



Tecnológico de Monterrey

Campus Santa Fe

Configuración de Instancias

Assessment

Alumna

María Fernanda Osorio Arroyo	A01026502
Andrea Alexandra Barrón Córdova	A01783126
Pablo Bolio Pradilla	A01782428
Emilia Salazar Leipen	A01781931
Lucia Barrenechea Carrancedo	A01782021

06 de Junio del 2025

Configuración de Instancias

El equipo BrainWaves configuró 3 instancias dentro de la VLAN 69. Tenemos una instancia dedicada a sostener el frontend, una instancia dedicada a sostener la base de datos o backend y una instancia dedicada a las API's.

Para estas instancias se creó un *Security group*, en el cual se establecieron los protocolos a seguir como: SSH, TCP. En este grupo de seguridad también se expusieron los puertos correspondientes a cada instancia.

Frontend: accesible en el puerto 3000 (React dev server)

Backend/API: accesible en el puerto 8000 (FastAPI)

Database: MySQL accesible en el puerto 3306

Web traffic: puertos estandard 80 (HTTP) y 443 (HTTPS)

SSH: puerto 22 para remote access

FrontEnd

I.P: 172.28.69.54

Nombre de la Instancia: KF

Source : Debian

Flavor : Tiny

Configuración:

```
#cloud-config
ssh_pwauth: true
preserve_hostname: false
hostname: KALMAN_Frontend

users:
  - name: Brainwaves
    plain_text_passwd: brainwavez123
    no_user_group: true
    groups: [sudo, adm]
    sudo: ALL=(ALL) NOPASSWD:ALL
    shell: /bin/bash
    ssh_authorized_keys:
      - ssh-rsa
        AAAAB3NzaC1yc2EAAAADAQABAAQgQDfE6Q7z3z0af8K5rFH8dMg1Gg8J6PedplSNG
        0SxGL0qKzGPwRNLzd6wcfoQCOUrYJB1UC989d9xxOoIDLc3I/R3s01eNW3BhsMgNvw
        BeworZgBXIDZSMX7owm0hwWLK+paVlhAVAPaz37uckbGiYTAtWrk0bXGr0lSJ3AgHz
        wPdfuBvLeLe0DNuUL78VOTu+K2xSsXtnD4GGYD/wjScwJtmMh86uve3i7BqGh/m3NY
        8HeQX46QFk26jBBv6KB5+11YEGvsaDMOA475i0ZTwp4v27A0/aKSUfcgoLs0bdzfkP
        SWMUHbQzhaGWRSGhiiWjn+dY9zPOMUK4+c0M1XomJVlKKenZCrUigJjJlfsRoKIBZK
        j+R/DtmaDisF8ehGOhM3uk2dt4o4zJfQVU1D0BYt+9uwkzUc6Kh+jdcZP2kZO6Vtd0
        wpTUsXyOIiFqYD1riMqYIMSulHXMhdwgLcCwd9DCGf9qE6/UAlav9Az2itU5Pxbb+p
        UJ0kdbLNd6KobB0=

ssh_deletekeys: false
```

```
chpasswd:
  list: |
    Brainwaves:brainwavez123
  expire: False
```

```
packages:
- nodejs
- npm
- git
- curl
- nginx
- python3
- python3-pip
- python3-venv
- unzip
- wget
- build-essential
- ca-certificates
- software-properties-common
- apt-transport-https
- lsb-release
- gnupg
```

```
runcmd:
- ufw allow 22/tcp
- ufw allow 80/tcp
- ufw allow 443/tcp
- ufw allow 3000/tcp
- ufw allow 5173/tcp
- ufw --force enable
- systemctl enable nginx
- systemctl start nginx
- curl -fsSL https://deb.nodesource.com/setup_lts.x | sudo -E
```

```
bash -
- apt-get install -y nodejs
- npm install -g create-react-app vite @vitejs/plugin-react
- npm install -g serve pm2 nodemon concurrently
- npm install -g eslint prettier typescript
- npm install -g @types/node @types/react @types/react-dom
- mkdir -p /var/www/html/frontend
- chown -R Brainwaves:Brainwaves /var/www/html/frontend
- mkdir -p /home/Brainwaves/projects
- chown -R Brainwaves:Brainwaves /home/Brainwaves/projects
- python3 -m pip install --upgrade pip
- echo 'export PATH="$HOME/.local/bin:$PATH"' >>
/home/Brainwaves/.bashrc
- echo 'alias ll="ls -la"' >> /home/Brainwaves/.bashrc
```

```
- echo 'alias python=python3' >> /home/Brainwaves/.bashrc
```

