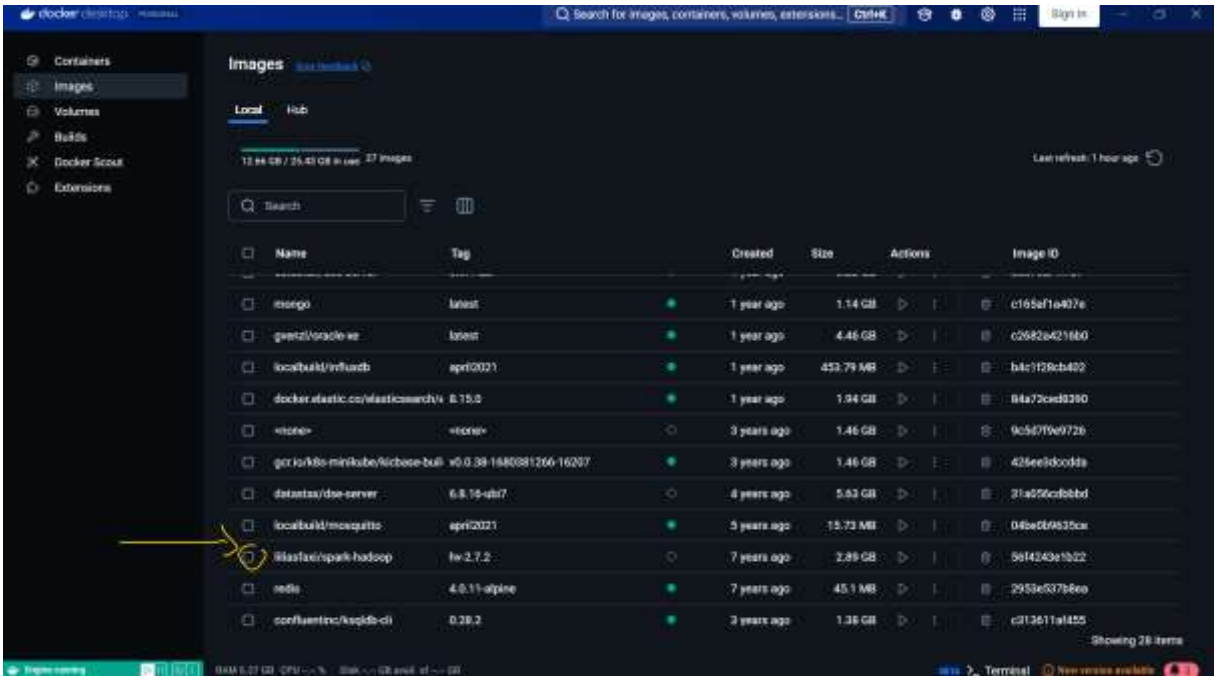
TP 1 BIG data

1. Télécharger l'image docker liliasfaxi/spark-hadoop:hv-2.7.2 uploadée sur dockerhub.

La commande :

docker pull liliasfaxi/spark-hadoop:hv-2.7.2



2. Créer les trois conteneurs à partir de l'image téléchargée. Pour cela:
    1. Créer un réseau bridge nommé hadoop qui permettra de relier les trois conteneurs.

```
C:\Users\T U F>docker network create --driver bridge hadoop
b26e85a42a3c85ce123f7e0c2d072301215665ae65d4a84a6e802b2412f76074

C:\Users\T U F>
```

2. Créer les trois conteneurs à partir de l'image téléchargée. Pour cela:
    1. Créer un réseau bridge nommé hadoop qui permettra de relier les trois conteneurs.
    2. Créer et lancer les trois conteneurs :
    - Le conteneur hadoop-master expose les ports 50070, 8088 et 16010.
    - Les conteneurs hadoop-slave1et hadoop-slave2 exposent le port 8042.

