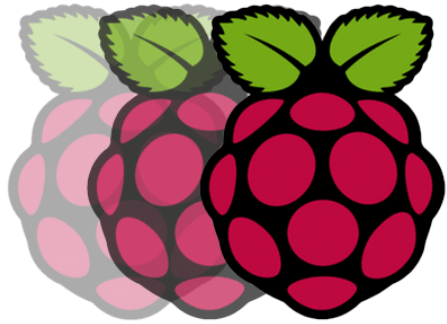


The background of the slide features a large, stylized Raspberry Pi logo. It consists of a black raspberry fruit with several green leaves on top. The fruit is composed of many small, pinkish-red segments.

# Raspberry Pi

## Lesson 4

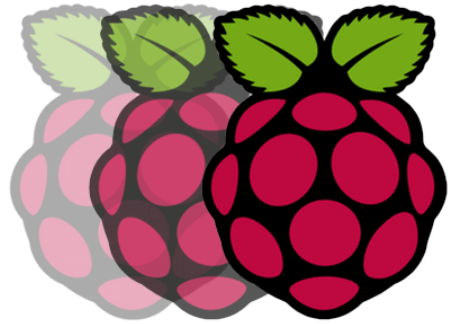
Getting Started with Terminal:  
**Mastering Command Line**



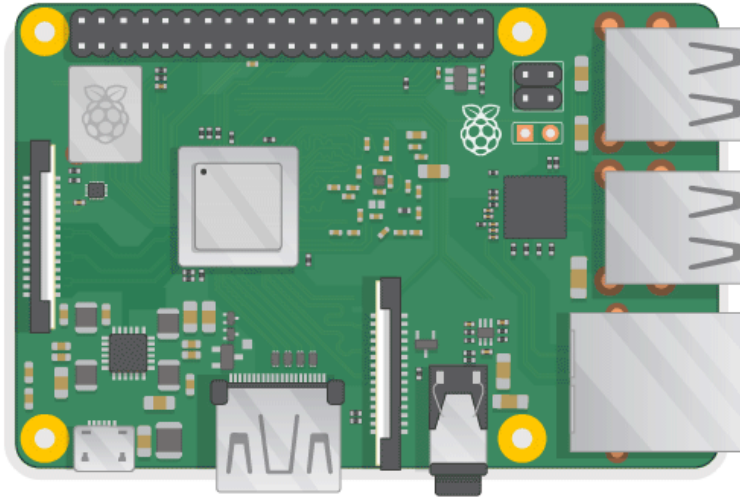
# Contents

- 01 **Parts**
- 02 **Introduction**
- 03 **Getting Started: Open Terminal**
- 04 **Navigate Folder and File**
- 05 **Read and Write Text**
- 06 **Permission to Install**
- 07 **Miscellaneous**



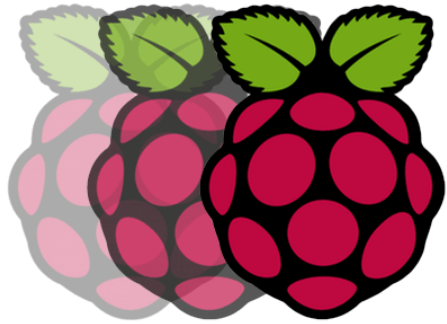


# Required Parts



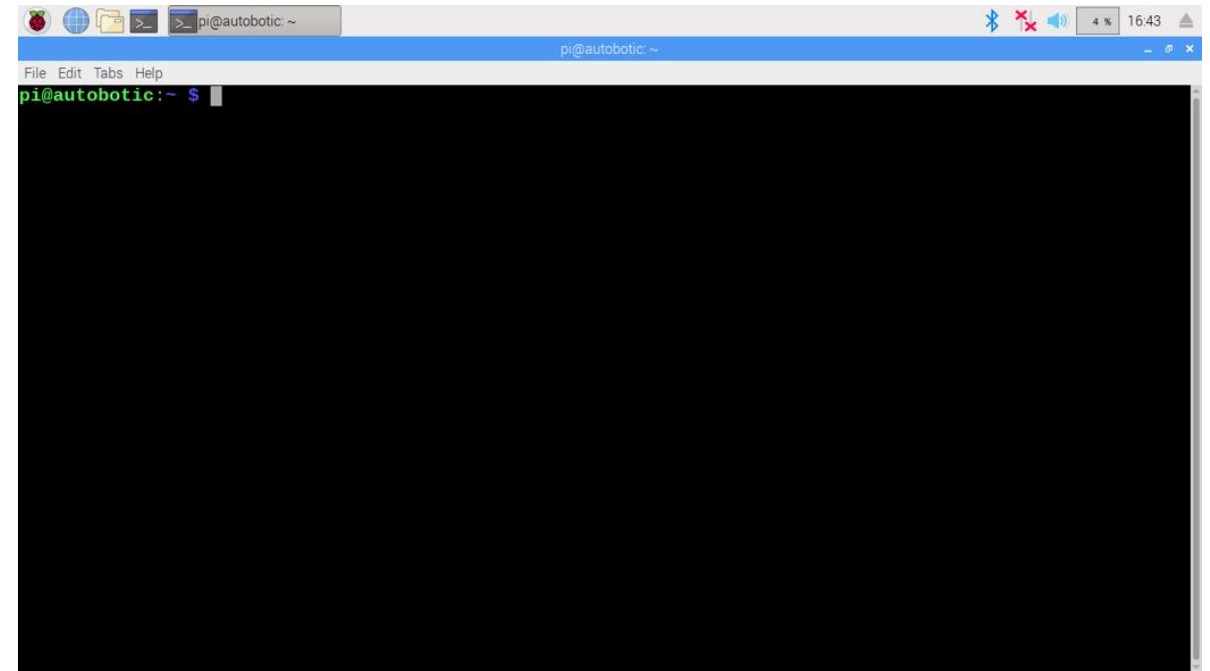
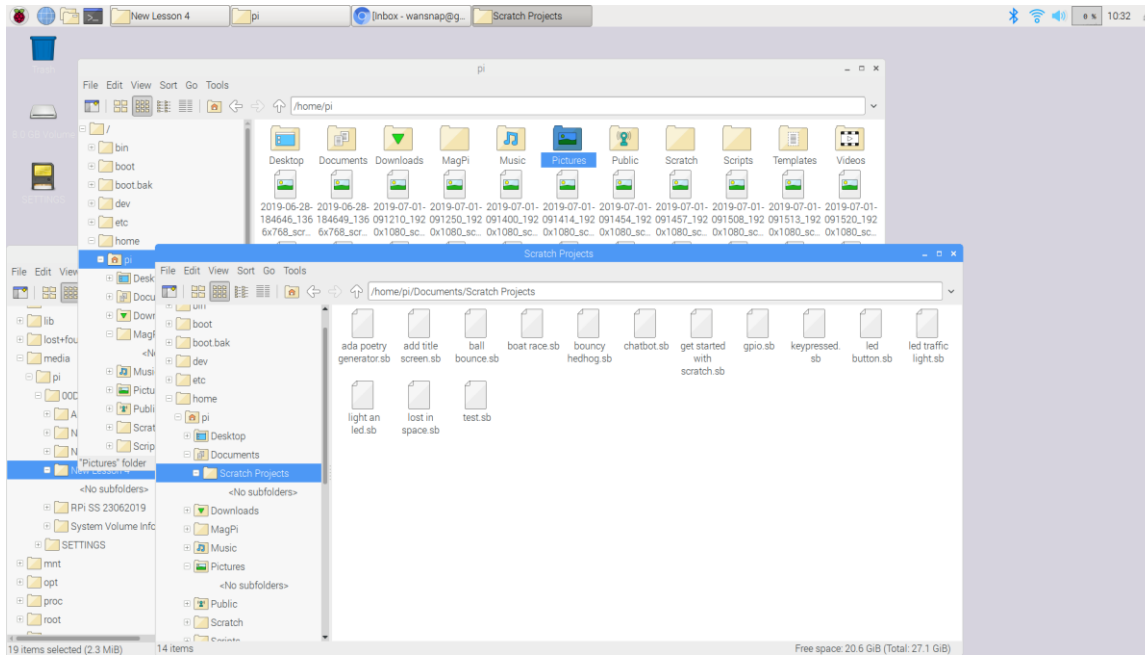
Raspberry Pi Computer

