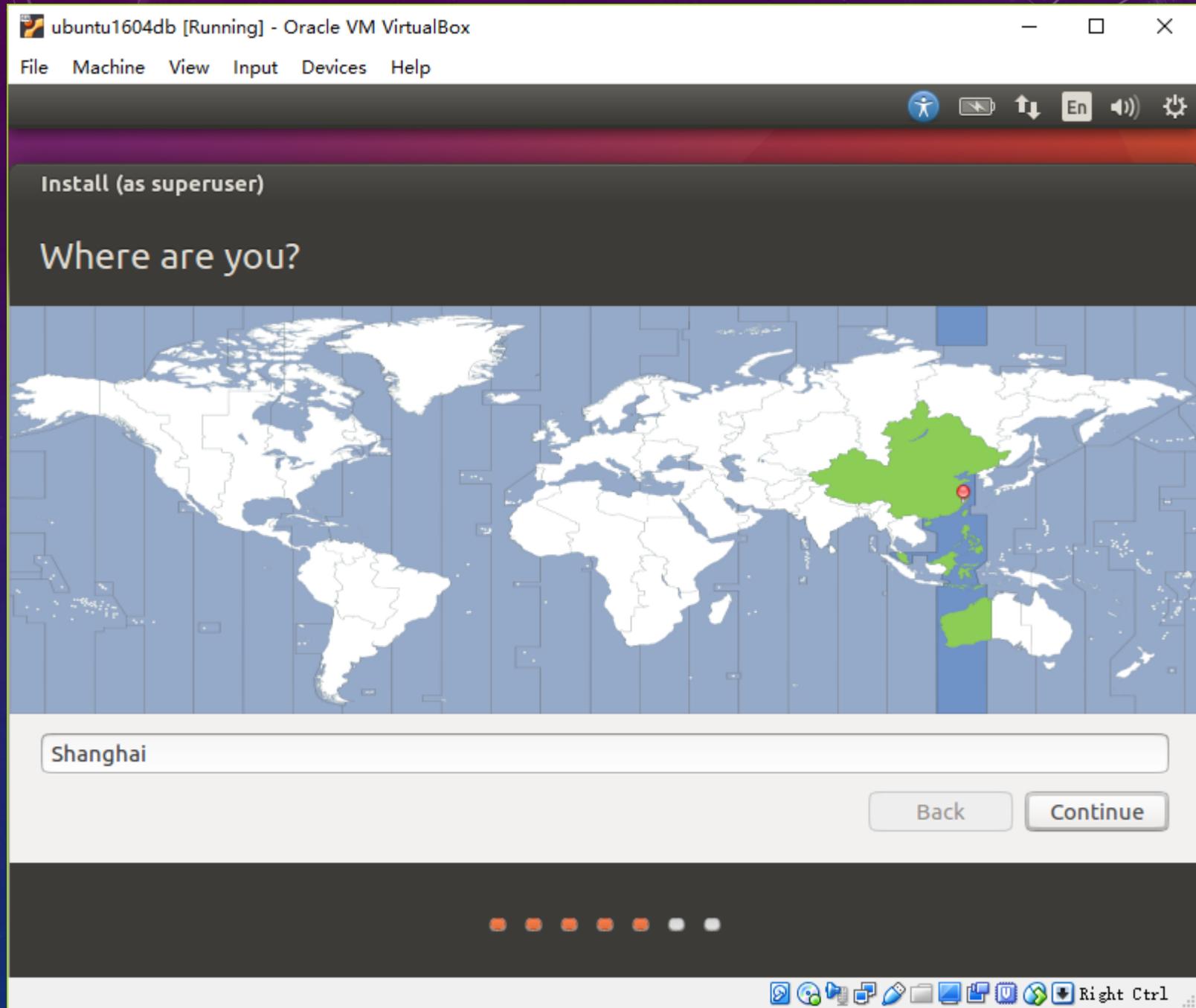
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



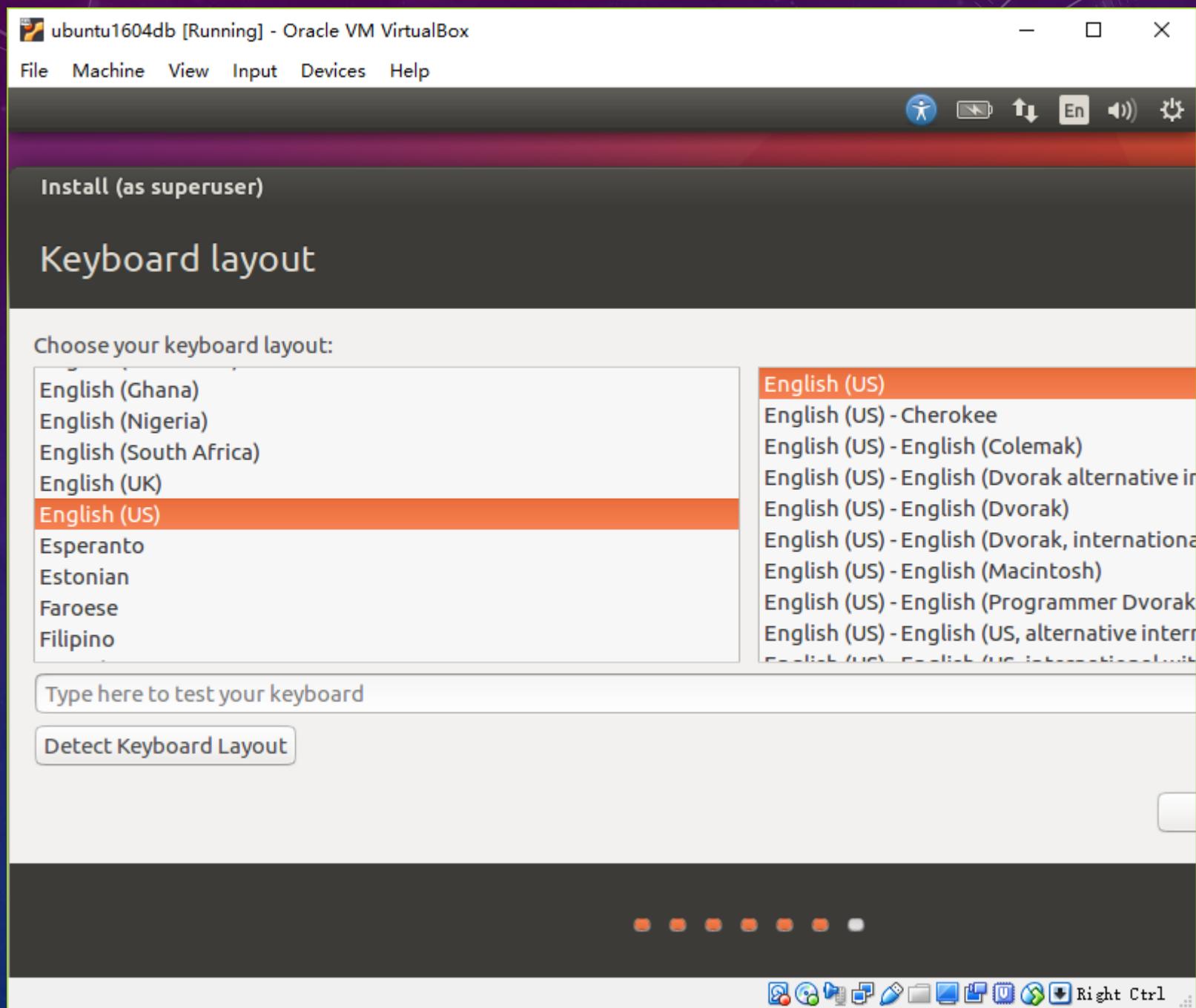
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



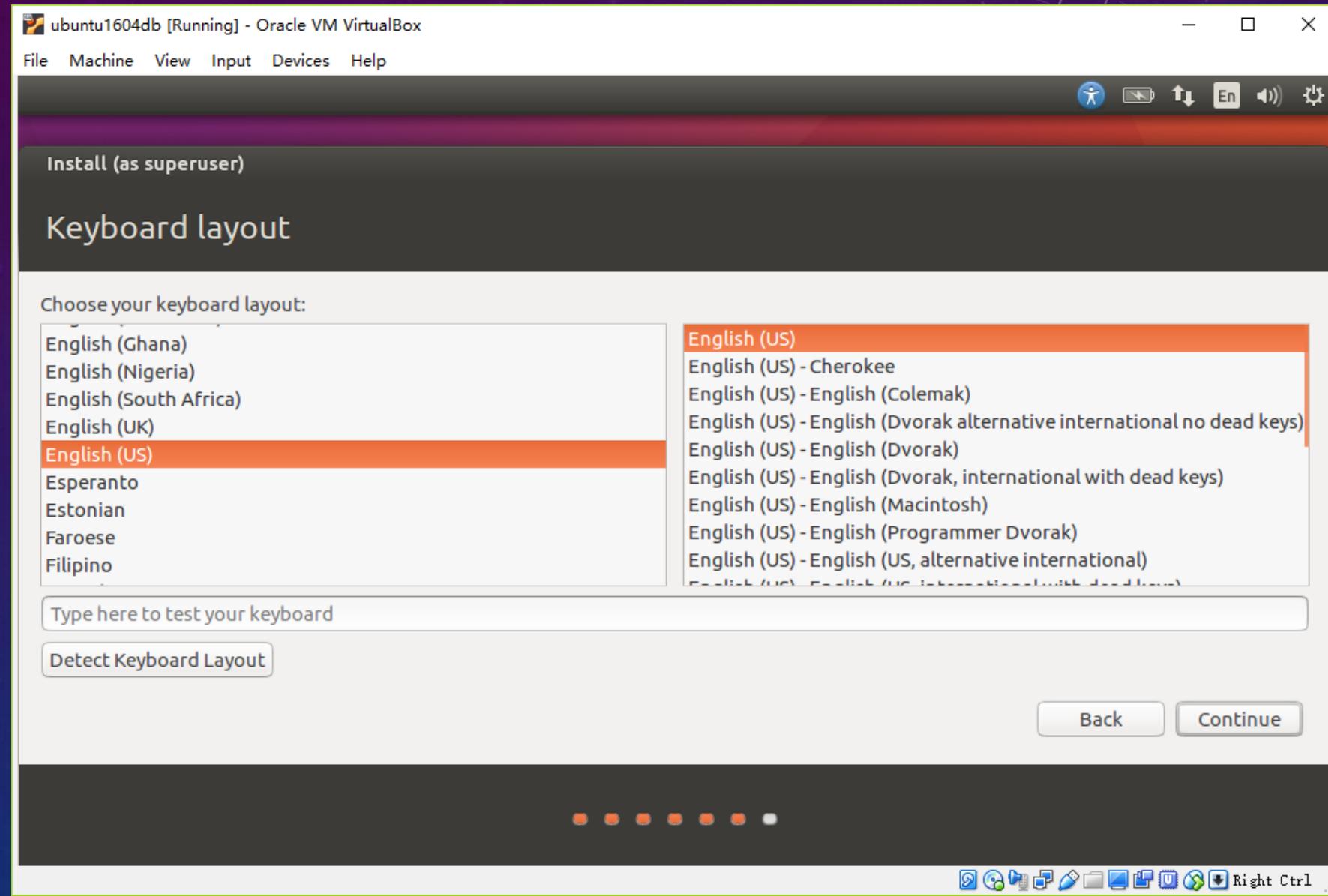
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



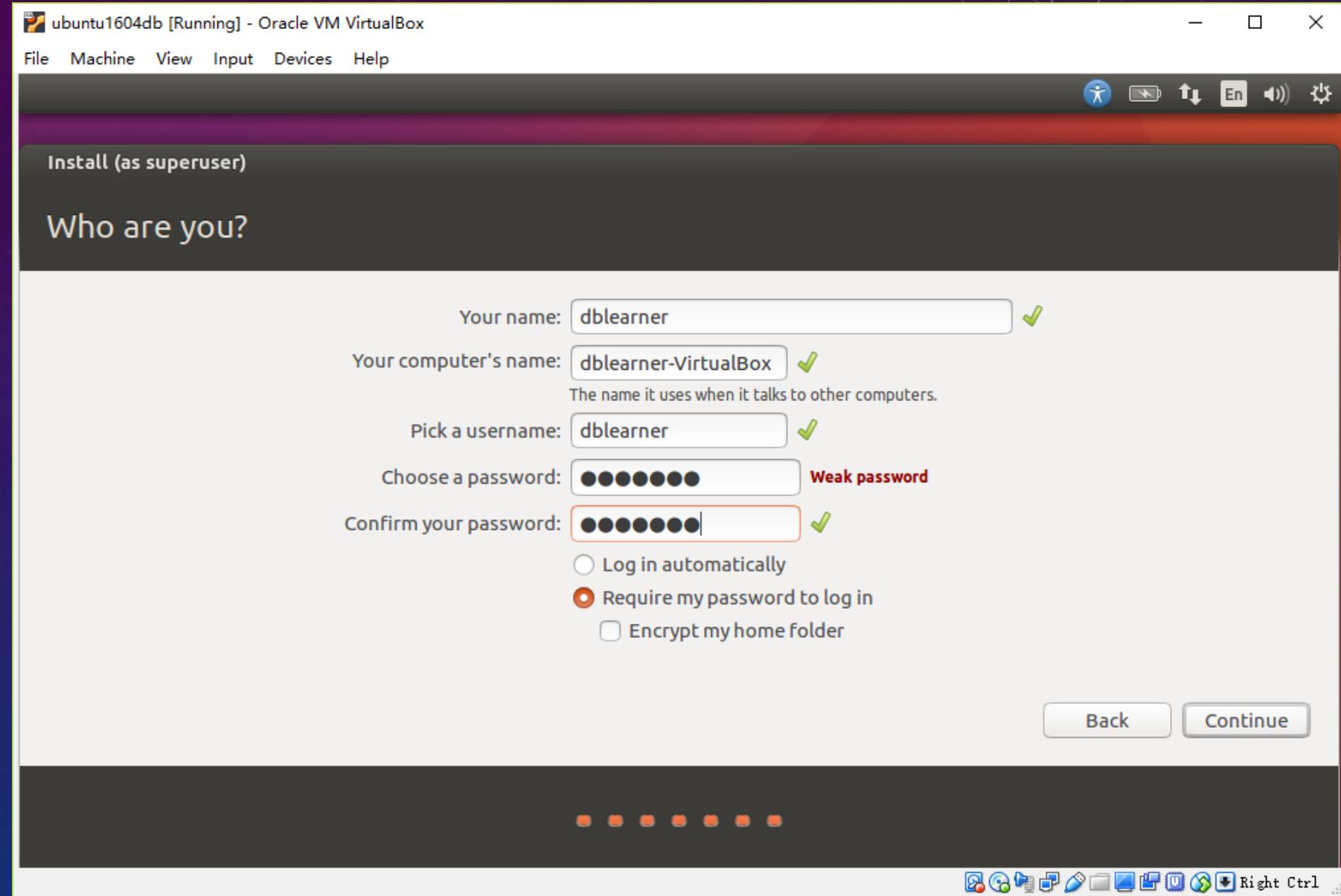
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



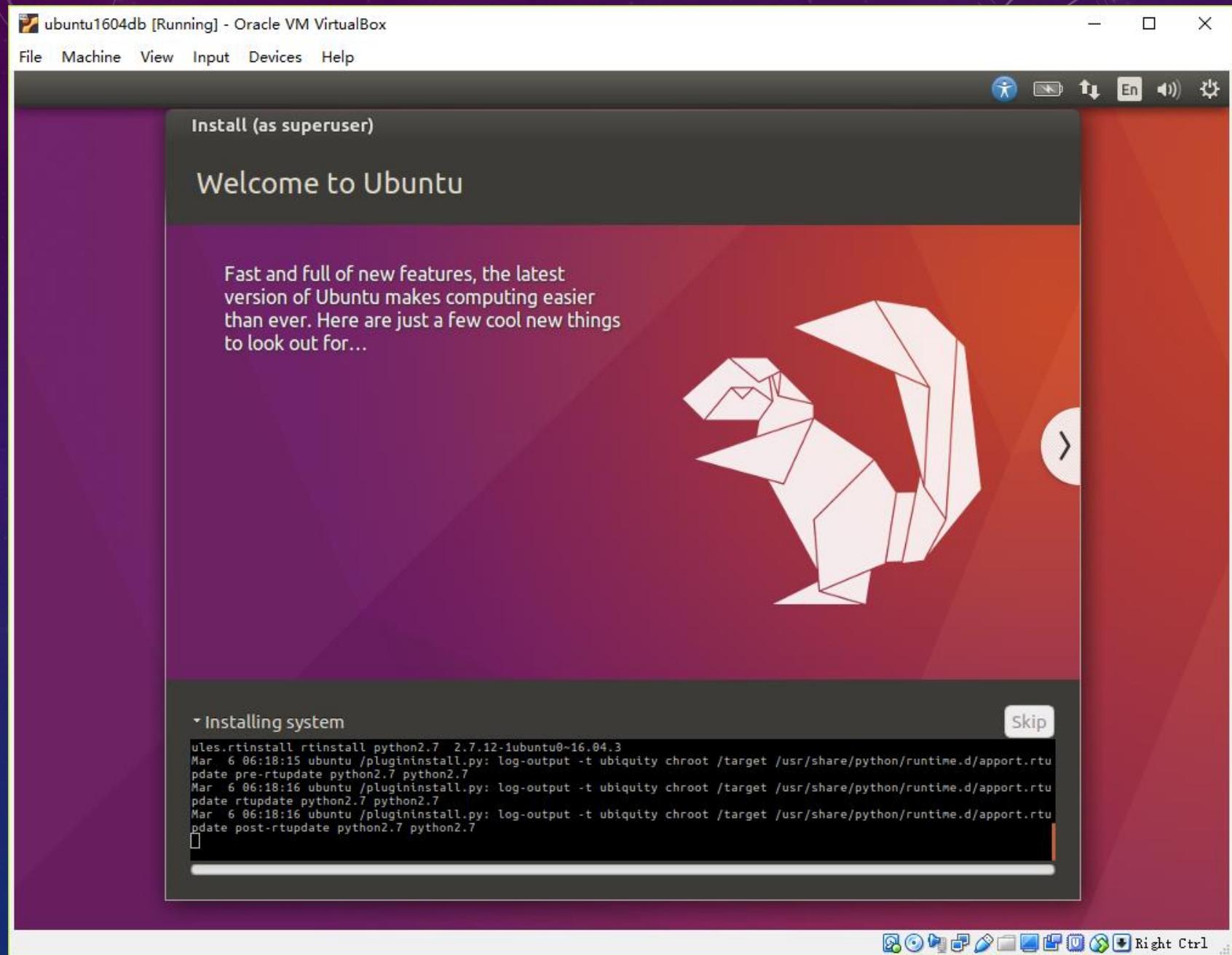
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Your name
- Your pwd



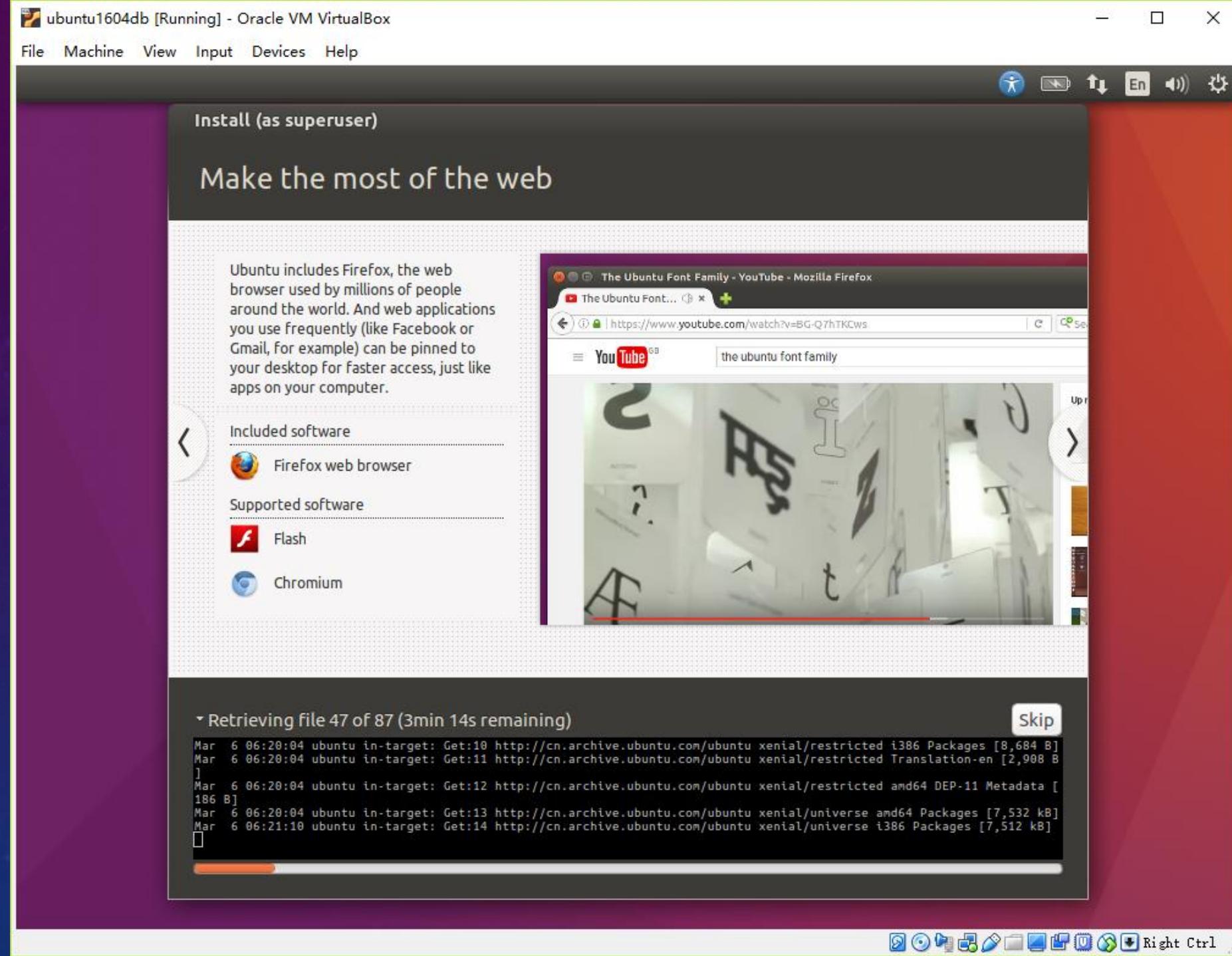
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Wait ...



