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Documentation for the **RoomAccum** Program
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The program RoomAccum is a Windows program written in Delphi, and extension of Pascal as implemented in the Embarcadero RAD Studio XE. The program logic can be seen in the program source file roomaccum12.dpr. Supporting procedures not essential to the program logic are in KWKSTD.PAS and are compiled in KWKSTE.DCU.

Running the program

Download the RoomAccumXX.exe file from Github to a directory on your computer. To run the program, navigate using the Windows File Explorer, to that directory and double-click on roomaccum12.exe. In a Windows "Run" window, You will see the program banner reproduced below. After that, the program will prompt you for information that it needs to run. Default answers are provided in {curly braces} and can be obtained by just pressing Enter. Reply Y or N to yes or no questions. For more information on running my programs may be found at http://tfqa.com. See especially http://tfqa.com/windos.htm and http://tfqa.com/conventions.htm.

Sample Input file

The program looks for input from a .txt file that must be saved in the same directory on your computer as the .exe file. The .txt files contains the dates and room counts and can be created using an editor such as NotePad that creates simple .txt files (or saving a Word document as plain text). That file needs to consist of the number of periods to be considered, the starting date for the sequence followed by, for each period, the end date of the period, and the number of rooms dated to that period.   All values must be integers and must be separated by at least one space or newline.

```
3
200   550   646
      1000  1215
      1150  4848
```

Sequence of Program Prompts

```
                    RoomAccum V12.0
      Population Growth/Room Accumulation Simulation

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               2014 East Alameda Drive
                Tempe, Arizona  85282
```

```
File with Period Data (Reply CON for Keyboard Entry) {.TXT} ? mimbresp3
File Must Have: nPeriod, Start[1], End[1], Rooms[1], End[2] Rooms[2]...
```

Provide the name of the file you wish to run. You need not enter the extension if it is the same as the default provided within the curly braces. If the program says it can't find the file you mistyped the name or it is in a different directory.

```
Display Annual Room Count on Screen {N} ?
```

Answering Y for yes to this question provides a very verbose output of the program progress.

```
Write Output Data to TXT File {N} ? Y
```

Answering Y to this prompt says you want, in addition to the output on the screen, a file with the results. If you answer Y it will ask you for the file name.

```
TXT Output File {MIMBRESP3_T.txt} ?
```

If you answered Y to the previous prompt Enter the file name, or if the offered default name is OK, just press Enter.

```
Write Period by Period Output Data to CSV File {N} ?
Write Annual Output Data to CSV File {N} ?
```

Similarly, the program asks whether you want other sorts of program output saved to a .csv file by the program. This is useful if you want to plot the results, for example in R.

```
Random Generator Seed (0 to set from clock) {0} ?
Random Seed: -581923690
```

You can set a random number generator seed if you wish to be able to reproduce a run exactly (rare). Setting from the clock is what you will almost always want to do.

```
Compound Interest Formula Implied Growth Calculation
   Period Start   End Implied Growth
    1 - 2   375   775          0.095
    2 - 3   775  1075          0.831
```

The program reports the then it reports the formula-derived, between period growth rates, the first of which which may be useful in selecting the number of initial rooms.

```
 [I]terate Growth Rate or [U]ser Control {I} ?
```

Normally you would iterate the growth date, which means the program will iterate through possible rates for each until it finds the rate the produces the observed number of dated rooms. If you say N it will simply run the program for your supplied rate and tell you the results. Reply Enter or I unless you have a specific reason not to.

```
Structure Use Life {25} ?
  S.D of Structure Use Life (reply 0 for Not Randomized) {0.0} ? 5
   Use Lives are Normally Distributed Around 25 with S.D. of 5.0
   Use Life Distribution Truncated to: Min=1; Max=2*Structure Life
```

