EXP 4: Create UDF (User Defined Functions) in Apache Pigand execute it in MapReduce / HDFS mode

AIM:

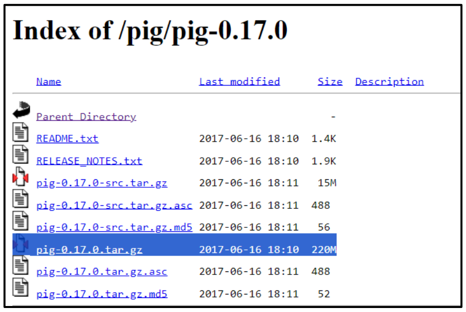
To create UDF in Apache Pig and execute it in MapReduce/HDFS mode.

PROCEDURE:

Pig Download and installation:

1. Download Pig:

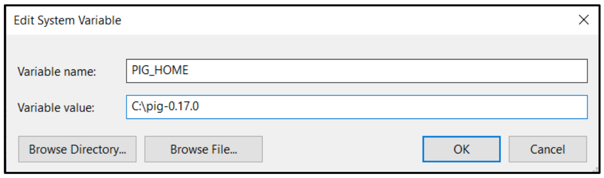
Download Pig from “https://downloads.apache.org/pig/pig-0.17.0/”



Index of /pig/pig-0.17.0

Name	Last modified	Size	Description
Parent Directory		-	
README.txt	2017-06-16 18:10	1.4K	
RELEASE_NOTES.txt	2017-06-16 18:10	1.9K	
pig-0.17.0-src.tar.gz	2017-06-16 18:11	15M	
pig-0.17.0-src.tar.gz.asc	2017-06-16 18:11	488	
pig-0.17.0-src.tar.gz.md5	2017-06-16 18:11	56	
pig-0.17.0.tar.gz	2017-06-16 18:10	220M	
pig-0.17.0.tar.gz.asc	2017-06-16 18:11	488	
pig-0.17.0.tar.gz.md5	2017-06-16 18:11	52	

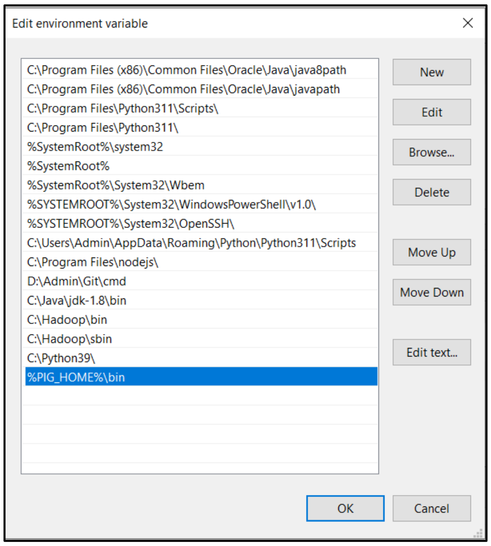
2. Add the environment variable for Pig:



Edit System Variable

Variable name: PIG_HOME

Variable value: C:\pig-0.17.0



Edit environment variable

```
C:\Program Files (x86)\Common Files\Oracle\Java\java8path
C:\Program Files (x86)\Common Files\Oracle\Java\javapath
C:\Program Files\Python311\Scripts\
C:\Program Files\Python311\
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
%SYSTEMROOT%\System32\OpenSSH\
C:\Users\Admin\AppData\Roaming\Python\Python311\Scripts
C:\Program Files\nodejs\
D:\Admin\Git\cmd
C:\Java\jdk-1.8\bin
C:\Hadoop\bin
C:\Hadoop\sbin
C:\Python39\
%PIG_HOME%\bin
```

3. Go to C:\pig-0.17.0\bin and open pig (Windows Command Script)

```
set HADOOP_BIN_PATH=%HADOOP_HOME%\libexec
```

4. Open Windows Powershell and type “pig –x local” and check whether pig grunt appears.

Pig is successfully installed.