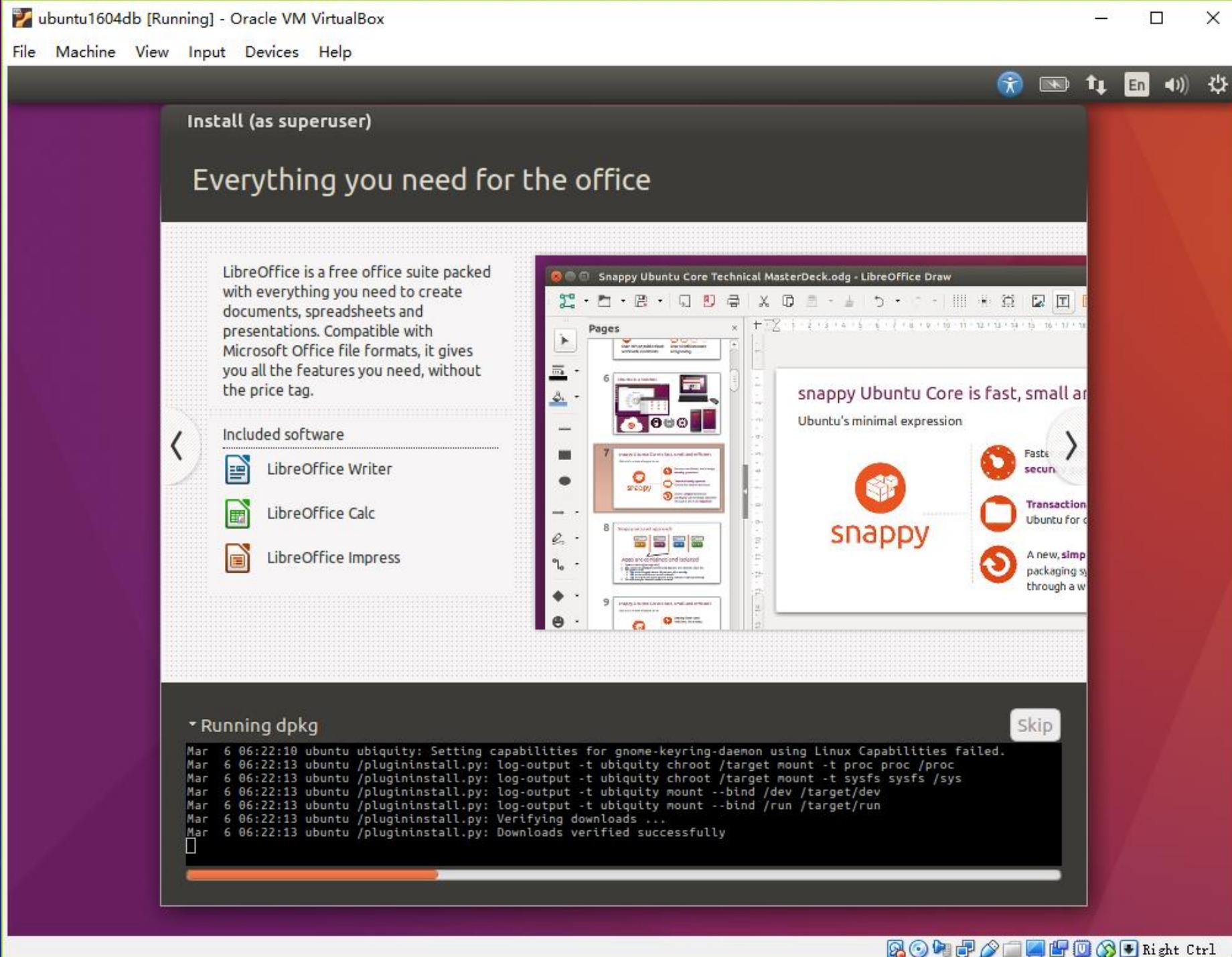
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Wait ...



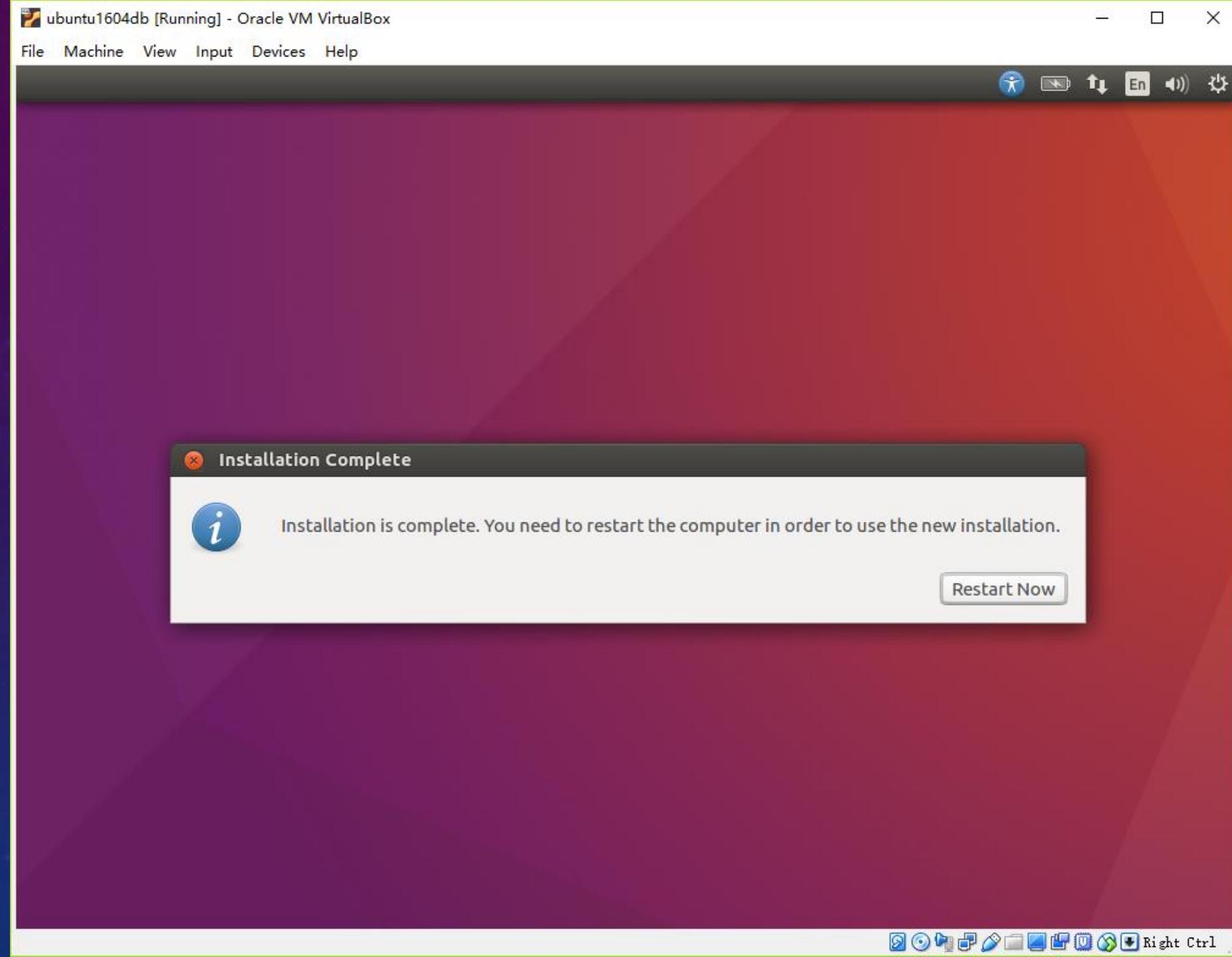
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Wait ...



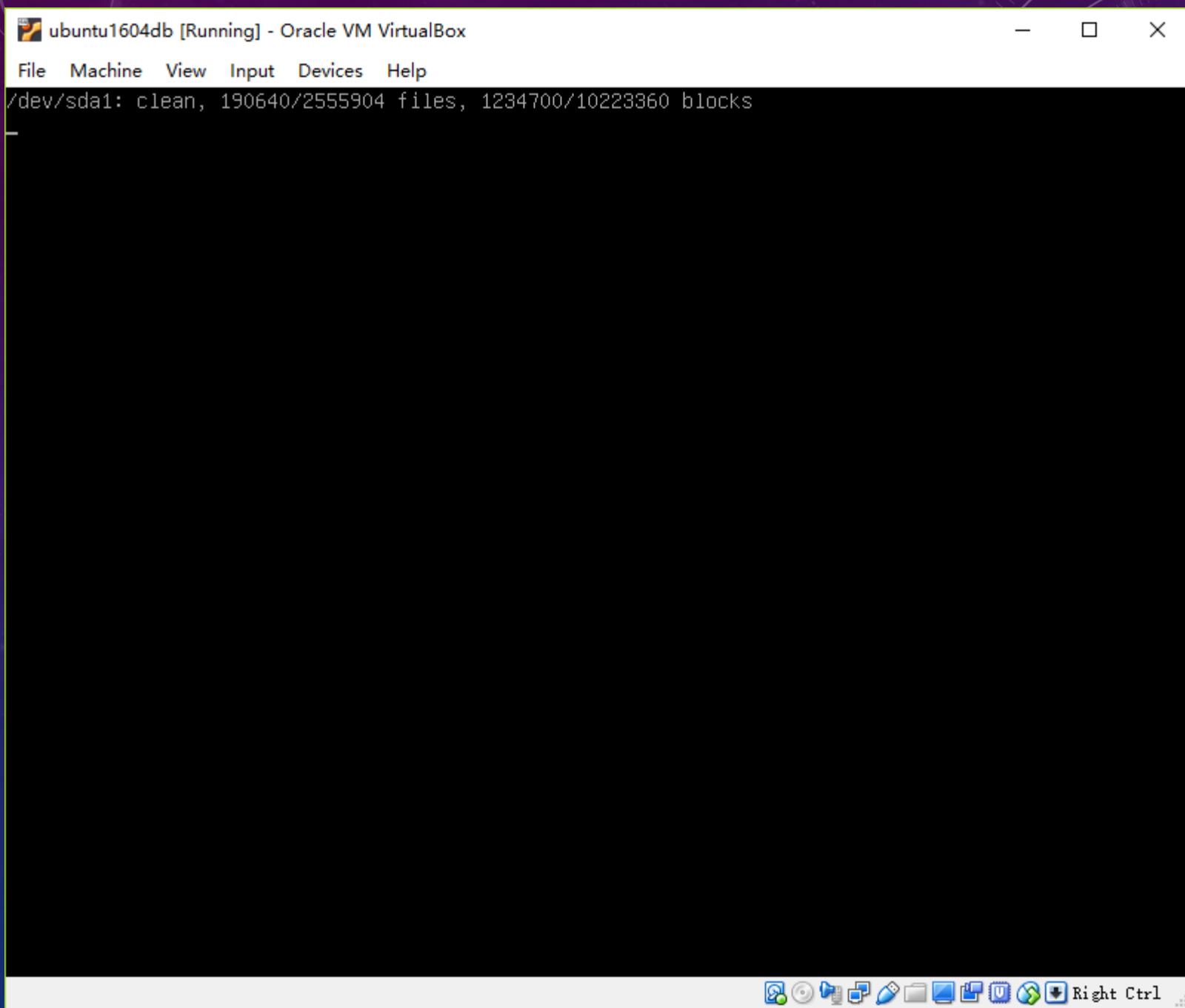
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Restart



INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Booting ...



ubuntu1604db [Running] - Oracle VM VirtualBox

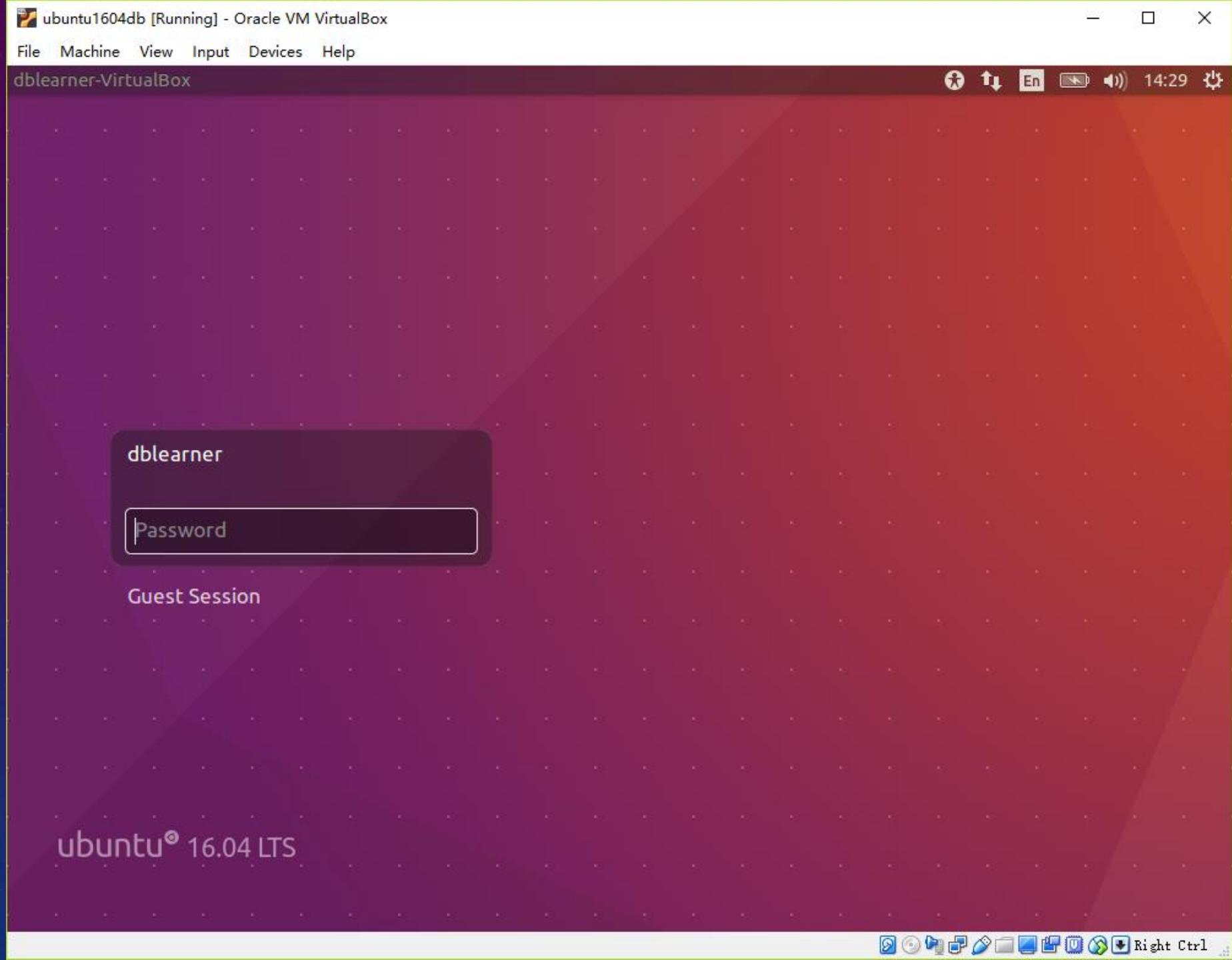
File Machine View Input Devices Help

```
/dev/sda1: clean, 190640/2555904 files, 1234700/10223360 blocks
```

The screenshot shows a terminal window within Oracle VM VirtualBox. The title bar indicates the session is named "ubuntu1604db [Running]" and is running on "Oracle VM VirtualBox". The menu bar includes "File", "Machine", "View", "Input", "Devices", and "Help". The terminal window displays the root prompt and disk usage information: "/dev/sda1: clean, 190640/2555904 files, 1234700/10223360 blocks". At the bottom of the screen, there is a toolbar with various icons, and the text "Right Ctrl" is visible.

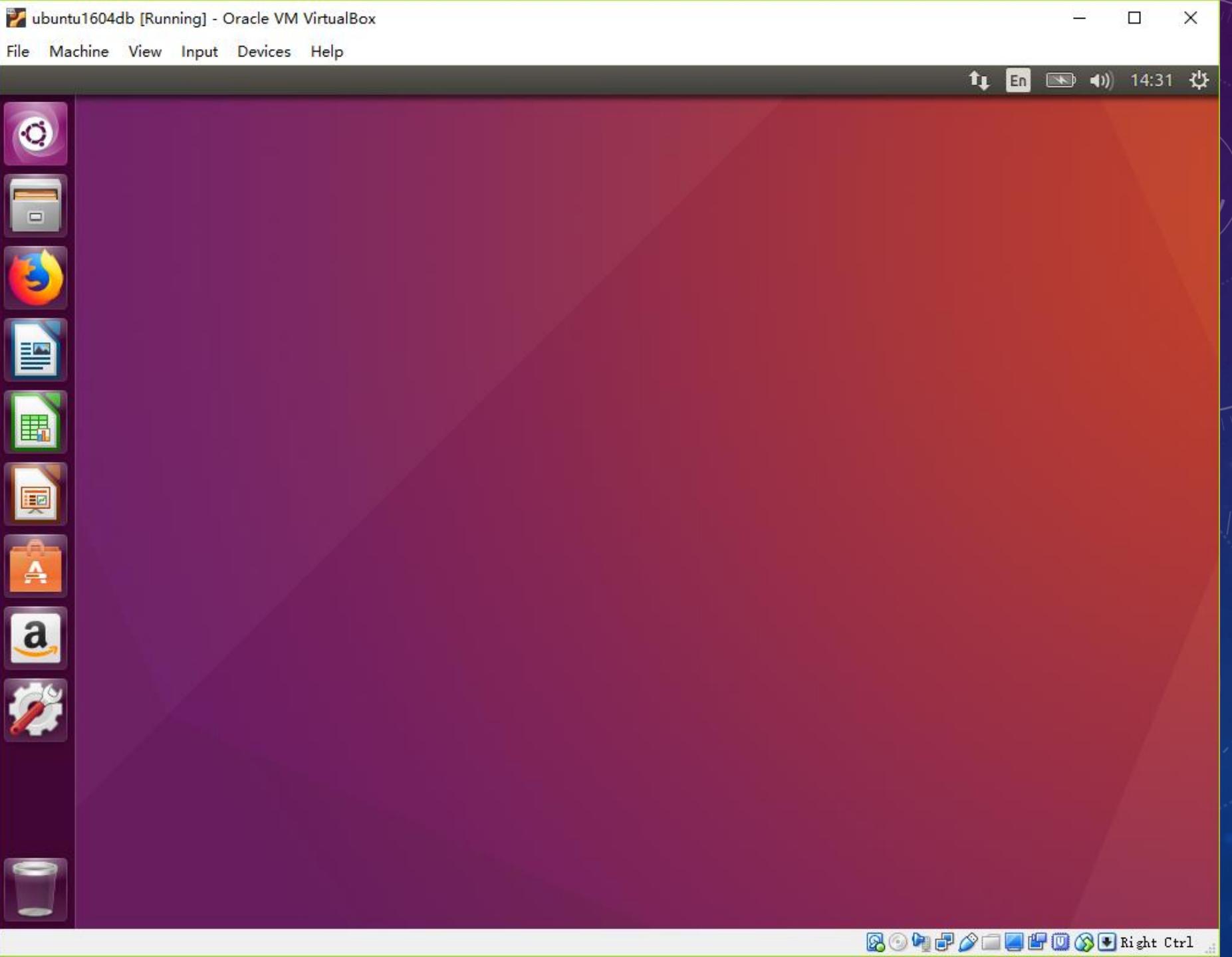
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Input your pwd



INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Gnome Desktop

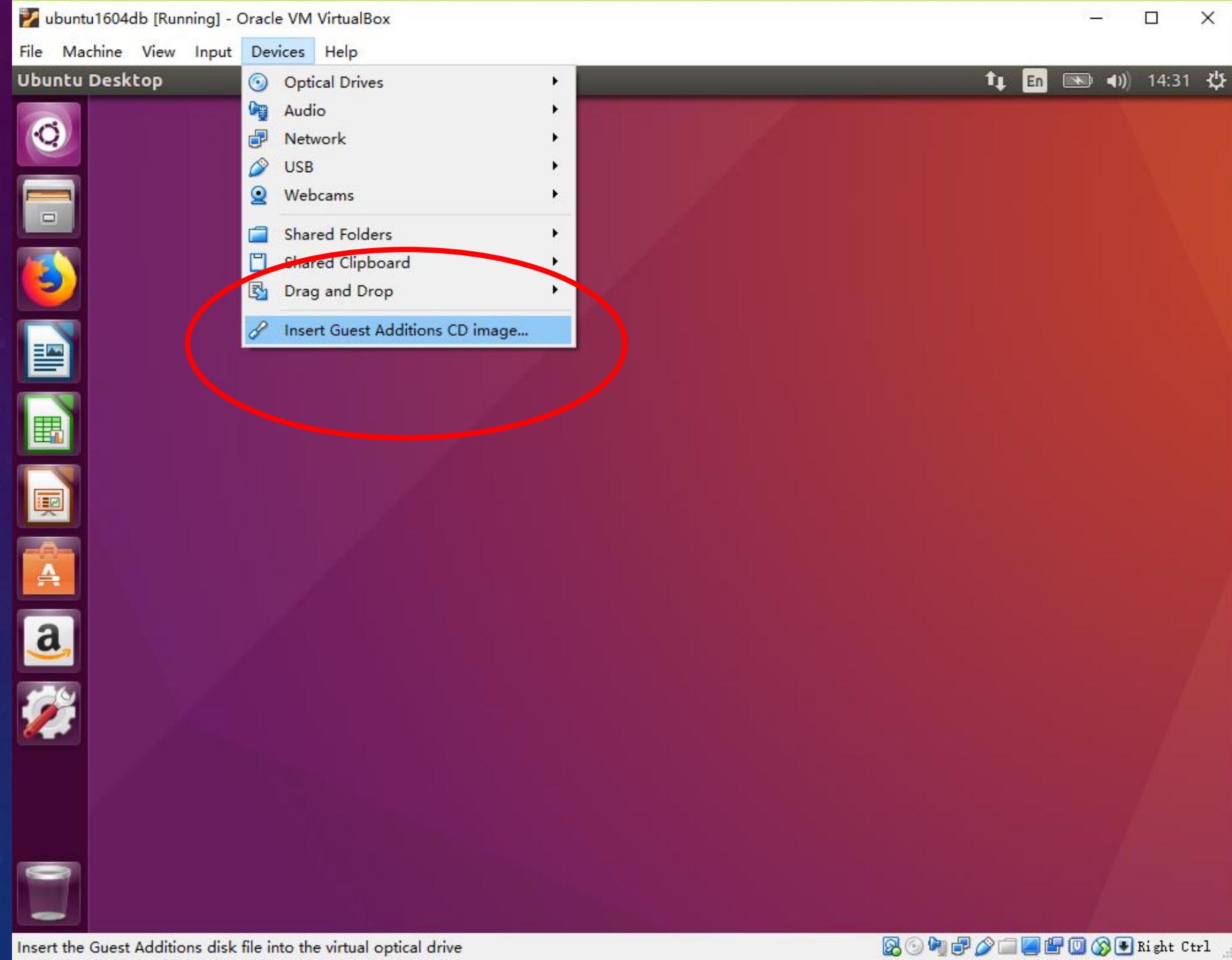


INSTALLING UBUNTU

- Installing Ubuntu
- Post-Installation Configuration

POST- INSTALLATION UBUNTU OS

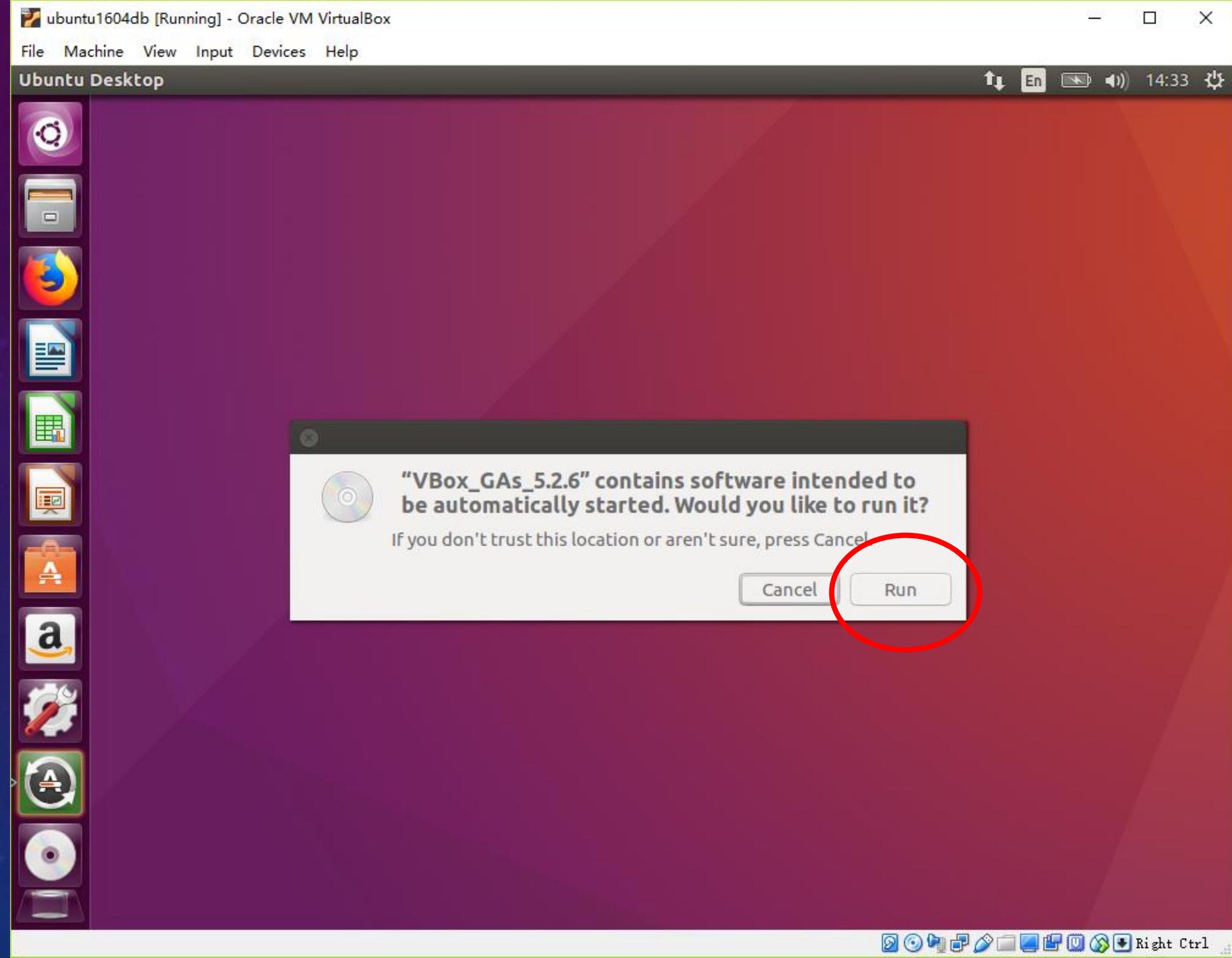
- To enhance guest os



POST- INSTALLATION UBUNTU OS

- To enhance guest os

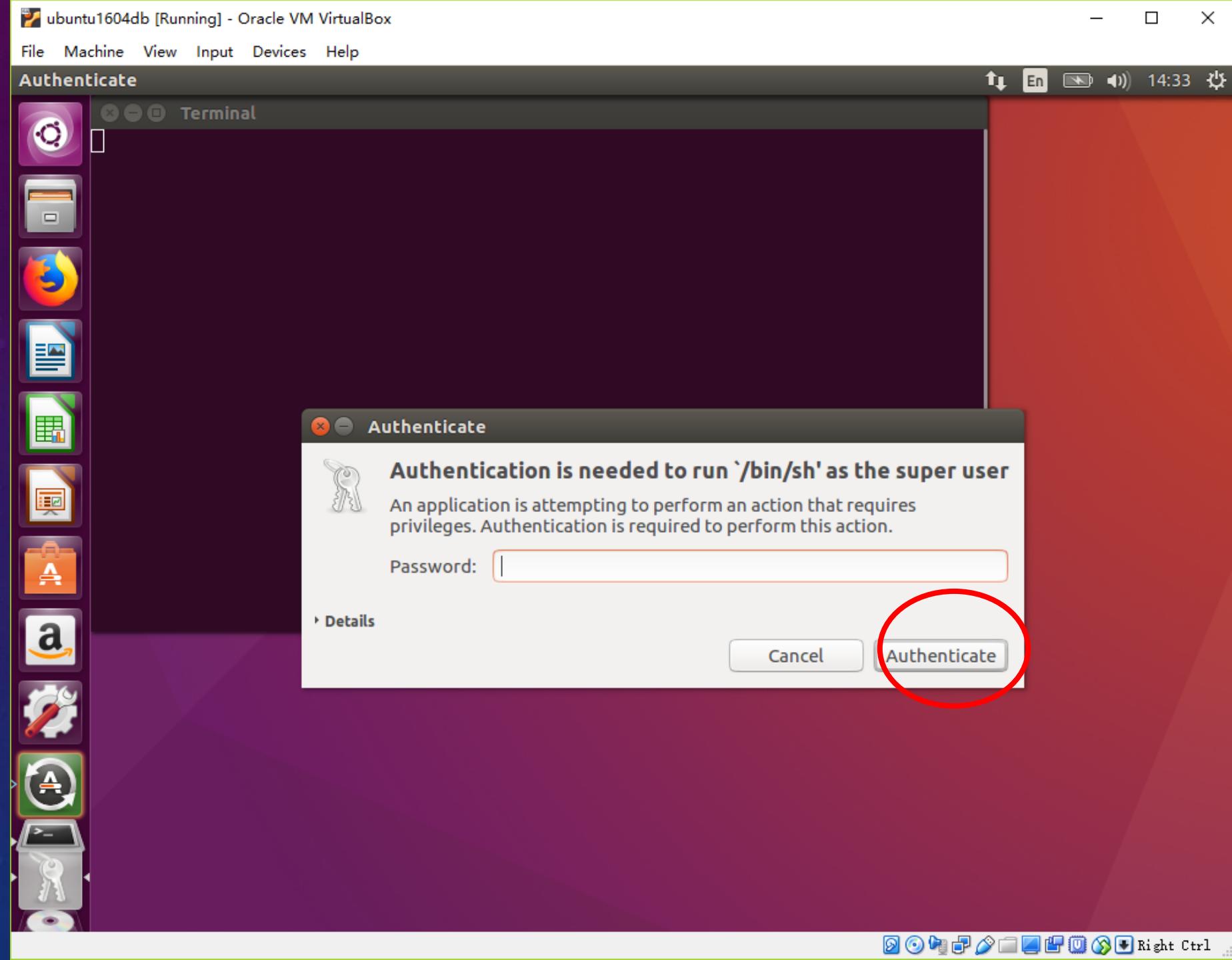
©LXD



POST- INSTALLATION UBUNTU OS

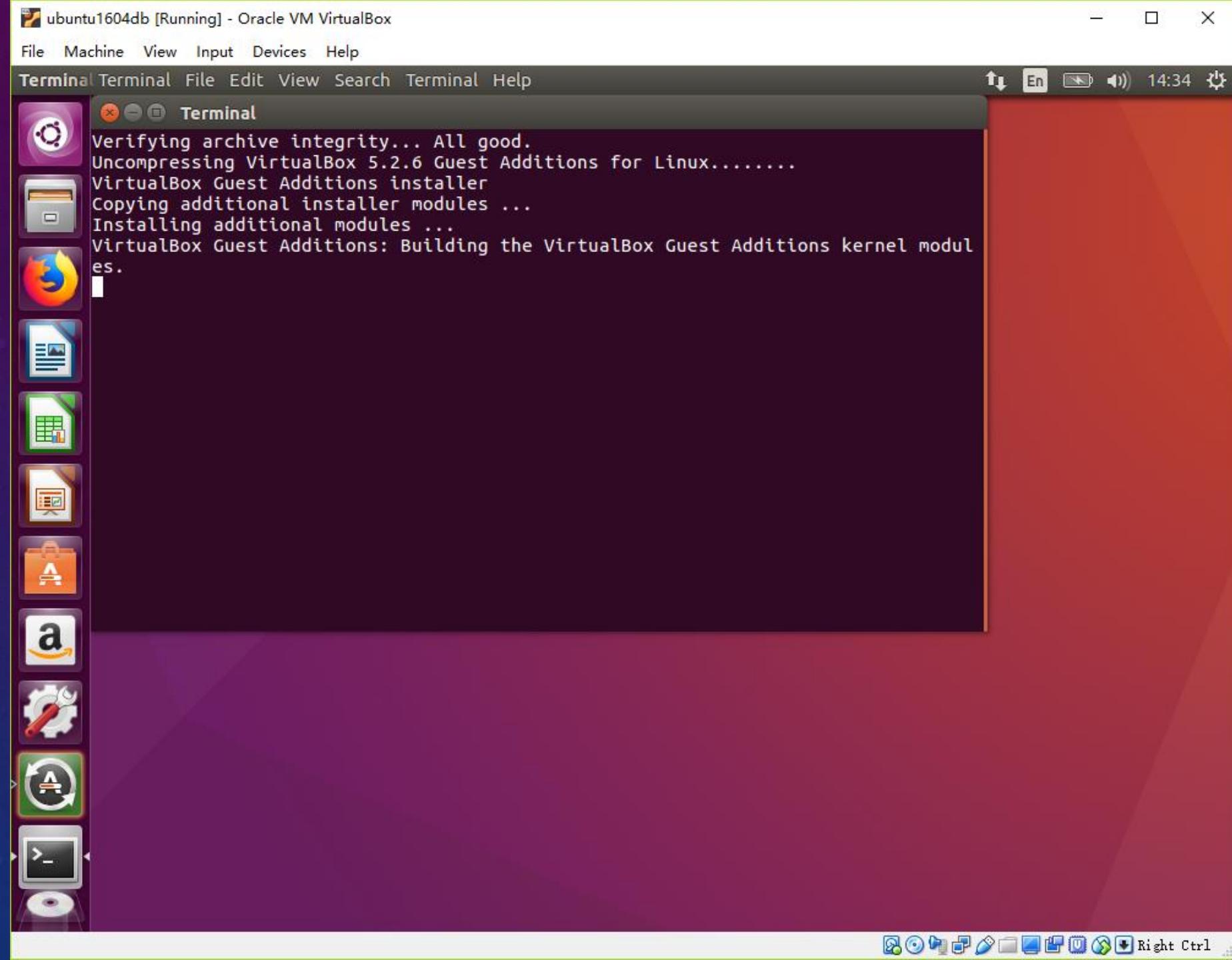
- To enhance guest os

©LXD



POST- INSTALLATION UBUNTU OS

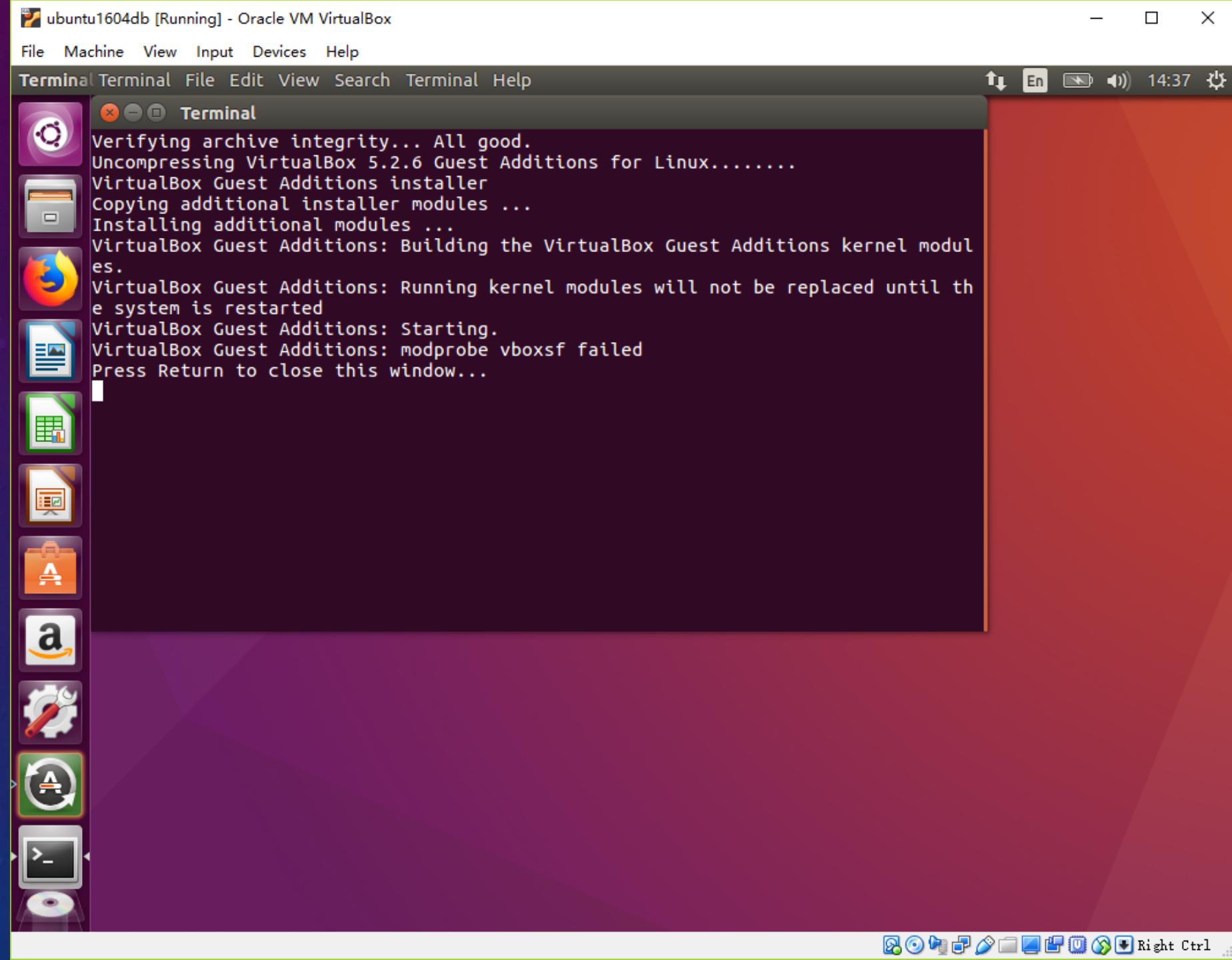
- To enhance guest os



POST- INSTALLATION UBUNTU OS

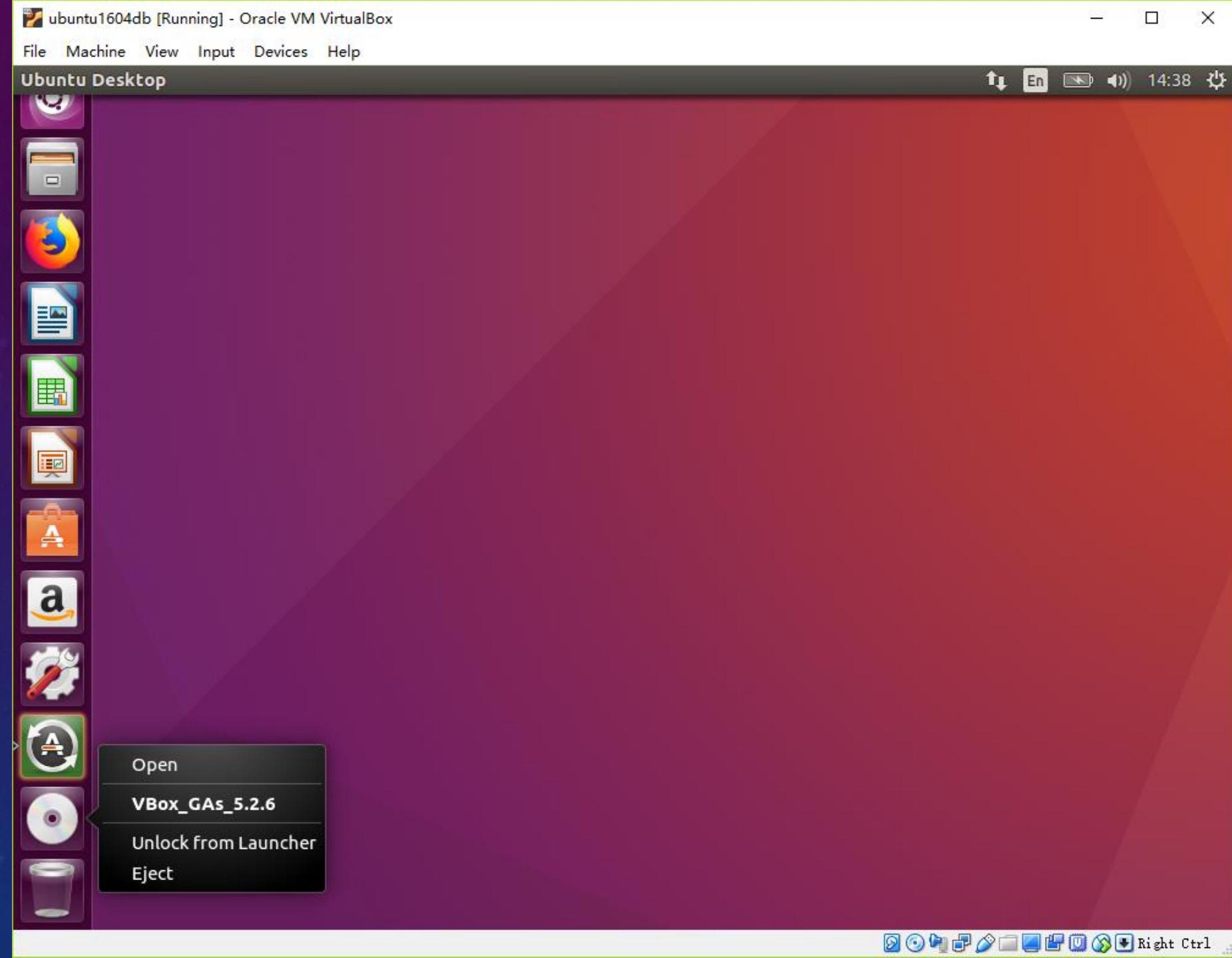
- To enhance guest os

©LXD



POST- INSTALLATION UBUNTU OS

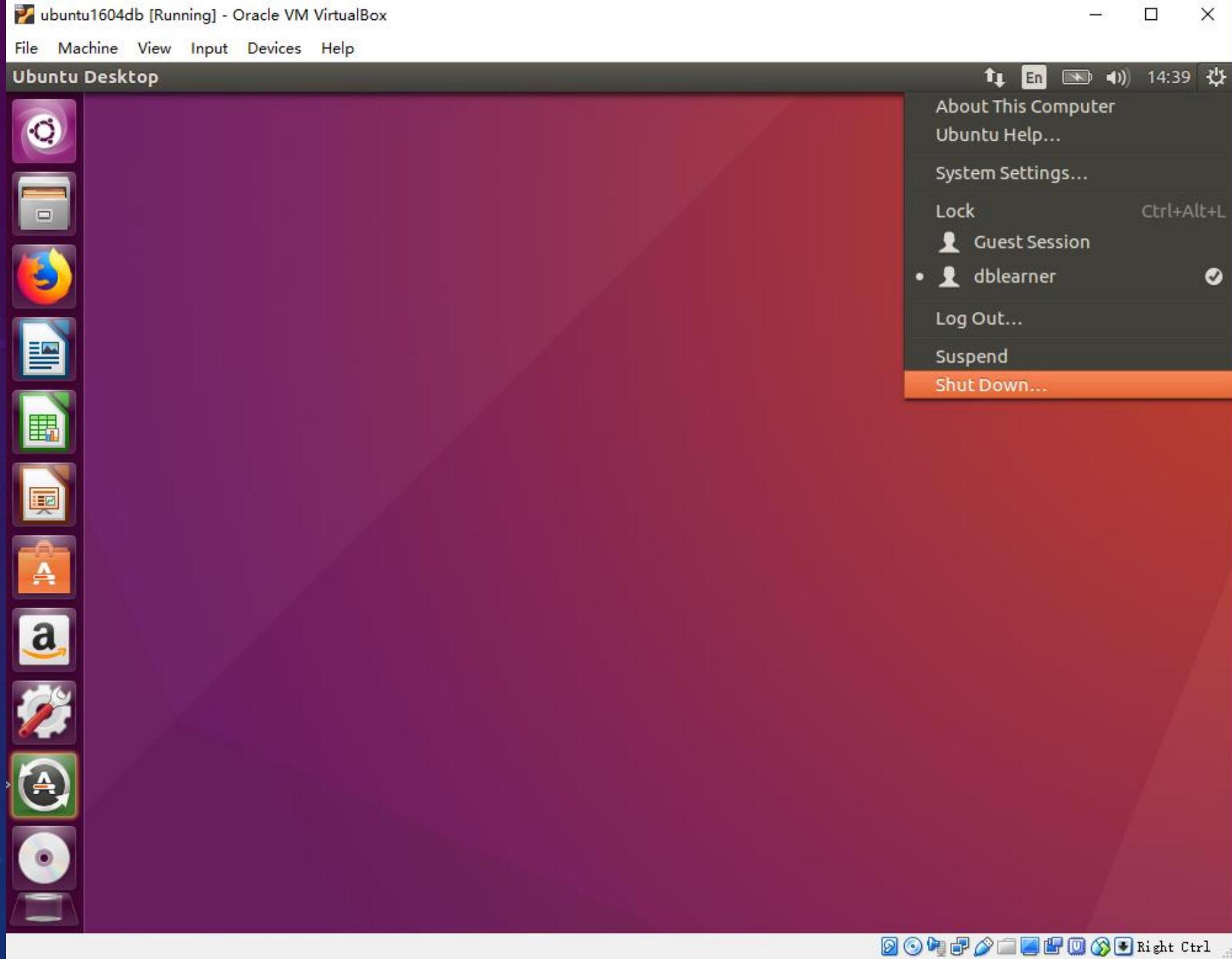
- To enhance guest os
 - Eject



POST- INSTALLATION UBUNTU OS

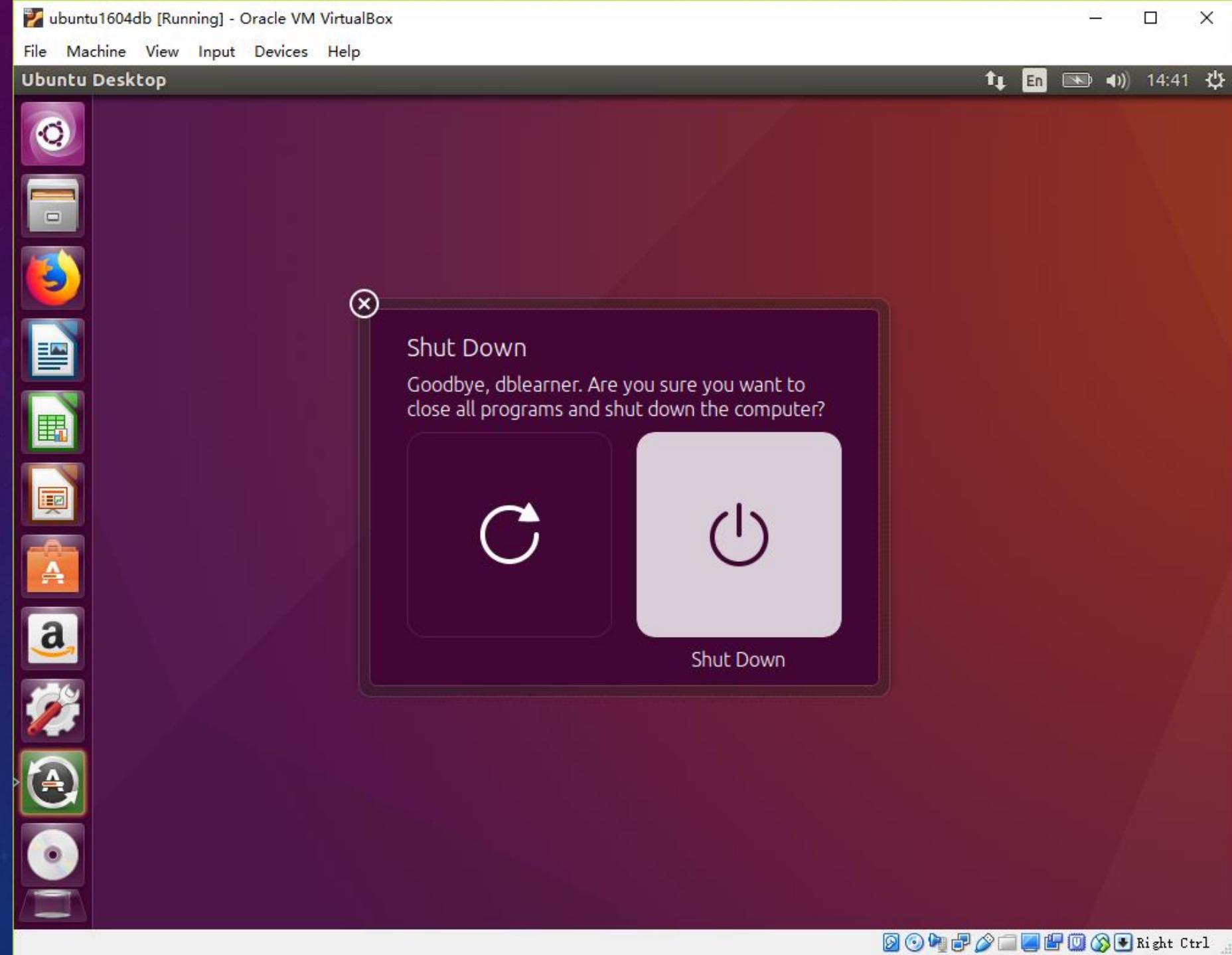
- To enhance guest os
 - Restart

©LXD



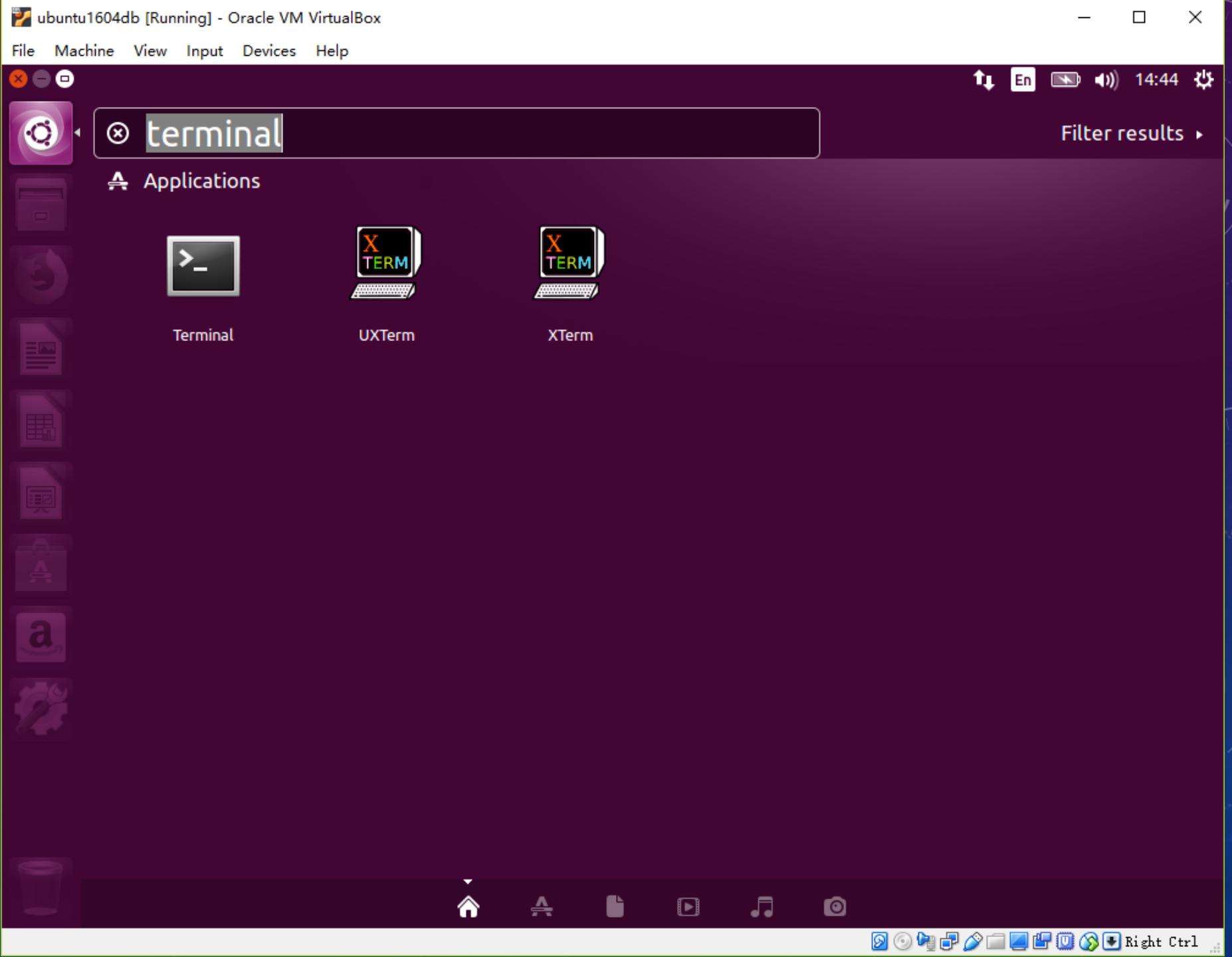
POST- INSTALLATION UBUNTU OS

- To enhance guest os
 - Eject and Restart



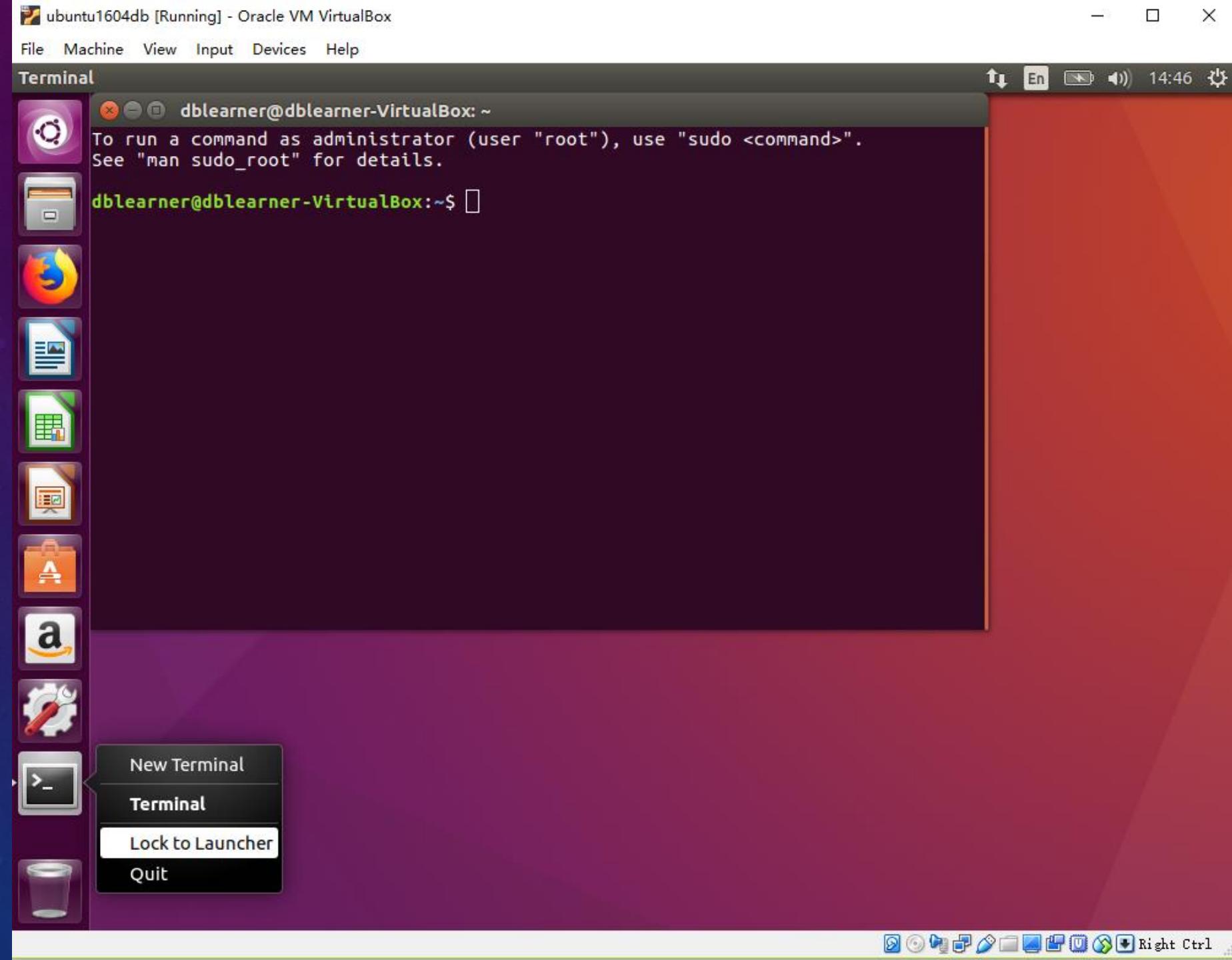
POST- INSTALLATION UBUNTU OS

- Dashboard
 - terminal



POST- INSTALLATIO N UBUNTU OS

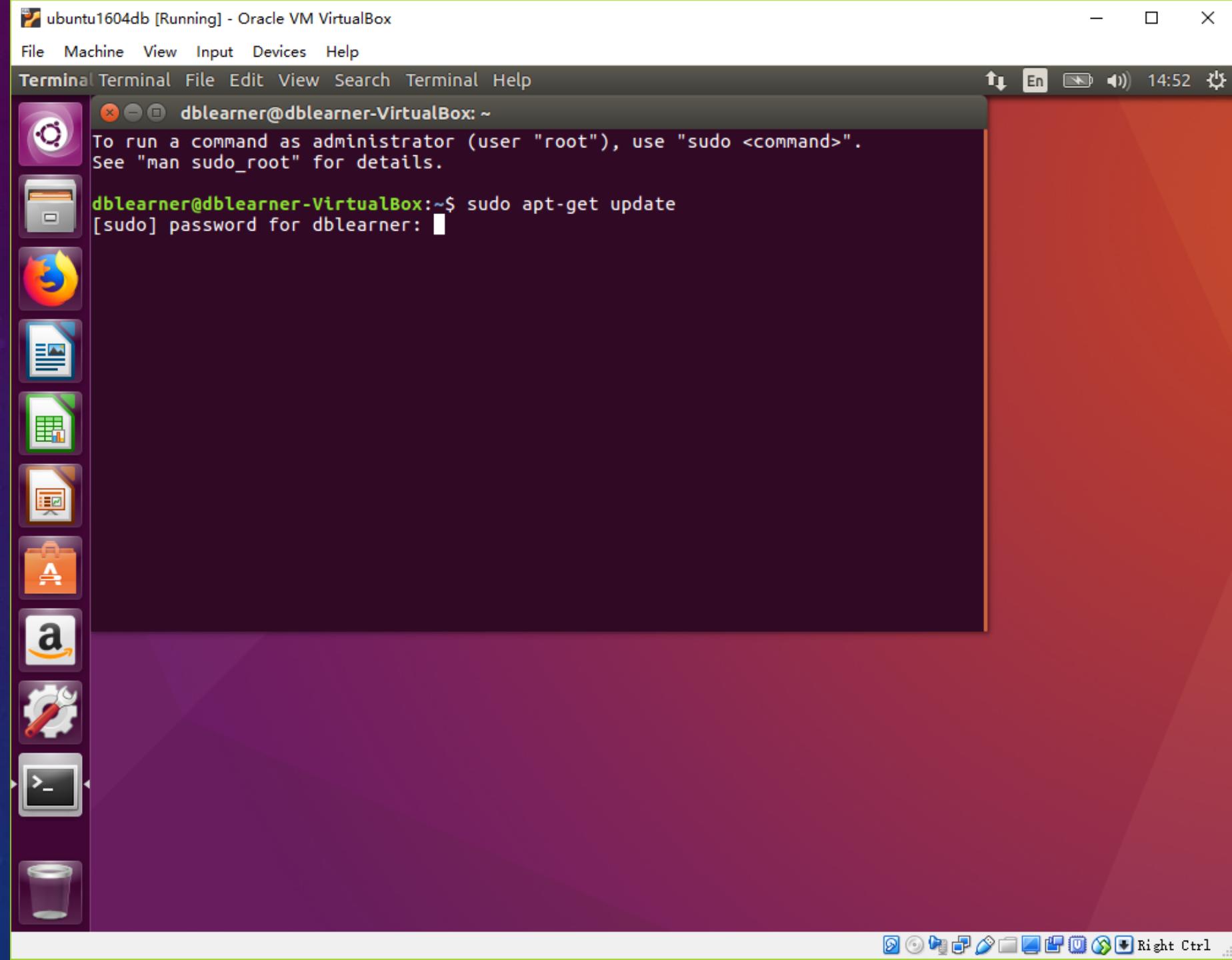
- Dashboard
 - Terminal
 - Lock to launcher



POST- INSTALLATIO N UBUNTU OS

- Dashboard
 - Update OS

©LXD



POST- INSTALLATIO N UBUNTU OS

- Dashboard
 - Update OS

©LXD

ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Terminal Terminal File Edit View Search Terminal Help

dblearner@dblearner-VirtualBox: ~

To run a command as administrator (user "root"), use "sudo <command>". See "man sudo_root" for details.

```
dblearner@dblearner-VirtualBox:~$ sudo apt-get update
[sudo] password for dblearner:
Get:1 http://security.ubuntu.com/ubuntu xenial-security InRelease [102 kB]
Hit:2 http://cn.archive.ubuntu.com/ubuntu xenial InRelease
Get:3 http://cn.archive.ubuntu.com/ubuntu xenial-updates InRelease [102 kB]
Hit:4 http://cn.archive.ubuntu.com/ubuntu xenial-backports InRelease
Fetched 204 kB in 2s (70.1 kB/s)
Reading package lists... Done
dblearner@dblearner-VirtualBox:~$ sudo apt-get upgrade
```

The image shows a Ubuntu 16.04 LTS desktop environment running in Oracle VM VirtualBox. A terminal window is open, displaying the output of the 'apt-get update' and 'apt-get upgrade' commands. The terminal window has a dark theme with white text. To the left of the terminal is a vertical dock containing icons for Dash, Home, Applications, System Settings, and a terminal. The desktop background features a purple and orange gradient. The top right corner shows system status icons for battery, signal, and time (14:58). The top bar includes standard menu options like File, Machine, View, Input, Devices, Help, and Terminal.