Others: Your Creativity



# Introduction

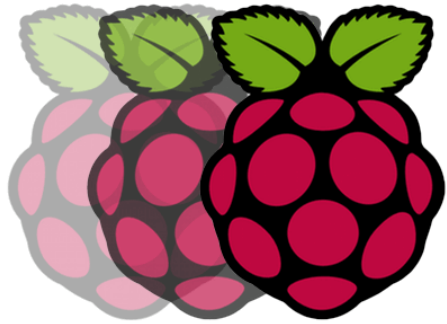
## GUI vs Terminal



a full control, and its fast way to do everything

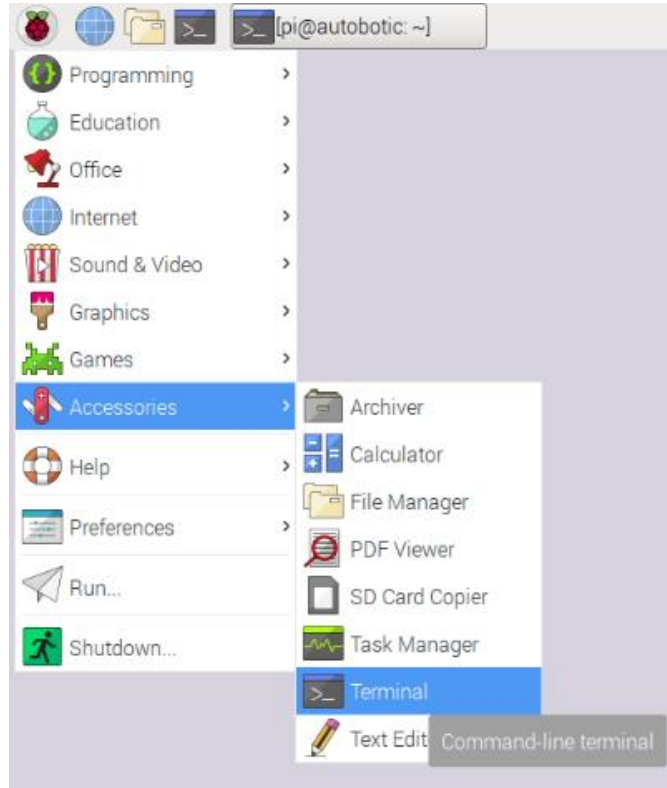
Better way to learn and use Raspbian (Linux) Raspberry Pi