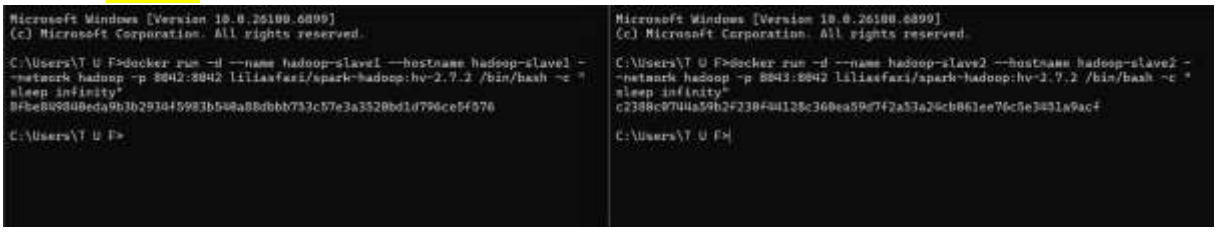
Pour le master on utilise les ports :
50070=>port pour HDFS (Le stockage distribuée)

8088=> Port pour YARN (gestion de ressources)

16010 => port pour l'interface HBASE => pour voir l'etat de la base de données distribuée

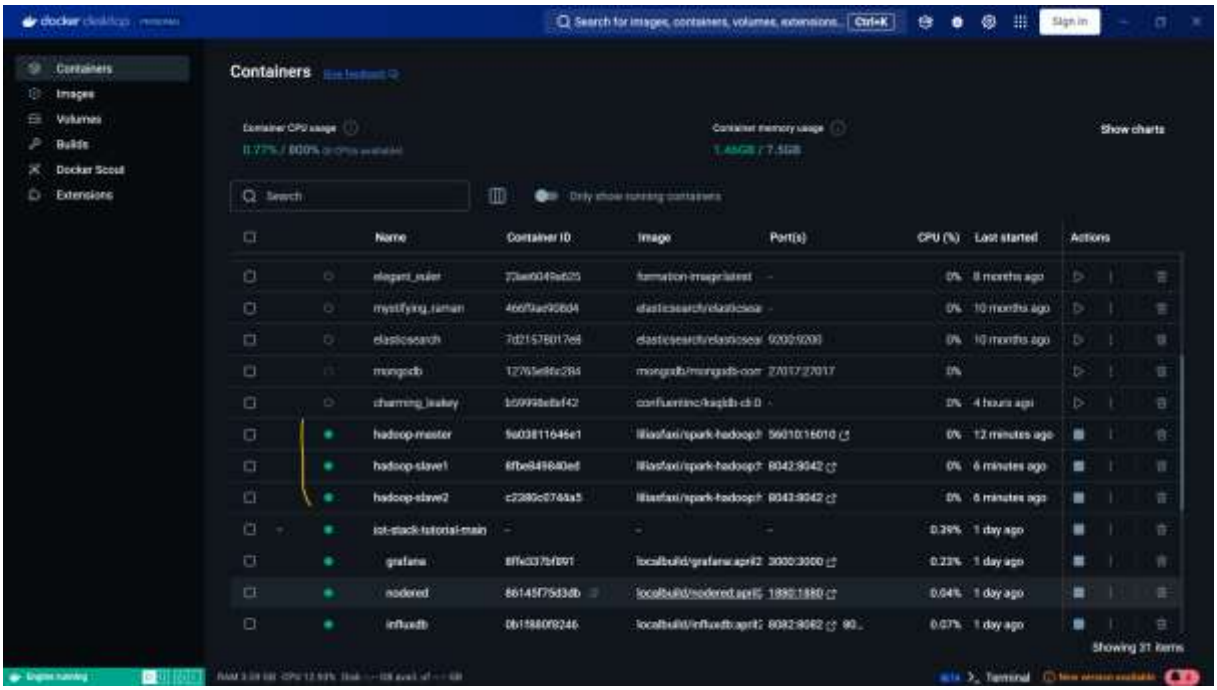
```
C:\Users\T U F>docker run -it --name hadoop-master --hostname hadoop-master --network hadoop -p 55070:50070 -p 55088:888
8 -p 56010:16010 liliasfaxi/spark-hadoop:hv-2.7.2 /bin/bash
root@hadoop-master:~#
```

Pour les 2 slaves :



C’est eux qu’ils vont executer les taches
le port 8042 => pour voir les ressources pris pour chaque slave et les conteneurs exécutés et les logs de chaque slave

ON VOIT LES CONTENEURS DANS DOCKER :



3. Entrer dans le conteneur master pour commencer à l'utiliser.

On demarre le serveure ssh dans tous les conteneurs master et slave :

```
root@hadoop-master:~# service ssh start
 * Starting OpenBSD Secure Shell server sshd
root@hadoop-master:~# ./start-hadoop.sh
```

```
C:\Users\T U F>docker exec -it hadoop-slave1 /bin/bash
root@hadoop-slave1:~# service ssh start
 * Starting OpenBSD Secure Shell server sshd
root@hadoop-slave1:~#
```

```
C:\Users\T U F>docker exec -it hadoop-slave2 /bin/bash
root@hadoop-slave2:~# service ssh start
 * Starting OpenBSD Secure Shell server sshd                          [ OK ]
root@hadoop-slave2:~#
```

