

DATABASE SYSTEM PRINCIPLE - ENVIRONMENT FOR LAB

李旭东 Li-Xudong

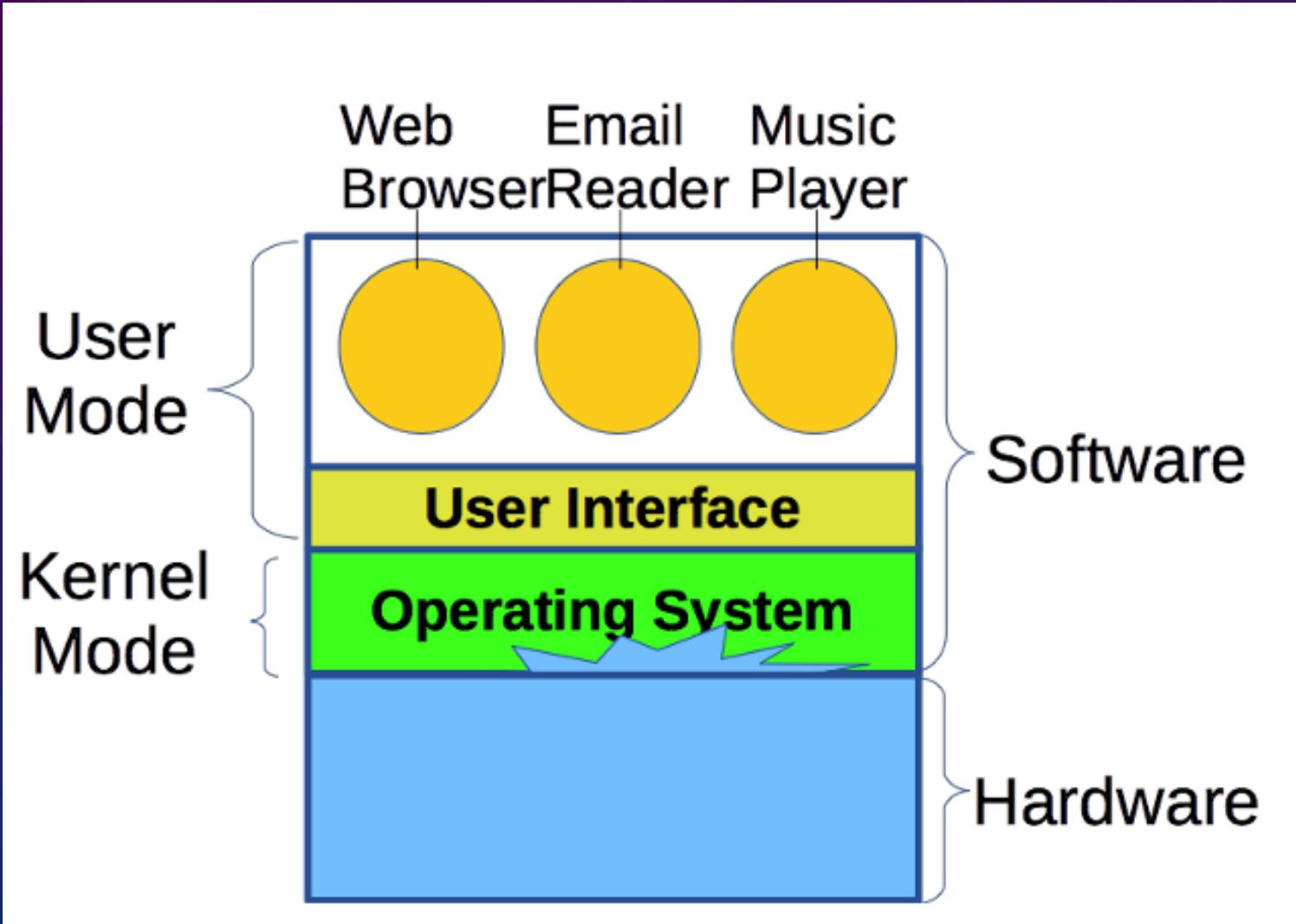
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NANKAI UNIVERSITY

OBJECTIVES

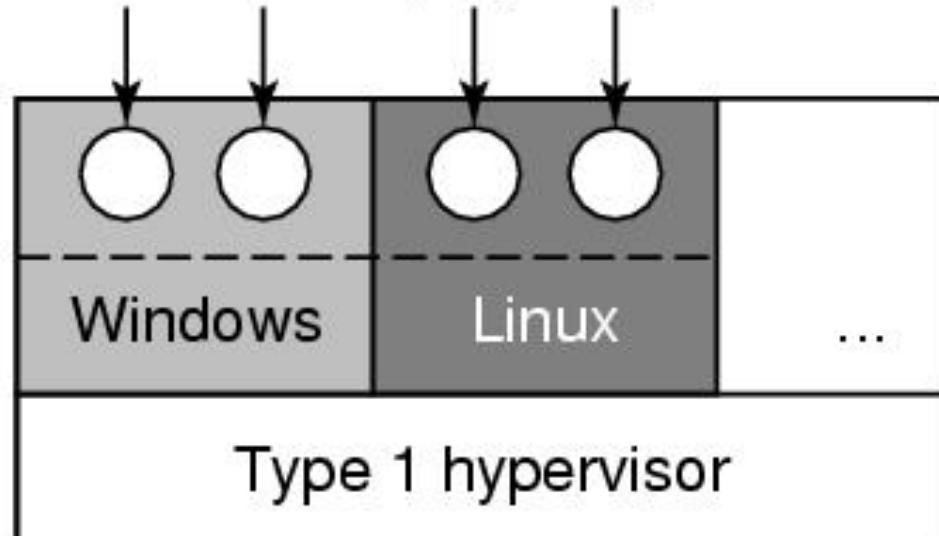
- Layers of Computer
- Virtual Machine
 - Host OS, Guest OS
- Enterprise Operating System
 - Linux kernel based OSes: Ubuntu
- DB Server
 - MySQL, PostgreSQL, MongoDB
- DB Client: python

LAYERS OF COMPUTER

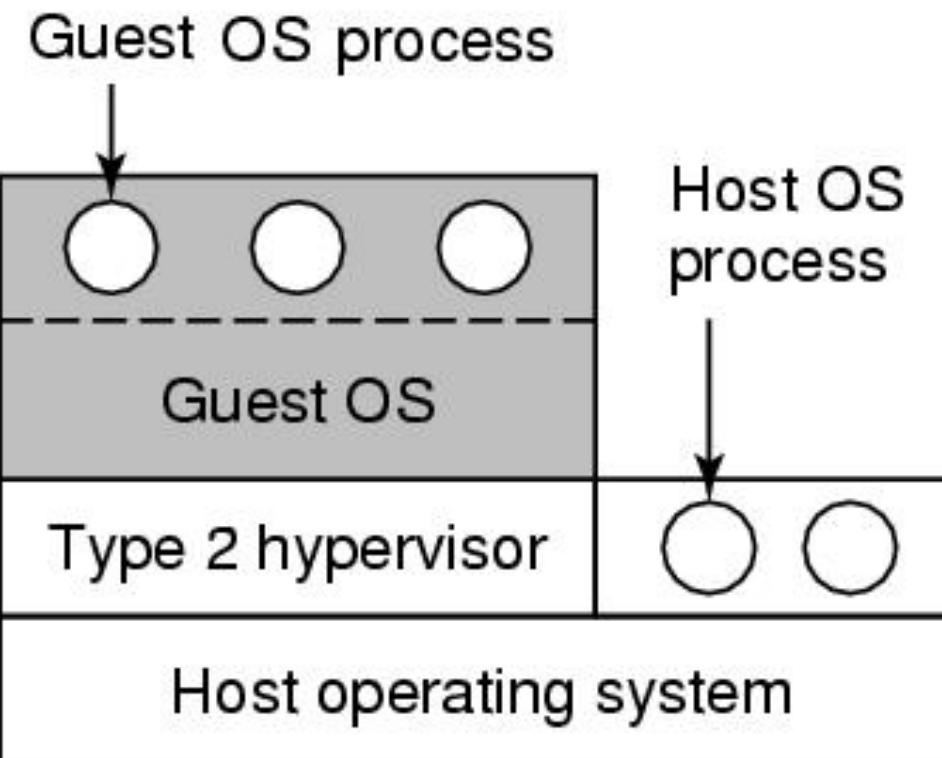


VIRTUAL MACHINE

Excel Word Mplayer Apollon



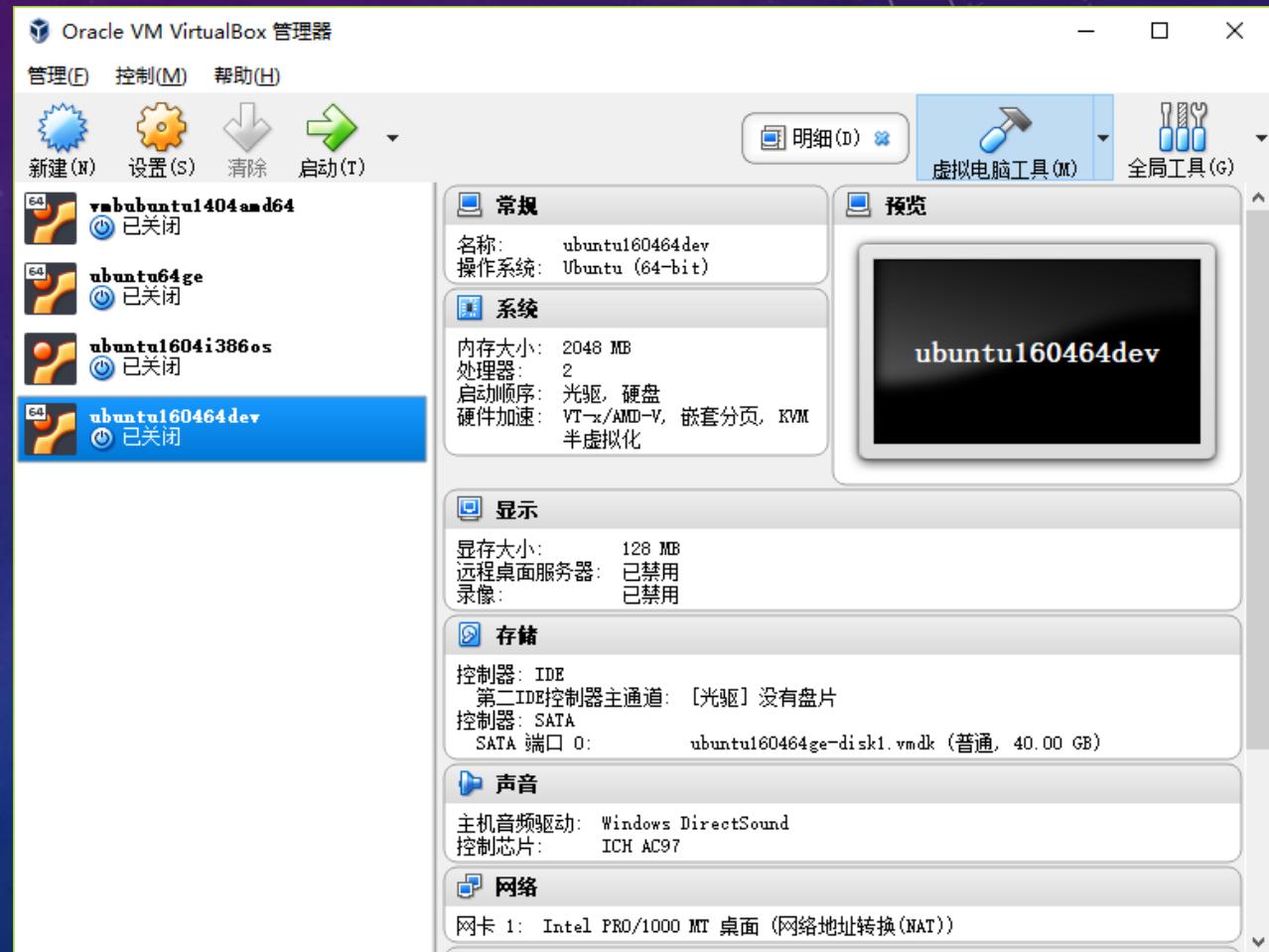
(a)



(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

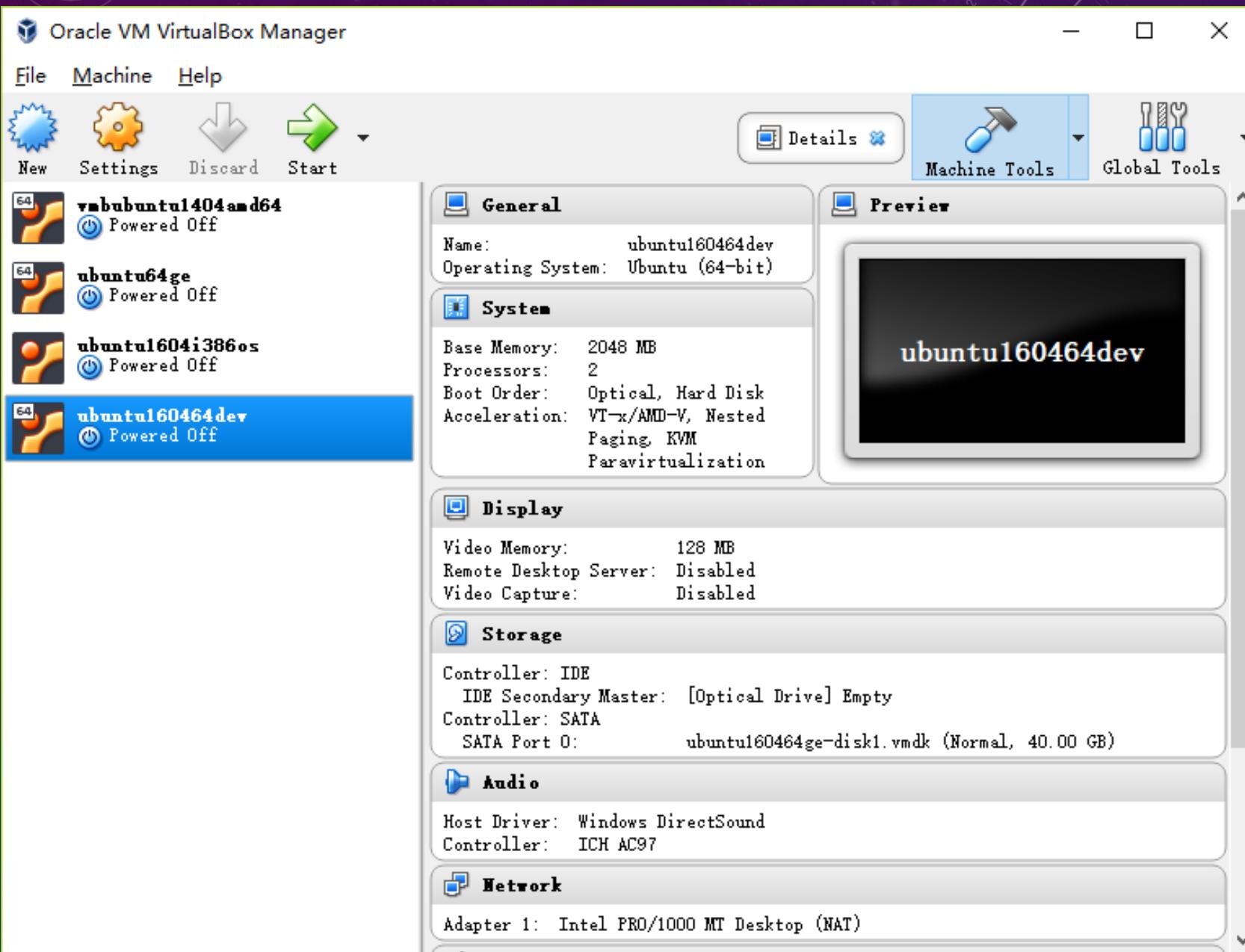
[Ubuntu 14.04.5 Desktop \(64-bit\)](#)

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

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

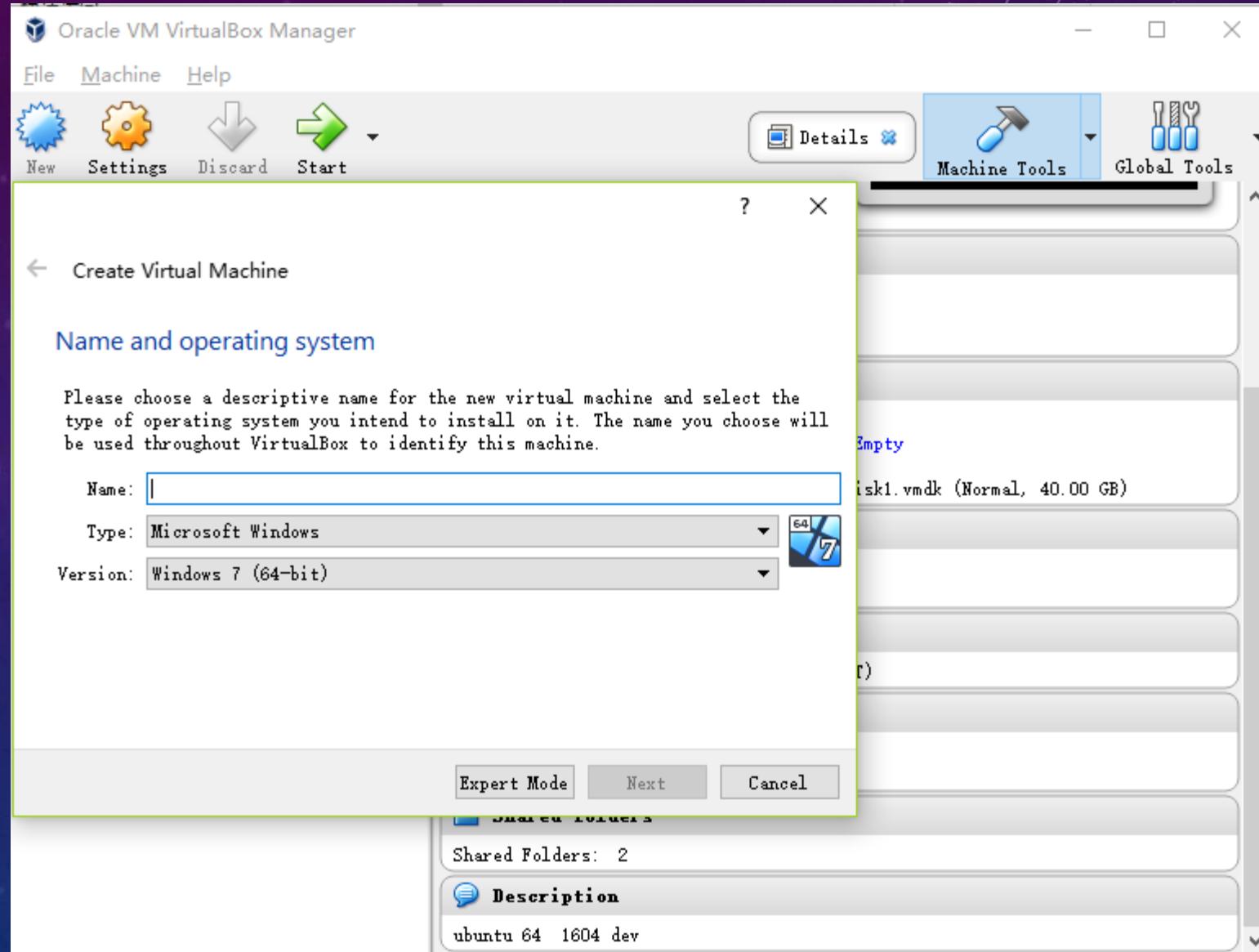
[Ubuntu 14.04.5 Server \(32-bit\)](#)

CREATE A GUEST UBUNTU OS IN VIRTUALBOX



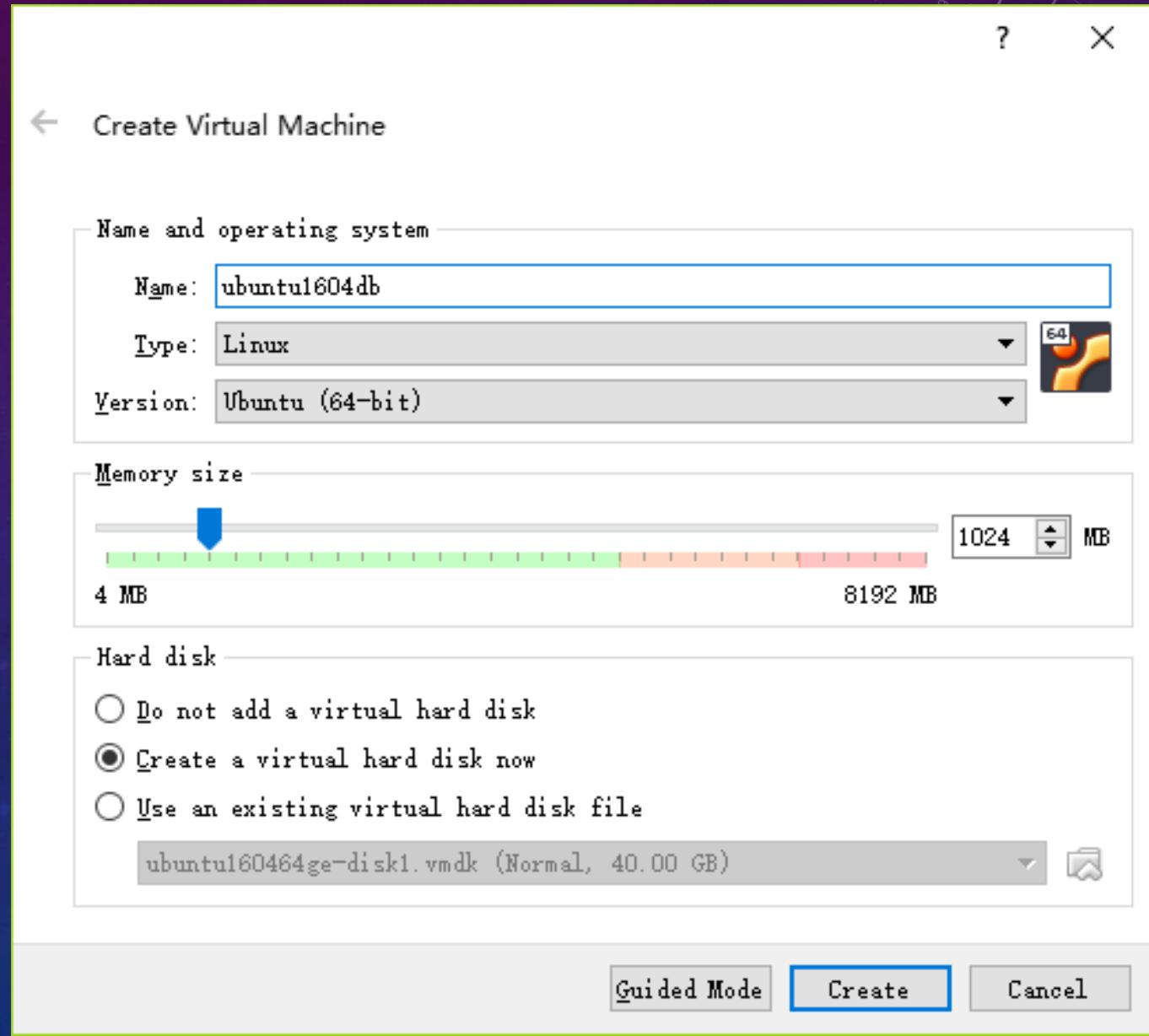
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



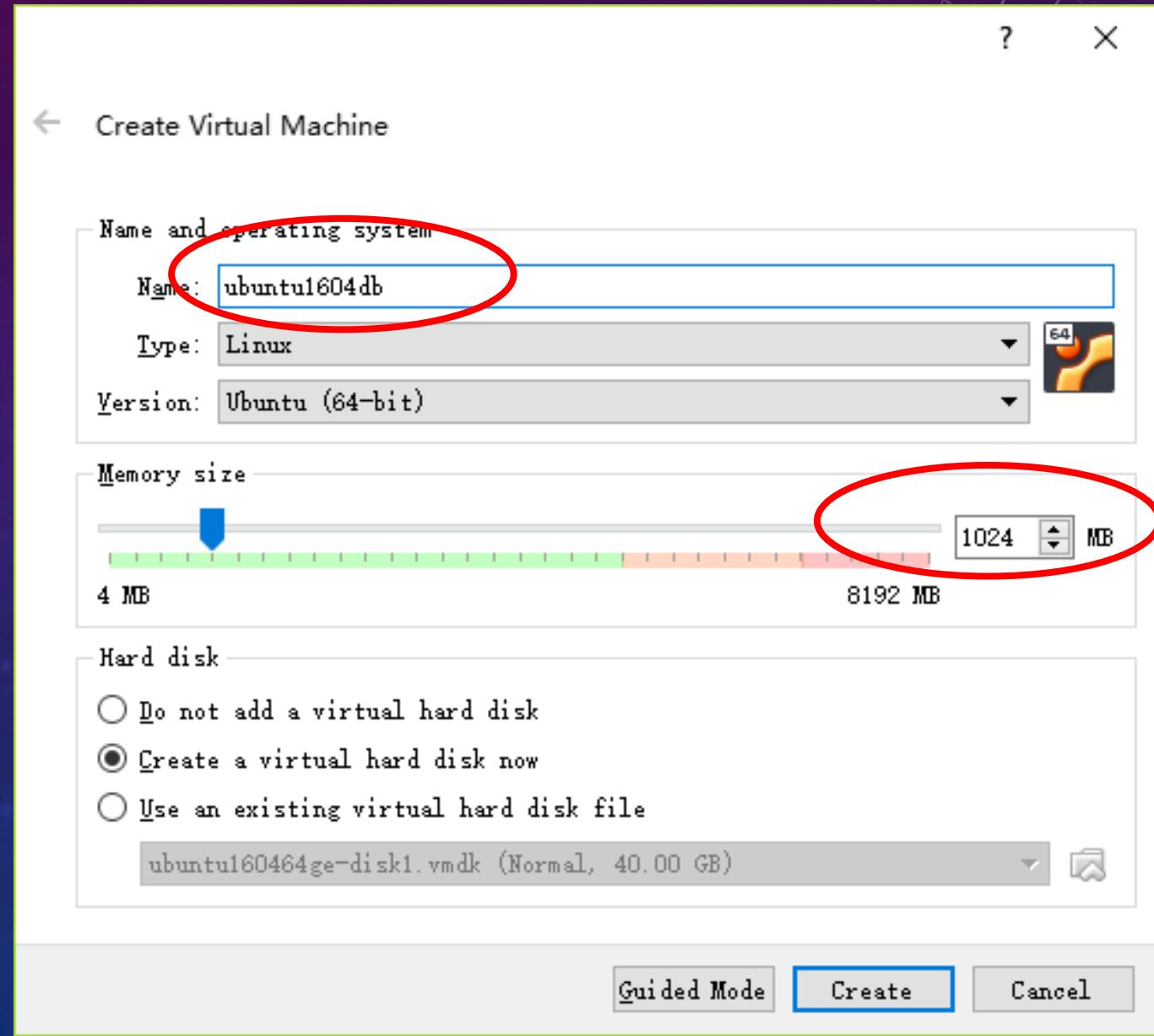
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



