

Introduction to Programming EE2310 Homework 6

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Problem

Simulate and get 16 cities' data (items below) by random and from file, use those data to calculate the change of the population.

- population
- birth rate
- death rate
- economic growth rate
- cost rate.

Additional Features

- If a city's population becomes negative after calculation, it will display 0.

Solution, Program Flow & Structure

Functions

- `main()` : Open the source file → Get the simulate choice and years that wants to simulate → Call the corresponding data-setting function of the choice (Generate the data or read from file) → Repeat calling the calculating loop.
- `ReadParameters(ifstream& read)` : Read data from the file which was opened in main → Save data into global variables.
- `GenParameters()` : Generate parameters by using `rand()` → Save parameters into global variables.
- `Simulate(int i, int j)` : Call the populations calculating functions → Print out the population of city(i,j).
- `CCost(int i, int j)` : Calculate the population flow caused by cost flow with the city on the right and below (to avoid calculating twice).
- `CEconomic(int i, int j)` : Calculate the population flow caused by economic growth with the city on the right and below (to avoid calculating twice).
- `CPopulation(int i, int j)` : Calculate the population change by birth and death rate.

Output Result

Generating with `rand()` :

```
C:\Users\淳佑\OneDrive\文件\課程\計算機程式設計\Homework\hw6\HW6.exe - □ ×
1>Generate 2>Read from file : 1
Years to run : 2
YEAR 0-----
 37191  14324  23572  42538
 38481  25298  36717  11008
 13475  21470  19537  23636
 13889  28191  14257  32382
YEAR 1-----
101447   6901  76533  27613
 43363 102594  15227  21144
   999   4856     0     0
26870  51882     0  20076
YEAR 2-----
165171  25987  80615  20584
 61477 163877     0   4856
 19643     0  41943  16281
 49778  65583  2243  12447
-----
Process exited after 2.508 seconds with return value 0
請按任意鍵繼續 . . .
```

Read parameters from file :

```
C:\Users\淳佑\OneDrive\文件\課程\計算機程式設計\Homework\hw6\HW6.exe - □ ×
1>Generate 2>Read from file : 2
Years to run : 3
YEAR 0-----
 27971  19919  24805  29247
 22483  24942  34580  34434
 11120  11442  13067  12233
 29247  34580  46001  12530
YEAR 1-----
 44214  83502     0  73822
   0  49354  96759     0
 27632   7549  39599  12354
 85177  67582     0  17917
YEAR 2-----
   0     0  176831  125495
 61437  72444  114061     0
 51530   4981     0  12476
 214937  28109  55660  25621
YEAR 3-----
 89826  387185     0  213341
   0  92597  55081     0
111424   3286  32319  12600
399949  68453     0  36638
-----
Process exited after 1.65 seconds with return value 0
```