Kalyan Big Data Projects – Project 4
How To Stream CSV Data Into Hadoop Using Apache Flume - Kafka Source

Pre-Requisites of Flume Project:

hadoop-2.6.0
flume-1.6.0
kafka-0.9.0
java-1.7

NOTE: Make sure that install all the above components

Flume Project Download Links:

`hadoop-2.6.0.tar.gz` ==> link
(https://archive.apache.org/dist/hadoop/core/hadoop-2.6.0/hadoop-2.6.0.tar.gz)

`apache-flume-1.6.0-bin.tar.gz` ==> link
(https://archive.apache.org/dist/flume/1.6.0/apache-flume-1.6.0-bin.tar.gz)

`kafka_2.11-0.9.0.0.tgz` ==> link
(https://archive.apache.org/dist/kafka/0.9.0.0/kafka_2.11-0.9.0.0.tgz)

`kalyan-bigdata-examples.jar` ==> link
(https://github.com/kalyanhadooptraining/kalyan-bigdata-realtime-projects/blob/master/kalyan/kalyan-bigdata-examples.jar)

`kalyan-kafka-source-agent.conf` ==> link
(https://github.com/kalyanhadooptraining/kalyan-bigdata-realtime-projects/blob/master/kafka/project4-flume-kafka-source/kalyan-kafka-source-agent.conf)

Learnings of this Project:

- We will learn Flume Configurations and Commands
- Flume Agent
  1. Source (Kafka Source)
  2. Channel (Memory Channel)
  3. Sink (Hdfs Sink)
- We will learn Kafka Configurations and Commands
- Kafka Information
  1. Kalyan Util (CSV data generator)
  2. Kafka Producer (Listen on CSV data)
  3. Kafka Consumer (Recieves the data from Kafka Producer)
  4. Flume Kafka Source (Will Send the Kafka Producer data to Flume Channel)
- Major project in Real Time `Product Log Analysis`
  1. We are extracting the data from server logs
  2. This data will be useful to do analysis on product views
  3. CSV is the output format
- We can use hive / pig / mapreduce to analyze this data
  1. explore hive query to analysis
  2. explore pig scripts to analysis
  3. explore mapreduce to analysis

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1. create "**kalyan-kafka-source-agent.conf**" file with below content

```
agent.sources = KAFKA
agent.channels = MemChannel
agent.sinks = HDFS

agent.sources.KAFKA.type = org.apache.flume.source.kafka.KafkaSource
agent.sources.KAFKA.kafka.bootstrap.servers = localhost:9092
agent.sources.KAFKA.kafka.topics.regex = ^flume-topic[0-9]$
agent.sources.KAFKA.channels = MemChannel

agent.sinks.HDFS.type = hdfs
agent.sinks.HDFS.channel = MemChannel
agent.sinks.HDFS.hdfs.path = hdfs://localhost:8020/user/kafka/messages
agent.sinks.HDFS.hdfs.fileType = DataStream
agent.sinks.HDFS.hdfs.writeFormat = Text
agent.sinks.HDFS.hdfs.batchSize = 100
agent.sinks.HDFS.hdfs.rollSize = 0
agent.sinks.HDFS.hdfs.rollCount = 100
agent.sinks.HDFS.hdfs.useLocalTimeStamp = true

agent.channels.MemChannel.type = memory
agent.channels.MemChannel.capacity = 1000
agent.channels.MemChannel.transactionCapacity = 100
```

2. Copy "**kalyan-kafka-source-agent.conf**" file into "**$FUME_HOME/conf**" folder

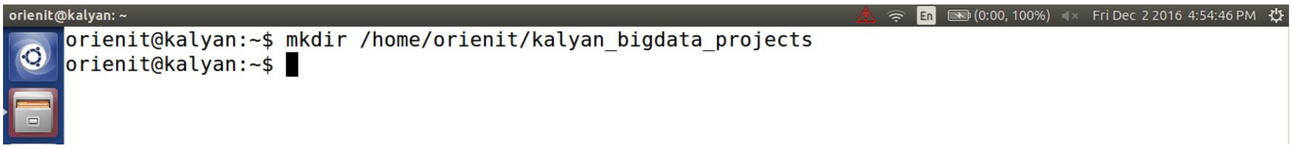
3. Generate Large Amount of Sample CSV data follow this article.

