Server under execution

Naive.txt:

20ms delay without cache (write to naive.txt):

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.server.Server --delay 20 --cache

 Initializing server zone 1...
 Loaded 230 countries.
 Initializing server zone 2...
 Loaded 230 countries.
 Initializing server zone 3...
 Loaded 230 countries.
 Initializing server zone 4...
 Loaded 230 countries.
 Initializing server zone 5...
 Loaded 230 countries.
 Server up and ready with cache mode naive
```

50ms delay without cache (write to naive.txt):

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.server.Server --delay 50 --cache

 Initializing server zone 1...
 Loaded 230 countries.
 Initializing server zone 2...
 Loaded 230 countries.
 Initializing server zone 3...
 Loaded 230 countries.
 Initializing server zone 4...
 Loaded 230 countries.
 Initializing server zone 5...
 Loaded 230 countries.
 Server up and ready with cache mode naive
```

Server_cache.txt

20ms delay with server cache (write to server_cache.txt):

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.server.Server --delay 20 --cache server

 Initializing server zone 1...
 Loaded 230 countries.
 Initializing server zone 2...
 Loaded 230 countries.
 Initializing server zone 3...
 Loaded 230 countries.
 Initializing server zone 4...
 Loaded 230 countries.
 Initializing server zone 5...
 Loaded 230 countries.
 Server up and ready with cache mode server
```

50ms delay and server cache (write to server_cache.txt):

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.server.Server --delay 50 --cache server

 Initializing server zone 1...
 Loaded 230 countries.
 Initializing server zone 2...
 Loaded 230 countries.
 Initializing server zone 3...
 Loaded 230 countries.
 Initializing server zone 4...
 Loaded 230 countries.
 Initializing server zone 5...
 Loaded 230 countries.
 Server up and ready with cache mode server
```

Client_cache.txt:

20ms delay with server and client cache (write to client_cache.txt):

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.server.Server --delay 20 --cache server

  Initializing server zone 1...
  Loaded 230 countries.
  Initializing server zone 2...
  Loaded 230 countries.
  Initializing server zone 3...
  Loaded 230 countries.
  Initializing server zone 4...
  Loaded 230 countries.
  Initializing server zone 5...
  Loaded 230 countries.
  Server up and ready with cache mode server
```

Server queue length with both server and client cache:

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.server.Server --delay 20 --cache server

  Initializing server zone 1...
  Loaded 230 countries.
  Initializing server zone 2...
  Loaded 230 countries.
  Initializing server zone 3...
  Loaded 230 countries.
  Initializing server zone 4...
  Loaded 230 countries.
  Initializing server zone 5...
  Loaded 230 countries.
  Server up and ready with cache mode server
  Server zone 4 has queue length: 0
  Server zone 1 has queue length: 1
  Server zone 1 has queue length: 1
  Server zone 2 has queue length: 1
  Server zone 2 has queue length: 1
  Server zone 4 has queue length: 1
  Server zone 1 has queue length: 1
  Server zone 1 has queue length: 1
  Server zone 1 has queue length: 2
  Server zone 4 has queue length: 1
  Server zone 4 has queue length: 1
  Server zone 4 has queue length: 2
  Server zone 2 has queue length: 0
  Server zone 4 has queue length: 2
  Server zone 3 has queue length: 1
  Server zone 4 has queue length: 2
  Server zone 4 has queue length: 3
  Server zone 4 has queue length: 4
  Server zone 4 has queue length: 5
  Server zone 4 has queue length: 5
  Server zone 1 has queue length: 0
  Server zone 2 has queue length: 1
  Server zone 2 has queue length: 1
```

50ms delay with server and client cache (write to client_cache.txt):

