

# BigData – Projekat 2

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# Kafka Producer App

- Pomoćna aplikacija koja čita vrstu po vrstu iz `emission_data.csv` fajla, na osnovu kojeg se kreira DTO objekat sa odgovarajućim atributima, koji se serijalizuje u JSON i šalje na kafka topic “traffic-data”.

```
public static void produceEvent(KafkaProducer<String, DataEntryDTO> producer, String topic, String lineCsv){
    DataEntryDTO dataObj = toDTOObject(lineCsv);
    ProducerRecord<String, DataEntryDTO> rec = new ProducerRecord<>(topic, dataObj.getKey(), dataObj);
    producer.send(rec);
    System.out.println("New event. Event key(Vehicle ID) = " + dataObj.getKey());
}

public static void main(String[] args) {
    if (args.length < 2) {
        System.out.println("Missing input parameters...");
        System.exit(1);
    }
    String inputPath = args[0];
    String topic = args[1];
    try (KafkaProducer<String, DataEntryDTO> producer = createProducer()) {
        File f = new File(inputPath + "/emission_data.csv");
        try (FileReader fr = new FileReader(f)) {
            try(BufferedReader rd = new BufferedReader(fr)){
                //skipping 1st line
                rd.readLine();
                String line = rd.readLine();
                while(line != null){
                    produceEvent(producer, topic, line);
                    line = rd.readLine();
                    Thread.sleep(1000);
                }
            }
            producer.close();
        }
    }
}
```

# Atributi klase DataEntryDTO

- Iako se ne koriste svi navedeni atributi ostavio sam neke po izboru.

```
public class DataEntryDTO implements Serializable {
```

```
    private int _timestep;  
    @JsonGetter("timestep")  
    public int getTimestep(){  
        return this._timestep;  
    }
```

```
    private float _vehicleCO;  
    @JsonGetter("vehicle_CO")  
    public float getVehicleCO(){  
        return this._vehicleCO;  
    }
```

```
    private float _vehicleCO2;  
    @JsonGetter("vehicle_CO2")  
    public float getVehicleCO2(){  
        return this._vehicleCO2;  
    }
```

```
    private float _vehicleHC;  
    @JsonGetter("vehicle_HC")  
    public float getVehicleHC(){  
        return this._vehicleHC;  
    }
```

```
    private float _vehicleNOx;  
    @JsonGetter("vehicle_NOx")  
    public float getVehicleNOx(){  
        return this._vehicleNOx;  
    }
```

```
public class DataEntryDTO implements Serializable {
```

```
    private float _vehiclePMx;  
    @JsonGetter("vehicle_PMx")  
    public float getVehiclePMx(){  
        return this._vehiclePMx;  
    }
```

```
    private float _vehicleFuel;  
    @JsonGetter("vehicle_fuel")  
    public float getVehicleFuel(){  
        return this._vehicleFuel;  
    }
```

```
    private String _vehicleID;  
    @JsonGetter("vehicle_id")  
    public String getVehicleID(){  
        return this._vehicleID;  
    }
```

```
    private String _vehicleLane;  
    @JsonGetter("vehicle_lane")  
    public String getVehicleLane(){  
        return this._vehicleLane;  
    }
```

```
    private float _vehicleNoise;  
    @JsonGetter("vehicle_noise")  
    public float getVehicleNoise(){  
        return this._vehicleNoise;  
    }
```

```
public class DataEntryDTO implements Serializable {
```

```
    private String _vehicleType;  
    @JsonGetter("vehicle_type")  
    public String getVehicleType(){  
        return this._vehicleType;  
    }
```

```
    private boolean _waiting;  
    @JsonGetter("vehicle_waiting")  
    public boolean getVehicleWaiting(){  
        return this._waiting;  
    }
```

```
    private float _vehicleX;  
    @JsonGetter("vehicle_x")  
    public float getVehicleX(){  
        return this._vehicleX;  
    }
```

```
    private float _vehicleY;  
    @JsonGetter("vehicle_y")  
    public float getVehicleY(){  
        return this._vehicleY;  
    }
```

