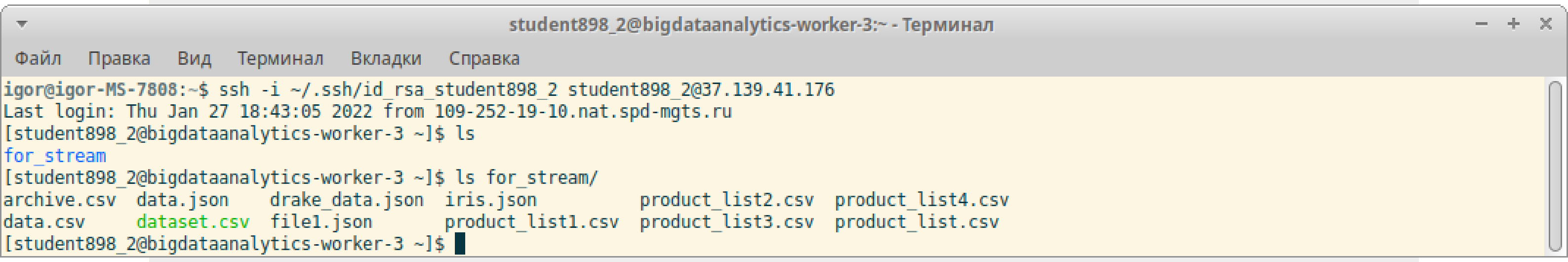
7. Spark ML. Аналитика признаков в пакетном режиме. Подготовка, обучение ML-модели

Подключиться к кластеру, выполнить команду spark-submit с приложенными к занятию скриптами, приложить листинг консоли (запуск, результат).
Обучить модель на основании данных из хранилища Hive sint_sales, проверить сходимость и показатель ROC.
Дополнительно, спроектировать приложение по потоковой обработки данных на основании схемы предложенной на вебинаре - итоговая работа по курсу

ls

ls for_stream/



```
igor@igor-MS-7808:~$ ssh -i ~/.ssh/id_rsa_student898_2 student898_2@37.139.41.176
Last login: Thu Jan 27 18:43:05 2022 from 109-252-19-10.nat.spd-mgts.ru
[student898_2@bigdataanalytics-worker-3 ~]$ ls
for_stream
[student898_2@bigdataanalytics-worker-3 ~]$ ls for_stream/
archive.csv  data.json    drake_data.json  iris.json         product_list2.csv  product_list4.csv
data.csv     dataset.csv  file1.json       product_list1.csv  product_list3.csv  product_list.csv
[student898_2@bigdataanalytics-worker-3 ~]$ 
```

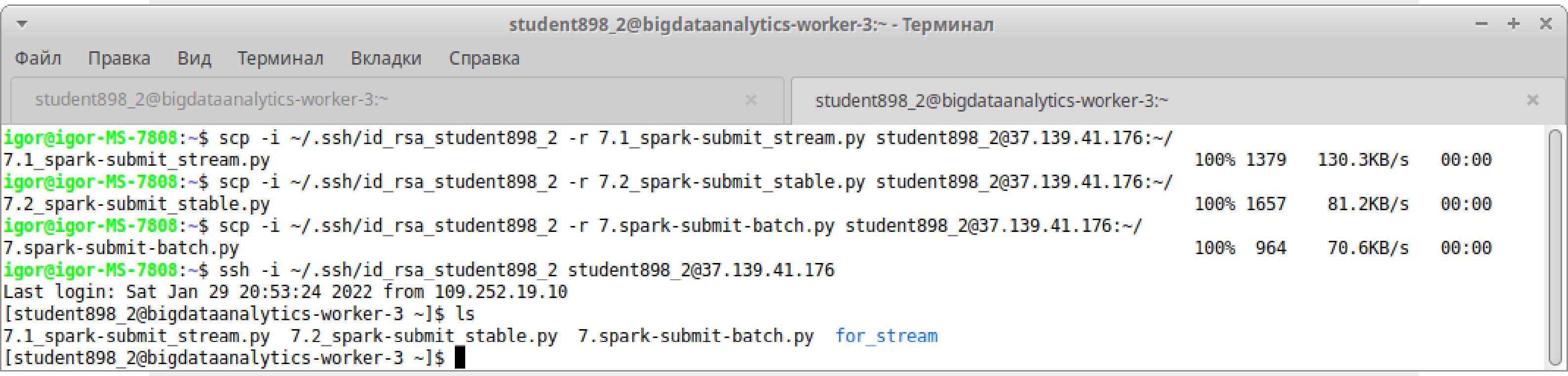
Скопируем подготовленные файлы на удаленный сервер с помощью команды `scp`. Эта команда запускается на локальном компьютере

scp -i ~/.ssh/id_rsa_student898_2 -r 7.1_spark-submit_stream.py student898_2@37.139.41.176:~/

scp -i ~/.ssh/id_rsa_student898_2 -r 7.2_spark-submit_stable.py student898_2@37.139.41.176:~/

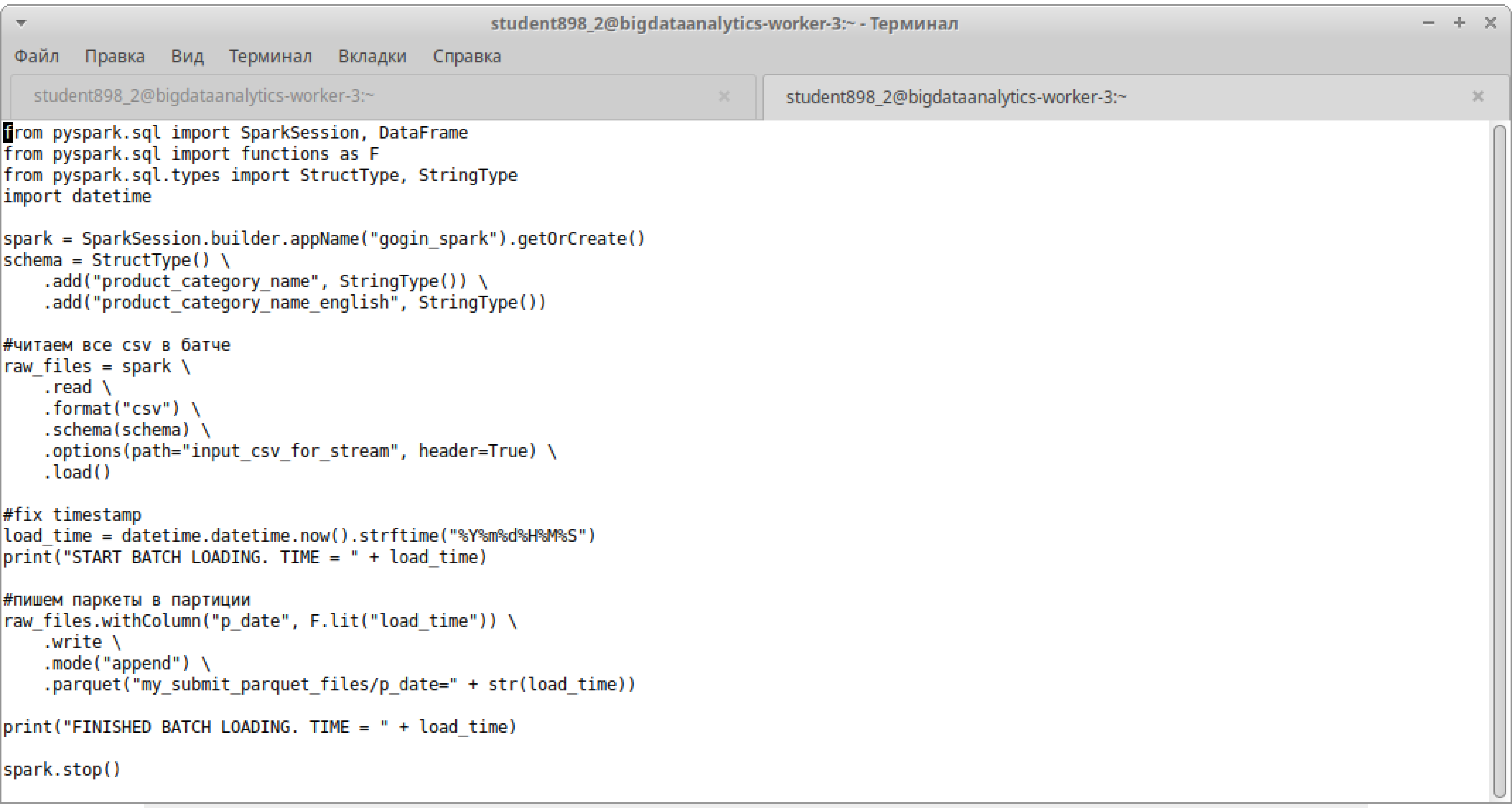
scp -i ~/.ssh/id_rsa_student898_2 -r 7.spark-submit-batch.py student898_2@37.139.41.176:~/

ls


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка
student898_2@bigdataanalytics-worker-3:~
student898_2@bigdataanalytics-worker-3:~

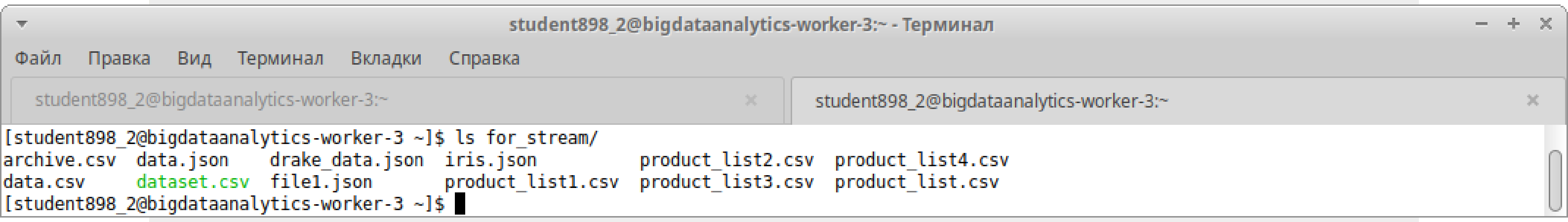
```
igor@igor-MS-7808:~$ scp -i ~/.ssh/id_rsa_student898_2 -r 7.1_spark-submit_stream.py student898_2@37.139.41.176:~/
7.1_spark-submit_stream.py                                                                        100% 1379   130.3KB/s   00:00
igor@igor-MS-7808:~$ scp -i ~/.ssh/id_rsa_student898_2 -r 7.2_spark-submit_stable.py student898_2@37.139.41.176:~/
7.2_spark-submit_stable.py                                                                        100% 1657    81.2KB/s   00:00
igor@igor-MS-7808:~$ scp -i ~/.ssh/id_rsa_student898_2 -r 7.spark-submit-batch.py student898_2@37.139.41.176:~/
7.spark-submit-batch.py                                                                           100%  964    70.6KB/s   00:00
igor@igor-MS-7808:~$ ssh -i ~/.ssh/id_rsa_student898_2 student898_2@37.139.41.176
Last login: Sat Jan 29 20:53:24 2022 from 109.252.19.10
[student898_2@bigdataanalytics-worker-3 ~]$ ls
7.1_spark-submit_stream.py  7.2_spark-submit_stable.py  7.spark-submit-batch.py  for_stream
[student898_2@bigdataanalytics-worker-3 ~]$ 
```

vi 7.spark-submit-batch.py


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка
student898_2@bigdataanalytics-worker-3:~
student898_2@bigdataanalytics-worker-3:~

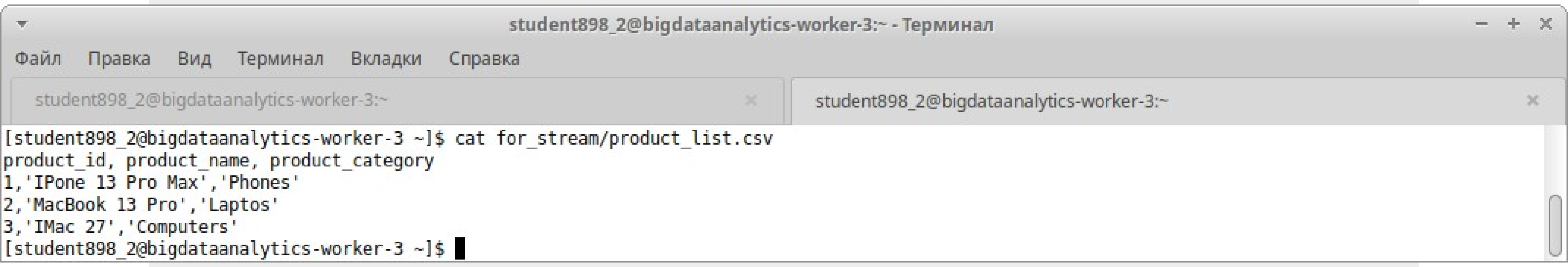
```
from pyspark.sql import SparkSession, DataFrame
from pyspark.sql import functions as F
from pyspark.sql.types import StructType, StringType
import datetime

spark = SparkSession.builder.appName("gogin_spark").getOrCreate()
schema = StructType() \
    .add("product_category_name", StringType()) \
    .add("product_category_name_english", StringType())

#читаем все csv в батче
raw_files = spark \
    .read \
    .format("csv") \
    .schema(schema) \
    .options(path="input_csv_for_stream", header=True) \
    .load()

#fix timestamp
load_time = datetime.datetime.now().strftime("%Y%m%d%H%M%S")
print("START BATCH LOADING. TIME = " + load_time)

#пишем паркеты в партиции
raw_files.withColumn("p_date", F.lit("load_time")) \
    .write \
    .mode("append") \
    .parquet("my_submit_parquet_files/p_date=" + str(load_time))

print("FINISHED BATCH LOADING. TIME = " + load_time)

spark.stop()
```

```
ls for_stream/
```


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка
student898_2@bigdataanalytics-worker-3:~
student898_2@bigdataanalytics-worker-3:~

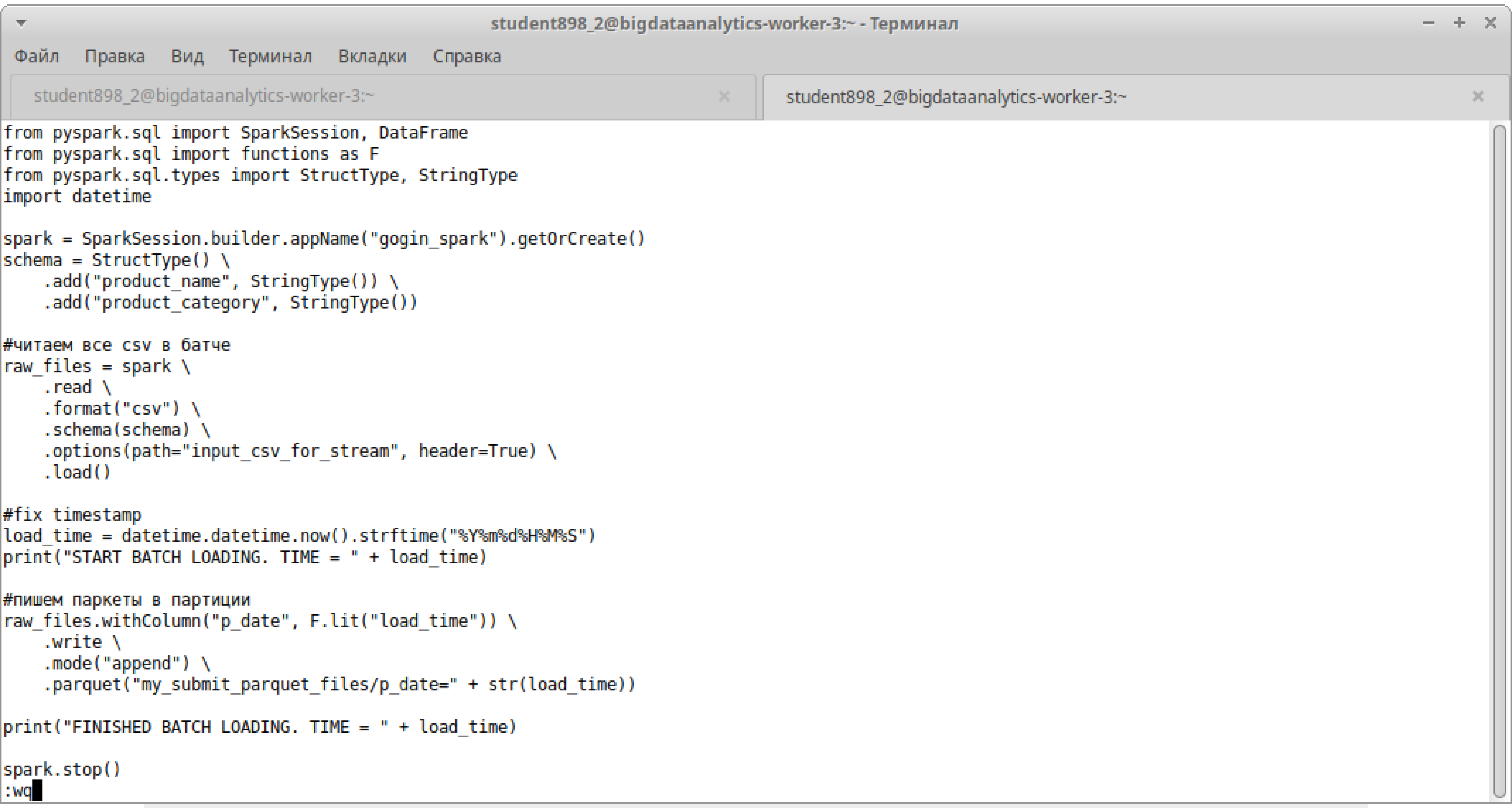
```
[student898_2@bigdataanalytics-worker-3 ~]$ ls for_stream/
archive.csv  data.json    drake_data.json  iris.json          product_list2.csv  product_list4.csv
data.csv     dataset.csv  file1.json       product_list1.csv  product_list3.csv  product_list.csv
[student898_2@bigdataanalytics-worker-3 ~]$
```

```
cat for_stream/product_list.csv
```