Puis on lance haddop et Yarn dans le conteneur Master :

```
root@hadoop-master:~# ./start-hadoop.sh

Starting namenodes on [hadoop-master]
hadoop-master: Warning: Permanently added 'hadoop-master,172.27.0.2' (ECDSA) to the list of known hosts.
hadoop-master: starting namenode, logging to /usr/local/hadoop/logs/hadoop-root-namenode-hadoop-master.out
hadoop-slave1: Warning: Permanently added 'hadoop-slave1,172.27.0.3' (ECDSA) to the list of known hosts.
hadoop-slave2: Warning: Permanently added 'hadoop-slave2,172.27.0.4' (ECDSA) to the list of known hosts.
hadoop-slave2: starting datanode, logging to /usr/local/hadoop/logs/hadoop-root-datanode-hadoop-slave2.out
hadoop-slave1: starting datanode, logging to /usr/local/hadoop/logs/hadoop-root-datanode-hadoop-slave1.out
Starting secondary namenodes [0.0.0.0]
0.0.0.0: Warning: Permanently added '0.0.0.0' (ECDSA) to the list of known hosts.
0.0.0.0: starting secondarynamenode, logging to /usr/local/hadoop/logs/hadoop-root-secondarynamenode-hadoop-master.out

starting yarn daemons
resourcemanager running as process 328. Stop it first.
hadoop-slave2: Warning: Permanently added 'hadoop-slave2,172.27.0.4' (ECDSA) to the list of known hosts.
hadoop-slave1: Warning: Permanently added 'hadoop-slave1,172.27.0.3' (ECDSA) to the list of known hosts.
hadoop-slave1: starting nodemanager, logging to /usr/local/hadoop/logs/yarn-root-nodemanager-hadoop-slave1.out
hadoop-slave2: starting nodemanager, logging to /usr/local/hadoop/logs/yarn-root-nodemanager-hadoop-slave2.out

root@hadoop-master:~#
```

Premiers pas avec Hadoop :

- Créer un répertoire dans HDFS, appelé input.

```
root@hadoop-master:~# hdfs dfs -ls /
root@hadoop-master:~# hdfs dfs -mkdir /input
root@hadoop-master:~# hdfs dfs -ls /
Found 1 items
drwxr-xr-x   - root supergroup          0 2025-11-28 19:57 /input
root@hadoop-master:~#
```

- Nous allons utiliser le fichier **purchases.txt'** comme entrée pour le traitement MapReduce. Ce fichier se trouve déjà sous le répertoire principal de votre machine master.
- Charger le fichier **purchases** dans le répertoire input que vous avez créé.

+et Afficher le contenu du répertoire **input**.

On telecharge le fichier et le transmettre vers le master

```
C:\Users\T U F>docker cp "C:\Users\T U F\Downloads\purchases.txt.gz" hadoop-master:/root/
Successfully copied 38.5MB to hadoop-master:/root/

C:\Users\T U F>
```

On copie le fichier dans le repertoire input crée :