(http://kalyanbigdatatraining.blogspot.com/2016/12/how-to-generate-large-amount-of-sample.html)

4. Follow below steps...

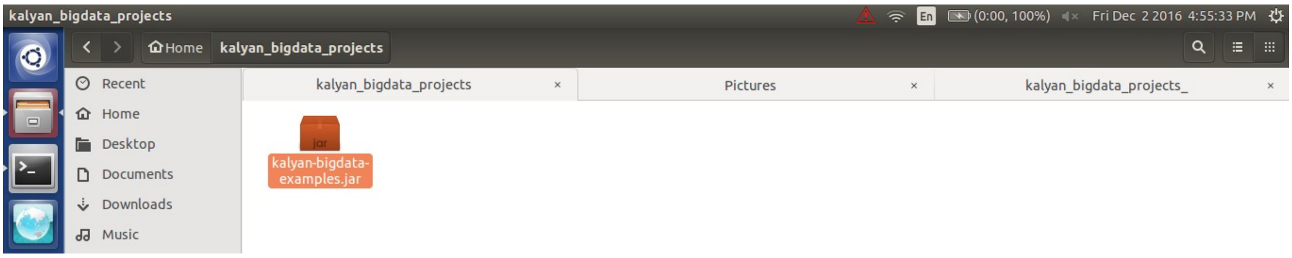
i) Create '**kalyan_bigdata_projects**' folder in **user home** (i.e **/home/orienit**)

Command: *mkdir /home/orienit/kalyan_bigdata_projects*



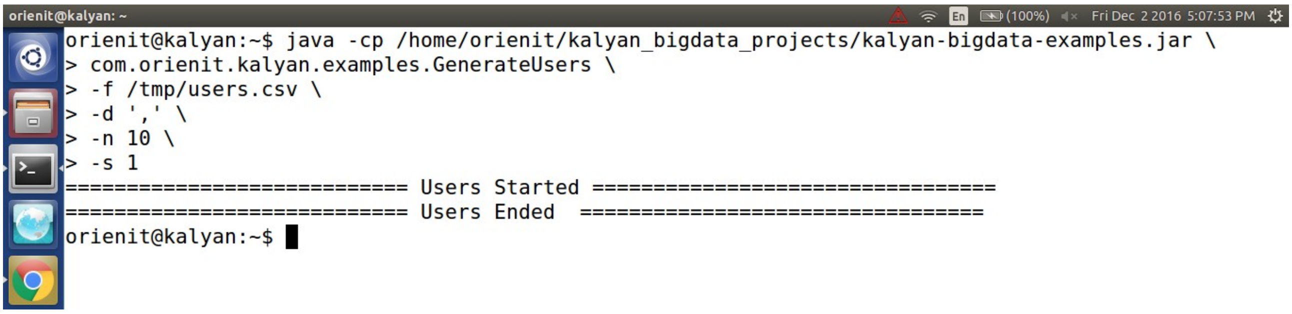
```
orienit@kalyan:~$ mkdir /home/orienit/kalyan_bigdata_projects
orienit@kalyan:~$ 
```

ii) Copy '**kalyan-bigdata-examples.jar**' jar file into '**/home/orienit/kalyan_bigdata_projects**' folder



iii) Execute Below Command to Generate Sample CSV data with 100 lines. Increase this number to get more data ...

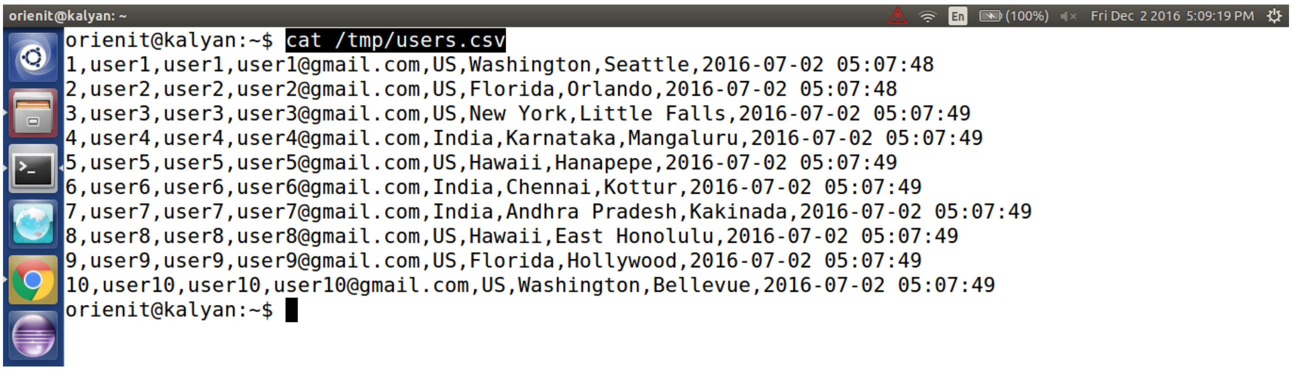
java -cp /home/orienit/kalyan_bigdata_projects/kalyan-bigdata-examples.jar \
com.orienit.kalyan.examples.GenerateUsers \
-f /tmp/users.csv \
-d ',' \
-n 10 \
-s 1



```
orienit@kalyan:~$ java -cp /home/orienit/kalyan_bigdata_projects/kalyan-bigdata-examples.jar \
> com.orienit.kalyan.examples.GenerateUsers \
> -f /tmp/users.csv \
> -d ',' \
> -n 10 \
> -s 1
============================ Users Started =================================
============================ Users Ended  =================================
orienit@kalyan:~$ 
```

