

# Linux 101

2022/11/22



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# Goal



**What**



What is Linux

**Why**



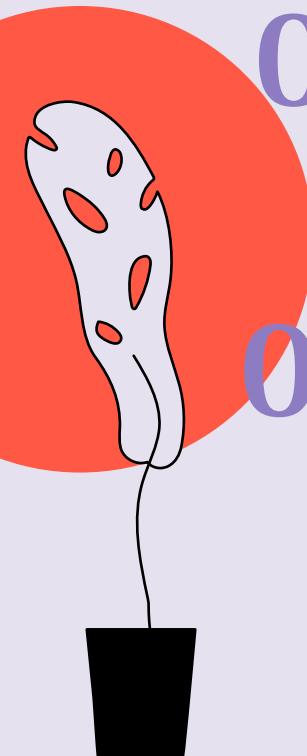
Why Linux

**How**



How to present your model  
with Linux

# Course Outline



01

## Introduction

What is Linux

03

## API Service

Implement a model into  
api service

02

## Hello Linux

From 0 to give up

04

## Startup

Maintain server? Try  
cloud~

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01

# Introduction

What is Linux





# 1969

year the beginning of everything



# What is Linux?

Linux?

Unix?



Linux

UNIX®

# Linux???



Debian



CentOS



redhat  
**Linux**



ubuntu



Fedora



Arch

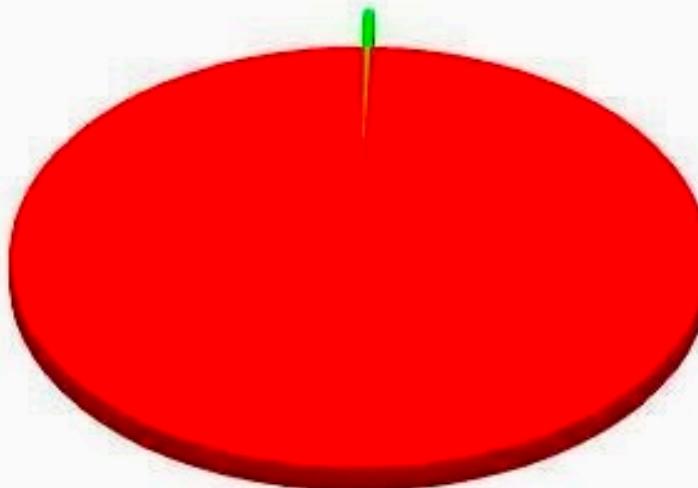


BY OFFENSIVE SECURITY



Mint

# Linux programmer's agenda



- Program in Linux
- Convince the people to use Linux instead of Windows, and to use Open Code programs.

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# 02

# Hello Linux

From 0 to give up



Using Linux for the  
first time:



After mastering Linux :



Unlimited power!

Using Windows for the  
first time:



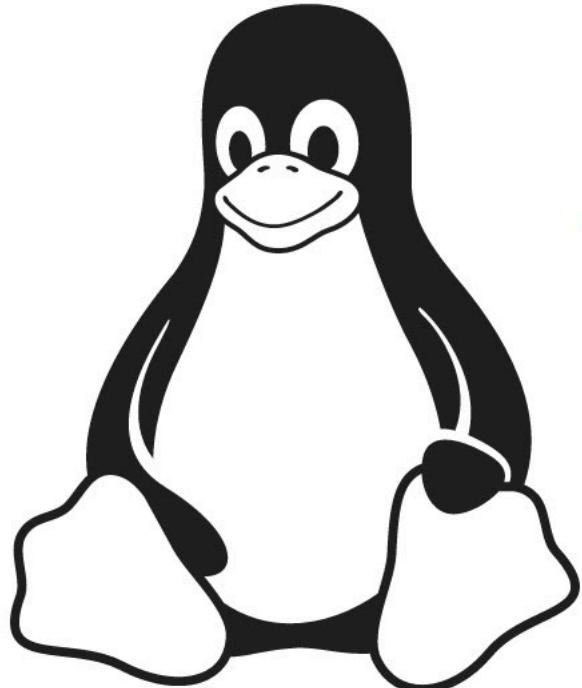
After mastering  
Windows :



