

VINÍCIUS HENRIQUE DOS SANTOS

POSTECH

MACHINE LEARNING ENGINEERING

BIG DATA PIPELINES

AULA 05

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EMSE

O QUE VEM POR AÍ?

Você está prestes a conhecer o Apache Nifi, a ferramenta capaz de se conectar e processar TUDO! Ele vem ganhando cada vez mais espaço no mercado por conta da sua grande versatilidade, tolerância a falhas e poder de processamento quando falamos de dados em batch ou tempo real. Aperte os cintos e prepare-se para conhecê-lo de forma prática.

Nós não pararemos por aí: vou te apresentar uma das soluções mais fortes do mercado quando pensamos em bancos de dados de documentos, o Elasticsearch. Essa ferramenta é capaz de indexar, processar e buscar documentos em frações de segundos e nessa aula você aprenderá como inserir, processar e usar os seus documentos dentro dela!

HANDS ON

Realize as configurações para iniciar os serviços do Apache NIFI, Elasticsearch e Kibana.

Através do Apache NIFI, realize uma movimentação de arquivos bidirecionais:

- Da sua máquina para algum Storage Cloud (do provedor que você tiver mais familiaridade).
- Movimente um arquivo do storage da cloud de sua preferência para a sua máquina local.

Através do Kibana, interaja com o Elasticsearch com o seguinte objetivo:

- Adicione um documento.
- Consulte esse documento.
- Altere esse documento.

SAIBA MAIS

Configurando o ambiente para o Apache NiFi

Faça o download do virtualizador de sua preferência; aqui eu seguirei com o [Virtual Box](#), que não tem custos e é compatível com a grande maioria dos sistemas operacionais.



Figura 1 – VirtualBox
Fonte: elaborado pelo autor (2024)

A versão do Linux que usaremos é o [Ubuntu](#) 22.04.3 LTS (a mais recente na data em que esse curso está sendo desenvolvido).

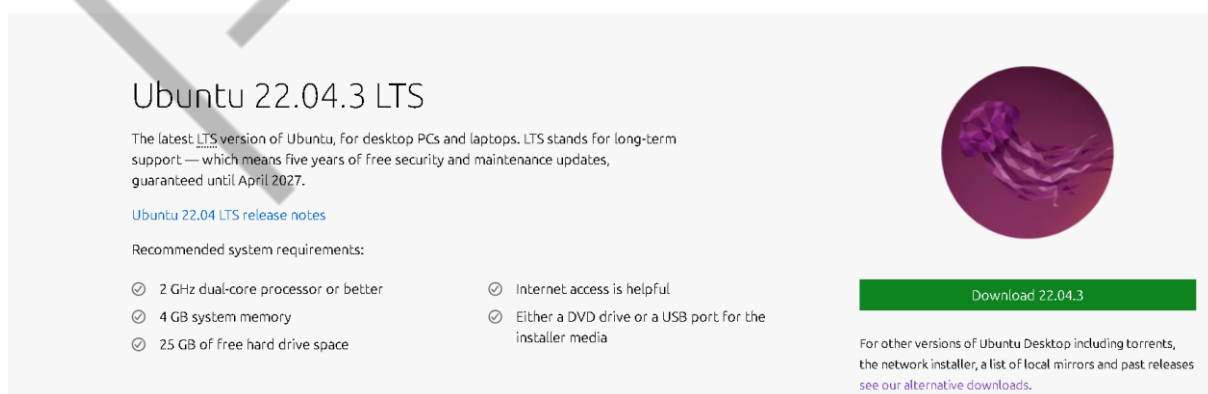


Figura 2 – Ubuntu 22.04.3 LTS
Fonte: elaborado pelo autor (2024)

Realize a instalação padrão do Virtual Box, abra o aplicativo e clique em “novo”.

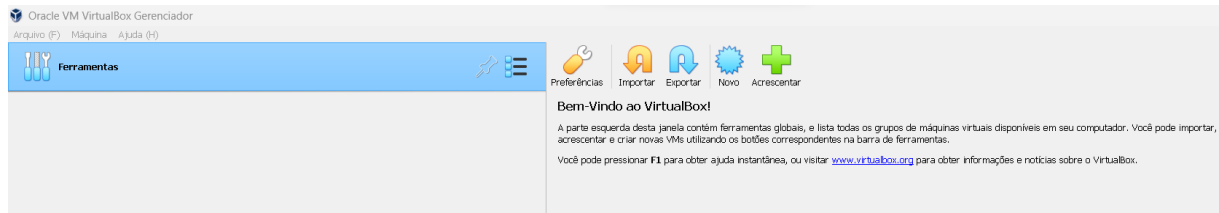


Figura 3 – Tela inicial do VirtualBox
Fonte: elaborado pelo autor (2024)

Preencha as informações necessárias apontando para a “.iso” que você baixou do Ubuntu:

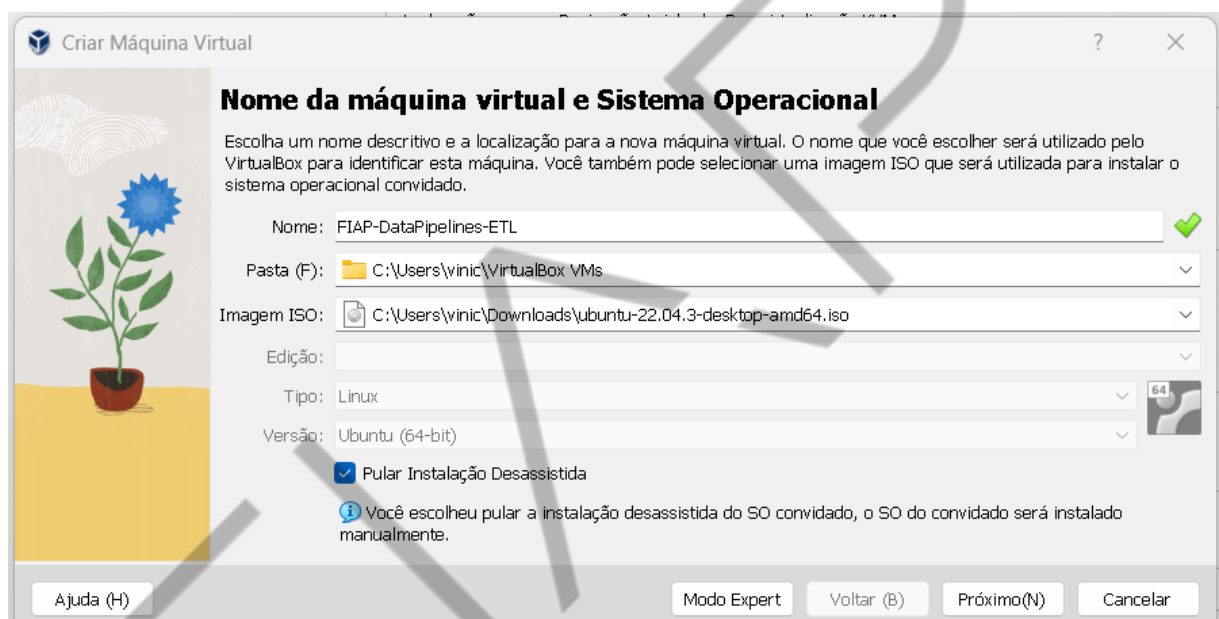


Figura 4 – Nome da máquina virtual e Sistema Operacional
Fonte: elaborado pelo autor (2024)

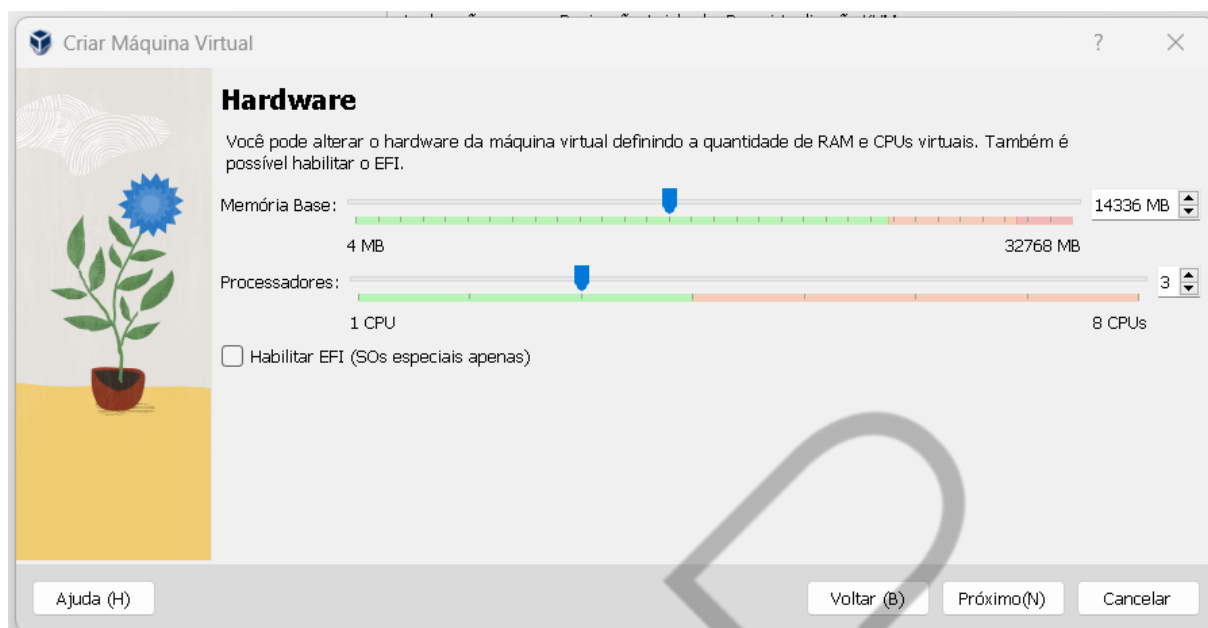


Figura 5 – Hardware
Fonte: elaborado pelo autor (2024)