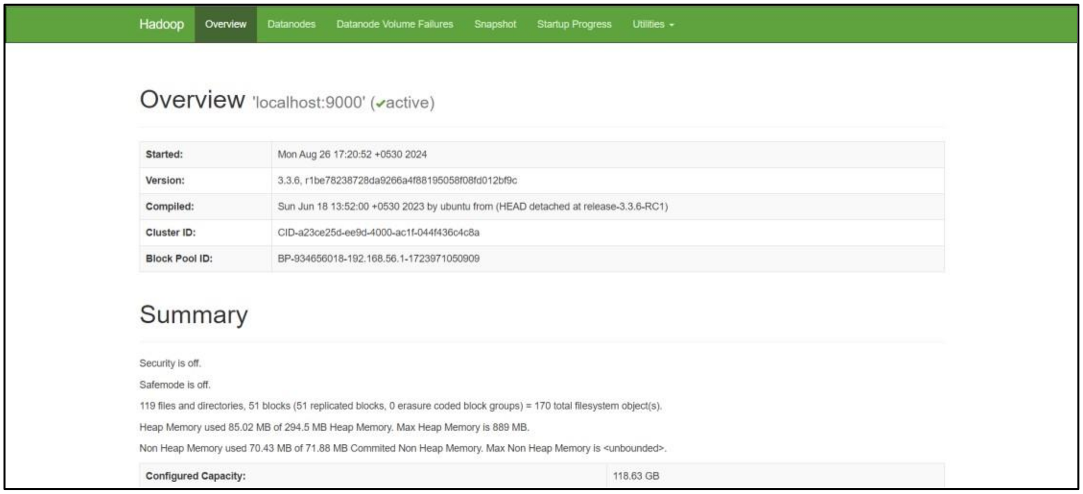
Create UDF:

1. Start Hadoop services:

Open command prompt as an administrator

```
start-dfs.cmd
start-yarn.cmd
```

2. Open the browser and go to the URL “localhost:9870”



Overview 'localhost:9000' (✓active)

Started:	Mon Aug 26 17:20:52 +0530 2024
Version:	3.3.6, r1be78238728da9266a4f88195058f08fd012bf9c
Compiled:	Sun Jun 18 13:52:00 +0530 2023 by ubuntu from (HEAD detached at release-3.3.6-RC1)
Cluster ID:	CID-a23ce25d-ee9d-4000-ac1f-044f436c4c8a
Block Pool ID:	BP-934656018-192.168.56.1-1723971050909

Summary

Security is off.

Safemode is off.

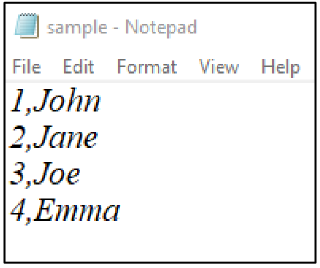
119 files and directories, 51 blocks (51 replicated blocks, 0 erasure coded block groups) = 170 total filesystem object(s).

Heap Memory used 85.02 MB of 294.5 MB Heap Memory. Max Heap Memory is 889 MB.

Non Heap Memory used 70.43 MB of 71.88 MB Commited Non Heap Memory. Max Non Heap Memory is <unbounded>.

Configured Capacity:	118.63 GB

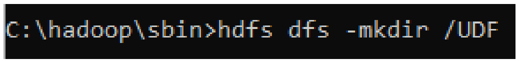
3. Create a text file “sample.txt”:



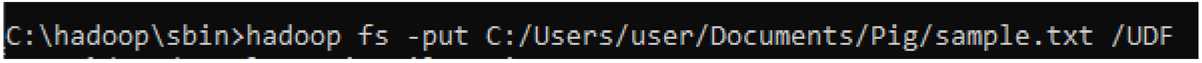
```
1,John
2,Jane
3,Joe
4,Emma
```

4. Create a Directory in HDFS and copy the Input File to HDFS

```
hdfs dfs –mkdir /UDF

hadoop fs -put C:/Users/user/Documents/Pig/sample.txt /UDF
```



```
C:\hadoop\sbin>hdfs dfs -mkdir /UDF
```



```
C:\hadoop\sbin>hadoop fs -put C:/Users/user/Documents/Pig/sample.txt /UDF
```

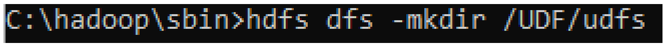
5. Create a Python file “uppercase_udf.py”:

```
# uppercase_udf.py
def uppercase(text):
    return text.upper()
if __name__ == "__main__":
    import sys
    for line in sys.stdin:
        line = line.strip()
        result = uppercase(line)
        print(result)
```

