**Data Cleaning**

1. Capital Bikeshare: W., C. (2016). Exploratory Data Analysis of Capital Bikeshare. Retrieved October 5, 2016, from <https://s3.amazonaws.com/capitalbikeshare-data/index.html>.

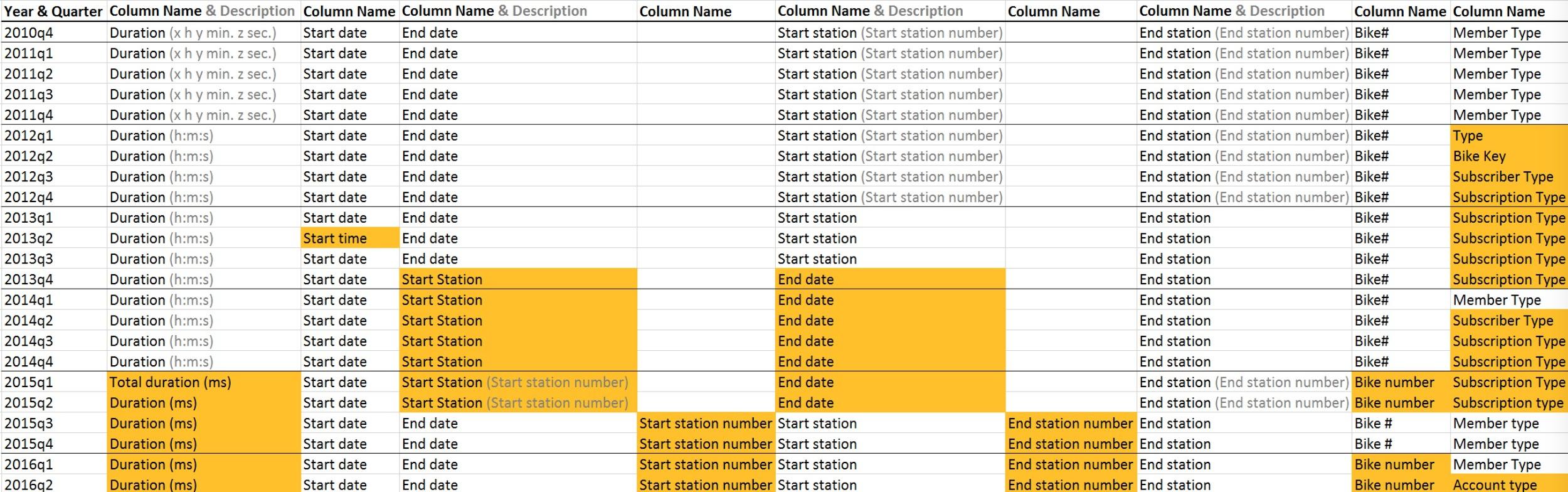
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URL: <https://www.capitalbikeshare.com/terms-of-use#Proprietary>.

These datasets were provided by Capital Bikeshare, which contain bike-ride details for the period of 2010 to 2016 like duration. The columns contain the information of start date with time, end date with time, start station, end station, bike ID, etc., and with about 15000000 rows of data.

Most of the columns in the data are easy to understand with clear column names. The “Station Map” site provides clear information about the columns of “Start\_station”, “End\_station”, “Start\_station\_num”, and “End\_station\_num”. According to the “FAQs” and “How It Works” sites, we also got more insights about the “Member\_Type” column: “Registered” refers to those registered members, especially those people who rent the bikes frequently; “Casual” refers to those random users, such as visitors.

The datasets contain several formatting issues (see the screenshot below):



At the beginning, we summarized all the column names and formats from each dataset. Then, we marked those yellow columns that are the ones need to be cleaned, initially. The main issues in this datasets are: 1. The “Duration” columns have several formats among different years, even in a year but different quarters; 2. Start/end date and time are all stored in the “Start/End date” columns; 3. Some of the files are missing station number. Also, in some of the files, the “Start/End station number” are involved in the “Start/End station” and surrounded by brackets.

During the data cleaning, we unified the “Duration” format as “x h. y min. z sec.” and added a new “Duration\_s” column to store duration in seconds; added “Start/End time” columns to store the start time in “Start/End date” columns; separated “Start/End station” and “Start/End station” columns. After the data cleaning, there are in total of 13 columns. In order to be more efficient, we omitted all the column names during the data cleaning, and start to read the data from row 2. In addition, we attached all SQL scripts in the appendix from Page 7.

1. Holiday Schedule: Holiday Schedules | dchr (A. Parihar, Trans.). (n.d.). Retrieved October 07, 2016, from <http://dchr.dc.gov/page/holiday-schedules>.
2. This dataset was created by us from the holiday list published on dc.gov and is subject to [Creative Commons CC0 1.0 Universal](http://creativecommons.org/publicdomain/zero/1.0/legalcode) license terms and conditions. The CC0 license provides following rights:
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It is a minimalistic data set that contains details like date and event/holiday name for the years 2010 through 2016. As we created this data set from the available source, it is as per our need. hence data cleaning is not required here.