Figura 6 – Disco Rígido Virtual
Fonte: elaborado pelo autor (2024)

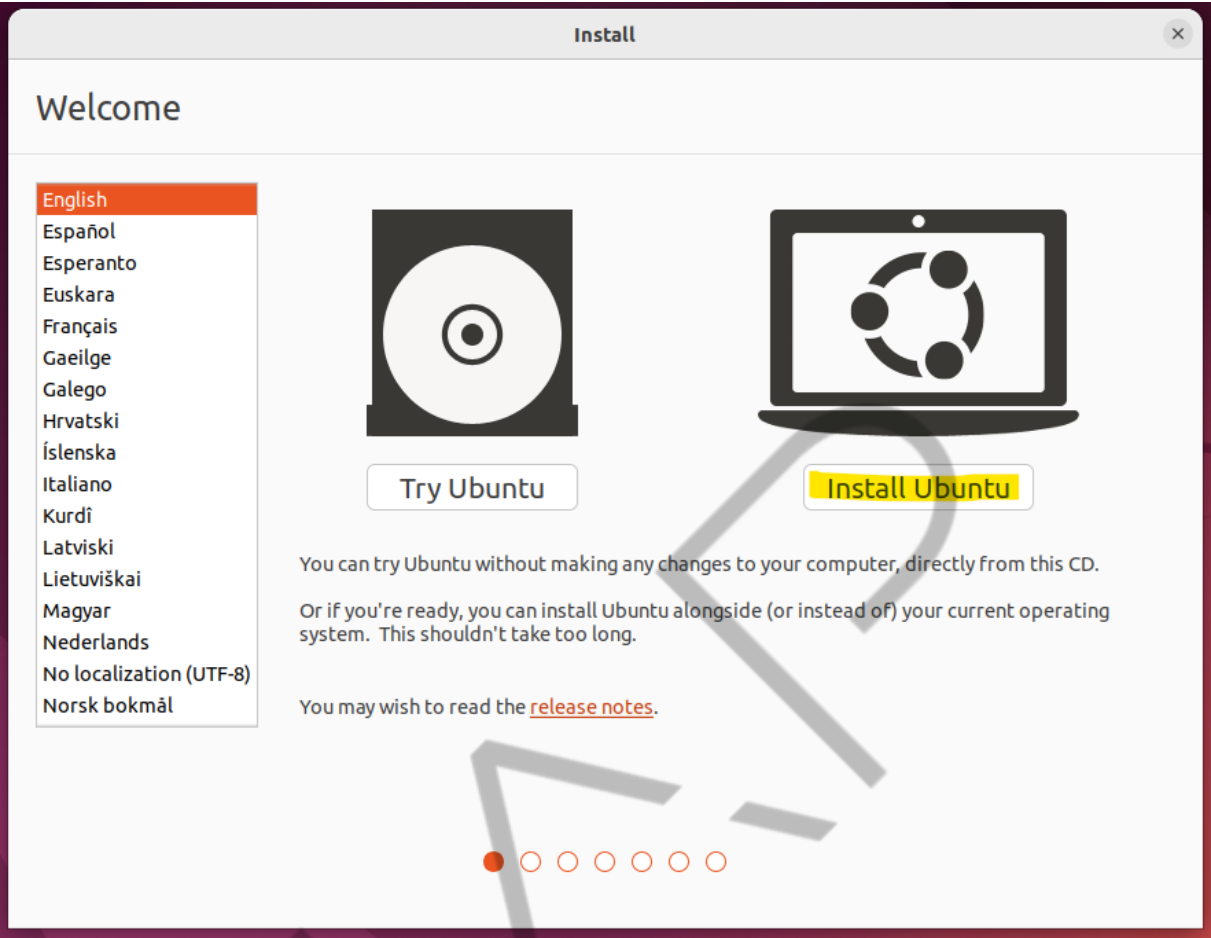


Figura 7 – Install Ubuntu
Fonte: elaborado pelo autor (2024)

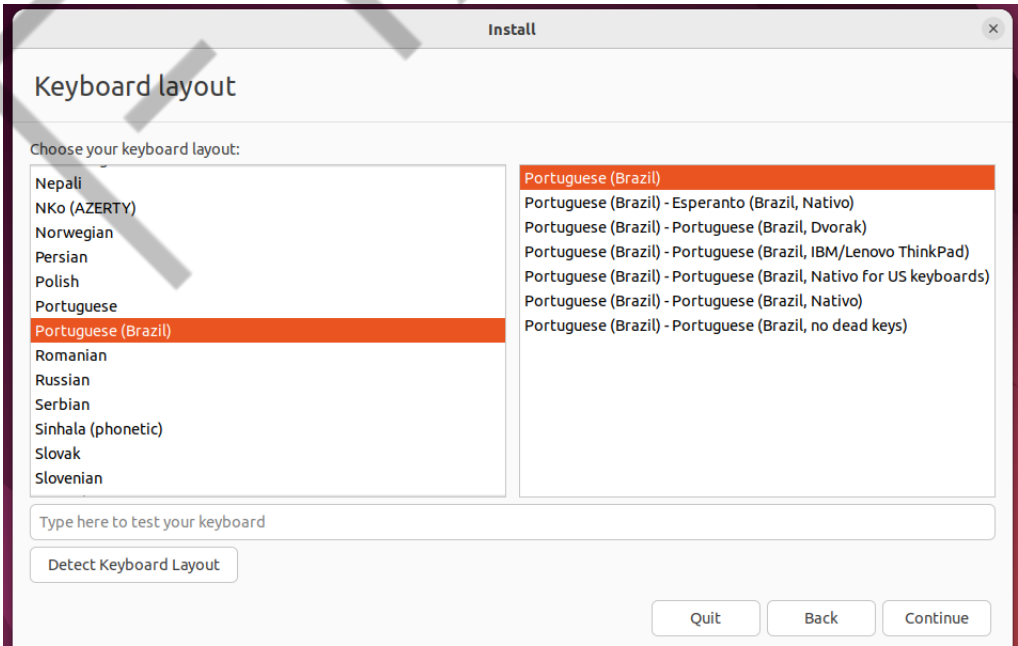


Figura 8 – Escolha da linguagem
Fonte: elaborado pelo autor (2024)

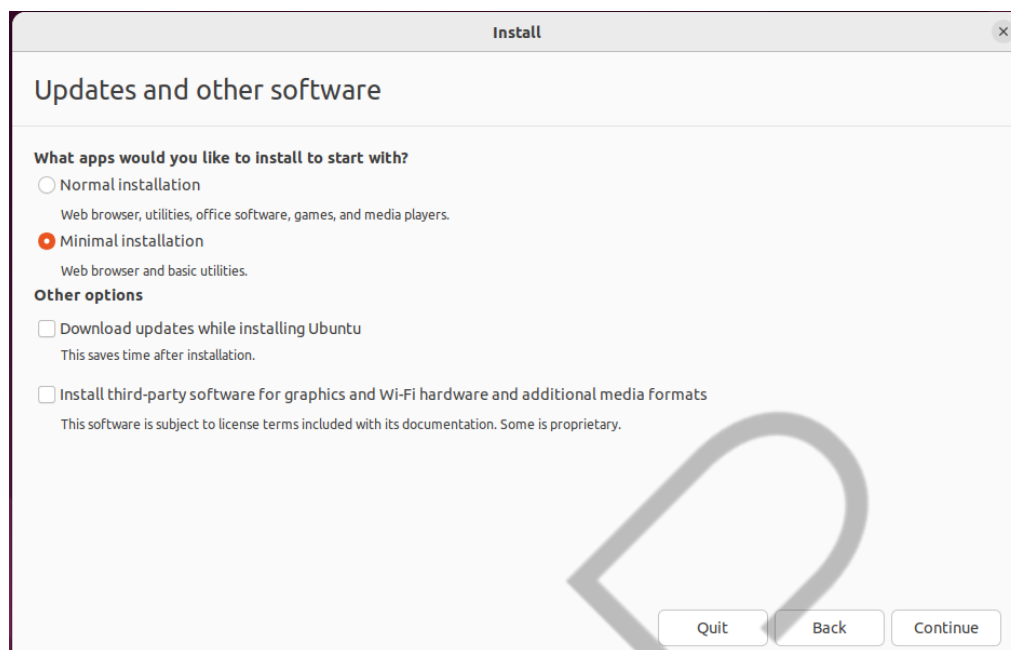


Figura 9 – Instalação mínima
Fonte: elaborado pelo autor (2024)

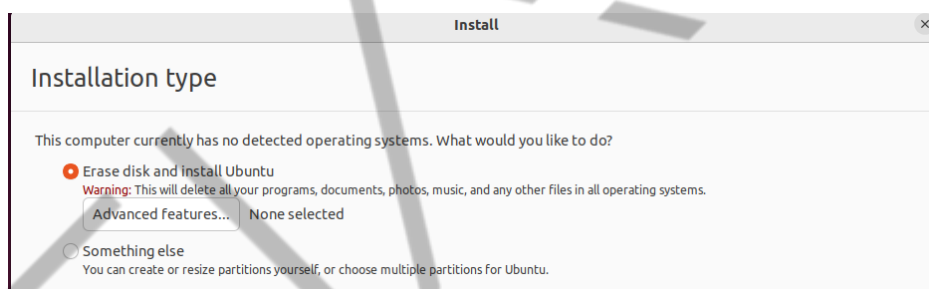


Figura 10 – Tipo de instalação
Fonte: elaborado pelo autor (2024)

