

## Description

Develop a Java SE Netbeans project using the sample data files contained in *data\_files.zip* as an input feed into an application that provides data analytics. The data was obtained from the United States Census Bureau at <http://www.census.gov/popest/data/datasets.html>

Create an abstract class called *Record* and a subclass called *PopulationRecord* employing instance variables for each of the fields in the data files. Provide default (*noarg*) and (*full-arg*) constructors where required. Provide accessors(*gets*) and mutators(*sets*) for all of the instance variables/fields. Provide *toString()* methods to format object state.

Provide comparator classes implementing *java.util.Comparator* or *java.lang.Comparable* for comparing various fields in the application's data analysis requirements.

Locate the *Record*, *PopulationRecord* and comparator classes (or interface(s)) in a package called *domain*.

Provide the following functionality in the driver:

- Read input data into *PopulationRecord* objects.
- Collect *PopulationRecord* objects into an *ArrayList* called *populationRecords*.
- Encapsulate a *java.util.Date* object and the *ArrayList* object into a serializable class called *PersistentObject*.
- Create an instance of *PersistentObject* with the current timestamp and the *ArrayList* object.
- Serialize the persistent object to a file called *population-record.ser* relative to your project path.
- Make the application sleep for 5 seconds.
- Deserialize the persisted object into a date object and an *ArrayList* object called *deserializedPopulationRecords*.
- Display the time difference between serialization and deserialization.
- Display the following data analytics:
  1. population %increase based on estimate per region per year
  2. max and min births per state per year
  3. max and min deaths per state per year
  4. number of states with estimated population increase
  5. number of states with estimated population decrease
  6. state with most estimated population per year,
  7. state with least estimated population per year.
- Write all displayed data to a text file called *population-records.txt* in your project folder called *output*

## Installation and Compile Notes

Program was built using a Windows XP desktop configured with—

- java version "1.7.0\_07"
- Java(TM) SE Runtime Environment (build 1.7.0\_07-b11)
- Java HotSpot(TM) Client VM (build 23.3-b01, mixed mode, sharing)

To run, extract the contents of the mp1.zip file to a local folder. Open a windows command prompt, and navigate to the dist subdirectory. To run the project from the command line, go to the dist folder and type the following:

```
java -jar "mp1.jar"
```

Alternately, navigate to the test directory and run the test.bat script. This script will capture all STDOUT and STDERR output in the output\population-records.txt file.

## Screen Captures

When executed, the application will write its output to the STDOUT in the following format.

```
parsing CSV...
5.0 seconds elapsed.
NA 2010 Population % Incr: 0.1893731011587931
NA 2011 Population % Incr: 0.1893731011587931
NA 2010 Population % Incr: 0.08833411874243048
NA 2011 Population % Incr: 0.08833411874243048
NA 2010 Population % Incr: 0.07391786515057074
NA 2011 Population % Incr: 0.07391786515057074
NA 2010 Population % Incr: 0.26342805276909825
NA 2011 Population % Incr: 0.26342805276909825
NA 2010 Population % Incr: 0.25654679128868985
NA 2011 Population % Incr: 0.25654679128868985
NA 2010 Population % Incr: 0.11854213675025915
NA 2011 Population % Incr: 0.11854213675025915
NA 2010 Population % Incr: 0.5512291071496457
NA 2011 Population % Incr: 0.5512291071496457
NA 2010 Population % Incr: 0.3308034573771987
NA 2011 Population % Incr: 0.3308034573771987
NA 2010 Population % Incr: 0.19434682901217146
NA 2011 Population % Incr: 0.19434682901217146
NA 2010 Population % Incr: 0.22612900493037572
NA 2011 Population % Incr: 0.22612900493037572
NA 2010 Population % Incr: 0.36777250280164064
NA 2011 Population % Incr: 0.36777250280164064
NA 2010 Population % Incr: 0.03919871229012531
```