1. Station Details: Live XML - feeds.capitalbikeshare.com (Y. Liu, Trans.). (n.d.). Retrieved October 28, 2016, from <https://feeds.capitalbikeshare.com/stations/stations.xml>
   1. License and Terms of use are same as of 1st dataset since they originate from same source and falls under similar terms of use.

[This data](https://feeds.capitalbikeshare.com/stations/stations.xml)set was provided by Capital Bikeshare Company and contains detail information about 408 stations, which includes station ID, terminal number, longitude, latitude, the number of bikes, the number of empty docks and etc. In total, there are 15 fields before cleaning. Most fields are very straightforward and easy to understand. Also, the “how it works” guide provided by official website is very helpful to let us understand the meaning of certain fields, like docks. The dataset is very organized but does have missing values for certain fields, like removal date. We remove these fields, since these two fields are missing for all station records.

For the basic step-by-step description for cleaning process, we only use Excel to transform the format of this dataset from XML file to CSV format and remove those unnecessary fields based on the following reasons: the answers to certain fields are extremely identical and do not have any valuable information, like the values for “public”, “temporary”, “installed”, “instalDate” and “locked”; certain fields are not relative to our research questions, like “latestUpdateTime” and “lastCommWithServer”. Therefore, we only keep 7 fields for this dataset.

1. Weather History:

2010: Weather UnderGround. Weather History for Washington, DC | Weather Underground. Retrieved October 9, 2016, from <https://www.wunderground.com/history/airport/KDCA/2010/10/1/CustomHistory.html?dayend=31&monthend=12&yearend=2010&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=&format=1>

2011: Weather UnderGround. Weather History for Washington, DC | Weather Underground. Retrieved October 9, 2016, from <https://www.wunderground.com/history/airport/KDCA/2011/1/1/CustomHistory.html?dayend=31&monthend=12&yearend=2011&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=&format=1>

2012: Weather UnderGround. Weather History for Washington, DC | Weather Underground. Retrieved October 9, 2016, from <https://www.wunderground.com/history/airport/KDCA/2012/1/1/CustomHistory.html?dayend=31&monthend=12&yearend=2012&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=&format=1>

2013: Weather UnderGround. Weather History for Washington, DC | Weather Underground. Retrieved October 9, 2016, from <https://www.wunderground.com/history/airport/KDCA/2013/1/1/CustomHistory.html?dayend=31&monthend=12&yearend=2013&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=&format=1>

2014: Weather UnderGround. Weather History for Washington, DC | Weather Underground. Retrieved October 9, 2016, from <https://www.wunderground.com/history/airport/KDCA/2014/1/1/CustomHistory.html?dayend=31&monthend=12&yearend=2014&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=&format=1>

2015: Weather UnderGround. Weather History for Washington, DC | Weather Underground. Retrieved October 9, 2016, from <https://www.wunderground.com/history/airport/KDCA/2015/1/1/CustomHistory.html?dayend=31&monthend=12&yearend=2015&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=&format=1>

2016: Weather UnderGround. Weather History for Washington, DC | Weather Underground. Retrieved October 9, 2016, from <https://www.wunderground.com/history/airport/KDCA/2016/1/1/CustomHistory.html?dayend=30&monthend=6&yearend=2016&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=&format=1>

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URL: <https://www.wunderground.com/legal>

These datasets were provided by Weather Underground, which contain the weather conditions in Washington D.C. area from Oct 1, 2010 to Jun 30, 2016 duration (in total of 2100 rows). In details, there are columns about date (EST), temperature, dew point, humidity, sea level pressure, visibility, wind speed, gust speed, precipitation, cloud cover, events, and wind direction in degrees (WindDirDegrees).

There are 23 columns in total before the data cleaning. Most of the columns are easy to understand and we Googled some of the professional terms such as “dew point” and wind “direction in degrees (WindDirDegrees)”.

The data are all clean without any missing values. The original data is in .txt format (comma delimited) and we exported it to Excel. After careful consideration, the most critical factors that would impact the bike-share data would be temperature, visibility, wind speed, and events. Therefore, we keep those related columns as our main focus of analysis (in total of 5 columns) and deleted unnecessary columns with Excel.

Word Count: 1091

**Appendix**

Below are the scripts divided by year:

2010 Q4

**CREATE** **TABLE** #data\_loading\_2010**(**

Duration **varchar(**1000**)** **,**

Start\_date **datetime** **,**

End\_date **datetime** **,**

Start\_station **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**DECLARE** @**SQL** **VARCHAR(MAX);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2010 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2010-Q4-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**CREATE** **TABLE** #data\_format\_2010**(**

Duration **varchar(**100**)** **,**

Duration\_s **bigint,**

Start\_date **datetime** **,**

Start\_day **date,**

Start\_time **time,**

End\_date **datetime,**

End\_day **date,**

End\_time **time,**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**100**)** **,**

End\_station **varchar(**1000**)** **,**

end\_station\_num **varchar(**100**),**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**INSERT** **INTO** #data\_format\_2010