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка
student898_2@bigdataanalytics-worker-3:~
student898_2@bigdataanalytics-worker-3:~

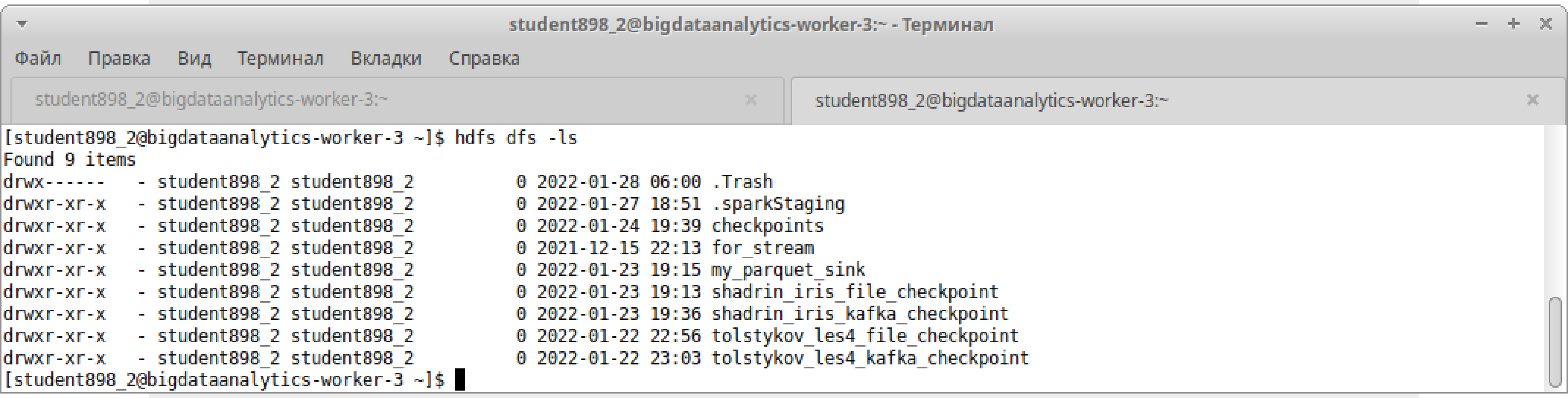
```
[student898_2@bigdataanalytics-worker-3 ~]$ cat for_stream/product_list.csv
product_id, product_name, product_category
1,'IPone 13 Pro Max','Phones'
2,'MacBook 13 Pro','Laptos'
3,'IMac 27','Computers'
[student898_2@bigdataanalytics-worker-3 ~]$
```

изменяем


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка
student898_2@bigdataanalytics-worker-3:~
student898_2@bigdataanalytics-worker-3:~

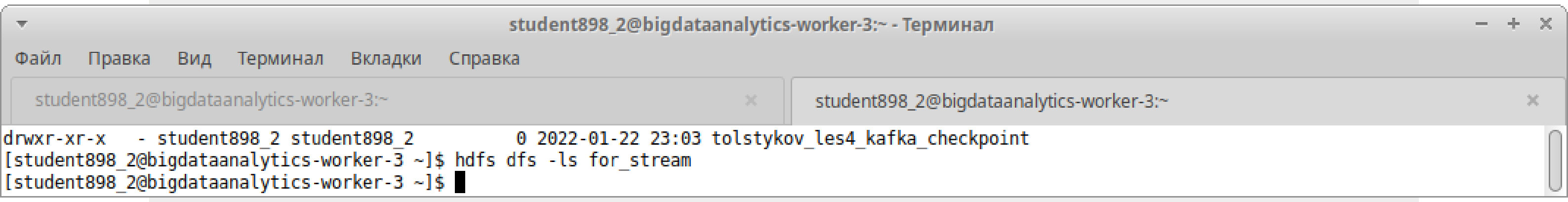
```
from pyspark.sql import SparkSession, DataFrame
from pyspark.sql import functions as F
from pyspark.sql.types import StructType, StringType
import datetime

spark = SparkSession.builder.appName("gogin_spark").getOrCreate()
schema = StructType() \
    .add("product_name", StringType()) \
    .add("product_category", StringType())

#читаем все csv в батче
raw_files = spark \
    .read \
    .format("csv") \
    .schema(schema) \
    .options(path="input_csv_for_stream", header=True) \
    .load()

#fix timestamp
load_time = datetime.datetime.now().strftime("%Y%m%d%H%M%S")
print("START BATCH LOADING. TIME = " + load_time)

#пишем паркеты в партиции
raw_files.withColumn("p_date", F.lit("load_time")) \
    .write \
    .mode("append") \
    .parquet("my_submit_parquet_files/p_date=" + str(load_time))

print("FINISHED BATCH LOADING. TIME = " + load_time)

spark.stop()
:wq
```

```
hdfs dfs -ls
```


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка
student898_2@bigdataanalytics-worker-3:~
student898_2@bigdataanalytics-worker-3:~

```
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls
Found 9 items
drwx------   - student898_2 student898_2          0 2022-01-28 06:00 .Trash
drwxr-xr-x   - student898_2 student898_2          0 2022-01-27 18:51 .sparkStaging
drwxr-xr-x   - student898_2 student898_2          0 2022-01-24 19:39 checkpoints
drwxr-xr-x   - student898_2 student898_2          0 2021-12-15 22:13 for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:15 my_parquet_sink
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:13 shadrin_iris_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:36 shadrin_iris_kafka_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 22:56 tolstykov_les4_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 23:03 tolstykov_les4_kafka_checkpoint
[student898_2@bigdataanalytics-worker-3 ~]$
```

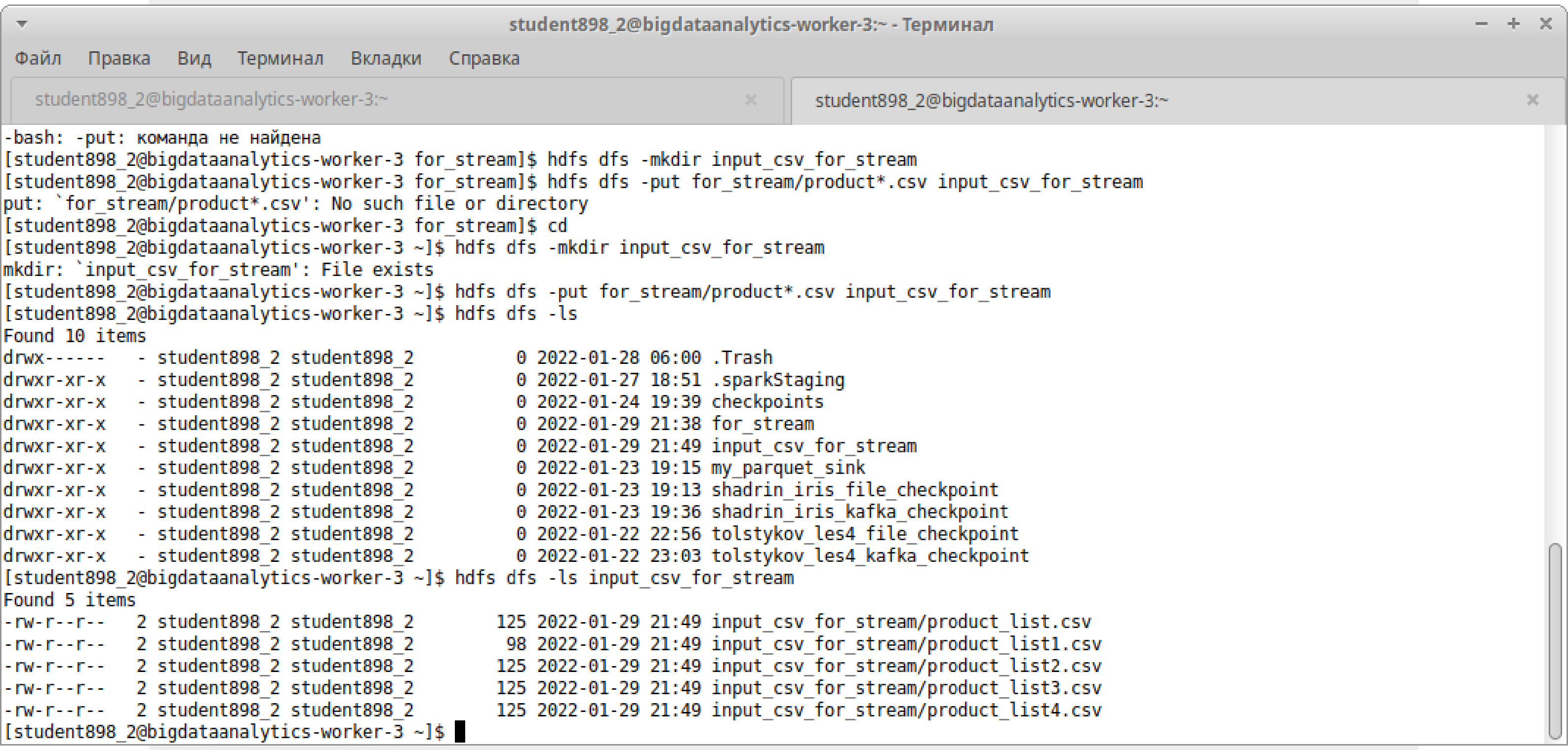
```
hdfs dfs -ls for_stream
```


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка
student898_2@bigdataanalytics-worker-3:~
student898_2@bigdataanalytics-worker-3:~

```
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 23:03 tolstykov_les4_kafka_checkpoint
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls for_stream
[student898_2@bigdataanalytics-worker-3 ~]$
```

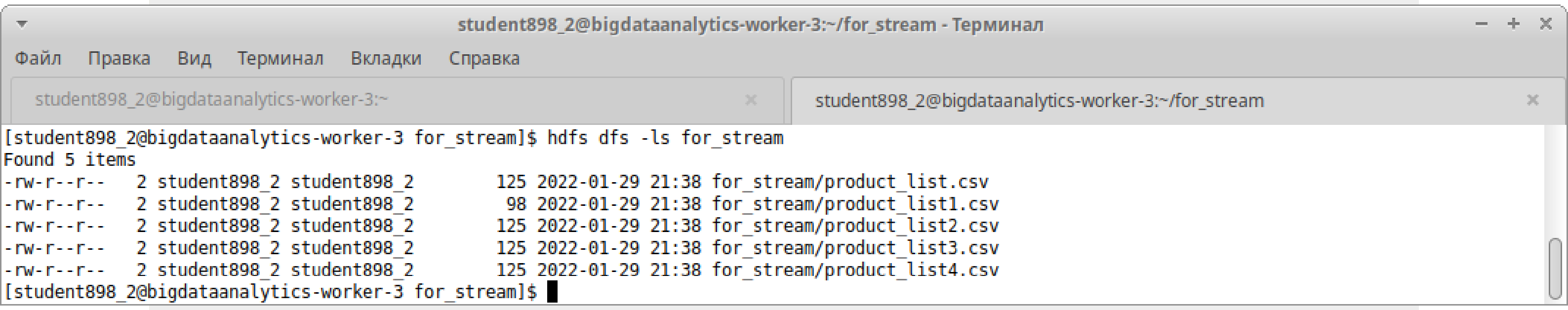
Перемещаем файлы

```
hdfs dfs -mkdir input_csv_for_stream
hdfs dfs -put for_stream/product*.csv input_csv_for_stream

hdfs dfs -ls

hdfs dfs -ls input_csv_for_stream
```


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка
student898_2@bigdataanalytics-worker-3:~
student898_2@bigdataanalytics-worker-3:~

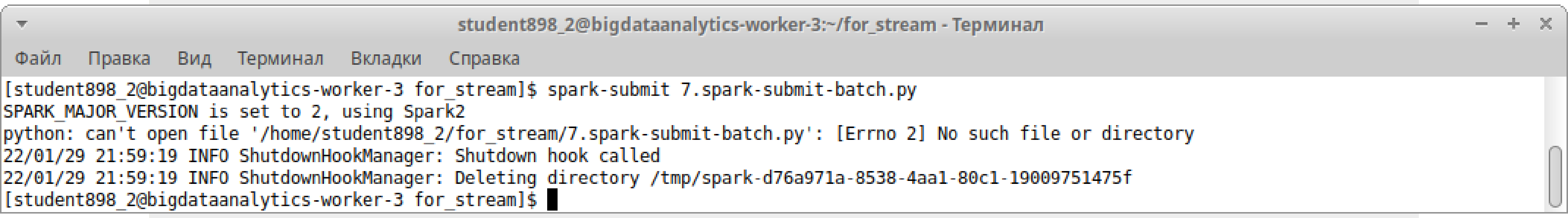
```
-bash: -put: команда не найдена
[student898_2@bigdataanalytics-worker-3 for_stream]$ hdfs dfs -mkdir input_csv_for_stream
[student898_2@bigdataanalytics-worker-3 for_stream]$ hdfs dfs -put for_stream/product*.csv input_csv_for_stream
put: `for_stream/product*.csv': No such file or directory
[student898_2@bigdataanalytics-worker-3 for_stream]$ cd
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -mkdir input_csv_for_stream
mkdir: `input_csv_for_stream': File exists
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -put for_stream/product*.csv input_csv_for_stream
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls
Found 10 items
drwx------   - student898_2 student898_2          0 2022-01-28 06:00 .Trash
drwxr-xr-x   - student898_2 student898_2          0 2022-01-27 18:51 .sparkStaging
drwxr-xr-x   - student898_2 student898_2          0 2022-01-24 19:39 checkpoints
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:38 for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:49 input_csv_for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:15 my_parquet_sink
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:13 shadrin_iris_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:36 shadrin_iris_kafka_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 22:56 tolstykov_les4_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 23:03 tolstykov_les4_kafka_checkpoint
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls input_csv_for_stream
Found 5 items
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:49 input_csv_for_stream/product_list.csv
-rw-r--r--   2 student898_2 student898_2         98 2022-01-29 21:49 input_csv_for_stream/product_list1.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:49 input_csv_for_stream/product_list2.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:49 input_csv_for_stream/product_list3.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:49 input_csv_for_stream/product_list4.csv
[student898_2@bigdataanalytics-worker-3 ~]$ 
```

```
hdfs dfs -ls for_stream
```


student898_2@bigdataanalytics-worker-3:~/for_stream - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка
student898_2@bigdataanalytics-worker-3:~
student898_2@bigdataanalytics-worker-3:~/for_stream

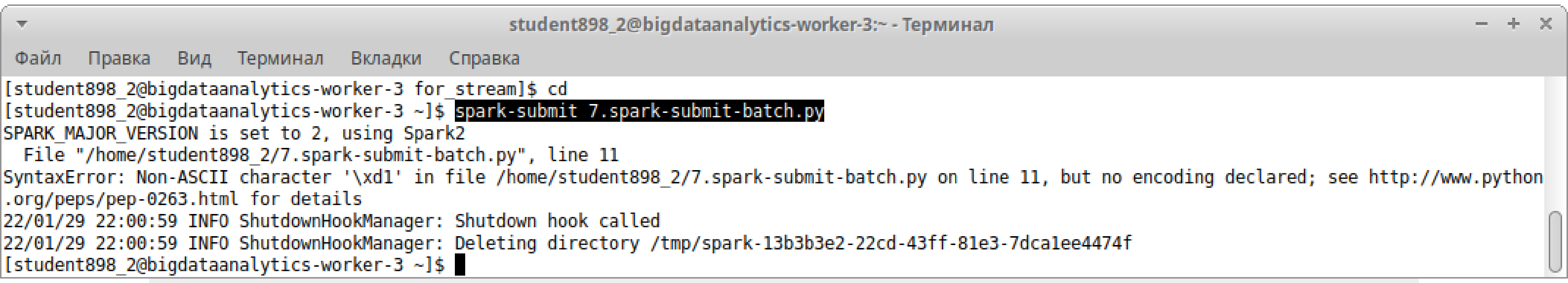
```
[student898_2@bigdataanalytics-worker-3 for_stream]$ hdfs dfs -ls for_stream
Found 5 items
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:38 for_stream/product_list.csv
-rw-r--r--   2 student898_2 student898_2         98 2022-01-29 21:38 for_stream/product_list1.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:38 for_stream/product_list2.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:38 for_stream/product_list3.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:38 for_stream/product_list4.csv
[student898_2@bigdataanalytics-worker-3 for_stream]$ 
```

```
spark-submit 7.spark-submit-batch.py
```


student898_2@bigdataanalytics-worker-3:~/for_stream - Терминал
Файл
Правка
Вид
Терминал
Вкладки
Справка

