## Load HVAC.csv file into temporary table

```
= spark.read.csv("/user/spark/#VAC.csv").toWf("date","time","targettemp","actualtemp","system","systemage
scala> val
,"buildid")
nvacDF: org.apache.spark.sql.DataFrane = [date: string, time: string ... 5 more fields]
scala> hvəcuf.show
      date|
                         time|targettemp|actualtemp|system|systemage|buildid|
                                                                                                                             4
17
   6/1/13 | 0:00:01 |
                                                   66
                                                                                        13|
                                                                                                             26|
   6/2/13| 1:00:01|
6/3/13| 2:00:01|
6/4/13| 3:00:01|
                                                                                        3|
17|
2|
16|
                                                   69
                                                                          68
                                                                                                             26
                                                                                                                             18
15
                                                   79
67
68
                                                                                                             26
23
                                                                          73 |
63 |
74 |
56 |
56 |
73 |
69 |
  6/5/13 | 4:00:01 |
6/5/13 | 4:00:01 |
6/6/13 | 5:00:01 |
6/7/13 | 6:00:01 |
6/8/13 | 7:00:01 |
                                                                                                              9
                                                                                                                             3 |
4 |
2 |
16 |
9 |
                                                   67
70
                                                                                        13
12
                                                                                                             28
                                                                                                             24
                                                                                        20
16
                                                                                                             26
6/9/13| 8:00:01
6/10/12| 9:00:01
6/11/13| 0:00:01
6/12/13| 1:00:01
                                                   65
67
                                                                                                                             12
15
7
15
6
                                                                         70
62
73
61
59
56
                                                                                        10
                                                                                                             17
                                                   69
69
65
                                                                                                             11
                                                                                        2
14
3
19
19
| 6/12/13 | 11:00:01 |
| 6/13/13 | 12:00:01 |
| 6/14/13 | 13:00:01 |
| 6/15/13 | 4:00:01 |
| 6/16/13 | 15:00:01 |
| 6/16/13 | 17:00:01 |
| 6/18/13 | 17:00:01 |
| 6/19/13 | 18:00:01 |
| 6/20/13 | 19:00:01 |
                                                                                                             2|
2|
22|
11|
                                                   67
65
                                                                                                                             28
8
6
                                                                                        15
12
                                                                                                               1 5
                                                    6/
                                                                          5/
                                                    66
                                                                          57
                                                                                                                             13
                                                                                        8
17
                                                                                                                              4
                                                                                                             22
only showing top 20 rows
```

```
def addtemp:hange = udf((act:altemp:Int, targettemp:Int) => {
  val diff = actua;temp-targettemp
  if(diff >= 5 || diff >= -5) "1"
         else "0"
Mdtempchange: org.apache.spark.sql.expressions.UserDefinecFunction
scala> /al finalHVACData = hvacDF.withColumn("tempchange",addtempchange(hvacDF("actualtemp"),hvacDF("targettemp")))
finalHVACData: org.apache.spark.sql.DataFrame = [date: string, time: string ... 6 more fields]
scala> finalHVACData.show
     date
                   time|targettemp|actualtemp|system|systemage|buildid|tempchange|
  6/1/13 | 0:00:01 |
                                                                                                                       6/2/13| 1:00:01|
6/3/13| 2:00:01|
0/4/13| 3:00:01|
                                         69
                                                          68
                                                                                      28
                                                                                                   17
                                         70
                                                          73
                                                                                                   18
                                                          63
74
56
58
                                                                                      23
9
  6/4/13
6/5/13
                                                                                                   15
6/4/13| 3:00:01

6/5/13| 4:09:01

6/6/13| 5:09:01

6/7/13| 6:00:01

6/8/13| 7:09:01

6/9/13| 8:00:01

6/10/13| 9:00:01
                                         68
                                                                      13
12
                                                                                      28
24
                                                                                                    4 2
                                         67
70
                                                          73 |
69 |
57 |
70 |
                                                                                      26
                                         78
                                                                      20
16
                                                                                                   16
                                                                                       9
                                         66
                                                                                                    9
                                                                                                   12
                                         65
 6/11/13 10:00:01
                                         67
                                                                                                   15
 6/12/13 | 11:00:01
6/13/13 | 12:00:01
                                                          62
73
61
59
56
57
57
                                                                      2
14
                                                                                     11
2
2
22
11
7
5
                                                                                                   7
15
                                         69
6/14/13|13:00:01|
6/15/13|14:00:01|
6/16/13|15:00:01|
                                         65
                                                                      19
19
19
15
12
                                         67
65
67
66
                                                                                                   20
8
6/17/13|16:00:01|
6/18/13|17:00:01|
6/19/13|18:00:01|
6/20/13|10:00:01|
                                                                                                   6
13
                                                                      8
17
                                                                                                                       θį
                                         69 j
                                                           58
                                                                                      22 j
                                                                                                                       ø
oely showing top 20 rows
```

● Add a new column, tempchange - set to 1, if there is a change of greater than +/-5 between actual and target temperature