# Getting Started

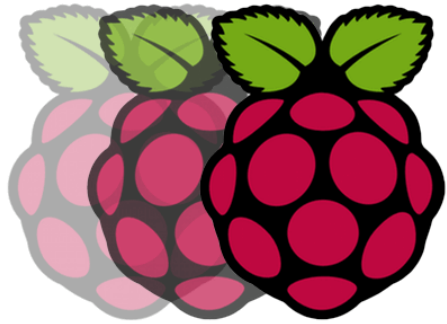
Open Terminal



## Using GUI

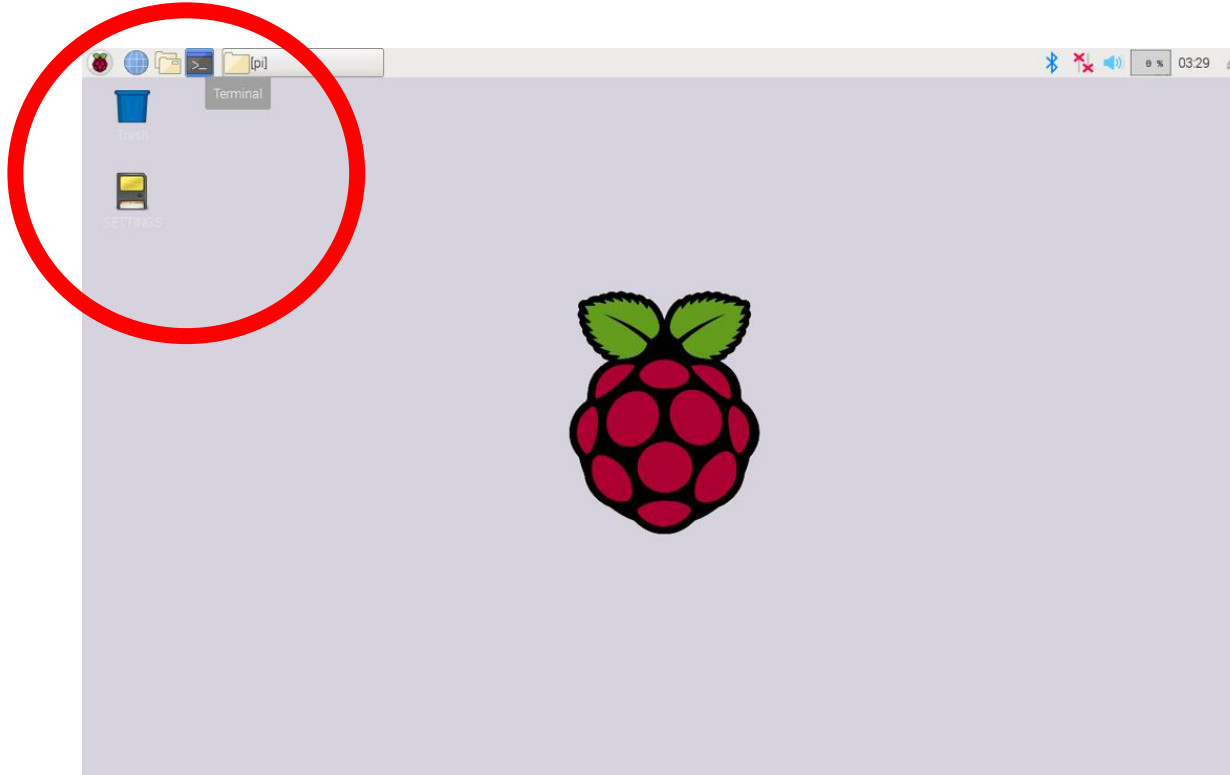
Main menu > Accessories > Terminal



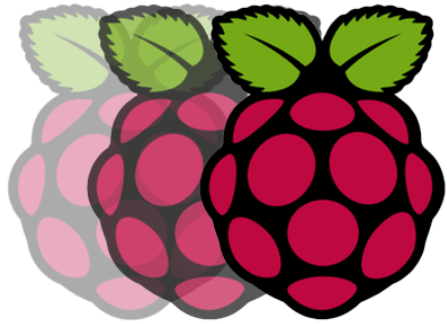


# Getting Started

Open Terminal

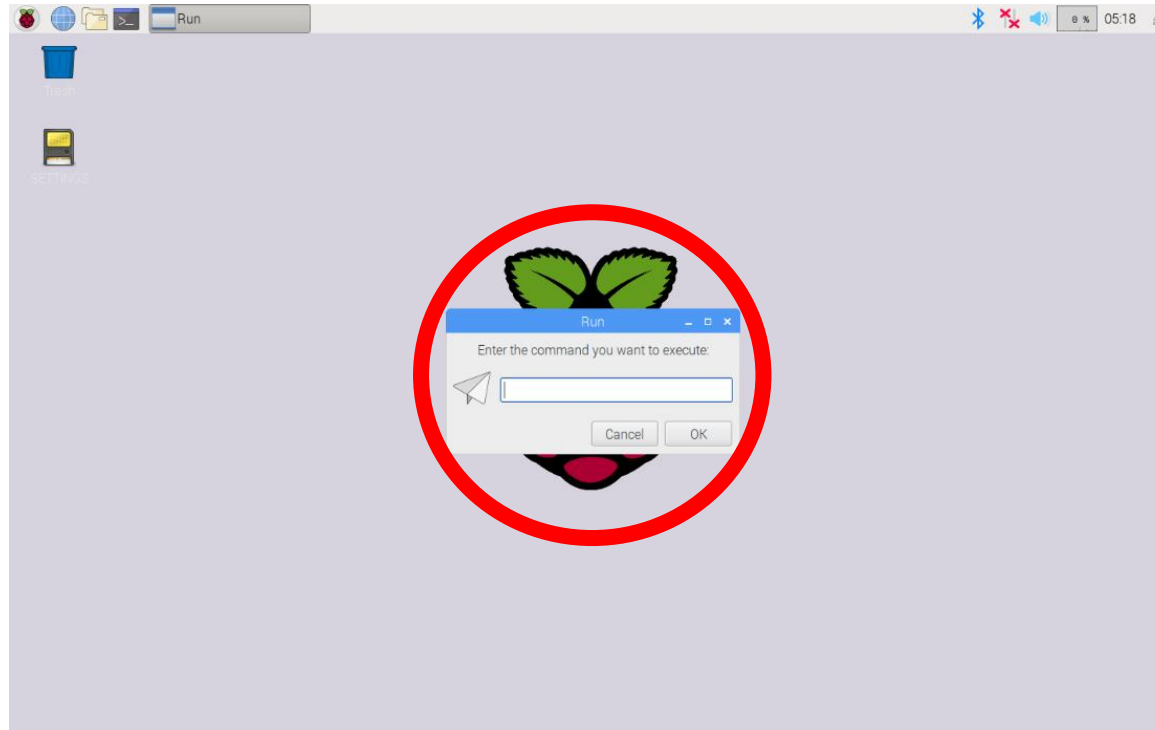


Using GUI  
Shortcuts Icon



# Getting Started

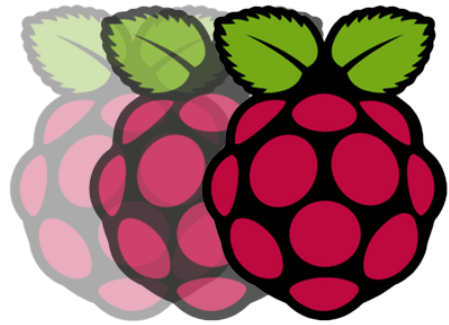
Open Terminal



## Using GUI

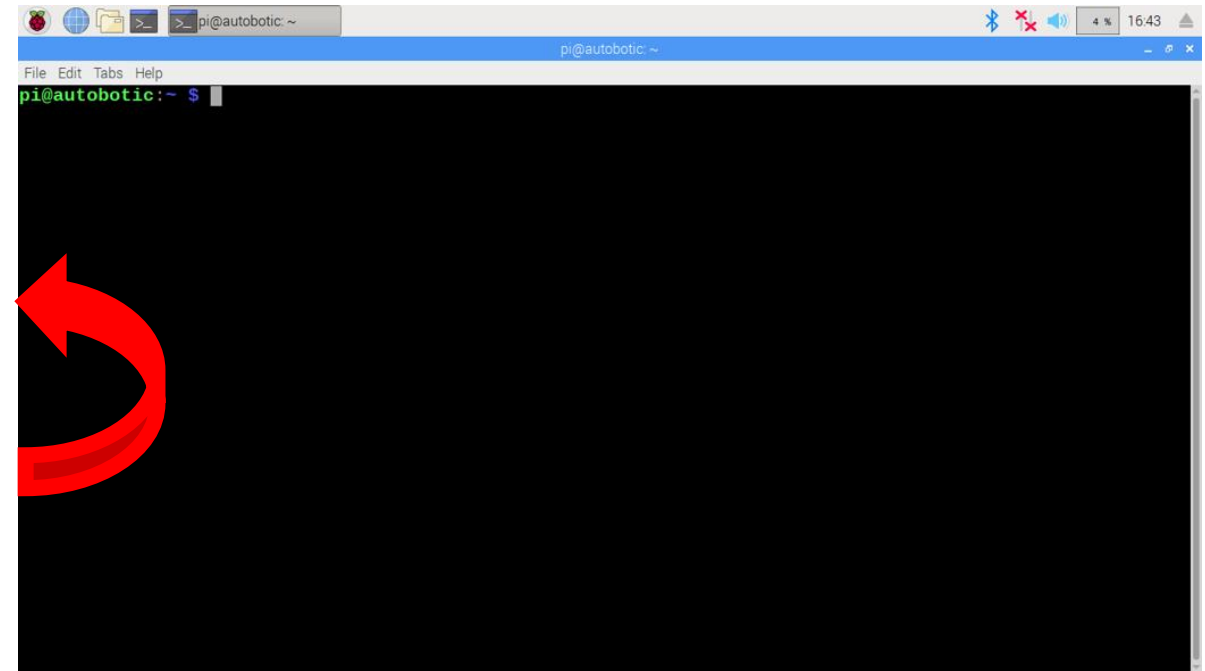
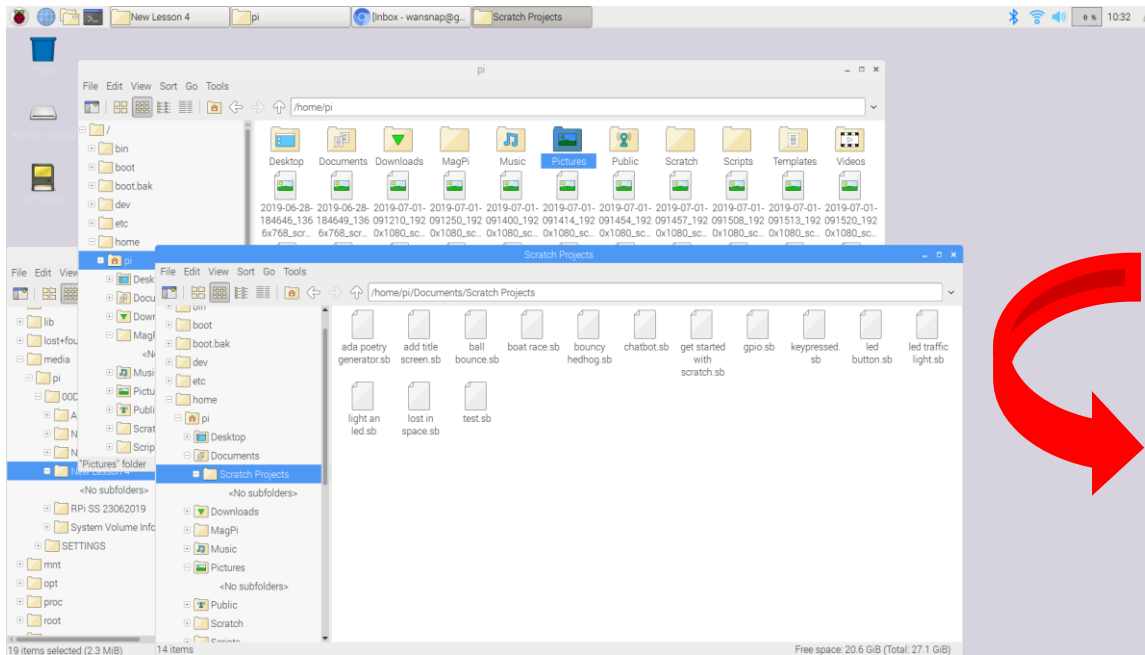
Alt + F7 > ltxterminal





# Getting Started

Switch to Terminal and GUI

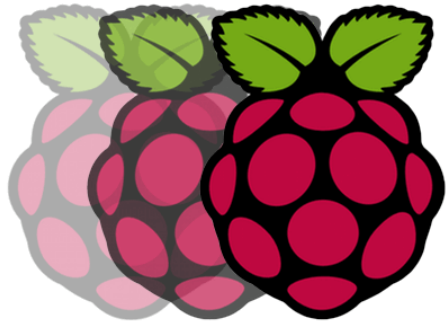


Ctrl + Alt + [F1, F2, F3, F4, F5, F6, F7]

GUI desktop to Terminal Interchangeably







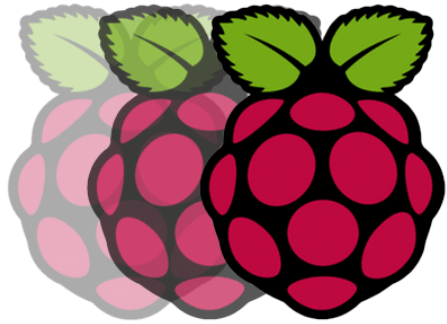
# Look Around (ls)

Navigate Folders and Files

```
pi@autobotic: ~  
File Edit Tabs Help  
pi@autobotic:~ $ ls  