Backend

I.P: 172.28.69.82

Nombre: KB

Source : Debian

Flavor : Tiny

Configuration:

```
#cloud-config
ssh_pwauth: true
preserve_hostname: false
hostname: KALMAN_Backend

users:
  - name: Brainwaves
    plain_text_passwd: brainwavez123
    no_user_group: true
    groups: [sudo, adm]
    sudo: ALL=(ALL) NOPASSWD:ALL
    shell: /bin/bash
    ssh_authorized_keys:
      - ssh-rsa
        AAAAB3NzaC1yc2EAAAADAQABAAQGBgQDfE6Q7z3z0af8K5rFH8dMg1Gg8J6PedplSNG
        0SxGL0qKzGPwRNLzd6wcfoQCOURYJB1UC989d9xxOoIDLc3I/R3s01eNW3BhsMgNvw
        BeworZgBXIDZSMX7owm0hwWLK+paVlhAVAPaz37uckbGiYTAtWrk0bXGr0lSJ3AgHz
        wPdfuBvLeLe0DNuUL78VOTu+K2xSsXtnD4GGYD/wjScwJtmMh86uve3i7BqGh/m3NY
        8HeQX46QFk26jBBv6KB5+11YEGvsadMOA475i0ZTwp4v27A0/aKSUfcgoLs0bdzfkP
        SWMUHbQzhaGWSghiiWjn+dY9zPOmUK4+c0M1XomJVlKKenZCrUigJjJ1fSRoKIBZK
        j+R/DtmaDisF8ehGOhM3uk2dt4o4zJfQVULD0BYt+9uwkzUc6Kh+jdcZP2kZO6Vtd0
        wpTUsXyOIiFqYD1rIMqYIMSULHXMhdwgLcCwd9DCGf9qE6/UAlav9Az2itU5Pxbb+p
        UJ0kdbLNd6KobB0=

ssh_deletekeys: false

chpasswd:
  list: |
    Brainwaves:brainwavez123
  expire: False

packages:
  - python3
  - python3-pip
  - python3-venv
  - python3-dev
```

- mysql-server
- mysql-client
- libmysqlclient-dev
- git
- curl
- nginx
- unzip
- wget
- build-essential
- software-properties-common
- apt-transport-https
- ca-certificates
- lsb-release
- gnupg
- pkg-config

runcmd:

- ufw allow 22/tcp
 - ufw allow 80/tcp
 - ufw allow 443/tcp
 - ufw allow 3306/tcp
 - ufw allow 8000/tcp
 - ufw --force enable
 - systemctl enable mysql
 - systemctl start mysql
 - systemctl enable nginx
 - systemctl start nginx
 - mysql -e "ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY 'brainwavez123';"
 - mysql -e "CREATE DATABASE IF NOT EXISTS kalman_db;"
 - mysql -e "CREATE USER 'kalman_user'@'localhost' IDENTIFIED BY 'brainwavez123';"
 - mysql -e "GRANT ALL PRIVILEGES ON kalman_db.* TO 'kalman_user'@'localhost';"
 - mysql -e "FLUSH PRIVILEGES;"
 - python3 -m pip install --upgrade pip setuptools wheel
 - python3 -m pip install fastapi uvicorn sqlalchemy pymysql python-multipart
 - python3 -m pip install python-jose python-dotenv passlib bcrypt
 - python3 -m pip install pydantic mysql-connector-python alembic
 - python3 -m pip install requests httpx pytest pytest-asyncio
 - apt-get update
 - wget
- https://dev.mysql.com/get/Downloads/MySQLGUITools/mysql-workbench-community_8.0.36-1ubuntu22.04_amd64.deb -O /tmp/mysql-workbench.deb || true
- apt-get install -y libgtkmm-3.0-1v5 libzip4 || true

```

- dpkg -i /tmp/mysql-workbench.deb || true
- apt-get install -f -y || true
- mkdir -p /home/Brainwaves/backend
- chown -R Brainwaves:Brainwaves /home/Brainwaves/backend
- echo 'export PATH="$HOME/.local/bin:$PATH"' >>
/home/Brainwaves/.bashrc
- echo 'alias python=python3' >> /home/Brainwaves/.bashrc
- echo 'alias pip=pip3' >> /home/Brainwaves/.bashrc

```

API 1

I.P: 172.28.69.19

Nombre: KAPIOne

Source: Debian

Flavor: Tiny

Configuración:

```

#cloud-config
ssh_pwauth: true
preserve_hostname: false
hostname: KAPI1