**SELECT** Duration**,**

**convert(int,substring(**Duration**,**1**,** **Charindex(**'h'**,**Duration**)**-1**))\***60**\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'h'**,**Duration**)**+2 **,** **(Charindex(**'min.'**,**Duration**)-Charindex(**'h'**,**Duration**))**-2**))** **\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'min.'**,**Duration**)**+5 **,(Charindex(**'sec.'**,**Duration**)-Charindex(**'min.'**,**Duration**))**-5**))** **AS** Duration\_ms**,**

Start\_date**,**

**CONVERT(date,** Start\_date**)** **AS** Start\_day**,**

**CONVERT(time,** Start\_date**)** **AS** Start\_time**,**

End\_date**,**

**CONVERT(date,** End\_date**)** **AS** End\_day**,**

**CONVERT(time,** End\_date**)** **AS** End\_time**,**

Start\_station**,**

**substring(**Start\_station**,** **Charindex(**'('**,**Start\_station**)**+1 **,** **(Charindex(**')'**,**Start\_station**)-Charindex(**'('**,**Start\_station**))**-1**),**

End\_station**,**

**substring(**End\_station**,** **Charindex(**'('**,**End\_station**)**+1 **,** **(Charindex(**')'**,**End\_station**)-Charindex(**'('**,**End\_station**))**-1**),**

Bike\_num**,**

Member\_Type

**FROM** #data\_loading\_2010

**CREATE** **TABLE** ##output\_2010**(**

row\_id **INT** **IDENTITY(**1**,**1**)** **PRIMARY** **KEY,**

Duration **varchar(**1000**)** **,**

Duration\_s **varchar(**300**),**

Start\_date **varchar(**3000**),**

Start\_day **varchar(**3000**),**

Start\_time **varchar(**3000**),**

End\_date **varchar(**3000**),**

End\_day **varchar(**3000**),**

End\_time **varchar(**3000**),**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

End\_station\_num **varchar(**1000**),**

Bike\_num **varchar(**1000**)** **,**

Member\_Type **varchar(**1000**)**

**);**

**INSERT** **INTO** ##output\_2010 **VALUES** **(**'Duration'**,**'Duration\_s'**,**'Start\_date'**,**'Start\_day'**,**'Start\_time'**,**'End\_date'**,**'End\_day'**,**'End\_time'**,**'Start\_station'**,**'Start\_station\_num'**,**'End\_station'**,**'End\_station\_num'**,**'Bike\_num'**,**'Member\_Type'**);**

**INSERT** **INTO** ##output\_2010

**SELECT** **\*** **FROM** #data\_format\_2010**;**

**DECLARE** @baseDirectory **AS** **VARCHAR(max);**

**SET** @baseDirectory **=**'C:\Users\mchin\Desktop\Data\_Clean'

**declare** @vme\_output **varchar(**300**);** **set** @vme\_output **=** '##output\_2010'

**SET** @**sql** **=** 'Exec master..xp\_cmdshell ''BCP "select Duration,Duration\_s,Start\_date,Start\_day,Start\_time,End\_date,End\_day,End\_time,Start\_station,Start\_station\_num,End\_station,End\_station\_num,Bike\_num,Member\_Type from tempdb.dbo.'**+**@vme\_output**+**' where Duration is not null order by row\_id " queryout "'

**+** @baseDirectory **+**

'\2010\_output.txt' **+**

'" -c -T -S ' **+** @@SERVERNAME **+** ''''**;**

PRINT @**sql;**

**EXEC(**@**sql);**

**drop** **table** ##output\_2010

**drop** **table** #data\_format\_2010

**drop** **table** #data\_loading\_2010

2011 Q1-Q4

**CREATE** **TABLE** #data\_loading\_2011**(**

Duration **varchar(**1000**)** **,**

Start\_date **datetime** **,**

End\_date **datetime** **,**

Start\_station **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**DECLARE** @**SQL** **VARCHAR(MAX);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2011 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2011-Q1-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2011 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2011-Q2-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2011 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2011-Q3-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2011 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2011-Q4-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**CREATE** **TABLE** #data\_format\_2011**(**

Duration **varchar(**100**)** **,**

Duration\_s **bigint,**

Start\_date **datetime** **,**

Start\_day **date,**

Start\_time **time,**

End\_date **datetime,**

End\_day **date,**

End\_time **time,**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**100**)** **,**

End\_station **varchar(**1000**)** **,**

end\_station\_num **varchar(**100**),**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**INSERT** **INTO** #data\_format\_2011

**SELECT** Duration**,**

**convert(int,substring(**Duration**,**1**,** **Charindex(**'h'**,**Duration**)**-1**))\***60**\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'h'**,**Duration**)**+2 **,** **(Charindex(**'min.'**,**Duration**)-Charindex(**'h'**,**Duration**))**-2**))** **\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'min.'**,**Duration**)**+5 **,(Charindex(**'sec.'**,**Duration**)-Charindex(**'min.'**,**Duration**))**-5**))** **AS** Duration\_ms**,**

Start\_date**,**

**CONVERT(date,** Start\_date**)** **AS** Start\_day**,**

**CONVERT(time,** Start\_date**)** **AS** Start\_time**,**

End\_date**,**

**CONVERT(date,** End\_date**)** **AS** End\_day**,**

**CONVERT(time,** End\_date**)** **AS** End\_time**,**

Start\_station**,**

**substring(**Start\_station**,** **Charindex(**'('**,**Start\_station**)**+1 **,** **(Charindex(**')'**,**Start\_station**)-Charindex(**'('**,**Start\_station**))**-1**),**