2019-06-28-032934_1440x900_scrot.png Documents Music project.sb2 scratchthumbs.db Videos  
2019-06-28-033051_1440x900_scrot.png Downloads New Public Scripts  
Desktop MagPi Pictures Scratch Templates  
pi@autobotic:~ $
```

ls [option] [file ...]  
List directory content





# Change Directory (cd)

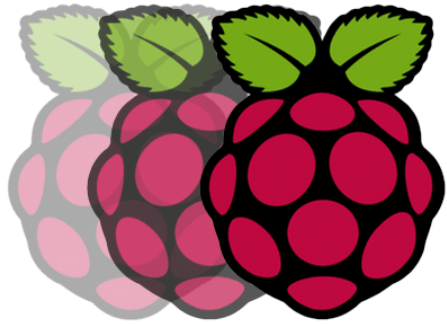
Navigate Folders and Files

A screenshot of a terminal window on a Raspberry Pi. The window title is 'pi@autobotic: ~/MagPi'. The terminal shows the following commands and output:

```
pi@autobotic:~$ ls
2019-06-28-172813_1366x768_screenshot.png  Downloads  Pictures  Scratch  Templates
Desktop                                     MagPi      project.sb2  scratchthumbs.db  Videos
Documents                                   Music      Public      Scripts
pi@autobotic:~$ cd MagPi
pi@autobotic:~/MagPi$
```