# Spark Structured Streaming

- Komande za pokretanje (nalazimo se u folderu projekta – “BigData-Projekat2”)

`docker build --rm -f spark-streaming-app ./SparkStreamingApp/`

`docker compose -f ./SparkStreaming/docker-compose.yml up -d --scale spark-worker=2`

```
uros@uros-A5-X1:~/Master/BigData/Projekti/Projekat2$ docker compose -f ./SparkStreaming/docker-compose.yml up -d --scale spark-worker=2
```

```
[+] Running 9/13
  ... Network mobility_infr          Created
  ... Volume "sparkstreaming_kafka_data" Created
  ... Volume "sparkstreaming_cassandra_data1" Created
  ... Volume "sparkstreaming_zookeeper_data" Created
  ... Container cassandra-1          Healthy
  ... Container spark                Started
  ... Container sparkstreaming-spark-worker-2 Started
  ... Container sparkstreaming-spark-worker-1 Started
  ... Container zookeeper            Started
  ... Container kafka                Started
  ... Container init-cassandra       Exited
  ... Container consumer-app         Started
  ... Container init-kafka           Started
```

```
uros@uros-A5-X1:~/Master/BigData/Projekti/Projekat2$ docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
053a5b31a70b	consumer-app	"python -u /consumer..."	About a minute ago	Up 9 seconds		consumer-app
727101428c18	bitnami/kafka:latest	"/opt/bitnami/script..."	About a minute ago	Up About a minute	9092/tcp, 0.0.0.0:9094->9094/tcp, :::9094->9094/tcp	kafka
821bdc4c57a8	cassandra:latest	"docker-entrypoint.s..."	About a minute ago	Up About a minute (healthy)	7000-7001/tcp, 7199/tcp, 9042/tcp, 9160/tcp	cassandra-1
3b13ca19574f	bitnami/spark:latest	"/opt/bitnami/script..."	About a minute ago	Up About a minute	0.0.0.0:8080->8080/tcp, :::8080->8080/tcp	spark
7c5de96147a2	bitnami/spark:latest	"/opt/bitnami/script..."	About a minute ago	Up About a minute		sparkstreaming-spark-worker-1
8b17a9243491	bitnami/zookeeper:latest	"/opt/bitnami/script..."	About a minute ago	Up About a minute	2888/tcp, 3888/tcp, 0.0.0.0:2181->2181/tcp, :::2181->2181/tcp, 8080/tcp	zookeeper
b230d5ac572e	bitnami/spark:latest	"/opt/bitnami/script..."	About a minute ago	Up About a minute		sparkstreaming-spark-worker-2

```
uros@uros-A5-X1:~/Master/BigData/Projekti/Projekat2$
```

# Spark Structured Streaming

