

# DATABASE SYSTEM PRINCIPLE – ENVIRONMENT FOR LAB

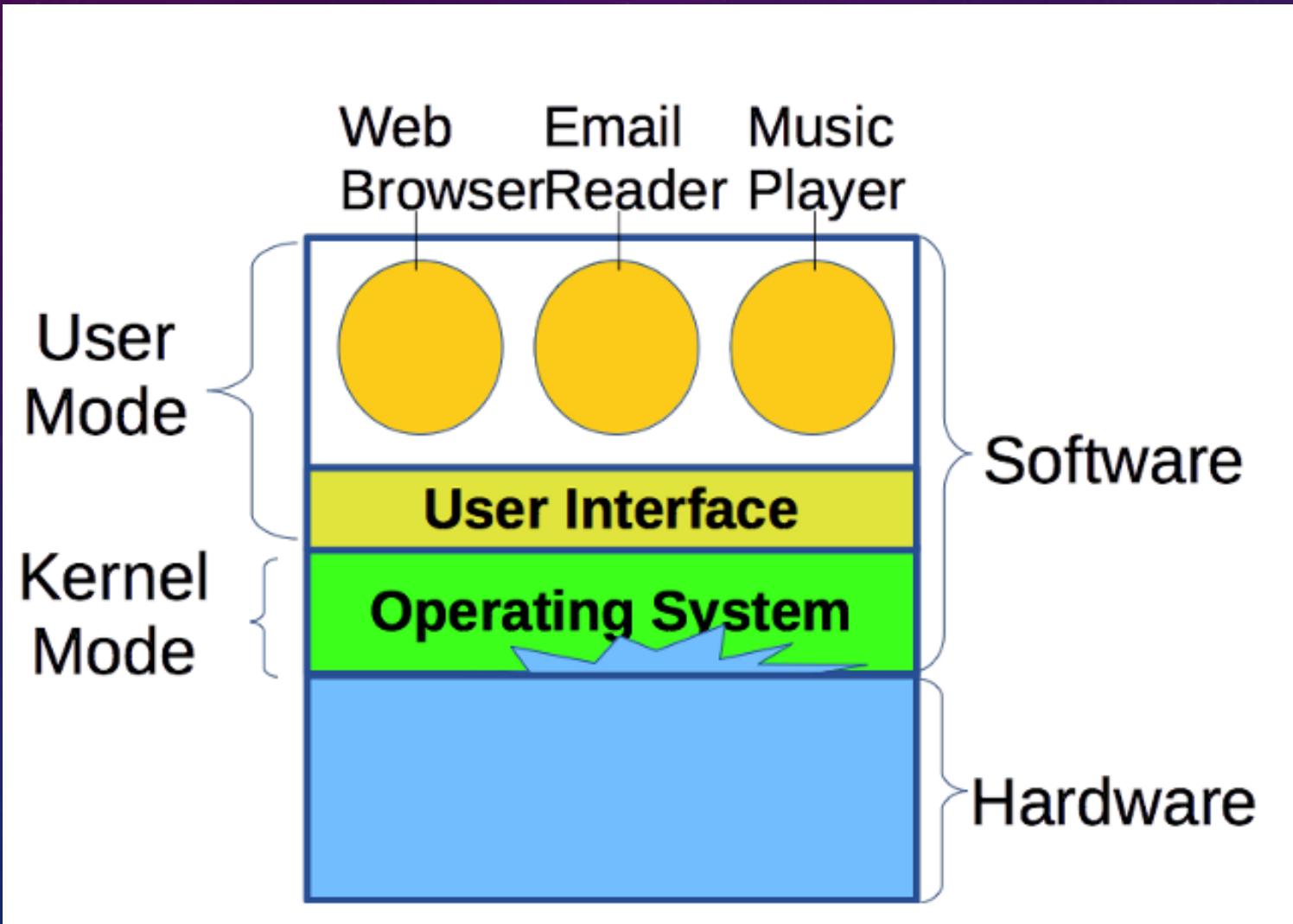
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NANKAI UNIVERSITY

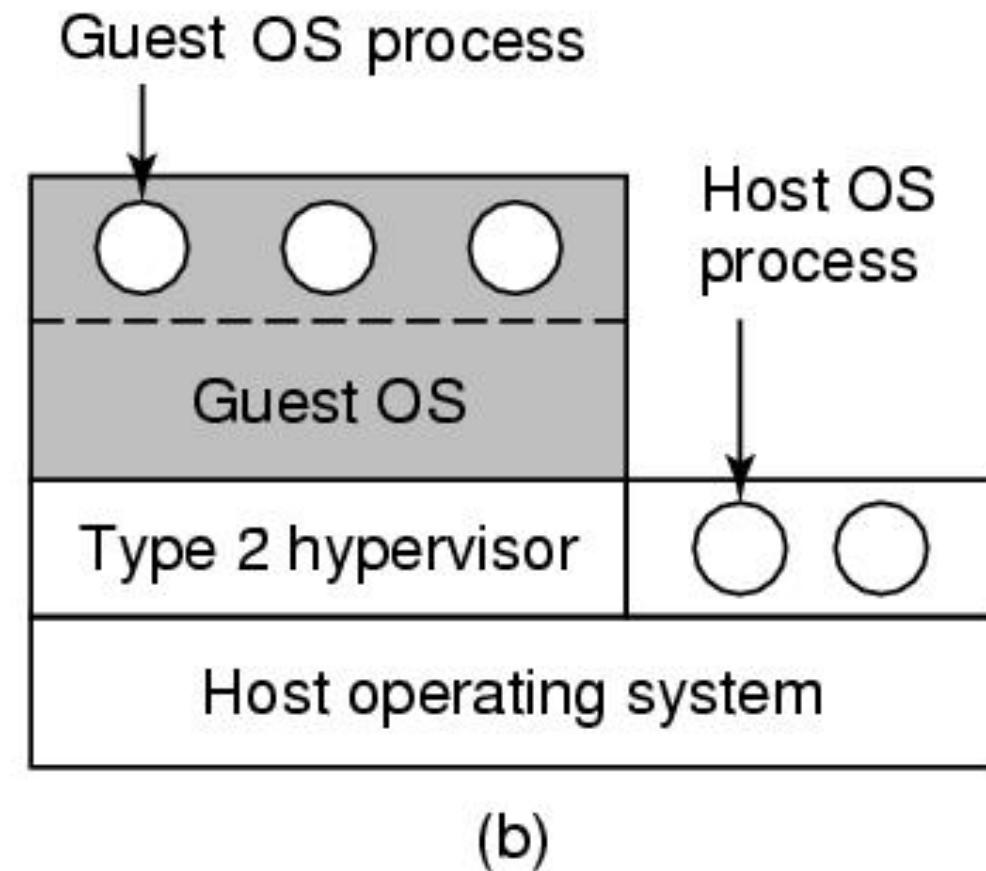
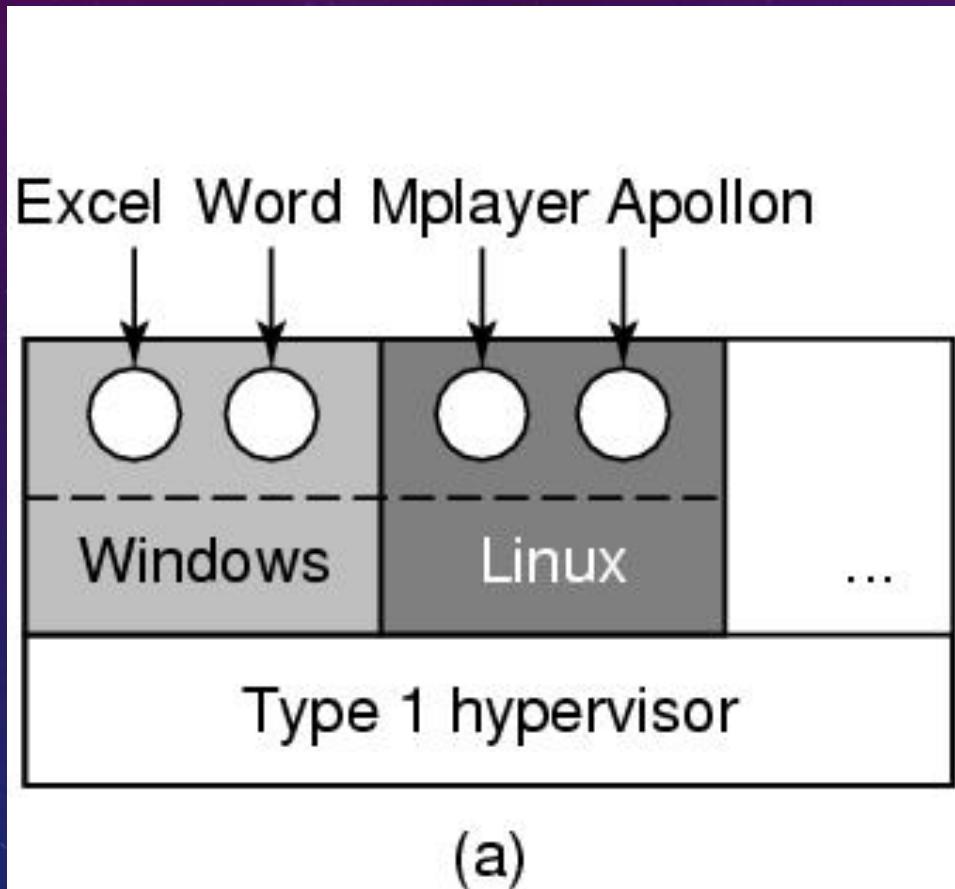
# OBJECTIVES

- 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

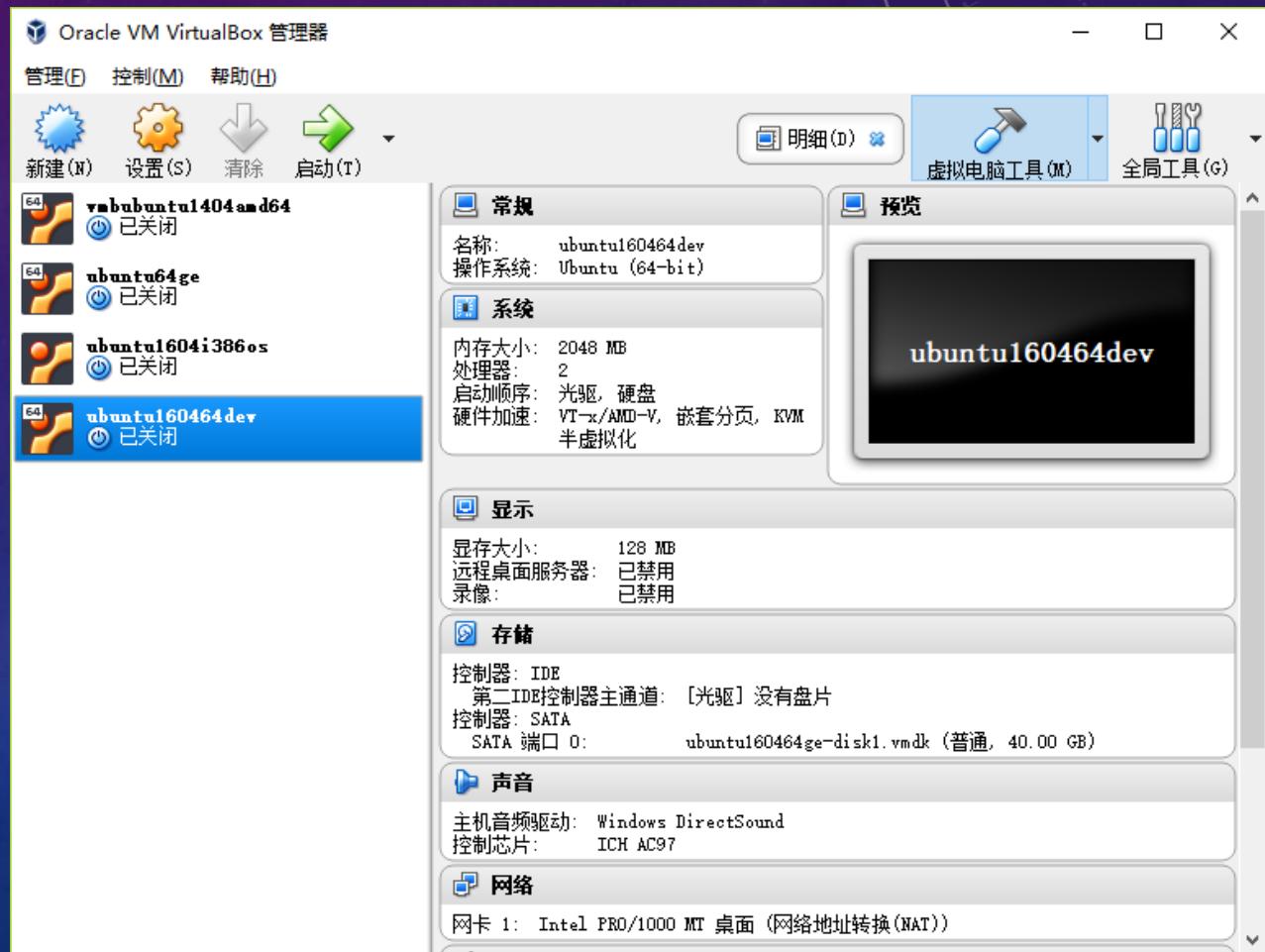


# VIRTUAL MACHINE



# VIRTUAL MACHINE: HYPERVISOR

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



# REAL FREE OSSES

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

# LINUX KERNEL

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

# LINUX KERNEL BASED OSES

[https://en.wikipedia.org/wiki/Comparison\\_of\\_Linux\\_distributions](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

- [ubuntu-16.04.6-desktop-amd64.iso](https://www.ubuntu.com/download/desktop)
- [ubuntu-18.04.2-desktop-amd64.iso](https://www.ubuntu.com/download/desktop)
- <https://www.ubuntu.com/download/desktop>

The screenshot shows a Microsoft Edge browser window displaying the Canonical website for downloading Ubuntu Desktop. The URL in the address bar is <https://www.ubuntu.com/download/desktop>. The page title is "Download Ubuntu Desktop". The main content features a large heading "Ubuntu 18.04.2 LTS" with a "Download" button below it. To the left, there's a section about system requirements, including a bulleted list of hardware specifications. To the right, there's a note about other download options like torrents and network installers.

Ubuntu 18.04.2 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 2023, of free security and maintenance updates, guaranteed.

[Ubuntu 18.04 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

For other versions of Ubuntu Desktop including torrents, the network installer, a list of local mirrors, and past releases see our [alternative downloads](#).

Download

# 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

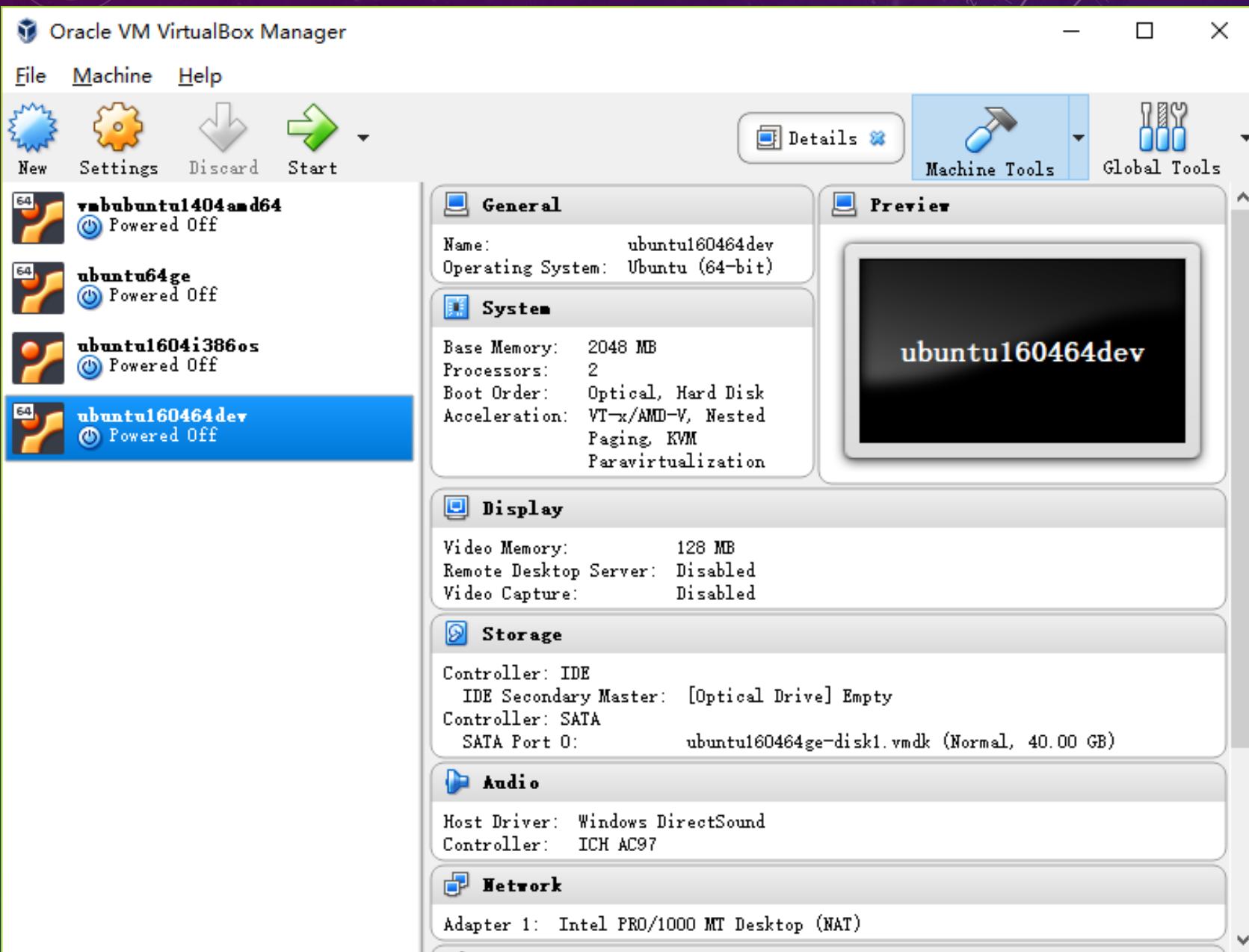
[Ubuntu 14.04.5 Desktop \(64-bit\)](#)

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

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

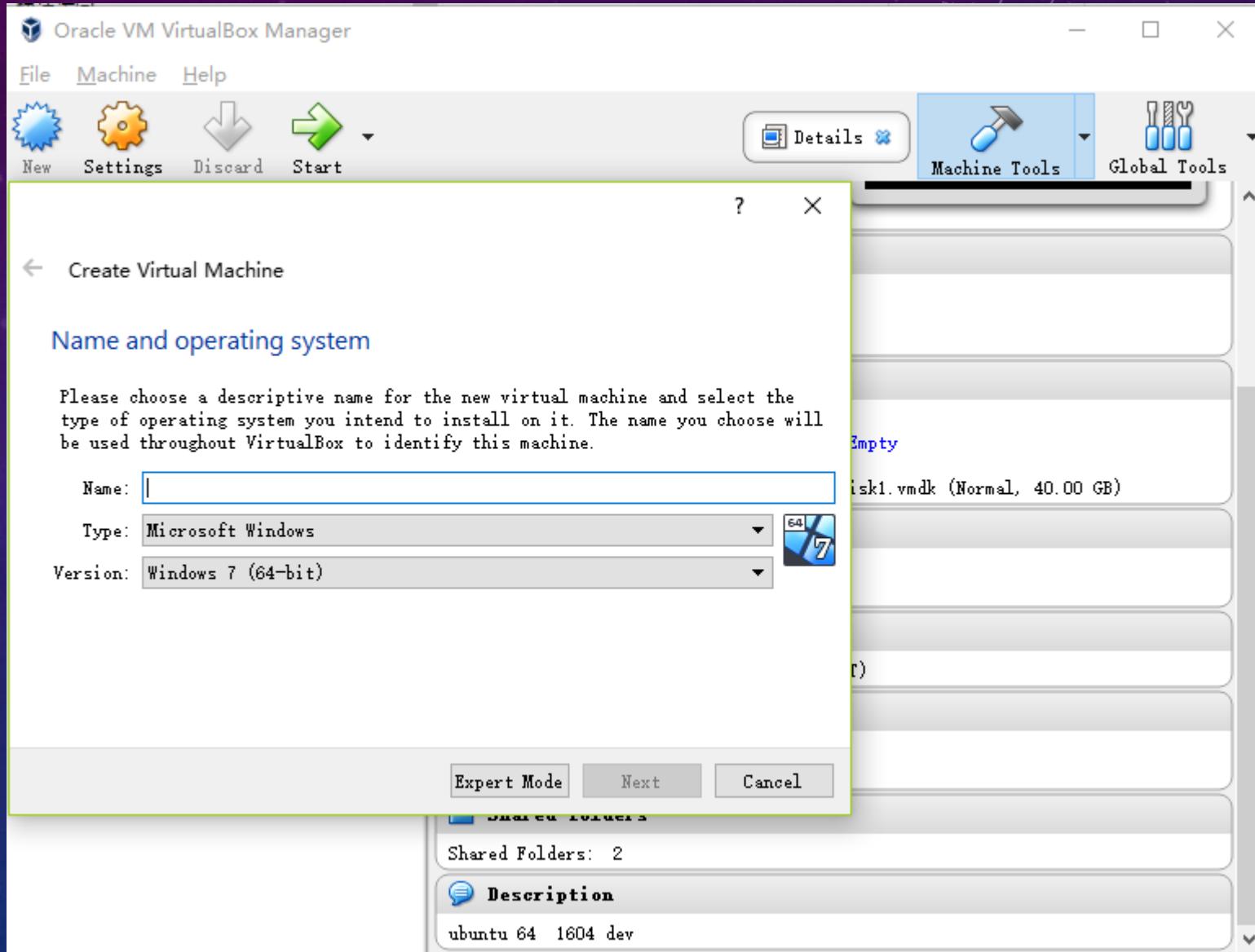
[Ubuntu 14.04.5 Server \(32-bit\)](#)

# CREATE A GUEST UBUNTU OS IN VIRTUALBOX



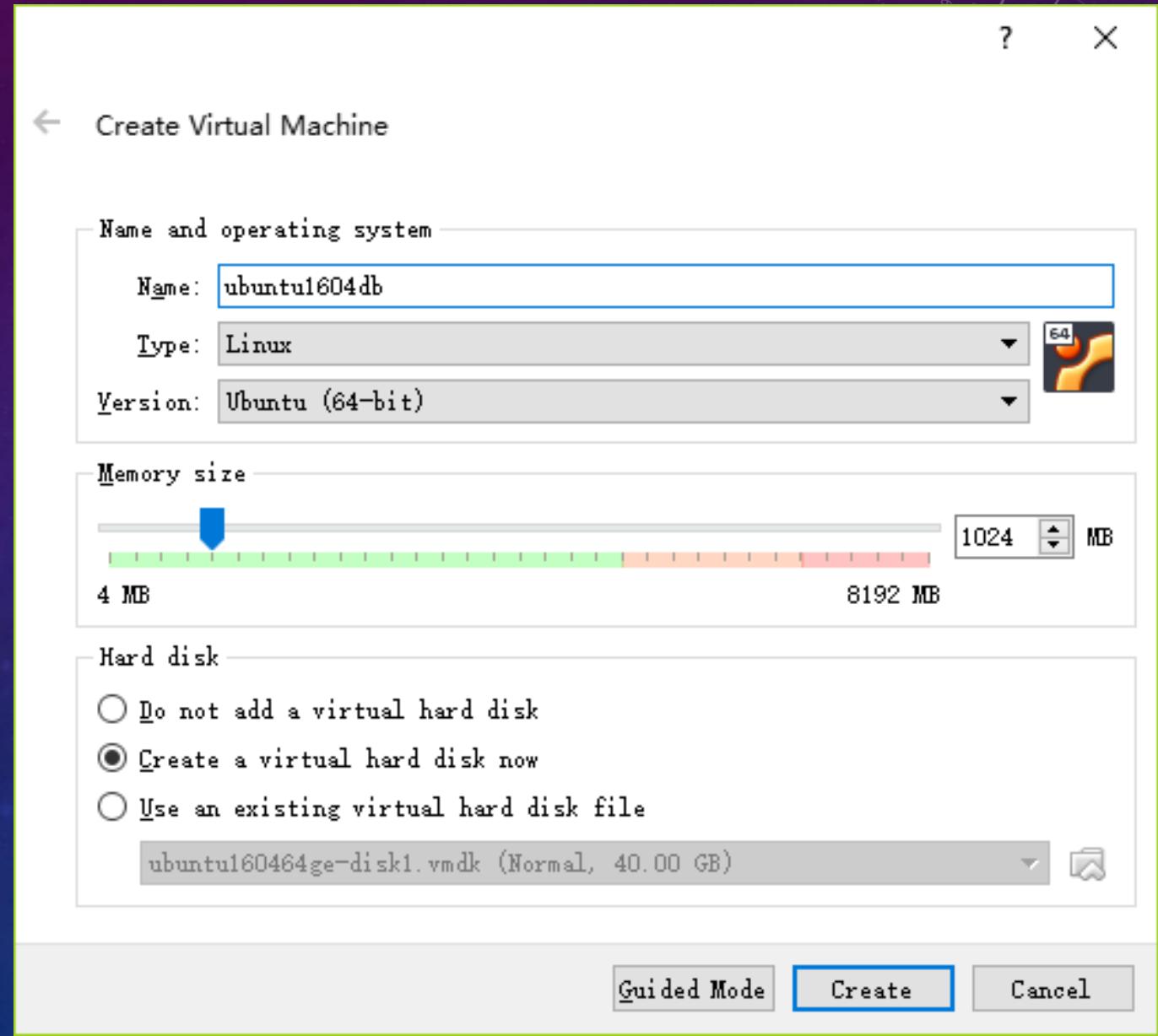
# CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



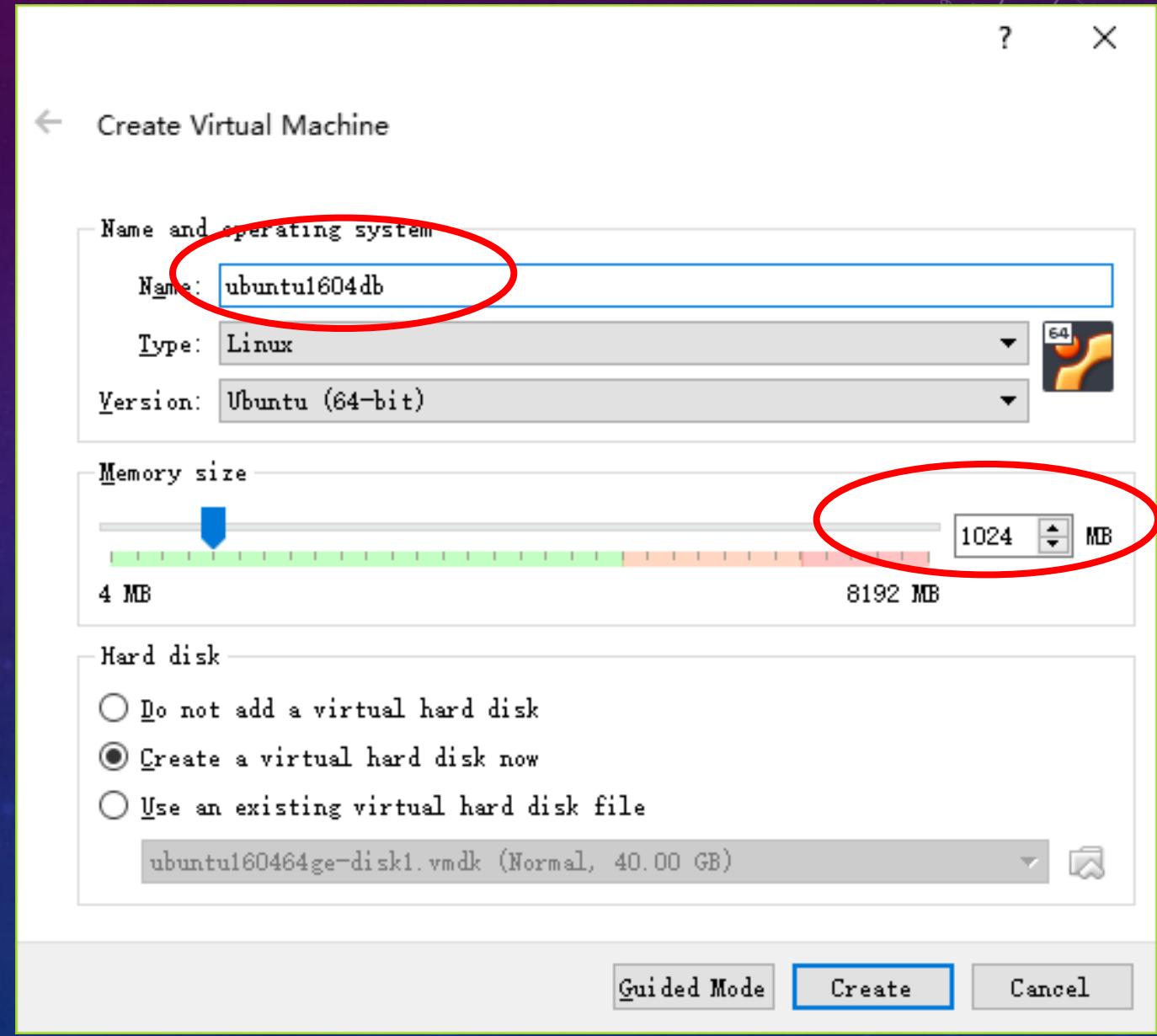
# CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