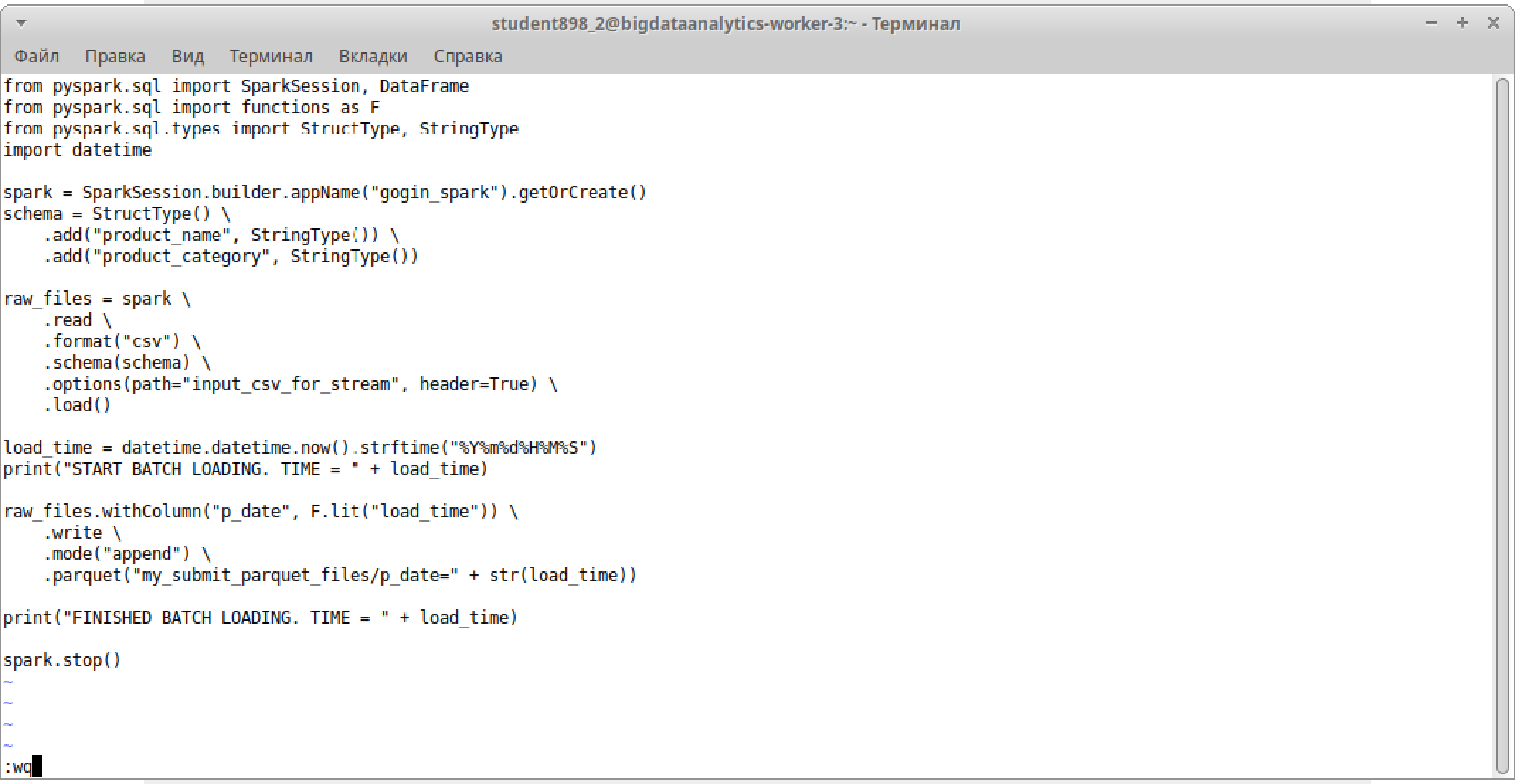
```
[student898_2@bigdataanalytics-worker-3 for_stream]$ spark-submit 7.spark-submit-batch.py
SPARK_MAJOR_VERSION is set to 2, using Spark2
python: can't open file '/home/student898_2/for_stream/7.spark-submit-batch.py': [Errno 2] No such file or directory
22/01/29 21:59:19 INFO ShutdownHookManager: Shutdown hook called
22/01/29 21:59:19 INFO ShutdownHookManager: Deleting directory /tmp/spark-d76a971a-8538-4aa1-80c1-19009751475f
[student898_2@bigdataanalytics-worker-3 for_stream]$ 
```

```
cd

spark-submit 7.spark-submit-batch.py
```



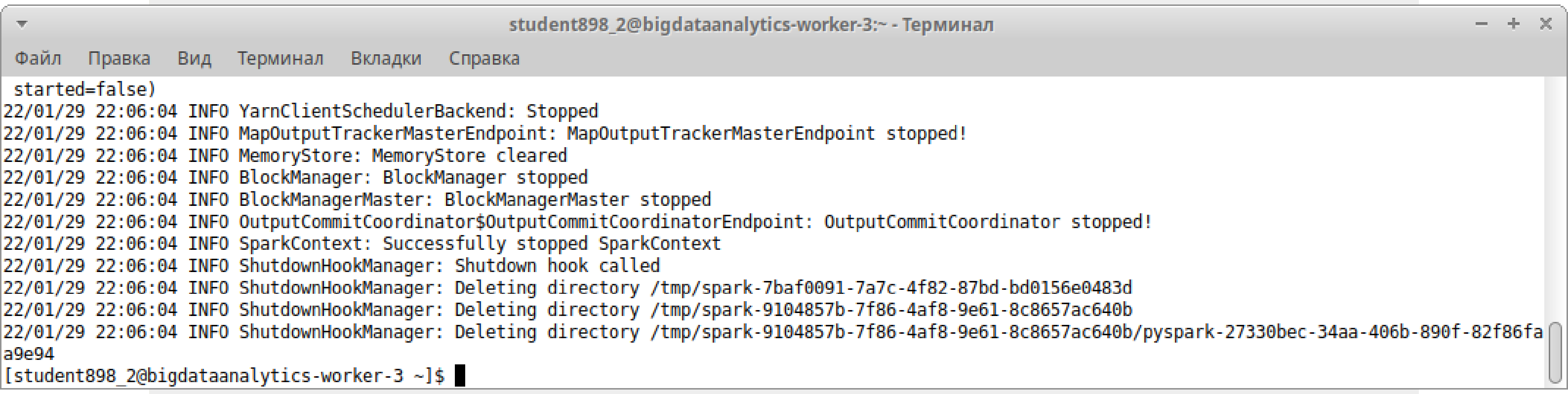
```
[student898_2@bigdataanalytics-worker-3 for_stream]$ cd
[student898_2@bigdataanalytics-worker-3 ~]$ spark-submit 7.spark-submit-batch.py
SPARK_MAJOR_VERSION is set to 2, using Spark2
  File "/home/student898_2/7.spark-submit-batch.py", line 11
SyntaxError: Non-ASCII character '\xd1' in file /home/student898_2/7.spark-submit-batch.py on line 11, but no encoding declared; see http://www.python
.org/peps/pep-0263.html for details
22/01/29 22:00:59 INFO ShutdownHookManager: Shutdown hook called
22/01/29 22:00:59 INFO ShutdownHookManager: Deleting directory /tmp/spark-13b3b3e2-22cd-43ff-81e3-7dca1ee4474f
[student898_2@bigdataanalytics-worker-3 ~]$ 
```

удаляю русские слова



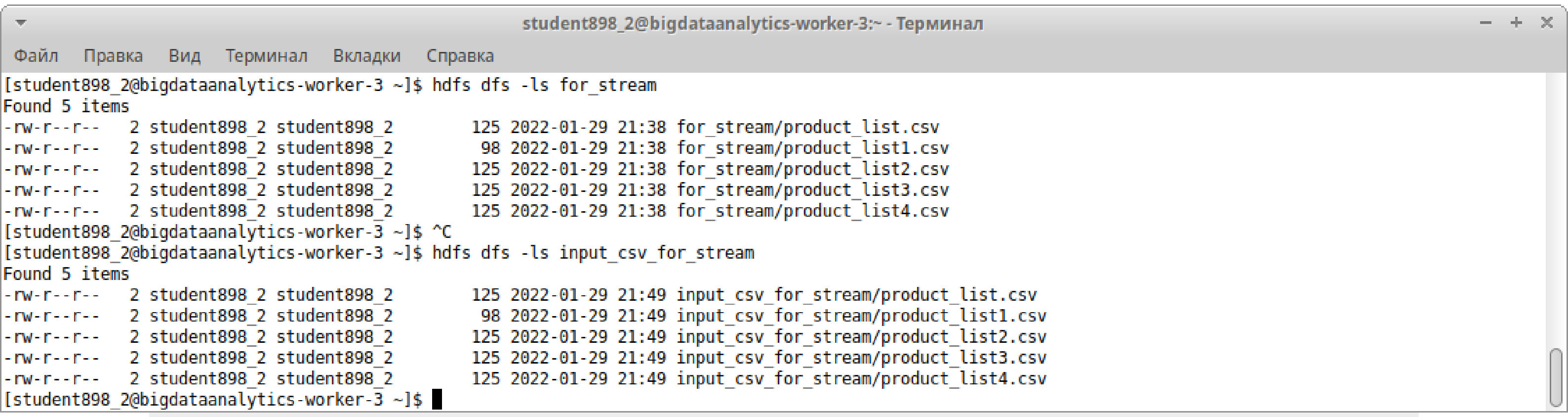
```
from pyspark.sql import SparkSession, DataFrame
from pyspark.sql import functions as F
from pyspark.sql.types import StructType, StringType
import datetime

spark = SparkSession.builder.appName("gogin_spark").getOrCreate()
schema = StructType() \
    .add("product_name", StringType()) \
    .add("product_category", StringType())

raw_files = spark \
    .read \
    .format("csv") \
    .schema(schema) \
    .options(path="input_csv_for_stream", header=True) \
    .load()

load_time = datetime.datetime.now().strftime("%Y%m%d%H%M%S")
print("START BATCH LOADING. TIME = " + load_time)

raw_files.withColumn("p_date", F.lit("load_time")) \
    .write \
    .mode("append") \
    .parquet("my_submit_parquet_files/p_date=" + str(load_time))

print("FINISHED BATCH LOADING. TIME = " + load_time)

spark.stop()
~
~
~
~
:wq
```

запустился



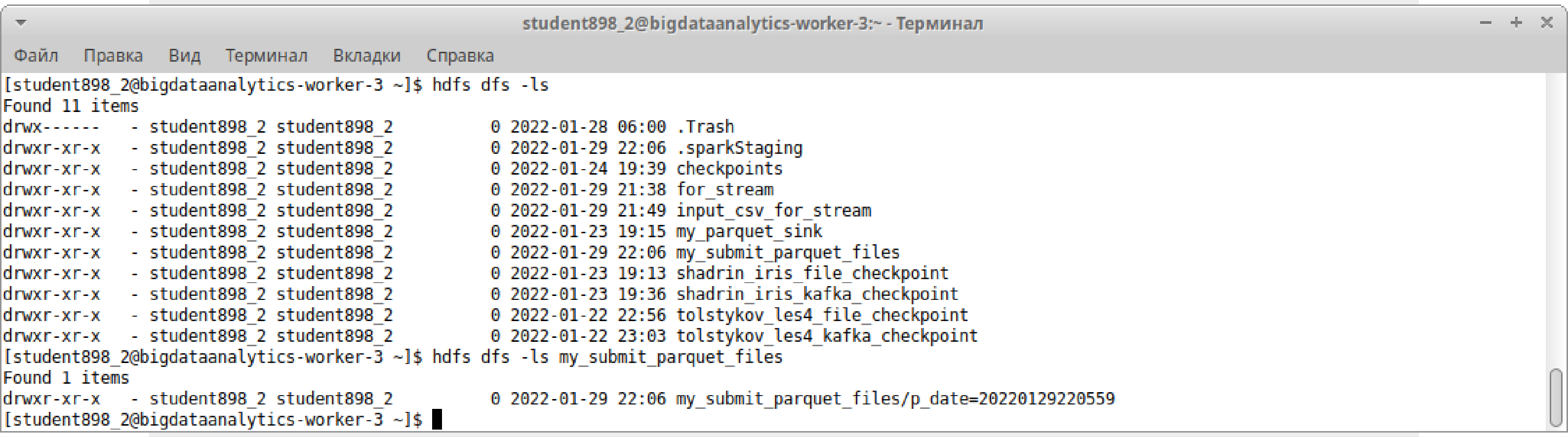
```
 started=false)
22/01/29 22:06:04 INFO YarnClientSchedulerBackend: Stopped
22/01/29 22:06:04 INFO MapOutputTrackerMasterEndpoint: MapOutputTrackerMasterEndpoint stopped!
22/01/29 22:06:04 INFO MemoryStore: MemoryStore cleared
22/01/29 22:06:04 INFO BlockManager: BlockManager stopped
22/01/29 22:06:04 INFO BlockManagerMaster: BlockManagerMaster stopped
22/01/29 22:06:04 INFO OutputCommitCoordinator$OutputCommitCoordinatorEndpoint: OutputCommitCoordinator stopped!
22/01/29 22:06:04 INFO SparkContext: Successfully stopped SparkContext
22/01/29 22:06:04 INFO ShutdownHookManager: Shutdown hook called
22/01/29 22:06:04 INFO ShutdownHookManager: Deleting directory /tmp/spark-7baf0091-7a7c-4f82-87bd-bd0156e0483d
22/01/29 22:06:04 INFO ShutdownHookManager: Deleting directory /tmp/spark-9104857b-7f86-4af8-9e61-8c8657ac640b
22/01/29 22:06:04 INFO ShutdownHookManager: Deleting directory /tmp/spark-9104857b-7f86-4af8-9e61-8c8657ac640b/pyspark-27330bec-34aa-406b-890f-82f86fa
a9e94
[student898_2@bigdataanalytics-worker-3 ~]$ 
```

```
hdfs dfs -ls for_stream

hdfs dfs -ls input_csv_for_stream
```



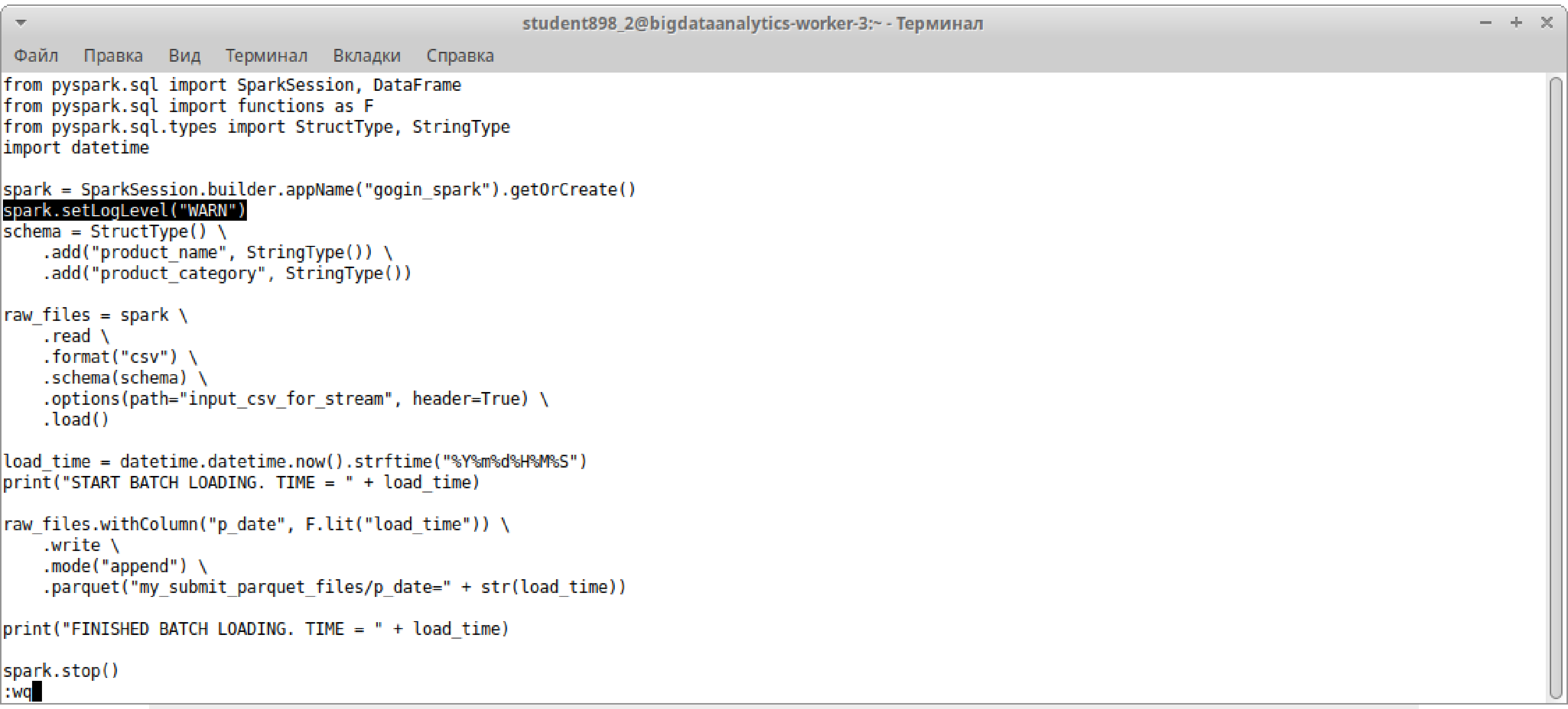
```
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls for_stream
Found 5 items
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:38 for_stream/product_list.csv
-rw-r--r--   2 student898_2 student898_2         98 2022-01-29 21:38 for_stream/product_list1.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:38 for_stream/product_list2.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:38 for_stream/product_list3.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:38 for_stream/product_list4.csv
[student898_2@bigdataanalytics-worker-3 ~]$ ^C
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls input_csv_for_stream
Found 5 items
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:49 input_csv_for_stream/product_list.csv
-rw-r--r--   2 student898_2 student898_2         98 2022-01-29 21:49 input_csv_for_stream/product_list1.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:49 input_csv_for_stream/product_list2.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:49 input_csv_for_stream/product_list3.csv
-rw-r--r--   2 student898_2 student898_2        125 2022-01-29 21:49 input_csv_for_stream/product_list4.csv
[student898_2@bigdataanalytics-worker-3 ~]$ 
```

```
hdfs dfs -ls

hdfs dfs -ls my_submit_parquet_files
```



```
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls
Found 11 items
drwx------   - student898_2 student898_2          0 2022-01-28 06:00 .Trash
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 22:06 .sparkStaging
drwxr-xr-x   - student898_2 student898_2          0 2022-01-24 19:39 checkpoints
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:38 for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:49 input_csv_for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:15 my_parquet_sink
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 22:06 my_submit_parquet_files
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:13 shadrin_iris_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:36 shadrin_iris_kafka_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 22:56 tolstykov_les4_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 23:03 tolstykov_les4_kafka_checkpoint
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls my_submit_parquet_files
Found 1 items
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 22:06 my_submit_parquet_files/p_date=20220129220559
[student898_2@bigdataanalytics-worker-3 ~]$ 
```