```
docker run -d --name spark-streaming-app -p 4040:4040 --network mobility_infr -e  
SPARK_STREAMING_APP_ARGS_WINDOW_SIZE=1_minute -e  
SPARK_STREAMING_APP_ARGS_WINDOW_SLIDE=20_seconds spark-streaming-app
```

- Napomena: Argumenti `window_size` i `window_slide` moraju da se navedu u formatu “duration”\_“time\_unit”, kao na primeru iznad (npr. 1\_minute, 5\_minutes, 10\_seconds, itd.)

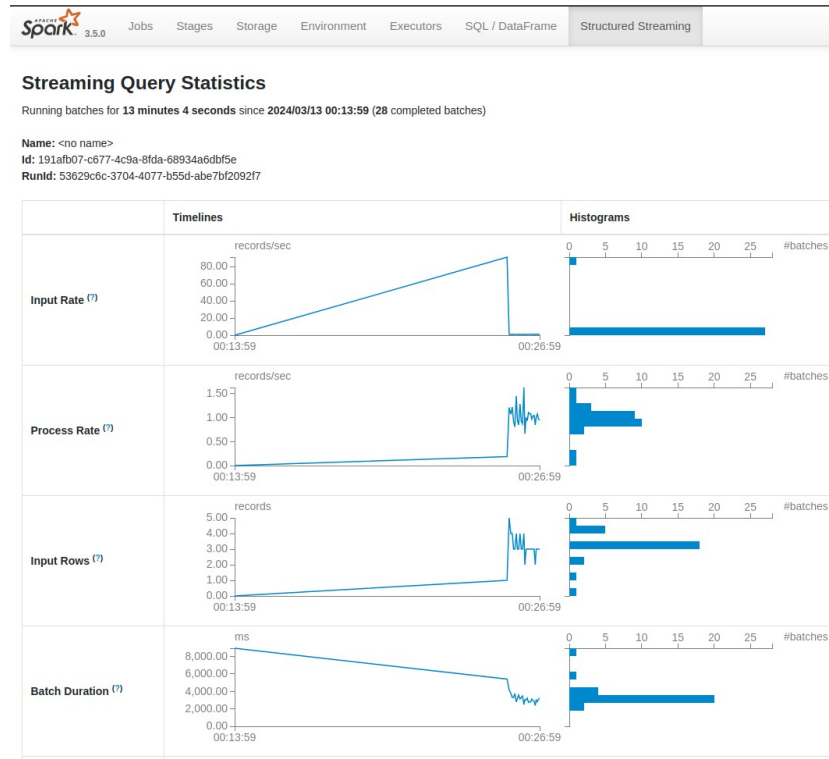
```
java -jar ./SUMODDataProducer/SUMODDataProducer.jar ./SUMODDataProducer/input traffic_data
```

- Pokrećemo KafkaProducer aplikaciju koja je “zapakovana” kao jar fajl. Potrebno je navesti putanju do input foldera i ime topica na koji se podaci šalju (kako je u obe streaming aplikacija ime topica “traffic\_data”, u data producer aplikaciji ne treba dirati ovaj parametar)

```
uros@uros-A5-X1:~/Master/BigData/Projekti/Projekat$ java -jar ./SUMODDataProducer/SUMODDataProducer.jar ./SUMODDataProducer/input traffic_data  
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".  
SLF4J: Defaulting to no-operation (NOP) logger implementation  
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.  
New event. Event key(Vehicle ID) = bus0  
New event. Event key(Vehicle ID) = motorcycle0  
New event. Event key(Vehicle ID) = veh0  
New event. Event key(Vehicle ID) = bus0  
New event. Event key(Vehicle ID) = motorcycle0  
New event. Event key(Vehicle ID) = veh0  
New event. Event key(Vehicle ID) = veh1  
New event. Event key(Vehicle ID) = bus0  
New event. Event key(Vehicle ID) = motorcycle0  
New event. Event key(Vehicle ID) = veh0  
New event. Event key(Vehicle ID) = veh1  
New event. Event key(Vehicle ID) = veh2  
New event. Event key(Vehicle ID) = veh3
```

# Rezultati

- Napomena: U Spark Streaming aplikaciji je moguće izostaviti argument `window_slide` i tada ćemo imati tumbling prozore veličine `window_size`



# Rezultati

- Komandomo `docker run --rm -it --network mobility_infr nuvo/docker-cqlsh cqlsh cassandra-1 9042 --cqlversion=3.4.6` je moguće dobiti interaktivni shell za izvršavanje upita nad bazom u kojoj su smešteni rezultati obrade. Keyspace se zove *mobility*, ime familije kolona je *traffic\_data*.