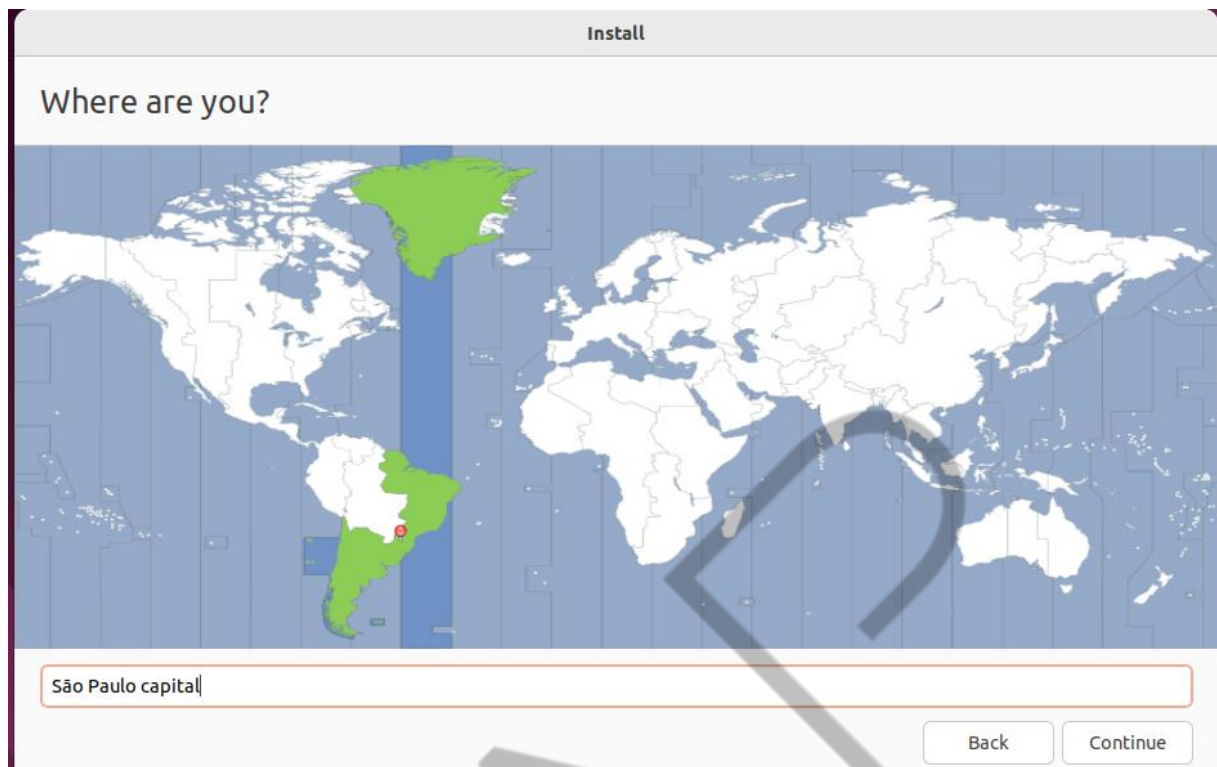


Figura 11 – Localização
Fonte: elaborado pelo autor (2024)

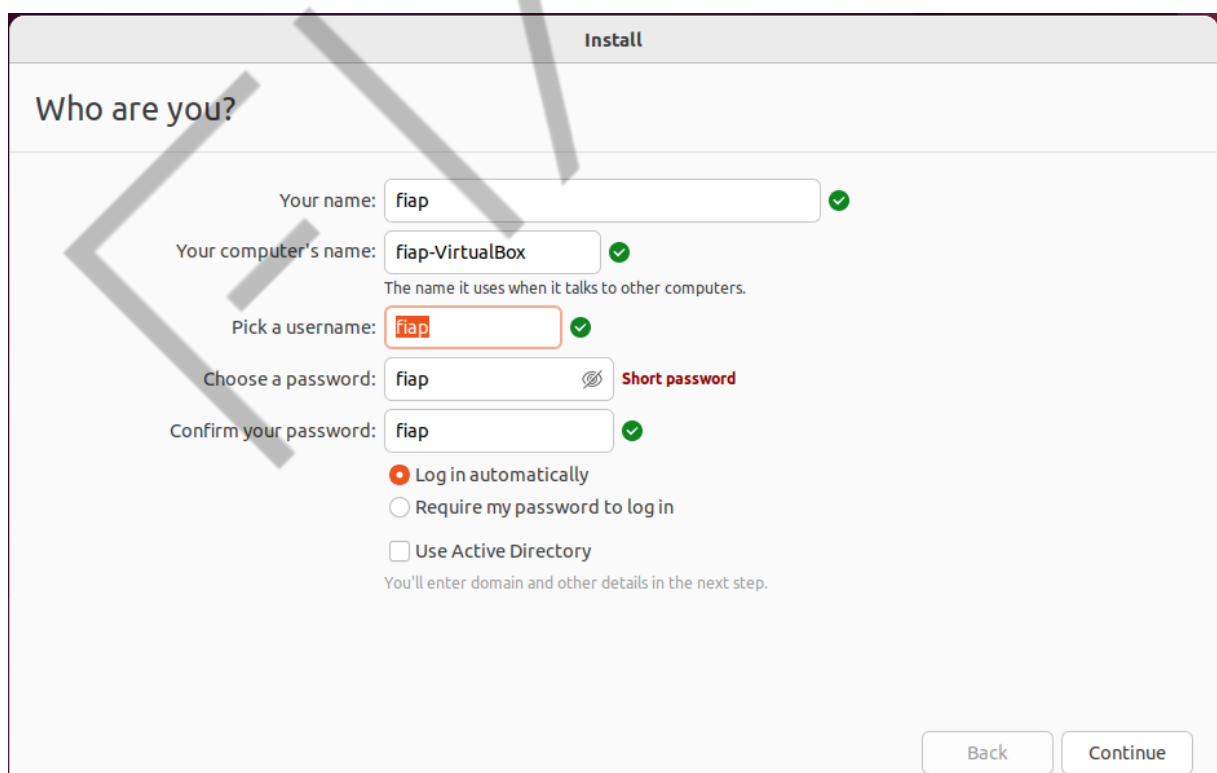


Figura 12 – Escolhendo um usuário
Fonte: elaborado pelo autor (2024)

Agora que o Ubuntu iniciou, vamos atualizar os pacotes e garantir que tudo que precisamos está com a versão atualizada.

```
sudo apt update
```

```
sudo apt upgrade
```

Depois que os arquivos do sistema operacional forem copiados e instalados, vá em “Dispositivos” no Virtual box e selecione a opção destacada.

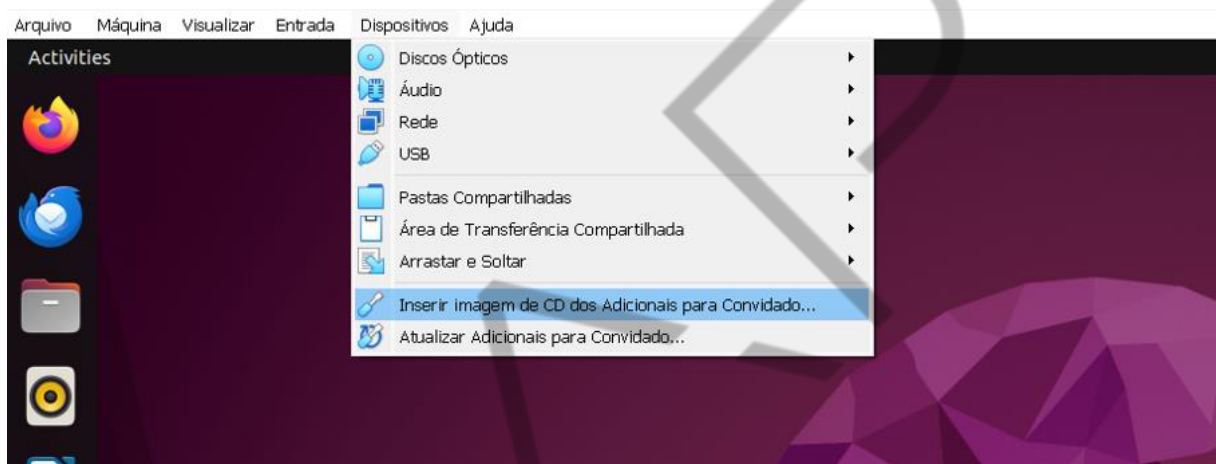


Figura 13 – Inserir Imagem de CD dos Adicionais para Convidado
Fonte: elaborado pelo autor (2024)

Após isso, desligue a máquina virtual.

Com a VM desligada, vá em configurações e faça as alterações para que você tenha os mesmos parâmetros da figura 14 e inicie a máquina novamente.