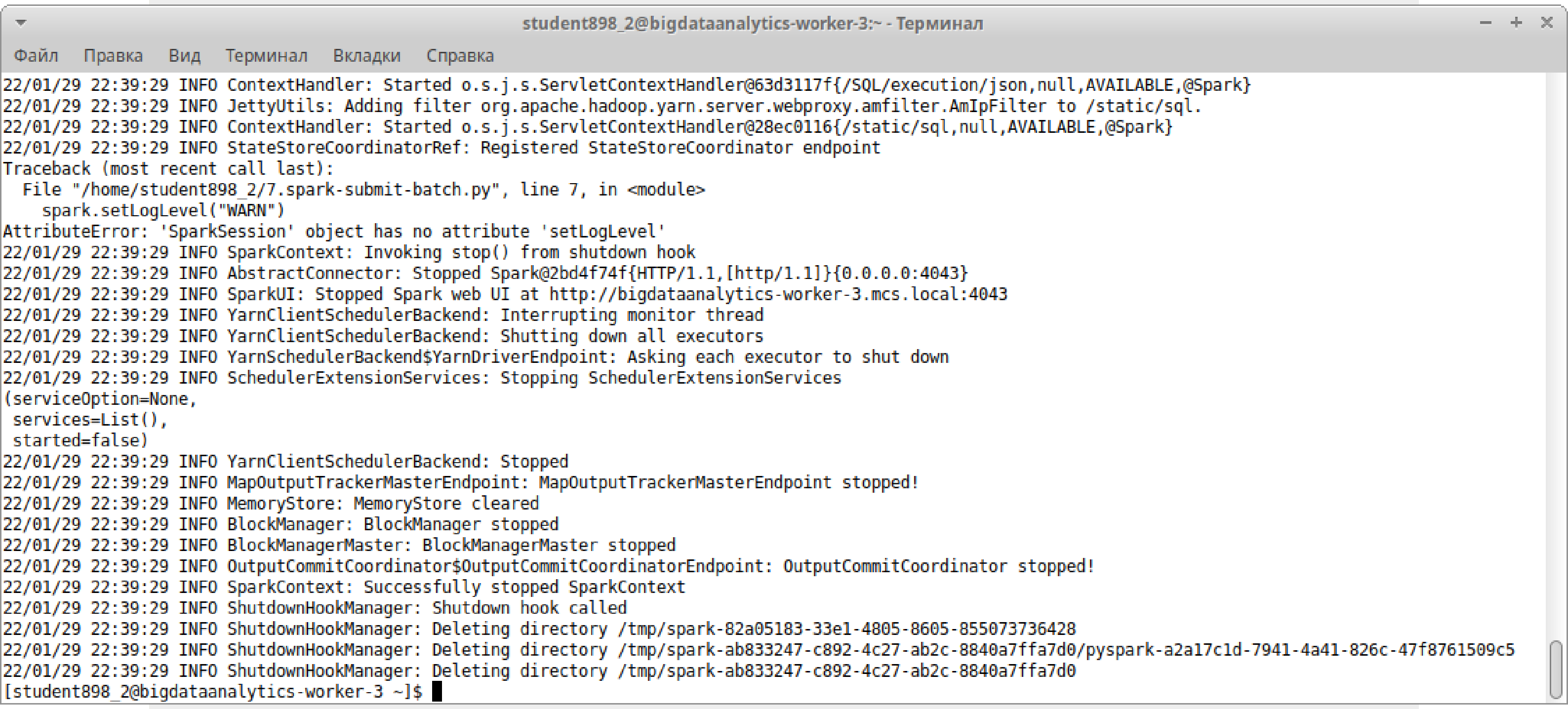
```
эксперементируем

vi 7.spark-submit-batch.py

вставляем

spark.setLogLevel("WARN")
```



student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл Правка Вид Терминал Вкладки Справка

```
from pyspark.sql import SparkSession, DataFrame
from pyspark.sql import functions as F
from pyspark.sql.types import StructType, StringType
import datetime

spark = SparkSession.builder.appName("gogin_spark").getOrCreate()
spark.setLogLevel("WARN")
schema = StructType() \
    .add("product_name", StringType()) \
    .add("product_category", StringType())

raw_files = spark \
    .read \
    .format("csv") \
    .schema(schema) \
    .options(path="input_csv_for_stream", header=True) \
    .load()

load_time = datetime.datetime.now().strftime("%Y%m%d%H%M%S")
print("START BATCH LOADING. TIME = " + load_time)

raw_files.withColumn("p_date", F.lit("load_time")) \
    .write \
    .mode("append") \
    .parquet("my_submit_parquet_files/p_date=" + str(load_time))

print("FINISHED BATCH LOADING. TIME = " + load_time)

spark.stop()
:wq
```

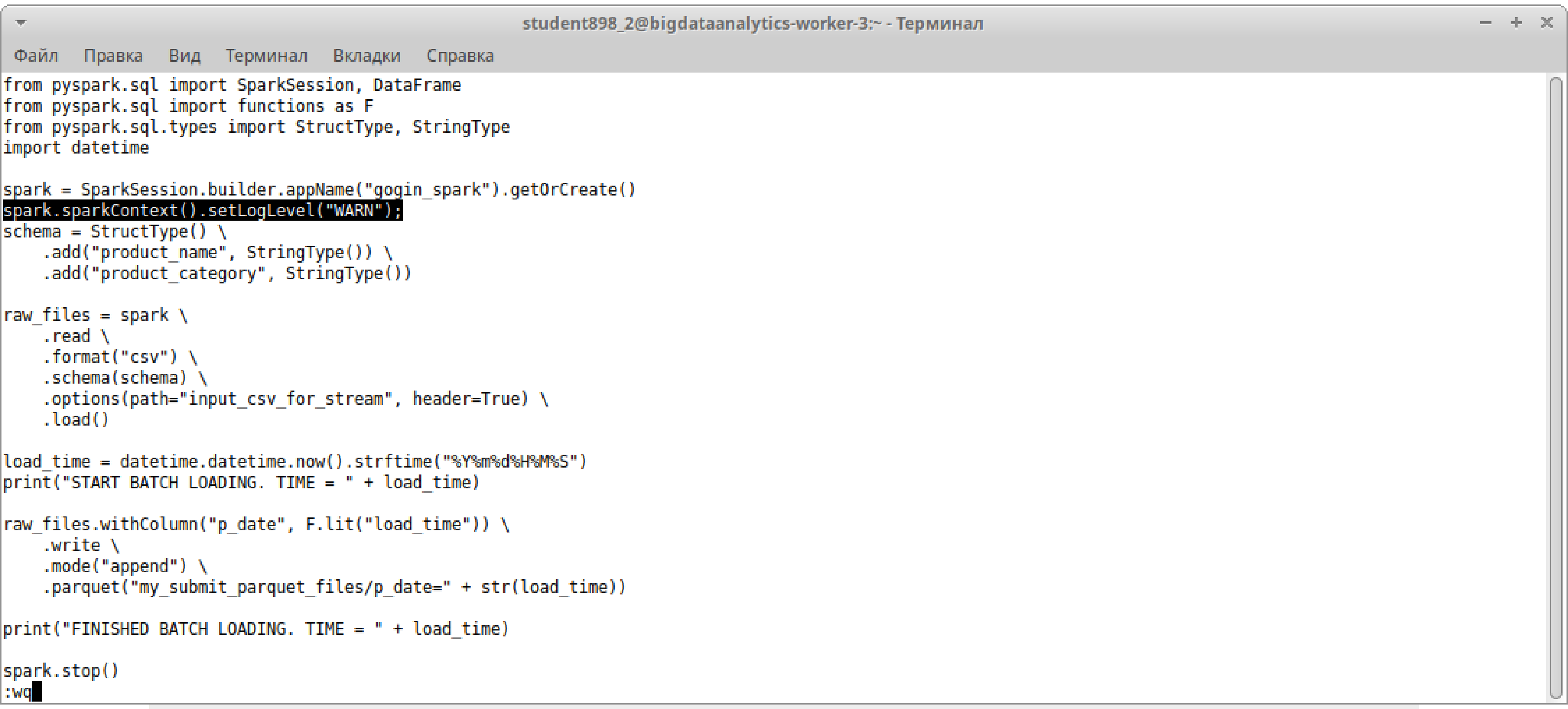
```
spark-submit 7.spark-submit-batch.py
```



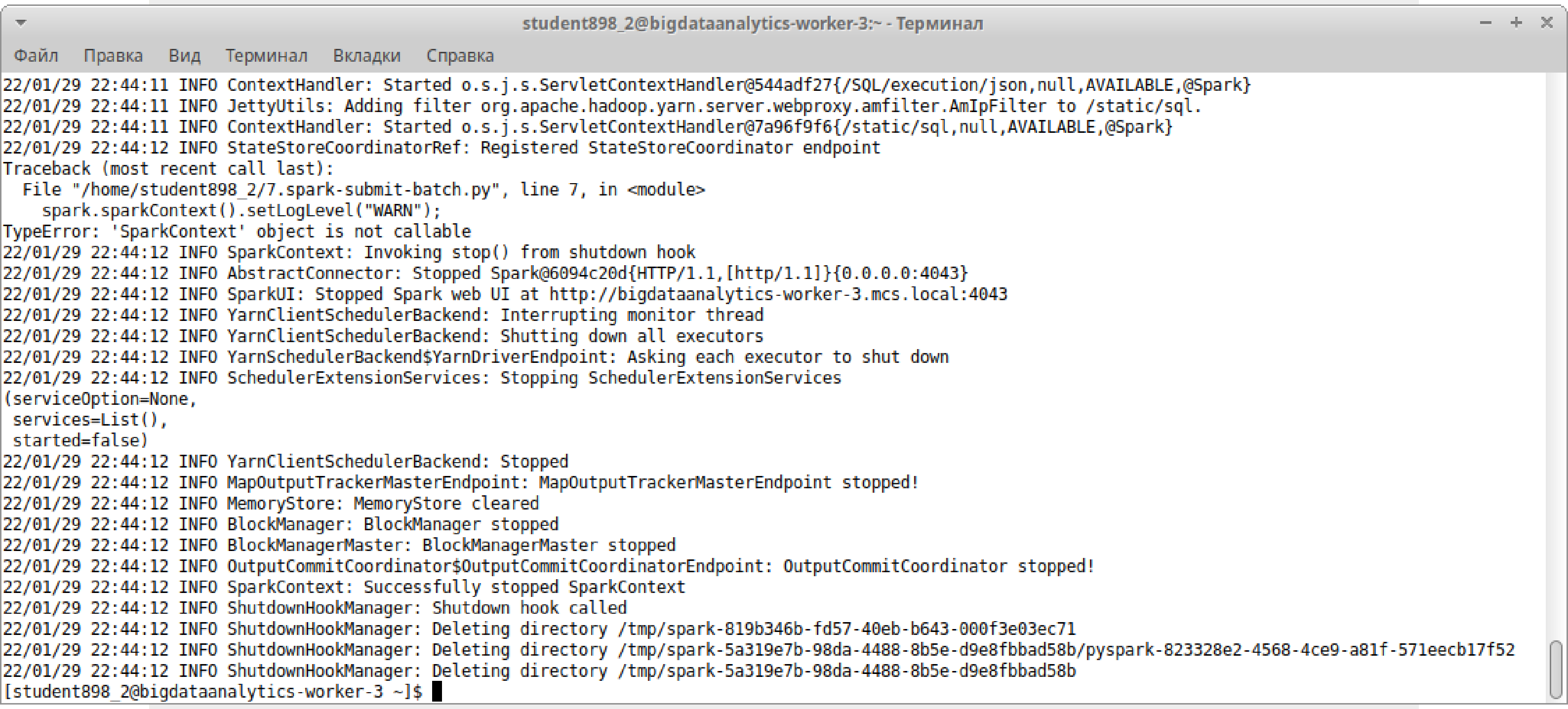
student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл Правка Вид Терминал Вкладки Справка

```
22/01/29 22:39:29 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@63d3117f{/SQL/execution/json,null,AVAILABLE,@Spark}
22/01/29 22:39:29 INFO JettyUtils: Adding filter org.apache.hadoop.yarn.server.webproxy.amfilter.AmIpFilter to /static/sql.
22/01/29 22:39:29 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@28ec0116{/static/sql,null,AVAILABLE,@Spark}
22/01/29 22:39:29 INFO StateStoreCoordinatorRef: Registered StateStoreCoordinator endpoint
Traceback (most recent call last):
  File "/home/student898_2/7.spark-submit-batch.py", line 7, in <module>
    spark.setLogLevel("WARN")
AttributeError: 'SparkSession' object has no attribute 'setLogLevel'
22/01/29 22:39:29 INFO SparkContext: Invoking stop() from shutdown hook
22/01/29 22:39:29 INFO AbstractConnector: Stopped Spark@2bd4f74f{HTTP/1.1,[http/1.1]}{0.0.0.0:4043}
22/01/29 22:39:29 INFO SparkUI: Stopped Spark web UI at http://bigdataanalytics-worker-3.mcs.local:4043
22/01/29 22:39:29 INFO YarnClientSchedulerBackend: Interrupting monitor thread
22/01/29 22:39:29 INFO YarnClientSchedulerBackend: Shutting down all executors
22/01/29 22:39:29 INFO YarnSchedulerBackend$YarnDriverEndpoint: Asking each executor to shut down
22/01/29 22:39:29 INFO SchedulerExtensionServices: Stopping SchedulerExtensionServices
(serviceOption=None,
 services=List(),
 started=false)
22/01/29 22:39:29 INFO YarnClientSchedulerBackend: Stopped
22/01/29 22:39:29 INFO MapOutputTrackerMasterEndpoint: MapOutputTrackerMasterEndpoint stopped!
22/01/29 22:39:29 INFO MemoryStore: MemoryStore cleared
22/01/29 22:39:29 INFO BlockManager: BlockManager stopped
22/01/29 22:39:29 INFO BlockManagerMaster: BlockManagerMaster stopped
22/01/29 22:39:29 INFO OutputCommitCoordinator$OutputCommitCoordinatorEndpoint: OutputCommitCoordinator stopped!
22/01/29 22:39:29 INFO SparkContext: Successfully stopped SparkContext
22/01/29 22:39:29 INFO ShutdownHookManager: Shutdown hook called
22/01/29 22:39:29 INFO ShutdownHookManager: Deleting directory /tmp/spark-82a05183-33e1-4805-8605-855073736428
22/01/29 22:39:29 INFO ShutdownHookManager: Deleting directory /tmp/spark-ab833247-c892-4c27-ab2c-8840a7ffa7d0/pyspark-a2a17c1d-7941-4a41-826c-47f8761509c5
22/01/29 22:39:29 INFO ShutdownHookManager: Deleting directory /tmp/spark-ab833247-c892-4c27-ab2c-8840a7ffa7d0
[student898_2@bigdataanalytics-worker-3 ~]$
```

```
spark.sparkContext().setLogLevel("WARN");
```

