

the class/function where you have made your change: (in the iteration part)

```
pageRank = contribs.reduceByKey(new RankAdjust()).mapValues(sum -> (1-  
beta)/numOfPages.value() + sum * beta);
```

start Spark master node:


```
选择命令提示符 - spark-class org.apache.spark.deploy.master.Master
Microsoft Windows [版本 10.0.18363.900]
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C:\Users\89762>spark-class org.apache.spark.deploy.master.Master
Using Spark's default log4j profile: org/apache/spark/log4j-defaults.properties
20/07/01 02:38:11 INFO Master: Started daemon with process name: 13988@hp
20/07/01 02:38:12 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java cl
asses where applicable
20/07/01 02:38:12 INFO SecurityManager: Changing view acls to: 89762
20/07/01 02:38:12 INFO SecurityManager: Changing modify acls to: 89762
20/07/01 02:38:12 INFO SecurityManager: Changing view acls groups to:
20/07/01 02:38:12 INFO SecurityManager: Changing modify acls groups to:
20/07/01 02:38:12 INFO SecurityManager: SecurityManager: authentication disabled; ui acls disabled; users with view per
missions: Set(89762); groups with view permissions: Set(); users with modify permissions: Set(89762); groups with modif
y permissions: Set()
20/07/01 02:38:15 INFO Utils: Successfully started service 'sparkMaster' on port 7077.
20/07/01 02:38:15 INFO Master: Starting Spark master at spark://192.168.56.1:7077
20/07/01 02:38:15 INFO Master: Running Spark version 2.4.6
20/07/01 02:38:15 INFO Utils: Successfully started service 'MasterUI' on port 8080.
20/07/01 02:38:15 INFO MasterWebUI: Bound MasterWebUI to 0.0.0.0, and started at http://hp:8080
20/07/01 02:38:15 INFO Master: I have been elected leader! New state: ALIVE
```

← → ↺ ⬆

localhost:8080

☆ OFF

 **Spark Master at spark://192.168.56.1:7077**

URL: spark://192.168.56.1:7077
Alive Workers: 0
Cores in use: 0 Total, 0 Used
Memory in use: 0.0 B Total, 0.0 B Used
Applications: 0 Running, 0 Completed
Drivers: 0 Running, 0 Completed
Status: ALIVE

Workers (0)

Worker Id	Address	State	Cores	Memory
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Running Applications (0)

Application ID	Name	Cores	Memory per Executor	Submitted Time	User	State	Duration
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Completed Applications (0)


Application ID	Name	Cores	Memory per Executor	Submitted Time	User	State	Duration
----------------	------	-------	---------------------	----------------	------	-------	----------

start a worker node:

```
命令提示符 - spark-class org.apache.spark.deploy.master.Master
Microsoft Windows [版本 10.0.18363.900]
(c) 2019 Microsoft Corporation。保留所有权利。

C:\Users\89762>spark-class org.apache.spark.deploy.master.Master
Using Spark's default log4j profile: org/apache/spark/log4j-defaults.properties
20/07/01 03:00:34 INFO Master: Started daemon with process name: 13320@hp
20/07/01 03:00:35 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
20/07/01 03:00:35 INFO SecurityManager: Changing view acls to: 89762
20/07/01 03:00:35 INFO SecurityManager: Changing modify acls to: 89762
20/07/01 03:00:35 INFO SecurityManager: Changing view acls groups to:
20/07/01 03:00:35 INFO SecurityManager: Changing modify acls groups to:
20/07/01 03:00:35 INFO SecurityManager: SecurityManager: authentication disabled; ui acls disabled; users with view permissions: Set(89762); groups with view permissions: Set(); users with modify permissions: Set(89762); groups with modify permissions: Set()
20/07/01 03:00:38 INFO Utils: Successfully started service 'sparkMaster' on port 7077.
20/07/01 03:00:38 INFO Master: Starting Spark master at spark://192.168.56.1:7077
20/07/01 03:00:38 INFO Master: Running Spark version 2.4.6
20/07/01 03:00:38 INFO Master: Successfully started service 'MasterUI' on port 8080.
20/07/01 03:00:38 INFO MasterWebUI: Bound MasterWebUI to 0.0.0.0, and started at http://hp:8080
20/07/01 03:00:39 INFO Master: I have been elected leader! New state: ALIVE
20/07/01 03:01:04 INFO Master: Registering worker 192.168.56.1:62684 with 8 cores, 15.0 GB RAM
```

