

AI 雲端部署 feat. LINE Bot

Enos Chou

2022/07/13, 07/15

Enos' Steps

2022/06/10(五) 13:30~16:30

專題分享 by Enos

2022/06/17(五) 09:00~16:30

專題訂定 by Teams feat. Enos

2022/07/13(三) 09:00~16:30

AI 雲端部署(上) by Enos

2022/07/15(五) 09:00~16:30

AI 雲端部署(下) by Enos

2022/08/05(五) 09:00~16:30

專題預報 by Teams feat. Enos

Focus

LINE Bot AI 部署

LINE Bot 部署 + AI 部署

TensorFlow.js AI 部署

課前準備

1. New GCP account

- a. 以三個月內新申請的帳號完成登入 <https://console.cloud.google.com>
- b. 申請時須信用卡，預刷 40 元不會請款

2. Ready Azure account

- a. 以班導師提供的序號儲值或新申請帳號並完成登入
- b. 序號兌換流程 <https://www.microsoftazurepass.com/Home/HowTo>
- c. 完成 Azure 登入 <https://portal.azure.com>

課前準備

3. MobaXterm Home Edition (Windows Only)

- a. 下載並安裝 MobaXterm Home Edition 最新版
- b. <https://mobaxterm.mobatek.net/> > Download > Home Edition Download now

4. LINE Messaging API settings

- a. 備妥一組測試用 LINE Bot 並完成 LINE Messaging API 相關設定

5. (Optional) TensorFlow 開發環境

- a. 備妥 Python 虛擬環境，包含 TensorFlow 2.4.4 以上

LINE Bot AI 部署

LINE Bot AI 部署重點

1. 長期可用且廉價的硬體環境 ...

Why Not Cloud ?

雲端 vs 地端

To Tech

Scalability

To Biz

CAPEX vs OPEX

Which Cloud ?

Magic Quadrant for Cloud

1. Magic Quadrant for Cloud Infrastructure and Platform Services
(2021/07)
2. Magic Quadrant for Cloud AI Developer Services
(2021/02)

Cloud Market Share

IaaS + PaaS Market Share
(2021/Q4)

LINE Bot AI 部署重點

1. 長期可用且廉價的硬體環境 ... **Cloud**
2. Flask as Web Server 的替代方案 ...
3. 長期可用且廉價的 SSL 網域方案 ...

Warning from Flask

```
python3 your_module.py (app.run())
```

```
* Serving Flask app 'somebot' (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: off
```