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# Linux file system

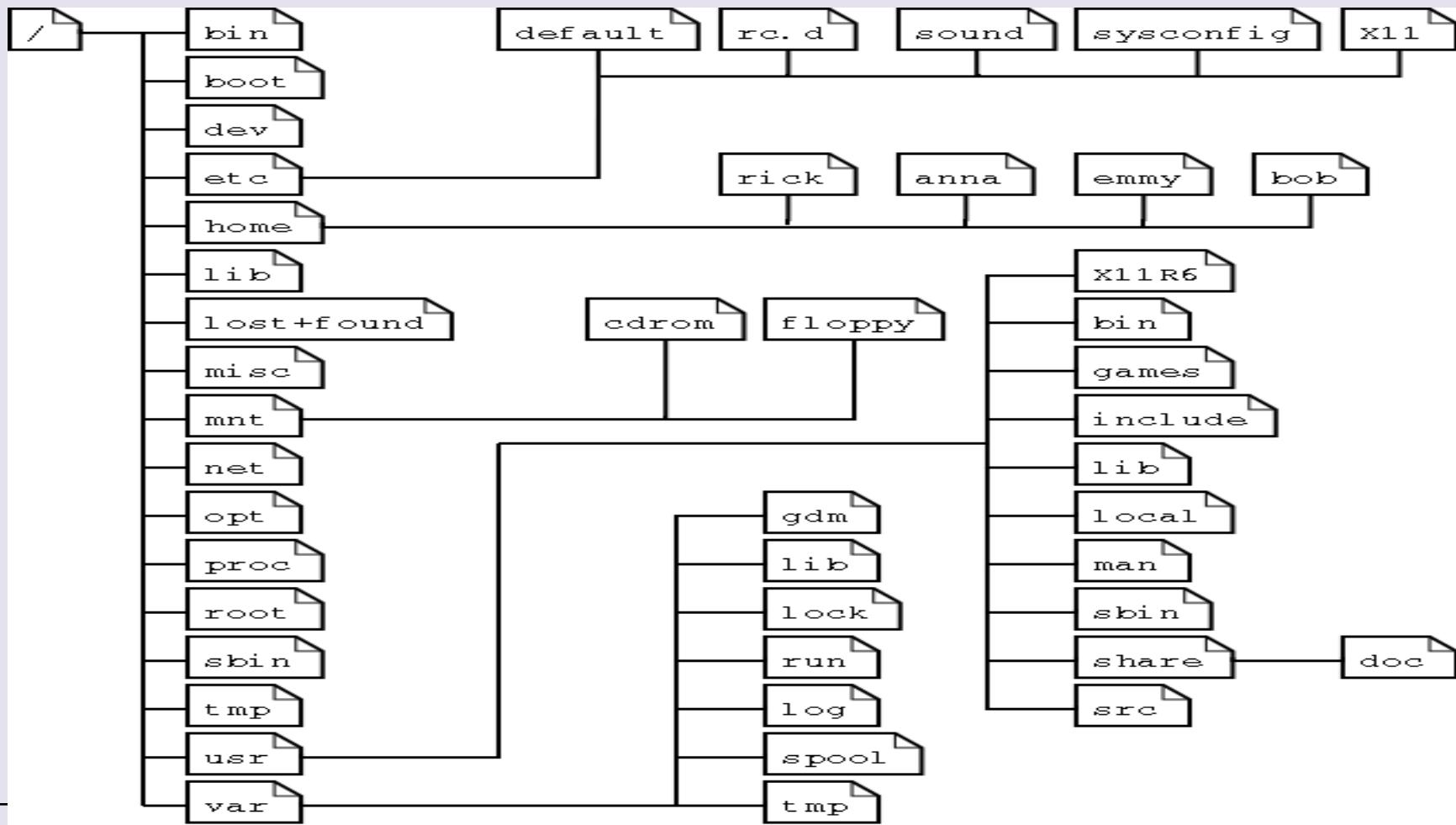




Everything...  
is a file.



PROJECT TWINE



# Basic folders(1/2)

folders	Meaning
/bin	常用的執行檔存放處
/boot	Linux core, 開機相關檔案
/dev	跟裝置有關的檔案
/etc	系統服務的設定檔
/home	User's home directory
/lib	library
/mnt	軟碟跟光碟掛點的地方
/proc	System core, process info

# Basic folders(2/2)

folders	Meaning
/root	Superuser home directory
/sbin	System management program
/tmp	暫放檔案的地方
/usr	系統資訊、程式、指令等等 /usr/local: 預設未來安裝套件目錄
/var	預設工作目錄，主要存放系統資訊檔案或是log等等

# File's attribute

```
> ls -l
total 16
-rw-r--r--  1 tungchun  staff   18 Nov  7 15:55 text1
-rw-r--r--  1 tungchun  staff   12 Nov  7 15:58 text2
dr-xr-xr-x  4 root      wheel  4.7K Oct 14 22:10 dev
lrwxr-xr-x@ 1 root      wheel  11B Jan  1 2020 etc -> private/etc
檔案屬性 檔案數 擁有者 擁有者群組 大小 建檔日期 檔名
```

[ - ] [ rw- ] [ r-- ] [ r-- ]  
0 123 456 789

0: directory/file

123: 擁有人的權限

r: read

456: 同群組使用者權限

w: write

789: 其他使用者權限

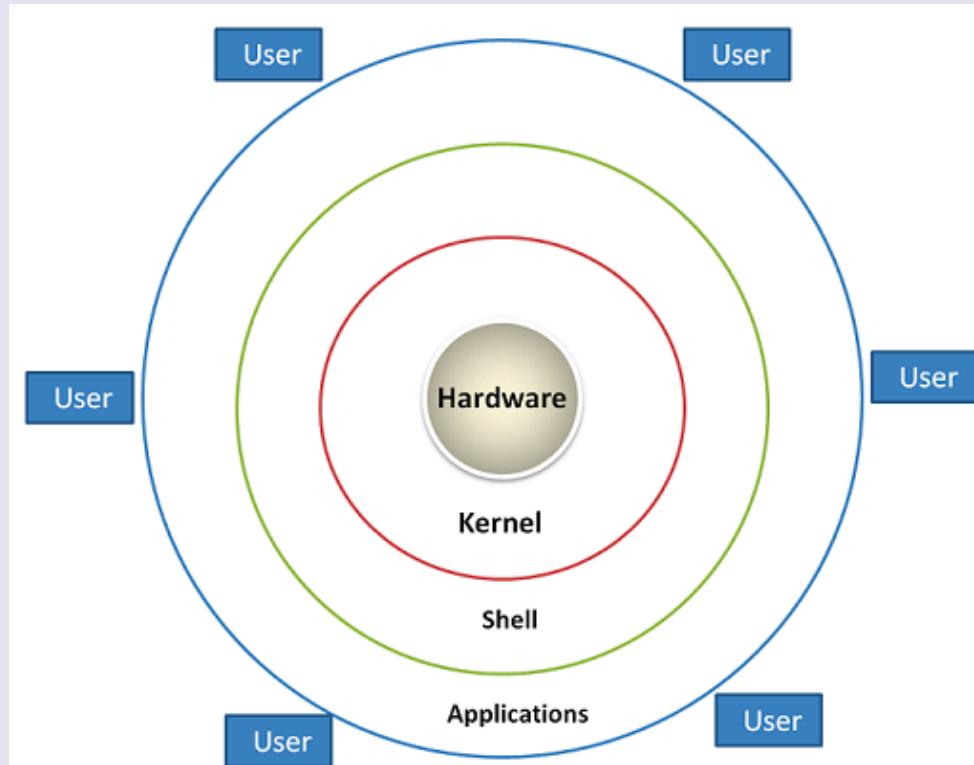
x: execute

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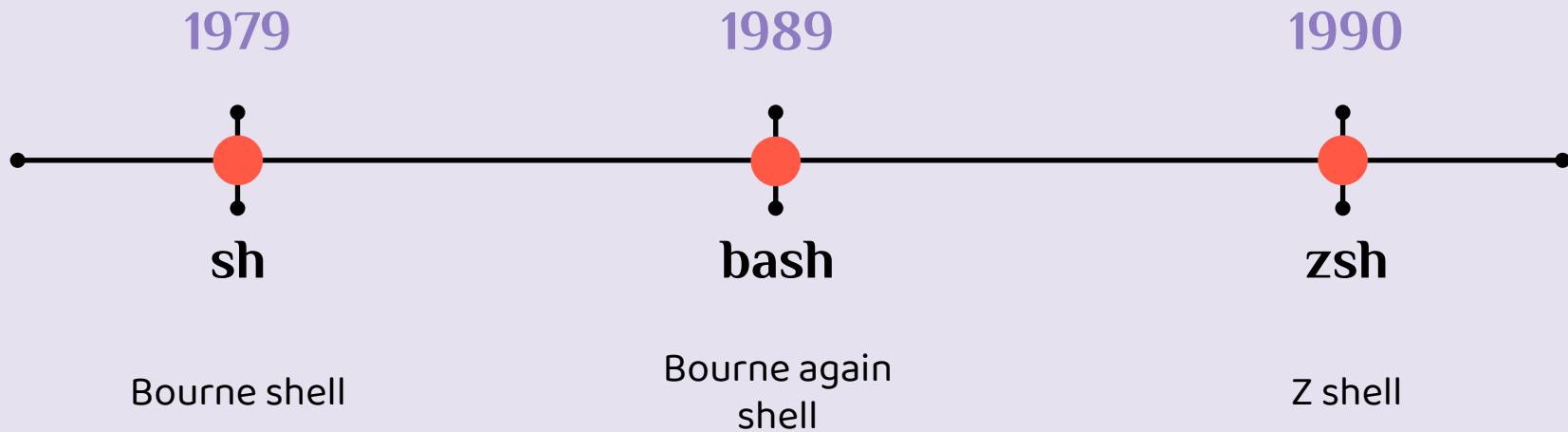
# Linux basic command