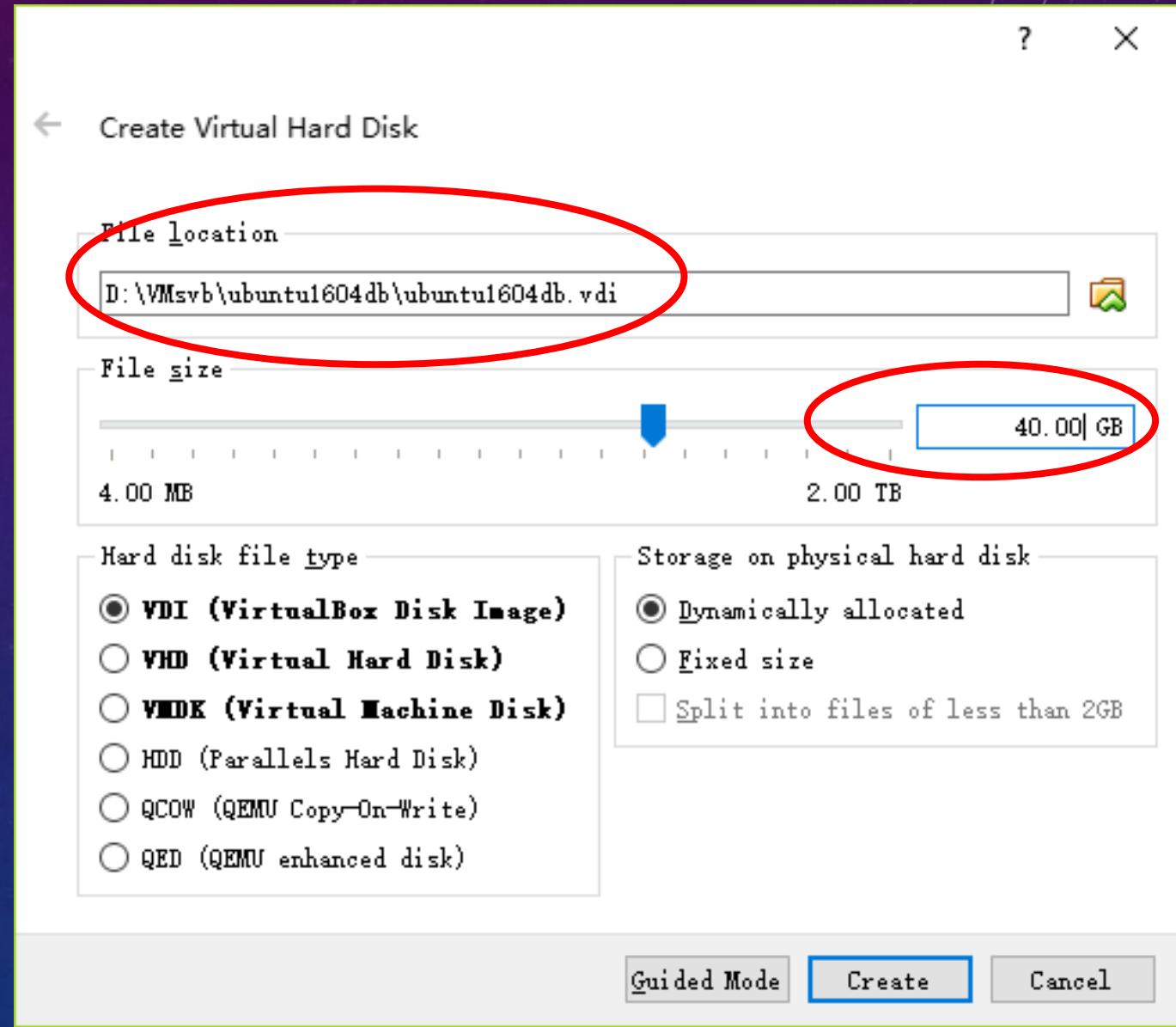
# CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



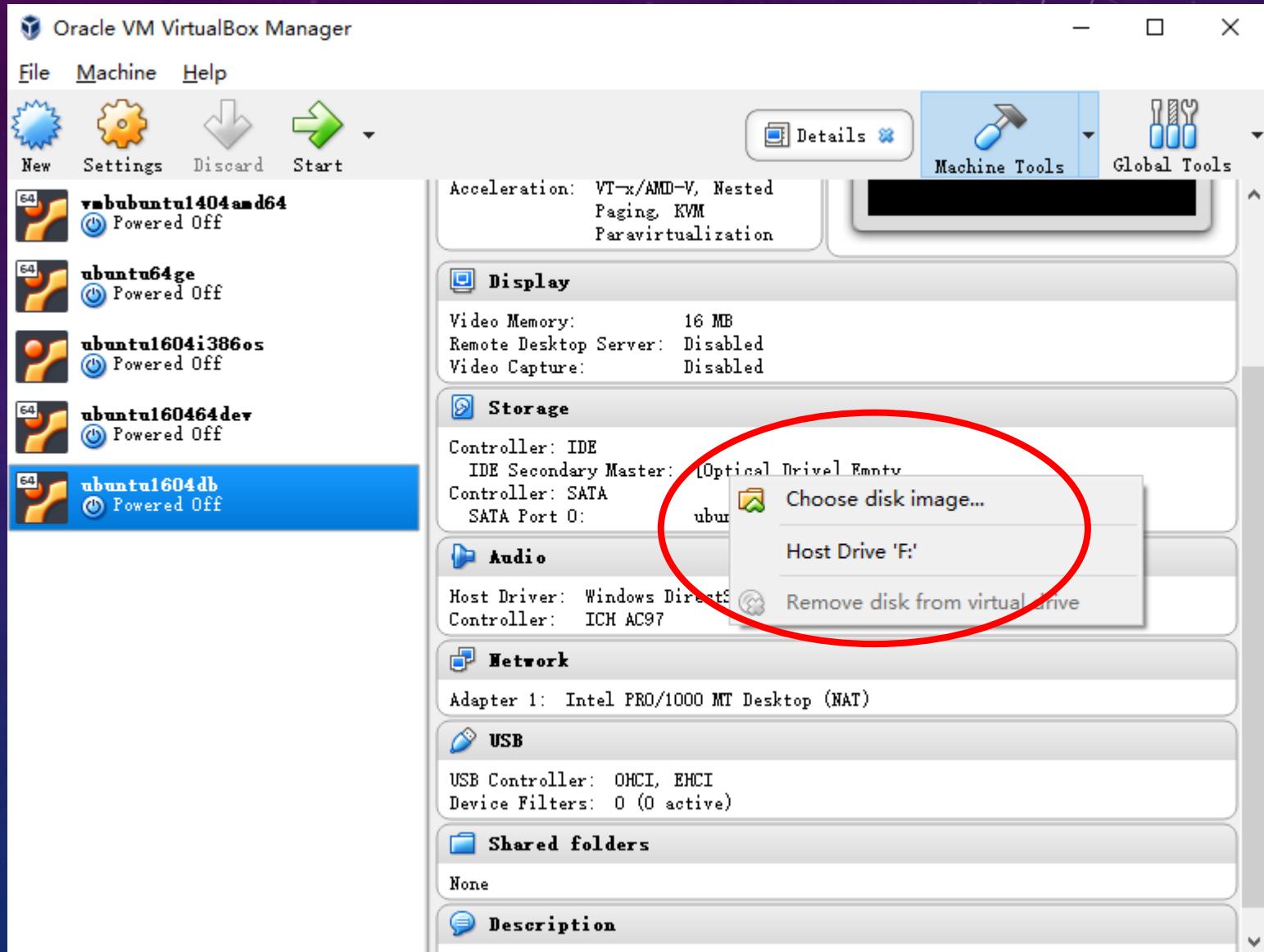
# CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



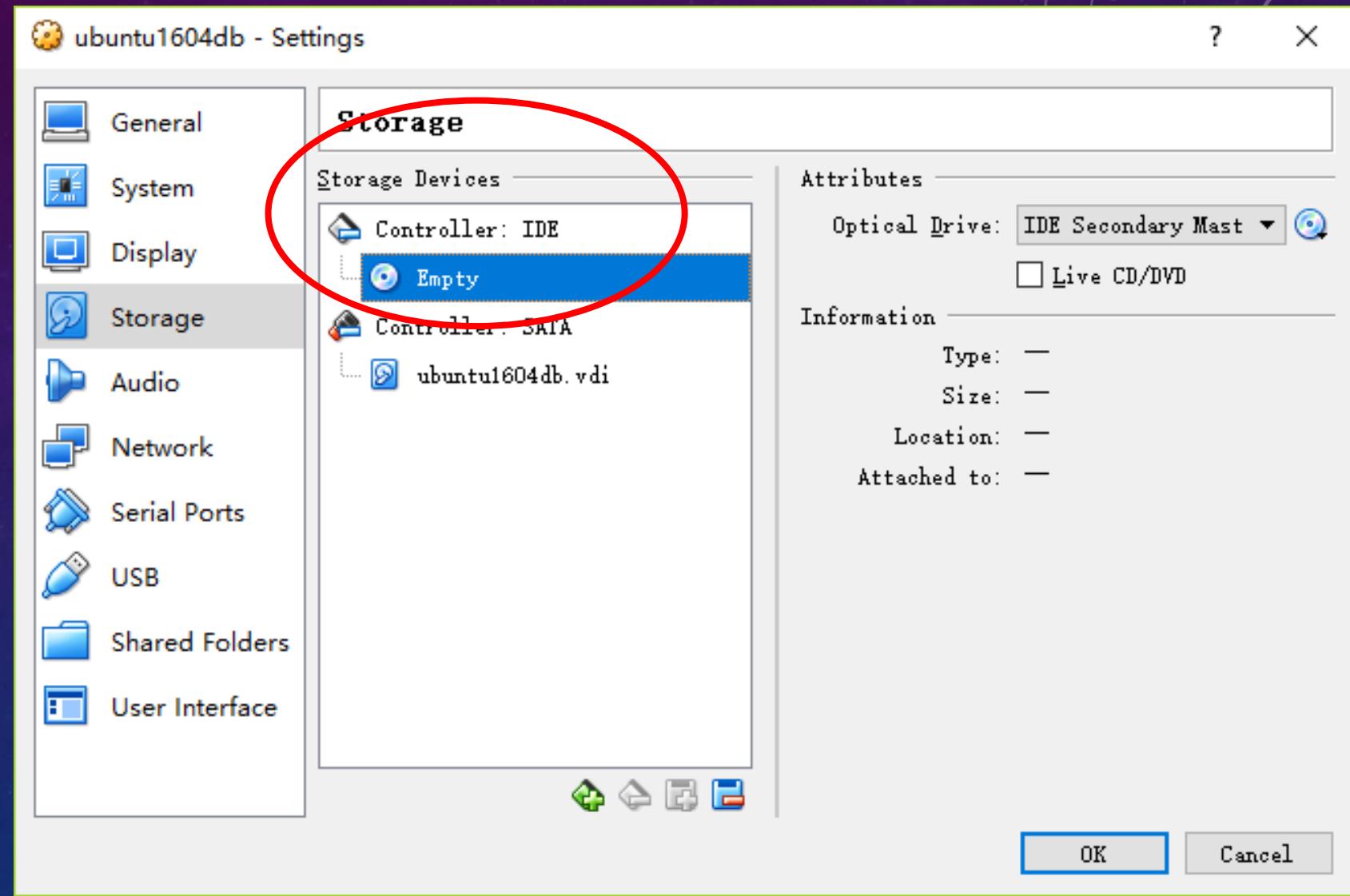
# CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



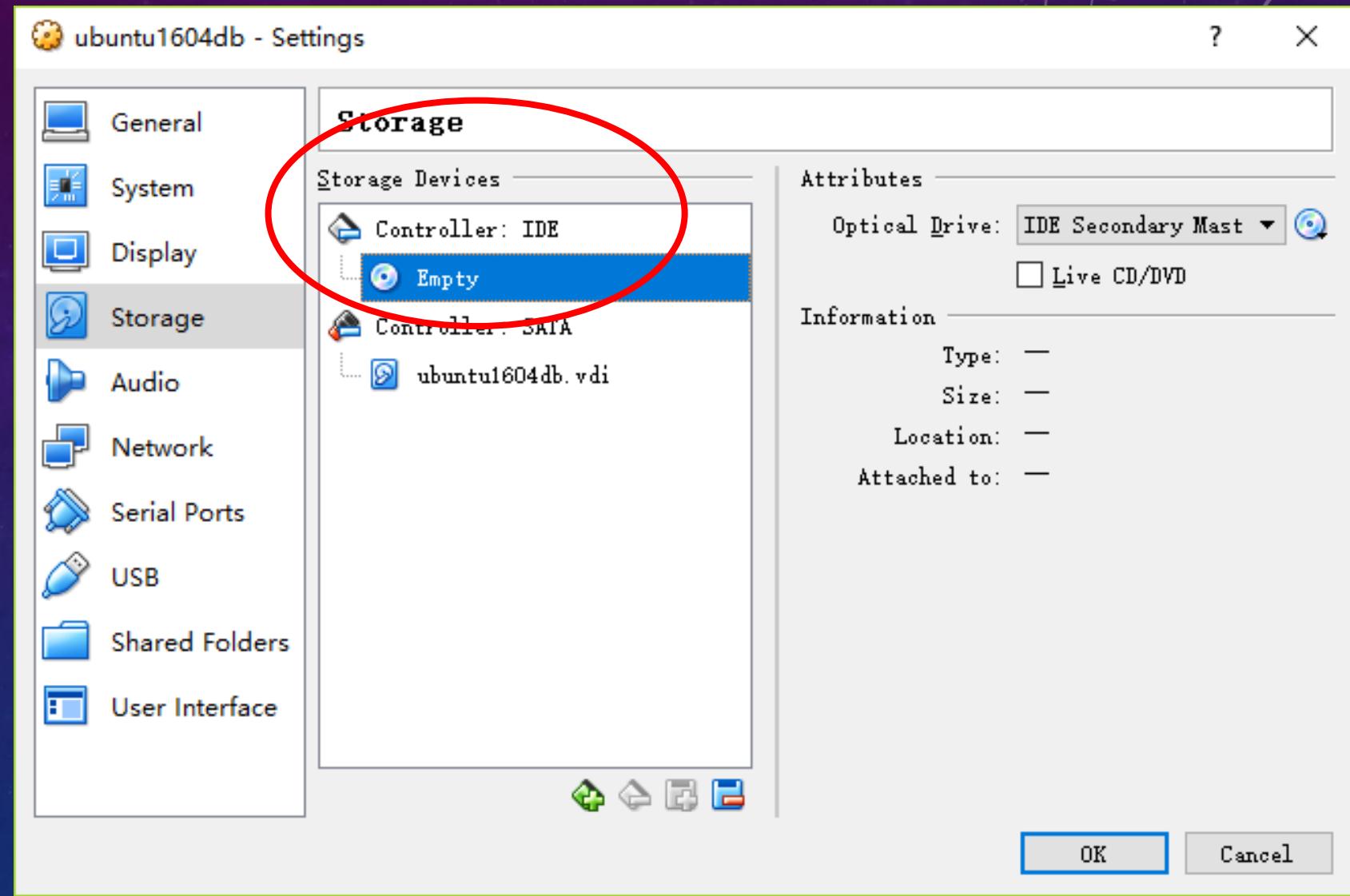
# CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



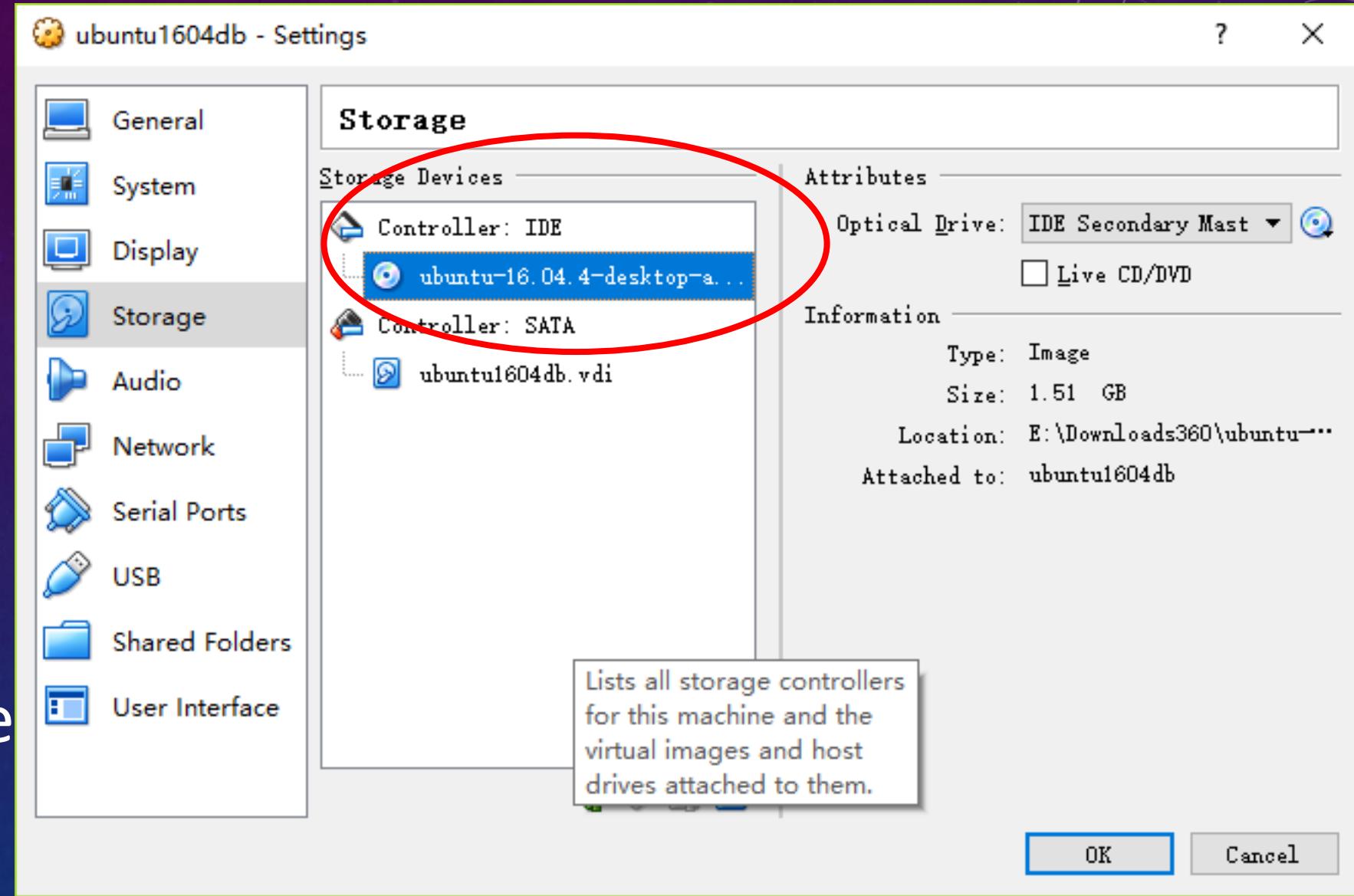
# CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



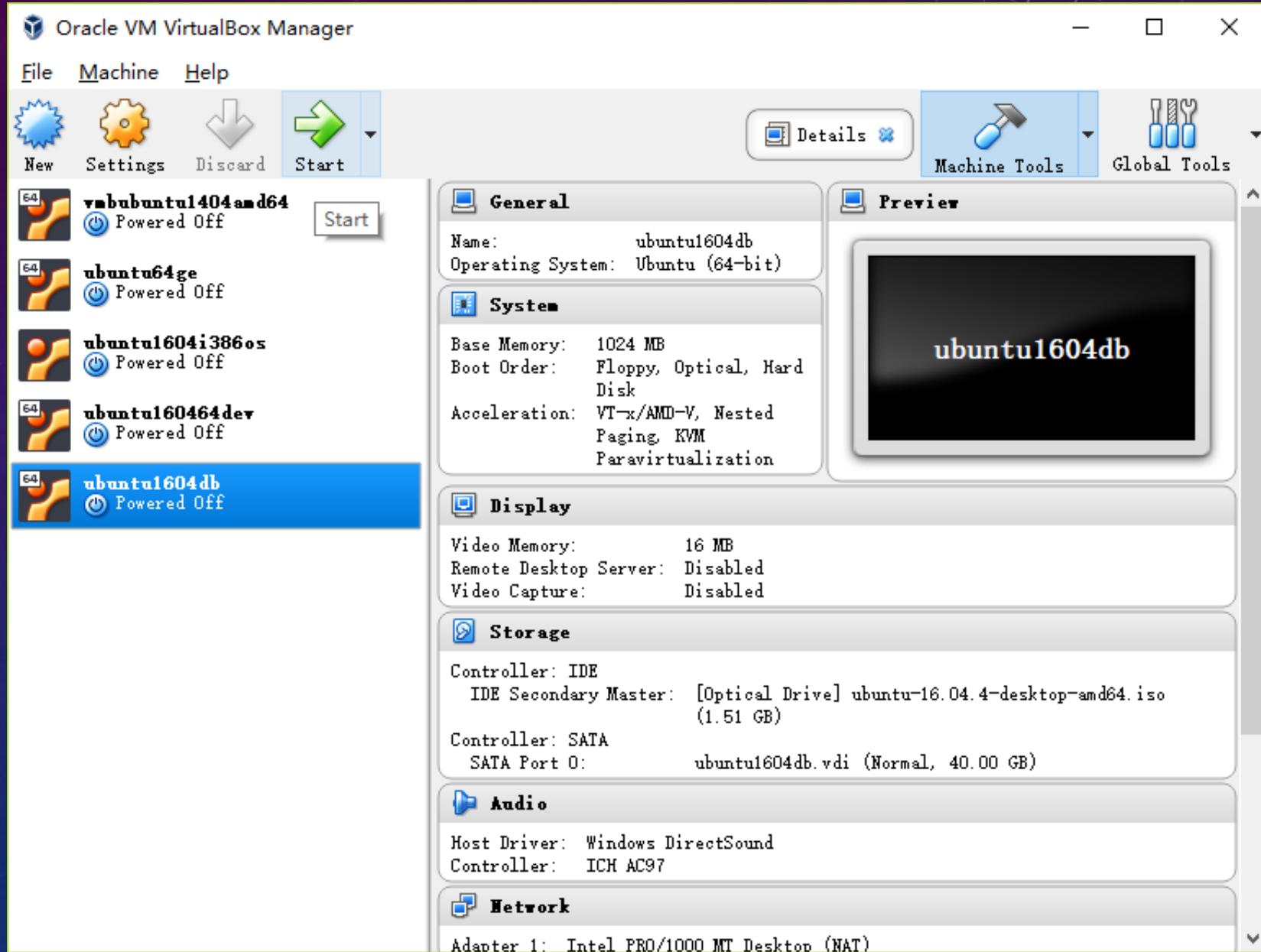
# CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode