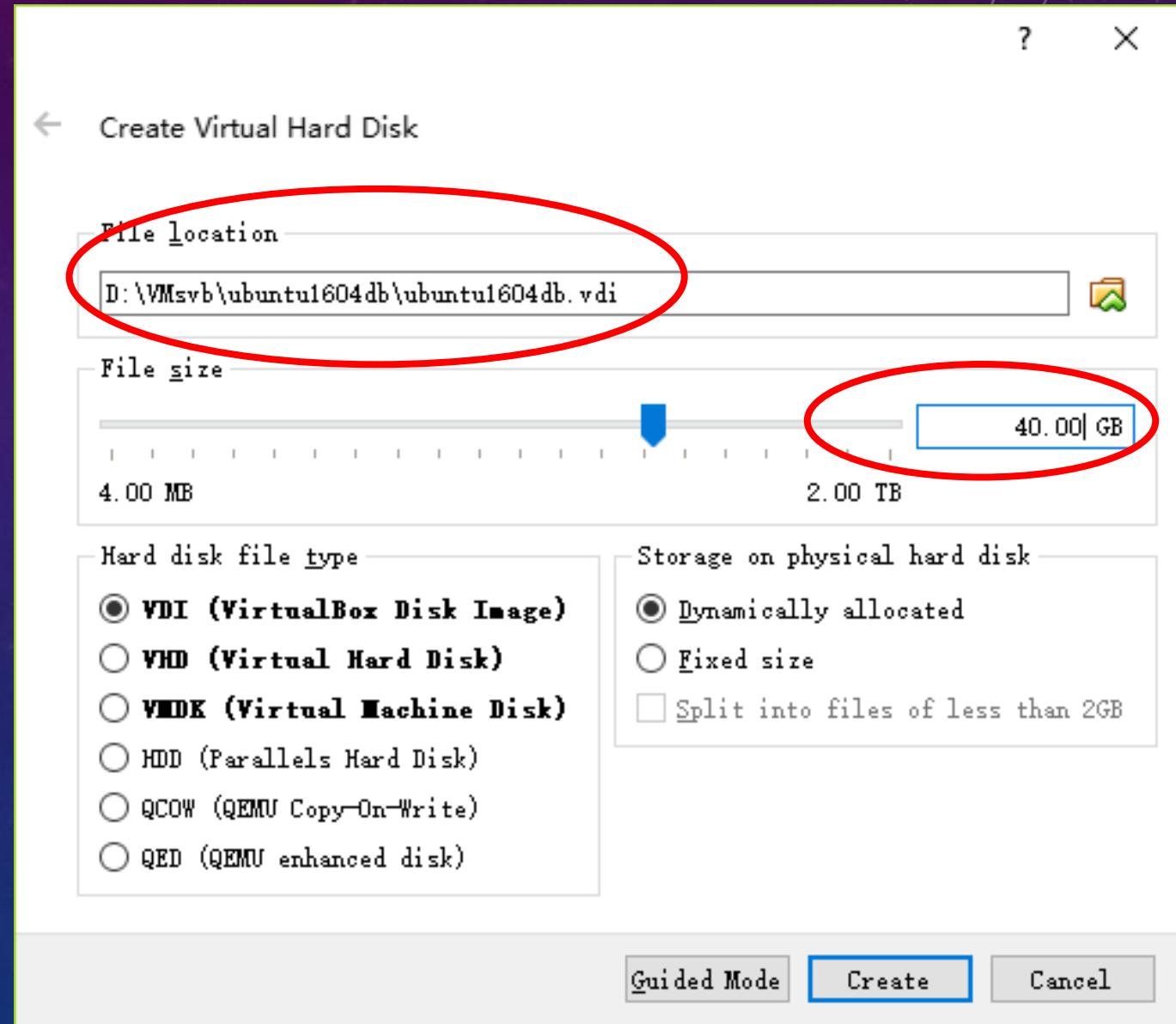
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



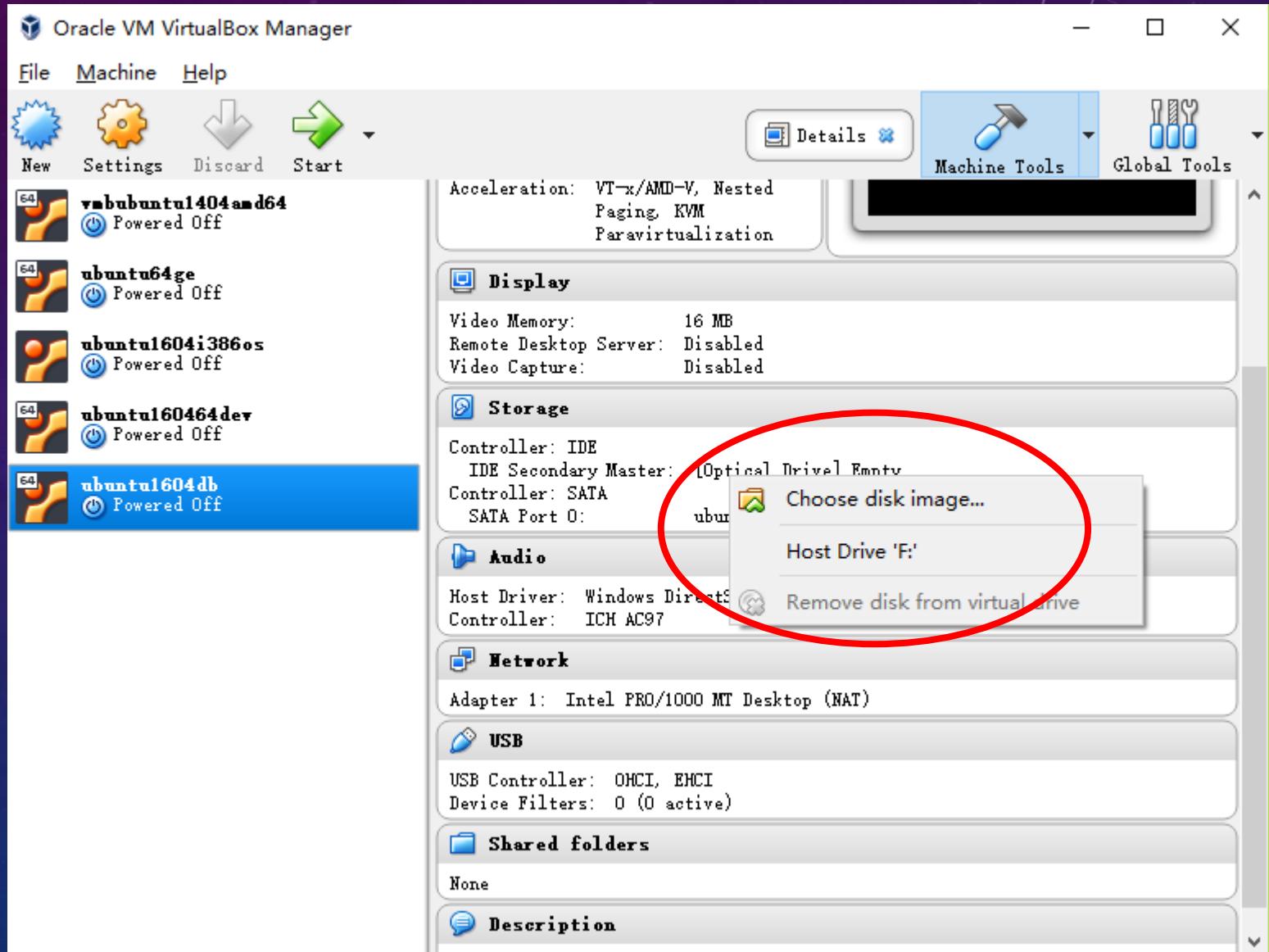
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



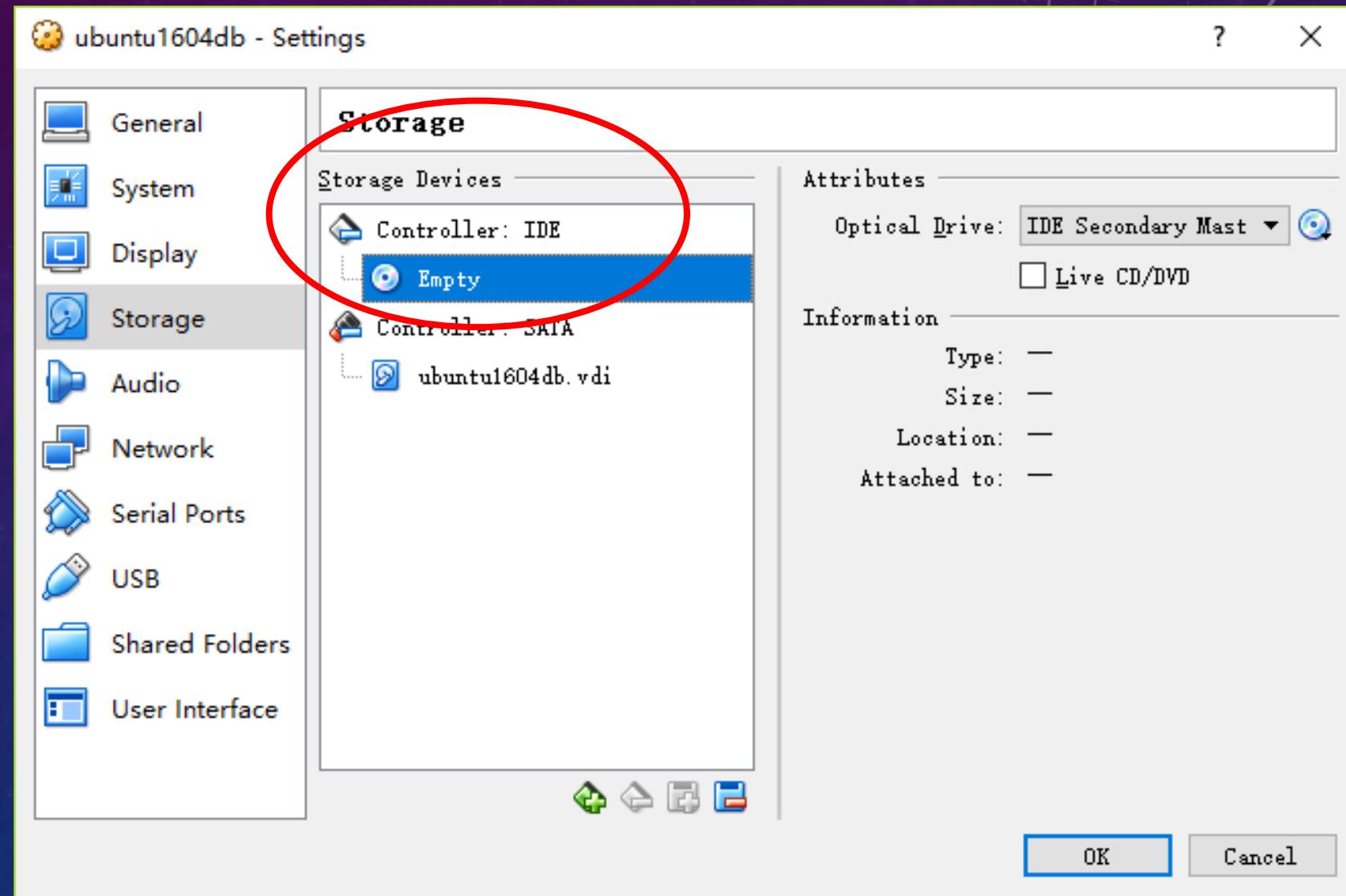
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



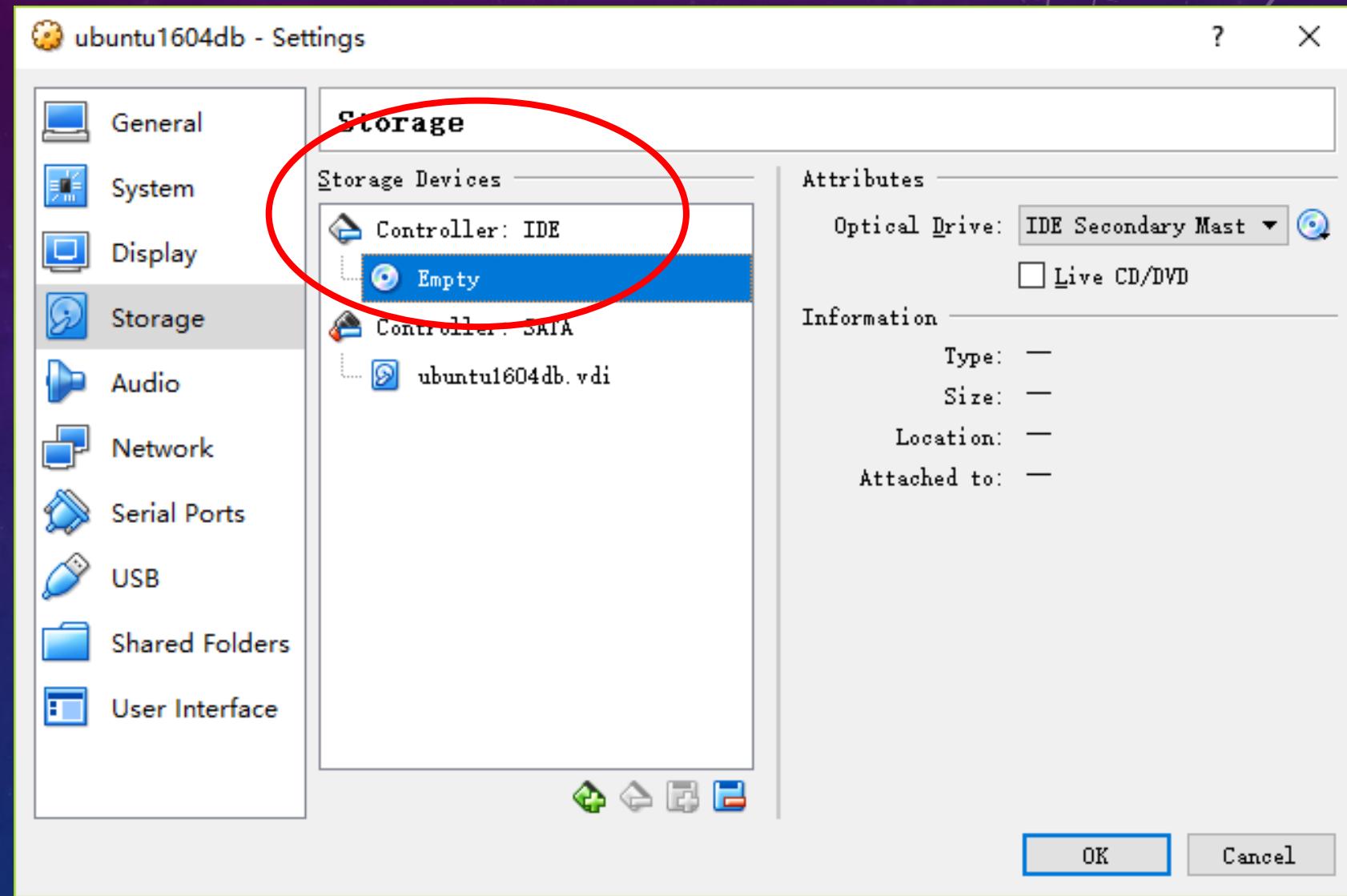
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



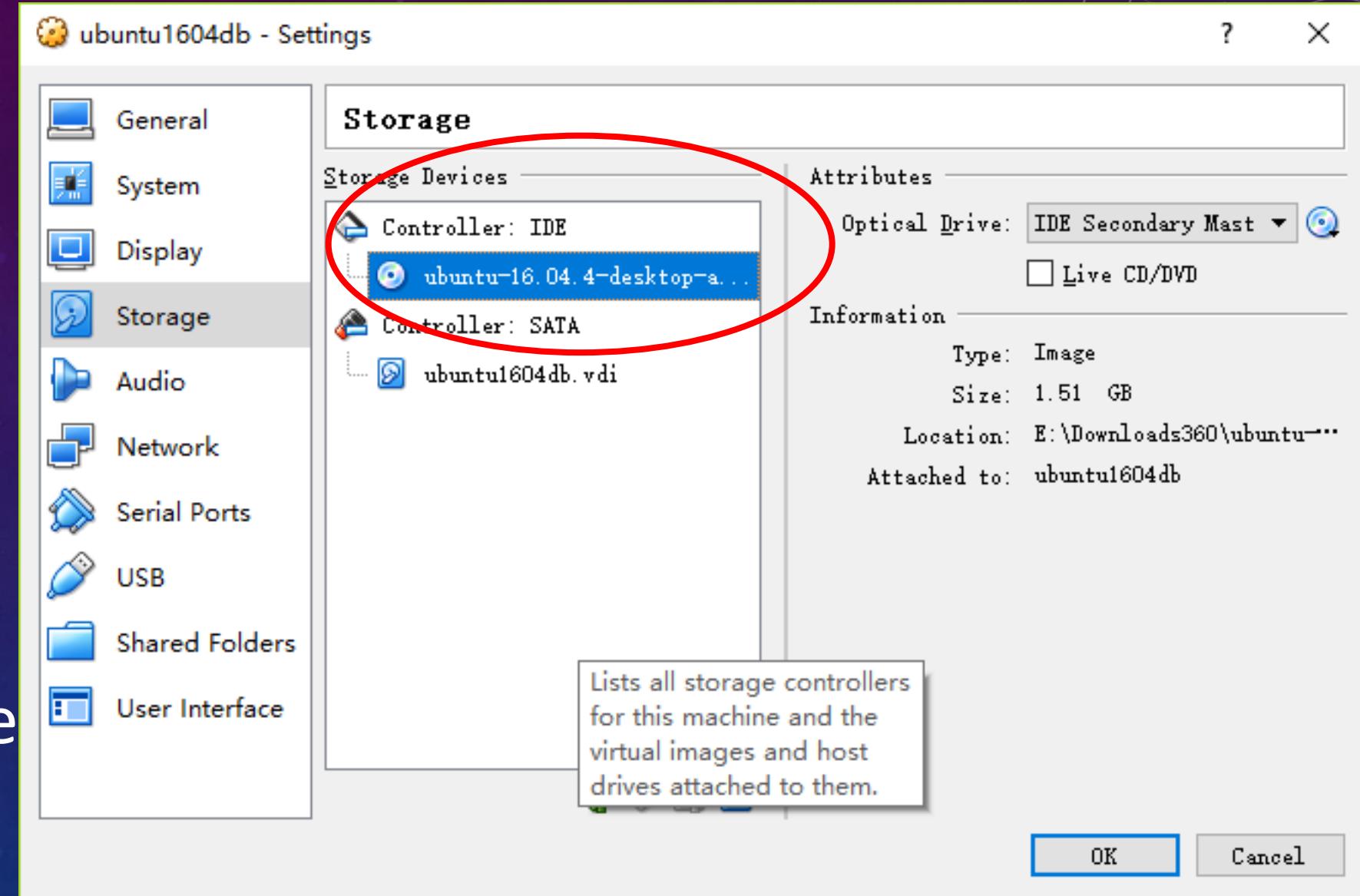
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



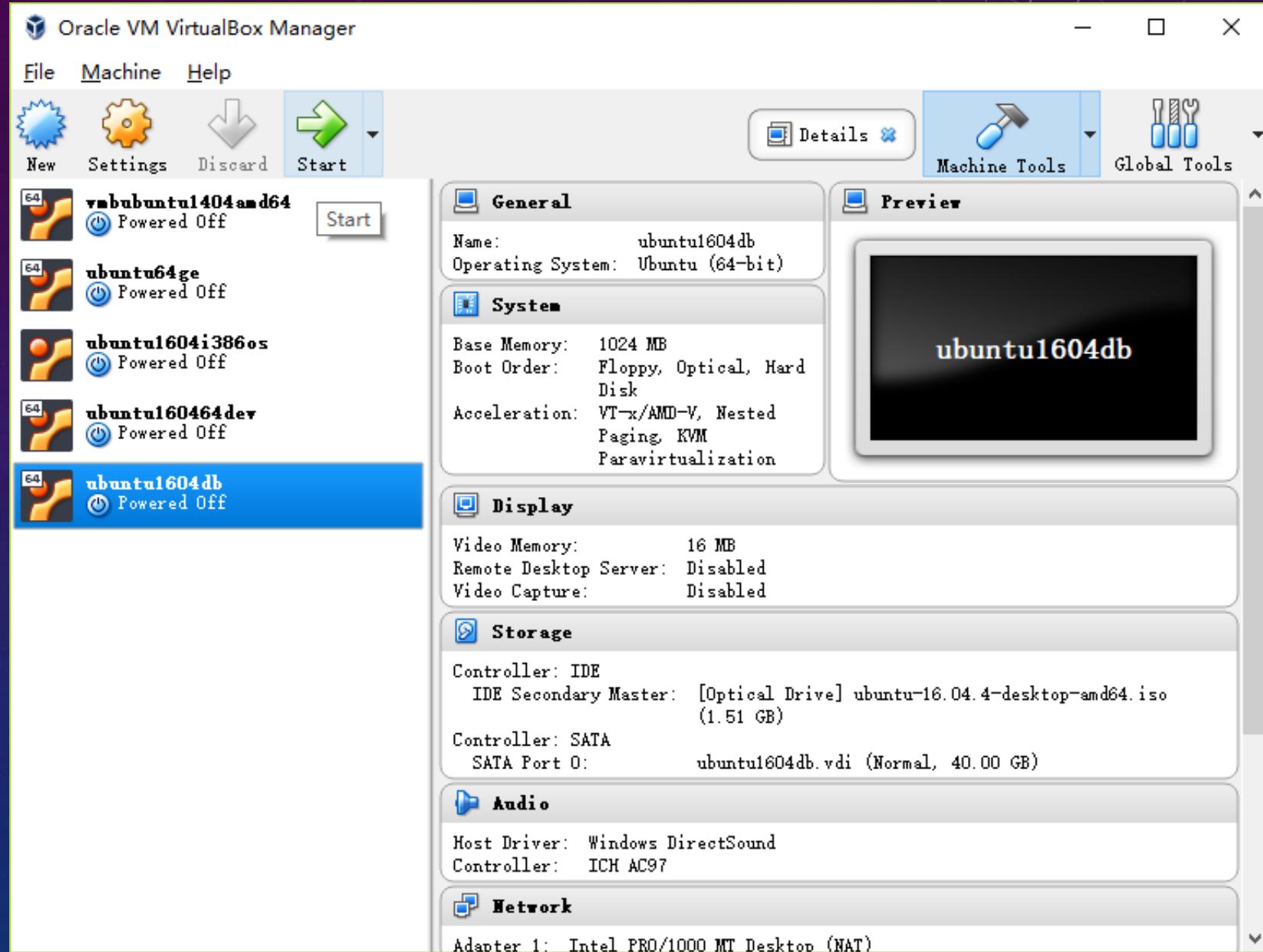
CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode

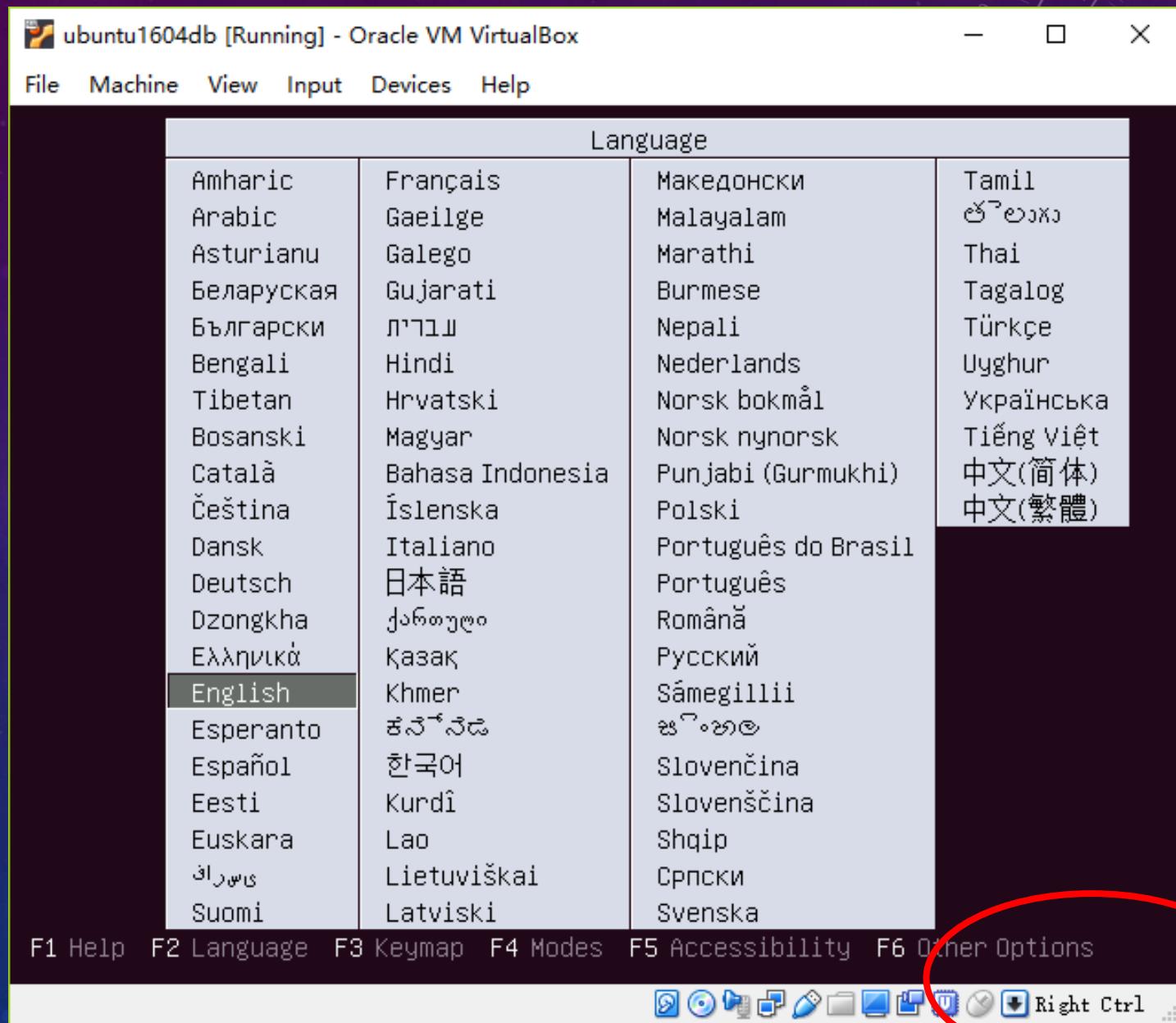


INSTALLING UBUNTU

- Installing Ubuntu
- Post-Installation Configuration

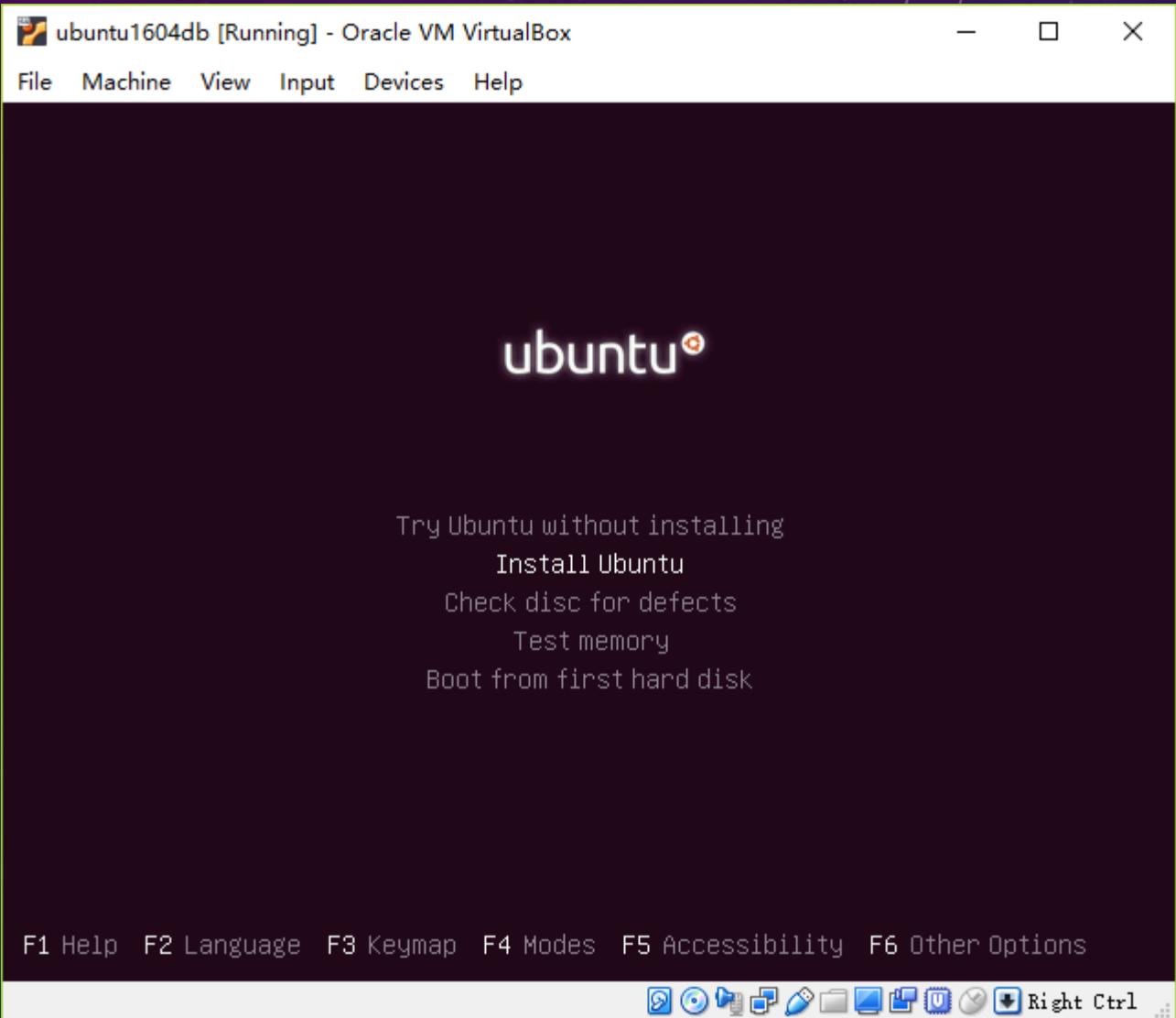
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Hot key
 - Right Ctrl