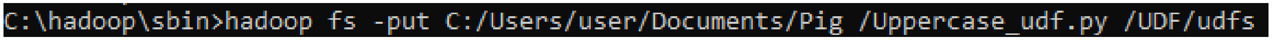
6. Create a Directory in HDFS and copy the Input File to HDFS

```
hdfs dfs –mkdir /UDF/udfs
```

```
hadoop fs -put C:/Users/user/Documents/Pig/Uppercase_udf.py /UDF/udfs
```

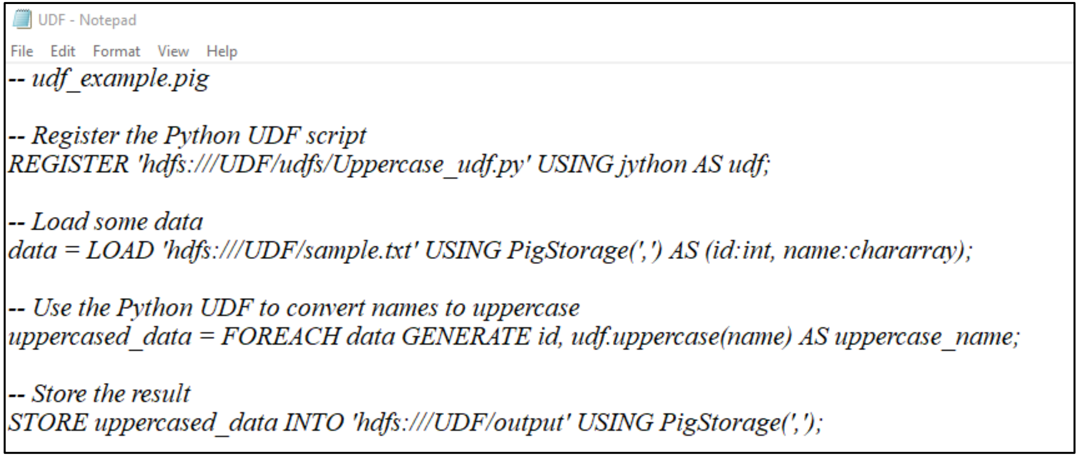


```
C:\hadoop\sbin>hdfs dfs -mkdir /UDF/udfs
```



```
C:\hadoop\sbin>hadoop fs -put C:/Users/user/Documents/Pig /Uppercase_udf.py /UDF/udfs
```

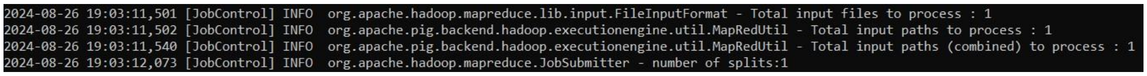
7. Create pig file “UDF.pig”:



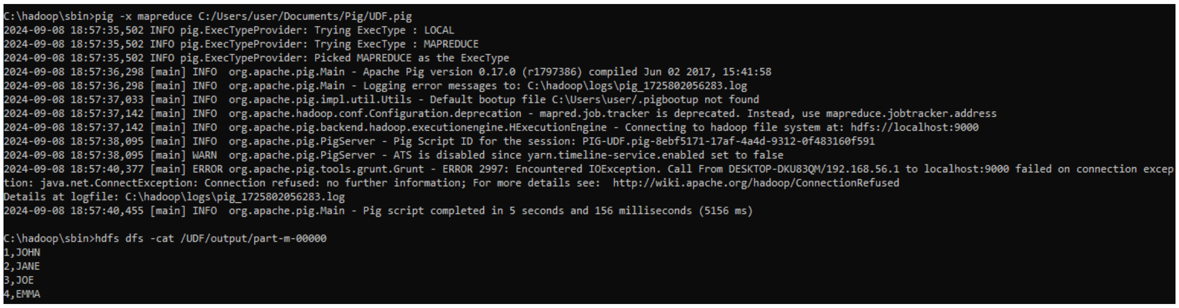
```
-- udf_example.pig

-- Register the Python UDF script
REGISTER 'hdfs:///UDF/udfs/Uppercase_udf.py' USING jython AS udf;

-- Load some data
data = LOAD 'hdfs:///UDF/sample.txt' USING PigStorage(',') AS (id:int, name:chararray);

-- Use the Python UDF to convert names to uppercase
uppercased_data = FOREACH data GENERATE id, udf.uppercase(name) AS uppercase_name;

-- Store the result
STORE uppercased_data INTO 'hdfs:///UDF/output' USING PigStorage(',');
```