# CREATE A GUEST UBUNTU OS IN VIRTUALBOX

- Expert Mode

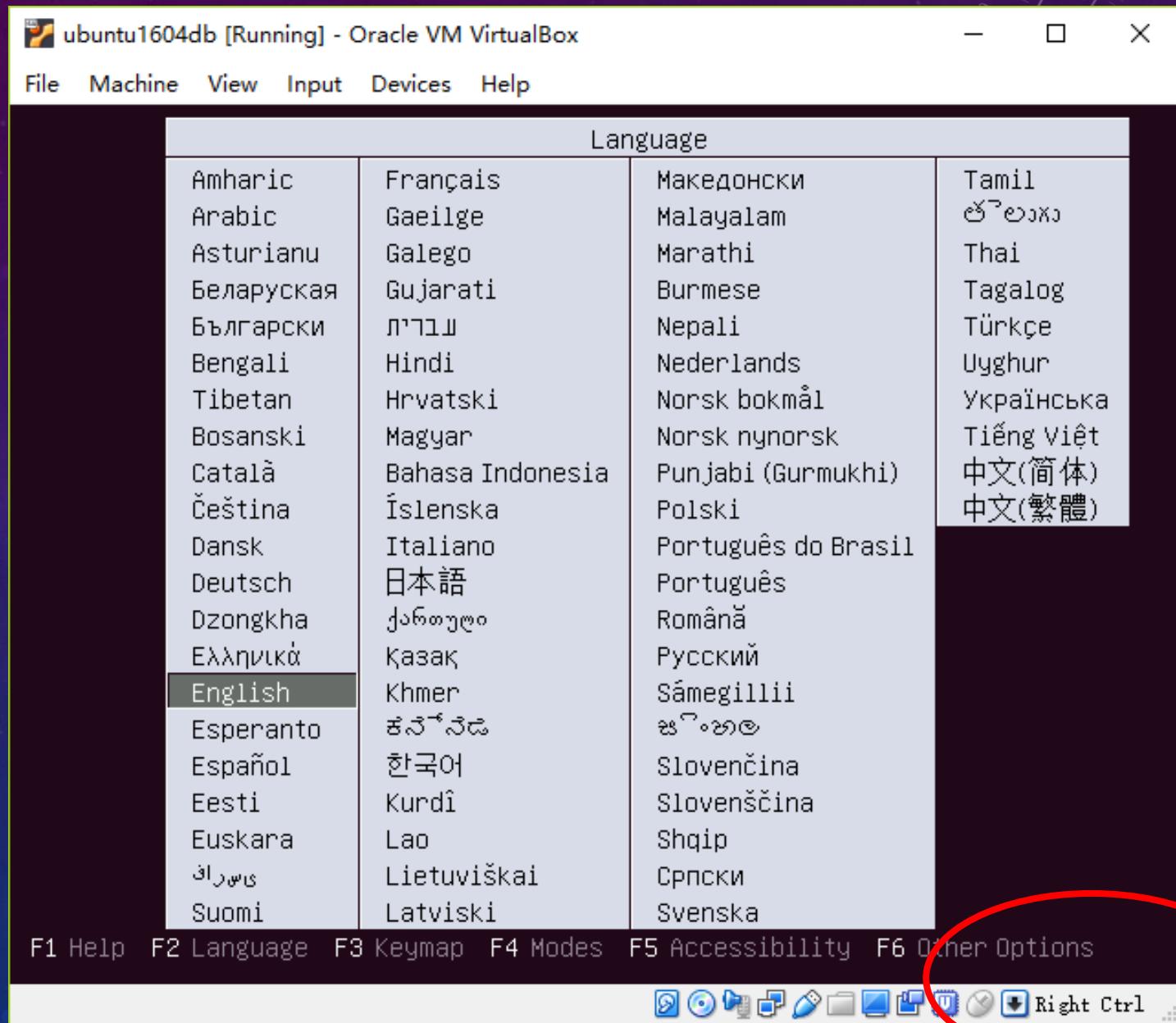


# INSTALLING UBUNTU

- Installing Ubuntu
- Post-Installation Configuration

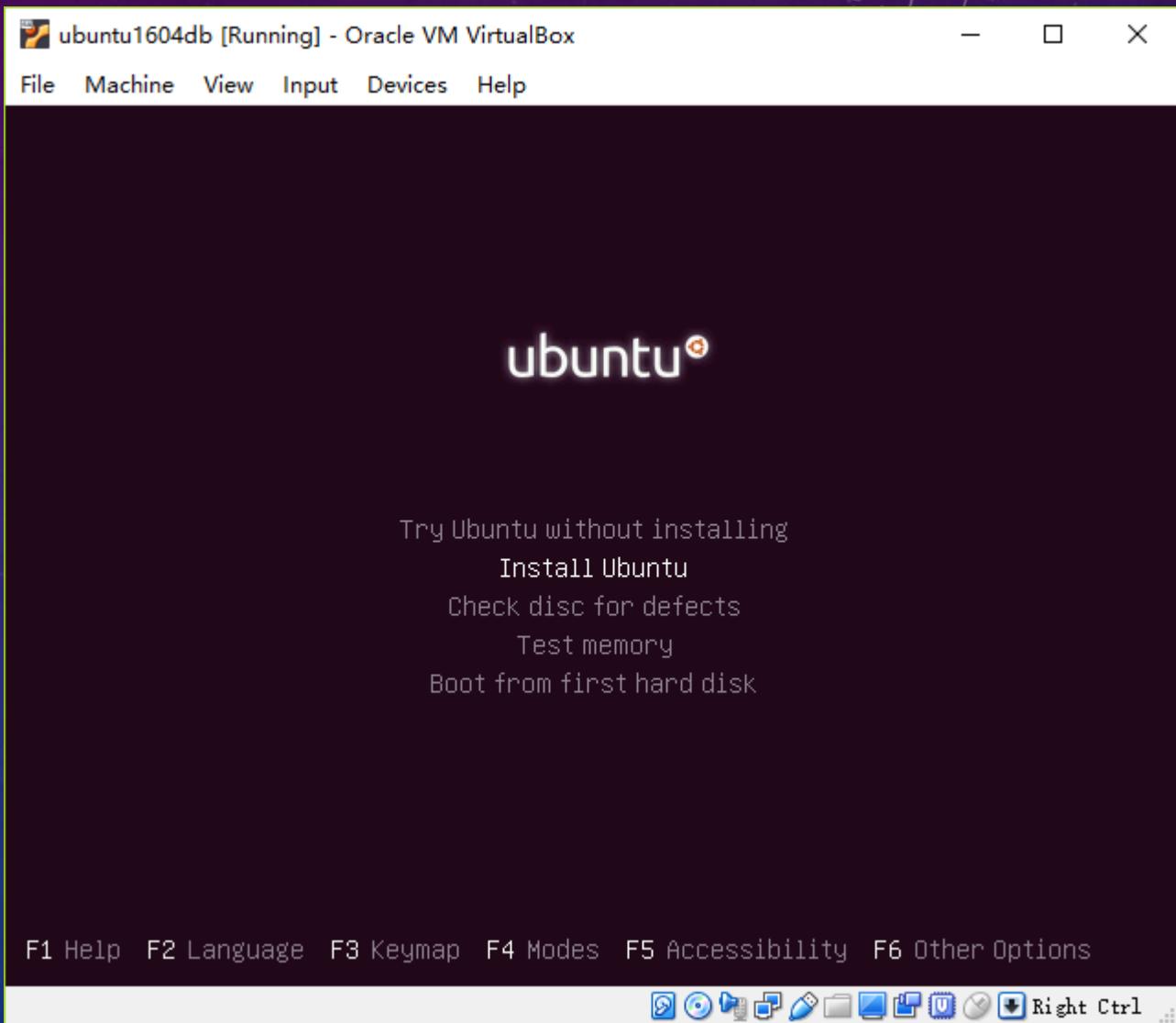
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Hot key
  - Right Ctrl

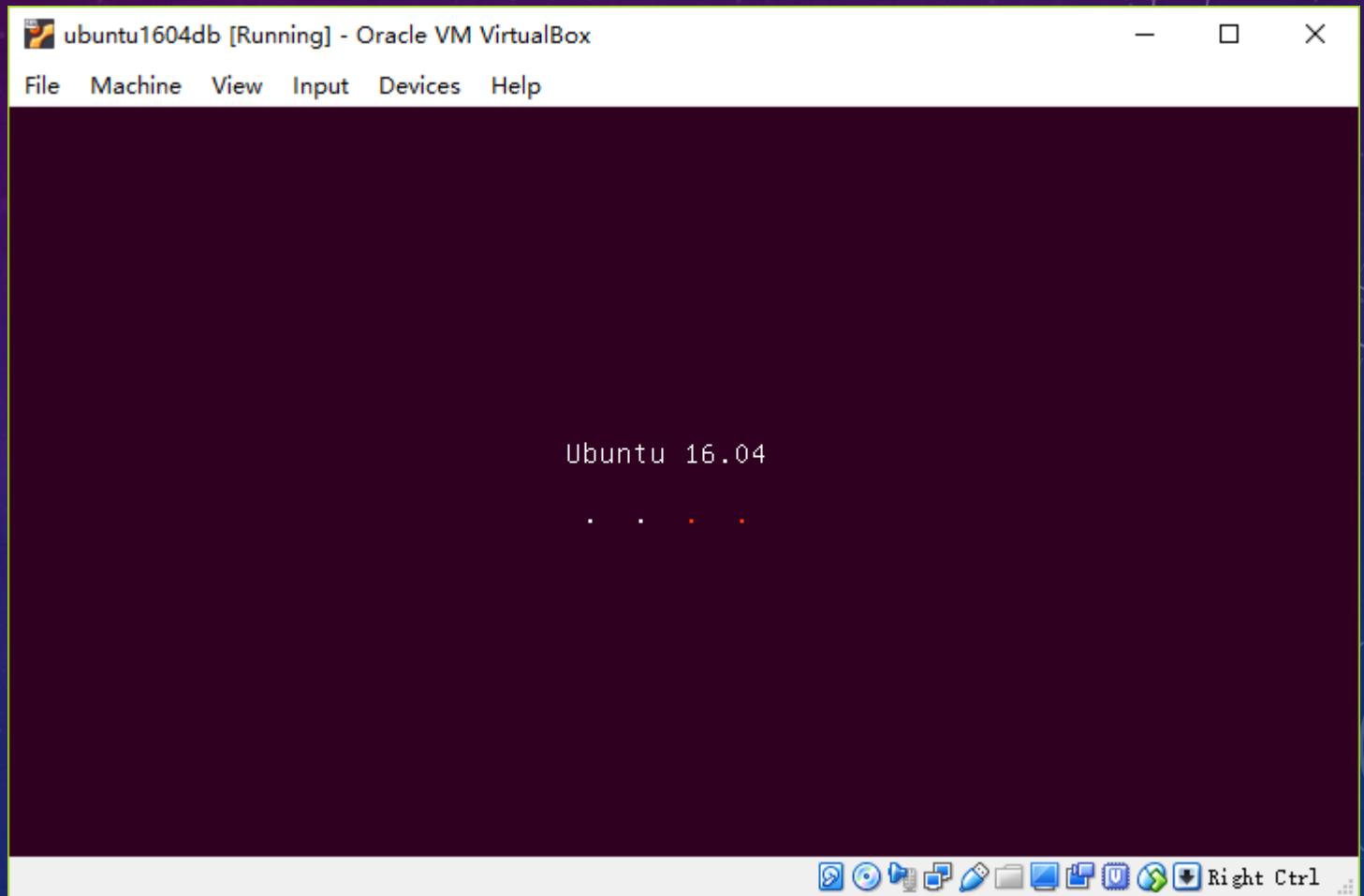


# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Select the second line

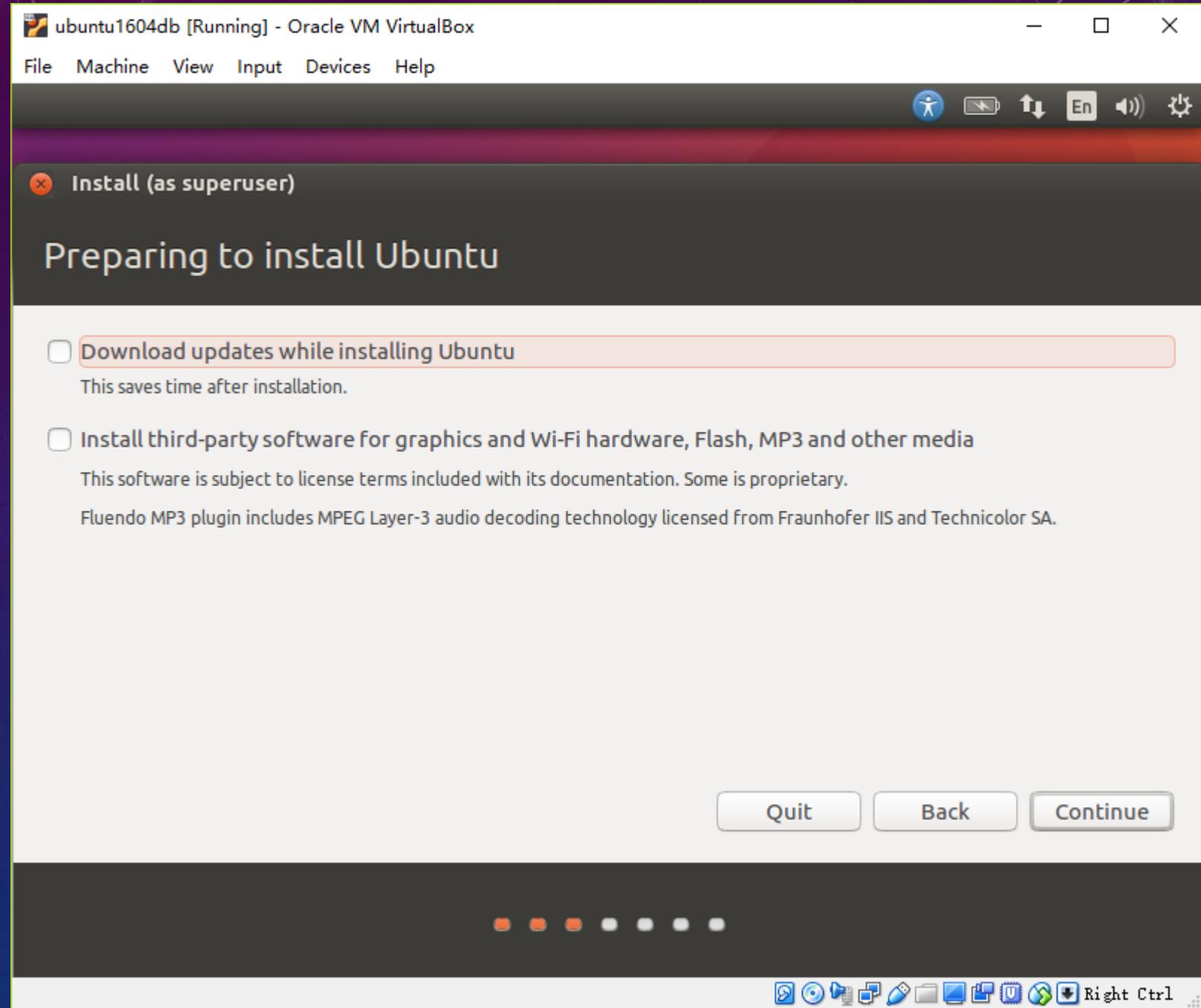


# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX



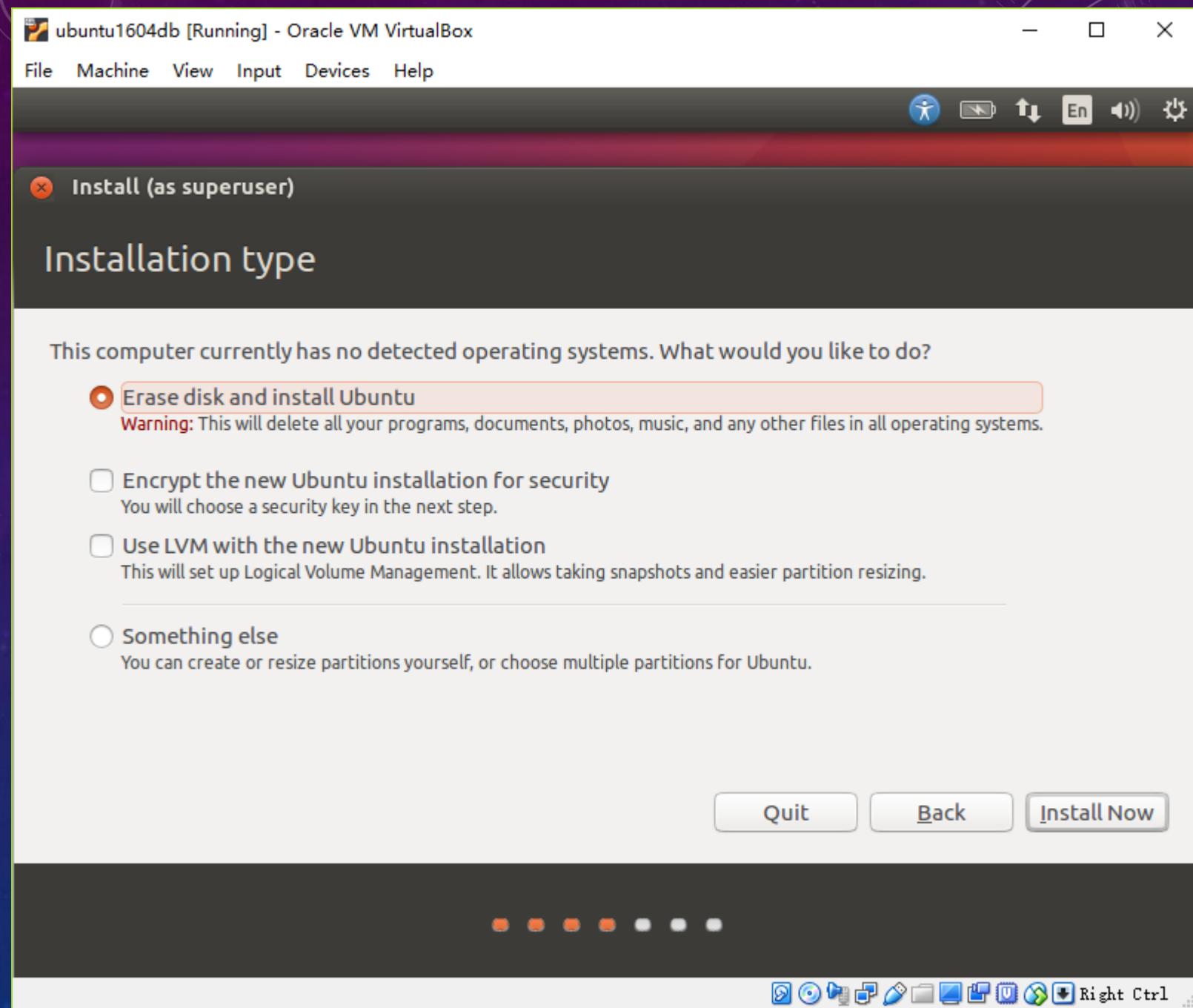
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



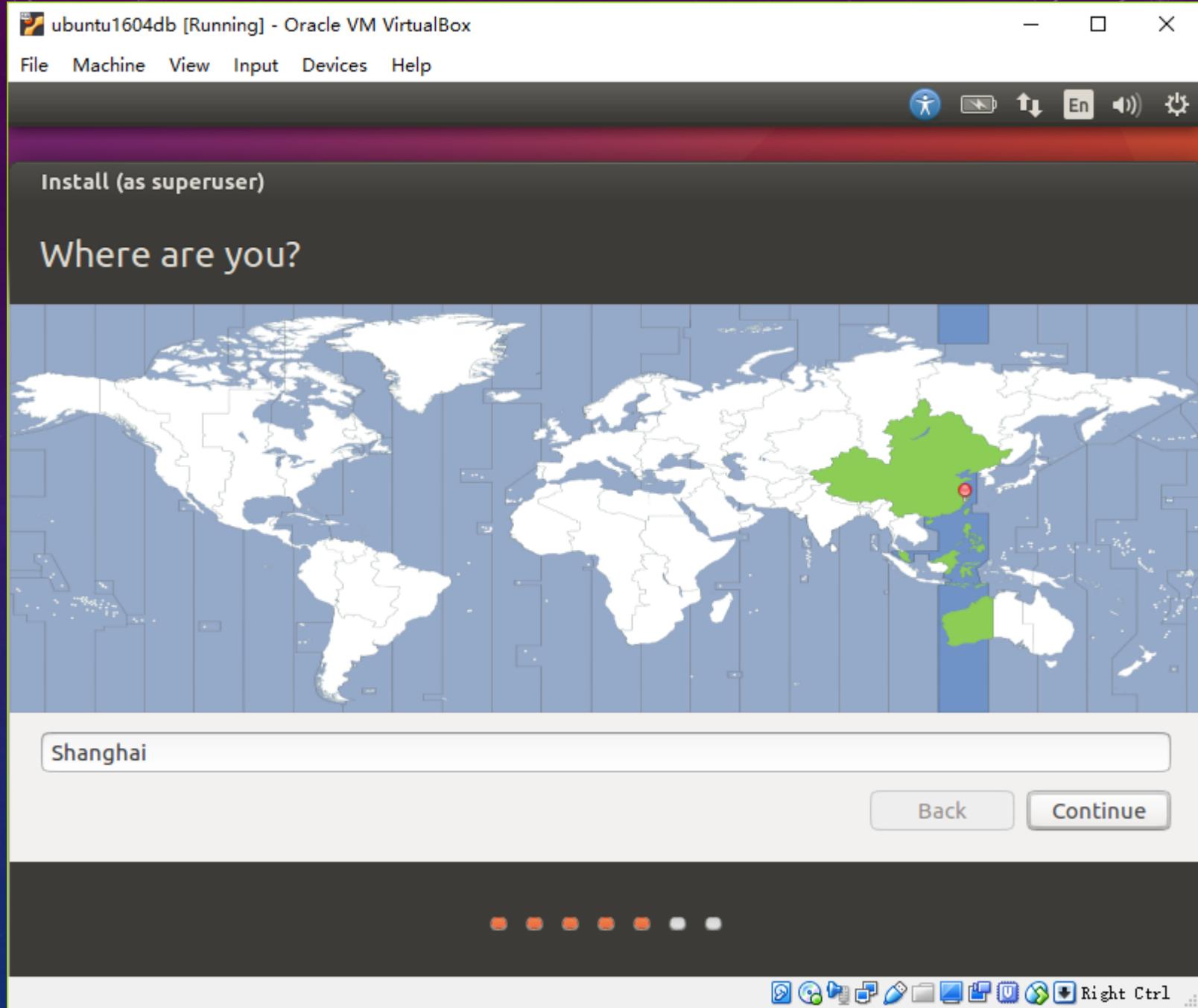
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



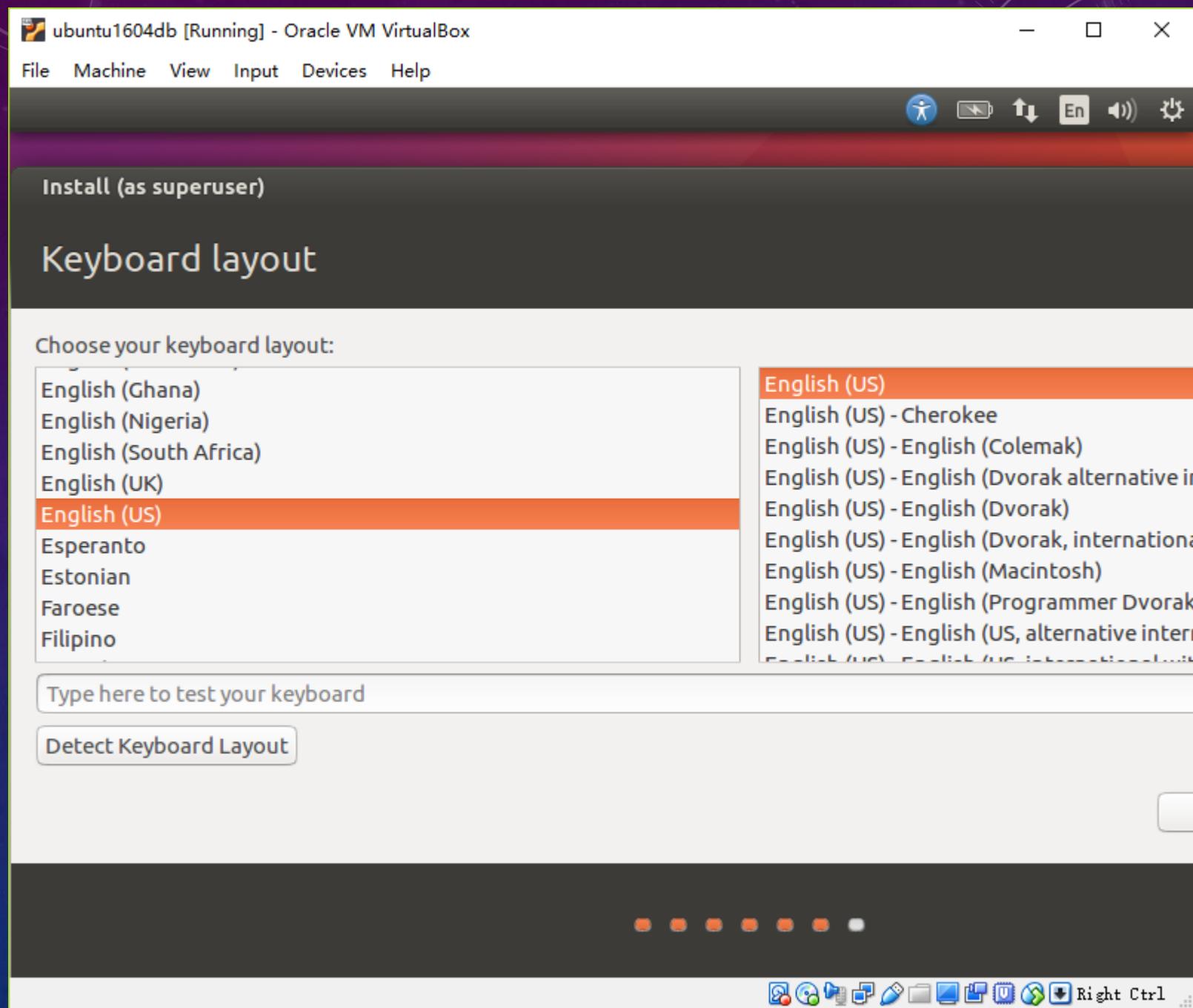
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



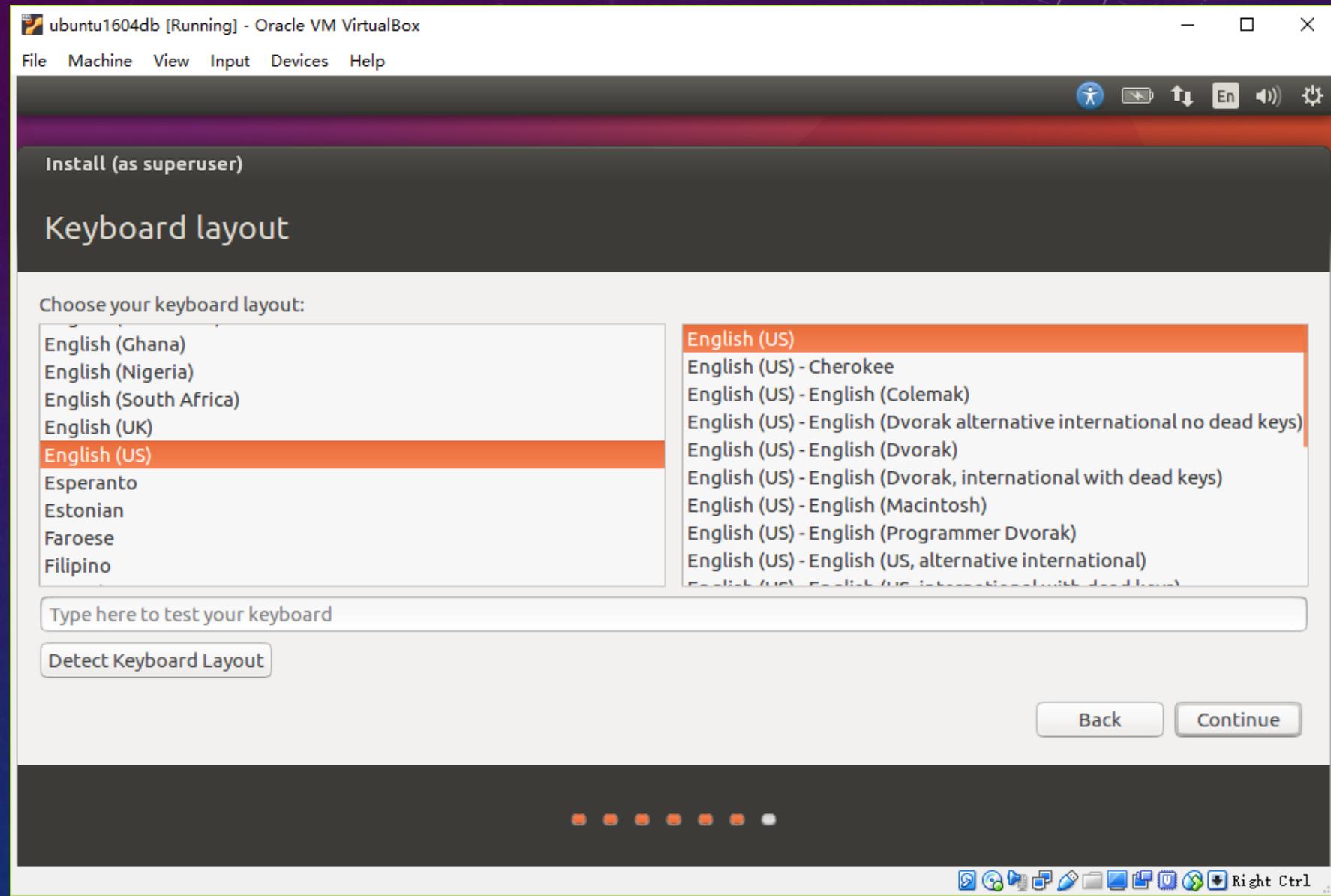
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