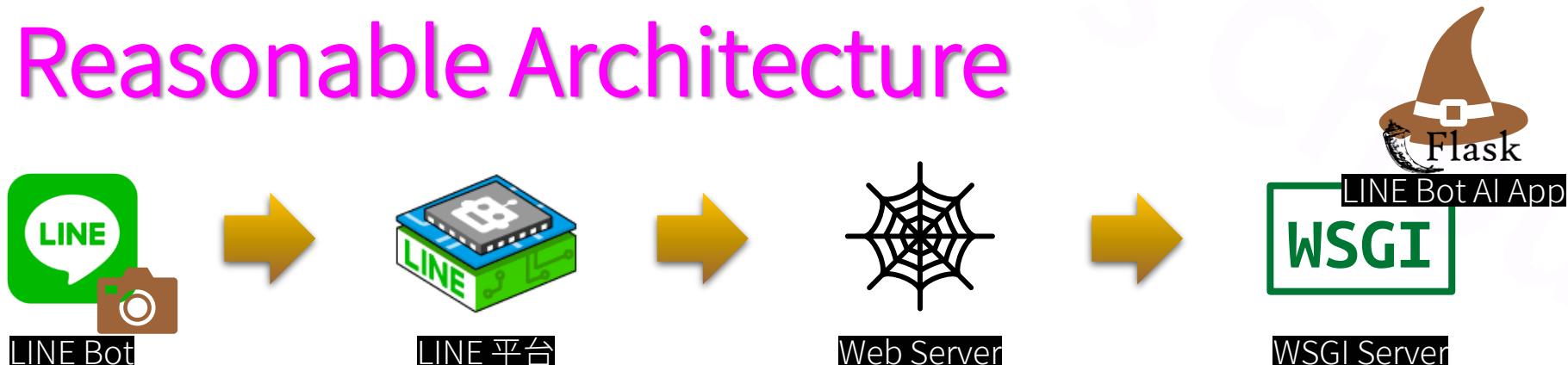
```
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

Architecture

Warning from Flask

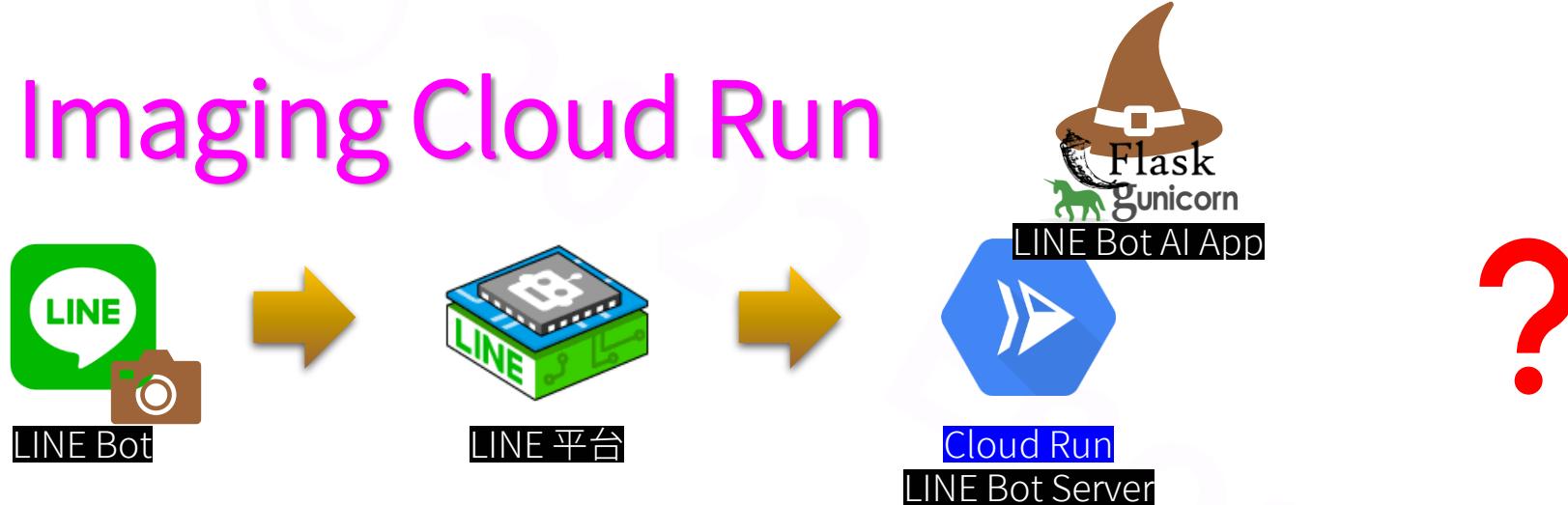


Reasonable Architecture

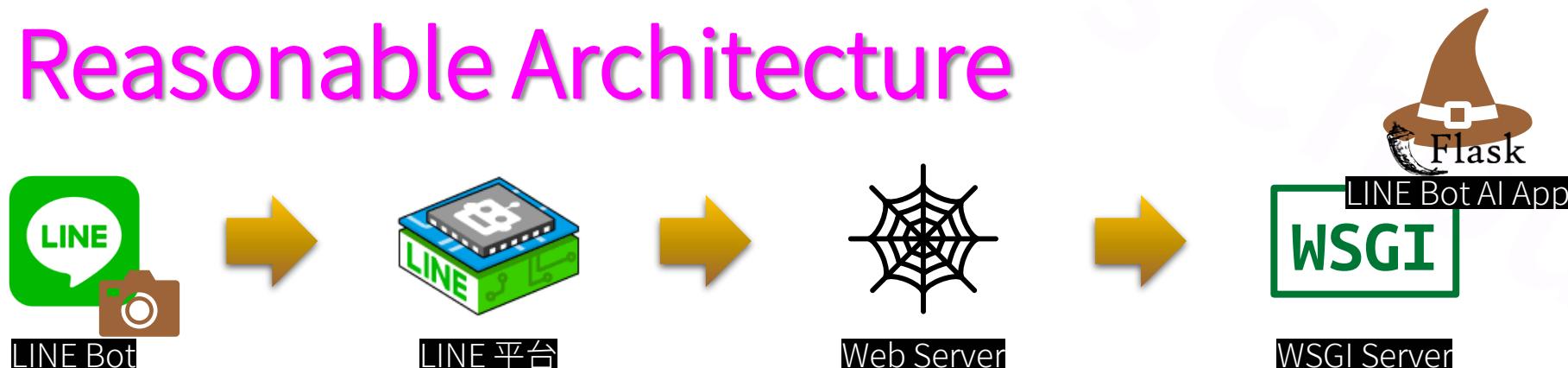


Architecture

Imaging Cloud Run

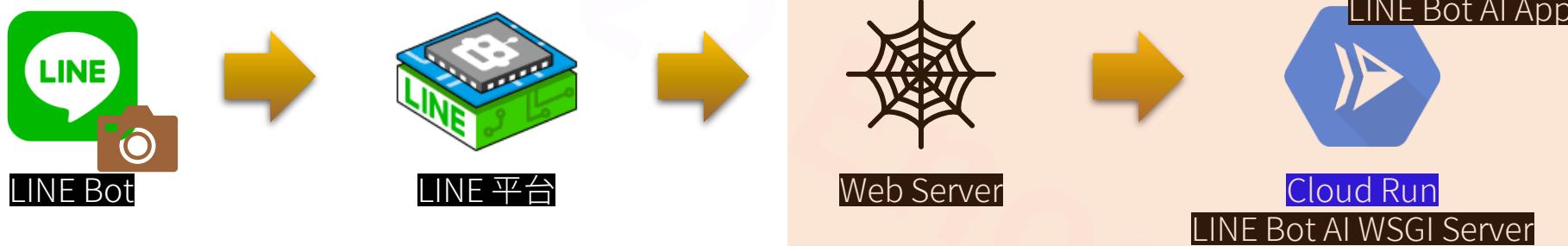


Reasonable Architecture

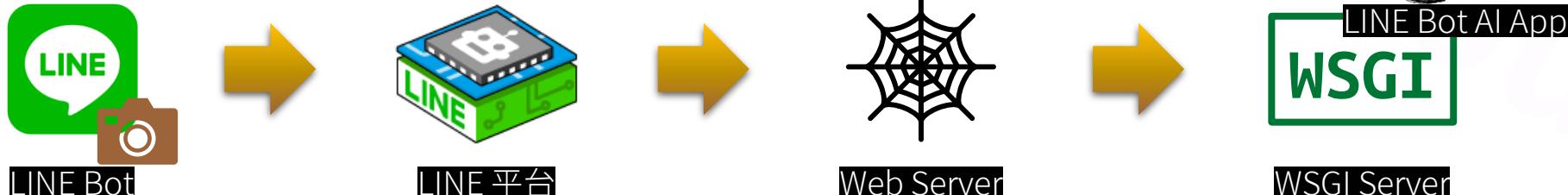


Architecture

Reasonable Cloud Run

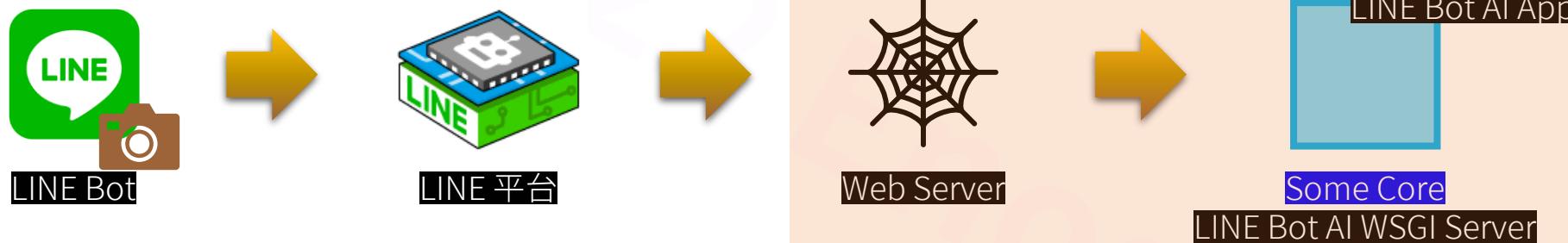


Reasonable Architecture

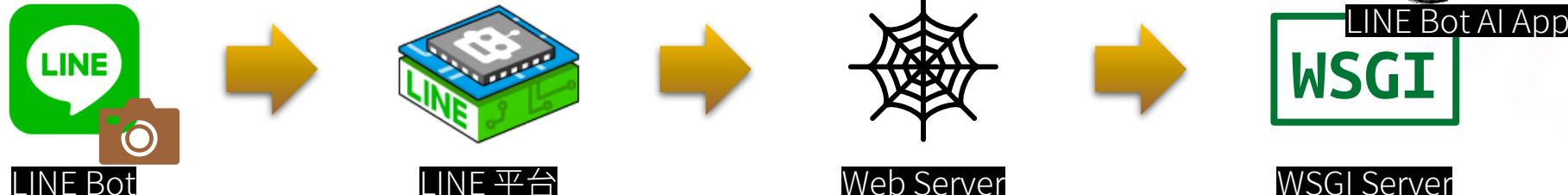


Architecture

Serverless

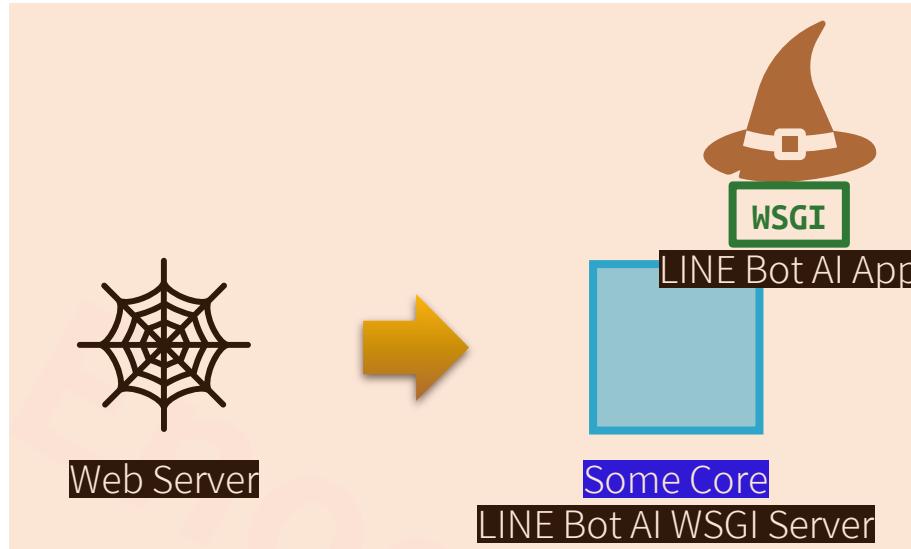
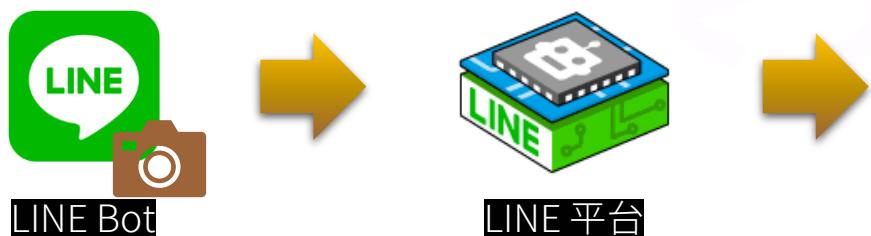


Reasonable Architecture

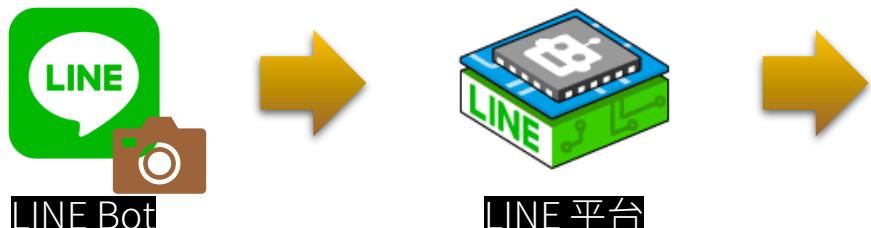


Architecture

Serverless

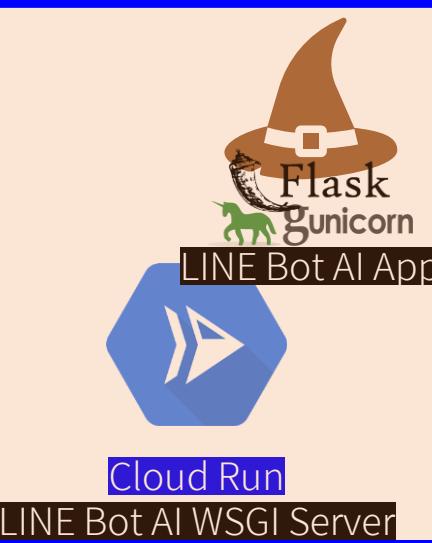
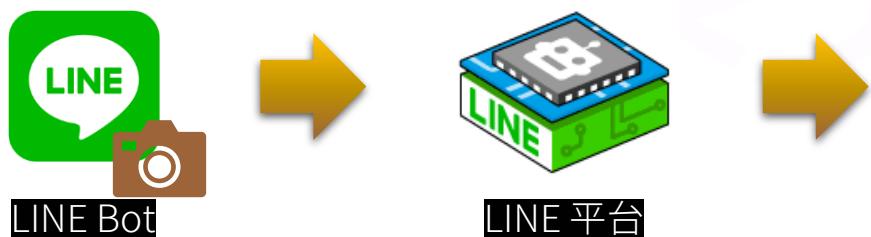


Server or VM

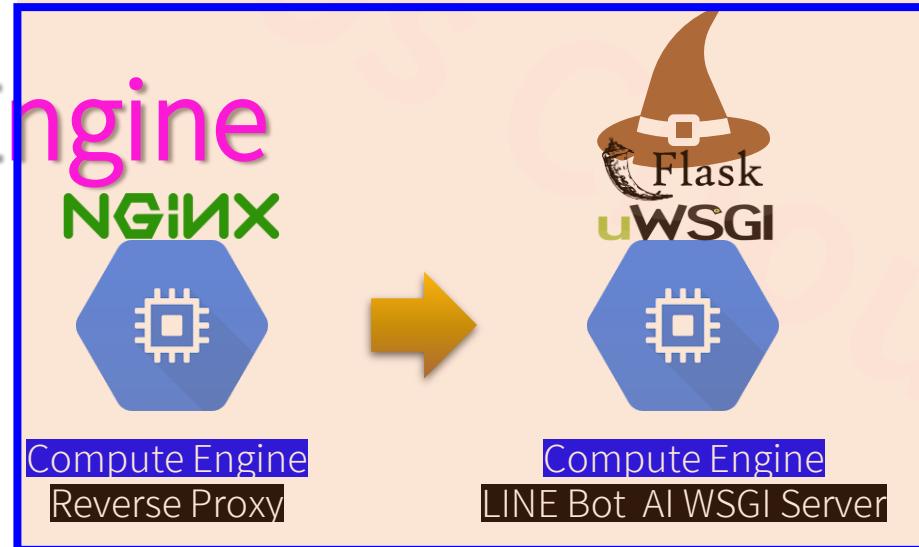
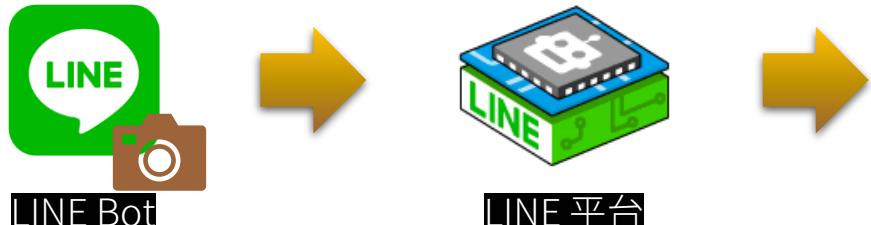


Architecture

Google Cloud Run



Google Compute Engine



LINE Bot AI 部署重點

1. 長期可用且廉價的硬體環境 ... **Cloud**
2. Flask as Web Server 的替代方案 ... **Got it**
3. 長期可用且廉價的 SSL 網域方案 ...

LINE Messaging API 的 SSL 需求

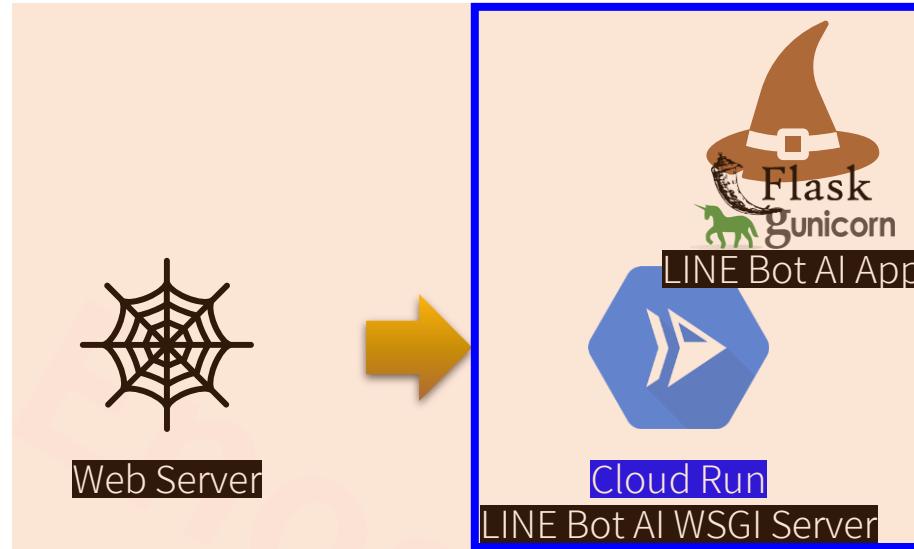
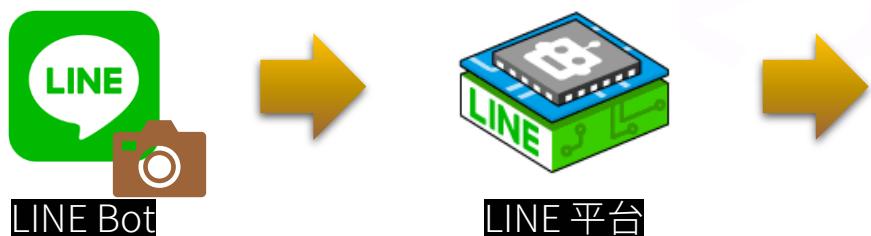
The screenshot shows the LINE Developers console interface. On the left, there's a sidebar with 'Console home', 'Providers' (which is expanded to show 'Available APIs'), 'Search...', and user account information ('Admin'). The main content area shows the path 'TOP > test > trees > Messaging API'. Under 'Available APIs', it lists 'REPLY_MESSAGE' and 'PUSH_MESSAGE'. Below that, the 'Webhook settings' section is shown. It includes a 'Webhook URL' field containing 'https://tenadv.site/callback' (which is highlighted with a pink rectangle), a 'Verify' button, an 'Edit' button, and a 'Use webhook' toggle switch which is turned on (green). A large pink annotation text '對應的 Web Server 需要 Domain Name + SSL 憑證' is overlaid on this section. Further down, there are 'Webhook redelivery' and 'Error statistics aggregation' settings, each with its own toggle switch.

SSL: Security Socket Layer ➔ TLS: Transport Layer Security problems? Please use our [inquiry form](#).

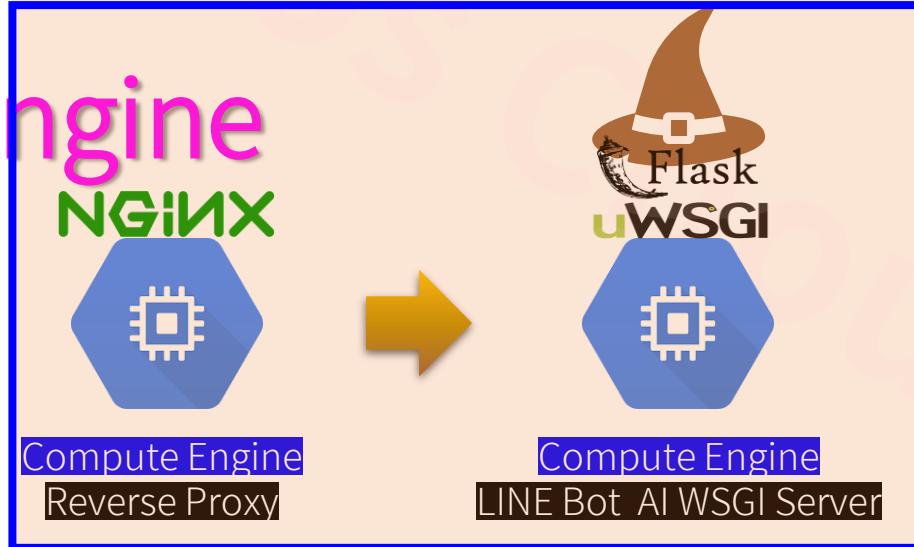
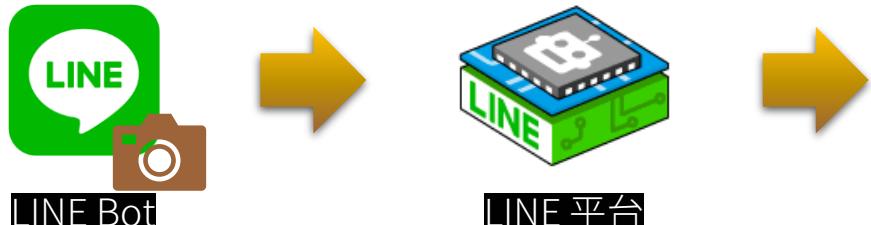
⊕ Family sites English

Architecture

Google Cloud Run



Google Compute Engine



一線品牌憑證

DigiCert

- <https://digicert.com/> > TLS/SSL Certificates > Basic TLS/SSL Certificates
- US\$ 250/ year

免費憑證

Let's Encrypt

- <https://letsencrypt.org/zh-tw/>
- 免費憑證
- 多家機構合資成立，包含 Cisco、IBM、NGINX、Heroku、LINE … 等
- 效期 3 個月
- Line Messaging API 接受

LINE Bot AI 部署重點

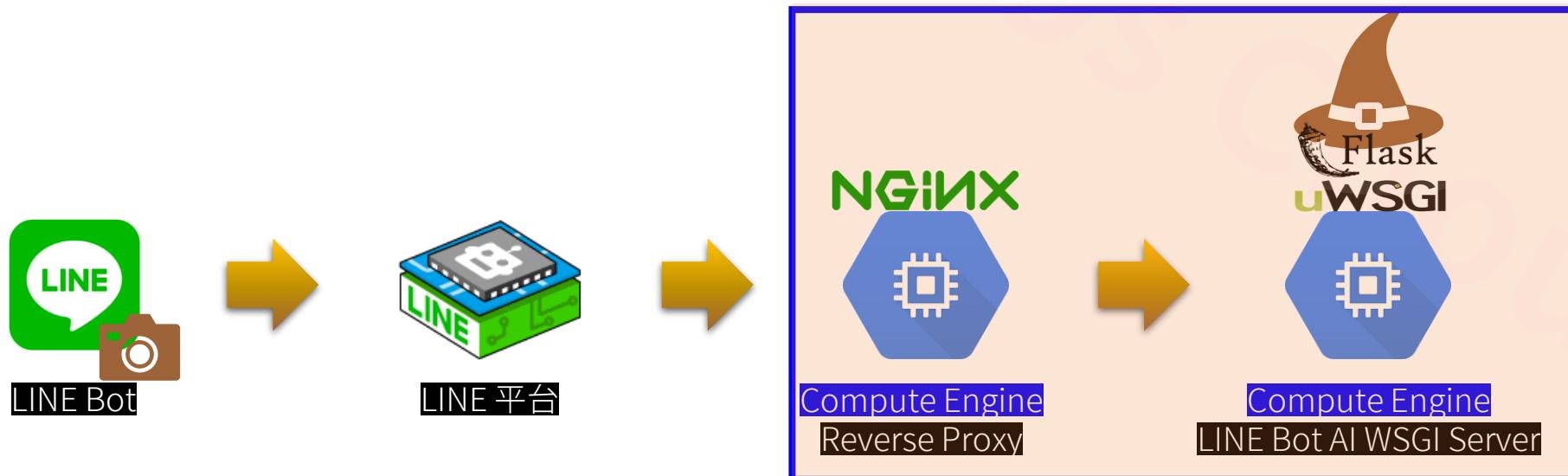
1. 長期可用且廉價的硬體環境 ... Cloud
2. Flask as Web Server 的替代方案 ... Got it
3. 長期可用且廉價的 SSL 網域方案 ... Got it

LINE Bot AI 雲端部署選項

Cloud	Server (VM)	Serverless	Note
Heroku	N/A	Heroku	http://heroku.com/ > Pricing
Google	Compute Engine	Cloud Run	*GCP 需要每3個月換帳號才能免費執行
Azure	VM	Web App	*Azure 需要 Coupon 才能免費執行
AWS	EC2	Fargate	?

Solution 1 - VM 部署

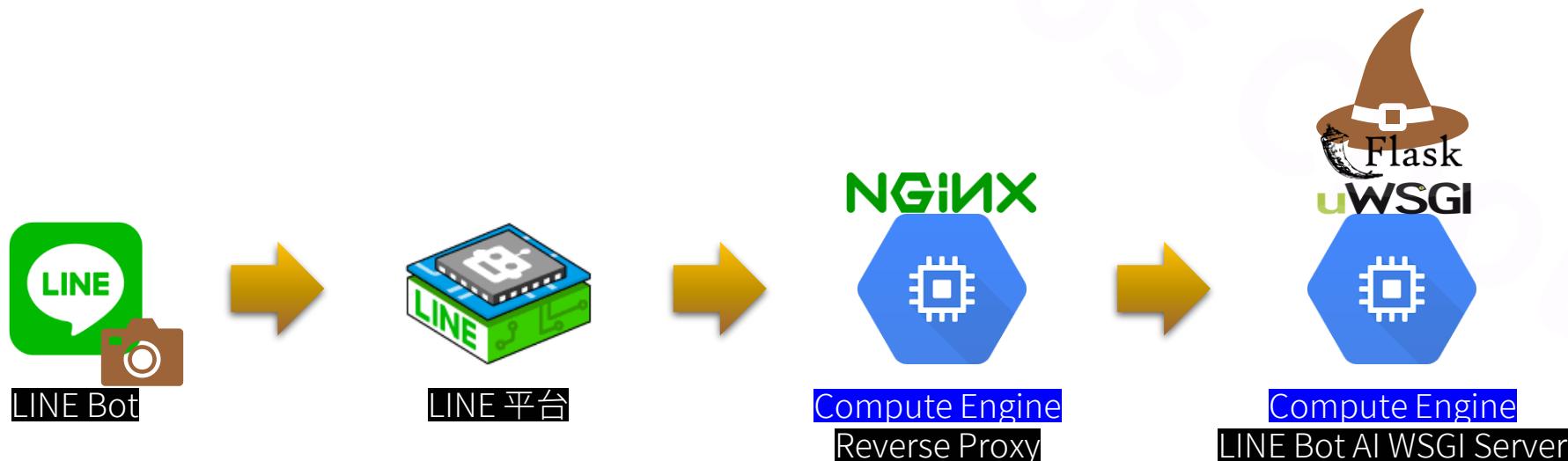
1. 長期可用且廉價的硬體環境 ... Google Compute Engine/ Azure VM
2. Flask as Web Server 的替代方案 ... NGINX + Domain + uWSGI
3. 長期可用且廉價的 SSL 網域方案 ... Let's Encrypt + Certbot

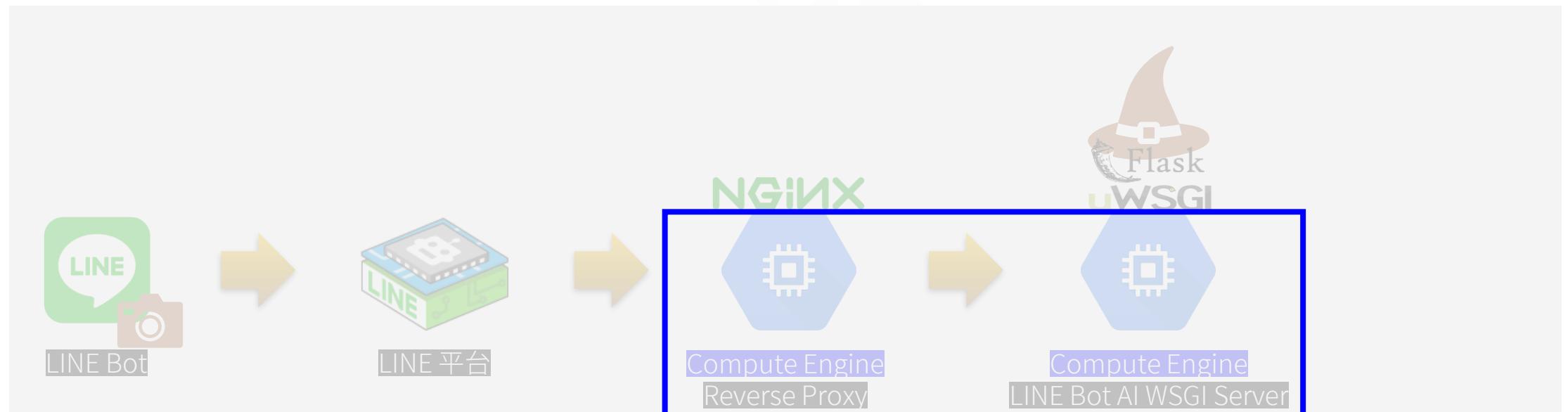


任務

1. 於 GCP 與 Azure 建立 VM
2. 以 MobaXterm 連線 VM 進行部署
3. 於 VM 架設 LINE Bot & uWSGI
4. 申購與設定 Domain
5. 於 VM 架設 NGINX
6. 於 VM 運用 Certbot 設定憑證

流程





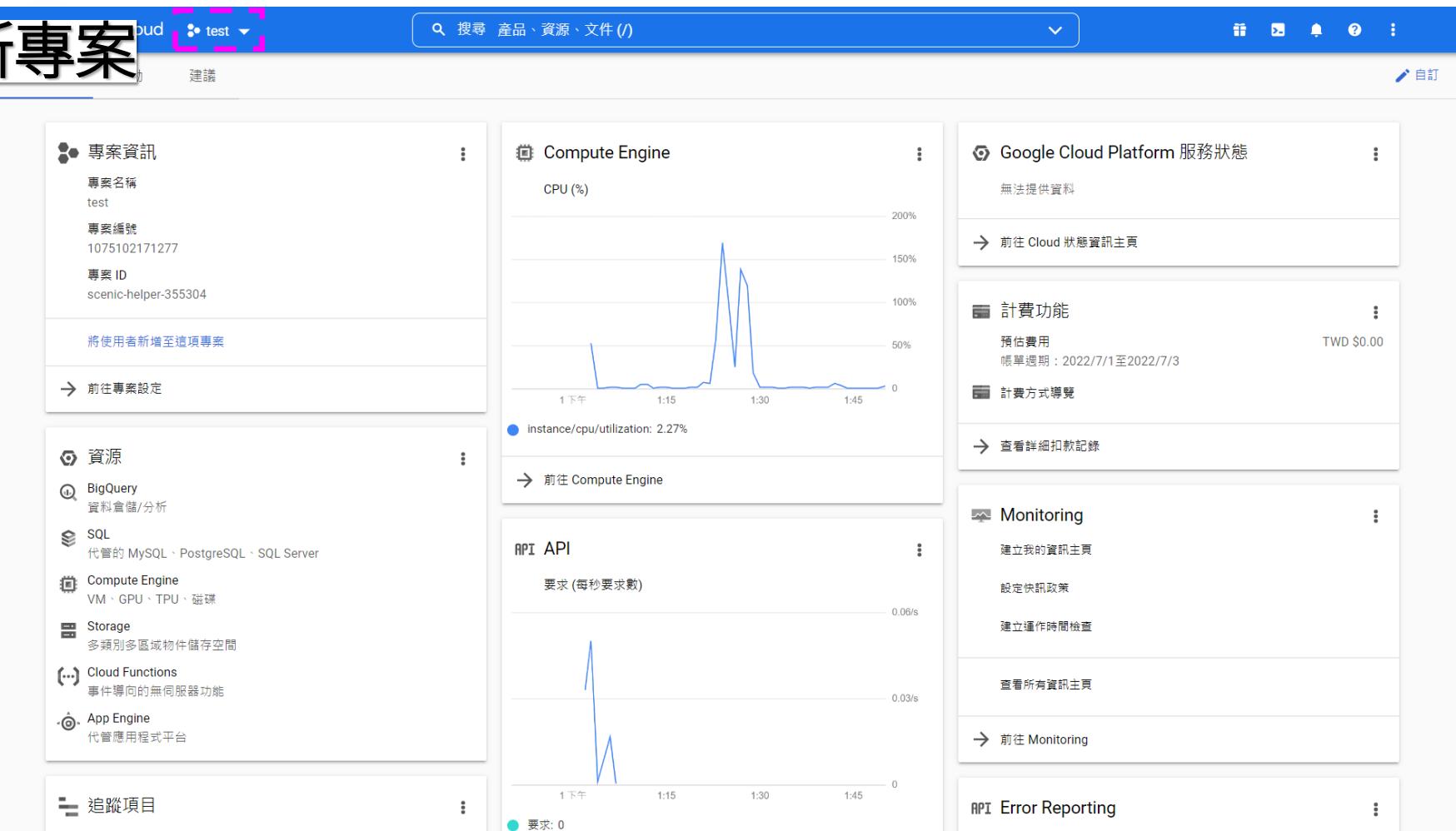
架設 VM - GCP

1. 登入

<https://console.cloud.google.com>

架設 VM - GCP

2. 建立並切換至新專案



架設 VM - GCP

3. 啟用 Compute Engine

The screenshot shows the Google Cloud Platform (GCP) dashboard. On the left, a sidebar menu is open, showing various services like Compute Engine, Kubernetes Engine, Cloud Storage, and BigQuery. The 'Compute Engine' item is highlighted with a pink rectangle. The main content area displays two charts: one for CPU utilization and another for API requests per second. The CPU chart shows a sharp spike around 1:25, and the API chart shows a similar spike around the same time. To the right of the charts, there are sections for Google Cloud Platform service status, billing information, monitoring, and error reporting.

https://console.cloud.google.com/compute?authuser=3&project=scenic-helper-355304

Compute Engine

CPU (%)

API API

Monitoring

API Error Reporting

架設 VM - GCP

3. 啟用 Compute Engine

The screenshot shows the Google Cloud Platform API library interface. At the top, there's a blue header bar with the text "test" and some icons. Below the header, the title "Compute Engine API" is displayed, along with a "Google Enterprise API" link and a "Compute Engine API" link. A prominent blue button labeled "啟用" (Enable) is highlighted with a pink rectangle. To the right of the button is another button labeled "試用這個 API" (Try this API). Below the title, there are tabs for "總覽", "說明文件", and "支援". The "總覽" tab is selected and underlined. The "總覽" section contains a brief description: "Creates and runs virtual machines on Google Cloud Platform." To the right of this, under the heading "其他詳細資料", there are details: "類型: SaaS & APIs", "上次更新時間: 2022/4/30", "類別: Compute, Networking, Google Enterprise APIs", and "服務名稱: compute.googleapis.com". Further down, there's a "教學課程與說明文件" section with a "Learn more" link, and a "支援" section with a "瞭解詳情" link.

架設 VM - GCP

3. 啟用 Compute Engine

The screenshot shows the Google Cloud Platform (GCP) Compute Engine interface. The left sidebar has a tree view with the following sections:

- 虛擬機器
 - VM 執行個體 (selected)
 - 執行個體範本
 - 單一用戶群節點
 - 機器映像檔
 - TPU
 - 承諾使用折扣
 - Migrate for Compute Engi...
- 儲存空間
 - 磁碟
 - 快照
 - 映像檔
- 執行個體群組
 - 執行個體群組
 - 健康狀態檢查
- Marketplace
- 版本資訊

The main content area displays the "VM Instances" page with the following elements:

- A search bar at the top: 搜尋 產品、資源、文件 (/).
- A toolbar with buttons: 建立執行個體 (Create VM), 匯入 VM (Import VM), 重新整理 (Refresh), 開始/繼續 (Start/Resume), 停止 (Stop), 暫停 (Pause), 重設 (Reset), 刪除 (Delete).
- A table header: 狹選 輸入屬性名稱或值 (Filter input property name or value). Columns: 狹選 (Filter), 狹選 (Filter), 名稱 (Name), 上 (Up), 區域 (Region), 建議 (Suggested), 使用者 (User), 內部 IP (Internal IP), 外部 IP (External IP), 連線 (Connections).
- A central area featuring a globe icon with colored dots (red, green, blue, yellow) representing different regions.
- A section titled "VM 執行個體" (VM Instances) with the following text:

Compute Engine 可讓您使用在 Google 基礎架構中運作的虛擬機器。您可以建立微型 VM，或是執行 Debian、Windows 或其他標準映像檔的大型執行個體。請建立第一個 VM 執行個體、使用遷移服務匯入 VM 執行個體，或是透過快速入門導覽課程建構範例應用程式。
- Buttons at the bottom: 建立執行個體 (Create VM) and 進入快速入門導覽課程 (Enter Quickstart Guide).
- On the right side, there are tabs: 選取執行個體 (Select instance), PERMISSIONS (selected), LABELS, and MONITORING.
- A message in the PERMISSIONS tab: 請至少選取一項資源。 (Please select at least one resource.)

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Compute Engine interface for creating a VM. The left sidebar has sections for VM execution instances, storage space (disks, snapshots, images), instance group management, Marketplace, and version history. The main area is titled 'VM execution instances' and features a search bar and a table with columns for status, name, region, suggestion, user, internal IP, external IP, and connection. A large central image shows a globe with colored dots (green, blue, red, yellow) representing different regions or data centers. Below the globe, there's a section titled 'VM execution instance' with a brief description of what Compute Engine is and two buttons at the bottom: 'Create instance' (highlighted with a pink box) and 'Enter quick start guide'. On the right side, there are tabs for 'PERMISSIONS' (selected), 'LABELS', and 'MONITORING', and a note saying 'Please select at least one resource.'.

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Platform (GCP) interface for creating a new VM instance. The top navigation bar includes the Google Cloud logo, project name 'test', a search bar, and various navigation icons.

VM Configuration:

- Name:** bot (highlighted with a pink box)
- Region:** us-west1 (奥勒岡州) (highlighted with a pink box)
- Machine Type:** e2-small (2 vCPU, 2 GB Memory) (highlighted with a pink box)
- Machine Series:** E2 (highlighted with a pink box)
- Processor:** Intel Xeon (E2-2124 v4) (highlighted with a pink box)
- Memory:** 2 GB
- Processor Cores:** 1 個共用核心
- Processor Cache:** 4 MB
- Processor Clock Speed:** 2.2 GHz
- Processor RAM:** 2 GB
- Processor TDP:** 15 W
- Processor Cache:** 4 MB
- Processor Clock Speed:** 2.2 GHz
- Processor RAM:** 2 GB

Optional Settings:

- Display Device:** 啟用顯示裝置
- 密鑰 VM 服務:**

Cost Estimation:

項目	預估每月費用
2 vCPU + 2 GB memory	US\$12.23
10 GB 平衡永久磁碟	US\$1.00
Sustained use discount	-US\$0.00
Total	US\$13.23

Notes:

- 這會成為VM主機名稱設定完畢無法更改
- 各地區價格與可用服務不同
- 依需求指定主機規格

GCP 一律免費方案 (Free Tier)

<https://cloud.google.com/> > GCP 定價 > 20 項以上的產品

Compute Engine

每月 1 個 e2-micro 執行個體

- 2 個 vCPU
- 1GB 記憶體
- 地區限制：奧勒岡州：us-west1、愛荷華州：us-central1、南卡羅來納州：us-east1

每月 30GB 標準永久磁碟

每月 1GB 網路輸出流量

注意：預設為已平衡的永久磁碟。移除 VM 後需個別移除磁碟

注意：VM 停止後，VM 不收費但磁碟與外部 IP 仍會收費

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Platform (GCP) interface for creating a new VM instance. The top navigation bar includes the Google Cloud logo, project name 'test', a search bar, and various navigation icons.

The main page title is '建立執行個體' (Create Instance). A sidebar on the left lists options: '新增 VM 執行個體' (Create new VM instance), '運用範本建立新的 VM 執行個體' (Create new VM instance from template), '運用機器映像檔建立新的 VM 執行個體' (Create new VM instance from image), and 'Marketplace'.

The main configuration area includes:

- 名稱:** bot
- 類型:** 新的已平衡永久磁碟
- 大小:** 10 GB
- 映像檔:** Debian GNU/Linux 11 (bullseye)

A large blue button labeled '變更' (Change) is highlighted with a pink box.

身分及 API 存取權 (Identity & API Access) section:

- 服務帳戶:** Compute Engine default service account
- 說明文字: 您必須為想透過這個服務帳戶存取 VM 的使用者設定服務帳戶使用者角色 (roles/iam.serviceAccountUser)。 [瞭解詳情](#)

存取權範圍:

- 允許預設存取權
- 允許所有 Cloud API 的完整存取權
- 針對各個 API 設定存取權

防火牆 (Firewall) section:

- 說明文字: 您可以新增標記和防火牆規則，藉此接受來自網際網路的特定網路流量。
- 允許 HTTP 流量
- 允許 HTTPS 流量

網路、磁碟、安全性、管理、單一用戶群 (Networking, Disks, Security, Management, Single User) section (collapsed):

這個 VM 執行個體將會耗用您的免費試用額度。 [GCP 免費方案](#)

Bottom navigation bar: 建立 (Create) (highlighted), 取消 (Cancel), 對等指令列 (Peer-to-Peer List) (dropdown menu open).

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Platform interface for creating a new VM instance. On the left, the 'Create Instance' wizard is open, showing options like 'Add VM instance', 'From template', 'From image', and 'Marketplace'. On the right, a detailed configuration dialog for 'Boot Disk' is displayed, with fields for 'Image source' (Ubuntu), 'Disk type' (Standard Persistent Disk), and 'Size (GB)' (30). The 'Size (GB)' field is highlighted with a pink rectangle.

1. 硬碟空間視需求設定，一般應用可設為 30G
2. 預設的已平衡的永久硬碟非永久免費，為防未來若轉為正式帳號導致誤出帳可改為標準永久磁碟

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Platform interface for creating a new VM instance. The configuration details are as follows:

- 名稱:** bot
- 類型:** 新的標準永久磁碟
- 大小:** 30 GB
- 映像檔:** Ubuntu 18.04 LTS

預估每月費用: US\$13.43
每小時約為 US\$0.02
用多少付多少：無須預繳費用，而是以秒計費

項目	預估每月費用
2 vCPU + 2 GB memory	US\$12.23
30 GB 標準永久磁碟	US\$1.20
Sustained use discount	-US\$0.00
Total	US\$13.43

身分及 API 存取權: 服務帳戶: Compute Engine default service account

必須為想透過這個服務帳戶存取 VM 的使用者設定服務帳戶使用者角色 (roles/iam.serviceAccountUser)。詳解詳情

存取權範圍: 允許預設存取權 (selected)

防火牆: 允許 HTTP 流量 (selected), 允許 HTTPS 流量 (selected)

底部提示: 這個 VM 執行個體將會耗用您的免費試用額度。GCP 免費方案

操作按钮: 建立 (highlighted with a pink box), 取消, 對等指令列

右侧文本: HTTP for Certbot
HTTPS for LINE Messaging

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Platform (GCP) interface for creating a new VM instance. The top navigation bar includes the Google Cloud logo, a project selector for 'test', a search bar, and various navigation icons.

The main content area is titled '建立執行個體' (Create Instance). It displays the following configuration steps:

- 如要建立 VM 執行個體，請先選取下列任一選項：**
 - 新增 VM 執行個體** (Selected): From scratch to build a new VM instance.
 - 運用範本建立新的 VM 執行個體**: Use a template to build a new VM instance.
 - 運用機器映像檔建立新的 VM 執行個體**: Use a machine image to build a new VM instance.
 - Marketplace**: Instantly available solutions deployed to VM instances.
- 服務帳戶**: Set to 'Compute Engine default service account'. A note states: '您必須為想透過這個服務帳戶存取 VM 的使用者設定服務帳戶使用者角色 (roles/iam.serviceAccountUser)' with a 'View details' link.
- 存取權範圍**:
 - 允許預設存取權
 - 允許所有 Cloud API 的完整存取權
 - 針對各個 API 設定存取權
- 防火牆**:
 - You can add tags and firewall rules to accept specific network traffic from the internet.
 - 允許 HTTP 流量
 - 允許 HTTPS 流量
- 網路**: Hostname and network interface settings.
- 磁碟**: Other disk settings.
- 安全性**: Protection of VM and security features.
- 管理**: Deletion, retention, automation, and availability policies.
- 單一用戶群**: Resource quota and CPU overcommitment settings.

預估每月費用: US\$13.43 (Estimated monthly cost: US\$13.43)

項目 **預估每月費用**

2 vCPU + 2 GB memory	US\$12.23
30 GB 標準永久磁碟	US\$1.20
Sustained use discount	-US\$0.00
Total	US\$13.43

[Compute Engine 定價](#)

[^ LESS](#)

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Platform interface for creating a new VM instance. The top navigation bar includes the Google Cloud logo, project name 'test', a search bar, and various navigation icons.

The main page title is '建立執行個體' (Create Instance). On the left, a sidebar lists options: '新增 VM 執行個體' (Create new VM instance), '運用範本建立新的 VM 執行個體' (Create a new VM instance from a template), '運用機器映像檔建立新的 VM 執行個體' (Create a new VM instance from a machine image), and 'Marketplace'.

The main configuration area is titled '網路介面' (Network Interface). It shows a dropdown menu set to 'default default (10.138.0.0/20)'. A note below states: '必須先有新的網路，才能建立其他網路介面。' (You must have a new network before you can create other network interfaces.)

Other sections visible include '磁碟' (Disk), '安全性' (Security), '管理' (Management), and '單一用戶群' (Single User). At the bottom, a note says: '這個 VM 執行個體將會耗用您的免費試用額度。GCP 免費方案' (This VM instance will consume your free trial quota. GCP Free Tier).

On the right, a sidebar displays '預估每月費用' (Estimated monthly cost) at US\$13.43, with a note: '每小時約為 US\$0.02'. It also shows a breakdown of costs:

項目	預估每月費用
2 vCPU + 2 GB memory	US\$12.23
30 GB 標準永久磁碟	US\$1.20
Sustained use discount	-US\$0.00
Total	US\$13.43

Below this, there's a link to 'Compute Engine 定價' (Compute Engine Pricing) and a 'LESS' button.

At the bottom of the page are buttons for '建立' (Create), '取消' (Cancel), and '對等指令列' (Peer-to-Peer Command Line).

架設 VM - GCP

4. 建立 VM

The screenshot shows the 'Create VM instance' wizard on the Google Cloud Platform. The current step is 'Network interface'. The left sidebar lists options: 'Add VM instance' (selected), 'Clone template', 'Clone machine image', and 'Marketplace'. The main area shows network configuration: 'Network' set to 'default', 'Subnetwork' set to 'default IPv4 (10.138.0.0/20)', and 'IP stack type' set to 'IPv4 (single stack)'. A note says 'If you want to use IPv6, you must have an IPv6 subnet range.' Below this are 'External IP' settings ('Temporary') and 'Network service tier' ('Advanced'). On the right, a sidebar shows estimated monthly costs: 2 vCPU + 2 GB memory at US\$12.23, 30 GB standard persistent disk at US\$1.20, and a total of US\$13.43.

Google Cloud test 搜尋 產品、資源、文件 (/)

建立執行個體

如要建立 VM 執行個體，請先選取下列任一選項：

- + 新增 VM 執行個體 從頭開始建立一個 VM 執行個體
- [+] 運用範本建立新的 VM 執行個體 運用現有範本建立一個 VM 執行個體
- [+] 運用機器映像檔建立新的 VM 執行個體 運用現有機器映像檔建立一個 VM 執行個體
- Marketplace 將立即可用的解決方案部署至 VM 執行個體

網路介面

編輯網路介面

網路 * default

子網路 * default IPv4 (10.138.0.0/20)

如要使用 IPv6，您必須擁有 IPv6 子網路範圍。 諾解詳情

IP 堆疊類型

IPv4 (單一堆疊)

IPv4 和 IPv6 (雙重堆疊)

主要內部 IP

別名 IP 範圍

+ 新增 IP 範圍

外部 IP 地址

临时

網路服務級別

進階

標準級 (us-west1)

公開 DNS PTR 記錄

啟用 IPv4

預估每月費用

US\$13.43

每小時約為 US\$0.02

用多少付多少：無須預繳費用，而且是以秒計費

項目	預估每月費用
2 vCPU + 2 GB memory	US\$12.23
30 GB 標準永久磁碟	US\$1.20
Sustained use discount	-US\$0.00
Total	US\$13.43

Compute Engine 定價

LESS

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Platform (GCP) interface for creating a new VM. The top navigation bar includes 'Google Cloud' and a project dropdown ('test'). The search bar contains '搜尋 產品、資源、文件 (/)'.

The main title is '建立執行個體' (Create Instance). On the left, a sidebar lists options: '新增 VM 執行個體' (Create new VM instance), '運用範本建立新的 VM 執行個體' (Create new VM instance from template), '運用機器映像檔建立新的 VM 執行個體' (Create new VM instance from image), and 'Marketplace'.

The central panel is titled '網路介面' (Networking). It shows the '編輯網路介面' (Edit network interface) section. Under '網路' (Network), 'default' is selected. Under '子網路' (Subnetwork), 'default IPv4 (10.138.0.0/20)' is selected. A note states: '如要使用 IPv6，您必須擁有 IPv6 子網路範圍。' (If you want to use IPv6, you must have an IPv6 subnet range.)

The 'IP 堆疊類型' (IP stack type) section has 'IPv4 (單一堆疊)' (IPv4 (single stack)) selected. A dropdown menu for '篩選條件' (Filter conditions) is open, showing '無' (None) and '臨時' (Temporary), with '建立 IP 位址' (Create IP address) highlighted with a pink rectangle.

At the bottom, '網路服務級別' (Network service level) is set to '進階' (Advanced). Other options include '公開 DNS PTR 記錄' (Public DNS PTR record) and '啟用 IPv4' (Enable IPv4).

On the right, a '預估每月費用' (Estimated monthly cost) table shows:

項目	預估每月費用
2 vCPU + 2 GB memory	US\$12.23
30 GB 標準永久磁碟	US\$1.20
Sustained use discount	-US\$0.00
Total	US\$13.43

Below the table are links for 'Compute Engine 定價' (Compute Engine Pricing) and 'LESS'.

架設 VM - GCP

4. 建立 VM

Google Cloud test 建立執行個體

如要建立 VM 執行個體，請先選取下列任一選項：

- + 新增 VM 執行個體 從頭開始建立一個 VM 執行個體
- + 運用範本建立新的 VM 執行個體 運用現有範本建立一個 VM 執行個體
- [] 運用機器映像檔建立新的 VM 執行個體 運用現有機器映像檔建立一個 VM 執行個體
- Marketplace 將立即可用的解決方案部署至 VM 執行個體

網路介面

編輯網路介面

網路 * default

子網路 * default IPv4 (10.138.0.0/20)

IP 堆疊類型

● IPv4 (單一堆疊)

○ IPv4 和 IPv6 (雙重堆疊)

別 無

临时

建立 IP 位址

取消 保留在

預估每月費用

US\$13.43 每小時約為 US\$0.02

用多少付多少：無須預繳費用，而且是以秒計費

項目	預估每月費用
2 vCPU + 2 GB memory	US\$12.23
30 GB 標準永久磁碟	US\$1.20
Sustained use discount	-US\$0.00
Total	US\$13.43

Compute Engine 定價

LESS

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Platform (GCP) interface for creating a new VM instance. The top navigation bar includes the Google Cloud logo, project name 'test', a search bar, and various navigation icons.

The main page title is '建立執行個體' (Create Instance). On the left sidebar, there are four options:

- 新增 VM 執行個體** (Create New VM Instance): Selected and highlighted in blue.
- 運用範本建立新的 VM 執行個體** (Create New VM Instance from Template)
- 運用機器映像檔建立新的 VM 執行個體** (Create New VM Instance from Image)
- Marketplace** (Marketplace)

The main content area is titled '網路介面' (Network Interface). It contains the following settings:

- 編輯網路介面** (Edit Network Interface): A dropdown menu set to 'default'.
- 子網路 ***: default IPv4 (10.138.0.0/20)
- IP 堆疊類型**:
 - IPv4 (單一堆疊)
 - IPv4 和 IPv6 (雙重堆疊)
- 主要內部 IP**:
 - 臨時 (自動)
- 別名 IP 範圍**:
 - + 新增 IP 範圍**
 - 外部 IPv4 位址: botp (35.227.191.94)
- 網路服務級別**: 選擇了 '進階'
- 公開 DNS PTR 記錄**:
 - 啟用 IPv4
 - PTR 組態名稱

預估每月費用 (Estimated Monthly Cost): US\$13.43. This cost is calculated based on 2 vCPU + 2 GB memory, 30 GB 標準永久磁碟, and no sustained use discount.

Compute Engine 定價 (Compute Engine Pricing): A table showing the breakdown of costs:

項目	預估每月費用
2 vCPU + 2 GB memory	US\$12.23
30 GB 標準永久磁碟	US\$1.20
Sustained use discount	-US\$0.00
Total	US\$13.43

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Platform interface for creating a new VM instance. The top navigation bar includes the Google Cloud logo, project name 'test', a search bar, and various navigation icons.

The main content area is titled '建立執行個體' (Create Instance) and displays the following steps:

- 如要建立 VM 執行個體，請先選取下列任一選項：**
- + 新增 VM 執行個體** (Selected): From scratch to build a new VM instance.
- + 運用範本建立新的 VM 執行個體**: Use a template to build a new VM instance.
- + 運用機器映像檔建立新的 VM 執行個體**: Use a machine image to build a new VM instance.
- Marketplace**: Instantly deploy available solutions to the VM instance.

On the right side, there is a summary section:

- 預估每月費用**: **US\$13.43**
每小時約為 US\$0.02
- 用多少付多少**: 無須預繳費用，而是以秒計費
- 項目** **預估每月費用**
- 2 vCPU + 2 GB memory: US\$12.23
- 30 GB 標準永久磁碟: US\$1.20
- Sustained use discount: -US\$0.00
- Total**: **US\$13.43**

Below the summary, there are sections for **新增網路介面** (Add Network Interface), **磁碟** (Disk), **安全性** (Security), **管理** (Management), and **單一用戶群** (Single User). A note at the bottom states: '這個 VM 執行個體將會耗用您的免費試用額度。GCP 免費方案' (This VM instance will consume your free trial quota. GCP Free Tier).

At the bottom, there are buttons for **建立** (Create), **取消** (Cancel), and **對等指令列** (Peer-to-Peer Command Line).

架設 VM - GCP

4. 建立 VM

The screenshot shows the Google Cloud Compute Engine interface. The left sidebar has sections for Compute Engine, Storage, VM Groups, Marketplace, and Help & Support. The main area displays a table of VM instances. A pink box highlights the 'External IP' column for the first VM, which is 35.227.191.94. The table columns are: 狀態 (Status), 名稱 (Name), 區域 (Region), 建議 (Suggested), 使用者 (User), 內部 IP (Internal IP), 外部 IP (External IP), and 連線 (Connections). Below the table is a 'Related Actions' section with links to Actifio GO, VM Monitoring, VM Log, Firewall Rules, and Patch Management.

狀態	名稱	區域	建議	使用者	內部 IP	外部 IP	連線
<input type="checkbox"/>	<input checked="" type="checkbox"/> bot	us-west1-b			10.138.0.3 (nic0)	35.227.191.94 (nic0)	SSH

記錄外部 IP

架設 VM - GCP

5. 準備開發環境

建立金鑰

<https://cloud.google.com/> > 文件 > 運算 > Compute Engine > Guides: Managing SSH Keys in metadata > Windows

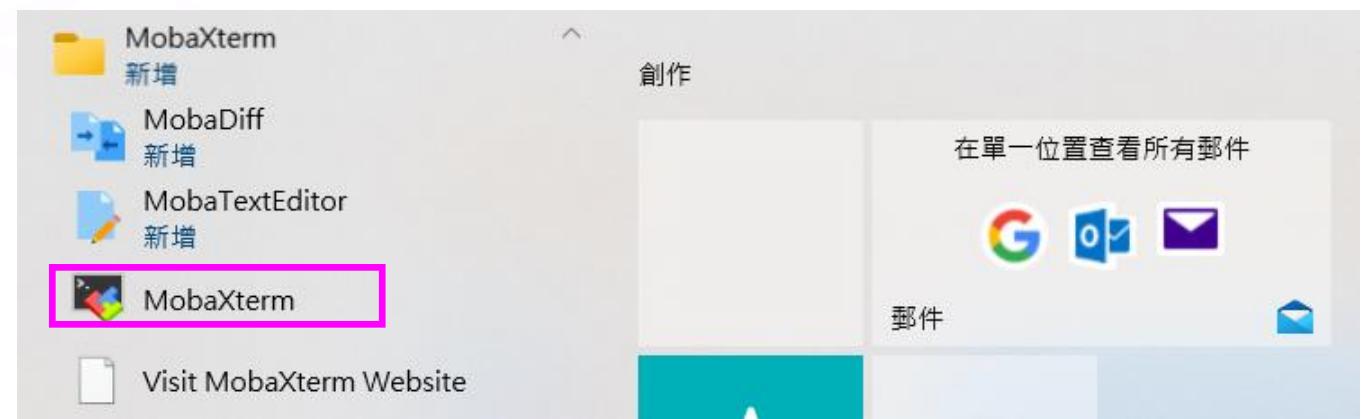
設定用戶端

<https://cloud.google.com/> > 文件 > 運算 > Compute Engine > Guides: Connecting to instances > Connecting to Linux VMs using advanced methods > Windows(PuTTY)

架設 VM - GCP

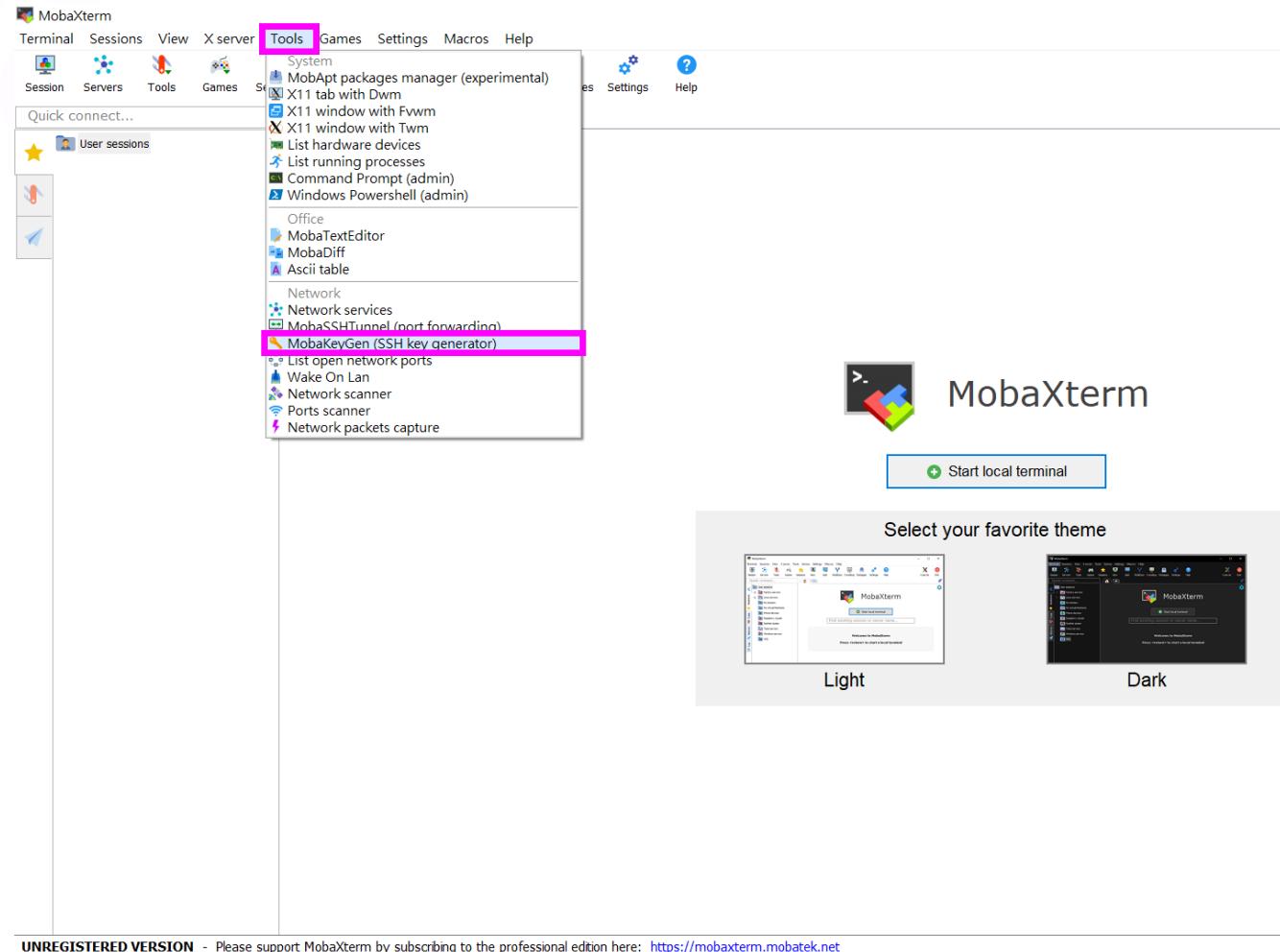
5. 準備開發環境

啟動 MobaXterm



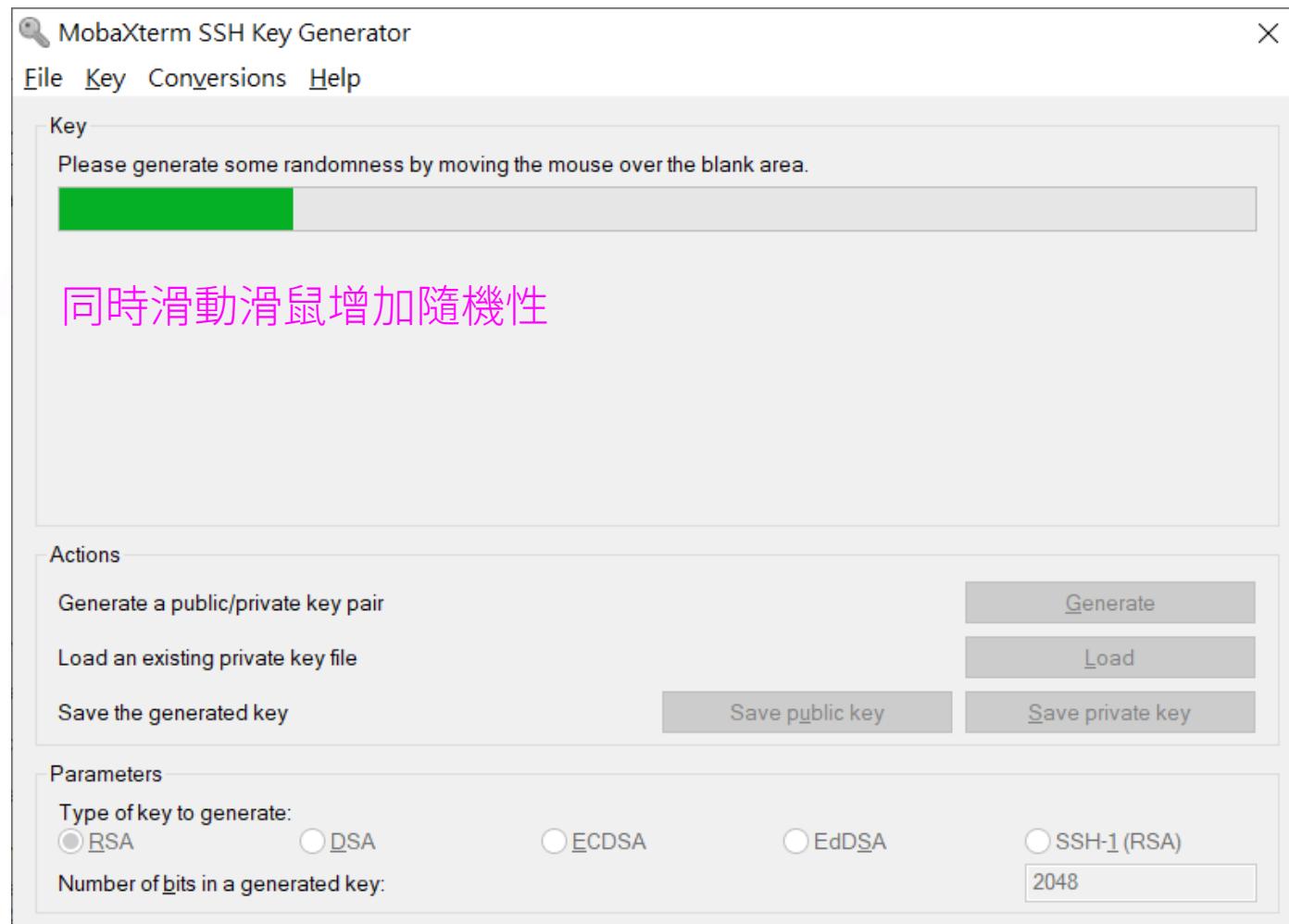
架設 VM - GCP

5. 準備開發環境



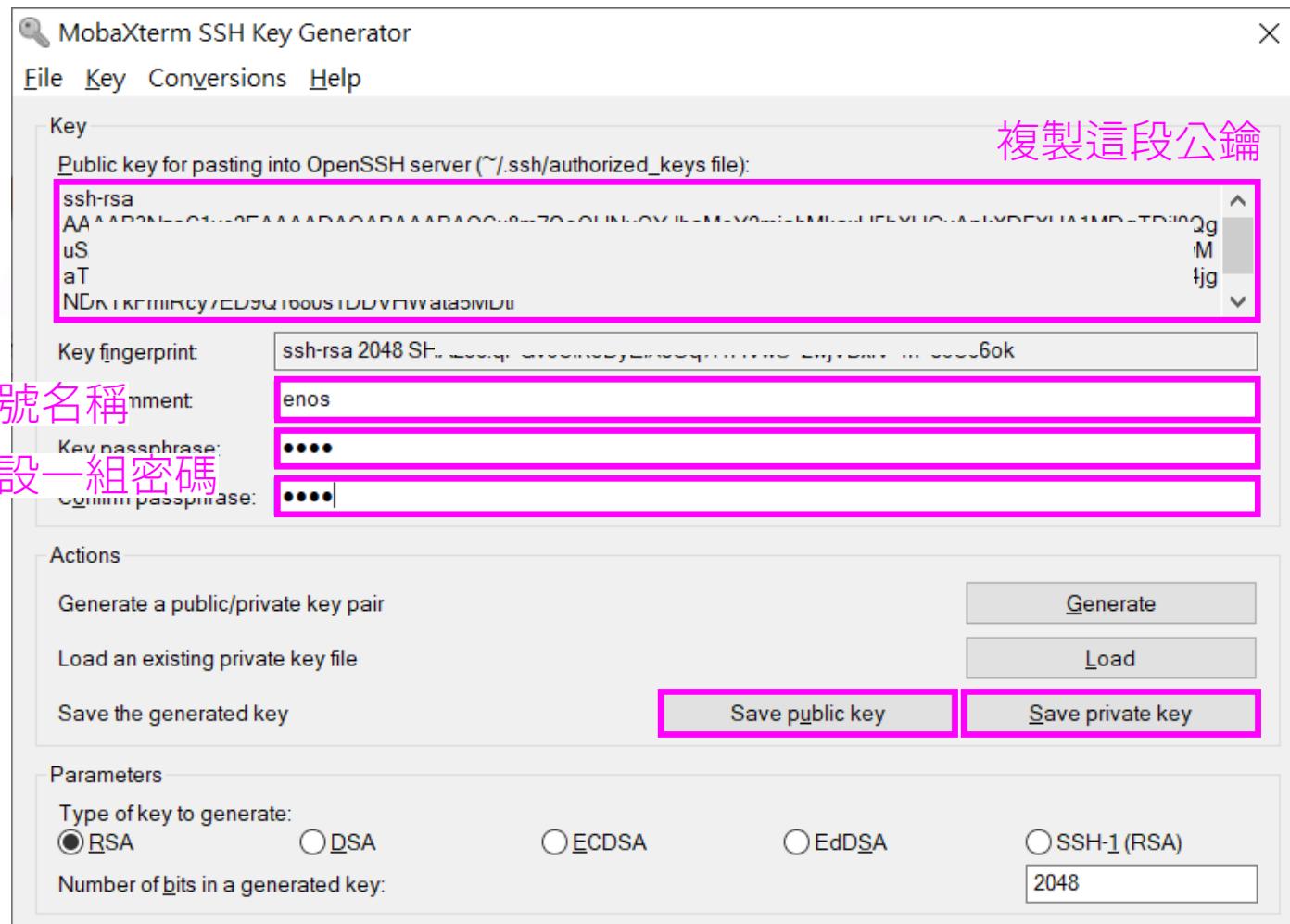
架設 VM - GCP

5. 準備開發環境



架設 VM - GCP

5. 準備開發環境



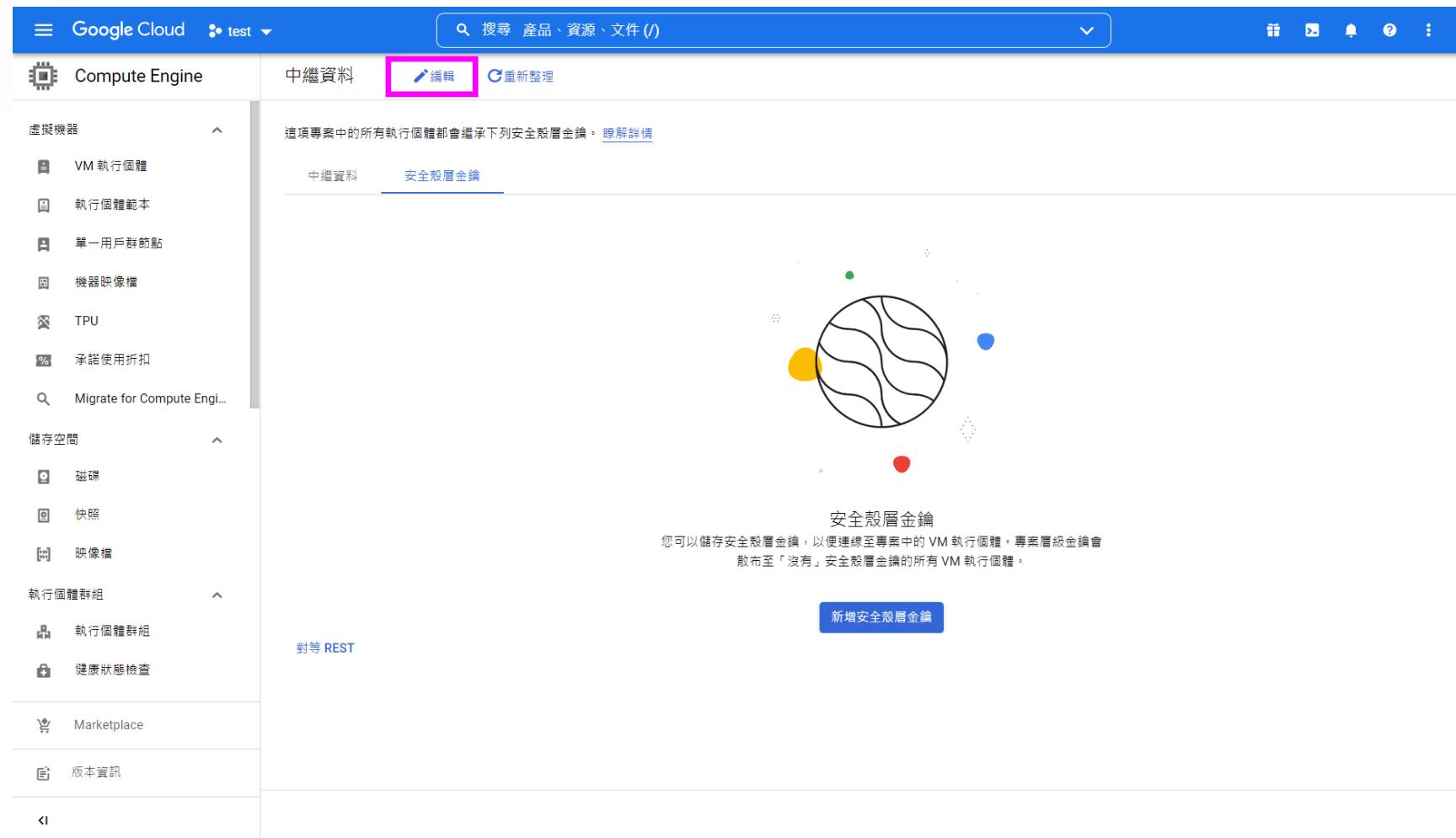
架設 VM - GCP

5. 準備開發環境

The screenshot shows the Google Cloud Platform interface for managing Compute Engine VMs. The left sidebar is collapsed, and the main area displays a table of VM instances. One instance is selected, showing its details: Region: us-west1-b,建议 (IP): 10.138.0.3 (nic0), 外部 IP: 35.227.191.94 (nic0), and SSH access is enabled. Below the table are several quick links: 查看帳單報表 (View Billing Report), 探索 VM 記錄檔 (Explore VM Log Files), and 管理修補程式 (Manage Patching). On the far left, a vertical navigation menu is open for the Compute Engine section. The '中繼資料' (Metadata) option is highlighted with a pink rectangle. Other visible options in the Compute Engine menu include VM 管理員 (VM Manager), OS 修補程式管理服務 (OS Patch Management Service), OS 設定管理服務 (OS Configuration Management Service), 同伺服器 (Server-to-Server), 網路 (Networking), 磁碟區 (Disk Zones), NFS 共用 (NFS Share), 設定 (Settings), 可用區 (Regions), 網路端點群組 (Network Endpoints), 作業 (Operations), 安全性掃描 (Security Scan), and 設定 (Settings).

架設 VM - GCP

5. 準備開發環境



The screenshot shows the Google Cloud Compute Engine interface. The left sidebar lists various services: 虛擬機器 (Virtual Machines), 儲存空間 (Storage), 執行個體群組 (Compute Instances), Marketplace, and 版本資訊 (Version). The main content area is titled 'Compute Engine' and shows a section for '中繼資料' (Relay Data) and '安全殼層金鑰' (Secure Layer Key). A pink box highlights the '編輯' (Edit) button. Below this, there's a note about inheritance of security keys across the project. A large graphic of a globe with colored dots (yellow, blue, red) is displayed. A blue button at the bottom right says '新增安全殼層金鑰' (Add Secure Layer Key).

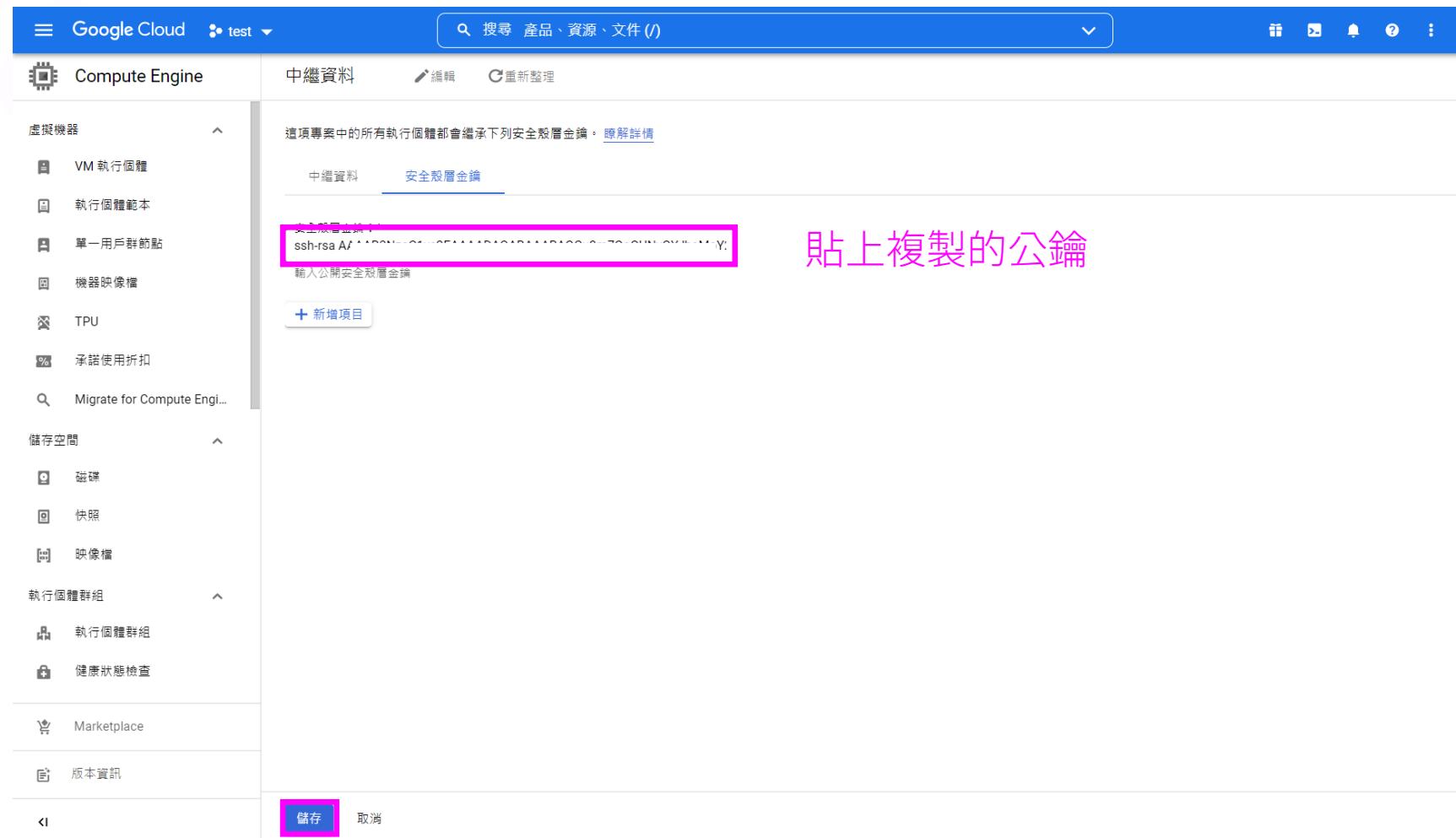
架設 VM - GCP

5. 準備開發環境

The screenshot shows the Google Cloud Compute Engine interface. The left sidebar lists categories: 虛擬機器, 儲存空間, 執行個體群組, Marketplace, and 版本資訊. The main area has tabs: 中繼資料 (selected), 編輯, and 重新整理. A message states: '這項專案中的所有執行個體都會繼承下列安全殼層金鑰。' with a link '瞭解詳情'. Below are two buttons: 中繼資料 and 安全殼層金鑰. A pink box highlights the '+ 新增項目' button. At the bottom are '儲存' and '取消' buttons.

架設 VM - GCP

5. 準備開發環境

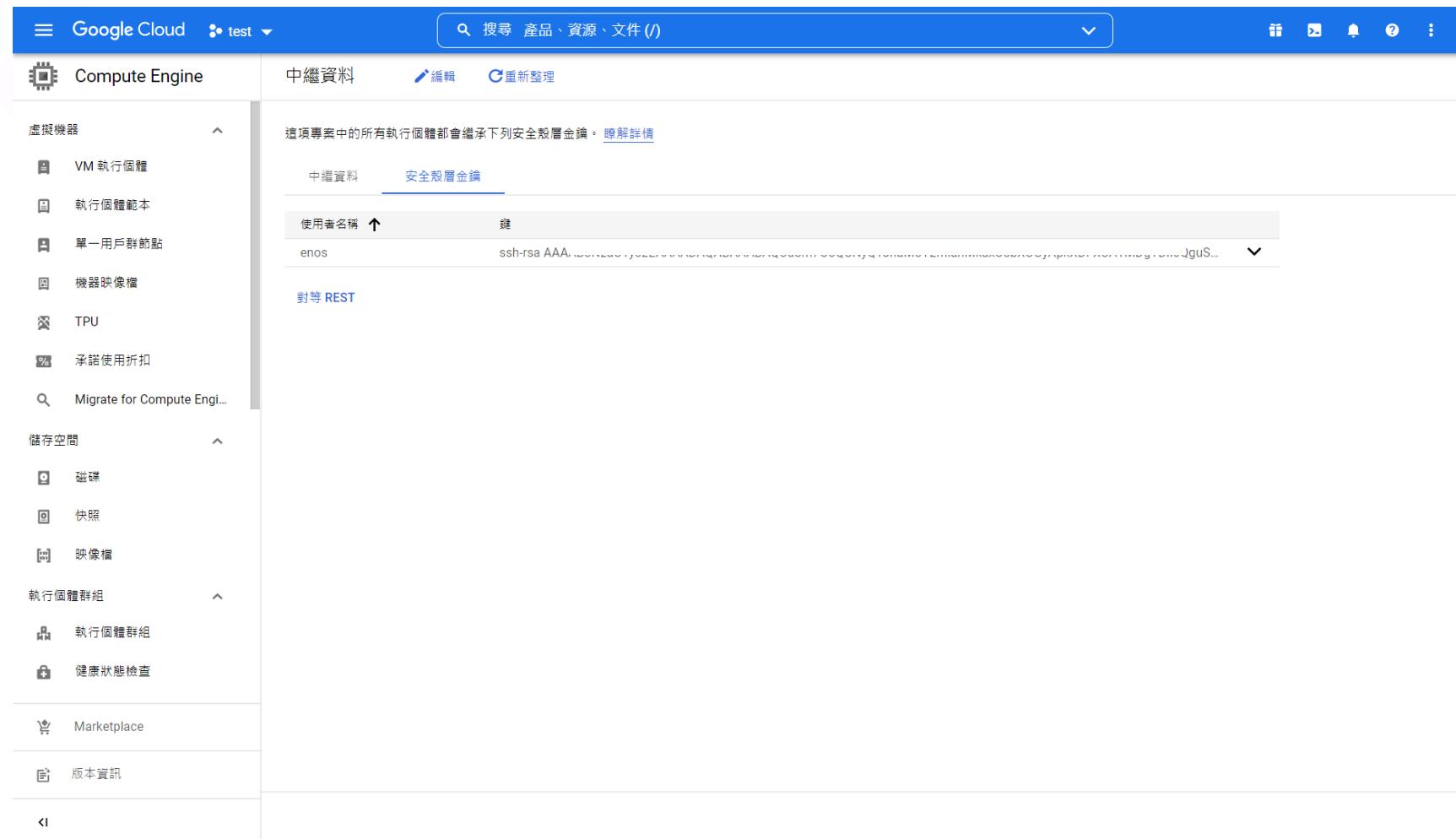


The screenshot shows the Google Cloud Compute Engine interface under the 'Compute Engine' tab. In the center, there's a '中繼資料' (Relay Data) section with tabs for '中繼資料' (Relay Data) and '安全殼層金鑰' (SSH Keys). A clipboard icon with a red border is overlaid on the '安全殼層金鑰' tab. Below it, a text input field contains the SSH key: `ssh-rsa AAAQABJQ2A...Y.`. At the bottom right of the input field is a '儲存' (Save) button.

貼上複製的公鑰

架設 VM - GCP

5. 準備開發環境

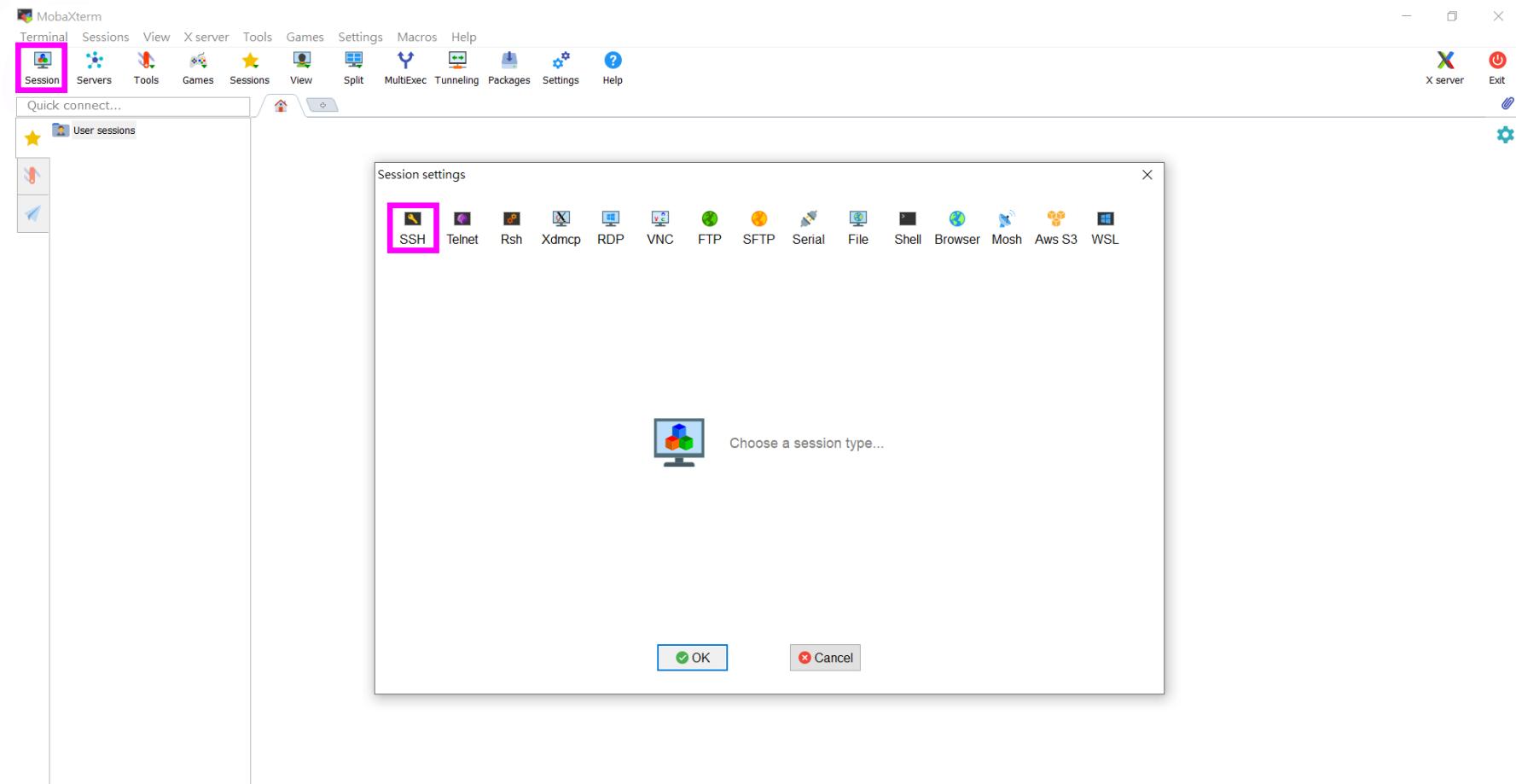


The screenshot shows the Google Cloud Compute Engine interface. The left sidebar lists various services: Compute Engine, VM 執行個體, 執行個體範本, 單一用戶群節點, 機器映像檔, TPU, 承諾使用折扣, and Migrate for Compute Eng... Under 'Compute Engine', there are sections for 儲存空間 (磁碟, 快照, 映像檔) and 執行個體群組 (執行個體群組, 健康狀態檢查). The main content area displays a table of SSH keys for a VM named 'enos'. The table has columns for '使用者名稱' (User Name) and '鍵' (Key). One entry is shown: 'enos' with the key value 'ssh-rsa AAA...'. A note above the table states: '這項專案中的所有執行個體都會繼承下列安全殼層金鑰。' (All VMs in this project will inherit the following secure shell key.)

使用者名稱	鍵
enos	ssh-rsa AAA...

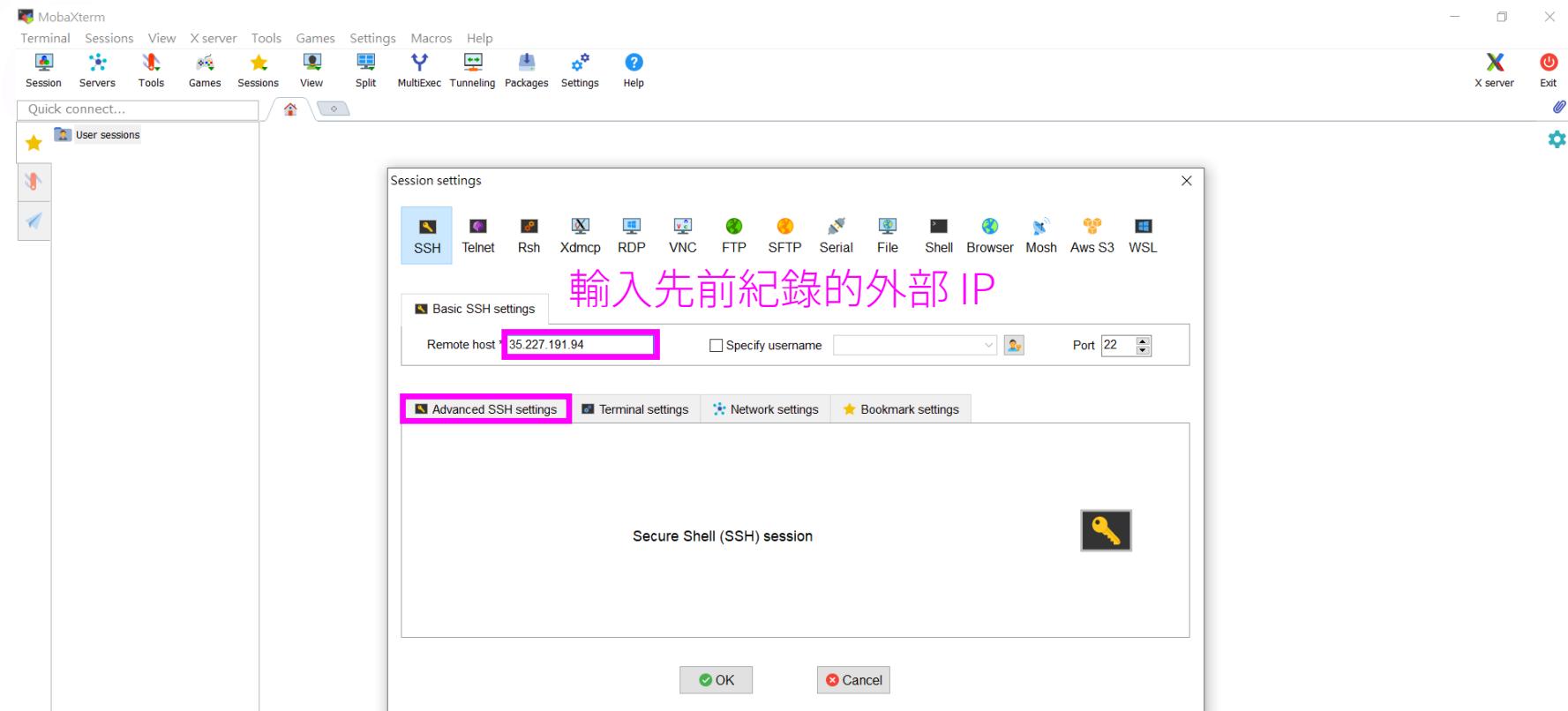
架設 VM - GCP

5. 準備開發環境



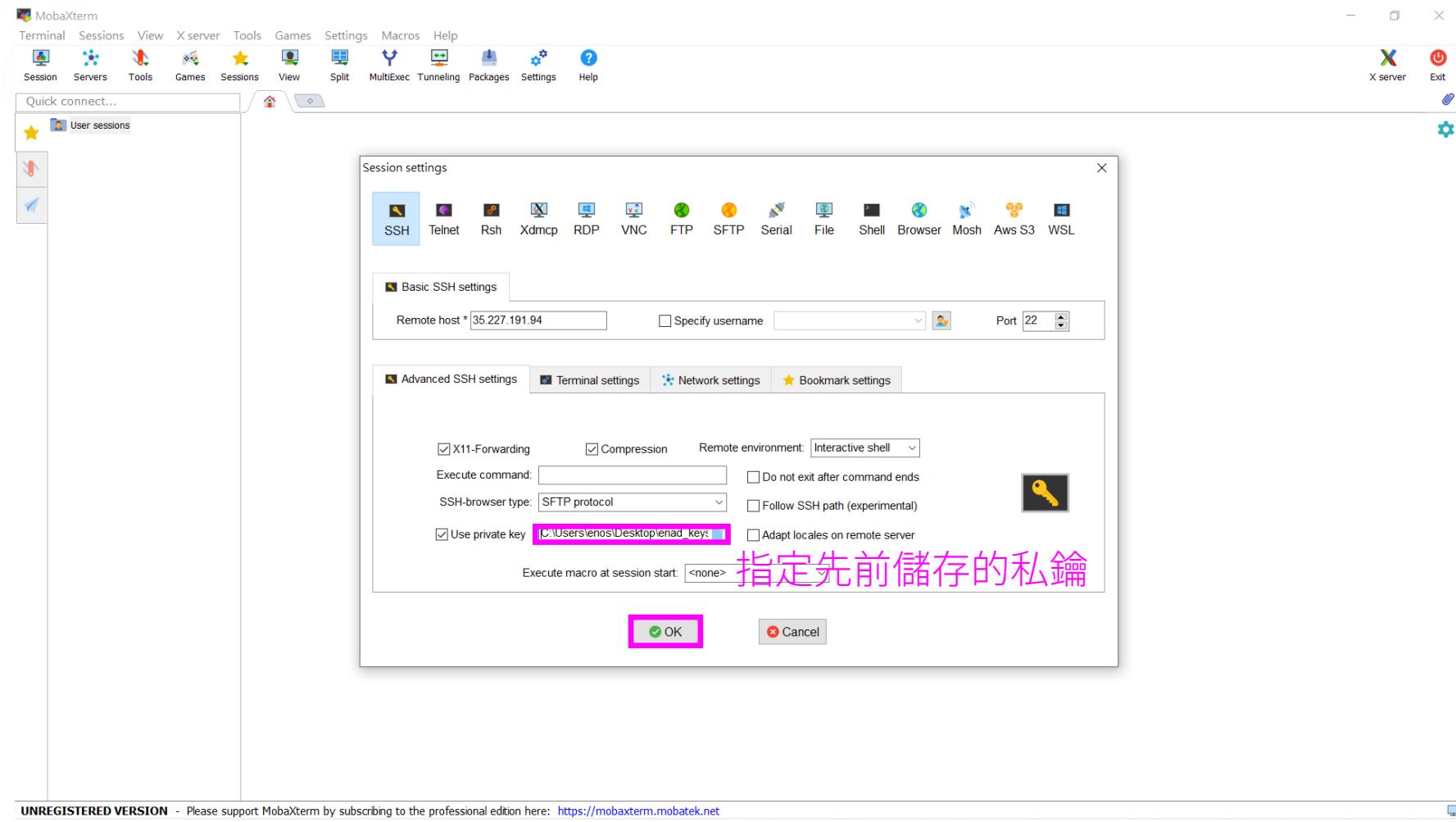
架設 VM - GCP

5. 準備開發環境



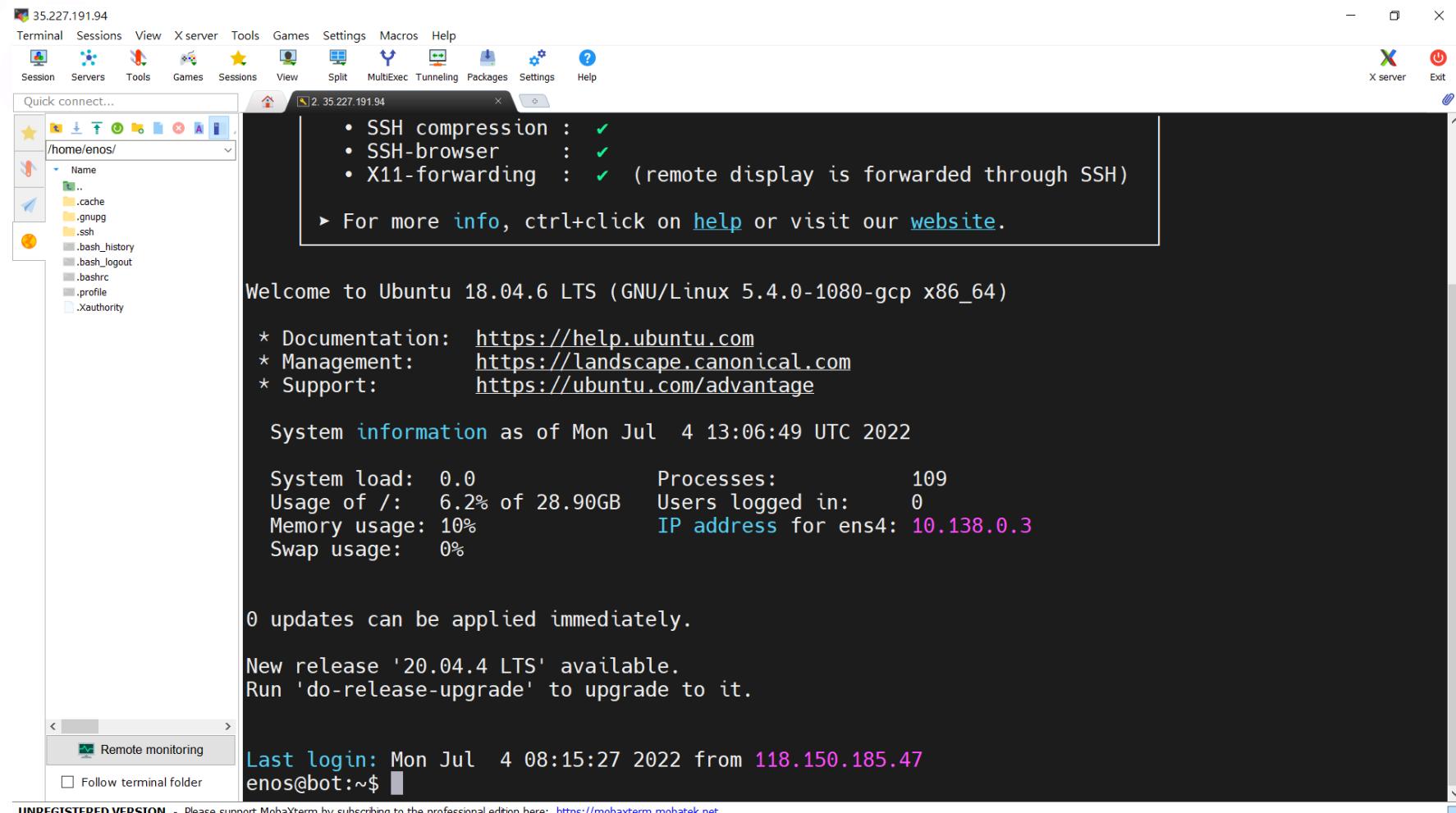
架設 VM - GCP

5. 準備開發環境



架設 VM - GCP

5. 準備開發環境



SSH compression : ✓
SSH-browser : ✓
X11-forwarding : ✓ (remote display is forwarded through SSH)
For more info, ctrl+click on help or visit our website.

Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 5.4.0-1080-gcp x86_64)

* Documentation: <https://help.ubuntu.com>
* Management: <https://landscape.canonical.com>
* Support: <https://ubuntu.com/advantage>

System information as of Mon Jul 4 13:06:49 UTC 2022

System load: 0.0	Processes: 109
Usage of /: 6.2% of 28.90GB	Users logged in: 0
Memory usage: 10%	IP address for ens4: 10.138.0.3
Swap usage: 0%	

0 updates can be applied immediately.

New release '20.04.4 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Mon Jul 4 08:15:27 2022 from 118.150.185.47
enos@bot:~\$

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

架設 VM - Azure

1. 登入

<https://portal.azure.com>

The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with the Microsoft Azure logo, a search bar, and various icons for account settings and help. Below the header, the main content area is titled "Azure 服務" (Azure Services) and features a row of service icons: 建立資源 (Create Resource), 虛擬機器 (Virtual Machines), 容器執行個體 (Container Instances), 容器登錄 (Container Registry), App Service 方案 (App Service Plan), 防火牆原則 (Firewall Rules), 應用程式服務 (App Service), 資源群組 (Resource Groups), 認知服務 (Cognitive Services), and a "更多服務" (More Services) button. Underneath this, there's a section titled "Resources" with tabs for "Recent" and "Favorite". It displays a message: "No resources have been viewed recently" with a "View all resources" button. Further down, there are sections for "瀏覽" (Browse) with links to 訂用帳戶 (Billing Account), 資源群組 (Resource Groups), 所有資源 (All Resources), and 儀表板 (Dashboard); and "工具" (Tools) with links to Microsoft Learn, Azure 監視器 (Azure Monitor), 適用於雲端的 Microsoft Defender (Microsoft Defender for Cloud), and 成本管理 (Cost Management). A footer bar at the bottom contains the URL "https://portal.azure.com/#create/hub".

架設 VM - Azure

2. 建立 VM

The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with the Azure logo, a search bar, and various icons for account settings and help. Below the navigation bar, the main content area has a title 'Azure 服務' (Azure Services) and a 'Resources' sidebar with tabs for 'Recent' (which is selected) and 'Favorite'. The main pane displays a list of recent resources under the heading 'viewed recently'. One item in the list, 'Azure 虛擬機器' (Azure Virtual Machine), is highlighted with a pink rectangle. This item has a sub-menu with options like '+ 建立' (Create) and '檢視' (View). Other items in the list include '具有預設設定的 Azure 虛擬機器' (Azure VM with pre-defined settings), 'Azure Arc 虛擬機器' (Azure Arc VM), and 'Azure VMWare 解決方案虛擬機器' (Azure VMWare Solution VM). At the bottom of the main pane, there's a section for '實用的連結' (Useful Links) with links to '概觀' (Overview) and '開始使用' (Get Started). The footer contains sections for '工具' (Tools) with links to 'Microsoft Learn', 'Azure 監視器', '適用於雲端的 Microsoft Defender', and '成本管理', and a '所有資源' (All Resources) link.

架設 VM - Azure

2. 建立 VM

The screenshot shows the 'Create Virtual Machine' wizard in the Microsoft Azure portal. The page title is '建立虛擬機器'. The top navigation bar includes '首頁 > 虛擬機器 >' and '建立虛擬機器 ...'. The main tabs are '基本' (selected), '磁碟', '網路', '管理', '進階', '標籤', and '檢閱 + 建立'. A note at the top says: '請建立執行 Linux 或 Windows 的虛擬機器。請從 Azure Marketplace 選取映像，或使用您自己的自訂映像。完成 [基本] 索引標籤，然後檢閱並建立，以使用預設參數佈建虛擬機器，或檢閱每個索引標籤進行完全的自訂。' Below this is a '專案詳細資料' section with fields for '訂用帳戶 *' (Azure Pass - 賽助) and '資源群組 *' ((新增) bot_group). The '執行個體詳細資料' section includes '虛擬機器名稱 *' (bot), '區域 *' ((US) West US 3), '可用性選項' (可用性區域), and '可用性區域 *' (區域 1). The '安全性類型' is set to '標準'. The '影像 *' dropdown is highlighted with a pink box and contains 'Ubuntu Server 18.04 LTS - Gen2'. At the bottom, there are buttons for '檢閱 + 建立' (Review + Create) and '下一步：磁碟 >' (Next Step: Disks).

設定主機名稱
選擇區域

選擇作業系統

架設 VM - Azure

2. 建立 VM

The screenshot shows the Microsoft Azure portal interface for creating a new virtual machine. The top navigation bar includes the Microsoft Azure logo, a search bar, and various navigation icons.

The main content area is titled "建立虛擬機器" (Create Virtual Machine). The second step, "選擇主機規格" (Select VM Size), is currently active. The selected VM size is "Standard_DS1_v2 - 1 個 vcpu, 3.5 GiB 記憶體 (每月 \$1,533.58)".

Under "Administrator 帳戶" (Administrator Account), the "SSH 公開金鑰" (SSH Public Key) option is selected. A note explains that Azure will automatically generate an SSH key pair and save it for future use, providing a fast, simple, and secure way to connect to the virtual machine.

For "使用者名稱" (User Name), the value "azureuser" is entered. Under "SSH 公開金鑰來源" (SSH Public Key Source), "產生新的金鑰組" (Generate new key pair) is selected, and the key pair name is "bot_key".

In the "輸入連接埠規則" (Input Connection Rule) section, the "允許選取的連接埠" (Allow selected ports) option is selected. The chosen port is "SSH (22)". A warning message states: "這可讓所有 IP 位址存取您的虛擬機器。建議您只將此項用於測試。使用 [網路功能] 索引標籤中的 [進階] 控制項可建立規則，限制輸入流量只能來自自己知的 IP 位址。" (This allows all IP addresses to access your virtual machine. It is recommended to use this setting only for testing. Use the [Network] tab's [Advanced] controls to create rules that restrict input traffic to known IP addresses.)

At the bottom, there are buttons for "檢閱 + 建立" (Review + Create) and "下一步：磁碟" (Next Step: Disk). The URL in the address bar is <https://portal.azure.com/#>.

架設 VM - Azure

2. 建立 VM

Microsoft Azure

搜尋資源、服務及文件 (G+)

首頁 > 虛擬機器 >

建立虛擬機器 ...

Administrator 帳戶

驗證類型 ①

SSH 公開金鑰

密碼

Azure 現在會自動為您產生 SSH 金鑰組，並允許您儲存以供未來使用。這是一種快速、簡單且安全的方式，讓您可以連線至虛擬機器。

使用者名稱 * ①

SSH 公開金鑰來源

SSH 公開金鑰 * ①

輸入連接埠規則

選取可從公用網際網路存取的虛擬機器網路連接埠。您可以在 [網路] 索引標籤上指定限制範圍更小或更精確的網路存取。

公用輸入連接埠 * ①

無

允許選取的連接埠

選取輸入連接埠 *

SSH (22)

⚠️ 這可讓所有 IP 位址存取您的虛擬機器。建議您只將此項用於測試。使用 [網路功能] 索引標籤中的 [進階] 控制項可建立規則，限制輸入流量只能來自自己知的 IP 位址。

檢閱 + 建立 < 上一步 下一步：磁碟 > 提供意見反應

自訂帳號
金鑰建立方式，選擇現有
貼上公鑰

架設 VM - Azure

2. 建立 VM

The screenshot shows the 'Create Virtual Machine' wizard in the Microsoft Azure portal. The current step is 'Set up the virtual machine'. The configuration includes:

- Administrator account:** SSH Public Key selected.
- SSH Public Key Type:** SSH Public Key.
- SSH Public Key Source:** Existing public key selected.
- SSH Public Key:** A dropdown menu showing several options, with one highlighted.
- Input connection rules:** Port selection dropdown showing HTTP (80), HTTPS (443), and SSH (22). The checkboxes for HTTP (80) and HTTPS (443) are checked, while SSH (22) is unchecked. A callout box highlights these two ports with the text "HTTP for Certbot" and "HTTPS for LINE Messaging".
- Public input connection port:** "Allow selected connections" is selected.

At the bottom, there are buttons for "Review + Create" and "Next Step: Configure".

架設 VM - Azure

2. 建立 VM

The screenshot shows the Microsoft Azure VM creation process. At the top, the navigation bar includes 'Microsoft Azure', a search bar ('搜尋資源、服務及文件 (G+)'), and various icons for account and settings. The main title is '建立虛擬機器'.

A green success message '驗證成功' is displayed. Below it, a navigation bar has tabs: '基本' (Basic), '磁碟' (Disk), '網路' (Network), '管理' (Management), '進階' (Advanced), '標籤' (Tags), and '檢閱 + 建立' (Review + Create), with '檢閱 + 建立' currently selected.

A note in a blue box states: '以下提供的成本是估計值，而不是最終價格。請使用 [定價計算機](#) 以滿足您所有的定價需求。'

PRODUCT DETAILS

1 X Standard DS1 v2
by Microsoft
[Terms of use](#) | [Privacy policy](#)

Subscription credits apply ⓘ
2.1008 TWD/hr
[Pricing for other VM sizes](#)

TERMS

By clicking "建立", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. See the [Azure Marketplace Terms](#) for additional details.

注意: 您已將 SSH 個連接埠設定為網際網路。建議您只將此項用於測試。若要變更此設定，請回到 [基本] 索引標籤。

底部有三个主要按钮：'基本' (Basic)、'訂用帳戶' (Subscription) 和 'Azure Pass - 贊助' (Azure Pass - Sponsorship). '建立' (Create) 按钮被高亮显示为当前操作步骤。其他按钮包括 '< 上一步' (Previous Step)、'下一步 >' (Next Step) 和 '下載自動化的範本' (Download Template).

架設 VM - Azure

2. 建立 VM

The screenshot shows the Microsoft Azure portal interface. At the top, the title bar reads "Microsoft Azure". Below it, the search bar says "搜尋資源、服務及文件 (G+ /)". The main content area displays a deployment named "CreateVm-Canonical.UbuntuServer-18_04-Its-gen2-20220705184003" with a status message "歡迎您提供寶貴的意見! →". A large green checkmark indicates "您的部署已完成". Deployment details include the name, start time (5/7/2022 下午 6:43:09), account (Azure Pass - 賽助), and resource group (bot_group). A "Deployment Details" section is expanded, showing steps like "Set automatic shutdown" and "Monitor VM health and dependency on network". Navigation buttons at the bottom include "前往資源" and "建立另一個 VM". On the right side, there are three promotional cards: "Cost Management", "Microsoft Defender", and "Free Microsoft Learning Courses".

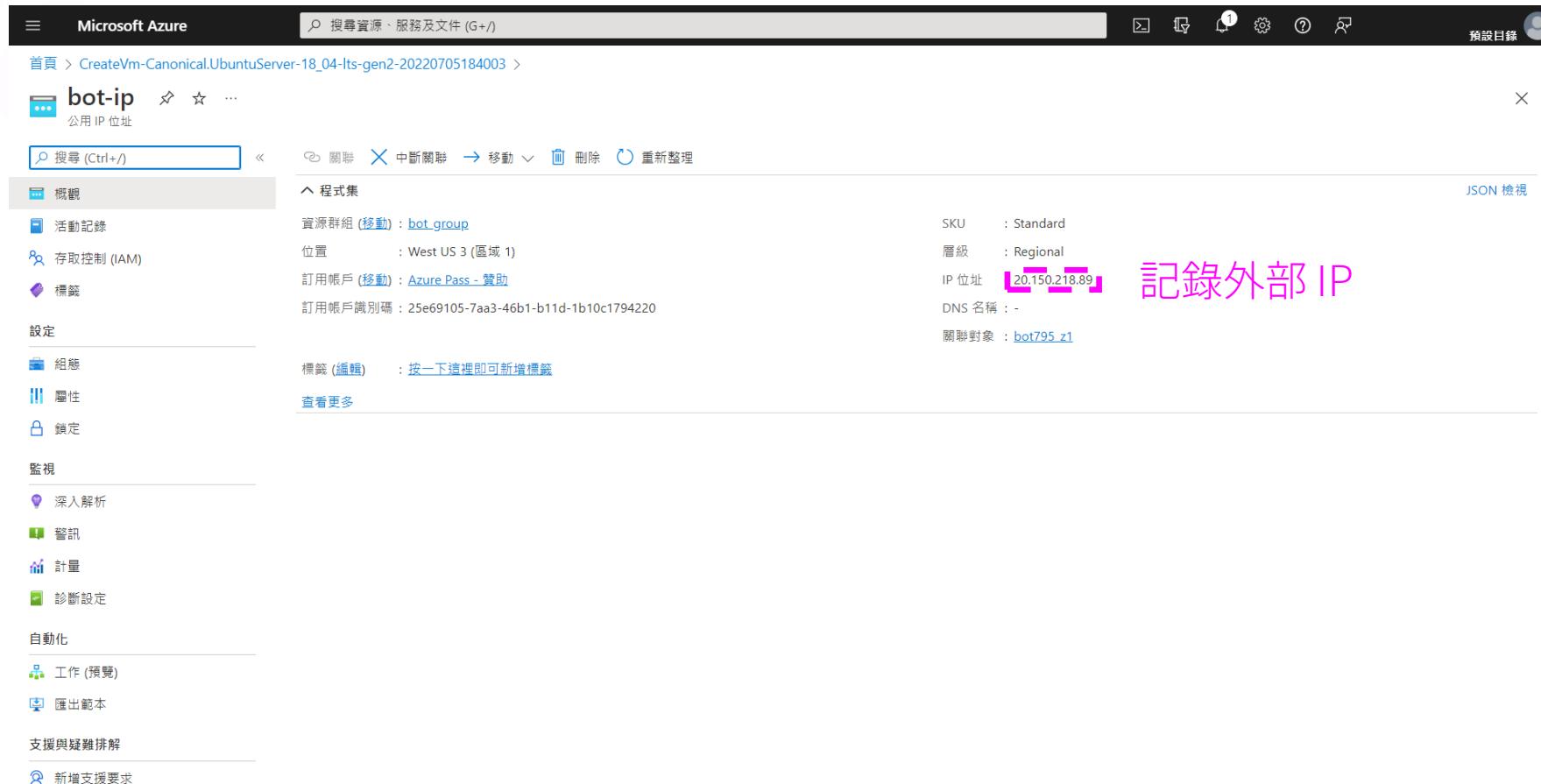
架設 VM - Azure

2. 建立 VM

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the Microsoft Azure logo, a search bar, and various navigation icons. The main title of the page is "CreateVm-Canonical.UbuntuServer-18_04-Its-gen2-20220705184003 | 概觀". On the left, there's a sidebar with navigation links: 首頁 >, 部署 (selected), 搜尋 (Ctrl+ /), 刪除, 取消, 重新部署, 重新整理. The main content area displays a success message: "您的部署已完成" (Deployment completed successfully). Below it, deployment details are listed: 部署名稱: CreateVm-Canonical.UbuntuServer-18_04-Its-gen2-2022..., 開始時間: 5/7/2022 下午6:43:09, 訂用帳戶: Azure Pass - 賽助, 相互關聯識別碼: dc当地... . A table titled "部署詳細資料 (下載)" (Deployment details) lists the resources created: bot, bot795_z1, bot-ip (highlighted with a pink box), bot-nsg, and bot_group-vnet. The right side of the screen features a sidebar with links: 成本管理 (Cost Management), 適用於雲端的 Microsoft Defender (Microsoft Defender for Cloud), 免費 Microsoft 教學課程 (Free Microsoft Learning Courses), and 治詢專家 (Azure Experts). The bottom of the page has two buttons: 前往資源 (Go to Resources) and 建立另一個 VM (Create Another VM).

架設 VM - Azure

2. 建立 VM



Microsoft Azure

首頁 > CreateVm-Canonical.UbuntuServer-18_04-lts-gen2-20220705184003 >

bot-ip 公用 IP 位址

搜尋 (Ctrl+ /) 搜尋 (Ctrl+ /)

關聯 中斷關聯 移動 ▶️ 刪除 重新整理

JSON 檢視

概觀

活動記錄 存取控制 (IAM) 標籤

SKU : Standard
層級 : Regional
IP 位址 : 20.150.218.89
DNS 名稱 : -
關聯對象 : bot795 z1

程式集

資源群組 (移動) : bot_group
位置 : West US 3 (區域 1)
訂用帳戶 (移動) : Azure Pass - 贊助
訂用帳戶識別碼 : 25e69105-7aa3-46b1-b11d-1b10c1794220

標籤 (編輯) : 按一下這裡即可新增標籤
查看更多

組態 屬性 鎖定

監視 深入解析 警訊 計量 診斷設定

自動化 工作 (預覽) 匯出範本

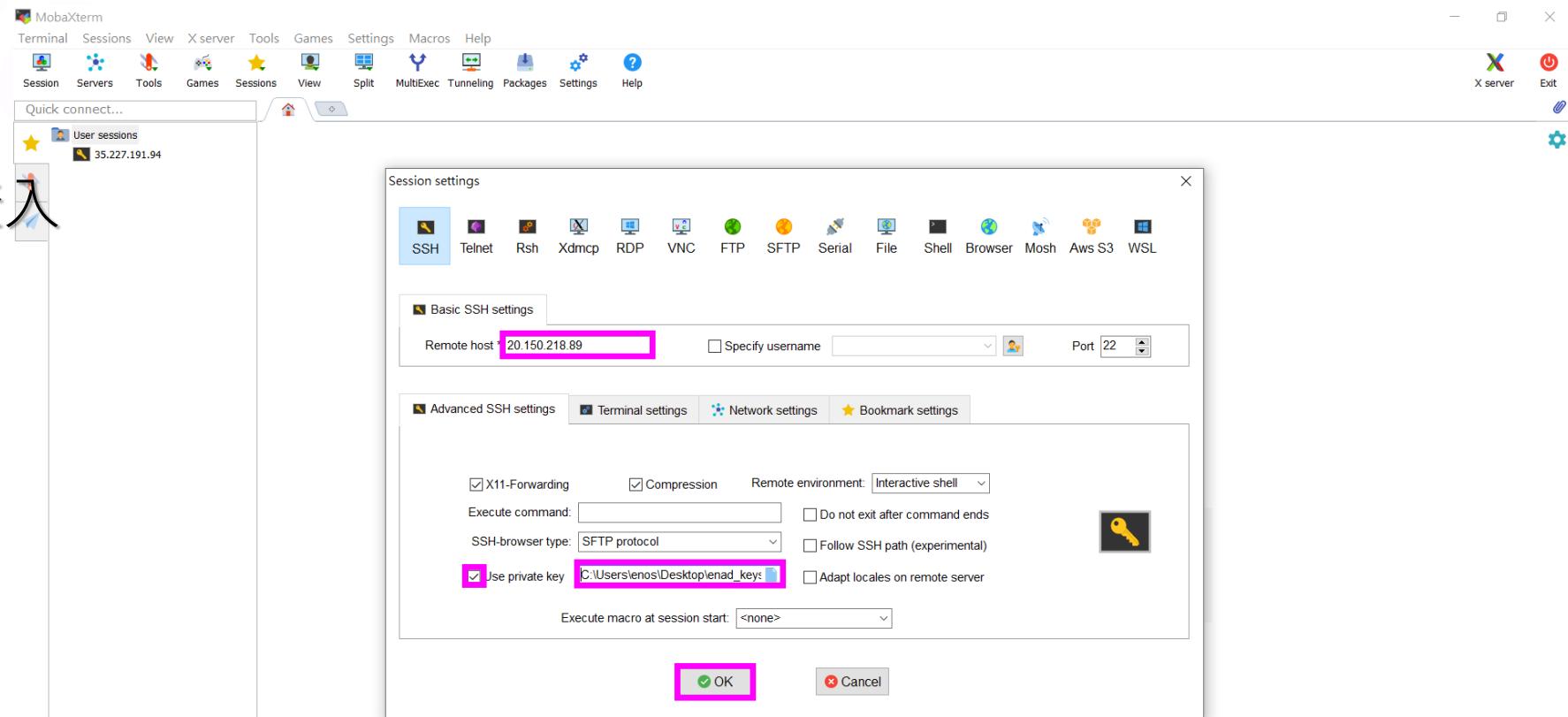
支援與疑難排解 新增支援要求

記錄外部 IP

架設 VM - Azure

3. 準備開發環境

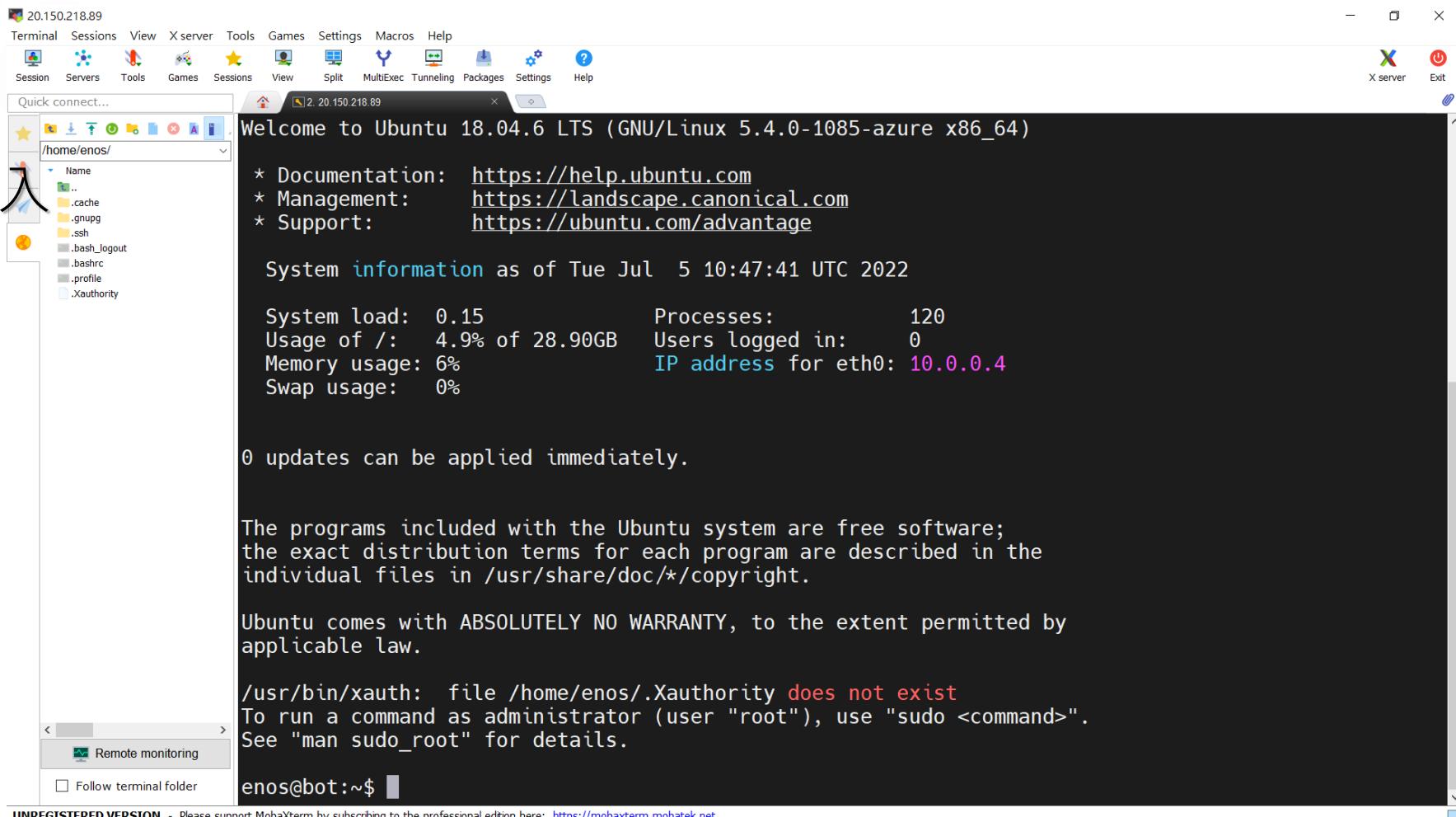
以 MobaXterm 登入

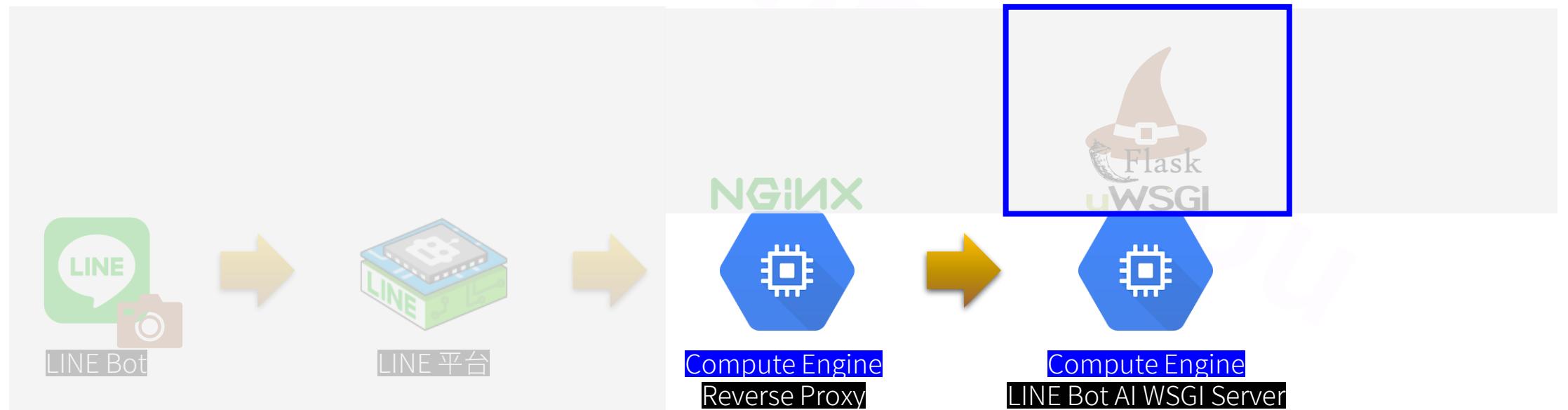


架設 VM - Azure

3. 準備開發環境

以 MobaXterm 登入





LINE Bot & WSGI

1. 準備程式碼

a. 下載範例程式並調整

- ① trees17bot.py # secret, token, model, labels
- ② trees17V1.h5
- ③ treeset_labels.txt
- ④ other tree samples

LINE Bot & WSGI

1. 準備程式碼

b. 製作 requirements.txt

line-bot-sdk

flask

pillow

tensorflow==2.4.4

uwsgi

LINE Bot & WSGI

1. 準備程式碼

c. 於 VM 建立專案目錄

`mkdir your_project`

`mkdir trees`

`ls`

The screenshot shows a MobaXterm window titled '35.227.191.94'. The terminal session is connected to '2. 35.227.191.94'. The terminal window displays the following output:

```
SSH compression : ✓
SSH-browser : ✓
X11-forwarding : ✓ (remote display is forwarded through SSH)

For more info, ctrl+click on help or visit our website.

Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 5.4.0-1080-gcp x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

System information as of Tue Jul  5 02:32:56 UTC 2022

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

/usr/bin/xauth: file /home/enos/.Xauthority does not exist
enos@bot:~$ mkdir trees
enos@bot:~$ ls
trees
enos@bot:~$
```

At the bottom of the terminal window, there is a note: "UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>".

LINE Bot & WSGI

1. 準備程式碼

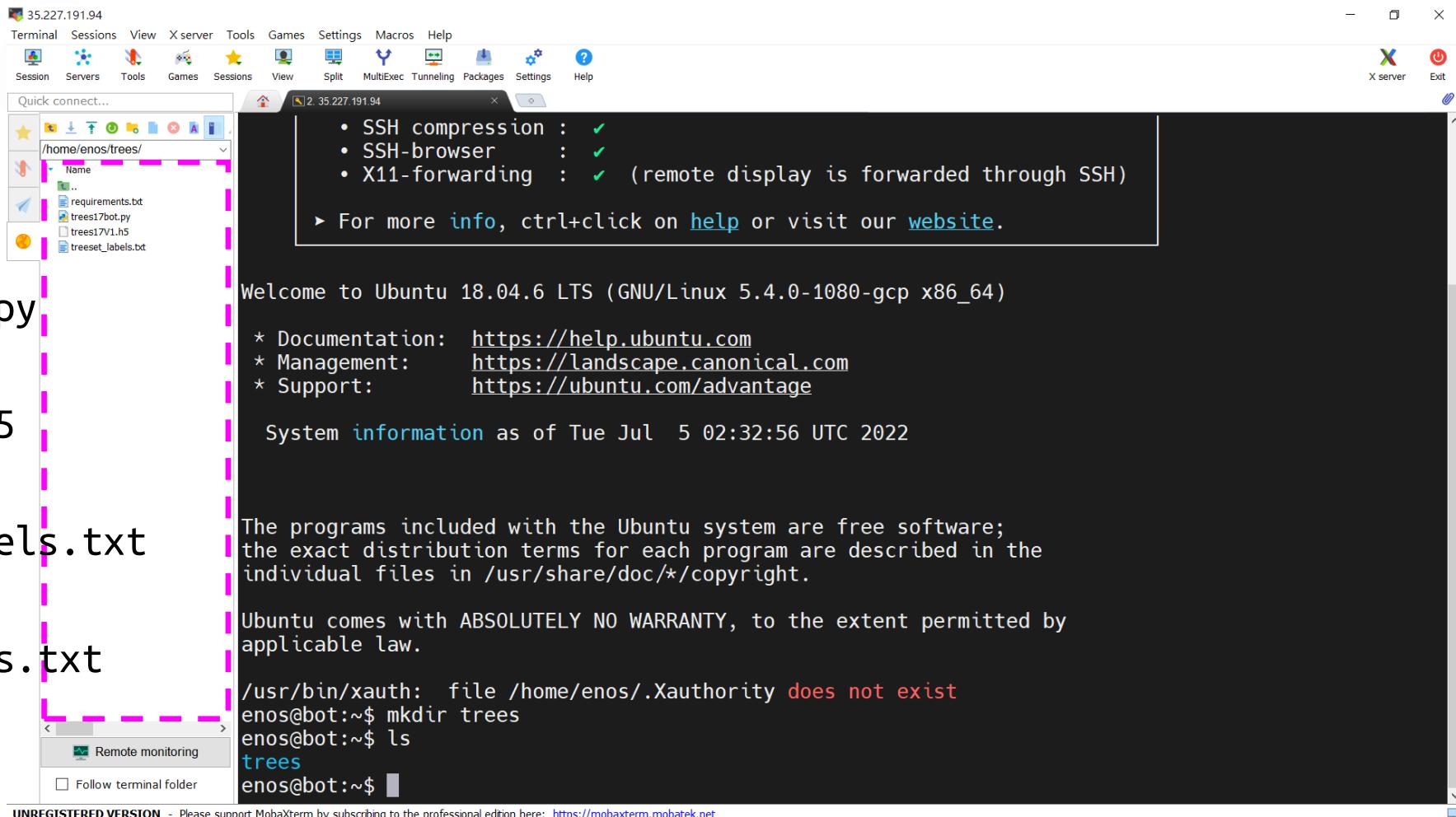
d. 上傳上述檔案至專案目錄

① trees17bot.py

② trees17V1.h5

③ treeset_labels.txt

④ requirements.txt



The screenshot shows a MobaXterm interface. On the left, a file browser window titled '35.227.191.94' displays a directory structure under '/home/enos/trees/'. The files listed are requirements.txt, trees17bot.py, trees17V1.h5, and treeset_labels.txt. On the right, a terminal window titled '2. 35.227.191.94' shows the following output:

```
SSH compression : ✓
SSH-browser : ✓
X11-forwarding : ✓ (remote display is forwarded through SSH)

For more info, ctrl+click on help or visit our website.

Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 5.4.0-1080-gcp x86_64)

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individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

/usr/bin/xauth: file /home/enos/.Xauthority does not exist
enos@bot:~$ mkdir trees
enos@bot:~$ ls
trees
enos@bot:~$
```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

LINE Bot & WSGI

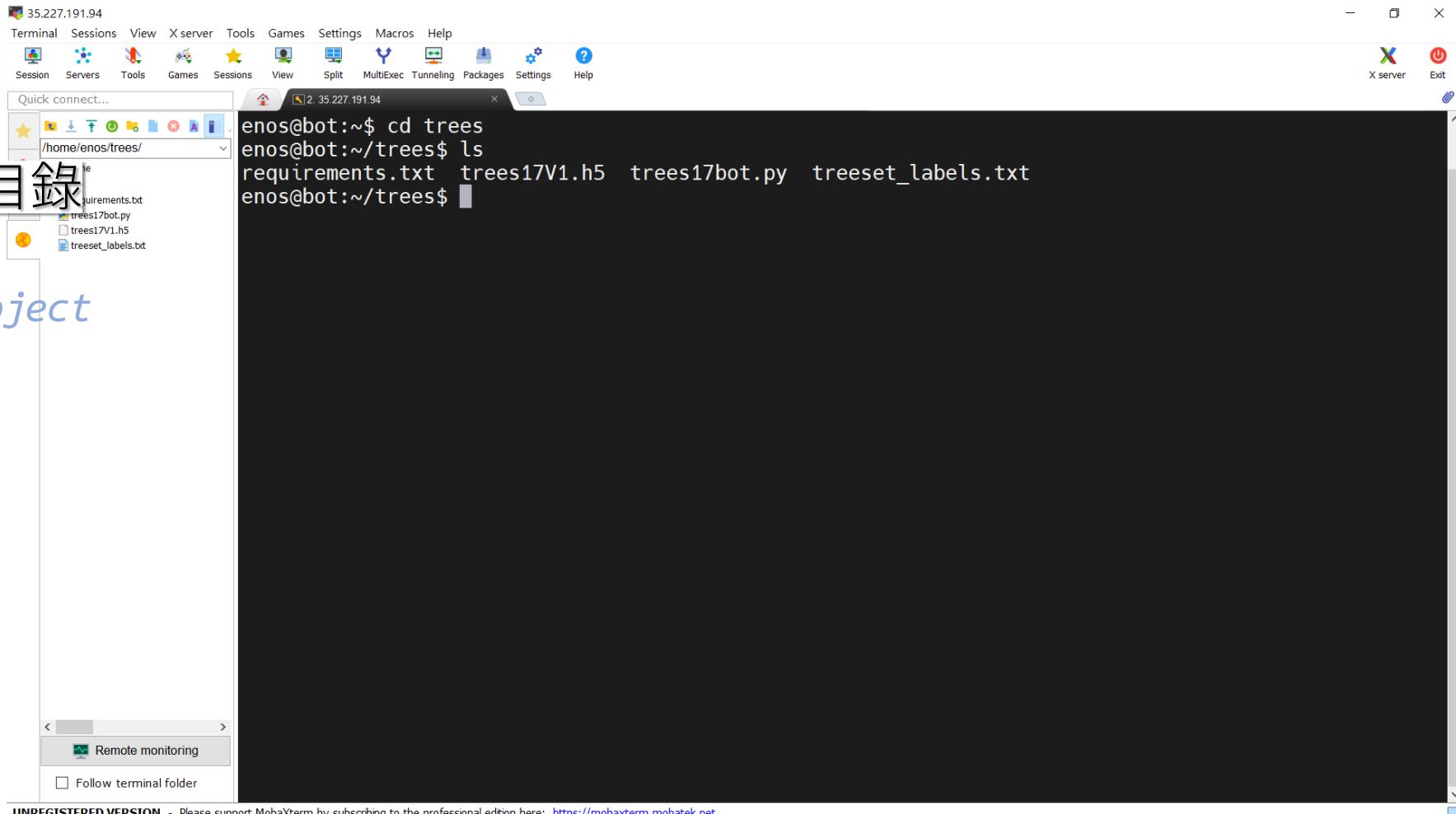
2. 部署服務

a. 進入 VM 專案目錄

`cd; cd your_project`

`cd; cd trees`

`ls`



```
35.227.191.94
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
2. 35.227.191.94
enos@bot:~$ cd trees
enos@bot:~/trees$ ls
requirements.txt  trees17V1.h5  trees17bot.py  treeset_labels.txt
enos@bot:~/trees$
```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

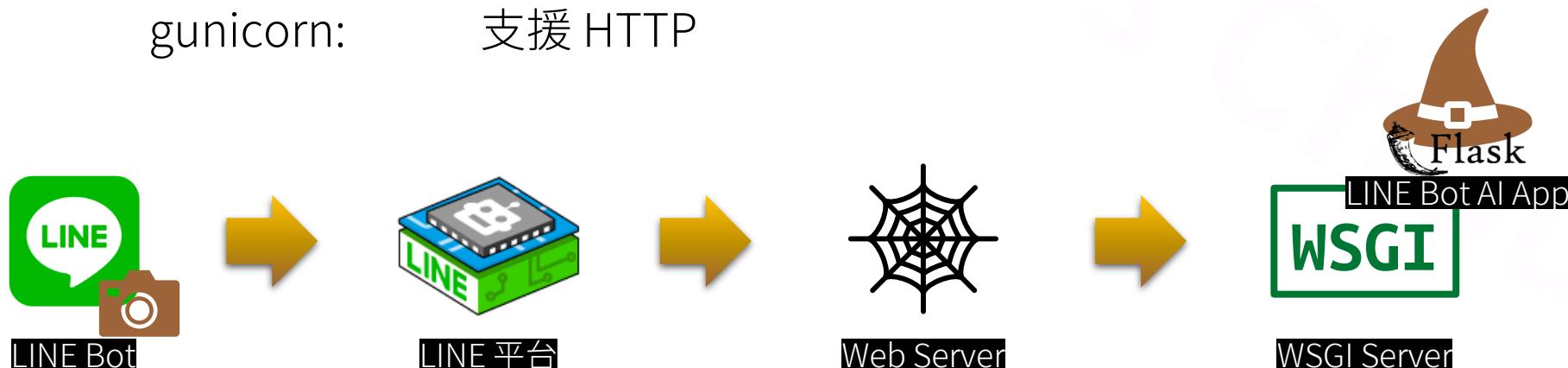
LINE Bot & WSGI

WSGI Server 的選擇

uWSGI vs gunicorn

uWSGI: 支援 HTTP，亦可搭配 NGINX 支援 uwsgi protocol

gunicorn: 支援 HTTP



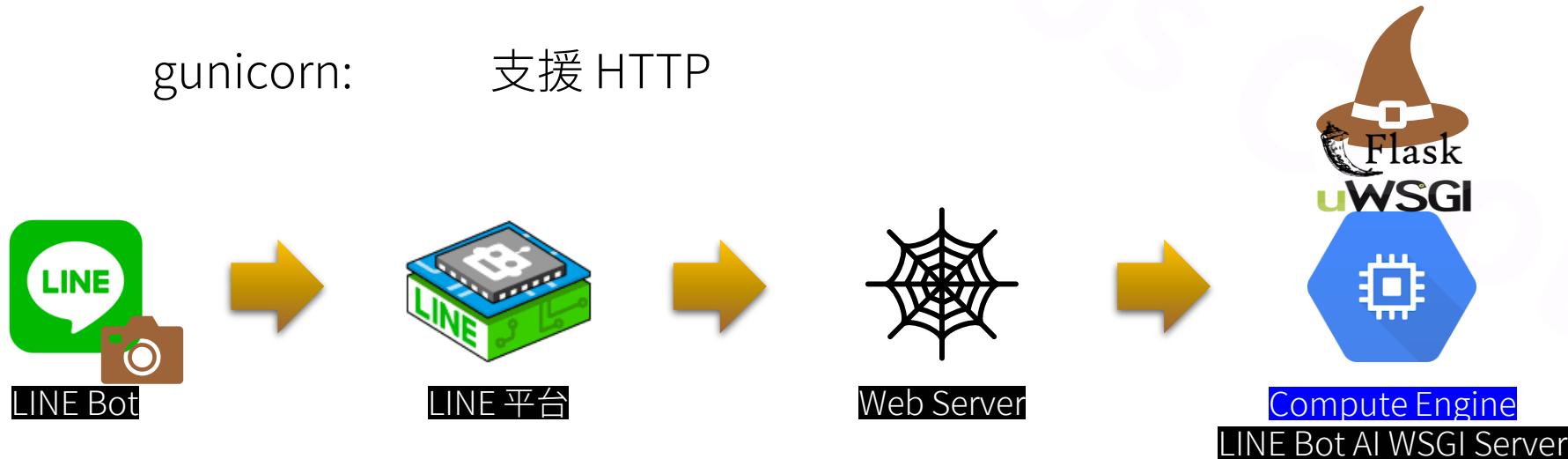
LINE Bot & WSGI

WSGI Server 的選擇

uWSGI vs gunicorn

○ uWSGI: 支援 HTTP，亦可搭配 NGINX 支援 uwsgi protocol

gunicorn: 支援 HTTP



LINE Bot & WSGI

2. 部署服務

b. 更新系統同時安裝 LINE Bot 與 WSGI Server (< 7 分)

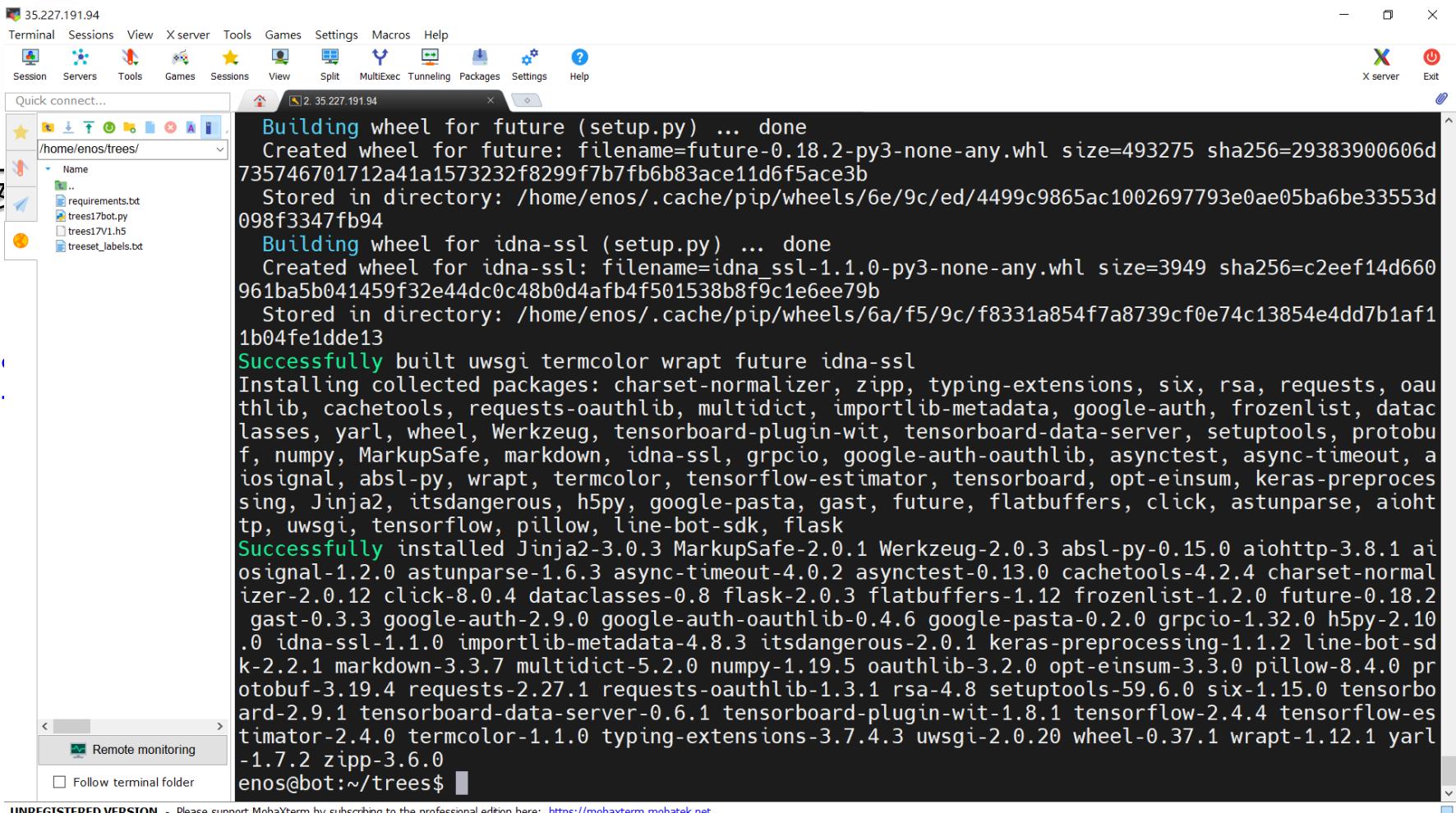
```
sudo apt update; sudo apt install -y python3-pip; pip3 install --upgrade  
pip; sudo timedatectl set-timezone Asia/Taipei; python3 -m pip install -r  
requirements.txt --no-warn-script-location; source ../../profile
```

LINE Bot & WSGI

2. 部署服務

b. 更新系統同時安裝

```
sudo apt update  
pip; sudo timed.  
requirements.tx
```



The screenshot shows a terminal window titled '35.227.191.94' running on MobaXterm. The terminal is displaying the output of a pip command. The output shows the successful building of wheels for 'future' and 'idna-ssl', followed by the installation of many other packages including 'charset-normalizer', 'zipp', 'typing-extensions', 'six', 'rsa', 'requests', 'oauthlib', 'cachetools', 'requests-oauthlib', 'multidict', 'importlib-metadata', 'google-auth', 'frozenlist', 'dataclasses', 'yarl', 'wheel', 'Werkzeug', 'tensorboard-plugin-wit', 'tensorboard-data-server', 'setuptools', 'protobuf', 'numpy', 'MarkupSafe', 'markdown', 'idna-ssl', 'grpcio', 'google-auth-oauthlib', 'asynctest', 'async-timeout', 'aiosignal', 'absl-py', 'wrapt', 'termcolor', 'tensorflow-estimator', 'tensorboard', 'opt-einsum', 'keras-preprocessing', 'Jinja2', 'itsdangerous', 'h5py', 'google-pasta', 'gast', 'future', 'flatbuffers', 'click', 'astunparse', 'aiottp', 'uwsgi', 'tensorflow', 'pillow', 'line-bot-sdk', and 'flask'. The message 'Successfully installed' is visible at the bottom of the output.

```
Building wheel for future (setup.py) ... done  
Created wheel for future: filename=future-0.18.2-py3-none-any.whl size=493275 sha256=29383900606d  
735746701712a41a1573232f8299f7b7fb6b83ace11d6f5ace3b  
Stored in directory: /home/enos/.cache/pip/wheels/6e/9c/ed/4499c9865ac1002697793e0ae05ba6be33553d  
098f3347fb94  
Building wheel for idna-ssl (setup.py) ... done  
Created wheel for idna-ssl: filename=idna_ssl-1.1.0-py3-none-any.whl size=3949 sha256=c2eef14d660  
961ba5b041459f32e44dc0c48b0d4afb4f501538b8f9c1e6ee79b  
Stored in directory: /home/enos/.cache/pip/wheels/6a/f5/9c/f8331a854f7a8739cf0e74c13854e4dd7b1af1  
1b04fe1dde13  
Successfully built uwsgi termcolor wrapt future idna-ssl  
Installing collected packages: charset-normalizer, zipp, typing-extensions, six, rsa, requests, oauthlib, cachetools, requests-oauthlib, multidict, importlib-metadata, google-auth, frozenlist, dataclasses, yarl, wheel, Werkzeug, tensorboard-plugin-wit, tensorboard-data-server, setuptools, protobuf, numpy, MarkupSafe, markdown, idna-ssl, grpcio, google-auth-oauthlib, asynctest, async-timeout, aiosignal, absl-py, wrapt, termcolor, tensorflow-estimator, tensorboard, opt-einsum, keras-preprocessing, Jinja2, itsdangerous, h5py, google-pasta, gast, future, flatbuffers, click, astunparse, aiottp, uwsgi, tensorflow, pillow, line-bot-sdk, flask  
Successfully installed Jinja2-3.0.3 MarkupSafe-2.0.1 Werkzeug-2.0.3 absl-py-0.15.0 aiohttp-3.8.1 aiосignal-1.2.0 astunparse-1.6.3 async-timeout-4.0.2 asynctest-0.13.0 cachetools-4.2.4 charset-normalizer-2.0.12 click-8.0.4 dataclasses-0.8 flask-2.0.3 flatbuffers-1.12 frozenlist-1.2.0 future-0.18.2 gast-0.3.3 google-auth-2.9.0 google-auth-oauthlib-0.4.6 google-pasta-0.2.0 grpcio-1.32.0 h5py-2.10.0 idna-ssl-1.1.0 importlib-metadata-4.8.3 itsdangerous-2.0.1 keras-preprocessing-1.1.2 line-bot-sdk-2.2.1 markdown-3.3.7 multidict-5.2.0 numpy-1.19.5 oauthlib-3.2.0 opt-einsum-3.3.0 pillow-8.4.0 protobuf-3.19.4 requests-2.27.1 requests-oauthlib-1.3.1 rsa-4.8 setuptools-59.6.0 six-1.15.0 tensorflow-2.9.1 tensorboard-data-server-0.6.1 tensorboard-plugin-wit-1.8.1 tensorflow-2.4.4 tensorflow-estimator-2.4.0 termcolor-1.1.0 typing-extensions-3.7.4.3 uwsgi-2.0.20 wheel-0.37.1 wrapt-1.12.1 yarl-1.7.2 zipp-3.6.0  
enos@bot:~/trees$
```

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LINE Bot & WSGI

3. 啟動服務

a. 進入 VM 專案目錄

```
cd; cd your_project
```

```
cd; cd trees
```

LINE Bot & WSGI

3. 啟動服務

b. 以 WSGI Server 帶起服務模組

```
uwsgi -w your_module:app -s :your_port -d your_project.log
```

```
uwsgi -w trees17bot:app -s :3000 -d trees.log
```

```
35.227.191.94
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
2. 35.227.191.94
enos@bot:~/trees$ uwsgi -w trees17bot:app -s :3000 -d trees.log
enos@bot:~/trees$
```

trees17bot.py
trees17v1.h5
treeset_labels.txt

< >
Remote monitoring
 Follow terminal folder

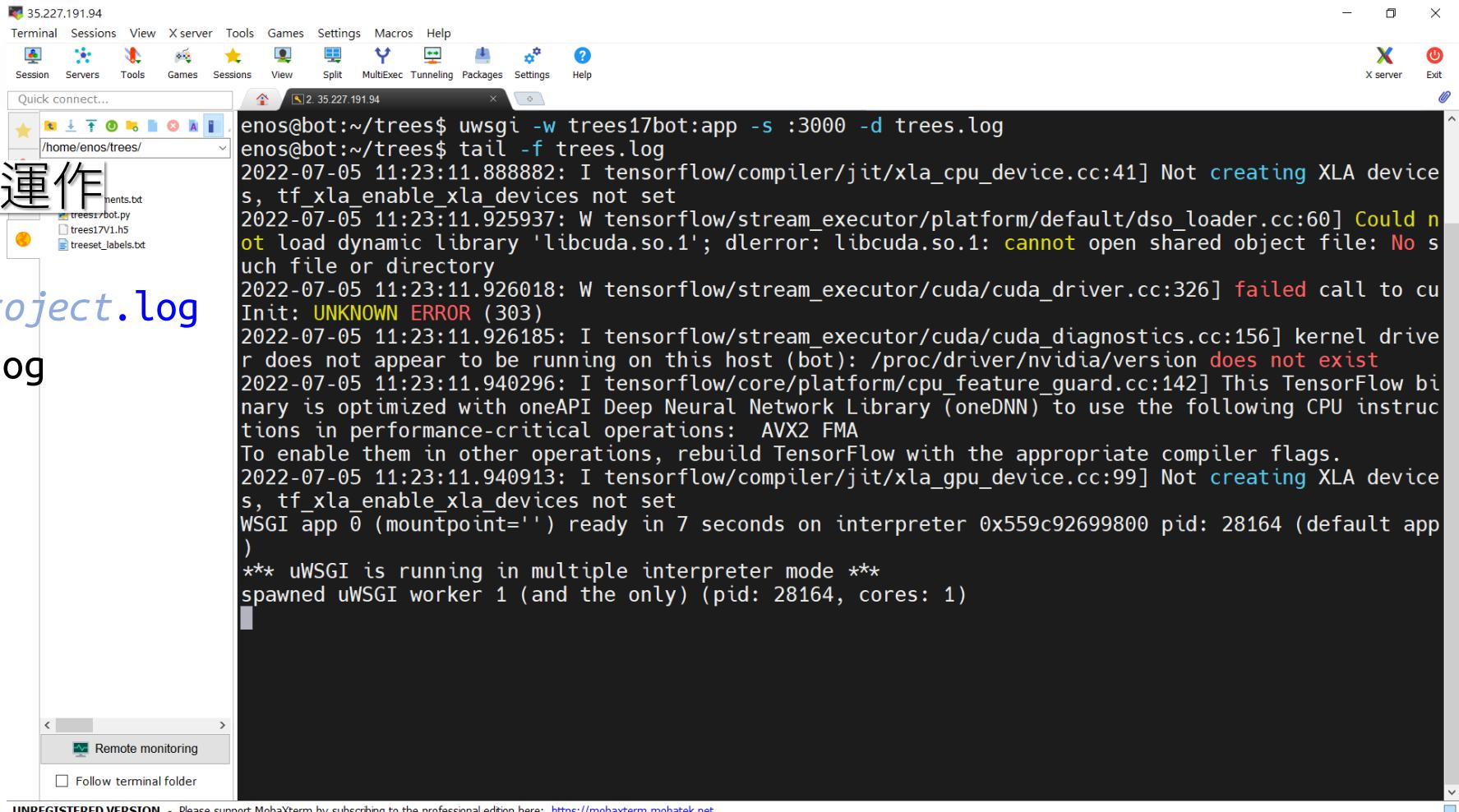
UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

LINE Bot & WSGI

3. 啟動服務

c. 確認服務正常運作

```
tail -f your_project.log  
tail -f trees.log
```



The screenshot shows a MobaXterm window titled '35.227.191.94' connected to an X server. The terminal window displays the command 'uwsgi -w trees17bot:app -s :3000 -d trees.log' followed by the output of 'tail -f trees.log'. The log output shows TensorFlow initialization messages, including warnings about XLA device creation and CUDA driver issues, and concludes with the message 'WSGI app 0 (mountpoint='') ready in 7 seconds on interpreter 0x559c92699800 pid: 28164 (default app)'. A status bar at the bottom indicates 'UNREGISTERED VERSION'.

```
35.227.191.94
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
2. 35.227.191.94
enos@bot:~/trees$ uwsgi -w trees17bot:app -s :3000 -d trees.log
enos@bot:~/trees$ tail -f trees.log
2022-07-05 11:23:11.888882: I tensorflow/compiler/jit/xla_cpu_device.cc:41] Not creating XLA devices, tf_xla_enable_xla_devices not set
2022-07-05 11:23:11.925937: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'libcuda.so.1'; dlerror: libcuda.so.1: cannot open shared object file: No such file or directory
2022-07-05 11:23:11.926018: W tensorflow/stream_executor/cuda/cuda_driver.cc:326] failed call to cuInit: UNKNOWN ERROR (303)
2022-07-05 11:23:11.926185: I tensorflow/stream_executor/cuda/cuda_diagnostics.cc:156] kernel driver does not appear to be running on this host (bot): /proc/driver/nvidia/version does not exist
2022-07-05 11:23:11.940296: I tensorflow/core/platform/cpu_feature_guard.cc:142] This TensorFlow binary is optimized with oneAPI Deep Neural Network Library (oneDNN) to use the following CPU instructions in performance-critical operations: AVX2 FMA
To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.
2022-07-05 11:23:11.940913: I tensorflow/compiler/jit/xla_gpu_device.cc:99] Not creating XLA devices, tf_xla_enable_xla_devices not set
WSGI app 0 (mountpoint='') ready in 7 seconds on interpreter 0x559c92699800 pid: 28164 (default app)
*** uWSGI is running in multiple interpreter mode ***
spawned uWSGI worker 1 (and the only) (pid: 28164, cores: 1)
```

LINE Bot & WSGI

3. 啟動服務

d. 日常上下服務

取得背景程序 PID

```
ps -ef | grep uwsgi
```

移除背景程序

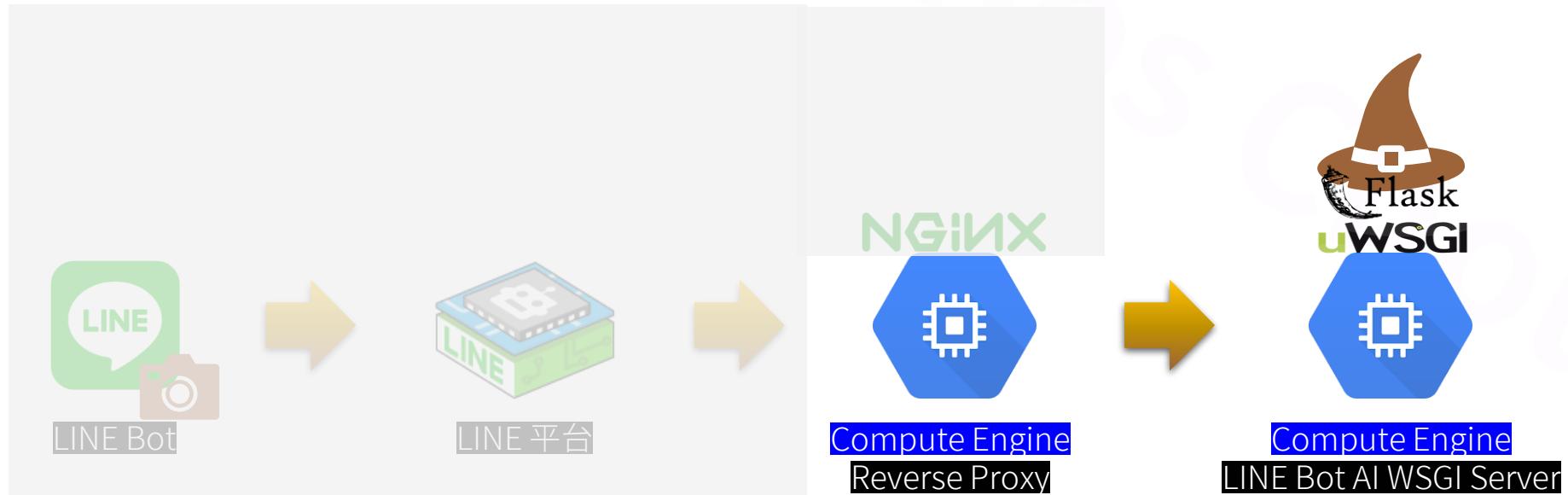
```
kill your_pid
```

```
kill -9 your_pid
```

The screenshot shows a MobaXterm window titled '35.227.191.94'. The terminal session is running on a Linux system with the command line interface. A pink box highlights the word 'PID' in the title bar. The terminal window displays the following command and its output:

```
enos@bot:~/trees$ ps -ef | grep uwsgi
enos 28164 1 0 11:23 ? 00:00:05 uwsgi -w trees17bot:app -s :3000 -d trees.log
enos 28427 9603 0 11:45 pts/0 00:00:00 grep --color=auto uwsgi
enos@bot:~/trees$ kill 28164
enos@bot:~/trees$ ps -ef | grep uwsgi
enos 28432 9603 0 11:49 pts/0 00:00:00 grep --color=auto uwsgi
enos@bot:~/trees$
```

The terminal also shows a file browser sidebar with files like requirements.txt, trees17bot.py, trees17V1.h5, and treeset_labels.txt. At the bottom of the terminal window, there is a status bar with the text 'UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net'.



申購並設定網域

何謂網域？

- a. 網域為可讀且符合格式的字串，對應特定 IP Address
- b. 主網擁用有者可設定多組子網域

中央氣象局

	IP Address	俗稱
cwb.gov.tw		主網域
www.cwb.gov.tw	210.61.218.11	子網域
opendata.cwb.gov.tw	61.56.14.16	子網域
opendata.cwb.gov.tw/dataset		子目錄

申購並設定網域

何謂 CAA？

RFC 8659

DNS Certification Authority Authorization (CAA) Resource Record

RFC: Request For Comments

申購並設定網域

已知支援 CAA 的網域供應商

- 1. GoDaddy
- 2. PC home 買網址
- ▲ 3. Cloudflare (感謝台北 AI 班 4 期推薦，待實證)

已知**不**支援 CAA 的網域供應商

- ✗ 1. Seednet
- ✗ 2. Hinet

申購並設定網域

GoDaddy

<https://tw.godaddy.com/>

申購並設定網域

GoDaddy

a. 申購網域

The screenshot shows the GoDaddy homepage. At the top, there is a navigation bar with the GoDaddy logo, a search bar containing the text 'enadv', and several menu items: '聯絡我們 ▾', '說明', '登入 ▾', and a shopping cart icon. The main banner features the text '運用 .com 帶領企業進軍網路世界，只要 NT\$291/第 1 年'. Below the banner is a search bar with the placeholder '搜尋'.

更多助您擴展企業規模的工具。

大家都知道我們是網域行家，不過您也可以看看其他讓企業在網路上更能大展身手的重要功能。



申購並設定網域

GoDaddy

a. 申購網域

The screenshot shows the GoDaddy Taiwan website interface. At the top, there's a navigation bar with links for '聯絡我們' (Contact Us), '說明' (Help), '登入' (Log In), and a shopping cart icon. Below the navigation is a search bar containing 'enadv'. To the right of the search bar is a magnifying glass icon and a green button labeled '前往購物車' (Go to Cart). The main content area displays a list of domain names and their prices:

Domain Name	Price (NT\$)	Service Fee (NT\$)	Action
enadv.com	NT\$734 ^②	NT\$3,653	加入購物車
enadv.tw	NT\$734 ^②	NT\$1,070	加入購物車
enadv.net	NT\$498 ^②	NT\$592	加入購物車
enadv.com.tw	NT\$1,070 ^②	NT\$1,070	加入購物車
enadv.org	NT\$319 ^②	NT\$676	加入購物車
enadv.cc	NT\$175 ^②	NT\$460	加入購物車

A note above the first row states: '◎ enadv.com 已被他人使用 我們依然有機會能為您取得。看看'.

申購並設定網域

GoDaddy

a. 申購網域

The screenshot shows the GoDaddy checkout process for a .CLUB domain. At the top, it displays the domain name "enadv.club" and the registration type ".CLUB 網域註冊". A dropdown menu shows "1年" (1 year) selected. To the right, the price is listed as "NT\$33" with a note "現省 94%" (Save 94%). Below this, a yellow box contains the text: "每年 170,000 次，這就是罪犯嘗試竊取網域的頻率。保護您的網域。" (Every year, there are 170,000 times when criminals try to steal domains. Protect your domain.) and the price "NT\$199/年, 每個網域" (NT\$199 per year, per domain). A "新增" (Add) button is next to the price. At the bottom left is a link "查看優惠免責聲明" (View promotional disclaimer), and at the bottom right is a "清空購物車" (Empty shopping cart) button.

小計 (TWD) **NT\$33**

促銷代碼: [GOKBTW06](#)

◎讚! 您的訂單成功省下 NT\$474.

繼續結帳

◎包您滿意
如果您對選購內容有任何不滿之處，歡迎洽詢 GoDaddy
客戶顧問為您解決問題。

cPanel® 主機服務

- 領先業界的網頁載入時間
- 運作時間保證達到 99.9%
- 屢獲殊榮的客戶支援

NT\$234/月

[新增](#)

新增網域

搜尋您的理想網域



相符網域可供使用

enadv.net	NT\$592	NT\$340	新增
enadv.co	NT\$1,104	NT\$148	新增
enadv.info	NT\$834	NT\$78	新增

申購並設定網域

GoDaddy

a. 申購網域

The screenshot shows the GoDaddy Taiwan website's payment page. At the top, the GoDaddy logo and '台灣' are visible. A navigation bar at the top right includes '聯絡我們' with a dropdown arrow. Below the navigation, the word '購買' (Purchase) is centered. A breadcrumb navigation bar shows the steps: 購物籃 > 登入 > 帳單資訊 > 付款 > 完成 > (highlighted in blue).
The main content area is divided into two sections:

- 付款** (Payment): Shows a VISA payment method.
- 帳單資訊** (Billing Information): An empty field for entering billing details.

To the right, a summary box displays the purchase details:

- enadv.club** (.CLUB 網域註冊)
- NT\$35** (現省 94%)
- 續約期數: 1 年 (selected)
- 於 2022年6月續約, 費用為 NT\$537 (1 年效期)

Below the summary, there are links for '查看優惠免責聲明' (View promotional terms and conditions) and '清空購物車' (Empty shopping cart). The total amount is listed as **總計 (TWD) NT\$35**. A note below states: '讚! 您的訂單成功省下 NT\$474。'
At the bottom right is a large, highlighted button labeled **完成購買** (Complete Purchase). A small note at the bottom right of the page states: '按下「完成購買」之後, 即表示您同意我們的條款與條件及隱私政策之內容, 並同意將您的產品加入我們的自動續約服務, 您隨時都可以到帳戶中的「續約和帳單」頁面取消此服務。直到取消為止, 系統都會透過您為此訂單選擇的付款方式或備份付款方式自動收取續約的費用。您的付款正在 美國 進行處理。'

申購並設定網域

GoDaddy

b. 設定網域

The screenshot shows the GoDaddy website interface. At the top, there's a navigation bar with links for '網域名稱', '網站', 'Email 及行銷', '說明', and a user profile dropdown. The user profile dropdown is open, showing information for '周志昂' (Zhou Zhidong), including a PIN and a link to view it. Below the navigation, there's a search bar with placeholder text '找出完美網域' and a '搜尋網域' button. A large central banner features a man holding a book titled 'Christopher Lee Wheat and Wood'. The banner text says '虛擬主機' (Virtual Hosting) and '既快又安全的主機服務。' (Fast and secure hosting service). It also mentions '包含免費網域 + email。最低 NT\$62 起。' (Includes free domain + email. Starting from NT\$62). A '瞭解更多資訊' (Learn more) button is visible. Below the banner is a table comparing various services:

.app 網域 NT\$576/第 1 年	Microsoft 365 NT\$52/月	虛擬主機 NT\$62/月	j.info™ 特賣中！NT\$130/第 1 年。 讓全世界知道您的知識素養。
WordPress NT\$209/月	網站安全性 NT\$167/月	SSL 一年 NT\$1,739	

申購並設定網域

GoDaddy

b. 設定網域

The screenshot shows the GoDaddy dashboard. At the top, there's a navigation bar with the GoDaddy logo, a '我的帳戶' (My Account) link, and various icons for help, cart, notifications, and account settings. Below the navigation is a search bar labeled '搜尋新網域'. A main heading says '開始使用新產品'. On the left, there's a section for '網域' (Domains) featuring a green globe icon and the domain 'enadv.site' with the subtext '建立網站或電子郵件地址'. On the right, a dropdown menu for 'enadv.site' is open, showing options like '建立網站', '設定電子郵件帳戶', '連線至現有網站', '管理我的網域', '編輯設定' (highlighted with a pink box), '變更隱私', and '管理 DNS' (also highlighted with a pink box). At the bottom right, there's a blue button with the text '洽詢我們'.

申購並設定網域

GoDaddy

b. 設定網域

The screenshot shows the GoDaddy DNS Management interface for the domain `enadv.site`. The top navigation bar includes links for GoDaddy logo, domains, help, shopping cart, notifications, and account settings. The main menu has options for Domains, Buy, DNS, Settings, and Help. The current page is "DNS Management" under "My Domains / Domain Settings". The sub-page title is "enadv.site".

DNS Records

DNS records determine domain behavior, such as displaying website content and sending emails.

Type	Name	Data	TTL	Actions
A	@	Parked	600 seconds	Delete Edit

Buttons at the top of the DNS records table include: Delete, Duplicate, Filter, New (highlighted with a pink box), and More.

申購並設定網域

GoDaddy

b. 設定網域

DNS 管理
enadv.site

enadv.site
[選取其他網域](#)

DNS 記錄

DNS 記錄會決定網域行為，如顯示網站內容及發送 email 等。

刪除 複製 篩選 新增 ...

A 記錄會透過 IPv4 位址將您的網域連線至網站，也可以用來[建立子網域](#)並指向 IP 位址。
X

類型	名稱	內容值	TTL
A	t	35.227.191.94	自訂

A Record 子網域名稱 VM 外部 IP
秒 600

新增記錄 清除



申購並設定網域

GoDaddy

b. 設定網域

The screenshot shows the GoDaddy DNS settings interface for the domain `enadv.site`. The main title is "DNS 記錄". A sub-section titled "CAA 記錄" is highlighted with a pink box. The table displays one record:

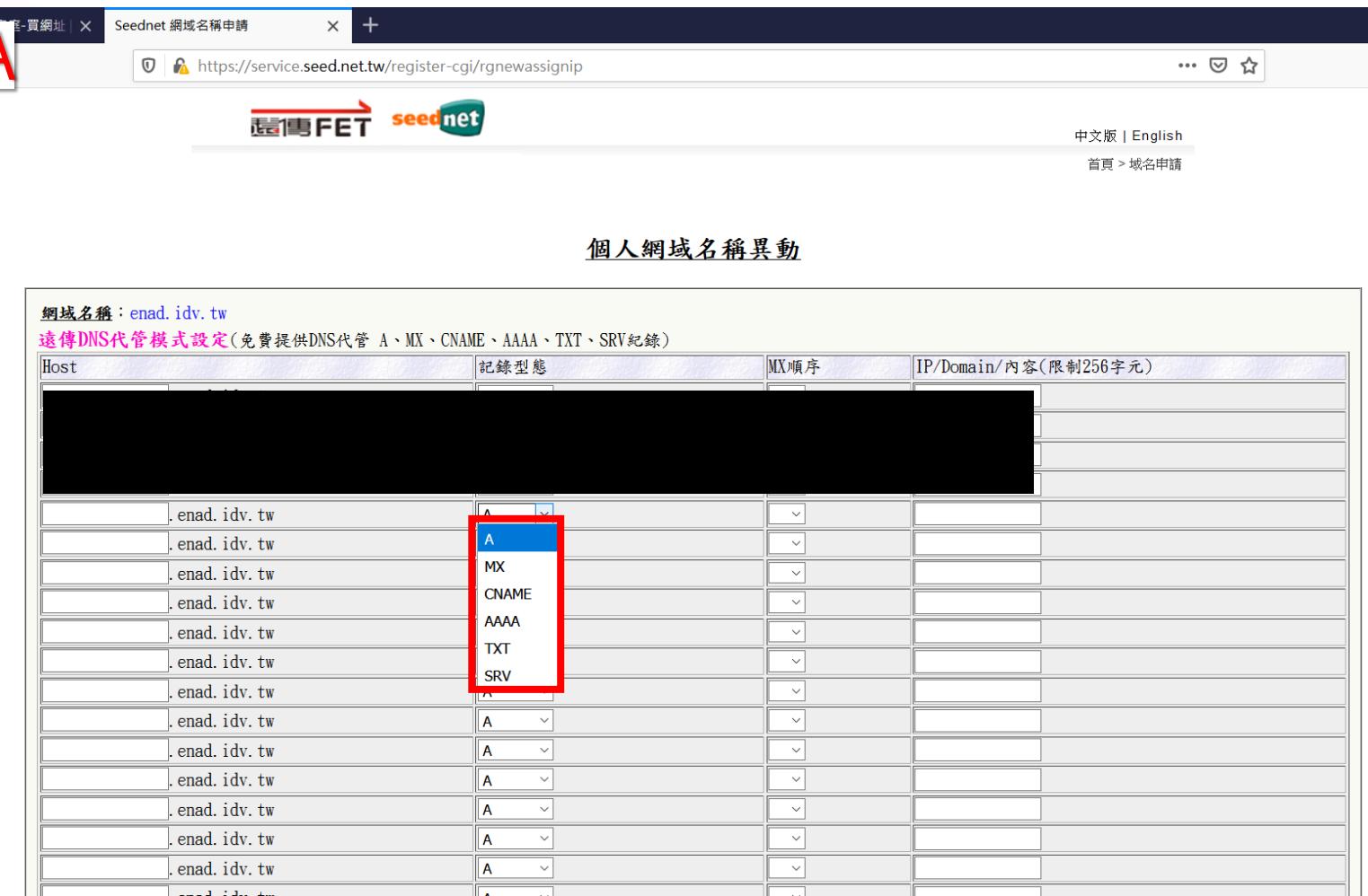
類型	名稱	旗標
CAA	t	0

Below the table, the fields are labeled: "CAA Record" (highlighted in pink), "子網域名稱" (highlighted in pink), "內容值" (highlighted in pink), "憑證商" (highlighted in pink), "TTL" (highlighted in pink), and "秒" (highlighted in pink). The TTL value is set to 600.

At the bottom, there are buttons for "新增記錄" (Add Record) and "清除" (Clear).

申購並設定網域

Seednet 不支援 CAA



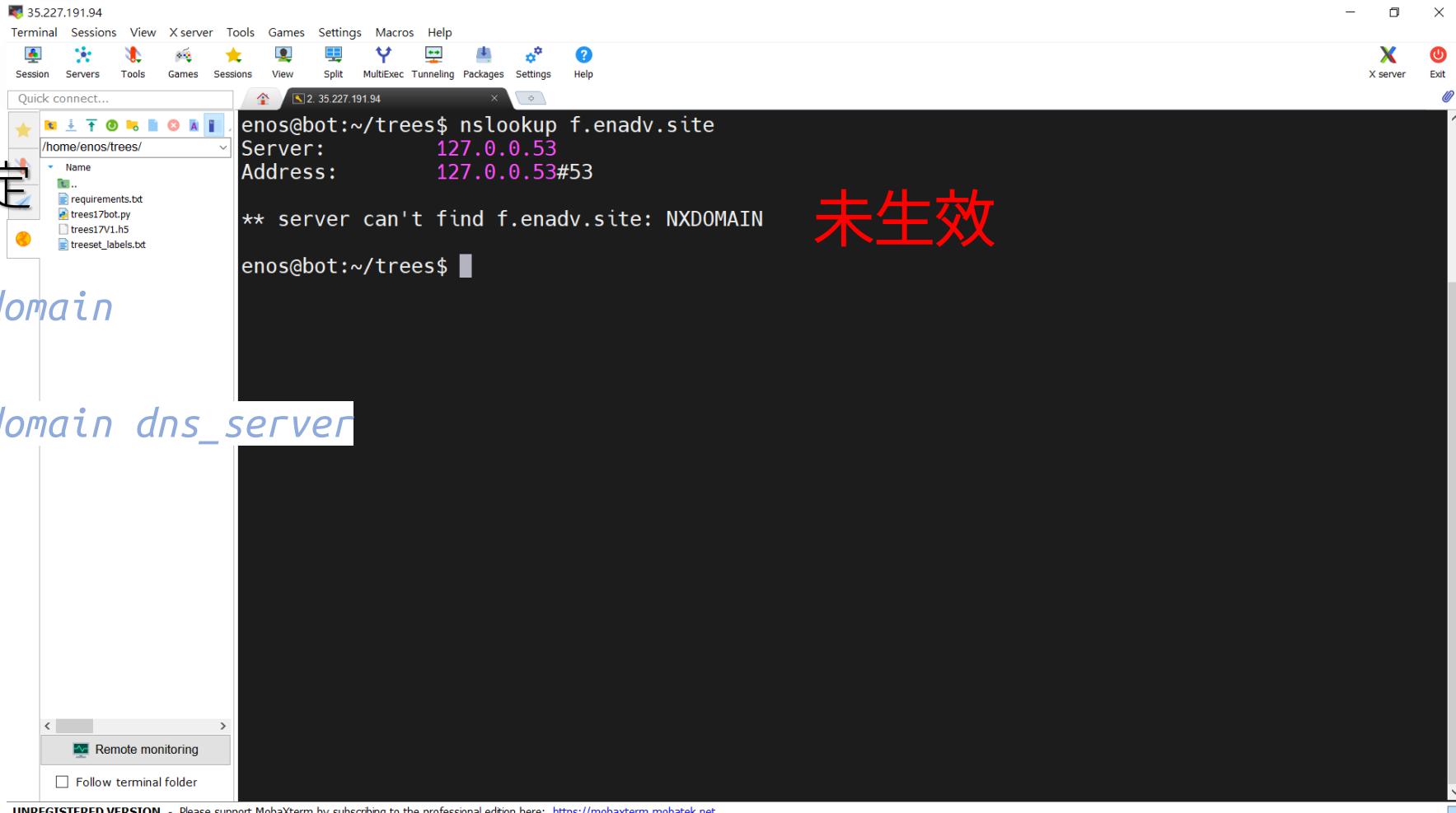
申購並設定網域

驗證網域

確認網域與 IP 綁定

`nslookup your_domain`

`nslookup your_domain dns_server`



The screenshot shows a terminal window in MobaXterm connected to IP 35.227.191.94. The terminal output is as follows:

```
enos@bot:~/trees$ nslookup f.enadv.site
Server:      127.0.0.53
Address:    127.0.0.53#53

** server can't find f.enadv.site: NXDOMAIN
enos@bot:~/trees$
```

A red text overlay on the right side of the terminal window reads "未生效" (Not effective).

At the bottom of the terminal window, there is a note: "UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>".

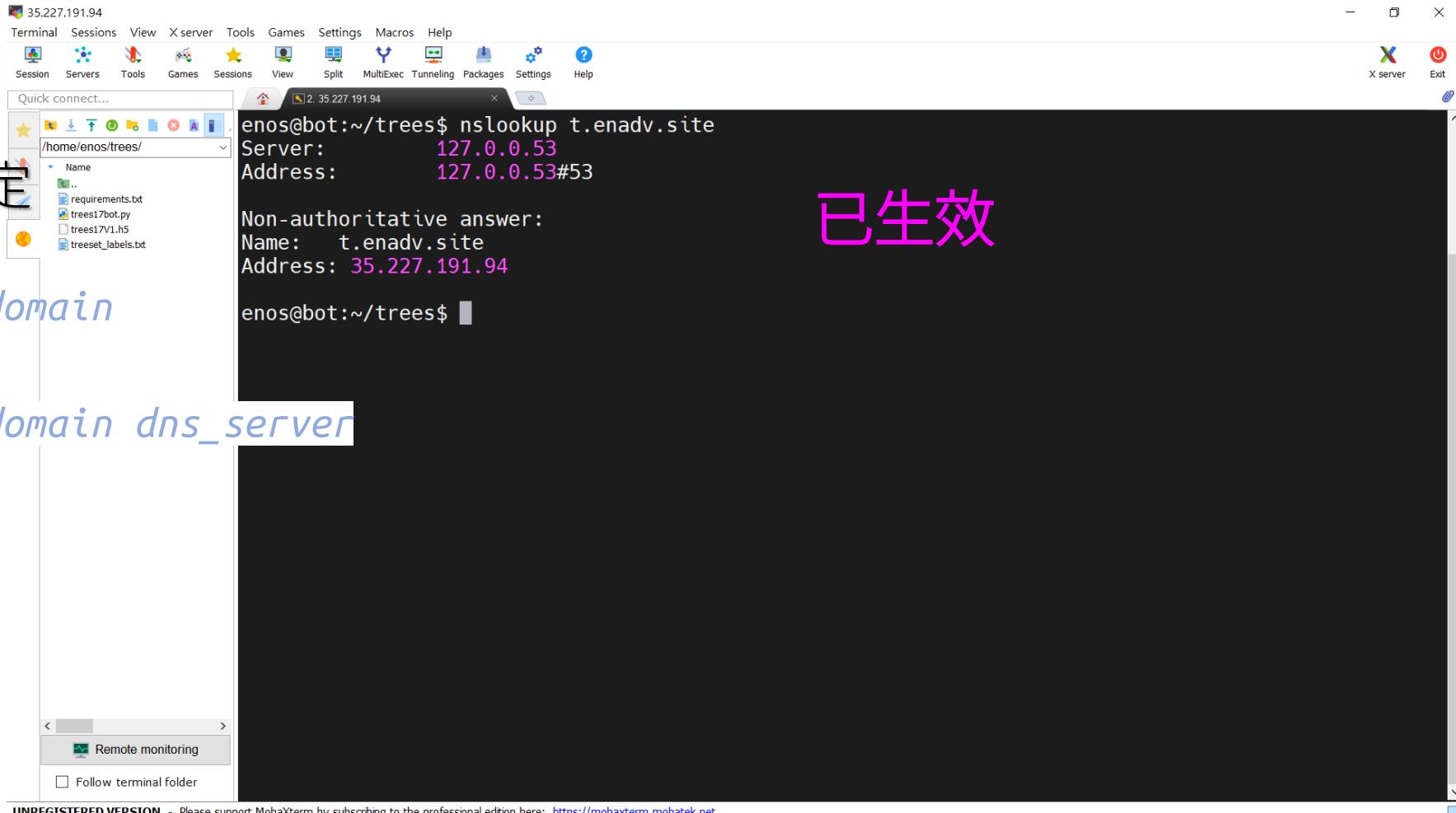
申購並設定網域

驗證網域

確認網域與 IP 綁定

`nslookup your_domain`

`nslookup your_domain dns_server`



The screenshot shows a terminal window in MobaXterm with the title bar "35.227.191.94". The menu bar includes Terminal, Sessions, View, X server, Tools, Games, Settings, Macros, Help, Session, Servers, Tools, Games, Sessions, View, Split, MultiExec, Tunneling, Packages, Settings, and Help. The terminal window displays the following output:

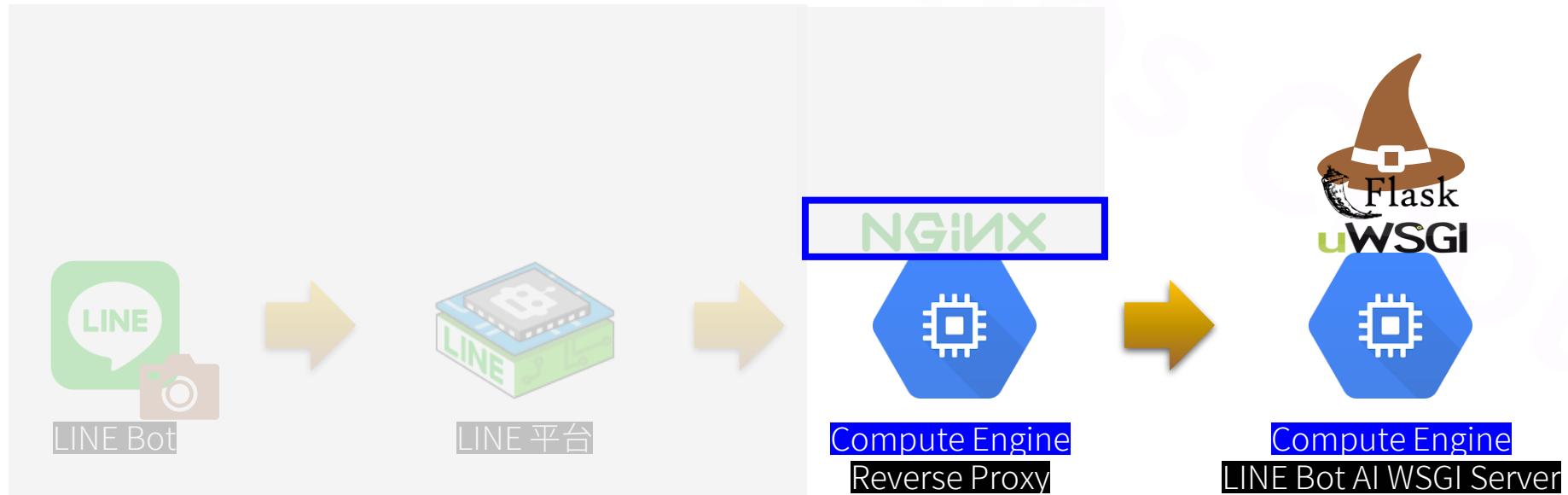
```
enos@bot:~/trees$ nslookup t.enadv.site
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
Name: t.enadv.site
Address: 35.227.191.94

enos@bot:~/trees$
```

A sidebar on the left shows a file tree under "/home/enos/trees/". The terminal window has a status bar at the bottom with "UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>".

已生效



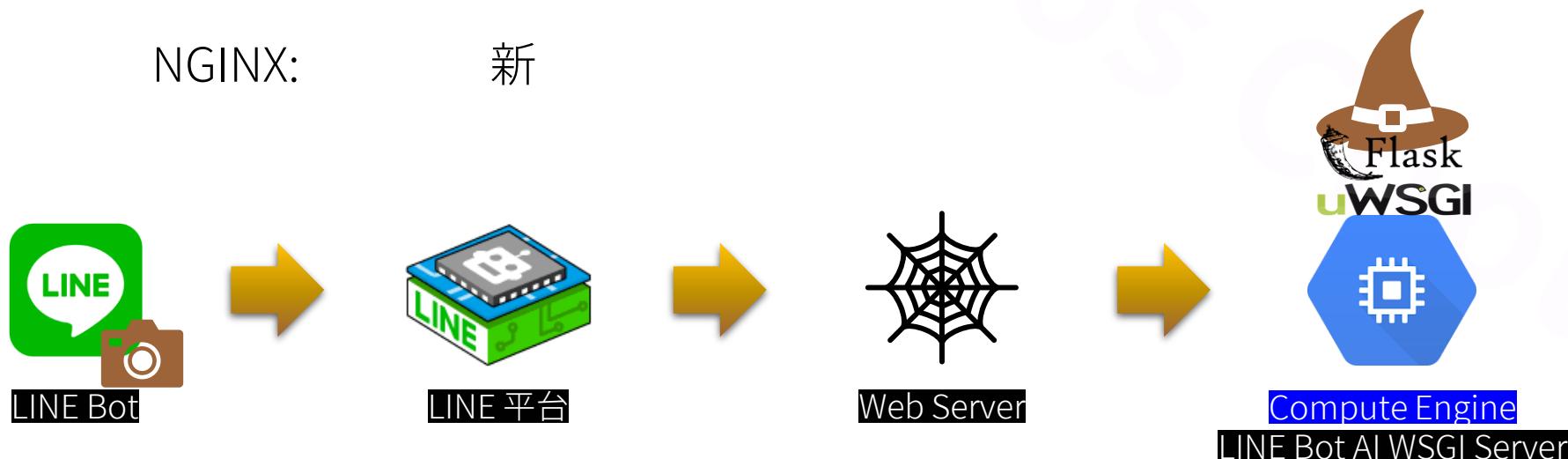
網站與憑證

Web Server 的選擇

Apache vs NGINX

Apache: 經典

NGINX: 新



網站與憑證

Web Server 的選擇

Apache vs NGINX

Apache: 經典



NGINX: 新



LINE Bot



LINE 平台



NGINX

Compute Engine
Reverse Proxy



Compute Engine
LINE Bot AI WSGI Server

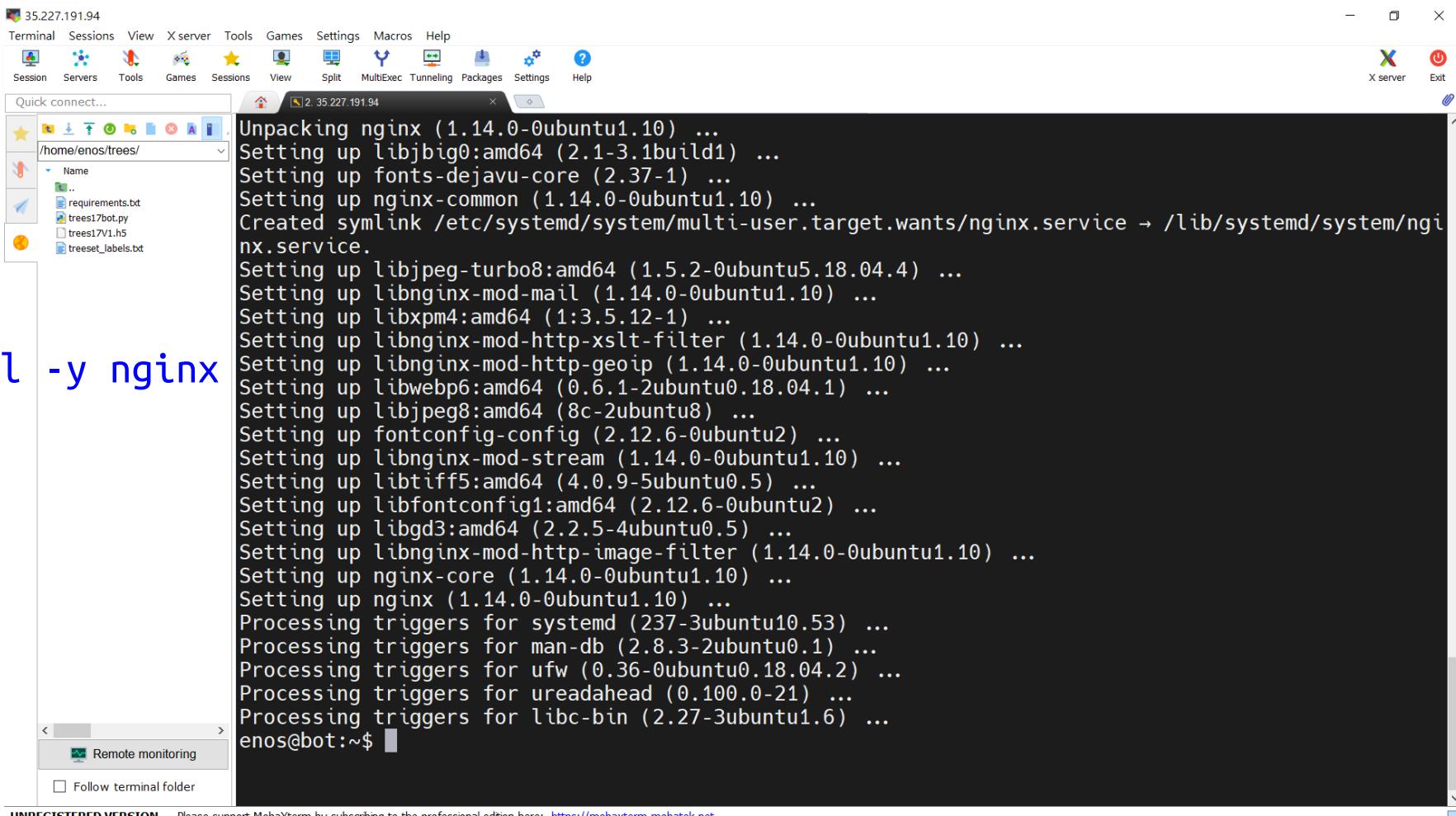
網站與憑證

1. 架設 NGINX

a. 安裝 NGINX

登入 VM

`sudo apt install -y nginx`



The screenshot shows a terminal window in MobaXterm connected to an Ubuntu 18.04 VM (IP: 35.227.191.94). The terminal is displaying the output of the command `sudo apt install -y nginx`. The output shows the package manager handling the installation of nginx and its dependencies, including libjbig2, fonts-dejavu-core, nginx-common, libjpeg-turbo8, libnginx-mod-mail, libxpm4, libnginx-mod-http-xslt-filter, libnginx-mod-http-geoip, libwebp6, libjpeg8, fontconfig-config, libnginx-mod-stream, libtiff5, libfontconfig1, libgd3, libnginx-mod-http-image-filter, nginx-core, and nginx itself. The process also triggers for systemd, man-db, ufw, ureadahead, and libc-bin.