5. Verify the Sample CSV data in Console, using below command

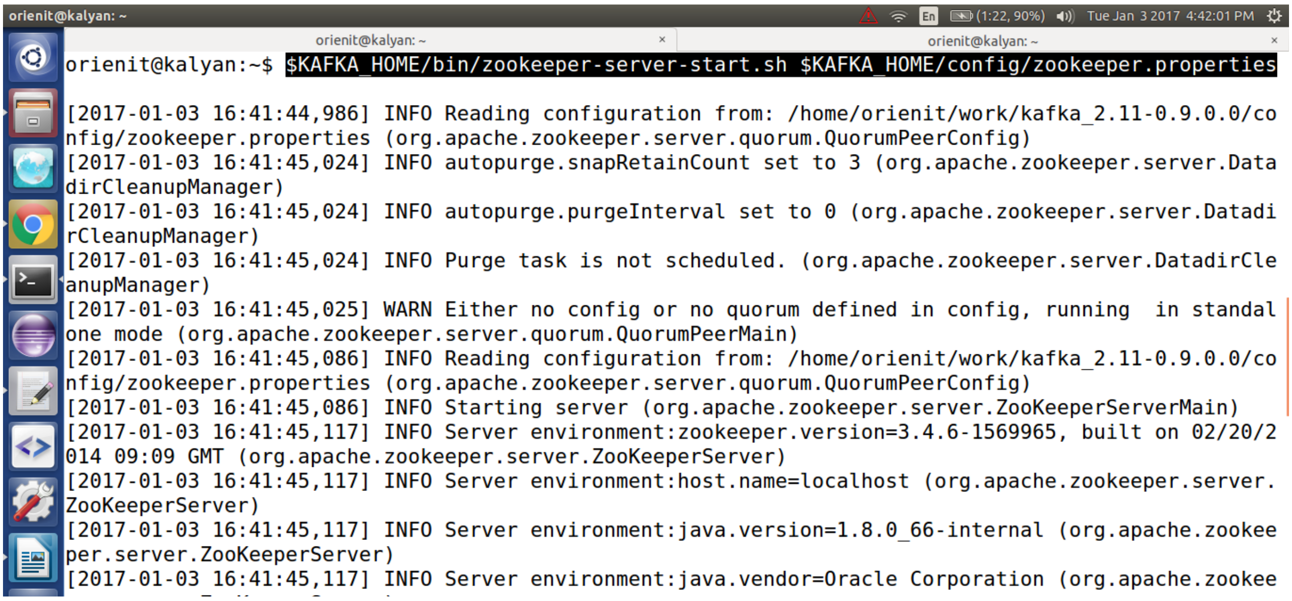
cat /tmp/users.csv



```
orienit@kalyan:~$ cat /tmp/users.csv
1,user1,user1,user1@gmail.com,US,Washington,Seattle,2016-07-02 05:07:48
2,user2,user2,user2@gmail.com,US,Florida,Orlando,2016-07-02 05:07:48
3,user3,user3,user3@gmail.com,US,New York,Little Falls,2016-07-02 05:07:49
4,user4,user4,user4@gmail.com,India,Karnataka,Mangaluru,2016-07-02 05:07:49
5,user5,user5,user5@gmail.com,US,Hawaii,Hanapepe,2016-07-02 05:07:49
6,user6,user6,user6@gmail.com,India,Chennai,Kottur,2016-07-02 05:07:49
7,user7,user7,user7@gmail.com,India,Andhra Pradesh,Kakinada,2016-07-02 05:07:49
8,user8,user8,user8@gmail.com,US,Hawaii,East Honolulu,2016-07-02 05:07:49
9,user9,user9,user9@gmail.com,US,Florida,Hollywood,2016-07-02 05:07:49
10,user10,user10,user10@gmail.com,US,Washington,Bellevue,2016-07-02 05:07:49
orienit@kalyan:~$ 
```