POST- INSTALLATIO N UBUNTU OS

- Dashboard
 - Update OS

©LXD

ubuntu1604db [Running] - Oracle VM VirtualBox

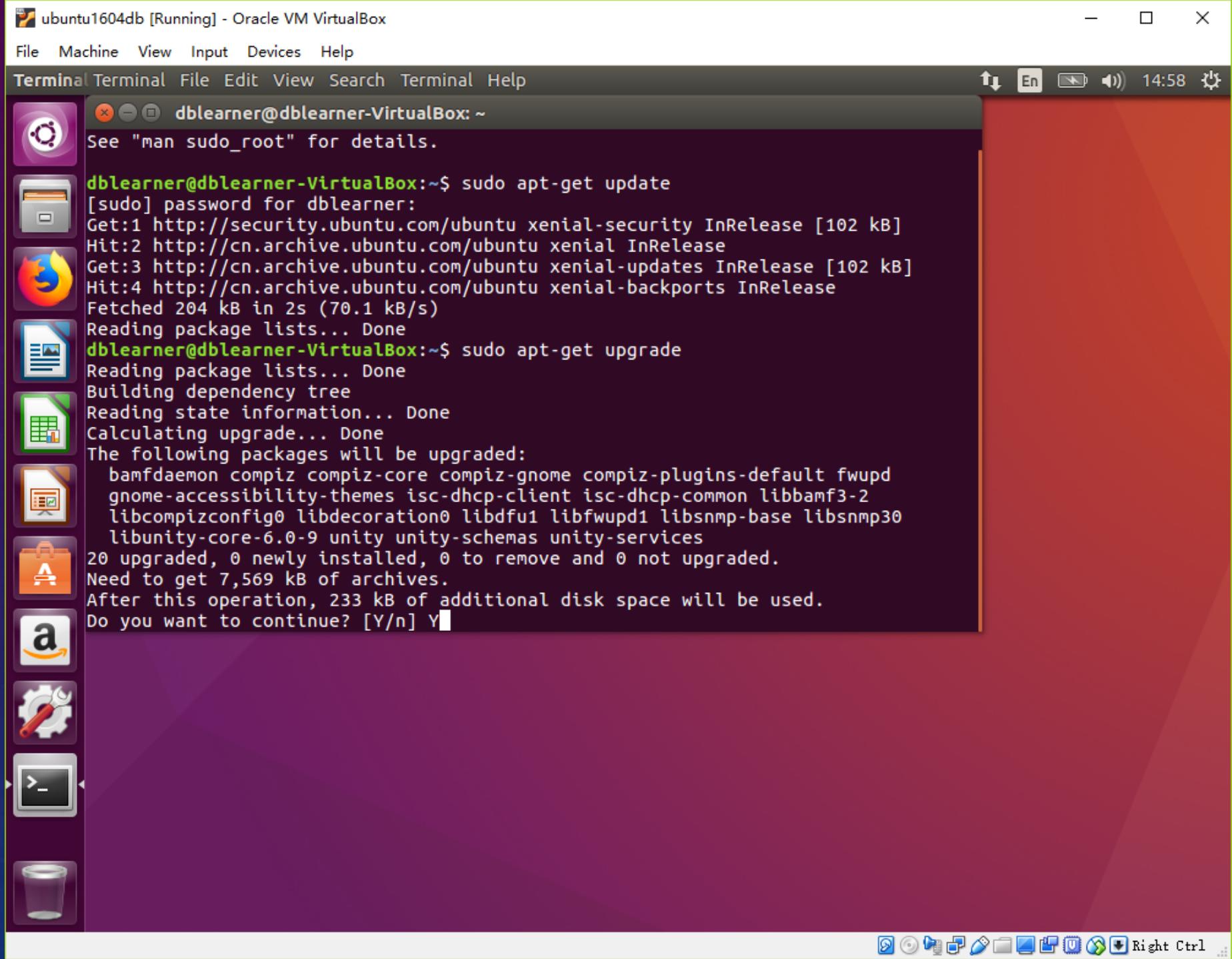
File Machine View Input Devices Help

Terminal Terminal File Edit View Search Terminal Help

See "man sudo_root" for details.

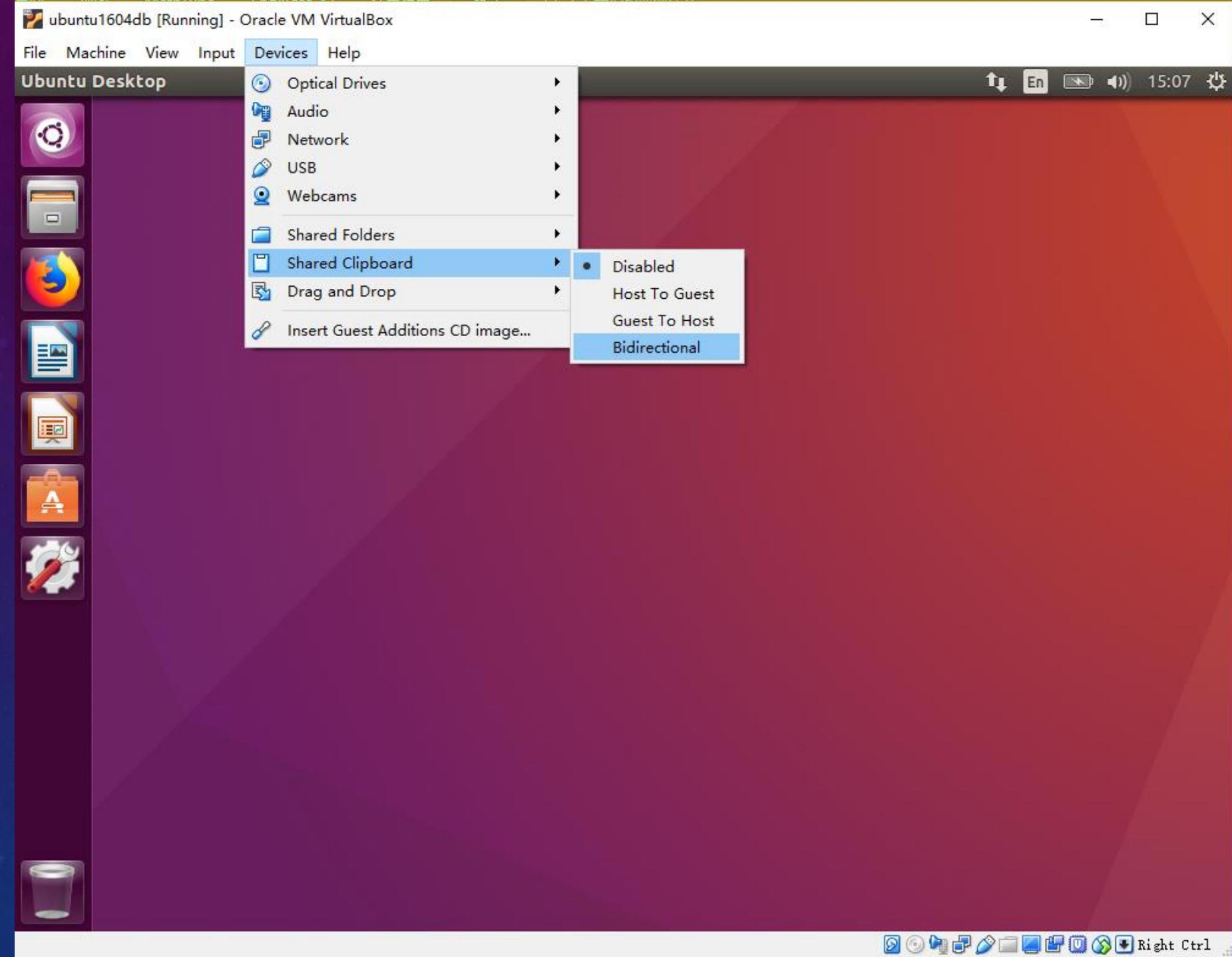
```
dblearner@dblearner-VirtualBox:~$ sudo apt-get update
[sudo] password for dblearner:
Get:1 http://security.ubuntu.com/ubuntu xenial-security InRelease [102 kB]
Hit:2 http://cn.archive.ubuntu.com/ubuntu xenial InRelease
Get:3 http://cn.archive.ubuntu.com/ubuntu xenial-updates InRelease [102 kB]
Hit:4 http://cn.archive.ubuntu.com/ubuntu xenial-backports InRelease
Fetched 204 kB in 2s (70.1 kB/s)
Reading package lists... Done
dblearner@dblearner-VirtualBox:~$ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
bamfdaemon compiz compiz-core compiz-gnome compiz-plugins-default fwupd
gnome-accessibility-themes isc-dhcp-client isc-dhcp-common libbamf3-2
libcompizconfig0 libdecoration0 libdfu1 libfwupd1 libsnmp-base libsnmp30
libunity-core-6.0-9 unity unity-schemas unity-services
20 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 7,569 kB of archives.
After this operation, 233 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

En 14:58



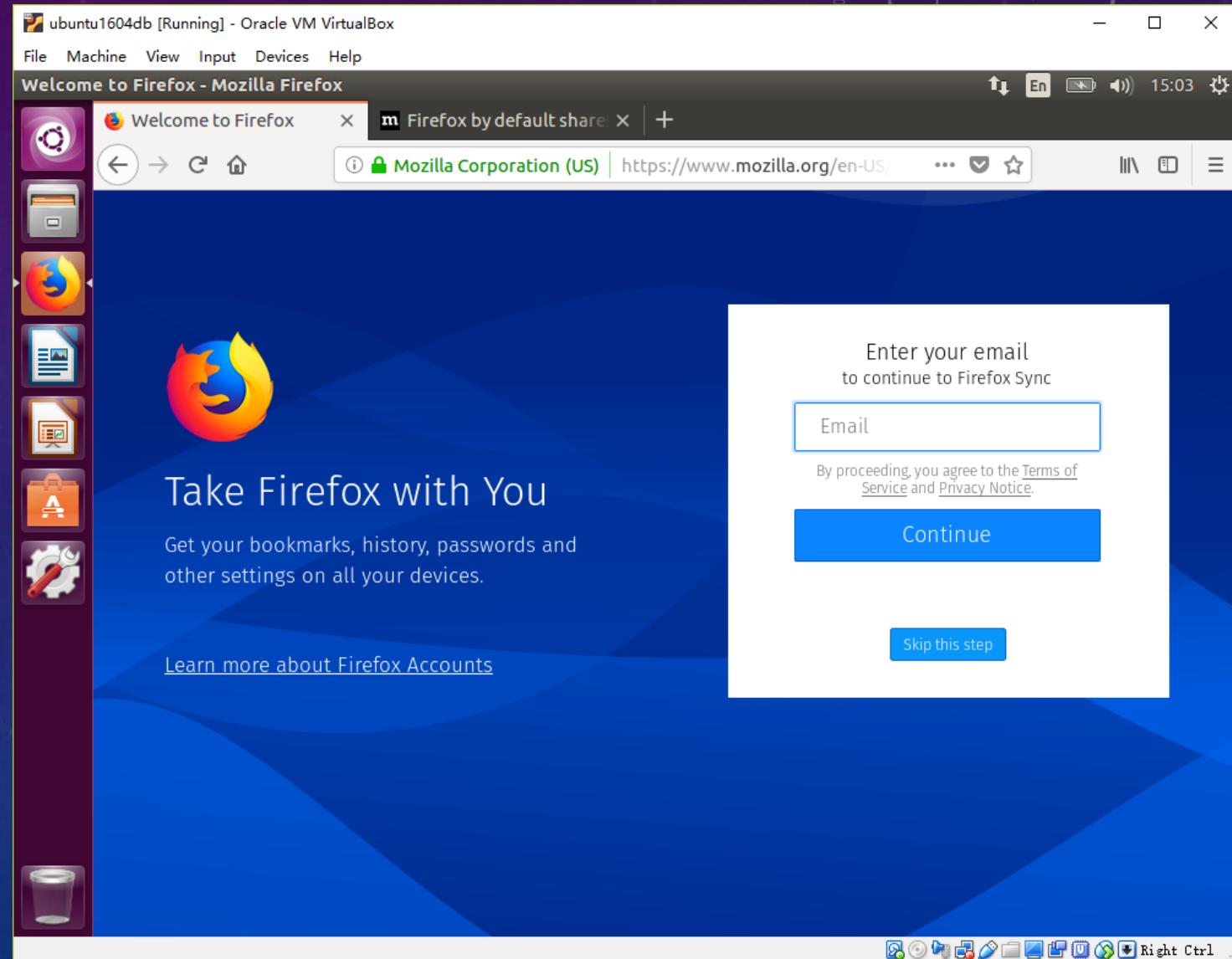
POST- INSTALLATIO N UBUNTU OS

- Shared between host os and guest os



WORKING WITH UBUNTU

- On the Internet
- Productivity Applications
- Multimedia Applications
- System Administration
- ...



DATABASES

- MySQL
- PostgreSQL
- MongoDB
- ...

DBA'S RESPONSIBILITIES

- Installing and maintaining database servers
- Installing and maintaining database clients
- Managing accounts and users
- Ensuring database security
- Ensuring data integrity

MySQL

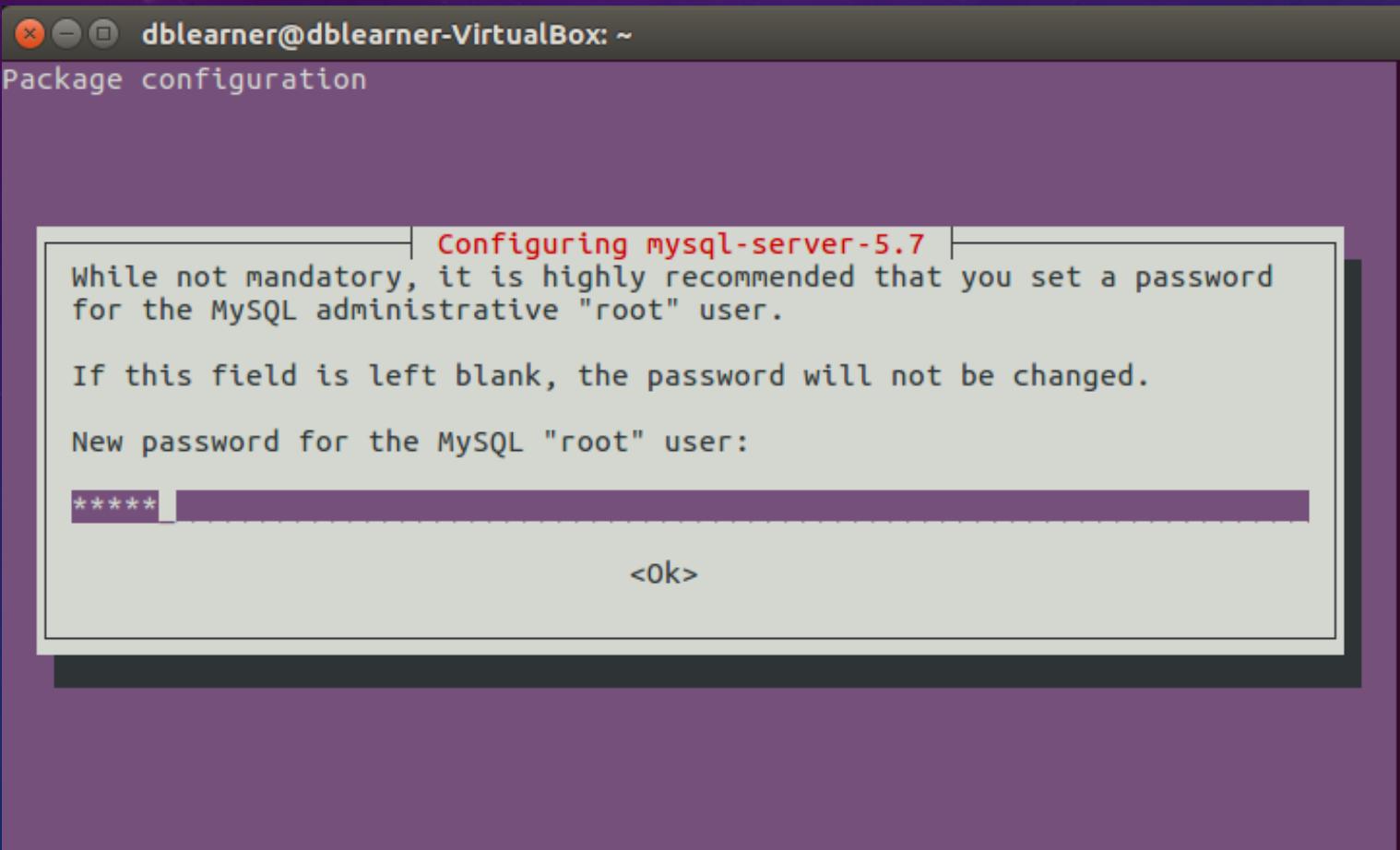
- <https://dev.mysql.com/>

The screenshot shows a Linux desktop environment with a dark blue theme. A window titled "MySQL :: Developer Zone" is open in a web browser, displaying the MySQL developer zone website. The URL in the address bar is <https://dev.mysql.com/>. The page features the MySQL logo and navigation links for MySQL.COM, DOWNLOADS, DOCUMENTATION, and DEVELOPER ZONE. The DEVELOPER ZONE link is highlighted with an orange underline. Below the navigation, there are links for Forums, Bugs, Worklog, Labs, Planet MySQL, News and Events, and Community. The main content area highlights several MySQL products: MySQL InnoDB Cluster (GET STARTED), New! Oracle MySQL Cloud Service (LEARN MORE), MySQL 8.0 Release Candidate (DOWNLOAD NOW), and MySQL 5.7 3x Faster (GA Now! DOWNLOAD NOW). At the bottom, there are links for Oracle MySQL Cloud Service, MySQL Engineering Blogs, MySQL Documentation, MySQL Downloads, and MySQL Forums.

The desktop interface includes a vertical dock on the left with icons for various applications like a terminal, file manager, and browser, and a system tray at the bottom with icons for network, battery, and system status.

MYSQL: INSTALLATION

- sudo apt-get install mysql-server



MYSQL: INSTALLATION

- sudo apt install mysql-client
- sudo apt install libmysqlclient-dev
- Test db
- sudo netstat -tap | grep mysql

```
dblearner@dblearner-VirtualBox:~$ sudo netstat -tap | grep mysql
tcp          0      0 localhost:mysql          *:*                  LISTEN
7364/mysqld
dblearner@dblearner-VirtualBox:~$
```

MYSQL: ACCESS

- mysql -uroot -p

The image shows a screenshot of an Ubuntu 16.04 LTS desktop environment within a VirtualBox window. The desktop has a purple and orange gradient background with various icons on the left. A terminal window titled 'ubuntu1604db [Running] - Oracle VM VirtualBox' is open, showing the MySQL command-line interface. The session starts with:

```
dblearner@dblearner-VirtualBox:~$ mysql -uroot -p
```

Then it prompts for a password:

```
Enter password:
```

It then displays the MySQL monitor welcome message:

```
Welcome to the MySQL monitor. Commands end with ; or \g.  
Your MySQL connection id is 4  
Server version: 5.7.21-0ubuntu0.16.04.1 (Ubuntu)
```

Copyright information follows:

```
Copyright (c) 2000, 2018, Oracle and/or its affiliates. All rights reserved.
```

A trademark notice is shown:

```
Oracle is a registered trademark of Oracle Corporation and/or its  
affiliates. Other names may be trademarks of their respective  
owners.
```

Help instructions are provided:

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

The MySQL prompt 'mysql>' is visible at the bottom of the terminal window.

MySQL: ACCESS

ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Terminal Terminal File Edit View Search Terminal Help

dblearner@dblearner-VirtualBox: ~

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

```
mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
4 rows in set (0.15 sec)
```