```
uros@uros-A5-X1:~/Master/BigData/Projekti/Projekat2$ docker run --rm -it --network mobility_infr nuvo/docker-cqlsh cqlsh cassandra-1 9042 --cqlversion=3.4.6
```

```
Connected to Test Cluster at cassandra-1:9042.
```

```
[cqlsh 5.0.1 | Cassandra 4.1.3 | CQL spec 3.4.6 | Native protocol v5]
```

```
Use HELP for help.
```

```
cqlsh> use mobility;
```

```
cqlsh:mobility> select * from traffic_data;
```

id	agg_type	lane	sum_co	sum_co2	sum_fuel	sum_hc	sum_nox	sum_pmx	time_from	time_to	vehicle_count	zone
198e3d7a-bf55-43ad-a657-92c44e3f850b	lane_agg	669874507_0	null	null	null	null	null	null	2024-03-13T00:25:40.000Z	2024-03-13T00:26:40.000Z	2	null
758c4e80-fe99-47d3-a318-e5f6e04ee295	lane_agg	-173493700#2_0	null	null	null	null	null	null	2024-03-13T00:25:20.000Z	2024-03-13T00:26:20.000Z	3	null
aa86d88b-d7db-47d6-9c20-498c5aff743f7	pollution_agg	null	2362.47998	1.4188e+05	45036.80859	46.1	732.549999	20.54	2024-03-13T00:25:40.000Z	2024-03-13T00:26:40.000Z	null	SE
f8f1bc96-8fea-47b4-b539-cf7735d70f9f	lane_agg	734712582#2_0	null	null	null	null	null	null	2024-03-13T00:25:40.000Z	2024-03-13T00:26:40.000Z	3	null
9ea7d83b-1912-4a05-a675-41f95a2bc5c4	lane_agg	61072226#0_0	null	null	null	null	null	null	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	4	null
decd2d91-5ac7-4891-8219-3e8f9cb2f6bc	lane_agg	260124785#3_1	null	null	null	null	null	null	2024-03-13T00:25:20.000Z	2024-03-13T00:26:20.000Z	4	null
129ee1b7-ec4f-4b3b-bc18-96d055f69d70	lane_agg	-48820562#4_0	null	null	null	null	null	null	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	1	null
a59c6724-b8ba-4ce7-83a6-1e242eb95912	lane_agg	571469975#2_0	null	null	null	null	null	null	2024-03-13T00:25:20.000Z	2024-03-13T00:26:20.000Z	1	null
9726da26-6ce4-4cc0-a6ec-0f12667c6281	lane_agg	:650854042_4_0	null	null	null	null	null	null	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	1	null
ec6d23b9-7907-4e40-a13c-51a298b1fa81	lane_agg	:97839381_1_0	null	null	null	null	null	null	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	1	null
9d2c6a26-587f-447c-90ef-8c05b7f5a8b3	lane_agg	49292938#4_0	null	null	null	null	null	null	2024-03-13T00:25:40.000Z	2024-03-13T00:26:40.000Z	5	null
b8f841b4-8865-439c-a74c-807458450e12	lane_agg	734712582#2_0	null	null	null	null	null	null	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	4	null
da126417-1433-470c-b81a-3b9c517d85b9	lane_agg	741245822#0_0	null	null	null	null	null	null	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	4	null
7a8a43f5-6304-4b06-91e4-8e3a71c4c35c	lane_agg	48651788#0_0	null	null	null	null	null	null	2024-03-13T00:25:00.000Z	2024-03-13T00:26:00.000Z	5	null
e0f884da-d884-481e-9bcb-2eed8882d68	pollution_agg	null	434.20001	48477.49219	15407.83008	17.49	218.14	7.07	2024-03-13T00:25:20.000Z	2024-03-13T00:26:20.000Z	null	NW
