Working with Real and Big Data
BASH SCRIPT #1
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INTRODUCTION :

This BASH script is to correlate the location number to the actual location name. If we look at the file BTemperature_Stations.txt, each station, numbered 1 to 338, has a proper name. For example, station number 28 is KELOWNA, and station 241 is TORONTO. If you consider the line of the file corresponding to TORONTO, it looks like:

241 6158355 TORONTO ON 1840 3 2012 12 43.67 -79.40 113 Y

where the location/station number is first (241), followed by the station ID code (6158355), followed by the station name (TORONTO), followed by province (ON), year the measurements begin (1840), month in 1840 (3 - March), final year of measurements in the dataset (2012), final year month (12 - December), and additional information, including the latitude and longitude of the site location.

My BASH script, findtemp.sh, will filter an output with the proper name of the site, rather than a file name. It should run as follows

$ ./findtemp.sh 1948 318

MONTICELLO

1948

-9.5

DESCRIPTION:

For writing a Bash Script, we always start with **#!/bin/bash.**

Defining the text files to a particular variable:

 # temporary file definitions

BTstns="BTemperature_Stations.txt"

alldatafile="BIGDATA8zx2756.txt"

smalldatafile="distilled_datazx47432_$1.dat"

locationsfile="locationszx646332.txt"

tempfile="tempfile.txt”

First of all, I extracted station IDs from BTemperature_Stations.txt.The actual data starts from the line 5 and ends at line 343.

So using For Loop, I scanned lines 5 to 343 to get the data from that file.For loop is shown below:

```
for x in {5..343}
do
        next=$(head -n $x $BTstns | tail -n 1)  # read line x from
BTemperature_Stations.txt
        line=($next)
        stationNUM=(${line[0]})         # station number
        stationID=(${line[1]})          # station ID
        stationNAME=(${line[2]})        # station name
        nextfile=mm$stationID.txt
         newfile=$stationNAME
         echo "$newfile" >>$tempfile

        echo "$nextfile" >> $locationsfile      # write the data file
name first
        y=$(cat $nextfile | tr "," "\n")        # remove commas,
replace with newlines
        for z in $y                     # go through each token in
the file $x
        do
                echo $z >> $alldatafile
        done
done
```

Execution of For loop:

For x in 5,
`next=$(head -n $x $BTstns | tail -n 1)`
next= 5th line(data) from the BTemperature_Stations.txt file.
i.e.
next=1 1100120 AGASSIZ BC 1893 1 2012 12 49.25 -121.77 15 N

Now,
`line=($next)` (line is an array that takes the value inside the next variable)

`stationNUM=(${line[0]})` (stationNUM=1)
`stationID=(${line[1]}` (stationID=1100120)

```
stationNAME=(${line[2]})
```
(stationNAME=AGASSIZ)

```
nextfile=mm$stationID.txt
```
(nextfile=mm.1100120.txt)

```
 newfile=$stationNAME
```
(newfile=AGASSIZ)

```
 echo "$newfile" >>$tempfile
```
(Transfering station names to “tempfile.txt”)

```
 echo "$nextfile" >> $locationsfile (In first loop it will print
 mm.1100120.txt to the locationszx646332.txt)
```

```
 y=$(cat $nextfile | tr "," "\n")
        for z in $y
        do
                echo $z >> $alldatafile
        done
done
```

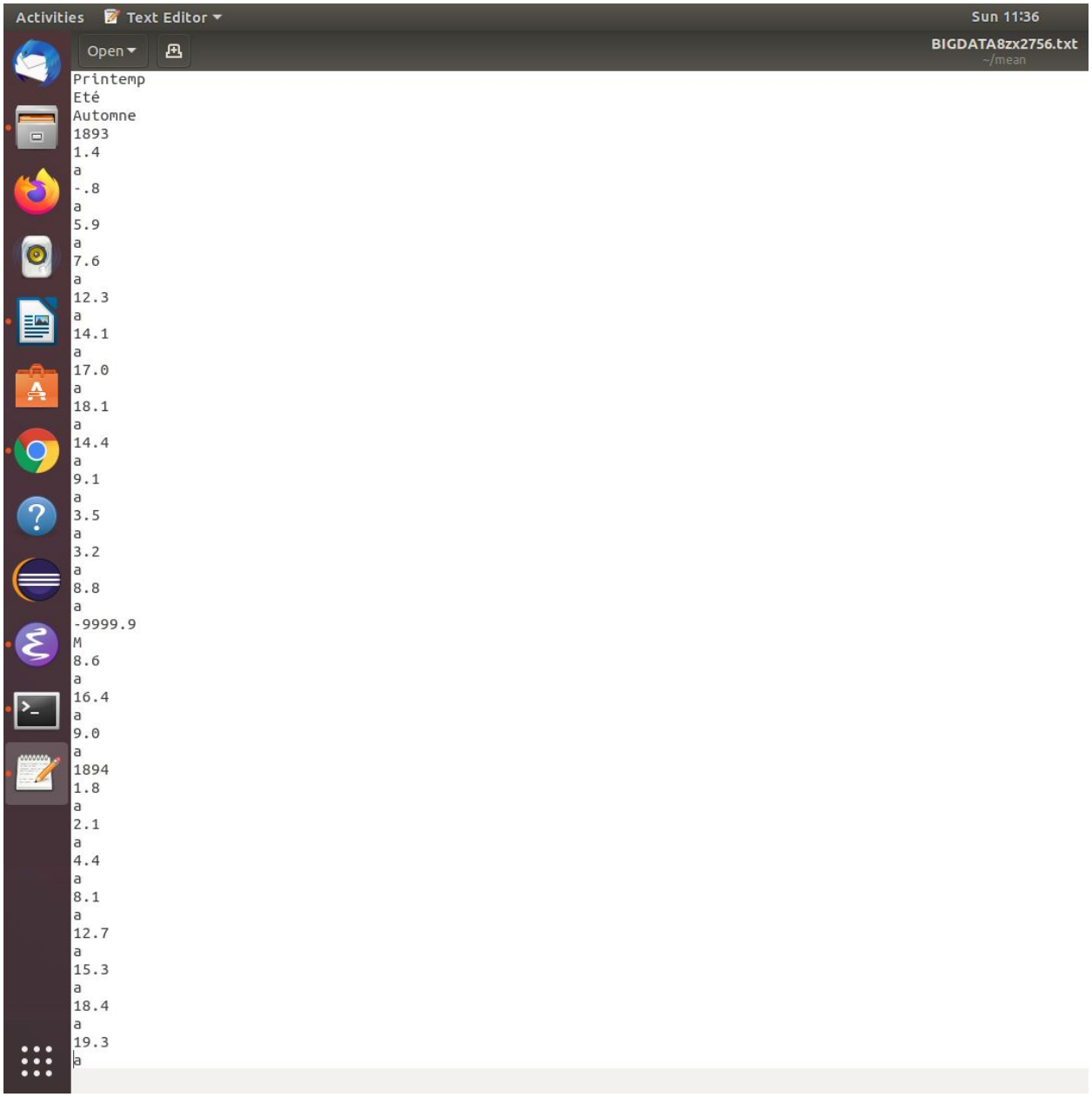
As you can see in the screenshot below, the mm1100120.txt file consists of the data separated by the commas. In order to remove that we use **tr command** to replace commas by newlines.And after scanning all the data, that data is moved to “BIGDATA8zx2756.txt”.