```

users:

```

- name: Brainwaves
  plain_text_passwd: brainwavez123
  no_user_group: true
  groups: [sudo, adm]
  sudo: ALL=(ALL) NOPASSWD:ALL
  shell: /bin/bash
  ssh_authorized_keys:
    - ssh-rsa

```

```

AAAAB3NzaC1yc2EAAAADAQABAAQGCvR9Pms5wUleoV87kfF/2IZ17EFx6Gcfx/o
JOtvGxDMzZaFooR6tLM2JjONEX+Y4DLYQUEDveGVu5Bd2ub1xpYY1aSYU1/KqALNXA
LeYWCC80vs/JFA0nt4dRJVbgME0mfYQyEDXWLNhulITbknBCxnbrjNDlV3BKSWSfvN
FDEXTzEkapGj5lRUSGnMvXU5+gElykQAzP+cxIDZTjm9HDIuqxxSSGNu+ku7Fm96Ge
l/ajo5HUIJ/nd0JtIcrrtHX9aHJdGGQ6DcyjA1Es8IXoV9q9aRgo/LN2quv4ZYB9fU
vJC6M1cn0q6QPTBmvzfQzKVSPeVAqjJXvJ+ACV5gBLjJOOfw4VjhnHeGJV51YZKJ4
46gGl2Oj2xuo+i8xhZ/1QO3QD06w0tuTUDuHVVtKmCo9w+oBHQ45j2N9S1T7u/yEC3
Sf6g2rovu7L8s4rbxzzj4pb/2/SNPfetz5oNBmo/pKdWdYHdt2ycg1F7P37zz0BQtd2
eEMzmGrpTNNKqs= ferosorio@Fernandas-Laptop.local

```

```
ssh_deletekeys: false
```

chpasswd:

```
list: |
```

Brainwaves:brainwavez123
expire: False

packages:

- python3
- python3-pip
- python3-venv
- python3-dev
- nodejs
- npm
- mysql-server
- mysql-client
- libmysqlclient-dev
- git
- curl
- nginx
- unzip
- wget
- build-essential
- software-properties-common
- apt-transport-https
- ca-certificates
- lsb-release
- gnupg
- pkg-config
- redis-server

runcmd:

- ufw allow 22/tcp
- ufw allow 80/tcp
- ufw allow 443/tcp
- ufw allow 3306/tcp
- ufw allow 8000/tcp
- ufw allow 6379/tcp
- ufw --force enable
- systemctl enable mysql
- systemctl start mysql
- systemctl enable nginx
- systemctl start nginx
- systemctl enable redis-server
- systemctl start redis-server
- mysql -e "ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY 'brainwavez123';"
- mysql -e "CREATE DATABASE IF NOT EXISTS datamed CHARACTER SET utf8mb4 COLLATE utf8mb4_unicode_ci;"
- mysql -e "CREATE USER IF NOT EXISTS 'app_user'@'localhost' IDENTIFIED BY 'app_pass';"

```

- mysql -e "ALTER USER 'app_user'@'localhost' IDENTIFIED BY
'app_pass';"
- mysql -e "GRANT ALL PRIVILEGES ON datamed.* TO
'app_user'@'localhost';"
- mysql -e "CREATE USER IF NOT EXISTS 'app_user'@'%' IDENTIFIED
BY 'app_pass';"
- mysql -e "ALTER USER 'app_user'@'%' IDENTIFIED BY 'app_pass';"
- mysql -e "GRANT ALL PRIVILEGES ON datamed.* TO
'app_user'@'%'";"
- mysql -e "FLUSH PRIVILEGES;"
- python3 -m pip install --upgrade pip setuptools wheel
- python3 -m pip install fastapi uvicorn sqlalchemy pymysql
python-multipart
- python3 -m pip install python-jose python-dotenv passlib
bcrypt
- python3 -m pip install pydantic mysql-connector-python alembic
- python3 -m pip install requests httpx pytest pytest-asyncio
- python3 -m pip install redis celery gunicorn
- curl -fsSL https://deb.nodesource.com/setup_lts.x | sudo -E
bash -
- apt-get install -y nodejs
- npm install -g pm2 nodemon
- apt-get update
- wget
https://dev.mysql.com/get/Downloads/MySQLGUITools/mysql-workbench-
community_8.0.36-1ubuntu22.04_amd64.deb -O
/tmp/mysql-workbench.deb || true
- apt-get install -y libgtkmm-3.0-1v5 libzip4 || true
- dpkg -i /tmp/mysql-workbench.deb || true
- apt-get install -f -y || true
- mkdir -p /home/Brainwaves/api
- chown -R Brainwaves:Brainwaves /home/Brainwaves/api
- echo 'export PATH="$HOME/.local/bin:$PATH"' >>
/home/Brainwaves/.bashrc
- echo 'alias python=python3' >> /home/Brainwaves/.bashrc
- echo 'alias pip=pip3' >> /home/Brainwaves/.bashrc
- echo 'export API_INSTANCE=KAPI1' >> /home/Brainwaves/.bashrc