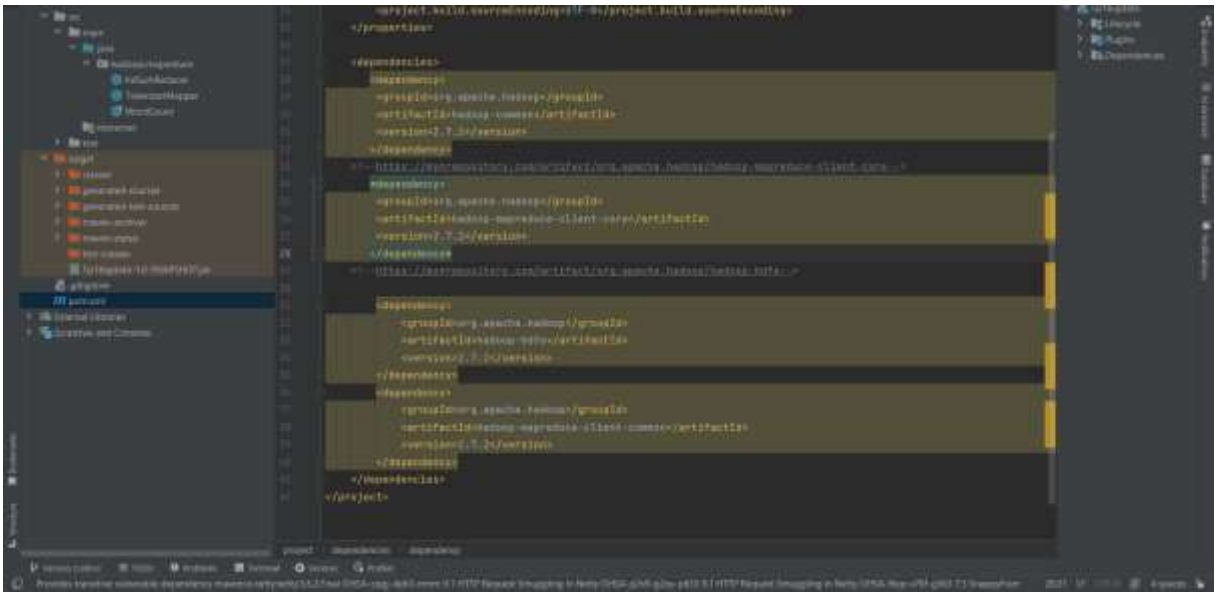
```
root@hadoop-master:~# ls
hdfs  purchases.txt  purchases2.txt  run-wordcount.sh  start-hadoop.sh  start-kafka-zookeeper.sh
root@hadoop-master:~# ls /root
hdfs  purchases.txt  purchases.txt.gz  purchases2.txt  run-wordcount.sh  start-hadoop.sh  start-kafka-zookeeper.sh
root@hadoop-master:~# hdfs dfs -put -f /root/purchases.txt.gz /input/
root@hadoop-master:~# hdfs dfs -ls /input
Found 1 items
-rw-r--r--   2 root supergroup   38454568 2025-11-28 20:09 /input/purchases.txt.gz
root@hadoop-master:~#
```

- Afficher les dernières lignes du fichier **purchases.**

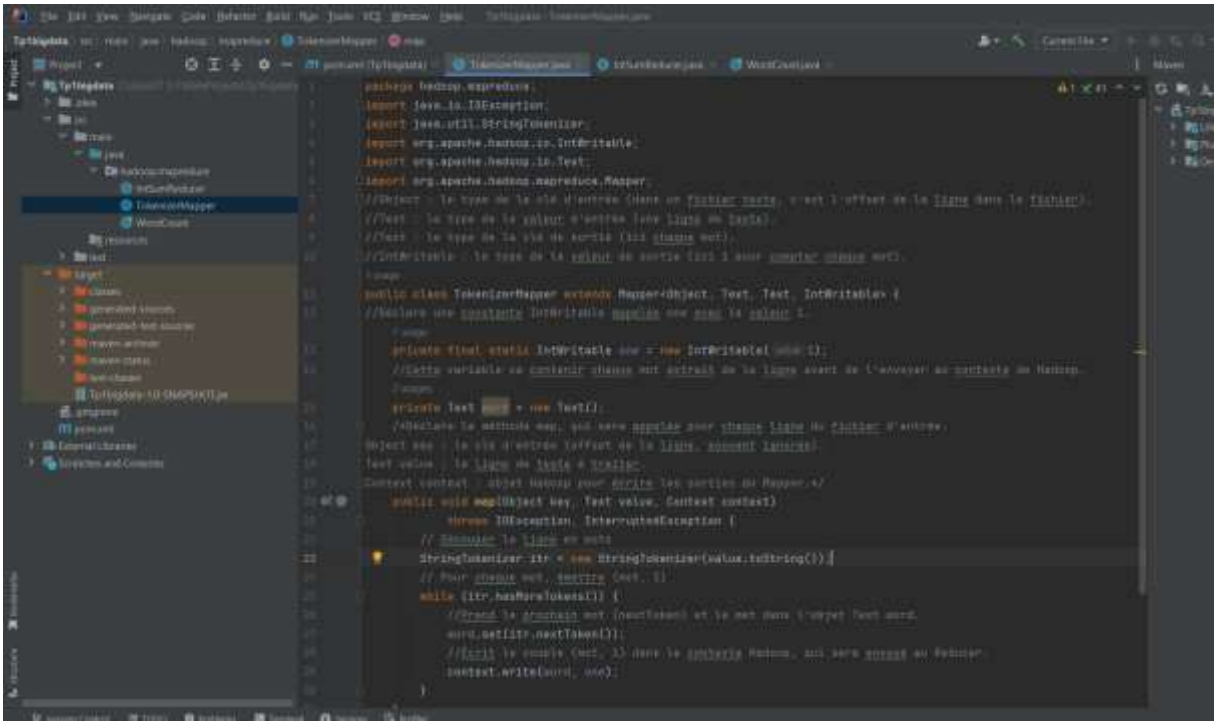
```
root@hadoop-master:~# hdfs dfs -cat /input/purchases.txt.gz | gunzip -c | head -n 10
2012-01-01      09:00   San Jose        Men's Clothing  214.05  Amex
2012-01-01      09:00   Fort Worth      Women's Clothing        153.57  Visa
2012-01-01      09:00   San Diego       Music   66.08   Cash
2012-01-01      09:00   Pittsburgh      Pet Supplies    493.51  Discover
2012-01-01      09:00   Omaha   Children's Clothing     235.63  MasterCard
2012-01-01      09:00   Stockton        Men's Clothing  247.18  MasterCard
2012-01-01      09:00   Austin  Cameras 379.6   Visa
2012-01-01      09:00   New York        Consumer Electronics    296.8   Cash
2012-01-01      09:00   Corpus Christi  Toys    25.38   Discover
2012-01-01      09:00   Fort Worth      Toys    213.88  Visa
cat: Unable to write to output stream.
root@hadoop-master:~#
```