6. Start the `**zookeeper**` using below command (New Terminal)

$KAFKA_HOME/bin/zookeeper-server-start.sh $KAFKA_HOME/config/zookeeper.properties

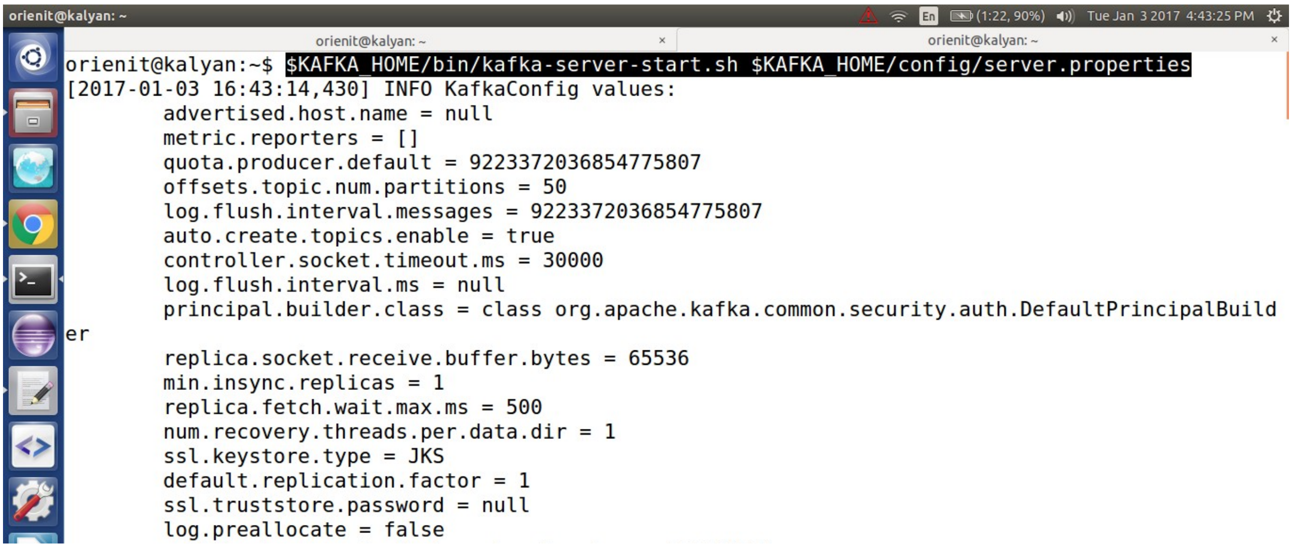


```
orienit@kalyan:~$ $KAFKA_HOME/bin/zookeeper-server-start.sh $KAFKA_HOME/config/zookeeper.properties

[2017-01-03 16:41:44,986] INFO Reading configuration from: /home/orienit/work/kafka_2.11-0.9.0.0/co
nfig/zookeeper.properties (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2017-01-03 16:41:45,024] INFO autopurge.snapRetainCount set to 3 (org.apache.zookeeper.server.Data
dirCleanupManager)
[2017-01-03 16:41:45,024] INFO autopurge.purgeInterval set to 0 (org.apache.zookeeper.server.Datadi
rCleanupManager)
[2017-01-03 16:41:45,024] INFO Purge task is not scheduled. (org.apache.zookeeper.server.DatadirCle
anupManager)
[2017-01-03 16:41:45,025] WARN Either no config or no quorum defined in config, running  in standal
one mode (org.apache.zookeeper.server.quorum.QuorumPeerMain)
[2017-01-03 16:41:45,086] INFO Reading configuration from: /home/orienit/work/kafka_2.11-0.9.0.0/co
nfig/zookeeper.properties (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2017-01-03 16:41:45,086] INFO Starting server (org.apache.zookeeper.server.ZooKeeperServerMain)
[2017-01-03 16:41:45,117] INFO Server environment:zookeeper.version=3.4.6-1569965, built on 02/20/2
014 09:09 GMT (org.apache.zookeeper.server.ZooKeeperServer)
[2017-01-03 16:41:45,117] INFO Server environment:host.name=localhost (org.apache.zookeeper.server.
ZooKeeperServer)
[2017-01-03 16:41:45,117] INFO Server environment:java.version=1.8.0_66-internal (org.apache.zookee
per.server.ZooKeeperServer)
[2017-01-03 16:41:45,117] INFO Server environment:java.vendor=Oracle Corporation (org.apache.zookee
```