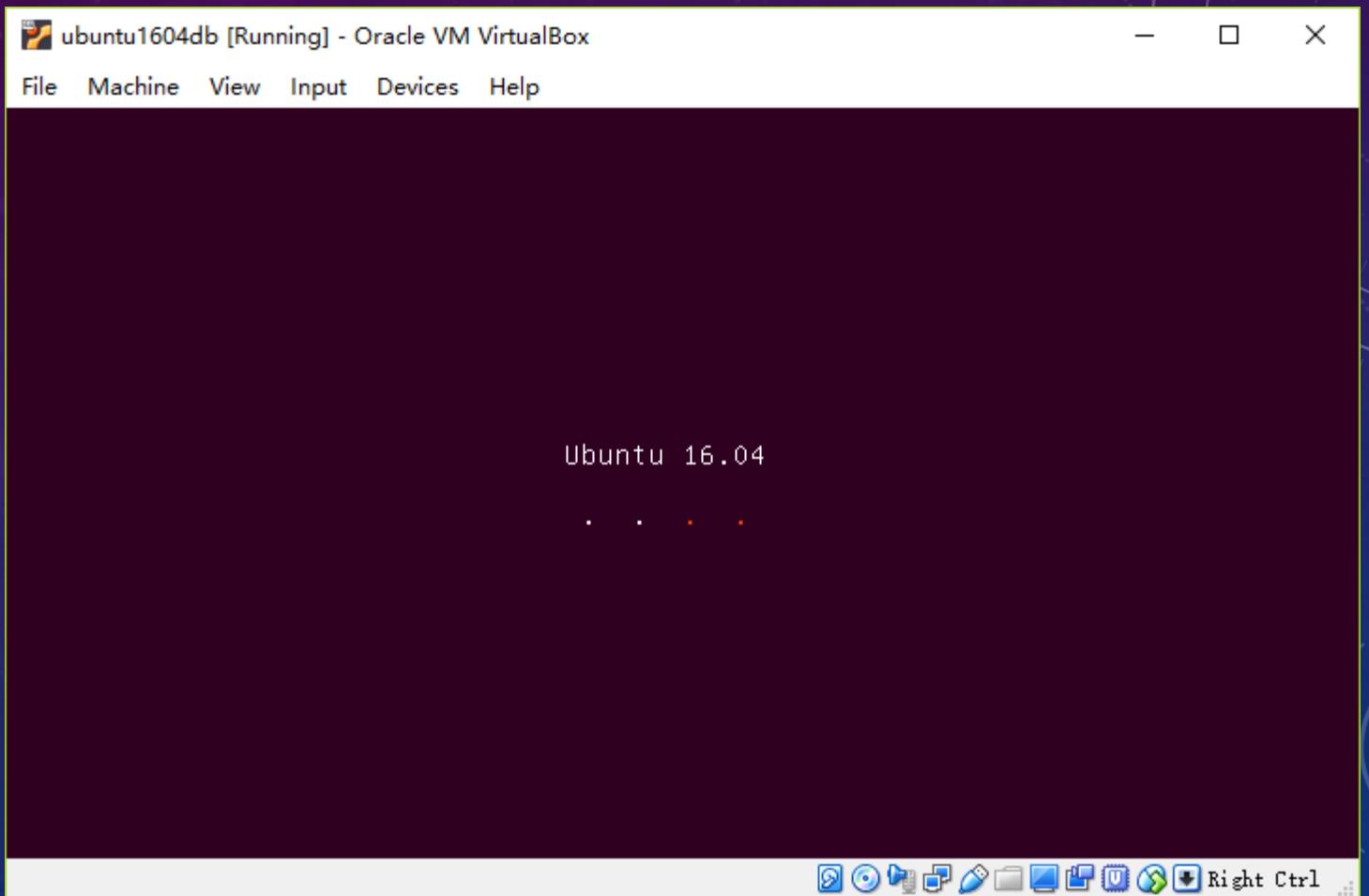


INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Select the second line

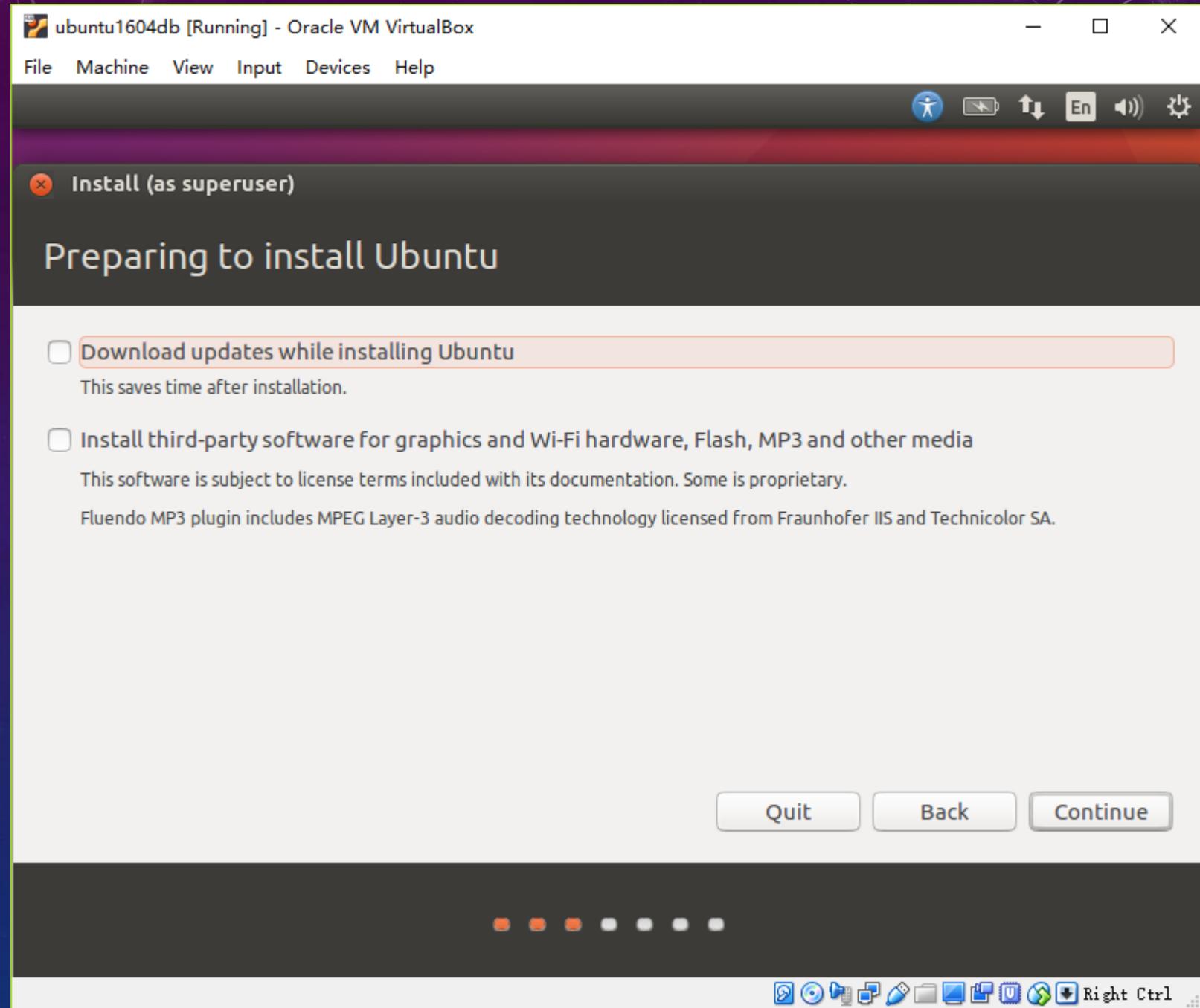


INSTALL A GUEST UBUNTU OS IN VIRTUALBOX



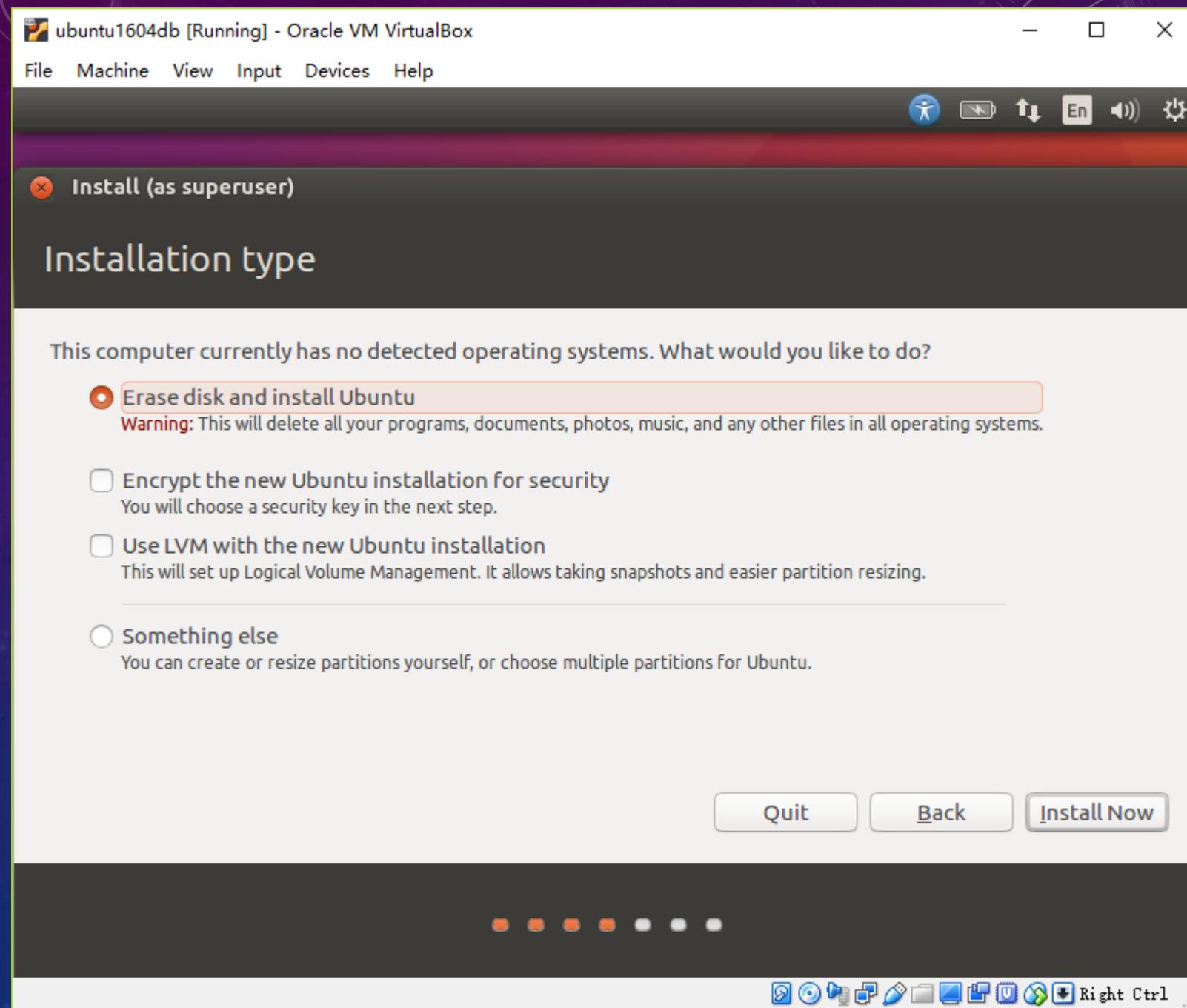
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



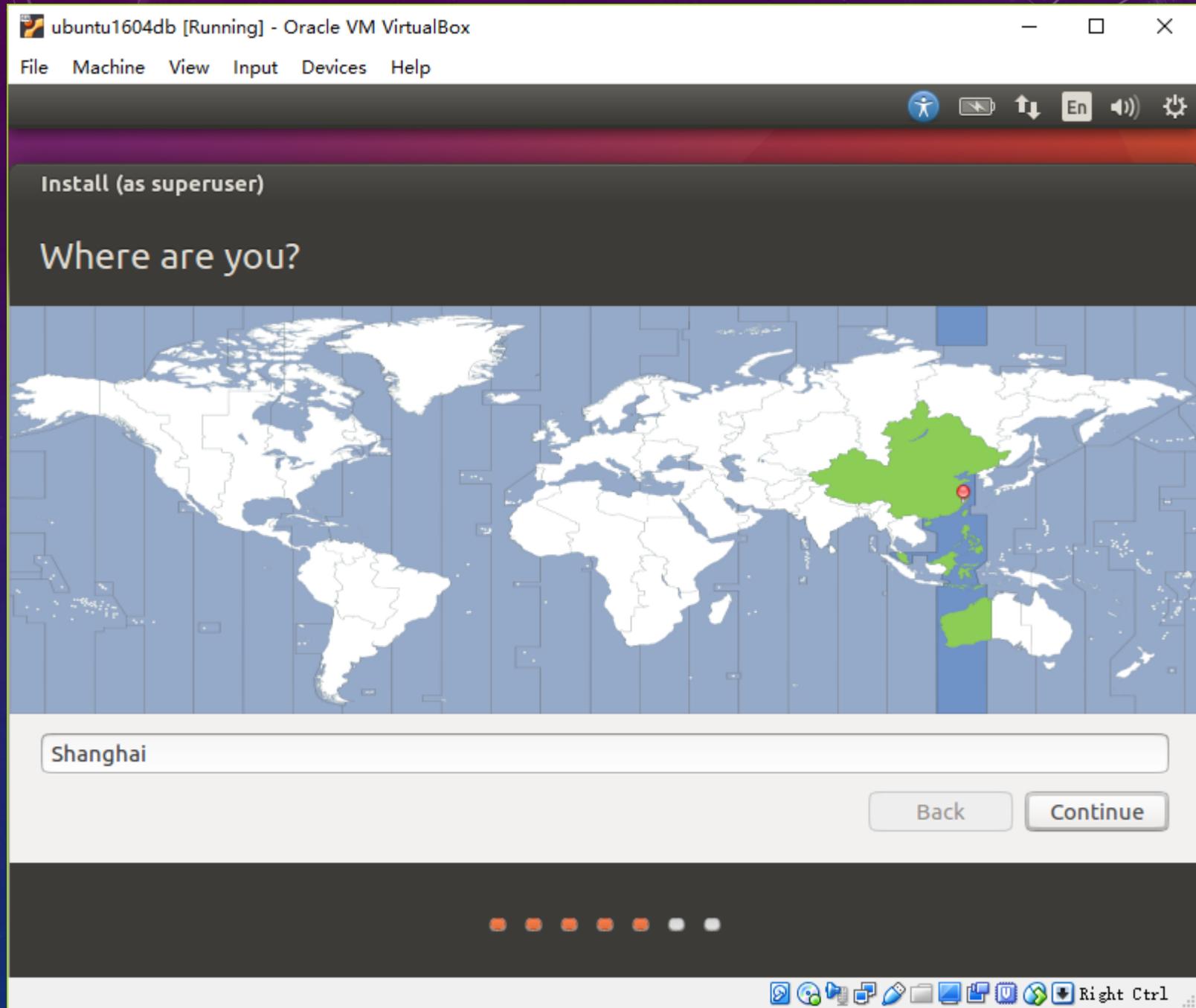
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



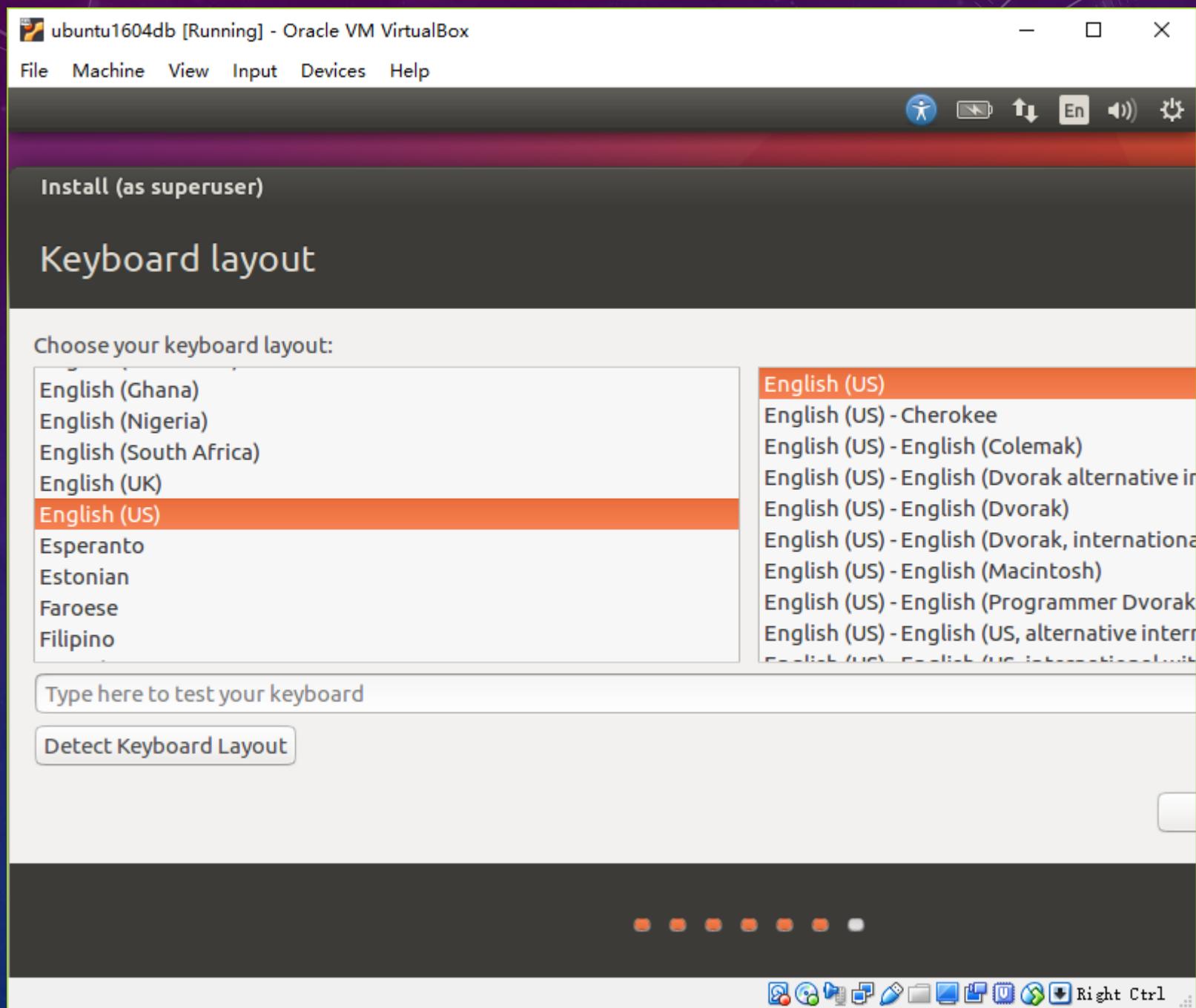
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



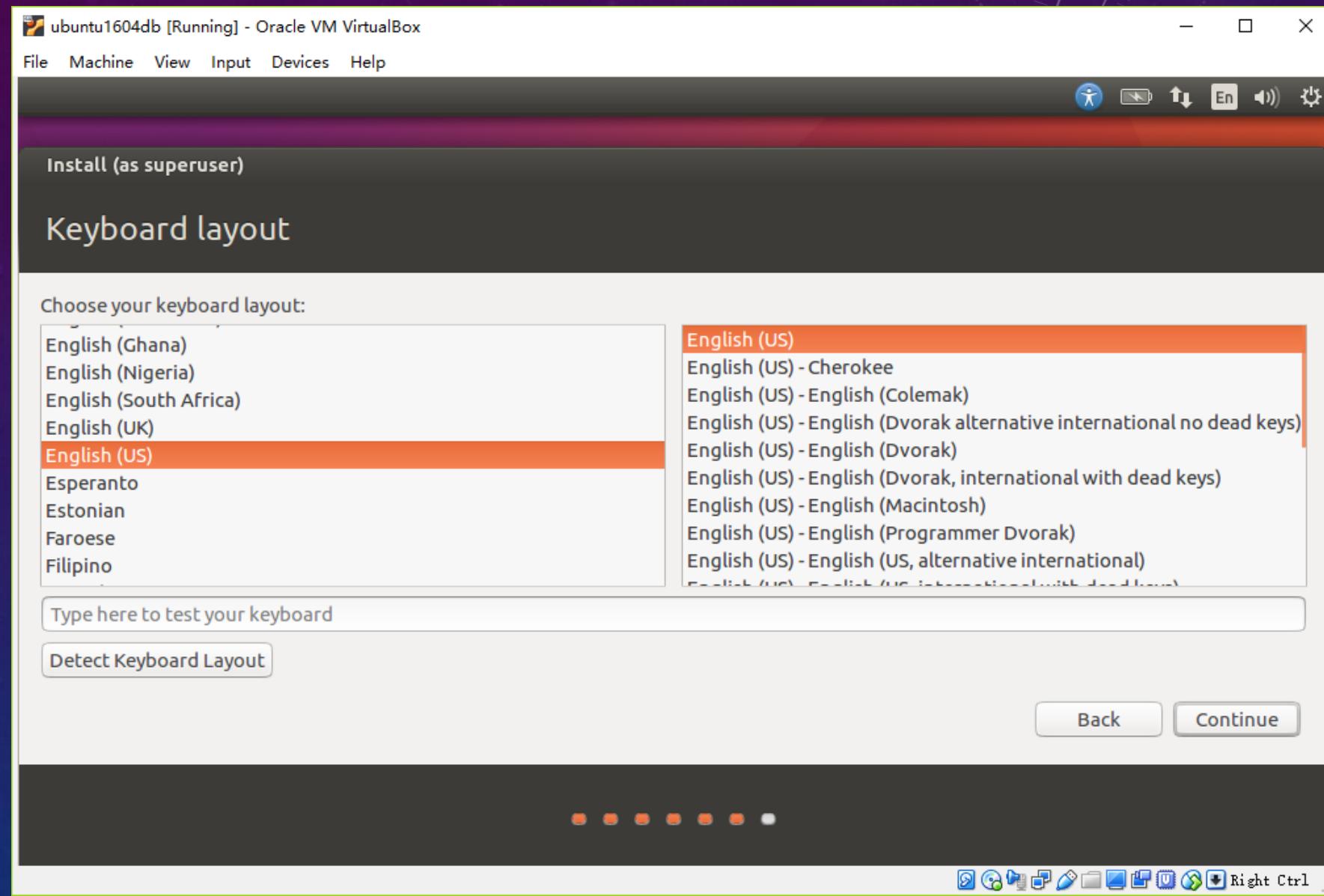
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



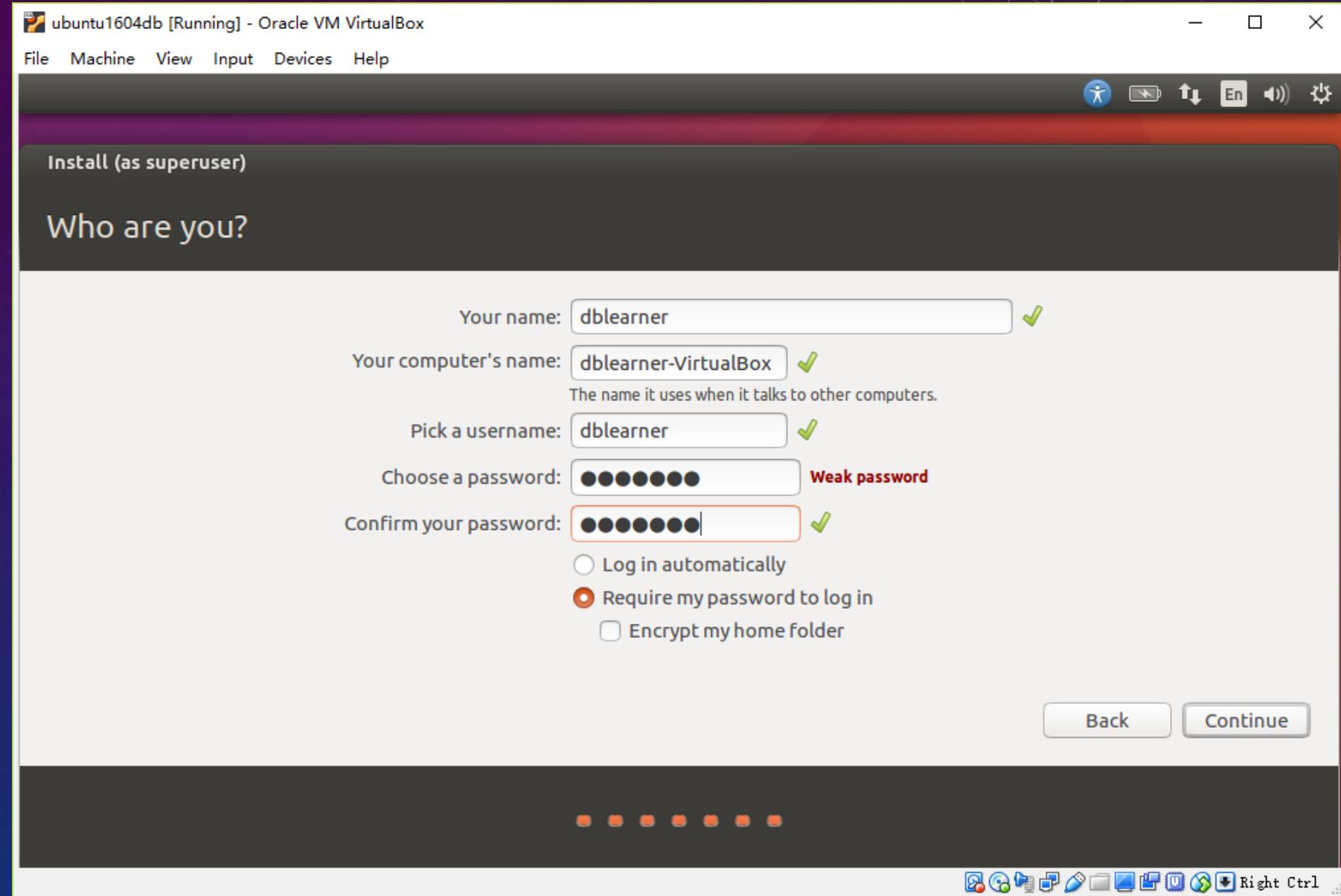
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