```
35.227.191.94
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
[2] 35.227.191.94
Unpacking nginx (1.14.0-0ubuntu1.10) ...
Setting up libjbig2:amd64 (2.1-3.1build1) ...
Setting up fonts-dejavu-core (2.37-1) ...
Setting up nginx-common (1.14.0-0ubuntu1.10) ...
Created symlink /etc/systemd/system/multi-user.target.wants/nginx.service → /lib/systemd/system/nginx.service.
Setting up libjpeg-turbo8:amd64 (1.5.2-0ubuntu5.18.04.4) ...
Setting up libnginx-mod-mail (1.14.0-0ubuntu1.10) ...
Setting up libxpm4:amd64 (1:3.5.12-1) ...
Setting up libnginx-mod-http-xslt-filter (1.14.0-0ubuntu1.10) ...
Setting up libnginx-mod-http-geoip (1.14.0-0ubuntu1.10) ...
Setting up libwebp6:amd64 (0.6.1-2ubuntu0.18.04.1) ...
Setting up libjpeg8:amd64 (8c-2ubuntu8) ...
Setting up fontconfig-config (2.12.6-0ubuntu2) ...
Setting up libnginx-mod-stream (1.14.0-0ubuntu1.10) ...
Setting up libtiff5:amd64 (4.0.9-5ubuntu0.5) ...
Setting up libfontconfig1:amd64 (2.12.6-0ubuntu2) ...
Setting up libgd3:amd64 (2.2.5-4ubuntu0.5) ...
Setting up libnginx-mod-http-image-filter (1.14.0-0ubuntu1.10) ...
Setting up nginx-core (1.14.0-0ubuntu1.10) ...
Setting up nginx (1.14.0-0ubuntu1.10) ...
Processing triggers for systemd (237-3ubuntu10.53) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ufw (0.36-0ubuntu0.18.04.2) ...
Processing triggers for ureadahead (0.100.0-21) ...
Processing triggers for libc-bin (2.27-3ubuntu1.6) ...
enos@bot:~$
```

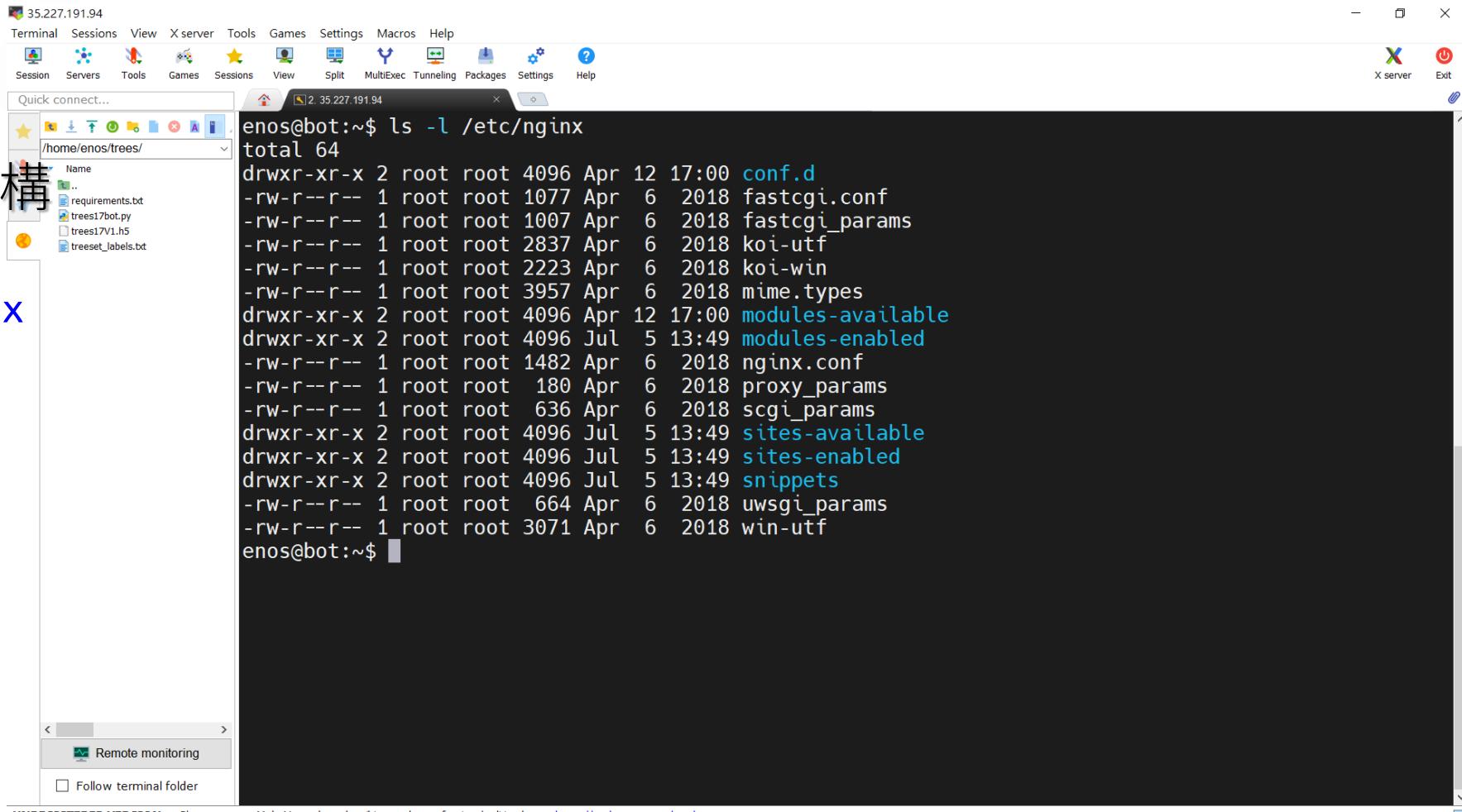
UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

網站與憑證

1. 架設 NGINX

b. 觀察組態檔架構

`ls -l /etc/nginx`



The screenshot shows a terminal window in MobaXterm connected to IP 35.227.191.94. The terminal title is '2. 35.227.191.94'. The command entered is 'ls -l /etc/nginx'. The output lists numerous files and directories under /etc/nginx, including 'conf.d', 'fastcgi.conf', 'fastcgi_params', 'koi-utf', 'koi-win', 'mime.types', 'modules-available', 'modules-enabled', 'nginx.conf', 'proxy_params', 'scgi_params', 'sites-available', 'sites-enabled', 'snippets', 'uwsgi_params', and 'win-utf'. The terminal interface includes a file browser on the left showing local files like 'requirements.txt', 'trees17bot.py', 'trees17V1.h5', and 'treeset_labels.txt'. A status bar at the bottom indicates 'UNREGISTERED VERSION'.

```
enos@bot:~$ ls -l /etc/nginx
total 64
drwxr-xr-x 2 root root 4096 Apr 12 17:00 conf.d
-rw-r--r-- 1 root root 1077 Apr  6 2018 fastcgi.conf
-rw-r--r-- 1 root root 1007 Apr  6 2018 fastcgi_params
-rw-r--r-- 1 root root 2837 Apr  6 2018 koi-utf
-rw-r--r-- 1 root root 2223 Apr  6 2018 koi-win
-rw-r--r-- 1 root root 3957 Apr  6 2018 mime.types
drwxr-xr-x 2 root root 4096 Apr 12 17:00 modules-available
drwxr-xr-x 2 root root 4096 Jul  5 13:49 modules-enabled
-rw-r--r-- 1 root root 1482 Apr  6 2018 nginx.conf
-rw-r--r-- 1 root root 180 Apr  6 2018 proxy_params
-rw-r--r-- 1 root root 636 Apr  6 2018 scgi_params
drwxr-xr-x 2 root root 4096 Jul  5 13:49 sites-available
drwxr-xr-x 2 root root 4096 Jul  5 13:49 sites-enabled
drwxr-xr-x 2 root root 4096 Jul  5 13:49 snippets
-rw-r--r-- 1 root root 664 Apr  6 2018 uwsgi_params
-rw-r--r-- 1 root root 3071 Apr  6 2018 win-utf
enos@bot:~$
```

網站與憑證

1. 架設 NGINX

b. 觀察組態檔架構

```
ls -l /etc/nginx
```

`nginx.conf`

NGINX 啟動時預設讀取的參數檔，內容包含掃描 `sites-enabled` 中所有參數檔

`sites-available` 目錄

儲存各種啟動參數檔，但未必會被啟動。
欲啟動的參數檔應以 symbolic link 方式置
於 `sites-enabled` 目錄

`sites-enabled` 目錄

實際欲啟動的參數檔

網站與憑證

1. 架設 NGINX

c. 建立組態檔

```
sudo nano /etc/nginx/sites-available/your_project.conf  
sudo nano /etc/nginx/sites-available/trees.conf
```

```
server {  
    server_name your_domain;  
    location / {  
        include uwsgi_params;  
        uwsgi_pass your_ip:your_port;  
    }  
}
```

網站與憑證

1. 架設 NGINX

c. 建立組態檔

```
sudo nano /etc/
```

```
sudo nano /etc/
```

```
server {  
    server_name  
    location /  
        include  
        uwsgi_p  
    }  
}
```

The screenshot shows a terminal window titled 'GNU nano 2.9.3' displaying the contents of the file '/etc/nginx/sites-available/trees.conf'. The window is part of the MobaXterm interface, which includes a file browser sidebar on the left showing files like 'requirements.txt', 'trees17bot.py', 'trees17V1.h5', and 'treeset_labels.txt'. The terminal window has a dark background with white text. At the bottom, there are various keyboard shortcuts for navigating the text.

```
server {  
    server_name t.enadv.site;  
    # for LINE Bot  
    location / {  
        include uwsgi_params;  
        #uwsgi_pass unix:/home/your_account/your_project/your_project.sock;  
        uwsgi_pass 127.0.0.1:3000;  
        #proxy_pass http://your_url;  
    }  
    # for Web or LIFF  
    #location /test {  
        #root /home/your_account/your_project;  
        #alias /home/your_account/your_project;  
    #}  
}
```

At the bottom of the terminal window, there is a footer bar with the following text: 'UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>'.

網站與憑證

1. 架設 NGINX

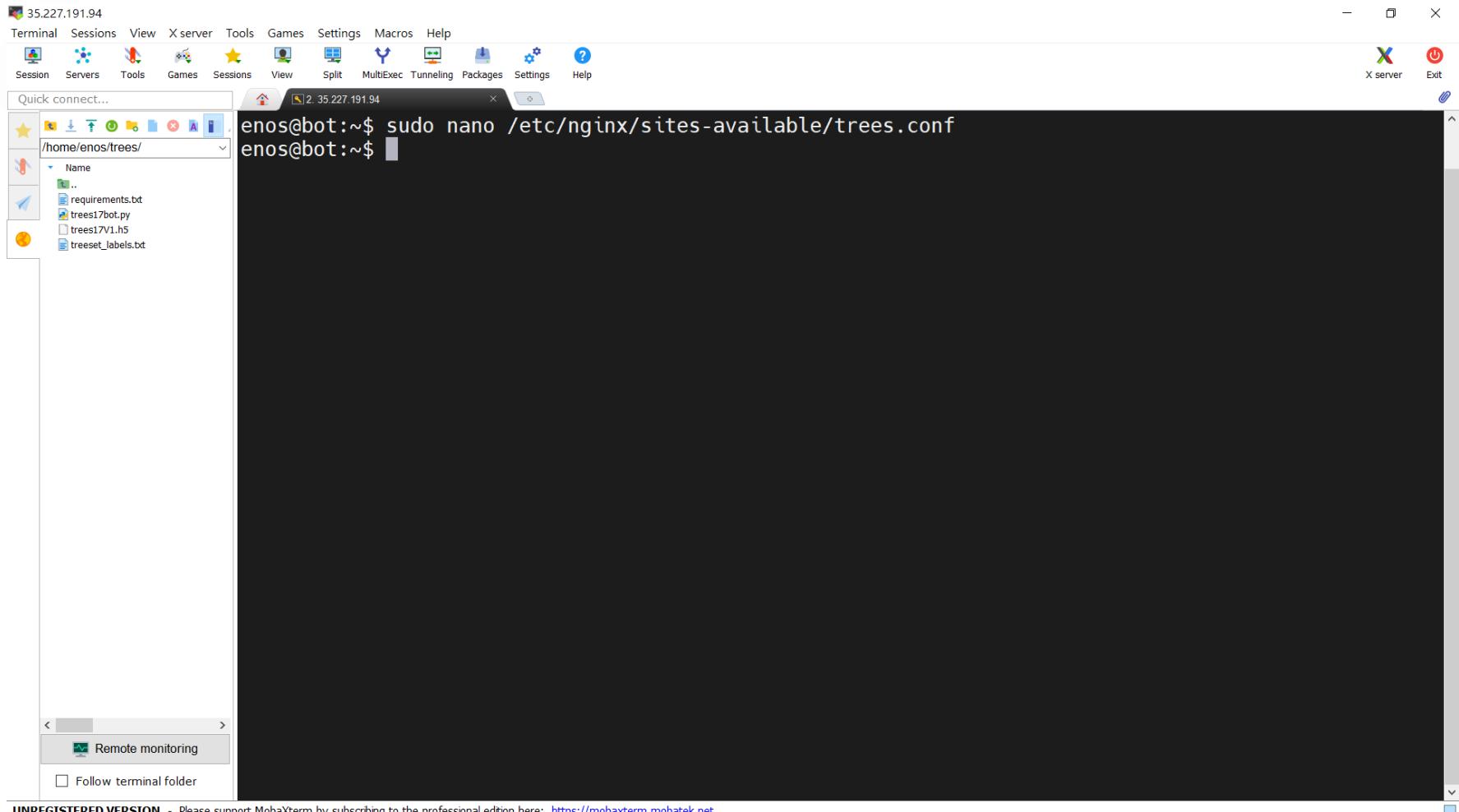
c. 建立組態檔

儲存

Ctrl + O

退出

Ctrl + X



網站與憑證

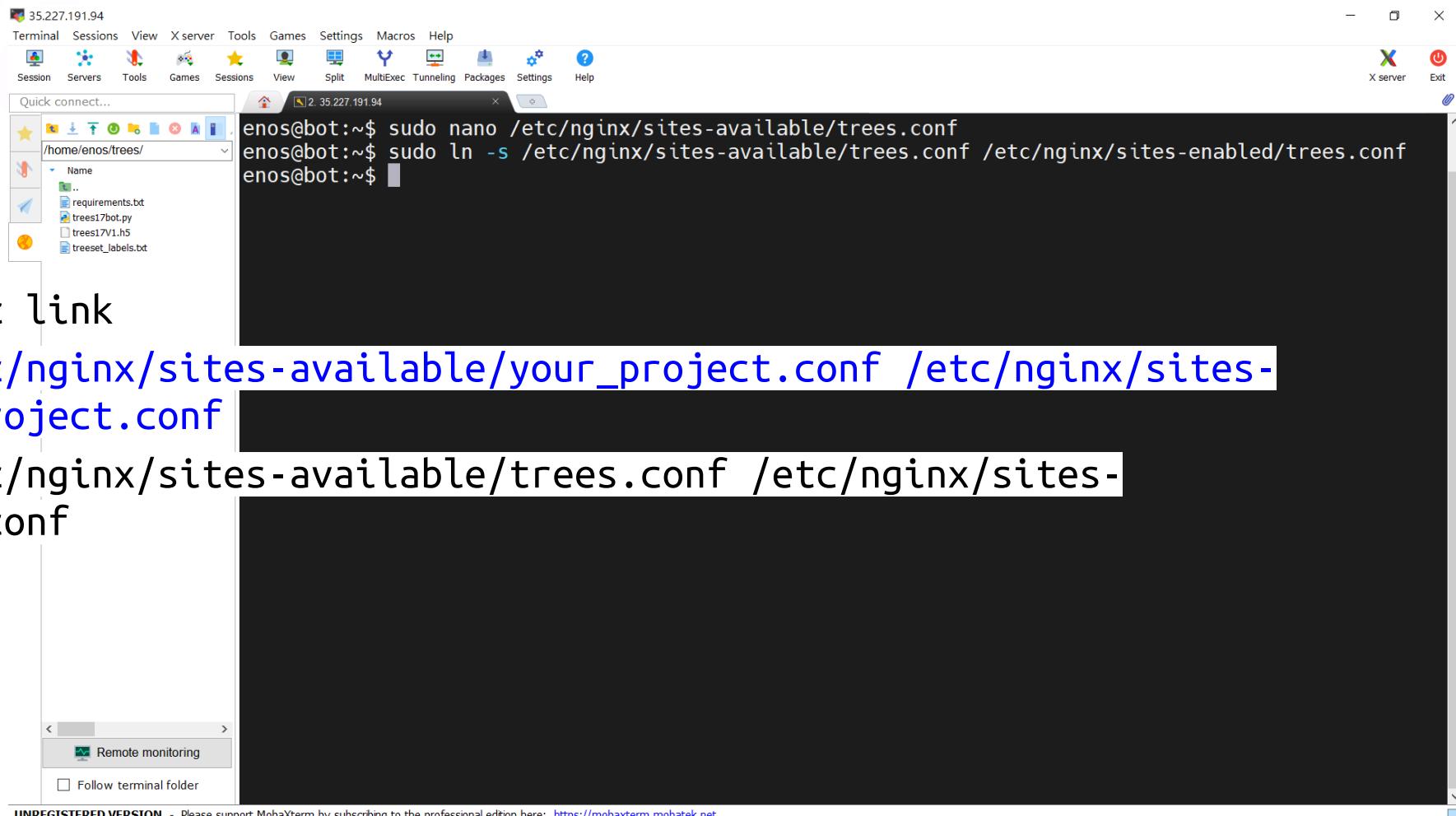
1. 架設 NGINX

c. 建立組態檔

```
# 建立 symbolic link
```

```
sudo ln -s /etc/nginx/sites-available/your_project.conf /etc/nginx/sites-enabled/your_project.conf
```

```
sudo ln -s /etc/nginx/sites-available/trees.conf /etc/nginx/sites-enabled/trees.conf
```



```
35.227.191.94
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
X server Exit
Quick connect...
[...]
Name
.. requirements.txt
trees7bot.py
trees17v1.h5
treeset_labels.txt
[...]
Remote monitoring
Follow terminal folder
UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net
```

網站與憑證

1. 架設 NGINX

c. 建立組態檔

```
# 確認 symbolic link
```

```
ls /etc/nginx/sites-enabled/
```

```
# 確認組態檔
```

```
cat /etc/nginx/sites-enabled/your_project.conf
```

```
cat /etc/nginx/sites-enabled/trees.conf
```

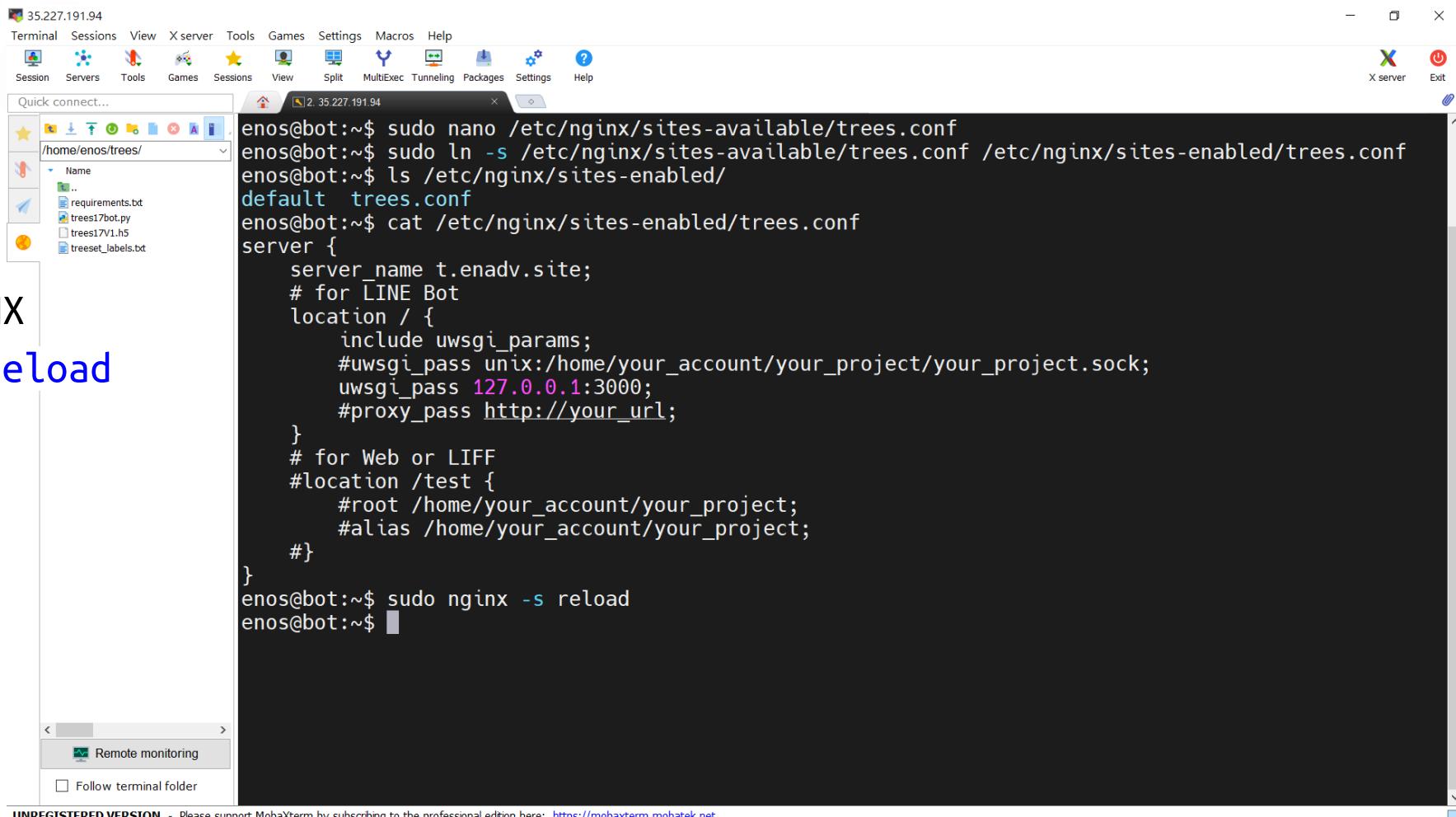
```
35.227.191.94
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
[...]
/home/enos/trees/
Name
.. requirements.txt
trees17bot.py
trees17V1.h5
treeset_labels.txt
[...]
2. 35.227.191.94
enos@bot:~$ sudo nano /etc/nginx/sites-available/trees.conf
enos@bot:~$ sudo ln -s /etc/nginx/sites-available/trees.conf /etc/nginx/sites-enabled/trees.conf
enos@bot:~$ ls /etc/nginx/sites-enabled/
default trees.conf
enos@bot:~$ cat /etc/nginx/sites-enabled/trees.conf
server {
    server_name t.enadv.site;
    # for LINE Bot
    location / {
        include uwsgi_params;
        #uwsgi_pass unix:/home/your_account/your_project/your_project.sock;
        uwsgi_pass 127.0.0.1:3000;
        #proxy_pass http://your_url;
    }
    # for Web or LIFF
    #location /test {
        #root /home/your_account/your_project;
        #index index.html index.htm;
    }
}
[...]
Remote monitoring
Follow terminal folder
UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net
X server Exit
```

網站與憑證

1. 架設 NGINX

d. 載入新組態

```
# 重新啟動 NGINX  
sudo nginx -s reload
```



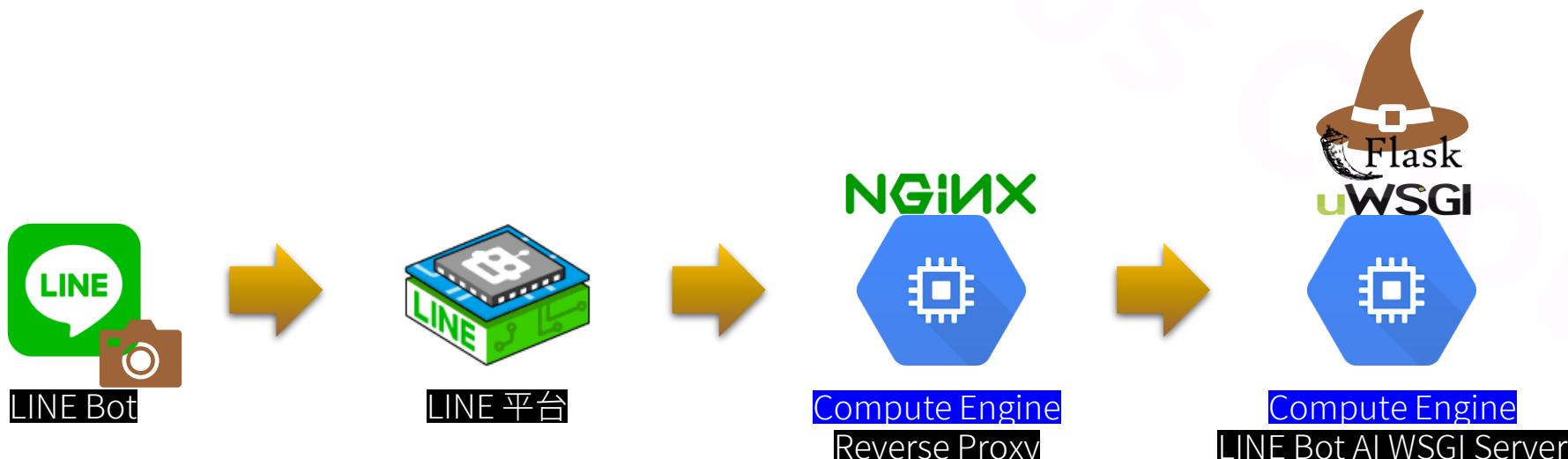
```
35.227.191.94  
Terminal Sessions View X server Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help  
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help  
Quick connect...  
enos@bot:~$ sudo nano /etc/nginx/sites-available/trees.conf  
enos@bot:~$ sudo ln -s /etc/nginx/sites-available/trees.conf /etc/nginx/sites-enabled/  
enos@bot:~$ ls /etc/nginx/sites-enabled/  
default trees.conf  
enos@bot:~$ cat /etc/nginx/sites-enabled/trees.conf  
server {  
    server_name t.enadv.site;  
    # for LINE Bot  
    location / {  
        include uwsgi_params;  
        #uwsgi_pass unix:/home/your_account/your_project/your_project.sock;  
        uwsgi_pass 127.0.0.1:3000;  
        #proxy_pass http://your_url;  
    }  
    # for Web or LIFF  
    #location /test {  
        #root /home/your_account/your_project;  
        #alias /home/your_account/your_project;  
    #}  
}  
enos@bot:~$ sudo nginx -s reload  
enos@bot:~$ █
```

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網站與憑證

免費憑證機器人 Certbot 特色

- <https://certbot.eff.org/>
- 採用 Let's Encrypt 免費憑證
- 自動安裝且自動更新憑證

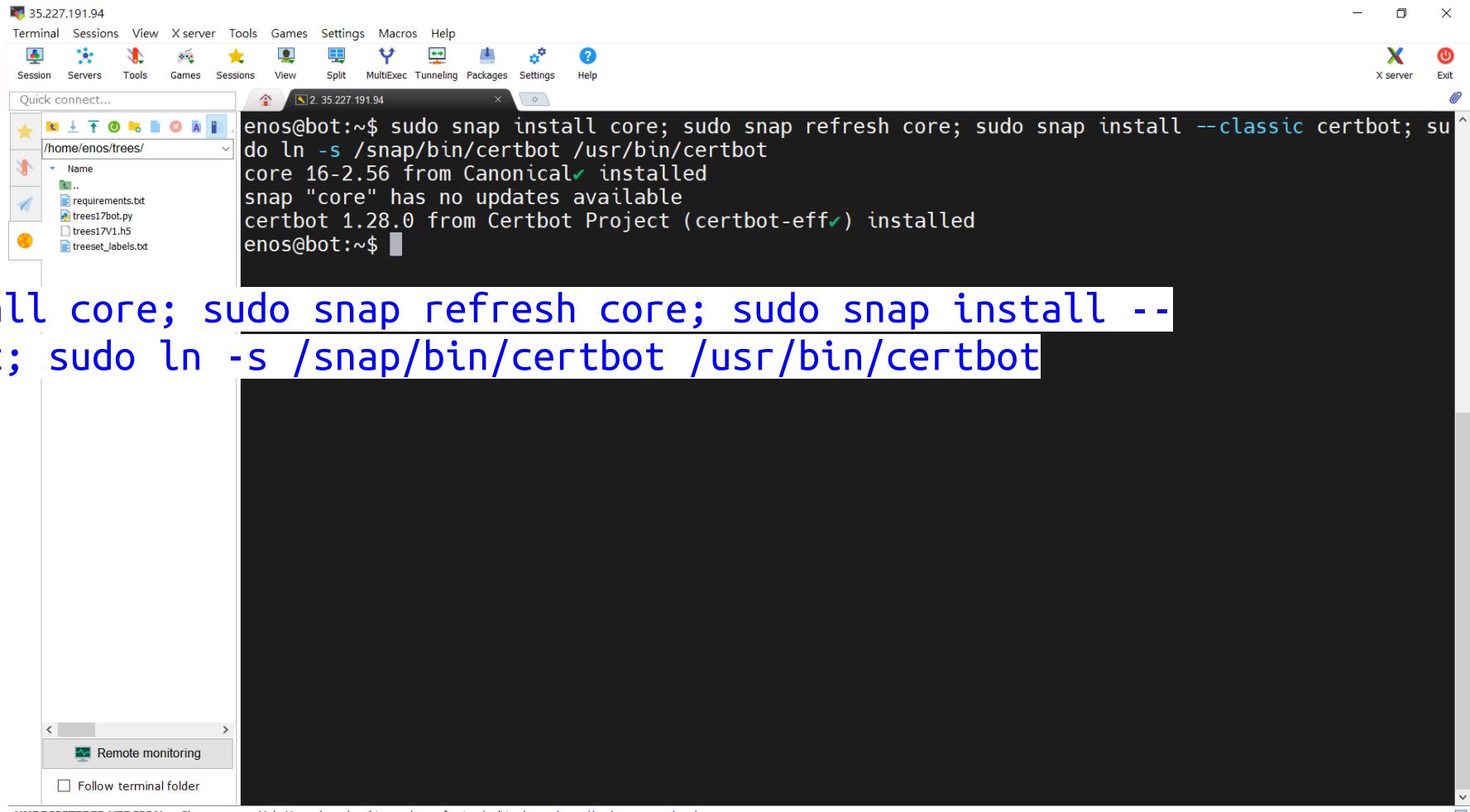


網站與憑證

2. 架設 Certbot

a. 安裝 Certbot

```
sudo snap install core; sudo snap refresh core; sudo snap install --classic certbot; sudo ln -s /snap/bin/certbot /usr/bin/certbot
```



The screenshot shows a terminal window titled '35.227.191.94' running on a Linux system. The terminal window has a dark background and contains the following command and its output:

```
enos@bot:~$ sudo snap install core; sudo snap refresh core; sudo snap install --classic certbot; sudo ln -s /snap/bin/certbot /usr/bin/certbot
core 16-2.56 from Canonical✓ installed
snap "core" has no updates available
certbot 1.28.0 from Certbot Project (certbot-eff✓) installed
enos@bot:~$
```

The terminal window is part of a larger interface with a navigation bar at the top and a sidebar on the left. The sidebar shows a file tree under '/home/enos/trees/' with files like 'requirements.txt', 'trees17bot.py', 'trees17V1.h5', and 'treeset_labels.txt'. At the bottom of the terminal window, there are options for 'Remote monitoring' and 'Follow terminal folder'. A watermark at the bottom of the terminal window reads 'UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>'.

網站與憑證

2. 架設 Certbot

b. 申請憑證

`sudo certbot --nginx`

The screenshot shows a terminal window titled '35.227.191.94' with the command `sudo certbot --nginx` being run. The terminal output indicates the installation of Certbot via snap and its configuration for Nginx. A cursor is visible in the terminal, with the text '輸入 email' (Input email) overlaid to indicate where user input is required.

```
35.227.191.94
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
[...]
/home/enos/trees/
Name
.. requirements.txt
trees17bot.py
trees17V1.h5
treeset_labels.txt
enos@bot:~$ sudo snap install core; sudo snap refresh core; sudo snap install --classic certbot; sudo ln -s /snap/bin/certbot /usr/bin/certbot
core 16-2.56 from Canonical✓ installed
snap "core" has no updates available
certbot 1.28.0 from Certbot Project (certbot-eff✓) installed
enos@bot:~$ sudo certbot --nginx
Saving debug log to /var/log/letsencrypt/letsencrypt.log
Enter email address (used for urgent renewal and security notices)
(Enter 'c' to cancel): [REDACTED] 輸入 email
```

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網站與憑證

2. 架設 Certbot

b. 申請憑證

`sudo certbot --nginx`

The screenshot shows a terminal window titled '35.227.191.94' running on a Linux system. The terminal session is connected to IP 35.227.191.94. The user has run the command `sudo certbot --nginx`. The output shows the installation of the 'core' snap, which includes Certbot. It then prompts for an email address for renewal notices, which is entered as `@gmail.com`. Finally, it asks the user to accept the Terms of Service, with the response `(Y)es/(N)o: Y` (Yes).

```
35.227.191.94
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
[...]
/home/enos/trees/
Name
.. requirements.txt
trees17bot.py
trees17V1.h5
treeset_labels.txt
enos@bot:~$ sudo snap install core; sudo snap refresh core; sudo snap install --classic certbot; sudo ln -s /snap/bin/certbot /usr/bin/certbot
core 16-2.56 from Canonical✓ installed
snap "core" has no updates available
certbot 1.28.0 from Certbot Project (certbot-eff✓) installed
enos@bot:~$ sudo certbot --nginx
Saving debug log to /var/log/letsencrypt/letsencrypt.log
Enter email address (used for urgent renewal and security notices)
(Enter 'c' to cancel): @gmail.com

-----
Please read the Terms of Service at
https://letsencrypt.org/documents/LE-SA-v1.2-November-15-2017.pdf. You must
agree in order to register with the ACME server. Do you agree?
(Y)es/(N)o: Y
```

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網站與憑證

2. 架設 Certbot

b. 申請憑證

`sudo certbot --nginx`

The screenshot shows a terminal window in MobaXterm connected to IP 35.227.191.94. The terminal session is titled '2. 35.227.191.94'. The user runs the command `sudo certbot --nginx`. The output shows the installation of the core snap, the creation of a symbolic link for certbot, the installation of certbot 1.28.0, and the execution of certbot --nginx. It prompts for an email address for urgent renewal notices, which is entered as '@gmail.com'. A message asks if the user agrees to the Terms of Service, with '(Y)es/(N)o:' followed by a question mark. The user's response is 'N' (No). A note at the bottom explains that the user can share their email with the Electronic Frontier Foundation for EFF news and campaigns.

```
35.227.191.94
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
[...]
/home/enos/trees/
Name
.. requirements.txt
trees17bot.py
trees17V1.h5
treeset_labels.txt

[...]
enos@bot:~$ sudo snap install core; sudo snap refresh core; sudo snap install --classic certbot; sudo ln -s /snap/bin/certbot /usr/bin/certbot
core 16-2.56 from Canonical✓ installed
snap "core" has no updates available
certbot 1.28.0 from Certbot Project (certbot-eff✓) installed
enos@bot:~$ sudo certbot --nginx
Saving debug log to /var/log/letsencrypt/letsencrypt.log
Enter email address (used for urgent renewal and security notices)
(Enter 'c' to cancel): @gmail.com

-----
Please read the Terms of Service at
https://letsencrypt.org/documents/LE-SA-v1.2-November-15-2017.pdf. You must
agree in order to register with the ACME server. Do you agree?
(Y)es/(N)o: Y

-----
Would you be willing, once your first certificate is successfully issued, to
share your email address with the Electronic Frontier Foundation, a founding
partner of the Let's Encrypt project and the non-profit organization that
develops Certbot? We'd like to send you email about our work encrypting the web,
EFF news, campaigns, and ways to support digital freedom.

(Y)es/(N)o: [REDACTED] 接收其他訊息，N

[...]
UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net
```

網站與憑證

2. 架設 Certbot

b. 申請憑證

`sudo certbot --nginx`

The screenshot shows a terminal window titled '35.227.191.94' running on the MobaXterm application. The terminal interface includes a menu bar with options like Terminal, Sessions, View, X server, Tools, Games, Settings, Macros, Help, and a toolbar with icons for Session, Servers, Tools, Games, Sessions, View, Split, MultiExec, Tunneling, Packages, Settings, and Help.

The terminal session is connected to IP address 35.227.191.94. The command `sudo certbot --nginx` is being executed. The output shows:

```
certbot 1.28.0 from Certbot Project (certbot-eff✓) installed  
enos@bot:~$ sudo certbot --nginx  
Saving debug log to /var/log/letsencrypt/letsencrypt.log  
Enter email address (used for urgent renewal and security notices)  
(Enter 'c' to cancel): @gmail.com  
  
-----  
Please read the Terms of Service at  
https://letsencrypt.org/documents/LE-SA-v1.2-November-15-2017.pdf. You must  
agree in order to register with the ACME server. Do you agree?  
(Y)es/(N)o: Y  
  
-----  
Would you be willing, once your first certificate is successfully issued, to  
share your email address with the Electronic Frontier Foundation, a founding  
partner of the Let's Encrypt project and the non-profit organization that  
develops Certbot? We'd like to send you email about our work encrypting the web,  
EFF news, campaigns, and ways to support digital freedom.  
  
-----  
(Y)es/(N)o: N  
Account registered.  
  
Which names would you like to activate HTTPS for?  
-----  
1: t.enadv.site  
----- 指定憑證域名，1  
Select the appropriate numbers separated by commas and/or spaces, or leave input  
blank to select all options shown (Enter 'c' to cancel):
```

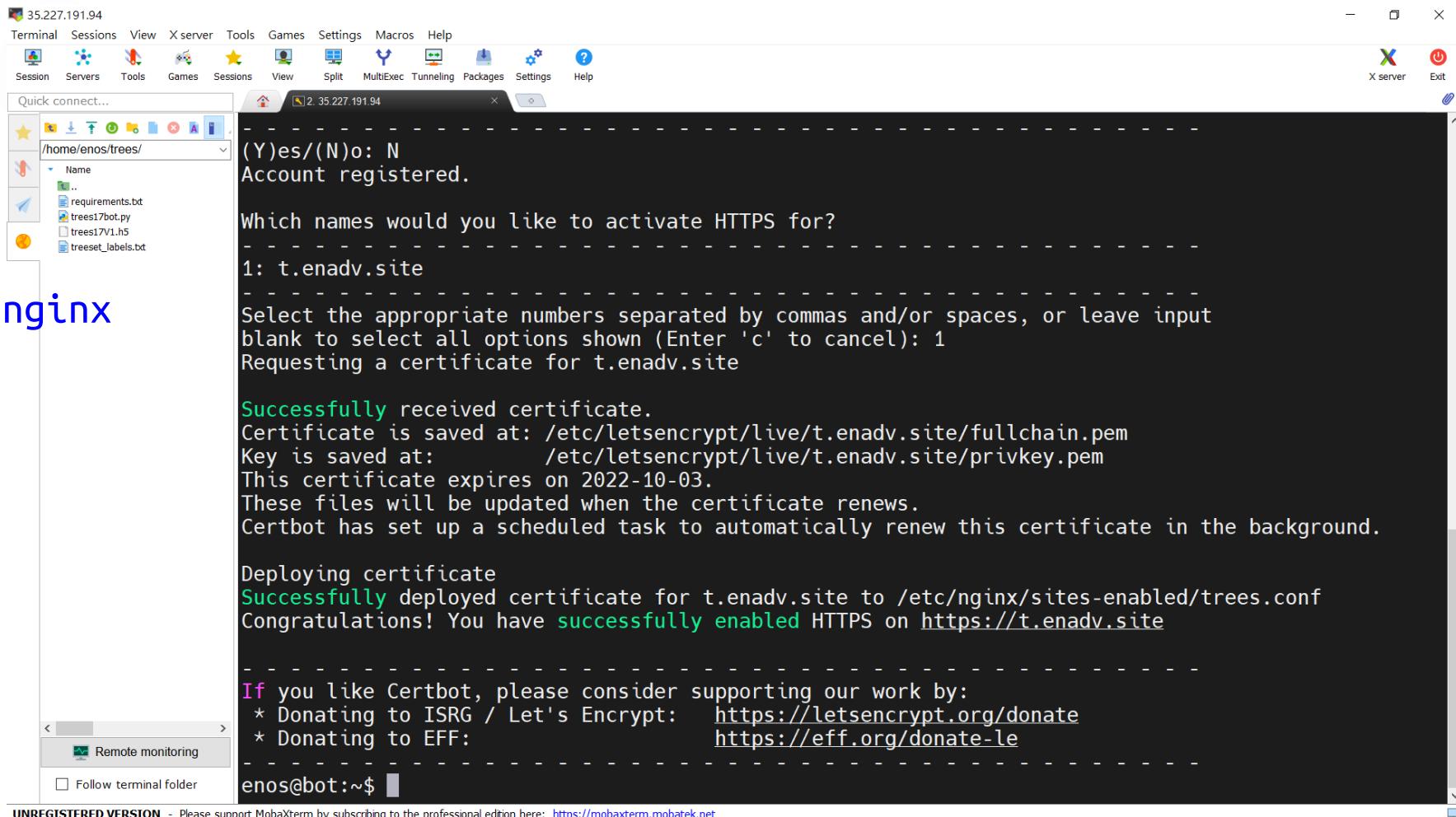
At the bottom of the terminal window, there is a note: "UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>".

網站與憑證

2. 架設 Certbot

b. 申請憑證

`sudo certbot --nginx`



The screenshot shows a terminal window in MobaXterm connected to IP 35.227.191.94. The terminal displays the output of the `sudo certbot --nginx` command. The process starts with account registration, followed by selecting names for HTTPS activation (choosing 't.enadv.site'), and then requesting a certificate for that domain. It successfully receives the certificate, saves it to `/etc/letsencrypt/live/t.enadv.site/fullchain.pem` and `/etc/letsencrypt/live/t.enadv.site/privkey.pem`, and notes its expiration date (2022-10-03). The terminal also mentions a scheduled task for automatic renewal. Finally, it shows the certificate has been deployed to the Nginx configuration file `/etc/nginx/sites-enabled/trees.conf` and that HTTPS is now enabled on `https://t.enadv.site`. A note at the bottom encourages supporting Certbot's work.