7. Start the `**kafka server**` using below command (New Terminal)

$KAFKA_HOME/bin/kafka-server-start.sh $KAFKA_HOME/config/server.properties



```
orienit@kalyan:~$ $KAFKA_HOME/bin/kafka-server-start.sh $KAFKA_HOME/config/server.properties
[2017-01-03 16:43:14,430] INFO KafkaConfig values:
        advertised.host.name = null
        metric.reporters = []
        quota.producer.default = 9223372036854775807
        offsets.topic.num.partitions = 50
        log.flush.interval.messages = 9223372036854775807
        auto.create.topics.enable = true
        controller.socket.timeout.ms = 30000
        log.flush.interval.ms = null
        principal.builder.class = class org.apache.kafka.common.security.auth.DefaultPrincipalBuild
er
        replica.socket.receive.buffer.bytes = 65536
        min.insync.replicas = 1
        replica.fetch.wait.max.ms = 500
        num.recovery.threads.per.data.dir = 1
        ssl.keystore.type = JKS
        default.replication.factor = 1
        ssl.truststore.password = null
        log.preallocate = false
```

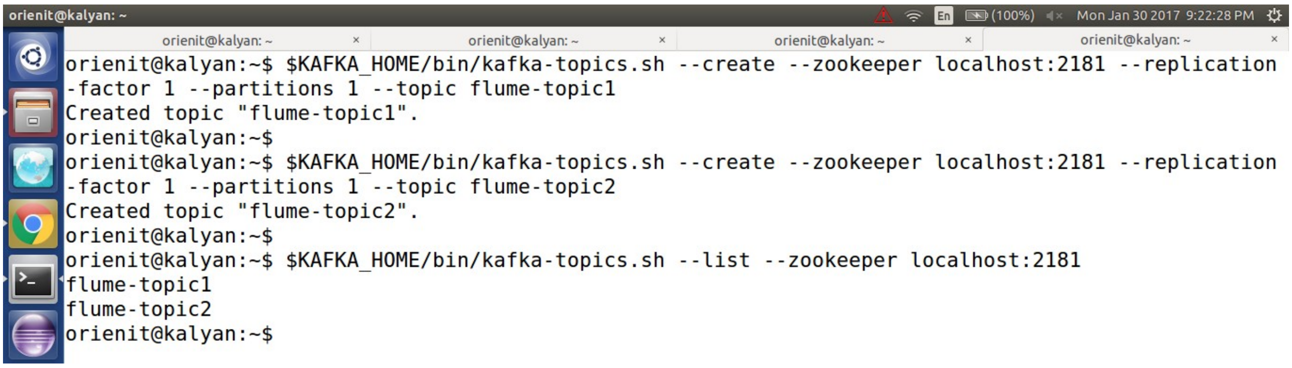
8. Create a `**flume-topic1 & flume-topic2**` topics using below command (New Terminal)

$KAFKA_HOME/bin/kafka-topics.sh --create --zookeeper localhost:2181 --replication-factor 1 --partitions 1 --topic flume-topic1

$KAFKA_HOME/bin/kafka-topics.sh --create --zookeeper localhost:2181 --replication-factor 1 --partitions 1 --topic flume-topic2

9. List out all the topics

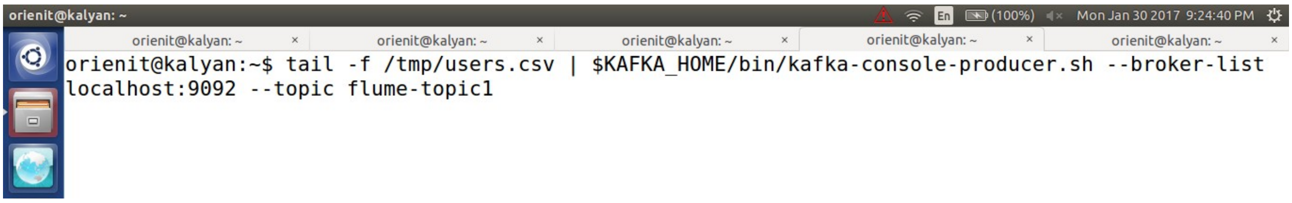
$KAFKA_HOME/bin/kafka-topics.sh --list --zookeeper localhost:2181



```
orienit@kalyan:~$ $KAFKA_HOME/bin/kafka-topics.sh --create --zookeeper localhost:2181 --replication
-factor 1 --partitions 1 --topic flume-topic1
Created topic "flume-topic1".
orienit@kalyan:~$
orienit@kalyan:~$ $KAFKA_HOME/bin/kafka-topics.sh --create --zookeeper localhost:2181 --replication
-factor 1 --partitions 1 --topic flume-topic2
Created topic "flume-topic2".
orienit@kalyan:~$
orienit@kalyan:~$ $KAFKA_HOME/bin/kafka-topics.sh --list --zookeeper localhost:2181
flume-topic1
flume-topic2
orienit@kalyan:~$
```

