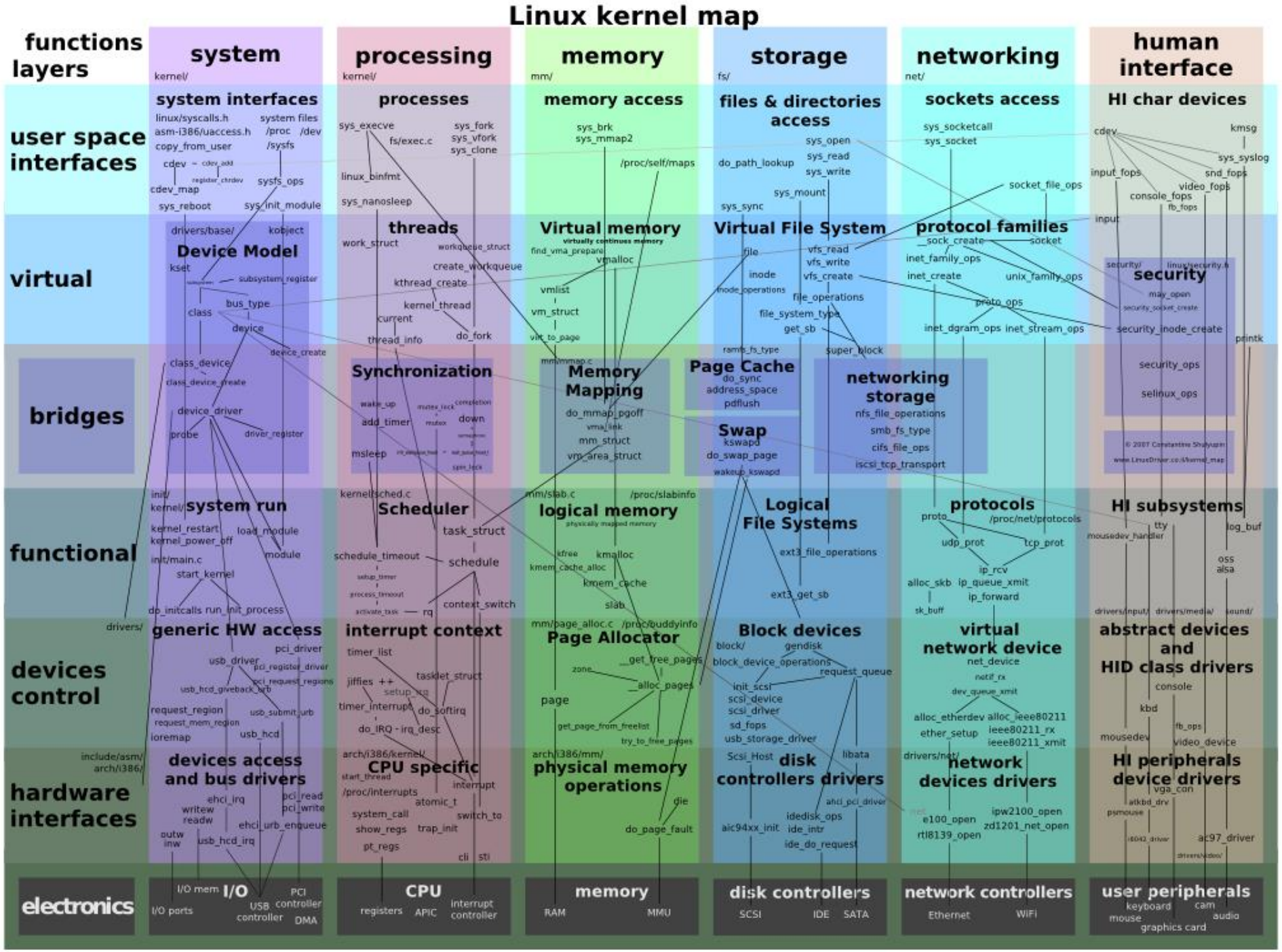
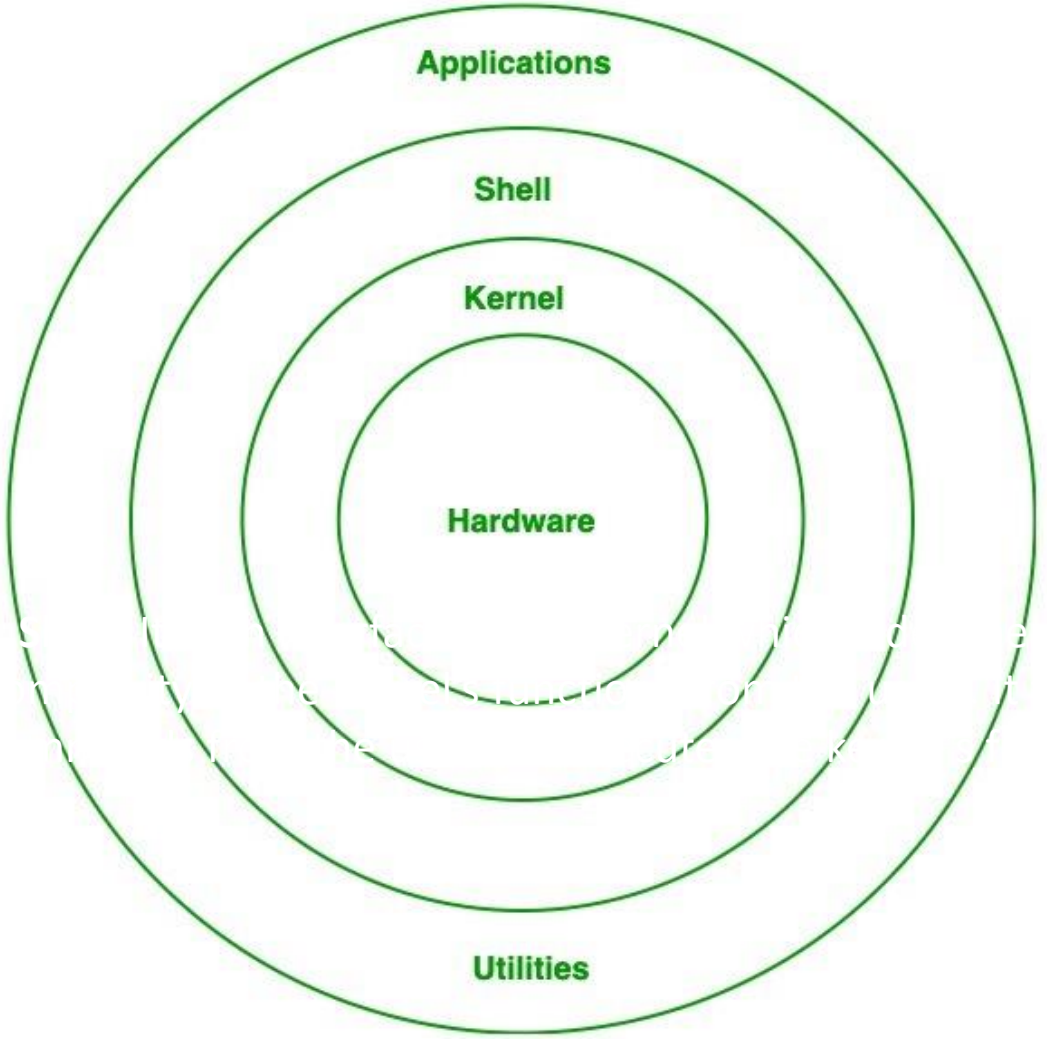
UBUNTU 16.04
ROS KINETIC