NA	2011	Population	%	Incr:	0.03919871229012531
NA	2010	Population	%	Incr:	0.20691943951337183
NA	2011	Population	%	Incr:	0.20691943951337183
NA	2010	Population	%	Incr:	0.5299780796147064
NA	2011	Population	%	Incr:	0.5299780796147064
NA	2010	Population	%	Incr:	0.19840105830917854
NA	2011	Population	%	Incr:	0.19840105830917854
NA	2010	Population	%	Incr:	0.2528680816626513
NA	2011	Population	%	Incr:	0.2528680816626513
NA	2010	Population	%	Incr:	0.22480318694171364
NA	2011	Population	%	Incr:	0.22480318694171364
NA	2010	Population	%	Incr:	0.22454965673247076
NA	2011	Population	%	Incr:	0.22454965673247076
NA	2010	Population	%	Incr:	0.088444591038072
NA	2011	Population	%	Incr:	0.088444591038072
NA	2010	Population	%	Incr:	0.10521607699188747
NA	2011	Population	%	Incr:	0.10521607699188747
NA	2010	Population	%	Incr:	0.1264464030725294
NA	2011	Population	%	Incr:	0.1264464030725294
NA	2010	Population	%	Incr:	0.21117247867070343
NA	2011	Population	%	Incr:	0.21117247867070343
NA	2010	Population	%	Incr:	0.1811556629753406
NA	2011	Population	%	Incr:	0.1811556629753406
NA	2010	Population	%	Incr:	0.26406392416064683
NA	2011	Population	%	Incr:	0.26406392416064683
NA	2010	Population	%	Incr:	-0.07392568736962317
NA	2011	Population	%	Incr:	-0.07392568736962317
NA	2010	Population	%	Incr:	0.21007864829138112
NA	2011	Population	%	Incr:	0.21007864829138112
NA	2010	Population	%	Incr:	0.11969218170424743
NA	2011	Population	%	Incr:	0.11969218170424743
NA	2010	Population	%	Incr:	-0.06568433577322513
NA	2011	Population	%	Incr:	-0.06568433577322513
NA	2010	Population	%	Incr:	0.12694372563714607
NA	2011	Population	%	Incr:	0.12694372563714607
NA	2010	Population	%	Incr:	0.09351945558533574
NA	2011	Population	%	Incr:	0.09351945558533574
NA	2010	Population	%	Incr:	0.11334250692987241
NA	2011	Population	%	Incr:	0.11334250692987241
NA	2010	Population	%	Incr:	0.15595073856773953
NA	2011	Population	%	Incr:	0.15595073856773953
NA	2010	Population	%	Incr:	0.20806629211083802
NA	2011	Population	%	Incr:	0.20806629211083802
NA	2010	Population	%	Incr:	0.13819402040546538

NA	2011	Population	%	Incr:	0.13819402040546538
NA	2010	Population	%	Incr:	0.025446800235781695
NA	2011	Population	%	Incr:	0.025446800235781695
NA	2010	Population	%	Incr:	0.0875692996298636
NA	2011	Population	%	Incr:	0.0875692996298636
NA	2010	Population	%	Incr:	0.32697481521770805
NA	2011	Population	%	Incr:	0.32697481521770805
NA	2010	Population	%	Incr:	0.08825424819683082
NA	2011	Population	%	Incr:	0.08825424819683082
NA	2010	Population	%	Incr:	0.2596514594186446
NA	2011	Population	%	Incr:	0.2596514594186446
NA	2010	Population	%	Incr:	0.30300732540280795
NA	2011	Population	%	Incr:	0.30300732540280795
NA	2010	Population	%	Incr:	0.012707491404240212
NA	2011	Population	%	Incr:	0.012707491404240212
NA	2010	Population	%	Incr:	0.23538167818872865
NA	2011	Population	%	Incr:	0.23538167818872865
NA	2010	Population	%	Incr:	0.18945079108364912
NA	2011	Population	%	Incr:	0.18945079108364912
NA	2010	Population	%	Incr:	0.12078839719709199
NA	2011	Population	%	Incr:	0.12078839719709199
NA	2010	Population	%	Incr:	-0.0037052273156958178
NA	2011	Population	%	Incr:	-0.0037052273156958178
NA	2010	Population	%	Incr:	0.2538611015262799
NA	2011	Population	%	Incr:	0.2538611015262799
NA	2010	Population	%	Incr:	0.29698592448844235
NA	2011	Population	%	Incr:	0.29698592448844235
NA	2010	Population	%	Incr:	0.17847153610637068
NA	2011	Population	%	Incr:	0.17847153610637068
NA	2010	Population	%	Incr:	0.4291214660114364
NA	2011	Population	%	Incr:	0.4291214660114364
NA	2010	Population	%	Incr:	0.4194819972611017
NA	2011	Population	%	Incr:	0.4194819972611017
NA	2010	Population	%	Incr:	0.026848168811057612
NA	2011	Population	%	Incr:	0.026848168811057612
NA	2010	Population	%	Incr:	0.28650061304607033
NA	2011	Population	%	Incr:	0.28650061304607033
NA	2010	Population	%	Incr:	0.2737733733459835
NA	2011	Population	%	Incr:	0.2737733733459835
NA	2010	Population	%	Incr:	0.07404225373395301
NA	2011	Population	%	Incr:	0.07404225373395301
NA	2010	Population	%	Incr:	0.08217006336924339
NA	2011	Population	%	Incr:	0.08217006336924339
NA	2010	Population	%	Incr:	0.16464818869250175