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.server.Server --delay 50 --cache server
  Initializing server zone 1...
  Loaded 230 countries.
  Initializing server zone 2...
  Loaded 230 countries.
  Initializing server zone 3...
  Loaded 230 countries.
  Initializing server zone 4...
  Loaded 230 countries.
  Initializing server zone 5...
  Loaded 230 countries.
  Server up and ready with cache mode server
```

Client under execution

Naive.txt
20ms delay without cache (write to naive.txt):

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.client.Client --delay 20 --cache

Client up, writing to file output/naive_delay_20.txt, with delay 20ms
189578 getPopulationofCountry French Guiana Zone:4 (turnaround time: 99 ms, execution time: 89 ms, waiting time: 1 ms, processed by Server Zone:
4)

48029 getPopulationofCountry Seychelles Zone:1 (turnaround time: 84 ms, execution time: 83 ms, waiting time: 0 ms, processed by Server Zone:1)

447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 85 ms, execution time: 83 ms, waiting time: 1 ms, processed by Server Z
one:2)

31731367 getPopulationofCountry Canada Zone:1 (turnaround time: 137 ms, execution time: 84 ms, waiting time: 49 ms, processed by Server Zone:1)

1070 getPopulationofCountry Tokelau Zone:4 (turnaround time: 83 ms, execution time: 82 ms, waiting time: 0 ms, processed by Server Zone:4)

447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 140 ms, execution time: 83 ms, waiting time: 55 ms, processed by Server
 Zone:2)

276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 99 ms, execution time: 85 ms, waiting time: 12 ms, processed by Server Zone:1)

30376 getPopulationofCountry Palau Zone:4 (turnaround time: 81 ms, execution time: 80 ms, waiting time: 0 ms, processed by Server Zone:4)

276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 154 ms, execution time: 81 ms, waiting time: 70 ms, processed by Server Zone:1)

7571439 getPopulationofCountry Kenya Zone:2 (turnaround time: 83 ms, execution time: 80 ms, waiting time: 1 ms, processed by Server Zone:2)

3645095 getPopulationofCountry Uganda Zone:4 (turnaround time: 134 ms, execution time: 81 ms, waiting time: 51 ms, processed by Server Zone:4)

276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 214 ms, execution time: 85 ms, waiting time: 125 ms, processed by Server Zone:1
)
```

50ms delay without cache (write to naive.txt):

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.client.Client --delay 50 --cache --output naive.txt

Client up, writing to file output/naive_delay_50.txt, with delay 50ms
189578 getPopulationofCountry French Guiana Zone:4 (turnaround time: 102 ms, execution time: 93 ms, waiting time: 1 ms, processed by Server Zone
:4)

48029 getPopulationofCountry Seychelles Zone:1 (turnaround time: 84 ms, execution time: 81 ms, waiting time: 1 ms, processed by Server Zone:1)

31731367 getPopulationofCountry Canada Zone:1 (turnaround time: 116 ms, execution time: 87 ms, waiting time: 28 ms, processed by Server Zone:1)

447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 85 ms, execution time: 83 ms, waiting time: 0 ms, processed by Server Z
one:2)

447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 106 ms, execution time: 82 ms, waiting time: 22 ms, processed by Server
 Zone:2)

1070 getPopulationofCountry Tokelau Zone:4 (turnaround time: 87 ms, execution time: 85 ms, waiting time: 0 ms, processed by Server Zone:4)

276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 86 ms, execution time: 84 ms, waiting time: 0 ms, processed by Server Zone:1)

276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 109 ms, execution time: 82 ms, waiting time: 25 ms, processed by Server Zone:1)

276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 136 ms, execution time: 82 ms, waiting time: 53 ms, processed by Server Zone:1)

30376 getPopulationofCountry Palau Zone:4 (turnaround time: 87 ms, execution time: 84 ms, waiting time: 0 ms, processed by Server Zone:4)

3645095 getPopulationofCountry Uganda Zone:4 (turnaround time: 106 ms, execution time: 80 ms, waiting time: 23 ms, processed by Server Zone:4)
```

Server_cache.txt
20ms delay with server cache (write to server_cache.txt):

```
● an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.client.Client --delay 20 --cache server --output server_cache.txt

  Client up, writing to file output/server_cache.txt, with delay 20ms
  189578 getPopulationofCountry French Guiana Zone:4 (turnaround time: 100 ms, execution time: 89 ms, waiting time: 2 ms, processed by Server Zone
  :4)

  48029 getPopulationofCountry Seychelles Zone:1 (turnaround time: 82 ms, execution time: 80 ms, waiting time: 0 ms, processed by Server Zone:1)