End\_station**,**

**substring(**End\_station**,** **Charindex(**'('**,**End\_station**)**+1 **,** **(Charindex(**')'**,**End\_station**)-Charindex(**'('**,**End\_station**))**-1**),**

Bike\_num**,**

Member\_Type

**FROM** #data\_loading\_2011

**CREATE** **TABLE** ##output\_2011**(**

row\_id **INT** **IDENTITY(**1**,**1**)** **PRIMARY** **KEY,**

Duration **varchar(**1000**)** **,**

Duration\_s **varchar(**300**),**

Start\_date **varchar(**3000**),**

Start\_day **varchar(**3000**),**

Start\_time **varchar(**3000**),**

End\_date **varchar(**3000**),**

End\_day **varchar(**3000**),**

End\_time **varchar(**3000**),**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

End\_station\_num **varchar(**1000**),**

Bike\_num **varchar(**1000**)** **,**

Member\_Type **varchar(**1000**)**

**);**

**INSERT** **INTO** ##output\_2011 **VALUES** **(**'Duration'**,**'Duration\_s'**,**'Start\_date'**,**'Start\_day'**,**'Start\_time'**,**'End\_date'**,**'End\_day'**,**'End\_time'**,**'Start\_station'**,**'Start\_station\_num'**,**'End\_station'**,**'End\_station\_num'**,**'Bike\_num'**,**'Member\_Type'**);**

**INSERT** **INTO** ##output\_2011

**SELECT** **\*** **FROM** #data\_format\_2011**;**

**DECLARE** @baseDirectory **AS** **VARCHAR(max);**

**SET** @baseDirectory **=**'C:\Users\mchin\Desktop\Data\_Clean'

**declare** @vme\_output **varchar(**300**);** **set** @vme\_output **=** '##output\_2011'

**SET** @**sql** **=** 'Exec master..xp\_cmdshell ''BCP "select Duration,Duration\_s,Start\_date,Start\_day,Start\_time,End\_date,End\_day,End\_time,Start\_station,Start\_station\_num,End\_station,End\_station\_num,Bike\_num,Member\_Type from tempdb.dbo.'**+**@vme\_output**+**' where Duration is not null order by row\_id " queryout "'

**+** @baseDirectory **+**

'\2011\_output.txt' **+**

'" -c -T -S ' **+** @@SERVERNAME **+** ''''**;**

PRINT @**sql;**

**EXEC(**@**sql);**

**drop** **table** ##output\_2011

**drop** **table** #data\_format\_2011

**drop** **table** #data\_loading\_2011

2012 Q1-Q4

**CREATE** **TABLE** #data\_loading\_2012**(**

Duration **varchar(**1000**)** **,**

Start\_date **datetime** **,**

End\_date **datetime** **,**

Start\_station **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**DECLARE** @**SQL** **VARCHAR(MAX);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2012 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2012-Q1-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2012 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2012-Q2-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2012 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2012-Q3-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2012 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2012-Q4-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**CREATE** **TABLE** #data\_format\_2012**(**

Duration **varchar(**100**)** **,**

Duration\_s **bigint,**

Start\_date **datetime** **,**

Start\_day **date,**

Start\_time **time,**

End\_date **datetime,**

End\_day **date,**

End\_time **time,**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**100**)** **,**

End\_station **varchar(**1000**)** **,**

end\_station\_num **varchar(**100**),**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**INSERT** **INTO** #data\_format\_2012

**SELECT** Duration**,**

**convert(int,substring(**Duration**,**1**,** **Charindex(**'h'**,**Duration**)**-1**))\***60**\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'h'**,**Duration**)**+2 **,** **(Charindex(**'m'**,**Duration**)-Charindex(**'h'**,**Duration**))**-2**))** **\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'m'**,**Duration**)**+2 **,(Charindex(**'s'**,**Duration**)-Charindex(**'m'**,**Duration**))**-2**))** **AS** Duration\_ms**,**

Start\_date**,**

**CONVERT(date,** Start\_date**)** **AS** Start\_day**,**

**CONVERT(time,** Start\_date**)** **AS** Start\_time**,**

End\_date**,**

**CONVERT(date,** End\_date**)** **AS** End\_day**,**

**CONVERT(time,** End\_date**)** **AS** End\_time**,**

Start\_station**,**

**null** **as** startstation**,**

End\_station**,**

**null** **as** endstation**,**

Bike\_num**,**

Member\_Type

**FROM** #data\_loading\_2012

**CREATE** **TABLE** ##output\_2012**(**

row\_id **INT** **IDENTITY(**1**,**1**)** **PRIMARY** **KEY,**

Duration **varchar(**1000**)** **,**

Duration\_s **varchar(**300**),**

Start\_date **varchar(**3000**),**

Start\_day **varchar(**3000**),**

Start\_time **varchar(**3000**),**

End\_date **varchar(**3000**),**

End\_day **varchar(**3000**),**

End\_time **varchar(**3000**),**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