1100120,AGASSIZ ,BC, station not joined, Monthly mean of homogenized daily mean temperature , °C, Updated to December 2012

1100120,AGASSIZ ,BC, station non-jointe, Moyenne mensuelle des températures homogénéisées moyennes quotidiennes , °C, Mise à jour jusqu à décembre 2012

Year,	Jan, ,	Feb, ,	Mar, ,	Apr, ,	May, ,	Jun, ,	Jul, ,	Aug, ,	Sep, ,	Oct, ,	Nov, ,	Dec, ,	Annual, ,	Winter, ,	Spring, ,	Summer, ,	Autumn
Year,	Janv, ,	Fév, ,	Mars, ,	Avr, ,	Mai, ,	Juin, ,	Juil, ,	Août, ,	Sept, ,	Oct, ,	Nov, ,	Déc, ,	Annuel, ,	Hiver, ,	Printemp, ,	Eté, ,	Automne
1893,	1.4,a,	-.8,a,	5.9,a,	7.6,a,	12.3,a,	14.1,a,	17.0,a,	18.1,a,	14.4,a,	9.1,a,	3.5,a,	3.2,a,	8.8,a,	-9999.9,M,	8.6,a,	16.4,a,	9.0,a
1894,	1.8,a,	2.1,a,	4.4,a,	8.1,a,	12.7,a,	15.3,a,	18.4,a,	19.3,a,	14.0,a,	9.4,a,	6.7,a,	2.7,a,	9.6,a,	2.4,a,	8.4,a,	17.7,a,	10.0,a
1895,	1.6,a,	5.6,a,	6.2,a,	9.1,a,	12.4,a,	16.1,a,	17.8,a,	17.1,a,	12.5,a,	12.5,a,	6.2,a,	-9999.9,M,	-9999.9,M,	3.3,a,	9.2,a,	17.0,a,	10.4,a
1896,	1.5,a,	5.7,a,	6.1,a,	8.0,a,	12.1,a,	15.4,a,	19.6,a,	19.3,a,	13.9,a,	12.2,a,	.3,a,	4.5,a,	9.9,a,	-9999.9,M,	8.7,a,	18.1,a,	8.8,a
1897,	-9999.9,M,	4.9,a,	3.4,a,	12.2,a,	16.2,a,	14.7,a,	16.4,a,	20.5,a,	15.5,a,	11.0,a,	4.1,a,	2.2,a,	-9999.9,M,	-9999.9,M,	10.6,a,	17.2,a,	10.2,a
1898,	2.4,a,	6.1,a,	6.1,a,	9.5,a,	16.5,a,	17.0,a,	19.0,a,	21.9,a,	16.2,a,	11.2,a,	5.0,a,	3.1,a,	11.2,a,	3.6,a,	10.7,a,	19.3,a,	10.8,a
1899,	1.9,a,	2.3,a,	6.4,a,	9.8,a,	11.6,a,	14.8,a,	18.6,a,	16.7,a,	16.9,a,	11.8,a,	8.0,a,	3.7,a,	10.2,a,	2.4,a,	9.3,a,	16.7,a,	12.2,a
1900,	6.2,a,	3.7,a,	11.7,a,	12.2,a,	13.0,a,	-9999.9,M,	18.7,a,	16.2,a,	15.1,a,	11.4,a,	4.1,a,	5.4,a,	-9999.9,M,	4.5,a,	12.3,a,	-9999.9,M,	10.2,a
1901,	2.8,a,	3.4,a,	8.4,a,	8.0,a,	16.3,a,	15.4,a,	16.2,a,	18.5,a,	13.8,a,	12.9,a,	6.8,a,	3.6,a,	10.5,a,	3.9,a,	10.9,a,	16.7,a,	11.2,a
1902,	2.5,a,	-9999.9,M,	-9999.9,M,	-9999.9,M,	-9999.9,M,	-9999.9,M,	17.0,a,	16.1,a,	14.7,a,	11.2,a,	4.1,a,	2.6,a,	-9999.9,M,	-9999.9,M,	-9999.9,M,	-9999.9,M,	10.0,a
1903,	3.8,a,	3.6,a,	4.4,a,	8.3,a,	12.1,a,	16.8,a,	16.5,a,	16.8,a,	13.5,a,	9.2,a,	4.4,a,	4.6,a,	9.5,a,	3.3,a,	8.3,a,	16.7,a,	9.0,a
1904,	2.6,a,	2.1,a,	6.4,a,	12.3,a,	13.4,a,	14.0,a,	18.3,a,	17.7,a,	14.4,a,	12.3,a,	8.3,a,	4.8,a,	10.6,a,	3.1,a,	10.7,a,	16.7,a,	11.7,a
1905,	3.3,a,	3.0,a,	10.5,a,	12.5,a,	14.3,a,	15.1,a,	20.9,a,	17.1,a,	12.1,a,	7.3,a,	5.6,a,	4.5,a,	10.5,a,	3.7,a,	12.4,a,	17.7,a,	8.3,a
1906,	3.8,a,	6.8,a,	6.8,a,	11.5,a,	12.9,a,	15.1,a,	21.0,a,	17.8,a,	12.6,a,	10.5,a,	4.4,a,	3.5,a,	10.6,a,	5.0,a,	10.4,a,	18.0,a,	9.2,a
1907,	-4.7,a,	2.4,a,	4.0,a,	9.3,a,	14.2,a,	15.2,a,	18.3,a,	15.5,a,	14.1,a,	11.9,a,	9.3,a,	3.3,a,	9.4,a,	.4,a,	9.2,a,	16.3,a,	11.8,a
1908,	3.7,a,	3.7,a,	6.0,a,	10.6,a,	11.9,a,	17.3,a,	18.9,a,	17.2,a,	12.0,a,	9.3,a,	7.7,a,	3.3,a,	10.1,a,	3.6,a,	9.5,a,	17.8,a,	9.7,a
1909,	-3.0,a,	2.4,a,	7.1,a,	8.8,a,	11.7,a,	15.1,a,	16.7,a,	16.5,a,	14.3,a,	9.8,a,	5.2,a,	.4,a,	8.8,a,	.9,a,	9.2,a,	16.1,a,	9.8,a
1910,	3.0,a,	1.4,a,	9.0,a,	10.4,a,	14.1,a,	17.1,a,	19.3,a,	15.7,a,	15.1,a,	10.5,a,	7.4,a,	3.9,a,	10.6,a,	1.6,a,	11.2,a,	17.4,a,	11.0,a
1911,	-2.1,a,	1.6,a,	5.5,a,	8.4,a,	12.1,a,	15.1,a,	19.1,a,	17.0,a,	14.1,a,	10.8,a,	3.6,a,	4.1,a,	9.1,a,	1.1,a,	8.7,a,	17.1,a,	9.5,a
1912,	1.6,a,	5.6,a,	6.0,a,	8.2,a,	14.6,a,	16.1,a,	16.6,a,	16.4,a,	14.0,a,	9.3,a,	5.9,a,	4.0,a,	9.9,a,	3.8,a,	9.6,a,	16.4,a,	9.7,a
1913,	-1.6,a,	1.3,a,	4.7,a,	11.1,a,	11.7,a,	15.0,a,	17.2,a,	18.2,a,	14.0,a,	9.2,a,	6.7,a,	4.4,a,	9.3,a,	1.2,a,	9.2,a,	16.8,a,	10.0,a
1914,	3.3,a,	4.2,a,	7.5,a,	11.2,a,	13.9,a,	14.5,a,	17.1,a,	17.6,a,	12.9,a,	10.7,a,	6.1,a,	1.5,a,	10.0,a,	4.0,a,	10.9,a,	16.4,a,	9.9,a
1915,	2.7,a,	4.9,a,	9.1,a,	10.3,a,	12.8,a,	15.6,a,	17.4,a,	19.3,a,	14.2,a,	9.4,a,	4.3,a,	3.3,a,	10.3,a,	3.0,a,	10.7,a,	17.4,a,	9.3,a