```
(Y)es/(N)o: N
Account registered.

Which names would you like to activate HTTPS for?
-----
1: t.enadv.site
-----
Select the appropriate numbers separated by commas and/or spaces, or leave input
blank to select all options shown (Enter 'c' to cancel): 1
Requesting a certificate for t.enadv.site

Successfully received certificate.
Certificate is saved at: /etc/letsencrypt/live/t.enadv.site/fullchain.pem
Key is saved at: /etc/letsencrypt/live/t.enadv.site/privkey.pem
This certificate expires on 2022-10-03.
These files will be updated when the certificate renews.
Certbot has set up a scheduled task to automatically renew this certificate in the background.

Deploying certificate
Successfully deployed certificate for t.enadv.site to /etc/nginx/sites-enabled/trees.conf
Congratulations! You have successfully enabled HTTPS on https://t.enadv.site

-----
If you like Certbot, please consider supporting our work by:
* Donating to ISRG / Let's Encrypt: https://letsencrypt.org/donate
* Donating to EFF: https://eff.org/donate-le
-----
enos@bot:~$
```

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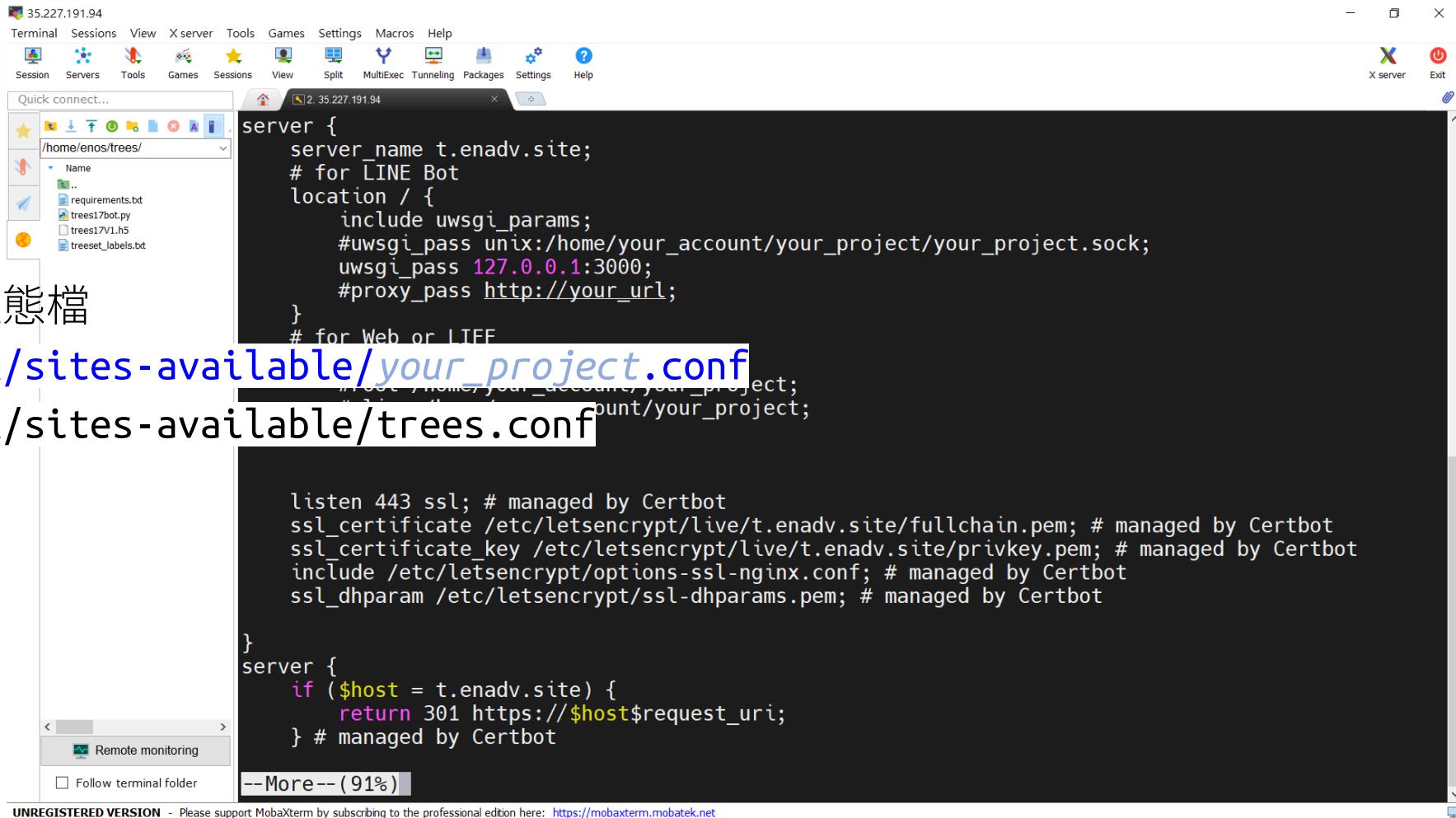
網站與憑證

2. 架設 Certbot

b. 申請憑證

觀察 NGINX 組態檔

```
more /etc/nginx/sites-available/your_project.conf  
more /etc/nginx/sites-available/trees.conf
```



```
server {  
    server_name t.enadv.site;  
    # for LINE Bot  
    location / {  
        include uwsgi_params;  
        #uwsgi_pass unix:/home/your_account/your_project/your_project.sock;  
        uwsgi_pass 127.0.0.1:3000;  
        #proxy_pass http://your_url;  
    }  
    # for Web or LTTEF  
}  
  
listen 443 ssl; # managed by Certbot  
ssl_certificate /etc/letsencrypt/live/t.enadv.site/fullchain.pem; # managed by Certbot  
ssl_certificate_key /etc/letsencrypt/live/t.enadv.site/privkey.pem; # managed by Certbot  
include /etc/letsencrypt/options-ssl-nginx.conf; # managed by Certbot  
ssl_dhparam /etc/letsencrypt/ssl-dhparams.pem; # managed by Certbot  
  
}  
server {  
    if ($host = t.enadv.site) {  
        return 301 https://$host$request_uri;  
    } # managed by Certbot  
}  
--More-- (91%)
```

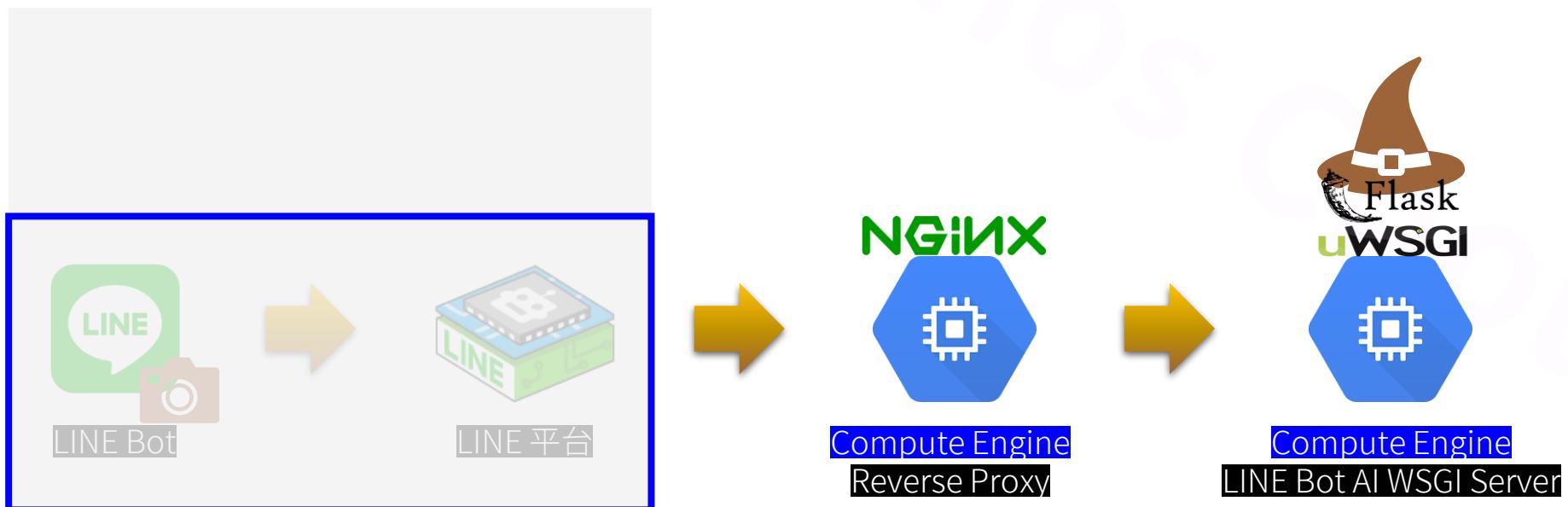
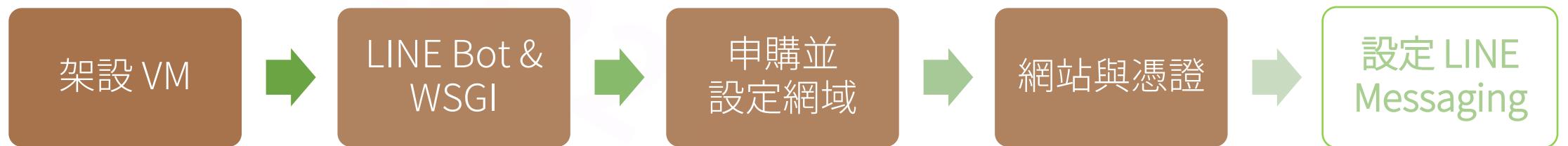
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網站與憑證

2. 架設 Certbot

c. (移除憑證)

- ① `sudo certbot delete --cert-name your_domain`
- ② 手動移除 `/etc/nginx/sites-available/your_project.conf` 中 Certbot
增加的設定



設定 LINE Messaging

1. 調整 LINE Messaging

a. 調整 Webhook URL

The screenshot shows the LINE Messaging API settings page. On the left, there's a sidebar with 'Console home', 'Providers' (selected), 'Search...', 'Admin', 'Tools', and 'Support'. The main area shows the breadcrumb 'TOP > test > trees > Messaging API'. Under 'Available APIs', there are two options: 'REPLY_MESSAGE' and 'PUSH_MESSAGE'. The 'Webhook settings' section contains a 'Webhook URL' field set to 'https://t.enadv.site/callback', with 'Verify' and 'Edit' buttons. A green toggle switch is turned on for 'Use webhook'. Below it, another green toggle switch is turned off for 'Webhook redelivery'. At the bottom, a green toggle switch is turned on for 'Error statistics aggregation'. The footer includes links to '© LINE Corporation', 'Terms and policies', 'About trademarks', and 'Found any problems? Please use our inquiry form'. It also features language and site selection dropdowns for 'Family sites' and 'English'.

設定 LINE Messaging

1. 調整 LINE Messaging

a. 調整 Webhook URL

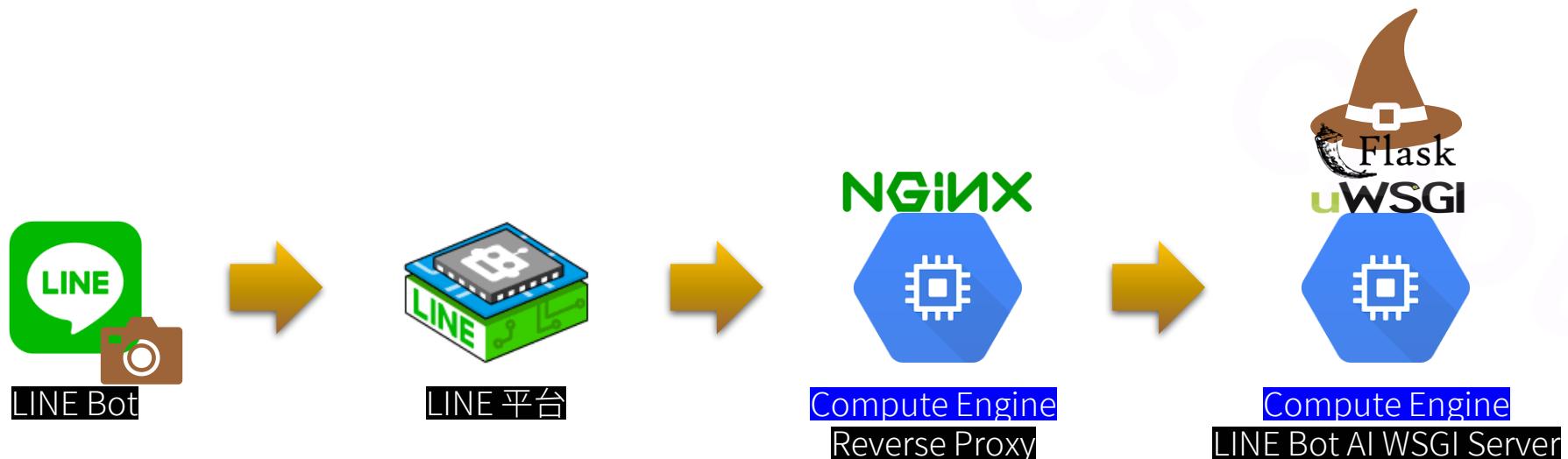
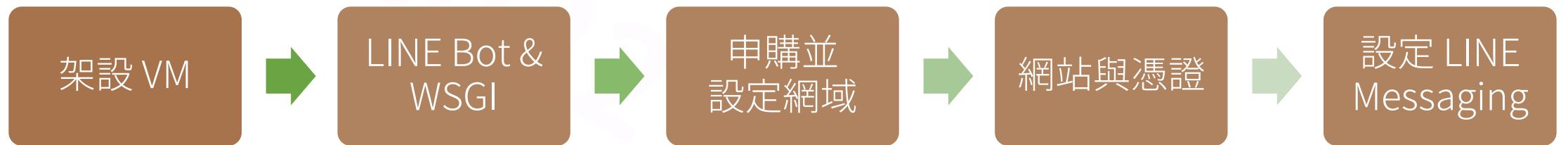
The screenshot shows the LINE Messaging API settings page. On the left, there's a sidebar with 'Console home', 'Providers' (selected), 'Search...', 'Admin', 'Tools', and 'Support'. The main area shows 'Available APIs' with 'REPLY_MESSAGE' and 'PUSH_MESSAGE'. Under 'Webhook settings', the 'Webhook URL' is set to 'https://tenadv.site/callback', and a 'Verify' button is visible. A modal dialog box is open, displaying 'Success' above an 'OK' button. Below the modal, there are 'Use webhook' (switched on), 'Webhook redelivery' (switched off), and 'Error statistics aggregation' (switched on). At the bottom, there are links for '© LINE Corporation', 'Terms and policies', 'About trademarks', and 'Found any problems? Please use our inquiry form'. There are also buttons for 'Family sites' and 'English'.

設定 LINE Messaging

1. 調整 LINE Messaging

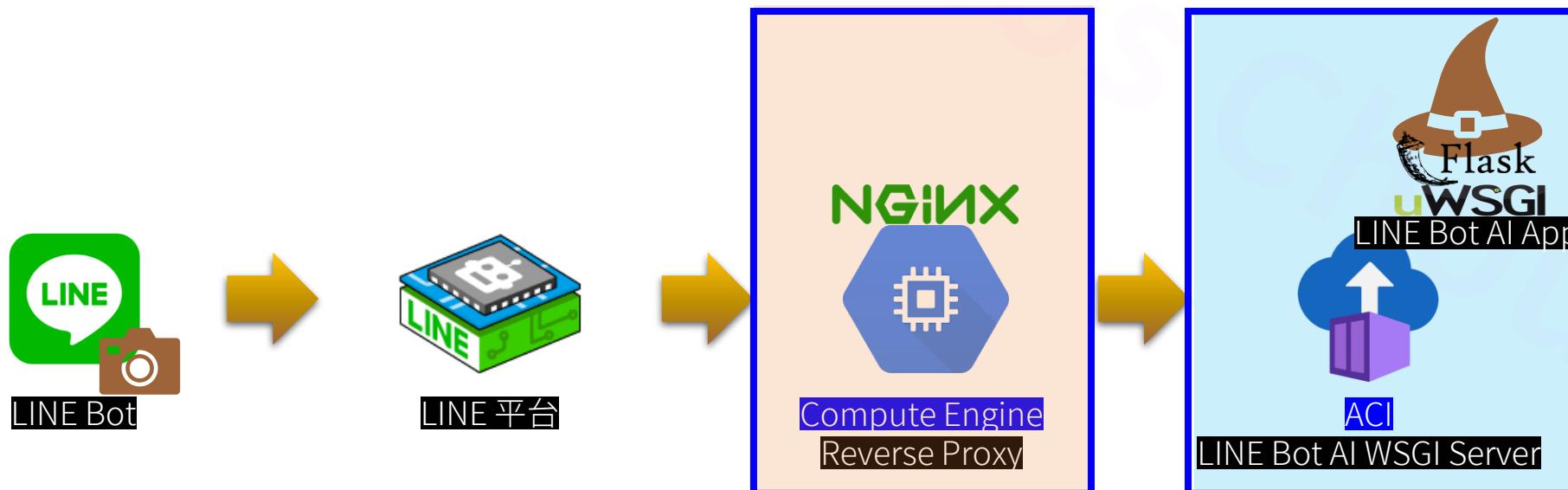
b. LINE 測試





Solution 2 - Mixed 部署

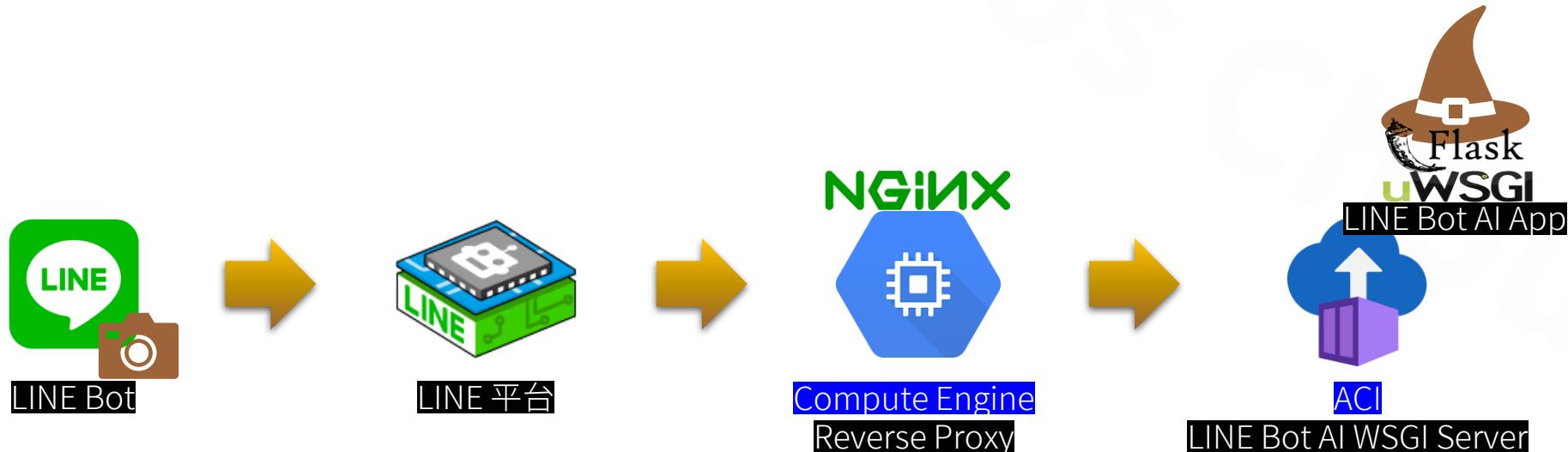
1. 長期可用且廉價的硬體環境 ... Google Compute Engine + Azure ACI
2. Flask as Web Server 的替代方案 ... NGINX + Domain + uWSGI
3. 長期可用且廉價的 SSL 網域方案 ... Let's Encrypt + Certbot

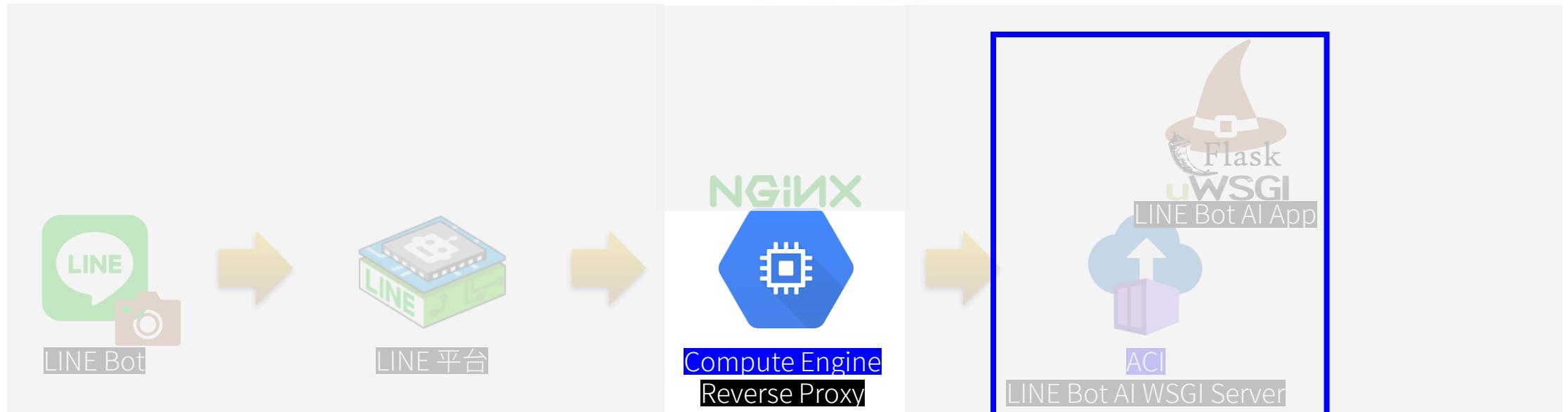


任務

1. 上傳程式至 Cloud Shell
2. 建立 Container 並推送至容器登錄
3. 部署 Container 至容器執行個體
4. 調整 GCE NGINX 轉導設定

流程





LINE Bot & WSGI

1. 啟動容器登入

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the Microsoft Azure logo, a search bar, and various navigation icons. The main content area is titled "Azure 服務" (Azure Services) and features a "Container Registry" blade. The "Container Registry" blade has a "Create" button highlighted with a pink box. Below it, there's a "Description" section with text about managing container registries. To the right of the main content, there are sections for "上次檢視時間" (Last checked time), "Microsoft 提供的免費訓練" (Free training provided by Microsoft), and "實用連結" (Useful links). At the bottom, there are links to "Microsoft Learn", "Azure Monitor", "Microsoft Defender", and "Cost Management". The URL in the address bar is <https://portal.azure.com/#blade/HubsExtension/BrowseResourceBlade/resourceType/Microsoft.ContainerRegistry%2Fregistries>.

LINE Bot & WSGI

1. 啟動容器登入

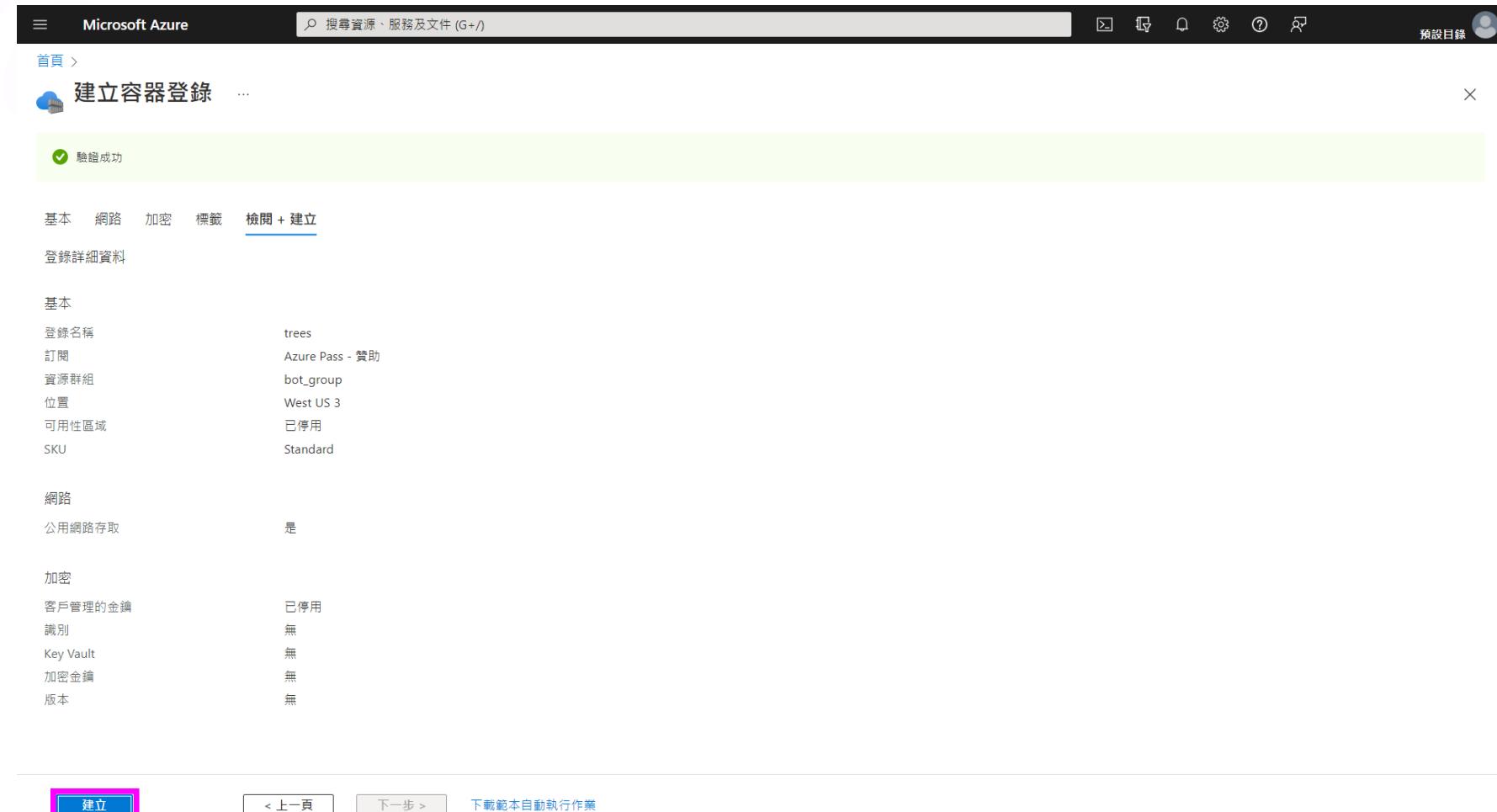
The screenshot shows the '建立容器登錄' (Create Container Registry) page in the Microsoft Azure portal. The '基本' (Basic) tab is selected. Key configuration details include:

- 訂用帳戶 ***: Azure Pass - 贊助
- 資源群組 ***: bot_group
- 登錄名稱 ***: trees.azurecr.io # global unique
- 位置 ***: West US 3
- 可用性區域**: 已啟用
- SKU ***: 標準

At the bottom, there are navigation buttons: '檢閱 + 建立' (Review + Create), '< 上一頁' (Previous Page), and '下一步: 網路' (Next Step: Network).

LINE Bot & WSGI

1. 啟動容器登入



The screenshot shows the Microsoft Azure portal interface for creating a container registry. The title bar reads "Microsoft Azure". The main content area is titled "建立容器登錄" (Create Container Registry) with a "驗證成功" (Verification successful) message. The "檢閱 + 建立" (Review + Create) tab is selected. The "登錄詳細資料" (Login details) section displays the following configuration:

基本	網路	加密	標籤
登錄名稱 訂閱 資源群組 位置 可用性區域 SKU	trees Azure Pass - 贊助 bot_group West US 3 已停用 Standard		
網路	公用網路存取 是		
加密			
客戶管理的金鑰 識別 Key Vault 加密金鑰 版本	已停用 無 無 無		

At the bottom, there are buttons for "建立" (Create), "< 上一頁" (Previous page), "下一步 >" (Next step), and "下載範本自動執行作業" (Download template for automated deployment).

LINE Bot & WSGI

1. 啟動容器登入

The screenshot shows the Microsoft Azure Container Registry deployment status page for the 'Microsoft.ContainerRegistry' service. The main message is '您的部署已完成' (Deployment completed) with a checkmark icon. Deployment details include:

- 部署名稱: Microsoft.ContainerRegistry
- 訂用帳戶: Azure Pass - 賽助
- 資源群組: bot_group
- 開始時間: 7/7/2022 下午 6:47:20
- 相互關聯識別碼: 3f09d40b-edcc-4e6e-a64d-f9e5d629dc02

Below the main message, there are two sections: '部署詳細資料 (下載)' (Deployment details) and '後續步驟' (Next steps). A prominent blue button labeled '前往資源' (Go to resource) is located at the bottom of the main content area.

On the right side of the page, there are several promotional cards:

- 成本管理**: 接收通知以掌握預算，並避免帳單上出現非預期的費用。 [設定成本警示 >](#)
- 適用於雲端的 Microsoft Defender**: 保護應用程式及基礎結構。 [移至適用於雲端的 Microsoft Defender >](#)
- 免費 Microsoft 教學課程**: 立即開始學習。 [立即開始學習 >](#)
- 諮詢專家**: Azure 專家是服務提供者合作夥伴，可協助您在 Azure 上管理資產，也是您的第一線支援。 [尋找 Azure 專家 >](#)

LINE Bot & WSGI

2. 準備程式碼

a. 下載範例程式並調整

- ① trees17bot.py # secret, token, model, labels
- ② trees17V1.h5
- ③ treeset_labels.txt
- ④ other tree samples

LINE Bot & WSGI

2. 準備程式碼

b. 製作 requirements.txt

```
line-bot-sdk
flask
pillow
tensorflow==2.4.4
uwsgi
```

LINE Bot & WSGI

2. 準備程式碼

c. 製作 Dockerfile

Note

調整 *your_module*

```
FROM ubuntu:18.04
WORKDIR /your_module
COPY * ./
ENV TZ=Asia/Taipei
RUN mkdir var && \
    ln -snf /usr/share/zoneinfo/$TZ /etc/localtime && \
    echo $TZ > /etc/timezone && \
    apt-get update && \
    apt-get install -y python3-pip tzdata && \
    dpkg-reconfigure -f noninteractive tzdata && \
    python3 -m pip install --upgrade pip && \
    python3 -m pip install -r requirements.txt
CMD uwsgi -w your_module:app --http-socket :$PORT
```

LINE Bot & WSGI

2. 準備程式碼

d. 啟動 Cloud Shell

The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with the Microsoft Azure logo, a search bar, and various icons for account settings and notifications. Below the navigation bar is the 'Azure 服務' (Azure Services) section, which includes links for '建立資源' (Create Resource), '虛擬機器' (Virtual Machines), '容器執行個體' (Container Instances), '容器登錄' (Container Registry), 'App Service 方案' (App Service Plan), '防火牆原則' (Firewall Rules), '應用程式服務' (Application Services), '資源群組' (Resource Groups), '認知服務' (Cognitive Services), and '更多服務' (More Services). The main area is titled 'Resources' and shows a 'Recent' tab with a list of recent resources. The list includes:

名稱	類型	上次檢視時間
trees	容器登錄	8 分鐘之前
bot_group	資源群組	8 分鐘之前
bot-ip	公用 IP 位址	2 天前
bot	虛擬機器	2 天前

Below the resource list is a link to '查看全部' (View All). At the bottom of the page is an 'Azure Cloud Shell' terminal window. The terminal window has a header with icons for Bash, PowerShell, and Python. The terminal output shows:

```
Bash ⓘ ? ⓘ ⌂ ⓘ { } ⓘ
Requesting a Cloud Shell. Succeeded.
Connecting terminal...
Welcome to Azure Cloud Shell
Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell
enos@Azure:~$
```

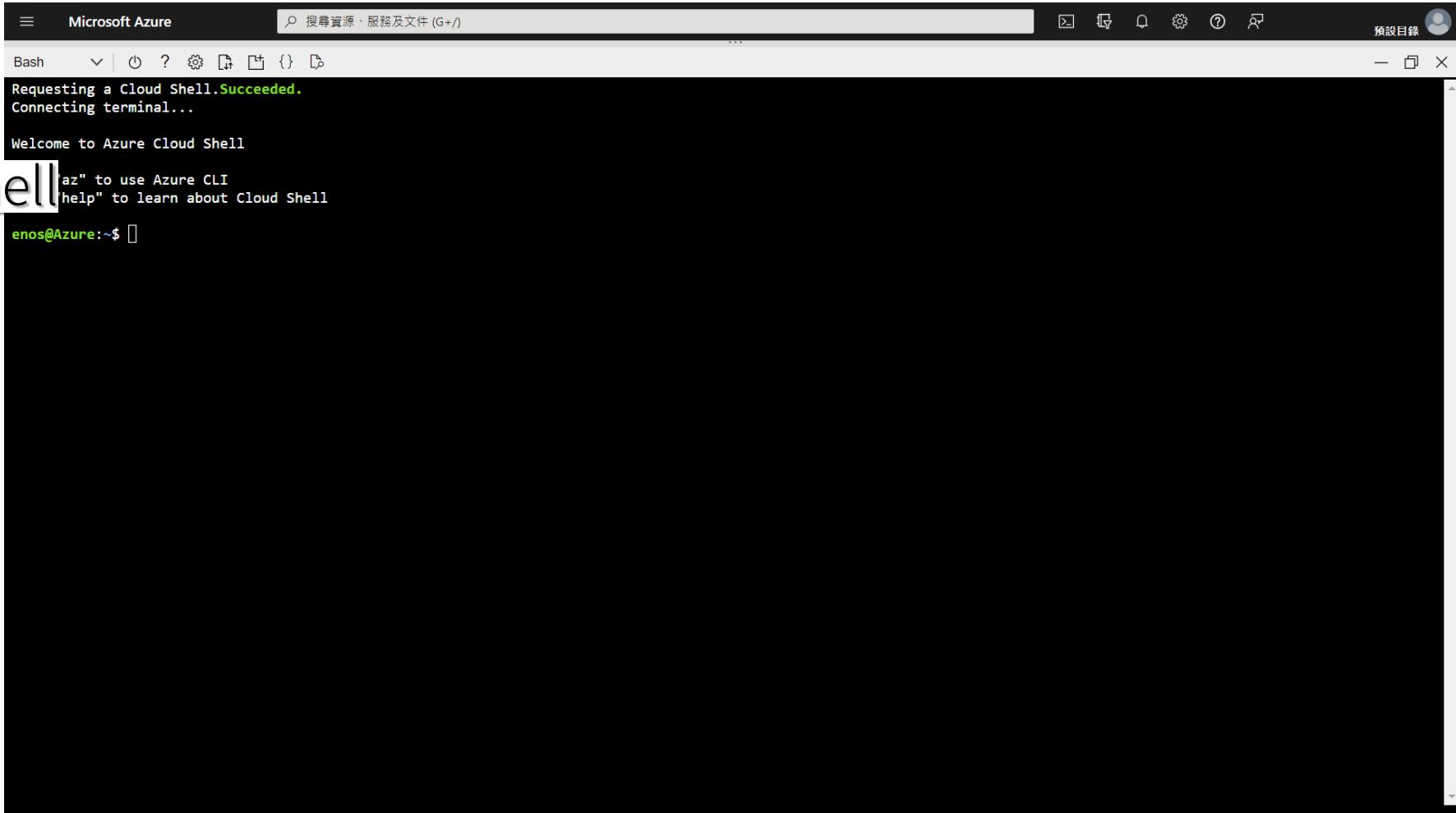
Overlaid on the terminal window are two pink text annotations:

- 'Create storage' is positioned above the terminal window.
- '初次使用選擇 Bash' is positioned below the terminal window.

LINE Bot & WSGI

2. 準備程式碼

d. 啟動 Cloud Shell



The screenshot shows a Microsoft Azure Cloud Shell terminal window. The title bar says "Microsoft Azure" and "Bash". The main area displays the following text:

```
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell
az" to use Azure CLI
"help" to learn about Cloud Shell

enos@Azure:~$
```

The terminal is black with white text. The status message "Succeeded." is highlighted in green. The prompt "enos@Azure:~\$" is at the bottom.

LINE Bot & WSGI

2. 準備程式碼

e. 上傳下列程式並置於專案目錄

① trees17bot.py

② trees17V1.py

③ treeset_labels.txt

④ Dockerfile

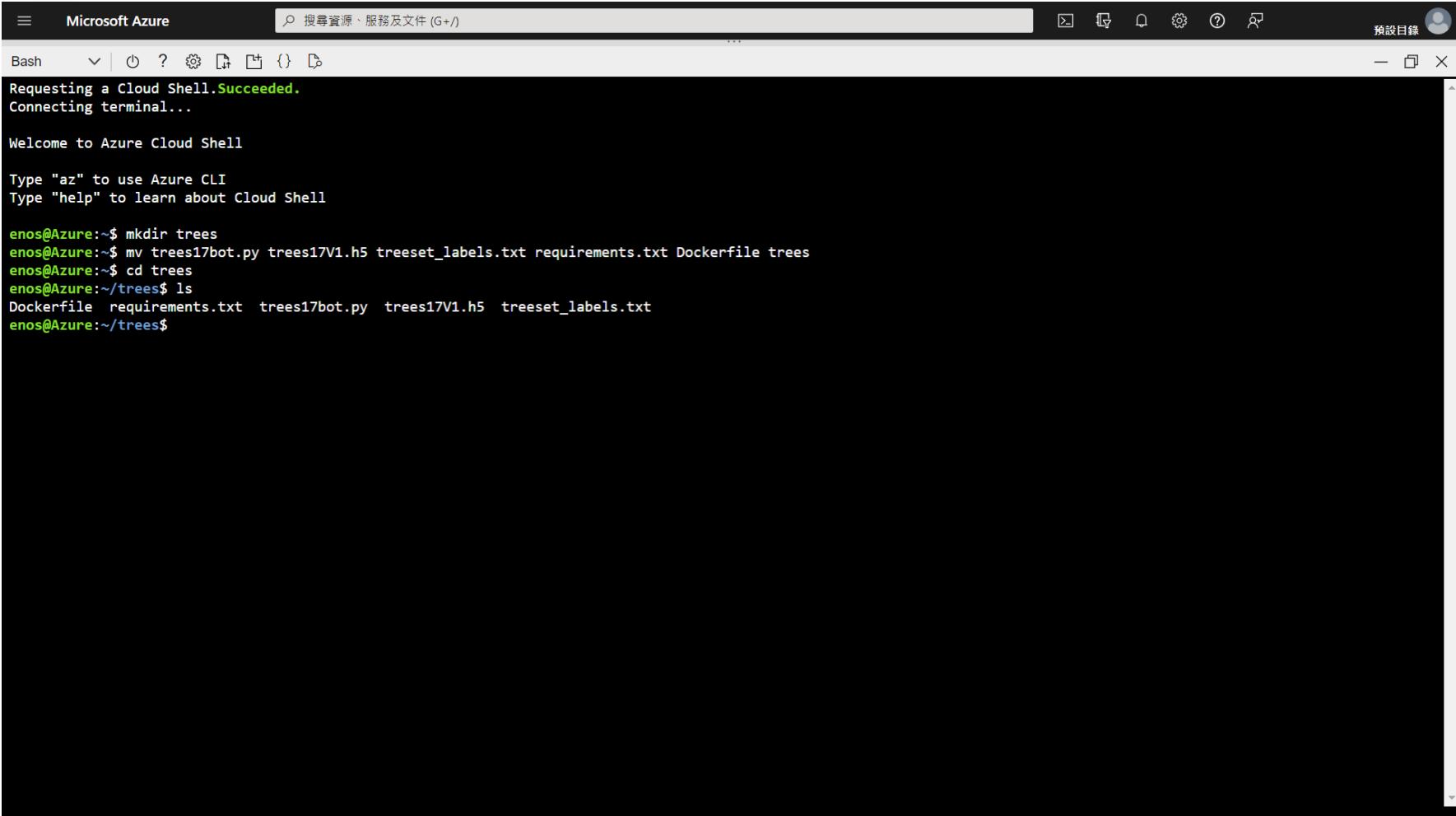
⑤ requirements.txt



LINE Bot & WSGI

2. 準備程式碼

f. 移至專案目錄



The screenshot shows a Microsoft Azure Cloud Shell interface. The title bar says "Microsoft Azure" and "Bash". The terminal window displays the following command history:

```
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

enos@Azure:~$ mkdir trees
enos@Azure:~$ mv trees17bot.py trees17V1.h5 treeset_labels.txt requirements.txt Dockerfile trees
enos@Azure:~$ cd trees
enos@Azure:~/trees$ ls
Dockerfile requirements.txt trees17bot.py trees17V1.h5 treeset_labels.txt
enos@Azure:~/trees$
```

LINE Bot & WSGI

3. 建立 Container

a. 製作並推送 Container 至容器登錄

```
az acr build --registry your_registry --image your_container:your_tag .
az acr build --registry trees --image trees17:0.0.0 .
```

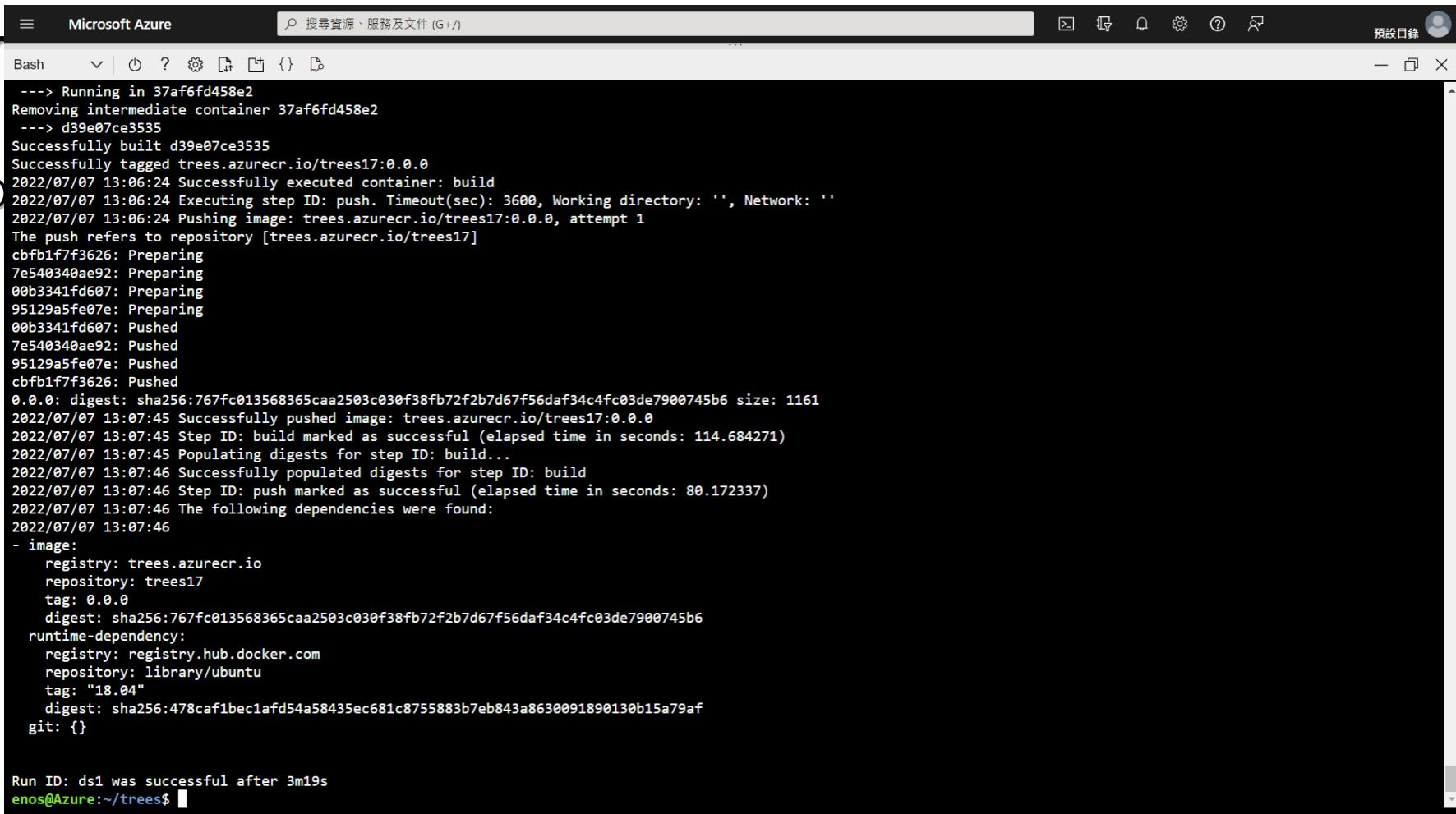
LINE Bot & WSGI

3. 建立 Container

a. 製作並推送 Container

```
az acr build --
```

```
az acr build --
```



```
---> Running in 37af6fd458e2
Removing intermediate container 37af6fd458e2
---> d39e07ce3535
Successfully built d39e07ce3535
Successfully tagged trees.azurecr.io/trees17:0.0.0
2022/07/07 13:06:24 Successfully executed container: build
2022/07/07 13:06:24 Executing step ID: push. Timeout(sec): 3600, Working directory: '', Network: ''
2022/07/07 13:06:24 Pushing image: trees.azurecr.io/trees17:0.0.0, attempt 1
The push refers to repository [trees.azurecr.io/trees17]
cbfb1f7f3626: Preparing
7e540340ae92: Preparing
00b3341fd607: Preparing
95129a5fe07e: Preparing
00b3341fd607: Pushed
7e540340ae92: Pushed
95129a5fe07e: Pushed
cbfb1f7f3626: Pushed
0.0.0: digest: sha256:767fc013568365caa2503c030f38fb72f2b7d67f56daf34c4fc03de7900745b6 size: 1161
2022/07/07 13:07:45 Successfully pushed image: trees.azurecr.io/trees17:0.0.0
2022/07/07 13:07:45 Step ID: build marked as successful (elapsed time in seconds: 114.684271)
2022/07/07 13:07:45 Populating digests for step ID: build...
2022/07/07 13:07:46 Successfully populated digests for step ID: build
2022/07/07 13:07:46 Step ID: push marked as successful (elapsed time in seconds: 80.172337)
2022/07/07 13:07:46 The following dependencies were found:
2022/07/07 13:07:46
- image:
    registry: trees.azurecr.io
    repository: trees17
    tag: 0.0.0
    digest: sha256:767fc013568365caa2503c030f38fb72f2b7d67f56daf34c4fc03de7900745b6
    runtime-dependency:
        registry: registry.hub.docker.com
        repository: library/ubuntu
        tag: "18.04"
        digest: sha256:478caf1bec1afdf54a58435ec681c8755883b7eb843a8630091890130b15a79af
    git: {}

