Exercise 2 (10 points) – can be done individually or in pair

- The first lines of all source files must be comment containing names & IDs of all members. Also create file readme.txt containing names & IDs of all members.
- Put all files (source, input, output) in folder Ex2_xxx where xxx = your full ID. That is, your source files must be in package Ex2_xxx and input/output files (if there is any) must be read from/write to this folder
- The group representative zips Ex2_xxx & submits it to Google Classroom. The other members submit only readme.txt. Email submission is not accepted.
- The exercise is graded only once, and after graded, members can't be added.

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1. Get density threshold from user.

2. Read country name, population, area (in km^2) from input file. For each country,
   2.1 Calculate population density = population/area.
   2.2 Calculate its population and area in thousands (K), millions (M), or billions (B):
   if 1000 < value < 1,000,000 calculate value in thousands
   if 1,000,000 < value < 1,000,000,000 calculate value in millions
   if value > 1,000,000,000 calculate value in billions

   2.3 Also check whether its density > input threshold.

3. Write the output to another file in the same format as in demo:
   3.1 Country name must be left aligned.

   3.2 Actual population and its value in K/M/B, if applicable.
   3.3 Actual area and its value in K/M/B, if applicable.
   - Actual population and actual area must be printed with thousand separators.
   - Values in K/M/B must be printed with 1 decimal place.
   - All numeric values must be righted aligned.

   3.3 Population density with thousand separator & 1 decimal place, right aligned.
   3.4 Whether the population density > input threshold
   3.5 All columns must be properly aligned. You'll get point deduction for messy output.

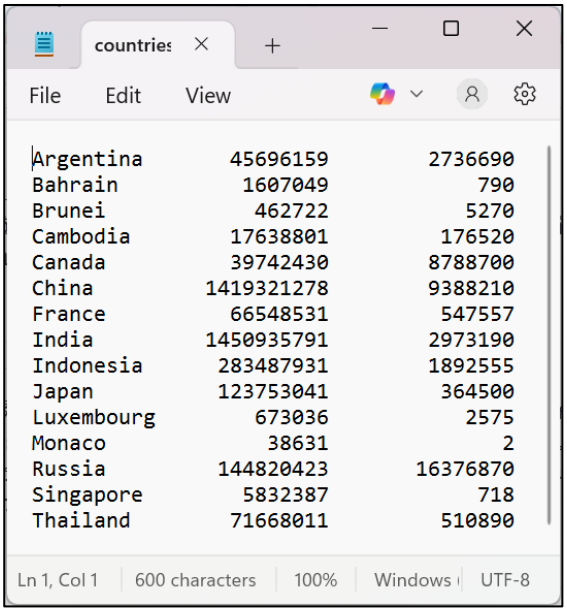
4. The output file must be placed in the same folder as Java file + input file.

Note 1

- Maximum integer value is 2^{32} i.e. about 2 billion.
- You can still use int variables to keep population and area (for values >2 billion, you have to use long variables instead).
- But since we will calculate density as double, it's better to read population and area into double variables which can keep much bigger value than int.

Note 2

- Use %s, %f, %d formatting instead of \t to avoid messy spacing
- When printing the output to file, use **\r\n** instead of \n



countries

File Edit View

```
Argentina       45696159        2736690
Bahrain          1607049            790
Brunei            462722           5270
Cambodia        17638801         176520
Canada          39742430        8788700
China         1419321278        9388210
France          66548531         547557
India         1450935791        2973190
Indonesia      283487931        1892555
Japan          123753041         364500
Luxembourg        673036           2575
Monaco             38631              2
Russia         144820423       16376870
Singapore        5832387            718
Thailand        71668011         510890
```