1916,	-5.5,a,	2.3,a,	5.1,a,	9.6,a,	11.9,a,	16.1,a,	16.4,a,	18.3,a,	15.1,a,	9.6,a,	4.1,a,	.0,a,	8.6,a,	.0,a,	8.9,a,	16.9,a,	9.6,a
1917,	.3,a,	.3,a,	3.9,a,	7.2,a,	12.4,a,	14.0,a,	17.4,a,	18.5,a,	15.1,a,	9.6,a,	7.6,a,	2.3,a,	9.1,a,	.2,a,	7.8,a,	16.6,a,	10.8,a
1918,	2.9,a,	2.4,a,	4.7,a,	10.0,a,	11.9,a,	16.8,a,	18.1,a,	16.9,a,	19.2,a,	11.3,a,	6.1,a,	3.7,a,	10.3,a,	2.5,a,	8.9,a,	17.3,a,	12.2,a
1919,	3.6,a,	2.8,a,	6.1,a,	10.3,a,	11.7,a,	14.7,a,	18.3,a,	18.0,a,	16.4,a,	8.0,a,	5.1,a,	1.5,a,	9.7,a,	3.4,a,	9.4,a,	17.0,a,	9.8,a
1920,	2.4,a,	4.4,a,	6.4,a,	8.9,a,	12.8,a,	16.0,a,	19.5,a,	19.5,a,	14.1,a,	8.7,a,	8.3,a,	4.0,a,	10.4,a,	2.8,a,	9.4,a,	18.3,a,	10.4,a
1921,	2.7,a,	4.4,a,	6.3,a,	10.0,a,	12.7,a,	15.5,a,	17.3,a,	17.5,a,	12.2,a,	11.4,a,	4.2,a,	1.1,a,	9.6,a,	3.7,a,	9.7,a,	16.8,a,	9.3,a
1922,	.0,a,	-.3,a,	4.2,a,	8.3,a,	12.9,a,	16.8,a,	18.2,a,	17.8,a,	15.2,a,	12.3,a,	5.6,a,	-.9,a,	9.2,a,	.3,a,	8.5,a,	17.6,a,	11.0,a
1923,	2.4,a,	.9,a,	6.0,a,	11.6,a,	12.4,a,	17.1,a,	19.1,a,	19.0,a,	16.4,a,	12.9,a,	7.8,a,	2.6,a,	10.7,a,	.8,a,	10.0,a,	18.4,a,	12.4,a
1924,	2.1, ,	5.9, ,	6.1, ,	8.8, ,	15.2, ,	15.2, ,	17.5, ,	17.2, ,	14.9, ,	10.1, ,	5.2, ,	.1, ,	9.9, ,	3.5,a,	10.0, ,	16.6, ,	10.1,
1925,	2.9, ,	6.2, ,	6.3, ,	10.8, ,	16.0, ,	16.4, ,	18.9, ,	17.6, ,	15.5, ,	9.3, ,	5.8, ,	6.7, ,	11.0, ,	3.1, ,	11.0, ,	17.6, ,	10.2,
1926,	3.8, ,	5.7, ,	10.2, ,	13.1, ,	13.2, ,	17.0, ,	18.9, ,	18.2, ,	14.1, ,	12.2, ,	7.8, ,	2.2, ,	11.4, ,	5.4, ,	12.2, ,	18.0, ,	11.4,
1927,	.6, ,	4.0, ,	5.4, ,	8.4, ,	11.8, ,	17.2, ,	19.1, ,	19.0, ,	14.7, ,	10.3, ,	4.4, ,	-.4, ,	9.5, ,	2.3, ,	8.5, ,	18.4, ,	9.8,
1928,	2.5, ,	5.3, ,	8.0, ,	9.6, ,	15.7, ,	15.6, ,	18.9, ,	18.0, ,	14.7, ,	10.2, ,	6.7, ,	3.2, ,	10.7, ,	2.5, ,	11.1, ,	17.5, ,	10.5,
1929,	-1.4, ,	.6, ,	6.5, ,	8.1, ,	13.5, ,	15.7, ,	17.9, ,	17.7, ,	16.8, ,	12.3, ,	5.9, ,	2.0, ,	9.6, ,	.8, ,	9.4, ,	17.1, ,	11.7,
1930,	-3.6, ,	4.7, ,	7.4, ,	11.4, ,	12.4, ,	15.5, ,	18.2, ,	18.6, ,	15.5, ,	9.6, ,	5.9, ,	4.4, ,	10.0, ,	1.0, ,	10.4, ,	17.4, ,	10.3,
1931,	6.2, ,	5.4, ,	7.4, ,	11.4, ,	14.6, ,	15.8, ,	19.0, ,	17.6, ,	14.4, ,	11.0, ,	4.1, ,	2.5, ,	10.8, ,	5.3, ,	11.1, ,	17.5, ,	9.8,
1932,	.9, ,	2.5, ,	6.4, ,	10.7, ,	13.2, ,	16.5, ,	15.9, ,	17.9, ,	15.3, ,	11.3, ,	7.5, ,	1.2, ,	9.9, ,	2.0, ,	10.1, ,	16.8, ,	11.4,
1933,	2.1, ,	-.4, ,	6.0, ,	9.4, ,	11.6, ,	14.5, ,	17.0, ,	19.7, ,	13.3, ,	10.5, ,	7.6, ,	1.8, ,	9.4, ,	1.0, ,	9.0, ,	17.1, ,	10.5,
1934,	4.7, ,	7.5, ,	9.3, ,	13.6, ,	14.3, ,	16.0, ,	16.9, ,	18.6, ,	14.1, ,	12.1, ,	8.1, ,	3.4, ,	11.6, ,	4.7, ,	12.4, ,	17.2, ,	11.4,
1935,	-1.2, ,	6.3, ,	4.4, ,	9.3, ,	13.0, ,	15.1, ,	17.6, ,	17.8, ,	16.8, ,	9.7, ,	4.7, ,	6.3, ,	10.0, ,	2.8, ,	8.9, ,	16.8, ,	10.4,
1936,	3.5, ,	-3.3, ,	4.0, ,	11.0, ,	14.4, ,	16.8, ,	17.1, ,	18.1, ,	14.5, ,	12.3, ,	6.7, ,	3.9, ,	9.9, ,	2.2, ,	9.8, ,	17.3, ,	11.2,
1937,	-4.1, ,	.2, ,	8.3, ,	7.8, ,	13.1, ,	16.6, ,	17.8, ,	17.0, ,	15.9, ,	12.8, ,	6.5, ,	2.9, ,	9.6, ,	.0, ,	9.7, ,	17.1, ,	11.7,
1938,	3.0, ,	4.0, ,	7.1, ,	10.8, ,	13.7, ,	16.3, ,	19.3, ,	17.0, ,	17.2, ,	12.5, ,	5.7, ,	3.1, ,	10.8, ,	3.3, ,	10.5, ,	17.5, ,	11.8,
1939,	4.3, ,	1.3, ,	7.0, ,	10.5, ,	13.5, ,	14.1, ,	17.7, ,	19.3, ,	15.8, ,	10.8, ,	8.7, ,	6.7, ,	10.8, ,	2.9, ,	10.3, ,	17.0, ,	11.8,
1940,	4.5, ,	5.2, ,	8.6, ,	11.7, ,	14.8, ,	16.6, ,	17.6, ,	18.5, ,	18.0, ,	12.4, ,	4.5, ,	5.2, ,	11.5, ,	5.5, ,	11.7, ,	17.6, ,	11.6,
1941,	5.1, ,	7.8, ,	10.9, ,	11.7, ,	13.2, ,	16.0, ,	20.4, ,	18.3, ,	13.8, ,	11.0, ,	7.5, ,	4.4, ,	11.7, ,	6.0, ,	11.9, ,	18.2, ,	10.8,
1942,	4.3, ,	5.3, ,	6.8, ,	11.1, ,	13.3, ,	15.6, ,	20.0, ,	20.1, ,	16.0, ,	11.7, ,	5.8, ,	3.6, ,	11.1, ,	4.7, ,	10.4, ,	18.6, ,	11.2,
1943,	-3.1, ,	6.2, ,	5.2, ,	11.1, ,	11.8, ,	15.8, ,	18.0, ,	16.9, ,	17.1, ,	11.4, ,	7.7, ,	4.2, ,	10.2, ,	2.2, ,	9.4, ,	16.9, ,	12.1,