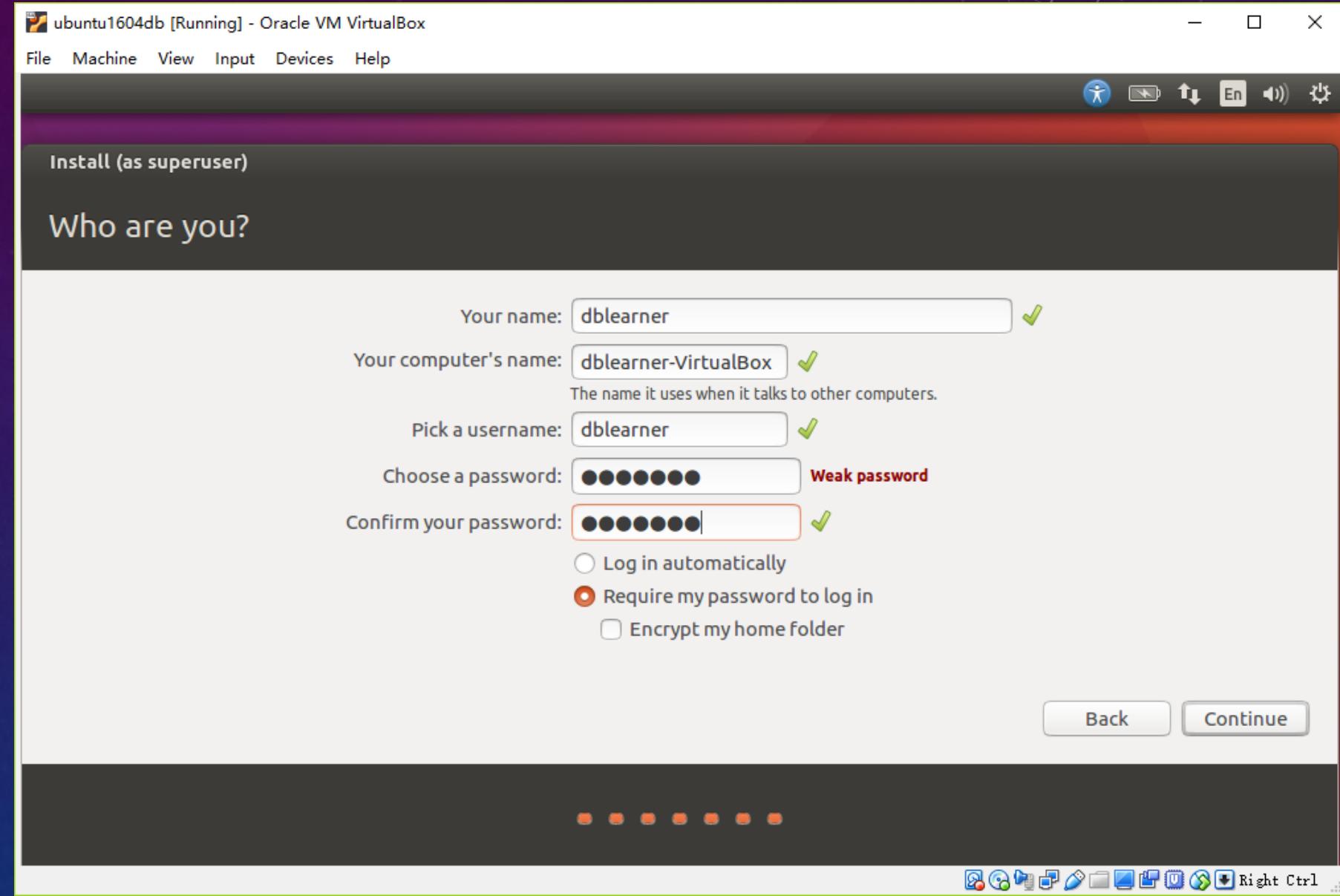
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Default Selection



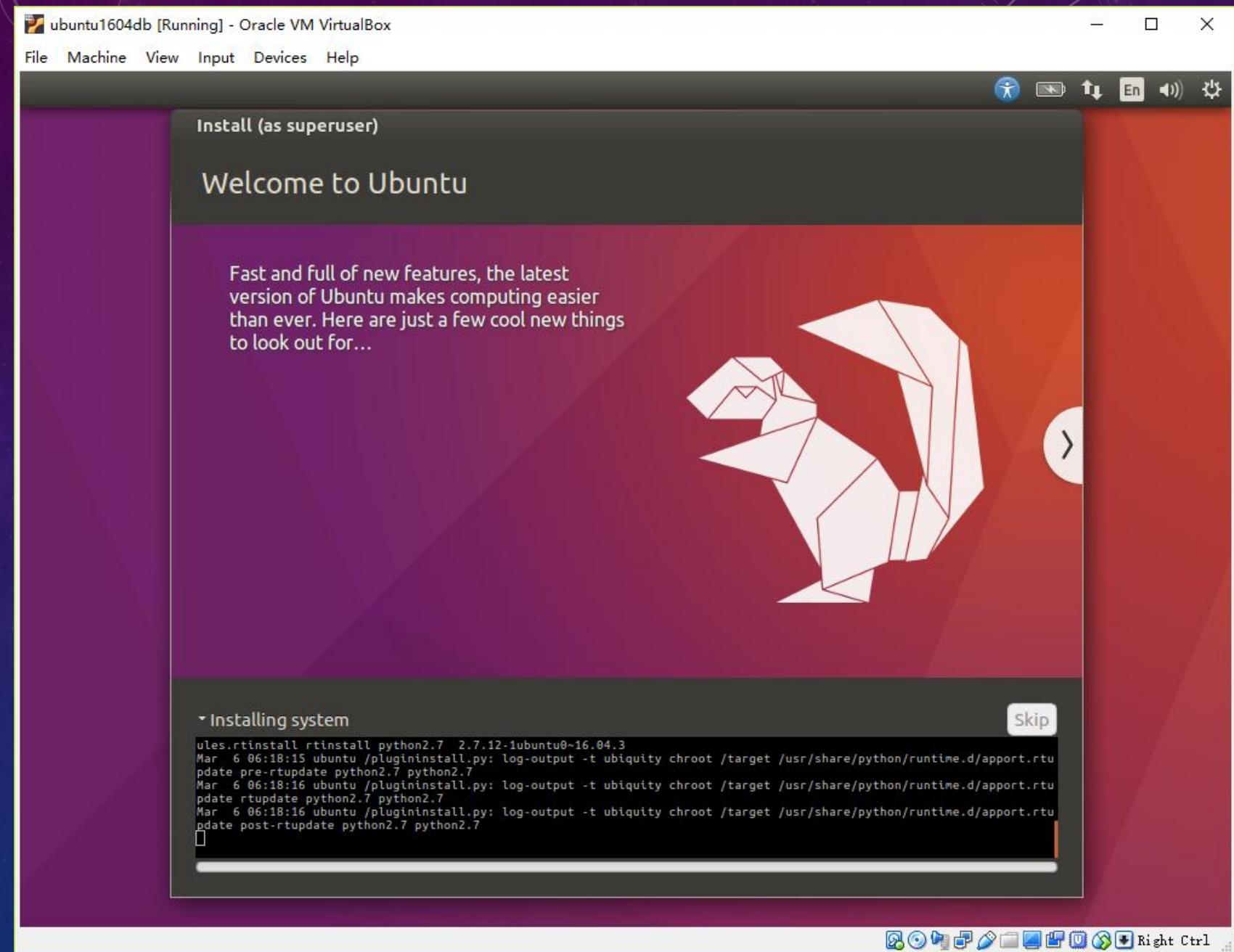
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Your name
- Your pwd



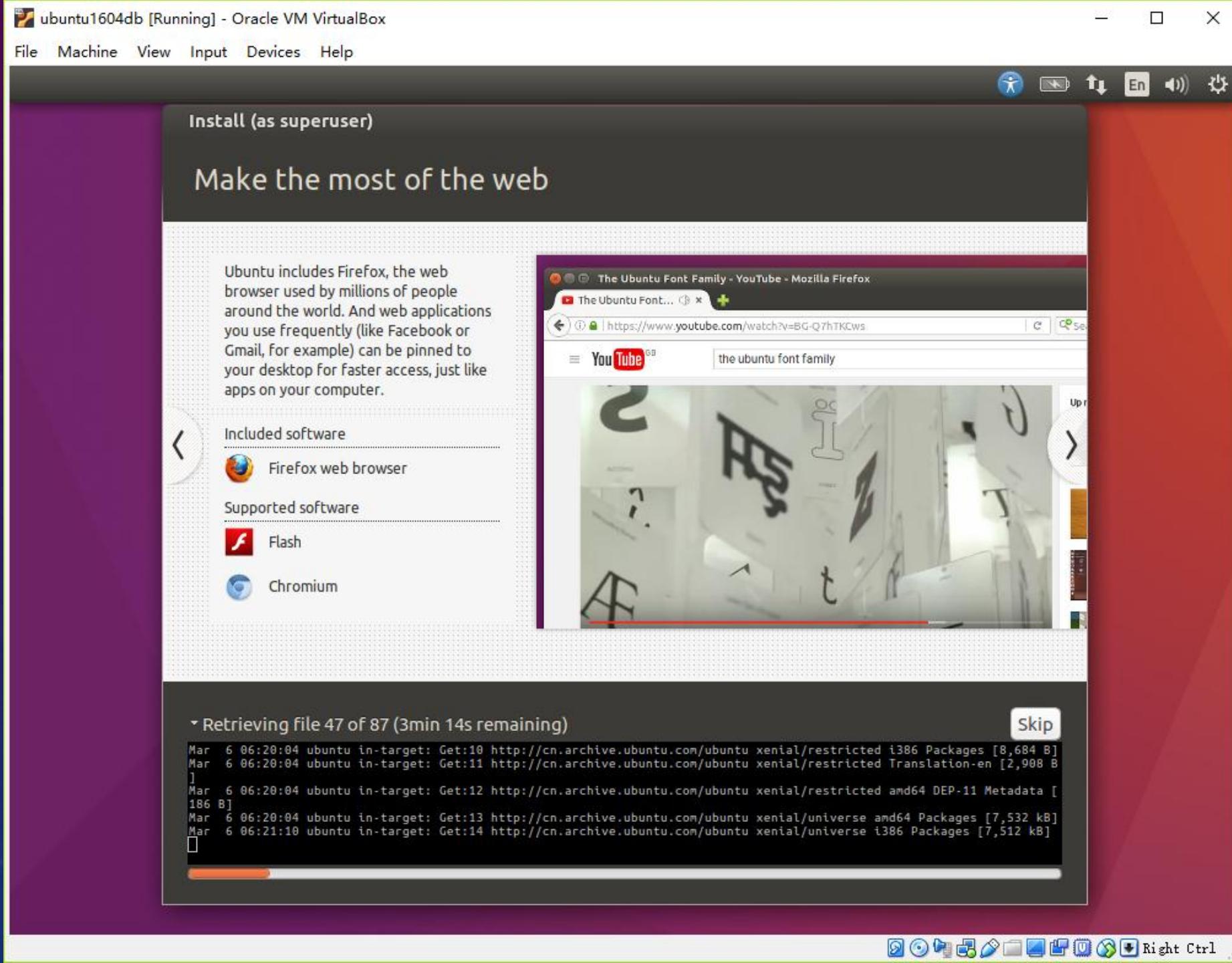
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Wait ...



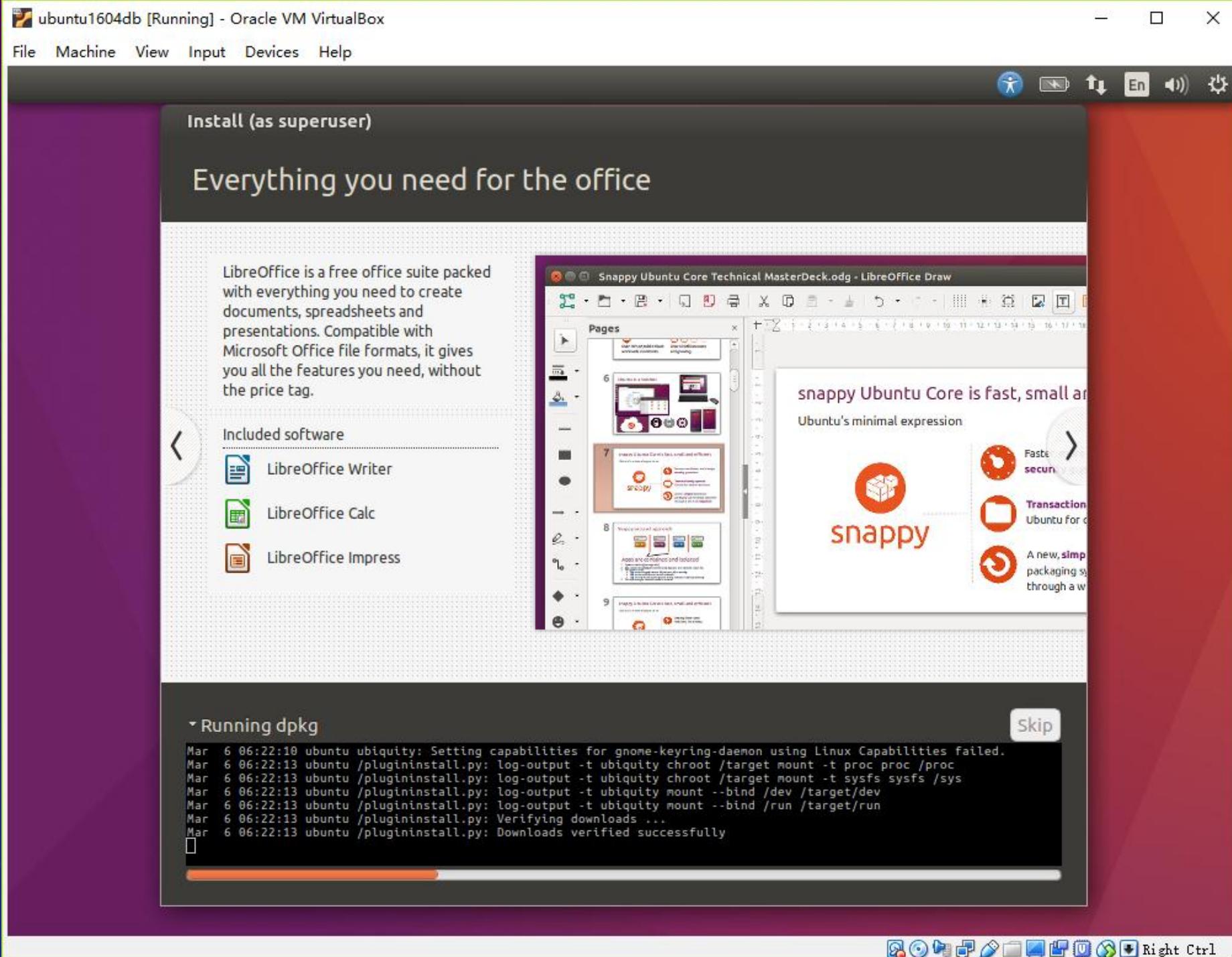
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Wait ...



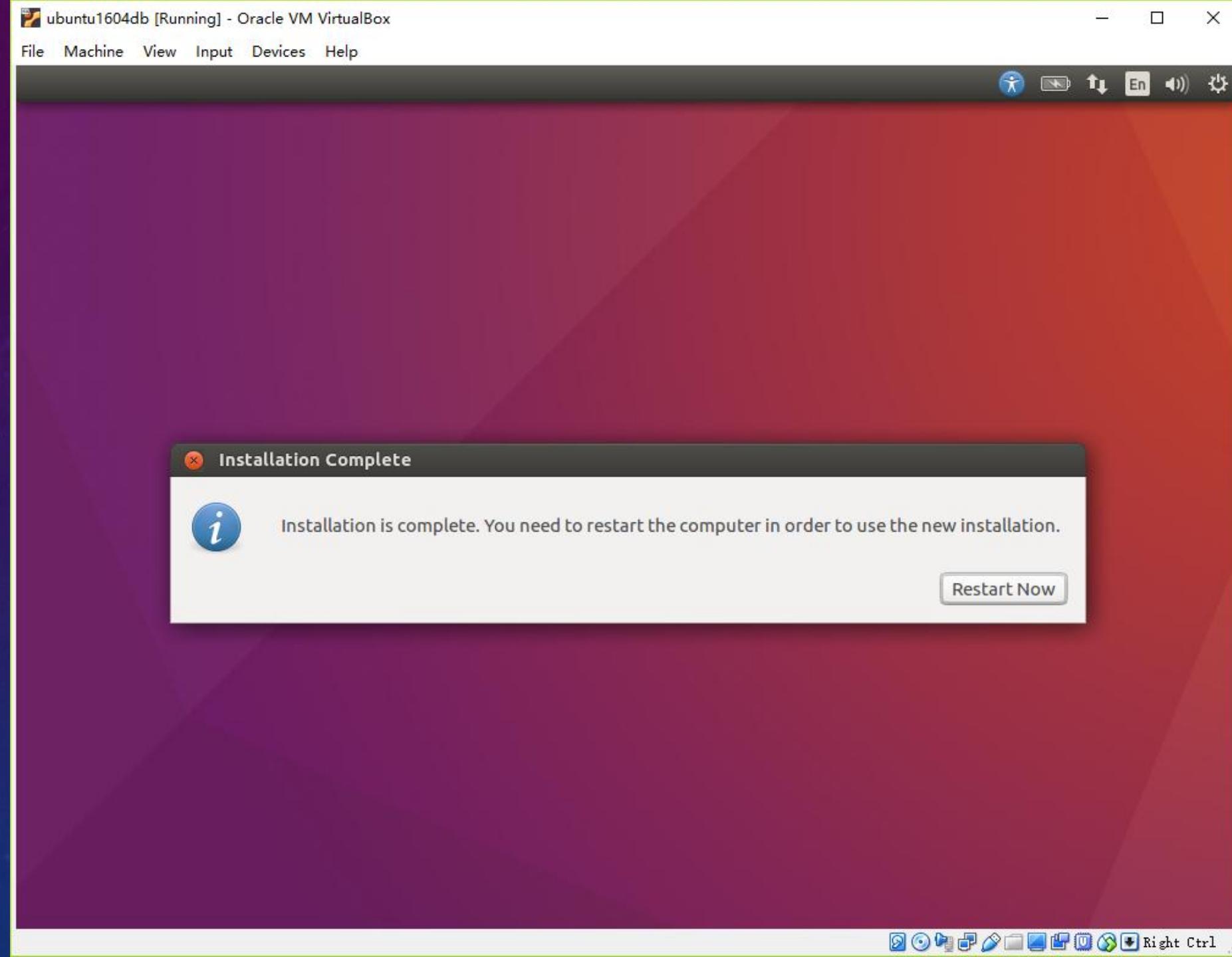
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Wait ...



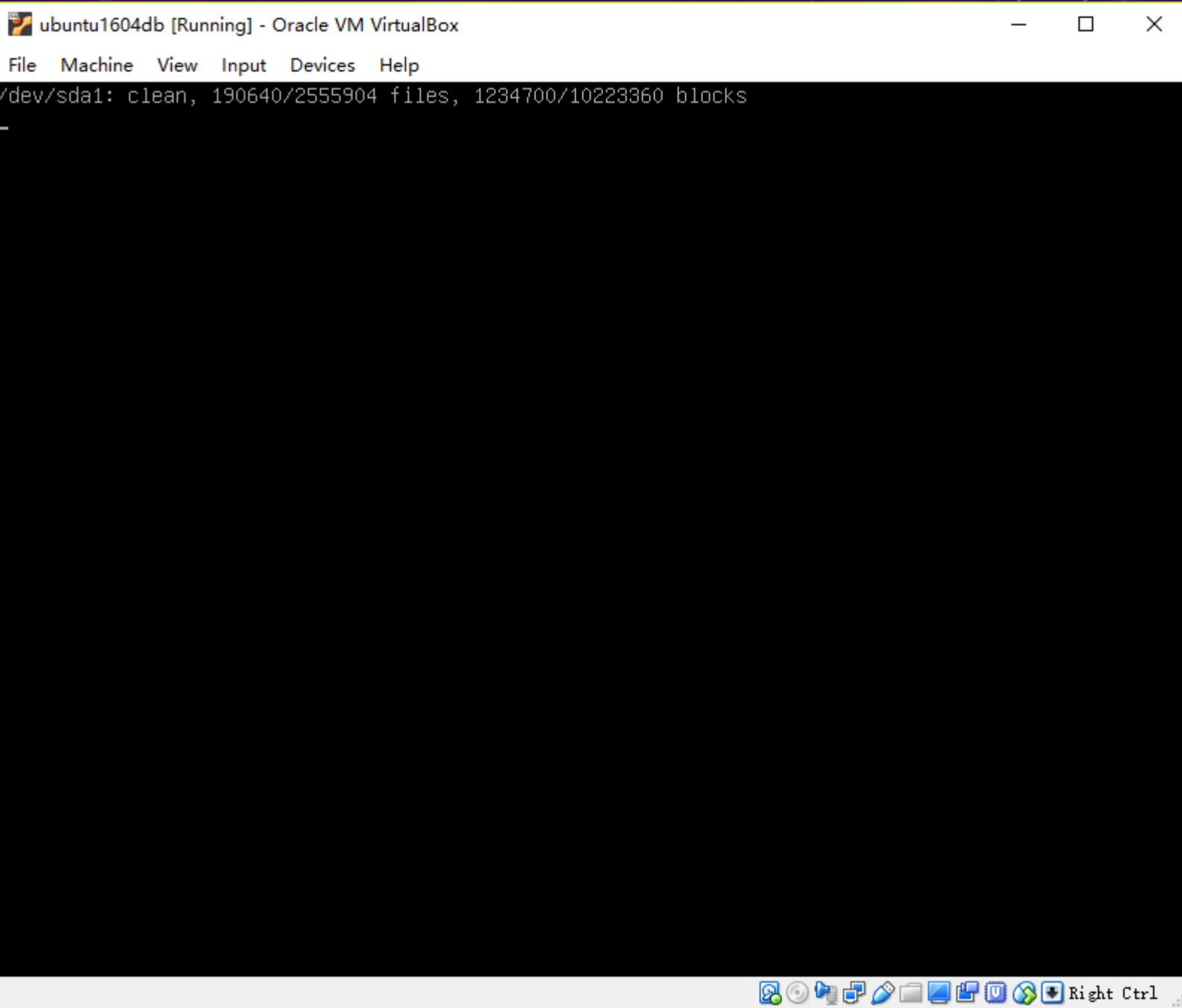
# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Restart



# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Booting ...



ubuntu1604db [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

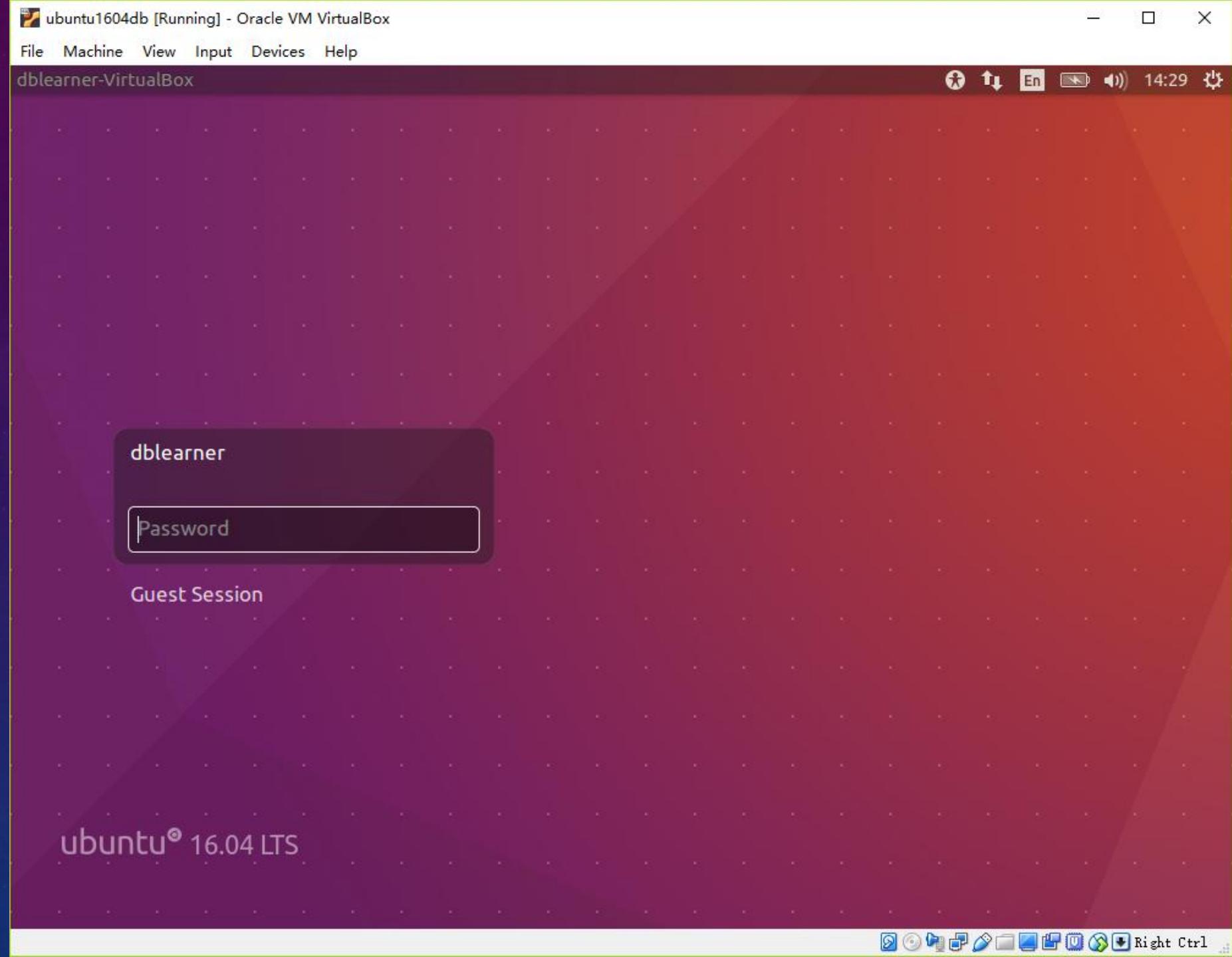
```
/dev/sda1: clean, 190640/2555904 files, 1234700/10223360 blocks
```

The screenshot shows a Windows host system running Oracle VM VirtualBox. A virtual machine named "ubuntu1604db" is running, indicated by the title bar. The main window is a terminal session showing the output of a disk usage command. The desktop environment of the guest OS is not visible.

# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

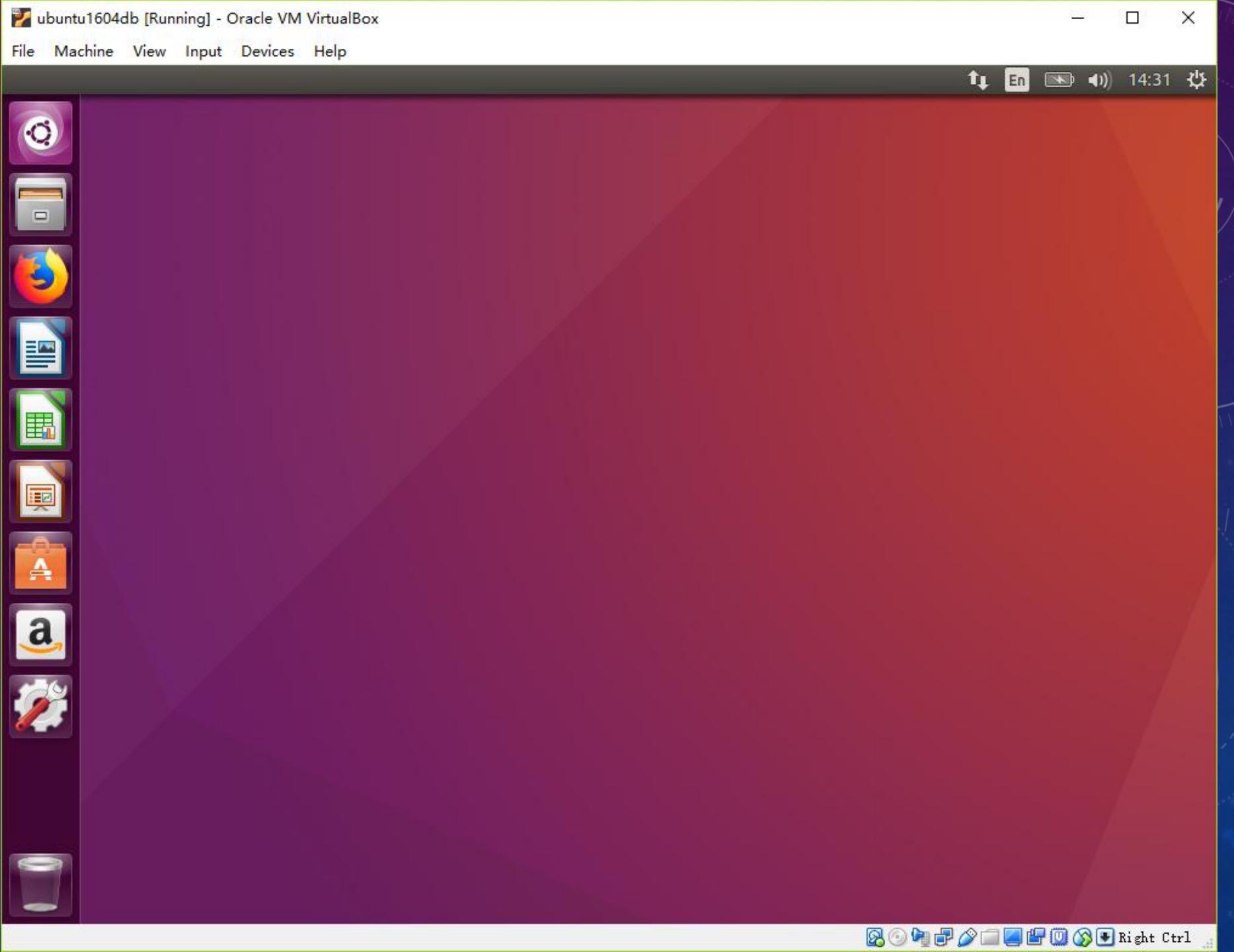
- Input your pwd

©LXD



# INSTALL A GUEST UBUNTU OS IN VIRTUALBOX

- Gnome Desktop

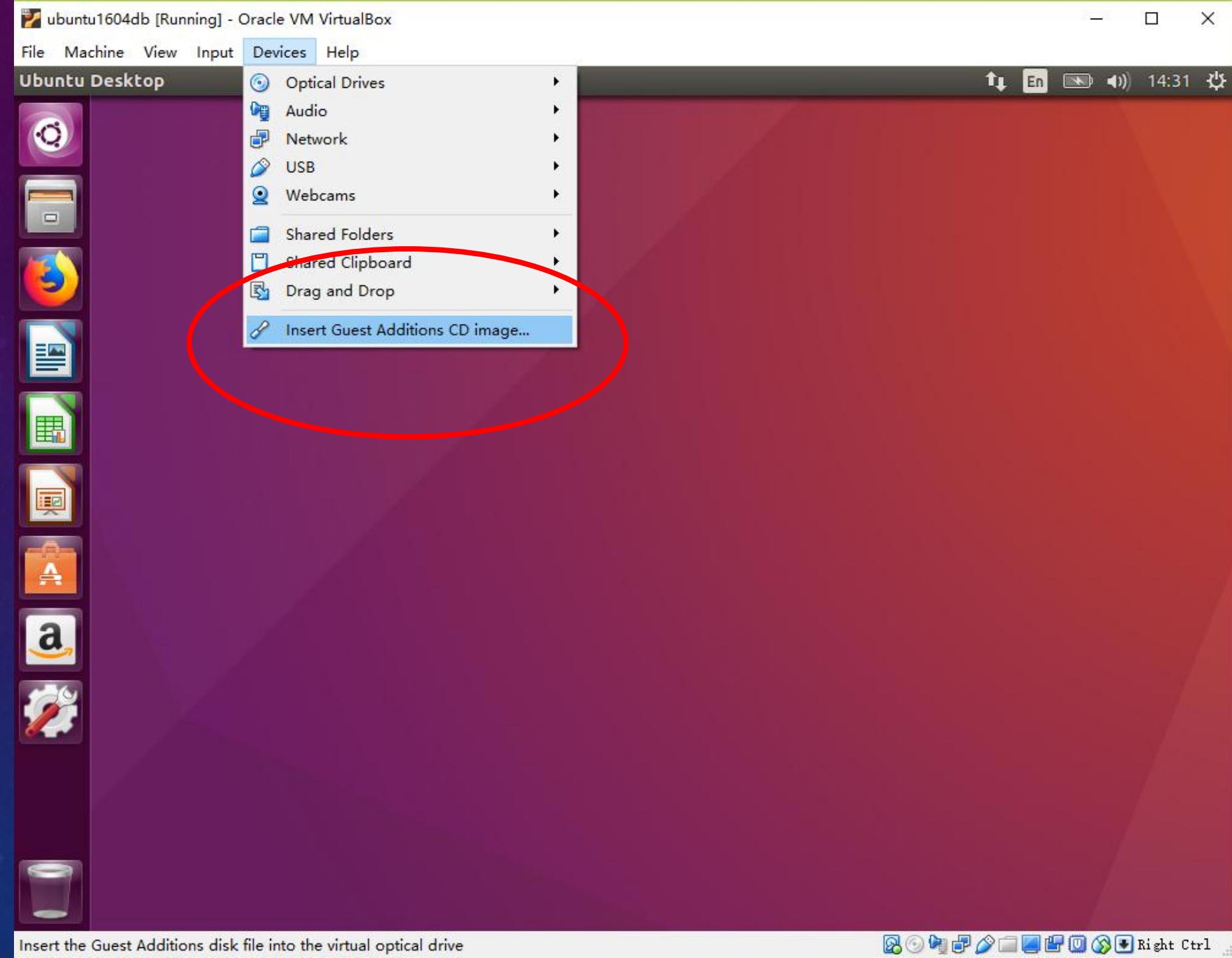


# INSTALLING UBUNTU

- Installing Ubuntu
- Post-Installation Configuration

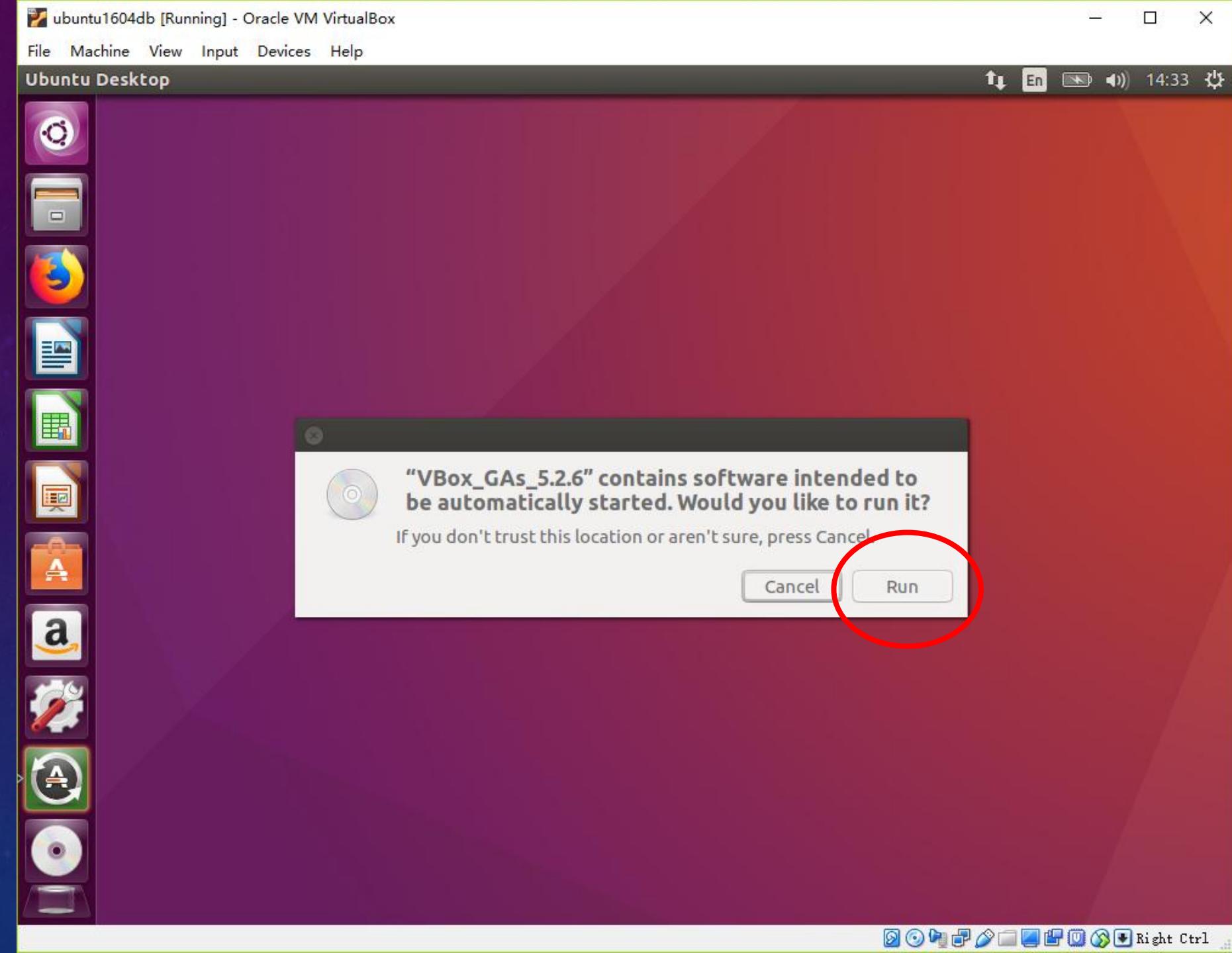
# POST- INSTALLATIO N UBUNTU OS

- To enhance guest os



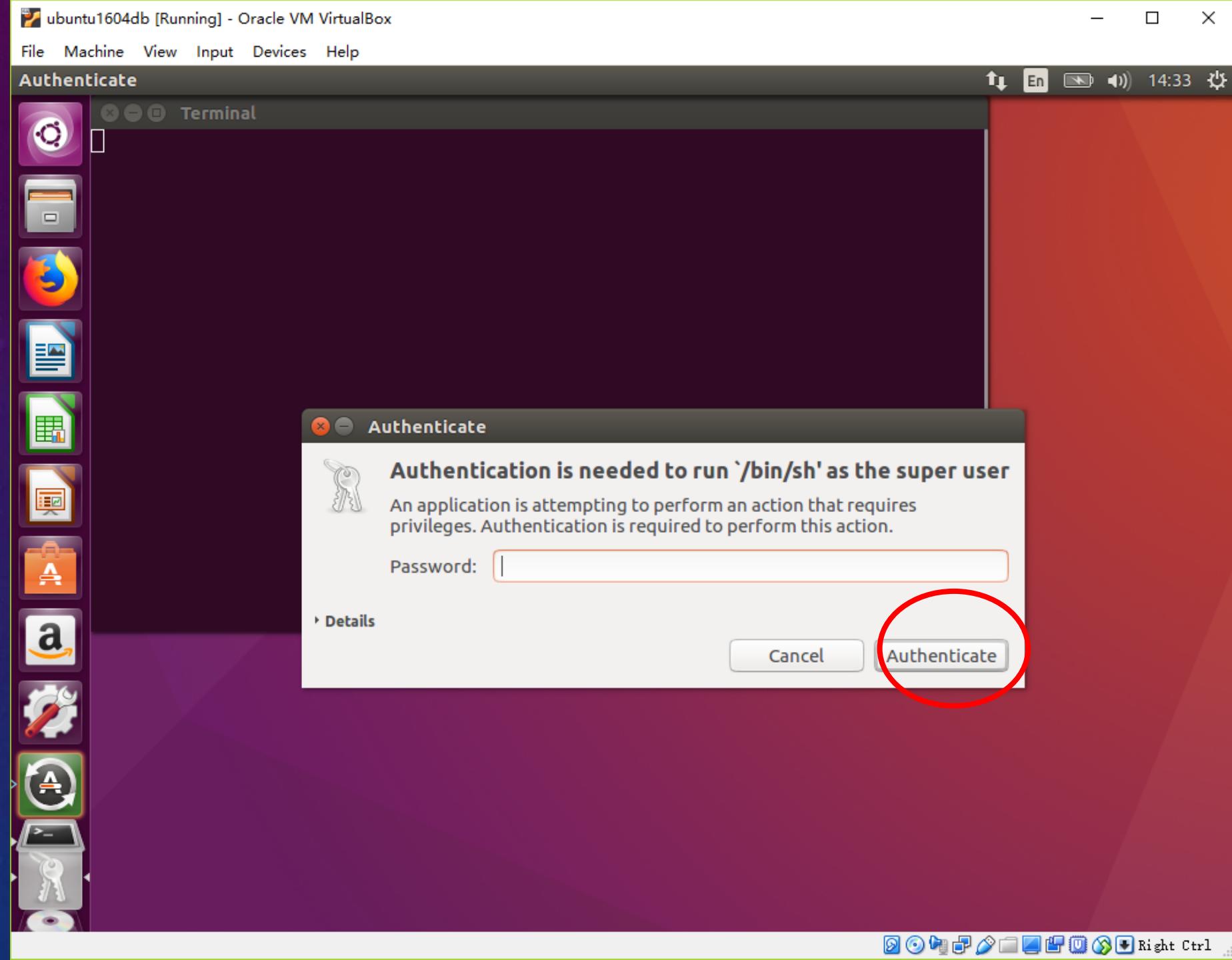
# POST- INSTALLATIO N UBUNTU OS

- To enhance guest os



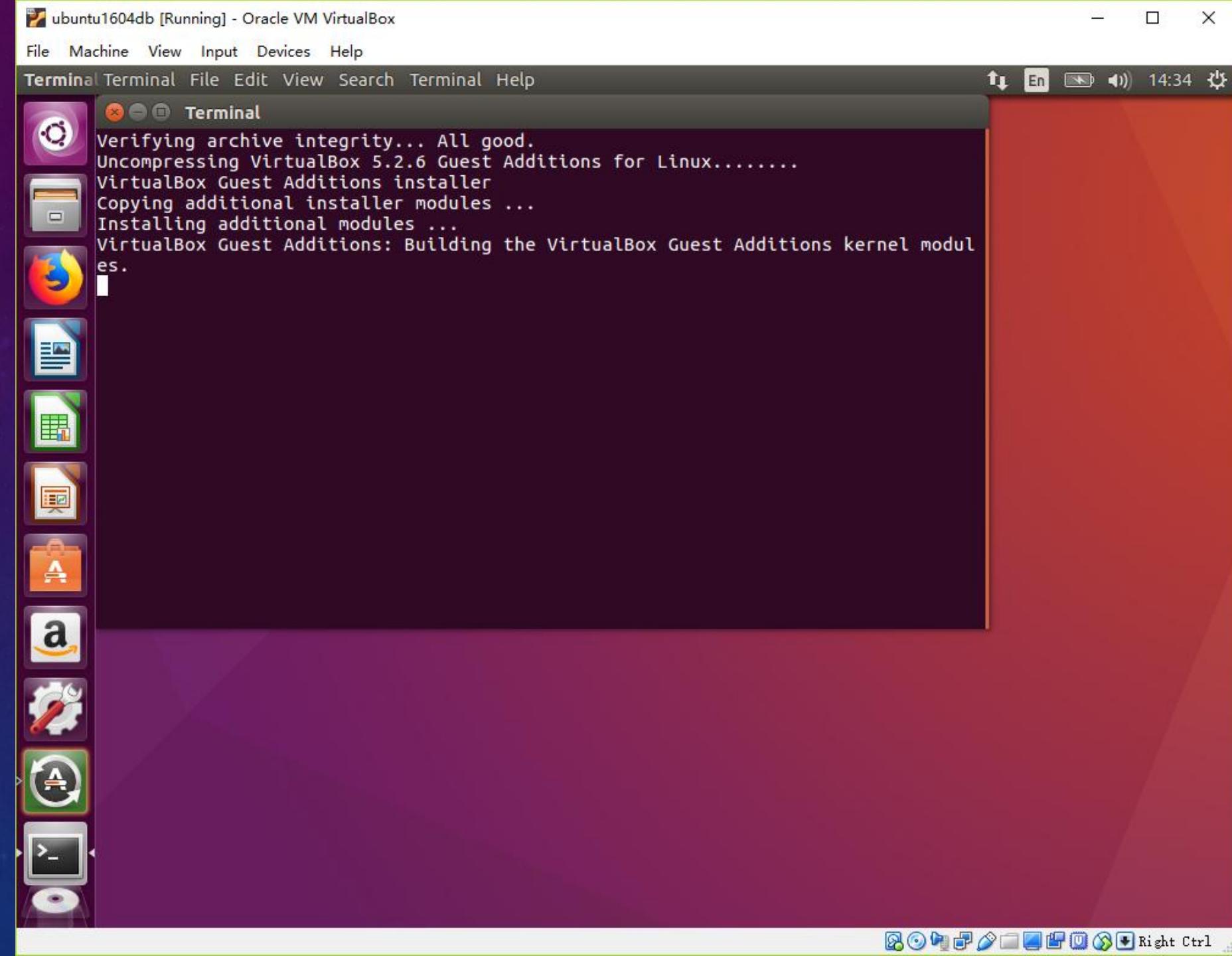
# POST- INSTALLATIO N UBUNTU OS

- To enhance guest os



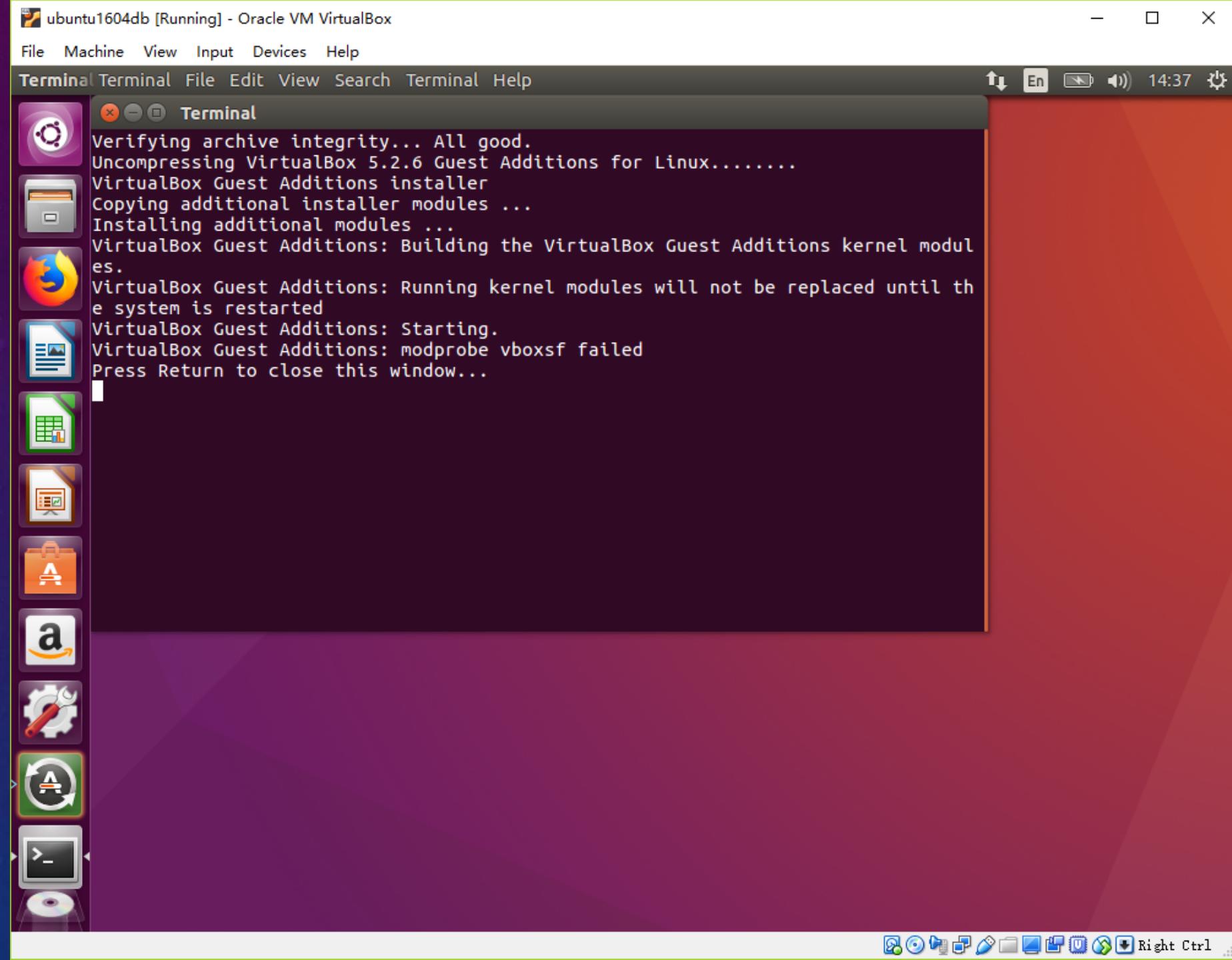
# POST- INSTALLATIO N UBUNTU OS

- To enhance guest os



# POST- INSTALLATIO N UBUNTU OS

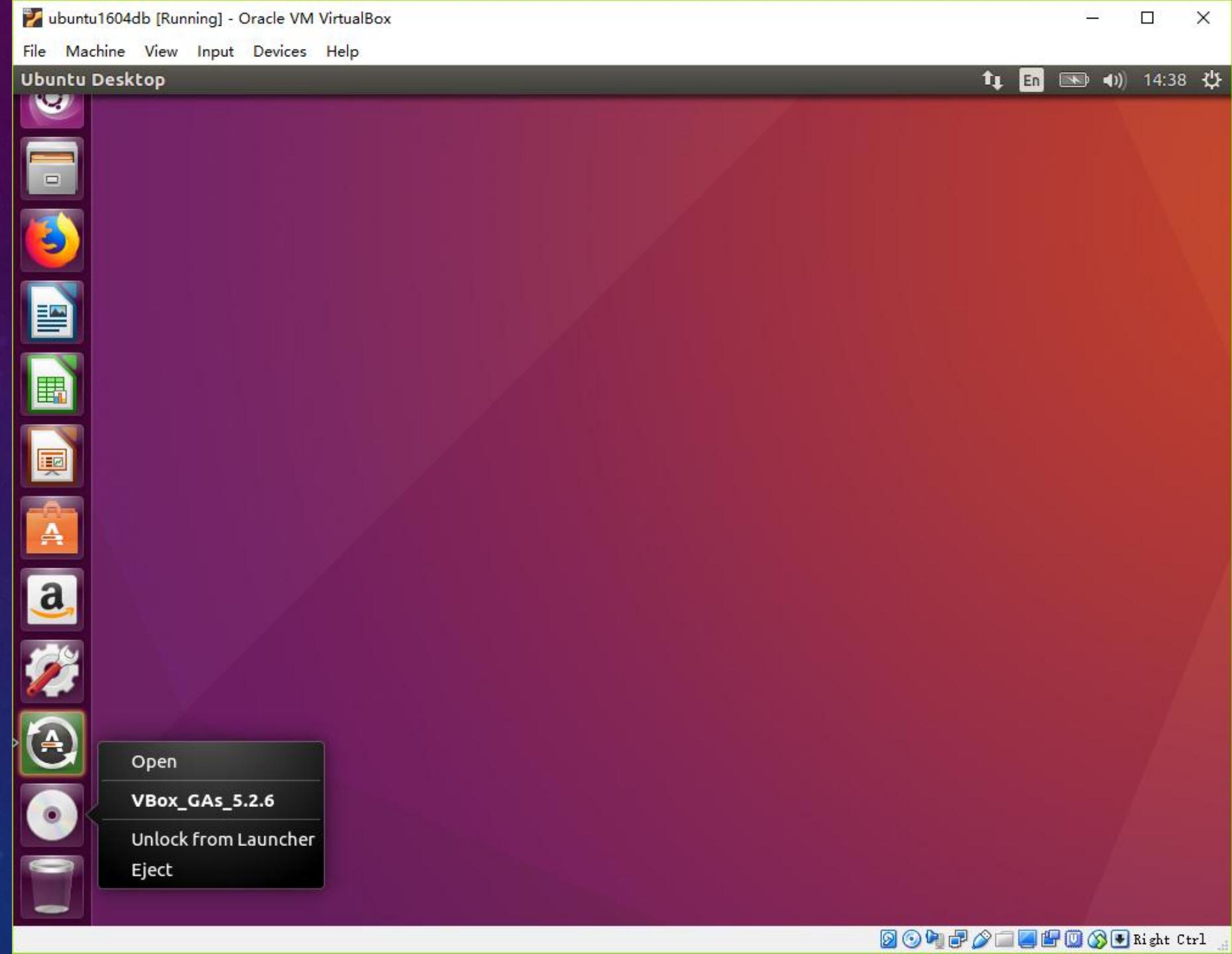
- To enhance guest os



# POST- INSTALLATIO N UBUNTU OS

- To enhance guest os
  - Eject

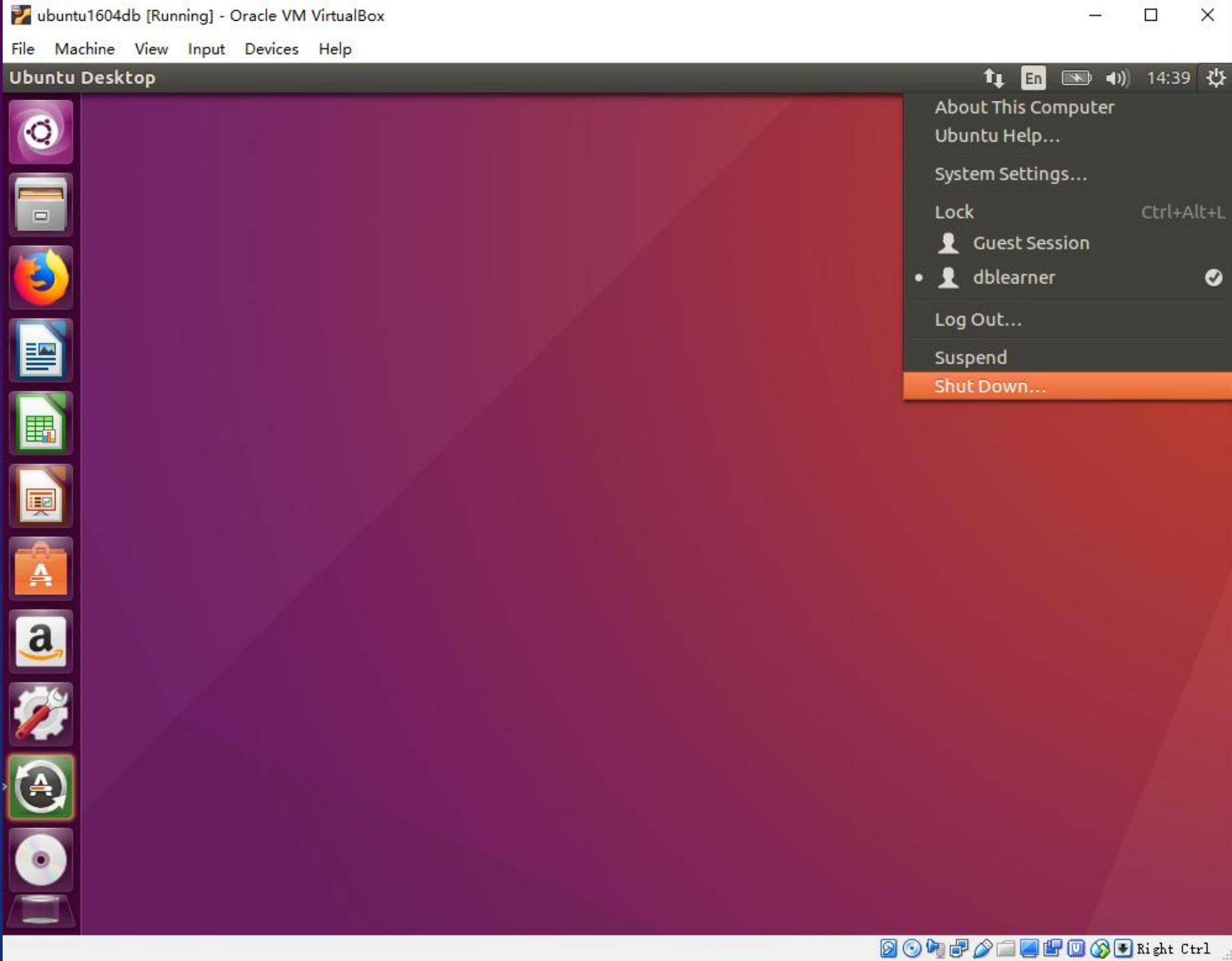
©LXD



