Create UDF (User Defined Functions) in Apache Pig and execute it in MapReduce / HDFS mode

Aim:

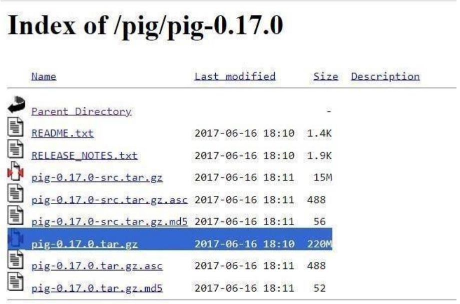
To create UDF in Apache Pig and execute it in MapReduce/HDFS mode.

Procedure:

Pig Download and installation:

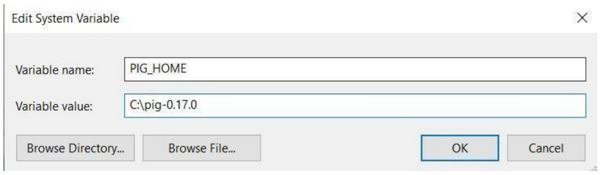
1. Download Pig:

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
```

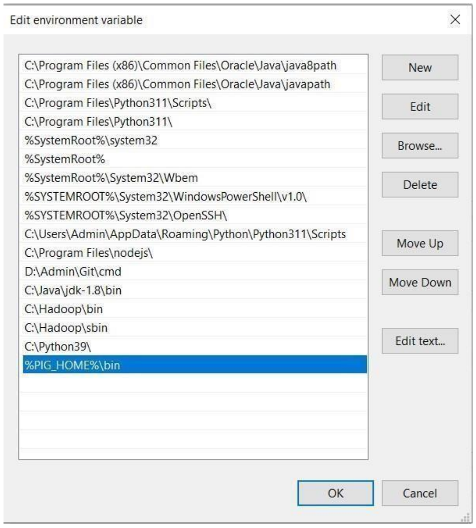
2. Add the environment variable for Pig:



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-0.16.0\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.

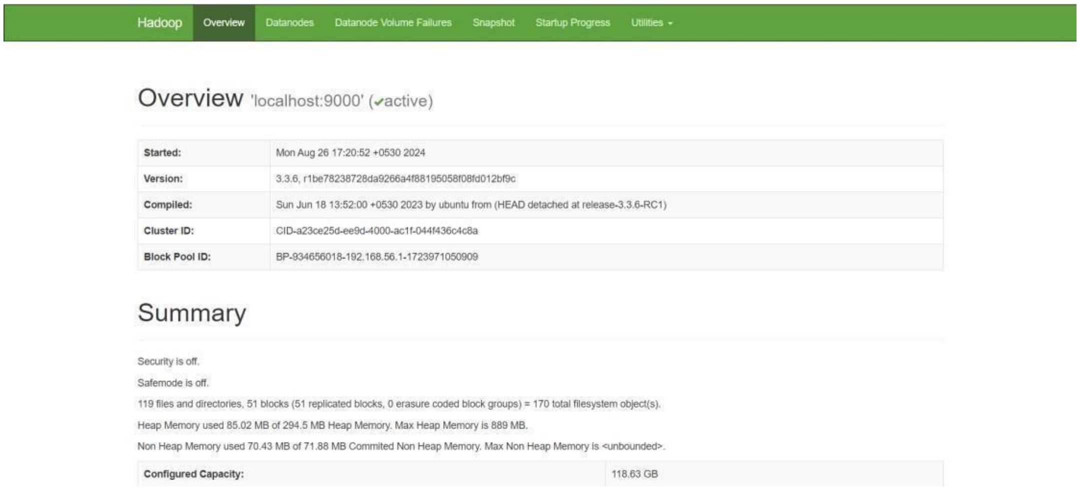
Create UDF:

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.

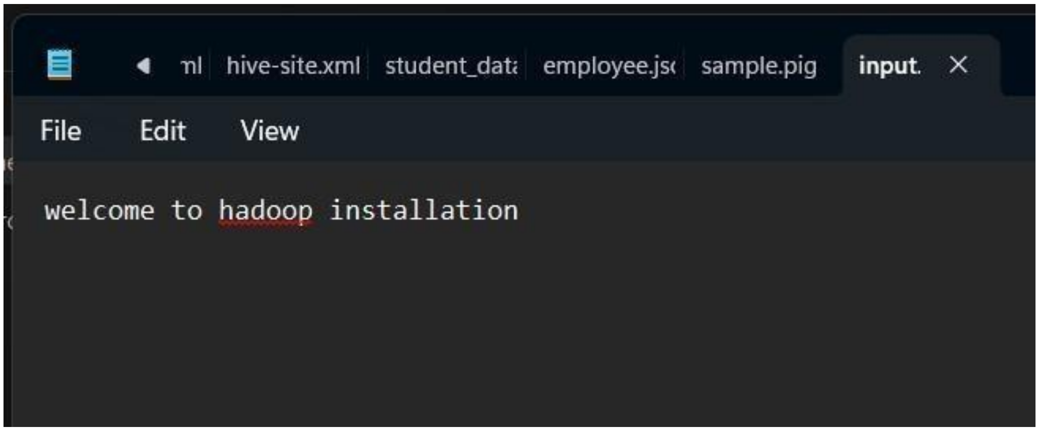
119 files and directories, 51 blocks (51 replicated blocks, 0 erasure coded block groups) = 170 total filesystem object(s).

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>.

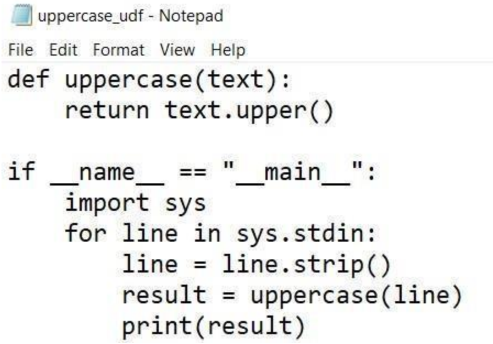
Configured Capacity:	118.63 GB

3. Create a text file “input.txt”:



