

CONFIGURACIÓN DE **HADOOP**

— EN MODO STANDALONE —
Y PSEUDO-CLÚSTER



**STANDALONE
MODE**



PSEUDO-CLÚSTER

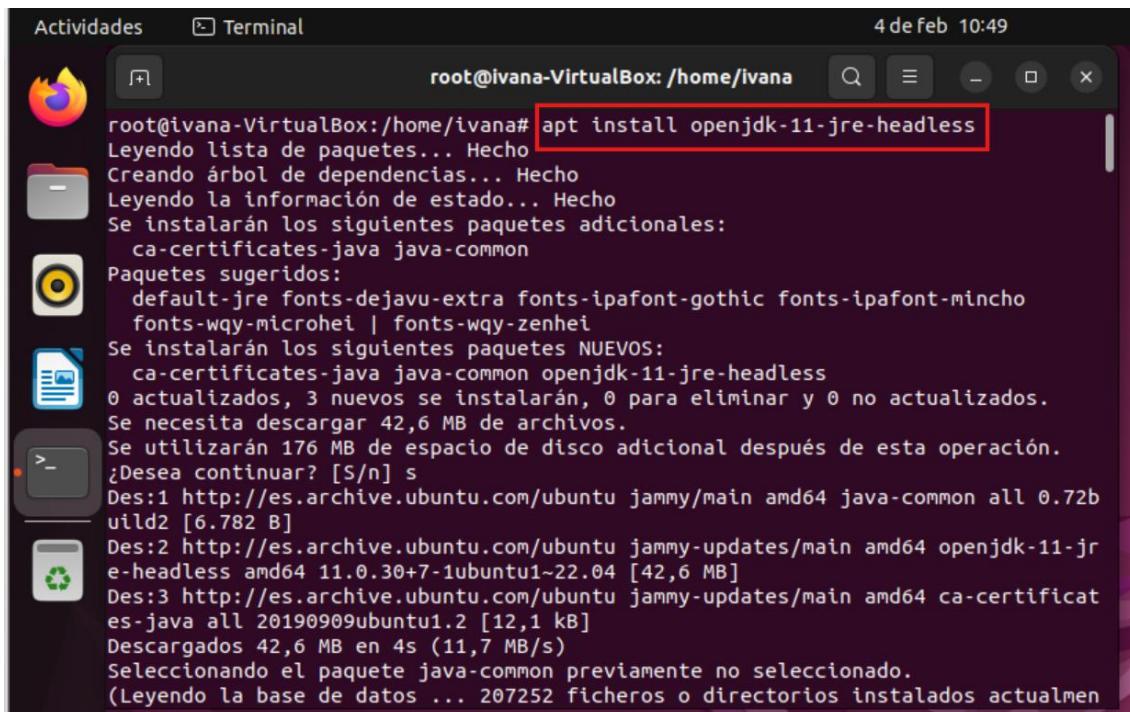


Ivana Sánchez Pérez

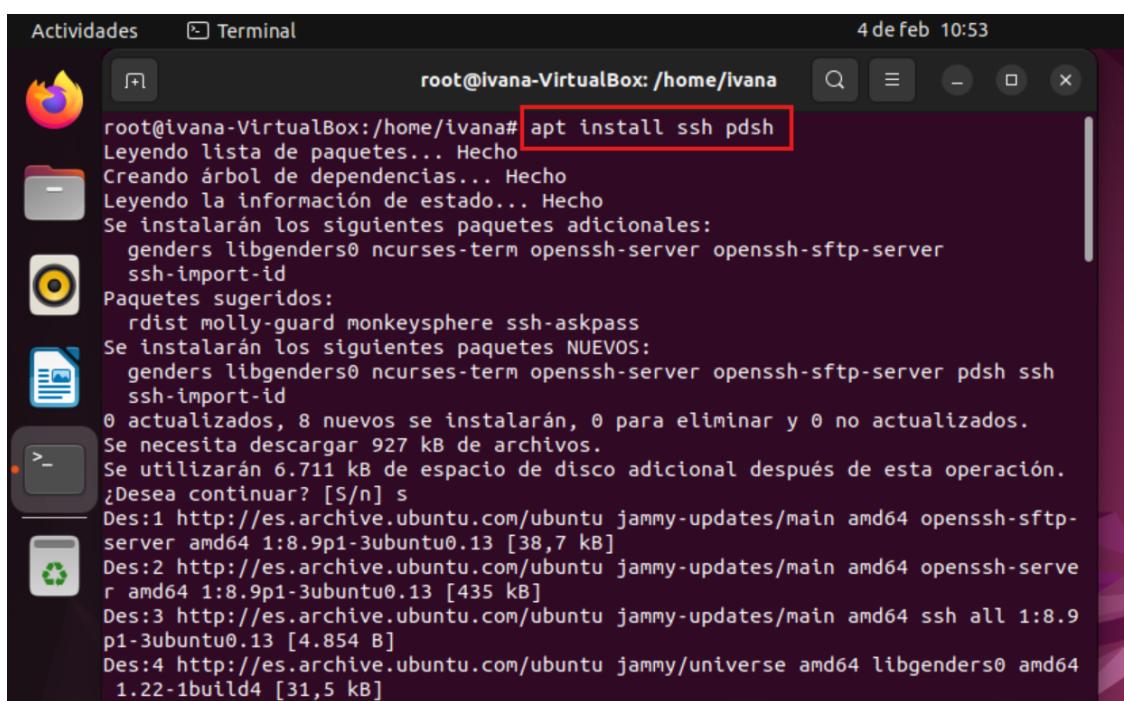
CONFIGURACIÓN DE HADOOP EN MODO STANDALONE Y PSEUDO-CLÚSTER

CONFIGURACIÓN DEL ENTORNO (MODO STANDALONE)