29db426e-5a0f-4ebb-9073-6f7110506f76	pollution_agg	null	80.66	23579.46875	7476.08008	14.75	184.49001	6.05	2024-03-13T00:25:40.000Z	2024-03-13T00:26:40.000Z	null	SW
796fea29-5d84-480e-9008-2d2795c6a778	lane_agg	-173493700#2_0	null	null	null	null	null	null	2024-03-13T00:25:00.000Z	2024-03-13T00:26:00.000Z	1	null
2dc6671d-7e95-4b19-be7e-b842cc7350e0	lane_agg	23182833#1_0	null	null	null	null	null	null	2024-03-13T00:25:40.000Z	2024-03-13T00:26:40.000Z	1	null
9fc85500-835f-4777-9d03-7728aaa94e88	lane_agg	50033135#1_0	null	null	null	null	null	null	2024-03-13T00:25:20.000Z	2024-03-13T00:26:20.000Z	2	null
7e8882ea-4011-44ba-8cd3-be4742a6ba45	lane_agg	741245822#0_0	null	null	null	null	null	null	2024-03-13T00:25:00.000Z	2024-03-13T00:26:00.000Z	1	null
68955be8-0f31-4b24-b14c-5d33da222d0d	lane_agg	44463548_0	null	null	null	null	null	null	2024-03-13T00:25:20.000Z	2024-03-13T00:26:20.000Z	6	null
e23e4d18-e475-4d84-b58c-4fb6aec55a5d	lane_agg	49292938#4_0	null	null	null	null	null	null	2024-03-13T00:25:00.000Z	2024-03-13T00:26:00.000Z	4	null
1d9f206f-1602-4d87-bc38-074979b24e23	lane_agg	61072226#0_0	null	null	null	null	null	null	2024-03-13T00:25:20.000Z	2024-03-13T00:26:20.000Z	4	null
42d75918-449f-4ee2-967d-19f8f797c979	lane_agg	571469975#2_0	null	null	null	null	null	null	2024-03-13T00:25:00.000Z	2024-03-13T00:26:00.000Z	1	null
61fa48a4-3718-44fc-a31c-4d37262760b8	pollution_agg	null	2750.19995	1.2289e+05	39043.85938	44.55	558.06	18.11	2024-03-13T00:25:20.000Z	2024-03-13T00:26:20.000Z	null	SE
fe147c3b-1090-48a7-ba53-c9de400407fc	pollution_agg	null	672.95001	61658.21094	19546.96094	25.54	413.5	11.02	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	null	NW
5d0e687a-4e97-427a-bfe3-e72fde613ed4	lane_agg	48651788#0_0	null	null	null	null	null	null	2024-03-13T00:25:40.000Z	2024-03-13T00:26:40.000Z	5	null
38adb59e-36f1-4521-920e-589bd92e40cc	lane_agg	48651788#0_0	null	null	null	null	null	null	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	3	null
31f1376e-ba5b-4654-b6bd-1279c8b42728	pollution_agg	0	2287.16992	729.51001	0.03	0.69	0.01	0.01	2024-03-13T00:25:00.000Z	2024-03-13T00:26:00.000Z	null	SW
b2e8bb8e-ce2d-45c8-aeff-aab871875337	lane_agg	23182833#1_0	null	null	null	null	null	null	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	2	null
bce36a60-1fbc-47fc-ba04-7f71f2571844	pollution_agg	null	633.31	20245.91016	6425.19971	12.33	131.7	4.71	2024-03-13T00:24:40.000Z	2024-03-13T00:25:40.000Z	null	SE
0081841b-9b9a-46f0-b0ba-01dd9b9ef9444	lane_agg	668697837#0_0	null	null	null	null	null	null	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	2	null
30161e1f-b9b0-41c0-9fe3-56273548e6bd	pollution_agg	null	1351.05005	1.0253e+05	32520.16992	31.58	590.46997	14.8	2024-03-13T00:26:00.000Z	2024-03-13T00:27:00.000Z	null	SE

# Flink Streaming

- Komande za pokretanje (nalazimo se u folderu projekta – “BigData-Projekat2”)

`docker compose -f ./FlinkStreaming/docker-compose.yml up -d --scale taskmanager=2`