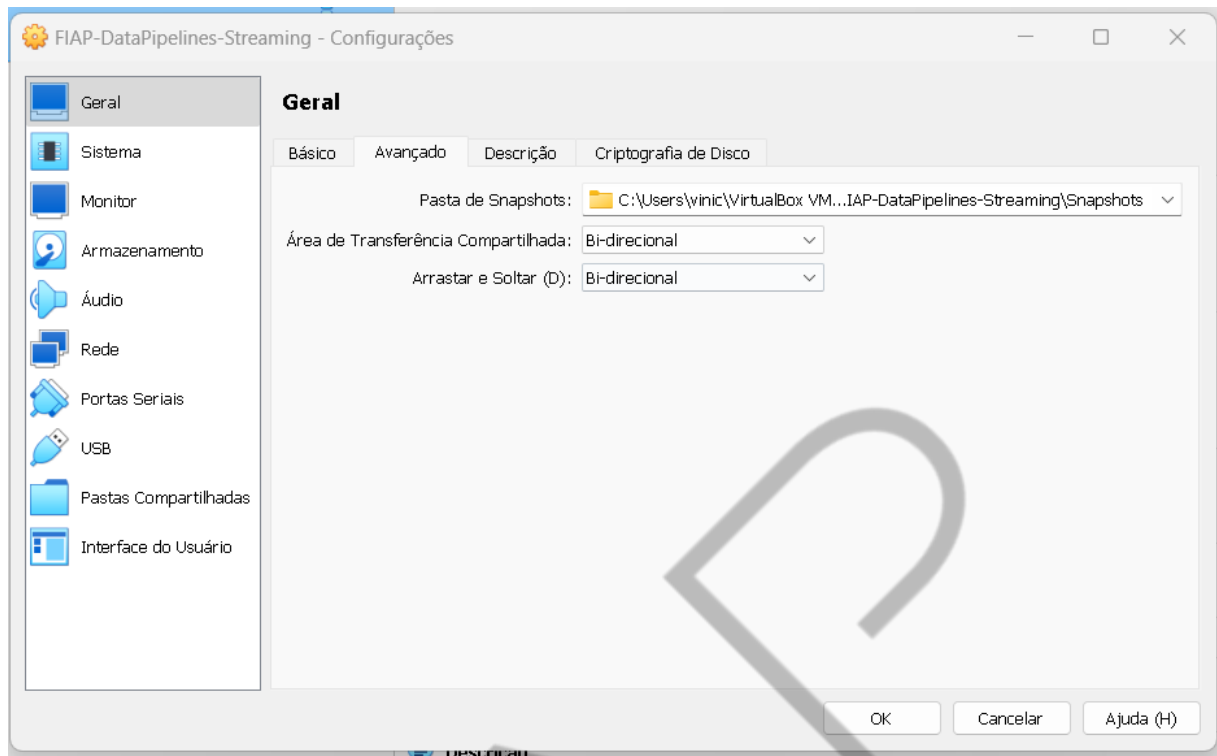


Figura 14 – Parâmetros indicados
Fonte: elaborado pelo autor (2024)

Abra o terminal (atalho Control + Alt + T) do Linux para executarmos os comandos necessários:

```
sudo apt update
```

```
sudo apt upgrade
```

```
sudo apt install build-essential gcc make perl dkms curl tcl
```

Clique na imagem do “CD” que apareceu na barra de ferramentas no Ubuntu.



Figura 15 – Ícone de CD
Fonte: elaborado pelo autor (2024)

Em seguida, na janela, abra um terminal dentro dessa pasta:

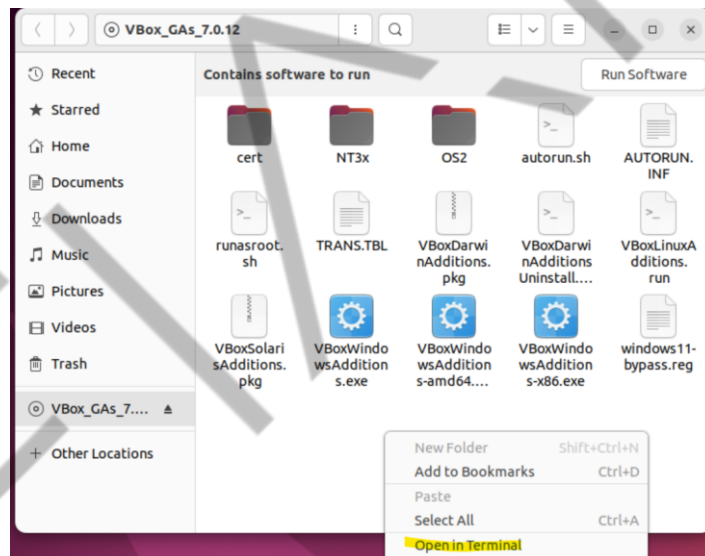


Figura 16 – Abrindo um terminal
Fonte: elaborado pelo autor (2024)

Em seguida, execute esses comandos no terminal:

```
sudo ./VboxLinuxAdditions.run
```

```
fiap@FIAP-DataPipelines-Streaming: /media/fiap/VBox_GAs_7.0.12
fiap@FIAP-DataPipelines-Streaming:/media/fiap/VBox_GAs_7.0.12$ sudo ./VboxLinuxAdditions.run
[sudo] password for fiap:
sudo: ./VboxLinuxAdditions.run: command not found
fiap@FIAP-DataPipelines-Streaming:/media/fiap/VBox_GAs_7.0.12$ sudo ./VBoxLinuxAdditions.run
Verifying archive integrity... 100% MD5 checksums are OK. All good.
Uncompressing VirtualBox 7.0.12 Guest Additions for Linux 100%
VirtualBox Guest Additions installer
Removing installed version 7.0.12 of VirtualBox Guest Additions...
update-initramfs: Generating /boot/initrd.img-6.2.0-26-generic
Copying additional installer modules ...
Installing additional modules ...
VirtualBox Guest Additions: Starting.
VirtualBox Guest Additions: Setting up modules
VirtualBox Guest Additions: Building the VirtualBox Guest Additions kernel
modules. This may take a while.
VirtualBox Guest Additions: To build modules for other installed kernels, run
VirtualBox Guest Additions: /sbin/rcvboxadd quicksetup <version>
VirtualBox Guest Additions: or
VirtualBox Guest Additions: /sbin/rcvboxadd quicksetup all
VirtualBox Guest Additions: Building the modules for kernel 6.5.0-17-generic.
```

Figura 17 – Execução de comandos no terminal
Fonte: elaborado pelo autor (2024)

Feche o terminal e reinicie a máquina virtual. Quando ela religar, você conseguirá copiar e colar texto ou arquivos entre máquina hospedeira e convidado, o que facilitará bastante as coisas daqui para frente.

Abra um novo terminal e execute o seguinte comando: `sudo apt install default-jdk`

```
fiap@fiap-VirtualBox:~$ sudo apt install default-jdk
[sudo] password for fiap:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ca-certificates-java default-jdk-headless default-jre default-jre-headless
  fonts-dejavu-extra java-common libatk-wrapper-java libatk-wrapper-java-jni
  libice-dev libpthread-stubs0-dev libsm-dev libx11-dev libxau-dev libxcb1-dev
  libxdmcp-dev libxt-dev openjdk-11-jdk openjdk-11-jdk-headless openjdk-11-jre
  openjdk-11-jre-headless x11proto-dev xorg-sgml-doctools xtrans-dev
Suggested packages:
  libice-doc libsm-doc libx11-doc libxcb-doc libxt-doc openjdk-11-demo
  openjdk-11-source visualvm fonts-ipafont-gothic fonts-ipafont-mincho
  fonts-wqy-microhei | fonts-wqy-zenhei
The following NEW packages will be installed:
  ca-certificates-java default-jdk default-jdk-headless default-jre
  default-jre-headless fonts-dejavu-extra java-common libatk-wrapper-java
  libatk-wrapper-java-jni libice-dev libpthread-stubs0-dev libsm-dev
  libx11-dev libxau-dev libxcb1-dev libxdmcp-dev libxt-dev openjdk-11-jdk
  openjdk-11-jdk-headless openjdk-11-jre openjdk-11-jre-headless x11proto-dev
  xorg-sgml-doctools xtrans-dev
0 upgraded, 24 newly installed, 0 to remove and 0 not upgraded.
Need to get 122 MB of archives.
After this operation, 275 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://br.archive.ubuntu.com/ubuntu jammy/main amd64 java-common all 0.72build2 [6.782 B]
```

Figura 18 – Comando `sudo apt install default-jdk`
Fonte: elaborado pelo autor (2024)

Abra o catálogo de software do ubuntu e instale o VSCode:

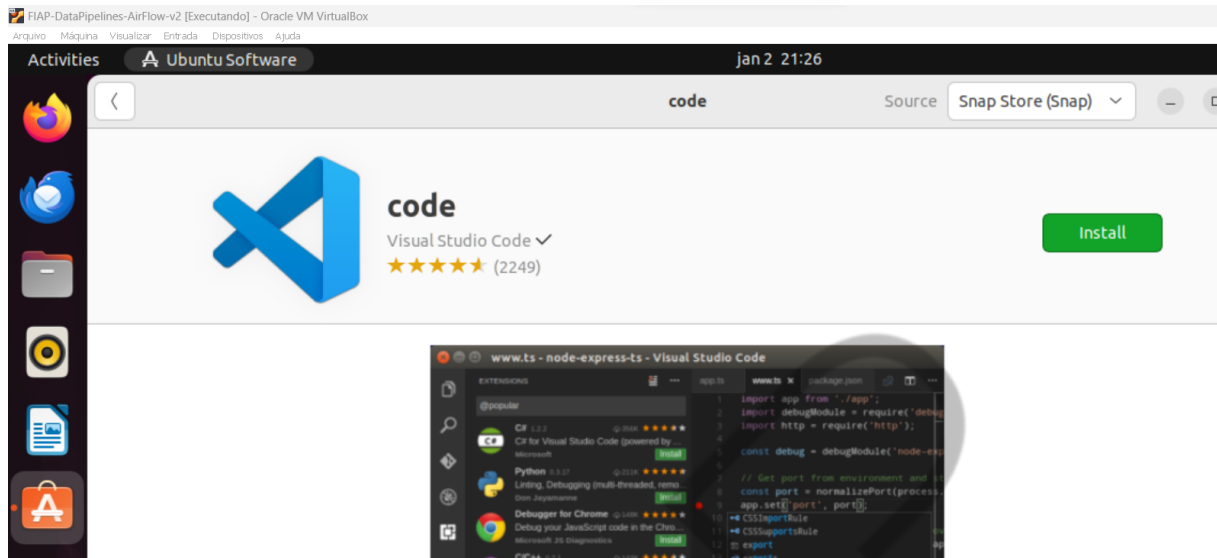


Figura 19 – Instalando o VSCode
Fonte: elaborado pelo autor (2024)