1- Instalación de Java 11, SSH y PDSH



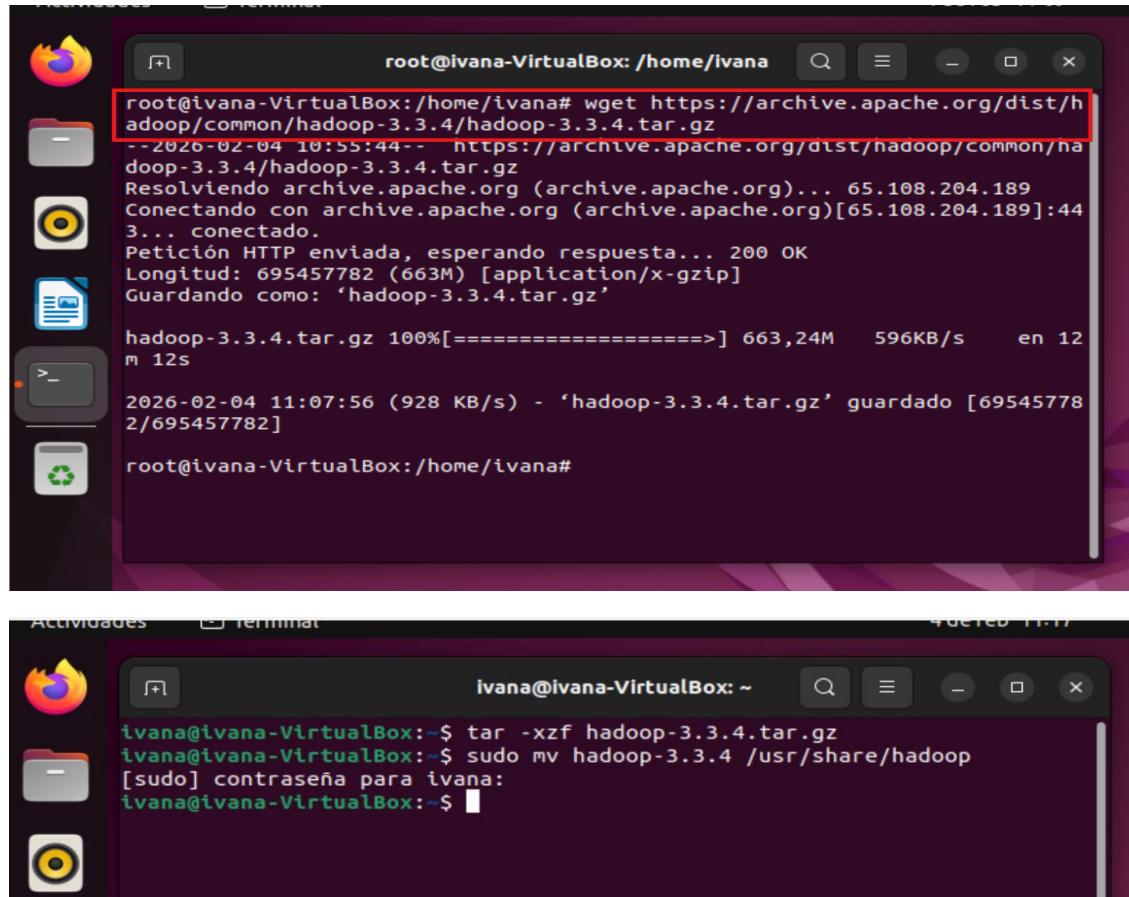
```
root@ivana-VirtualBox:/home/ivana# apt install openjdk-11-jre-headless
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Se instalarán los siguientes paquetes adicionales:
  ca-certificates-java java-common
Paquetes sugeridos:
  default-jre fonts-dejavu-extra fonts-ipafont-gothic fonts-ipafont-mincho
  fonts-wqy-microhei | fonts-wqy-zenhei
Se instalarán los siguientes paquetes NUEVOS:
  ca-certificates-java java-common openjdk-11-jre-headless
0 actualizados, 3 nuevos se instalarán, 0 para eliminar y 0 no actualizados.
Se necesita descargar 42,6 MB de archivos.
Se utilizarán 176 MB de espacio de disco adicional después de esta operación.
¿Desea continuar? [S/n] s
Des:1 http://es.archive.ubuntu.com/ubuntu jammy/main amd64 java-common all 0.72b
uild2 [6.782 B]
Des:2 http://es.archive.ubuntu.com/ubuntu jammy-updates/main amd64 openjdk-11-jr
e-headless amd64 11.0.30+7-1ubuntu1~22.04 [42,6 MB]
Des:3 http://es.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ca-certificat
es-java all 20190909ubuntu1.2 [12,1 kB]
Descargados 42,6 MB en 4s (11,7 MB/s)
Seleccionando el paquete java-common previamente no seleccionado.
(Leyendo la base de datos ... 207252 ficheros o directorios instalados actualmen
```



```
root@ivana-VirtualBox:/home/ivana# apt install ssh pdsh
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Se instalarán los siguientes paquetes adicionales:
  genders libgenders0 ncurses-term openssh-server openssh-sftp-server
  ssh-import-id
Paquetes sugeridos:
  rdist molly-guard monkeysphere ssh-askpass
Se instalarán los siguientes paquetes NUEVOS:
  genders libgenders0 ncurses-term openssh-server openssh-sftp-server pdsh ssh
  ssh-import-id
0 actualizados, 8 nuevos se instalarán, 0 para eliminar y 0 no actualizados.
Se necesita descargar 927 kB de archivos.
Se utilizarán 6.711 kB de espacio de disco adicional después de esta operación.
¿Desea continuar? [S/n] s
Des:1 http://es.archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-sftp-
server amd64 1:8.9p1-3ubuntu0.13 [38,7 kB]
Des:2 http://es.archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-serve
r amd64 1:8.9p1-3ubuntu0.13 [435 kB]
Des:3 http://es.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ssh all 1:8.9
p1-3ubuntu0.13 [4.854 B]
Des:4 http://es.archive.ubuntu.com/ubuntu jammy/universe amd64 libgenders0 amd64
1.22-1build4 [31,5 kB]
```

2- Instalación de Hadoop

Descarga y comprensión de la versión 3.3.4 en la ruta
/usr/share/hadoop.



```
root@ivana-VirtualBox:/home/ivana# wget https://archive.apache.org/dist/hadoop/common/hadoop-3.3.4/hadoop-3.3.4.tar.gz
--2026-02-04 10:55:44-- https://archive.apache.org/dist/hadoop/common/hadoop-3.3.4/hadoop-3.3.4.tar.gz
Resolviendo archive.apache.org (archive.apache.org)... 65.108.204.189
Conectando con archive.apache.org (archive.apache.org)[65.108.204.189]:443... conectado.
Petición HTTP enviada, esperando respuesta... 200 OK
Longitud: 695457782 (663M) [application/x-gzip]
Guardando como: 'hadoop-3.3.4.tar.gz'

hadoop-3.3.4.tar.gz 100%[=====] 663,24M  596KB/s   en 12m 12s

2026-02-04 11:07:56 (928 KB/s) - 'hadoop-3.3.4.tar.gz' guardado [695457782/695457782]

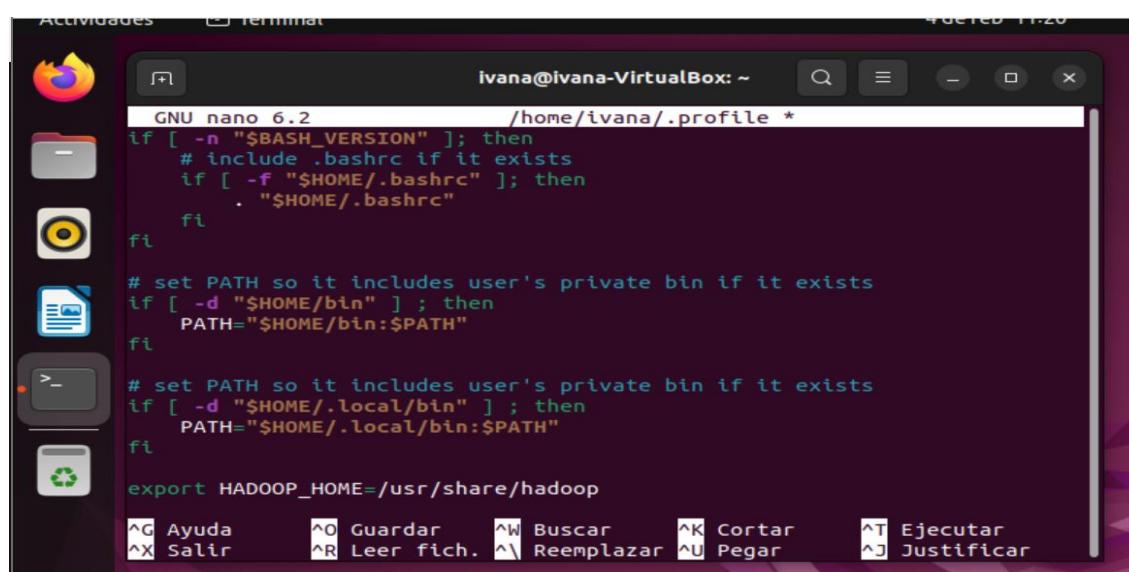
root@ivana-VirtualBox:/home/ivana#
```



```
ivana@ivana-VirtualBox:~$ tar -xzf hadoop-3.3.4.tar.gz
ivana@ivana-VirtualBox:~$ sudo mv hadoop-3.3.4 /usr/share/hadoop
[sudo] contraseña para ivana:
ivana@ivana-VirtualBox:~$
```

3- Variables del entorno

Configuración del archivo **.profile** para definir **HADOOP_HOME** y asegurar que el sistema reconozca los binarios.



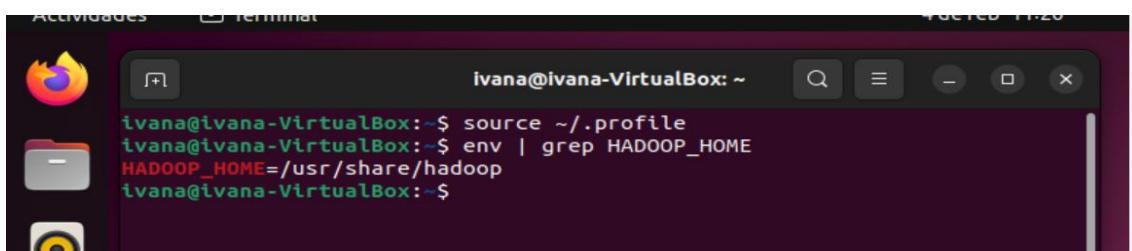
```
GNU nano 6.2          /home/ivana/.profile *
if [ -n "$BASH_VERSION" ]; then
    # include .bashrc if it exists
    if [ -f "$HOME/.bashrc" ]; then
        . "$HOME/.bashrc"
    fi
fi

# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/bin" ] ; then
    PATH="$HOME/bin:$PATH"
fi

# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/.local/bin" ] ; then
    PATH="$HOME/.local/bin:$PATH"
fi

export HADOOP_HOME=/usr/share/hadoop
```