You first enter the nominal structure use-life. You then have the option to answer 0 (the default) to the next question to use that fixed use-life or to have normally distributed use-lives around your number with a standard deviation that you provide.

```
 Randomly Age Period 1 Structures (Rec. Unless Uselife<<Period 1 Length) {Y} ?
```

Ordinarily you would want to randomly age the structures in the initial period unless you believe that there was no previous occupation.

```
 Scale Factor to Improve Estimates {100} ?
```

In order to make the computations more accurate, the program will scale up all of the room numbers by a factor for its internal computations. This scaling is removed in the results. This basically reduces the sampling error due to ransom processes in the analyses.

```
Initial Number of Period 1 Rooms {0} ? 30
```

Here you supply the initial number of period 1 rooms. You will want to try different values in successive runs of the program. The article recommends running the program to find the number of initial rooms that make the smallest difference between the simulated growth rate of the first two periods with the formula's growth rate between the first two periods. This will usually (or perhaps always be the number of rooms for which the modeled growth rates for the first two periods are closest together.

```
1-34
2-25
3-23
```

The program shows you the number of iterations for each period's calculations (which do not matter) and then shows the program results, below.

```
Structure Life: 15 Initial Period 1 Ages Randomized (Uniformly Distributed)
         Start   End    Start Initial  MidPt  Ending   Dated  Target  Growth
Period   Date   Date    Rooms  Dated   Rooms   Rooms   Rooms   Rooms  Rate %
   1      200    550      23     23      27      32      646     646   0.092
   2      550   1000      32     15      40      51     1215    1215   0.104
   3     1000   1150      51     24     268    1418     4848    4848   2.246
```

```
Run Again {Y} ?
```

Replying yes allows you to run the program again, starting from the structure use-life prompt. If you reply no, the program ends.

```
Program End
OK to Close Program Window {Y} ?
```

It provides this prompt to allow you to examine the on-screen results. One you reply with Y or Enter it will close that window and you won't be able to recover it.

Sample Output Text File

```
Random Seed: -618053446

Compound Interest Formula Implied Growth Calculation
Period Start   End Implied Growth
 1 - 2   375   775         0.095
 2 - 3   775  1075         0.831


Structure Life: 15 Initial Period 1 Ages Randomized (Uniformly Distributed)
         Start   End    Start  Midpt  Ending   Dated  Target  Growth
Period   Date   Date    Rooms  rooms   Rooms   Rooms   Rooms  Rate %
   1      200    550      23     27      32      646     646   0.09
   2      550   1000      32     40      51     1215    1215   0.10
   3     1000   1150      51    268    1418     4848    4848   2.25
```

Sample Period Output CSV File

```
UseLife,UseSD,InitRm,Period,PerBeg,PerEnd,PerInitRm,PerMidRm,PerEndRm,PerDatedRm,Targ
Rm,Rate
```

```
15,  0.0,   23,1,  200,  550,  23,   27,     32,     646,  646,  0.092
15,  0.0,   23,2,  550, 1000,  32,   40,     51,    1215, 1215,  0.104
15,  0.0,   23,3, 1000, 1150,  51,  268,   1418,    4848, 4848,  2.246
```

Sample Yearly Output CSV File

```
UseLife,UseSD,InitRm,Year,OccRm
 15,  0.0,   23,  200,0
 15,  0.0,   23,  201,23
 15,  0.0,   23,  202,23
 15,  0.0,   23,  203,23
 15,  0.0,   23,  204,23
 15,  0.0,   23,  205,23
 15,  0.0,   23,  206,23
 15,  0.0,   23,  207,23
 15,  0.0,   23,  208,23
 15,  0.0,   23,  209,23
 15,  0.0,   23,  210,23
...
 15,  0.0,   23, 1145,1269
 15,  0.0,   23, 1146,1297
 15,  0.0,   23, 1147,1326
 15,  0.0,   23, 1148,1356
 15,  0.0,   23, 1149,1387
 15,  0.0,   23, 1150,1418
```