```
welcome to hadoop installation
```

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

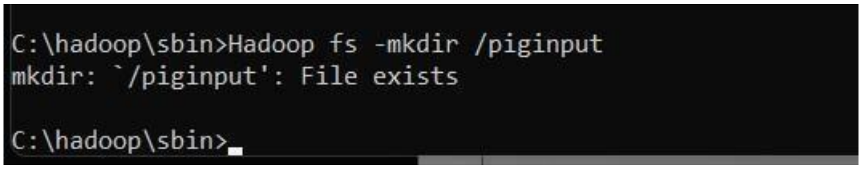


```
def uppercase(text):
    return text.upper()

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

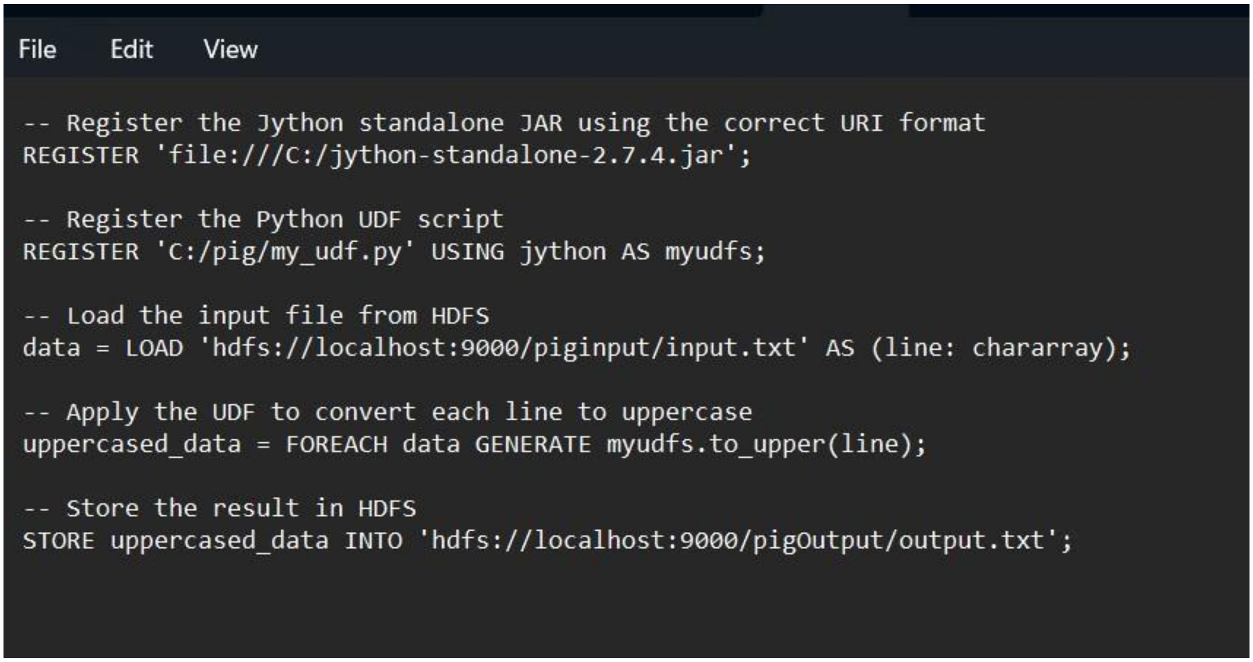
Hadoop fs -mkdir /piginput

hadoop fs -put udfs C:\pig\sample.pig /piginput



```
C:\hadoop\sbin>Hadoop fs -mkdir /piginput
mkdir: `/piginput': File exists

C:\hadoop\sbin>
```