```

API 2

IP: 172.28.69.102

Nombre: KAPIOne

Source: Debian

Flavor: Tiny

Configuración:


```
#cloud-config
ssh_pwauth: true
preserve_hostname: false
hostname: KAPI2

users:
  - name: Brainwaves
    plain_text_passwd: brainwavez123
    no_user_group: true
    groups: [sudo, adm]
    sudo: ALL=(ALL) NOPASSWD:ALL
    shell: /bin/bash
    ssh_authorized_keys:
      - ssh-rsa
        AAAAB3NzaC1yc2EAAAADAQABAAQGC+4EZ48fVGZfuLKcp2kNQLnRvT8EzUXsAwBK
        Hn9Gx2AetvK8d/oBFTQpDRcfXJtiszIRGntqedjoYs+kF19G26iu3zDvXU714VdHfd
        CwUQQPPj4QCpeMHbOWkThlh3IDSQcpvpXSAdGX49T76u6bRheEILKcOXRus93DizoF
        mbd6qVXLu8FWOk0LBZO2gw7SJYK+b6/9bsUuW/XrvId9k6asHg9Uao3L68GcCPHays
        Qiw40uxBMeQHvffROWSr3DkfqGjZnhRClaNVQp+gQtt3r0PJf/VDxQpJQiQ3n7R0GO
        kt8llwQHajSOPSN/cmC2ztVyyegbx/X/hKAu4R8IdXvPkJxSJfag3/xMNkQ1UC+XED
        5Tw6WSH7ArvzUSjpmndlk7fppHm8X7sREJSFENpm0SuAhpRtLoVKp3zXfw07lLvHnv
        qteW3/3B2HZlmErQ+OmU4VD097EILY35bSqD3QHDsCYWBY94i7+zi3+YFiAzoOJBRT
        R2QC1Yklw/qXG90= ferosorio@Fernandas-Laptop.local

ssh_deletekeys: false

chpasswd:
  list: |
    Brainwaves:brainwavez123
  expire: False

packages:
  - python3
  - python3-pip
  - python3-venv
  - python3-dev
  - nodejs
  - npm
  - mysql-server
  - mysql-client
  - libmysqlclient-dev
  - git
  - curl
  - nginx
  - unzip
  - wget
  - build-essential
  - software-properties-common
```

- apt-transport-https
- ca-certificates
- lsb-release
- gnupg
- pkg-config
- redis-server

runcmd:

- ufw allow 22/tcp
- ufw allow 80/tcp
- ufw allow 443/tcp
- ufw allow 3306/tcp
- ufw allow 8000/tcp
- ufw allow 6379/tcp
- ufw --force enable
- systemctl enable mysql
- systemctl start mysql
- systemctl enable nginx
- systemctl start nginx
- systemctl enable redis-server
- systemctl start redis-server
- mysql -e "ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY 'brainwavez123';"
- mysql -e "CREATE DATABASE IF NOT EXISTS datamed CHARACTER SET utf8mb4 COLLATE utf8mb4_unicode_ci;"
- mysql -e "CREATE USER IF NOT EXISTS 'app_user'@'localhost' IDENTIFIED BY 'app_pass';"
- mysql -e "ALTER USER 'app_user'@'localhost' IDENTIFIED BY 'app_pass';"
- mysql -e "GRANT ALL PRIVILEGES ON datamed.* TO 'app_user'@'localhost';"
- mysql -e "CREATE USER IF NOT EXISTS 'app_user'@'%' IDENTIFIED BY 'app_pass';"
- mysql -e "ALTER USER 'app_user'@'%' IDENTIFIED BY 'app_pass';"
- mysql -e "GRANT ALL PRIVILEGES ON datamed.* TO 'app_user'@'%';"
- mysql -e "FLUSH PRIVILEGES;"
- python3 -m pip install --upgrade pip setuptools wheel
- python3 -m pip install fastapi uvicorn sqlalchemy pymysql python-multipart
- python3 -m pip install python-jose python-dotenv passlib bcrypt
- python3 -m pip install pydantic mysql-connector-python alembic
- python3 -m pip install requests httpx pytest pytest-asyncio
- python3 -m pip install redis celery gunicorn
- curl -fsSL https://deb.nodesource.com/setup_lts.x | sudo -E bash -
- apt-get install -y nodejs

```

- npm install -g pm2 nodemon
- apt-get update
- wget
https://dev.mysql.com/get/Downloads/MySQLGUITools/mysql-workbench-
community_8.0.36-1ubuntu22.04_amd64.deb -O
/tmp/mysql-workbench.deb || true
- apt-get install -y libgtkmm-3.0-1v5 libzip4 || true
- dpkg -i /tmp/mysql-workbench.deb || true
- apt-get install -f -y || true
- mkdir -p /home/Brainwaves/api
- chown -R Brainwaves:Brainwaves /home/Brainwaves/api
- echo 'export PATH="$HOME/.local/bin:$PATH"' >>
/home/Brainwaves/.bashrc
- echo 'alias python=python3' >> /home/Brainwaves/.bashrc
- echo 'alias pip=pip3' >> /home/Brainwaves/.bashrc
- echo 'export API_INSTANCE=KAPI2' >> /home/Brainwaves/.bashrc