8. Execute Pig file

```
pig -x mapreduce C:/Users/user/Documents/Pig/UDF.pig
```



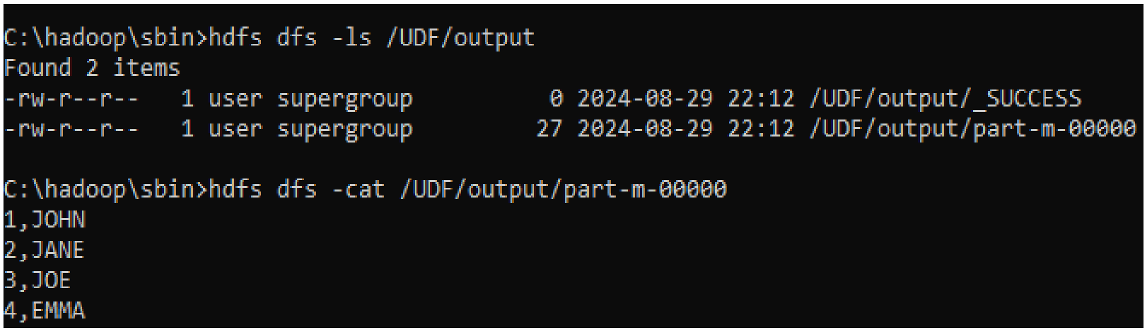
```
2024-08-26 19:03:11,501 [JobControl] INFO  org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input files to process : 1
2024-08-26 19:03:11,502 [JobControl] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to process : 1
2024-08-26 19:03:11,540 [JobControl] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths (combined) to process : 1
2024-08-26 19:03:12,073 [JobControl] INFO  org.apache.hadoop.mapreduce.JobSubmitter - number of splits:1
```



```
C:\hadoop\sbin>pig -x mapreduce C:/Users/user/Documents/Pig/UDF.pig
2024-09-08 18:57:35,502 INFO pig.ExecTypeProvider: Trying ExecType : LOCAL
2024-09-08 18:57:35,502 INFO pig.ExecTypeProvider: Trying ExecType : MAPREDUCE
2024-09-08 18:57:35,502 INFO pig.ExecTypeProvider: Picked MAPREDUCE as the ExecType
2024-09-08 18:57:36,298 [main] INFO  org.apache.pig.Main - Apache Pig version 0.17.0 (r1797386) compiled Jun 02 2017, 15:41:58
2024-09-08 18:57:36,298 [main] INFO  org.apache.pig.Main - Logging error messages to: C:\hadoop\logs\pig_1725802056283.log
2024-09-08 18:57:37,033 [main] INFO  org.apache.pig.impl.util.Utils - Default bootup file C:\Users\user/.pigbootup not found
2024-09-08 18:57:37,142 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - mapred.job.tracker is deprecated. Instead, use mapreduce.jobtracker.address
2024-09-08 18:57:37,142 [main] INFO  org.apache.pig.backend.hadoop.executionengine.HExecutionEngine - Connecting to hadoop file system at: hdfs://localhost:9000
2024-09-08 18:57:38,095 [main] INFO  org.apache.pig.PigServer - Pig Script ID for the session: PIG-UDF.pig-8ebf5171-17af-4a4d-9312-0f483160f591
2024-09-08 18:57:38,095 [main] WARN  org.apache.pig.PigServer - ATS is disabled since yarn.timeline-service.enabled set to false
2024-09-08 18:57:40,377 [main] ERROR org.apache.pig.tools.grunt.Grunt - ERROR 2997: Encountered IOException. Call From DESKTOP-DKU83QM/192.168.56.1 to localhost:9000 failed on connection excep
tion: java.net.ConnectException: Connection refused: no further information; For more details see:  http://wiki.apache.org/hadoop/ConnectionRefused
Details at logfile: C:\hadoop\logs\pig_1725802056283.log
2024-09-08 18:57:40,455 [main] INFO  org.apache.pig.Main - Pig script completed in 5 seconds and 156 milliseconds (5156 ms)

C:\hadoop\sbin>hdfs dfs -cat /UDF/output/part-m-00000
1,JOHN
2,JANE
3,JOE
4,EMMA
```