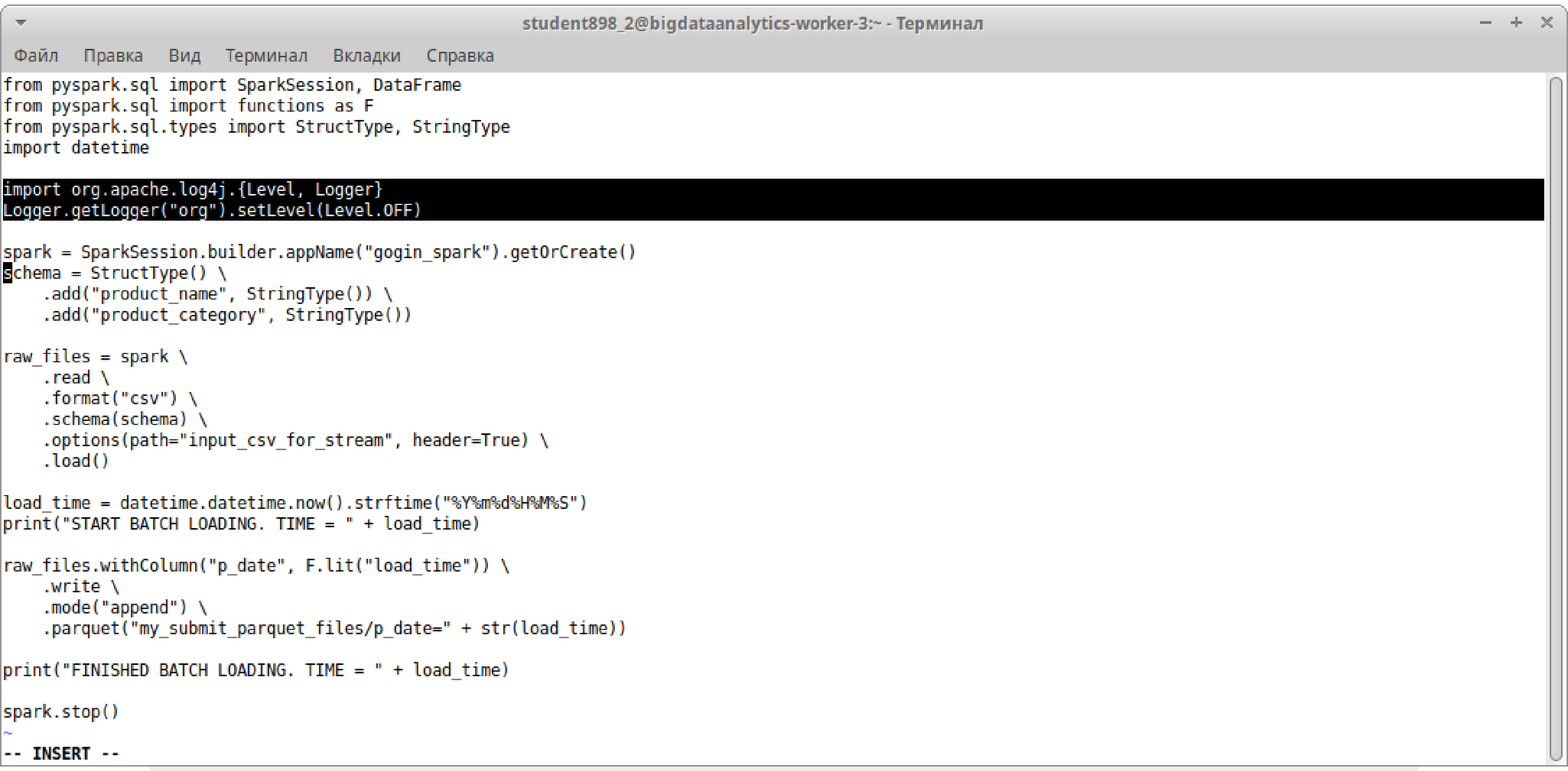


```
from pyspark.sql import SparkSession, DataFrame
from pyspark.sql import functions as F
from pyspark.sql.types import StructType, StringType
import datetime

spark = SparkSession.builder.appName("gogin_spark").getOrCreate()
spark.sparkContext().setLogLevel("WARN");
schema = StructType() \
    .add("product_name", StringType()) \
    .add("product_category", StringType())

raw_files = spark \
    .read \
    .format("csv") \
    .schema(schema) \
    .options(path="input_csv_for_stream", header=True) \
    .load()

load_time = datetime.datetime.now().strftime("%Y%m%d%H%M%S")
print("START BATCH LOADING. TIME = " + load_time)

raw_files.withColumn("p_date", F.lit("load_time")) \
    .write \
    .mode("append") \
    .parquet("my_submit_parquet_files/p_date=" + str(load_time))

print("FINISHED BATCH LOADING. TIME = " + load_time)

spark.stop()
:wq
```

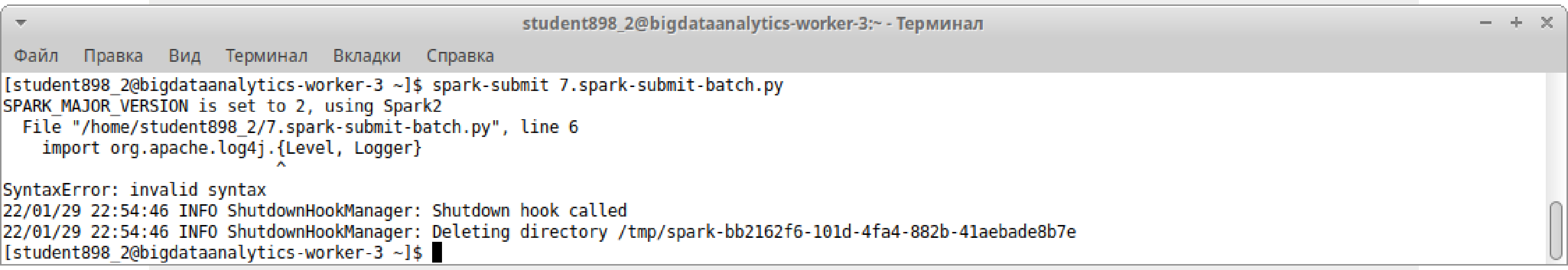


```
22/01/29 22:44:11 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@544adf27{/SQL/execution/json,null,AVAILABLE,@Spark}
22/01/29 22:44:11 INFO JettyUtils: Adding filter org.apache.hadoop.yarn.server.webproxy.amfilter.AmIpFilter to /static/sql.
22/01/29 22:44:11 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@7a96f9f6{/static/sql,null,AVAILABLE,@Spark}
22/01/29 22:44:12 INFO StateStoreCoordinatorRef: Registered StateStoreCoordinator endpoint
Traceback (most recent call last):
  File "/home/student898_2/7.spark-submit-batch.py", line 7, in <module>
    spark.sparkContext().setLogLevel("WARN");
TypeError: 'SparkContext' object is not callable
22/01/29 22:44:12 INFO SparkContext: Invoking stop() from shutdown hook
22/01/29 22:44:12 INFO AbstractConnector: Stopped Spark@6094c20d{HTTP/1.1,[http/1.1]}{0.0.0.0:4043}
22/01/29 22:44:12 INFO SparkUI: Stopped Spark web UI at http://bigdataanalytics-worker-3.mcs.local:4043
22/01/29 22:44:12 INFO YarnClientSchedulerBackend: Interrupting monitor thread
22/01/29 22:44:12 INFO YarnClientSchedulerBackend: Shutting down all executors
22/01/29 22:44:12 INFO YarnSchedulerBackend$YarnDriverEndpoint: Asking each executor to shut down
22/01/29 22:44:12 INFO SchedulerExtensionServices: Stopping SchedulerExtensionServices
(serviceOption=None,
 services=List(),
 started=false)
22/01/29 22:44:12 INFO YarnClientSchedulerBackend: Stopped
22/01/29 22:44:12 INFO MapOutputTrackerMasterEndpoint: MapOutputTrackerMasterEndpoint stopped!
22/01/29 22:44:12 INFO MemoryStore: MemoryStore cleared
22/01/29 22:44:12 INFO BlockManager: BlockManager stopped
22/01/29 22:44:12 INFO BlockManagerMaster: BlockManagerMaster stopped
22/01/29 22:44:12 INFO OutputCommitCoordinator$OutputCommitCoordinatorEndpoint: OutputCommitCoordinator stopped!
22/01/29 22:44:12 INFO SparkContext: Successfully stopped SparkContext
22/01/29 22:44:12 INFO ShutdownHookManager: Shutdown hook called
22/01/29 22:44:12 INFO ShutdownHookManager: Deleting directory /tmp/spark-819b346b-fd57-40eb-b643-000f3e03ec71
22/01/29 22:44:12 INFO ShutdownHookManager: Deleting directory /tmp/spark-5a319e7b-98da-4488-8b5e-d9e8fbbad58b/pyspark-823328e2-4568-4ce9-a81f-571eecb17f52
22/01/29 22:44:12 INFO ShutdownHookManager: Deleting directory /tmp/spark-5a319e7b-98da-4488-8b5e-d9e8fbbad58b
[student898_2@bigdataanalytics-worker-3 ~]$
```

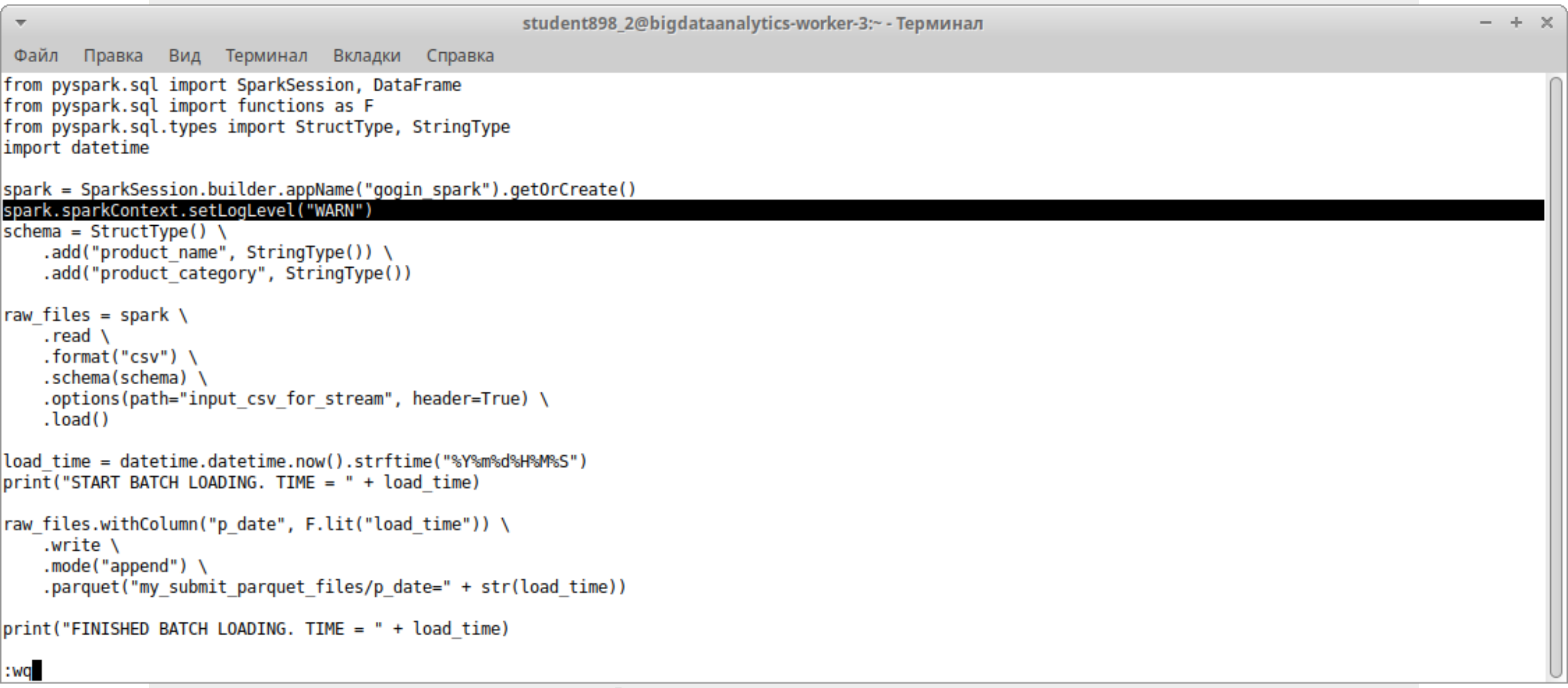
```
еще один вариант

import org.apache.log4j.{Level, Logger}

Logger.getLogger("org").setLevel(Level.OFF)
```


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл Правка Вид Терминал Вкладки Справка

```
from pyspark.sql import SparkSession, DataFrame
from pyspark.sql import functions as F
from pyspark.sql.types import StructType, StringType
import datetime

import org.apache.log4j.{Level, Logger}
Logger.getLogger("org").setLevel(Level.OFF)

spark = SparkSession.builder.appName("gogin_spark").getOrCreate()
schema = StructType() \
    .add("product_name", StringType()) \
    .add("product_category", StringType())

raw_files = spark \
    .read \
    .format("csv") \
    .schema(schema) \
    .options(path="input_csv_for_stream", header=True) \
    .load()

load_time = datetime.datetime.now().strftime("%Y%m%d%H%M%S")
print("START BATCH LOADING. TIME = " + load_time)

raw_files.withColumn("p_date", F.lit("load_time")) \
    .write \
    .mode("append") \
    .parquet("my_submit_parquet_files/p_date=" + str(load_time))

print("FINISHED BATCH LOADING. TIME = " + load_time)

spark.stop()
~
-- INSERT --
```


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл Правка Вид Терминал Вкладки Справка

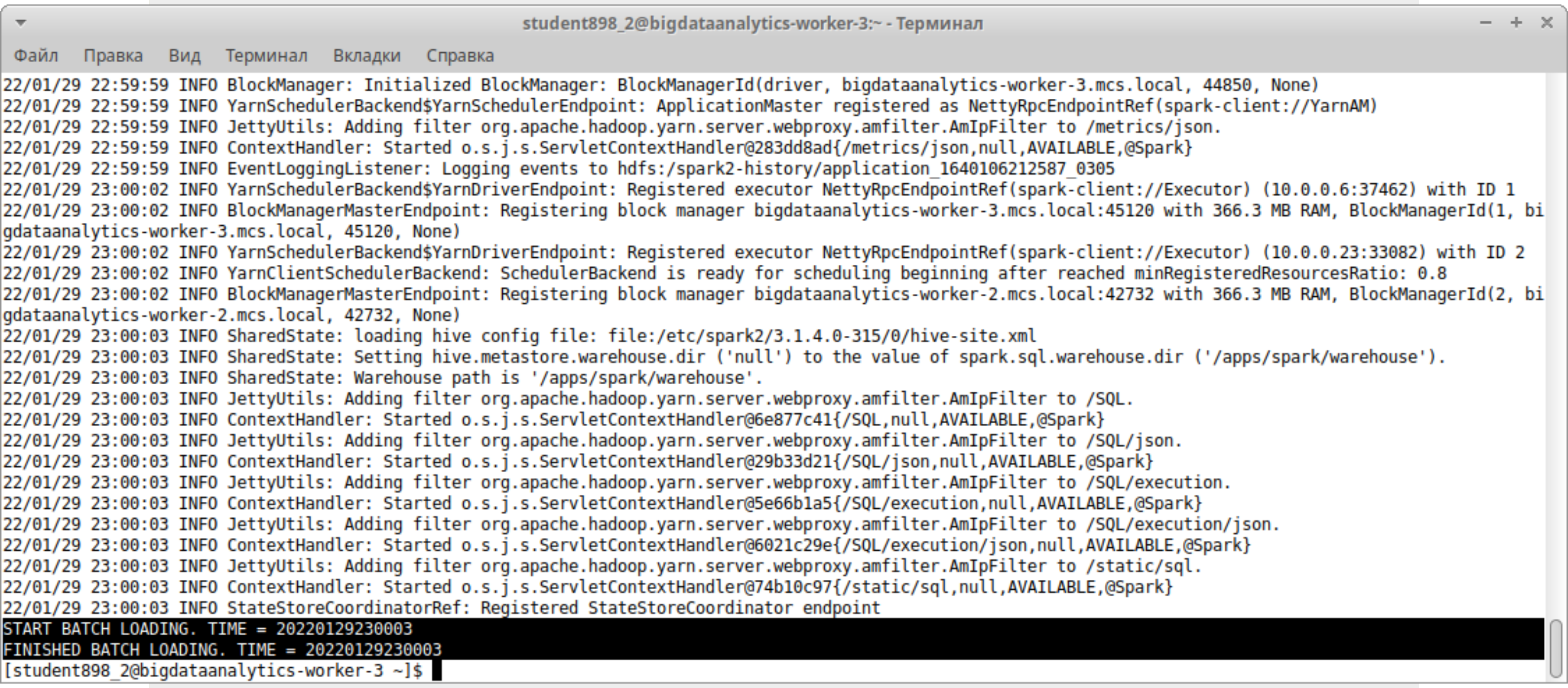
```
[student898_2@bigdataanalytics-worker-3 ~]$ spark-submit 7.spark-submit-batch.py
SPARK_MAJOR_VERSION is set to 2, using Spark2
  File "/home/student898_2/7.spark-submit-batch.py", line 6
    import org.apache.log4j.{Level, Logger}
                            ^

SyntaxError: invalid syntax
22/01/29 22:54:46 INFO ShutdownHookManager: Shutdown hook called
22/01/29 22:54:46 INFO ShutdownHookManager: Deleting directory /tmp/spark-bb2162f6-101d-4fa4-882b-41aebade8b7e
[student898_2@bigdataanalytics-worker-3 ~]$
```


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл Правка Вид Терминал Вкладки Справка

```
from pyspark.sql import SparkSession, DataFrame
from pyspark.sql import functions as F
from pyspark.sql.types import StructType, StringType
import datetime

spark = SparkSession.builder.appName("gogin_spark").getOrCreate()
spark.sparkContext.setLogLevel("WARN")
schema = StructType() \
    .add("product_name", StringType()) \
    .add("product_category", StringType())

raw_files = spark \
    .read \
    .format("csv") \
    .schema(schema) \
    .options(path="input_csv_for_stream", header=True) \
    .load()

load_time = datetime.datetime.now().strftime("%Y%m%d%H%M%S")
print("START BATCH LOADING. TIME = " + load_time)

raw_files.withColumn("p_date", F.lit("load_time")) \
    .write \
    .mode("append") \
    .parquet("my_submit_parquet_files/p_date=" + str(load_time))

print("FINISHED BATCH LOADING. TIME = " + load_time)

:wq
```

```
spark.sparkContext.setLogLevel("WARN")
```