# POST- INSTALLATIO N UBUNTU OS

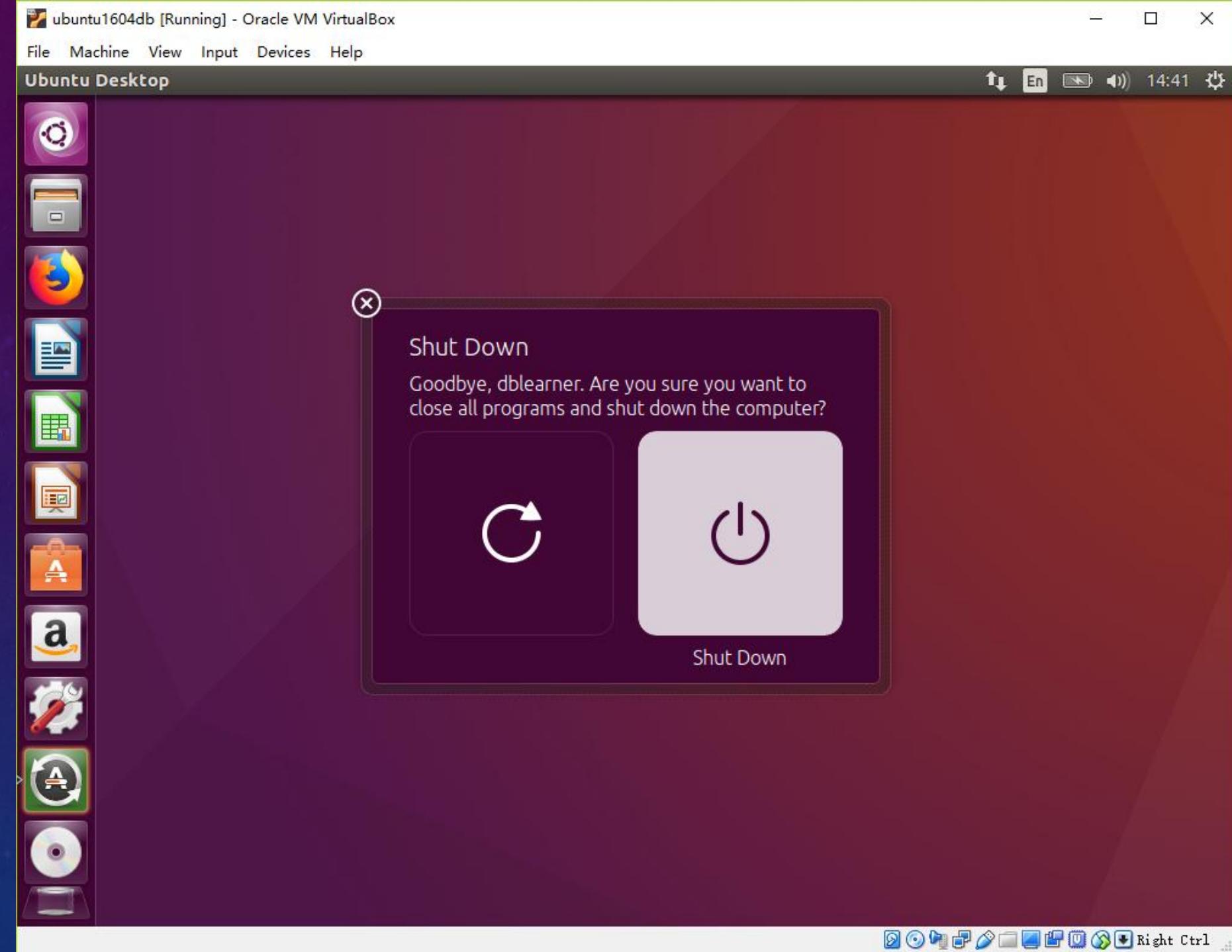
- To enhance guest os
  - Restart

©LXD



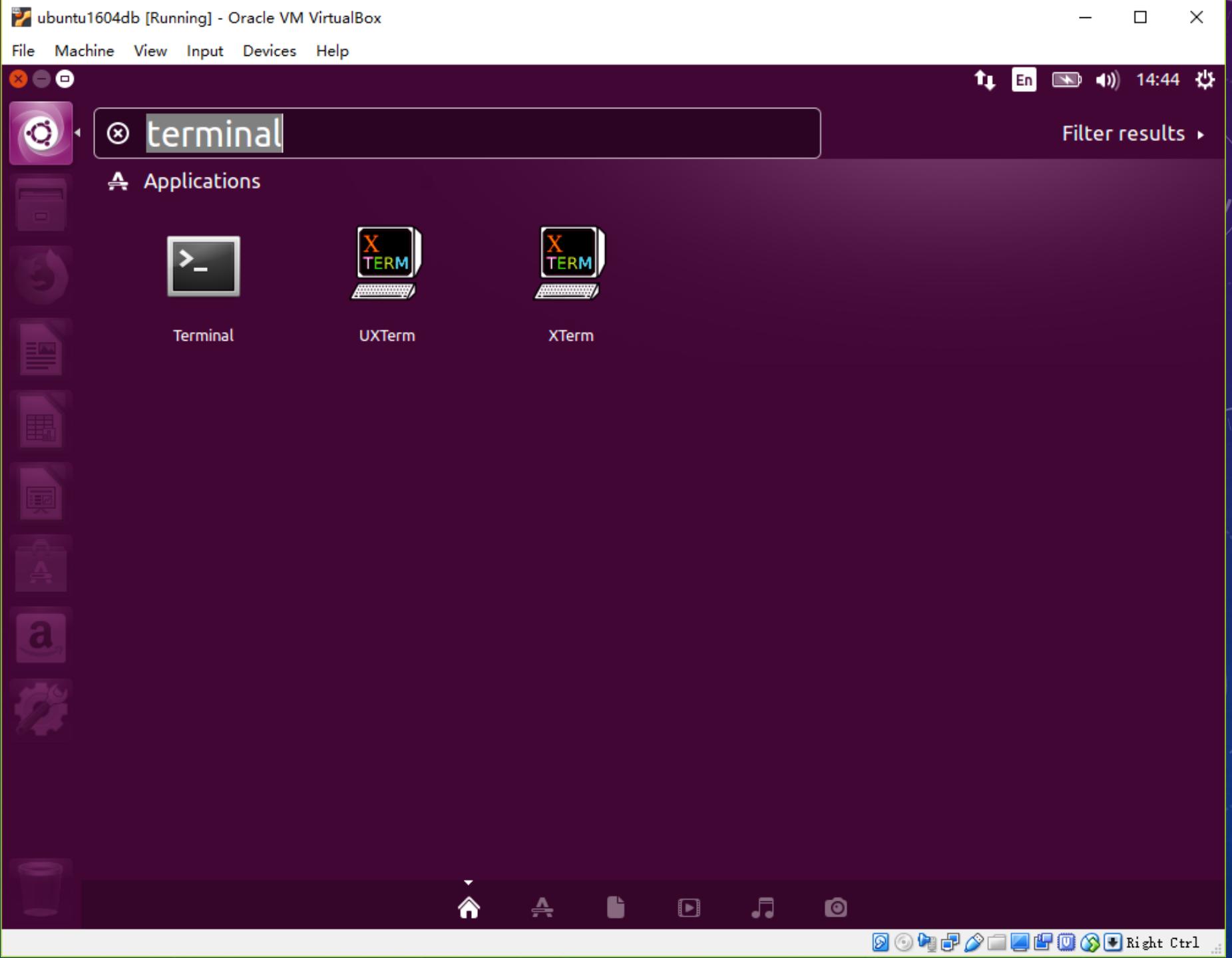
# POST- INSTALLATIO N UBUNTU OS

- To enhance guest os
  - Eject and Restart



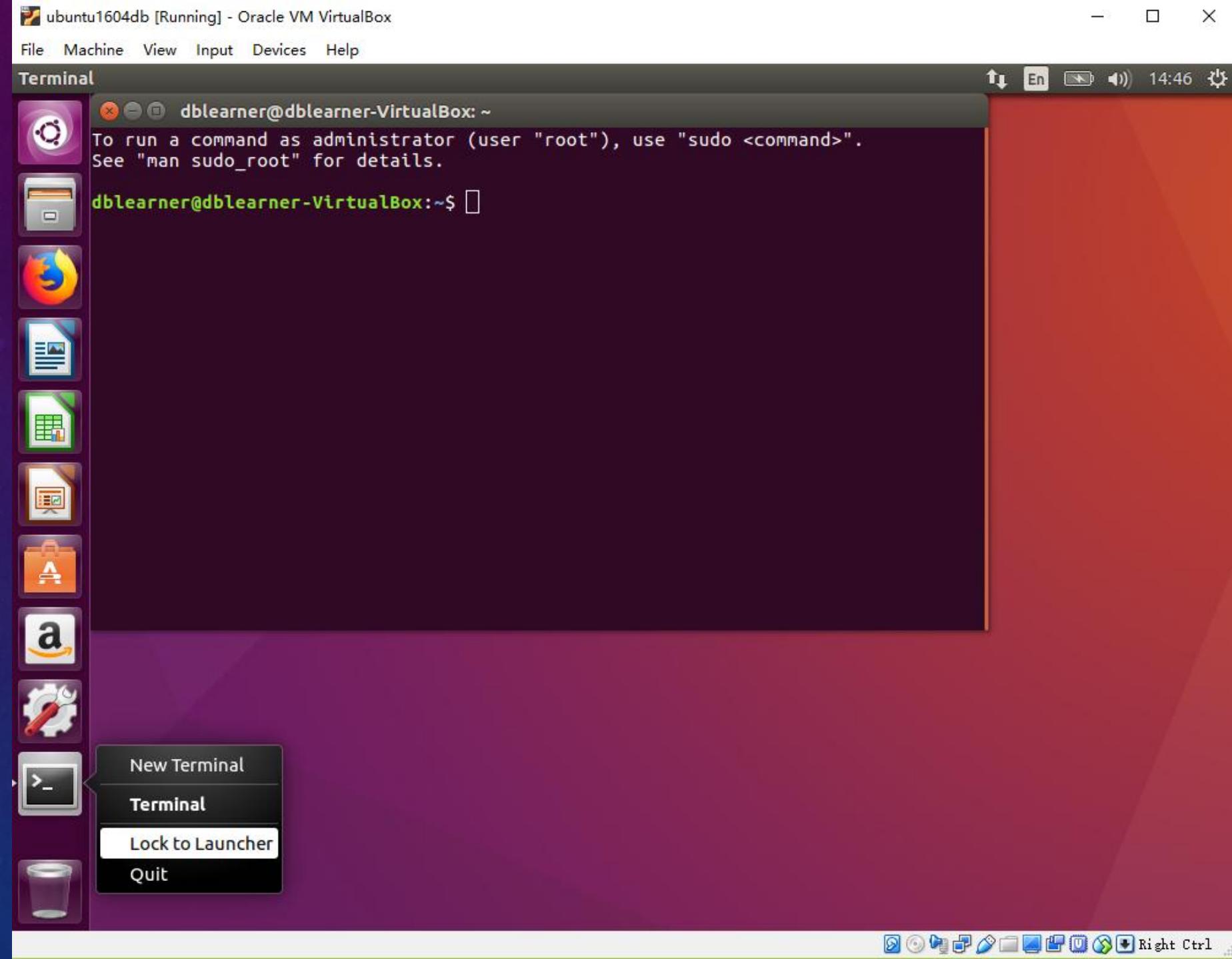
# POST- INSTALLATIO N UBUNTU OS

- Dashboard
  - terminal



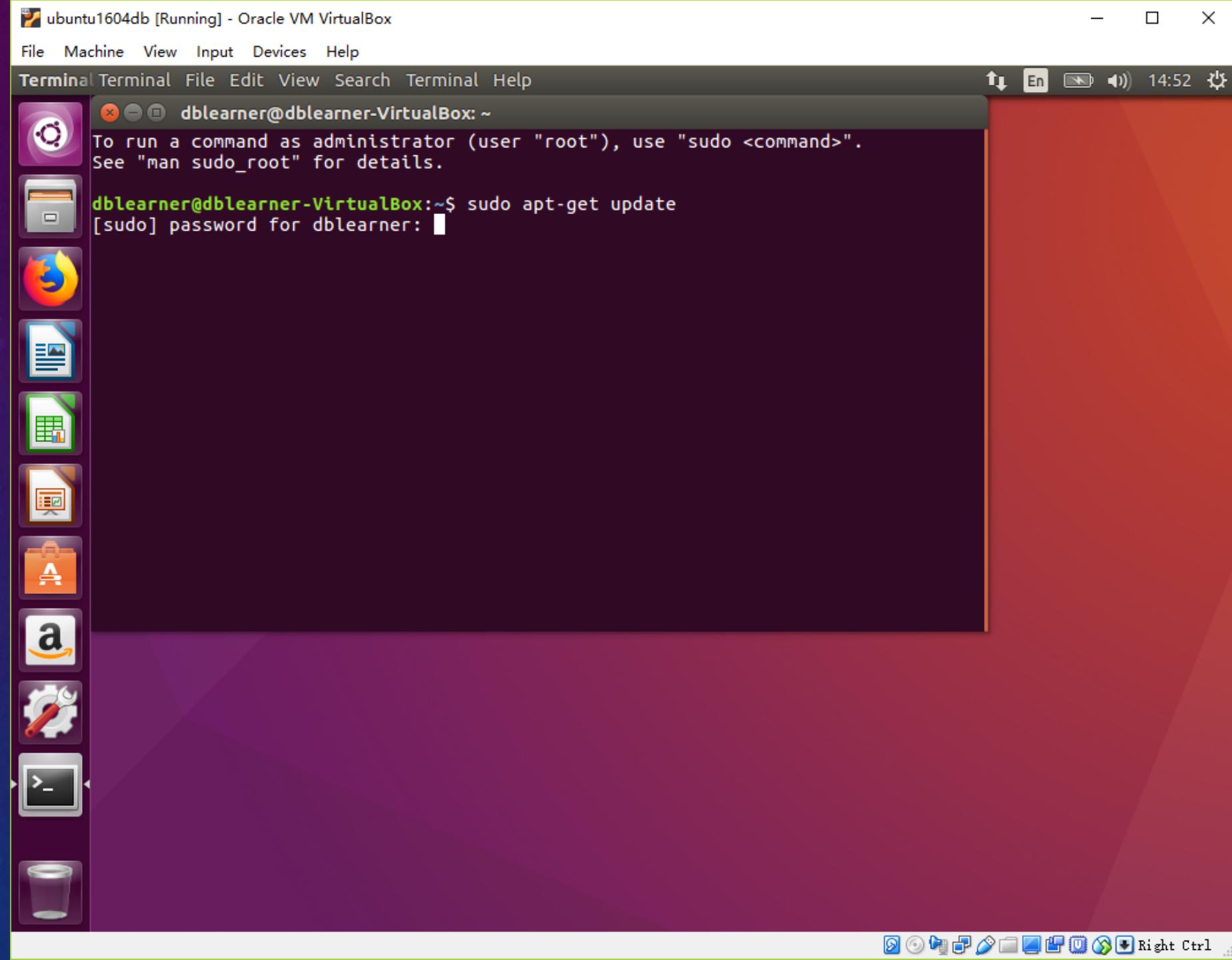
# POST- INSTALLATI ON UBUNTU OS

- Dashboard
  - Terminal
  - Lock to launcher



# POST- INSTALLATI ON UBUNTU OS

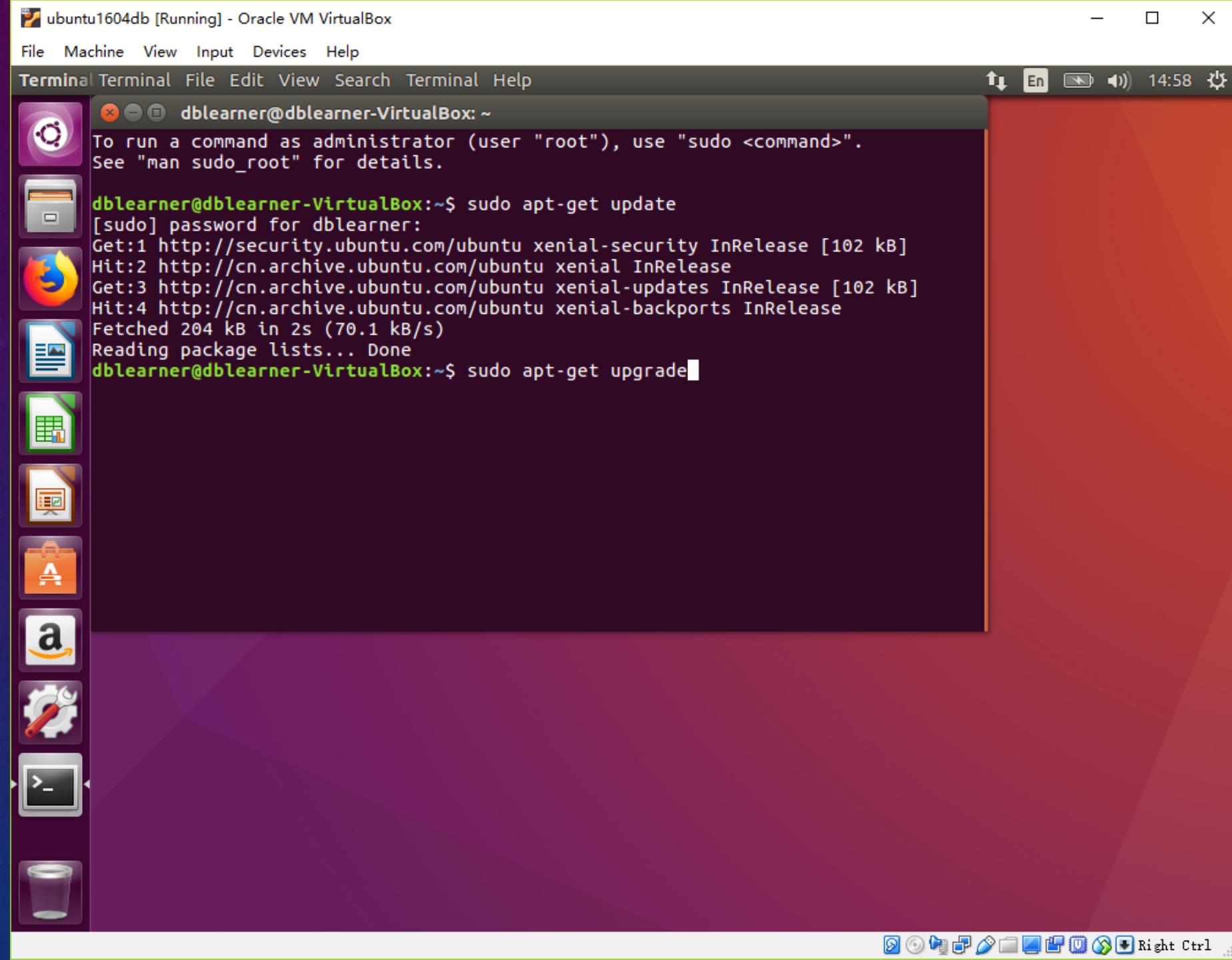
- Dashboard
  - Update OS



# POST- INSTALLATI- ON UBUNTU OS

- Dashboard
    - Update OS

© LXD



# POST- INSTALLATI ON UBUNTU OS

- Dashboard
  - Update OS

©LXD

ubuntu1604db [Running] - Oracle VM VirtualBox

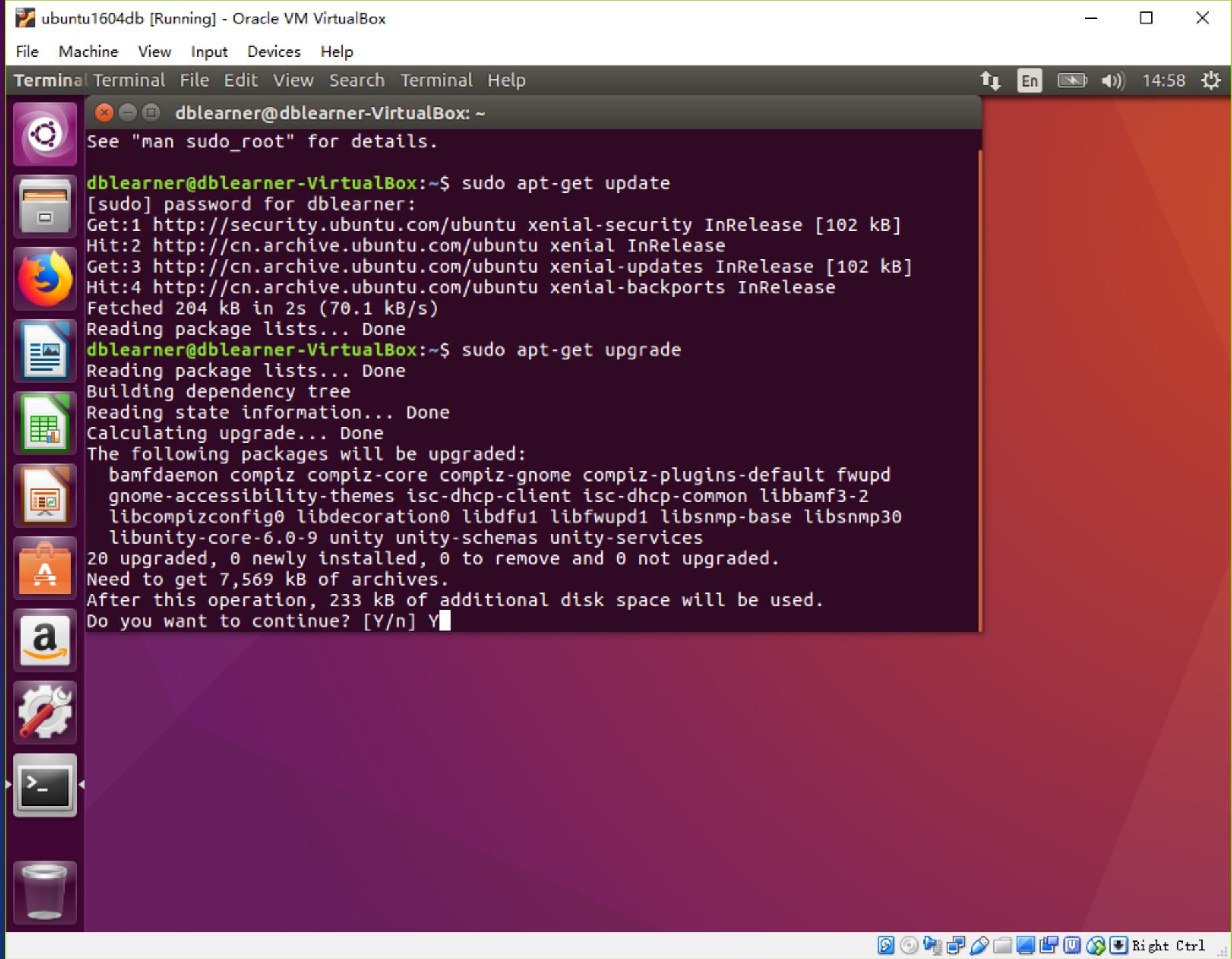
File Machine View Input Devices Help

Terminal Terminal File Edit View Search Terminal Help

See "man sudo\_root" for details.