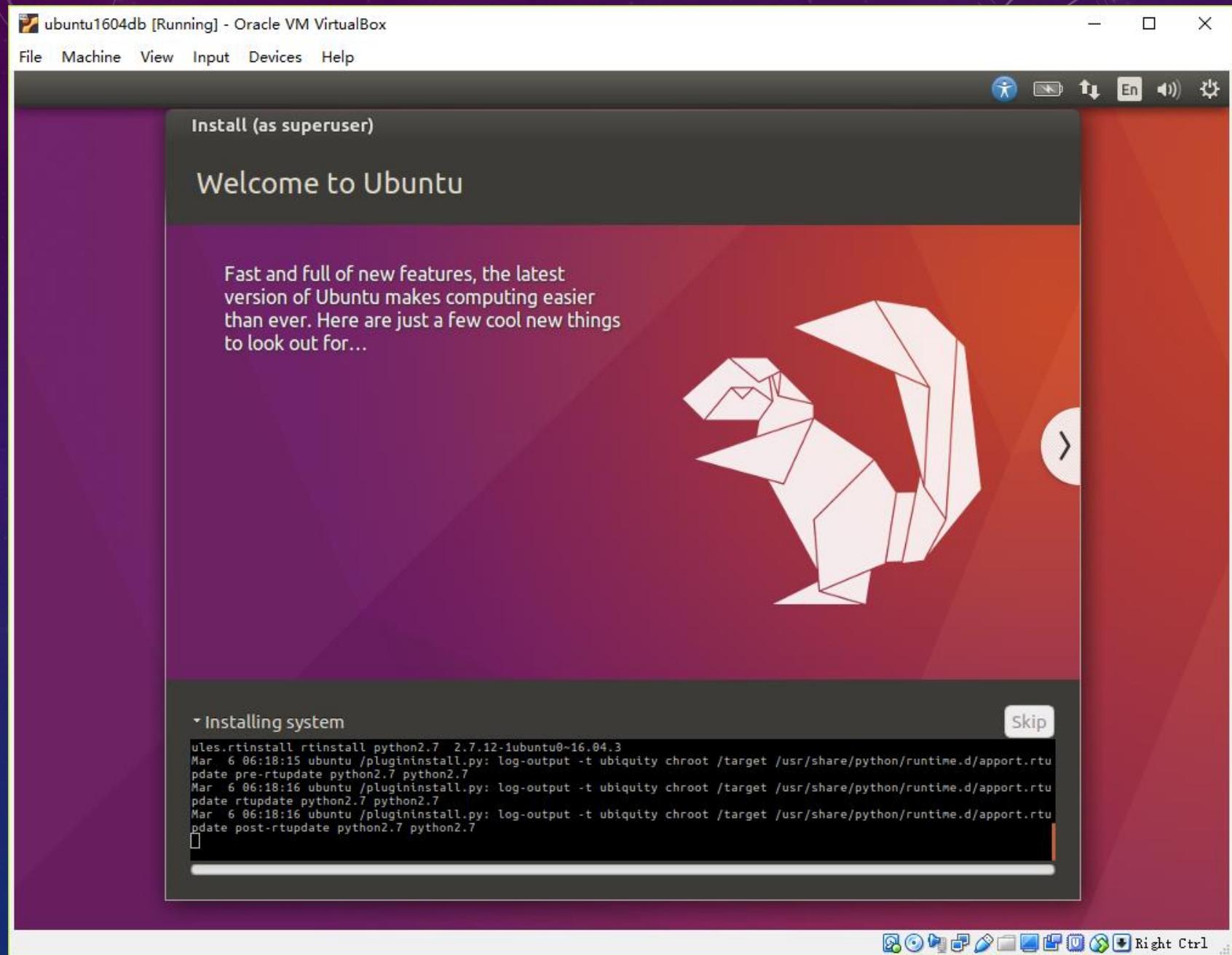
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Your name
- Your pwd



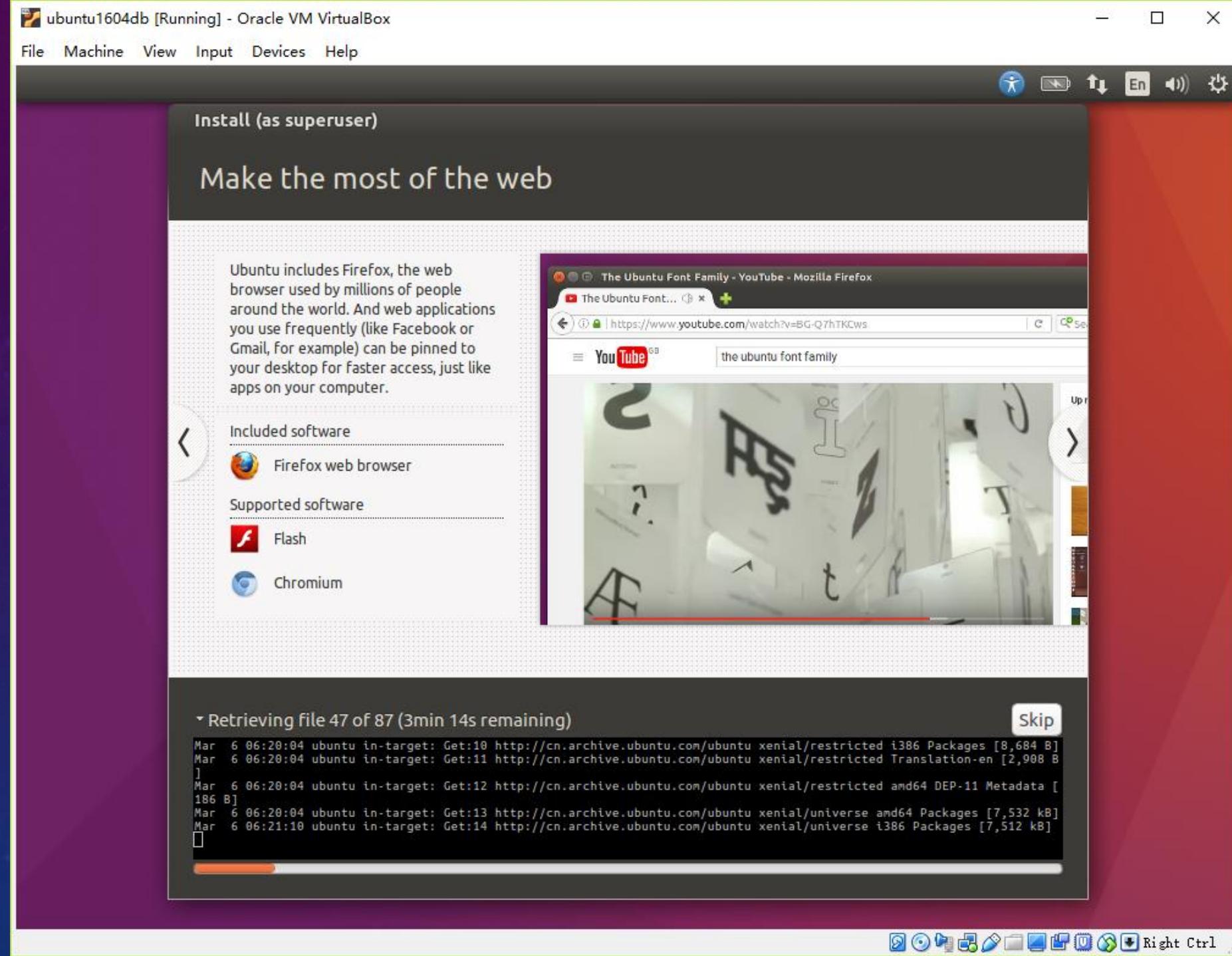
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Wait ...



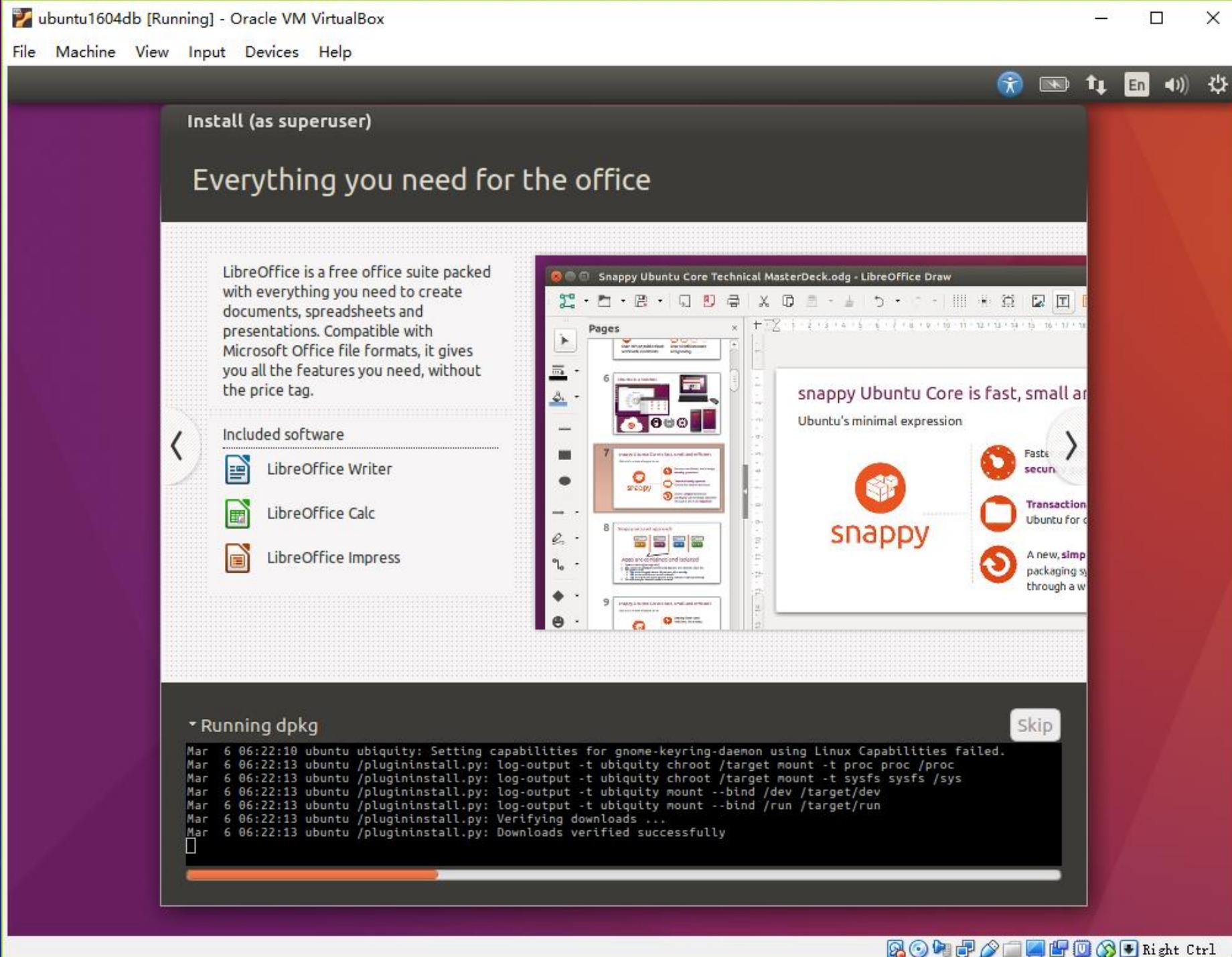
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Wait ...



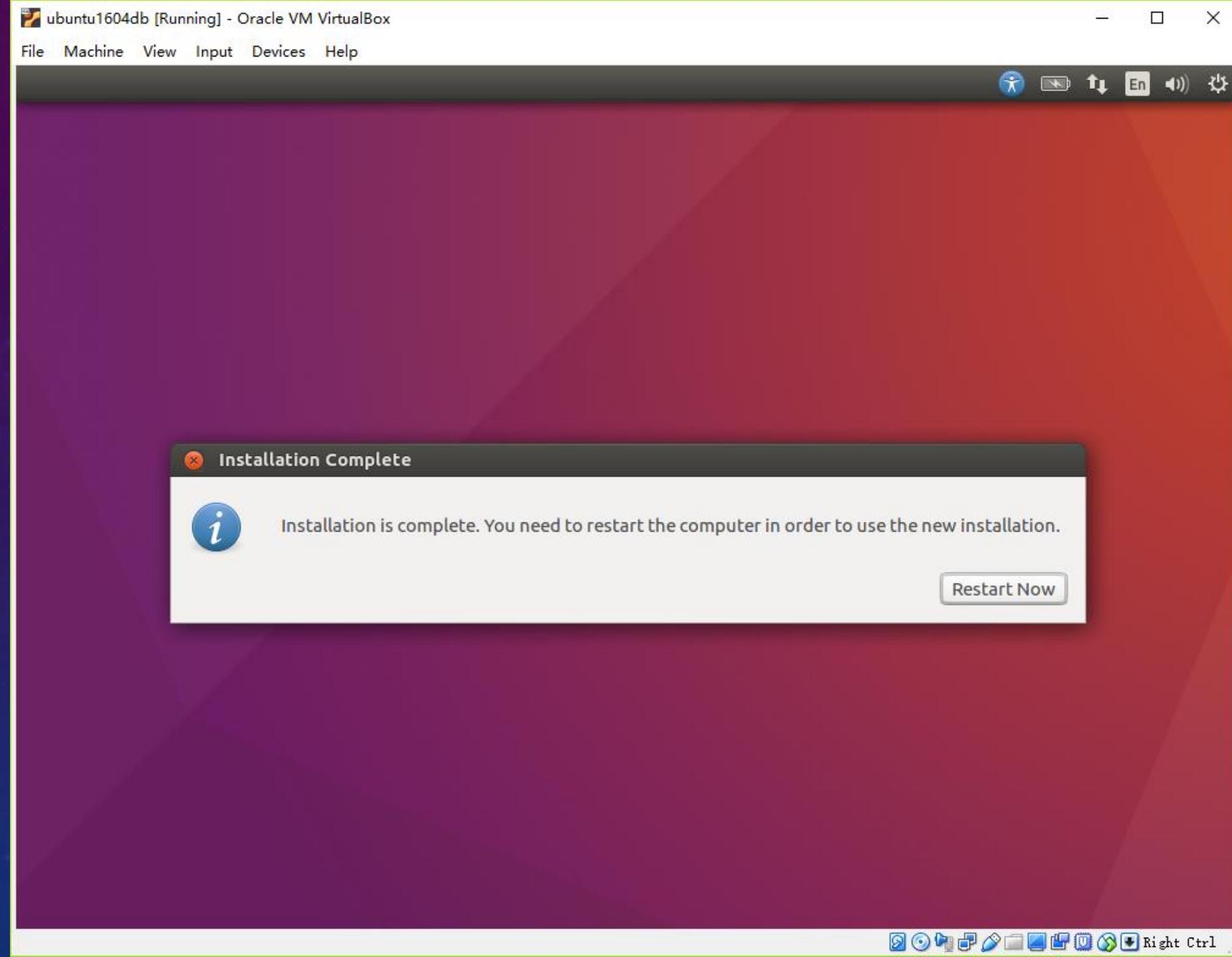
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Wait ...



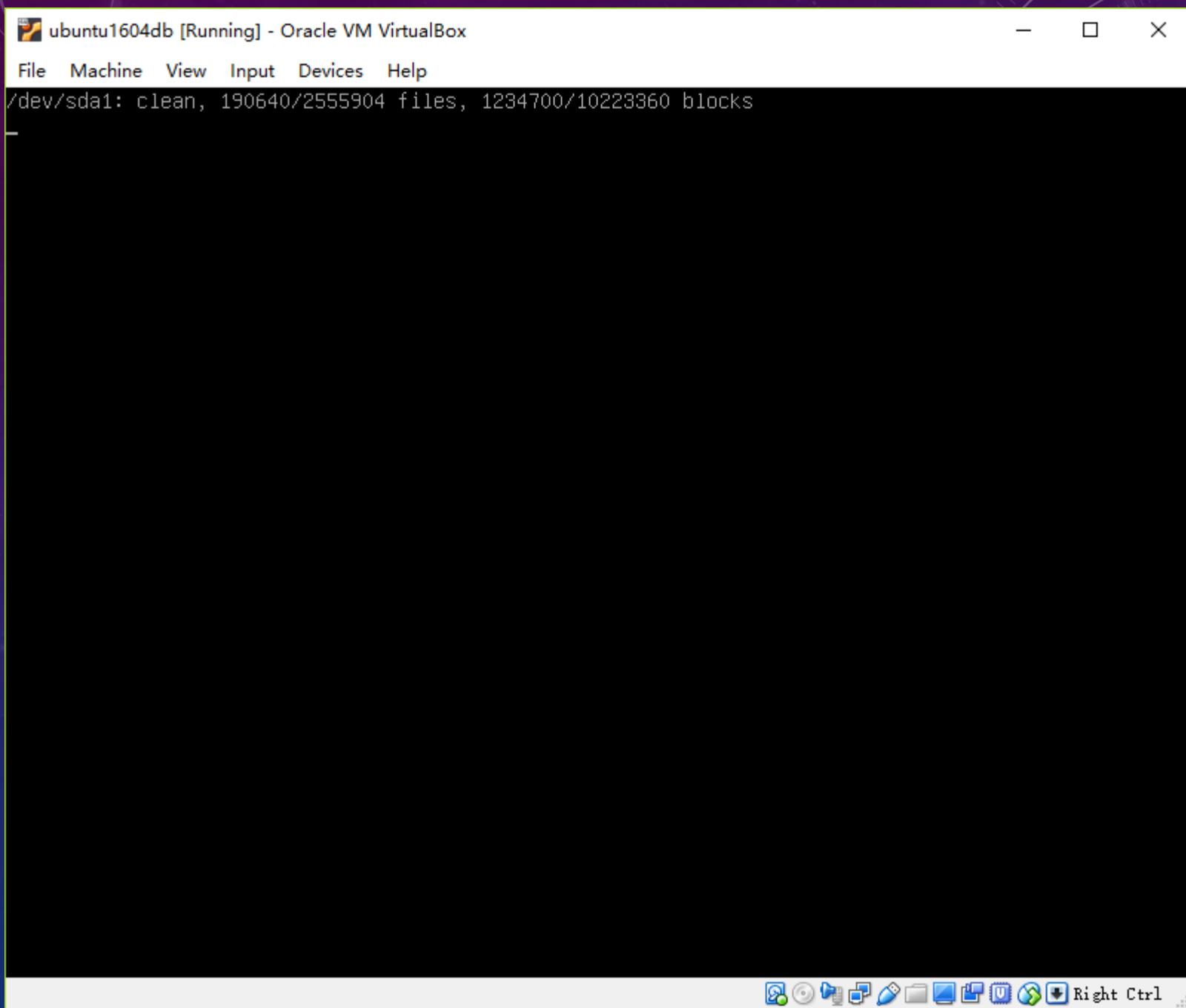
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Restart



INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Booting ...



ubuntu1604db [Running] - Oracle VM VirtualBox

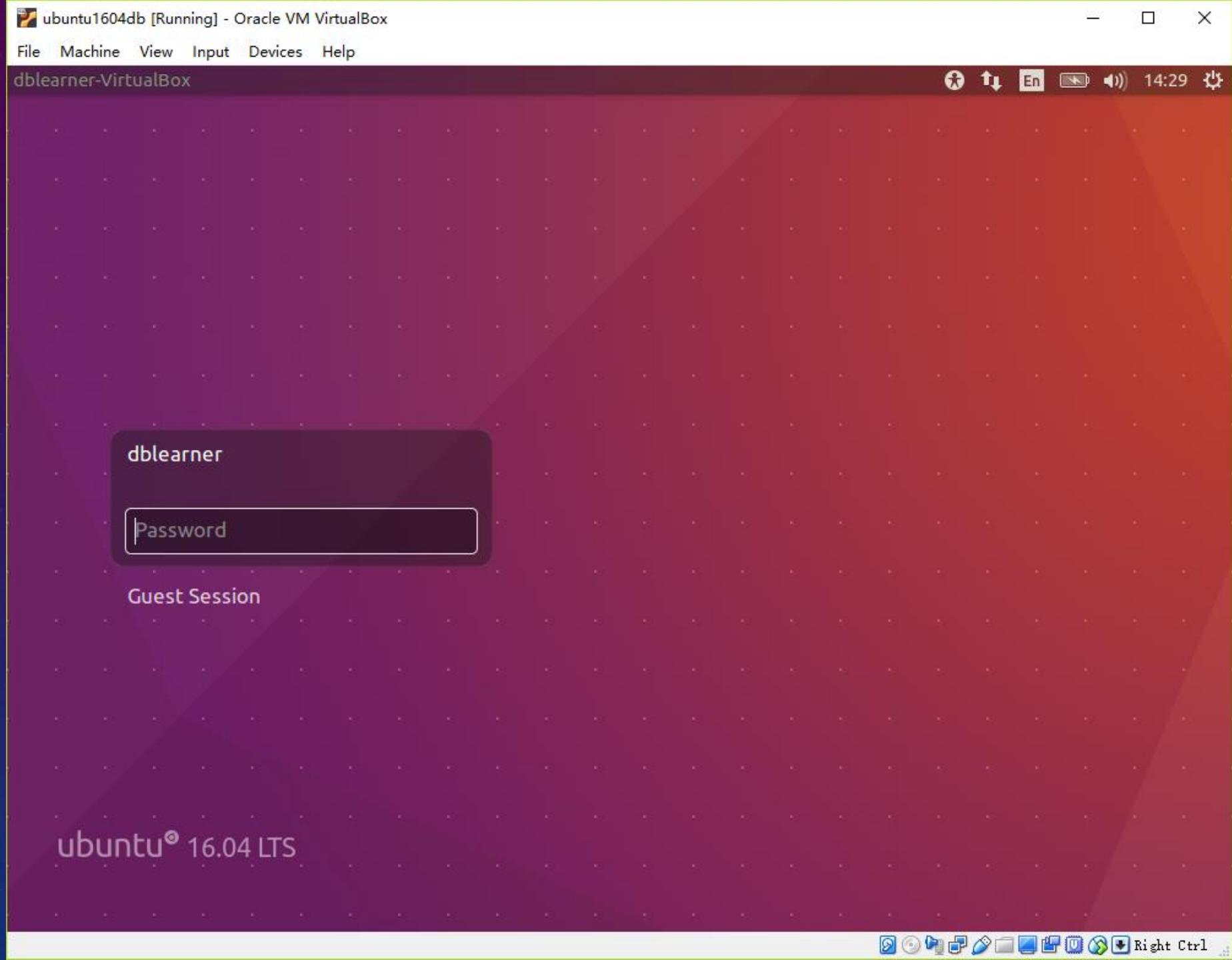
File Machine View Input Devices Help

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

Right Ctrl

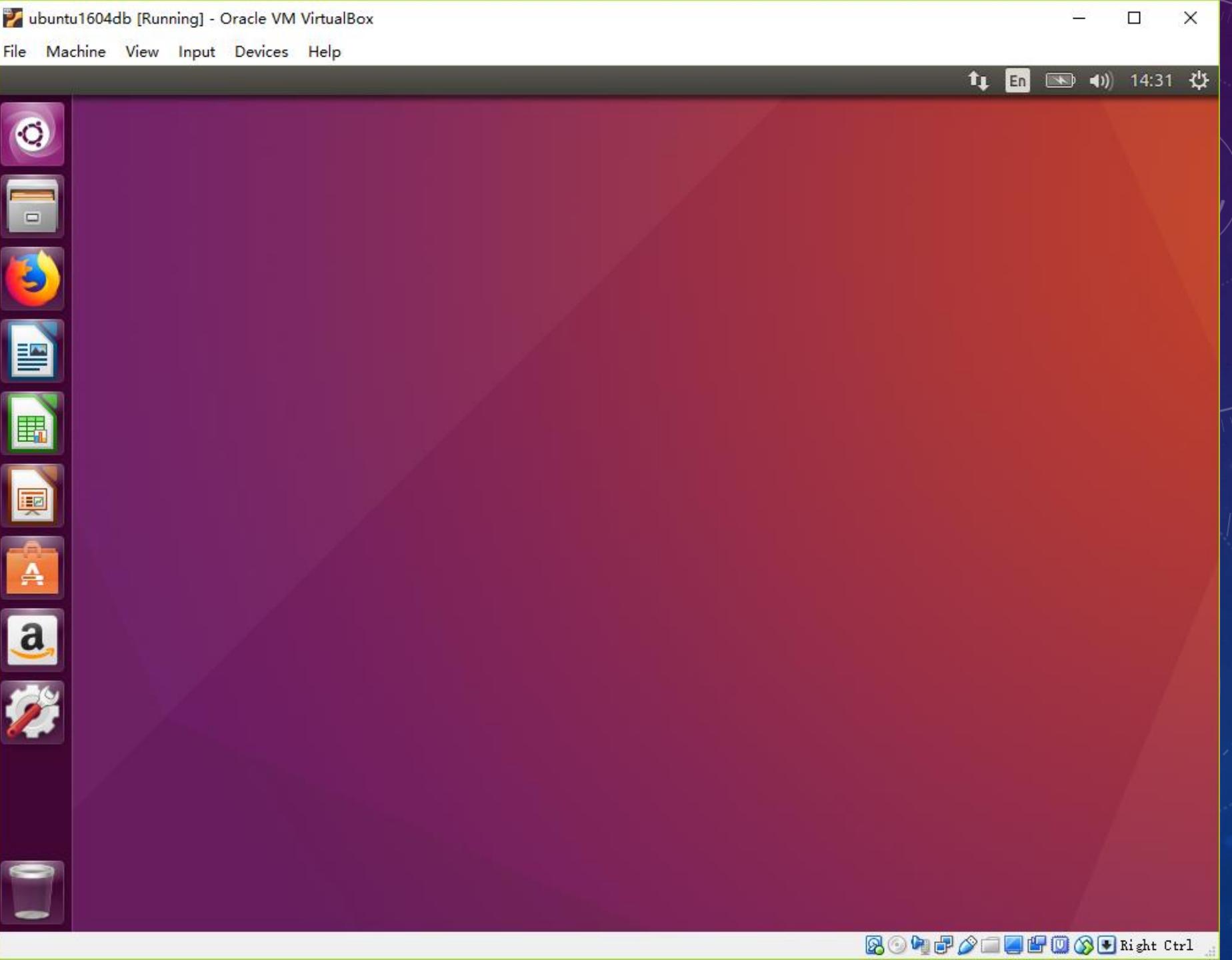
INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Input your pwd



INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Gnome Desktop

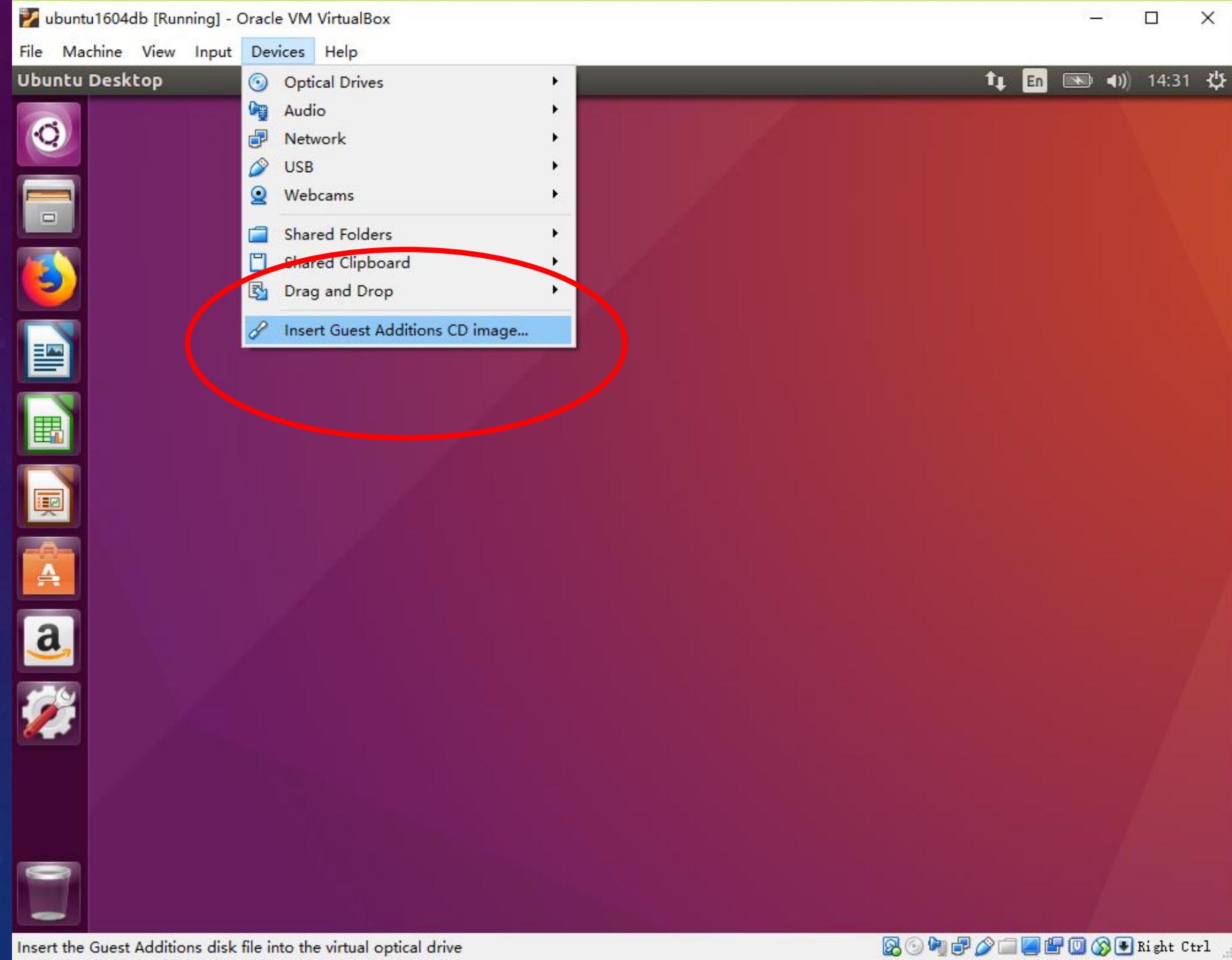


INSTALLING UBUNTU

- Installing Ubuntu
- Post-Installation Configuration

POST- INSTALLATION UBUNTU OS

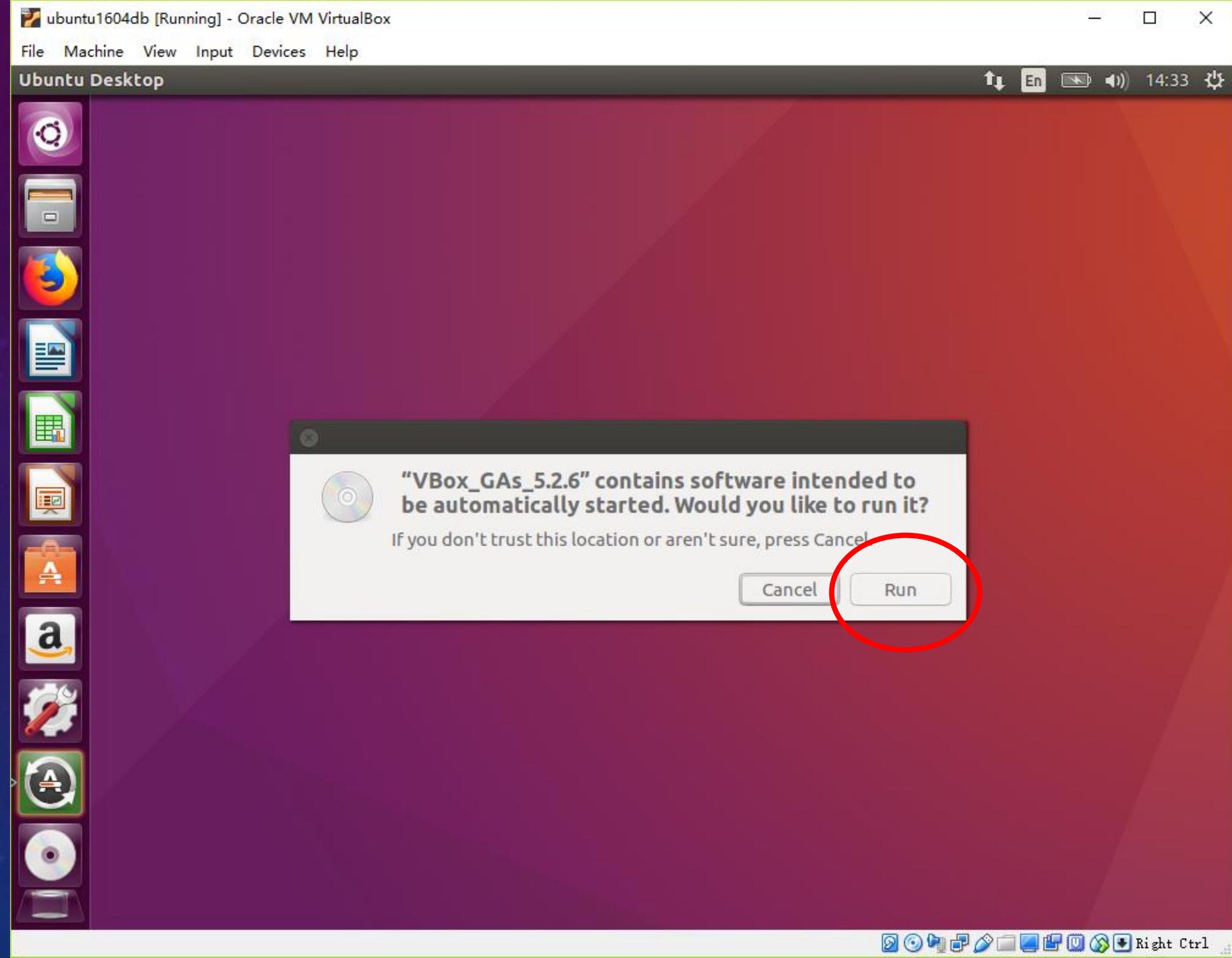
- To enhance guest os



POST- INSTALLATION UBUNTU OS

- To enhance guest os

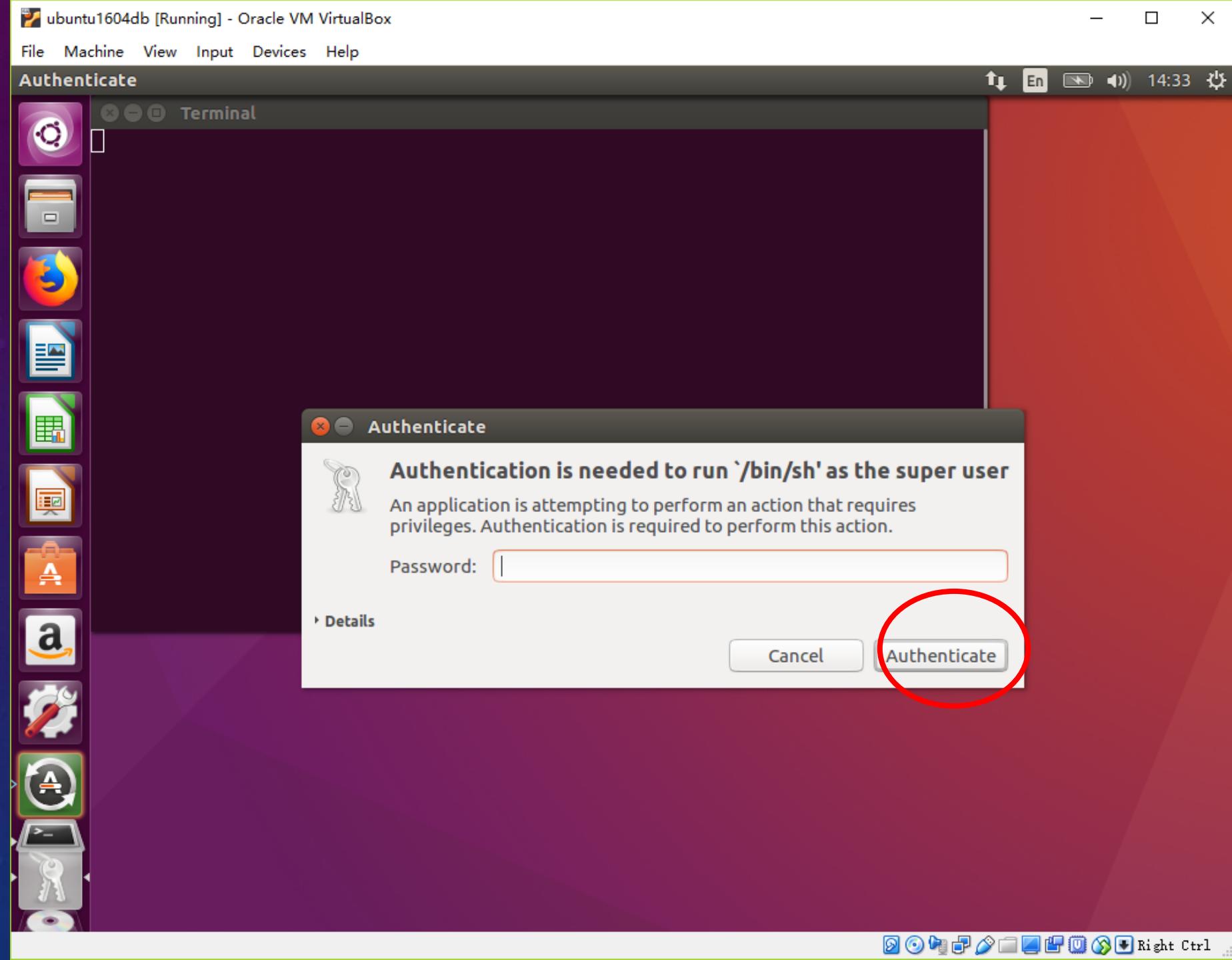
©LXD



POST- INSTALLATION UBUNTU OS

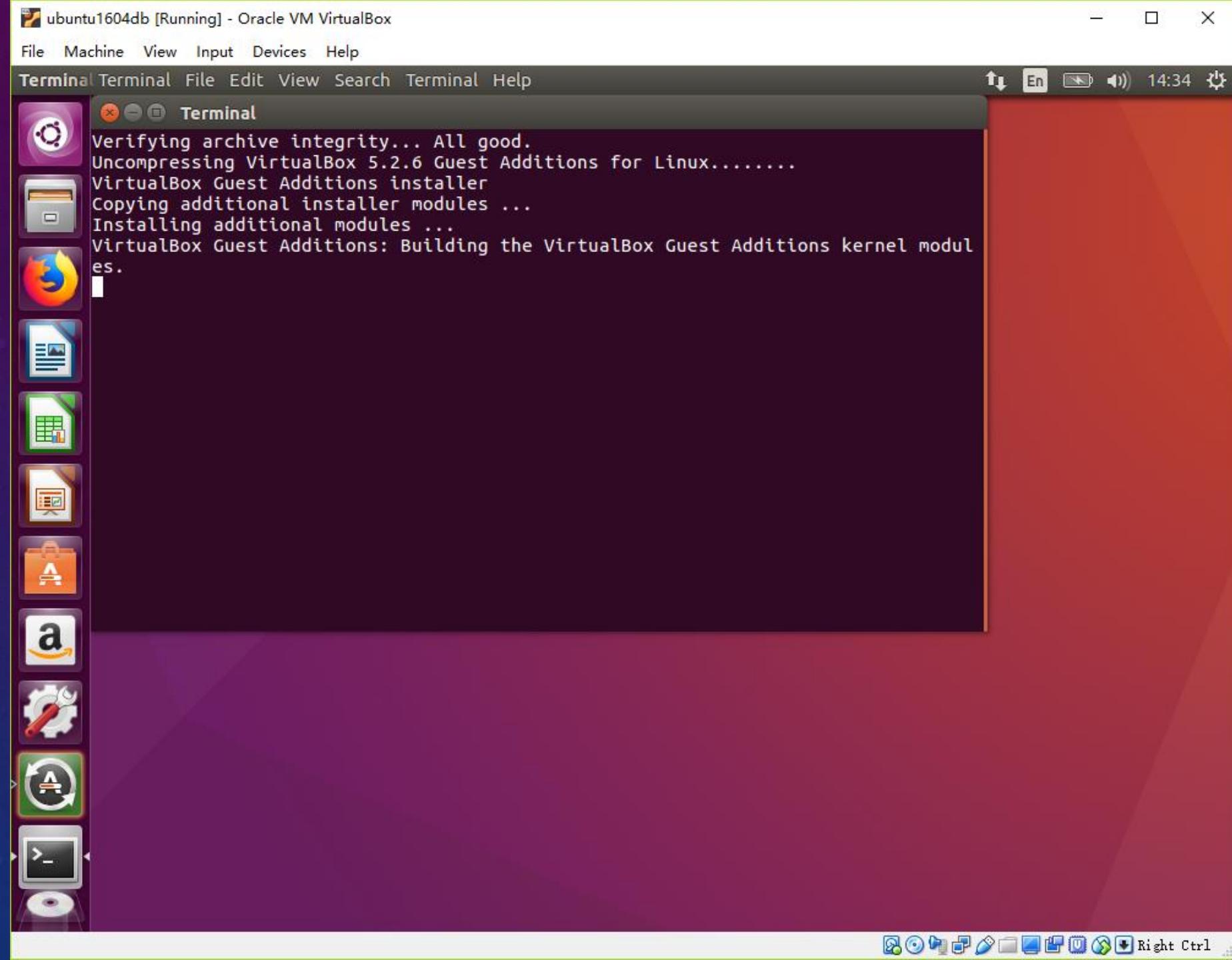
- To enhance guest os

©LXD



POST- INSTALLATION UBUNTU OS

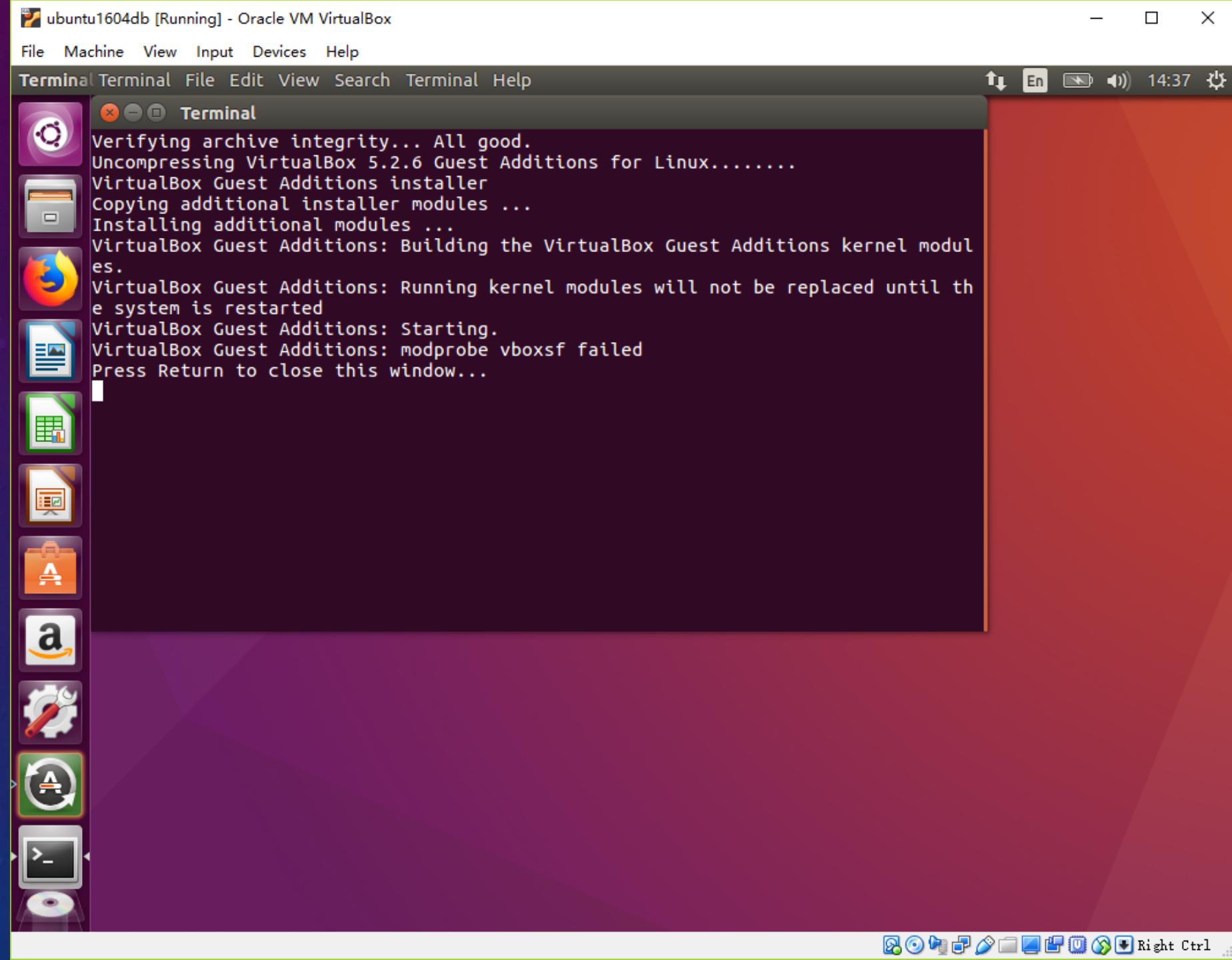
- To enhance guest os



POST- INSTALLATION UBUNTU OS

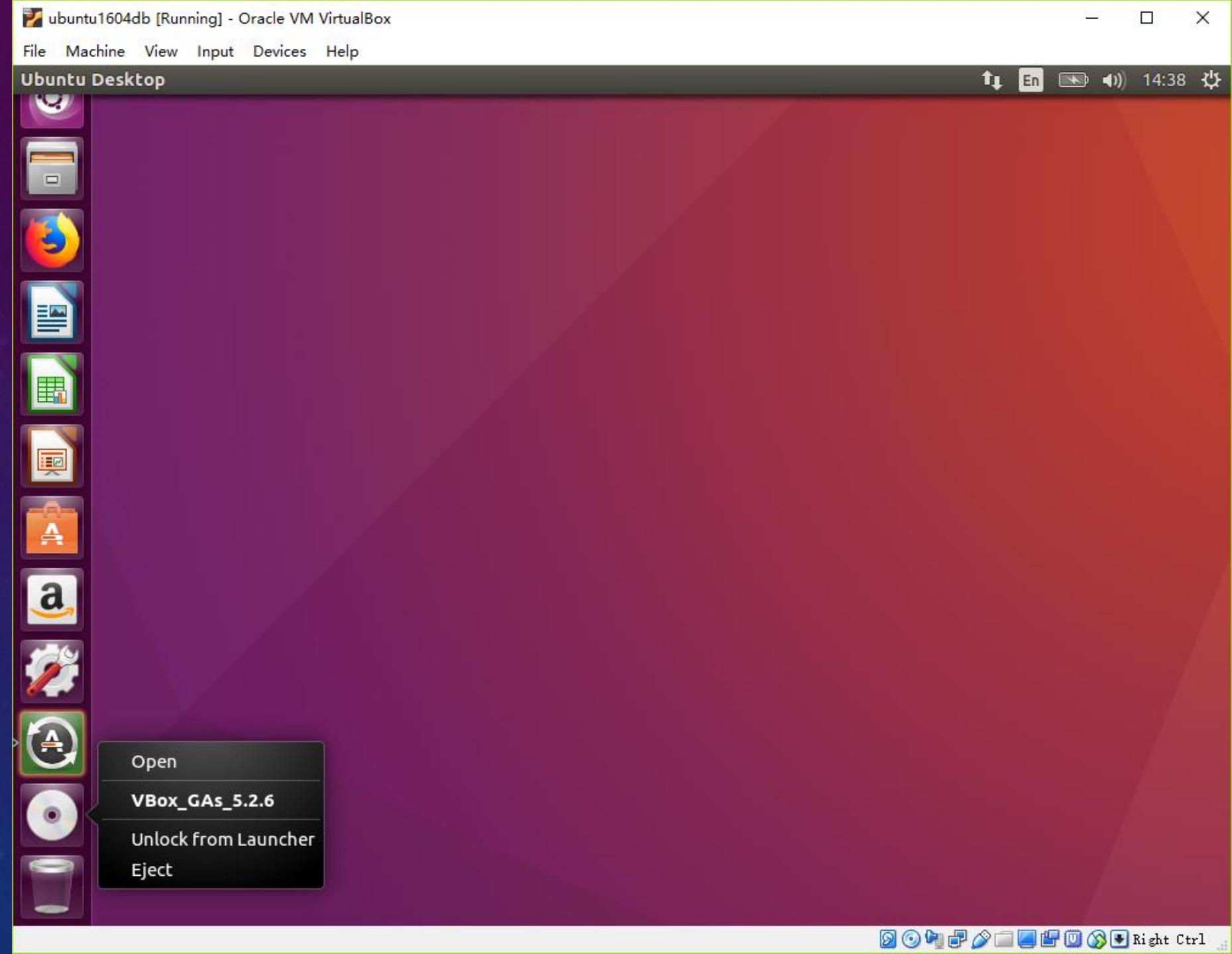
- To enhance guest os

©LXD



POST- INSTALLATION UBUNTU OS

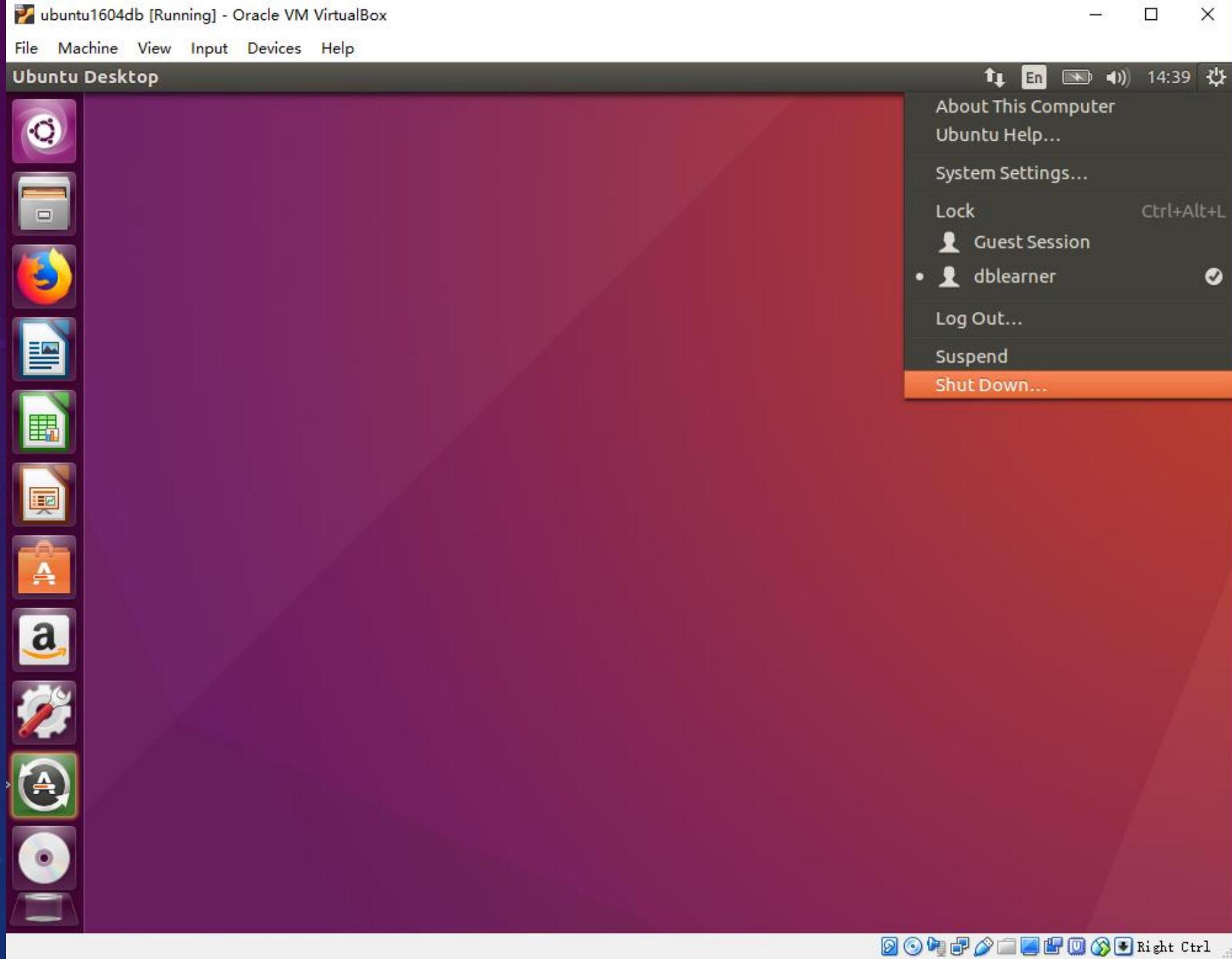
- To enhance guest os
 - Eject



POST- INSTALLATION UBUNTU OS

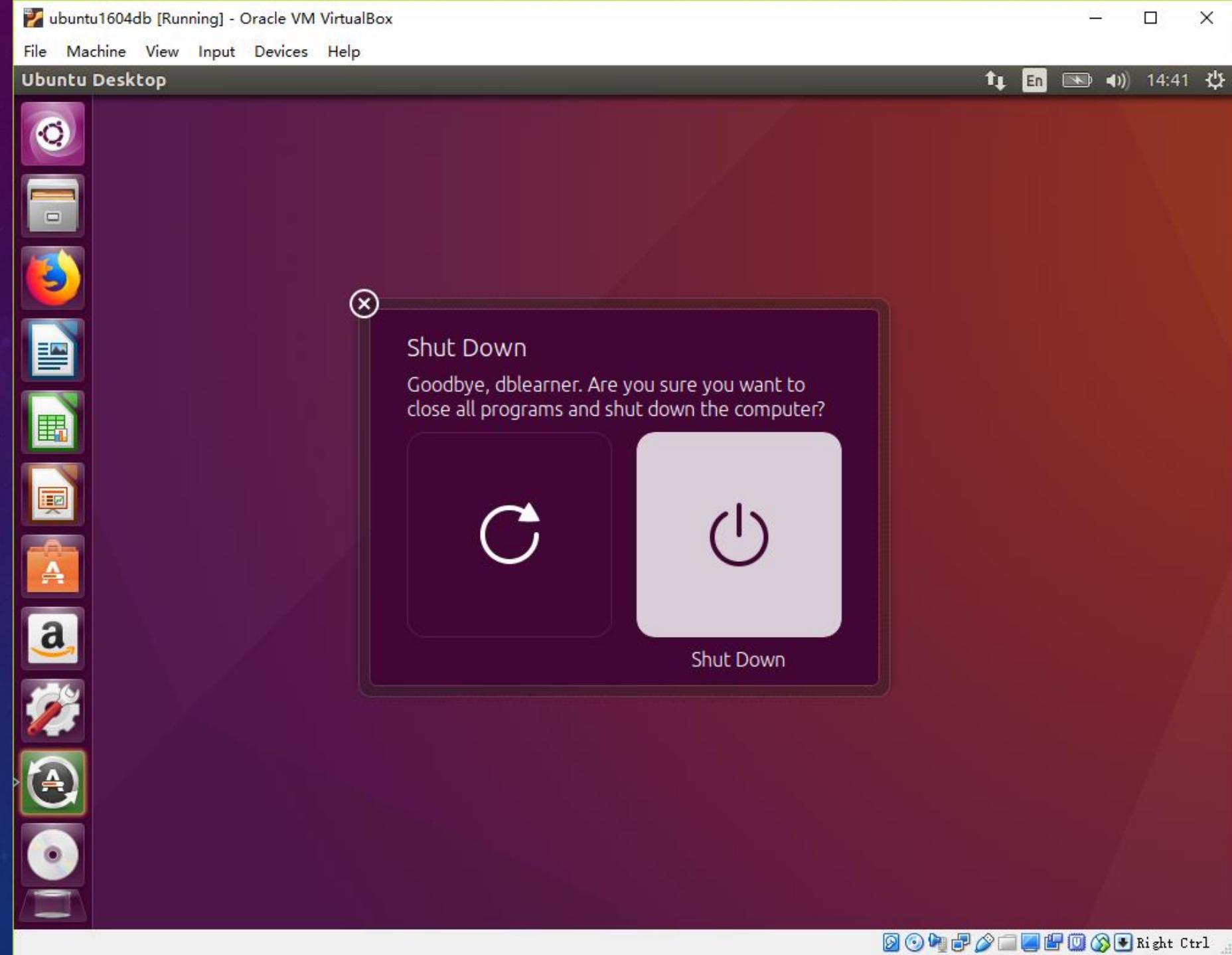
- To enhance guest os
 - Restart

©LXD



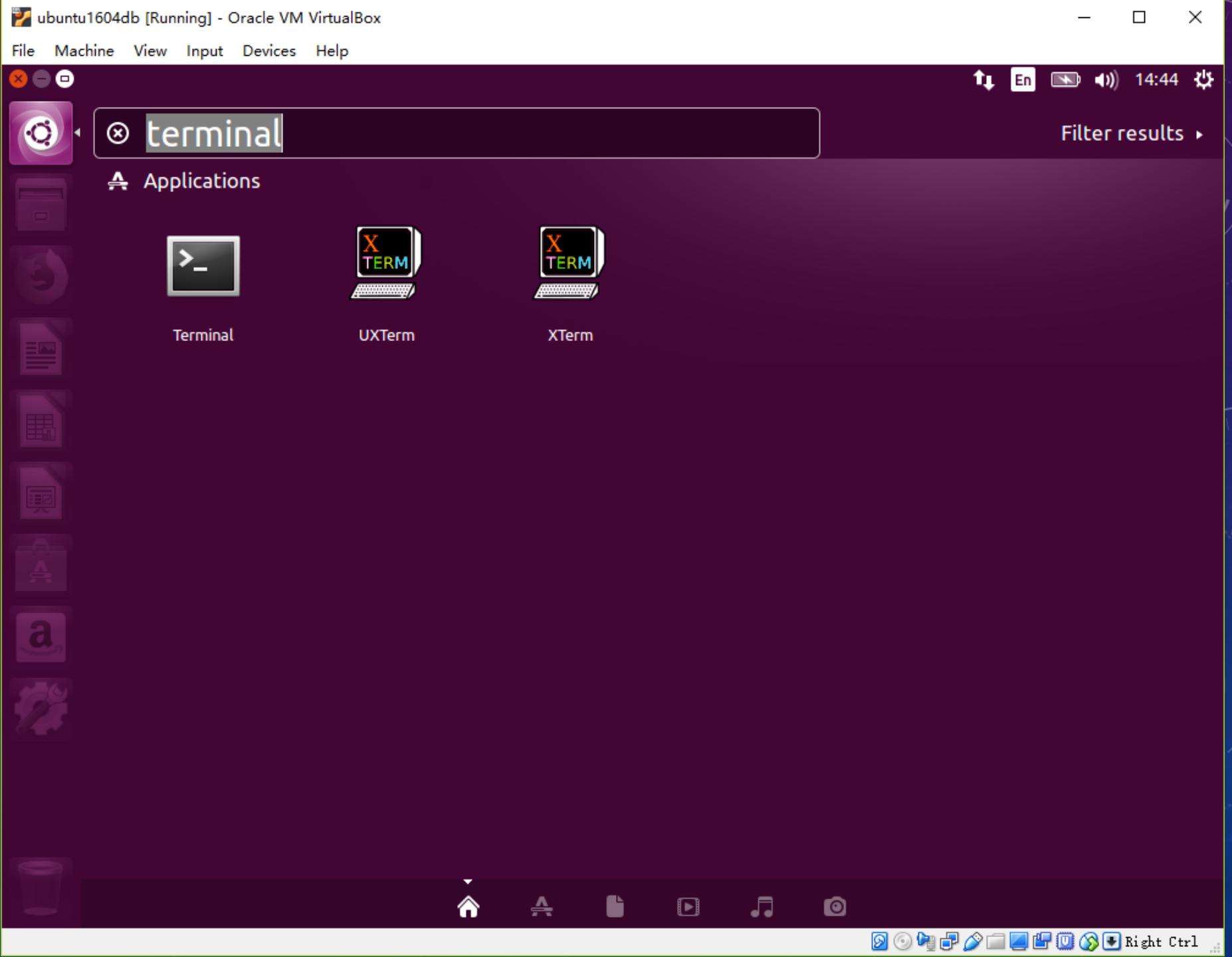
POST- INSTALLATION UBUNTU OS

- To enhance guest os
 - Eject and Restart



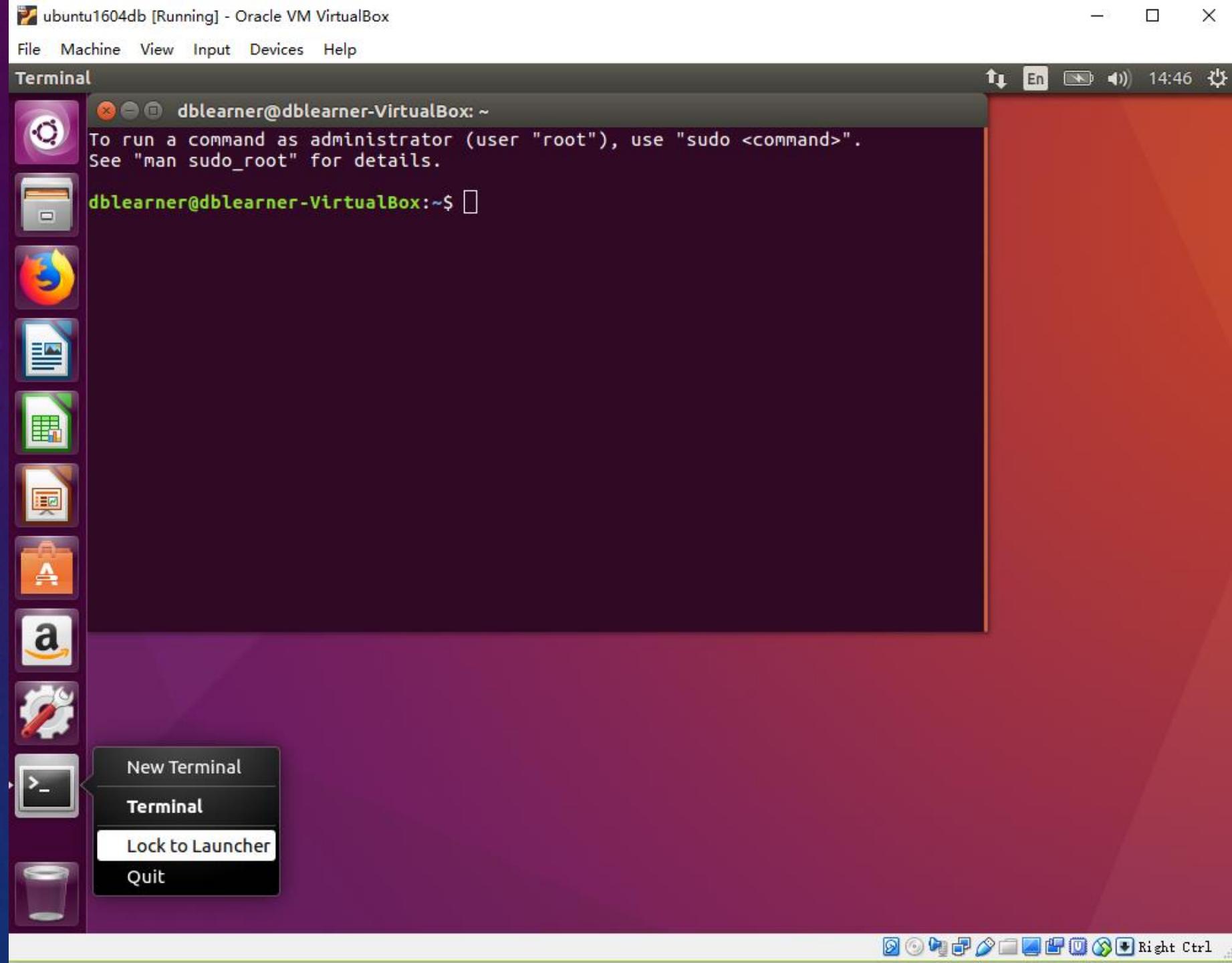
POST- INSTALLATION UBUNTU OS

- Dashboard
 - terminal



POST- INSTALLATIO N UBUNTU OS

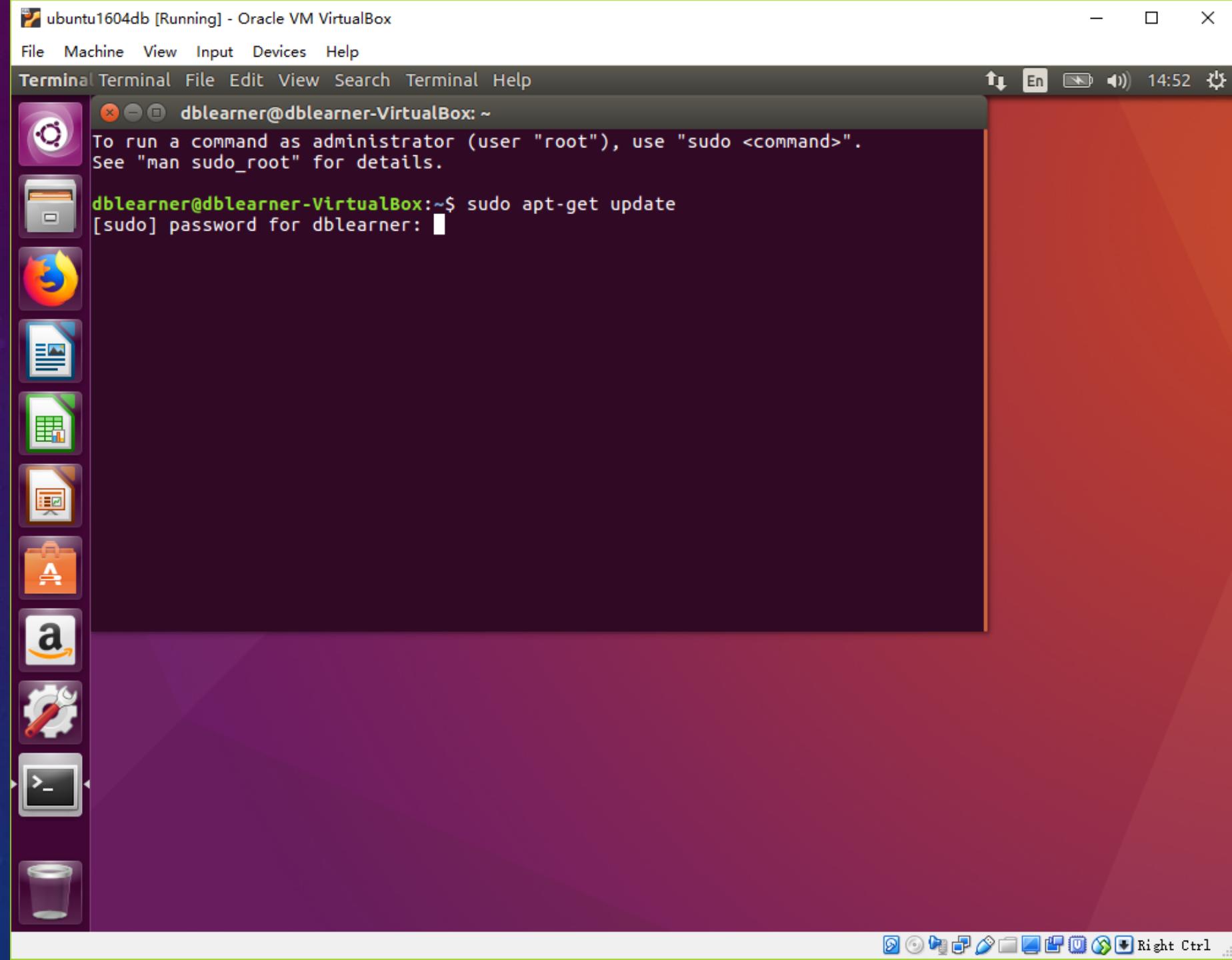
- Dashboard
 - Terminal
 - Lock to launcher



POST- INSTALLATIO N UBUNTU OS

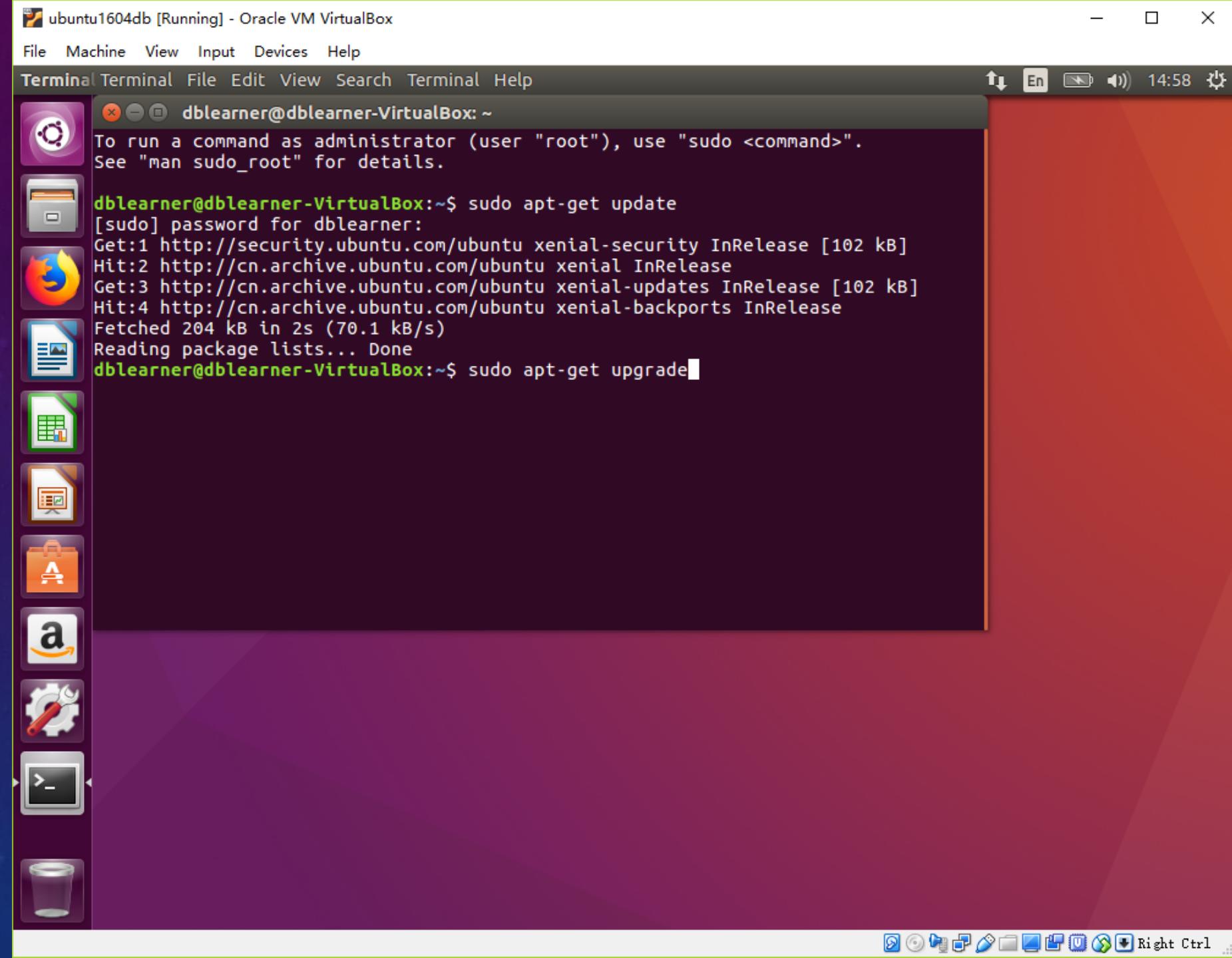
- Dashboard
 - Update OS

©LXD



POST- INSTALLATIO N UBUNTU OS

- Dashboard
 - Update OS