Linux kernel map
functions
layers
system
kernel/
processing
kernel/
memory
mm/
storage
fs/
networking
net/
human interface
user space interfaces
system interfaces
processes
memory access
files & directories access
sockets access
HI char devices
virtual
threads
Virtual memory
Virtual File System
protocol families
Device Model
security
bridges
Synchronization
Memory Mapping
Page Cache
networking storage
Swap
functional
system run
Scheduler
logical memory
Logical File Systems
protocols
HI subsystems
devices control
generic HW access
interrupt context
Page Allocator
Block devices
virtual network device
abstract devices and HID class drivers
hardware interfaces
devices access and bus drivers
CPU specific
physical memory operations
disk controllers drivers
network devices drivers
HI peripherals device drivers
electronics
I/O
CPU
memory
disk controllers
network controllers
user peripherals



Shell: It is an interface to the kernel which hides the complexity of the kernel's functions from the users.

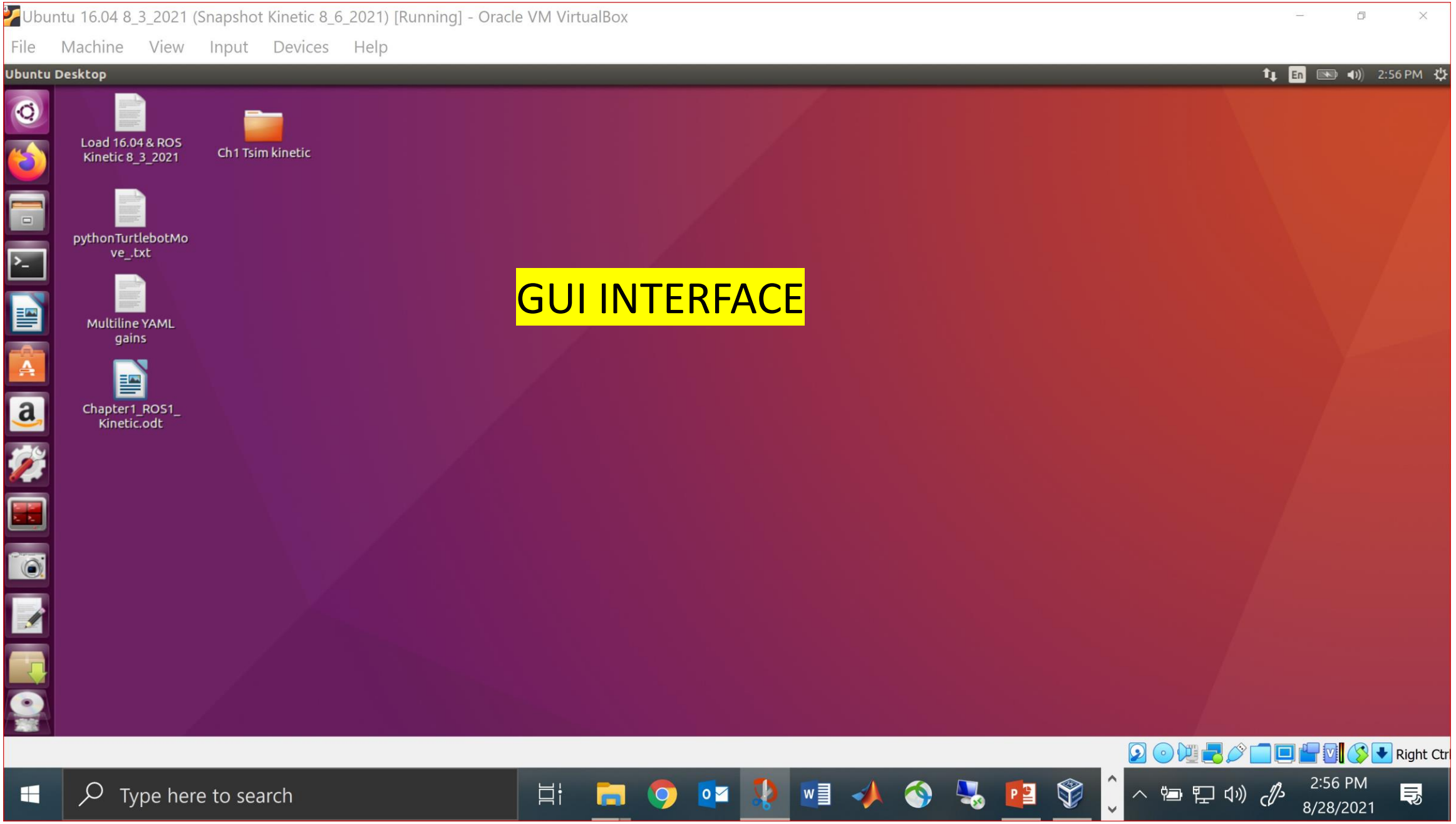
It takes commands from the user and executes the kernel's functions.