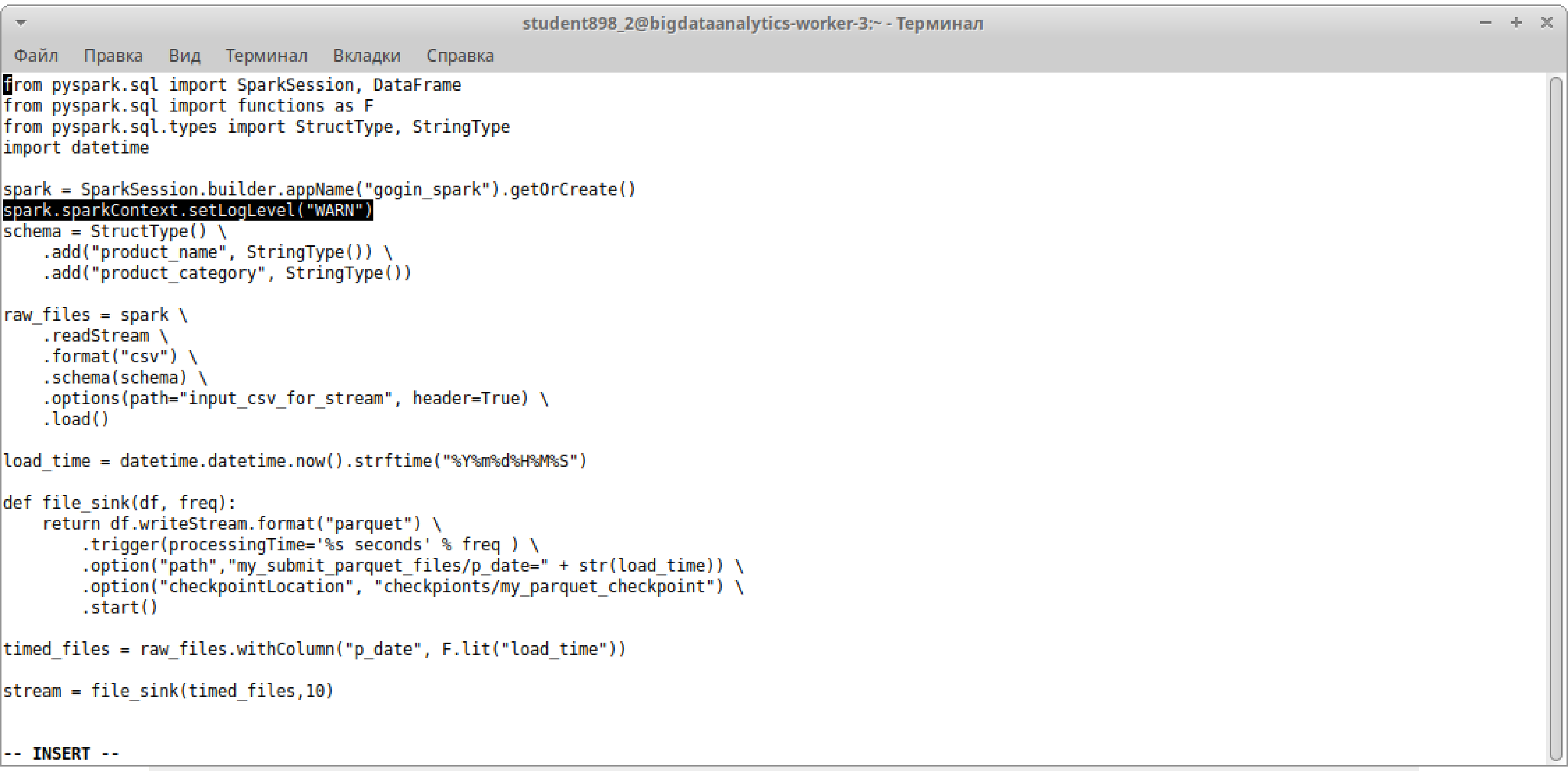
```
START BATCH LOADING. TIME = 20220129230003

FINISHED BATCH LOADING. TIME = 20220129230003
```



student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл Правка Вид Терминал Вкладки Справка

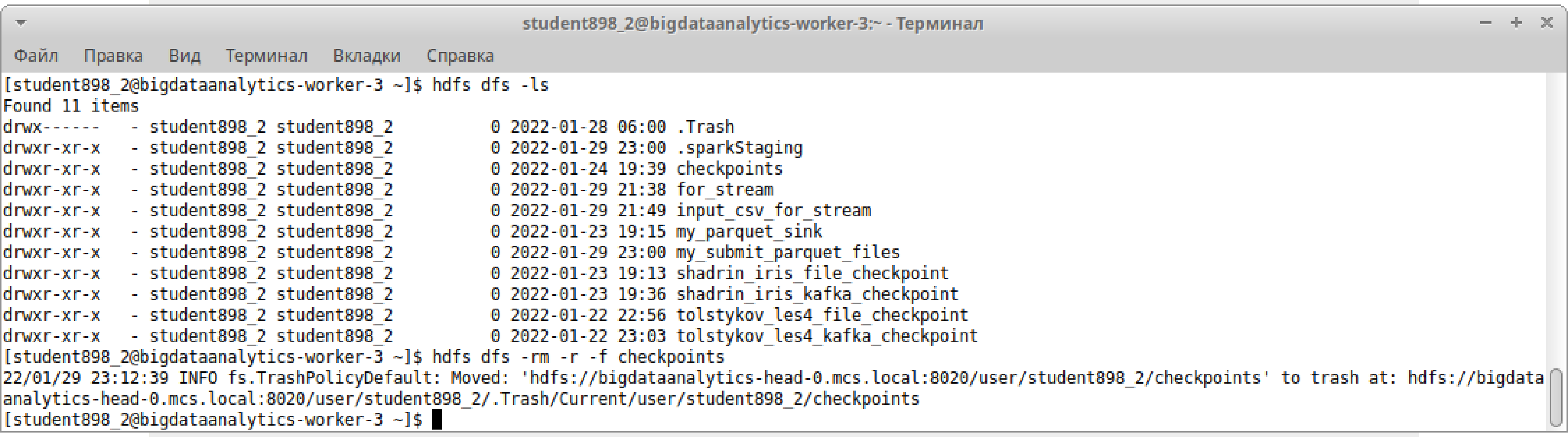
```
22/01/29 22:59:59 INFO BlockManager: Initialized BlockManager: BlockManagerId(driver, bigdataanalytics-worker-3.mcs.local, 44850, None)
22/01/29 22:59:59 INFO YarnSchedulerBackend$YarnSchedulerEndpoint: ApplicationMaster registered as NettyRpcEndpointRef(spark-client://YarnAM)
22/01/29 22:59:59 INFO JettyUtils: Adding filter org.apache.hadoop.yarn.server.webproxy.amfilter.AmIpFilter to /metrics/json.
22/01/29 22:59:59 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@283dd8ad{/metrics/json,null,AVAILABLE,@Spark}
22/01/29 22:59:59 INFO EventLoggingListener: Logging events to hdfs:/spark2-history/application_1640106212587_0305
22/01/29 23:00:02 INFO YarnSchedulerBackend$YarnDriverEndpoint: Registered executor NettyRpcEndpointRef(spark-client://Executor) (10.0.0.6:37462) with ID 1
22/01/29 23:00:02 INFO BlockManagerMasterEndpoint: Registering block manager bigdataanalytics-worker-3.mcs.local:45120 with 366.3 MB RAM, BlockManagerId(1, bi
gdataanalytics-worker-3.mcs.local, 45120, None)
22/01/29 23:00:02 INFO YarnSchedulerBackend$YarnDriverEndpoint: Registered executor NettyRpcEndpointRef(spark-client://Executor) (10.0.0.23:33082) with ID 2
22/01/29 23:00:02 INFO YarnClientSchedulerBackend: SchedulerBackend is ready for scheduling beginning after reached minRegisteredResourcesRatio: 0.8
22/01/29 23:00:02 INFO BlockManagerMasterEndpoint: Registering block manager bigdataanalytics-worker-2.mcs.local:42732 with 366.3 MB RAM, BlockManagerId(2, bi
gdataanalytics-worker-2.mcs.local, 42732, None)
22/01/29 23:00:03 INFO SharedState: loading hive config file: file:/etc/spark2/3.1.4.0-315/0/hive-site.xml
22/01/29 23:00:03 INFO SharedState: Setting hive.metastore.warehouse.dir ('null') to the value of spark.sql.warehouse.dir ('/apps/spark/warehouse').
22/01/29 23:00:03 INFO SharedState: Warehouse path is '/apps/spark/warehouse'.
22/01/29 23:00:03 INFO JettyUtils: Adding filter org.apache.hadoop.yarn.server.webproxy.amfilter.AmIpFilter to /SQL.
22/01/29 23:00:03 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@6e877c41{/SQL,null,AVAILABLE,@Spark}
22/01/29 23:00:03 INFO JettyUtils: Adding filter org.apache.hadoop.yarn.server.webproxy.amfilter.AmIpFilter to /SQL/json.
22/01/29 23:00:03 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@29b33d21{/SQL/json,null,AVAILABLE,@Spark}
22/01/29 23:00:03 INFO JettyUtils: Adding filter org.apache.hadoop.yarn.server.webproxy.amfilter.AmIpFilter to /SQL/execution.
22/01/29 23:00:03 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@5e66b1a5{/SQL/execution,null,AVAILABLE,@Spark}
22/01/29 23:00:03 INFO JettyUtils: Adding filter org.apache.hadoop.yarn.server.webproxy.amfilter.AmIpFilter to /SQL/execution/json.
22/01/29 23:00:03 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@6021c29e{/SQL/execution/json,null,AVAILABLE,@Spark}
22/01/29 23:00:03 INFO JettyUtils: Adding filter org.apache.hadoop.yarn.server.webproxy.amfilter.AmIpFilter to /static/sql.
22/01/29 23:00:03 INFO ContextHandler: Started o.s.j.s.ServletContextHandler@74b10c97{/static/sql,null,AVAILABLE,@Spark}
22/01/29 23:00:03 INFO StateStoreCoordinatorRef: Registered StateStoreCoordinator endpoint
START BATCH LOADING. TIME = 20220129230003
FINISHED BATCH LOADING. TIME = 20220129230003
[student898_2@bigdataanalytics-worker-3 ~]$
```

```
переношу код в остальные файлы

spark.sparkContext.setLogLevel("WARN")

vi 7.1_spark-submit_stream.py

удаляю русские слова
```



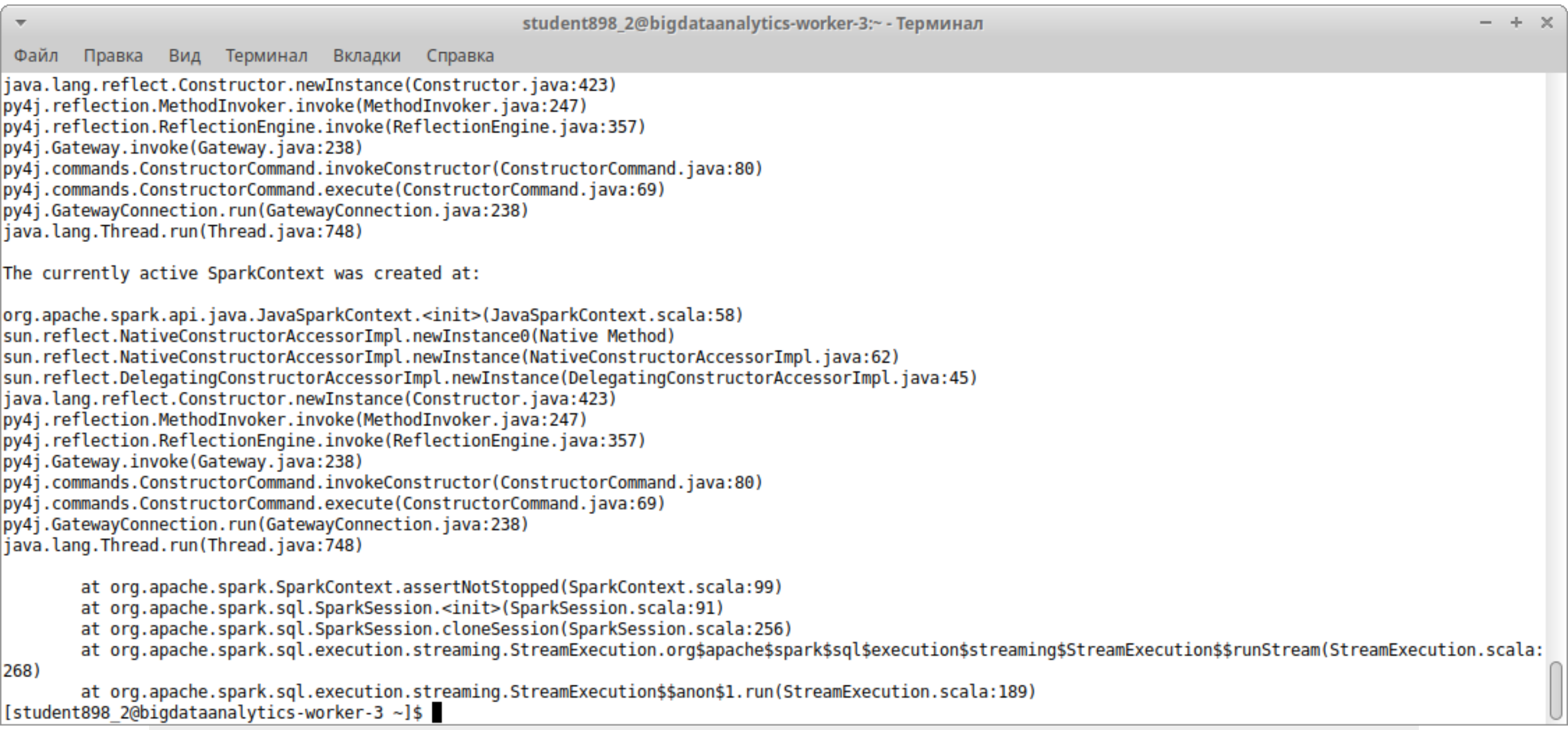
```
from pyspark.sql import SparkSession, DataFrame
from pyspark.sql import functions as F
from pyspark.sql.types import StructType, StringType
import datetime

spark = SparkSession.builder.appName("gogin_spark").getOrCreate()
spark.sparkContext.setLogLevel("WARN")
schema = StructType() \
    .add("product_name", StringType()) \
    .add("product_category", StringType())

raw_files = spark \
    .readStream \
    .format("csv") \
    .schema(schema) \
    .options(path="input_csv_for_stream", header=True) \
    .load()

load_time = datetime.datetime.now().strftime("%Y%m%d%H%M%S")

def file_sink(df, freq):
    return df.writeStream.format("parquet") \
        .trigger(processingTime='%s seconds' % freq ) \
        .option("path","my_submit_parquet_files/p_date=" + str(load_time)) \
        .option("checkpointLocation", "checkpionts/my_parquet_checkpoint") \
        .start()

timed_files = raw_files.withColumn("p_date", F.lit("load_time"))

stream = file_sink(timed_files,10)


-- INSERT --
```

```
hdfs dfs -ls

hdfs dfs -rm -r -f checkpoints
```



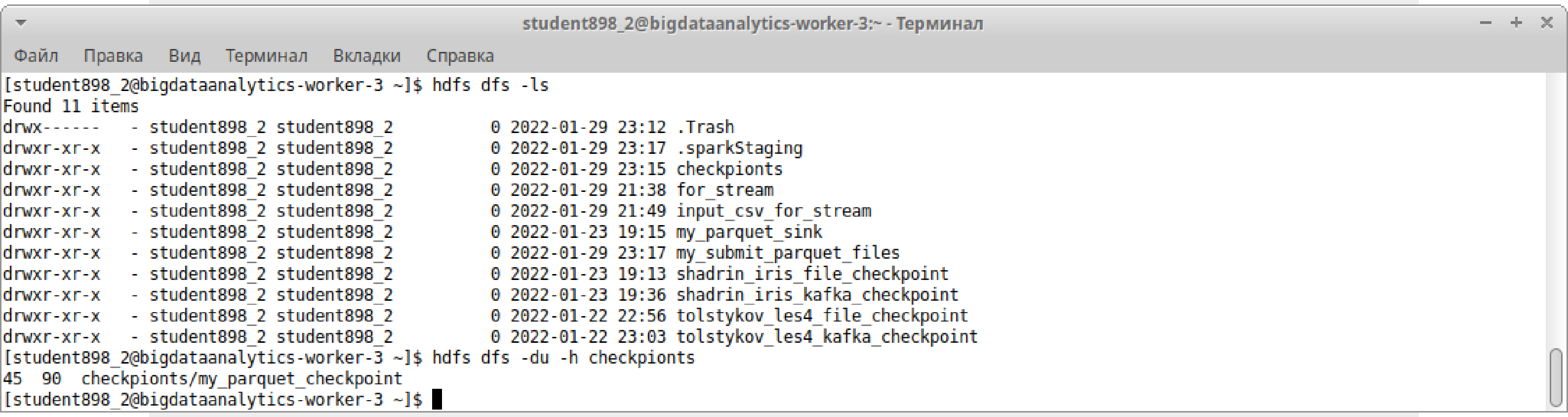
```
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls
Found 11 items
drwx------   - student898_2 student898_2          0 2022-01-28 06:00 .Trash
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 23:00 .sparkStaging
drwxr-xr-x   - student898_2 student898_2          0 2022-01-24 19:39 checkpoints
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:38 for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:49 input_csv_for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:15 my_parquet_sink
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 23:00 my_submit_parquet_files
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:13 shadrin_iris_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:36 shadrin_iris_kafka_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 22:56 tolstykov_les4_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 23:03 tolstykov_les4_kafka_checkpoint
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -rm -r -f checkpoints
22/01/29 23:12:39 INFO fs.TrashPolicyDefault: Moved: 'hdfs://bigdataanalytics-head-0.mcs.local:8020/user/student898_2/checkpoints' to trash at: hdfs://bigdata
analytics-head-0.mcs.local:8020/user/student898_2/.Trash/Current/user/student898_2/checkpoints
[student898_2@bigdataanalytics-worker-3 ~]$
```

```
spark-submit 7.1_spark-submit_stream.py
```