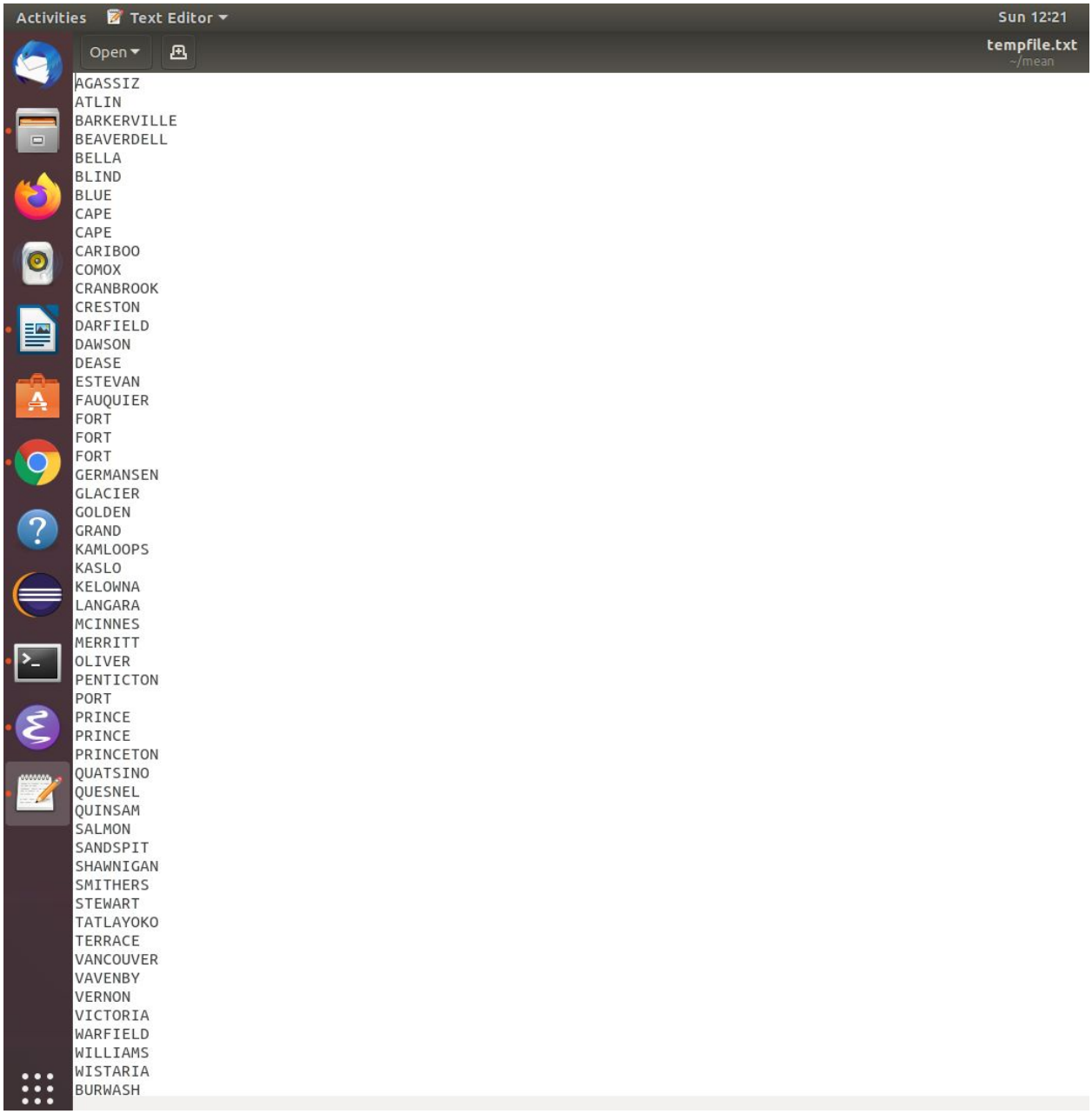
After replacing **“,”** with **“\n” (“BIGDATA8zx2756.txt” file)**