`cd [file ...]`  
Change working directory





# Home (~)

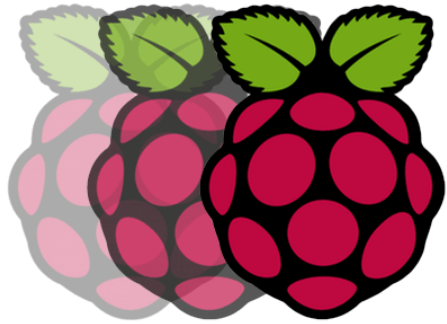
Navigate Folders and Files

```
pi@autobotic: ~/MagPi
File Edit Tabs Help
pi@autobotic:~$ ls
2019-06-28-172813_1366x768_screenshot.png  Downloads  Pictures  Scratch  Templates
Desktop                                     MagPi      project.sb2  scratchthumbs.db  Videos
Documents                                   Music      Public      Scripts
pi@autobotic:~$ cd MagPi
pi@autobotic:~/MagPi$
```

cd ~

Directed to "home" Pi directory





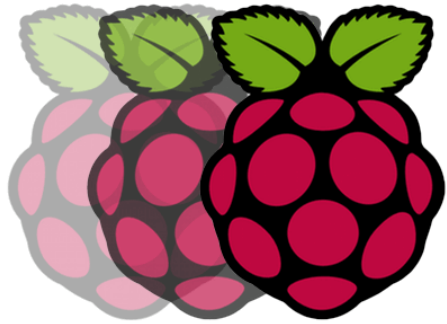
# Previous Directory (-)

Navigate Folders and Files

```
pi@autobotic: ~/MagPi
File Edit Tabs Help
pi@autobotic:~$ ls
2019-06-28-172813_1366x768_scrot.png  Downloads  Pictures  Scratch  Templates
Desktop                               MagPi      project.sb2  scratchthumbs.db  Videos
Documents                             Music      Public      Scripts
pi@autobotic:~$ cd MagPi
pi@autobotic:~/MagPi$ cd ~
pi@autobotic:~$ cd -
/home/pi/MagPi
pi@autobotic:~/MagPi$
```

cd -

Directed to las/previous working directory



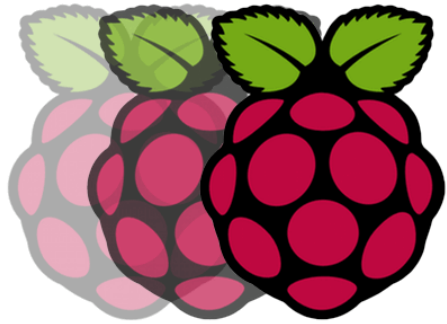
# Present Directory (pwd)

Navigate Folders and Files

```
pi@autobotic: ~/MagPi
File Edit Tabs Help
pi@autobotic:~$ ls
2019-06-28-172813_1366x768_scrot.png  Downloads  Pictures  Scratch  Templates
Desktop                               MagPi      project.sb2  scratchthumbs.db  Videos
Documents                             Music      Public      Scripts
pi@autobotic:~$ cd MagPi
pi@autobotic:~/MagPi$ cd ~
pi@autobotic:~$ cd -
/home/pi/MagPi
pi@autobotic:~/MagPi$
```

pwd

Printed/present working directory



# Create Folder (mkdir)

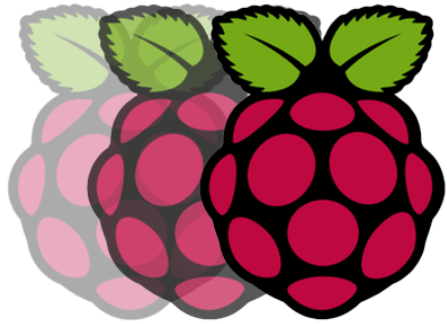
Read and Write Text

```
pi@autobotic: ~  
File Edit Tabs Help  
pi@autobotic:~ $ ls  
2019-06-28-172813_1366x768_scrot.png Desktop Public  
2019-06-28-175231_1366x768_scrot.png Documents Scratch  
2019-06-28-180151_1366x768_scrot.png Downloads scratchthumbs.db  
2019-06-28-180210_1366x768_scrot.png MagPi Scripts  
2019-06-28-180253_1366x768_scrot.png Music Templates  
2019-06-28-180714_1366x768_scrot.png Pictures Videos  
2019-06-28-181304_1366x768_scrot.png project.sb2  
pi@autobotic:~ $ mkdir tempfolder  
pi@autobotic:~ $ ls  
2019-06-28-172813_1366x768_scrot.png Desktop Public  
2019-06-28-175231_1366x768_scrot.png Documents Scratch  
2019-06-28-180151_1366x768_scrot.png Downloads scratchthumbs.db  
2019-06-28-180210_1366x768_scrot.png MagPi Scripts  
2019-06-28-180253_1366x768_scrot.png Music tempfolder  
2019-06-28-180714_1366x768_scrot.png Pictures Templates  
2019-06-28-181304_1366x768_scrot.png project.sb2 Videos  
pi@autobotic:~ $
```

mkdir [file ...]

Create a new folder





# Editing (nano)

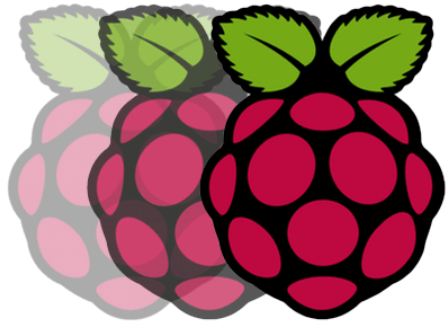
Read and Write text

```
pi@autobotic: ~/temp...
File Edit Tabs Help
pi@autobotic:~$ ls
2019-06-28-172813_1366x768_scrot.png Desktop Public
2019-06-28-175231_1366x768_scrot.png Documents Scratch
2019-06-28-180151_1366x768_scrot.png Downloads scratchthumbs.db
2019-06-28-180210_1366x768_scrot.png MagPi Scripts
2019-06-28-180253_1366x768_scrot.png Music Templates
2019-06-28-180714_1366x768_scrot.png Pictures Videos
2019-06-28-181304_1366x768_scrot.png project.sb2
pi@autobotic:~$ mkdir tempfolder
pi@autobotic:~$ ls
2019-06-28-172813_1366x768_scrot.png Desktop Public
2019-06-28-175231_1366x768_scrot.png Documents Scratch
2019-06-28-180151_1366x768_scrot.png Downloads scratchthumbs.db
2019-06-28-180210_1366x768_scrot.png MagPi Scripts
2019-06-28-180253_1366x768_scrot.png Music Templates
2019-06-28-180714_1366x768_scrot.png Pictures Videos
2019-06-28-181304_1366x768_scrot.png project.sb2
pi@autobotic:~$ cd tempfolder/
pi@autobotic:~/tempfolder$ nano newfile.txt
pi@autobotic:~/tempfolder$ ls
newfile.txt
pi@autobotic:~/tempfolder$
```

```
pi@autobotic: ~/temp...
File Edit Tabs Help
GNU nano 2.7.4 File: newfile.txt Modified
this is new text file
[New File]
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos ^Y Prev Page
^X Exit ^R Read File ^\ Replace ^U Uncut Text ^T To Spell ^_ Go To Line ^V Next Page
```

nano [file ...]  
Create/edit a new/old files (any format)





# Concatenate (cat)

Read and Write Text

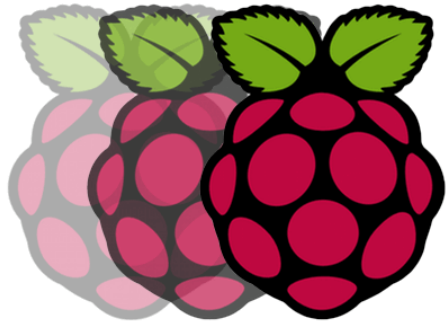
```
pi@autobotic: ~/tempfolder
File Edit Tabs Help
pi@autobotic:~/tempfolder $ ls
newfile.txt
pi@autobotic:~/tempfolder $ cat newfile.txt
this is new text file
pi@autobotic:~/tempfolder $
```

cat [option] [file ...]