```
uros@uros-A5-X1:~/Master/BigData/Projekti/Projekat2$ docker compose -f ./FlinkStreaming/docker-compose.yml up -d --scale taskmanager=2
[+] Running 9/13
  :: Network mobility_infr      Created
  :: Volume "flinkstreaming_zookeeper_data" Created
  :: Volume "flinkstreaming_kafka_data" Created
  :: Volume "flinkstreaming_cassandra_data1" Created
  ✓ Container cassandra-1      Healthy
  ✓ Container jobmanager       Started
  ✓ Container zookeeper        Started
  ✓ Container init-cassandra    Exited
  ✓ Container kafka            Started
  ✓ Container flinkstreaming-taskmanager-2 Started
  ✓ Container flinkstreaming-taskmanager-1 Started
  ✓ Container consumer-app      Started
  ✓ Container init-kafka        Started
uros@uros-A5-X1:~/Master/BigData/Projekti/Projekat2$ docker ps
```

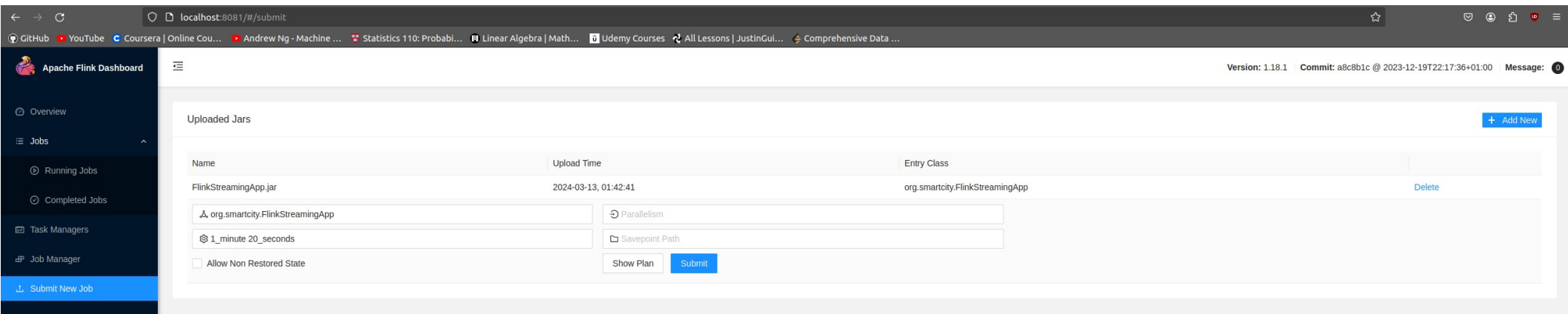
CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
350bc7d16669	consumer-app	"python -u /consumer..."	About a minute ago	Up 9 seconds		consumer-app
3d16e3972aa2	flink:1.18.1-java8	"/docker-entrypoint..."	About a minute ago	Up About a minute	6123/tcp, 8081/tcp	flinkstreaming-taskmanager-1
43a1cd2f69a3	flink:1.18.1-java8	"/docker-entrypoint..."	About a minute ago	Up About a minute	6123/tcp, 8081/tcp	flinkstreaming-taskmanager-2
fc636b0ca02e	bitnami/kafka:latest	"/opt/bitnami/script..."	About a minute ago	Up About a minute	9092/tcp, 0.0.0.0:9094->9094/tcp, :::9094->9094/tcp	kafka
382b47c3daa5	flink:1.18.1-java8	"/docker-entrypoint..."	About a minute ago	Up About a minute	6123/tcp, 0.0.0.0:8081->8081/tcp, :::8081->8081/tcp	jobmanager
b5a84e1df4dc	bitnami/zookeeper:latest	"/opt/bitnami/script..."	About a minute ago	Up About a minute	2888/tcp, 3888/tcp, 0.0.0.0:2181->2181/tcp, :::2181->2181/tcp, 8080/tcp	zookeeper
b8a351b14fd9	cassandra:latest	"docker-entrypoint.s..."	About a minute ago	Up About a minute (healthy)	7000-7001/tcp, 7199/tcp, 9042/tcp, 9160/tcp	cassandra-1