10. Start the `**kafka producer**` using below command (New Terminal)

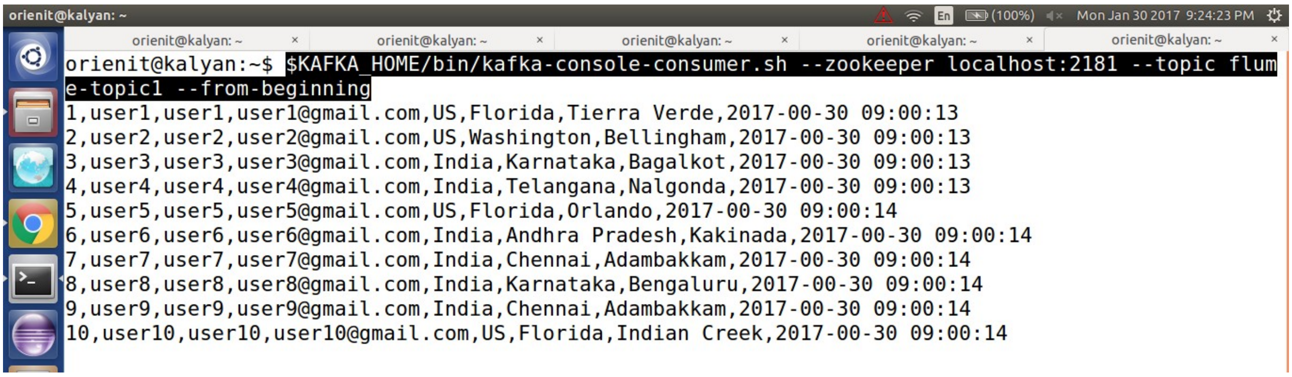
tail -f /tmp/users.csv | $KAFKA_HOME/bin/kafka-console-producer.sh --broker-list localhost:9092 --topic flume-topic1



```
orienit@kalyan:~$ tail -f /tmp/users.csv | $KAFKA_HOME/bin/kafka-console-producer.sh --broker-list
localhost:9092 --topic flume-topic1
```

11. Start the `**kafka consumer**` using below command (New Terminal)

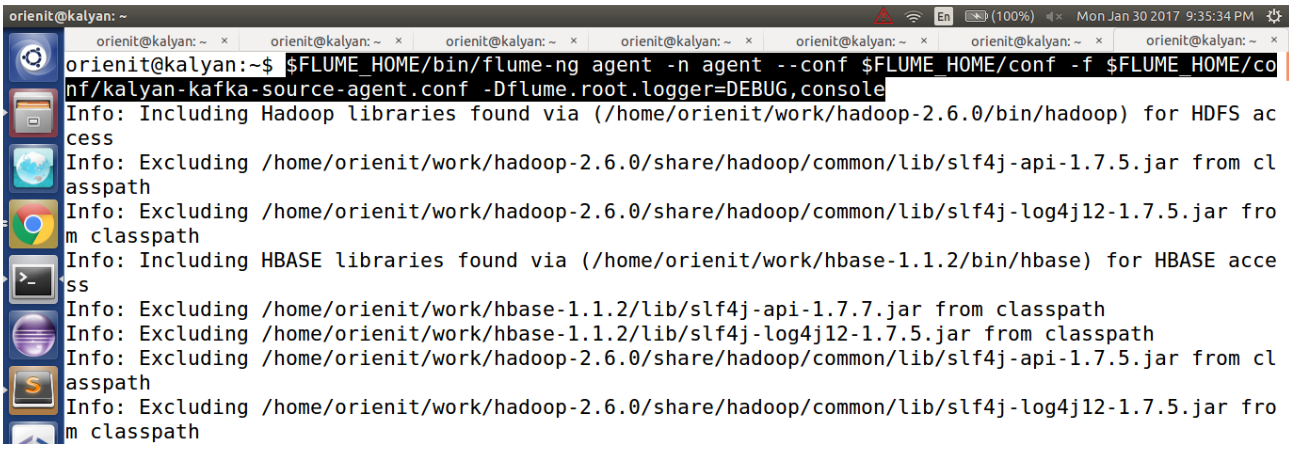
$KAFKA_HOME/bin/kafka-console-consumer.sh --zookeeper localhost:2181 --topic flume-topic1 --from-beginning



```
orienit@kalyan:~$ $KAFKA_HOME/bin/kafka-console-consumer.sh --zookeeper localhost:2181 --topic flum
e-topic1 --from-beginning
1,user1,user1,user1@gmail.com,US,Florida,Tierra Verde,2017-00-30 09:00:13
2,user2,user2,user2@gmail.com,US,Washington,Bellingham,2017-00-30 09:00:13
3,user3,user3,user3@gmail.com,India,Karnataka,Bagalkot,2017-00-30 09:00:13
4,user4,user4,user4@gmail.com,India,Telangana,Nalgonda,2017-00-30 09:00:13
5,user5,user5,user5@gmail.com,US,Florida,Orlando,2017-00-30 09:00:14
6,user6,user6,user6@gmail.com,India,Andhra Pradesh,Kakinada,2017-00-30 09:00:14
7,user7,user7,user7@gmail.com,India,Chennai,Adambakkam,2017-00-30 09:00:14
8,user8,user8,user8@gmail.com,India,Karnataka,Bengaluru,2017-00-30 09:00:14
9,user9,user9,user9@gmail.com,India,Chennai,Adambakkam,2017-00-30 09:00:14
10,user10,user10,user10@gmail.com,US,Florida,Indian Creek,2017-00-30 09:00:14
```