Create/edit a new/old files (any format)







# Remove (rm)

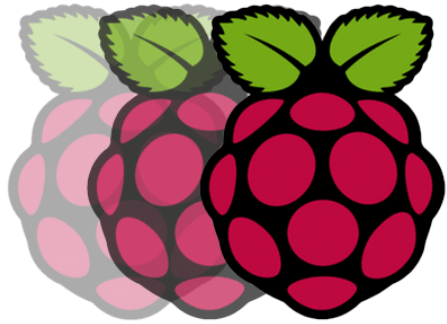
Read and Write Text

```
pi@autobotic:~$ ls
2019-06-28-184646_1366x768_scrot.png  Desktop  MagPi  project.sb2  scratchthumbs.db  Templates
2019-06-28-184649_1366x768_scrot.png  Documents Music  Public      Scripts         Videos
2019-07-01-091210_1920x1080_scrot.png  Downloads Pictures Scratch    tempfolder
pi@autobotic:~$ rm -r tempfolder
pi@autobotic:~$ ls
2019-06-28-184646_1366x768_scrot.png  2019-07-01-091210_1920x1080_scrot.png  Documents  MagPi  Pictures  Public  scratchthumbs.db  Templates
2019-06-28-184649_1366x768_scrot.png  Desktop                                Downloads  Music  project.sb2  Scratch  Scripts         Videos
pi@autobotic:~$
```

rm [option] [file ...]

Create/edit a new/old files (any format)





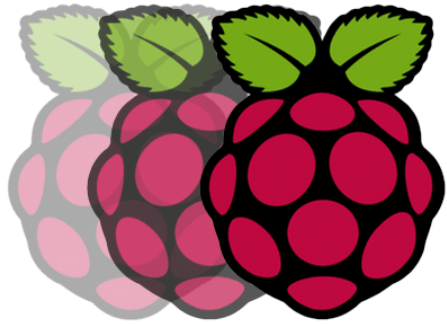
# Update

Permission to Install

```
pi@autobotic:~$ sudo apt-get update
Get:1 http://archive.raspberrypi.org/debian stretch InRelease [25.4 kB]
Get:2 http://raspbian.raspberrypi.org/raspbian stretch InRelease [15.0 kB]
Get:3 http://archive.raspberrypi.org/debian stretch/main armhf Packages [221 kB]
Get:4 http://raspbian.raspberrypi.org/raspbian stretch/main armhf Packages [11.7 MB]
34% [4 Packages 1,989 kB/11.7 MB 17%] 5,405 B/s 29min 49s
```

`sudo apt-get update`  
refreshing the list of available updates





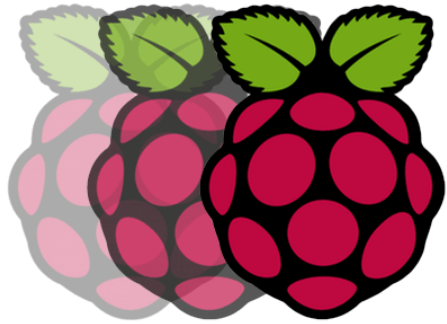
# Upgrade

Permission to Install

```
pi@autobotic:~$ sudo apt-get update
Get:1 http://archive.raspberrypi.org/debian stretch InRelease [25.4 kB]
Get:2 http://raspbian.raspberrypi.org/raspbian stretch InRelease [15.0 kB]
Get:3 http://archive.raspberrypi.org/debian stretch/main armhf Packages [221 kB]
Get:4 http://raspbian.raspberrypi.org/raspbian stretch/main armhf Packages [11.7 MB]
Fetched 11.9 MB in 53s (223 kB/s)
Reading package lists... Done
pi@autobotic:~$ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  libexpat1 libexpat1-dev
2 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 179 kB of archives.
After this operation, 0 B of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://mirror.rise.ph/raspbian/raspbian stretch/main armhf libexpat1-dev armhf 2.2.0-2+deb9u2 [116 kB]
Get:2 http://mirror.rise.ph/raspbian/raspbian stretch/main armhf libexpat1 armhf 2.2.0-2+deb9u2 [62.3 kB]
Fetched 179 kB in 1s (133 kB/s)
Reading changelogs... Done
Reading database ... 80%
```

`sudo apt-get upgrade`  
upgrades/installs the new version of the package available





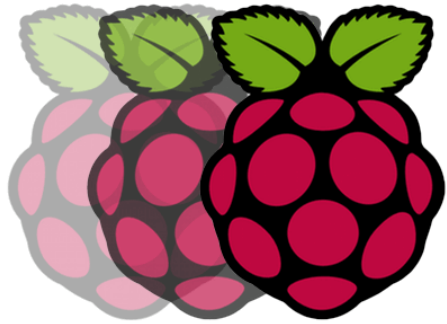
# Install

Permission to Install

```
pi@autobotic:~$ sudo apt-get update
Get:1 http://archive.raspberrypi.org/debian stretch InRelease [25.4 kB]
Get:2 http://raspbian.raspberrypi.org/raspbian stretch InRelease [15.0 kB]
Get:3 http://archive.raspberrypi.org/debian stretch/main armhf Packages [221 kB]
Get:4 http://raspbian.raspberrypi.org/raspbian stretch/main armhf Packages [11.7 MB]
Fetched 11.9 MB in 53s (223 kB/s)
Reading package lists... Done
pi@autobotic:~$ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  libxpat1 libxpat1-dev
2 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 179 kB of archives.
After this operation, 0 B of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://mirror.rise.ph/raspbian/raspbian stretch/main armhf libxpat1-dev armhf 2.2.0-2+deb9u2 [116 kB]
Get:2 http://mirror.rise.ph/raspbian/raspbian stretch/main armhf libxpat1 armhf 2.2.0-2+deb9u2 [62.3 kB]
Fetched 179 kB in 1s (133 kB/s)
Reading changelogs... Done
Reading database ... 80%
```