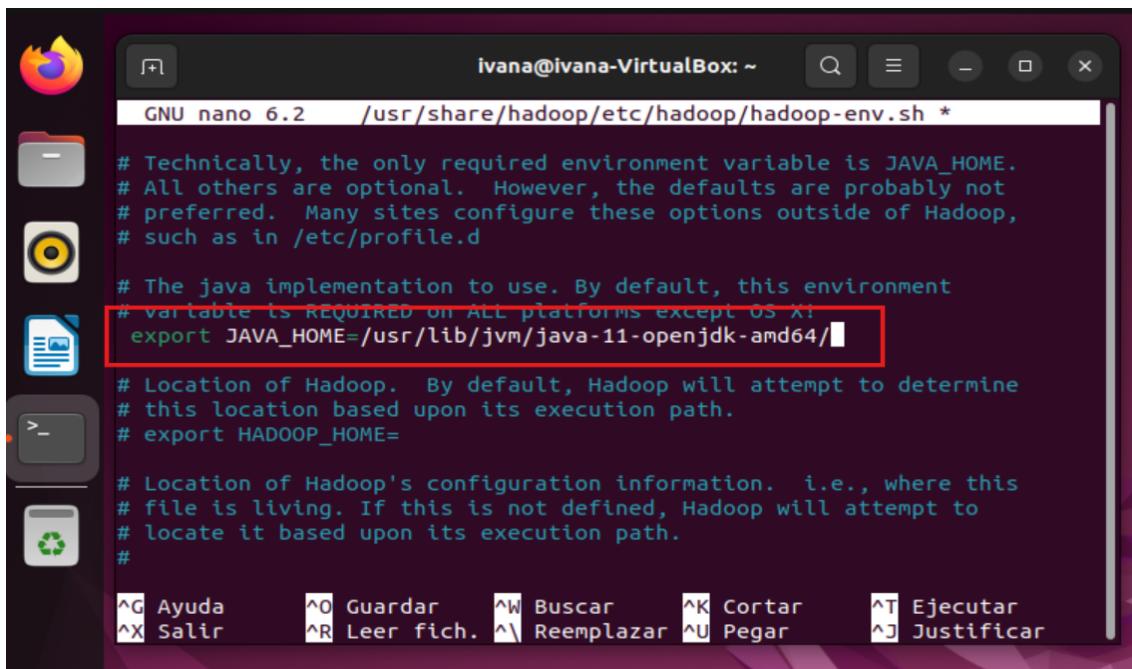
Cargamos los cambios y verificamos



```
ivana@ivana-VirtualBox:~$ source ~/profile
ivana@ivana-VirtualBox:~$ env | grep HADOOP_HOME
HADOOP_HOME=/usr/share/hadoop
ivana@ivana-VirtualBox:~$
```

4- Configuración de Java en Hadoop

Hadoop necesita saber dónde está Java para arrancar sus servicios. Para ello definimos la ruta de Java dentro de `hadoop-env.sh`.



```
GNU nano 6.2      /usr/share/hadoop/etc/hadoop-env.sh *
# Technically, the only required environment variable is JAVA_HOME.
# All others are optional. However, the defaults are probably not
# preferred. Many sites configure these options outside of Hadoop,
# such as in /etc/profile.d

# The java implementation to use. By default, this environment
# variable is REQUIRED on ALL platforms except OS X!
export JAVA_HOME=/usr/lib/jvm/java-11-openjdk-amd64/

# Location of Hadoop. By default, Hadoop will attempt to determine
# this location based upon its execution path.
# export HADOOP_HOME=

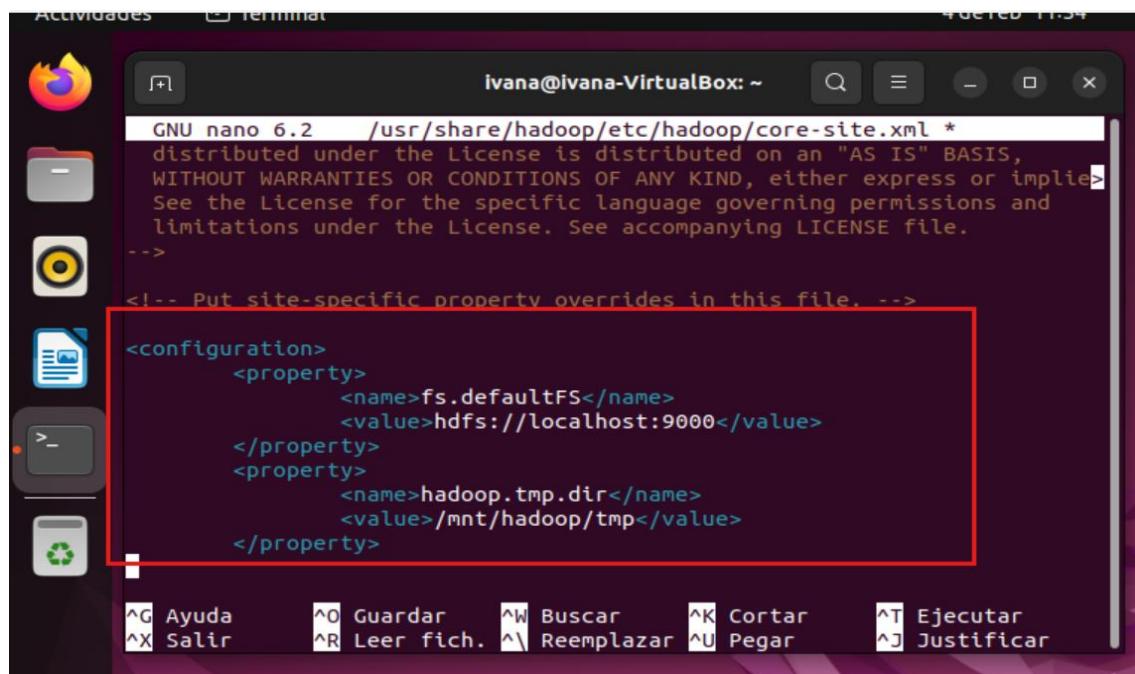
# Location of Hadoop's configuration information. i.e., where this
# file is living. If this is not defined, Hadoop will attempt to
# locate it based upon its execution path.
#
```

CONFIGURACIÓN EN MODO PSEUDO-CLÚSTER

Este modo simula un clúster en nuestra propia máquina.

1- Configuración de los archivos XML

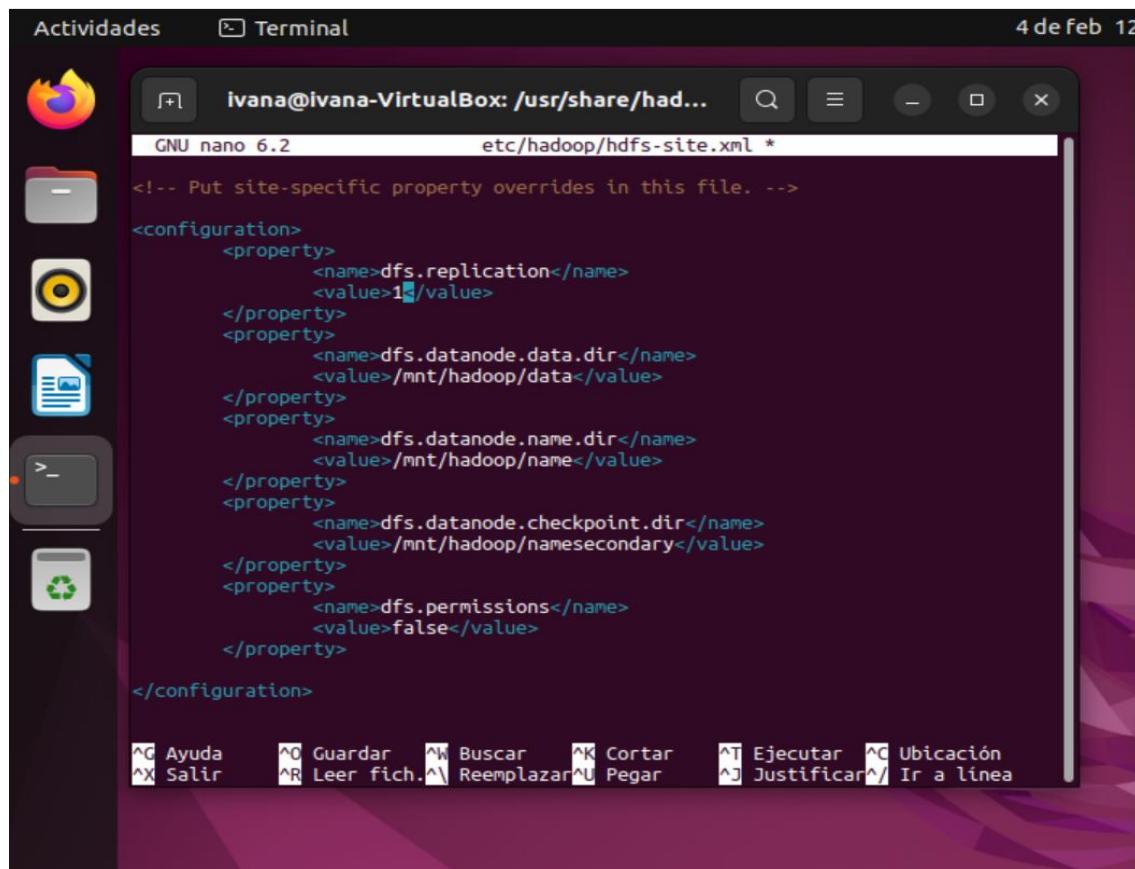
Edición de `core-site.xml` y `hdfs-site.xml` para definir el sistema de archivos por defecto y factor de replicación.



```
GNU nano 6.2      /usr/share/hadoop/etc/hadoop/core-site.xml *
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.
-->

<! -- Put site-specific property overrides in this file. -->

<configuration>
    <property>
        <name>fs.defaultFS</name>
        <value>hdfs://localhost:9000</value>
    </property>
    <property>
        <name>hadoop.tmp.dir</name>
        <value>/mnt/hadoop/tmp</value>
    </property>
```