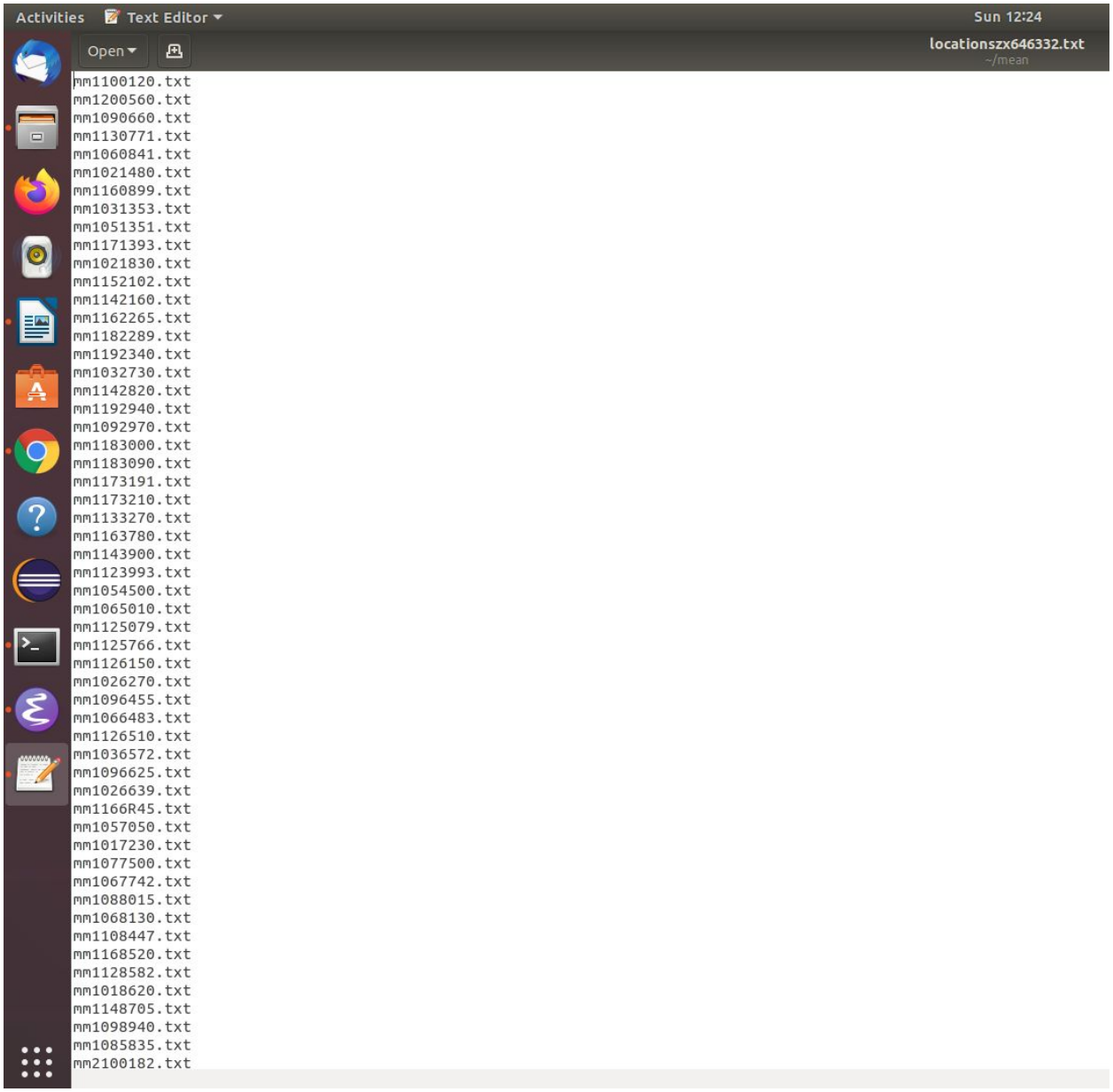
Similarly For Loop will execute for other lines in "BTemperature_Stations.txt".