Instale o Docker:

`sudo apt-get update`

```
fiap@fiap-VirtualBox:~$ sudo apt-get update
[sudo] password for fiap:
Hit:1 http://br.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://br.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://br.archive.ubuntu.com/ubuntu jammy-backports InRelease
Get:4 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Fetched 110 kB in 1s (83,5 kB/s)
Reading package lists... Done
fiap@fiap-VirtualBox:~$
```

Figura 20 – Instalando o Docker
Fonte: elaborado pelo autor (2024)

`sudo apt-get install \`

`apt-transport-https \`

`ca-certificates \`

`curl \`

`gnupg \`

`lsb-release`

```

Reading package lists... Done
flap@flap-VirtualBox:~$ sudo apt-get install \
  apt-transport-https \
  ca-certificates \
  curl \
  gnupg \
  lsb-release
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
lsb-release is already the newest version (11.1.0ubuntu4).
lsb-release set to manually installed.
ca-certificates is already the newest version (20230311ubuntu0.22.04.1).
ca-certificates set to manually installed.
curl is already the newest version (7.81.0-1ubuntu1.15).
gnupg is already the newest version (2.2.27-3ubuntu2.1).
gnupg set to manually installed.
The following NEW packages will be installed:
  apt-transport-https
0 upgraded, 1 newly installed, 0 to remove and 22 not upgraded.
Need to get 1.510 B of archives.
After this operation, 170 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://br.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 apt-transport-https all 2.4.11 [1.510 B]
Fetched 1.510 B in 0s (15,2 kB/s)
Selecting previously unselected package apt-transport-https.
(Reading database ... 185499 files and directories currently installed.)
Preparing to unpack .../apt-transport-https_2.4.11_all.deb ...
Unpacking apt-transport-https (2.4.11) ...
Setting up apt-transport-https (2.4.11) ...
flap@flap-VirtualBox:~$

```

Figura 21 – Docker (1)
Fonte: elaborado pelo autor (2024)

```
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /usr/share/keyrings/docker-archive-keyring.gpg
```

```

flap@flap-VirtualBox:~$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /usr/share/keyrings/docker-archive-keyring.gpg
flap@flap-VirtualBox:~$

```

Figura 22 – Docker (2)
Fonte: elaborado pelo autor (2024)

```

echo \
  "deb [arch=$(dpkg --print-architecture) signed-by=/usr/share/keyrings/docker-archive-keyring.gpg] https://download.docker.com/linux/ubuntu \
    $(lsb_release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /dev/null

```

```

flap@flap-VirtualBox:~$ echo \
  "deb [arch=$(dpkg --print-architecture) signed-by=/usr/share/keyrings/docker-archive-keyring.gpg] https://download.docker.com/linux/ubuntu \
    $(lsb_release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
flap@flap-VirtualBox:~$

```

Figura 23 – Docker (3)
Fonte: elaborado pelo autor (2024)

```
sudo apt-get update
```



```

fiap@fiap-VirtualBox:~$ sudo apt-get update
Hit:1 http://br.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://br.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://br.archive.ubuntu.com/ubuntu jammy-backports InRelease
Get:4 https://download.docker.com/linux/ubuntu jammy InRelease [48,8 kB]
Hit:5 http://security.ubuntu.com/ubuntu jammy-security InRelease
Get:6 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages [27,6 kB]
Fetched 76,4 kB in 1s (56,6 kB/s)
Reading package lists... Done

```

Figura 24 – Docker (4)
Fonte: elaborado pelo autor (2024)

`sudo apt-get install docker-ce docker-ce-cli containerd.io`

```

fiap@fiap-VirtualBox:~$ sudo apt-get install docker-ce docker-ce-cli containerd.io
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  docker-buildx-plugin docker-ce-rootless-extras docker-compose-plugin git git-man liberror-perl libslirp0 pigz slirp4netns
Suggested packages:
  aufs-tools cgroupfs-mount | cgroup-lite git-daemon-run | git-daemon-sysvinit git-doc git-email git-gui gitk gitweb git-cvs git-mediawiki git-svn
The following NEW packages will be installed:
  containerd.io docker-buildx-plugin docker-ce docker-ce-cli docker-ce-rootless-extras docker-compose-plugin git git-man liberror-perl libslirp0 pigz slirp4netns
0 upgraded, 12 newly installed, 0 to remove and 22 not upgraded.
Need to get 123 MB of archives.
After this operation, 445 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://br.archive.ubuntu.com/ubuntu jammy/universe amd64 pigz amd64 2.6-1 [63,6 kB]
Get:2 https://download.docker.com/linux/ubuntu jammy/stable amd64 containerd.io amd64 1.6.28-1 [29,6 MB]
Get:3 http://br.archive.ubuntu.com/ubuntu jammy/main amd64 liberror-perl all 0.17029-1 [26,5 kB]
Get:4 http://br.archive.ubuntu.com/ubuntu jammy-updates/main amd64 git-man all 1:2.34.1-1ubuntu1.10 [954 kB]
Get:5 http://br.archive.ubuntu.com/ubuntu jammy-updates/main amd64 git amd64 1:2.34.1-1ubuntu1.10 [3.166 kB]
Get:6 http://br.archive.ubuntu.com/ubuntu jammy/main amd64 libslirp0 amd64 4.6.1-1build1 [61,5 kB]
Get:7 http://br.archive.ubuntu.com/ubuntu jammy/universe amd64 slirp4netns amd64 1.0.1-2 [28,2 kB]
Get:8 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-buildx-plugin amd64 0.13.0-1-ubuntu.22.04-jammy [29,5 MB]
Get:9 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-ce-cli amd64 5:25.0.4-1-ubuntu.22.04-jammy [13,7 MB]
Get:10 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-ce amd64 5:25.0.4-1-ubuntu.22.04-jammy [24,3 MB]
Get:11 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-ce-rootless-extras amd64 5:25.0.4-1-ubuntu.22.04-jammy [9.320 kB]
Get:12 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-compose-plugin amd64 2.24.7-1-ubuntu.22.04-jammy [12,1 MB]
Fetched 123 MB in 24s (5.080 kB/s)
Selecting previously unselected package pigz.
(Reading database ... 185503 files and directories currently installed.)
Preparing to unpack .../00-pigz_2.6-1_amd64.deb ...
Unpacking pigz (2.6-1) ...
Selecting previously unselected package containerd.io.
Preparing to unpack .../01-containerd.io_1.6.28-1_amd64.deb ...
Unpacking containerd.io (1.6.28-1) ...
Selecting previously unselected package docker-buildx-plugin.
Preparing to unpack .../02-docker-buildx-plugin_0.13.0-1-ubuntu.22.04-jammy_amd64.deb ...
Unpacking docker-buildx-plugin (0.13.0-1-ubuntu.22.04-jammy) ...

```

Figura 25 – Docker (5)
Fonte: elaborado pelo autor (2024)

`sudo curl -L`

`"https://github.com/docker/compose/releases/download/1.29.2/docker-compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose`

```

fiap@fiap-VirtualBox:~$ sudo curl -L "https://github.com/docker/compose/releases/download/1.29.2/docker-compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload   Total   Spent    Left   Speed
100 12.1M  100 12.1M    0     0  1638k      0  0:00:07  0:00:07 --:--:-- 1460k
fiap@fiap-VirtualBox:~$

```

Figura 26 – Docker (6)
Fonte: elaborado pelo autor (2024)

`sudo chmod +x /usr/local/bin/docker-compose`

```

fiap@fiap-VirtualBox:~$ sudo chmod +x /usr/local/bin/docker-compose
fiap@fiap-VirtualBox:~$

```

Figura 27 – Docker (7)
Fonte: elaborado pelo autor (2024)

```
sudo ln -s /usr/local/bin/docker-compose /usr/bin/docker-compose
```

```
fiap@fiap-VirtualBox:~$ sudo ln -s /usr/local/bin/docker-compose /usr/bin/docker-compose
```

Figura 28 – Docker (8)
Fonte: elaborado pelo autor (2024)

```
docker-compose --version
```

```
fiap@fiap-VirtualBox:~$ docker-compose --version  
docker-compose version 1.29.2, build 5becea4c
```

Figura 29 – Docker (9)
Fonte: elaborado pelo autor (2024)

Crie uma pasta chamada “nifi” e abra ela usando o VS Code. Além disso, crie um arquivo chamado “docker-compose.yml” com o seguinte conteúdo:

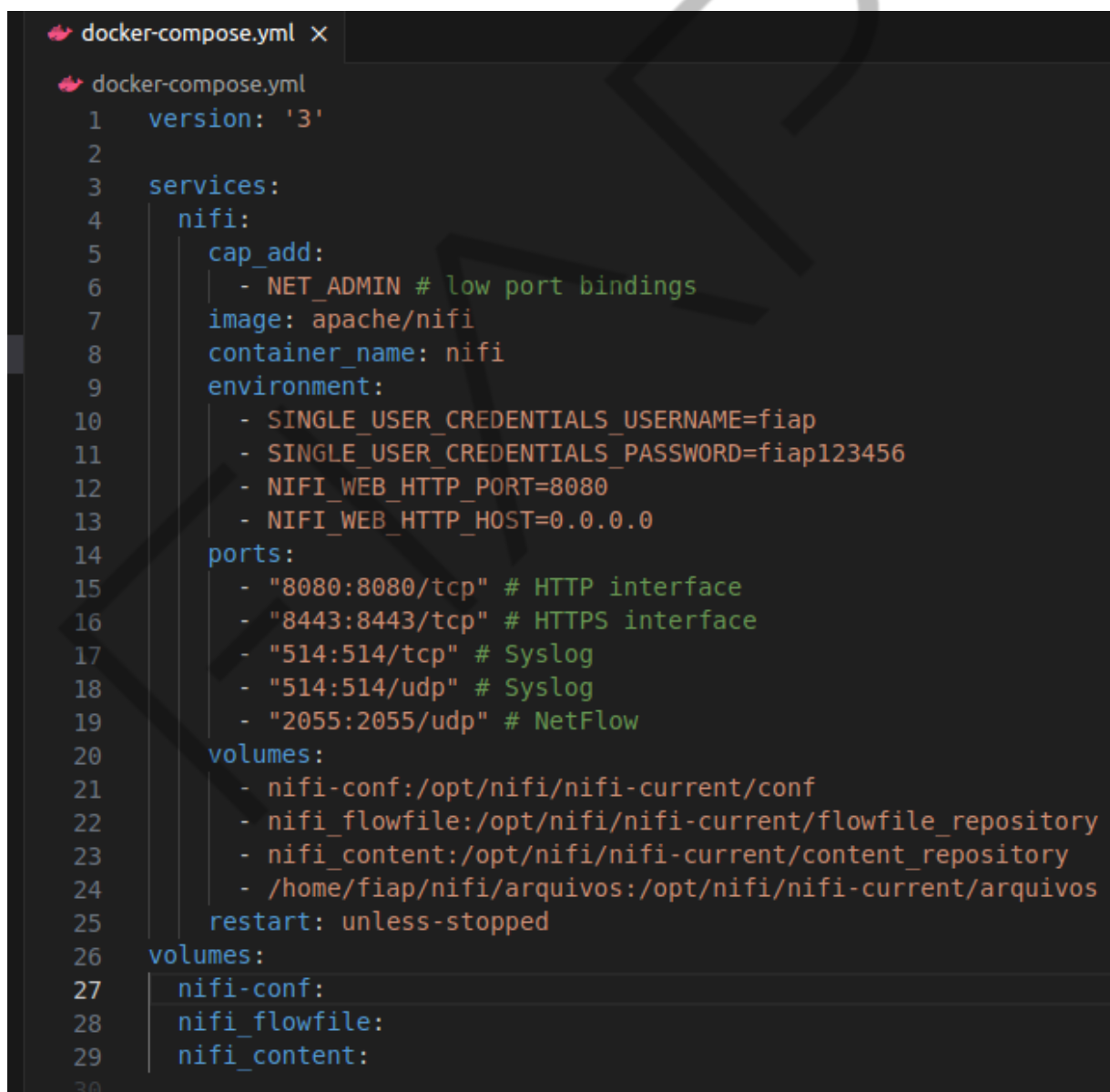
```
version: '3'  
version: '3'  
  
services:  
  nifi:  
    cap_add:  
      - NET_ADMIN # low port bindings  
    image: apache/nifi  
    container_name: nifi  
    environment:  
      - SINGLE_USER_CREDENTIALS_USERNAME=fiap  
      - SINGLE_USER_CREDENTIALS_PASSWORD=fiap123456  
      - NIFI_WEB_HTTP_PORT=8080  
      - NIFI_WEB_HTTP_HOST=0.0.0.0  
    ports:  
      - "8080:8080/tcp" # HTTP interface  
      - "8443:8443/tcp" # HTTPS interface  
      - "514:514/tcp" # Syslog  
      - "514:514/udp" # Syslog  
      - "2055:2055/udp" # NetFlow  
    volumes:  
      - nifi-conf:/opt/nifi/nifi-current/conf  
      - nifi_flowfile:/opt/nifi/nifi-current/flowfile_repository  
      - nifi_content:/opt/nifi/nifi-current/content_repository  
      - /home/fiap/nifi/arquivos:/opt/nifi/nifi-current/arquivos
```

```
restart: unless-stopped
```

Figura 30 – docker-compose.yml (1)
Fonte: elaborado pelo autor (2024)

```
volumes:  
  nifi-conf:  
  nifi_flowfile:  
  nifi_content:
```

Figura 31 – volumes
Fonte: elaborado pelo autor (2024)



```
docker-compose.yml x  
docker-compose.yml  
1  version: '3'  
2  
3  services:  
4    nifi:  
5      cap_add:  
6      | - NET_ADMIN # low port bindings  
7      image: apache/nifi  
8      container_name: nifi  
9      environment:  
10     | - SINGLE_USER_CREDENTIALS_USERNAME=fiap  
11     | - SINGLE_USER_CREDENTIALS_PASSWORD=fiap123456  
12     | - NIFI_WEB_HTTP_PORT=8080  
13     | - NIFI_WEB_HTTP_HOST=0.0.0.0  
14     ports:  
15     | - "8080:8080/tcp" # HTTP interface  
16     | - "8443:8443/tcp" # HTTPS interface  
17     | - "514:514/tcp" # Syslog  
18     | - "514:514/udp" # Syslog  
19     | - "2055:2055/udp" # NetFlow  
20     volumes:  
21     | - nifi-conf:/opt/nifi/nifi-current/conf  
22     | - nifi_flowfile:/opt/nifi/nifi-current/flowfile_repository  
23     | - nifi_content:/opt/nifi/nifi-current/content_repository  
24     | - /home/fiap/nifi/arquivos:/opt/nifi/nifi-current/arquivos  
25     restart: unless-stopped  
26  volumes:  
27    nifi-conf:  
28    nifi_flowfile:  
29    nifi_content:  
30
```

Figura 32 – docker-compose.yml (2)
Fonte: elaborado pelo autor (2024)

Dentro da pasta “nifi”, crie uma segunda pasta chamada “arquivos”. E dentro dessa, cole os 3 arquivos csv que recebeu e crie uma outra pasta chamada “destino”:

```
fiap@fiap-VirtualBox:~/nifi/arquivos$ ls
destino tp_transacao.csv transacoes.csv vendedor.csv
fiap@fiap-VirtualBox:~/nifi/arquivos$
```

Figura 33 – Pasta “destino”
Fonte: elaborado pelo autor (2024)

Dentro dessa pasta crie uma pasta chamada “arquivos”

Execute o comando “sudo docker-compose up -d”

```
fiap@fiap-VirtualBox:~/nifi$ sudo docker-compose up -d
Pulling nifi (apache/nifi)...
latest: Pulling from apache/nifi
df2fac849a45: Pull complete
34e4ff12b5293: Pull complete
e908aed94709: Pull complete
83fc2a0b820e: Pull complete
e850e12d7171: Pull complete
26c70ae315ff: Pull complete
addc9d28b702: Pull complete
fdae999c6aef: Pull complete
5180cc02a3ed: Pull complete
b79bccd990d5: Pull complete
83b0bc310ae4: Pull complete
4f4fb708ef54: Pull complete
Digest: sha256:194bec0b676876990861dd4088c1ce78c517660f508037a88d5741f0226ab7
Status: Downloaded newer image for apache/nifi:latest
Creating nifi ... done
fiap@fiap-VirtualBox:~/nifi$ sudo docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED   STATUS    PORTS                               NAMES
593207381be4   apache/nifi  "/scripts/start.sh"      4 minutes ago    Up 3 minutes    0.0.0.0:514->514/udp, :::514->514/udp, 0.0.0.0:514->514/tcp, :::514->514/tcp, 0.0.0.0:8080->8080/tcp, :::8080->8080/tcp, 8000/tcp, 0.0.0.0:8443->8443/tcp, 0.0.0.0:2055->2055/udp, :::8443->8443/tcp, :::2055->2055/udp, 10000/tcp    nifi
fiap@fiap-VirtualBox:~/nifi$
```

Figura 34 – sudo docker-compose up -d
Fonte: elaborado pelo autor (2024)

Ao concluir, abra o navegador e digite <http://localhost:8080/nifi/>

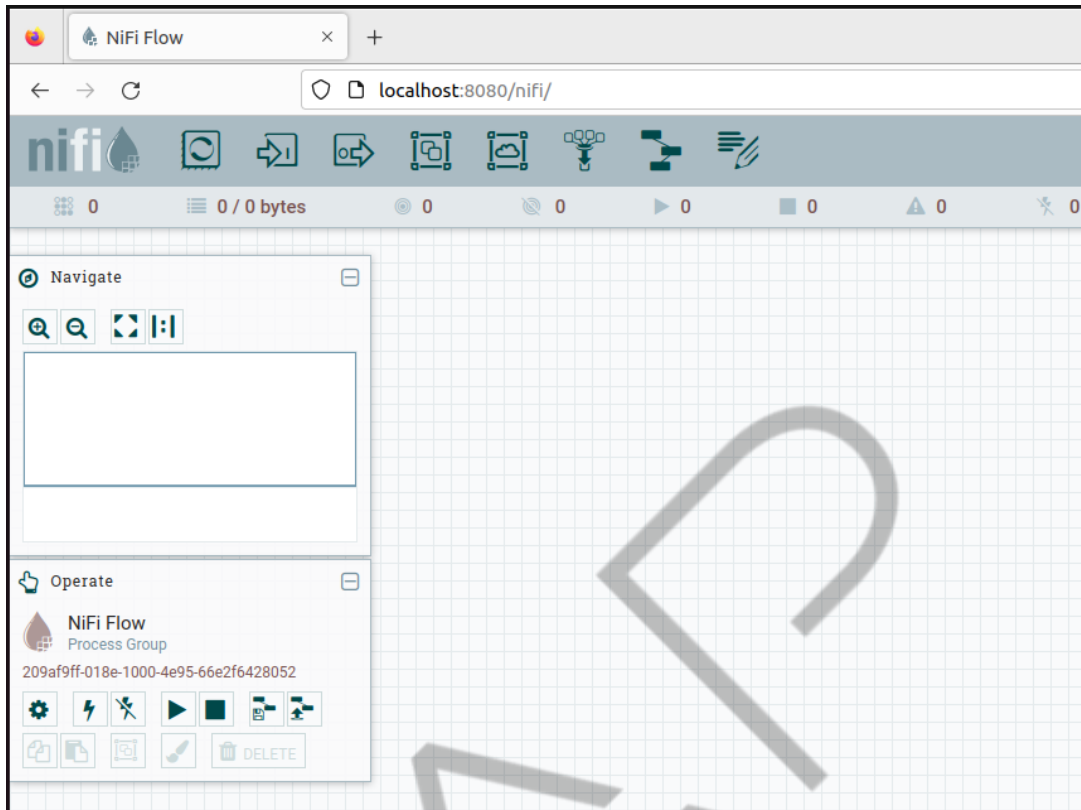


Figura 35 – <http://localhost:8080/nifi/>
Fonte: elaborado pelo autor (2024)