MAP REDUCE PROCESS :

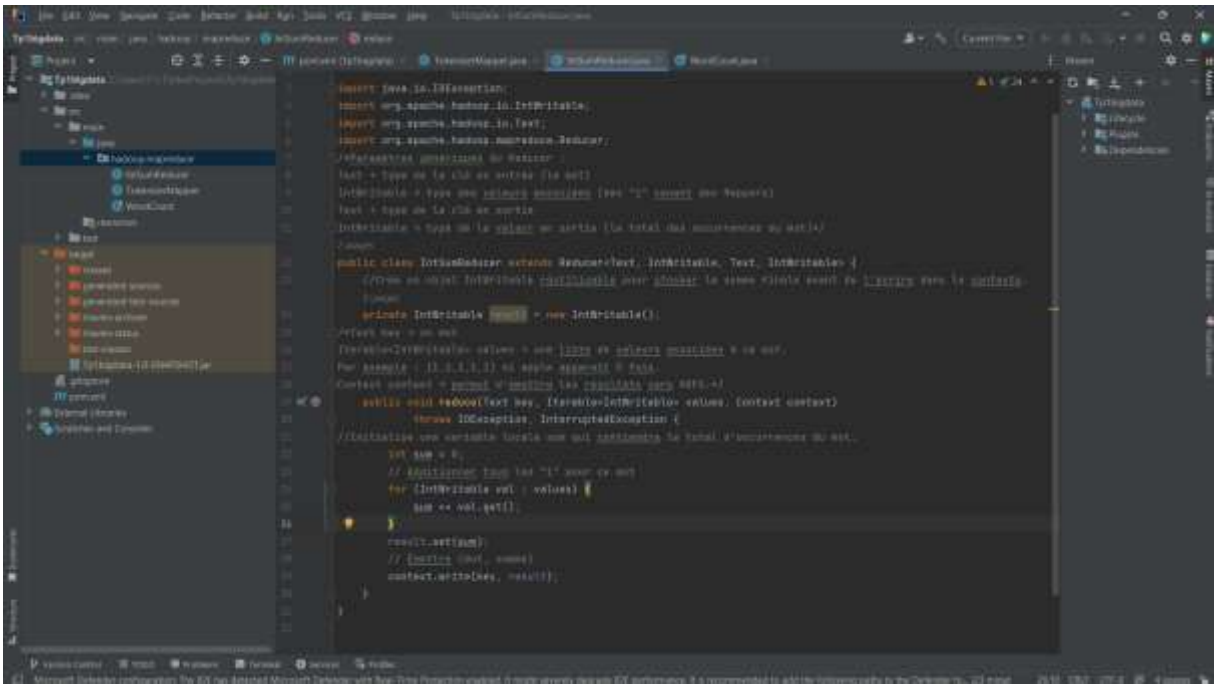
1/ dans le fichier pom.xml on ajoute les dépendances demandées