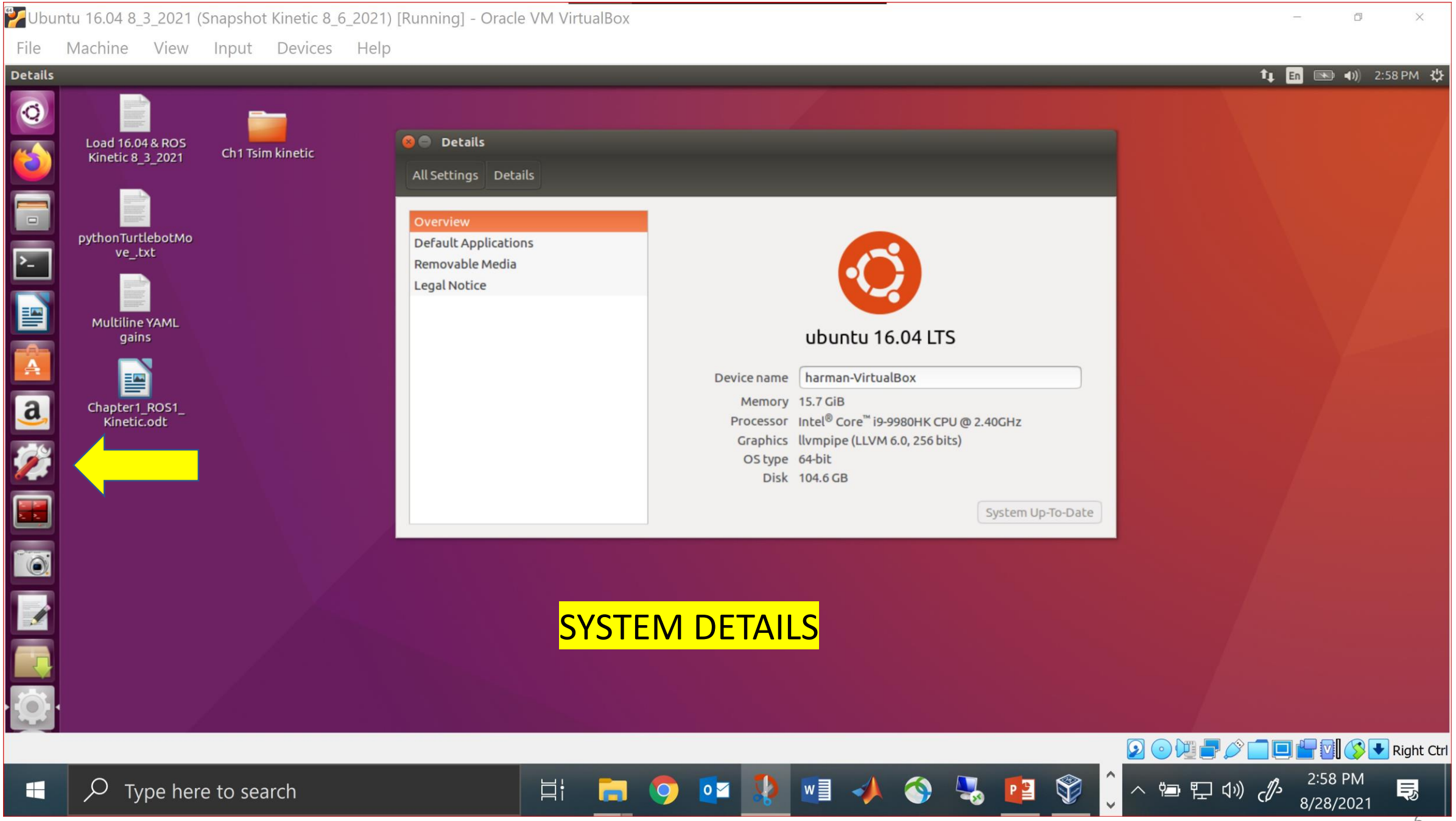
https://www.geeksforgeeks.org/introduction-to-linux-operating-system/

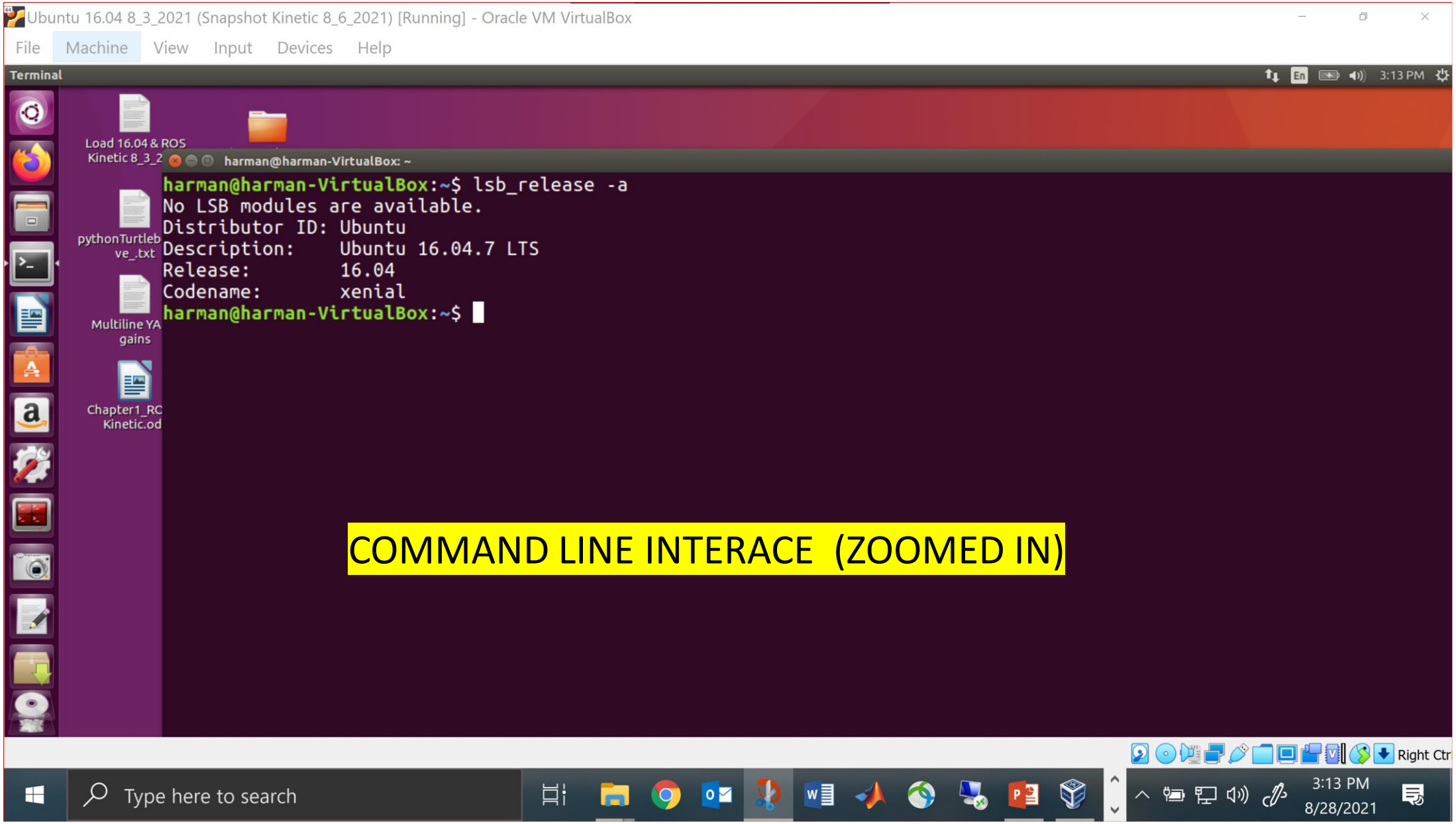
ROS is not strictly tied to Ubuntu-based operating systems; however, Ubuntu is the primarily supported operating system for ROS. "LTS" (long term support) distributions of ROS are synchronized with the LTS distributions of Ubuntu. To maximize compatibility, the distribution of ROS you install should match the version of Ubuntu you are running based on this list:

- Ubuntu 14.04.06 LTS (Trusty Tahr) --> ROS Indigo Igloo
- **Ubuntu 16.04.7 LTS (Xenial Xerus) --> ROS Kinetic Kame**
- Ubuntu 18.04.5 LTS (Bionic Beaver) --> ROS Melodic Morenia
- Ubuntu 20.04.1 LTS (Focal Fossa) --> ROS Noetic Ninjemys

https://github-wiki-see.page/m/brennanyama/RobotOperatingSystem/wiki/ROS-distribution-compatibility-with-Ubuntu


Ubuntu 16.04 8_3_2021 (Snapshot Kinetic 8_6_2021) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Ubuntu Desktop
2:56 PM
Load 16.04 & ROS Kinetic 8_3_2021
Ch1 Tsim kinetic
pythonTurtlebotMove_.txt
Multiline YAML gains
Chapter1_ROS1_Kinetic.odt
GUI INTERFACE
Right Ctrl
Type here to search
2:56 PM
8/28/2021


Ubuntu 16.04 8_3_2021 (Snapshot Kinetic 8_6_2021) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Details
2:58 PM
Load 16.04 & ROS Kinetic 8_3_2021
Ch1 Tsim kinetic
pythonTurtlebotMove_.txt
Multiline YAML gains
Chapter1_ROS1_Kinetic.odt
Details
All Settings
Details
Overview
Default Applications
Removable Media
Legal Notice
ubuntu 16.04 LTS
Device name harman-VirtualBox
Memory 15.7 GiB
Processor Intel® Core™ i9-9980HK CPU @ 2.40GHz
Graphics llvmpipe (LLVM 6.0, 256 bits)
OS type 64-bit
Disk 104.6 GB
System Up-To-Date
SYSTEM DETAILS
Right Ctrl
Type here to search
2:58 PM
8/28/2021


Ubuntu 16.04 8_3_2021 (Snapshot Kinetic 8_6_2021) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Terminal
3:13 PM
Load 16.04 & ROS Kinetic 8_3_2
pythonTurtleb ve_.txt
Multiline YA gains
Chapter1_RC Kinetic.od
harman@harman-VirtualBox: ~
harman@harman-VirtualBox:~$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description: Ubuntu 16.04.7 LTS
Release: 16.04
Codename: xenial
harman@harman-VirtualBox:~$
COMMAND LINE INTERACE (ZOOMED IN)
Right Ctr
Type here to search
3:13 PM
8/28/2021

http://wiki.ros.org/Distributions

ROS.org

A ROS distribution is a versioned set of ROS packages.
These are akin to Linux distributions (e.g. Ubuntu).

The purpose of the ROS distributions is to let developers work against a relatively stable codebase until they are ready to roll everything forward.