Load building.csv file into temporary table

```
= spark.read.csv("/user/spark/building.csv").toDF("buildid","buildingngr",'buildingage","hvacproduc
buildingD=: org.apache.spark.sql.DataFrame = [buildid: string, buildingmgr: string ... 3 more fields]
scala> buildingur.createurweplace:empview("building")
scala> spark.sql("select * from building").show
|buildid|buildingmgr|buildingage|hvacproduct|
                                                                 USAI
                                                           France
        2|
3|
4|
5|
6|
7|
8|
                     M2 |
                                               FN39TG
                                     27|
                     M3 |
H4 |
M5 |
M6 |
M7 |
                                     28
                                               JONS77
                                                               Brazil
                                     17
                                              663919
                                                             Finland
                                              ACMXX22 Hong Kong
AC3000 Singapore
FN39TG South Africa
                                             ACMX22
                                     3 j
                                     13
                      M8
                                     25 |
11 |
23 |
14 |
26 |
25 |
17 |
19 |
23 |
11 |
25 |
                                               JONS 77
                                                            Australia
                     M9
                                              661919
                                                              Mexico
                    M18
M11
      18 |
11 |
12 |
13 |
14 |
15 |
16 |
17 |
18 |
                                              ACMD(22
                                                                China
                                              AC3000
                                                              Belgium
                                                              Finland
                    M12
                                              FN39TG
                                              JONS77 Saudi Arabia
GG1919 Germany
ACMAX22 Is ael
                    M13
M14
                    M15
                                              ACMAX22
                    M16
M17
                                              AC1000
                                                                Turkey
                                               FN39TG
                                                                Egypt
                    M18
                                               J0NS77
       19
20
                                               661919
                                              ACMXX22
```

Figure out the number of times, temperature has changed by 5 degrees or more for each country:

	chc. spark. :	4			,,	ottony				
ala⊳ finalResult s	how									
uildid  date	time targe	ttemp actua	ltemp sy	stem sy	stemage temp	change bui	ldingmgr buil	dingage hv	racproduct	coun
							· · · · · · · · • · · · · · ·			
	99:91	66	58	13	20	9	[14]	17	6G1919	
17   6/2/13   1:0		69	66	3	20	1	M1/	11	FN.5910	
	99:91	70	73	17	20	1	M18	25	JDNS77	
15 6/4/13 31		67	63	2	23	1	M15	19	ACHUA(22)	Isr
3 6/5/13 4:		68	74	16	9	1	M3	28	JDNS77	
4   6/6/13   5:		67	56	13	28	8)	H4	17	6G1919	
2 6/7/13 6:		70	58	12	24	0	M2	27	FN39TG	
16   6/8/13   7:		70	73	20	26  9  5	1	M16	23	AC1000	Tur
	00:01	66	69	16	9	1	M9	11	661919	
12 6/10/13  9:		65	57	6	5	9	M12	26	FN39TG	
15   6/11/13   10:		67	70	10	17	1	H15	19	ACHAX22	l Int
7   6/12/13   11:		69	62	2	11  2  2	9	M7	13		South Afr
15   6/13/13   12+		69	73	14	2	1	M15	19	ACMAX22	Isr
6 6 / 14 / 13   13 :		65	61	3	2	1	M6	9	AC1000	
20 6/15/13 14:		67	59	19	22	9)	M20	19	ACMAX22	Argent
8 6/16/13   15:		65	56	19	11	0	M8	25	JDNS77	
6 6/17/13 16:		67	57	15	7 5	9	M6	9	AC1000	Singap
13 6/18/13 17:		66	57	12		0	M13	25	JDNS77	Saudi Āra
4 6/19/13 18:		69	58	8	22	9	H4	17	6G1919	Finl
7[6/20/13]19:	00:91	67	30 j	17 j	oj.	o j	H7	13 [	FN39TG	South Afr

scala⊨ spa	ark.sqlj	select •	from Result	where tem	pchange	- 1").sho	ner				
buildid	date	time	targettemp a	ctualtemp	system	systemage	tempchange	buildirgmgr	buildingage	hvacproduct	country
17	5/2/13	1:00:01	69	68	3	29	1	M17	11	FN39TG	Egypt
18	5/3/13	2:00:01	70	73	17	29	1	M18	25	JDNS77	Indonesia
15	5/4/13	3:00:01	67	63	2 j	23	1	M15	19	ACMAX22	Israel
1 3	5/5/13	4:00:01	68	74	16	9	1	M3	28	JDNS77	Brazil
16	5/8/13	7:00:01	70	73 į	20 j	26	1	M16	23	AC1090	Turkey
i 9i	5/9/13	8:00:01	66	69	16	9	1	M9	11	GG1919	
15   6	5/11/13	10:00:01	67	70 j	10	17	1	M15		ACMAX22	Israel
		12:00:01	69	73 į	14	2	1	M15	19	ACMAX22	Israel
616	5/14/13	13:00:01	651	611	3 i	21	11	M6	9		Singapore
17 6	1/21/13	20:00:01	69	61 i 72 j	71	51	ī j	M17		FN39TG	Egypt
916	5/22/13	21:00:01	66	69 j	6 ј	29	11	M9	11	661919	Mexico
i 29İ6	1/23/13	22:00:01	67		61	18	11	M28	19	ACMAX22	/rgentina
18 6	5/25/13	0:13:19	70	65  71	19	18 14	11	M18		3DNS77	Indonesia
i 8i6	5/26/13	1:13:19	67	71	11	6	1	MB	25	JDNS77	Australia
14 6	5/27/13	2:13:19	69	68	16	14	11	M14		661919	Germany
		4:13:19	66	771	71	6	Ĩ,	M13		JDNS77	
3 1		6:13:19	68	66	111	15	11	M3		JDNS77	Brazil
111		8:13:19	66	651	14	18	īi	M11		AC1090	
		9:13:19	67	69	11	3	1	MV	11	001919	
		10:13:19	70	781	5i	51	11	M10			China

only showing top 20 rows

scala> spark.sql	("select country,count(country	ry) from Result group by country").show
+		
country cou	unt(country)	
tt		
Singapore	415	
fürkey	414	
Germany	363	
France	400	
Argentina	468	
Belgium	376	
Finland	814	
China	425	
Hong Kong	405	
Israel	399	
USA	393	
Mexico	383	
Indonesia	421	
Saudi Arabia	395	
Canada	389	
Brazil	495  389	
Australia	405	
Egypt   South Africa	415	
South Affica	413	
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