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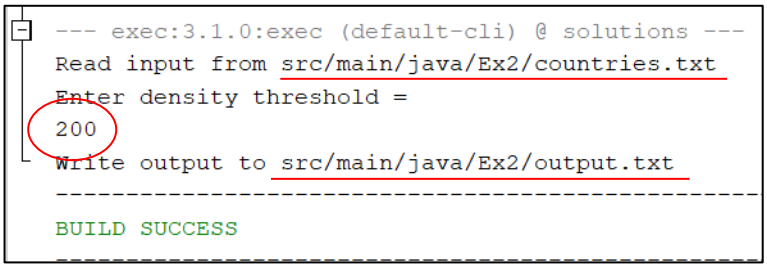
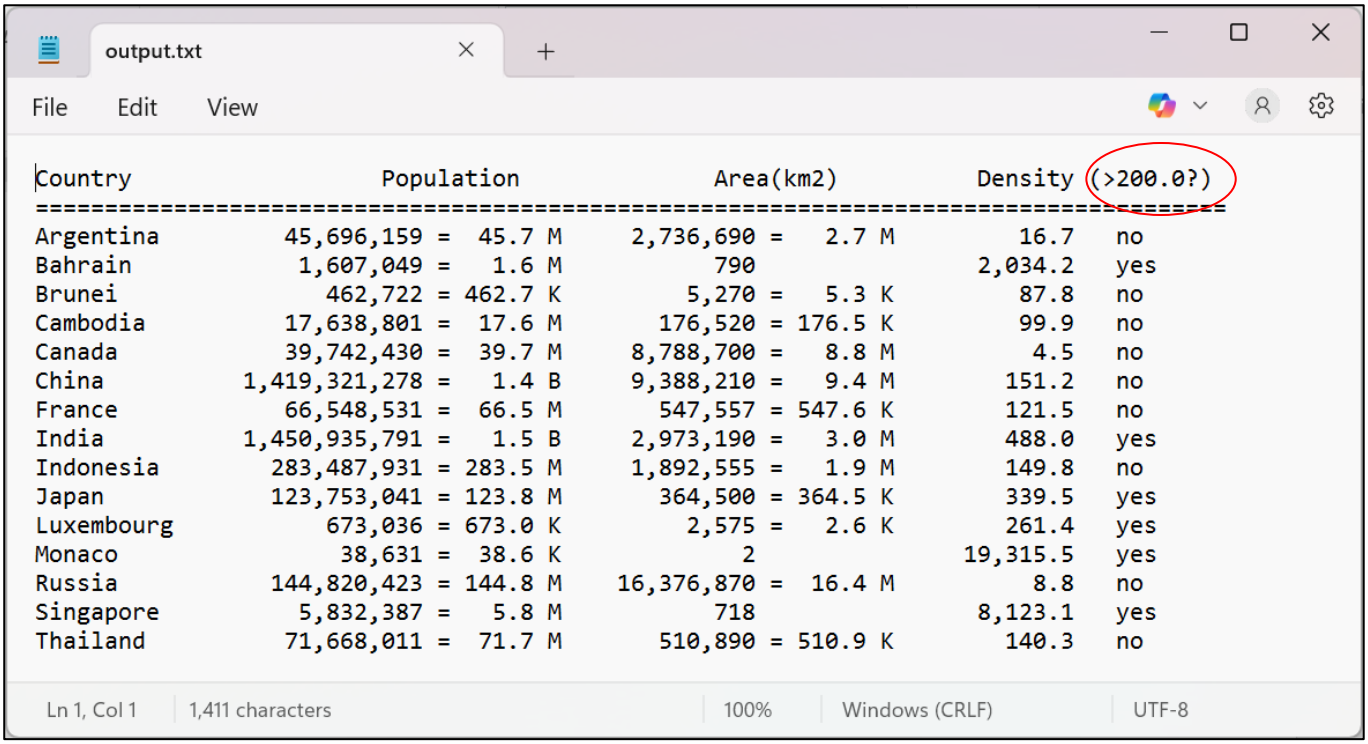


```
--- exec:3.1.0:exec (default-cli) @ solutions ---
Read input from src/main/java/Ex2/countries.txt
Enter density threshold =
200
Write output to src/main/java/Ex2/output.txt
------------------------------------------------------------
BUILD SUCCESS
------------------------------------------------------------
```



output.txt

File Edit View

```
Country                 Population              Area(km2)          Density (>200.0?)
================================================================================
Argentina          45,696,159 =  45.7 M     2,736,690 =   2.7 M         16.7   no
Bahrain             1,607,049 =   1.6 M           790                2,034.2   yes
Brunei                462,722 = 462.7 K         5,270 =   5.3 K         87.8   no
Cambodia           17,638,801 =  17.6 M       176,520 = 176.5 K         99.9   no
Canada             39,742,430 =  39.7 M     8,788,700 =   8.8 M          4.5   no
China           1,419,321,278 =   1.4 B     9,388,210 =   9.4 M        151.2   no
France             66,548,531 =  66.5 M       547,557 = 547.6 K        121.5   no
India           1,450,935,791 =   1.5 B     2,973,190 =   3.0 M        488.0   yes
Indonesia         283,487,931 = 283.5 M     1,892,555 =   1.9 M        149.8   no
Japan             123,753,041 = 123.8 M       364,500 = 364.5 K        339.5   yes
Luxembourg            673,036 = 673.0 K         2,575 =   2.6 K        261.4   yes
Monaco                 38,631 =  38.6 K             2               19,315.5   yes
Russia            144,820,423 = 144.8 M    16,376,870 =  16.4 M          8.8   no
Singapore           5,832,387 =   5.8 M           718                8,123.1   yes
Thailand           71,668,011 =  71.7 M       510,890 = 510.9 K        140.3   no
```

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