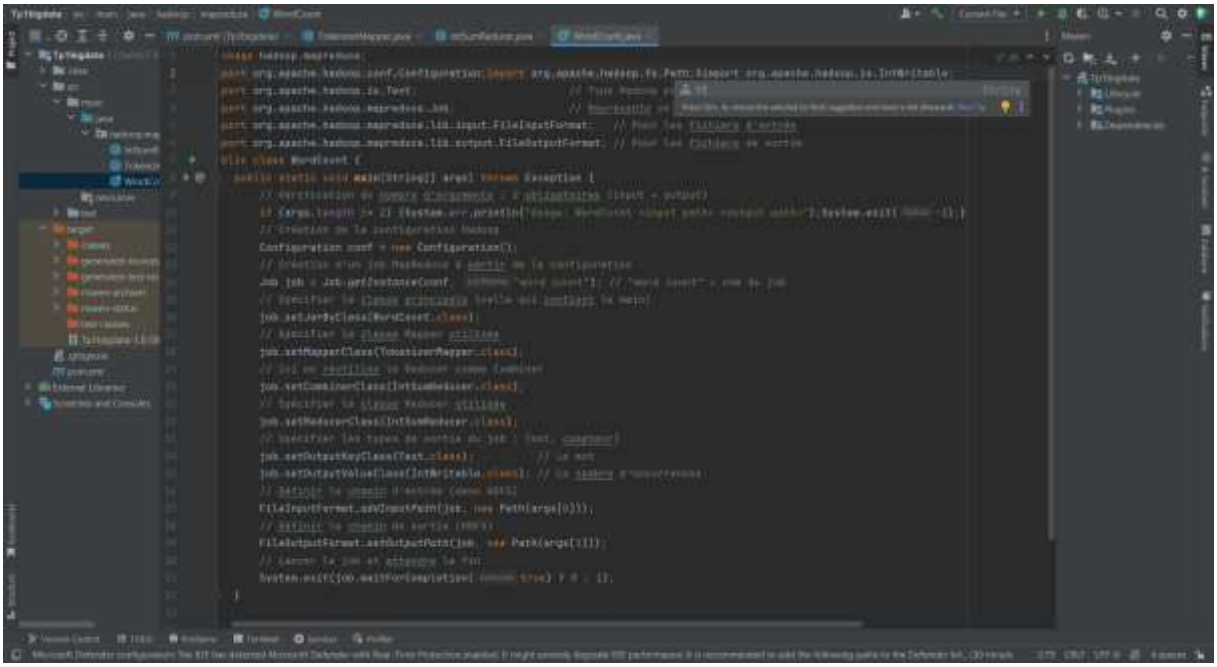
- Créer la classe **TokenizerMapper** qui représente la classe MAP.



- Créer la classe **IntSumReducer** qui représente la classe REDUCE.



- Enfin, créer la classe **WordCount** qui représente la classe Driver.



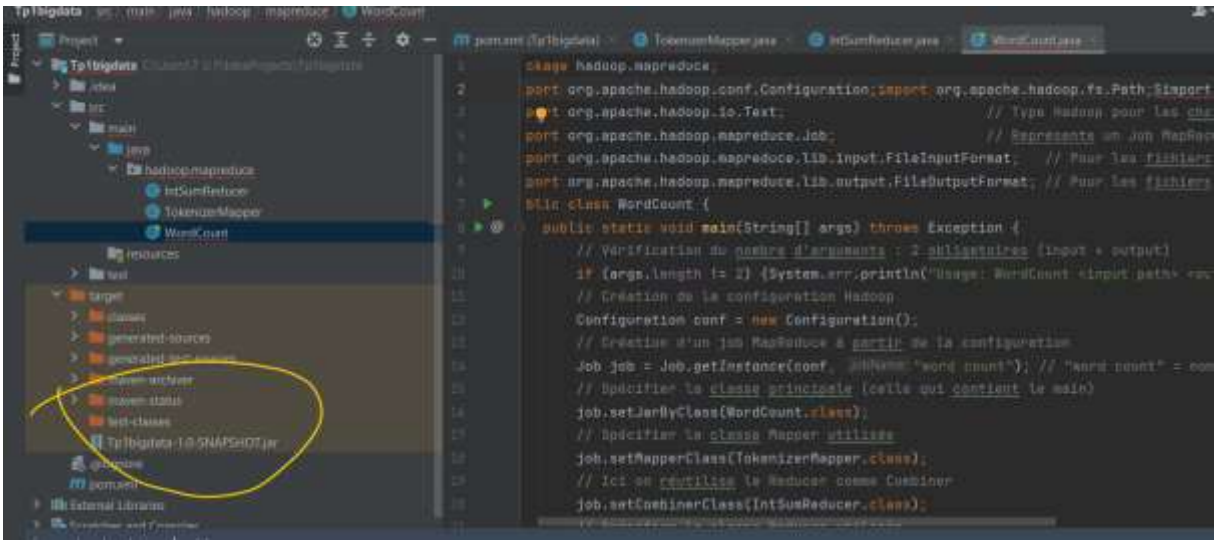
Dans votre projet IntelliJ :