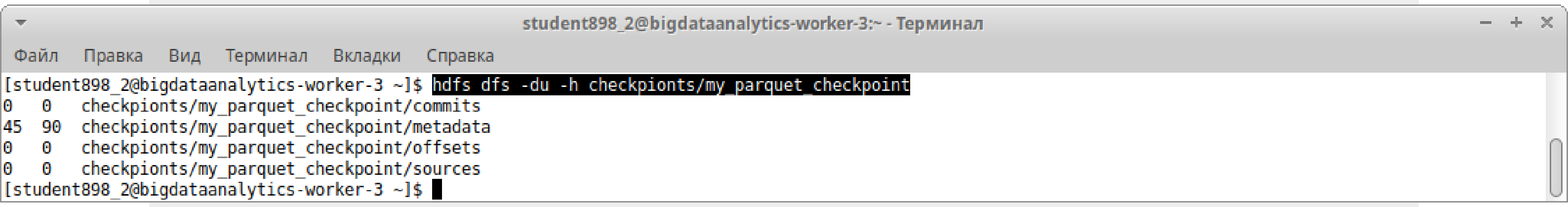
```
java.lang.reflect.Constructor.newInstance(Constructor.java:423)
py4j.reflection.MethodInvoker.invoke(MethodInvoker.java:247)
py4j.reflection.ReflectionEngine.invoke(ReflectionEngine.java:357)
py4j.Gateway.invoke(Gateway.java:238)
py4j.commands.ConstructorCommand.invokeConstructor(ConstructorCommand.java:80)
py4j.commands.ConstructorCommand.execute(ConstructorCommand.java:69)
py4j.GatewayConnection.run(GatewayConnection.java:238)
java.lang.Thread.run(Thread.java:748)

The currently active SparkContext was created at:

org.apache.spark.api.java.JavaSparkContext.<init>(JavaSparkContext.scala:58)
sun.reflect.NativeConstructorAccessorImpl.newInstance0(Native Method)
sun.reflect.NativeConstructorAccessorImpl.newInstance(NativeConstructorAccessorImpl.java:62)
sun.reflect.DelegatingConstructorAccessorImpl.newInstance(DelegatingConstructorAccessorImpl.java:45)
java.lang.reflect.Constructor.newInstance(Constructor.java:423)
py4j.reflection.MethodInvoker.invoke(MethodInvoker.java:247)
py4j.reflection.ReflectionEngine.invoke(ReflectionEngine.java:357)
py4j.Gateway.invoke(Gateway.java:238)
py4j.commands.ConstructorCommand.invokeConstructor(ConstructorCommand.java:80)
py4j.commands.ConstructorCommand.execute(ConstructorCommand.java:69)
py4j.GatewayConnection.run(GatewayConnection.java:238)
java.lang.Thread.run(Thread.java:748)

        at org.apache.spark.SparkContext.assertNotStopped(SparkContext.scala:99)
        at org.apache.spark.sql.SparkSession.<init>(SparkSession.scala:91)
        at org.apache.spark.sql.SparkSession.cloneSession(SparkSession.scala:256)
        at org.apache.spark.sql.execution.streaming.StreamExecution.org$apache$spark$sql$execution$streaming$StreamExecution$$runStream(StreamExecution.scala:
268)
        at org.apache.spark.sql.execution.streaming.StreamExecution$$anon$1.run(StreamExecution.scala:189)
[student898_2@bigdataanalytics-worker-3 ~]$
```

```
hdfs dfs -ls

hdfs dfs -du -h checkpionts
```



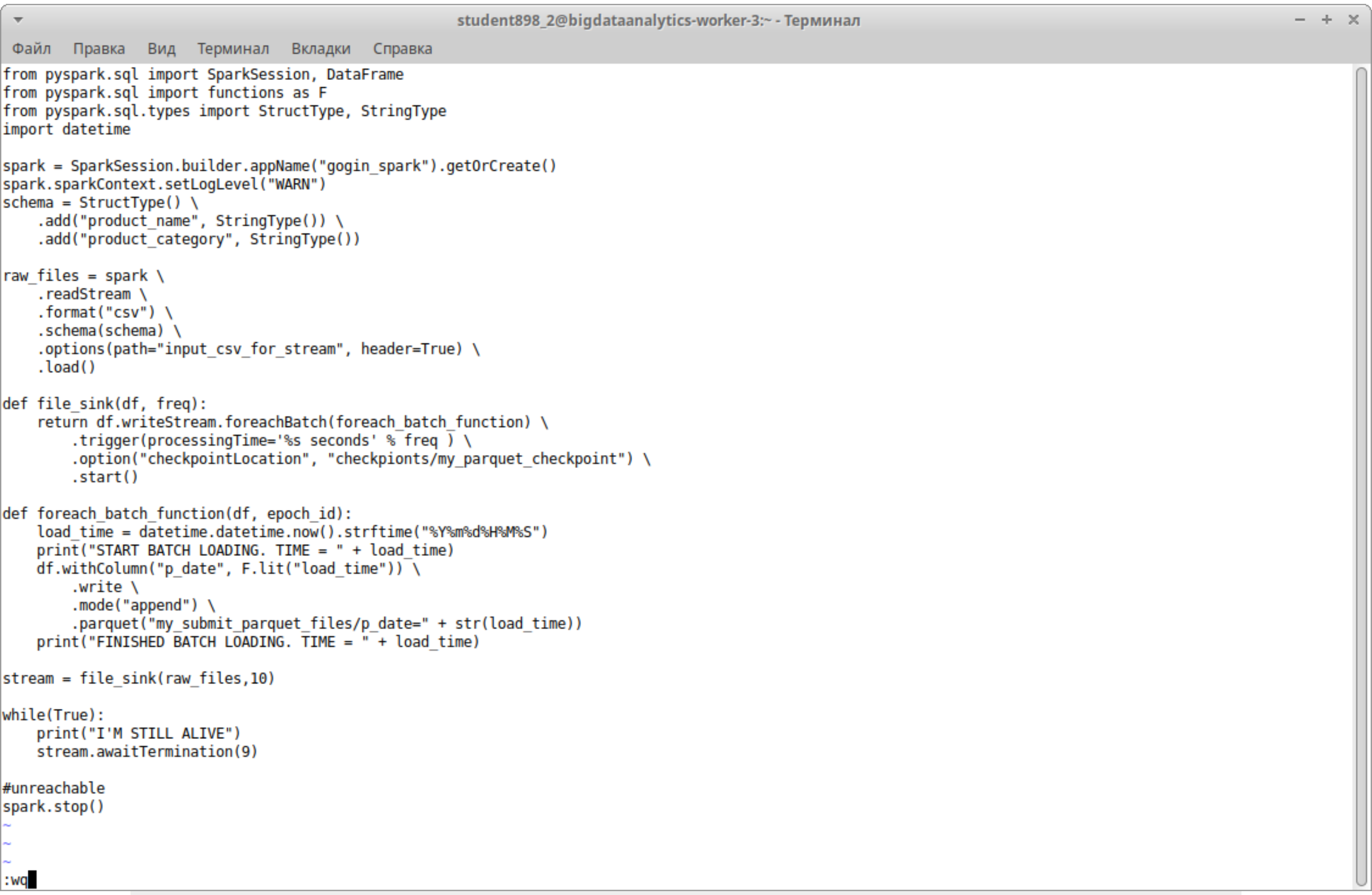
```
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls
Found 11 items
drwx------   - student898_2 student898_2          0 2022-01-29 23:12 .Trash
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 23:17 .sparkStaging
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 23:15 checkpionts
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:38 for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:49 input_csv_for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:15 my_parquet_sink
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 23:17 my_submit_parquet_files
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:13 shadrin_iris_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:36 shadrin_iris_kafka_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 22:56 tolstykov_les4_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 23:03 tolstykov_les4_kafka_checkpoint
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -du -h checkpionts
45  90  checkpionts/my_parquet_checkpoint
[student898_2@bigdataanalytics-worker-3 ~]$
```

```
hdfs dfs -du -h checkpionts/my_parquet_checkpoint
```



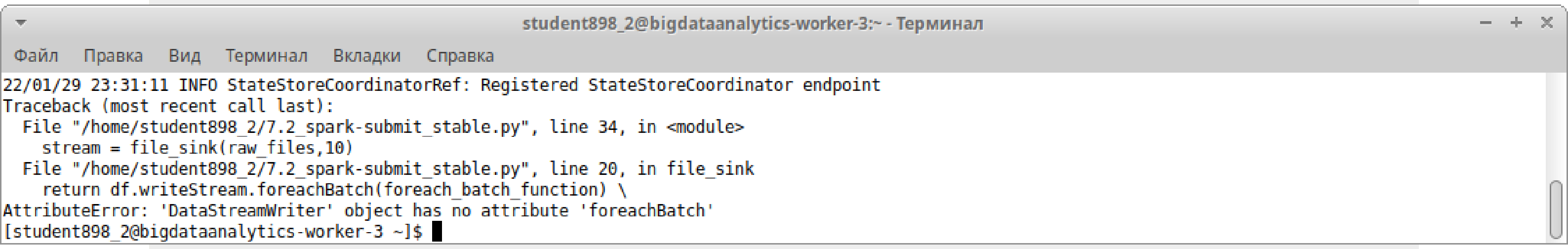
```
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -du -h checkpionts/my_parquet_checkpoint
0   0   checkpionts/my_parquet_checkpoint/commits
45  90  checkpionts/my_parquet_checkpoint/metadata
0   0   checkpionts/my_parquet_checkpoint/offsets
0   0   checkpionts/my_parquet_checkpoint/sources
[student898_2@bigdataanalytics-worker-3 ~]$
```

```
spark.sparkContext.setLogLevel("WARN")

vi 7.2_spark-submit_stable.py
```


student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл Правка Вид Терминал Вкладки Справка

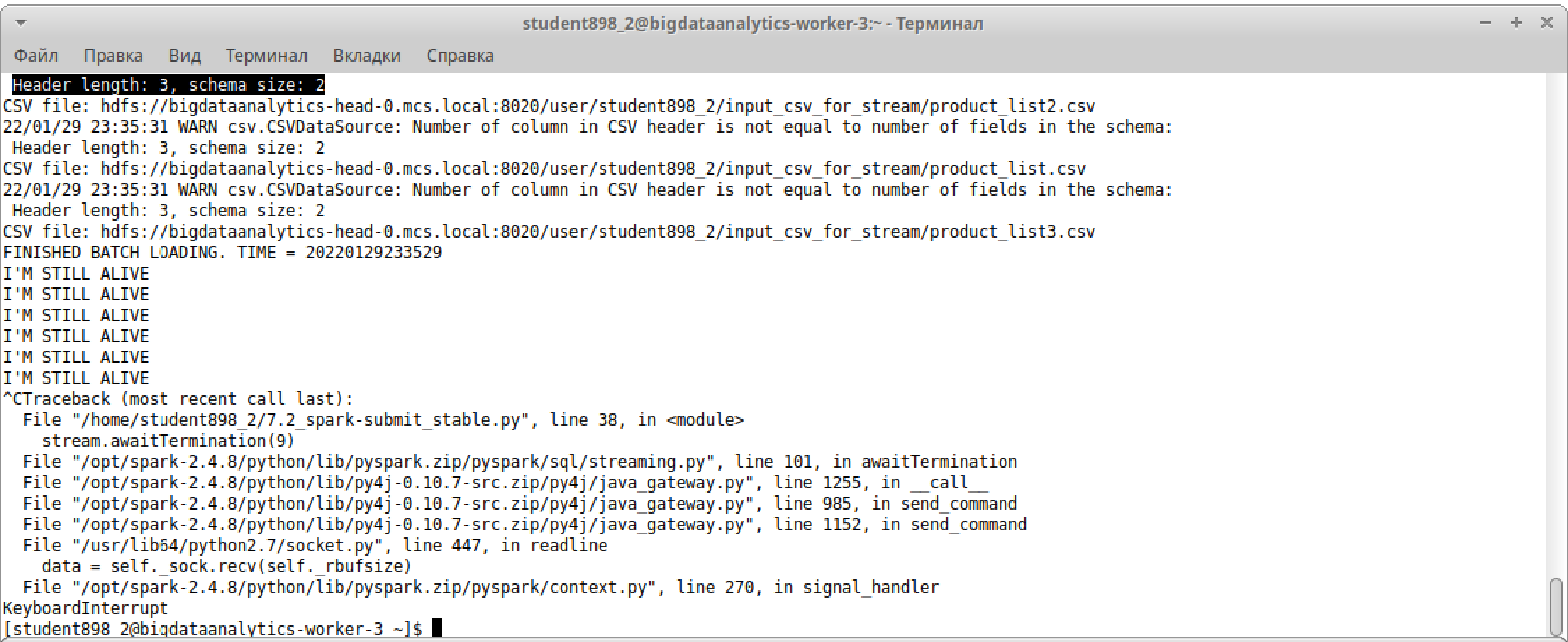
```
from pyspark.sql import SparkSession, DataFrame
from pyspark.sql import functions as F
from pyspark.sql.types import StructType, StringType
import datetime

spark = SparkSession.builder.appName("gogin_spark").getOrCreate()
spark.sparkContext.setLogLevel("WARN")
schema = StructType() \
    .add("product_name", StringType()) \
    .add("product_category", StringType())

raw_files = spark \
    .readStream \
    .format("csv") \
    .schema(schema) \
    .options(path="input_csv_for_stream", header=True) \
    .load()

def file_sink(df, freq):
    return df.writeStream.foreachBatch(foreach_batch_function) \
        .trigger(processingTime='%s seconds' % freq ) \
        .option("checkpointLocation", "checkpionts/my_parquet_checkpoint") \
        .start()

def foreach_batch_function(df, epoch_id):
    load_time = datetime.datetime.now().strftime("%Y%m%d%H%M%S")
    print("START BATCH LOADING. TIME = " + load_time)
    df.withColumn("p_date", F.lit("load_time")) \
        .write \
        .mode("append") \
        .parquet("my_submit_parquet_files/p_date=" + str(load_time))
    print("FINISHED BATCH LOADING. TIME = " + load_time)

stream = file_sink(raw_files,10)

while(True):
    print("I'M STILL ALIVE")
    stream.awaitTermination(9)

#unreachable
spark.stop()
~
~
~
:wq
```

```
hdfs dfs -rm -r -f checkpoints

spark-submit 7.2_spark-submit_stable.py
```