Configure a sua conta as ferramentas ELK

Se estiver com algum container rodando, desligue-o para seguir com as configurações:

```
sudo docker stop $(sudo docker ps -a -q)
```

```
fiap@fiap-VirtualBox:~$ sudo docker stop $(sudo docker ps -a -q)
de4827d6e5bb
fiap@fiap-VirtualBox:~$
```

Figura 36 – `sudo docker stop $(sudo docker ps -a -q)`
Fonte: elaborado pelo autor (2024)

Crie uma pasta chamada “elk”:

```
fiap@fiap-VirtualBox:~$ mkdir elk
fiap@fiap-VirtualBox:~$
```

Figura 37 – Pasta “elk”
Fonte: elaborado pelo autor (2024)

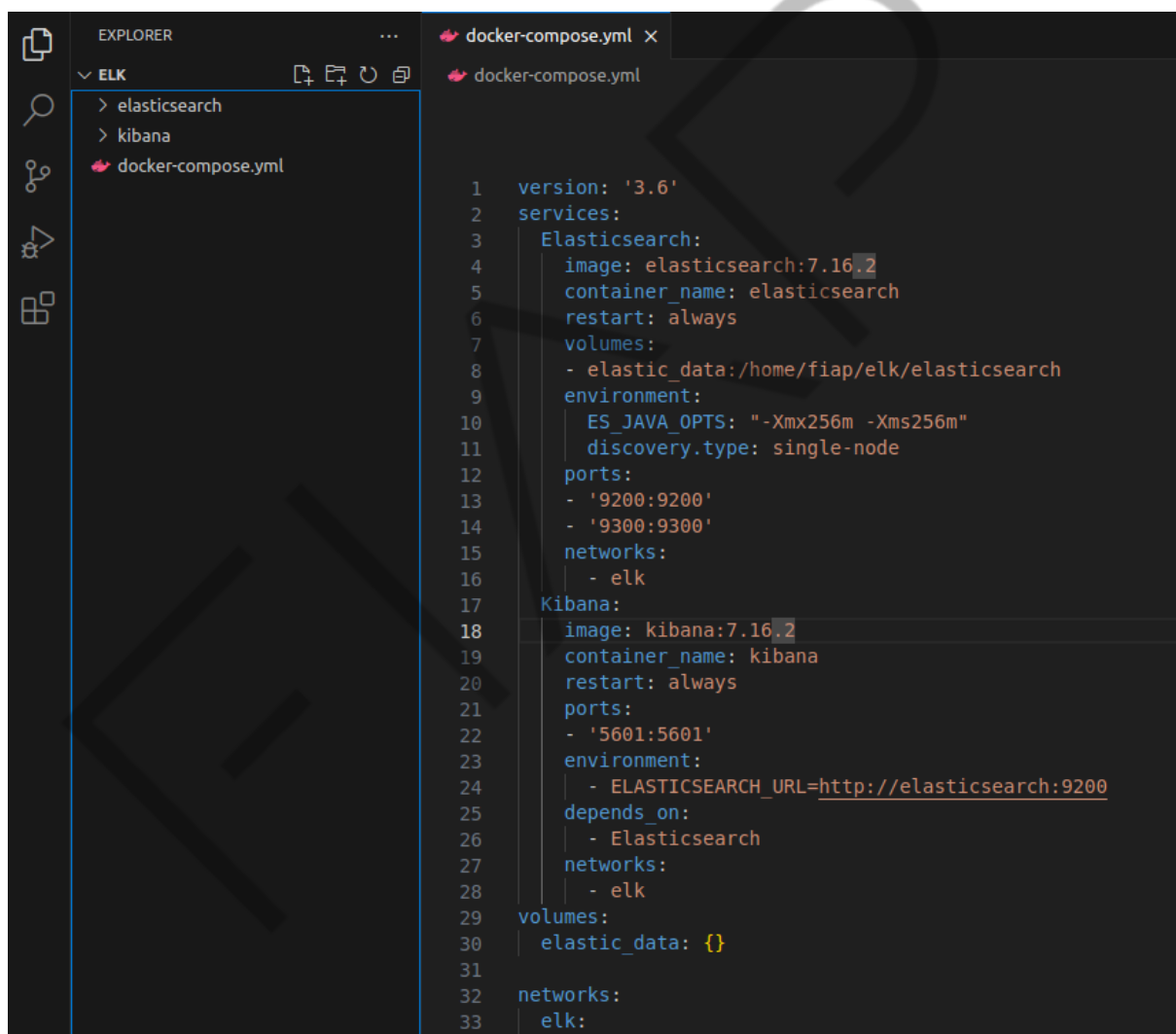
Entre na pasta “elk” e crie as seguintes pastas:

```
fiap@fiap-VirtualBox:~/elk$ mkdir elasticsearch
fiap@fiap-VirtualBox:~/elk$ mkdir kibana
```

Figura 38 – Elasticsearch e Kibana

Fonte: elaborado pelo autor (2024)

Abra essa pasta pelo VS Code e crie um arquivo chamado “docker-compose.yml”.

The image shows a screenshot of the Visual Studio Code editor. On the left, the Explorer sidebar shows a folder named 'ELK' containing subfolders 'elasticsearch' and 'kibana', and a file 'docker-compose.yml'. The main editor area displays the content of 'docker-compose.yml'. The file is a Docker Compose configuration for version 3.6, defining two services: 'Elasticsearch' and 'Kibana'. The 'Elasticsearch' service uses the 'elasticsearch:7.16.2' image, sets container_name to 'elasticsearch', restarts on failure, and maps the host's /home/fiap/elk/elasticsearch directory to the container's /usr/share/elasticsearch/data directory. It also sets environment variables for ES_JAVA_OPTS and discovery.type, and maps ports 9200 and 9300. The 'Kibana' service uses the 'kibana:7.16.2' image, sets container_name to 'kibana', restarts on failure, and maps port 5601. It depends on the 'Elasticsearch' service and sets the ELASTICSEARCH_URL environment variable. Both services are connected to a network named 'elk'.

```
1 version: '3.6'
2 services:
3   Elasticsearch:
4     image: elasticsearch:7.16.2
5     container_name: elasticsearch
6     restart: always
7     volumes:
8       - elastic_data:/home/fiap/elk/elasticsearch
9     environment:
10       ES_JAVA_OPTS: "-Xmx256m -Xms256m"
11       discovery.type: single-node
12     ports:
13       - '9200:9200'
14       - '9300:9300'
15     networks:
16       - elk
17   Kibana:
18     image: kibana:7.16.2
19     container_name: kibana
20     restart: always
21     ports:
22       - '5601:5601'
23     environment:
24       ELASTICSEARCH_URL=http://elasticsearch:9200
25     depends_on:
26       - Elasticsearch
27     networks:
28       - elk
29 volumes:
30   elastic_data: {}
31 networks:
32   elk:
```

Figura 39 – docker-compose.yml (1)

Fonte: elaborado pelo autor (2024)

```
version: '3.6'
services:
  Elasticsearch:
    image: elasticsearch:7.16.2
    container_name: elasticsearch
```

```
restart: always
volumes:
- elastic_data:/home/fiap/elk/elasticsearch
environment:
  ES_JAVA_OPTS: "-Xmx256m -Xms256m"
  discovery.type: single-node
ports:
- '9200:9200'
- '9300:9300'
networks:
- elk
Kibana:
  image: kibana:7.16.2
  container_name: kibana
  restart: always
  ports:
  - '5601:5601'
  environment:
    - ELASTICSEARCH_URL=http://elasticsearch:9200
  depends_on:
    - Elasticsearch
  networks:
    - elk
volumes:
  elastic_data: {}
networks:
  elk:
```

Figura 40 – docker-compose.yml (2)
Fonte: elaborado pelo autor (2024)

Navegue até a pasta “elk” pelo terminal:

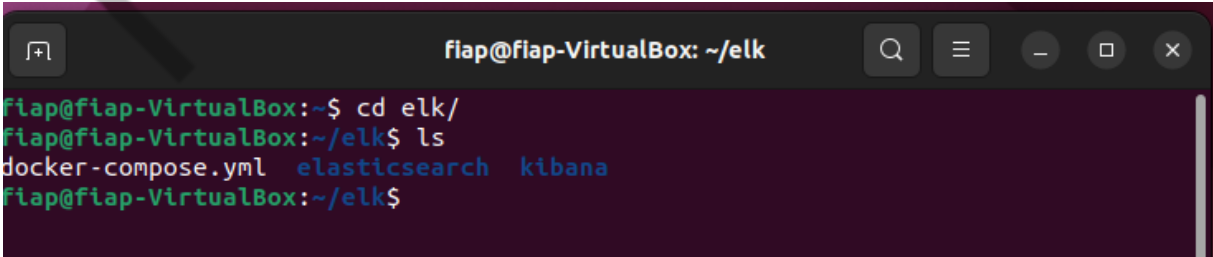
A terminal window titled 'fiap@fiap-VirtualBox: ~/elk' with search, menu, and window control icons. The command history shows: 'fiap@fiap-VirtualBox:~\$ cd elk/', 'fiap@fiap-VirtualBox:~/elk\$ ls', and the output 'docker-compose.yml elasticsearch kibana'. The prompt is now 'fiap@fiap-VirtualBox:~/elk\$'.