- Générer le fichier **jar** de l'application.
- Copier le fichier **jar** créé dans le conteneur **master**.
- Revenir au shell du conteneur master et lancer le job map reduce sur le fichier purchases.txt que vous aviez préalablement chargé dans le répertoire input de HDFS..
- Afficher le contenu du fichier généré.

On fait:

Tp1bigdata/target/Tp1bigdata-1.0-SNAPSHOT.jar

Le fichier Jar est généré:



On copie le JAR vers le master :

```
PS C:\Users\T U F\IdeaProjects\Tp1bigdata> docker cp target/Tp1bigdata-1.0-SNAPSHOT.jar hadoop-master:/root/
Successfully copied 6.66kB to hadoop-master:/root/
PS C:\Users\T U F\IdeaProjects\Tp1bigdata>
```

Maintenat on lance notre jib dans le conteneur laster

```
root@hadoop-master:~# ls
Tp1bigdata-1.0-SNAPSHOT.jar  purchases.txt     purchases2.txt    start-hadoop.sh
hdfs                         purchases.txt.gz  run-wordcount.sh  start-kafka-zookeeper.sh
root@hadoop-master:~# hadoop jar Tp1bigdata-1.0-SNAPSHOT.jar hadoop.mapreduce /input/purchases.txt.gz /output
Exception in thread "main" java.lang.ClassNotFoundException: hadoop.mapreduce
        at java.net.URLClassLoader.findClass(URLClassLoader.java:382)
        at java.lang.ClassLoader.loadClass(ClassLoader.java:424)
        at java.lang.ClassLoader.loadClass(ClassLoader.java:357)
        at java.lang.Class.forName0(Native Method)
        at java.lang.Class.forName(Class.java:348)
        at org.apache.hadoop.util.RunJar.run(RunJar.java:214)
        at org.apache.hadoop.util.RunJar.main(RunJar.java:136)
root@hadoop-master:~# hadoop jar Tp1bigdata-1.0-SNAPSHOT.jar hadoop.mapreduce.WordCount /input/purchases.txt.gz /output
25/11/28 21:19:43 INFO client.RMProxy: Connecting to ResourceManager at hadoop-master/172.27.0.2:8032
25/11/28 21:19:43 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your applic
ation with ToolRunner to remedy this.
25/11/28 21:19:43 INFO input.FileInputFormat: Total input paths to process : 1
25/11/28 21:19:44 INFO mapreduce.JobSubmitter: number of splits:1
25/11/28 21:19:44 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1764358966858_0001
25/11/28 21:19:44 INFO impl.YarnClientImpl: Submitted application application_1764358966858_0001
25/11/28 21:19:44 INFO mapreduce.Job: The url to track the job: http://hadoop-master:8088/proxy/application_1764358966858_0001/
25/11/28 21:19:44 INFO mapreduce.Job: Running job: job_1764358966858_0001
25/11/28 21:19:51 INFO mapreduce.Job: Job job_1764358966858_0001 running in uber mode : false
25/11/28 21:19:51 INFO mapreduce.Job:  map 0% reduce 0%
25/11/28 21:20:02 INFO mapreduce.Job:  map 16% reduce 0%
25/11/28 21:20:05 INFO mapreduce.Job:  map 23% reduce 0%
25/11/28 21:20:08 INFO mapreduce.Job:  map 31% reduce 0%
25/11/28 21:20:11 INFO mapreduce.Job:  map 38% reduce 0%
25/11/28 21:20:14 INFO mapreduce.Job:  map 45% reduce 0%
25/11/28 21:20:17 INFO mapreduce.Job:  map 52% reduce 0%
25/11/28 21:20:21 INFO mapreduce.Job:  map 60% reduce 0%
25/11/28 21:20:24 INFO mapreduce.Job:  map 67% reduce 0%
25/11/28 21:20:25 INFO mapreduce.Job:  map 100% reduce 0%
25/11/28 21:20:29 INFO mapreduce.Job:  map 100% reduce 100%
25/11/28 21:20:29 INFO mapreduce.Job: Job job_1764358966858_0001 completed successfully
25/11/28 21:20:29 INFO mapreduce.Job: Counters: 49
        File System Counters
                FILE: Number of bytes read=6954051
                FILE: Number of bytes written=7837076
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
```

```
                FILE: Number of write operations=0
                HDFS: Number of bytes read=38454681
                HDFS: Number of bytes written=999048
                HDFS: Number of read operations=6
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
        Job Counters
                Launched map tasks=1
                Launched reduce tasks=1
                Data-local map tasks=1
                Total time spent by all maps in occupied slots (ms)=30933
                Total time spent by all reduces in occupied slots (ms)=1778
                Total time spent by all map tasks (ms)=30933
                Total time spent by all reduce tasks (ms)=1778
                Total vcore-milliseconds taken by all map tasks=30933
                Total vcore-milliseconds taken by all reduce tasks=1778
                Total megabyte-milliseconds taken by all map tasks=31675392
                Total megabyte-milliseconds taken by all reduce tasks=1820672
        Map-Reduce Framework
                Map input records=4138476
                Map output records=27982895
                Map output bytes=323204504
                Map output materialized bytes=647726
                Input split bytes=111
                Combine input records=26081121
                Combine output records=569279
                Reduce input groups=51053
                Reduce shuffle bytes=647726
                Reduce input records=51053
                Reduce output records=51053
                Spilled Records=680332
                Shuffled Maps =1
                Failed Shuffles=0
                Merged Map outputs=1
                GC time elapsed (ms)=285
                CPU time spent (ms)=35580
                Physical memory (bytes) snapshot=453177344
                Virtual memory (bytes) snapshot=3904143604
                Total committed heap usage (bytes)=327680000
        Shuffle Errors
                BAD_ID=0
                CONNECTION=0
                IO_ERROR=0
                WRONG_LENGTH=0
```

```
                WRONG_REDUCE=0
        File Input Format Counters
                Bytes Read=38454568
        File Output Format Counters
                Bytes Written=499048
root@hadoop-master:~#
```