Run ID: ds1 was successful after 3m19s
enos@Azure:~/trees$
```

LINE Bot & WSGI

3. 建立 Container

b. 授權容器使用

```
az acr update -n your_registry --admin-enabled true
```

```
az acr update -n trees --admin-enabled
```

```
"networkRuleSet": null,  
"policies": {  
    "exportPolicy": {  
        "status": "enabled"  
    },  
    "quarantinePolicy": {  
        "status": "disabled"  
    },  
    "retentionPolicy": {  
        "days": 7,  
        "lastUpdatedTime": "2022-07-07T13:00:20.102439+00:00",  
        "status": "disabled"  
    },  
    "privateEndpointConnections": [],  
    "provisioningState": "Succeeded",  
    "publicNetworkAccess": "Enabled",  
    "resourceGroup": "bot_group",  
    "sku": {  
        "name": "Standard",  
        "tier": "Standard"  
    },  
    "status": null,  
    "systemData": {  
        "createdAt": "2022-07-07T13:00:18.911724+00:00",  
        "createdBy": "catchsob@gmail.com",  
        "createdByType": "User",  
        "lastModifiedAt": "2022-07-07T13:24:04.623816+00:00",  
        "lastModifiedBy": "catchsob@gmail.com",  
        "lastModifiedByType": "User"  
    },  
    "tags": {},  
    "type": "Microsoft.ContainerRegistry/registries",  
    "zoneRedundancy": "Disabled"  
}  
enos@Azure:~/trees$
```

LINE Bot & WSGI

4. 部署 ACI

a. 建立容器執行個體

The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with the Microsoft Azure logo, a search bar, and various icons. Below the navigation bar, the main content area has a title "Azure 服務" (Azure Services). There are several service icons: "建立資源" (Create Resource), "容器登錄" (Container Registry), "應用程式服務" (App Service), "容器執行個體" (Container Instance), and "虛擬機器" (Virtual Machine). A callout box highlights the "容器執行個體" icon, which is selected. The "Container Instance" blade is open, showing a "建立" (Create) button highlighted with a pink rectangle. Below the blade, there's a "Resources" section with a "Recent" tab selected, displaying four items: "trees" (Container Registry), "bot_group" (Resource Group), "bot-ip" (Public IP Address), and "bot" (Virtual Machine). To the right of the blade, there's a "描述" (Description) section with text about using Container Instances and a "上次檢視時間" (Last checked time) section showing times like "幾秒鐘前" (A few seconds ago), "2 小時之前" (2 hours ago), "2 天前" (2 days ago), and "2 天前" (2 days ago). At the bottom, there are sections for "瀏覽" (Browse) and "工具" (Tools), each with several icons.

LINE Bot & WSGI

4. 部署 ACI

a. 建立容器執行個體

Microsoft Azure

搜尋資源、服務及文件 (G+)

首頁 >

建立容器執行個體 ...

執行個體 (ACI) 可讓您快速且輕鬆地在 Azure 上執行容器，而不須管理伺服器或學習新工具。ACI 提供以秒為單位的計費，讓在雲端上執行容器的成本降到最低。深入了解 Azure 容器執行個體

專案詳細資料

選取用以管理部署資源及成本的訂用帳戶。使用像資料夾這樣的資源群組來安排及管理您的所有資源。

訂用帳戶 * ①

Azure Pass - 贊助

資源群組 * ①

bot_group

新建

容器詳細資料

容器名稱 * ①

treeswsqi

區域 * ①

(US) West US 3

可用性區域 ①

None

映像來源 * ①

快速入門映像

Azure Container Registry

其他登錄

登錄 * ①

trees

映像 * ①

trees17

映像標籤 * ①

0.0.0

檢閱 + 建立

< 上一步

下一步：網路 >

LINE Bot & WSGI

4. 部署 ACI

a. 建立容器執行個體

The screenshot shows the Microsoft Azure portal interface for creating a Container Instance. The top navigation bar includes 'Microsoft Azure', a search bar, and various icons. The main title is '建立容器執行個體' (Create Container Instance). Below it, there are tabs for '檢閱 + 建立' (Review + Create), '< 上一步' (Previous Step), and '下一步：進階 >' (Next Step: Advanced).

The configuration section for '建立容器執行個體' (Create Container Instance) includes:

- 網路 (Network):** Set to '公用' (Public). A note says: '個體從三個網路選項中進行選擇: [公用] 則將為容器執行個體建立公用 IP 位址。[私人] 則允許您為容器執行個體選擇新的或現有的虛擬網路。Windows 容器尚無法使用。[無] 將不會建立公用 IP 或虛擬網路。您仍能使用命令列存取容器記錄檔。'
- DNS 名稱標籤 (DNS Label):** .westus3.azurecontainer.io
- 連接埠 (Ports):** Shows two entries:
 - Port 80: Target Port 3000, Protocol TCP.
 - Port 3000: Target Port 3000, Protocol TCP.

A pink box highlights the '3000' port entry. To the right of the screenshot, a pink text overlay reads: '此 PORT 不須另外開通防火牆' (This PORT does not require additional firewall opening).

LINE Bot & WSGI

4. 部署 ACI

a. 建立容器執行個體

The screenshot shows the 'Create Container Instance' step in the Azure portal. In the 'Environment variables' section, there is a table with one row. The first column has two dropdowns, both set to '否'. The second column is labeled 'Name' with 'PORT' typed in. The third column is labeled 'Value' with '3000' typed in. Below the table, there is a 'Command line' input field containing '[]'. A tooltip below the input field says 'Example: ["/bin/bash", "-c", "echo hello; sleep 100000"]'. At the bottom of the screen, there are three buttons: 'Check + Create' (highlighted in blue), '< Previous Step', and 'Next Step: Labels >'.

Container 使用的 PORT 以環境變數指定

LINE Bot & WSGI

4. 部署 ACI

a. 建立容器執行個體

The screenshot shows the '建立容器執行個體' (Create Container Instance) step in the Azure portal. A green checkmark icon indicates '驗證成功' (Validation successful). The page displays configuration details across three tabs: '基本' (Basic), '網路' (Network), and '進階' (Advanced). The 'Basic' tab contains the following configuration:

設定	值
訂用帳戶	Azure Pass - 贊助
資源群組	bot_group
區域	West US 3
容器名稱	treeswsgi
映像類型	Private
映像登錄登入伺服器	trees.azurecr.io
映像	trees.azurecr.io/trees17:0.0.0
映像登錄使用者名稱	trees
OS 類型	Linux
記憶體 (GiB)	1.5
CPU 核心數	1
GPU 類型 (預覽)	None
GPU 計數	0

The 'Network' tab shows the network configuration:

設定	值
網路類型	公用
連接埠	80 (TCP)、3000 (TCP)

The 'Advanced' tab includes settings for '重新啟動原則' (Restart Policy) and '失敗時' (When Failed).

At the bottom, there are buttons for '建立' (Create), '< 上一步' (Previous Step), '下一步 >', and '下載自動化的範本' (Download template).

LINE Bot & WSGI

4. 部署 ACI

a. 建立容器執行個體

The screenshot shows the Microsoft Azure Container Instances overview page for a deployment named "Microsoft.ContainerInstances-20220708002003". The deployment status is marked as "完成" (Completed) with a green checkmark. Key details include:

- 部署名稱: Microsoft.ContainerInstances-20220708002003
- 訂用帳戶: Azure Pass - 賽助
- 資源群組: bot_group
- 開始時間: 8/7/2022 上午 12:31:09
- 相互關聯識別碼: e8c12da8-8d87-4d3b-a50c-3cbe7ea72106

Below the main summary, there are sections for "部署詳細資料" (Deployment Details) and "後續步驟" (Next Steps). A prominent blue button labeled "前往資源" (Go to Resource) is located in the "後續步驟" section. The page also features a sidebar with various Azure services and links.

<https://portal.azure.com/#@catchsobgmai.onmicrosoft.com/resource/subscriptions/25e69105-7aa3-46b1-b11d-1b10c1794220>

LINE Bot & WSGI

4. 部署 ACI

a. 建立容器執行個體

The screenshot shows the Microsoft Azure Container Instances (ACI) dashboard for the container named 'treeswsgi'. The top navigation bar includes the Microsoft Azure logo, search bar, and various icons for account management.

Container Details:

- Name:** treeswsgi
- Resource Group (移動):** bot_group
- Status:** 正在執行 (Running)
- Location:** West US 3
- Assigned Account (移動):** Azure Pass - 賽助
- Assigned Account ID:** 25e69105-7aa3-46b1-b11d-1b10c1794220
- Tags:** 按一下這裡即可新增標籤 (Click here to add tags)

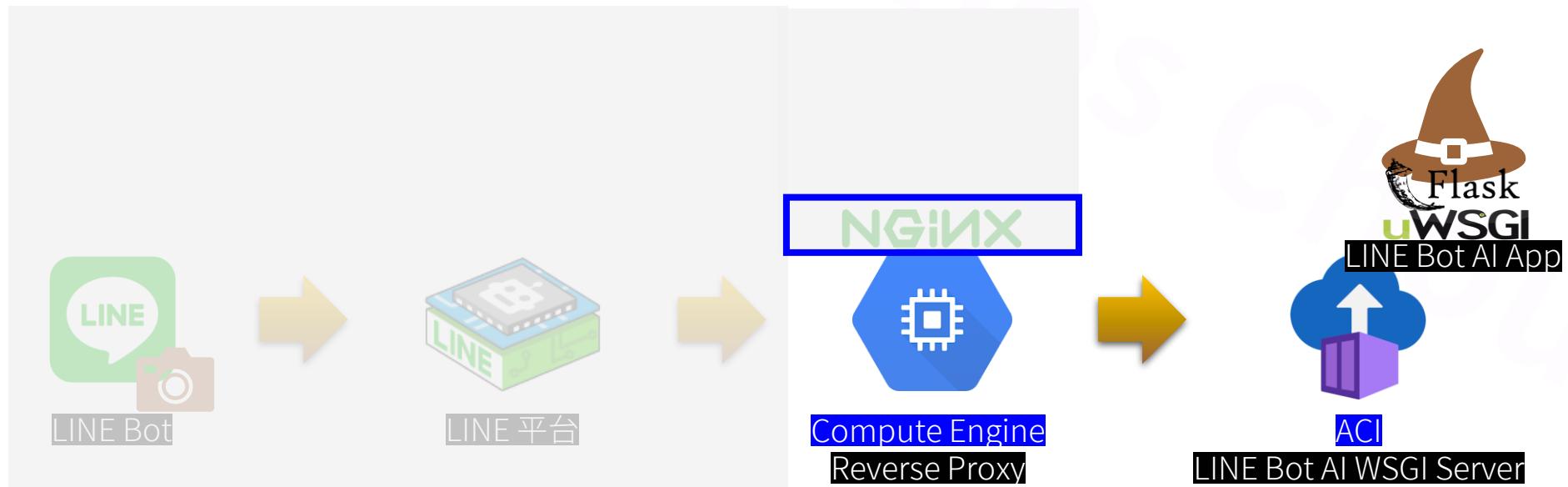
Networking:

- OS Type:** Linux
- IP Address (Public):** 20.118.147.248
- FQDN:** [REDACTED]
- Container Count:** 1

Reverse Proxy 轉導 IP: 20.118.147.248

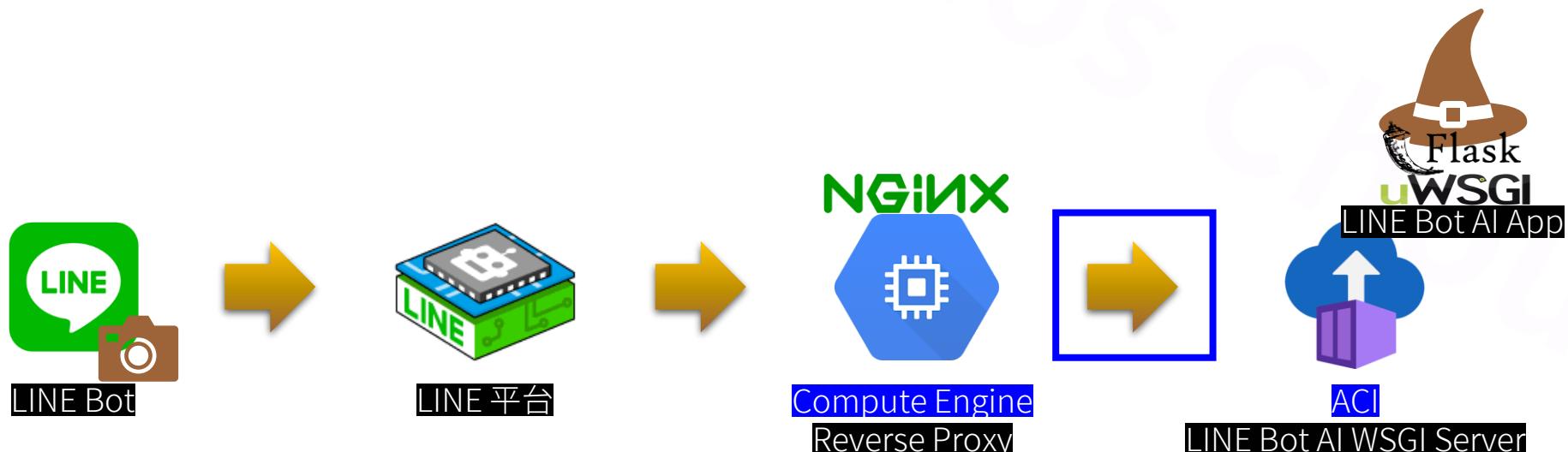
Monitoring Metrics:

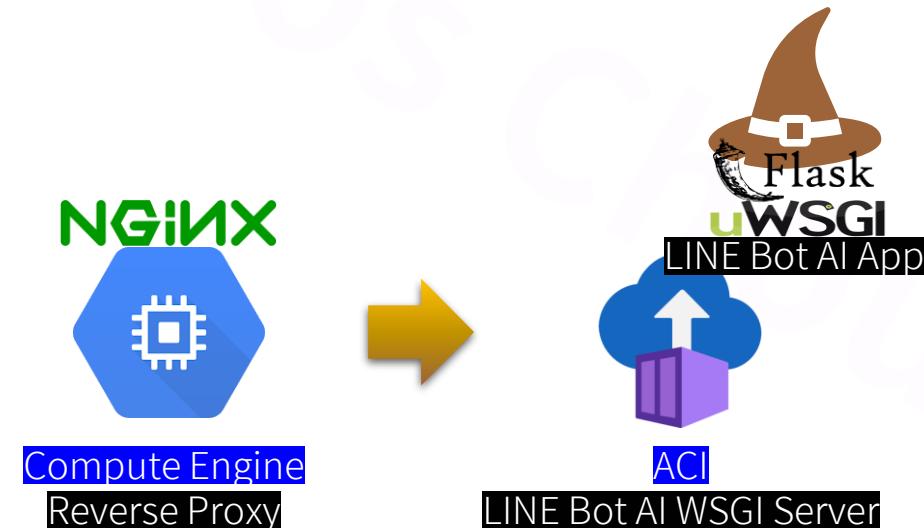
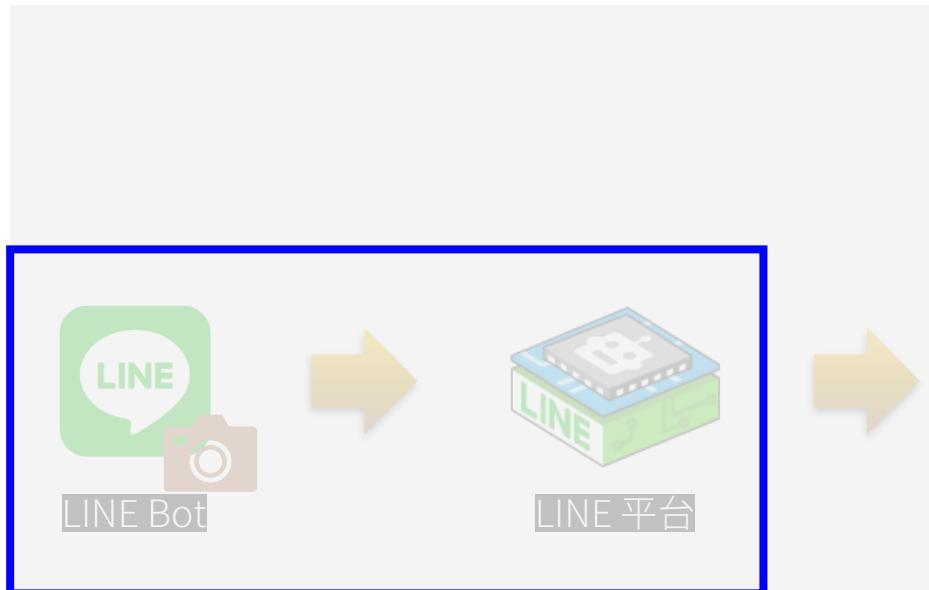
- CPU Usage (平均):** treeswsgi (Average CPU usage)
- Memory Usage (平均):** treeswsgi (Average memory usage)
- Received Network Interface:** qnR (Received network interface)
- Transmitted Network Interface:** qnR (Transmitted network interface)



網站與憑證 - Your Turn

嘗試由 NGINX @VM 轉導 LINE Message 至 LINE Bot + WSGI @ACI

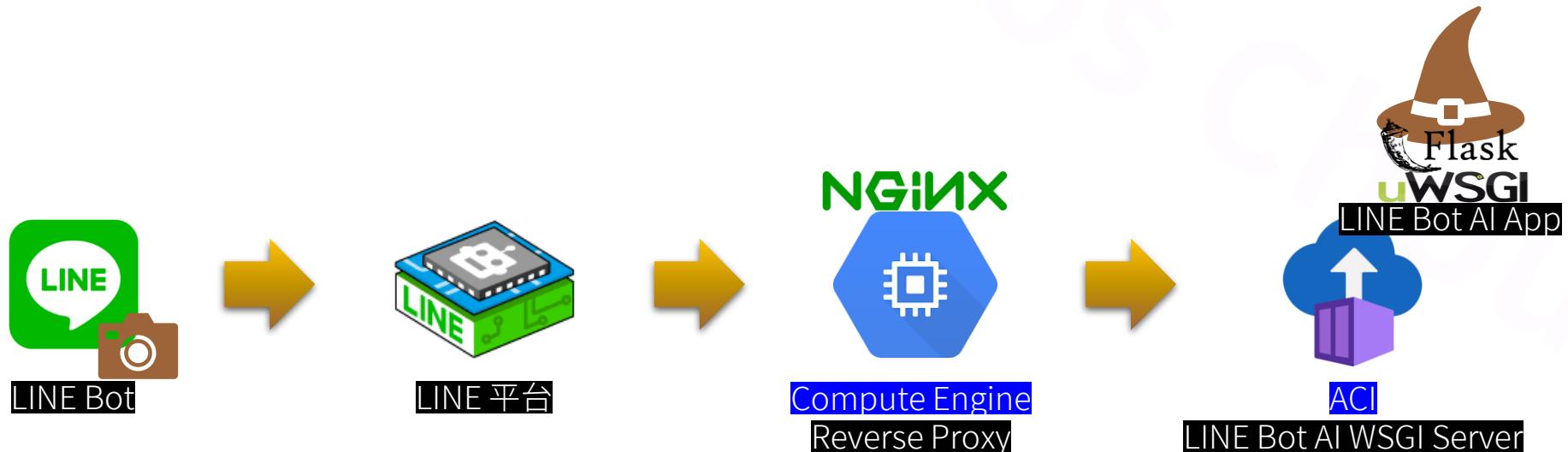




設定 LINE Messaging

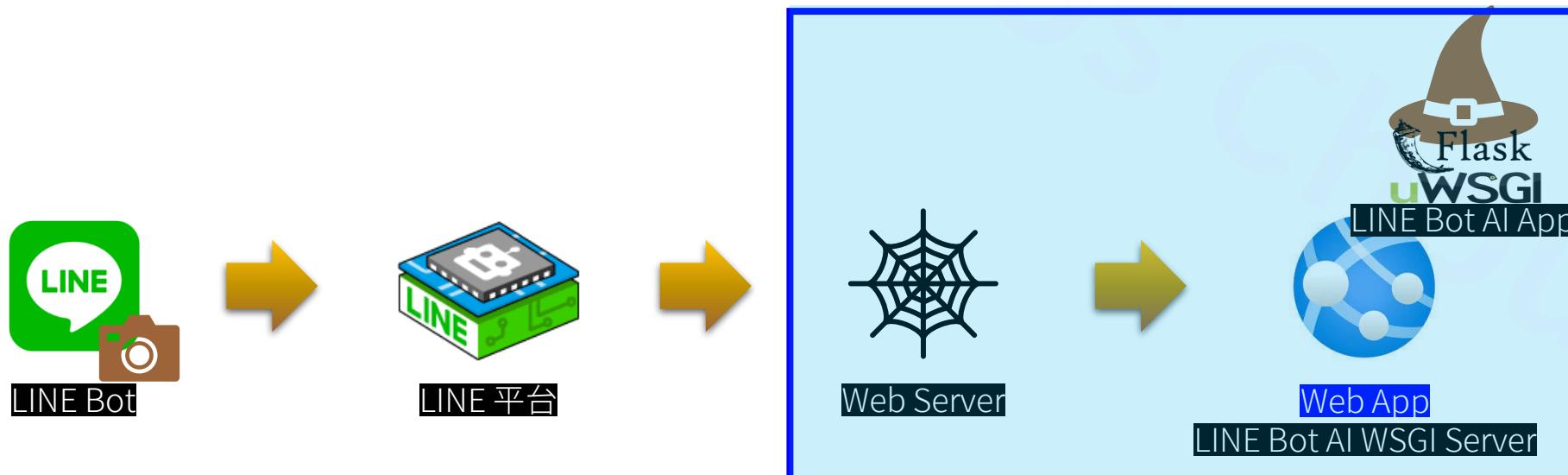
1. 調整 LINE Messaging

- a. 調整 Webhook URL
- b. LINE 測試



Solution 3 - Serverless 部署

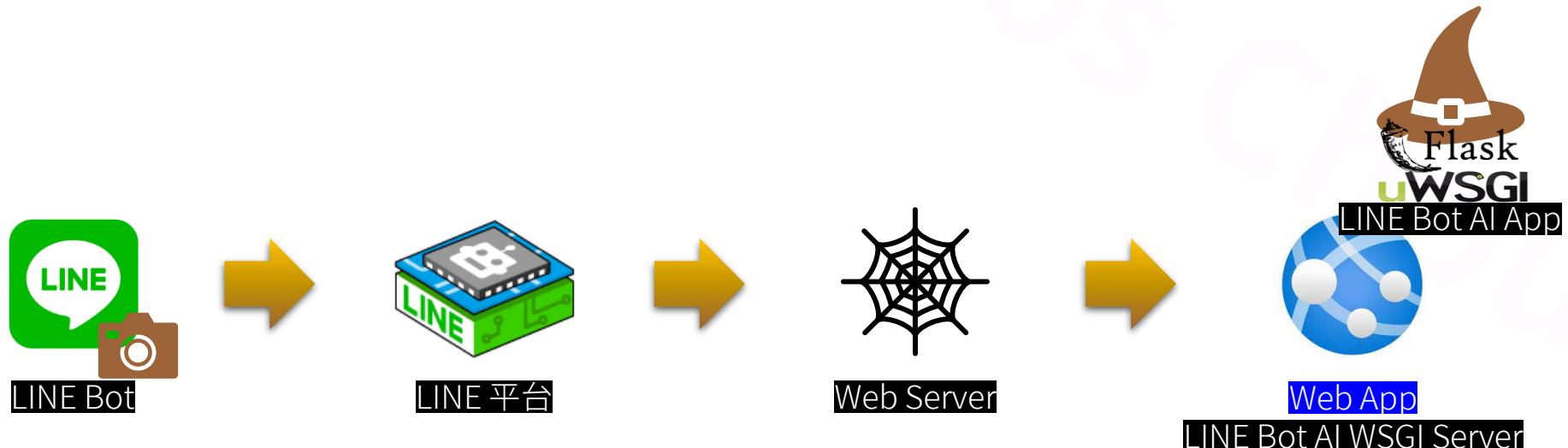
1. 長期可用且廉價的硬體環境 ... [Azure Web App](#)
2. Flask as Web Server 的替代方案 ... [Azure Web App](#)
3. 長期可用且廉價的 SSL 網域方案 ... [Azure Web App](#)

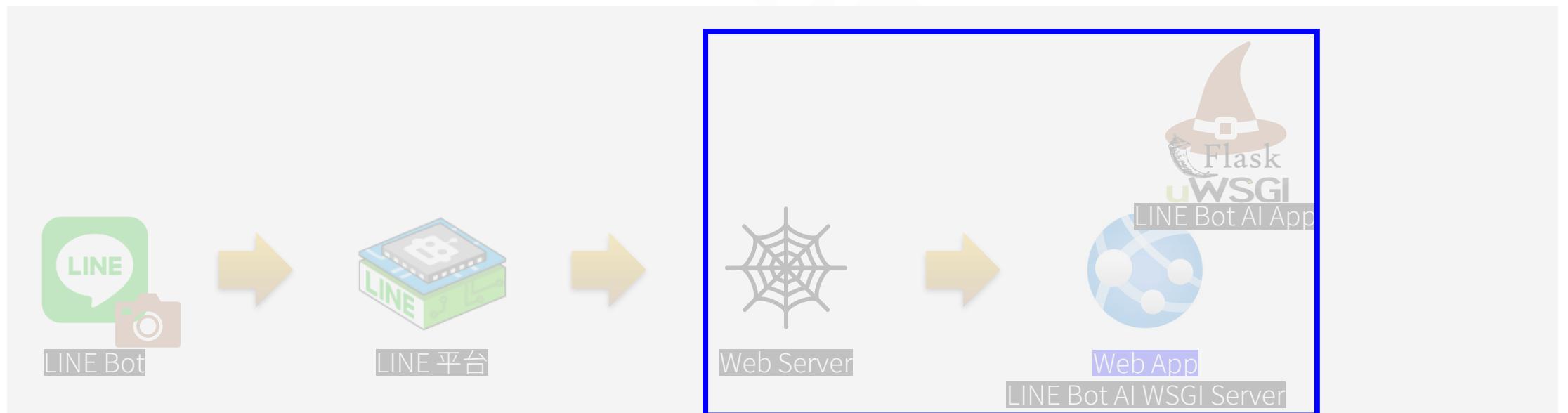


任務

1. 上傳程式至 Cloud Shell
2. 建立 Container 並推送至容器登錄
3. 部署 Container 至應用程式服務

流程





LINE Bot & WSGI

1. 部署 Web App

a. 由 Container 建立應用程式服務

The screenshot shows the Microsoft Azure Storage blade. At the top left, it says "trees | 存放庫". On the left sidebar, under "服務", "存放庫" is selected. In the main area, there is a container named "trees17". The container details are as follows:

上次更新日期	標籤計數
7/7/2022 下午9:07 [GMT+8]	1
資訊清單計數	1

Below the container details, there are two tabs: "標籤" and "資訊清單 (預覽)". On the right side, there is a context menu with the following options:

- 建立 Webhook
- 刪除
- 解除標籤
- 執行執行個體
- 部署到 Web 應用程式** (highlighted with a pink rectangle)

LINE Bot & WSGI

1. 部署 Web App

a. 由 Container 建立應用程式服務

The screenshot shows the Microsoft Azure portal interface for creating a new web application. The left sidebar displays the navigation path: 首頁 > 容器登錄 > trees > trees17 >. The main content area is titled "Web App for Containers". The configuration fields are as follows:

- 站台名稱 ***: treesapp (highlighted with a pink box)
- Azure Pass - 贊助**: Azure Pass - 贊助 (dropdown menu)
- 資源群組 ***: bot_group (dropdown menu)
- App Service 方案/位置 ***: ASP-botaroup-9a82/West US 3 (highlighted with a pink box)
- 影像**: trees17:0.0.0
- 作業系統 ***: Linux (radio button selected)

A note at the bottom states: "這會建立名為 'treesapp011919' 的 Webhook 供持續部署之用。Webhook 將會在登錄的當前位置 westus3 中建立。"

At the bottom right of the configuration pane is a blue "建立" (Create) button.

LINE Bot & WSGI

1. 部署 Web App

a. 由 Container 建立應用程式服務

The screenshot shows the Microsoft Azure portal interface for deploying a web application. The top navigation bar includes the Microsoft Azure logo, a search bar, and various navigation icons. The main title is "Microsoft.Web | 概觀" (Overview). Below the title, there are buttons for "部署" (Deploy), "刪除" (Delete), "取消" (Cancel), "重新部署" (Re-deploy), and "重新整理" (Refresh). A search bar at the top says "搜尋 (Ctrl+/".

On the left, there are two tabs: "輸出" (Output) and "範本" (Template). In the center, deployment details are shown: "部署名稱: Microsoft.Web", "訂用帳戶: Azure Pass - 贊助", and "資源群組: bot_group". It also displays the start time "開始時間: 8/7/2022 上午9:20:45" and a resource ID "相互關聯識別碼: ecb01972-0fb8-4836-9e53-84b7a42bd3fa". A large green button labeled "前往資源" (Go to Resource) is prominently displayed.

On the right side, there are several promotional cards:

- 成本管理**: "接收通知以掌握預算，並避免帳單上出現非預期的費用。" with a link "設定成本警報 >".
- Microsoft Defender**: "適用於雲端的 Microsoft Defender" with links "保護應用程式及基礎結構" and "移至適用於雲端的 Microsoft Defender >".
- 免費 Microsoft 教學課程**: "立即開始學習 >".
- 治詢專家**: "Azure 專家是服務提供者合作夥伴，可協助您在 Azure 上管理資產，也是您的第一線支援。" with a link "尋找 Azure 專家 >".

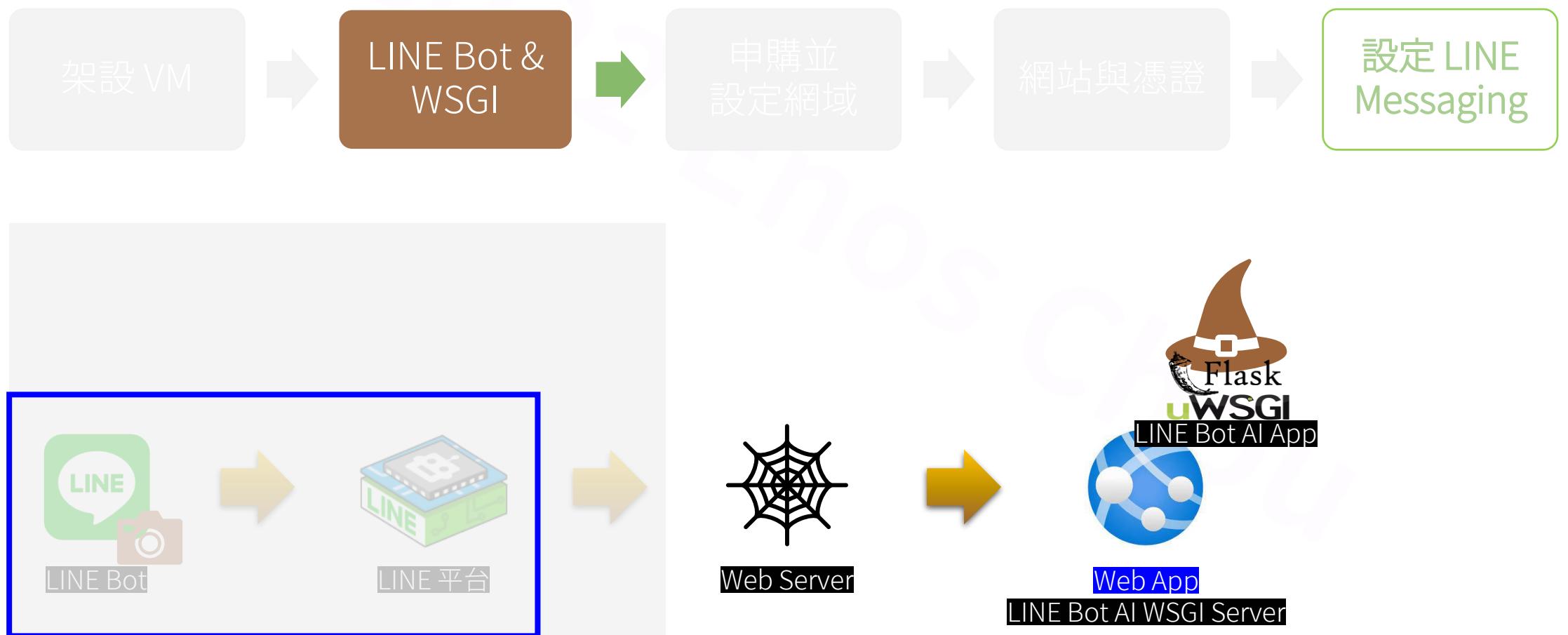
At the bottom of the page, a URL is provided: <https://portal.azure.com/#@catchsobgmai.onmicrosoft.com/resource/subscriptions/25e69105-7aa3-46b1-b11d-1b10c1794220>.

LINE Bot & WSGI

1. 部署 Web App

a. 由 Container 建立應用程式服務

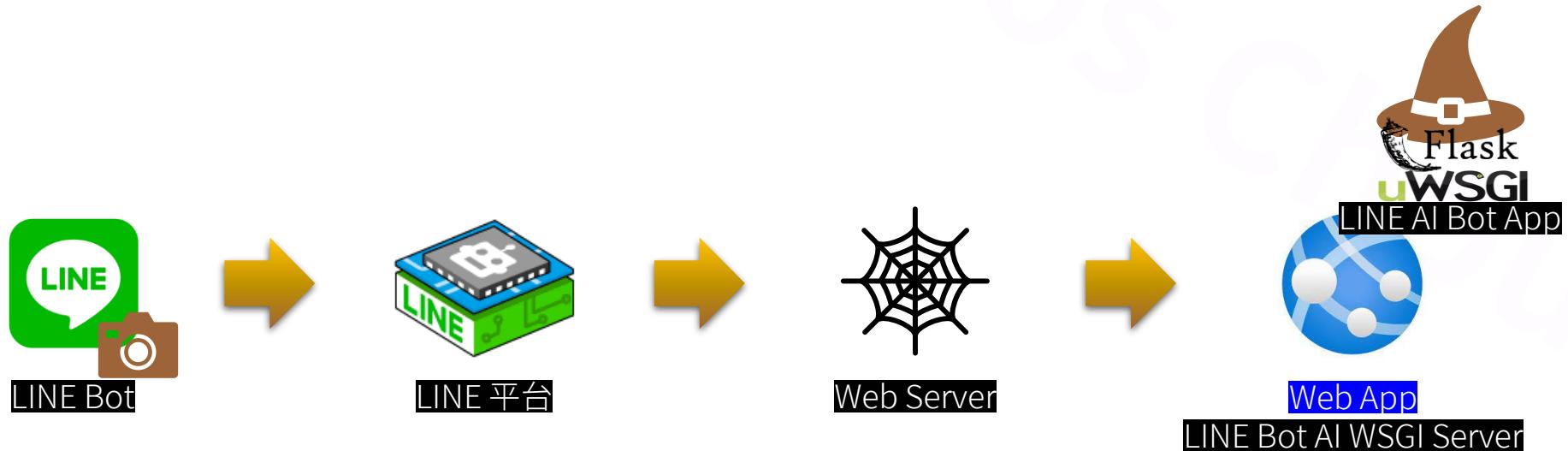
The screenshot shows the Microsoft Azure portal interface for managing an App Service named 'treesapp'. The top navigation bar includes 'Microsoft Azure', a search bar, and various icons for account management. The main content area displays the 'treesapp' service details, including its status as 'Running' in 'West US 3', and its URL as <https://treesapp.azurewebsites.net>. A large pink callout box highlights the URL field. On the left, a sidebar lists navigation links such as '存取控制 (IAM)', '標籤', '診斷並解決問題', '安全性', '事件 (預覽)', '部署', '設定', and specific items like '組態', '驗證', 'Application Insights', '身分識別', '備份', '自訂網域', 'TLS/SSL 設定', and 'TLS/SSL 設定 (預覽)'. Below the main details, three monitoring cards are visible: '診斷並解決問題', 'Application Insights', and three charts for 'HTTP 5xx', '資料輸入', and '連出的資料' showing data over time.



設定 LINE Messaging

1. 調整 LINE Messaging

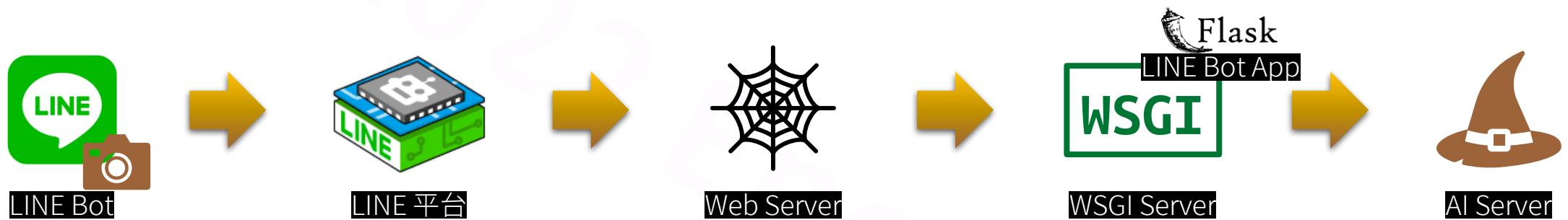
- a. 調整 Webhook URL
- b. LINE 測試



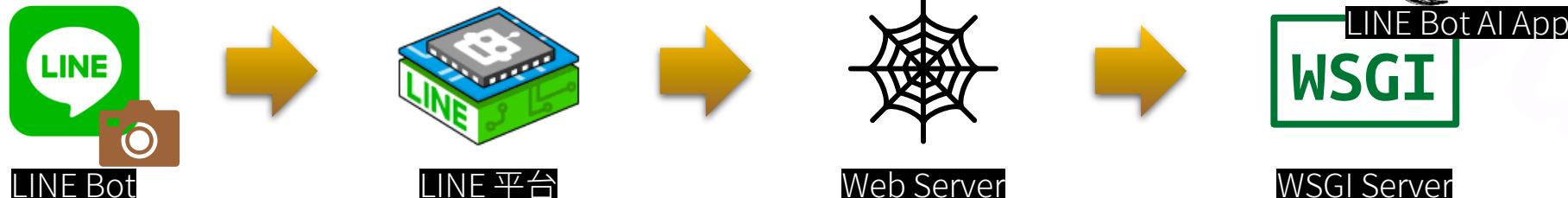
LINE Bot 部署 + AI 部署

Architecture

Smoother Architecture

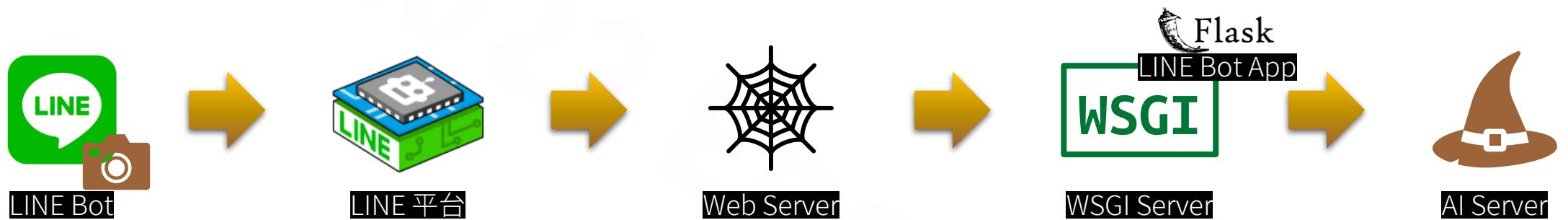


Reasonable Architecture

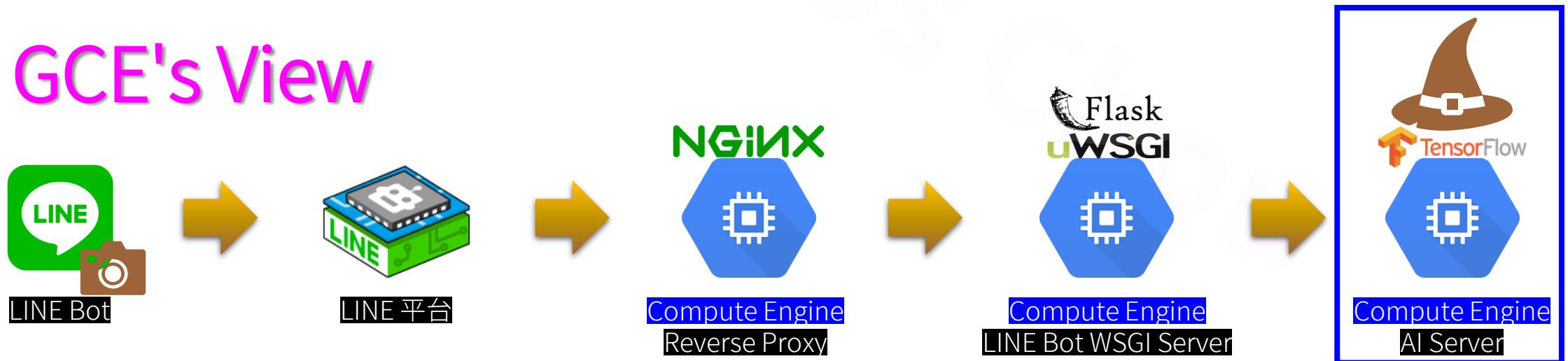


部署 TensorFlow Serving - VM

Smoother Architecture



GCE's View

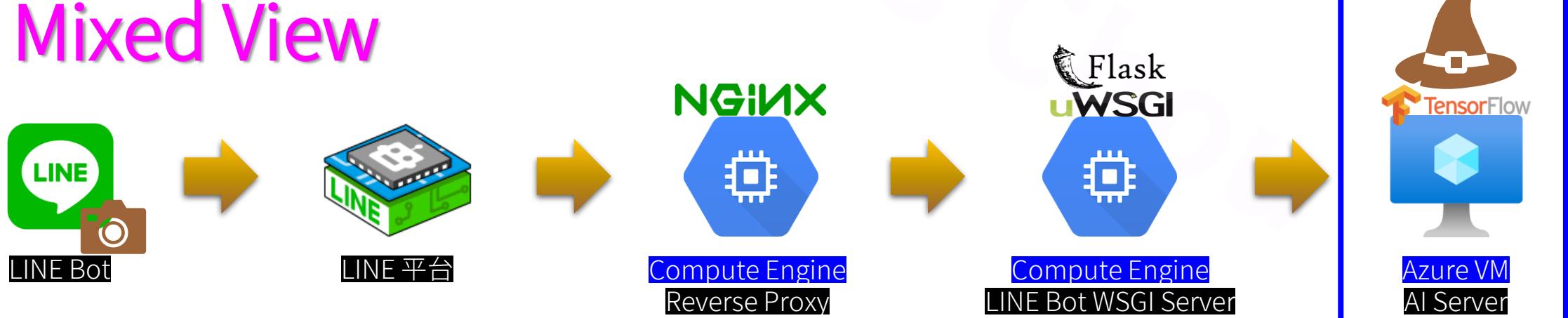


部署 TensorFlow Serving - VM

Azure VM's View



Mixed View



部署 TensorFlow Serving - VM

1. 建立 VM

- OS: Ubuntu 20.04
- RAM: 1GB
- HD: 10GB
- PORT: 8500, 8501 TCP

① Google Compute Engine 防火牆開通

導覽選單 > 虛擬私有雲網路 > 防火牆 > 建立防火牆規則 >
名稱："自行命名"；目標："網路中的所有執行個體"；來源 IPv4 範圍："0.0.0.0/0"；
指定的通訊協定和埠："TCP" "8500, 8501" > 建立

② Azure VM 防火牆開通

虛擬機器 > 進入指定 VM > 網路 > 新增輸入連接埠規則 >
目的地連接埠範圍："TCP" "8500, 8501"；名稱："自行命名" > 新增

部署 TensorFlow Serving - VM

2. 準備模型

a. 轉換模型為 TensorFlow SavedModel 格式

- ① 準備 TensorFlow 2.4.4 以上環境

```
pip install tensorflow==2.4.4
```

- ② 轉換模型

```
hdf5_to_savedmodel.py your_hdf5.h5 your_savedmodel
```

```
hdf5_to_savedmodel.py trees17V1.h5 1
```

部署 TensorFlow Serving - VM

2. 準備模型

b. 上傳 SavedModel 模型至 VM

- ① 登入 VM
- ② 建立模型目錄
- ③ 上傳 SavedModel 至模型目錄

部署 TensorFlow Serving - VM

2. 準備模型

b. 上傳 SavedModel 模型至 VM

路徑範例

/home/your_account/your_model/1/assets

/home/your_account/your_model/1/saved_model.pb

/home/your_account/your_model/1/variables/variables.data-00000-of-00001

/home/your_account/your_model/1/variables/variables.index

Note

- ① 模型放在 /home/someone/your_model/2 ... N/ 之下，系統會選用數字最大的模型
- ② 切勿忽略 variables 目錄下檔案

部署 TensorFlow Serving - VM

3. 安裝 TensorFlow Serving

安裝最新版本 TensorFlow Server (v2.9.0)

```
echo "deb [arch=amd64] http://storage.googleapis.com/tensorflow-serving-  
apt stable tensorflow-model-server tensorflow-model-server-universal" |  
sudo tee /etc/apt/sources.list.d/tensorflow-serving.list; curl  
https://storage.googleapis.com/tensorflow-serving-apt/tensorflow-serving.release.pub.gpg | sudo apt-key add -; sudo apt-get update; sudo  
apt-get install tensorflow-model-server
```

Note

系統不須安裝其他 TensorFlow 套件

部署 TensorFlow Serving - VM

4. 啟動 TensorFlow Serving

啟動 TensorFlow Serving for RESTful API & gRPC

```
nohup tensorflow_model_server --model_base_path=your_model_path --  
model_name=your_model_name --rest_api_port=your_rest_port --  
port=your_grpc_port &  
nohup tensorflow_model_server --model_base_path=/home/enos/trees --  
model_name=trees --rest_api_port=8501 --port=8500 &
```

Note

- ① --rest_api_port for RESTful API
- ② --port for gRPC
- ③ nohup ... & for 背景執行

部署 TensorFlow Serving - VM

5. 測試 TensorFlow Serving

a. 測試 RESTful API

```
python tf-serving_test.py --help
usage: tf-serving_test.py [-h] [--protocol {gRPC,REST}] [--ssl] [--host HOST]
                          [--port PORT] [--labels LABELS] [--input INPUT]
                          [--output OUTPUT]
                          MODEL PIC
```

```
python tf-serving_test.py --host 34.168.152.9 --port 8501 --protocol REST --
                          labels treeset_labels.txt trees 凤凰木.jpg
```

部署 TensorFlow Serving - VM

5. 測試 TensorFlow Serving

b. 測試 gRPC

```
# 確認 SavedModel I/O 名稱  
python model_io.py your_savedmodel  
python model_io.py 1
```

Note

gRPC 需要 model I/O 名稱作為參數

部署 TensorFlow Serving - VM

5. 測試 TensorFlow Serving

b. 測試 gRPC