```
uros@uros-A5-X1:~/Master/BigData/Projekti/Projekat2$
```



# Flink Streaming

- Aplikacija se submit-uje preko web-interfejsa na adresi “localhost:8081”. Putanja do jar fajla aplikacije je  
BigData-Projekat2/FlinkStreaming/FlinkStreamingApp/out/artifacts/FlinkStreamingApp\_jar/  
FlinkStreamingApp.jar



- Napomena: U Flink streaming aplikaciji je moguće navesti samo jedan argument, čime dobijamo tumbling prozore definisane veličine

# Rezultati

- Nakon što pokrenemo streaming aplikaciju, istim komandama od malopre možemo pokrenuti DataProducer aplikaciju, a zatim vršiti upite nad bazom.

Overview

Jobs

Running Jobs

Completed Jobs

Task Managers

Job Manager

Submit New Job

Athens StreamingData

Cancel Job

Job ID	27a54498183bfb24c7553f223d183d89	Job State	<span>RUNNING</span> 4	Actions	<a href="#">Job Manager Log</a>
Start Time	2024-03-13 01:47:06	Duration	15s		

Overview Exceptions TimeLine Checkpoints Configuration

```
graph LR; S["Source: SUMODataSource -> Filter -> Process  
Parallelism: 1  
Backpressured (max): 0%  
Busy (max): 0%"] -- HASH --> SW1["SlidingEventTimeWindows -> Sink: Writer -> Sink: Committer  
Parallelism: 1  
Backpressured (max): 0%  
Busy (max): 0%"]; S -- HASH --> SW2["SlidingEventTimeWindows  
Parallelism: 1  
Backpressured (max): 0%  
Busy (max): 0%"]; SW1 -- HASH --> SW3["SlidingEventTimeWindows -> Sink: Writer -> Sink: Committer  
Parallelism: 1  
Backpressured (max): 0%  
Busy (max): 0%"]; SW2 -- HASH --> SW3;
```

Name	Status	Bytes Received	Records Received	Bytes Sent	Records Sent	Parallelism	Start Time	Duration	End Time	Tasks
Source: SUMODataSource -> Filter -> Process	<span>RUNNING</span>	0 B	0	0 B	0	1	2024-03-13 01:47:07	15s	—	1
SlidingEventTimeWindows -> Sink: Writer -> Sink: Committer	<span>RUNNING</span>	4 B	0	0 B	0	1	2024-03-13 01:47:07	15s	—	1
SlidingEventTimeWindows	<span>RUNNING</span>	4 B	0	0 B	0	1	2024-03-13 01:47:07	15s	—	1
SlidingEventTimeWindows -> Sink: Writer -> Sink: Committer	<span>RUNNING</span>	4 B	0	0 B	0	1	2024-03-13 01:47:07	15s	—	1

# Rezultati