End\_station\_num **varchar(**1000**),**

Bike\_num **varchar(**1000**)** **,**

Member\_Type **varchar(**1000**)**

**);**

**INSERT** **INTO** ##output\_2012 **VALUES** **(**'Duration'**,**'Duration\_s'**,**'Start\_date'**,**'Start\_day'**,**'Start\_time'**,**'End\_date'**,**'End\_day'**,**'End\_time'**,**'Start\_station'**,**'Start\_station\_num'**,**'End\_station'**,**'End\_station\_num'**,**'Bike\_num'**,**'Member\_Type'**);**

**INSERT** **INTO** ##output\_2012

**SELECT** **\*** **FROM** #data\_format\_2012**;**

**DECLARE** @baseDirectory **AS** **VARCHAR(max);**

**SET** @baseDirectory **=**'C:\Users\mchin\Desktop\Data\_Clean'

**declare** @vme\_output **varchar(**300**);** **set** @vme\_output **=** '##output\_2012'

**SET** @**sql** **=** 'Exec master..xp\_cmdshell ''BCP "select Duration,Duration\_s,Start\_date,Start\_day,Start\_time,End\_date,End\_day,End\_time,Start\_station,Start\_station\_num,End\_station,End\_station\_num,Bike\_num,Member\_Type from tempdb.dbo.'**+**@vme\_output**+**' where Duration is not null order by row\_id " queryout "'

**+** @baseDirectory **+**

'\2012\_output.txt' **+**

'" -c -T -S ' **+** @@SERVERNAME **+** ''''**;**

PRINT @**sql;**

**EXEC(**@**sql);**

**drop** **table** ##output\_2012

**drop** **table** #data\_format\_2012

**drop** **table** #data\_loading\_2012

2013 Q1-Q4

**CREATE** **TABLE** #data\_loading\_2013**(**

Duration **varchar(**1000**)** **,**

Start\_date **datetime** **,**

End\_date **datetime** **,**

Start\_station **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**DECLARE** @**SQL** **VARCHAR(MAX);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2013 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2013-Q1-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2013 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2013-Q2-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2013 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2013-Q3-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**CREATE** **TABLE** #data\_loading\_2013\_temp**(**

Duration **varchar(**1000**)** **,**

Start\_date **datetime** **,**

Start\_station **varchar(**1000**)** **,**

End\_date **datetime** **,**

End\_station **varchar(**1000**)** **,**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2013\_temp FROM

''C:\Users\mchin\Desktop\Data\_Clean\2013-Q4-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**INSERT** **into** #data\_loading\_2013 **(**Duration**,** Start\_date**,** End\_date**,**Start\_station**,** End\_station**,**Bike\_num**,**Member\_type**)**

**select** Duration**,** Start\_date**,** End\_date**,**Start\_station**,**End\_station**,**Bike\_num**,**Member\_type **from** #data\_loading\_2013

**CREATE** **TABLE** #data\_format\_2013**(**

Duration **varchar(**100**)** **,**

Duration\_s **bigint,**

Start\_date **datetime** **,**

Start\_day **date,**

Start\_time **time,**

End\_date **datetime,**

End\_day **date,**

End\_time **time,**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**100**)** **,**

End\_station **varchar(**1000**)** **,**

end\_station\_num **varchar(**100**),**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**INSERT** **INTO** #data\_format\_2013

**convert(int,substring(**Duration**,**1**,** **Charindex(**'h'**,**Duration**)**-1**))\***60**\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'h'**,**Duration**)**+2 **,** **(Charindex(**'m'**,**Duration**)-Charindex(**'h'**,**Duration**))**-2**))** **\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'m'**,**Duration**)**+2 **,(Charindex(**'s'**,**Duration**)-Charindex(**'m'**,**Duration**))**-2**))** **AS** Duration\_ms**,**

Start\_date**,**

**CONVERT(date,** Start\_date**)** **AS** Start\_day**,**

**CONVERT(time,** Start\_date**)** **AS** Start\_time**,**

End\_date**,**

**CONVERT(date,** End\_date**)** **AS** End\_day**,**

**CONVERT(time,** End\_date**)** **AS** End\_time**,**

Start\_station**,**

**null** **as** startstation**,**

End\_station**,**

**null** **as** endstation**,**

Bike\_num**,**

Member\_Type

**FROM** #data\_loading\_2013

**CREATE** **TABLE** ##output\_2013**(**

row\_id **INT** **IDENTITY(**1**,**1**)** **PRIMARY** **KEY,**

Duration **varchar(**1000**)** **,**

Duration\_s **varchar(**300**),**

Start\_date **varchar(**3000**),**

Start\_day **varchar(**3000**),**

Start\_time **varchar(**3000**),**

End\_date **varchar(**3000**),**

End\_day **varchar(**3000**),**

End\_time **varchar(**3000**),**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