POST- INSTALLATIO N UBUNTU OS

- Dashboard
 - Update OS

©LXD

ubuntu1604db [Running] - Oracle VM VirtualBox

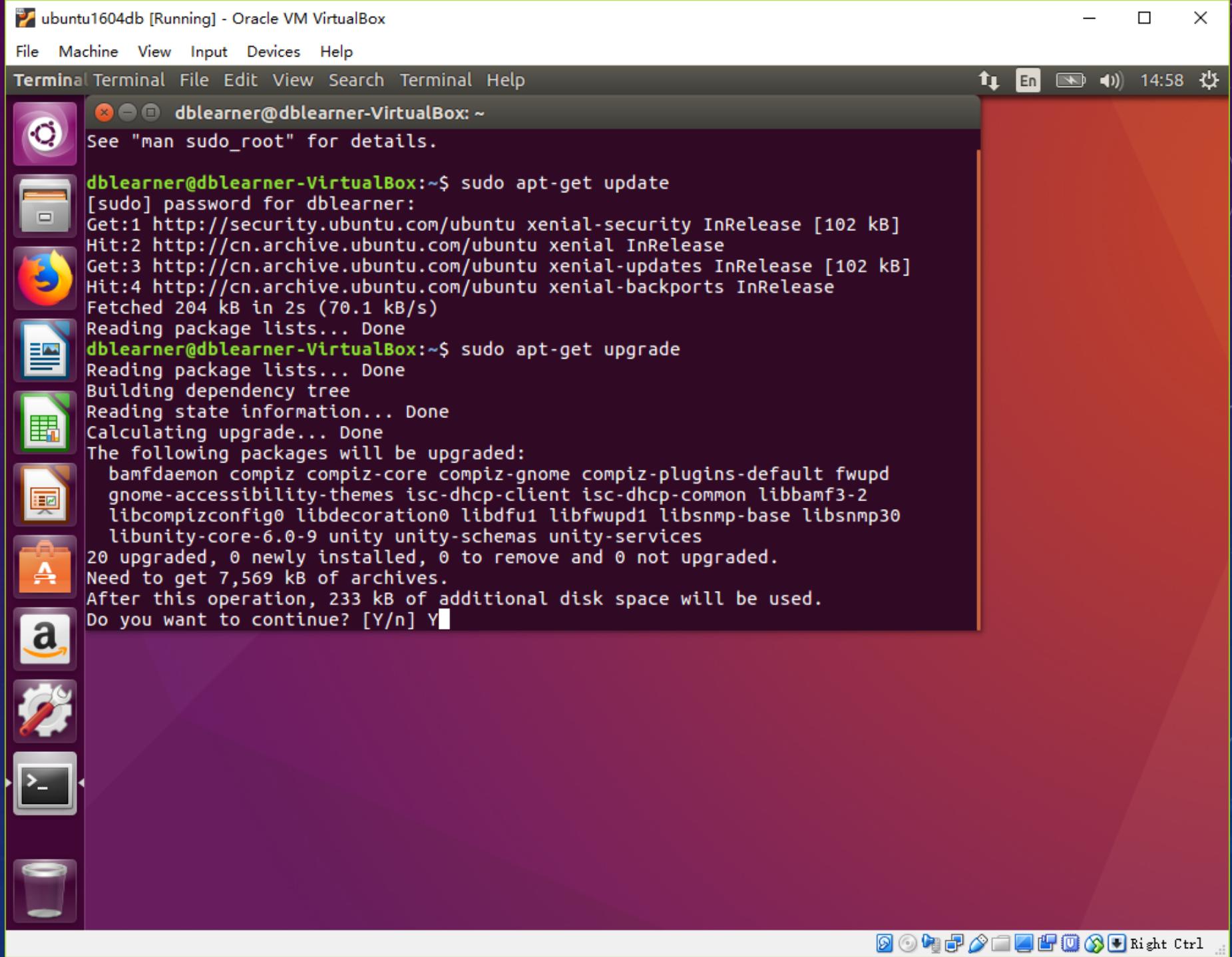
File Machine View Input Devices Help

Terminal Terminal File Edit View Search Terminal Help

See "man sudo_root" for details.

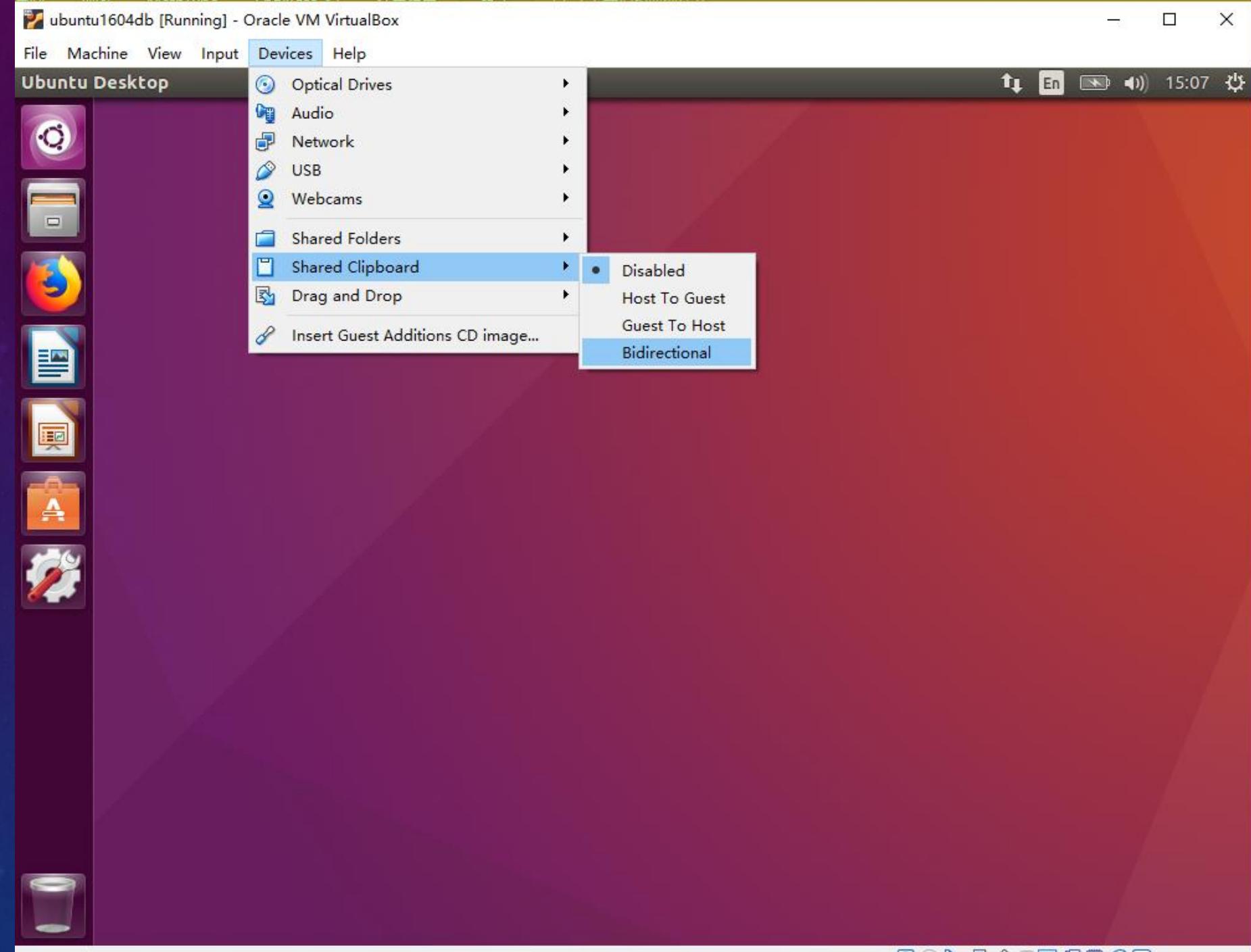
```
dblearner@dblearner-VirtualBox:~$ sudo apt-get update
[sudo] password for dblearner:
Get:1 http://security.ubuntu.com/ubuntu xenial-security InRelease [102 kB]
Hit:2 http://cn.archive.ubuntu.com/ubuntu xenial InRelease
Get:3 http://cn.archive.ubuntu.com/ubuntu xenial-updates InRelease [102 kB]
Hit:4 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



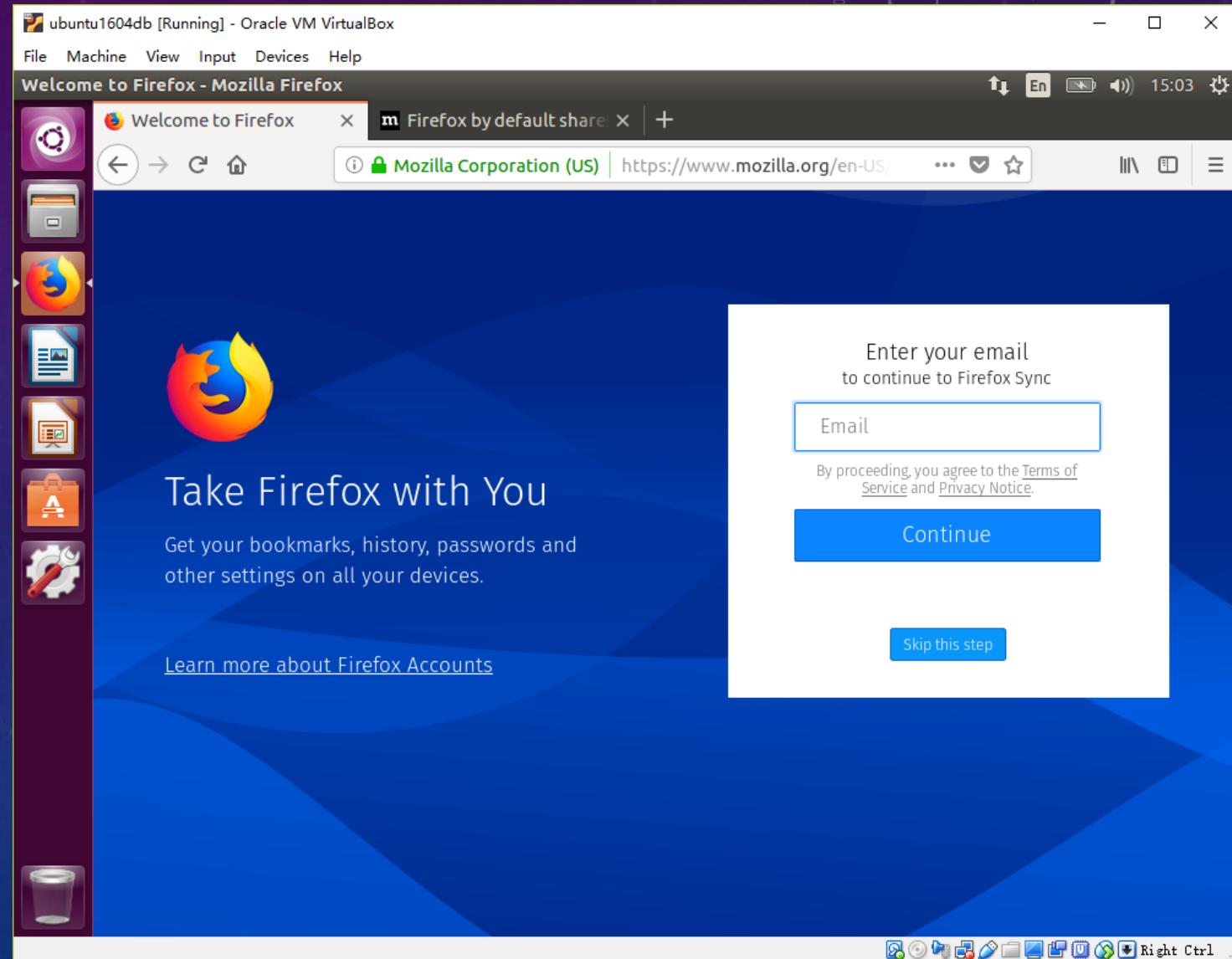
POST- INSTALLATIO N UBUNTU OS

- 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

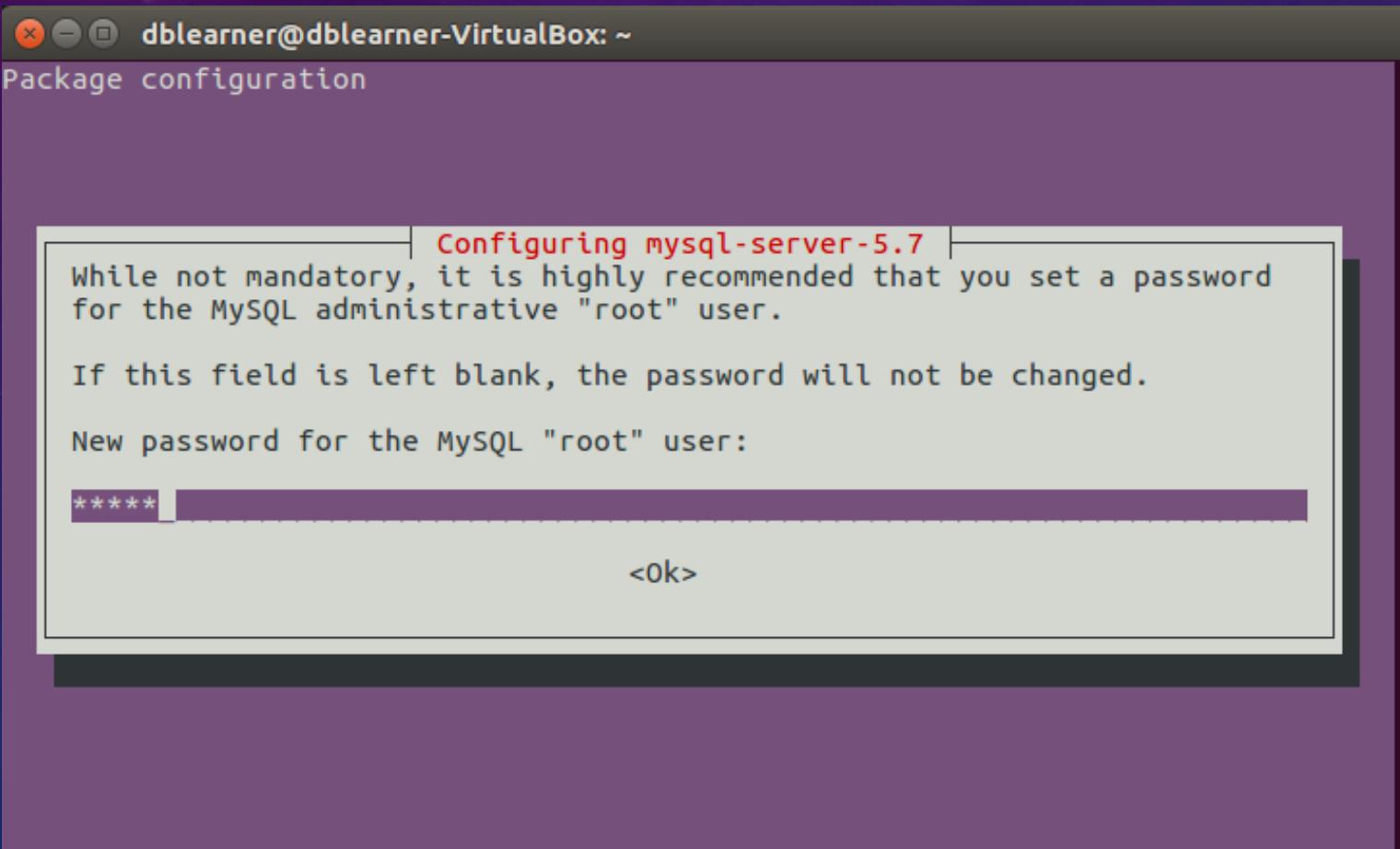
- <https://dev.mysql.com/>

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 running in Oracle VM VirtualBox. A terminal window titled "ubuntu1604db [Running] - Oracle VM VirtualBox" is open. The terminal session starts with the command "mysql -uroot -p", followed by a password prompt. The MySQL monitor then displays its welcome message, including the connection ID (4), server version (5.7.21-0ubuntu0.16.04.1), copyright information (Oracle, 2000-2018), and trademark notices. It also provides help instructions and ends with the MySQL prompt "mysql>".