# Linux System Architecture



# sh? bash? zsh?



# Check yourself

```
cat /etc/os-release
```

```
danny07292000@cloudshell:/usr/local/bin (if-aicompetition)$ cat /etc/os-release
PRETTY_NAME="Debian GNU/Linux 11 (bullseye)"
NAME="Debian GNU/Linux"
VERSION_ID="11"
VERSION="11 (bullseye)"
VERSION_CODENAME=bullseye
ID=debian
HOME_URL="https://www.debian.org/"
SUPPORT_URL="https://www.debian.org/support"
BUG_REPORT_URL="https://bugs.debian.org/"
```

# Check yourself

```
lsb_release -a
```

```
danny07292000@cloudshell:/usr/local/bin (if-aicompetition)$ lsb_release -a
No LSB modules are available.
Distributor ID: Debian
Description:    Debian GNU/Linux 11 (bullseye)
Release:        11
Codename:       bullseye
```

# Check yourself

uname

```
danny07292000@cloudshell:/usr/local/bin (if-aicompetition)$ uname -a
Linux cs-87686559192-default 5.10.147+ #1 SMP Fri Nov 4 08:53:26 UTC 2022 x86_64 GNU/Linux
danny07292000@cloudshell:/usr/local/bin (if-aicompetition)$ █
```

```
mac ~
↳ uname -a
Darwin tungchun-MacBook-Pro.local 21.3.0 Darwin Kernel Version 21.3.0: Wed Jan 5 21:37:58 PST 2022; root:xnu-8019.80.24~20/RELEASE_ARM64_T8101 x86_64
⌚ 02:24:45 ]
```

# Check yourself

```
cat /proc/version  
uname -r
```

```
danny07292000@cloudshell:/usr/local/bin (if-aicompetition)$ cat /proc/version  
Linux version 5.10.147+ (builder@9aad0af98e71) (Chromium OS 12.0_pre422132_p20210405-r10 clang version 13.0.0 (/var/tmp/portage/sys-devel/llvm-12.0_pre422132_p20210405-r10/work/llvm-12.0_pre422132_p20210405/clang cd442157cff4aad209ae532cbf031abbe10bc1df), LLD 13.0.0 (/var/tmp/portage/sys-devel/llvm-12.0_pre422132_p20210405-r10/work/llvm-12.0_pre422132_p20210405/lld cd442157cff4aad209ae532cbf031abbe10bc1df)) #1 SMP Fri Nov 4 08:53:26 UTC 2022  
danny07292000@cloudshell:/usr/local/bin (if-aicompetition)$ uname -r  
5.10.147+
```

# Superuser/root

```
sh-3.2$ whoami  
tungchun  
sh-3.2$
```

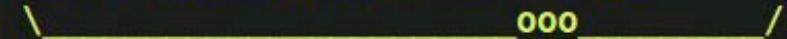


```
> sudo su  
sh-3.2# whoami  
root  
sh-3.2#
```

# Only For Linux Lovers



```
Me: Will you be my Valentine?  
Girl: No way  
Me: sudo will you be my Valentine?  
Girl: Yes..yes..yes! Let's go!
```



# shutdown

```
> sudo shutdown  
shutdown in two minutes

> sudo shutdown -h now  
shutdown now

> sudo shutdown -r now. #=> also reboot  
reboot now

> sudo shutdown -h 20:30  
shutdown at 20:30

> sudo shutdown -h +10  
shutdown in 10 minutes
```

# ps

```
> ps aux
USER          PID %CPU %MEM      VSZ   RSS TT STAT STARTED      TIME COMMAND
_twindowserver 348  7.2  1.1 410731504 182032 ?? Ss 14Oct21 78:56.33 /System/Library/PrivateFrameworks/S...
tungchun     554  4.7  3.9 10898732 651248 ?? S 14Oct21 3:45.93 /System/Applications/Utilities/Termin...
root         435  1.6  0.1 409004288 22048 ?? Rs 14Oct21 3:22.94 /usr/libexec/TouchBarServer
tungchun    25541  1.5  0.2 8933052 36384 s003 S 3:39PM 0:34.16 -zsh
tungchun    25708  1.4  1.1 449533728 181200 ?? S 3:48PM 2:09.41 /Applications/Visual Studio Code - ...
tungchun    1297  0.8  0.1 410777408 18448 ?? Ss 14Oct21 39:35.59 /System/Library/Frameworks/Virtualiz...
tungchun    25701  0.7  0.3 409684880 54000 ?? S 3:48PM 1:15.11 /Applications/Visual Studio Code - ...
tungchun     575  0.4  5.9 11091208 987696 ?? S 14Oct21 8:26.50 /Applications/LINE.app/Contents/MacOS...
tungchun    25742  0.3  0.2 447170384 35040 ?? S 3:48PM 0:30.98 /Applications/Visual Studio Code - ...
root        634  0.3  0.1 409157200 14464 ?? Ss 14Oct21 74:22.66 /usr/libexec/sysmond
tungchun     871  0.2  0.1 409439856 19296 ?? S 14Oct21 0:21.04 /System/Library/CoreServices/Siri.ap...
tungchun   14923  0.2 13.9 14356908 2332784 ?? S 26Oct21 24:38.96 /Applications/Microsoft PowerPoint.a...
_driverkit  23922  0.2  0.0 408554624 3936 ?? Ss 2:18PM 0:52.46 /System/Library/DriverExtensions/com...
tungchun    25768  0.2  0.5 447501408 82864 ?? S 3:48PM 0:20.35 /Applications/Visual Studio Code - ...
tungchun     589  0.2  0.7 410073504 119920 ?? S 14Oct21 14:27.83 /System/Applications/Utilities/Activ...
root       11437  0.2  0.0 408526960 6800 ?? Ss 18Oct21 0:58.77 /System/Library/PrivateFrameworks/An...
tungchun   22371  0.1  0.7 10085160 120784 ?? S Fri12AM 0:53.05 /Applications/Docker.app/Contents/Mac...
root        341  0.1  0.1 408660256 10992 ?? Ss 14Oct21 2:01.63 /usr/libexec/corebrightnessd --laun...
tungchun    25709  0.1  1.1 449502736 182560 ?? S 3:48PM 0:18.78 /Applications/Visual Studio Code - ...
tungchun   27367  0.0  1.3 434961360 220144 ?? S 4:26PM 0:17.40 /Applications/Google Chrome.app/Content...
tungchun   27361  0.0  0.4 434641344 61136 ?? S 4:25PM 0:00.54 /Applications/Google Chrome.app/Content...
tungchun   27360  0.0  0.4 434640256 60576 ?? S 4:25PM 0:00.55 /Applications/Google Chrome.app/Content...
tungchun   27358  0.0  0.4 434641376 60336 ?? S 4:25PM 0:00.54 /Applications/Google Chrome.app/Content...
tungchun   27245  0.0  0.4 434640352 63216 ?? S 4:19PM 0:00.79 /Applications/Google Chrome.app/Content...
```