End\_station\_num **varchar(**1000**),**

Bike\_num **varchar(**1000**)** **,**

Member\_Type **varchar(**1000**)**

**);**

**INSERT** **INTO** ##output\_2013 **VALUES** **(**'Duration'**,**'Duration\_s'**,**'Start\_date'**,**'Start\_day'**,**'Start\_time'**,**'End\_date'**,**'End\_day'**,**'End\_time'**,**'Start\_station'**,**'Start\_station\_num'**,**'End\_station'**,**'End\_station\_num'**,**'Bike\_num'**,**'Member\_Type'**);**

**INSERT** **INTO** ##output\_2013

**SELECT** **\*** **FROM** #data\_format\_2013**;**

**DECLARE** @baseDirectory **AS** **VARCHAR(max);**

**SET** @baseDirectory **=**'C:\Users\mchin\Desktop\Data\_Clean'

**declare** @vme\_output **varchar(**300**);** **set** @vme\_output **=** '##output\_2013'

**SET** @**sql** **=** 'Exec master..xp\_cmdshell ''BCP "select Duration,Duration\_s,Start\_date,Start\_day,Start\_time,End\_date,End\_day,End\_time,Start\_station,Start\_station\_num,End\_station,End\_station\_num,Bike\_num,Member\_Type from tempdb.dbo.'**+**@vme\_output**+**' where Duration is not null order by row\_id " queryout "'

**+** @baseDirectory **+**

'\2013\_output.txt' **+**

'" -c -T -S ' **+** @@SERVERNAME **+** ''''**;**

PRINT @**sql;**

**EXEC(**@**sql);**

**drop** **table** ##output\_2013

**drop** **table** #data\_format\_2013

**drop** **table** #data\_loading\_2013

**drop** **table** #data\_loading\_2013\_temp

2014 Q1-Q4

**CREATE** **TABLE** #data\_loading\_2014**(**

Duration **varchar(**1000**)** **,**

Start\_date **datetime** **,**

Start\_station **varchar(**1000**)** **,**

End\_date **datetime** **,**

End\_station **varchar(**1000**)** **,**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**DECLARE** @**SQL** **VARCHAR(MAX);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2014 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2014-Q1-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2014 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2014-Q2-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2014 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2014-Q3-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2014 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2014-Q4-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**CREATE** **TABLE** #data\_format\_2014**(**

Duration **varchar(**100**)** **,**

Duration\_s **bigint,**

Start\_date **datetime** **,**

Start\_day **date,**

Start\_time **time,**

End\_date **datetime,**

End\_day **date,**

End\_time **time,**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**100**)** **,**

End\_station **varchar(**1000**)** **,**

end\_station\_num **varchar(**100**),**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**INSERT** **INTO** #data\_format\_2014

**SELECT** Duration**,**

**convert(int,substring(**Duration**,**1**,** **Charindex(**'h'**,**Duration**)**-1**))\***60**\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'h'**,**Duration**)**+2 **,** **(Charindex(**'m'**,**Duration**)-Charindex(**'h'**,**Duration**))**-2**))** **\***60**+**

**convert(int,substring(**Duration**,** **Charindex(**'m'**,**Duration**)**+2 **,(Charindex(**'s'**,**Duration**)-Charindex(**'m'**,**Duration**))**-2**))** **AS** Duration\_ms**,** Start\_date**,**

**CONVERT(date,** Start\_date**)** **AS** Start\_day**,**

**CONVERT(time,** Start\_date**)** **AS** Start\_time**,**

End\_date**,**

**CONVERT(date,** End\_date**)** **AS** End\_day**,**

**CONVERT(time,** End\_date**)** **AS** End\_time**,**

Start\_station**,**

**null** **as** startstation**,**

End\_station**,**

**null** **as** endstation**,**

Bike\_num**,**

Member\_Type

**FROM** #data\_loading\_2014

**CREATE** **TABLE** ##output\_2014**(**

row\_id **INT** **IDENTITY(**1**,**1**)** **PRIMARY** **KEY,**

Duration **varchar(**1000**)** **,**

Duration\_s **varchar(**300**),**

Start\_date **varchar(**3000**),**

Start\_day **varchar(**3000**),**

Start\_time **varchar(**3000**),**

End\_date **varchar(**3000**),**

End\_day **varchar(**3000**),**

End\_time **varchar(**3000**),**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

End\_station\_num **varchar(**1000**),**

Bike\_num **varchar(**1000**)** **,**

Member\_Type **varchar(**1000**)**

**);**

**INSERT** **INTO** ##output\_2014 **VALUES** **(**'Duration'**,**'Duration\_s'**,**'Start\_date'**,**'Start\_day'**,**'Start\_time'**,**'End\_date'**,**'End\_day'**,**'End\_time'**,**'Start\_station'**,**'Start\_station\_num'**,**'End\_station'**,**'End\_station\_num'**,**'Bike\_num'**,**'Member\_Type'**);**

**INSERT** **INTO** ##output\_2014

**SELECT** **\*** **FROM** #data\_format\_2014**;**

**DECLARE** @baseDirectory **AS** **VARCHAR(max);**

**SET** @baseDirectory **=**'C:\Users\mchin\Desktop\Data\_Clean'

**declare** @vme\_output **varchar(**300**);** **set** @vme\_output **=** '##output\_2014'

**SET** @**sql** **=** 'Exec master..xp\_cmdshell ''BCP "select Duration,Duration\_s,Start\_date,Start\_day,Start\_time,End\_date,End\_day,End\_time,Start\_station,Start\_station\_num,End\_station,End\_station\_num,Bike\_num,Member\_Type from tempdb.dbo.'**+**@vme\_output**+**' where Duration is not null order by row\_id " queryout "'