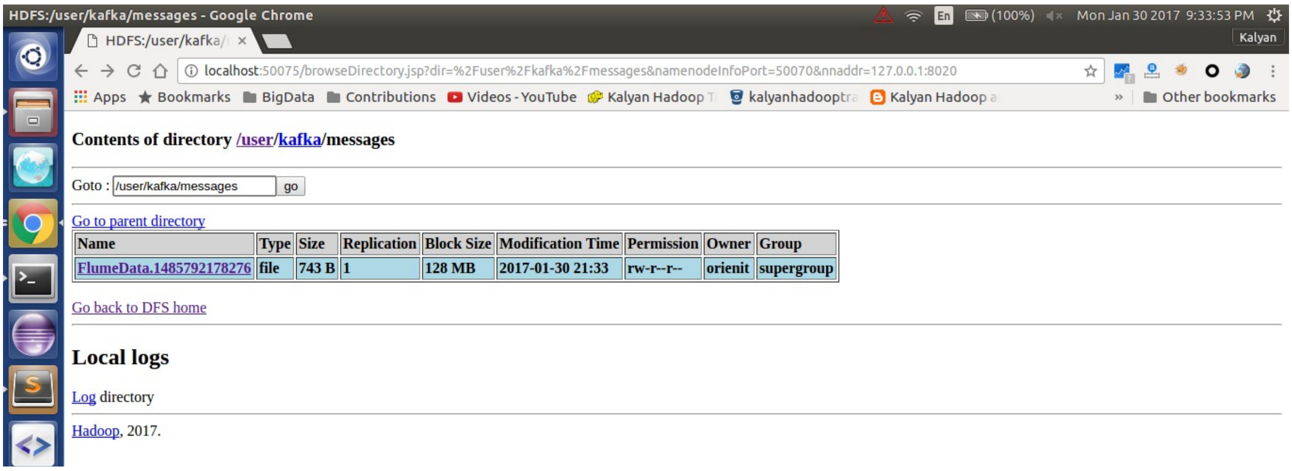
12. Execute the below command to `**Extract data from CSV into KAFKA using Flume**`

$FLUME_HOME/bin/flume-ng agent -n agent --conf $FLUME_HOME/conf -f $FLUME_HOME/conf/kalyan-kafka-source-agent.conf -Dflume.root.logger=DEBUG,console



```
orienit@kalyan:~$ $FLUME_HOME/bin/flume-ng agent -n agent --conf $FLUME_HOME/conf -f $FLUME_HOME/co
nf/kalyan-kafka-source-agent.conf -Dflume.root.logger=DEBUG,console
Info: Including Hadoop libraries found via (/home/orienit/work/hadoop-2.6.0/bin/hadoop) for HDFS ac
cess
Info: Excluding /home/orienit/work/hadoop-2.6.0/share/hadoop/common/lib/slf4j-api-1.7.5.jar from cl
asspath
Info: Excluding /home/orienit/work/hadoop-2.6.0/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar fro
m classpath
Info: Including HBASE libraries found via (/home/orienit/work/hbase-1.1.2/bin/hbase) for HBASE acce
ss
Info: Excluding /home/orienit/work/hbase-1.1.2/lib/slf4j-api-1.7.7.jar from classpath
Info: Excluding /home/orienit/work/hbase-1.1.2/lib/slf4j-log4j12-1.7.5.jar from classpath
Info: Excluding /home/orienit/work/hadoop-2.6.0/share/hadoop/common/lib/slf4j-api-1.7.5.jar from cl
asspath
Info: Excluding /home/orienit/work/hadoop-2.6.0/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar fro
m classpath
```