```
cqlsh> use mobility;  
cqlsh:mobility> select * from traffic_data;
```

id	agg_type	lane	sum_co	sum_co2	sum_fuel	sum_hc	sum_nox	sum_pmx	time_from	time_to	vehicle_count	zone
fea894bf-d2a9-46b8-bc47-6a04c140e47c	pollution_agg	null	748.75	61829.25	19615.33008	25.32	377.99002	10.57	2024 03 13 00:49:20	2024 03 13 00:50:20	null	NW
c6a121d2-5a17-4dff-971e-0b0a20a3691f	lane_agg	44463548_0	null	null	null	null	null	null	2024 03 13 00:48:20	2024 03 13 00:49:20	4	null
572902d4-78ae-425c-b32c-b455fd4c8fcf	pollution_agg	null	1343.78003	94669.53125	30032.67773	30.57	538.04999	13.96	2024 03 13 00:49:20	2024 03 13 00:50:20	null	SE
3f3f2e2e-d3cd-4fc4-a849-8dfad26c3717	pollution_agg	null	34.31	11343.36914	3603.14014	4.99	62.52	2.03	2024 03 13 00:48:40	2024 03 13 00:49:40	null	SW
27053e02-43fc-4ffc-b651-f8fb5baef256	lane_agg	1033862865#0_0	null	null	null	null	null	null	2024 03 13 00:49:20	2024 03 13 00:50:20	8	null
b2d0d2d2-b184-4680-95d4-324761e28c98	lane_agg	48651788#0_0	null	null	null	null	null	null	2024 03 13 00:48:40	2024 03 13 00:49:40	6	null
fe0541f7-67b5-4cd0-b2ed-ebca65afe7b3	pollution_agg	null	252.53	44383.60156	14078.99023	21.44	292.01001	8.68	2024 03 13 00:49:20	2024 03 13 00:50:20	null	SW
41f5bd9d-9c38-47fd-afb4-cfd247341813	pollution_agg	null	2750.19971	1.2289e+05	39043.85938	44.55	558.06006	18.11	2024 03 13 00:48:40	2024 03 13 00:49:40	null	SE
9f4fea91-82e8-4080-8c0f-c4f06abf2292	pollution_agg	null	626.28998	12337.32031	3935.21973	3.13	5.56	0.3	2024 03 13 00:48:20	2024 03 13 00:49:20	null	NE
ce616ea6-f8bf-40c6-8636-7ac5feb60077	pollution_agg	null	345.32001	41786.60156	13273.73926	16.91	215.73999	6.92	2024 03 13 00:48:40	2024 03 13 00:49:40	null	NW
b74bf91b-c5d6-4018-a980-7bcb5b38015	pollution_agg	null	2548.10986	98073.41406	28644.77148	32.06	332.44	12.39	2024 03 13 00:48:20	2024 03 13 00:49:20	null	SE
82657064-a9b6-44aa-8da5-c2fic2de4a92	pollution_agg	null	625.88	63313.46094	20108.03906	24.04	326.94	9.91	2024 03 13 00:49:00	2024 03 13 00:50:00	null	NW
69e0b874-742b-4897-ae0f-14dc23c0d94f	pollution_agg	null	220.69	21342.21094	6792.31006	6.18	66	2.36	2024 03 13 00:48:20	2024 03 13 00:49:20	null	NW
f014371c-6eb6-4354-b1c4-fc7c722798f3	pollution_agg	null	1670.42993	75525.75781	24089.40039	9.34	31.85	1.48	2024 03 13 00:49:20	2024 03 13 00:50:20	null	NE
5f7027e6-d9c4-4bd4-8d4b-364e8adb9b3b	pollution_agg	null	2962.88965	1.4319e+05	45471.58984	51.82	712.26007	21.79	2024 03 13 00:49:00	2024 03 13 00:50:00	null	SE
7f28c785-372d-4571-b88f-b75a7ac27f93	pollution_agg	null	1889.73999	59872.22656	19096.8418	9.95	26.04	1.26	2024 03 13 00:49:00	2024 03 13 00:50:00	null	NE
b3e7bb2e-2d42-4430-9d23-f70a2f8e54a6	pollution_agg	null	1215.51001	30704.67969	9793.66992	6.25	13.67	0.7	2024 03 13 00:48:40	2024 03 13 00:49:40	null	NE
ae155b15-ee12-4c85-9aba-30c443c4bd62	pollution_agg	null	60.49	18293.35938	5804.97021	9.9	123.74001	4.04	2024 03 13 00:49:00	2024 03 13 00:50:00	null	SW
1431a6ed-5de4-46d7-9a25-90e84f520b6	lane_agg	48651788#0_0	null	null	null	null	null	null	2024 03 13 00:49:00	2024 03 13 00:50:00	7	null

```
(19 rows)  
cqlsh:mobility>
```