**+** @baseDirectory **+**

'\2014\_output.txt' **+**

'" -c -T -S ' **+** @@SERVERNAME **+** ''''**;**

PRINT @**sql;**

**EXEC(**@**sql);**

**drop** **table** ##output\_2014

**drop** **table** #data\_format\_2014

**drop** **table** #data\_loading\_2014

2015 Q1-Q4

**CREATE** **TABLE** #data\_loading\_2015**(**

Duration **varchar(**1000**)** **,**

Start\_date **datetime** **,**

Start\_station **varchar(**1000**)** **,**

End\_date **datetime** **,**

End\_station **varchar(**1000**)** **,**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**DECLARE** @**SQL** **VARCHAR(MAX);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2015 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2015-Q1-Trips-History-Data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2015 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2015-Q2-Trips-History-Data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**CREATE** **TABLE** #data\_loading\_2015\_temp**(**

Duration **varchar(**1000**)** **,**

Start\_date **datetime** **,**

End\_date **datetime** **,**

Start\_station\_num **varchar(**1000**)** **,**

Start\_station **varchar(**1000**)** **,**

End\_station\_num **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2015\_temp FROM

''C:\Users\mchin\Desktop\Data\_Clean\2015-Q3-cabi-trip-history-data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2015\_temp FROM

''C:\Users\mchin\Desktop\Data\_Clean\2015-Q4-Trips-History-Data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**CREATE** **TABLE** #data\_format\_2015**(**

Duration **varchar(**100**)** **,**

Duration\_s **bigint,**

Start\_date **datetime** **,**

Start\_day **date,**

Start\_time **time,**

End\_date **datetime,**

End\_day **date,**

End\_time **time,**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**100**)** **,**

End\_station **varchar(**1000**)** **,**

end\_station\_num **varchar(**100**),**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**INSERT** **INTO** #data\_format\_2015

**SELECT** Duration**,**

**round(convert(bigint,**Duration**)/**1000**,**0**),**

Start\_date**,**

**CONVERT(date,** Start\_date**)** **AS** Start\_day**,**

**CONVERT(time,** Start\_date**)** **AS** Start\_time**,**

End\_date**,**

**CONVERT(date,** End\_date**)** **AS** End\_day**,**

**CONVERT(time,** End\_date**)** **AS** End\_time**,**

Start\_station**,**

**null** **as** startstation**,**

End\_station**,**

**null** **as** endstation**,**

Bike\_num**,**

Member\_Type

**FROM** #data\_loading\_2015

**INSERT** **INTO** #data\_format\_2015

**SELECT** Duration**,**

**round(convert(bigint,**Duration**)/**1000**,**0**),**

Start\_date**,**

**CONVERT(date,** Start\_date**)** **AS** Start\_day**,**

**CONVERT(time,** Start\_date**)** **AS** Start\_time**,**

End\_date**,**

**CONVERT(date,** End\_date**)** **AS** End\_day**,**

**CONVERT(time,** End\_date**)** **AS** End\_time**,**

Start\_station**,**

Start\_station\_num **as** startstation**,**

End\_station**,**

End\_station\_num **as** endstation**,**

Bike\_num**,**

Member\_Type

**FROM** #data\_loading\_2015\_temp

**CREATE** **TABLE** ##output\_2015**(**

row\_id **INT** **IDENTITY(**1**,**1**)** **PRIMARY** **KEY,**

Duration **varchar(**1000**)** **,**

Duration\_s **varchar(**300**),**

Start\_date **varchar(**3000**),**

Start\_day **varchar(**3000**),**

Start\_time **varchar(**3000**),**

End\_date **varchar(**3000**),**

End\_day **varchar(**3000**),**

End\_time **varchar(**3000**),**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

End\_station\_num **varchar(**1000**),**

Bike\_num **varchar(**1000**)** **,**

Member\_Type **varchar(**1000**)**

**);**

**INSERT** **INTO** ##output\_2015 **VALUES** **(**'Duration'**,**'Duration\_s'**,**'Start\_date'**,**'Start\_day'**,**'Start\_time'**,**'End\_date'**,**'End\_day'**,**'End\_time'**,**'Start\_station'**,**'Start\_station\_num'**,**'End\_station'**,**'End\_station\_num'**,**'Bike\_num'**,**'Member\_Type'**);**

**INSERT** **INTO** ##output\_2015

**SELECT** **\*** **FROM** #data\_format\_2015**;**

**DECLARE** @baseDirectory **AS** **VARCHAR(max);**

**SET** @baseDirectory **=**'C:\Users\mchin\Desktop\Data\_Clean'

**declare** @vme\_output **varchar(**300**);** **set** @vme\_output **=** '##output\_2015'

**SET** @**sql** **=** 'Exec master..xp\_cmdshell ''BCP "select Duration,Duration\_s,Start\_date,Start\_day,Start\_time,End\_date,End\_day,End\_time,Start\_station,Start\_station\_num,End\_station,End\_station\_num,Bike\_num,Member\_Type from tempdb.dbo.'**+**@vme\_output**+**' where Duration is not null order by row\_id " queryout "'