```
mysql> use mysql
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A
```

```
Database changed
```

```
mysql> select Host, User from user;
+-----+-----+
| Host | User |
+-----+-----+
| localhost | debian-sys-maint |
| localhost | mysql.session |
| localhost | mysql.sys |
| localhost | root |
+-----+-----+
4 rows in set (0.03 sec)
```

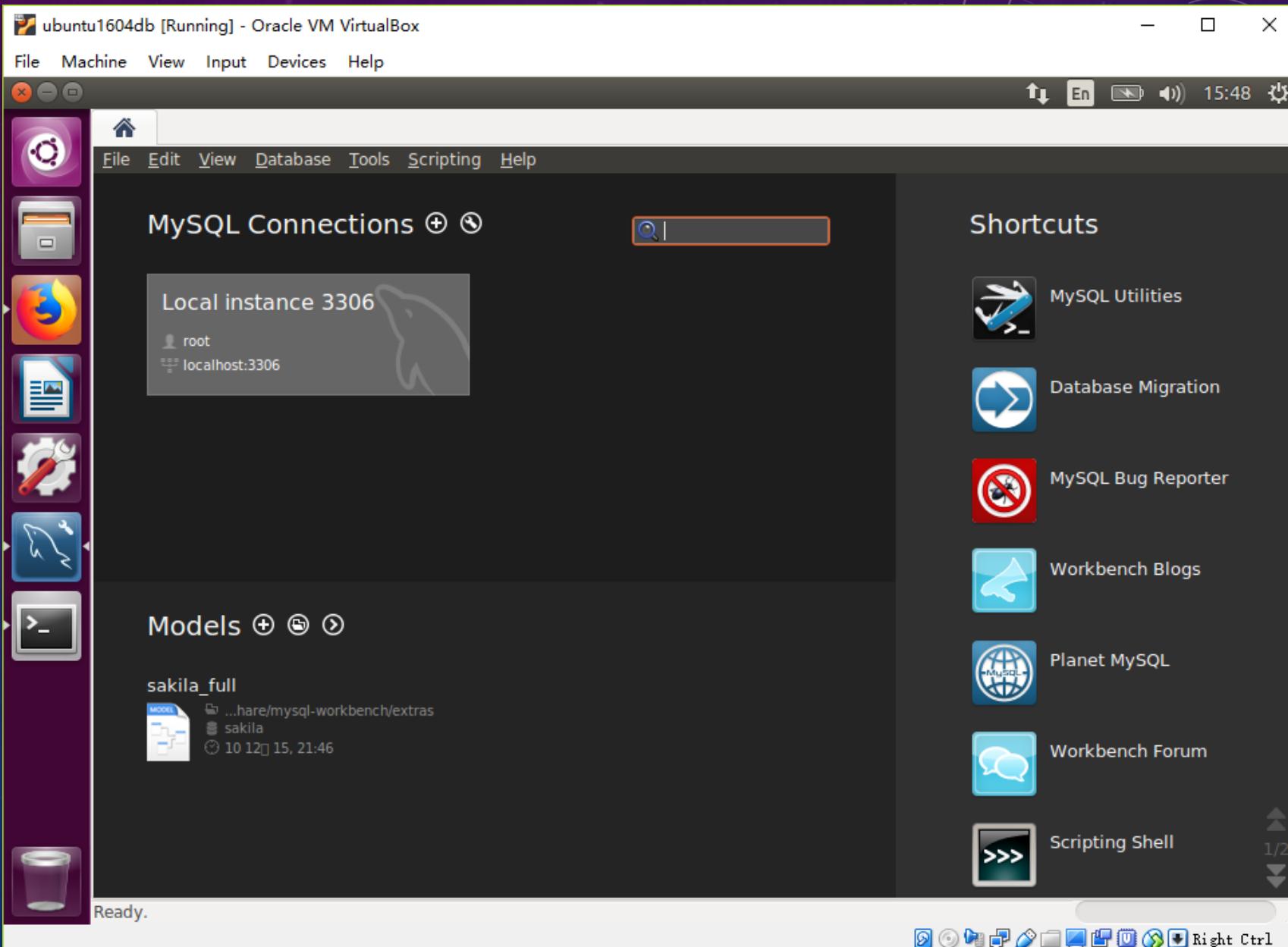
```
mysql>
```

MYSQL: SERVICE MANAGEMENT

- `sudo systemctl stop mysql.service`
- `sudo systemctl start mysql.service`
- `sudo systemctl restart mysql.service`
- `sudo systemctl status mysql.service`

MYSQL: GUI CLIENT APPLICATION

- mysql-workbench
 - sudo apt-get install mysql-workbench



MySQL:

mysql-workbench

ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Local instance 3306

File Edit View Query Database Server Tools Scripting Help

MANAGEMENT

- Server Status
- Client Connections
- Users and Privileges
- Status and System Variable
- Data Export
- Data Import/Restore

INSTANCE

- Startup / Shutdown
- Server Logs
- Options File

PERFORMANCE

- Dashboard
- Performance Reports
- Performance Schema Setup

SCHEMAS

- Filter objects
- sys_config
- Columns

 - variable
 - value
 - set_time
 - set_by

Query Completed

Query 1

```
1 • select variable, value from sys.sys_config;
```

Result Grid Filter Rows: Edit: Export/Import: Wrap Cell Content:

#	variable	value
1	diagnostics.allow_i_s_tables	OFF
2	diagnostics.include_raw	OFF
3	ps_thread_trx_info.max_length	65535
...		

sys_config 1

Action Output

	Time	Action	Message
1	15:50:37	select variable, value from sys.sys_config LIMIT 0, 1000	6 row(s) returned

Right Ctrl

The screenshot shows the MySQL Workbench interface running on an Ubuntu 16.04 LTS system within a VirtualBox VM. The main window displays a query results grid for the `sys_config` table, which contains three rows: `diagnostics.allow_i_s_tables` set to OFF, `diagnostics.include_raw` set to OFF, and `ps_thread_trx_info.max_length` set to 65535. The interface includes a left sidebar with management, instance, performance, and schema navigation, and a top toolbar with various database and application icons.

MYSQL: IMPORT DATA OF LABS

- Import the data of Database system concepts
- How to store the data, and anyone can access it easily?

MYSQL: IMPORT DATA OF LABS

- Github
- <https://github.com>

The screenshot shows a Linux desktop environment with a dark theme. A window titled "The world's leading soft x" is open in a browser, displaying the GitHub homepage. The URL bar shows "GitHub, Inc. (US) | https://github.com". The main content of the page features the GitHub logo and the tagline "Built for developers". Below this, a paragraph explains GitHub's purpose: "GitHub is a development platform inspired by the way you work. From **open source** to **business**, you can host and review code, manage projects, and build software alongside millions of other developers." On the right side of the page, there is a sign-up form with fields for "Username", "Email", and "Password", each with placeholder text. A large green "Sign up for GitHub" button is at the bottom. The desktop interface includes a vertical dock on the left with icons for the terminal, file manager, and other applications like Firefox and LibreOffice. The top bar shows the title "ubuntu1604db [Running] - Oracle VM VirtualBox" and various system status icons.

The world's leading soft x

GitHub, Inc. (US) | https://github.com

Built for developers

GitHub is a development platform inspired by the way you work. From **open source** to **business**, you can host and review code, manage projects, and build software alongside millions of other developers.

Username

Pick a username

Email

you@example.com

Password

Create a password

Use at least one letter, one numeral, and seven characters.

Sign up for GitHub

By clicking "Sign up for GitHub", you agree to our terms of service and privacy policy. We'll

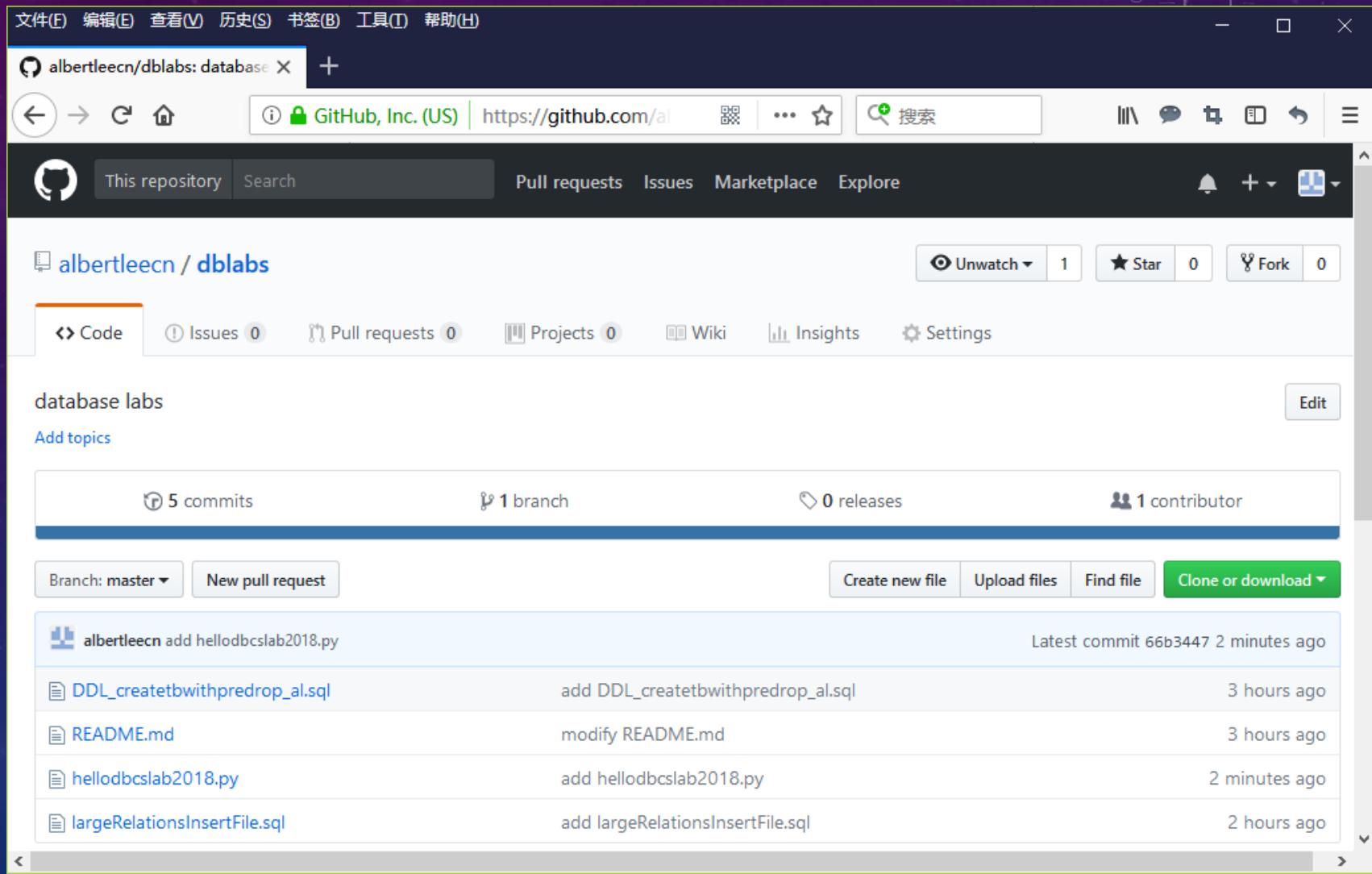
Right Ctrl

GIT

- Git is a version control system for tracking changes in computer files and coordinating work on those files among multiple people. It is primarily used for source code management in software development, but it can be used to keep track of changes in any set of files.
- As a distributed revision control system it is aimed at speed, data integrity, and support for distributed, non-linear workflows.
- Git was created by Linus Torvalds in 2005 for development of the Linux kernel, with other kernel developers contributing to its initial development.

MYSQL: IMPORT DATA OF LABS

git clone https://github.com/albertleecn/dblabs.git



MYSQL: IMPORT DATA OF LABS

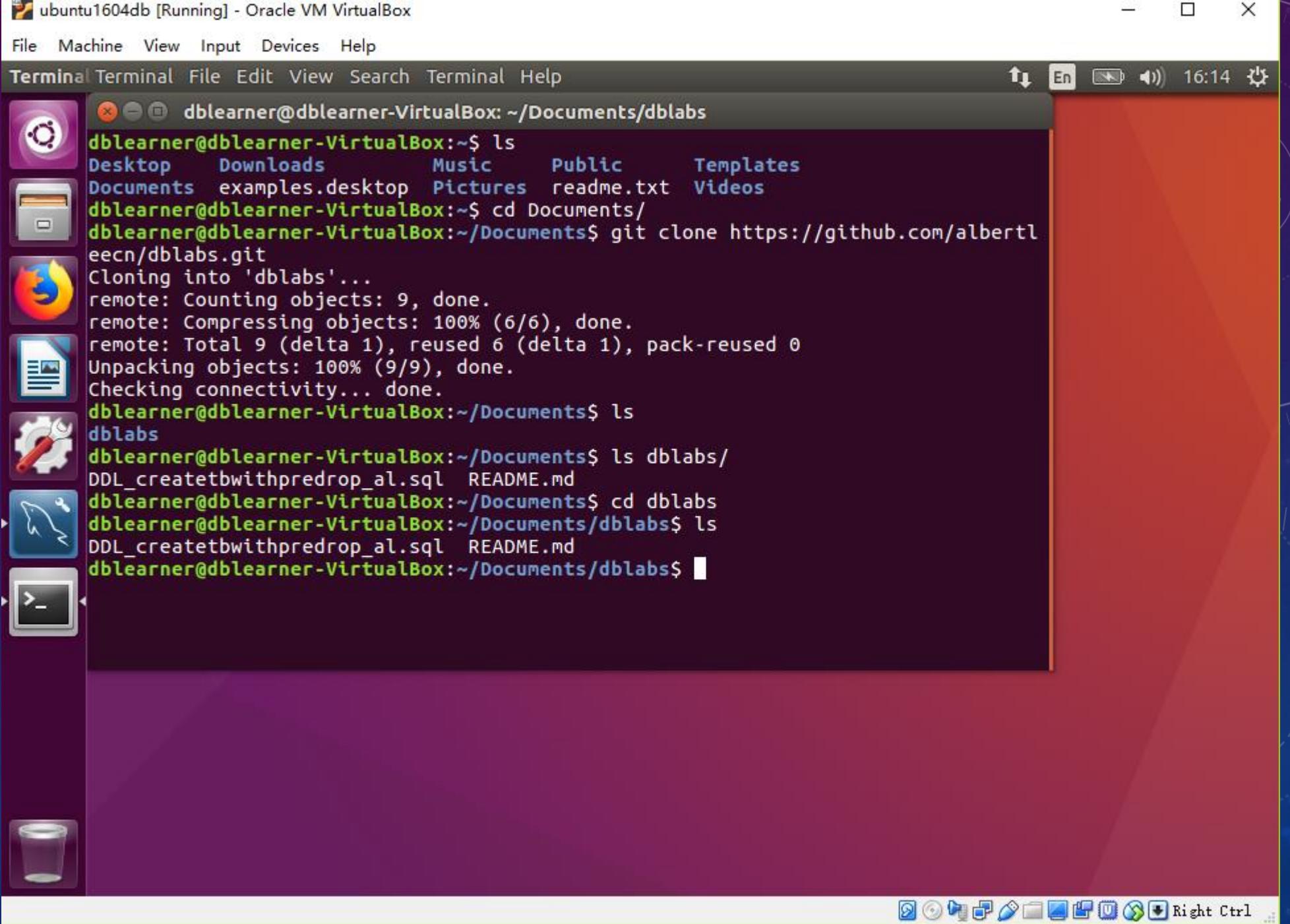
ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Terminal Terminal File Edit View Search Terminal Help

En 16:14