> kill 348 #PID

kill process

# top

Processes: 482 total, 5 running, 477 sleeping, 3405 threads															02:09:44		
PID	COMMAND	%CPU	TIME	#TH	#WQ	#PORTS	MEM	PURG	CMPRS	PGRP	PPID	STATE	BOOSTS	%CPU_ME	%CPU_OTHRS	UID	FAULTS
348*	WindowServer	22.6	52:07:01	25	8	11189-	2887M-	0B	757M-	348	1	sleeping	*0[1]	0.00000	0.02505	88	194942751+
81537*	com.apple.pr	13.6	03:00:37	10/1	6/2	330+	56M+	0B	21M	81537	1	running	0[6055]	0.05358	0.10129	501	79294058+
4788*	top	10.5	00:01.46	2/1	0	33	7521K+	0B	0B	4788	12746	running	*0[1]	0.00000	0.00000	0	3916+
760*	sysmond	8.0	05:46:20	3	2	21	2225K	0B	1088K	760	1	sleeping	0[9402]	0.00000	0.19181	0	22026295+
0*	kernel_task	6.9	80:07:17	512/8	0	0	80M	0B	0B	0	0	running	0[0]	0.00000	0.00000	0	383707
586*	Activity Mon	3.4	04:48:35	5	3	620	99M	0B	60M-	586	1	sleeping	0[107443]	0.19353	0.00000	501	25121843+
98087*	Google Chrom	2.5	01:17.02	17/1	1	173	92M	0B	35M-	73228	73228	running	*0[4]	0.00000	0.00000	501	286538+
81548*	VTDecoderXPC	2.1	16:35.66	5/1	2	85+	11M+	0B	3120K	81548	1	running	0[2837]	0.00000	0.04837	501	31385824+
8991*	Microsoft Po	1.8	26:25.14	18	9	1089	1176M	64K	653M	8991	1	sleeping	*0[28586]	0.00051	0.00000	501	17271162
79650*	LINE	1.6	03:00:35	27	2	751	637M	0B	579M	79650	1	sleeping	*0[37491]	0.00000	0.00000	501	73398612
33549*	Slack Helper	1.4	22:24.83	17	1	190	228M-	0B	136M-	31688	31688	sleeping	*0[1]	0.00000	0.00000	501	12878287+
581*	Terminal	0.8	39:58.71	10	3	750	327M	21M	216M-	581	1	sleeping	*0[99657]	0.00249	0.00000	501	61090038+
78589*	lghub Helper	0.7	14:35.88	11	2	153	52M	0B	29M	78567	78567	sleeping	*1[5]	0.00000	0.00000	501	131461
73254*	Google Chrom	0.5	54:00.00	17	5	629	696M	0B	195M	73228	73228	sleeping	*1[5]	0.00000	0.00000	501	9474972
78968*	airportd	0.5	04:13:31	10	8	20919	37M	0B	26M-	78968	1	sleeping	*35663[11]	0.00000	0.00000	0	5270912+
73256*	Google Chrom	0.4	15:26.10	11	1	199-	41M-	0B	21M	73228	73228	sleeping	*0[3]	0.00000	0.00000	501	868498+
502*	mds_stores	0.4	88:14.70	6	4	105	198M+	0B	138M-	502	1	sleeping	*0[1]	0.00000	0.00919	0	36906655+
67407*	Photos	0.3	13:13.58	6	4	527	180M	0B	86M	67407	1	sleeping	*0[14791]	0.00000	0.00000	501	1308286
73228*	Google Chrom	0.3	43:30.21	31	1	1812	356M	0B	239M-	73228	1	sleeping	*0[10612]	0.00000	0.00000	501	8814170+
979*	Code - Insid	0.2	51:34.06	16	1	59	30M	0B	26M	576	975	sleeping	*0[1]	0.00000	0.00000	501	1957710
22068*	com.apple.We	0.2	13:40.92	4	1	95	145M	0B	137M	22068	1	sleeping	0[1942210+]	0.00000	0.00000	501	1540920
31688*	Slack	0.2	40:20.28	27	1	880	192M+	0B	160M-	31688	1	sleeping	*0[46722]	0.00000	0.00000	501	32849405+
79730*	com.apple.We	0.2	16:17.48	8	2	275	45M	0B	32M	79730	1	sleeping	*0[17509]	0.00000	0.00000	501	2196810
1098*	zsh	0.2	02:24.65	1	0	21	13M	0B	5008K-	1098	979	sleeping	*0[2]	0.00000	0.00000	501	3838079+
79245*	logd	0.2	24:52.67	4	3	1333	41M	0B	34M-	79245	1	sleeping	*0[1]	0.00000	0.00024	0	3782587+
565*	sharingd	0.1	57:16.68	5	1	540	69M	0B	49M	565	1	sleeping	*0[1]	0.00000	0.00000	501	10796723
448*	TouchBarServ	0.1	61:07.07	6	4	620	40M-	2944K+	17M	448	1	sleeping	*0[1]	0.00000	0.00018	0	8815692
341*	corebrightne	0.1	68:19.11	5	4	148	5457K	0B	3104K	341	1	sleeping	*0[1]	0.00399	0.00000	0	6075894+
11201*	Preview	0.1	21:32.14	6	2	1028	842M	0B	570M	11201	1	sleeping	*0[94832]	0.00000	0.00000	501	24483714
31690*	Slack Helper	0.1	51:50.52	9	1	157	209M	0B	56M	31688	31688	sleeping	*1[11]	0.00000	0.00000	501	12677839

# file management(1/2)

command	Meaning
cat	印出檔案內容
more/less	慢慢看檔案內容
mkdir	建立目錄
rm	移除檔案
mv	移動檔案/目錄
cp	複製檔案/目錄
find	尋找檔案
whereis	尋找檔案

# file management(2/2)

command	Meaning
chmod	變更檔案屬性
chown	變更檔案擁有者
chgrp	變更檔案擁有者群組
df	顯示硬碟空間資訊
du	檔案使用掉的空間

# echo

```
> echo hello  
hello
```

```
> echo hello      world  
hello world
```

```
> echo "hello      world"  
hello      world
```

```
> echo hello world #123  
hello world
```

```
> echo "hello world #123"  
hello world #123
```

```
> echo $SHELL $HOME $PWD  
/bin/zsh /Users/tungchun /Users/tungchun
```

```
> (exit 0);echo $?;(exit 4);echo $?  
0  
4
```