```
python tf-serving-test.py --help
usage: tf-serving-test.py [-h] [--protocol {gRPC,REST}] [--ssl] [--host HOST]
                           [--port PORT] [--labels LABELS] [--input INPUT]
                           [--output OUTPUT]
```

MODEL PIC

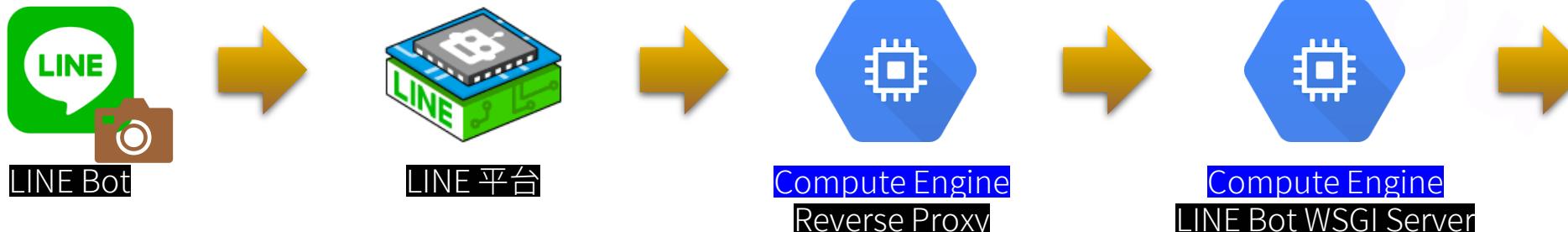
```
python tf-serving-test.py --host 34.168.152.9 --port 8500 --protocol gRPC --
                           input input_4 --labels treeset_labels.txt trees 凤凰木.jpg
```

部署 TensorFlow Serving - Cloud Run

Mixed View



Google's View



部署 TensorFlow Serving - Cloud Run

1. 準備模型

a. 轉換模型為 TensorFlow SavedModel 格式

```
# 準備 TensorFlow 2.4.4 以上環境  
pip install tensorflow==2.4.4  
  
# 轉換模型  
hdf5_to_savedmodel.py your_hdf5.h5 your_savedmodel  
hdf5_to_savedmodel.py trees17V1.h5 1
```

部署 TensorFlow Serving - Cloud Run

1. 準備模型

b. 將 SavedModel 置於模型目錄

- ① 建立模型目錄
- ② 上傳或複製 SavedModel 至模型目錄

部署 TensorFlow Serving - Cloud Run

1. 準備模型

b. 將 SavedModel 置於模型目錄

路徑範例

your_model/1/assets

your_model/1/saved_model.pb

your_model/1/variables/variables.data-00000-of-00001

your_model/1/variables/variables.index

Note

- ① 模型放在 *your_model/2 ... N/* 之下，系統會選用數字最大的模型
- ② 切勿忽略 **variables** 目錄下檔案

部署 TensorFlow Serving - Cloud Run

2. 製作 Container

a. 製作 Dockerfile

```
# Dockerfile 範例
FROM tensorflow/serving:2.8.0
COPY your_model/1/ /models/your_model/1
ENTRYPOINT tensorflow_model_server --port=$PORT --model_name=your_model --
model_base_path=/models/your_model
```

Note

此範例採用 gRPC，可自行調整為 RESTful API

部署 TensorFlow Serving - Cloud Run

2. 製作 Container

b. 將 Dockerfile 置於模型目錄同層級

```
# 路徑範例  
Dockerfile  
your_model/1/assets  
your_model/1/saved_model.pb  
your_model/1/variables/variables.data-00000-of-00001  
your_model/1/variables/variables.index
```

部署 TensorFlow Serving - Cloud Run

3. 部署

a. 以 Google Cloud Shell 編輯器部署

- ① 上傳 trees 目錄與 Dockerfile 至 GCP 專案帳號之 Cloud Shell
- ② 開啟 Cloud Shell 編輯器，指定 Workspace 為 Dockerfile 所在目錄，包含 trees 目錄
- ③ 以 Cloud Shell 編輯器部署 Cloud Run

Cloud Shell 編輯器 > Coud Code - Cloud Run: Cloud Run >
(Enable Cloud Run API) > (Login to Google Cloud SDK) >
(授權 Cloud Shell : 授權) > (Select a project) > Deploy to Cloud Run >
Create a service > Service name : "自行命名" ; Region : "自行指定" >
Show Advanced Settings > Memory allocated : "**512**" MiB > Deploy

部署 TensorFlow Serving - Cloud Run

3. 部署

b. 以 Google Cloud Shell + Cloud Run 部署

- ① 上傳 trees 目錄與 Dockerfile 至 GCP 專案帳號之 Cloud Shell
- ② `docker build -t gcr.io/your_project/your_container:your_tag .`
- ③ `docker push gcr.io/your_project/your_container:your_tag`
- ④ 由 Cloud Run 部署

Cloud Run > 建立服務 > 容器映像檔網址："選擇先前推送的 Container"；服務名稱："自行命名"；地區："自行指定"；驗證："允許未經驗證的叫用" > 建立

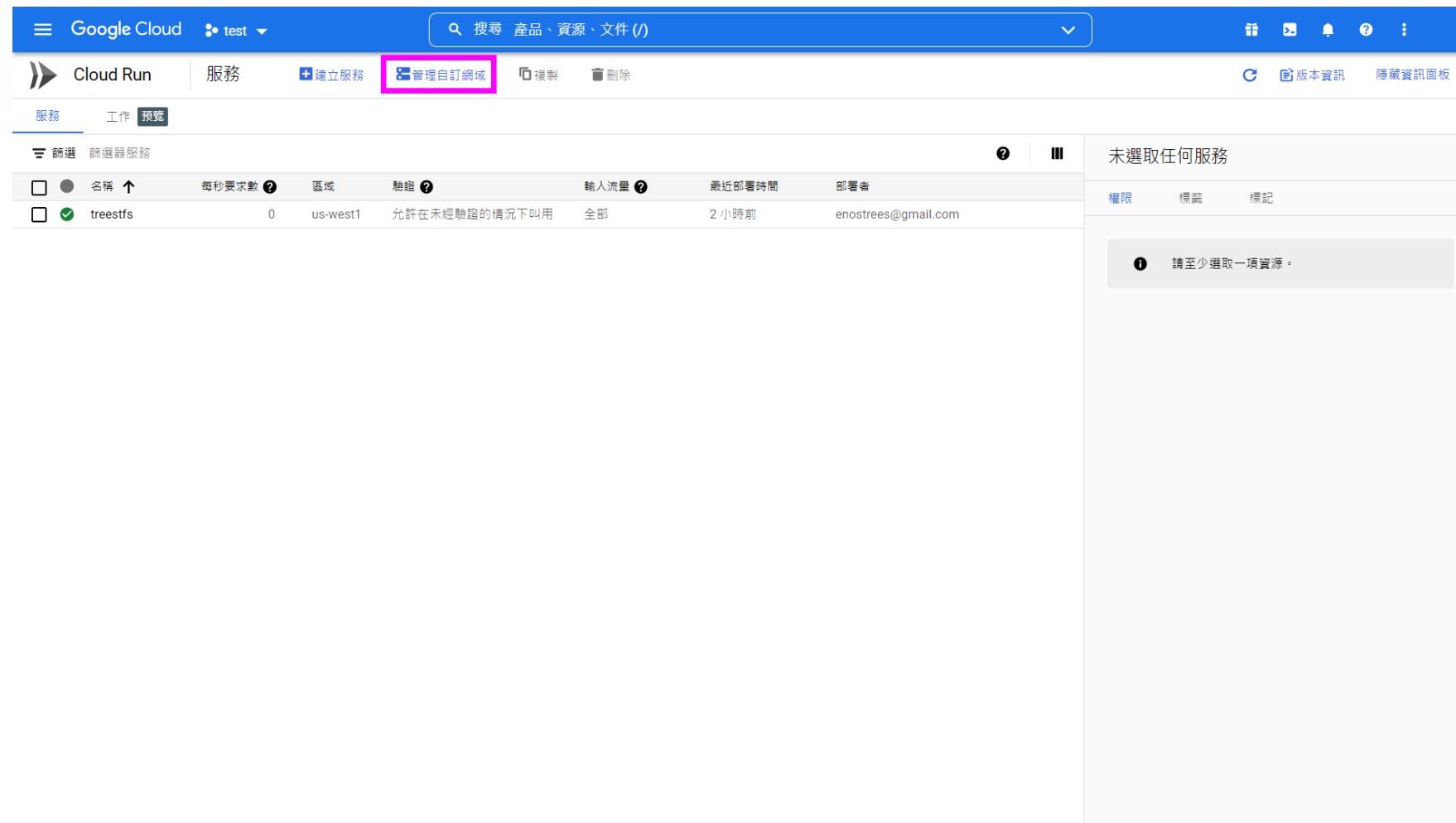
Note

- ① Cloud Run 記憶體需 512M 以上；建議採用 HTTP/2
- ② Client 連結時，HOST 須移除 "`https://`"；PORT 為 443，採用 SSL

部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

a. 驗證網域



The screenshot shows the Google Cloud Platform interface for managing Cloud Run services. The top navigation bar includes the Google Cloud logo, a project dropdown set to 'test', a search bar, and various notification and settings icons. Below the navigation is a secondary header with tabs for 'Cloud Run', '服務' (Services), '+ 建立服務' (+ Create Service), '管理自訂網域' (Manage Custom Domains) which is highlighted with a pink rectangle, '複製' (Copy), and '刪除' (Delete). The main content area has three tabs: '服務' (Services) which is selected and highlighted in blue, '工作' (Work), and '預覽' (Preview). A sidebar on the left is titled '篩選 帶過濾器服務' (Filter Selected Services) and lists one service: 'treestfs'. The main table displays the service details: Name (treestfs), Request Rate (0), Region (us-west1), and a note that it's '允許在未經驗證的情況下叫用' (Allow calls even if unverified). It also shows Input Traffic (All), Last Deployment (2 hours ago), and Deployer (enostrees@gmail.com). To the right of the table, there are sections for '未選取任何服務' (No services selected), '權限' (Permissions), '標籤' (Labels), and '標記' (Annotations). A note at the bottom says '請至少選取一項資源' (Please select at least one resource).

部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

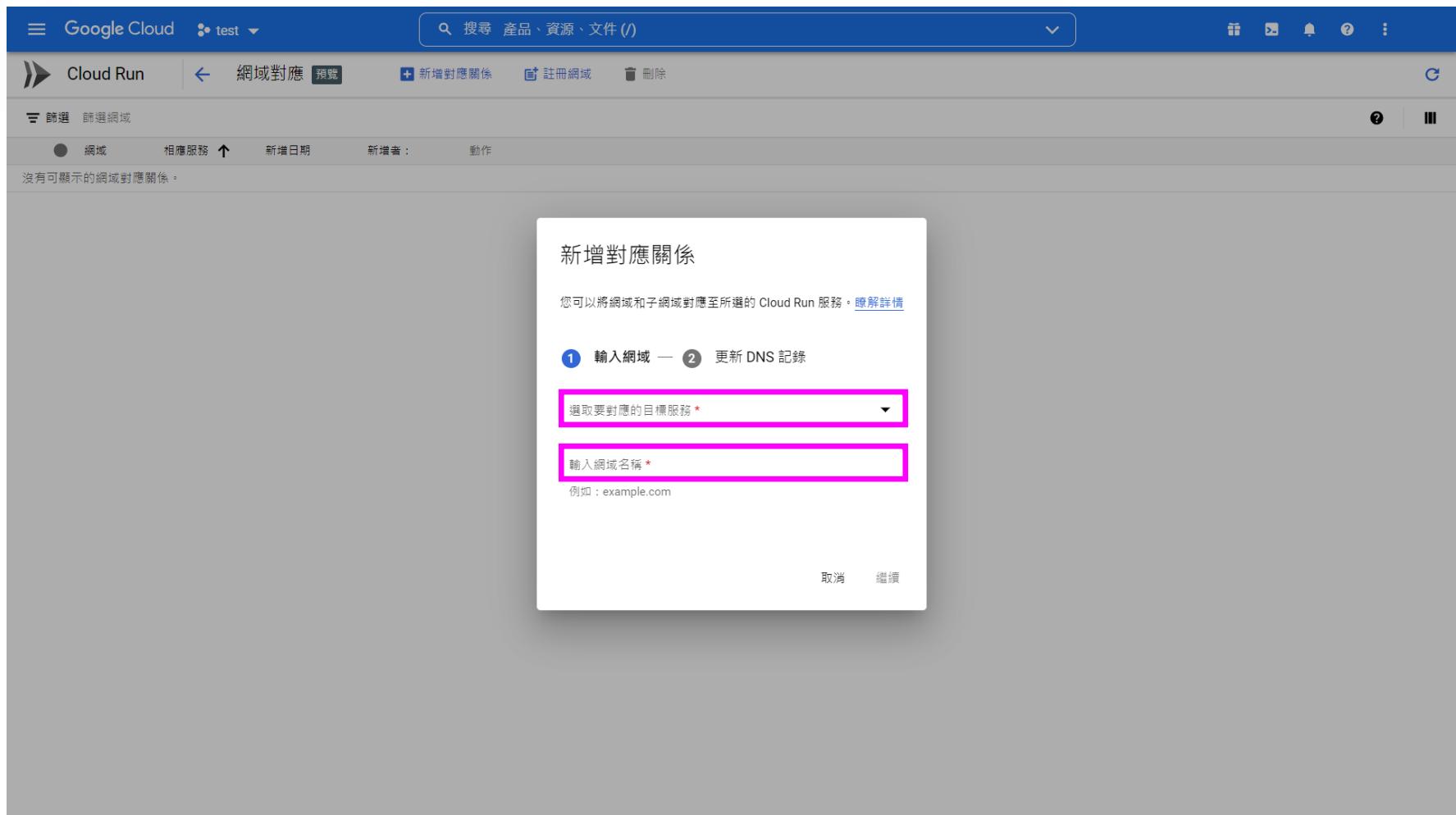
a. 驗證網域

The screenshot shows the Google Cloud Platform interface for managing Cloud Run domains. The top navigation bar includes 'Google Cloud' with a dropdown for 'test', a search bar, and various icons. Below the navigation is a secondary header with 'Cloud Run' and '網域對應' (Domain Mapping) tabs, where 'Domain Mapping' is selected. A prominent blue button labeled '+ 新增對應關係' (Add Mapping) is highlighted with a pink rectangle. Below this is a table header with columns: '網域' (Domain), '相應服務' (Associated Service), '新增日期' (Created Date), '新增者' (Creator), and '動作' (Actions). The table body displays the message '沒有可顯示的網域對應關係。' (No domain mappings to display).

部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

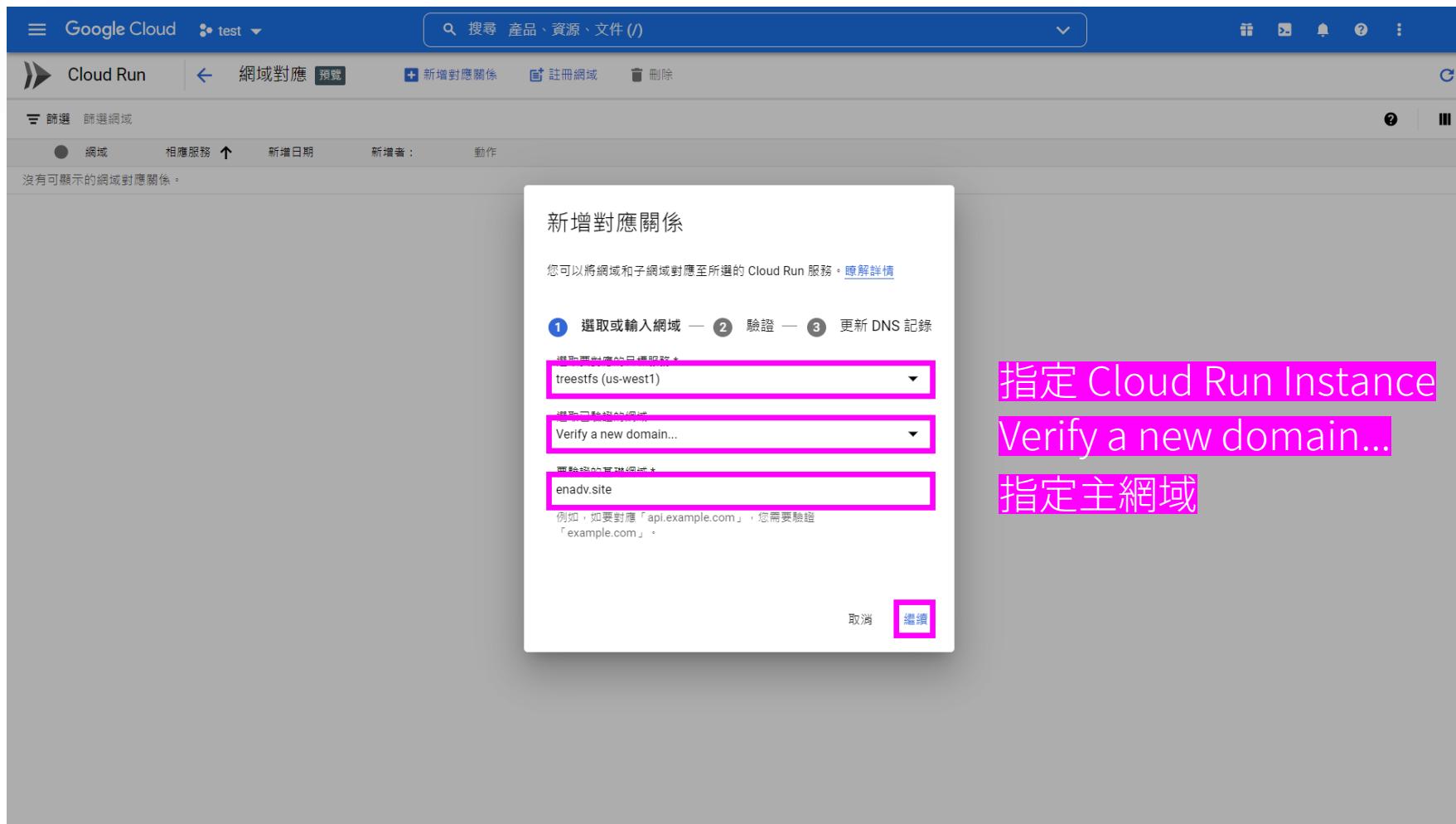
a. 驗證網域



部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

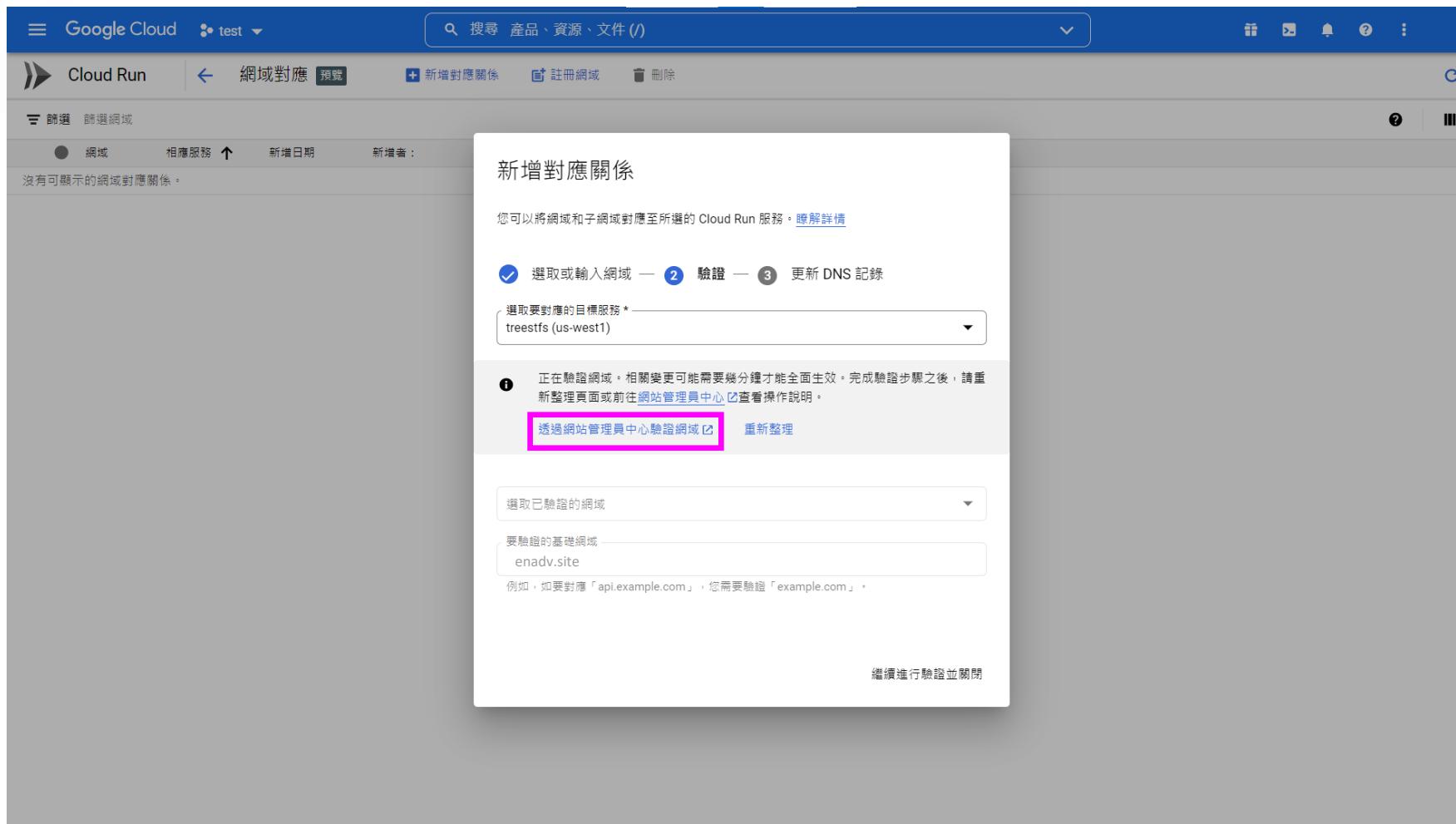
a. 驗證網域



部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

a. 驗證網域



部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

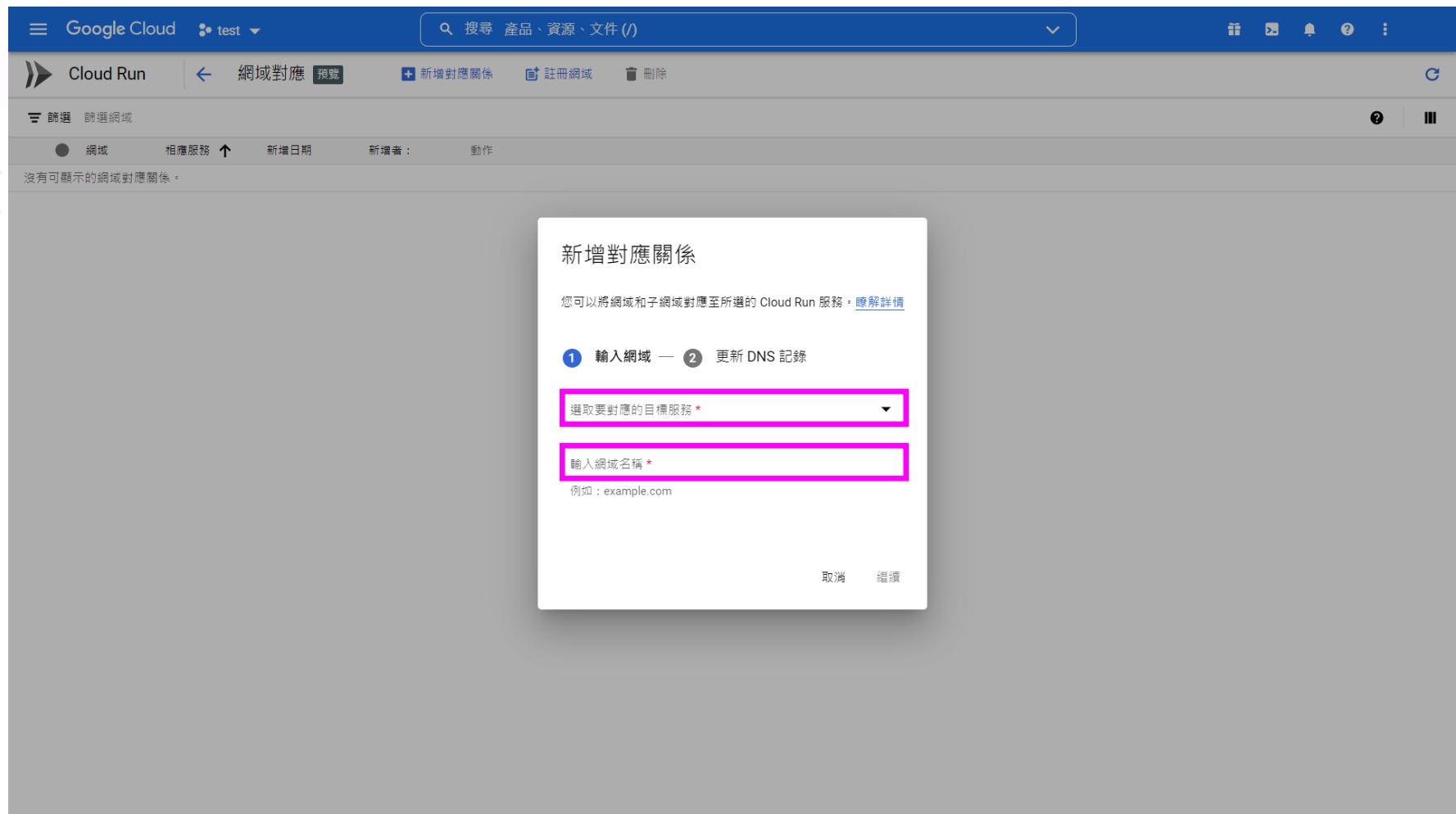
a. 驗證網域

The screenshot shows the Google Search Console interface for verifying the ownership of the domain `enadv.club`. The page title is "網站管理員中心". It displays a verification process using GoDaddy.com, with instructions to log in to the provider's website and follow their steps. A prominent orange button labeled "驗證" (Verify) is visible at the bottom left, while a grey button labeled "暫時不要" (Temporary No) is at the bottom right.

部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

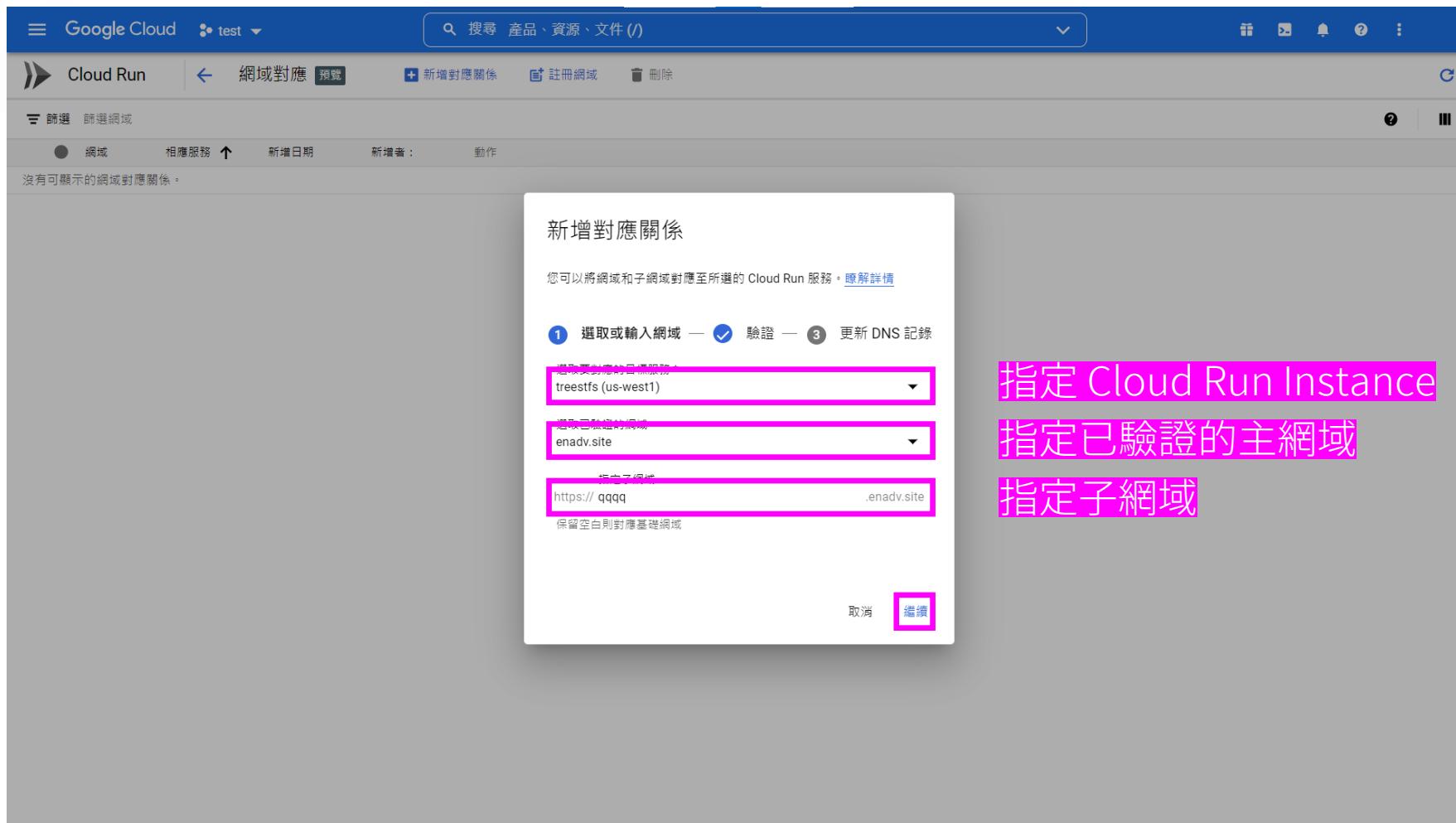
b. 建立網址對應



部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

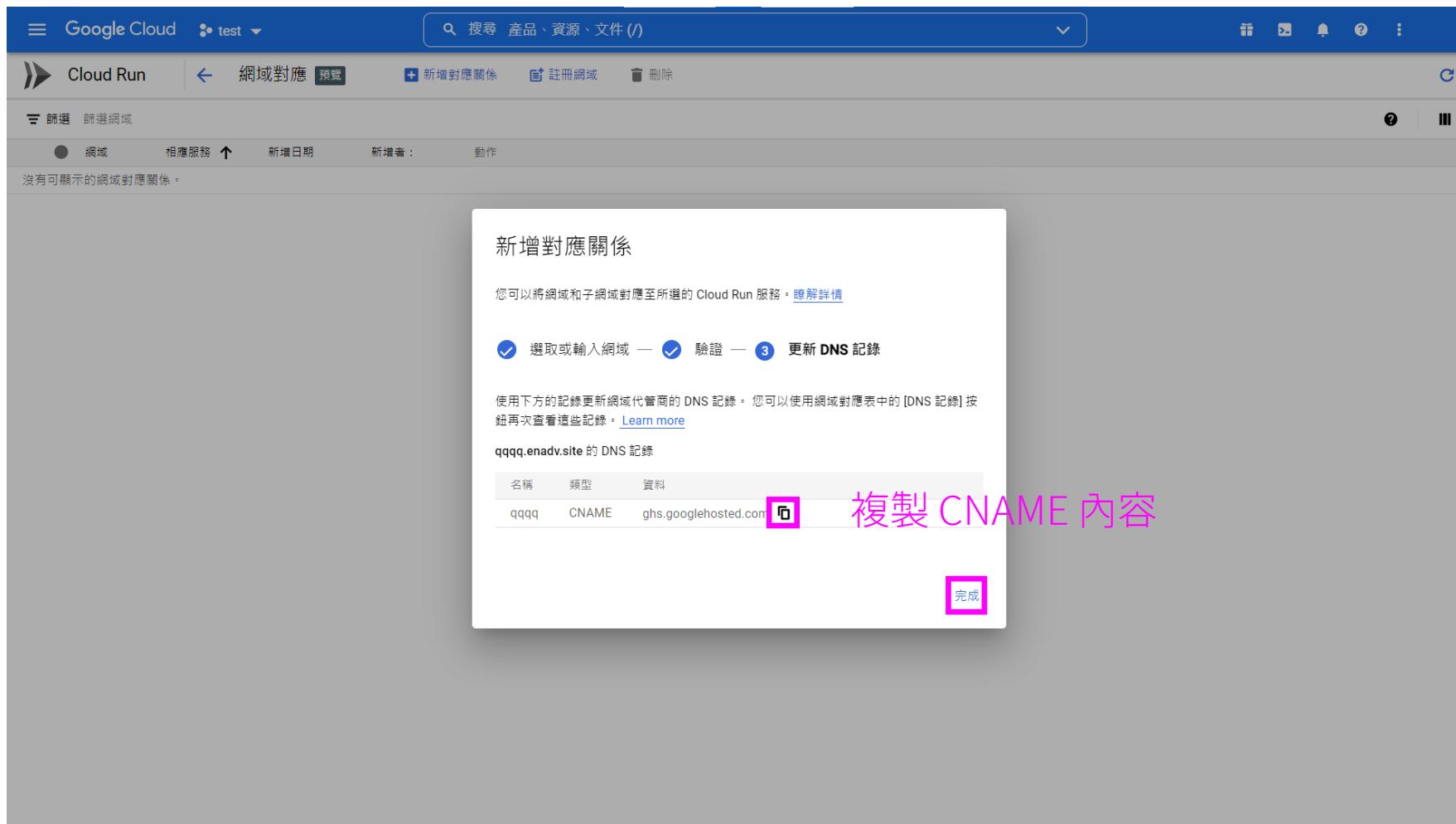
b. 建立網址對應



部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

b. 建立網址對應



部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

b. 建立網址對應

DNS 管理

enadv.site

The screenshot shows a DNS management interface for the domain `enadv.site`. The interface includes a header with the domain name and a link to '選取其他網域'. Below this is a section titled 'DNS 記錄' with a sub-instruction: 'DNS 記錄會決定網域行為，如顯示網站內容及發送 email 等。' There are buttons for '刪除' (Delete), '複製' (Copy), '篩選' (Filter), '新增' (Add), and three dots for more options. A table lists a single CNAME record:

類型	名稱	內容值	TTL
CNAME	qqqq	ghs.googlehosted.com.	自訂 秒 600

Below the table, there are buttons for '新增記錄' (Add Record) and '清除' (Clear). The entire screenshot is highlighted with a pink overlay.

部署 TensorFlow Serving - Cloud Run

4. (調整 Domain)

b. 建立網址對應



The screenshot shows the Google Cloud Platform interface for managing Cloud Run domain mappings. The top navigation bar includes 'Google Cloud' with a dropdown for 'test', a search bar, and various icons. Below the navigation is a breadcrumb trail: 'Cloud Run > 網域對應'. The main content area displays a table of domain mappings:

網域	相應服務	新增日期	新增者	動作
qqqq.enadv.site	treestfs (us-west1)	17 分鐘前	@gmail.com	⋮

部署 TensorFlow Serving - Cloud Run

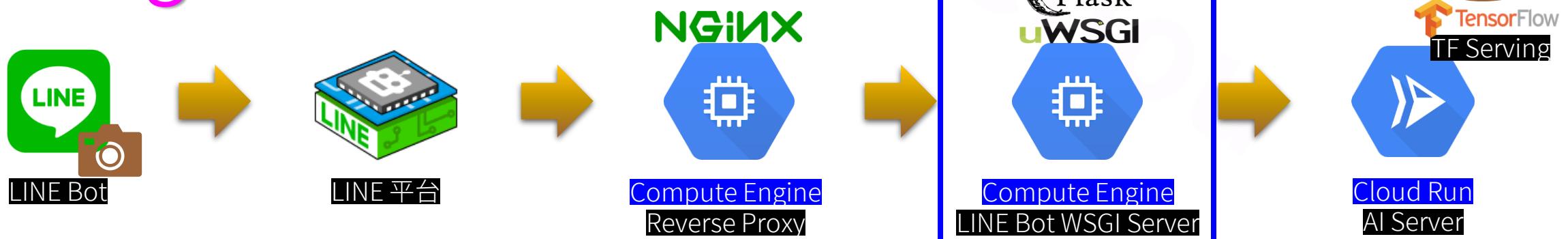
5. 測試 TensorFlow Serving

部署 LINE Bot + TensorFlow Serving - REST

Azure's View



Google's View



部署 LINE Bot + TensorFlow Serving - REST

1. 調整 LINE Bot

RESTful API 叫用 TensorFlow Serving 範例

```
rest = 'http://YOUR_HOST:YOUR_PORT/v1/models/YOUR_MODEL:predict'  
headers = {"content-type": "application/json"}  
data = json.dumps({"instances": img.tolist()})  
r = requests.post(rest, headers=headers, data=data)  
p = np.argmax(r.json()['predictions'])
```

部署 LINE Bot + TensorFlow Serving - REST

2. 重新部署 LINE Bot

a. 上傳新版 LINE Bot

```
# 須先行調整參數  
trees17bot_rest.py
```

部署 LINE Bot + TensorFlow Serving - REST

2. 重新部署 LINE Bot

b. 更新套件

```
line-bot-sdk  
flask  
pillow  
tensorflow==2.4.4  
requests  
numpy  
uwsgi
```

部署 LINE Bot + TensorFlow Serving - REST

2. 重新部署 LINE Bot

c. 以 uWSGI 重新啟動 LINE Bot

```
# 取得舊程序 PID  
ps -ef | grep uwsgi
```

```
# 刪除舊程序  
kill your_pid
```

```
# 重起服務  
uwsgi -w your_module:app -s :your_port -d your_project.log  
uwsgi -w trees17bot_rest:app -s :3000 -d trees.log
```

部署 LINE Bot + TensorFlow Serving - REST

2. 重新部署 LINE Bot

d. LINE 測試

部署 LINE Bot + TensorFlow Serving - gRPC

1. 調整 LINE Bot

a. gRPC 叫用 TensorFlow Serving 範例

```
grpcurl = 'YOUR_HOST:YOUR_PORT'  
ssl = False  
model = 'YOUR_MODEL'  
modelin = 'YOUR_MODELIN'  
modelout = 'YOUR_MODELOUT'
```

部署 LINE Bot + TensorFlow Serving - gRPC

1. 調整 LINE Bot

a. gRPC 叫用 TensorFlow Serving 範例

```
if ssl:  
    channel = grpc.secure_channel(grpcurl, grpc.ssl_channel_credentials())  
else:  
    channel = grpc.insecure_channel(grpcurl)  
stub = prediction_service_pb2_grpc.PredictionServiceStub(channel)  
req = predict_pb2.PredictRequest()  
req.model_spec.name = model  
req.inputs[modelin].CopyFrom(make_tensor_proto(img))  
r = stub.Predict(req, 13.0)  
p = np.argmax(r.outputs[modelout].float_val)
```

部署 LINE Bot + TensorFlow Serving - gRPC

1. 調整 LINE Bot

b. requirements.txt

```
line-bot-sdk
flask
pillow
tensorflow==2.4.4
tensorflow-serving-api
requests
numpy
uwsgi
```

Note

```
pip3 install -r requirements.txt
```

```
pip3 install --no-deps tensorflow-serving-api
```

部署 LINE Bot + TensorFlow Serving - gRPC

2. 重新部署 LINE Bot

a. 上傳新版 LINE Bot

- # 上傳以下檔案至 VM 專案目錄
 - ① trees17bot_grpc.py # 須先行調整參數
 - ② treeset_labels.txt
 - ③ requirements.txt # 須先行調整套件

部署 LINE Bot + TensorFlow Serving - gRPC

2. 重新部署 LINE Bot

b. 安裝或視需要更新套件

```
cd; cd your_project
```

```
pip3 install -r requirements.txt
```

```
pip3 install --no-deps tensorflow-serving-api
```

Note

- ① 若以既有平台部署可於部署前執行 `pip3 list` 確認需求套件是否已存在；安裝缺乏的套件即可
- ② `tensorflow-serving-api` 安裝時會一併安裝 `tensorflow`，以 `--no-deps` 避免

部署 LINE Bot + TensorFlow Serving - gRPC

2. 重新部署 LINE Bot

c. 以 uWSGI 重新啟動 LINE Bot

```
# 取得舊程序 PID  
ps -ef | grep uwsgi
```

```
# 刪除舊程序  
kill your_pid
```

```
# 重起服務  
uwsgi -w your_module:app -s :your_port -d your_project.log  
uwsgi -w trees17bot_grpc:app -s :3000 -d trees.log
```

部署 LINE Bot + TensorFlow Serving - gRPC

2. 重新部署 LINE Bot

d. LINE 測試

部署 LINE Bot + TensorFlow Serving - gRPC

3. 進階調整 LINE Bot

Issues

① Channel 建立成本高

建立 channel 耗時 ... 重複使用 Channel

② TensorFlow Serving API 叫用 TensorFlow 函式

導致一併安裝 TensorFlow 套件，浪費空間 (> 300MB) ... 去化 TensorFlow

部署 LINE Bot + TensorFlow Serving - gRPC

3. 進階調整 LINE Bot

a. 重複使用 Channel

略

部署 LINE Bot + TensorFlow Serving - gRPC

3. 進階調整 LINE Bot

b. 去化 TensorFlow

① 自行建立 proto

- git clone https://github.com/tensorflow/tensorflow
- mkdir p; cd tensorflow
- python3 -m grpc.tools.protoc ./tensorflow/core/framework/*.proto --python_out=../p --grpc_python_out=../p --proto_path=.
- python3 -m grpc.tools.protoc ./tensorflow/core/example/*.proto --python_out=../p --grpc_python_out=../p --proto_path=.
- python3 -m grpc.tools.protoc ./tensorflow/core/protobuf/*.proto --python_out=../p --grpc_python_out=../p --proto_path=.
- cd ..; move p/tensorflow to project directory

Note

- ① 需要套件 `grpcio-tools`
- ② 建議在開發環境執行，產出可保存並上傳於部署環境

部署 LINE Bot + TensorFlow Serving - gRPC

3. 進階調整 LINE Bot

b. 去化 TensorFlow

```
② 取代 request.inputs[modelin].CopyFrom(make_tensor_proto(img))  
from tensorflow.core.framework import types_pb2  
from tensorflow.core.framework.tensor_shape_pb2 import TensorShapeProto  
from tensorflow.core.framework.tensor_pb2 import TensorProto  
  
d = [TensorShapeProto.Dim(size=x) for x in img.shape]  
t_p = TensorProto(dtype=types_pb2.DT_FLOAT, tensor_shape=TensorShapeProto(dim=d),  
                  tensor_content=img.tobytes())  
req.inputs[modelin].CopyFrom(t_p)
```

部署 LINE Bot + TensorFlow Serving - gRPC

3. 進階調整 LINE Bot

b. 去化 TensorFlow

③ 無依賴安裝 tensorflow-serving-api

```
# requirements.txt  
line-bot-sdk  
flask  
pillow  
numpy  
grpcio  
protobuf  
uwsgi
```

Note

pip3 install -r requirements.txt

pip3 install --no-deps tensorflow-serving-api

部署 LINE Bot + TensorFlow Serving - gRPC

4. 重新部署進階 LINE Bot

a. 上傳新版 LINE Bot

```
# 上傳以下檔案至 VM 專案目錄  
① trees17bot_adv.py # 須先行調整參數  
② treeset_labels.txt  
③ requirements.txt # 須先行調整套件
```

部署 LINE Bot + TensorFlow Serving - gRPC

4. 重新部署進階 LINE Bot

b. 安裝或視需要更新套件

```
cd; cd your_project
```

```
pip3 install -r requirements.txt
```

```
pip3 install --no-deps tensorflow-serving-api
```

Note

- ① 若以既有平台部署可於部署前執行 `pip3 list` 確認需求套件是否已存在；安裝缺乏的套件即可
- ② `tensorflow-serving-api` 安裝時會一併安裝 `tensorflow`，以 `--no-deps` 避免

部署 LINE Bot + TensorFlow Serving - gRPC

4. 重新部署進階 LINE Bot

c. 以 uWSGI 重新啟動 LINE Bot

```
# 取得舊程序 PID  
ps -ef | grep uwsgi
```

```
# 刪除舊程序  
kill your_pid
```

```
# 重起服務  
uwsgi -w your_module:app -s :your_port -d your_project.log  
uwsgi -w trees17bot_adv:app -s :3000 -d trees.log
```

部署 LINE Bot + TensorFlow Serving - gRPC

4. 重新部署進階 LINE Bot

d. LINE 測試

gcloud CLI

專案

初始化

```
gcloud init
```

登入

```
gcloud auth login
```

全部登出

```
gcloud auth revoke --all
```

查詢預設專案

```
gcloud config list project
```

設定預設專案代號

```
gcloud config set project your_project_id
```

```
gcloud config set project cryptic-bolt-319014
```

App Engine

部署

```
gcloud app deploy
```

觀察 log

```
gcloud app logs tail -s default
```

gcloud CLI

Compute Engine

SSH 登入

```
gcloud compute ssh your_id@your_vm
```

SCP 複製

```
gcloud compute scp your_file your_id@your_vm:
```

```
gcloud compute scp --recurse your_dir your_id@your_vm:
```

TensorFlow.js AI 部署

部署 TensorFlow.js Inference

1. 準備模型

a. 備妥 SavedModel 模型

- ① 準備 TensorFlow 2.4.4 以上環境

```
pip install tensorflow==2.4.4
```

- ② 轉換模型

```
hdf5_to_savedmodel.py your_hdf5.h5 your_savedmodel
```

```
hdf5_to_savedmodel.py trees17V1.h5 1
```

部署 TensorFlow.js Inference

1. 準備模型

b. 轉換 SavedModel 為 TensorFlow.js Model

① 安裝套件

```
pip install tensorflowjs # 會自動安裝 TensorFlow
```

② 轉換為 TensorFlow.js 格式

```
tensorflowjs_converter --input_format tf_saved_model your_savedmodel your_output  
tensorflowjs_converter --input_format tf_saved_model 1 js
```

部署 TensorFlow.js Inference

2. 開發測試

a. 開發 TensorFlow.js Inference

<https://www.tensorflow.org/js/>

部署 TensorFlow.js Inference

2. 開發測試

b. 架設測試 HTTP Server

```
python -m http.server your_port
```

```
python -m http.server 8000
```

部署 TensorFlow.js Inference

2. 開發測試

c. 網頁預覽

`http://localhost:your_port/your_html`

部署 TensorFlow.js Inference

3. 部署

a. 建立 VM

部署 TensorFlow.js Inference

3. 部署

b. 上傳程式與模型

- ① 登入 VM
- ② 於 `/home/your_account` 建立專案目錄
- ③ *.html, labels, TensorFlow.js 模型目錄移至專案目錄

部署 TensorFlow.js Inference

3. 部署

c. 架設 NGINX

```
# .conf
server {
    server_name your_domain;

    location /your_path {
        alias /home/your_account/your_project;
        index your_html;
    }
}
```

部署 TensorFlow.js Inference

4. Browser 測試

a. 以瀏覽器開啟網址

`https://your_domain/your_project/your_path`

`https://your_domain/your_project/your_path/your_html`



The End