```
dblearner@dbelearner-VirtualBox: ~/Documents/dblabs
dblearner@dbelearner-VirtualBox:~$ ls
Desktop Downloads Music Public Templates
Documents examples.desktop Pictures readme.txt Videos
dblearner@dbelearner-VirtualBox:~/Documents$ git clone https://github.com/albertleecn/dblabs.git
Cloning into 'dblabs'...
remote: Counting objects: 9, done.
remote: Compressing objects: 100% (6/6), done.
remote: Total 9 (delta 1), reused 6 (delta 1), pack-reused 0
Unpacking objects: 100% (9/9), done.
Checking connectivity... done.
dblearner@dbelearner-VirtualBox:~/Documents$ ls
dblabs
dblearner@dbelearner-VirtualBox:~/Documents$ ls dblabs/
DDL_createtbwithpredrop_al.sql README.md
dblearner@dbelearner-VirtualBox:~/Documents$ cd dblabs
dblearner@dbelearner-VirtualBox:~/Documents/dblabs$ ls
DDL_createtbwithpredrop_al.sql README.md
dblearner@dbelearner-VirtualBox:~/Documents/dblabs$
```



©LXD

MYSQL: IMPORT DATA OF LABS

- Add DB User
 - myuser
 - mypwd

The screenshot shows the MySQL Workbench application running on an Ubuntu 16.04 LTS virtual machine. The main window title is "ubuntu1604db [Running] - Oracle VM VirtualBox". The menu bar includes File, Machine, View, Input, Devices, Help, and a system tray with icons for battery, signal strength, and volume.

The left sidebar contains a vertical navigation menu with the following sections:

- MANAGEMENT**: Server Status, Client Connections, Users and Privileges (selected), Status and System Variable, Data Export, Data Import/Restore.
- INSTANCE**: Startup / Shutdown, Server Logs, Options File.
- PERFORMANCE**: Dashboard, Performance Reports, Performance Schema Setup.
- SCHEMAS**: Filter objects, sys (selected).

The central workspace displays the "Local instance 3306" database. A tab titled "Administration - Users and Privileges" is active. The "Users and Privileges" table lists the current users:

User	From Host
debian-sys-maint	localhost
mysql.session	localhost
mysql.sys	localhost
root	localhost

On the right side, there is a configuration panel for adding a new user:

- Login**: Text input for "Login Name" with a note: "You may create multiple accounts with this to connect from different hosts."
- Authentic**: A dropdown menu set to "Standard". Note: "For the standard password and/or host basis select 'Standard'."
- Limit to H**: Text input for "Limit to Host" with a note: "% and _ wildcards may be used".
- Password**: Text input for "Password" with a note: "Type a password to reset it." and "Consider using a password with 8 or more characters with mixed case letters, numbers and punctuation marks."
- Confirm P**: Text input for "Confirm Password" with a note: "Enter password again to confirm."
- Expire Pas**: A button to expire the password.

At the bottom of the workspace are buttons for "Add Account", "Delete", "Refresh", "Revert", and "Apply". The status bar at the bottom right shows various icons and the text "Right Ctrl".

MYSQL: IMPORT DATA OF LABS

- Add DB User
 - myuser
 - mypwd

ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Local instance 3306

File Edit View Query Database Server Tools Scripting Help

MANAGEMENT

- Server Status
- Client Connections
- Users and Privileges
- Status and System Variable
- Data Export
- Data Import/Restore

INSTANCE

- Startup / Shutdown
- Server Logs
- Options File

PERFORMANCE

- Dashboard
- Performance Reports
- Performance Schema Setup

SCHEMAS

- Filter objects
- sys

SQL Editor Opened.

Query 1 Administration - Users and Privileges

Local instance 3306

Users and Privileges

User	From Host
debian-sys-maint	localhost
mysql.session	localhost
mysql.sys	localhost
root	localhost
newuser	%

Details for account newuser@%

Login Name: myuser You may create multiple accounts with the same name to connect from different hosts.

Authentic: Standard For the standard password and/or host basis select 'Standard'.

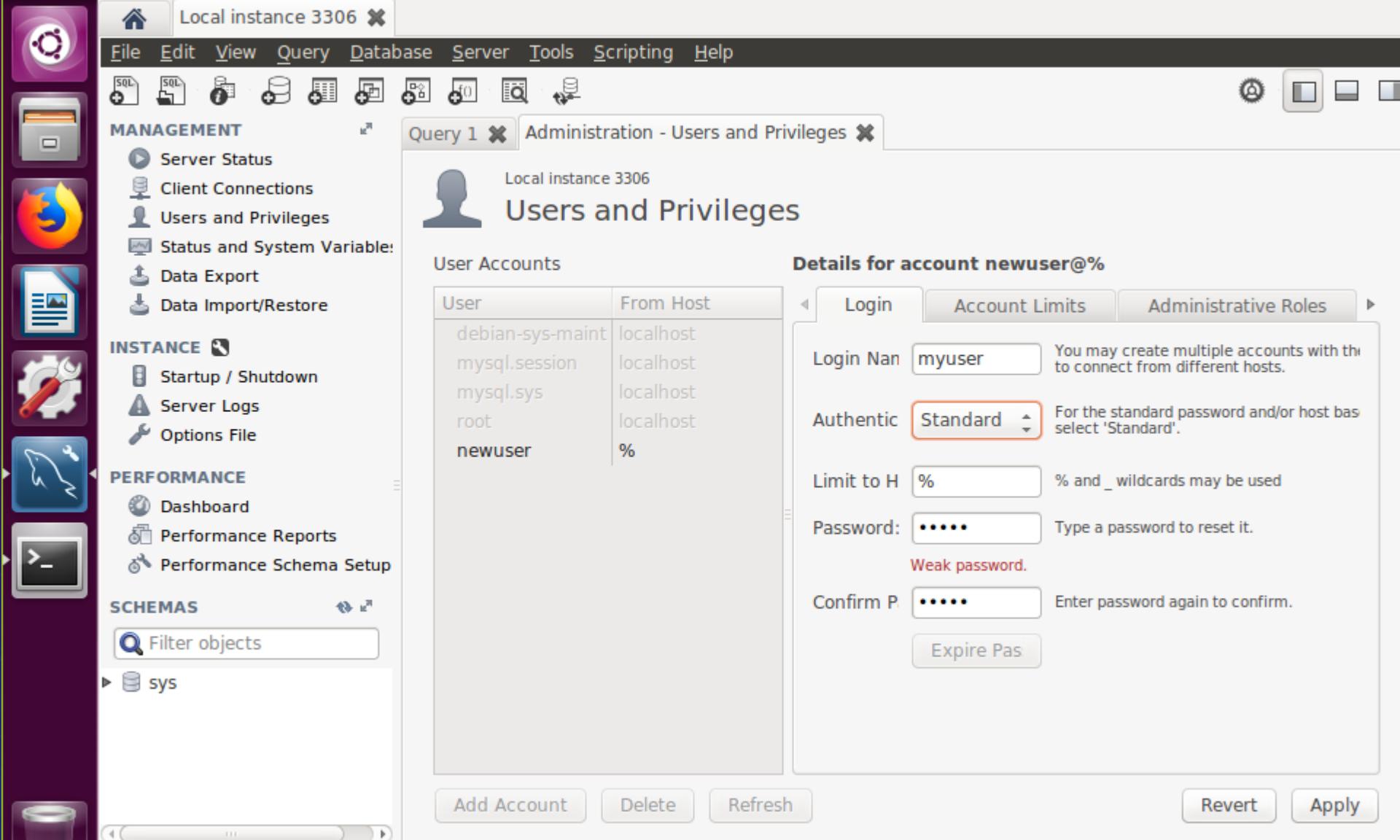
Limit to Host: % and _ wildcards may be used

Password: •••• Weak password.

Confirm Password: •••• Enter password again to confirm.

Expire Password: Right Ctrl

Add Account Delete Refresh Revert Apply



MYSQL: IMPORT DATA OF LABS

- Add DB User
 - myuser
 - mypwd

The screenshot shows the MySQL Workbench interface on an Ubuntu 16.04 LTS system. The main window title is "Local instance 3306". The left sidebar contains icons for various management tasks like Server Status, Client Connections, and Data Import/Restore. The central panel displays "User Accounts" with a list of users: debian-sys-maint, mysql.session, mysql.sys, root, and newuser. The "Details for account newuser@%" tab is open, showing the "Login" tab where the "Role" dropdown is set to "DBA" (highlighted with a red circle). The "Global Privileges" section lists numerous checked boxes, indicating full administrative privileges.

User	From Host
debian-sys-maint	localhost
mysql.session	localhost
mysql.sys	localhost
root	localhost
newuser	%

Details for account newuser@%

Login Tab:

Role
<input checked="" type="checkbox"/> DBA
<input checked="" type="checkbox"/> MaintenanceAdmin
<input checked="" type="checkbox"/> ProcessAdmin
<input checked="" type="checkbox"/> UserAdmin
<input checked="" type="checkbox"/> SecurityAdmin
<input checked="" type="checkbox"/> MonitorAdmin
<input checked="" type="checkbox"/> DBManager
<input checked="" type="checkbox"/> DBDesigner
<input checked="" type="checkbox"/> ReplicationAdmin
<input checked="" type="checkbox"/> BackupAdmin

Global Privileges:

- ALTER
- ALTER ROUTINE
- CREATE
- CREATE ROUTINE
- CREATE TABLESPACE
- CREATE TEMPORARY TABLES
- CREATE USER
- CREATE VIEW
- DELETE
- DROP
- EVENT

Revoke All Privileges Revert Apply

SQL Editor Opened.

MYSQL: IMPORT DATA OF LABS

- New Connection

The screenshot shows the MySQL Workbench interface running on an Ubuntu 16.04 LTS system within Oracle VM VirtualBox. The title bar indicates the session is 'ubuntu1604db [Running] - Oracle VM VirtualBox'. The main window displays the 'Database' tab of the 'Local instance 3306' connection. The 'File' menu is open, showing options like 'File', 'Edit', 'View', 'Query', 'Database', 'Server', 'Tools', 'Scripting', and 'Help'. The 'Database' option is highlighted. A context menu is open over a user account named 'myuser@%'. The menu items include 'Connect to Database...', 'Manage Connections...', 'Reverse Engineer...', 'Schema Transfer Wizard...', 'Migration Wizard...', and 'Edit Type Mappings for Generic Migration...'. Below the menu, a table lists accounts: mysql.session (localhost), mysql.sys (localhost), myuser (%), and root (localhost). The 'myuser' row is selected. To the right of the table, there are tabs for 'Account Limits' and 'Administrative Roles'. Under 'Administrative Roles', a list of privileges is shown, all of which are checked (indicated by orange checkboxes). The privileges listed are: ALTER, ALTER ROUTINE, CREATE, CREATE ROUTINE, CREATE TABLESPACE, CREATE TEMPORARY TABLES, CREATE USER, CREATE VIEW, DELETE, DROP, and EVENT. At the bottom of the window, buttons for 'Add Account', 'Delete', 'Refresh', 'Revert', and 'Apply' are visible.

Role	Global Privileges
<input checked="" type="checkbox"/> DBA	<input checked="" type="checkbox"/> ALTER
<input checked="" type="checkbox"/> MaintenanceAdmin	<input checked="" type="checkbox"/> ALTER ROUTINE
<input checked="" type="checkbox"/> ProcessAdmin	<input checked="" type="checkbox"/> CREATE
<input checked="" type="checkbox"/> UserAdmin	<input checked="" type="checkbox"/> CREATE ROUTINE
<input checked="" type="checkbox"/> SecurityAdmin	<input checked="" type="checkbox"/> CREATE TABLESPACE
<input checked="" type="checkbox"/> MonitorAdmin	<input checked="" type="checkbox"/> CREATE TEMPORARY TABLES
<input checked="" type="checkbox"/> DBManager	<input checked="" type="checkbox"/> CREATE USER
<input checked="" type="checkbox"/> DBDesigner	<input checked="" type="checkbox"/> CREATE VIEW
<input checked="" type="checkbox"/> ReplicationAdmin	<input checked="" type="checkbox"/> DELETE
<input checked="" type="checkbox"/> BackupAdmin	<input checked="" type="checkbox"/> DROP
	<input checked="" type="checkbox"/> EVENT

MYSQL: IMPORT DATA OF LABS

- New Connection

ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

MySQL Workbench

Manage Server Connections

MySQL Connections

Local instance 3306

Connection Name: Local instance 3306

Connection Remote Management System Profile

Do not use remote management

Native Windows remote management (only available on Windows)

SSH login based management

Hostname: localhost Port:

Username: dblearner

Password: [Store in Keychain ...](#) [Remove from Keychain](#)

Authenticate Using SSH Key

SSH Key Path: [Browse](#)

New Delete Duplicate Move Up Move Down Test Connection Close



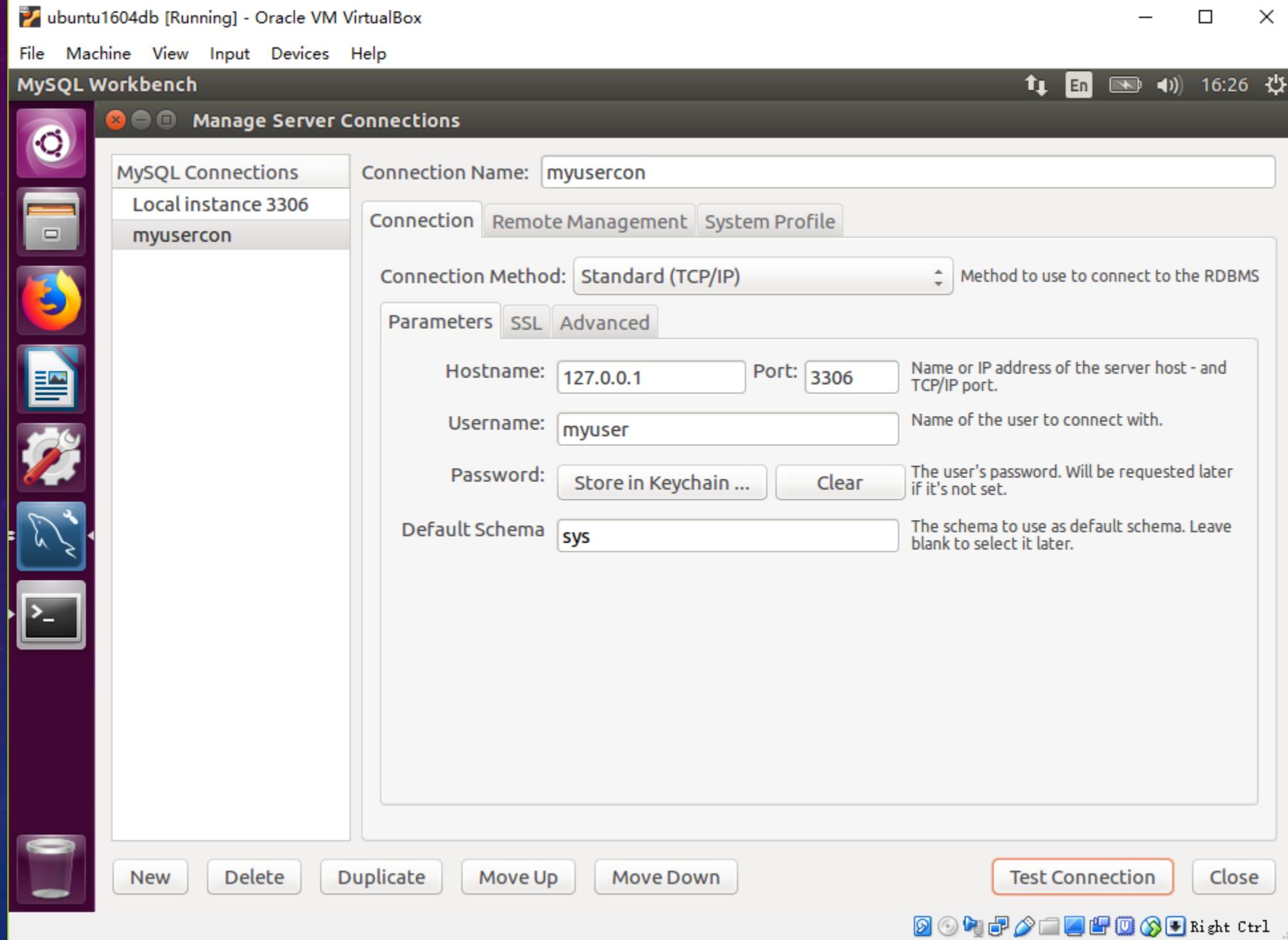
En 16:24

Right Ctrl

This screenshot shows the MySQL Workbench application running on a Linux desktop. The main window is titled 'Manage Server Connections' and displays a connection named 'Local instance 3306'. The 'Connection' tab is selected, showing configuration options for remote management. The 'Do not use remote management' radio button is selected. Other options include 'Native Windows remote management (only available on Windows)' and 'SSH login based management'. The connection details are set to 'localhost' for the hostname, 'dblearner' for the username, and a password entry field with a 'Store in Keychain ...' button. There is also an 'Authenticate Using SSH Key' checkbox and a 'Browse' button for the SSH key path. A toolbar at the bottom provides buttons for 'New', 'Delete', 'Duplicate', 'Move Up', 'Move Down', 'Test Connection', and 'Close'. On the left, a sidebar lists other connections: 'Ubuntu 16.04 db' (selected), 'Terminal', 'Firefox', 'Document', 'Settings', 'Dolphin', and 'Terminal'. The status bar at the bottom right shows the date and time as '16:24'.

MYSQL: IMPORT DATA OF LABS

- New Connection



MySQL: IMPORT DATA OF LABS

- New Connection

ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

MySQL Workbench

File Edit View Database Tools Scripting Help

MySQL Connections + ⚙

Local instance 3306

root
localhost:3306

myusercon

myuser
127.0.0.1:3306

Shortcuts

- MySQL Utilities
- Database Migration
- MySQL Bug Reporter
- Workbench Blogs
- Planet MySQL
- Workbench Forum
- Scripting Shell

Models + ⚙ ⚡

sakila_full

...hare/mysql-workbench/extras
sakila
10 12 15, 21:46

SQL Editor closed

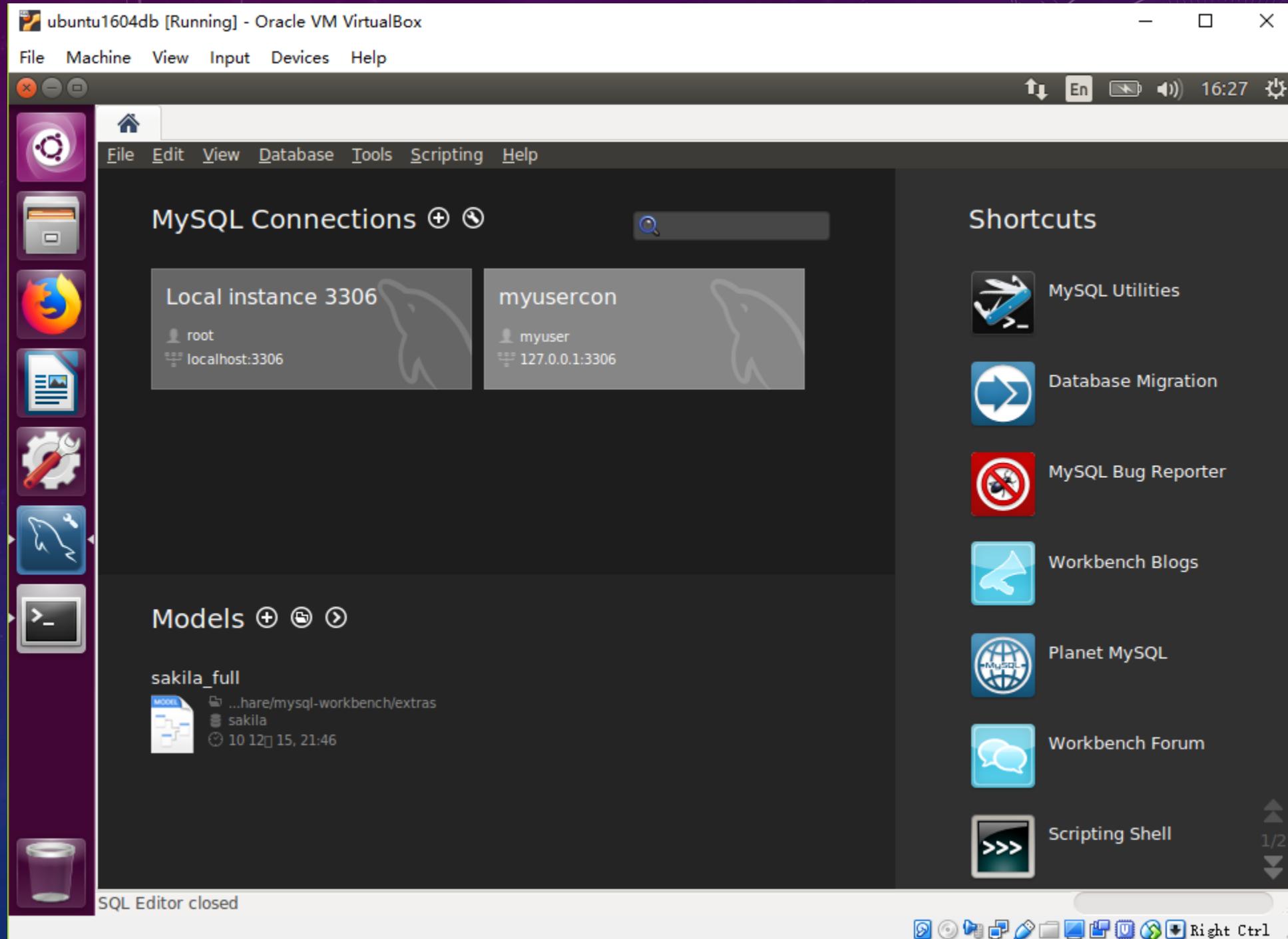
1/2

Right Ctrl

The screenshot shows the MySQL Workbench interface running on an Ubuntu 16.04 virtual machine. The main window displays 'MySQL Connections' with two entries: 'Local instance 3306' (root user, localhost:3306) and 'myusercon' (myuser user, 127.0.0.1:3306). Below the connections is a 'Models' section containing a single entry for 'sakila_full'. A sidebar on the right lists various 'Shortcuts' with their icons and names: MySQL Utilities, Database Migration, MySQL Bug Reporter, Workbench Blogs, Planet MySQL, Workbench Forum, and Scripting Shell. The desktop environment includes a dock at the bottom with icons for various applications like a browser, file manager, and terminal.

MySQL: IMPORT DATA OF LABS

- New Connection



MYSQL: IMPORT DATA OF LABS

- New DB
 - dbsclab2018

ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

MySQL Workbench

myusercon

File Edit View Query Database Server Tools Scripting Help

SQL SQL i + f o S Limit to 1000 rows

MANAGEMENT

- Server Status
- Client Connections
- Users and Privileges
- Status and System Variables
- Data Export
- Data Import/Restore

INSTANCE

- Startup / Shutdown
- Server Logs
- Options File

PERFORMANCE

- Dashboard
- Performance Reports
- Performance Schema Setup

SCHEMAS

Filter objects

sys

Action Output

Time Action Message

SQL Editor Opened.

The screenshot shows the MySQL Workbench application running in a Linux environment. The main window title is "myusercon". The left sidebar has a tree view with categories like MANAGEMENT, INSTANCE, PERFORMANCE, and SCHEMAS. Under SCHEMAS, there is a single entry for "sys". A message at the bottom says "SQL Editor Opened.". The top bar includes standard menu items like File, Edit, View, Query, Database, Server, Tools, Scripting, and Help, along with system icons for battery, signal, and time (16:28). A toolbar below the menu has icons for SQL, SQL editor, file operations, and search. A message box in the center says "Create a new schema in the connected server".

MYSQL: IMPORT DATA OF LABS

- New DB
- dbsclab2018

The screenshot shows the MySQL Workbench interface on a Linux desktop. The title bar indicates the session is running on an Ubuntu 16.04 VM. The main window displays the 'MANAGEMENT' sidebar with various icons and links. In the center, a 'Query 1' tab is open under the 'new_schema - Schema' tab. The schema configuration panel shows the following details:

- Name: dbsclab2018
- Default Collation: utf8 - utf8_bin
- Comments: (empty)

A large red annotation in the bottom right corner of the slide reads:

CREATE SCHEMA `dbsclab2018` DEFAULT CHARACTER SET utf8 COLLATE utf8_bin ;

MySQL Workbench

En 16:36

myusercon

File Edit View Query Database Server Tools Scripting Help

SQL SQL i Databases Scripts

MANAGEMENT

- Server Status
- Client Connections
- Users and Privileges
- Status and System Variable
- Data Export
- Data Import/Restore

INSTANCE

- Startup / Shutdown
- Server Logs
- Options File

PERFORMANCE

- Dashboard
- Performance Reports
- Performance Schema Setup

SCHEMAS

- Filter objects
- dbsclab2018
- sys
 - Tables
 - Views
 - Stored Procedures
 - Functions

Set as Default Schema
Filter to This Schema
Schema Inspector
Table Data Import Wizard
Copy to Clipboard
Send to SQL Editor
Create Schema...
Alter Schema...
Drop Schema...
Search Table Data...
Refresh All

Query 1 new_schema - Schema Administration - Users and Privileges

myusercon

Users and Privileges

User Accounts

User	From Host
debian-sys-maint	localhost
mysql.session	localhost
mysql.sys	localhost
myuser	%
root	localhost

Details for account myuser@%

Login Account Limits Administrative Roles Schema Privileges

Login Name: myuser You may create multiple accounts with the same name to connect from different hosts.

Authentication Type: Standard For the standard password and/or host based authentication, select 'Standard'.

Limit to Hosts Matching: % % and _ wildcards may be used

Password: Type a password to reset it. Consider using a password with 8 or more characters with mixed case letters, numbers and punctuation marks.

Confirm Password: Enter password again to confirm.

Expire Password

Delete Refresh Revert Apply



MySQL Workbench

File Edit View Database Tools Scripting Help

MySQL Connections

Local instance 3306
root
localhost:3306

Models

sakila_full
...hare/mysql-workbench/extras
sakila
10 12 15, 21:46

Manage Server Connections

MySQL Connections

Local instance 3306 myusercon

Connection Name: myusercon

Connection Method: Standard (TCP/IP)

Parameters SSL Advanced

Hostname: 127.0.0.1 Port: 3306

Username: myuser

Password:

Default Schema: dbsclab2018

New Delete Duplicate Move Up Move Down Test Connection Close

Shortcuts

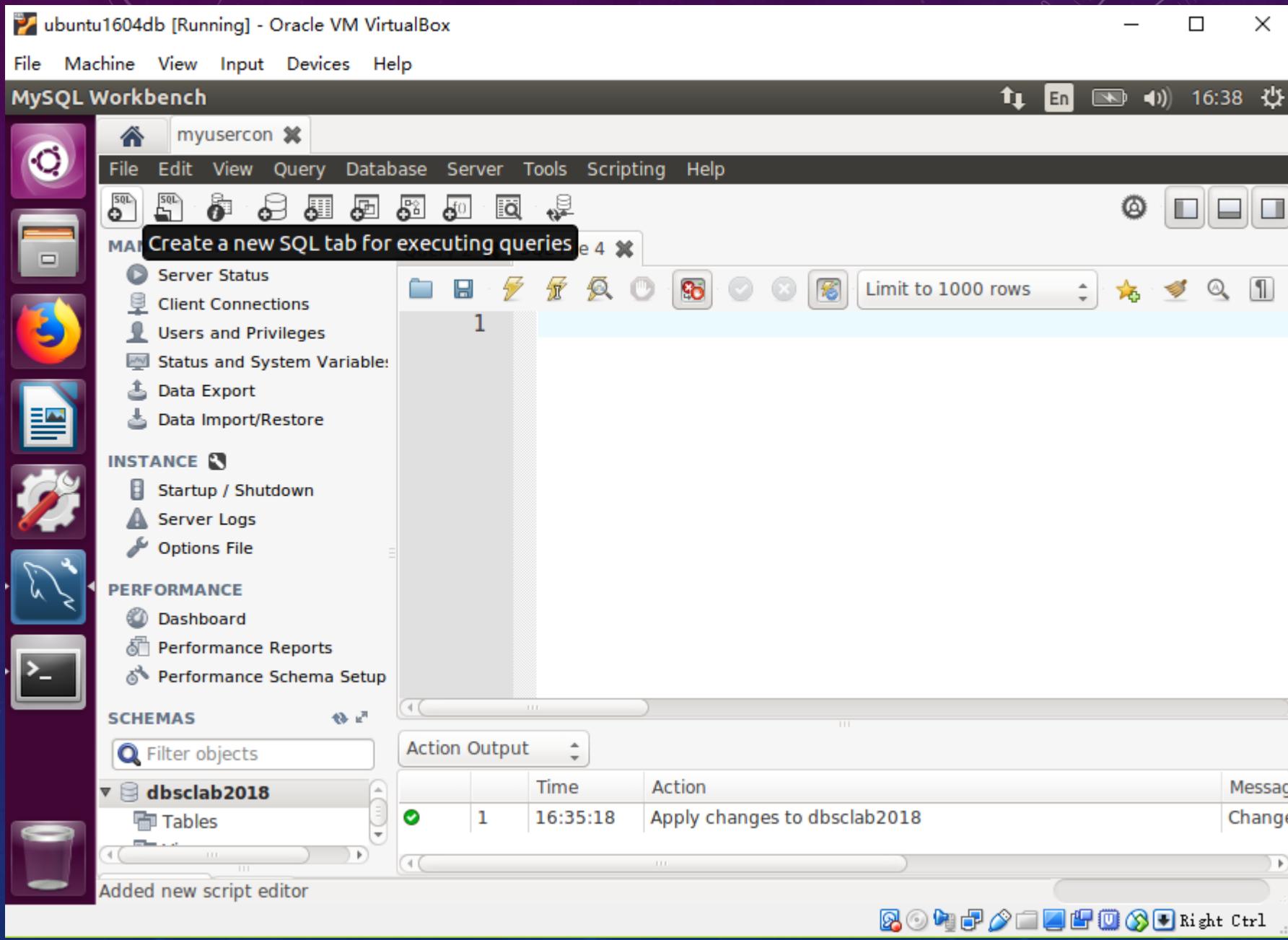
- MySQL Utilities
- Database Migration
- MySQL Bug Reporter
- Workbench Blogs
- Planet MySQL
- Workbench Forum
- Scripting Shell

©LXD

Server Profile Manager Opened.

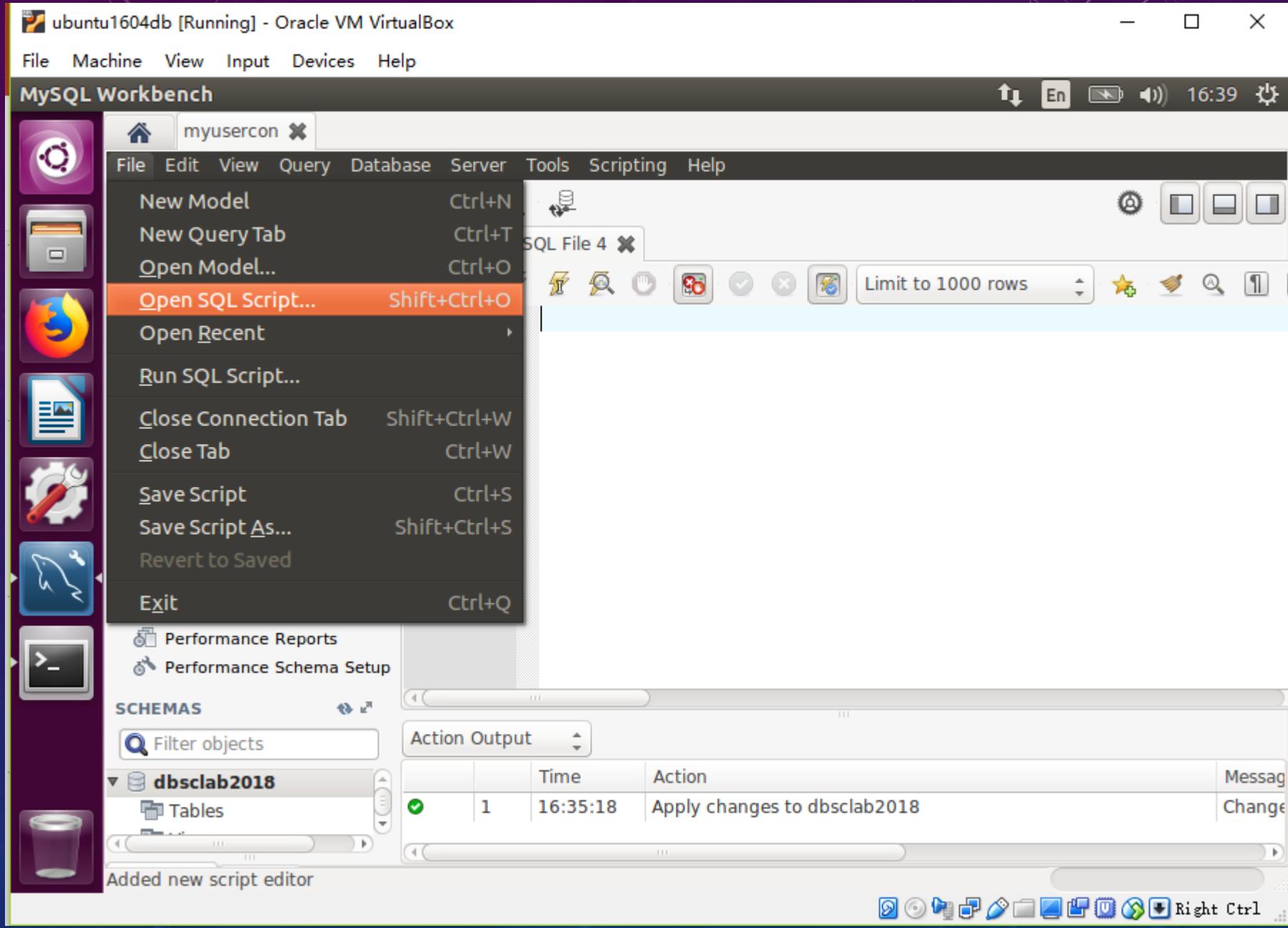
MYSQL: IMPORT DATA OF LABS

- New DB
 - dbsclab2018



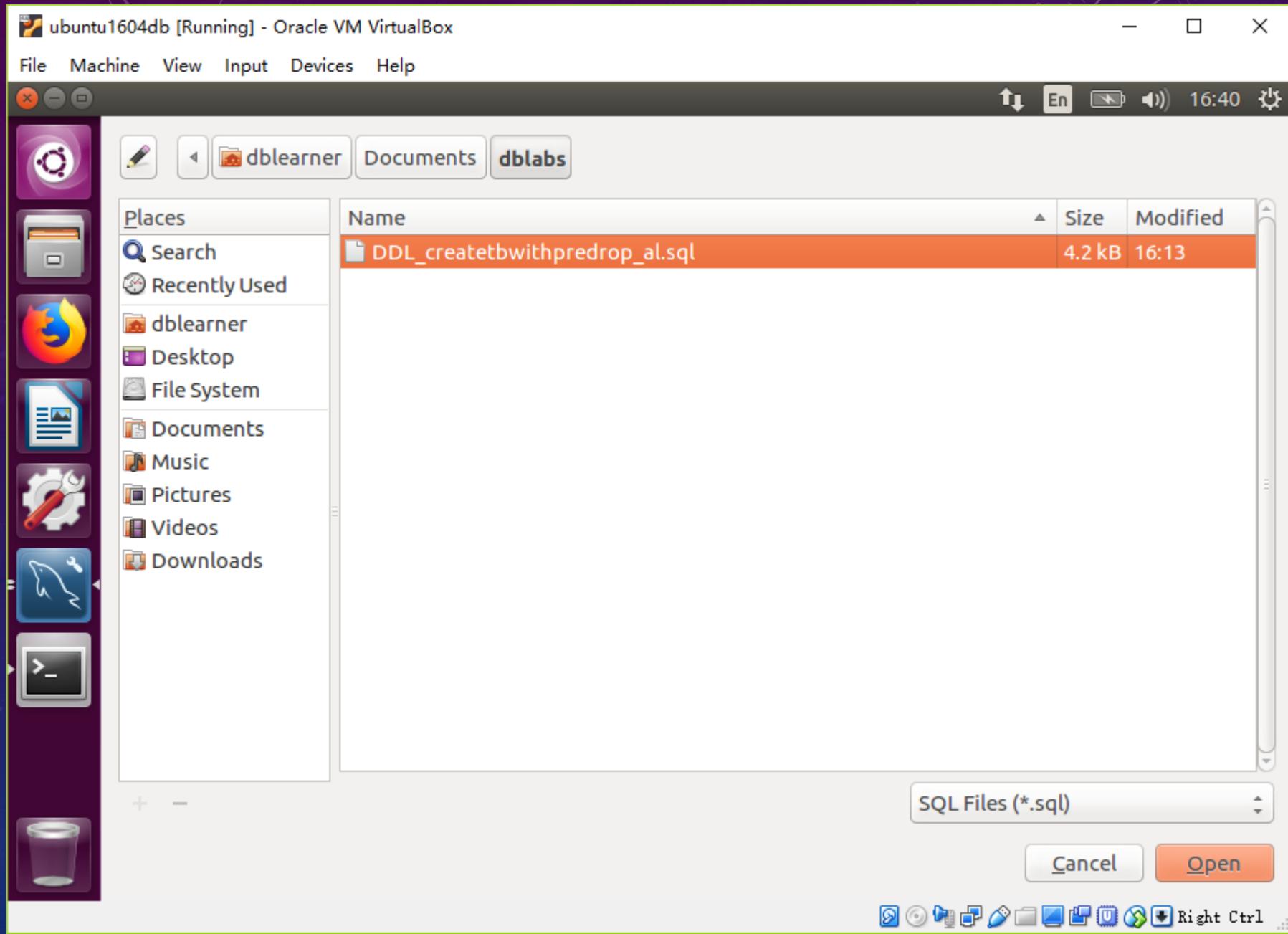
MYSQL: IMPORT DATA OF LABS

- New DB
 - dbsclab2018



MYSQL: IMPORT DATA OF LABS

- New DB
 - dbsclab2018





myusercon

File Edit View Query Database Server Tools Scripting Help



MANAGEMENT

- Server Status
- Client Connections
- Users and Privileges
- Status and System Variable:
- Data Export
- Data Import/Restore

INSTANCE

- Startup / Shutdown
- Server Logs
- Options File

PERFORMANCE

- Dashboard
- Performance Reports
- Performance Schema Setup

SCHEMAS

Filter objects

dbsclab2018

- Tables
 - advisor
 - classroom
 - course
 - department
 - instructor
 - prereq
 - section
 - student
 - takes
 - teaches

Query Completed