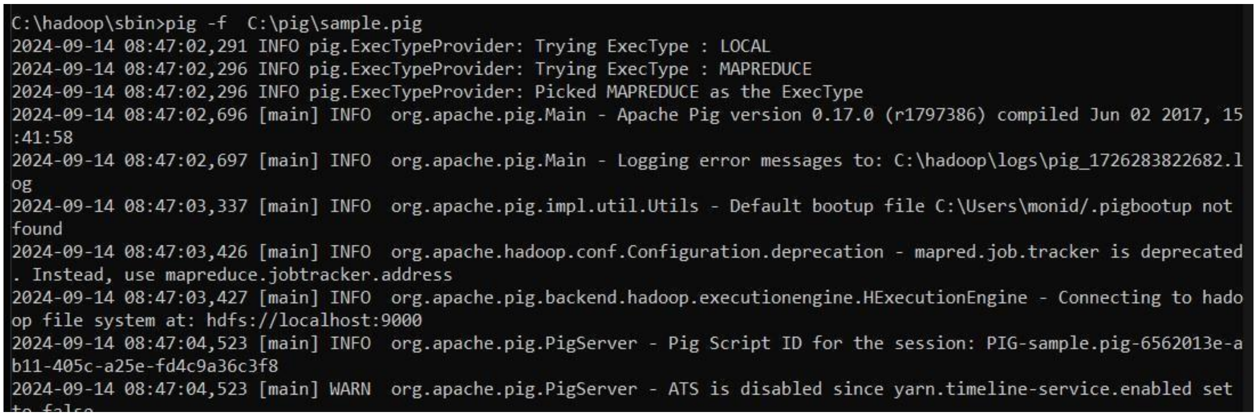
5. Create pig file “sample.pig”:



```
-- Register the Jython standalone JAR using the correct URI format
REGISTER 'file:///C:/jython-standalone-2.7.4.jar';

-- Register the Python UDF script
REGISTER 'C:/pig/my_udf.py' USING jython AS myudfs;

-- Load the input file from HDFS
data = LOAD 'hdfs://localhost:9000/piginput/input.txt' AS (line: chararray);

-- Apply the UDF to convert each line to uppercase
uppercased_data = FOREACH data GENERATE myudfs.to_upper(line);

-- Store the result in HDFS
STORE uppercased_data INTO 'hdfs://localhost:9000/pigOutput/output.txt';
```

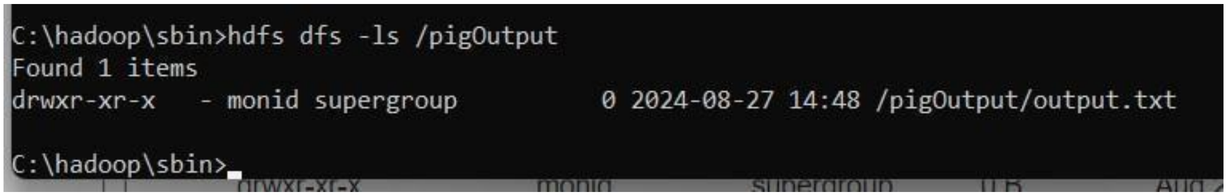
6. Execute Pig file:

pig -f C:\pig\sample.pig



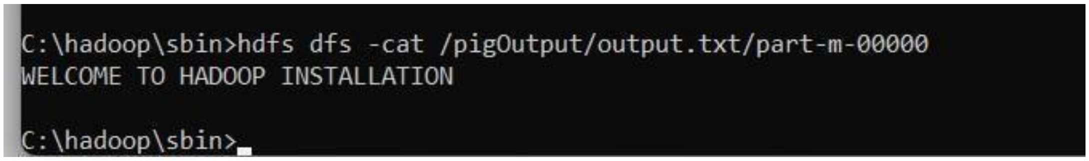
```
C:\hadoop\sbin>pig -f  C:\pig\sample.pig
2024-09-14 08:47:02,291 INFO pig.ExecTypeProvider: Trying ExecType : LOCAL
2024-09-14 08:47:02,296 INFO pig.ExecTypeProvider: Trying ExecType : MAPREDUCE
2024-09-14 08:47:02,296 INFO pig.ExecTypeProvider: Picked MAPREDUCE as the ExecType
2024-09-14 08:47:02,696 [main] INFO  org.apache.pig.Main - Apache Pig version 0.17.0 (r1797386) compiled Jun 02 2017, 15
:41:58
2024-09-14 08:47:02,697 [main] INFO  org.apache.pig.Main - Logging error messages to: C:\hadoop\logs\pig_1726283822682.l
og
2024-09-14 08:47:03,337 [main] INFO  org.apache.pig.impl.util.Utils - Default bootup file C:\Users\monid/.pigbootup not
found
2024-09-14 08:47:03,426 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - mapred.job.tracker is deprecated
. Instead, use mapreduce.jobtracker.address
2024-09-14 08:47:03,427 [main] INFO  org.apache.pig.backend.hadoop.executionengine.HExecutionEngine - Connecting to hado
op file system at: hdfs://localhost:9000
2024-09-14 08:47:04,523 [main] INFO  org.apache.pig.PigServer - Pig Script ID for the session: PIG-sample.pig-6562013e-a
b11-405c-a25e-fd4c9a36c3f8
2024-09-14 08:47:04,523 [main] WARN  org.apache.pig.PigServer - ATS is disabled since yarn.timeline-service.enabled set
to false
```