After execution of the FOR LOOP:

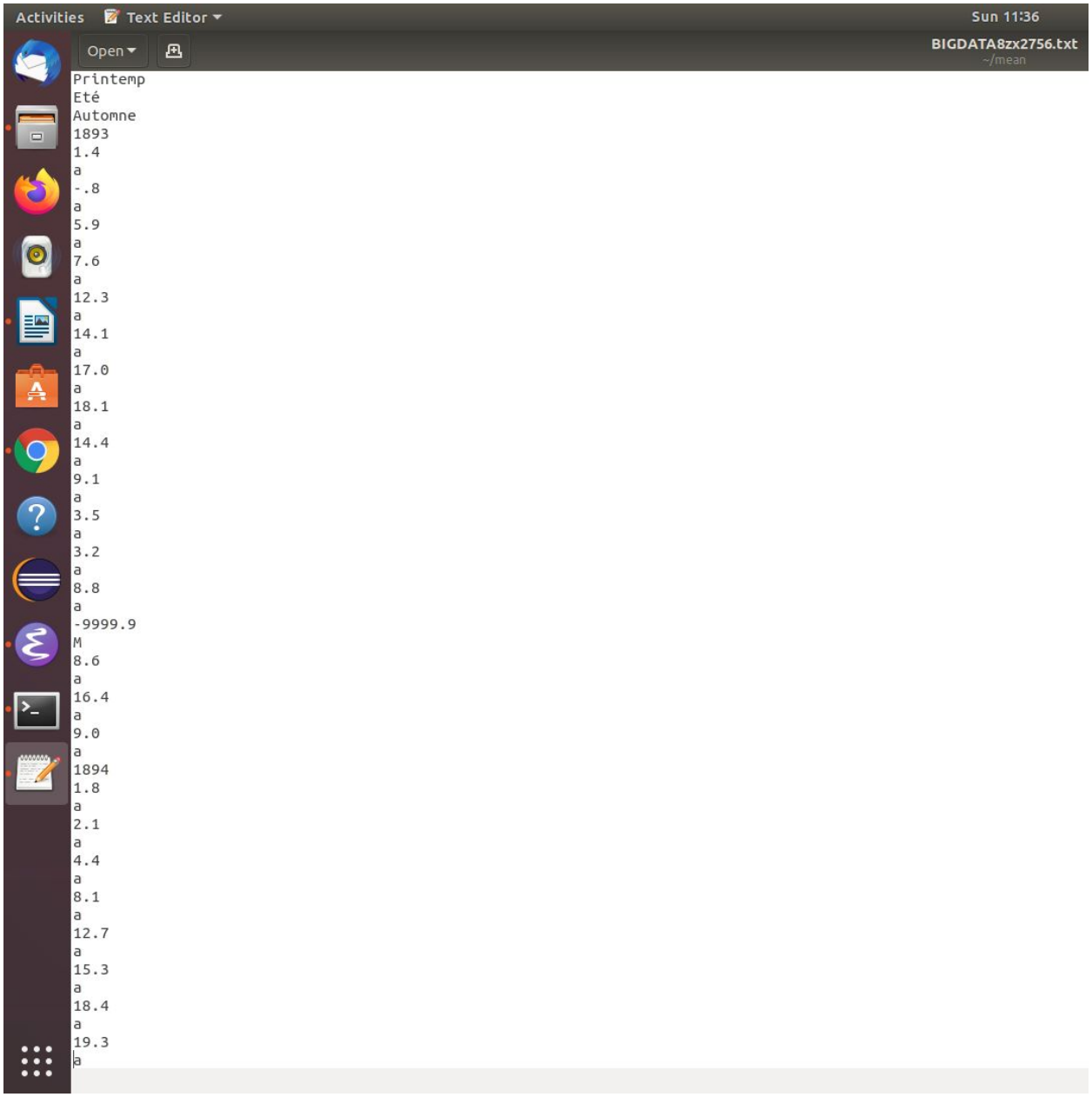
“tempfile.txt”