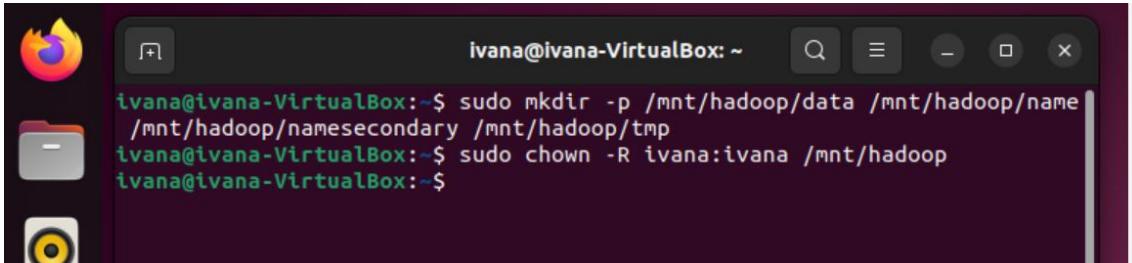


```
GNU nano 6.2          etc/hadoop/hdfs-site.xml *
<! -- Put site-specific property overrides in this file. -->

<configuration>
    <property>
        <name>dfs.replication</name>
        <value>1</value>
    </property>
    <property>
        <name>dfs.datanode.data.dir</name>
        <value>/mnt/hadoop/data</value>
    </property>
    <property>
        <name>dfs.datanode.name.dir</name>
        <value>/mnt/hadoop/name</value>
    </property>
    <property>
        <name>dfs.datanode.checkpoint.dir</name>
        <value>/mnt/hadoop/namesecondary</value>
    </property>
    <property>
        <name>dfs.permissions</name>
        <value>false</value>
    </property>
```

2- Preparación de directorios

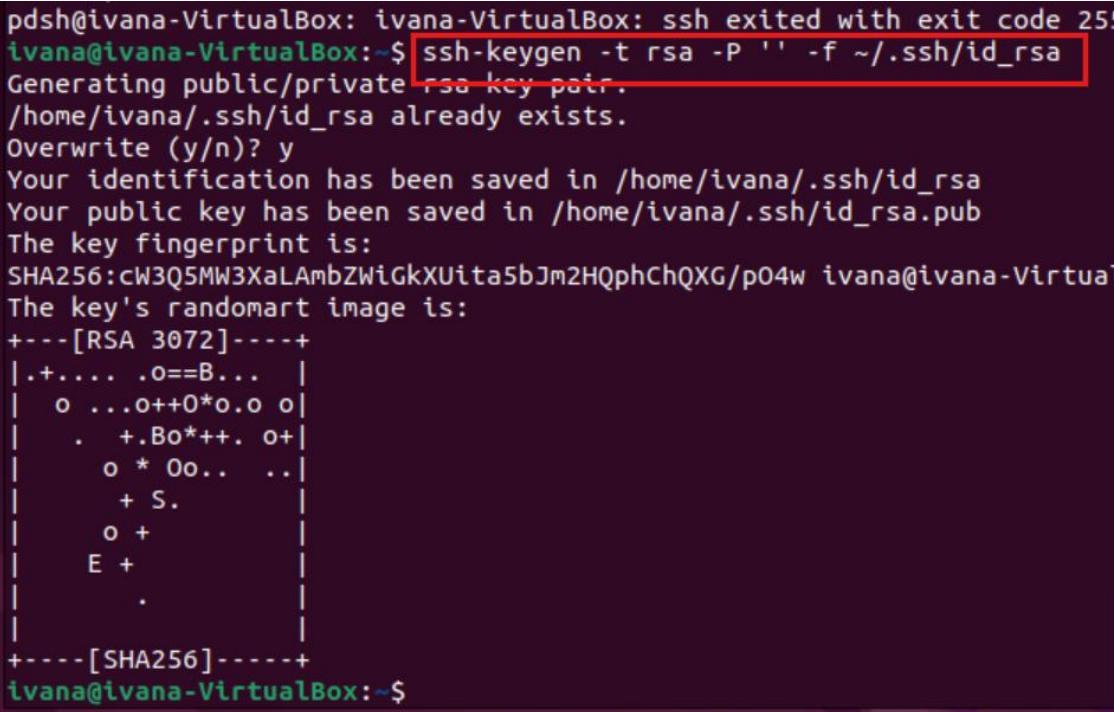
Creación de las carpetas físicas para datos, nombres y temporales en **/mnt/hadoop**, asignando permisos al usuario actual.



```
ivana@ivana-VirtualBox:~$ sudo mkdir -p /mnt/hadoop/data /mnt/hadoop/name /mnt/hadoop/namesecondary /mnt/hadoop/tmp  
ivana@ivana-VirtualBox:~$ sudo chown -R ivana:ivana /mnt/hadoop  
ivana@ivana-VirtualBox:~$  
  
ivana@ivana-VirtualBox:~$ ls  
Descargas Escritorio Imágenes Plantillas snap  
Documentos hadoop-3.3.4.tar.gz Música Públco Videos  
ivana@ivana-VirtualBox:~$ ls /mnt/hadoop/  
data name namesecondary tmp  
ivana@ivana-VirtualBox:~$
```

3- Acceso a SSH sin clave

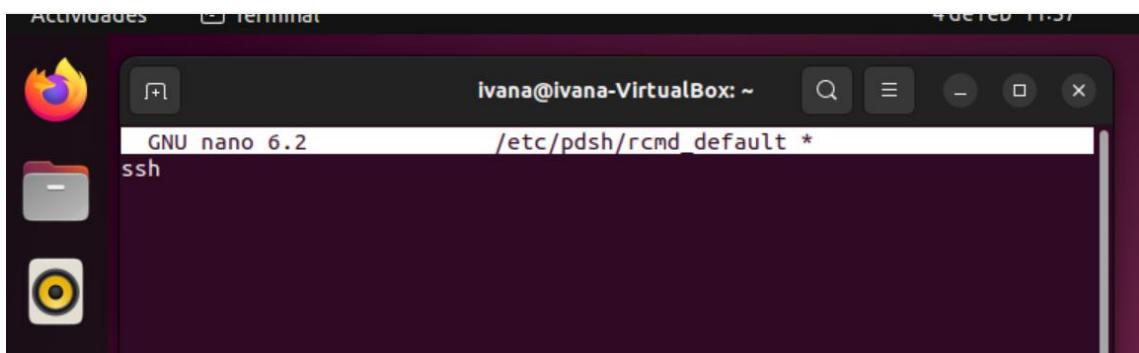
Generación de llaves RSA para permitir que Hadoop se comunique internamente consigo mismo, sin solicitar contraseñas.