# Text streams and filters

```
> echo "apple\npear\nbanana" | sort  
apple  
banana  
pear
```

```
> echo "apple\npear\nbanana"  
apple  
pear  
banana
```

```
> echo "apple\npear\nbanana" | grep x  
> echo "apple\npear\nbanana" | grep pear  
pear  
> echo "apple\npear\nbanana" | grep pear\n
```

# cat

```
> echo "apple\npear\nbanana" > text1
```

```
> cat text1
```

```
apple  
pear  
banana
```

```
> cat > text2
```

```
hello  
world
```

```
> cat text*
```

```
apple  
pear  
banana  
hello  
world
```

```
> cat text* | grep world  
world
```

# cut

```
> echo "apple pear banana" | cut -d ' ' -f 1  
apple  
  
> echo "apple pear banana" | cut -d ' ' -f 1-2  
apple pear  
  
> echo "apple pear banana" | cut -d ' ' -f 1-3  
apple pear banana  
  
> cat text1 | cut -d '\n' -f1  
apple  
pear  
ba
```

# sed

```
> echo "apple pear banana" | sed 's/a/A/'  
Apple pear banana
```

```
> echo "apple pear banana" | sed 's/a/A/g'  
Apple peAr bAnAnA
```

```
> cat text1 | sed 's/a/A/g'  
Apple  
peAr  
bAnAnA
```

# Standard I/O streams

- ***stdin***

the *standard input stream*, which provides input to commands.

- ***stdout***

the *standard output stream*, which displays output from commands.

- ***stderr***

the *standard error stream*, which displays error output from commands.

# exit code

Exit Code Number	Meaning	Example	Comments
1	Catchall for general errors	let "var1 = 1/0"	Miscellaneous errors, such as "divide by zero" and other impermissible operations
2	Misuse of shell builtins (according to Bash documentation)	empty_function() {}	
126	Command invoked cannot execute	/dev/null	Permission problem or command is not an executable
127	"command not found"	illegal_command	Possible problem with \$PATH or a typo
128	Invalid argument to <u>exit</u>	exit 3.14159	<b>exit</b> takes only integer args in the range 0 - 255 (see first footnote)
128+n	Fatal error signal "n"	kill -9 \$PPID of script	\$? returns 137 (128 + 9)
130	Script terminated by Control-C	Ctrl-C	Control-C is fatal error signal 2, (130 = 128 + 2, see above)
255*	Exit status out of range	exit -1	<b>exit</b> takes only integer args in the range 0 - 255

# Something else

› date

Mon Nov 8 00:07:38 CST 2021

› cal

November 2021

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	
7	<b>8</b>	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

---

# Editor



# vim

```
1 """
2 5.7
3 Pairwise Swap:
4 Write a program to swap odd and even bits in an integer with as few instructions as
5 possible (e.g., bit 0 and bit 1 are swapped, bit 2 and bit 3 are swapped, and so on).
6 """
7
8 def pairwise_swap(x):
9     print(bin(x))
10    y = 0b10101010
11    z = 0b10101011
12
13    even_bits = x & y
14    odd_bits = x & z
15    print('get even and odd bits')
16    print(f'even_bits: {bin(even_bits)}')
17    print(f'odd_bits: {bin(odd_bits)}\n')
18
19    even_bits >>= 1
20    odd_bits <=> 1
21    print('shift even and odd')
22    print(f'even_bits: {bin(even_bits)}')
23    print(f'odd_bits: {bin(odd_bits)}')
24
25    return (even_bits | odd_bits)
26
27 print(bin(pairwise_swap(23)))
28
~
```



# 03

# API Service

Implement a model into api  
service

# What is a Web Service?

A Web service is a collection of open protocols and standards which are widely used for exchanging data between systems or applications.

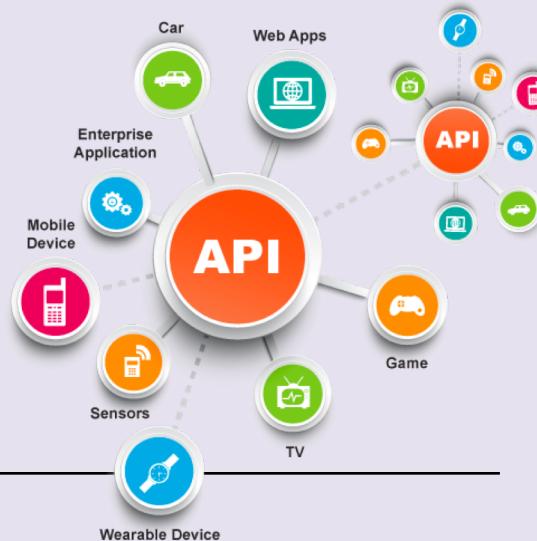
Software applications are written using various programming languages and running on multiple platforms. It allows you to use web services to exchange data over computer networks.



# What is an API?

API is the acronym for Application Programming Interface. It is a software interface that allows two applications to interact with each other without any user intervention.

APIs provide products or services to communicate with other products and services without having to know how they're implemented.



# Difference between Web and API

Web	API
All web services are APIs.	All APIs are not web services.
It supports XML.	Responses are formatted using Web API's MediaTypeFormatter into XML, JSON, or any other given format.
Need a SOAP protocol to send or receive and data over the network. Therefore it does not have light-weight architecture.	light-weight architecture.
It can be used by any client who understands XML.	It can be used by a client who understands JSON or XML.
Web service uses three styles: REST, SOAP, and XML-RPC for communication.	API can be used for any style of communication.
It provides support only for the HTTP protocol.	It provides support for the HTTP/s protocol: URL Request/Response Headers, etc.

# HTTP Method

HTTP method	Description
GET	Retrieve an existing resource.
POST	Create a new resource.
PUT	Update an existing resource.
PATCH	Partially update an existing resource.
DELETE	Delete a resource.

# HTTP Status Code(1/2)

Code range	Category
2xx	Successful operation
3xx	Redirection
4xx	Client error
5xx	Server error

# HTTP Status Code(2/2)

Code	Meaning
200	OK
201	Created
202	Accepted
204	No Content
400	Bad Request
401	Unauthorized
404	Not Found
415	Unsupported Media Type
422	Unprocessable Entity
500	Internal Server Error

# REST Architecture

Representational State Transfer (REST)

- Uniform Interface : 統一介面。
- Stateless : 無狀態。
- Cacheable : 可快取。
- Client-Server : 客戶伺服器分離模式，任何一個客戶端與伺服器都是可替換的。
- Layered System : 分層的系統，客戶端不知道他聯絡的是不是最終伺服器。
- Code on Demand (optional) : 伺服器可以將能力擴充到客戶端。

# API Endpoint

HTTP method	API endpoint	Description
GET	/customers	Get a list of customers.
GET	/customers/<customer_id>	Get a single customer.
POST	/customers	Create a new customer.
PUT	/customers/<customer_id>	Update a customer.
PATCH	/customers/<customer_id>	Partially update a customer.
DELETE	/customers/<customer_id>	Delete a customer.