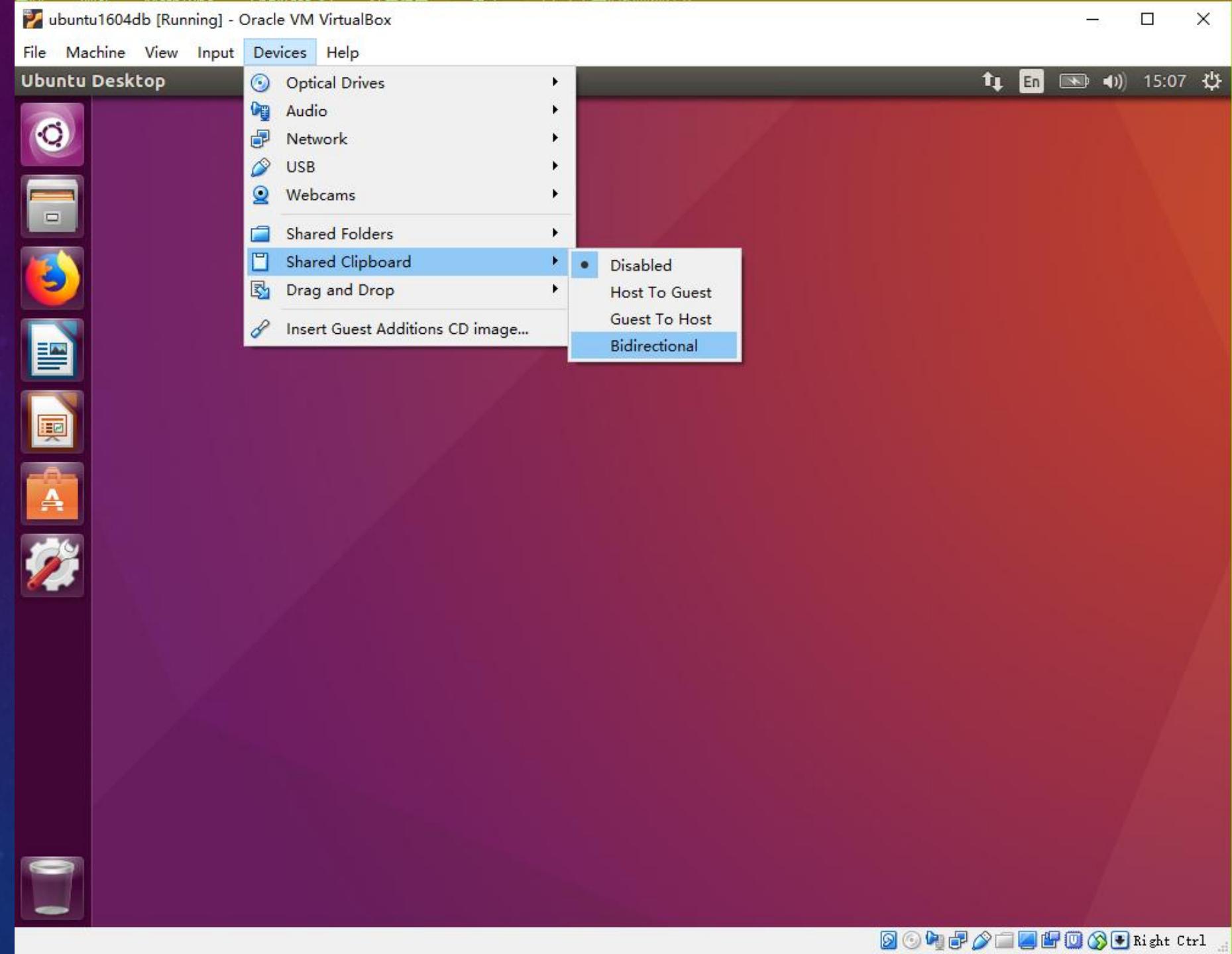
```
dblearner@dblearner-VirtualBox:~$ sudo apt-get update
[sudo] password for dblearner:
Get:1 http://security.ubuntu.com/ubuntu xenial-security InRelease [102 kB]
Hit:2 http://cn.archive.ubuntu.com/ubuntu xenial InRelease
Get:3 http://cn.archive.ubuntu.com/ubuntu xenial-updates InRelease [102 kB]
Hit:4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



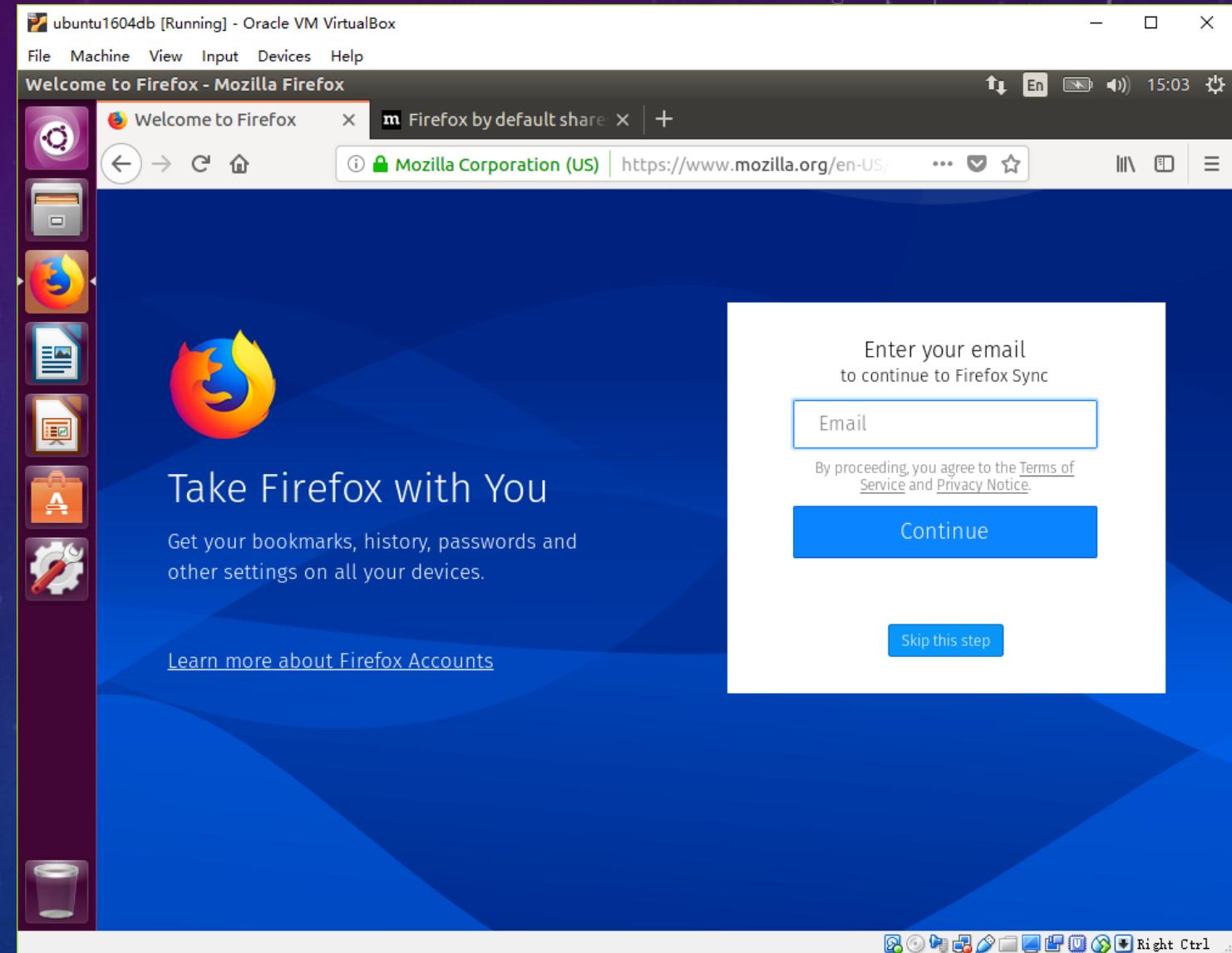
# POST- INSTALLATI ON UBUNTU OS

- 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

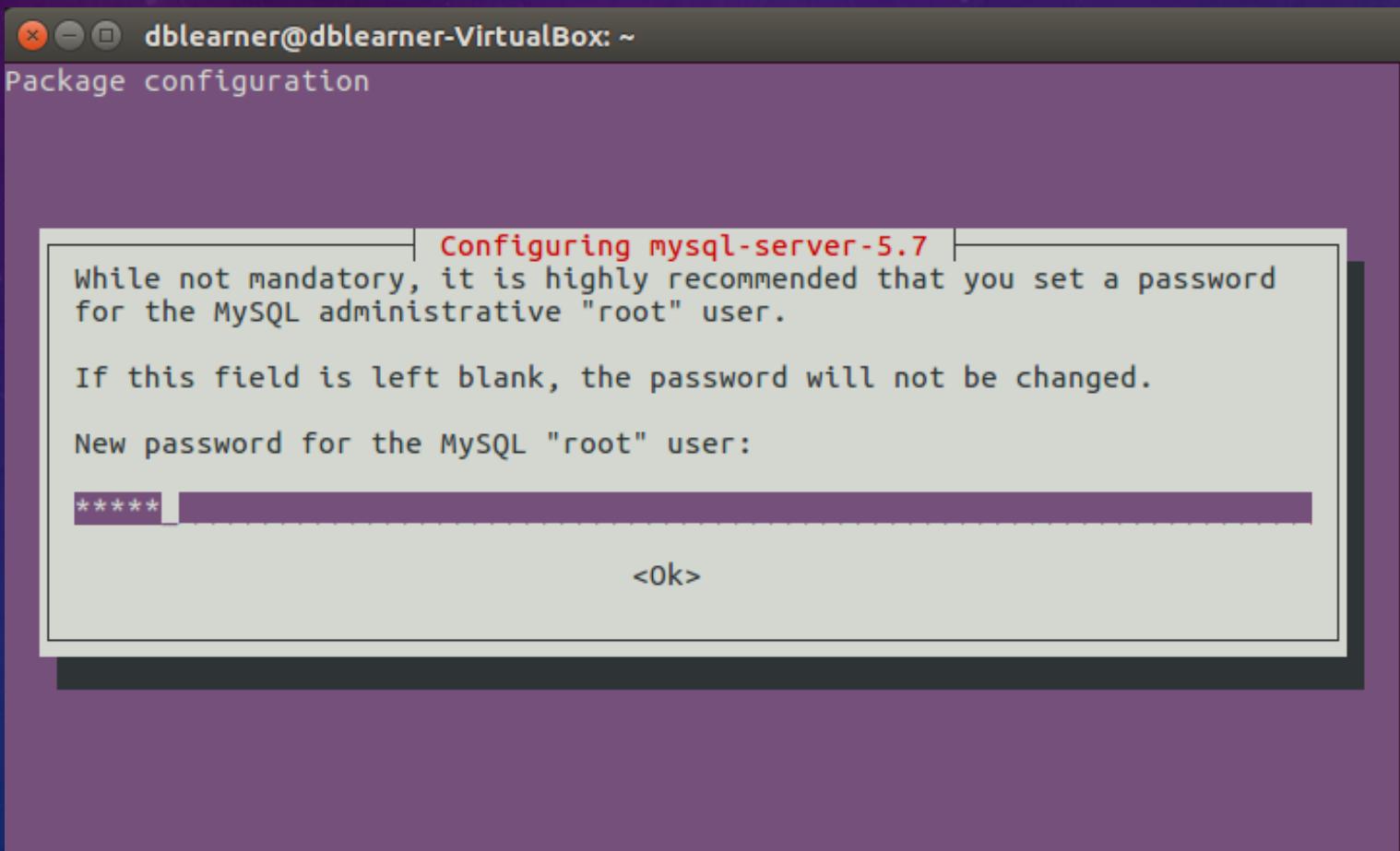
# MySQL

- <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 and services: "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", "New Defaults in MySQL 8.0" (with a detailed description), "MySQL Documentation", "MySQL Downloads", and "MySQL Forums". The desktop interface includes a dock with various application icons on the left and a taskbar at the bottom.

# 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)
```

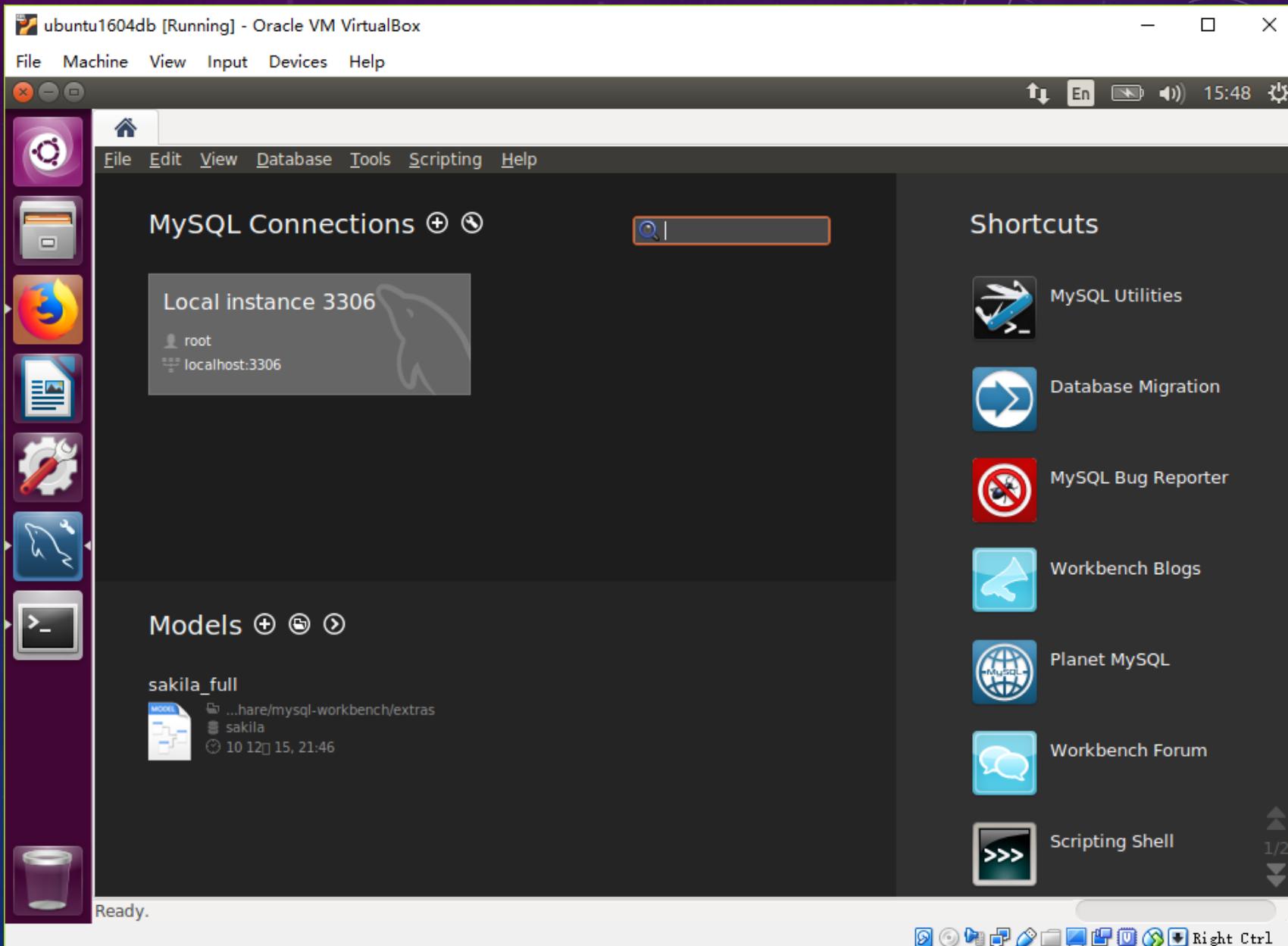
```
mysql>
```

# 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 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

©LXD

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." 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.

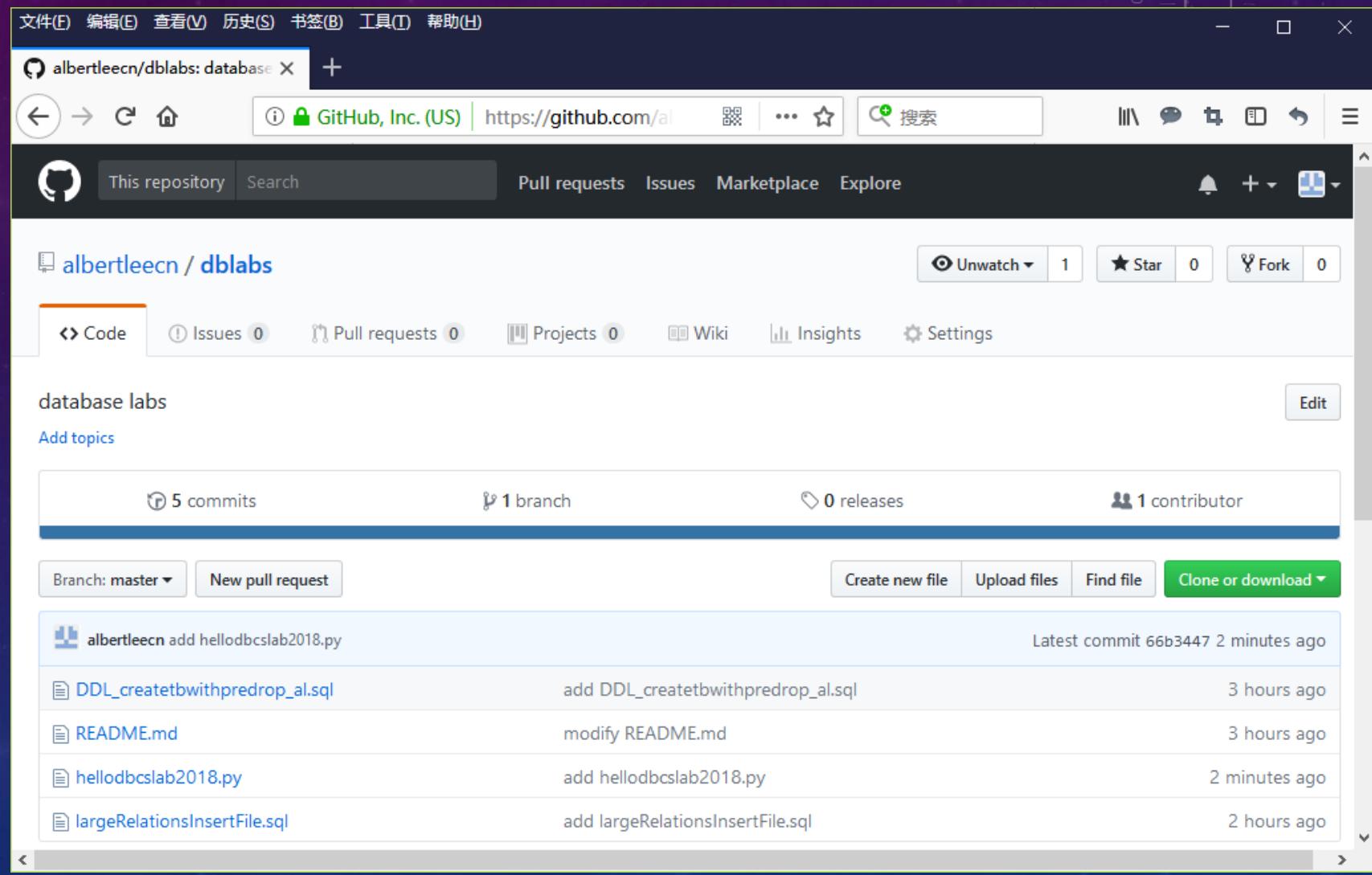
The browser window title is "The world's leading soft x". The URL in the address bar is "GitHub, Inc. (US) | https://github.com". The main heading on the page is "Built for developers". The text below it reads: "GitHub is a development platform inspired by the way you work. From **open source** to **business**, you can host and review code, manage projects, and build software alongside millions of other developers." The sign-up form fields are: "Username" (placeholder: "Pick a username"), "Email" (placeholder: "you@example.com"), and "Password" (placeholder: "Create a password"). Below the password field is a note: "Use at least one letter, one numeral, and seven characters." A large green button at the bottom says "Sign up for GitHub". At the bottom of the screen, there is a dock with icons for various applications.

# 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

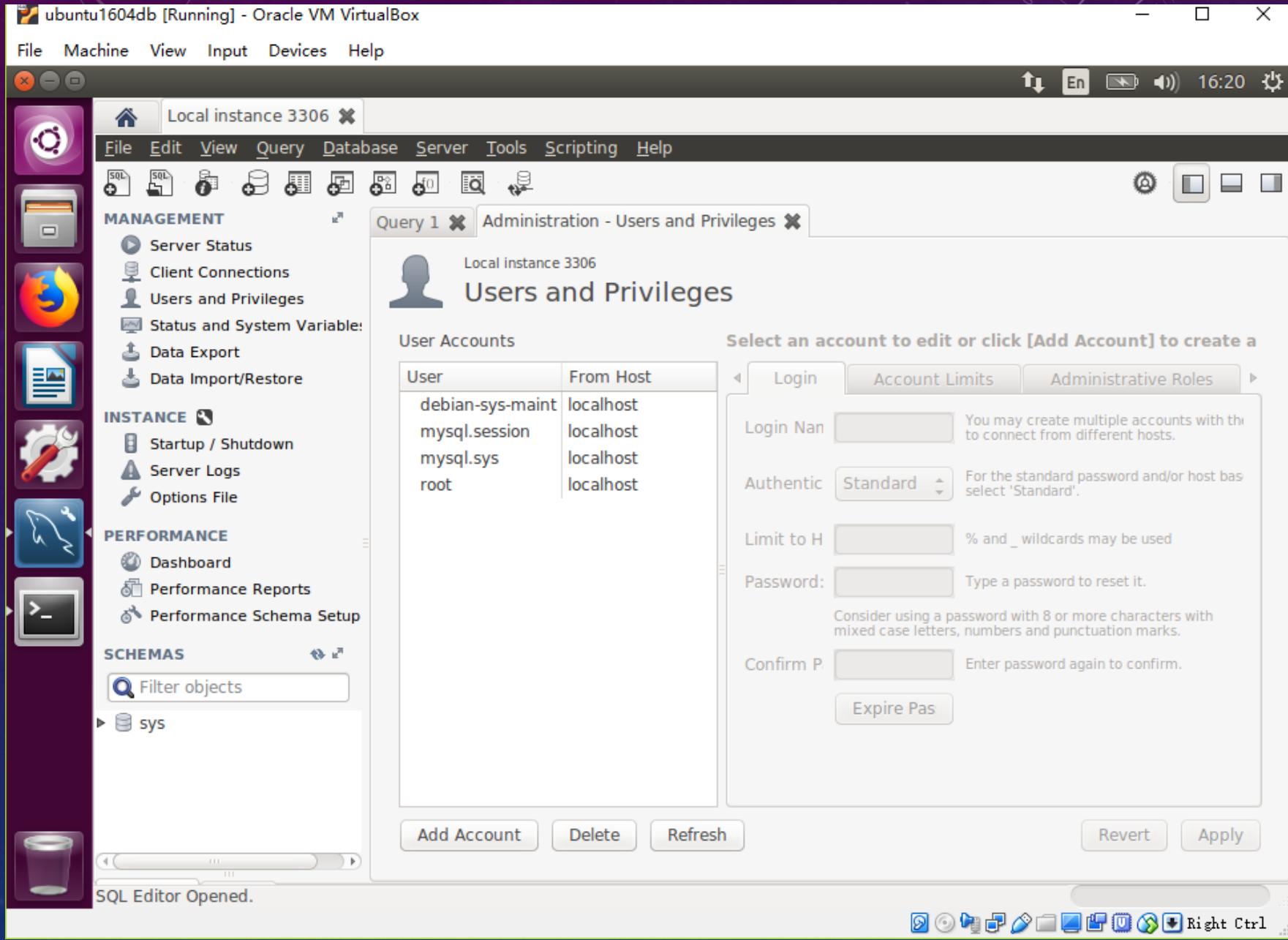
dblearner@dblearner-VirtualBox: ~/Documents/dblabs

```
dblearner@dblearner-VirtualBox:~$ ls
Desktop Downloads Music Public Templates
Documents examples.desktop Pictures readme.txt Videos
dblearner@dblearner-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@dblearner-VirtualBox:~/Documents$ ls
dblabs
dblearner@dblearner-VirtualBox:~/Documents$ ls dblabs/
DDL_createtbwithpredrop_al.sql README.md
dblearner@dblearner-VirtualBox:~/Documents$ cd dblabs
dblearner@dblearner-VirtualBox:~/Documents/dblabs$ ls
DDL_createtbwithpredrop_al.sql README.md
dblearner@dblearner-VirtualBox:~/Documents/dblabs$
```



# MySQL: IMPORT DATA OF LABS

- Add DB User
  - myuser
  - mypwd



# MySQL: IMPORT DATA OF LABS

- Add DB User
  - myuser
  - mypwd

The screenshot shows the MySQL Workbench application running on an Ubuntu 16.04 LTS system within Oracle VM VirtualBox. 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, network, volume, and time (16:20). The left sidebar contains icons for Home, Local instance 3306, File, Edit, View, Query, Database, Server, Tools, Scripting, and Help. The "MANAGEMENT" section includes Server Status, Client Connections, Users and Privileges, Status and System Variable, 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 a "sys" schema with a "Filter objects" search bar. A message at the bottom says "SQL Editor Opened." The central panel displays the "Administration - Users and Privileges" window for "Local instance 3306". It lists user accounts in a table:

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

On the right, the "Details for account newuser@%" tab is selected, showing configuration options:

- Login Name: myuser (Note: 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: (button)

Buttons at the bottom include Add Account, Delete, Refresh, Revert, and Apply.

# MySQL: IMPORT DATA OF LABS

- Add DB User
  - myuser
  - mypwd

The screenshot shows the MySQL Workbench interface for managing users and privileges. On the left, there's a sidebar with various management tools like Server Status, Client Connections, and Data Import/Restore. The main window displays a list of user accounts:

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

On the right, the 'Details for account newuser@%' panel is open, showing the 'Login' tab selected. 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 privilege editor, there are buttons for 'Revert' and 'Apply'.

# MySQL: IMPORT DATA OF LABS

- New Connection

The screenshot shows the MySQL Workbench interface on a Linux desktop. The title bar indicates it's running on an Ubuntu 16.04 database instance. The 'Database' menu is open, showing options like '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' account is currently selected. To the right, a detailed view of the 'myuser' account shows its roles and global privileges. The 'Global Privileges' section is fully checked, including ALTER, ALTER ROUTINE, CREATE, CREATE ROUTINE, CREATE TABLESPACE, CREATE TEMPORARY TABLES, CREATE USER, CREATE VIEW, DELETE, DROP, and EVENT.

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

Revoke All Privileges

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](#)

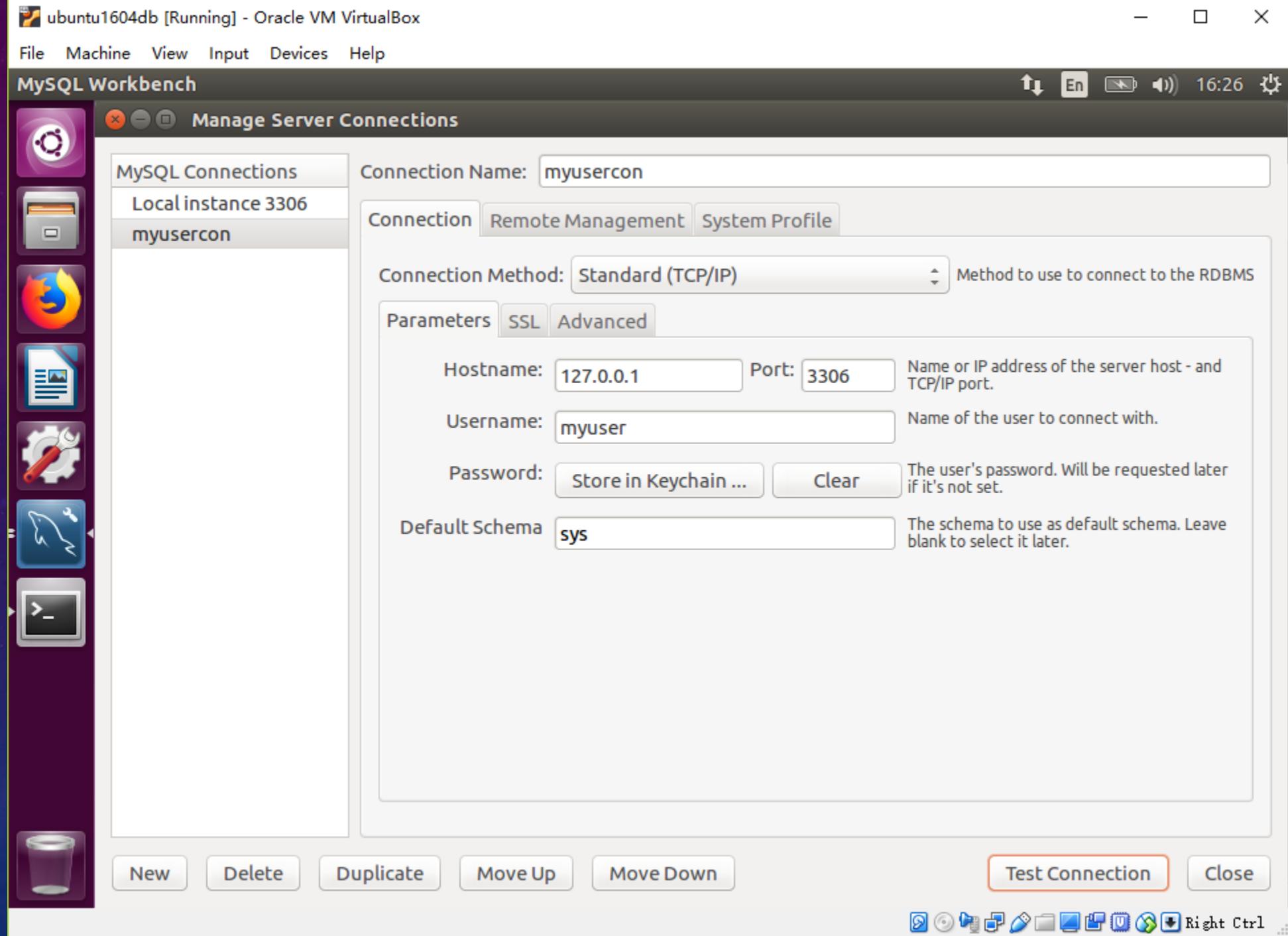
New Delete Duplicate Move Up Move Down Test Connection Close