`sudo apt-get install [file ...]`  
install a package





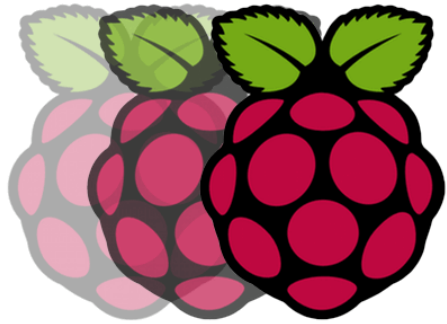
# Search

Permission to Install

```
pi@autobotic:~$ sudo apt-cache search bsdgame
bsdgames - collection of classic textual unix games
junior-math - Debian Jr. educational math
pi@autobotic:~$
```

`sudo apt-cache search [file ...]`  
find a package – before installing it





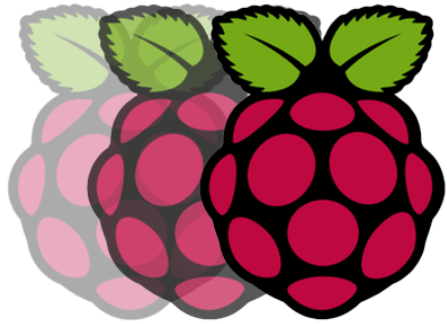
# Search (details)

Permission to Install

```
pi@autobotic:~$ sudo apt-cache show tree
Package: tree
Version: 1.7.0-5
Architecture: armhf
Maintainer: Florian Ernst <florian@debian.org>
Installed-Size: 91
Depends: libc6 (>= 2.4)
Homepage: http://mama.indstate.edu/users/ice/tree/
Priority: optional
Section: utils
Filename: pool/main/t/tree/tree_1.7.0-5_armhf.deb
Size: 41376
SHA256: d99f498a676884ab55e3cdf4ffe5d344e7f3e90359957f6626f97442e358fb2e
SHA1: f99ad293853cf63efb670992b0bdf0112c4e0b06
MD5sum: bb1e6f9b21f5bf6fc7531c850affb79b
Description: displays an indented directory tree, in color
 tree is a recursive directory listing command that produces a depth indented
 listing of files, which is colorized ala dircolors if the LS_COLORS environment
 variable is set and output is to tty.
Description-md5: 9b53b68087a50d4cd859ac0117aecc08
pi@autobotic:~$
```

sudo apt-cache show [file ...]  
to know the details





# Clean/Remove

Permission to Install

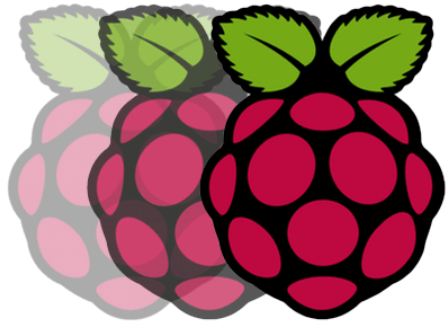
```
pi@autobotic:~$ sudo apt-get autoclean
Reading package lists... Done
Building dependency tree
Reading state information... Done
Del vim-common 2:8.0.0197-4+deb9u2 [159 kB]
Del xxd 2:8.0.0197-4+deb9u2 [131 kB]
Del vim-tiny 2:8.0.0197-4+deb9u2 [338 kB]
pi@autobotic:~$ sudo apt-get autoremove
Reading package lists... Done
Building dependency tree
Reading state information... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
pi@autobotic:~$
```

`sudo apt-get autoclean`

helps to clean up the .deb files of the packages that are no longer installed on your computer

`sudo apt-get autoremove`

remove un-needed the additional packages



# Find Help

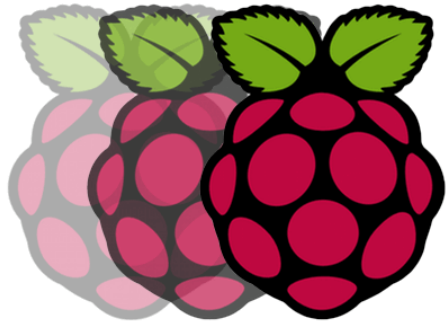
## Miscellaneous

```
File Edit Tabs Help
LS(1) User Commands LS(1)
NAME
ls - list directory contents
SYNOPSIS
ls [OPTION]... [FILE]...
DESCRIPTION
List information about the FILES (the current directory by default). Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.
Mandatory arguments to long options are mandatory for short options too.
-a, --all
do not ignore entries starting with .
-A, --almost-all
do not list implied . and ..
--author
with -l, print the author of each file
-b, --escape
print C-style escapes for nongraphic characters
--block-size=SIZE
scale sizes by SIZE before printing them; e.g., '--block-size=M' prints sizes in units of 1,048,576 bytes; see SIZE format below
-B, --ignore-backups
do not list implied entries ending with ~
-c
with -lt: sort by, and show, ctime (time of last modification of file status information); with -l: show ctime and sort by name; otherwise: sort by ctime, newest first
-C
list entries by columns
--color[=WHEN]
colorize the output; WHEN can be 'always' (default if omitted), 'auto', or 'never'; more info below
-d, --directory
Manual page ls(1) line 1 (press h for help or q to quit)
```

man [command]  
man pages are a user manual







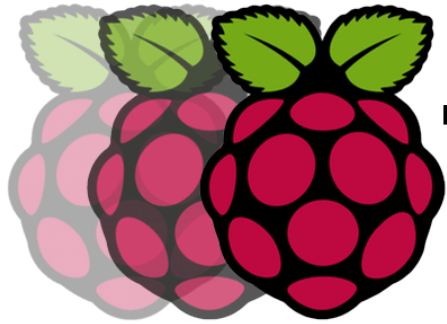
# Find Help

## Miscellaneous

```
pi@autobotic: ~  
File Edit Tabs Help  
LS(1) User Commands LS(1)  
NAME  
ls - list directory contents  
SYNOPSIS  
ls [OPTION]... [FILE]...  
DESCRIPTION  
List information about the FILES (the current directory by default). Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.  
Mandatory arguments to long options are mandatory for short options too.  
-a, --all do not ignore entries starting with .  
-A, --almost-all do not list implied . and ..  
--author with -l, print the author of each file  
-b, --escape print C-style escapes for nongraphic characters  
--block-size=SIZE scale sizes by SIZE before printing them; e.g., '--block-size=M' prints sizes in units of 1,048,576 bytes; see SIZE format below  
-B, --ignore-backups do not list implied entries ending with ~  
-c with -lt: sort by, and show, ctime (time of last modification of file status information); with -l: show ctime and sort by name; otherwise: sort by ctime, newest first  
-C list entries by columns  
--color[=WHEN] colorize the output; WHEN can be 'always' (default if omitted), 'auto', or 'never'; more info below  
-d, --directory  
Manual page ls(1) line 1 (press h for help or q to quit)
```