7. View the Output hdfs dfs -ls /pigOutput



```
C:\hadoop\sbin>hdfs dfs -ls /pigOutput
Found 1 items
drwxr-xr-x   - monid supergroup          0 2024-08-27 14:48 /pigOutput/output.txt

C:\hadoop\sbin>
```

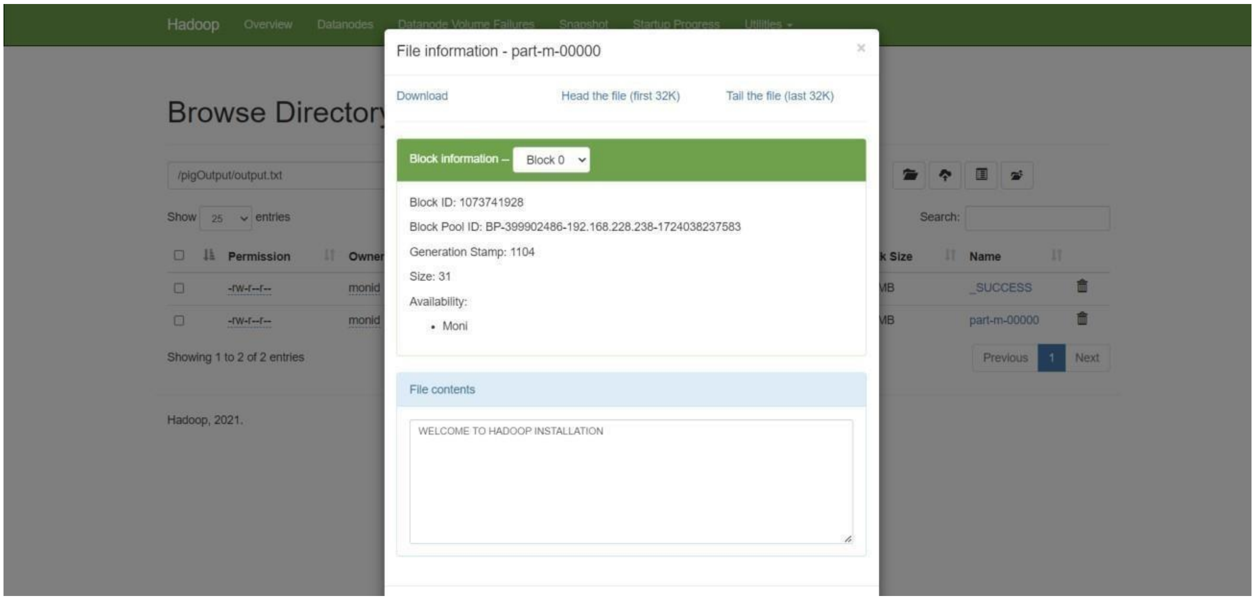
hdfs dfs -cat /pigOutput/output.txt/part-m-00000



```
C:\hadoop\sbin>hdfs dfs -cat /pigOutput/output.txt/part-m-00000
WELCOME TO HADOOP INSTALLATION

C:\hadoop\sbin>
```

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

“/pigOutput/output.data/part-m-00000”



/pigOutput/output.txt

Permission	Owner	k Size	Name
-rw-r--r--	monid	MB	_SUCCESS
-rw-r--r--	monid	MB	part-m-00000

Showing 1 to 2 of 2 entries

File information - part-m-00000

Download Head the file (first 32K) Tail the file (last 32K)

Block information -- Block 0

Block ID: 1073741928
Block Pool ID: BP-399902486-192.168.228.238-1724038237583
Generation Stamp: 1104
Size: 31
Availability:

- Moni

File contents

```
WELCOME TO HADOOP INSTALLATION
```

9. Stop Hadoop Services stop-dfs.cmd stopyarn.cmd

Result:

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