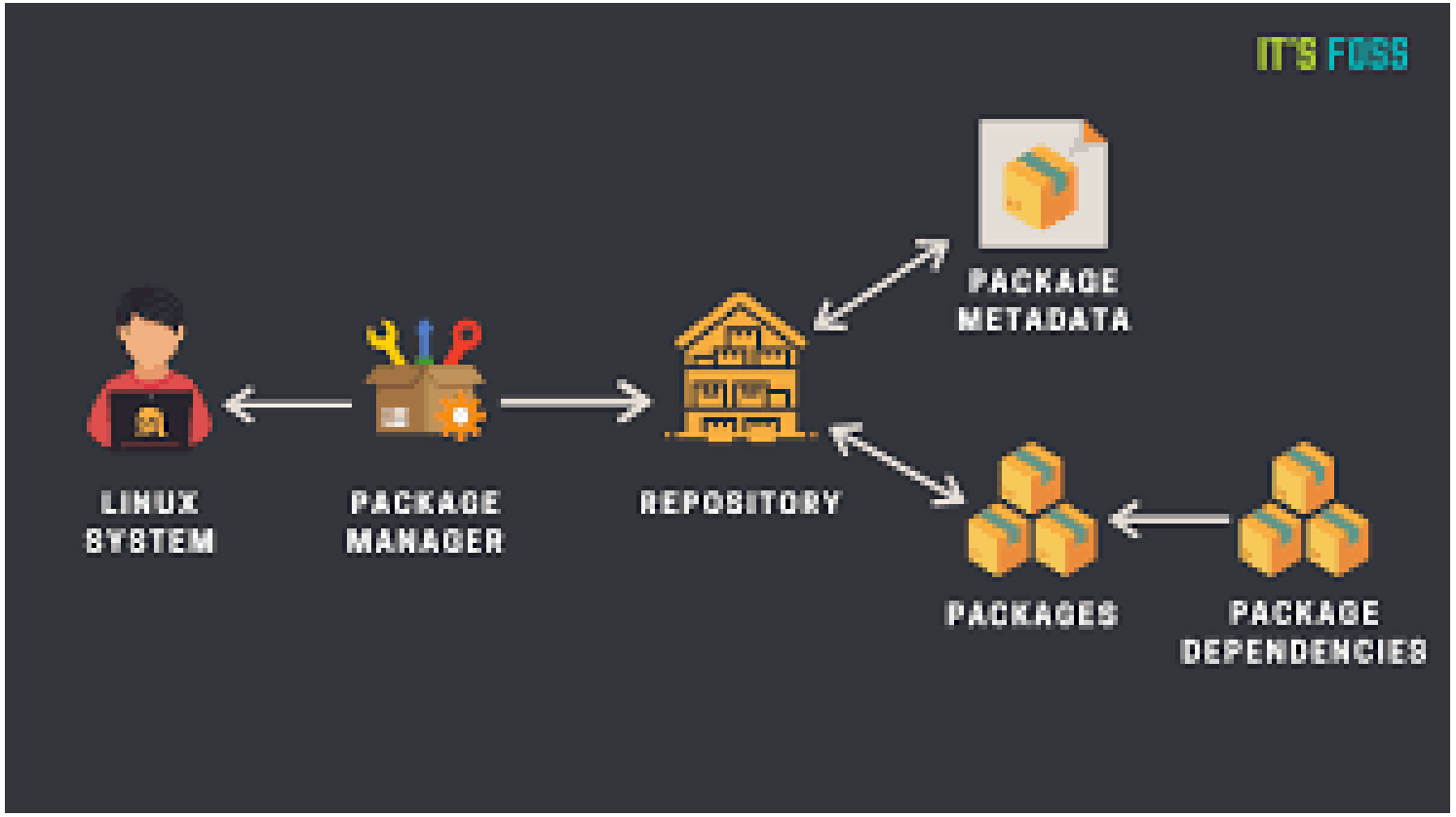
Therefore once a distribution is released,
we try to limit changes to bug fixes and non-breaking improvements for the core packages (every thing under ros-desktop-full).
And generally that applies to the whole community,
but for "higher" level packages, the rules are less strict, and so it falls to the maintainers of a given package to avoid breaking changes.

What is a package?

Software is a very broad term, and is generally taken to mean a program which you can run on your computer. However, such programs often need other resources to work. When you install software, thousands of files may be required just to let the program start! When you think that they all have to be put in exactly the right location, and some of those files may need to be changed depending on what type of computer you have, it can all get very complicated. Luckily, Ubuntu can look after this complexity.