NA 2011 Population % Incr: 0.16464818869250175  
NA 2010 Population % Incr: -0.10228705919739416  
NA 2011 Population % Incr: -0.10228705919739416  
AL 2010 Max / Min Births: 14482  
NA 2011 Max / Min Births: 59866  
AL 2010 Max / Min Deaths: 11562  
AL 2011 Max / Min Deaths: 47768  
AK 2010 Max / Min Births: 2834  
NA 2011 Max / Min Births: 11193  
AK 2010 Max / Min Deaths: 647  
AK 2011 Max / Min Deaths: 3338  
AR 2010 Max / Min Births: 20900  
NA 2011 Max / Min Births: 87887  
AR 2010 Max / Min Deaths: 11164  
AR 2011 Max / Min Deaths: 45899  
CA 2010 Max / Min Births: 9218  
NA 2011 Max / Min Births: 38156  
CA 2010 Max / Min Deaths: 6759  
CA 2011 Max / Min Deaths: 28478  
CO 2010 Max / Min Births: 123173  
NA 2011 Max / Min Births: 508069  
CO 2010 Max / Min Deaths: 57867  
CO 2011 Max / Min Deaths: 234045  
DE 2010 Max / Min Births: 16453  
NA 2011 Max / Min Births: 66213  
DE 2010 Max / Min Deaths: 7350  
DE 2011 Max / Min Deaths: 31123  
DC 2010 Max / Min Births: 9241  
NA 2011 Max / Min Births: 37319  
DC 2010 Max / Min Deaths: 6855  
DC 2011 Max / Min Deaths: 28244  
FL 2010 Max / Min Births: 2774  
NA 2011 Max / Min Births: 11172  
FL 2010 Max / Min Deaths: 1898  
FL 2011 Max / Min Deaths: 7633  
GA 2010 Max / Min Births: 2232  
NA 2011 Max / Min Births: 9003  
GA 2010 Max / Min Deaths: 1098  
GA 2011 Max / Min Deaths: 4773  
HI 2010 Max / Min Births: 51537  
NA 2011 Max / Min Births: 213292  
HI 2010 Max / Min Deaths: 42097  
HI 2011 Max / Min Deaths: 171257  
ID 2010 Max / Min Births: 32410

NA	2011	Max / Min Births:	134442
ID	2010	Max / Min Deaths:	16640
ID	2011	Max / Min Deaths:	70688
IN	2010	Max / Min Births:	4600
NA	2011	Max / Min Births:	18501
IN	2010	Max / Min Deaths:	2241
IN	2011	Max / Min Deaths:	9730
IA	2010	Max / Min Births:	5789
NA	2011	Max / Min Births:	22954
IA	2010	Max / Min Deaths:	2545
IA	2011	Max / Min Deaths:	11275
KS	2010	Max / Min Births:	42060
NA	2011	Max / Min Births:	167000
KS	2010	Max / Min Deaths:	24484
KS	2011	Max / Min Deaths:	100651
KY	2010	Max / Min Births:	21286
NA	2011	Max / Min Births:	84732
KY	2010	Max / Min Deaths:	14122
KY	2011	Max / Min Deaths:	56499
LA	2010	Max / Min Births:	9400
NA	2011	Max / Min Births:	38324
LA	2010	Max / Min Deaths:	6433
LA	2011	Max / Min Deaths:	27895
ME	2010	Max / Min Births:	9845
NA	2011	Max / Min Births:	40132
ME	2010	Max / Min Deaths:	5459
ME	2011	Max / Min Deaths:	24038
MD	2010	Max / Min Births:	13991
NA	2011	Max / Min Births:	56447
MD	2010	Max / Min Deaths:	10486
MD	2011	Max / Min Deaths:	41945
MA	2010	Max / Min Births:	15571
NA	2011	Max / Min Births:	63969
MA	2010	Max / Min Deaths:	9771
MA	2011	Max / Min Deaths:	40780
MI	2010	Max / Min Births:	3186
NA	2011	Max / Min Births:	12868
MI	2010	Max / Min Deaths:	3290
MI	2011	Max / Min Deaths:	12688
MN	2010	Max / Min Births:	18102
NA	2011	Max / Min Births:	72995
MN	2010	Max / Min Deaths:	10563
MN	2011	Max / Min Deaths:	43606
MS	2010	Max / Min Births:	18589