**+** @baseDirectory **+**

'\2015\_output.txt' **+**

'" -c -T -S ' **+** @@SERVERNAME **+** ''''**;**

PRINT @**sql;**

**EXEC(**@**sql);**

**drop** **table** ##output\_2015

**drop** **table** #data\_format\_2015

**drop** **table** #data\_loading\_2015

**drop** **table** #data\_loading\_2015\_temp

2016 Q1-Q2

**CREATE** **TABLE** #data\_loading\_2016**(**

Duration **varchar(**1000**)** **,**

Start\_date **datetime** **,**

End\_date **datetime** **,**

Start\_station\_num **varchar(**1000**)** **,**

Start\_station **varchar(**1000**)** **,**

End\_station\_num **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**DECLARE** @**SQL** **VARCHAR(MAX);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2016 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2016-Q1-Trips-History-Data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**SET** @**SQL** **=**

'BULK INSERT #data\_loading\_2016 FROM

''C:\Users\mchin\Desktop\Data\_Clean\2016-Q2-Trips-History-Data.csv ''

WITH (FIRSTROW = 2, FIELDTERMINATOR ='','', ROWTERMINATOR=''\n'' );'

**EXEC(**@**SQL);**

**CREATE** **TABLE** #data\_format\_2016**(**

Duration **varchar(**100**)** **,**

Duration\_s **bigint,**

Start\_date **datetime** **,**

Start\_day **date,**

Start\_time **time,**

End\_date **datetime,**

End\_day **date,**

End\_time **time,**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**100**)** **,**

End\_station **varchar(**1000**)** **,**

end\_station\_num **varchar(**100**),**

Bike\_num **varchar(**100**)** **,**

Member\_Type **varchar(**100**)**

**);**

**INSERT** **INTO** #data\_format\_2016

**SELECT** Duration**,**

**round(convert(bigint,**Duration**)/**1000**,**0**),**

Start\_date**,**

**CONVERT(date,** Start\_date**)** **AS** Start\_day**,**

**CONVERT(time,** Start\_date**)** **AS** Start\_time**,**

End\_date**,**

**CONVERT(date,** End\_date**)** **AS** End\_day**,**

**CONVERT(time,** End\_date**)** **AS** End\_time**,**

Start\_station**,**

Start\_station\_num **as** startstation**,**

End\_station**,**

End\_station\_num **as** endstation**,**

Bike\_num**,**

Member\_Type

**FROM** #data\_loading\_2016

**CREATE** **TABLE** ##output\_2016**(**

row\_id **INT** **IDENTITY(**1**,**1**)** **PRIMARY** **KEY,**

Duration **varchar(**1000**)** **,**

Duration\_s **varchar(**300**),**

Start\_date **varchar(**3000**),**

Start\_day **varchar(**3000**),**

Start\_time **varchar(**3000**),**

End\_date **varchar(**3000**),**

End\_day **varchar(**3000**),**

End\_time **varchar(**3000**),**

Start\_station **varchar(**1000**)** **,**

Start\_station\_num **varchar(**1000**)** **,**

End\_station **varchar(**1000**)** **,**

End\_station\_num **varchar(**1000**),**

Bike\_num **varchar(**1000**)** **,**

Member\_Type **varchar(**1000**)**

**);**

**INSERT** **INTO** ##output\_2016 **VALUES** **(**'Duration'**,**'Duration\_s'**,**'Start\_date'**,**'Start\_day'**,**'Start\_time'**,**'End\_date'**,**'End\_day'**,**'End\_time'**,**'Start\_station'**,**'Start\_station\_num'**,**'End\_station'**,**'End\_station\_num'**,**'Bike\_num'**,**'Member\_Type'**);**

**INSERT** **INTO** ##output\_2016

**SELECT** **\*** **FROM** #data\_format\_2016**;**

**DECLARE** @baseDirectory **AS** **VARCHAR(max);**

**SET** @baseDirectory **=**'C:\Users\mchin\Desktop\Data\_Clean'

**declare** @vme\_output **varchar(**300**);** **set** @vme\_output **=** '##output\_2016'

**SET** @**sql** **=** 'Exec master..xp\_cmdshell ''BCP "select Duration,Duration\_s,Start\_date,Start\_day,Start\_time,End\_date,End\_day,End\_time,Start\_station,Start\_station\_num,End\_station,End\_station\_num,Bike\_num,Member\_Type from tempdb.dbo.'**+**@vme\_output**+**' where Duration is not null order by row\_id " queryout "'

**+** @baseDirectory **+**

'\2016\_output.txt' **+**

'" -c -T -S ' **+** @@SERVERNAME **+** ''''**;**

PRINT @**sql;**

**EXEC(**@**sql);**

**drop** **table** ##output\_2016

**drop** **table** #data\_format\_2016

**drop** **table** #data\_loading\_2016