```

NGINX

IP: 172.28.69.158

Nombre: Knginx

Source: Debian

Flavor: Tiny

Configuración:

```

#cloud-config
# Simple cloud-init for Nginx instance with password
authentication

# Enable SSH password authentication
ssh_pwauth: true

# Set hostname
hostname: KalmanNginx
preserve_hostname: false

- name: Brainwaves
  plain_text_passwd: brainwavez123
  no_user_group: true
  groups: [sudo, adm]
  sudo: ALL=(ALL) NOPASSWD:ALL
  shell: /bin/bash
  ssh_authorized_keys:

```

```
- ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAQGDnL7QiTjsRGkjZ24kuP8Q/Ajwev+MOGuC3Is
PwY9J7ESdxBPqWl4AFgroDQAf/VUw7Z8GMtvAc5TKJ2dr2Bwzpyo3r+KIhypZzckcG
4HojGLg6FMC+sThLugbnNLG7UImfr9cNq1LW02MZJdRlpOGgneGVhQZHDk7eOgwpyh
mzZQUXradm+X7VsmEYErAoSsYJmsYv/UieLHYtUNK8KLQ0tBffv29fi21HYOcR0ftu
dJM1RlnGbwF2y3165KgOYU47pivPoZmMGzABlL2nYXKNbo3d00IeXK5HqcFjMaqJKL
45CCVfoSo7D19Vi7POi796OGg4rBL1khpnx0Xgh0kgf2PYU9c2LGT1JWpXNNg9e9W+
qZrg4bc8VHUhZ64pXQZx9KipU997zXv6TP4otnr+A/3oeBNY0s9Orn4CRBn0xmFRP6
ioFm/jHHjh889KxjOuyd/qRgRkC5/masgJhxLpm0LjHcjyLH+OZgKocjiDwIUH7tXJ
nQd2XeHbD9tEv40=
```

```
ssh_deletekeys: false
```

```
# Set password directly (alternative method)
```

```
chpasswd:
```

```
  users:
```

```
    - name: brainwaves
```

```
      password: brainwavez123
```

```
      type: text
```

```
  expire: false
```

```
# Install basic packages
```

```
packages:
```

```
  - nginx
```

```
  - curl
```

```
  - vim
```

```
  - htop
```

```
  - net-tools
```

```
# Ensure SSH service is configured correctly
```

```
runcmd:
```

```
  # Ensure password authentication is enabled in SSH config
```

```
  - sed -i 's/^PasswordAuthentication.*/PasswordAuthentication
yes/' /etc/ssh/sshd_config
```

```
  - sed -i 's/^#PasswordAuthentication.*/PasswordAuthentication
yes/' /etc/ssh/sshd_config
```

```
  - sed -i
```

```
's/^ChallengeResponseAuthentication.*/ChallengeResponseAuthenticat
ion yes/' /etc/ssh/sshd_config
```

```
  - sed -i
```

```
's/^#ChallengeResponseAuthentication.*/ChallengeResponseAuthentica
tion yes/' /etc/ssh/sshd_config
```

```
  # Restart SSH service to apply changes
```

```
  - systemctl restart sshd
```

```
  # Start and enable nginx
```

```
- systemctl enable nginx
- systemctl start nginx

# Configure firewall
- ufw allow 22/tcp
- ufw allow 80/tcp
- ufw allow 443/tcp
- echo "y" | ufw enable

# Optional: Add a simple message of the day
write_files:
- path: /etc/motd
  content: |
    Welcome to your Nginx Server!

    Username: brainwaves
    Password: brainwavez123

    Nginx is installed and running.
    Configure your sites in /etc/nginx/sites-available/

permissions: '0644'
```