9. View the Output

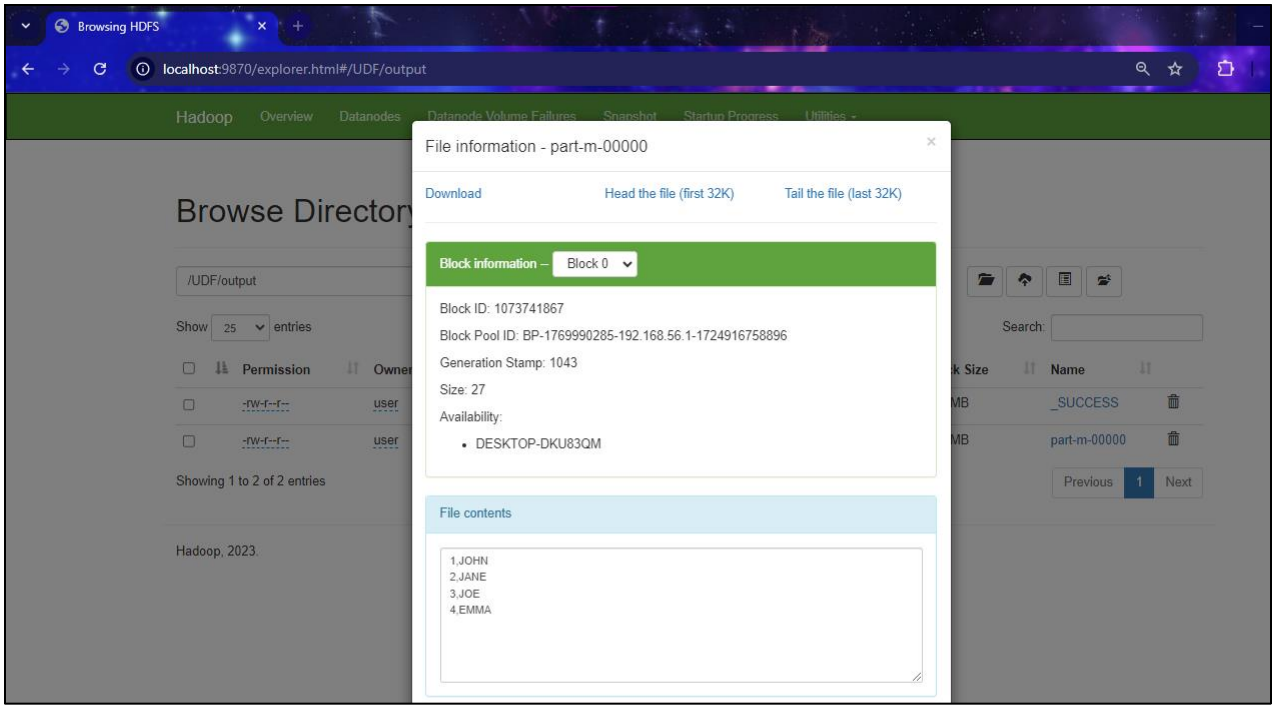
```
hdfs dfs -ls /UDF/output
hdfs dfs -cat /UDF/output/part-m-00000
```



```
C:\hadoop\sbin>hdfs dfs -ls /UDF/output
Found 2 items
-rw-r--r--   1 user supergroup          0 2024-08-29 22:12 /UDF/output/_SUCCESS
-rw-r--r--   1 user supergroup         27 2024-08-29 22:12 /UDF/output/part-m-00000

C:\hadoop\sbin>hdfs dfs -cat /UDF/output/part-m-00000
1,JOHN
2,JANE
3,JOE
4,EMMA
```

10. Once the map reduce operations are performed successfully, the output will be present in the specified directory.

“/UDF/output/part-m-00000”



File information - part-m-00000

Block ID: 1073741867
Block Pool ID: BP-1769990285-192.168.56.1-1724916758896
Generation Stamp: 1043
Size: 27
Availability:
- DESKTOP-DKU83QM

```
1,JOHN
2,JANE
3,JOE
4,EMMA
```

RESULT:

Thus, UDF in Apache Pig has been created and executed in MapReduce/HDFS mode successfully.