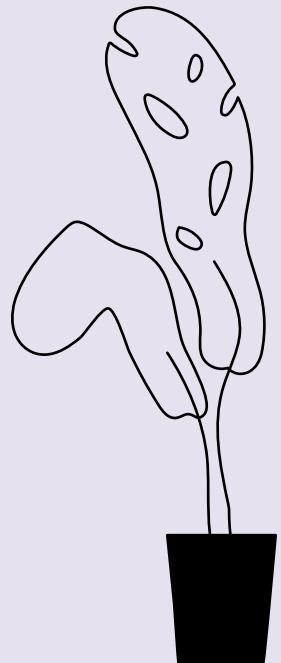


# Practice

[https://github.com/dannymonkey/api\\_service.git](https://github.com/dannymonkey/api_service.git)

---

# API Service with python





# Flask



# What is Flask?

- Python 的輕量化 api 框架
- 結合 Werkzeug and Jinja2

## Features:

- 內建開發用伺服器和除錯器
- 整合的單元測試支援
- RESTful quest
- 使用Jinja2模板引擎
- 支援安全cookie ( 客戶端對談 )
- 100%的WSGI1.0相容
- 基於Unicode
- 詳細的檔案、教學
- Google App Engine相容
- 可用Extensions增加其他功能



# Example

```
from flask import Flask
app = Flask(__name__)

@app.route("/")
def hello():
    return "Hello World!"

if __name__ == "__main__":
    app.run()
```

---

# 04

# Startup

Let's go on cloud





# Cloud



# Google Cloud Platform

## 網路



DNS Load Balancer



CDN Interconnect



VPC Firewall

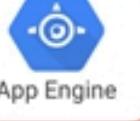
## 運算



Compute Engine



Kubernetes Engine



App Engine

## 儲存



Cloud Storage



Filestore



Cloud SQL



Spanner



Datastore



Bigtable

## 大數據



Pub/Sub



BigQuery



Data Flow



Datalab



Dataproc



Dataprep

## 機器學習



Speech API



Vision API



Translate API



Video API



AutoML



Dialog Flow



AI Hub



AI Platform

## 管理監控



IAM



StackDriver



Support

Security Scanner

## 安全性



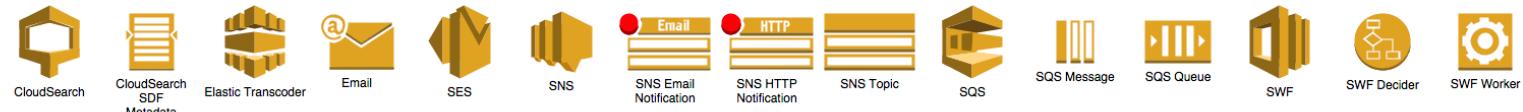
Security Command Center



KMS



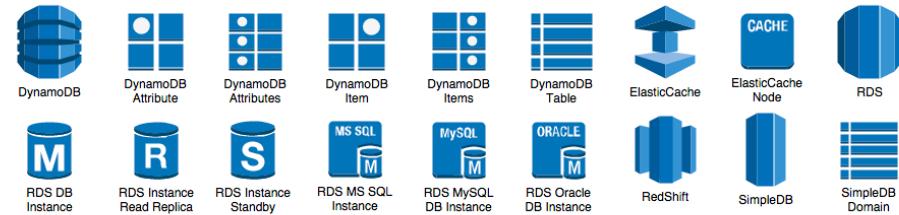
## Application Services



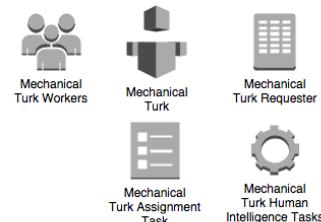
## Compute and Networking



## Database

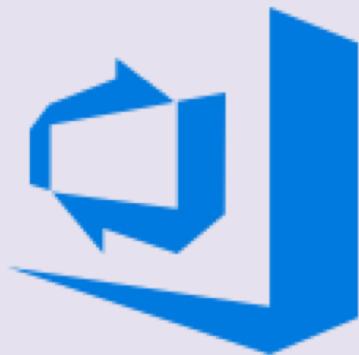


## On-Demand Workforce



## Deployment and Management





Azure DevOps

 Computer	 Internet and Mobile Applications	 Data and Storage	 Analytics
<ul style="list-style-type: none"> <li>● Azure Virtual Machines</li> <li>● Azure Virtual Machine Scale Sets</li> <li>● Azure Cloud Services</li> <li>● Azure Batch</li> <li>● Azure Container Service</li> <li>● Azure RemoteApp</li> <li>● Azure Service Fabric</li> </ul>	<ul style="list-style-type: none"> <li>● Azure App Service</li> <li>● Azure API Management</li> <li>● Azure Notification Hubs</li> <li>● Microsoft Power Apps</li> <li>● Azure Mobile Engagement</li> <li>● Azure Functions</li> <li>● Xamarin Test Cloud</li> </ul>	<ul style="list-style-type: none"> <li>● Azure Storage</li> <li>● Azure Storage Blob</li> <li>● Azure Storage Tables</li> <li>● Azure Storage Queues</li> <li>● Azure File Storage</li> <li>● Azure Import/Export</li> <li>● Azure StorSimple</li> <li>● Azure SQL Database</li> <li>● Azure SQL Data Warehouse</li> <li>● Azure Redis Cache</li> <li>● Azure DocumentDB</li> <li>● Azure Search</li> </ul>	<ul style="list-style-type: none"> <li>● Azure HDInsight</li> <li>● Azure Machine Learning</li> <li>● Azure Stream Analytics</li> <li>● Azure Cognitive Services</li> <li>● Azure Data Factory</li> <li>● Azure Event Hubs</li> <li>● Azure IoT Hub</li> <li>● Azure Data Catalog</li> <li>● Azure Data Lake Store</li> <li>● Azure Data Lake Analytics</li> </ul>
 Networking	 Hybrid Integrations	 Identity Management	 Management
<ul style="list-style-type: none"> <li>● Azure Virtual Network</li> <li>● Azure ExpressRoute</li> <li>● Azure VPN Gateway</li> <li>● Azure Load Balancer</li> <li>● Azure Application Gateway</li> <li>● Azure Traffic Manager</li> <li>● Azure DNS</li> <li>● Azure CDN</li> </ul>	<ul style="list-style-type: none"> <li>● Azure BizTalk Services</li> <li>● Azure Service Bus</li> <li>● Azure Backup</li> <li>● Azure Site Recovery</li> </ul>	<ul style="list-style-type: none"> <li>● Azure Active Directory</li> <li>● Azure AD Domain Services</li> <li>● Azure Active Directory B2C</li> <li>● Azure Multi-Factor Authentication</li> </ul>	<ul style="list-style-type: none"> <li>● Azure Automation</li> <li>● Azure Log Analytics</li> <li>● Azure Monitor</li> <li>● Azure Scheduler</li> </ul>
 Video	 Programmer Support Services	 Security	 Productivity
<ul style="list-style-type: none"> <li>● Azure Media Services</li> </ul>	<ul style="list-style-type: none"> <li>● Visual Studio Application Insights</li> <li>● Visual Studio Team Services</li> <li>● Azure DevTest Labs</li> </ul>	<ul style="list-style-type: none"> <li>● Azure Security Center</li> <li>● Azure Key Vault</li> </ul>	<ul style="list-style-type: none"> <li>● Office 365</li> <li>● PowerBI</li> </ul>