```
ubuntu1604db [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Terminal Terminal File Edit View Search Terminal Help
x - En 15:32
dblearner@dblearner-VirtualBox: ~
dblearner@dblearner-VirtualBox:~$ mysql -uroot -p
Enter password:
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 (c) 2000, 2018, Oracle and/or its affiliates. All rights reserved.

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

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

mysql> ■
```

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)
```

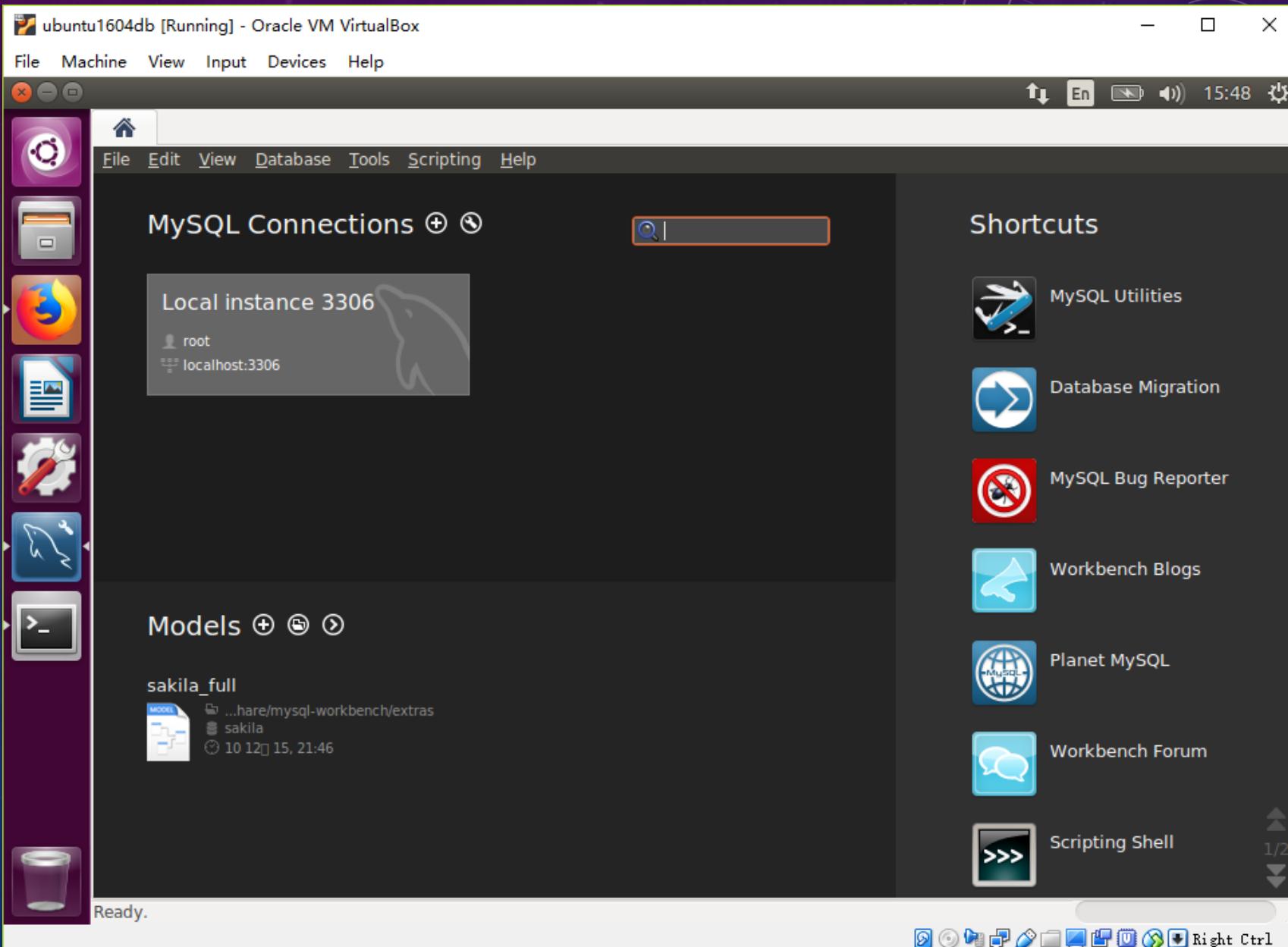
```
mysql>
```

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 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

Query Completed

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 result 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 bottom pane showing the execution history.

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." To the right of the main content, 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 of the form. At the very bottom of the screen, there is a horizontal dock with various application icons.

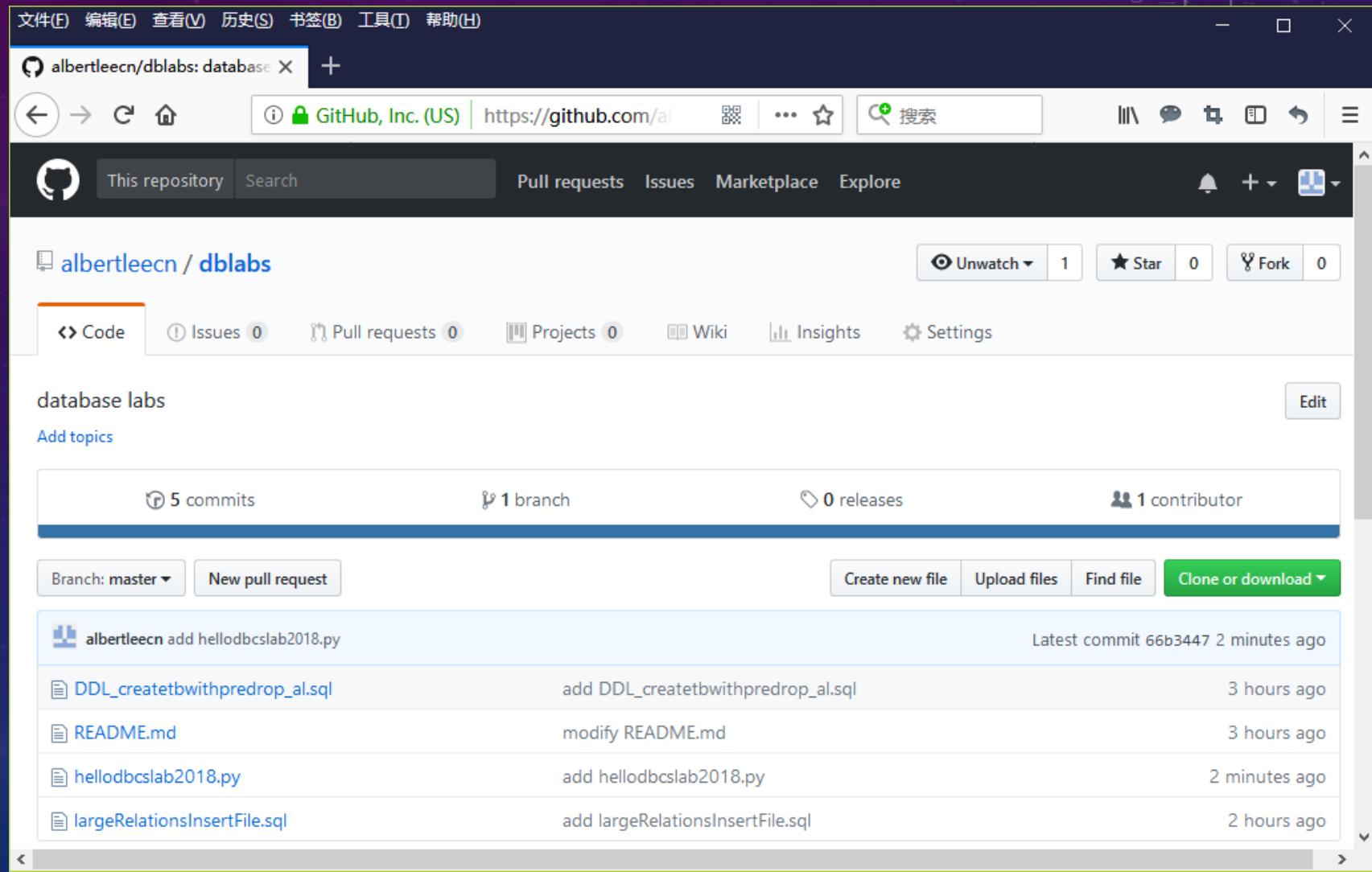
The desktop interface includes a vertical dock on the left containing icons for the terminal, file manager, and other applications. The top bar shows the title "ubuntu1604db [Running] - Oracle VM VirtualBox" and the system tray with icons for battery, signal, and time ("16:17").

