```
#Running on Colab
!pip install pyspark
!pip install -U -q PyDrive
!apt install openjdk-8-jdk-headless -qq
import os
os.environ['JAVA_HOME'] = '/usr/lib/jvm/java-8-openjdk-amd64'
```

```
Building wheels for collected packages: pyspark
  Building wheel for pyspark (setup.py) ... done
  Created wheel for pyspark: filename=pyspark-3.5.1-py2.py3-none-any.whl size=317488491 sha256=aa6a86f89ae0b799de37b72dcc524a6c0e31e4dda423de9cfe5361e5638252be
  Stored in directory: /root/.cache/pip/wheels/80/1d/60/2c256ed38dddce2fdd93be545214a63e02fbd8d74fb0b7f3a6
Successfully built pyspark
Installing collected packages: pyspark
Successfully installed pyspark-3.5.1
The following additional packages will be installed:
  libxtst6 openjdk-8-jre-headless
Suggested packages:
  openjdk-8-demo openjdk-8-source libnss-mdns fonts-dejavu-extra fonts-nanum fonts-ipafont-gothic
  fonts-ipafont-mincho fonts-wqy-microhei fonts-wqy-zenhei fonts-indic
The following NEW packages will be installed:
  libxtst6 openjdk-8-jdk-headless openjdk-8-jre-headless
0 upgraded, 3 newly installed, 0 to remove and 45 not upgraded.
Need to get 39.7 MB of archives.
After this operation, 144 MB of additional disk space will be used.
Selecting previously unselected package libxtst6:amd64.
(Reading database ... 121920 files and directories currently installed.)
Preparing to unpack .../libxtst6_2%3a1.2.3-1build4_amd64.deb ...
Unpacking libxtst6:amd64 (2:1.2.3-1build4) ...
Selecting previously unselected package openjdk-8-jre-headless:amd64.
Preparing to unpack .../openjdk-8-jre-headless_8u402-ga-2ubuntu1~22.04_amd64.deb ...
Unpacking openjdk-8-jre-headless:amd64 (8u402-ga-2ubuntu1~22.04) ...
Selecting previously unselected package openjdk-8-jdk-headless:amd64.
Preparing to unpack .../openjdk-8-jdk-headless_8u402-ga-2ubuntu1~22.04_amd64.deb ...
Unpacking openjdk-8-jdk-headless:amd64 (8u402-ga-2ubuntu1~22.04) ...
Setting up libxtst6:amd64 (2:1.2.3-1build4) ...
Setting up openjdk-8-jre-headless:amd64 (8u402-ga-2ubuntu1~22.04) ...
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/orbd to provide /usr/bin/orbd (orbd) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/servertool to provide /usr/bin/servertool (servertool) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/tnameserv to provide /usr/bin/tnameserv (tnameserv) in auto mode
Setting up openjdk-8-jdk-headless:amd64 (8u402-ga-2ubuntu1~22.04) ...
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/clhsdb to provide /usr/bin/clhsdb (clhsdb) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/extcheck to provide /usr/bin/extcheck (extcheck) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/hsdb to provide /usr/bin/hsdb (hsdb) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/idlj to provide /usr/bin/idlj (idlj) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/javah to provide /usr/bin/javah (javah) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jhat to provide /usr/bin/jhat (jhat) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jsadebugd to provide /usr/bin/jsadebugd (jsadebugd) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/native2ascii to provide /usr/bin/native2ascii (native2ascii) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/schemagen to provide /usr/bin/schemagen (schemagen) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/wsgen to provide /usr/bin/wsgen (wsgen) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/wsimport to provide /usr/bin/wsimport (wsimport) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/xjc to provide /usr/bin/xjc (xjc) in auto mode
Processing triggers for libc-bin (2.35-0ubuntu3.4) ...
/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_5.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_0.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc.so.2 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc_proxy.so.2 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbb.so.12 is not a symbolic link
```

```
#  Importing Required Libraries
import pyspark
from pyspark.sql import *
from pyspark.sql.functions import *
from pyspark import SparkContext, SparkConf

# Create Spark session and ContextRun PySpark.
# create the session
conf = SparkConf().set("spark.ui.port","4050")
# create the context
sc = pyspark.SparkContext(conf=conf)
spark = SparkSession.builder.appName("DataFrame").config('spark.ui.port', '4050').getOrCreate()
spark
```

**SparkSession - in-memory**

**SparkContext**

Spark UI

Version
v3.5.1
Master
local[*]
AppName
pyspark-shell

```
# Read the file and create the RDD
rdd1 = sc.textFile('file.txt').map(lambda line: (line.split('->')[0], line.split('->')[1].split(',')))

# Invert the matrix
inverted_rdd = rdd1.flatMap(lambda x: [(y, x[0]) for y in x[1]])

# Group by key
grouped_rdd = inverted_rdd.groupByKey()

# Collect the results
inverted_matrix = grouped_rdd.collect()

# Print the inverted matrix
for item in inverted_matrix:
    print(item[0] + " points to: " + ", ".join(item[1]))
```

```
 4 points to: 1, 2
 1 points to: 3
 0 points to: 4
 2 points to: 1, 5, 7
 3 points to: 2, 6
 6 points to: 5
```

```
# Read the file and create the RDD
rdd1 = sc.textFile('file.txt').map(lambda line: (line.split('->')[0], line.split('->')[1].split(',')))

# Invert the matrix
inverted_rdd = rdd1.map(lambda x: [(y, x[0]) for y in x[1]]) #map here is wrong
inverted_rdd.collect()
```

```
[[('2', '1'), ('4', '1')],
 [('3', '2'), ('4', '2')],
 [('1', '3')],
 [('0', '4')],
 [('6', '5'), ('2', '5')],
 [('3', '6')],
 [('2', '7')]]
```

```
# Read the file and create the RDD
rdd1 = sc.textFile('file.txt').map(lambda line: (line.split('->')[0], line.split('->')[1].split(',')))

# Invert the matrix
inverted_rdd = rdd1.flatMap(lambda x: [(y, x[0]) for y in x[1]]) #map here is wrong
inverted_rdd.collect()
```

```
[('2', '1'),
 ('4', '1'),
 ('3', '2'),
 ('4', '2'),
 ('1', '3'),
 ('0', '4'),
 ('6', '5'),
 ('2', '5'),
 ('3', '6'),
 ('2', '7')]
```