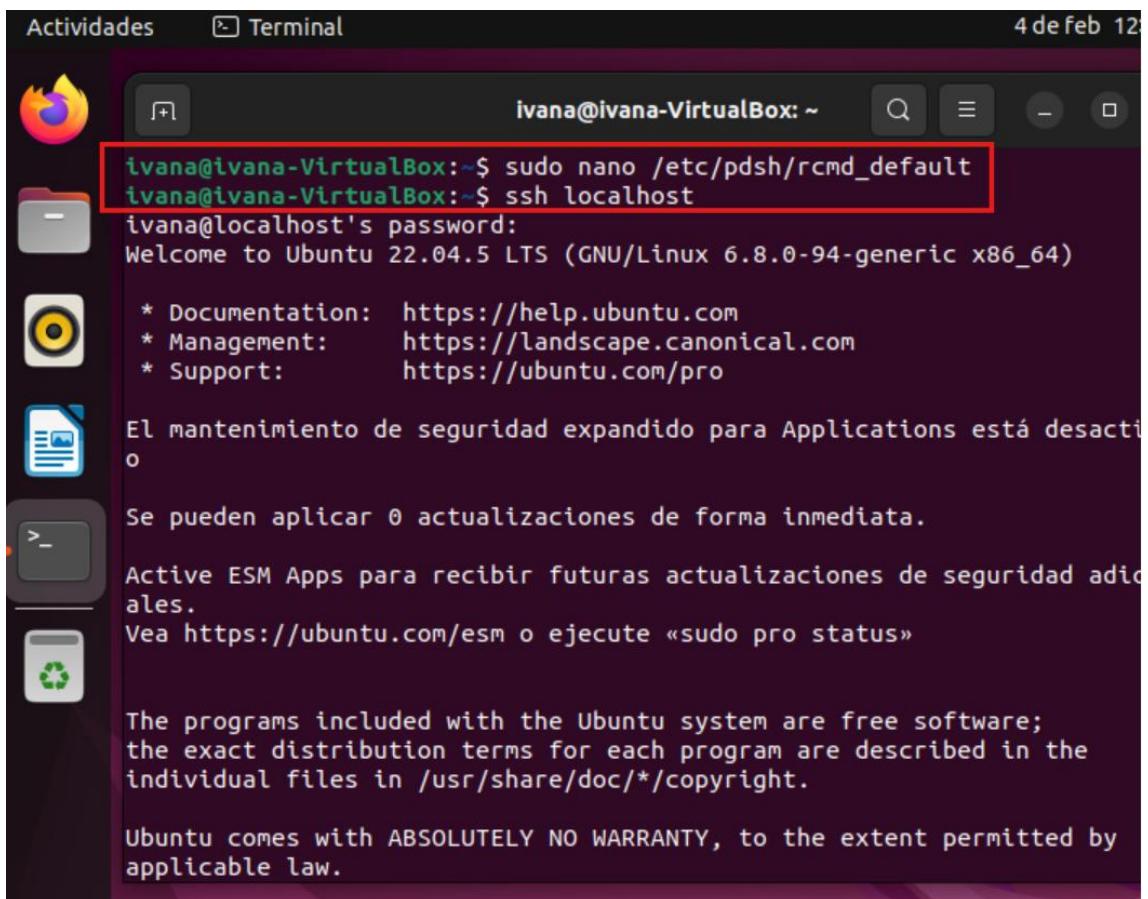
```
pdsh@ivana-VirtualBox: ivana-VirtualBox: ssh exited with exit code 255  
ivana@ivana-VirtualBox:~$ ssh-keygen -t rsa -P '' -f ~/.ssh/id_rsa  
Generating public/private rsa key pair.  
/home/ivana/.ssh/id_rsa already exists.  
Overwrite (y/n)? y  
Your identification has been saved in /home/ivana/.ssh/id_rsa  
Your public key has been saved in /home/ivana/.ssh/id_rsa.pub  
The key fingerprint is:  
SHA256:cW3Q5MW3XaLAmbZWiGkXUita5bJm2HQphChQXG/p04w ivana@ivana-Virtual  
The key's randomart image is:  
+---[RSA 3072]---+  
| .+.... .o==B... |  
| o ...o++0*o.o o |  
| . +.Bo*++. o+ |  
| o * Oo.. .. |  
| + S. |  
| o + |  
| E + |  
| . |  
+---[SHA256]---+  
ivana@ivana-VirtualBox:~$
```

4- Configuramos el Shell remoto por defecto para PDSH

Obligatorio en Ubuntu para que Hadoop pueda arrancar los servicios sin errores. Creamos el archivo de configuración *rcmd_default*



Verificamos la conexión SSH



5- Formateo y arranque

Formateo del NameNode y primer arranque de los servicios de almacenamiento mediante start-dfs.sh

a) Formatear el NameNode

```
ivana@ivana-VirtualBox: ~ $ /usr/share/hadoop/bin/hdfs namenode -format
WARNING: /usr/share/hadoop/logs does not exist. Creating.
2026-02-04 12:06:24,859 INFO namenode.NameNode: STARTUP_MSG:
/*****
STARTUP_MSG: Starting NameNode
STARTUP_MSG:   host = ivana-VirtualBox/127.0.1.1
STARTUP_MSG:   args = [-format]
STARTUP_MSG:   version = 3.3.4
STARTUP_MSG:   classpath = /usr/share/hadoop/etc/hadoop:/usr/share/hadoop/share/hadoop/common/lib/kerb-core-1.0.1.jar:/usr/share/hadoop/share/hadoop/common/lib/zookeeper-jute-3.5.6.jar:/usr/share/hadoop/share/hadoop/common/lib/commons-daemon-1.0.13.jar:/usr/share/hadoop/share/hadoop/common/lib/j2objc-annotations-1.1.jar:/usr/share/hadoop/share/hadoop/common/lib/jackson-provider-1.0.1.jar:/usr/share/hadoop/share/hadoop/common/lib/jakarta.activation-api-1.2.1.jar:/usr/share/hadoop/share/hadoop/common/lib/hadoop
```

b) Arrancar los servicios de almacenamiento

```
Actividades Terminal 4 de 1

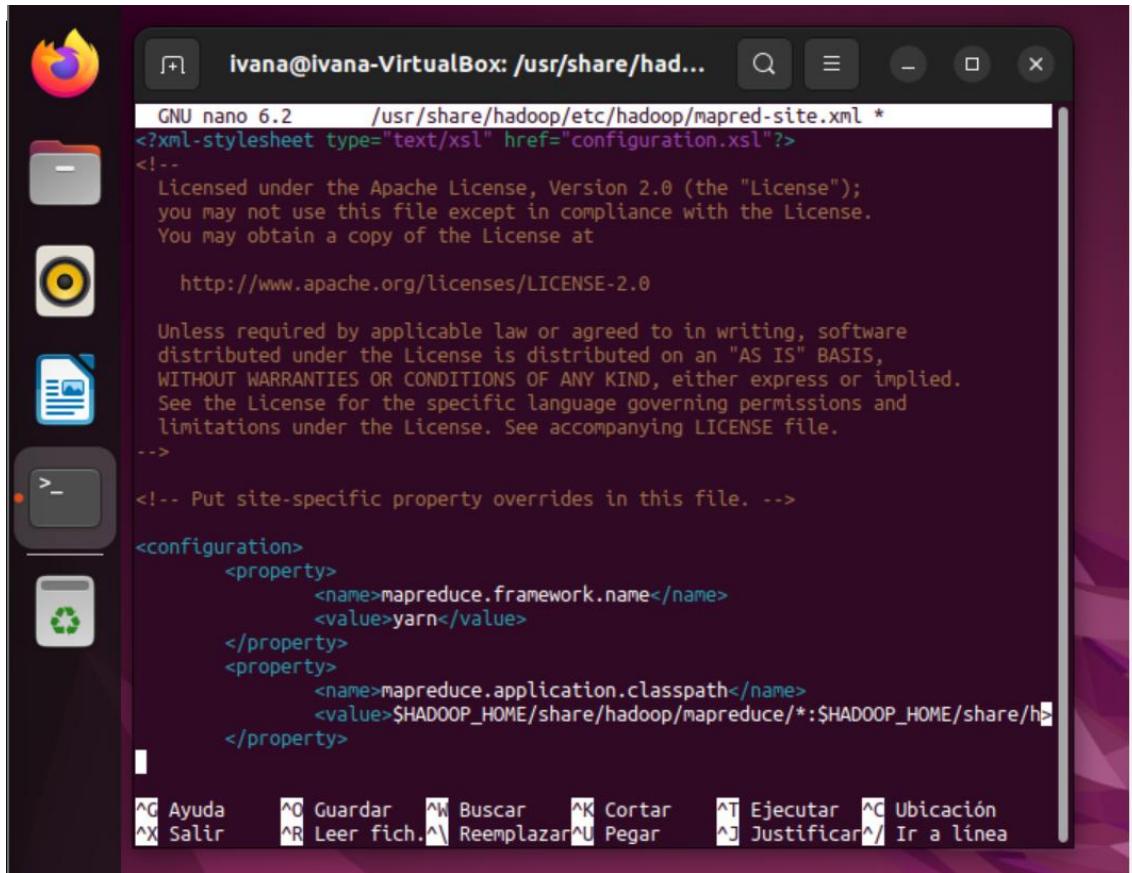
ivana@ivana-VirtualBox: /usr/share/hadoop$ /usr/share/hadoop/sbin/start-dfs.sh
Starting namenodes on [localhost]
Starting datanodes
Starting secondary namenodes [ivana-VirtualBox]
ivana@ivana-VirtualBox: /usr/share/hadoop$ jps
14288 NameNode
14418 DataNode
14643 SecondaryNameNode
14771 Jps
ivana@ivana-VirtualBox: /usr/share/hadoop$
```

CONFIGURACIÓN DE YARN Y RESOLUCIÓN DE ERRORES

Necesario para gestionar los recursos del sistema.