# Before Start

1. Supervisor
2. Docker



# Supervisor

# Supervisord

supervisord 是 Supervisor 的服務端組件，負責控制子進程的生命週期、響應客戶端組件的命令請求、重啓崩潰的進程以及日誌記錄等工作。

supervisord 使用 Windows-INI 格式的配置文件。

# Supervisorctl

是一個藉助命令行進行交互式操作的客戶端組件，它可以通過類似 Shell 的接口訪問 supervisord 提供的功能。

```
[ray@ip-172-31-34-164 supervisord.d]$ sudo supervisorctl update;
[ray@ip-172-31-34-164 supervisord.d]$ sudo supervisorctl status
laravel-worker:laravel-worker_00    RUNNING    pid 2941, uptime 1:06:19
laravel-worker:laravel-worker_01    RUNNING    pid 2942, uptime 1:06:19
laravel-worker:laravel-worker_02    RUNNING    pid 2943, uptime 1:06:19
laravel-worker:laravel-worker_03    RUNNING    pid 2944, uptime 1:06:19
laravel-worker:laravel-worker_04    RUNNING    pid 2945, uptime 1:06:19
laravel-worker:laravel-worker_05    RUNNING    pid 2946, uptime 1:06:19
laravel-worker:laravel-worker_06    RUNNING    pid 2947, uptime 1:06:19
laravel-worker:laravel-worker_07    RUNNING    pid 2948, uptime 1:06:19
[ray@ip-172-31-34-164 supervisord.d]$ █
```

# Web Server

如 Supervisor 配置文件中的 [inet\_http\_server] 項被啓用，則可以通過訪問 <http://localhost:9001> 進入一個功能類似 supervisorctl 的 Web 交互界面。

**Supervisor** status

Process helloworld-port5000 stopped

[REFRESH](#) [RESTART ALL](#) [STOP ALL](#)

State	Description	Name	Action
running	pid 652, uptime 0:03:09	es/elasticsearch	<a href="#">Restart</a> <a href="#">Stop</a> <a href="#">Clear Log</a> <a href="#">Tail -f</a>
running	pid 651, uptime 0:03:09	es/head	<a href="#">Restart</a> <a href="#">Stop</a> <a href="#">Clear Log</a> <a href="#">Tail -f</a>
running	pid 641, uptime 0:03:09	http	<a href="#">Restart</a> <a href="#">Stop</a> <a href="#">Clear Log</a> <a href="#">Tail -f</a>
stopped	Jun 17 10:09 AM	helloworld-port5000	<a href="#">Start</a> <a href="#">Clear Log</a> <a href="#">Tail -f</a>
running	pid 643, uptime 0:03:09	nginx	<a href="#">Restart</a> <a href="#">Stop</a> <a href="#">Clear Log</a> <a href="#">Tail -f</a>
running	pid 642, uptime 0:03:09	redis	<a href="#">Restart</a> <a href="#">Stop</a> <a href="#">Clear Log</a> <a href="#">Tail -f</a>
running	pid 810, uptime 0:03:05	seafie/seafiehub	<a href="#">Restart</a> <a href="#">Stop</a> <a href="#">Clear Log</a> <a href="#">Tail -f</a>
running	pid 645, uptime 0:03:09	seafie/seafieserver	<a href="#">Restart</a> <a href="#">Stop</a> <a href="#">Clear Log</a> <a href="#">Tail -f</a>

```
pip install supervisor
```

```
cd ~/
```

```
#### Mac
```

```
mv supervisord.conf /usr/local/etc/
```

```
#### Linux
```

```
mv supervisord.conf /etc/
```

```
mkdir ~/supervisor
```

```
mkdir ~/supervisor/log
```

```
mkdir ~/supervisor/conf.d
```

**vim** /usr/local/etc/supervisord.conf

```
39 [inet_http_server]          ; inet (TCP) server disabled by default
40 port=127.0.0.1:9001         ; ip_address:port specifier, *:port for all iface

169 [include]
170 files = /Users/tungchun/supervisor/conf.d/*.conf
```

### Mac

```
supervisord -c /usr/local/etc/supervisord.conf
```

### Linux

```
supervisord -c /etc/supervisord.conf
```

**vim run.sh**

```
1 #!/bin/bash
2
3 source /Users/tungchun/FJU_BigData/api_service/venv/bin/activate
4
5 python /Users/tungchun/FJU_BigData/api_service/api/app.py
```

**chmod +x run.sh**

**vim** ~/supervisor/conf.d/api.conf

```
1 [program:api_service]
2 command=/Users/tungchun/FJU_BigData/api_service/run.sh
3 autostart=true
4 autorestart=true
5 stderr_logfile=/Users/tungchun/supervisor/log/api.err.log
6 stdout_logfile=/Users/tungchun/supervisor/log/api.out.log
```

# supervisorctl

```
supervisor> reread
```

```
api_service: available
```

```
supervisor> status
```

```
supervisor> update
```

```
api_service: added process group
```

```
supervisor> status
```

```
api_service          BACKOFF  Exited too quickly (process log may have details)
```

---

```
supervisor>
```



# Docker

# docker help

```
MacBook-Pro:~ supervisor$ docker help
* bits @ 21:58

Usage: docker [OPTIONS] COMMAND
A self-sufficient runtime for containers

Options:
  --config string      Location of client config files (default "/Users/tungchun/.docker")
  -c, --context string Name of the context to use to connect to the daemon (overrides DOCKER_HOST env var and default context
                        set with "docker context use")
  -D, --debug          Enable debug mode
  -H, --host list      Daemon socket(s) to connect to
  -l, --log-level string Set the logging level ("debug"|"info"|"warn"|"error"|"fatal") (default "info")
    --tls              Use TLS; implied by --tlsverify
    --tlscacert string Trust certs signed only by this CA (default "/Users/tungchun/.docker/ca.pem")
    --tlscert string   Path to TLS certificate file (default "/Users/tungchun/.docker/cert.pem")
    --tlskey string    Path to TLS key file (default "/Users/tungchun/.docker/key.pem")
    --tlsverify        Use TLS and verify the remote
  -v, --version         Print version information and quit

Management Commands:
  app*      Docker App (Docker Inc., v0.9.1-beta3)
  builder   Manage builds
  buildx*   Build with BuildKit (Docker Inc., v0.5.1-docker)
  config    Manage Docker configs
  container Manage containers
  context   Manage contexts
  image     Manage images
  manifest  Manage Docker image manifests and manifest lists
  network   Manage networks
  node      Manage Swarm nodes
  plugin    Manage plugins
  scan*     Docker Scan (Docker Inc., v0.5.0)
  secret    Manage Docker secrets
  service   Manage services
  stack     Manage Docker stacks
```