info [command]  
info pages are a user manual with more details





# TAB Completion

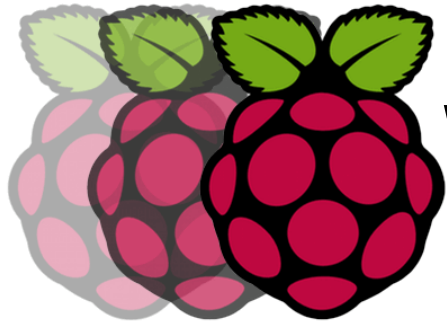
## Miscellaneous

```
pi@autobotic:~$ ls 2019-0
2019-06-28-184646_1366x768_scr0t.png 2019-07-01-091508_1920x1080_scr0t.png 2019-07-01-092732_1920x1080_scr0t.png
2019-06-28-184649_1366x768_scr0t.png 2019-07-01-091513_1920x1080_scr0t.png 2019-07-01-092750_1920x1080_scr0t.png
2019-07-01-091210_1920x1080_scr0t.png 2019-07-01-091520_1920x1080_scr0t.png 2019-07-01-093203_1920x1080_scr0t.png
2019-07-01-091250_1920x1080_scr0t.png 2019-07-01-091526_1920x1080_scr0t.png 2019-07-01-095349_1920x1080_scr0t.png
2019-07-01-091400_1920x1080_scr0t.png 2019-07-01-091614_1920x1080_scr0t.png 2019-07-01-100128_1920x1080_scr0t.png
2019-07-01-091414_1920x1080_scr0t.png 2019-07-01-091621_1920x1080_scr0t.png 2019-07-01-100158_1920x1080_scr0t.png
2019-07-01-091454_1920x1080_scr0t.png 2019-07-01-092247_1920x1080_scr0t.png 2019-07-01-100206_1920x1080_scr0t.png
2019-07-01-091457_1920x1080_scr0t.png 2019-07-01-092729_1920x1080_scr0t.png 2019-07-01-100654_1920x1080_scr0t.png
pi@autobotic:~$ ls 2019-0
2019-06-28-184646_1366x768_scr0t.png 2019-07-01-091508_1920x1080_scr0t.png 2019-07-01-092732_1920x1080_scr0t.png
2019-06-28-184649_1366x768_scr0t.png 2019-07-01-091513_1920x1080_scr0t.png 2019-07-01-092750_1920x1080_scr0t.png
2019-07-01-091210_1920x1080_scr0t.png 2019-07-01-091520_1920x1080_scr0t.png 2019-07-01-093203_1920x1080_scr0t.png
2019-07-01-091250_1920x1080_scr0t.png 2019-07-01-091526_1920x1080_scr0t.png 2019-07-01-095349_1920x1080_scr0t.png
2019-07-01-091400_1920x1080_scr0t.png 2019-07-01-091614_1920x1080_scr0t.png 2019-07-01-100128_1920x1080_scr0t.png
2019-07-01-091414_1920x1080_scr0t.png 2019-07-01-091621_1920x1080_scr0t.png 2019-07-01-100158_1920x1080_scr0t.png
2019-07-01-091454_1920x1080_scr0t.png 2019-07-01-092247_1920x1080_scr0t.png 2019-07-01-100206_1920x1080_scr0t.png
2019-07-01-091457_1920x1080_scr0t.png 2019-07-01-092729_1920x1080_scr0t.png 2019-07-01-100654_1920x1080_scr0t.png
pi@autobotic:~$ ls 2019-0*
2019-06-28-184646_1366x768_scr0t.png 2019-07-01-091513_1920x1080_scr0t.png 2019-07-01-093203_1920x1080_scr0t.png
2019-06-28-184649_1366x768_scr0t.png 2019-07-01-091520_1920x1080_scr0t.png 2019-07-01-095349_1920x1080_scr0t.png
2019-07-01-091210_1920x1080_scr0t.png 2019-07-01-091526_1920x1080_scr0t.png 2019-07-01-100128_1920x1080_scr0t.png
2019-07-01-091250_1920x1080_scr0t.png 2019-07-01-091614_1920x1080_scr0t.png 2019-07-01-100158_1920x1080_scr0t.png
2019-07-01-091400_1920x1080_scr0t.png 2019-07-01-091621_1920x1080_scr0t.png 2019-07-01-100206_1920x1080_scr0t.png
2019-07-01-091414_1920x1080_scr0t.png 2019-07-01-092247_1920x1080_scr0t.png 2019-07-01-100654_1920x1080_scr0t.png
2019-07-01-091454_1920x1080_scr0t.png 2019-07-01-092729_1920x1080_scr0t.png 2019-07-01-100752_1920x1080_scr0t.png
2019-07-01-091457_1920x1080_scr0t.png 2019-07-01-092732_1920x1080_scr0t.png
2019-07-01-091508_1920x1080_scr0t.png 2019-07-01-092750_1920x1080_scr0t.png
pi@autobotic:~$
```

lazy way for typing?

more than one file beginning with 2, they'll all be listed, and can type more letters and hit Tab again.





# Wildcard \*

## Miscellaneous

```
File Edit Tabs Help
pi@autobotic: ~
pi@autobotic:~$ ls 2019-0*
2019-06-28-184646_1366x768_scrout.png 2019-07-01-091513_1920x1080_scrout.png 2019-07-01-093203_1920x1080_scrout.png
2019-06-28-184649_1366x768_scrout.png 2019-07-01-091520_1920x1080_scrout.png 2019-07-01-095349_1920x1080_scrout.png
2019-07-01-091210_1920x1080_scrout.png 2019-07-01-091526_1920x1080_scrout.png 2019-07-01-100128_1920x1080_scrout.png
2019-07-01-091250_1920x1080_scrout.png 2019-07-01-091614_1920x1080_scrout.png 2019-07-01-100158_1920x1080_scrout.png
2019-07-01-091400_1920x1080_scrout.png 2019-07-01-091621_1920x1080_scrout.png 2019-07-01-100206_1920x1080_scrout.png
2019-07-01-091414_1920x1080_scrout.png 2019-07-01-092247_1920x1080_scrout.png 2019-07-01-100654_1920x1080_scrout.png
2019-07-01-091454_1920x1080_scrout.png 2019-07-01-092720_1920x1080_scrout.png 2019-07-01-100752_1920x1080_scrout.png
2019-07-01-091457_1920x1080_scrout.png 2019-07-01-092732_1920x1080_scrout.png 2019-07-01-101323_1920x1080_scrout.png
2019-07-01-091508_1920x1080_scrout.png 2019-07-01-092750_1920x1080_scrout.png
pi@autobotic:~$
```

\* wildcard

one represents any number of characters (including none)