NA	2011	Max / Min Births:	73368
MS	2010	Max / Min Deaths:	12958
MS	2011	Max / Min Deaths:	52355
MO	2010	Max / Min Births:	28932
NA	2011	Max / Min Births:	113894
MO	2010	Max / Min Deaths:	21459
MO	2011	Max / Min Deaths:	86988
MT	2010	Max / Min Births:	16979
NA	2011	Max / Min Births:	68088
MT	2010	Max / Min Deaths:	9326
MT	2011	Max / Min Deaths:	38436
NE	2010	Max / Min Births:	9515
NA	2011	Max / Min Births:	40464
NE	2010	Max / Min Deaths:	6516
NE	2011	Max / Min Deaths:	28837
NV	2010	Max / Min Births:	18600
NA	2011	Max / Min Births:	75910
NV	2010	Max / Min Deaths:	13350
NV	2011	Max / Min Deaths:	54361
NH	2010	Max / Min Births:	2973
NA	2011	Max / Min Births:	11911
NH	2010	Max / Min Deaths:	1840
NH	2011	Max / Min Deaths:	8629
NJ	2010	Max / Min Births:	6316
NA	2011	Max / Min Births:	25991
NJ	2010	Max / Min Deaths:	3362
NJ	2011	Max / Min Deaths:	14878
NM	2010	Max / Min Births:	9162
NA	2011	Max / Min Births:	36772
NM	2010	Max / Min Deaths:	4743
NM	2011	Max / Min Deaths:	19373
NY	2010	Max / Min Births:	3191
NA	2011	Max / Min Births:	12795
NY	2010	Max / Min Deaths:	2350
NY	2011	Max / Min Deaths:	9778
NC	2010	Max / Min Births:	25275
NA	2011	Max / Min Births:	104343
NC	2010	Max / Min Deaths:	16884
NC	2011	Max / Min Deaths:	68372
ND	2010	Max / Min Births:	7109
NA	2011	Max / Min Births:	28511
ND	2010	Max / Min Deaths:	3636
ND	2011	Max / Min Deaths:	15760
OH	2010	Max / Min Births:	61126

NA	2011	Max / Min Births:	242972
OH	2010	Max / Min Deaths:	36134
OH	2011	Max / Min Deaths:	146864
OK	2010	Max / Min Births:	29777
NA	2011	Max / Min Births:	122131
OK	2010	Max / Min Deaths:	19235
OK	2011	Max / Min Deaths:	78169
OR	2010	Max / Min Births:	2280
NA	2011	Max / Min Births:	8960
OR	2010	Max / Min Deaths:	1226
OR	2011	Max / Min Deaths:	5915
PA	2010	Max / Min Births:	35487
NA	2011	Max / Min Births:	140808
PA	2010	Max / Min Deaths:	26758
PA	2011	Max / Min Deaths:	107668
RI	2010	Max / Min Births:	13366
NA	2011	Max / Min Births:	53727
RI	2010	Max / Min Deaths:	7930
RI	2011	Max / Min Deaths:	34528
SC	2010	Max / Min Births:	11737
NA	2011	Max / Min Births:	46232
SC	2010	Max / Min Deaths:	7702
SC	2011	Max / Min Deaths:	31451
SD	2010	Max / Min Births:	36145
NA	2011	Max / Min Births:	143420
SD	2010	Max / Min Deaths:	30805
SD	2011	Max / Min Deaths:	125152
TX	2010	Max / Min Births:	2761
NA	2011	Max / Min Births:	11012
TX	2010	Max / Min Deaths:	2247
TX	2011	Max / Min Deaths:	9189
UT	2010	Max / Min Births:	14781
NA	2011	Max / Min Births:	59522
UT	2010	Max / Min Deaths:	10101
UT	2011	Max / Min Deaths:	41144
VT	2010	Max / Min Births:	2968
NA	2011	Max / Min Births:	11763
VT	2010	Max / Min Deaths:	1329
VT	2011	Max / Min Deaths:	6772
VA	2010	Max / Min Births:	20076
NA	2011	Max / Min Births:	80536
VA	2010	Max / Min Deaths:	14624
VA	2011	Max / Min Deaths:	58883
WA	2010	Max / Min Births:	97517



```
NA 2011 Max / Min Births: 396133
WA 2010 Max / Min Deaths: 39836
WA 2011 Max / Min Deaths: 165335
WV 2010 Max / Min Births: 13153
NA 2011 Max / Min Births: 52003
WV 2010 Max / Min Deaths: 3420
WV 2011 Max / Min Deaths: 14314
WI 2010 Max / Min Births: 1530
NA 2011 Max / Min Births: 5955
WI 2010 Max / Min Deaths: 1305
WI 2011 Max / Min Deaths: 5102
WY 2010 Max / Min Births: 25179
NA 2011 Max / Min Births: 101935
WY 2010 Max / Min Deaths: 13937
WY 2011 Max / Min Deaths: 58943
VI 2010 Max / Min Births: 21833
NA 2011 Max / Min Births: 86767
VI 2010 Max / Min Deaths: 11764
VI 2011 Max / Min Deaths: 48434
Count of States with Population Increases in 2011: 45
Count of States with Population Decreases in 2011: 3
State with the greatest population in 2011: CO
State with the greatest population in 2010: CO
State with the least population in 2011: GA
State with the least population in 2010: GA
```