1- Activación de YARN

Configuración de mapred.site.xml y arranque del gestor de recursos para ejecutar tareas MapReduce



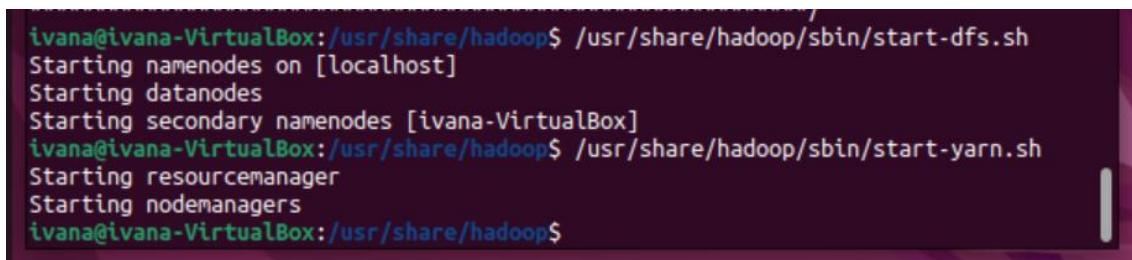
```
GNU nano 6.2      /usr/share/hadoop/etc/hadoop/mapred-site.xml *
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>
<!--
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you may not use this file except in compliance with the License.
You may obtain a copy of the License at

http://www.apache.org/licenses/LICENSE-2.0

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distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.
-->

<!-- Put site-specific property overrides in this file. -->

<configuration>
    <property>
        <name>mapreduce.framework.name</name>
        <value>yarn</value>
    </property>
    <property>
        <name>mapreduce.application.classpath</name>
        <value>$HADOOP_HOME/share/hadoop/mapreduce/*:$HADOOP_HOME/share/hadoop/mapreduce/*</value>
    </property>
</configuration>
```

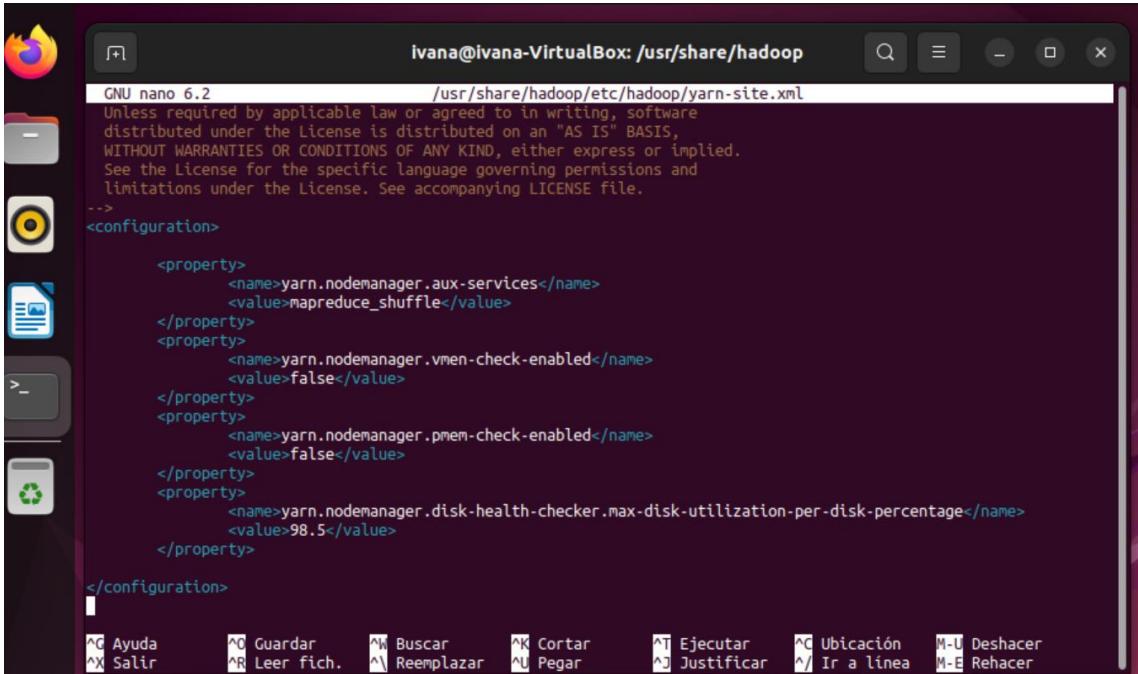


```
ivana@ivana-VirtualBox:/usr/share/hadoop$ /usr/share/hadoop/sbin/start-dfs.sh
Starting namenodes on [localhost]
Starting datanodes
Starting secondary namenodes [ivana-VirtualBox]
ivana@ivana-VirtualBox:/usr/share/hadoop$ /usr/share/hadoop/sbin/start-yarn.sh
Starting resourcemanager
Starting nodemanagers
ivana@ivana-VirtualBox:/usr/share/hadoop$
```

2- Depuración de errores

Debido al entorno de ejecución en una VM con recursos limitados, la tarea de WordCount fallaba inicialmente al superar los límites de memoria virtual permitidos por el sistema.

Para solucionar este inconveniente se ha procedido a modificar el archivo de configuración yarn-site.xml, para que desactivar la comprobación de la memorias tanto virtual como física y se ajustó al 98,5% para permitir que Hadoop siga trabajando incluso si el disco de la VM está casi lleno



The screenshot shows a terminal window titled "GNU nano 6.2" with the command "ivana@ivana-VirtualBox: /usr/share/hadoop". The file being edited is "/usr/share/hadoop/etc/hadoop/yarn-site.xml". The content of the file is as follows:

```
Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.

-->
<configuration>

<property>
    <name>yarn.nodemanager.aux-services</name>
    <value>mapreduce_shuffle</value>
</property>
<property>
    <name>yarn.nodemanager.vmem-check-enabled</name>
    <value>false</value>
</property>
<property>
    <name>yarn.nodemanager.pmem-check-enabled</name>
    <value>false</value>
</property>
<property>
    <name>yarn.nodemanager.disk-health-checker.max-disk-utilization-per-disk-percentage</name>
    <value>98.5</value>
</property>

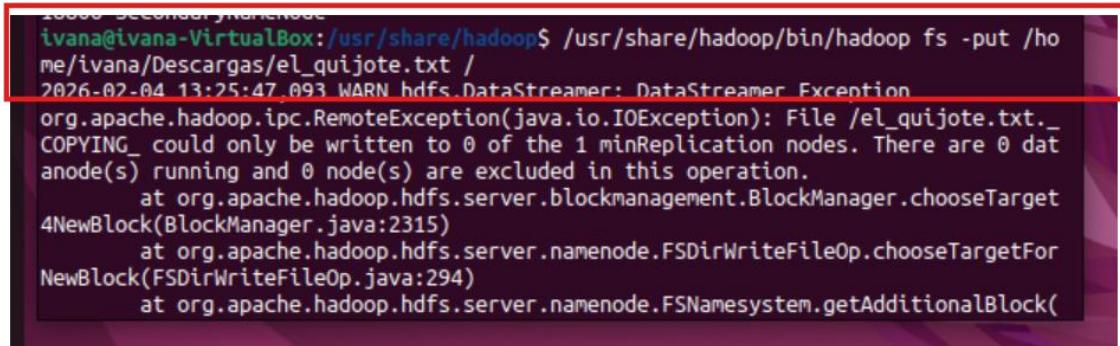
</configuration>
```

The terminal window includes a menu bar with "File", "Edit", "View", "Search", "Help", and "File", and a toolbar with various keyboard shortcuts.