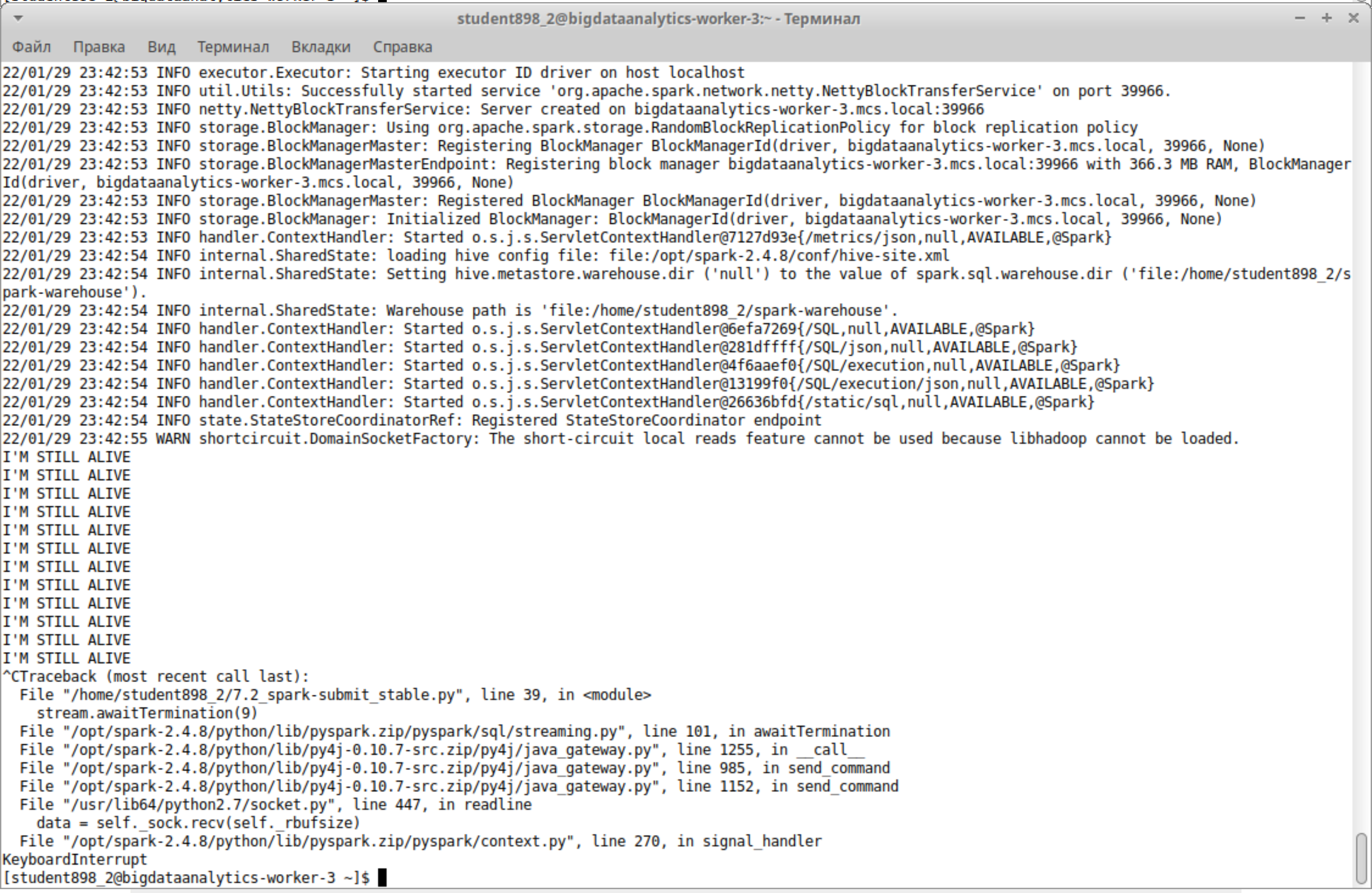

student898_2@bigdataanalytics-worker-3:~ - Терминал
Файл Правка Вид Терминал Вкладки Справка

```
22/01/29 23:31:11 INFO StateStoreCoordinatorRef: Registered StateStoreCoordinator endpoint
Traceback (most recent call last):
  File "/home/student898_2/7.2_spark-submit_stable.py", line 34, in <module>
    stream = file_sink(raw_files,10)
  File "/home/student898_2/7.2_spark-submit_stable.py", line 20, in file_sink
    return df.writeStream.foreachBatch(foreach_batch_function) \
AttributeError: 'DataStreamWriter' object has no attribute 'foreachBatch'
[student898_2@bigdataanalytics-worker-3 ~]$
```

```
/opt/spark-2.4.8/bin/spark-submit 7.2_spark-submit_stable.py
```



```
 Header length: 3, schema size: 2
CSV file: hdfs://bigdataanalytics-head-0.mcs.local:8020/user/student898_2/input_csv_for_stream/product_list2.csv
22/01/29 23:35:31 WARN csv.CSVDataSource: Number of column in CSV header is not equal to number of fields in the schema:
 Header length: 3, schema size: 2
CSV file: hdfs://bigdataanalytics-head-0.mcs.local:8020/user/student898_2/input_csv_for_stream/product_list.csv
22/01/29 23:35:31 WARN csv.CSVDataSource: Number of column in CSV header is not equal to number of fields in the schema:
 Header length: 3, schema size: 2
CSV file: hdfs://bigdataanalytics-head-0.mcs.local:8020/user/student898_2/input_csv_for_stream/product_list3.csv
FINISHED BATCH LOADING. TIME = 20220129233529
I'M STILL ALIVE
I'M STILL ALIVE
I'M STILL ALIVE
I'M STILL ALIVE
I'M STILL ALIVE
I'M STILL ALIVE
^CTraceback (most recent call last):
  File "/home/student898_2/7.2_spark-submit_stable.py", line 38, in <module>
    stream.awaitTermination(9)
  File "/opt/spark-2.4.8/python/lib/pyspark.zip/pyspark/sql/streaming.py", line 101, in awaitTermination
  File "/opt/spark-2.4.8/python/lib/py4j-0.10.7-src.zip/py4j/java_gateway.py", line 1255, in __call__
  File "/opt/spark-2.4.8/python/lib/py4j-0.10.7-src.zip/py4j/java_gateway.py", line 985, in send_command
  File "/opt/spark-2.4.8/python/lib/py4j-0.10.7-src.zip/py4j/java_gateway.py", line 1152, in send_command
  File "/usr/lib64/python2.7/socket.py", line 447, in readline
    data = self._sock.recv(self._rbufsize)
  File "/opt/spark-2.4.8/python/lib/pyspark.zip/pyspark/context.py", line 270, in signal_handler
KeyboardInterrupt
[student898_2@bigdataanalytics-worker-3 ~]$ 
```



```
22/01/29 23:42:53 INFO executor.Executor: Starting executor ID driver on host localhost
22/01/29 23:42:53 INFO util.Utils: Successfully started service 'org.apache.spark.network.netty.NettyBlockTransferService' on port 39966.
22/01/29 23:42:53 INFO netty.NettyBlockTransferService: Server created on bigdataanalytics-worker-3.mcs.local:39966
22/01/29 23:42:53 INFO storage.BlockManager: Using org.apache.spark.storage.RandomBlockReplicationPolicy for block replication policy
22/01/29 23:42:53 INFO storage.BlockManagerMaster: Registering BlockManager BlockManagerId(driver, bigdataanalytics-worker-3.mcs.local, 39966, None)
22/01/29 23:42:53 INFO storage.BlockManagerMasterEndpoint: Registering block manager bigdataanalytics-worker-3.mcs.local:39966 with 366.3 MB RAM, BlockManager
Id(driver, bigdataanalytics-worker-3.mcs.local, 39966, None)
22/01/29 23:42:53 INFO storage.BlockManagerMaster: Registered BlockManager BlockManagerId(driver, bigdataanalytics-worker-3.mcs.local, 39966, None)
22/01/29 23:42:53 INFO storage.BlockManager: Initialized BlockManager: BlockManagerId(driver, bigdataanalytics-worker-3.mcs.local, 39966, None)
22/01/29 23:42:53 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@7127d93e{/metrics/json,null,AVAILABLE,@Spark}
22/01/29 23:42:54 INFO internal.SharedState: loading hive config file: file:/opt/spark-2.4.8/conf/hive-site.xml
22/01/29 23:42:54 INFO internal.SharedState: Setting hive.metastore.warehouse.dir ('null') to the value of spark.sql.warehouse.dir ('file:/home/student898_2/s
park-warehouse').
22/01/29 23:42:54 INFO internal.SharedState: Warehouse path is 'file:/home/student898_2/spark-warehouse'.
22/01/29 23:42:54 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@6efa7269{/SQL,null,AVAILABLE,@Spark}
22/01/29 23:42:54 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@281dffff{/SQL/json,null,AVAILABLE,@Spark}
22/01/29 23:42:54 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@4f6aaef0{/SQL/execution,null,AVAILABLE,@Spark}
22/01/29 23:42:54 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@13199f0{/SQL/execution/json,null,AVAILABLE,@Spark}
22/01/29 23:42:54 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@26636bfd{/static/sql,null,AVAILABLE,@Spark}
22/01/29 23:42:54 INFO state.StateStoreCoordinatorRef: Registered StateStoreCoordinator endpoint
22/01/29 23:42:55 WARN shortcircuit.DomainSocketFactory: The short-circuit local reads feature cannot be used because libhadoop cannot be loaded.
I'M STILL ALIVE
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I'M STILL ALIVE
I'M STILL ALIVE
I'M STILL ALIVE
I'M STILL ALIVE
I'M STILL ALIVE
^CTraceback (most recent call last):
  File "/home/student898_2/7.2_spark-submit_stable.py", line 39, in <module>
    stream.awaitTermination(9)
  File "/opt/spark-2.4.8/python/lib/pyspark.zip/pyspark/sql/streaming.py", line 101, in awaitTermination
  File "/opt/spark-2.4.8/python/lib/py4j-0.10.7-src.zip/py4j/java_gateway.py", line 1255, in __call__
  File "/opt/spark-2.4.8/python/lib/py4j-0.10.7-src.zip/py4j/java_gateway.py", line 985, in send_command
  File "/opt/spark-2.4.8/python/lib/py4j-0.10.7-src.zip/py4j/java_gateway.py", line 1152, in send_command
  File "/usr/lib64/python2.7/socket.py", line 447, in readline
    data = self._sock.recv(self._rbufsize)
  File "/opt/spark-2.4.8/python/lib/pyspark.zip/pyspark/context.py", line 270, in signal_handler
KeyboardInterrupt
[student898_2@bigdataanalytics-worker-3 ~]$ 
```
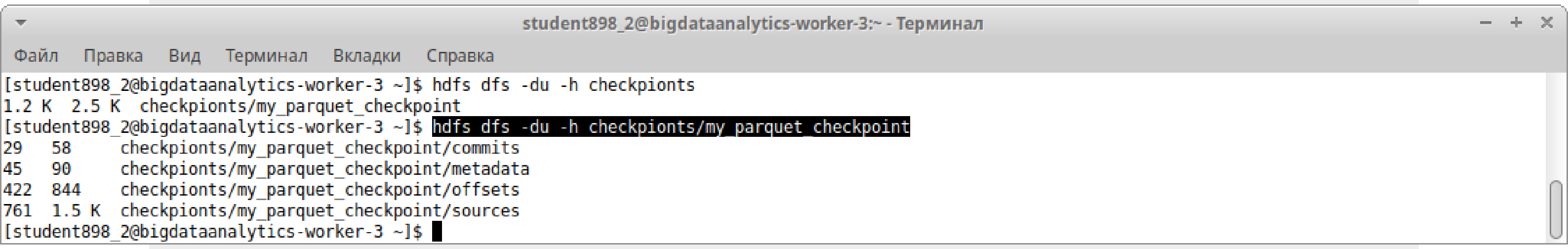
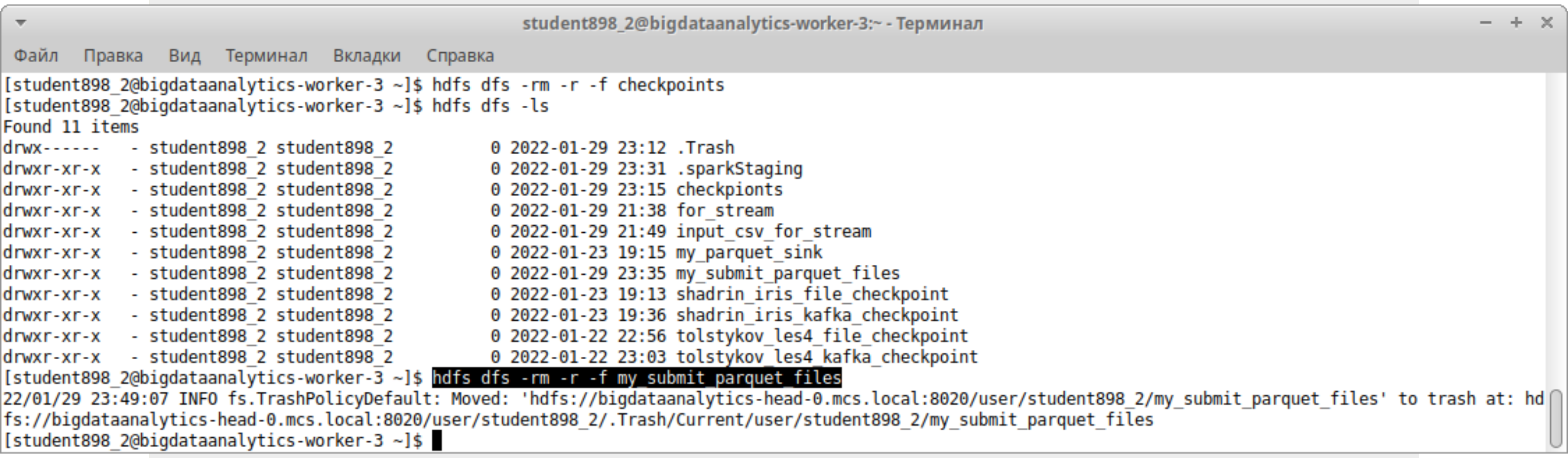

```
hdfs dfs -rm -r -f checkpoints
hdfs dfs -du -h checkpionts/my_parquet_checkpoint
```



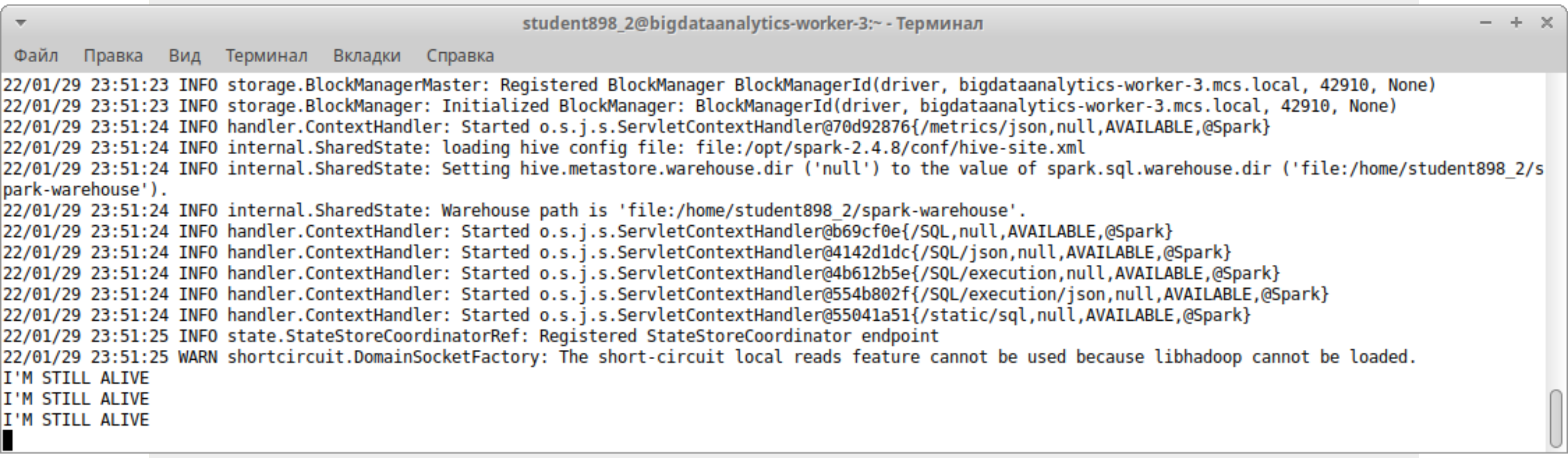
```
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -du -h checkpionts
1.2 K  2.5 K  checkpionts/my_parquet_checkpoint
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -du -h checkpionts/my_parquet_checkpoint
29   58     checkpionts/my_parquet_checkpoint/commits
45   90     checkpionts/my_parquet_checkpoint/metadata
422  844    checkpionts/my_parquet_checkpoint/offsets
761  1.5 K  checkpionts/my_parquet_checkpoint/sources
[student898_2@bigdataanalytics-worker-3 ~]$ 
```

```
hdfs dfs -rm -r -f checkpoints

hdfs dfs -rm -r -f my_submit_parquet_files
```



```
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -rm -r -f checkpoints
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -ls
Found 11 items
drwx------   - student898_2 student898_2          0 2022-01-29 23:12 .Trash
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 23:31 .sparkStaging
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 23:15 checkpionts
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:38 for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 21:49 input_csv_for_stream
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:15 my_parquet_sink
drwxr-xr-x   - student898_2 student898_2          0 2022-01-29 23:35 my_submit_parquet_files
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:13 shadrin_iris_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-23 19:36 shadrin_iris_kafka_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 22:56 tolstykov_les4_file_checkpoint
drwxr-xr-x   - student898_2 student898_2          0 2022-01-22 23:03 tolstykov_les4_kafka_checkpoint
[student898_2@bigdataanalytics-worker-3 ~]$ hdfs dfs -rm -r -f my_submit_parquet_files
22/01/29 23:49:07 INFO fs.TrashPolicyDefault: Moved: 'hdfs://bigdataanalytics-head-0.mcs.local:8020/user/student898_2/my_submit_parquet_files' to trash at: hd
fs://bigdataanalytics-head-0.mcs.local:8020/user/student898_2/.Trash/Current/user/student898_2/my_submit_parquet_files
[student898_2@bigdataanalytics-worker-3 ~]$ 
```

```
/opt/spark-2.4.8/bin/spark-submit 7.2_spark-submit_stable.py
```



```
22/01/29 23:51:23 INFO storage.BlockManagerMaster: Registered BlockManager BlockManagerId(driver, bigdataanalytics-worker-3.mcs.local, 42910, None)
22/01/29 23:51:23 INFO storage.BlockManager: Initialized BlockManager: BlockManagerId(driver, bigdataanalytics-worker-3.mcs.local, 42910, None)
22/01/29 23:51:24 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@70d92876{/metrics/json,null,AVAILABLE,@Spark}
22/01/29 23:51:24 INFO internal.SharedState: loading hive config file: file:/opt/spark-2.4.8/conf/hive-site.xml
22/01/29 23:51:24 INFO internal.SharedState: Setting hive.metastore.warehouse.dir ('null') to the value of spark.sql.warehouse.dir ('file:/home/student898_2/s
park-warehouse').
22/01/29 23:51:24 INFO internal.SharedState: Warehouse path is 'file:/home/student898_2/spark-warehouse'.
22/01/29 23:51:24 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@b69cf0e{/SQL,null,AVAILABLE,@Spark}
22/01/29 23:51:24 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@4142d1dc{/SQL/json,null,AVAILABLE,@Spark}
22/01/29 23:51:24 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@4b612b5e{/SQL/execution,null,AVAILABLE,@Spark}
22/01/29 23:51:24 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@554b802f{/SQL/execution/json,null,AVAILABLE,@Spark}
22/01/29 23:51:24 INFO handler.ContextHandler: Started o.s.j.s.ServletContextHandler@55041a51{/static/sql,null,AVAILABLE,@Spark}
22/01/29 23:51:25 INFO state.StateStoreCoordinatorRef: Registered StateStoreCoordinator endpoint
22/01/29 23:51:25 WARN shortcircuit.DomainSocketFactory: The short-circuit local reads feature cannot be used because libhadoop cannot be loaded.
I'M STILL ALIVE
I'M STILL ALIVE
I'M STILL ALIVE
```