← → ↺ 🏠 ⓘ localhost:8080

 **Spark Master at spark://192.168.56.1:7077**

URL: spark://192.168.56.1:7077

Alive Workers: 1

Cores in use: 8 Total, 0 Used

Memory in use: 15.0 GB Total, 0.0 B Used

Applications: 0 [Running](#), 0 [Completed](#)

Drivers: 0 Running, 0 Completed

Status: ALIVE

Workers (1)

Worker Id	Address	State	Cores	Memory
worker-20200701030103-192.168.56.1-62684	192.168.56.1:62684	ALIVE	8 (0 Used)	15.0 GB (0.0 B Used)

Running Applications (0)

Application ID	Name	Cores	Memory per Executor	Submitted Time	User	State	Duration
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Completed Applications (0)

Application ID	Name	Cores	Memory per Executor	Submitted Time	User	State	Duration
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submit the job, and the result of running the job:

```
C:\Users\89762>spark-submit --class SparkPageRank --master spark://hostIP:7077 SparkPageRank.jar
20/07/01 03:02:59 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java cl
asses where applicable
Using Spark's default log4j profile: org/apache/spark/log4j-defaults.properties
20/07/01 03:02:59 INFO SparkContext: Running Spark version 2.4.6
20/07/01 03:02:59 INFO SparkContext: Submitted application: SparkAverage
20/07/01 03:02:59 INFO SecurityManager: Changing view acls to: 89762
20/07/01 03:02:59 INFO SecurityManager: Changing modify acls to: 89762
20/07/01 03:02:59 INFO SecurityManager: Changing view acls groups to:
20/07/01 03:02:59 INFO SecurityManager: Changing modify acls groups to:
20/07/01 03:02:59 INFO SecurityManager: SecurityManager: authentication disabled; ui acls disabled; users with view per
missions: Set(89762); groups with view permissions: Set(); users with modify permissions: Set(89762); groups with modif
y permissions: Set()
20/07/01 03:02:59 INFO SecurityManager: SecurityManager: authentication disabled; ui acls disabled; users with view per
missions: Set(89762); groups with view permissions: Set(); users with modify permissions: Set(89762); groups with modif
y permissions: Set()
links has [4] elements
[(B,[A,D]),(D,[B,C]),(A,[B,C,D]),(C,[C])]
pageRank has [4] elements
[(B,0.25),(D,0.25),(A,0.25),(C,0.25)]
pageRank has [4] elements
[(B,0.21458333333333332),(D,0.21458333333333332),(A,0.14375),(C,0.42708333333333332)]
pageRank has [4] elements
[(B,0.16942708333333334),(D,0.16942708333333334),(A,0.12869791666666666),(C,0.53244791666666666)]
pageRank has [4] elements
[(B,0.14597092013888888),(D,0.14597092013888888),(A,0.10950651041666667),(C,0.59855164930555555)]
pageRank has [4] elements
[(B,0.13056448567708331),(D,0.13056448567708331),(A,0.09953764105902776),(C,0.6393333875868055)]
pageRank has [4] elements
[(B,0.12119223804615162),(D,0.12119223804615162),(A,0.0929899064127604),(C,0.6646256174949362)]
pageRank has [4] elements
[(B,0.11535384131989654),(D,0.11535384131989654),(A,0.08900670116961443),(C,0.6802856161905922)]
pageRank has [4] elements
[(B,0.11174394789234679),(D,0.11174394789234679),(A,0.08652538256095603),(C,0.6899867216543502)]
pageRank has [4] elements
[(B,0.10950670291318493),(D,0.10950670291318493),(A,0.08499117785424738),(C,0.6959954163193824)]
pageRank has [4] elements
[(B,0.10812118246347369),(D,0.10812118246347369),(A,0.08404034873810359),(C,0.6997172863349487)]
pageRank has [4] elements
[(B,0.10726293468943901),(D,0.10726293468943901),(A,0.08345150254697631),(C,0.7020226280741454)]
pageRank has altogether [4] elements
[(B,0.10726293468943901),(D,0.10726293468943901),(A,0.08345150254697631),(C,0.7020226280741454)]
```