“locationszx646332.txt”



“BIGDATA8zx2756.txt”



After execution of the foor loop now we have all the data, locations and names of the particular location in order.

Continuing further

```
yearsearch=$1 # year provided as argument
```

Here yearsearch=$1 indicates that we are taking the 1st input from the user.

```
cat  $alldatafile | grep -A 17 $yearsearch >> $smalldatafile
```

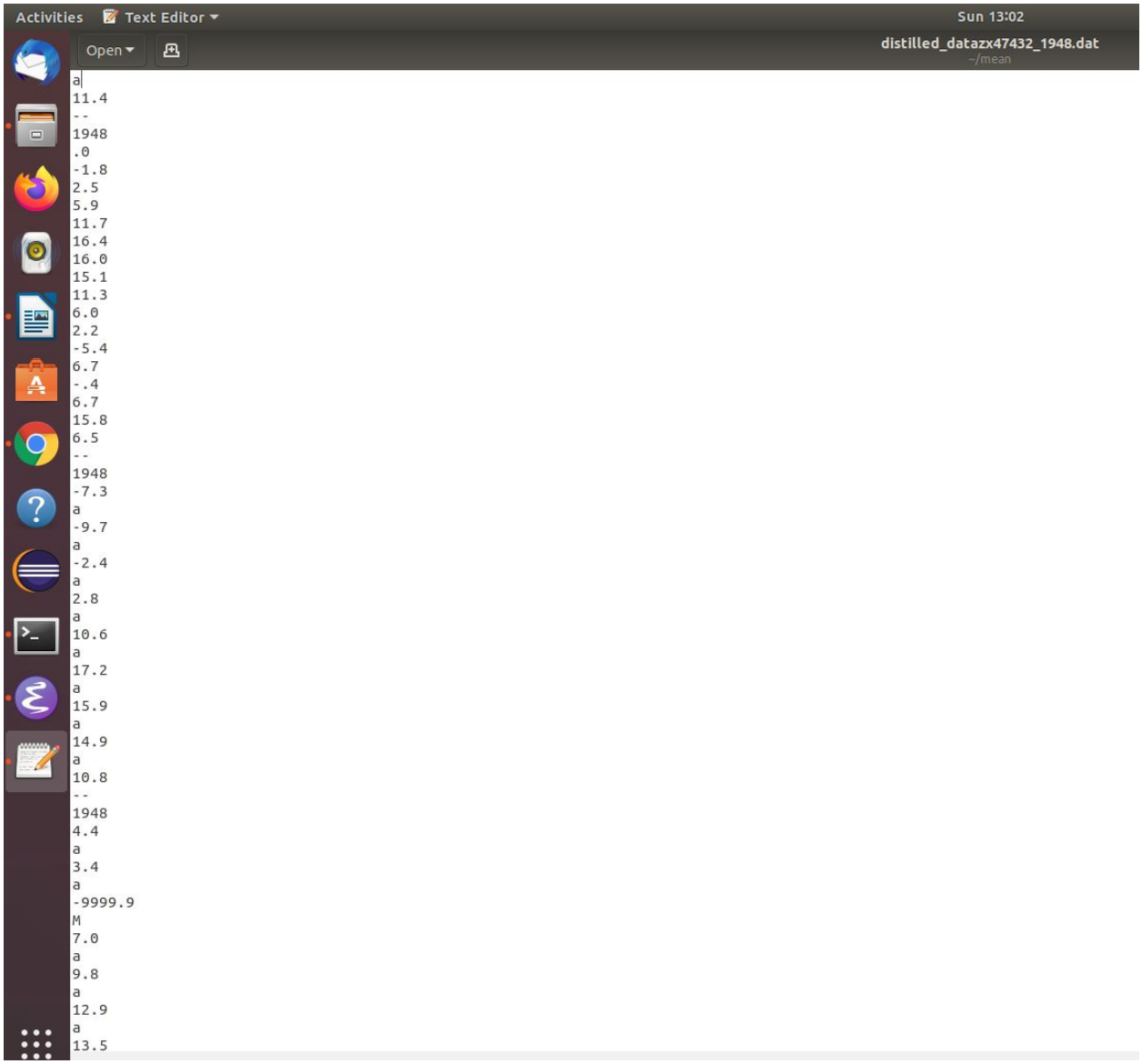
cat sends data from the **“BIGDATA8zx2756.txt”** to STDOUT
grep -A 17 searches for 17 lines after $yearsearch(i.e the input year from user (e.g 1948)

Piping is used to get the data from STDOUT and then search for 17 lines after a particular year entered by the user.

Then that data is sent to "distilled_datazx47432_$1.dat"

.
.
.
.
.
.
.