©LXD

Right Ctrl

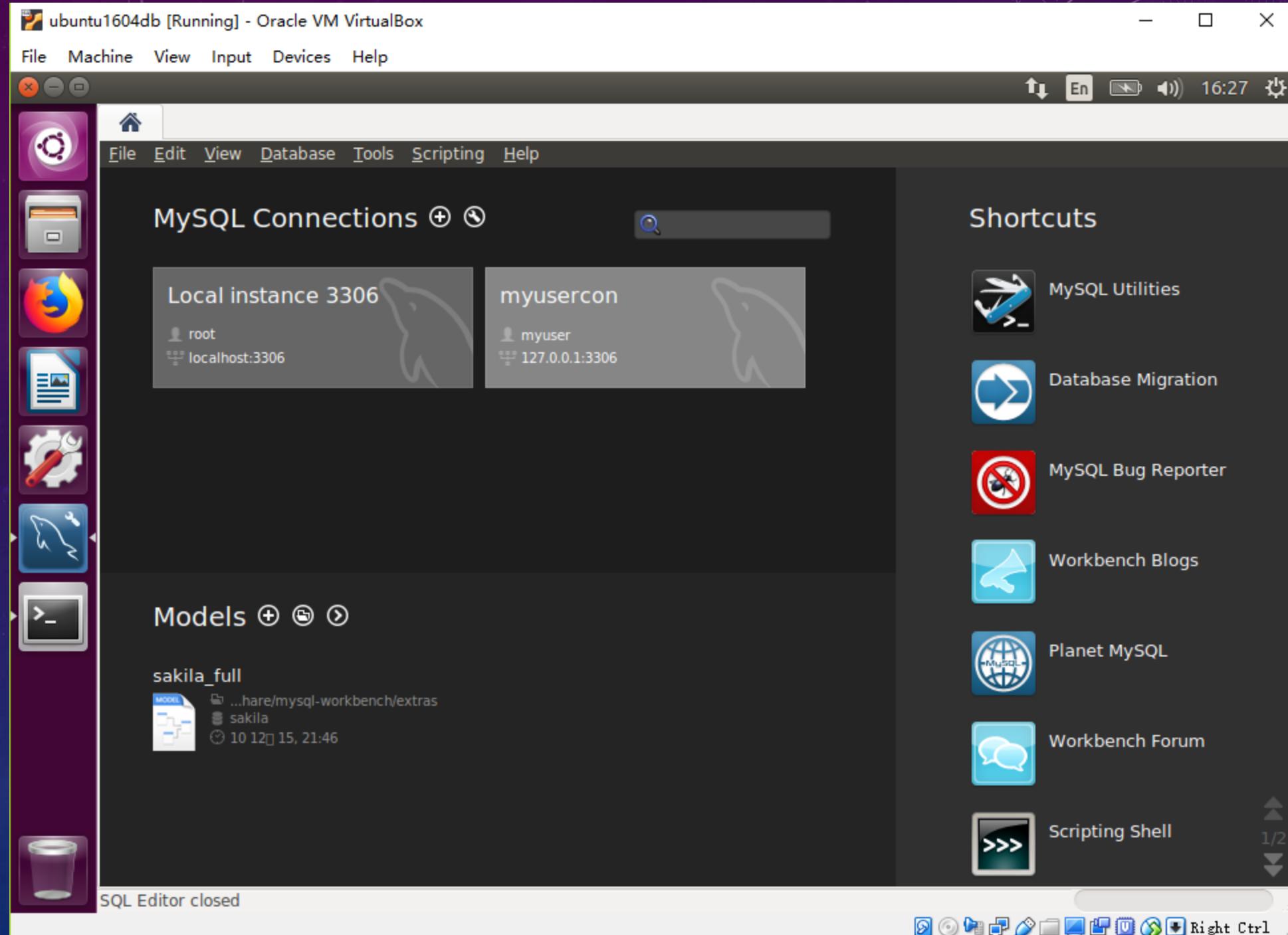
# MySQL: IMPORT DATA OF LABS

- New Connection



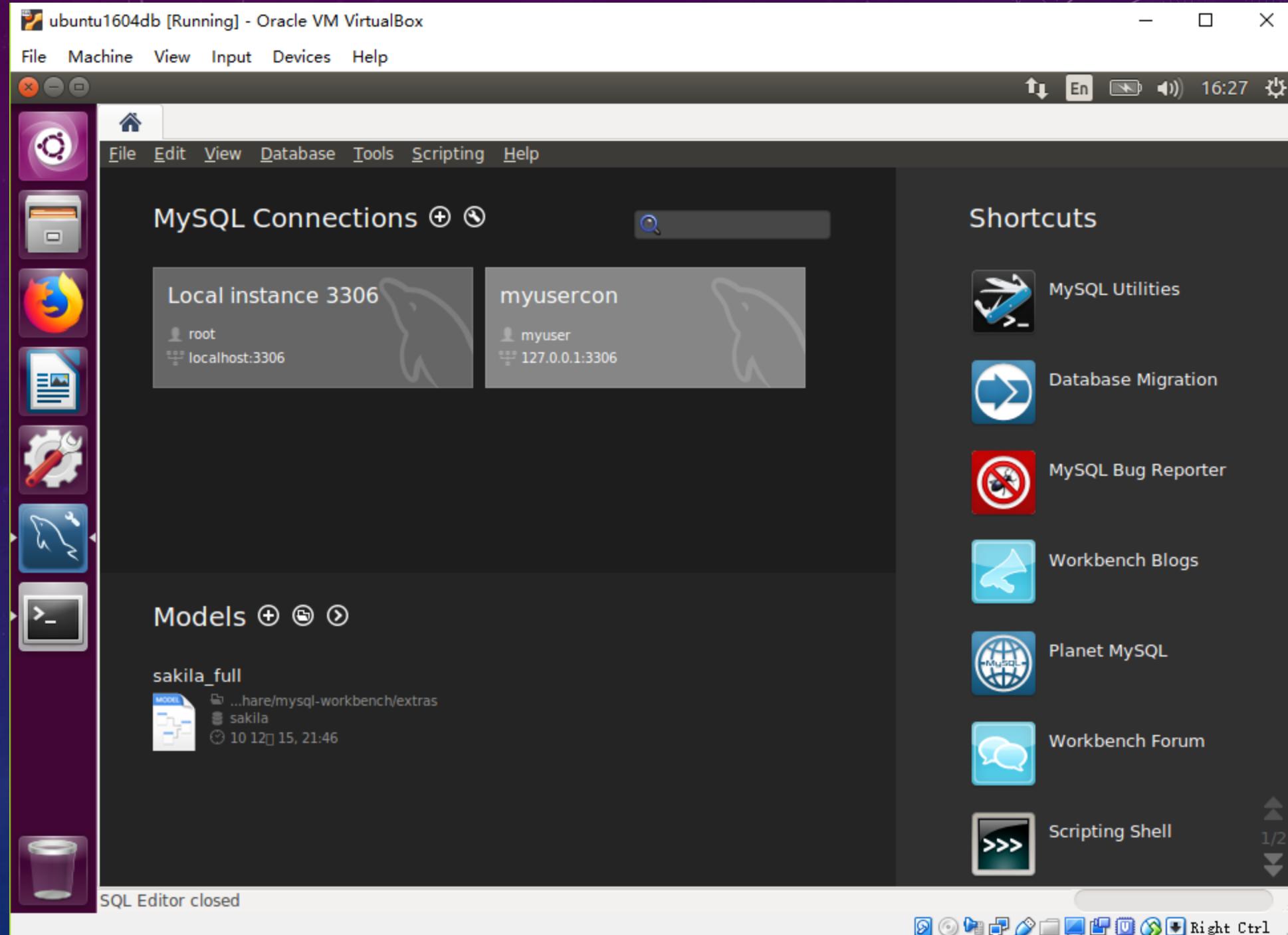
# MySQL: IMPORT DATA OF LABS

- New Connection



# 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 +

MANAGEMENT Create a new schema in the connected server

- 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.			

This screenshot shows the MySQL Workbench interface running on a Linux desktop. The title bar indicates it's on an Ubuntu 16.04 database instance within an Oracle VM VirtualBox. The main window is titled 'myusercon'. The 'MANAGEMENT' tab is selected, displaying options like Server Status, Client Connections, and Data Import/Restore. A prominent dialog box in the center says 'Create a new schema in the connected server'. On the left, there's a sidebar with icons for Home, MySQL, Firefox, and other applications. The bottom status bar shows 'SQL Editor Opened.' and a series of small application icons.

# MySQL: IMPORT DATA OF LABS

- New DB
- dbsclab2018

The screenshot shows the MySQL Workbench interface on an Ubuntu 16.04 VM. The left sidebar displays various management tools like Server Status, Client Connections, and Data Import/Restore. The main area shows a 'Query 1' tab with a schema creation dialog. The schema is named 'dbsclab2018' with a default collation of 'utf8 - utf8\_bin'. A large red annotation in the bottom right corner reads:

CREATE SCHEMA `dbsclab2018` DEFAULT  
CHARACTER SET utf8 COLLATE utf8\_bin ;

The status bar at the bottom indicates 'Closing Administrator.'

## MySQL Workbench

16:36

myusercon

File Edit View Query Database Server Tools Scripting Help

SQL SQL Editor Database Browser Find Search

**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	From Host
debian-sys-maint	localhost
mysql.session	localhost
mysql.sys	localhost
<b>myuser</b>	%
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

Revert Apply



MySQL Workbench

MySQL Connections + C

Local instance 3306

root  
localhost:3306

MySQL Connections

Local instance 3306

myusercon

Manage Server Connections

Connection Name: myusercon

Connection Method: Standard (TCP/IP)

Parameters SSL Advanced

Hostname: 127.0.0.1 Port: 3306

Username: myuser

Password:  Store in Keychain ... Clear

Default Schema: dbsclab2018

New Delete Duplicate Move Up Move Down Test Connection Close

Shortcuts

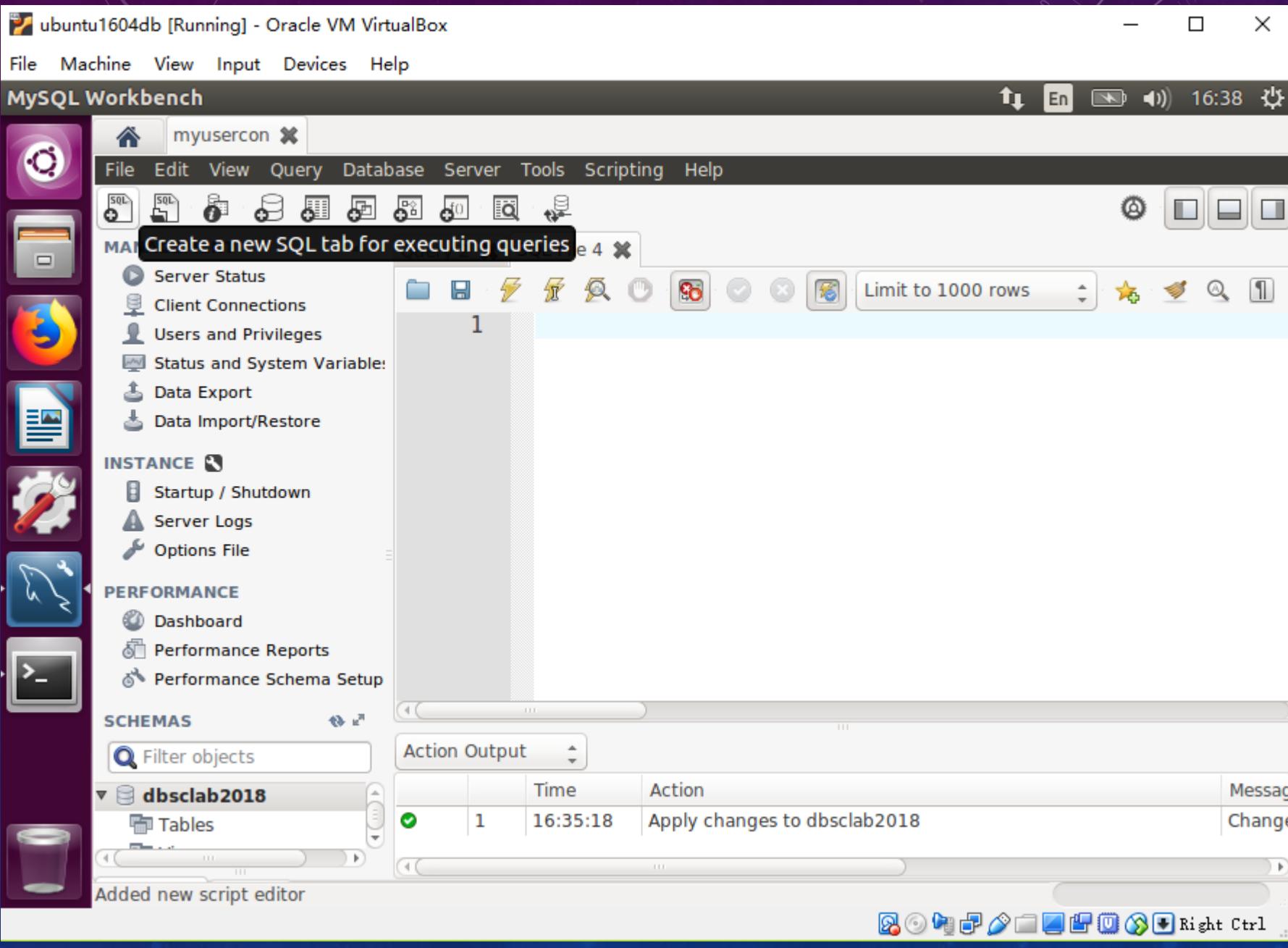
- MySQL Utilities
- Database Migration
- MySQL Bug Reporter
- Workbench Blogs
- Planet MySQL
- Workbench Forum
- Scripting Shell

©LXD

Server Profile Manager Opened.

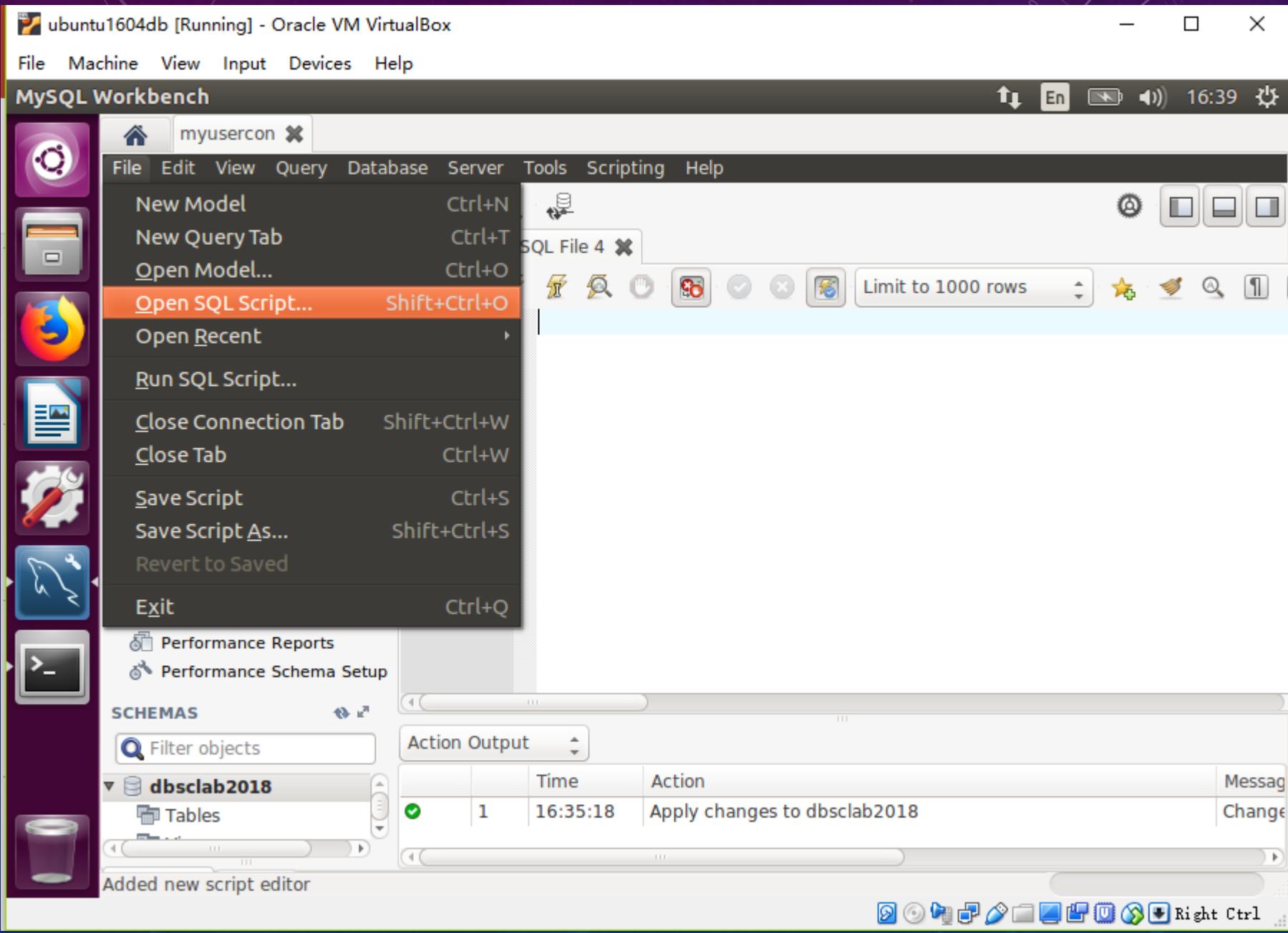
# MySQL: IMPORT DATA OF LABS

- New DB
  - dbsclab2018



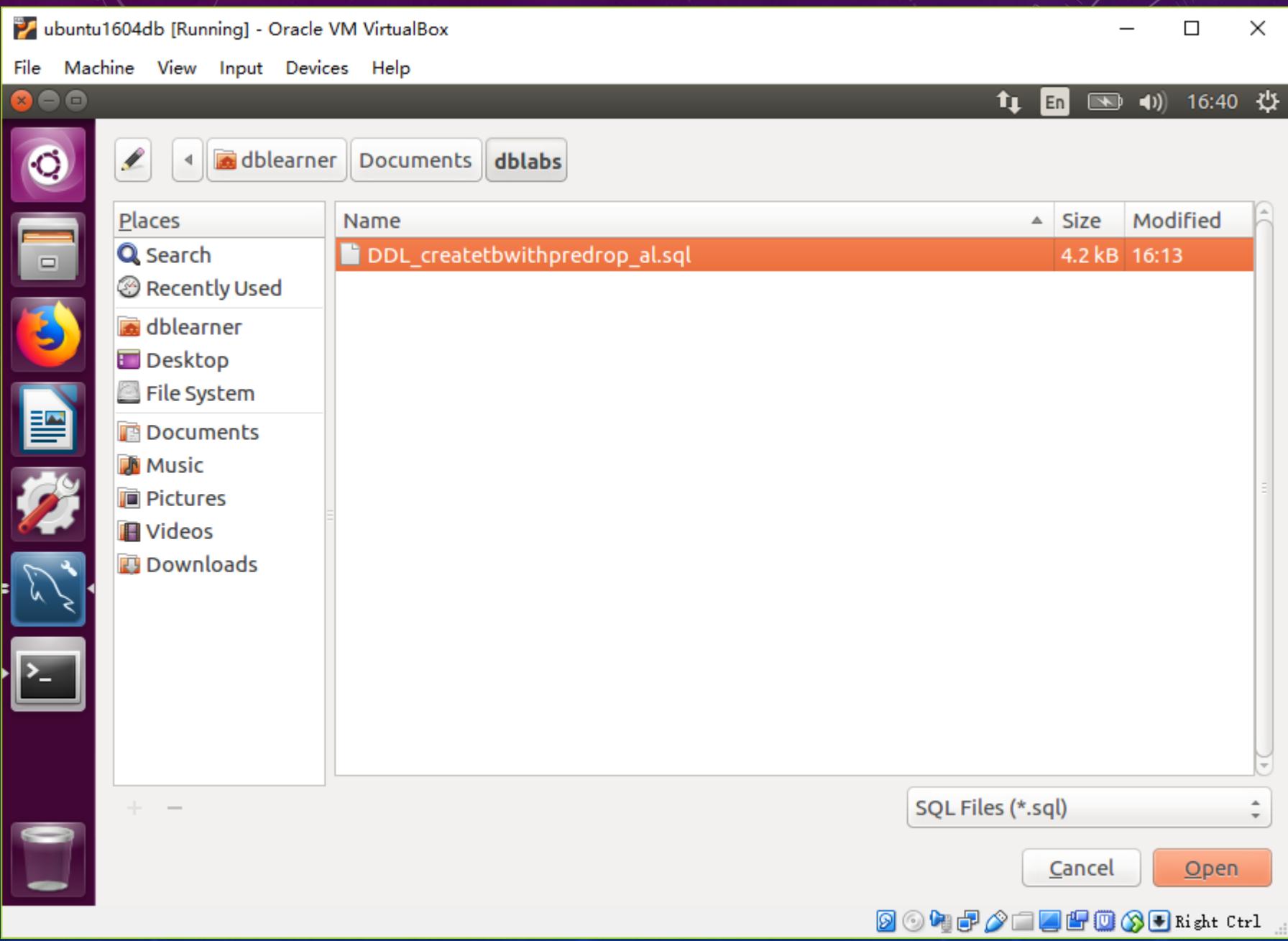
# MySQL: IMPORT DATA OF LABS

- 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   (ID          varchar(5),
41    name        varchar(20) not null,
42    dept_name  varchar(20),
43    salary      numeric(8,2) check (salary > 29000),
44    primary key (ID)
45  );
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	alter table takes add constraint takes_fk1 foreign key (dept_name)	Records: 0 Duplicates: 0 Warnings: 0	0.000 sec
✓	29	16:40:42 alter table `takes` add constraint `takes_fk2` foreign key (ID) references `instructor`(`ID`)	0 row(s) affected Records: 0 Duplicates: 0 Warnings: 0	0.036 sec
✓	30	16:40:42 create table advisor (s_ID varchar(5), i_ID...)	0 row(s) affected	0.015 sec
✓	31	16:40:42 create table time_slot (time_slot_id varchar(4), ...)	0 row(s) affected	0.011 sec
✓	32	16:40:42 create table prereq (course_id varchar(8), pre...	0 row(s) affected	0.013 sec

# MySQL: IMPORT DATA OF LABS

- New DB
  - dbsclab2018

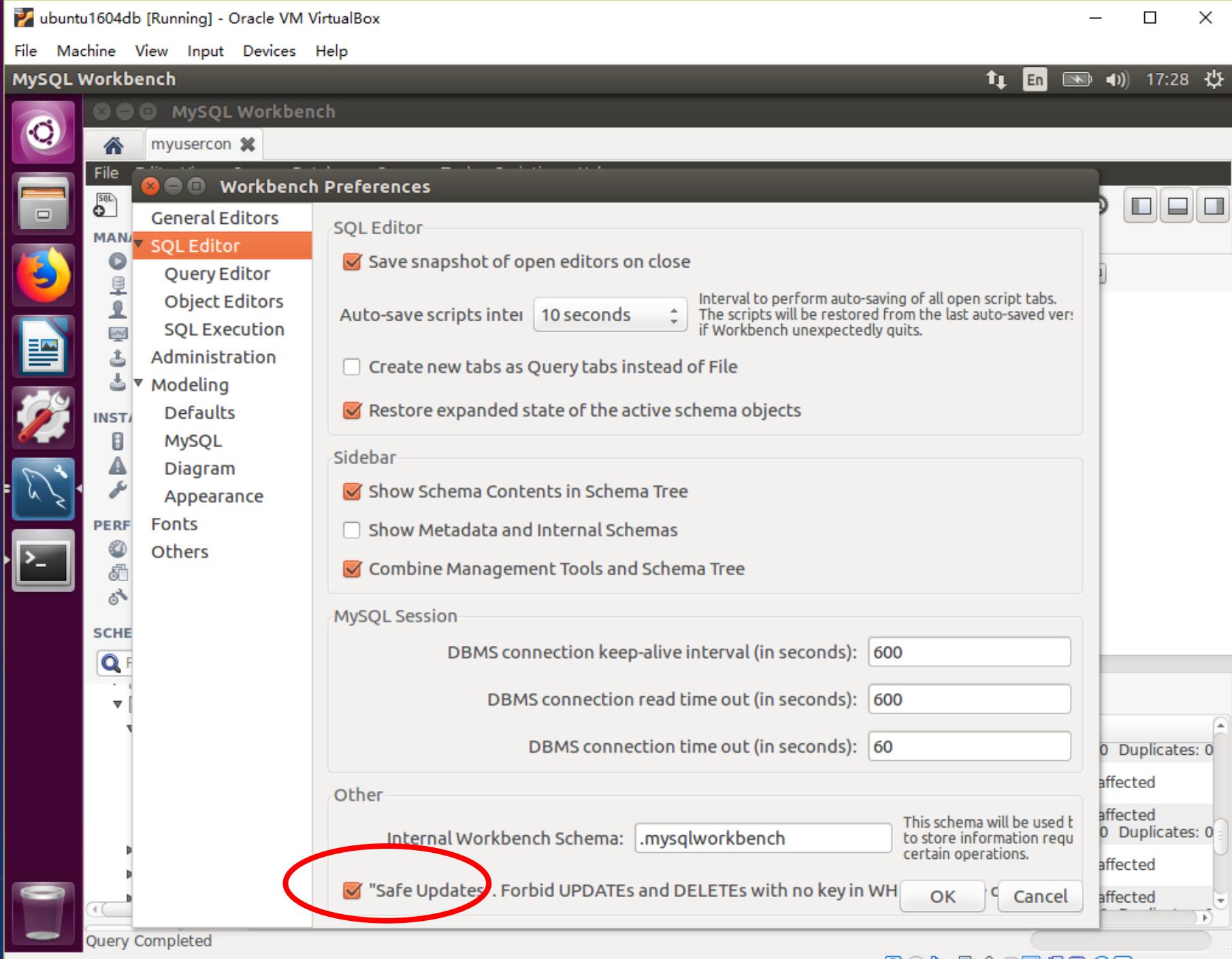
The screenshot shows the MySQL Workbench interface running on an Ubuntu 16.04 VM. The main window title is "ubuntu1604db [Running] - Oracle VM VirtualBox". The MySQL Workbench menu bar includes File, Machine, View, Input, Devices, Help, MySQL Workbench, and a system tray with icons for battery, signal, volume, and time (16:44). The left sidebar contains icons for Home, myusercon, 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, Columns, ID), and a trash bin icon. The central workspace has a "Query 2" tab with the query: "select ID, name, dept\_name from instructor;". The "Result Grid" shows the following data:

#	ID	name	dept_name
*	NULL	NULL	NULL

The "instructor 3" pane shows the query was executed at 16:43:59 by user 35. The "Action Output" pane displays the same query and its execution details.

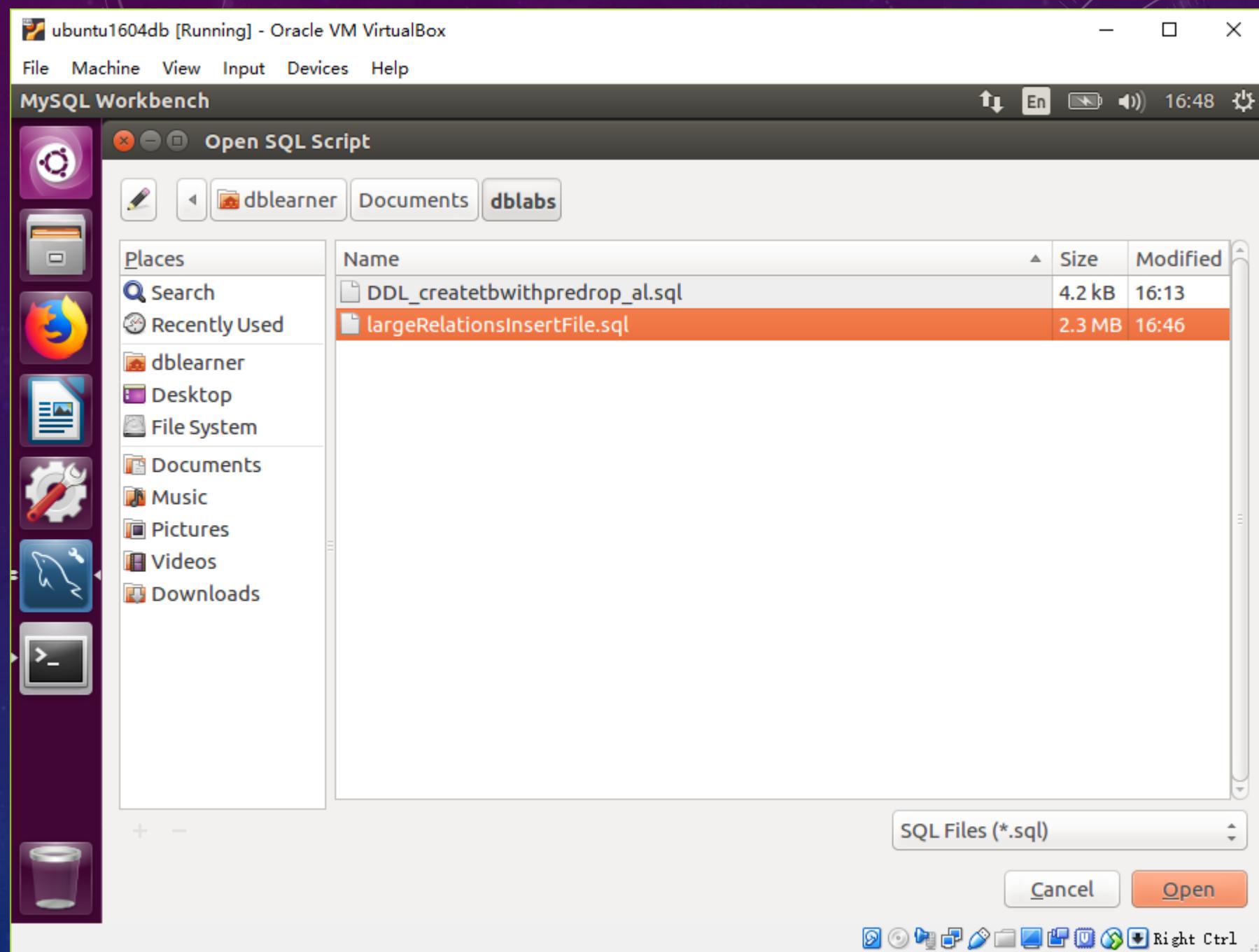
# MySQL: IMPORT DATA OF LABS

- 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 left sidebar displays the database schema for 'dbsclab2018', which includes tables for 'prereq', 'time\_slot', 'advisor', 'takes', 'student', 'teaches', 'section', 'instructor', 'course', 'department', and 'classroom'. The main window contains a query editor with the following SQL code:

```
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);
```

The status bar at the bottom indicates 'SQL Editor Opened.'

# 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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