Figura 41 – Pasta elk no terminal
Fonte: elaborado pelo autor (2024)

Execute o seguinte comando:

```
sudo docker-compose up -d
```

```
fiap@fiap-VirtualBox:~/elk$ sudo docker-compose up -d
Creating network "elk_elk" with the default driver
Creating volume "elk_elastic_data" with default driver
Pulling Elasticsearch (elasticsearch:7.16.2)...
7.16.2: Pulling from library/elasticsearch
7b1a6ab2e44d: Pulling fs layer
c0f9908af642: Pulling fs layer
7b1a6ab2e44d: Downloading [> ] 285.9kB/28.57MB
c0f9908af642: Downloading [> ] 2.923MB/28.57MB
7b1a6ab2e44d: Pull complete
c0f9908af642: Pull complete
04928834f6a2: Pull complete
6f647d55d420: Pull complete
da7afec4a2d7: Pull complete
146b4a7018b9: Pull complete
dc193d8d7c71: Pull complete
e3deb19b2c38: Pull complete
8b79893ce5a3: Pull complete
Digest: sha256:fe7ae76ec33e1222ece5216e3a9c6346999a73d3fb65256abb01638758db4b5d
Status: Downloaded newer image for elasticsearch:7.16.2
Pulling Kibana (kibana:7.16.2)...
7.16.2: Pulling from library/kibana
a1d0c7532777: Pull complete
700212586d98: Pull complete
013f69c97c90: Pull complete
7c92d785e3b2: Pull complete
efddc883940a: Pull complete
05ac9ba18fc0: Pull complete
1d6c552d0781: Pull complete
752fb7e12a50: Pull complete
be34b62839b5: Pull complete
9d7a37976b34: Pull complete
39cd3d8ea5b3: Pull complete
0c75809c03a7: Pull complete
99bff35135e1: Pull complete
Digest: sha256:cbff0e7f8200798130dc9ebca666c89d440f203272d66b007763ef554b21d0f0
Status: Downloaded newer image for kibana:7.16.2
Creating elasticsearch ... done
Creating kibana ... done
fiap@fiap-VirtualBox:~/elk$
```

Figura 42 – sudo docker-compose up -d
Fonte: elaborado pelo autor (2024)

sudo apt install ufw

```
fiap@fiap-VirtualBox:~$ sudo apt install ufw
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ufw is already the newest version (0.36.1-4ubuntu0.1).
ufw set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 24 not upgraded.
fiap@fiap-VirtualBox:~$
```

Figura 43 – sudo apt install ufw
Fonte: elaborado pelo autor (2024)

sudo ufw enable

```
fiap@fiap-VirtualBox:~$ sudo ufw enable
Firewall is active and enabled on system startup
fiap@fiap-VirtualBox:~$
```

Figura 44 – sudo ufw enable
Fonte: elaborado pelo autor (2024)


```
sudo ufw allow 9200/tcp
```

```
sudo ufw allow 5601/tcp
```

```
sudo ufw allow 9600/tcp
```

```
sudo ufw allow 9300/tcp
```

```
fiap@fiap-VirtualBox:~$ sudo ufw enable
Firewall is active and enabled on system startup
fiap@fiap-VirtualBox:~$ sudo ufw allow 9200/tcp
Rule added
Rule added (v6)
fiap@fiap-VirtualBox:~$ sudo ufw allow 5601/tcp
Rule added
Rule added (v6)
fiap@fiap-VirtualBox:~$ sudo ufw allow 9600/tcp
Rule added
Rule added (v6)
fiap@fiap-VirtualBox:~$ sudo ufw allow 9300/tcp
Rule added
Rule added (v6)
fiap@fiap-VirtualBox:~$
```

Figura 45 – sudo ufw allow
Fonte: elaborado pelo autor (2024)

Agora, digite no navegador: <http://localhost:5601>

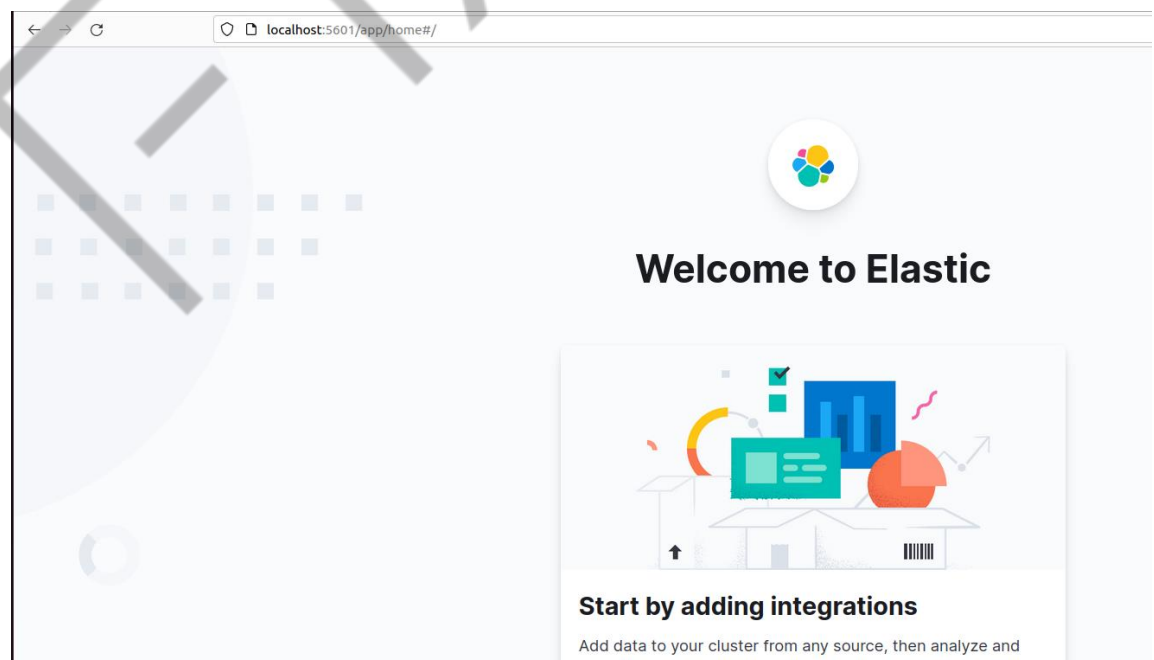


Figura 46 – <http://localhost:5601> (1)
Fonte: elaborado pelo autor (2024)

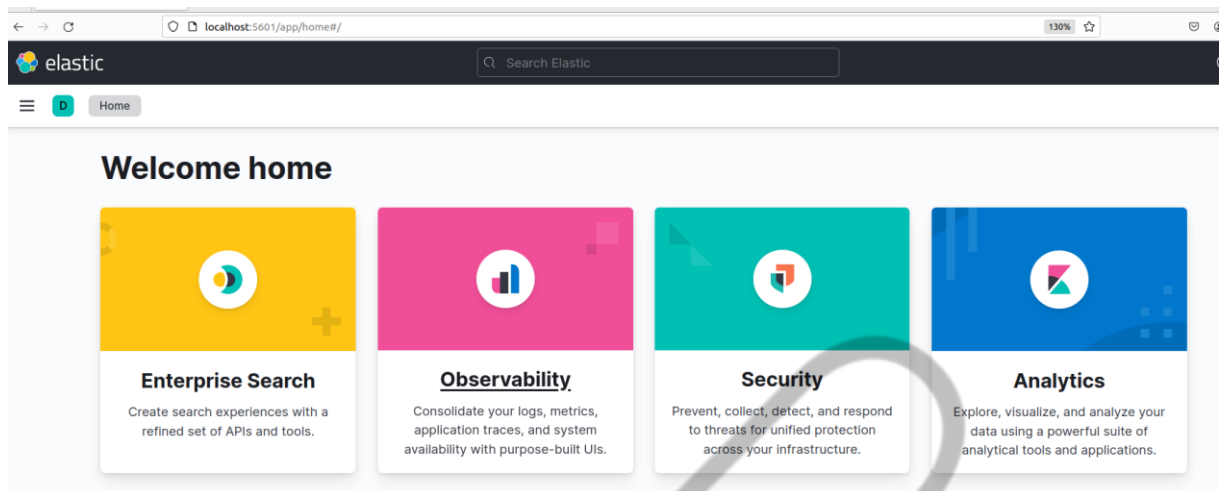


Figura 47 – <http://localhost:5601> (2)
Fonte: elaborado pelo autor (2024)

O QUE VOCÊ VIU NESTA AULA?

Nessa aula você entendeu o funcionamento de uma das ferramentas mais versáteis para ETL, tratamento de dados e arquivos: o Apache NIFI! Entendemos como usar a ferramenta para se conectar a diversas fontes de dados, realizamos uma demonstração com dados gerados artificialmente e colocamos isso em prática em nosso pipeline.

Além disso, você foi apresentado(a) ao ElasticSearch, peça central da stack ELK, e entendeu como manusear, inserir, consultar as informações, alterar e deletar um documento.

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PALAVRAS-CHAVE

Palavras-chave: ETL. ELK. Elastic. NiFi. Apache. Elasticsearch. Kibana. Document.

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