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$
```



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, volume, and time (16:20). The left sidebar contains a vertical toolbar with icons for Home, File, Edit, View, Query, Database, Server, Tools, Scripting, and Help. Below the toolbar are sections for 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), and SCHEMAS (sys). A search bar labeled "Filter objects" is also present. The central panel displays the "Local instance 3306" database. A sub-menu titled "Administration - Users and Privileges" is open, showing the "Users and Privileges" table. The table lists four user accounts:

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

On the right side of the "Users and Privileges" panel, there is a form to "Select an account to edit or click [Add Account] to create a new account". The form fields include:

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

At the bottom of the "Users and Privileges" panel are buttons for "Add Account", "Delete", "Refresh", "Revert", and "Apply". The status bar at the bottom of the window shows "SQL Editor Opened." and a series of small application icons.

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'.

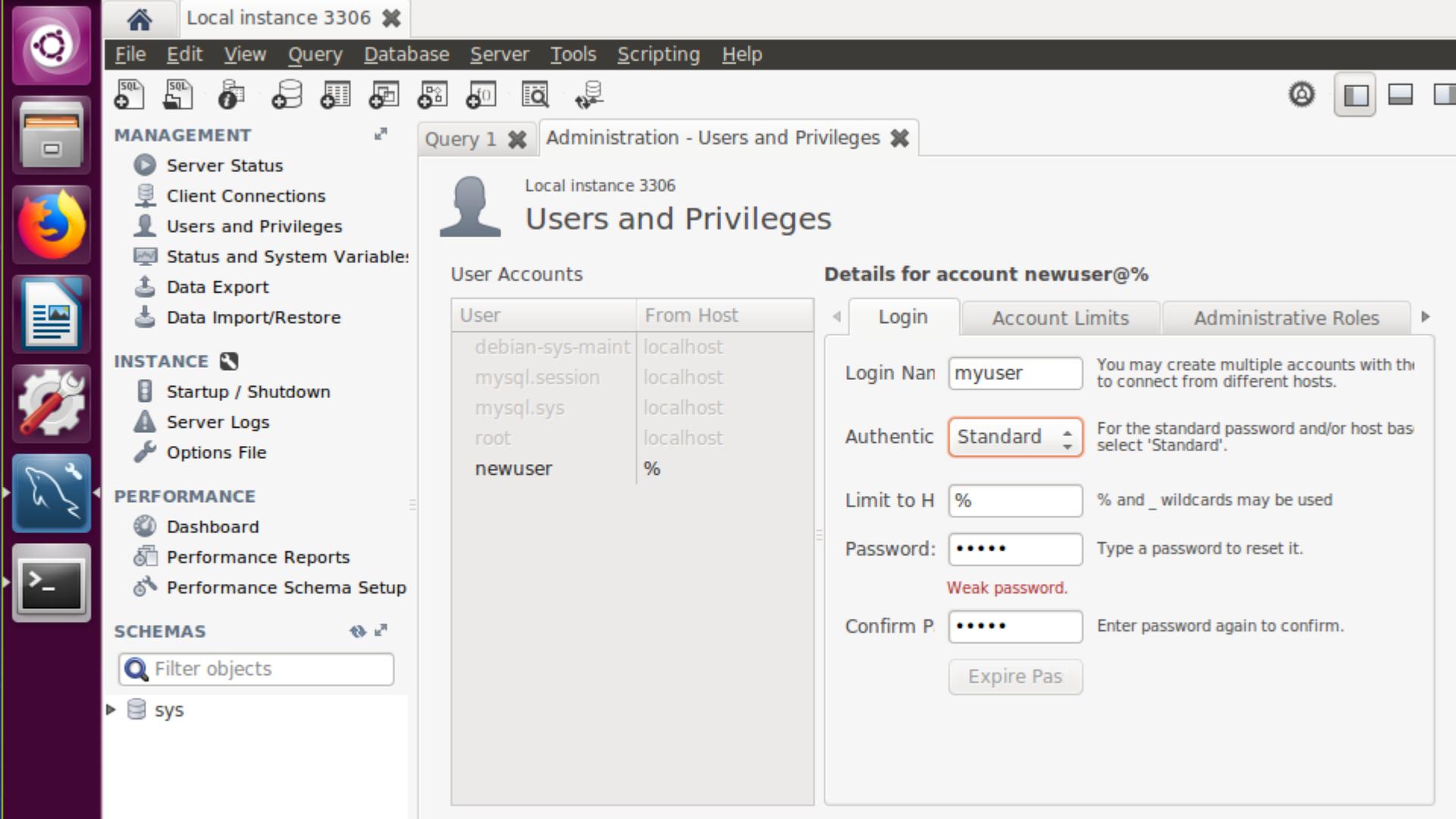
Limit to Host: % and _ wildcards may be used

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 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 area displays a table of User Accounts:

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

The "newuser" account is selected. On the right, the "Details for account newuser@%" dialog is open, showing the "Login" tab. The "Role" section has a checkbox for "DBA" which is checked and highlighted with a red circle. Below it is a list of other roles: MaintenanceAdmin, ProcessAdmin, UserAdmin, SecurityAdmin, MonitorAdmin, DBManager, DBDesigner, ReplicationAdmin, and BackupAdmin, all of which are checked. To the right of the roles is a "Global Privileges" section containing a long list of checked checkboxes, including ALTER, ALTER ROUTINE, CREATE, CREATE ROUTINE, CREATE TABLESPACE, CREATE TEMPORARY TABLES, CREATE USER, CREATE VIEW, DELETE, DROP, and EVENT.

At the bottom of the dialog are buttons for "Revert" and "Apply".

MYSQL: IMPORT DATA OF LABS

- New Connection

ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

MySQL Workbench Local instance 3306

File Edit View Query Database Server Tools Scripting Help

Connect to Database... Ctrl+U

Manage Connections...

Reverse Engineer... Ctrl+R

Schema Transfer Wizard...

Migration Wizard...

Edit Type Mappings for Generic Migration...

Search Table Data...

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

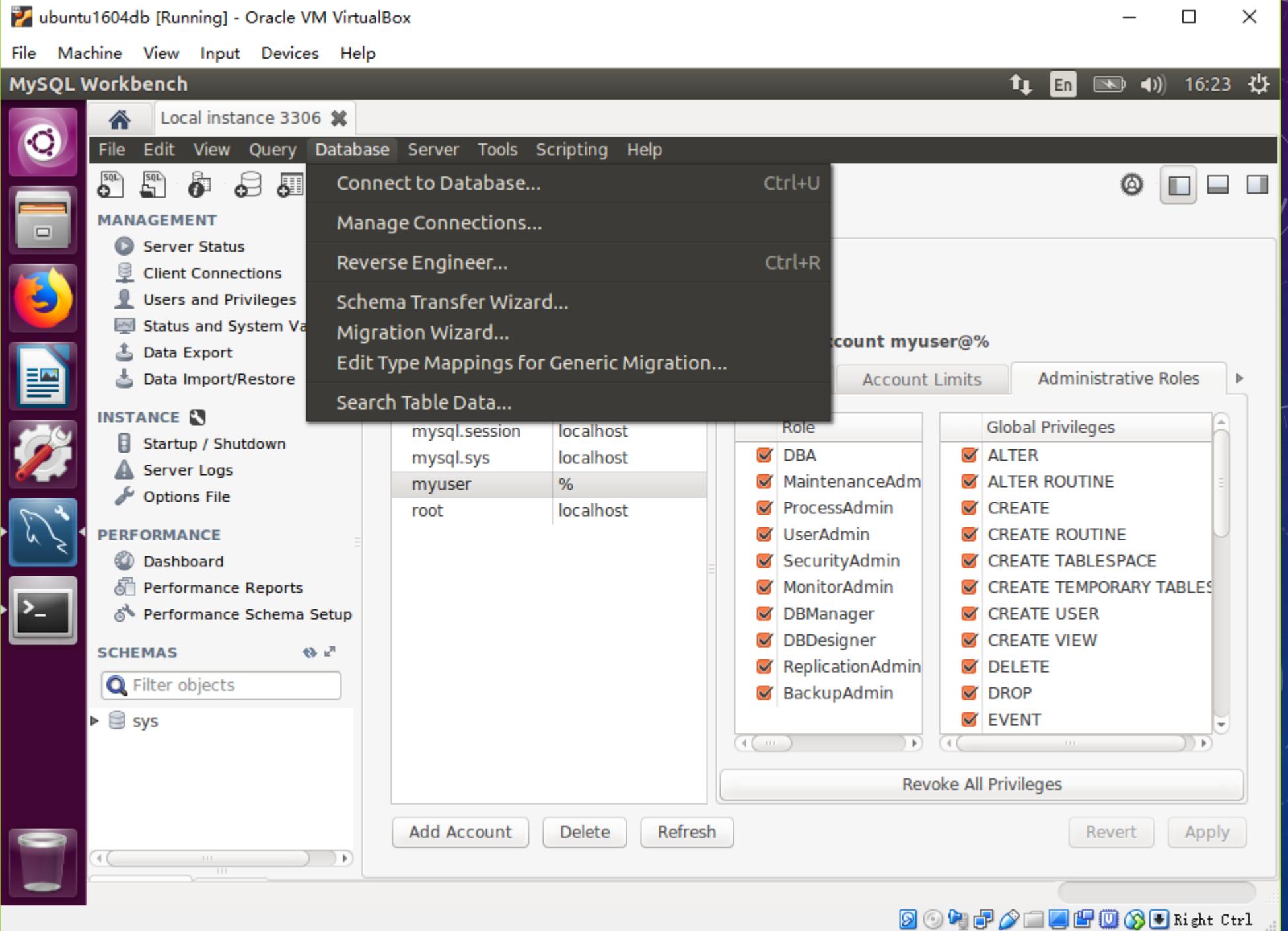
Account myuser@%

Account Limits Administrative Roles

	Role	Global Privileges
myuser.session	localhost	<input checked="" type="checkbox"/> ALTER <input checked="" type="checkbox"/> ALTER ROUTINE <input checked="" type="checkbox"/> CREATE <input checked="" type="checkbox"/> CREATE ROUTINE <input checked="" type="checkbox"/> CREATE TABLESPACE <input checked="" type="checkbox"/> CREATE TEMPORARY TABLES <input checked="" type="checkbox"/> CREATE USER <input checked="" type="checkbox"/> CREATE VIEW <input checked="" type="checkbox"/> DELETE <input checked="" type="checkbox"/> DROP <input checked="" type="checkbox"/> EVENT
mysql.sys	localhost	
myuser	%	
root	localhost	

Add Account Delete Refresh Revert Apply

Right Ctrl



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



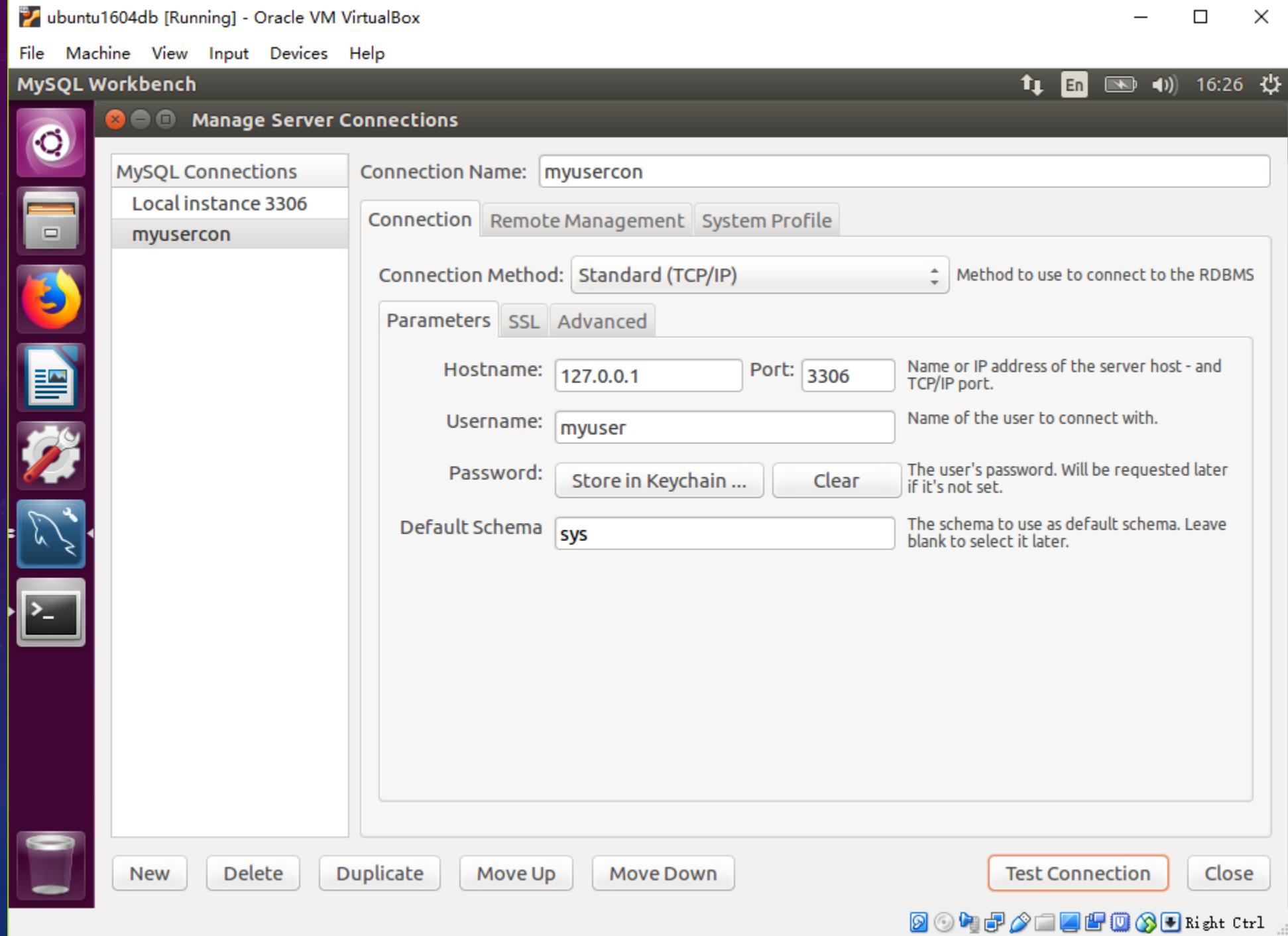
En 16:24

Right Ctrl

This screenshot shows the MySQL Workbench application running on a Linux desktop. The main window title is "ubuntu1604db [Running] - Oracle VM VirtualBox". The menu bar includes File, Machine, View, Input, Devices, and Help. The top right corner shows system status icons for battery, signal, and volume, along with the time "16:24" and a gear icon. The main panel is titled "MySQL Workbench" and "Manage Server Connections". On the left, there's a vertical toolbar with icons for Ubuntu, Terminal, Firefox, Document, Gear/Wrench, Dolphin, and a terminal. The central area shows a list of MySQL connections, with "Local instance 3306" selected. The connection details are displayed in a form: Connection Name is "Local instance 3306", the Connection tab is active, and the "Do not use remote management" radio button is selected. The Hostname is "localhost", the Username is "dblearner", and the Password is stored in a keychain. There are options for "Authenticate Using SSH Key" and "Remove from Keychain". At the bottom, there are buttons for New, Delete, Duplicate, Move Up, Move Down, Test Connection, and Close.

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

Models

- sakila_full
 - ...hare/mysql-workbench/extras
 - sakila

SQL Editor closed

Shortcuts

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

1/2

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

Models

- sakila_full
 - ...hare/mysql-workbench/extras
 - sakila

SQL Editor closed

Shortcuts

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

1/2

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

Create a new schema in the connected server

1

Action Output

	Time	Action	Message
SQL Editor Opened.			

The screenshot shows the MySQL Workbench interface running on an Ubuntu 16.04 host within a VirtualBox VM. The main window title is 'myusercon'. The left sidebar has a 'MANAGEMENT' section with options like Server Status, Client Connections, and Data Import/Restore. Below it are sections for INSTANCE, PERFORMANCE, and SCHEMAS. Under SCHEMAS, there's a 'sys' entry. A tooltip 'Create a new schema in the connected server' is displayed over the '+' icon in the toolbar. The bottom status bar says 'SQL Editor Opened.' and shows system icons for battery, signal, and volume.

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' section of the left sidebar, which includes icons for Server Status, Client Connections, Users and Privileges, Status and System Variables, Data Export, and Data Import/Restore. A central panel titled 'Query 1' shows a configuration dialog for creating a new schema. The 'Name:' field is set to 'dbsclab2018'. Below it, the 'Default Collation:' dropdown is set to 'utf8 - utf8_bin'. A large red annotation in the center-right of the screen reads:
**CREATE SCHEMA `dbsclab2018` DEFAULT
CHARACTER SET utf8 COLLATE utf8_bin ;**

MySQL Workbench

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

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

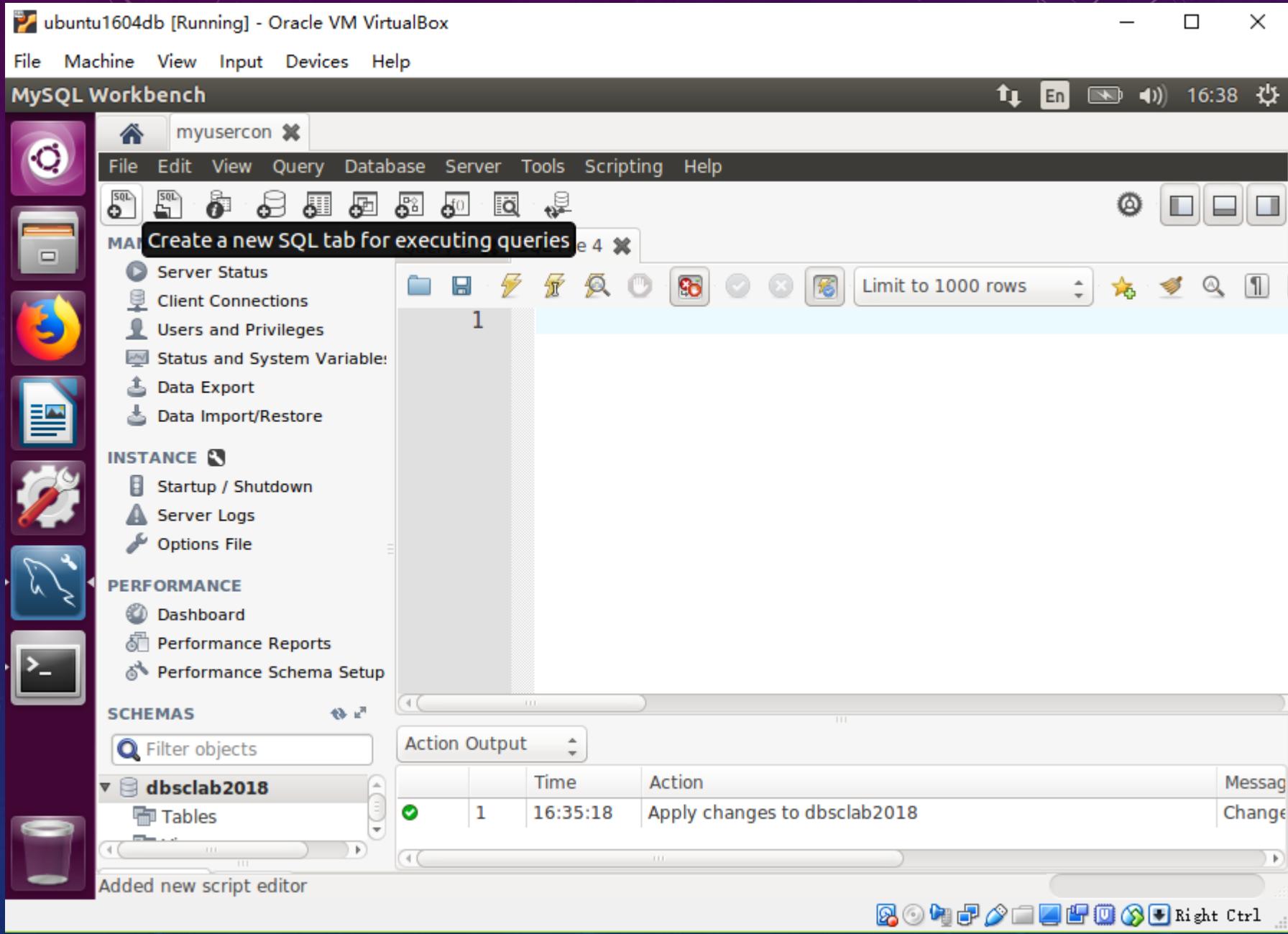
- MySQL Utilities
- Database Migration
- MySQL Bug Reporter
- Workbench Blogs
- Planet MySQL
- Workbench Forum
- Scripting Shell

©LXD

Server Profile Manager Opened.

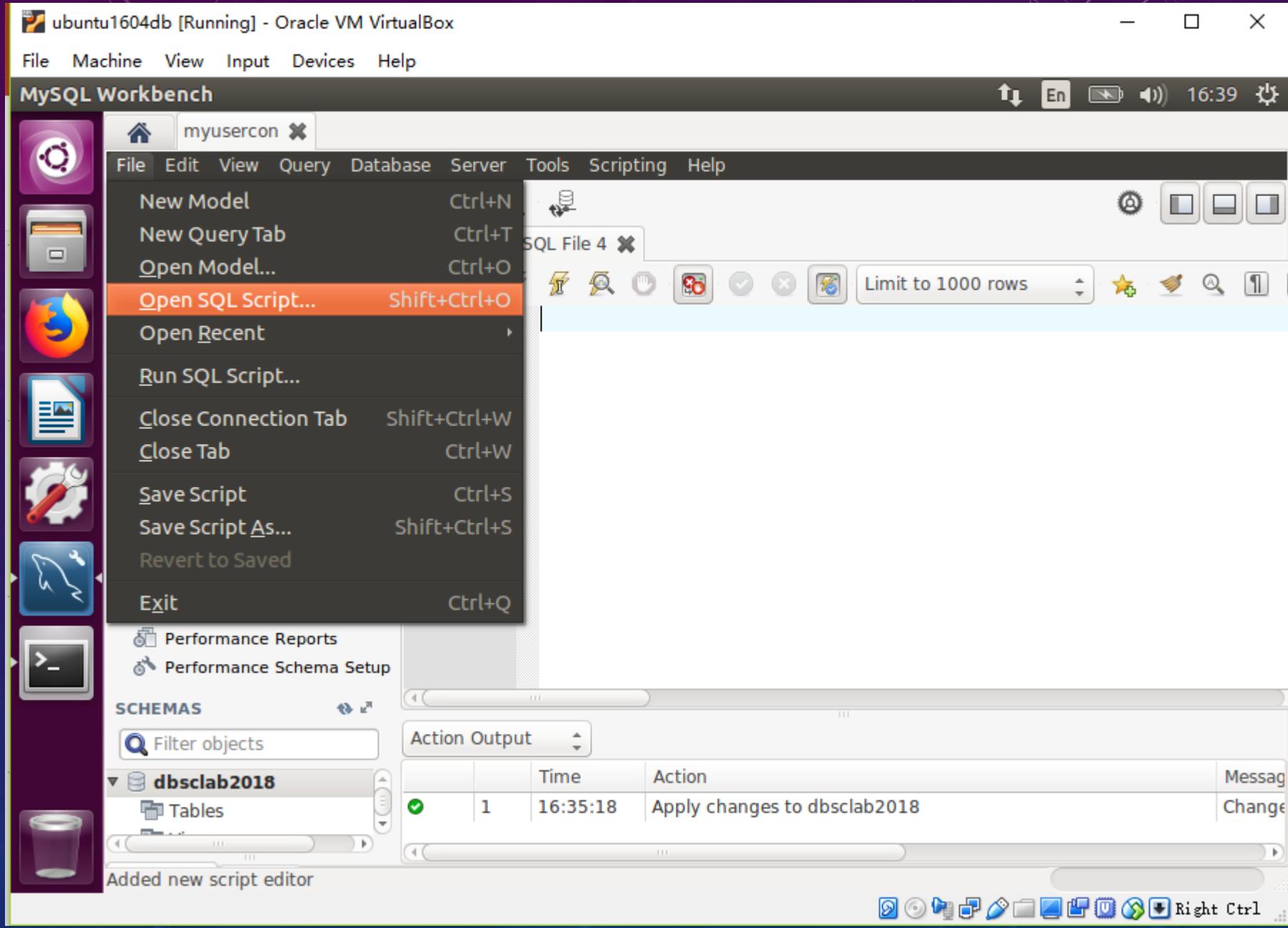
MYSQL: IMPORT DATA OF LABS

- New DB
 - dbsclab2018



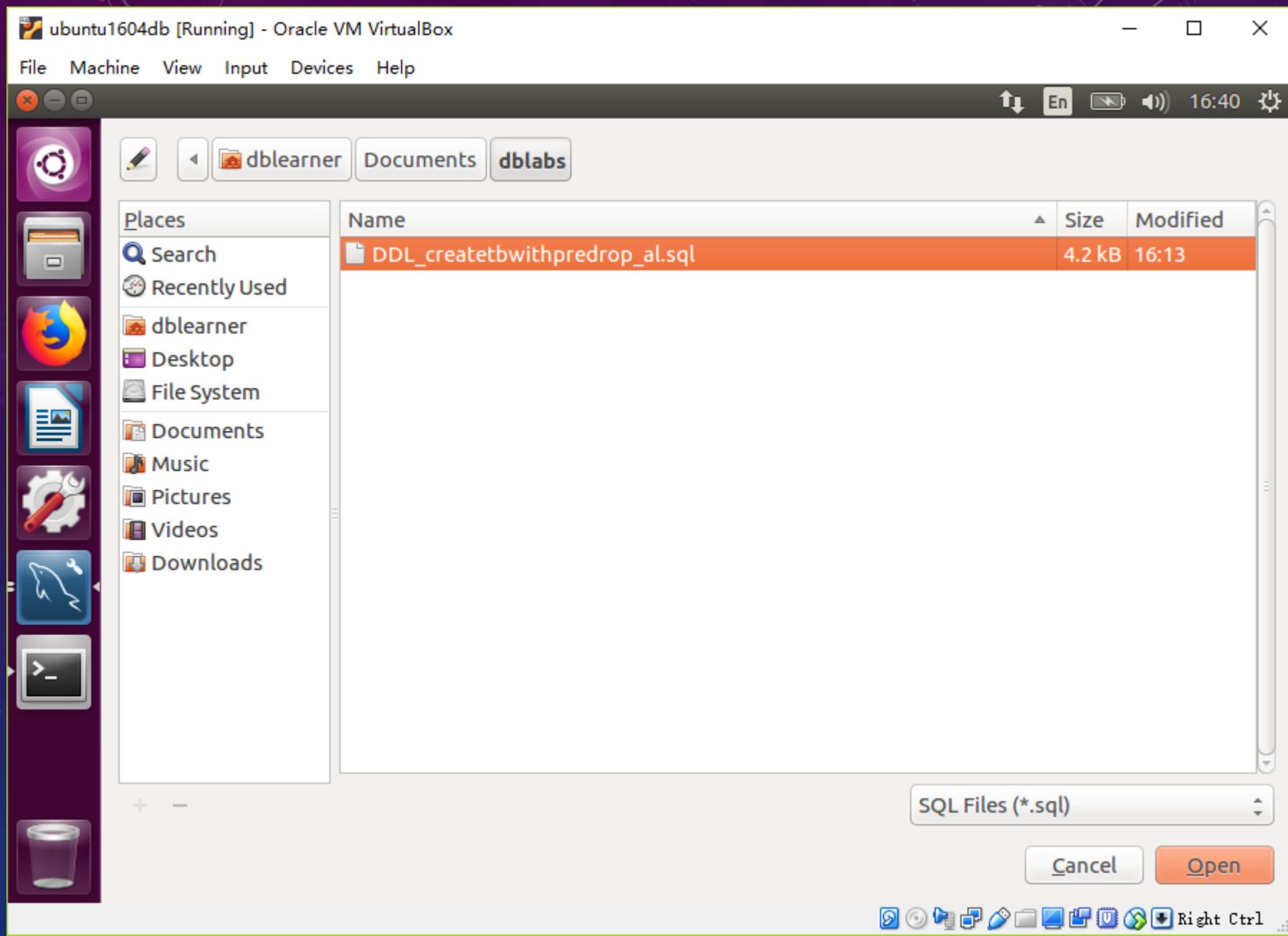
MYSQL: IMPORT DATA OF LABS

- 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

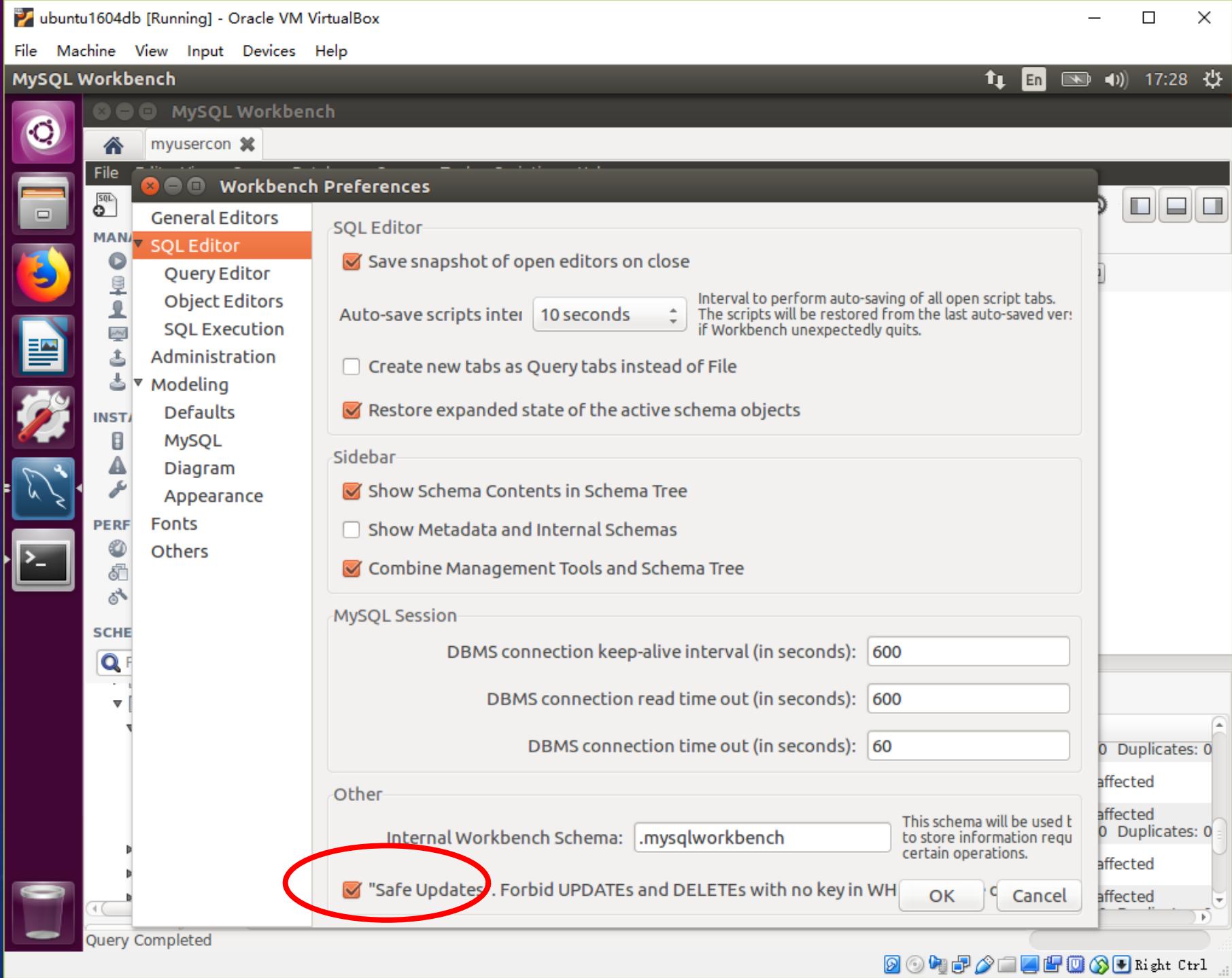
The screenshot shows the MySQL Workbench interface running on an Ubuntu 16.04 VM. The main window title is "ubuntu1604db [Running] - Oracle VM VirtualBox". The MySQL Workbench title bar says "MySQL Workbench". The left sidebar has a "myusercon" connection selected. The "MANAGEMENT" section includes Server Status, Client Connections, Users and Privileges, Status and System Variables, Data Export, and Data Import/Restore. The "INSTANCE" section includes Startup / Shutdown, Server Logs, and Options File. The "PERFORMANCE" section includes Dashboard, Performance Reports, and Performance Schema Setup. The "SCHEMAS" section shows the "instructor" schema expanded, with "Columns" and "ID" listed. The central area has a "Query 2" tab with the query: "select ID, name, dept_name from instructor;". The "Result Grid" shows a single row with columns #, ID, name, and dept_name, all containing NULL. Below the grid is a "instructor 3" table. The "Action Output" panel at the bottom shows a single entry: "Time" 16:43:59, "Action" "select ID, name, dept_name from instructor LIMIT 0, 1000", and "Mess" 0 row.

#	ID	name	dept_name
*	NULL	NULL	NULL

instructor 3		
Action Output	Time	Action
35	16:43:59	select ID, name, dept_name from instructor LIMIT 0, 1000
		Mess
		0 row

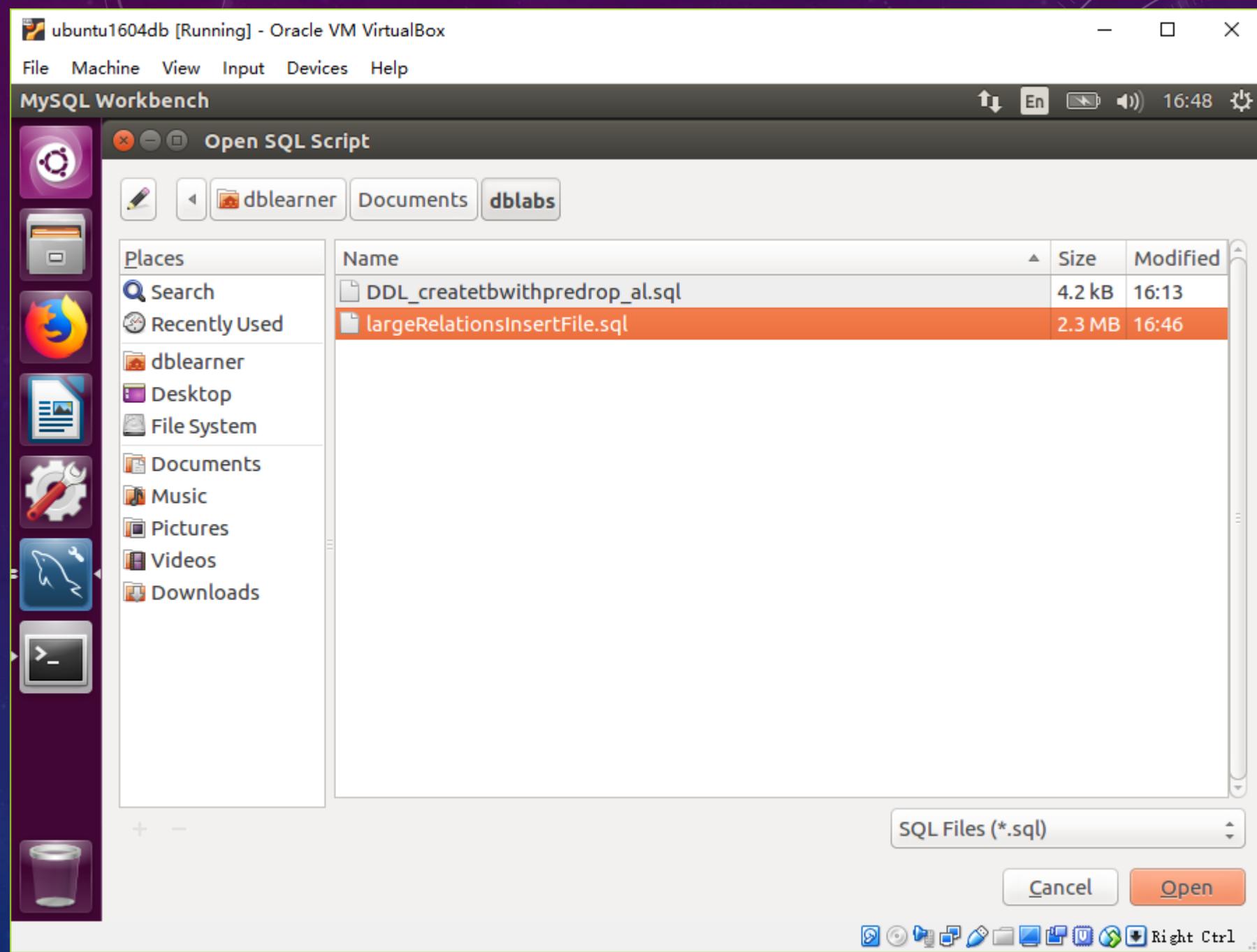
MYSQL: IMPORT DATA OF LABS

- 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 block of SQL code intended for batch importing data into a database named 'dbsclab2018'. The code consists of two parts: first, it performs a series of 'DELETE' operations to remove existing data from tables like 'prereq', 'time_slot', 'advisor', etc. Second, it executes a series of 'INSERT INTO' statements to insert new data into the 'time_slot' table, specifying values for columns such as day ('A', 'M', 'W', 'F'), month ('8', '0', '8', '0'), hour ('8', '0', '8', '0'), minute ('50', '50', '50', '50'), and second ('50', '50', '50', '50').

```
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;
```

DB CLIENTS: PYTHON

- python
 - 2.7
- python3
 - 3.5
- MySQL-python lib
 - sudo apt-get install python-pip
 - sudo pip install --upgrade pip
 - sudo pip install MySQL-python

MYSQL CLIENTS: PYTHON

```
$ cat hellodbcslab2018.py
```

```
#!/usr/bin/python  
import MySQLdb  
db = MySQLdb.connect("localhost","myuser","mypwd","dbsclab2018" )  
cursor = db.cursor()  
cursor.execute('SELECT name,dept_name from instructor')  
data = cursor.fetchall()  
for row in data:  
    print "%s, %s" %row  
db.close()
```

```
$
```

```
©LXD
```

```
$ python hellodbcslab2018.py  
Lembr, Accounting  
Bawa, Athletics  
...  
$
```

POSTGRESQL

<https://www.postgresql.org/>

The screenshot shows the official PostgreSQL website at <https://www.postgresql.org/>. The page features a dark header with a light blue bar containing the PostgreSQL logo and the text "PostgreSQL: The world's most advanced open source database". Below the header is a navigation menu with links to Home, About, Download, Documentation, Community, Developers, Support, and Your account. The main content area highlights the release of PostgreSQL 10.3 on March 1st, 2018. It includes a summary of the release, links to the Release Announcement, Release Notes, a guide to CVE-2018-1058, and a download link. To the right, there are sections for "LATEST RELEASES" (listing versions 10.3, 9.6.8, 9.5.12, 9.4.17, and 9.3.22), "SHORTCUTS" (links to Security, International Sites, Mailing Lists, Wiki, Report a Bug, and FAQs), and "SUPPORT US" (a note about PostgreSQL being free and a link to make a donation). A large image of a PostgreSQL elephant statue is positioned on the right side of the main content area.

文件(F) 编辑(E) 查看(V) 历史(S) 书签(B) 工具(T) 帮助(H)

PostgreSQL: The world's most advanced open source database.

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1st March 2018

PostgreSQL 10.3 Released!

The PostgreSQL Global Development Group has released an update to all supported versions of our database system, including 10.3, 9.6.8, 9.5.12, 9.4.17, and 9.3.22.

This release centers around added documentation that describes [CVE-2018-1058](#) and how to take steps to mitigate the impact on PostgreSQL databases. There are also several bug fixes included in the release. All users using the affected versions of PostgreSQL should update as soon as possible.

» [Release Announcement](#)
» [Release Notes](#)
» [A Guide to CVE-2018-1058](#)
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> FEATURED USER

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POSTGRESQL: INSTALLATION 1/3

- \$sudo apt-get -y install postgresql postgresql-contrib phppgadmin
- \$sudo su
- #su - postgres
- \$psql

\password postgres;

ENTER YOUR PASSWORD ...

\q

- \$exit

POSTGRESQL: INSTALLATION 2/3

- Config apache2

```
$vi /etc/apache2/conf-available/phppgadmin.conf
```

To comment 'Require local' #Require local

To add new line:allow from all

- Config phpPgAdmin

```
$vi /etc/phppgadmin/config.inc.php
```

To find \$conf['extra_login_security'] = true and change true to false

POSTGRESQL: INSTALLATION 3/3

- Reboot PostgreSQL and Apache2

```
$systemctl restart postgresql
```

```
$systemctl restart apache2
```

- In www browser

<http://localhost/phppgadmin>

ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

File Edit View History Bookmarks Tools Help

localhost/phppgadmin/

PostgreSQL 9.5.12 running on localhost:5432 -- You are logged in as user "postgres"

phpPgAdmin: PostgreSQL?

Databases? Roles? Tablespaces? Export

Database	Owner	Encoding	Collation	Character Type	Tablespace	Size	Actions			Comment
postgres	postgres	UTF8	en_US.UTF-8	en_US.UTF-8	pg_default	6984 kB	Drop	Privileges	Alter	default administrative connection database

Actions on multiple lines

Select all / Unselect all --- Execute

Create database

back to top

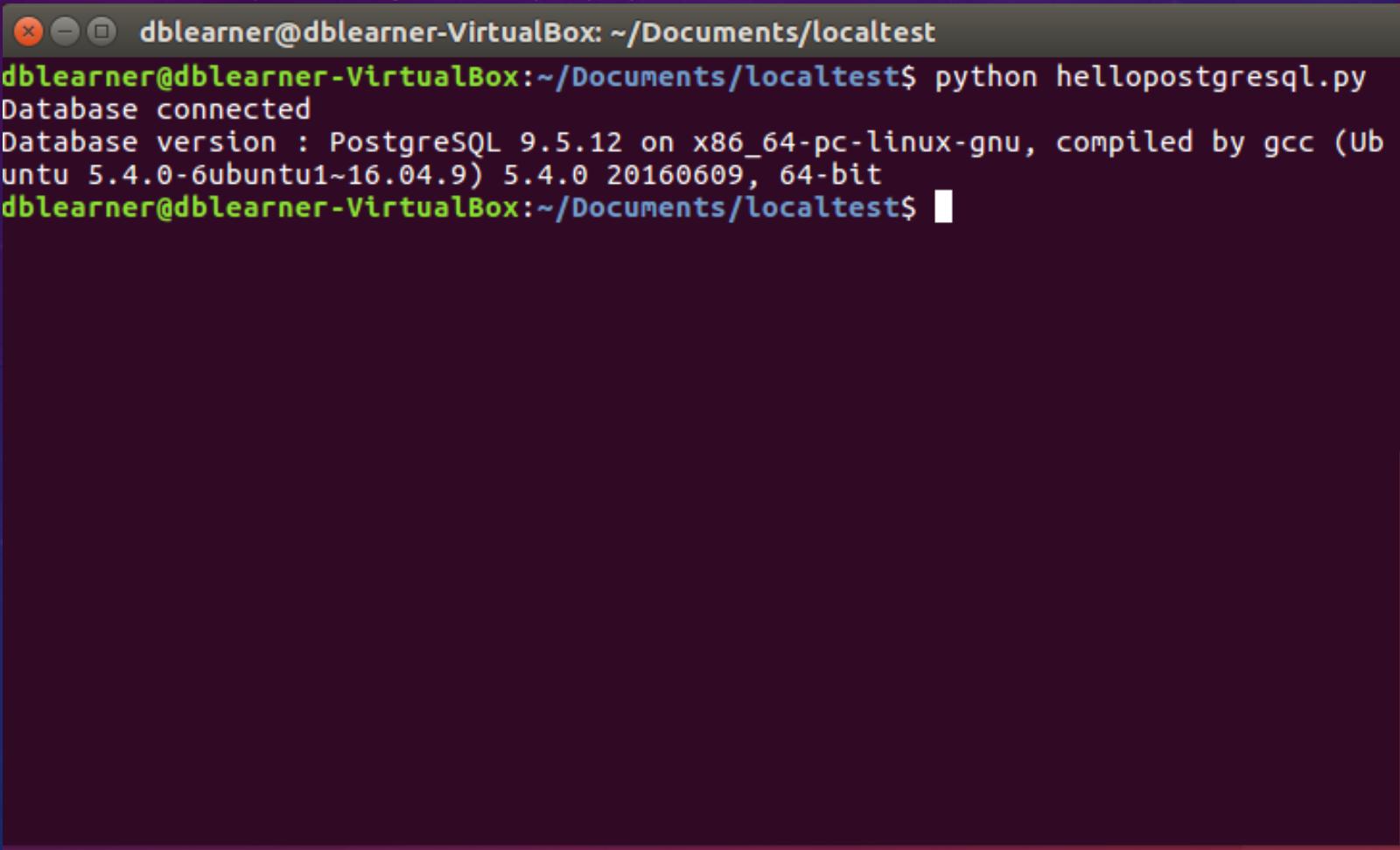
The image shows a screenshot of an Ubuntu 16.04 LTS desktop environment running inside Oracle VM VirtualBox. The desktop has a dark blue theme with a circular clock widget on the right side. A vertical dock on the left contains icons for various applications like Dash, Home, and System Settings. A window titled 'phpPgAdmin' is open, displaying the PostgreSQL 9.5.12 administration interface. The main pane shows the 'Databases?' tab selected, listing the 'postgres' database with its details: Owner (postgres), Encoding (UTF8), Collation (en_US.UTF-8), Character Type (en_US.UTF-8), Tablespace (pg_default), and Size (6984 kB). Action buttons for Drop, Privileges, and Alter are available for the database. Below the table, there's a section for 'Actions on multiple lines' with 'Select all / Unselect all' and an 'Execute' button. At the bottom, there's a 'Create database' link. The top bar includes standard file menu items and system status indicators.

POSTGRESQL CLIENTS: PYTHON 1/2

```
$ cat hellopostgresql.py
#!/usr/bin/python
import psycopg2
dbconn = psycopg2.connect(database="postgres", user="postgres", password="mypwd",
host="127.0.0.1", port="5432")
print "Database connected"
cursor = dbconn.cursor()
cursor.execute("SELECT VERSION()")
data = cursor.fetchone()
print "Database version : %s " % data
dbconn.close()
```

POSTGRESQL CLIENTS: PYTHON 2/2

- \$ sudo pip install psycopg2-binary
- \$ python hellopostgresql.py



```
dblerner@dblerner-VirtualBox: ~/Documents/localtest
dblerner@dblerner-VirtualBox:~/Documents/localtest$ python hellopostgresql.py
Database connected
Database version : PostgreSQL 9.5.12 on x86_64-pc-linux-gnu, compiled by gcc (Ubuntu 5.4.0-6ubuntu1~16.04.9) 5.4.0 20160609, 64-bit
dblerner@dblerner-VirtualBox:~/Documents/localtest$
```

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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