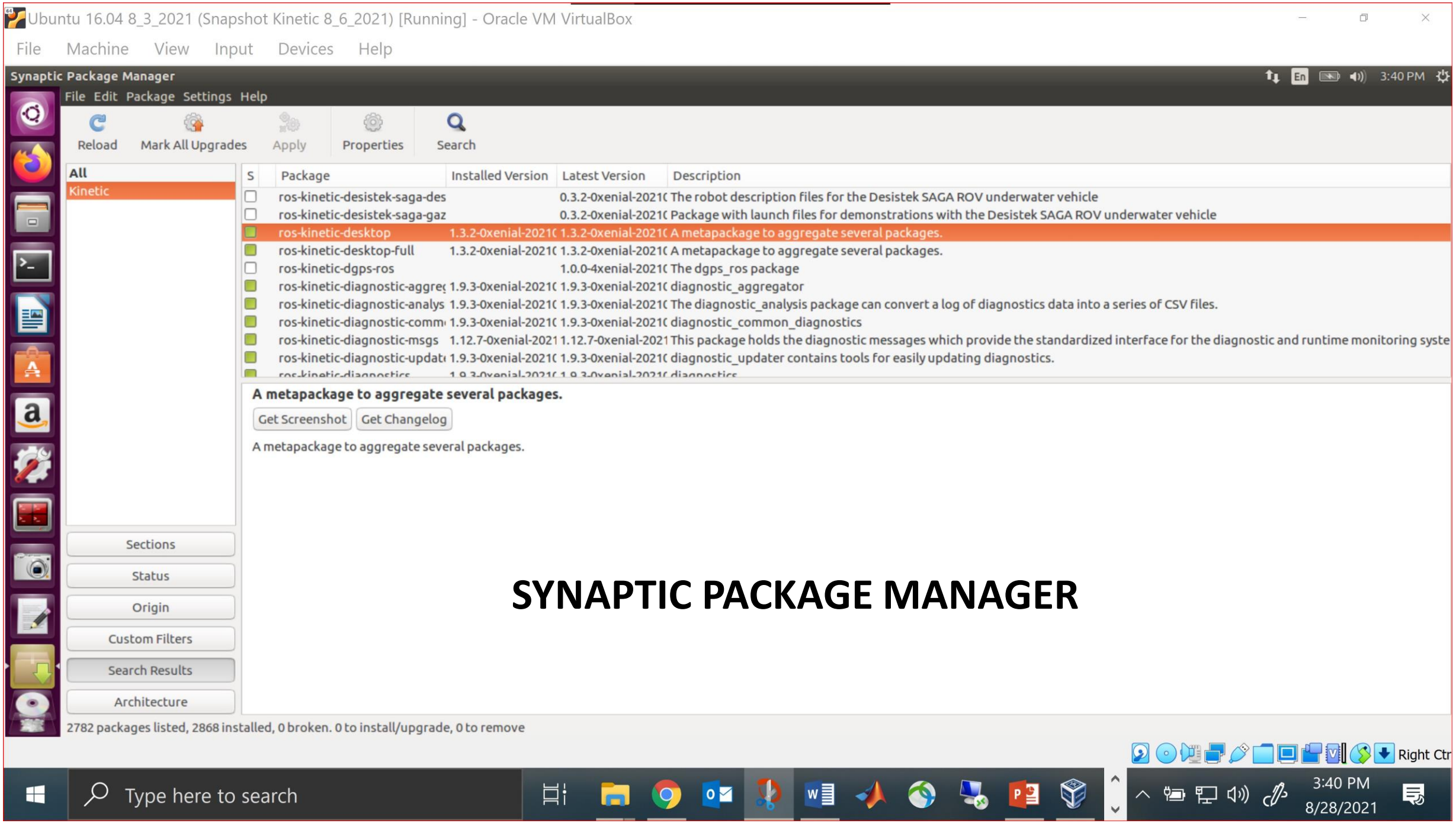
Ubuntu uses *packages* to store everything that a particular program needs to run. A 'package', then, is essentially a collection of files bundled into a single file, which can be handled much more easily. In addition to the files required for the program to run, there will be special files called *installation scripts*, which copy the files to where they are needed (amongst other things).

https://help.ubuntu.com/community/InstallingSoftware



Advanced Package Tool, or **APT**, is a free-software user interface that works with core libraries to handle the installation and removal of software on Debian, Ubuntu, and related Linux distribution

COMMAND LINE


Ubuntu 16.04 8_3_2021 (Snapshot Kinetic 8_6_2021) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Synaptic Package Manager
File Edit Package Settings Help
Reload
Mark All Upgrades
Apply
Properties
Search
All
Kinetic
S Package Installed Version Latest Version Description
ros-kinetic-desistek-saga-des 0.3.2-0xenial-2021(The robot description files for the Desistek SAGA ROV underwater vehicle
ros-kinetic-desistek-saga-gaz 0.3.2-0xenial-2021(Package with launch files for demonstrations with the Desistek SAGA ROV underwater vehicle
ros-kinetic-desktop 1.3.2-0xenial-2021(1.3.2-0xenial-2021(A metapackage to aggregate several packages.
ros-kinetic-desktop-full 1.3.2-0xenial-2021(1.3.2-0xenial-2021(A metapackage to aggregate several packages.
ros-kinetic-dgps-ros 1.0.0-4xenial-2021(The dgps_ros package
ros-kinetic-diagnostic-aggre(1.9.3-0xenial-2021(1.9.3-0xenial-2021(diagnostic_aggregator
ros-kinetic-diagnostic-analys 1.9.3-0xenial-2021(1.9.3-0xenial-2021(The diagnostic_analysis package can convert a log of diagnostics data into a series of CSV files.
ros-kinetic-diagnostic-comm 1.9.3-0xenial-2021(1.9.3-0xenial-2021(diagnostic_common_diagnostics
ros-kinetic-diagnostic-msgs 1.12.7-0xenial-2021 1.12.7-0xenial-2021 This package holds the diagnostic messages which provide the standardized interface for the diagnostic and runtime monitoring syste
ros-kinetic-diagnostic-updat(1.9.3-0xenial-2021(1.9.3-0xenial-2021(diagnostic_updater contains tools for easily updating diagnostics.
A metapackage to aggregate several packages.
Get Screenshot
Get Changelog
A metapackage to aggregate several packages.
Sections
Status
Origin
Custom Filters
Search Results
Architecture
2782 packages listed, 2868 installed, 0 broken. 0 to install/upgrade, 0 to remove
SYNAPTIC PACKAGE MANAGER
Right Ctr
Type here to search
3:40 PM
8/28/2021