"distilled_datazx47432_$1.dat"



THEN

```
head -n $2 $tempfile | tail -n 1
```

“$2”(example user enters 200)
head -n $2 $tempfile will display 200 names to STDOUT from “tempfile.txt”.--------->piped to **tail -n 1**

So it will display the 200th name

--->

```
cat $smalldatafile | grep -A $NUMCONTEXTLINES -m $2 $yearsearch |
tail -n $NCLPLUSONE   # send the target year's temp data to STDOUT
```

Here ,

NUMCONTEXTLINES=1
NCLPLUSONE=NUMCONTEXTLINES+1

cat $smalldatafile will send data from **"distilled_datazx47432_$1.dat"** to the **STDOUT**

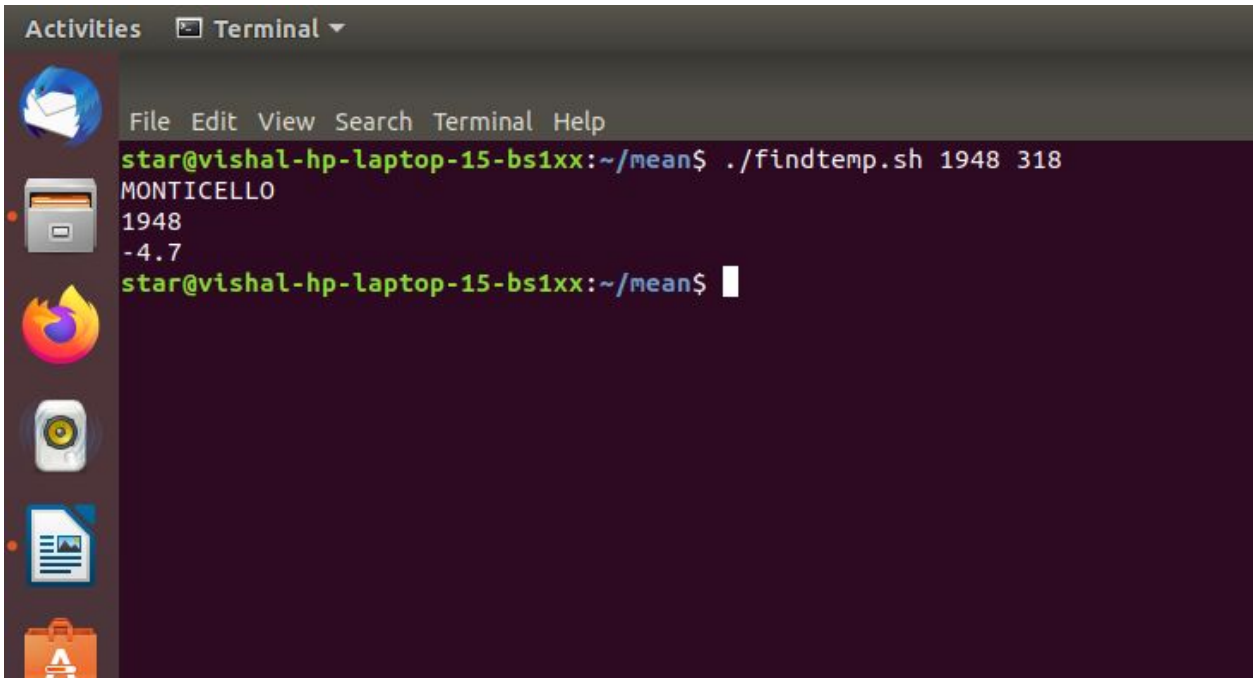
Suppose $2=200
grep -A 1 -m $2 $yearsearch will search for 1 line at the 200th position of that particular year entered by the user

tail -n 2
This will display last 2 line to the STDOUT (i.e **year and temperature**)

```
rm $alldatafile; rm $smalldatafile; rm $locationsfile;rm $tempfile
```

rm will remove all temporary files created.

OUTPUT:



CONCLUSION :

BASH SCRIPT#1 is helpful in finding out the name ,at particular position ,of a certain year mentioned by the user.It will be easy for users to use this script instead of searching manually each and every file.

APPENDIX:

```
#!/bin/bash
NUMCONTEXTLINES=1 # works up to 17
let NCLPLUSONE=NUMCONTEXTLINES+1

# temporary file definitions
BTstns="BTemperature_Stations.txt"
alldatafile="BIGDATA8zx2756.txt"
smalldatafile="distilled_datazx47432_$1.dat"
locationsfile="locationszx646332.txt"
tempfile="tempfile.txt"

# extract station IDs from BTemperature_Stations.txt

# scan lines from line 5 to 343
for x in {5..343}
do
      next=$(head -n $x $BTstns | tail -n 1)  # read line x from
BTemperature_Stations.txt
         line=($next)
      stationNUM=(${line[0]})          # station number
         stationID=(${line[1]})        # station ID
         stationNAME=(${line[2]}) # station name
      nextfile=mm$stationID.txt
      newfile=$stationNAME
      echo "$newfile" >>$tempfile
      echo "$nextfile" >> $locationsfile    # write the data file
name first
      y=$(cat $nextfile | tr "," "\n") # remove commas, replace with
newlines
      for z in $y                # go through each token in the file
$x
      do
           echo $z >> $alldatafile
      done
done

# scan for a particular year; there should be as many of a given year
```

```
# as there are geographical locations
yearsearch=$1 # year provided as argument
cat  $alldatafile | grep -A 17 $yearsearch >> $smalldatafile


# extract year's info for location specified in $2
head -n $2 $tempfile | tail -n 1   # send the location identifier
string to STDOUT
cat $smalldatafile | grep -A $NUMCONTEXTLINES -m $2 $yearsearch |
tail -n $NCLPLUSONE   # send the target year's temp data to STDOUT

# wrap up, delete all temporary files
rm $alldatafile; rm $smalldatafile; rm $locationsfile;rm  $tempfile;
exit 0
```