EJECUCIÓN DE LA TAREA Y RESULTADOS FINALES

1- Carga de Datos

Subida del archivo el_quijote.txt (texto plano) al sistema HDFS

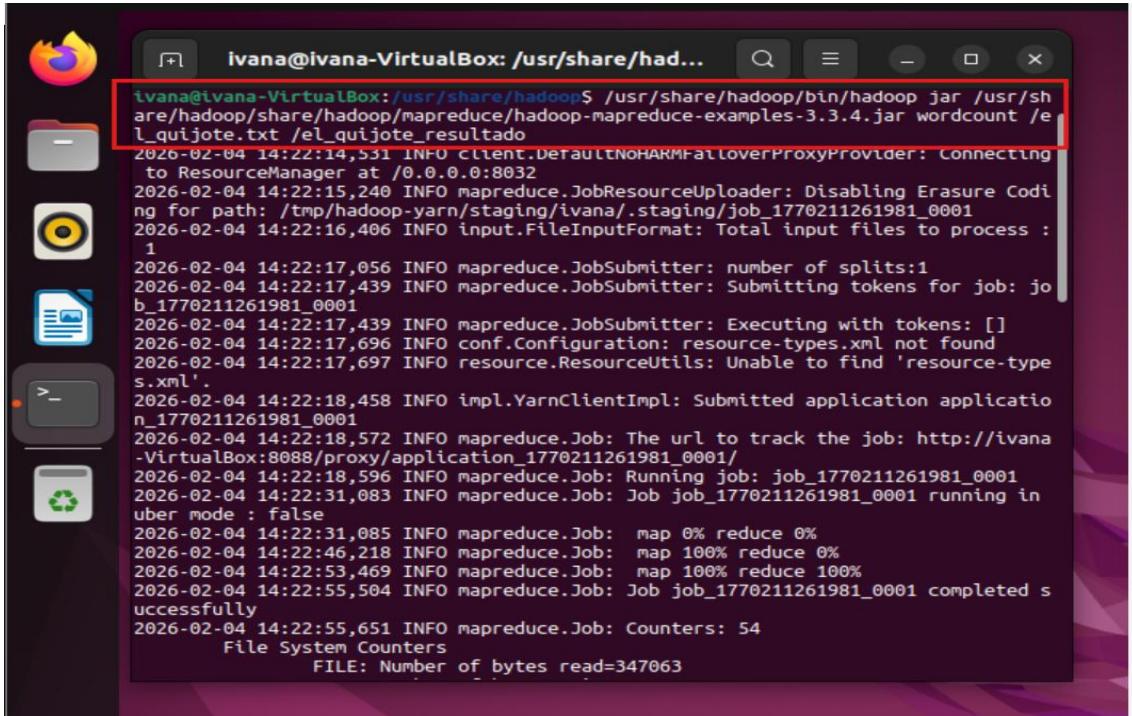


The screenshot shows a terminal window with the command "ivana@ivana-VirtualBox: /usr/share/hadoop\$ /usr/share/hadoop/bin/hadoop fs -put /home/ivana/Descargas/el_quijote.txt /". The output shows a warning message:

```
2026-02-04 13:25:47,093 WARN hdfs.DataStreamer: DataStreamer Exception
org.apache.hadoop.ipc.RemoteException(java.io.IOException): File /el_quijote.txt._COPYING_ could only be written to 0 of the 1 minReplication nodes. There are 0 datanode(s) running and 0 node(s) are excluded in this operation.
    at org.apache.hadoop.hdfs.server.blockmanagement.BlockManager.chooseTarget4NewBlock(BlockManager.java:2315)
    at org.apache.hadoop.hdfs.server.namenode.FSDirWriteFileOp.chooseTargetForNewBlock(FSDirWriteFileOp.java:294)
    at org.apache.hadoop.hdfs.server.namenode.FSNamesystem.getAdditionalBlock(
```

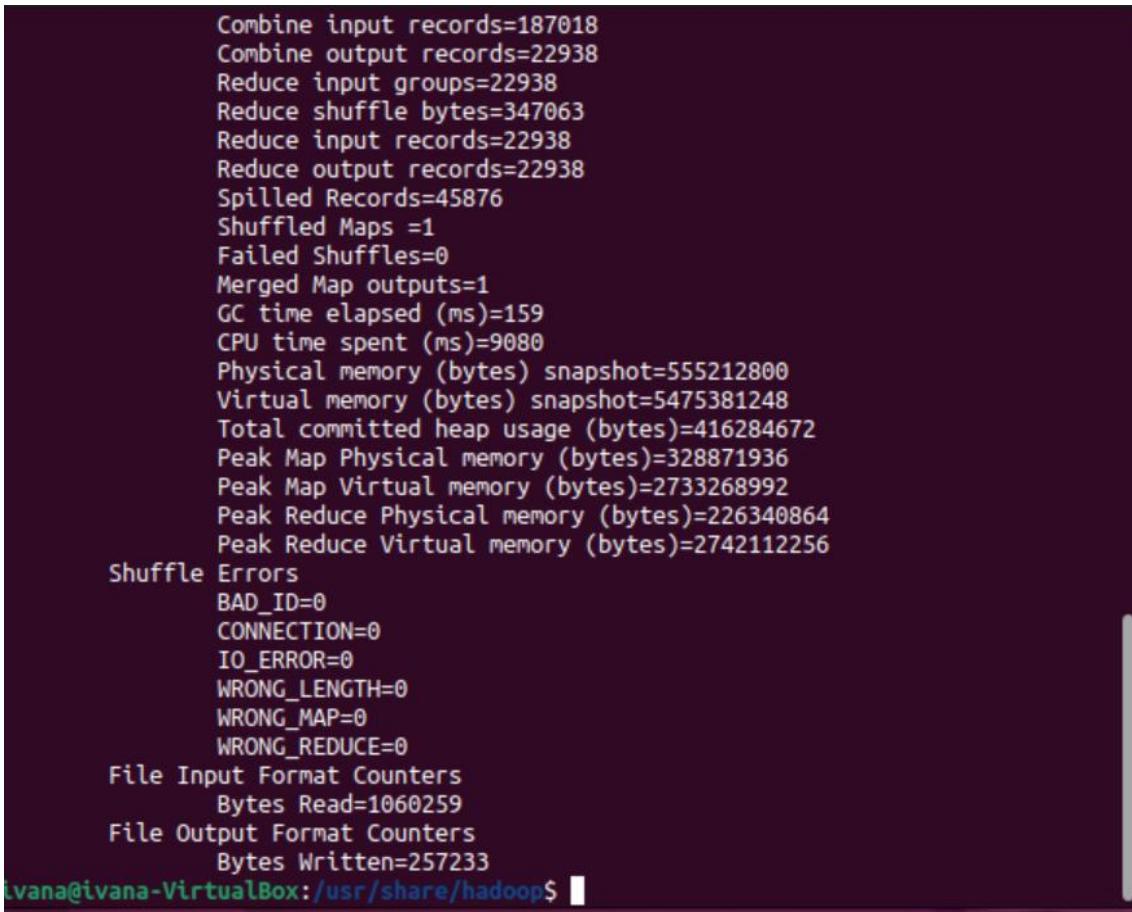
2- Procesamiento WordCount

Ejecución del programa de ejemplo para contar palabras, alcanzando el estado de SUCCEEDED tras las correcciones de memoria.