# docker build -t python-test .

```
apple ~ ~/FJU_BigData/api_service/api ⚡ main ?3
> docker build -t python-test .
[+] Building 3.8s (11/11) FINISHED
  => [internal] load build definition from Dockerfile          0.4s
  => => transferring dockerfile: 37B                          0.0s
  => [internal] load .dockerignore                            0.5s
  => => transferring context: 2B                           0.0s ]
  => [internal] load metadata for docker.io/library/python:3.7-slim   1.3s
  => [internal] load build context                         0.2s
  => => transferring context: 3.63kB                      0.0s
  => [1/6] FROM docker.io/library/python:3.7-slim@sha256:c2cc09c3de140f59b3065b9518fa7beb5fbedb4414762963bfe01079ce219f2e 0.0s
  => CACHED [2/6] WORKDIR /app                            0.0s
  => CACHED [3/6] COPY requirements.txt requirements.txt  0.0s
  => CACHED [4/6] RUN pip3 install --upgrade pip        0.0s
  => CACHED [5/6] RUN pip3 install -r requirements.txt  0.0s
  => [6/6] COPY . .                                     0.5s
  => exporting to image                                 0.8s
  => => exporting layers                               0.5s
  => => writing image sha256:7e9e57f2cc01d5ea63dd94af35a28b74b323ad25c40be90fd19df5cec882e93b 0.0s
  => => naming to docker.io/library/python-test       0.0s ]
```

## docker images

```
[> docker images]
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
python-test	latest	9769b38a2173	9 seconds ago	107MB
jupyter/datascience-notebook	latest	ba99ca4164f2	13 days ago	4.1GB
postgres	latest	01b2dbb34042	2 weeks ago	354MB
gcr.io/if-aicompetition/task_generator	v1	97dda1331e52	8 months ago	323MB
gcr.io/if-aicompetition/task_generator	<none>	907b687b3cb1	8 months ago	323MB
gcr.io/if-aicompetition/task_generator	<none>	4d9711dc3c09	8 months ago	323MB
spotify/kafka	latest	a9e0a5b8b15e	4 years ago	443MB

**docker network ls**

```
apple ✚ ~ /FJU_BigData/api_service/api 🐳 ⚒ main ?2
[> docker network ls
NETWORK ID      NAME        DRIVER      SCOPE
6fac7b854fe3    bridge      bridge      local
4d40f0d0abd1    desktop_default  bridge      local
18315fa69a63    host        host        local
dfb855a6aabb    none        null       local
```

```
docker run --net=desktop_default -p 5001:5001 -d python-test
```

```
apple:~/FJU_BigData/api_service/api$ main ?3
> docker run --net=desktop_default -p 5001:5001 python-test
* Serving Flask app 'app' (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: on
* Running on all addresses.
  WARNING: This is a development server. Do not use it in a production deployment.
* Running on http://172.23.0.5:5001/ (Press CTRL+C to quit)
* Restarting with stat
* Debugger is active!
* Debugger PIN: 139-709-387
172.23.0.1 -- [14/Nov/2021 16:28:34] "POST /inference HTTP/1.1" 200 -
172.23.0.1 -- [14/Nov/2021 16:29:41] "POST /user_info HTTP/1.1" 200 -
```

# docker ps

main ?2					x 255	1m 33s	23:21:00
CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS		
f7e483b29019	python-test	"python3 app.py --po..." sad_lumiere	About a minute ago	Up About a minute	0.0.0.0:5001->5001/tcp		
7a41789ed006	jupyter/datascience-notebook .0.0.0:8000->8000/tcp, 0.0.0.0:8888->8888/tcp	"tini -g -- bash -c ..." desktop_jupyter_1	16 minutes ago	Up 16 minutes	0.0.0.0:5000->5000/tcp, 0		
8b637302a64a	postgres:12	"docker-entrypoint.s..." db	16 minutes ago	Up 16 minutes	0.0.0.0:5432->5432/tcp		
45e13329ed9e	spotify/kafka .0.0.0:9092->9092/tcp	"supervisord -n" desktop_kafka_1	16 minutes ago	Up 16 minutes	0.0.0.0:2181->2181/tcp, 0		

---

# Our conclusions

## What

Now you know what is Linux

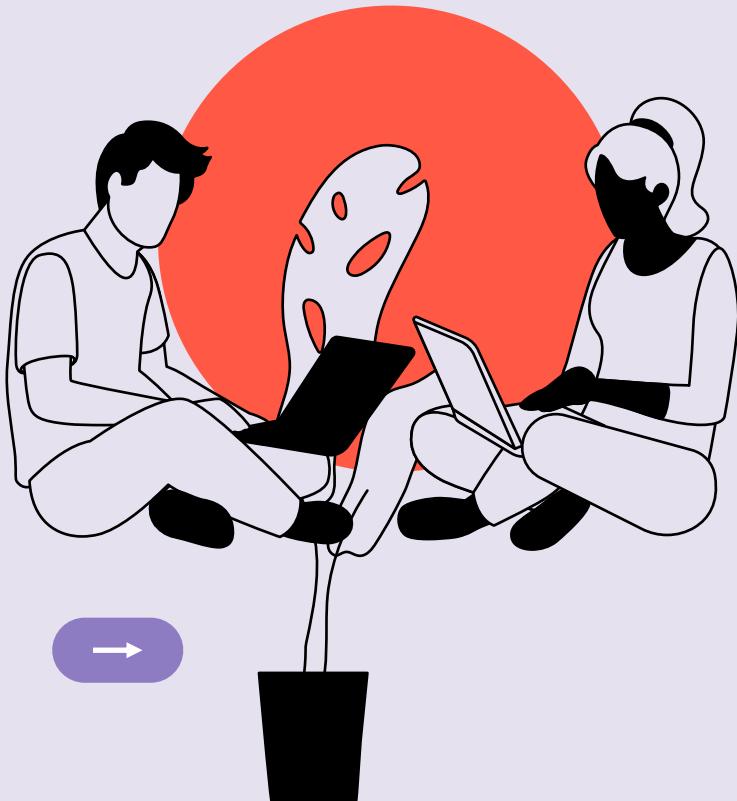
## Why

Maybe yes, maybe not

## How

You can build your own services





# Thanks!

Do you have any questions?

Do feel free to contact me~  
Email: danny07292000@gmail.com