```
31      credits      numeric(2,0) check (credits > 0),
32      primary key (course_id)
33  );
34
35 • alter table `course` add constraint `course_fk1`
36     foreign key (`dept_name`) references `department`(`dept_name`)
37     on delete set null;
38
39 • create table instructor
40   (
41     ID          varchar(5),
42     name        varchar(20) not null,
43     dept_name   varchar(20),
44     salary      numeric(8,2) check (salary > 29000),
45     primary key (ID)
46   );
47 • alter table `instructor` add constraint `instructor_fk1`
48     foreign key (`dept_name`) references `department`(`dept_name`)
49     on delete set null;
50
```

Action Output

		Time	Action	Message	Duration / Fetch
	28	16:40:42	alter table `takes` add constraint `takes_fk1` foreign key (ID...) references `instructor`(`ID`)	Records: 0 Duplicates: 0 Warnings: 0 0 row(s) affected Records: 0 Duplicates: 0 Warnings: 0	0.036 sec
	29	16:40:42	alter table `takes` add constraint `takes_fk2` foreign key (ID...) references `student`(`ID`)	0 row(s) affected	0.015 sec
	30	16:40:42	create table advisor (s_ID varchar(5), i_ID...)	0 row(s) affected	0.011 sec
	31	16:40:42	create table time_slot (time_slot_id varchar(4), ...)	0 row(s) affected	0.013 sec
	32	16:40:42	create table prereq (course_id varchar(8), pre...	0 row(s) affected	

MySQL: IMPORT DATA OF LABS

- New DB
 - dbsclab2018

The screenshot shows the MySQL Workbench interface running on an Ubuntu 16.04 VM. The main window title is "ubuntu1604db [Running] - Oracle VM VirtualBox". The MySQL Workbench menu bar includes File, Machine, View, Input, Devices, Help, and MySQL Workbench. The toolbar contains icons for Home, myusercon, File, Edit, View, Query, Database, Server, Tools, Scripting, and Help.

The left sidebar navigation pane includes:

- MANAGEMENT**: Server Status, Client Connections, Users and Privileges, Status and System Variables, Data Export, Data Import/Restore.
- INSTANCE**: Startup / Shutdown, Server Logs, Options File.
- PERFORMANCE**: Dashboard, Performance Reports, Performance Schema Setup.
- SCHEMAS**: Filter objects, Departments, instructor (selected), Columns, ID.

The central workspace displays a query editor titled "Query 2" with the SQL command:

```
1 • select ID, name, dept_name from instructor;
```

The "Result Grid" shows the following data:

#	ID	name	dept_name
*	NULL	NULL	NULL

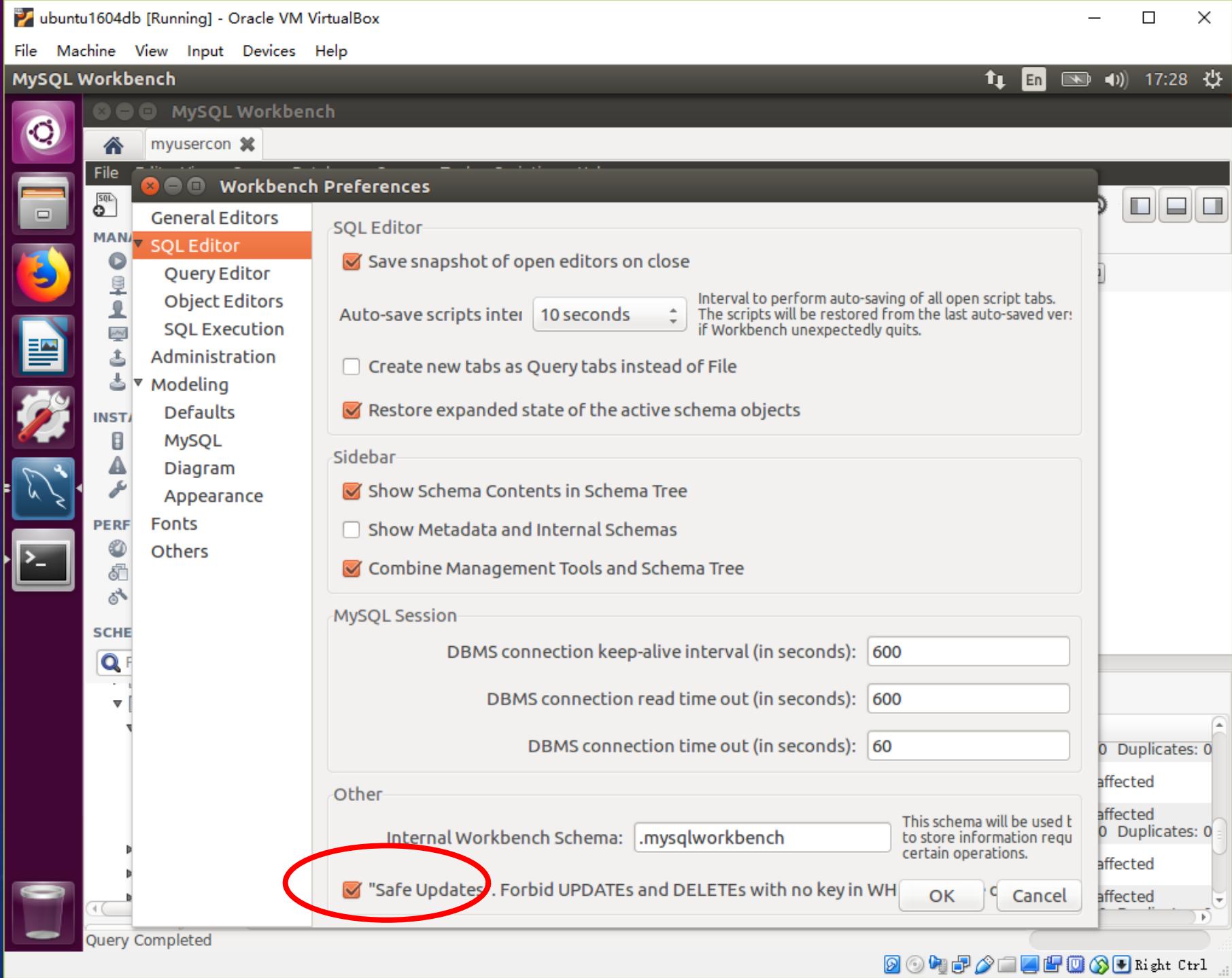
The "instructor 3" tab is open in the bottom panel, showing the "Action Output" table:

	Time	Action	
✓	35	16:43:59	select ID, name, dept_name from instructor LIMIT 0, 1000

The status bar at the bottom right shows "0 row".

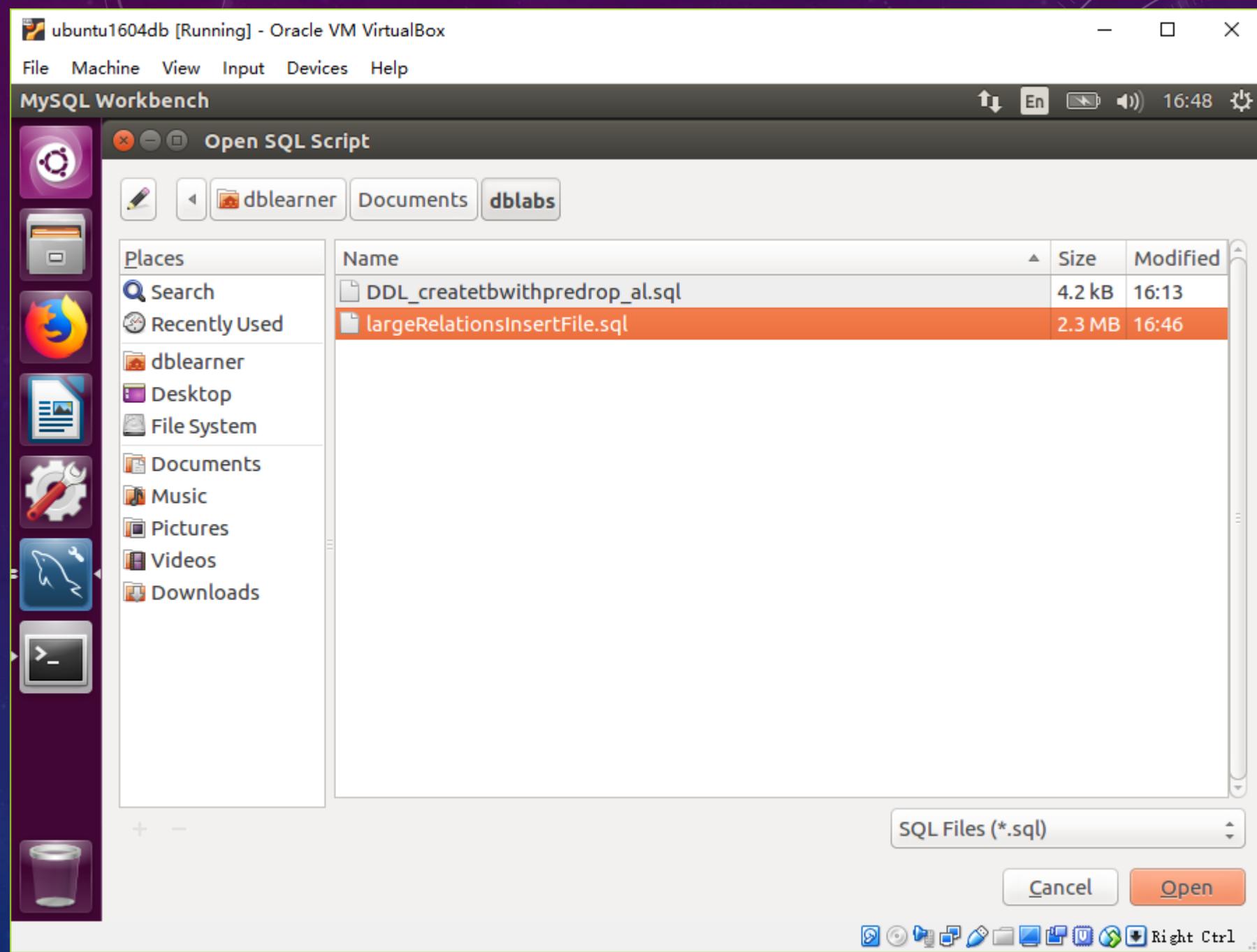
MYSQL: IMPORT DATA OF LABS

- New DB
 - dbsclab2018
 - Disable Safe Updates
 - Restart workbench
- ©LXD



MYSQL: IMPORT DATA OF LABS

- New DB
 - Dbsclab2018
 - Batch import



MySQL: IMPORT DATA OF LABS

- New DB
 - Dbsclab2018
 - Batch import

The screenshot shows the MySQL Workbench interface running on an Ubuntu 16.04 virtual machine. The main window displays a large SQL script intended for batch importing data into a database named 'dbsclab2018'. The script consists of approximately 20 numbered lines, starting with delete statements for various tables and followed by insert statements for a 'time_slot' table. The MySQL Workbench interface includes a left sidebar with management, instance, performance, and schema tools, and a bottom status bar indicating 'SQL Editor Opened.'

```
1 • delete from prereq;
2 • delete from time_slot;
3 • delete from advisor;
4 • delete from takes;
5 • delete from student;
6 • delete from teaches;
7 • delete from section;
8 • delete from instructor;
9 • delete from course;
10 • delete from department;
11 • delete from classroom;
12 • insert into time_slot values ( 'A', 'M', 8, 0, 8, 50);
13 • insert into time_slot values ( 'A', 'W', 8, 0, 8, 50);
14 • insert into time_slot values ( 'A', 'F', 8, 0, 8, 50);
15 • insert into time_slot values ( 'B', 'M', 9, 0, 9, 50);
16 • insert into time_slot values ( 'B', 'W', 9, 0, 9, 50);
17 • insert into time_slot values ( 'B', 'F', 9, 0, 9, 50);
18 • insert into time_slot values ( 'C', 'M', 11, 0, 11, 50);
19 • insert into time_slot values ( 'C', 'W', 11, 0, 11, 50);
```

MYSQL: IMPORT DATA OF LABS

- New DB
 - Dbsclab2018
 - Batch import

```
$mysql -u myuser -p  
show databases;  
use dbsclab2018;  
source largeRelationsInsertFile.sql;  
commit;  
quit;
```

SUMMARY

- Layers of Computer
- Virtual Machine
 - Host OS, Guest OS
- Enterprise Operating System
 - Linux kernel based OSes: Ubuntu
- DB Server
 - MySQL, PostgreSQL, MongoDB
- DB Client: Python

Q&A?

THANKS!

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