Glossary

apt: The 'Advanced Package Tool', the program on which Ubuntu's Package Managers are based. apt handles the more complicated parts of package management, such as maintaining a database of packages.

Architecture: The type of processor the computer uses is referred to as its architecture.

Binary Package: A package which contains a program suitable for one particular architecture.

deb: A .deb file is a Ubuntu (or Debian) package, which contains all of the files which the package will install.

Dependency: A dependency is a package which must be installed for another package to work properly.

Package Manager: A program which handles packages, allowing you to search, install and remove them. E.g. *Add/Remove...*

Repository/Software Channel: A location from which packages of a similar type are available to download and install.

Source Package: A package which contains the original code for a program, which must be compiled to be usable on a particular architecture.

https://help.ubuntu.com/community/InstallingSoftware

Package Dependencies

Programs often use some of the same files as each other. Rather than putting these files into each package, a separate package can be installed to provide them for all of the programs that need them. So, to install a program which needs one of these files, the package containing those files must also be installed. When a package depends on another in this way, it is known as a *package dependency*. By specifying dependencies, packages can be made smaller and simpler, and duplicates of files and programs are mostly removed.

When you install a program, its dependencies must be installed at the same time. Usually, most of the required dependencies will already be installed, but a few extras may be needed, too. So, when you install a package, don't be surprised if several other packages are installed too - these are just dependencies which are needed for your chosen package to function properly.

Ubuntu install of ROS Kinetic

We are building Debian packages for several Ubuntu platforms, listed below.
These packages are more efficient than source-based builds and are our preferred installation method for Ubuntu.
Ubuntu packages are built for the following distros and architectures:

Distro	amd64	i386	armhf
Wily	X	X	
Xenial	X	X	X

INSTRUCTIONS FOR INSTALLING ROS KINETIC - (PAGES 5-8 IN TEXTBOOK)

http://wiki.ros.org/kinetic/Installation/Ubuntu

Wiki: kinetic/Installation/Ubuntu (last edited 2021-01-19 21:24:05 by TullyFoote)

A **Unix shell** is a command-line interpreter or shell that provides a command line user interface for Unix-like operating systems. The shell is both an interactive command language and a scripting language, and is used by the operating system to control the execution of the system using shell scripts.

Bash (Bourne Again Shell) is a command processor that typically runs in a text window where the user types commands that cause actions. Bash can also read and execute commands from a file, called a shell script.

```
harman@harman-VirtualBox:~$  echo $0
bash
```

Environment setup

It's convenient if the ROS environment variables are automatically added to your bash session every time a new shell is launched:

```
echo "source /opt/ros/kinetic/setup.bash" >> ~/.bashrc source ~/.bashrc
```

If you have more than one ROS distribution installed, ~/.bashrc must only source the setup.bash for the version you are currently using.

If you just want to change the environment of your current shell, instead of the above you can type:

```
source /opt/ros/kinetic/setup.bash
```

TEXTBOOK PAGE 8

At the root directory are these system level directories:

Directory	Content
bin	Essential command binaries
boot	Static files of the boot loader
dev	Device files
etc	Host-specific system configuration
home	User home directories
lib	Essential shared libraries and kernel modules
media	Contains mount points for replaceable media
mnt	Mount point for mounting a file system temporarily
opt	Add-on application software packages
proc	Virtual directory for system information
root	Home directory for the root user
run	Run-time variable data
sbin	Essential system binaries
srv	Data for services provided by the system
sys	Virtual directory for system information
tmp	Temporary files
usr	Secondary hierarchy
var	Variable data

Ubuntu Directory Tree

- Top level directory is the **root** level denoted by the slash /
- Your account is under /home/username
- In your home directory (folder) you will see directories for:
  - Desktop
  - Documents
  - Downloads
  - Music
  - Pictures
  - Videos

PRACTICE WITH UBUNTU 16.06 AND

ON TO ROS KINETIC