A screenshot of a terminal window titled "ivanam@ivanam-VirtualBox: /usr/share/hadoop\$". The window displays the command "hadoop jar /usr/share/hadoop/mapreduce/hadoop-mapreduce-examples-3.3.4.jar wordcount /el_quijote.txt /el_quijote_resultado" followed by its output. The output shows the job submission process, including connecting to the ResourceManager, executing tokens, and running the job successfully with 54 counters. A red box highlights the command and the initial log output.

```
ivanam@ivanam-VirtualBox: /usr/share/hadoop$ hadoop jar /usr/share/hadoop/mapreduce/hadoop-mapreduce-examples-3.3.4.jar wordcount /el_quijote.txt /el_quijote_resultado
2026-02-04 14:22:14,531 INFO client.DefaultNoharmFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2026-02-04 14:22:15,240 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/ivanam/staging/job_1770211261981_0001
2026-02-04 14:22:16,406 INFO input.FileInputFormat: Total input files to process : 1
2026-02-04 14:22:17,056 INFO mapreduce.JobSubmitter: number of splits:1
2026-02-04 14:22:17,439 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1770211261981_0001
2026-02-04 14:22:17,439 INFO mapreduce.JobSubmitter: Executing with tokens: []
2026-02-04 14:22:17,696 INFO conf.Configuration: resource-types.xml not found
2026-02-04 14:22:17,697 INFO resource.ResourceUtils: Unable to find 'resource-type.xml'.
2026-02-04 14:22:18,458 INFO impl.YarnClientImpl: Submitted application application_1770211261981_0001
2026-02-04 14:22:18,572 INFO mapreduce.Job: The url to track the job: http://ivanam-VirtualBox:8088/proxy/application_1770211261981_0001/
2026-02-04 14:22:18,596 INFO mapreduce.Job: Running job: job_1770211261981_0001
2026-02-04 14:22:31,083 INFO mapreduce.Job: Job job_1770211261981_0001 running in uber mode : false
2026-02-04 14:22:31,085 INFO mapreduce.Job: map 0% reduce 0%
2026-02-04 14:22:46,218 INFO mapreduce.Job: map 100% reduce 0%
2026-02-04 14:22:53,469 INFO mapreduce.Job: map 100% reduce 100%
2026-02-04 14:22:55,504 INFO mapreduce.Job: Job job_1770211261981_0001 completed successfully
2026-02-04 14:22:55,651 INFO mapreduce.Job: Counters: 54
  File System Counters
    FILE: Number of bytes read=347063
```



A screenshot of a terminal window titled "ivanam@ivanam-VirtualBox: /usr/share/hadoop\$". The window displays various Hadoop job counters. These include metrics like Combine input records (187018), Combine output records (22938), Reduce input groups (22938), Reduce shuffle bytes (347063), Reduce input records (22938), Reduce output records (22938), Spilled Records (45876), Shuffled Maps (1), Failed Shuffles (0), Merged Map outputs (1), GC time elapsed (ms) (159), CPU time spent (ms) (9080), Physical memory (bytes) snapshot (555212800), Virtual memory (bytes) snapshot (5475381248), Total committed heap usage (bytes) (416284672), Peak Map Physical memory (bytes) (328871936), Peak Map Virtual memory (bytes) (2733268992), Peak Reduce Physical memory (bytes) (226340864), Peak Reduce Virtual memory (bytes) (2742112256), Shuffle Errors (BAD_ID=0, CONNECTION=0, IO_ERROR=0, WRONG_LENGTH=0, WRONG_MAP=0, WRONG_REDUCE=0), File Input Format Counters (Bytes Read=1060259), and File Output Format Counters (Bytes Written=257233).

```
Combine input records=187018
Combine output records=22938
Reduce input groups=22938
Reduce shuffle bytes=347063
Reduce input records=22938
Reduce output records=22938
Spilled Records=45876
Shuffled Maps =1
Failed Shuffles=0
Merged Map outputs=1
GC time elapsed (ms)=159
CPU time spent (ms)=9080
Physical memory (bytes) snapshot=555212800
Virtual memory (bytes) snapshot=5475381248
Total committed heap usage (bytes)=416284672
Peak Map Physical memory (bytes)=328871936
Peak Map Virtual memory (bytes)=2733268992
Peak Reduce Physical memory (bytes)=226340864
Peak Reduce Virtual memory (bytes)=2742112256
Shuffle Errors
  BAD_ID=0
  CONNECTION=0
  IO_ERROR=0
  WRONG_LENGTH=0
  WRONG_MAP=0
  WRONG_REDUCE=0
File Input Format Counters
  Bytes Read=1060259
File Output Format Counters
  Bytes Written=257233
```

3- Verificaciones

- a. Terminal: Visualización de las primeras 20 palabras procesadas.

```
ivana@ivana-VirtualBox: /usr/share/hadoop$ /usr/share/hadoop/bin/hadoop fs -cat /el_quijote_resultado/part-r-00000 | head -n 20
"Apenas" 1
"Caballero" 4
"Conde" 1
"Donde" 1
"Mas" 1
"Miau", 1
"No" 1
"Rastrea" 1
"Ricamonte", 1
"Tablante", 1
"dichosa" 1
"el" 7
"y" 1
";Oh," 1
'Este' 2
'';Ea, 1
(Y 1
(a 1
(al 1
(como 3
cat: Unable to write to output stream.
ivana@ivana-VirtualBox: /usr/share/hadoop$
```

- b. Interfaz Web: Comprobación en <https://localhost:9870> del estado Active del NameNode y la presencia de los datos en el clúster.

Overview 'localhost:9000' (active)

Started:	Wed Feb 04 14:20:32 +0100 2026
Version:	3.3.4, ra585a73c3e02ac62350c136643a5e7f6095a3db
Compiled:	Fri Jul 29 14:32:00 +0200 2022 by stevel from branch-3.3.4
Cluster ID:	CID-1a1f2dd7-8731-4c65-bd26-f770b6c50507
Block Pool ID:	BP-429561211-127.0.1.1-1770209264554

Summary

Security is off.
Safemode is off.
19 files and directories, 8 blocks (8 replicated blocks, 0 erasure coded block groups) = 27 total filesystem object(s).
Heap Memory used 92.59 MB of 258 MB Heap Memory. Max Heap Memory is 1.1 GB.
Non Heap Memory used 55.69 MB of 58.69 MB Committed Non Heap Memory. Max Non Heap Memory is <unbounded>.

Configured Capacity:	23.94 GB
Configured Remote Capacity:	0 B
DFS Used:	1.89 MB (0.01%)

DFS Used:	1.89 MB (0.01%)
Non DFS Used:	15.13 GB
DFS Remaining:	7.57 GB (31.63%)
Block Pool Used:	1.89 MB (0.01%)
DataNodes usages% (Min/Median/Max/stdDev):	0.01% / 0.01% / 0.01% / 0.00%
Live Nodes	1 (Decommissioned: 0, In Maintenance: 0)
Dead Nodes	0 (Decommissioned: 0, In Maintenance: 0)
Decommissioning Nodes	0
Entering Maintenance Nodes	0
Total Datanode Volume Failures	0 (0 B)
Number of Under-Replicated Blocks	0
Number of Blocks Pending Deletion (including replicas)	0
Block Deletion Start Time	Wed Feb 04 14:20:32 +0100 2026
Last Checkpoint Time	Wed Feb 04 13:47:45 +0100 2026
Enabled Erasure Coding Policies	RS-6-3-1024k

NameNode Journal Status

```
Current transaction ID: 161
Journal Manager State
FileJournalManager(root=/mnt/hadoop/tmp/dfs/name) EditLogFileOutputStream(/mnt/hadoop/tmp/dfs/name/current/edits_inprogress_0000000000000000085)
```

NameNode Storage

Storage Directory	Type	State
/mnt/hadoop/tmp/dfs/name	IMAGE_AND_EDITS	Active

En la imagen se observan los siguientes puntos clave que demuestran que el sistema está bien configurado:

- **Estado Activo:** El NameNode aparece como 'localhost:9000' (active), lo que indica que el formateo y el arranque fueron exitosos.
- **Seguridad y Modo Seguro:** Ambos parámetros, Security is off y Safemode is off, están desactivados, tal como se pedía en la guía para facilitar las pruebas.
- **Nodos Vivos:** Se muestra Live Nodes: 1, confirmando que el DataNode está conectado y listo para recibir datos.
- **Uso de Disco:** El sistema reconoce la capacidad total y muestra que hay archivos almacenados (1.89 MB de uso de DFS), que corresponden al Quijote y sus resultados.

ÚLTIMO PASO: APAGADO CORRECTO

Para asegurar que no se dan los archivos de datos que acabamos de ver en el navegador, ejecutaremos el comando de apagado antes de cerrar nuestra VM.

```
ivana@ivana-VirtualBox:~/usr/share/hadoop$ /usr/share/hadoop/sbin/stop-all.sh
WARNING: Stopping all Apache Hadoop daemons as ivana in 10 seconds.
WARNING: Use CTRL-C to abort.
Stopping namenodes on [localhost]
Stopping datanodes
Stopping secondary namenodes [ivana-VirtualBox]
Stopping nodemanagers
localhost: WARNING: nodemanager did not stop gracefully after 5 seconds: Trying to kill w
ill -9
Stopping resourcemanager
ivana@ivana-VirtualBox:~/usr/share/hadoop$
```