13. Verify the data in hdfs location is "**hdfs://localhost:8020/user/kafka/messages**"



HDFS:/user/kafka/messages - Google Chrome

localhost:50075/browseDirectory.jsp?dir=%2Fuser%2Fkafka%2Fmessages&namenodeInfoPort=50070&nnaddr=127.0.0.1:8020

Contents of directory /user/kafka/messages

Goto : /user/kafka/messages

Go to parent directory

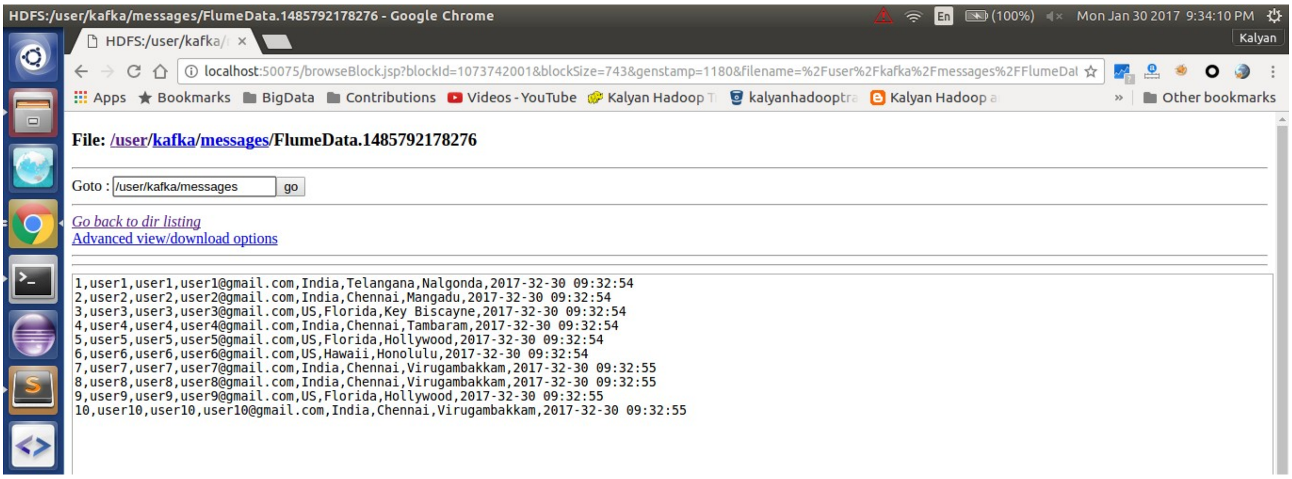
Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
FlumeData.1485792178276	file	743 B	1	128 MB	2017-01-30 21:33	rw-r--r--	orienit	supergroup

Go back to DFS home

Local logs

Log directory

Hadoop, 2017.



HDFS:/user/kafka/messages/FlumeData.1485792178276 - Google Chrome

localhost:50075/browseBlock.jsp?blockId=1073742001&blockSize=743&genstamp=1180&filename=%2Fuser%2Fkafka%2Fmessages%2FFlumeDat

File: /user/kafka/messages/FlumeData.1485792178276

Goto : /user/kafka/messages

Go back to dir listing
Advanced view/download options

```
1,user1,user1,user1@gmail.com,India,Telangana,Nalgonda,2017-32-30 09:32:54
2,user2,user2,user2@gmail.com,India,Chennai,Mangadu,2017-32-30 09:32:54
3,user3,user3,user3@gmail.com,US,Florida,Key Biscayne,2017-32-30 09:32:54
4,user4,user4,user4@gmail.com,India,Chennai,Tambaram,2017-32-30 09:32:54
5,user5,user5,user5@gmail.com,US,Florida,Hollywood,2017-32-30 09:32:54
6,user6,user6,user6@gmail.com,US,Hawaii,Honolulu,2017-32-30 09:32:54
7,user7,user7,user7@gmail.com,India,Chennai,Virugambakkam,2017-32-30 09:32:55
8,user8,user8,user8@gmail.com,India,Chennai,Virugambakkam,2017-32-30 09:32:55
9,user9,user9,user9@gmail.com,US,Florida,Hollywood,2017-32-30 09:32:55
10,user10,user10,user10@gmail.com,India,Chennai,Virugambakkam,2017-32-30 09:32:55
```