FINAL RESULT :

On execute :

hdfs dfs -cat /output/part-r-00000 | head -n 50

```
root@hadoop-master:~# hdfs dfs -ls /output
Found 2 items
-rw-r--r--   2 root supergroup          0 2025-11-28 21:20 /output/_SUCCESS
-rw-r--r--   2 root supergroup     499048 2025-11-28 21:20 /output/part-r-00000
root@hadoop-master:~# hdfs dfs -cat /output/part-r-00000 | head -n 50
0       86
0.01    78
0.02    83
0.03    80
0.04    89
0.05    82
0.06    81
0.07    70
0.08    85
0.09    84
0.1     81
0.11    87
0.12    97
0.13    83
0.14    75
0.15    90
0.16    86
0.17    102
0.18    78
0.19    78
0.2     76
0.21    87
0.22    89
0.23    91
0.24    94
0.25    81
0.26    79
0.27    78
0.28    69
0.29    83
0.3     104
0.31    89
0.32    95
0.33    79
0.34    70
0.35    88
0.36    79
0.37    86
0.38    76
0.39    72
0.4     75
0.41    86
0.42    89
0.43    102
0.44    80
0.45    78
0.46    78
0.47    88
0.48    88
```

```
0.17    102
0.18    78
0.19    78
0.2     76
0.21    87
0.22    89
0.23    91
0.24    94
0.25    81
0.26    79
0.27    78
0.28    69
0.29    83
0.3     104
0.31    89
0.32    95
0.33    79
0.34    70
0.35    88
0.36    79
0.37    86
0.38    76
0.39    72
0.4     75
0.41    86
0.42    89
0.43    102
0.44    80
0.45    78
0.46    78
0.47    88
0.48    88
0.49    92
cat: Unable to write to output stream.
root@hadoop-master:~#
```