  447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 103 ms, execution time: 101 ms, waiting time: 1 ms, processed by Server
   Zone:2)

  31731367 getPopulationofCountry Canada Zone:1 (turnaround time: 143 ms, execution time: 87 ms, waiting time: 54 ms, processed by Server Zone:1)

  1070 getPopulationofCountry Tokelau Zone:4 (turnaround time: 85 ms, execution time: 83 ms, waiting time: 0 ms, processed by Server Zone:4)

  447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 160 ms, execution time: 83 ms, waiting time: 76 ms, processed by Server
   Zone:2)

  276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 88 ms, execution time: 84 ms, waiting time: 4 ms, processed by Server Zone:1)

  30376 getPopulationofCountry Palau Zone:4 (turnaround time: 83 ms, execution time: 81 ms, waiting time: 1 ms, processed by Server Zone:4)

  276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 142 ms, execution time: 80 ms, waiting time: 60 ms, processed by Server Zone:1)

  3645095 getPopulationofCountry Uganda Zone:4 (turnaround time: 140 ms, execution time: 81 ms, waiting time: 57 ms, processed by Server Zone:4)

  7571439 getPopulationofCountry Kenya Zone:2 (turnaround time: 84 ms, execution time: 83 ms, waiting time: 0 ms, processed by Server Zone:2)
```

50ms delay and server cache(write to server_cache.txt):

```
● an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.client.Client --delay 50 --cache server

  Client up, writing to file output/server_cache_delay_50.txt, with delay 50ms
  189578 getPopulationofCountry French Guiana Zone:4 (turnaround time: 85 ms, execution time: 81 ms, waiting time: 0 ms, processed by Server Zone:
  4)

  48029 getPopulationofCountry Seychelles Zone:1 (turnaround time: 82 ms, execution time: 81 ms, waiting time: 0 ms, processed by Server Zone:1)

  31731367 getPopulationofCountry Canada Zone:1 (turnaround time: 113 ms, execution time: 84 ms, waiting time: 27 ms, processed by Server Zone:1)

  447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 86 ms, execution time: 84 ms, waiting time: 0 ms, processed by Server Z
  one:2)

  447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 112 ms, execution time: 84 ms, waiting time: 27 ms, processed by Server
   Zone:2)

  1070 getPopulationofCountry Tokelau Zone:4 (turnaround time: 84 ms, execution time: 84 ms, waiting time: 0 ms, processed by Server Zone:4)

  276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 86 ms, execution time: 84 ms, waiting time: 0 ms, processed by Server Zone:1)

  276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 111 ms, execution time: 83 ms, waiting time: 27 ms, processed by Server Zone:1)

  30376 getPopulationofCountry Palau Zone:4 (turnaround time: 97 ms, execution time: 95 ms, waiting time: 1 ms, processed by Server Zone:4)

  276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 153 ms, execution time: 96 ms, waiting time: 55 ms, processed by Server Zone:1)

  3645095 getPopulationofCountry Uganda Zone:4 (turnaround time: 84 ms, execution time: 83 ms, waiting time: 0 ms, processed by Server Zone:4)
```

Client_cache.txt
20ms delay with server and client cache (write to client_cache.txt):

```
● an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.client.Client --delay 20 --cache client --output client_cache.txt

  Client up, writing to file output/client_cache.txt, with delay 20ms
  189578 getPopulationofCountry French Guiana Zone:4 (turnaround time: 99 ms, execution time: 90 ms, waiting time: 1 ms, processed by Server Zone:
  4)

  48029 getPopulationofCountry Seychelles Zone:1 (turnaround time: 84 ms, execution time: 83 ms, waiting time: 1 ms, processed by Server Zone:1)

  447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 87 ms, execution time: 85 ms, waiting time: 0 ms, processed by Server Z
  one:2)

  31731367 getPopulationofCountry Canada Zone:1 (turnaround time: 138 ms, execution time: 81 ms, waiting time: 54 ms, processed by Server Zone:1)

  1070 getPopulationofCountry Tokelau Zone:4 (turnaround time: 87 ms, execution time: 85 ms, waiting time: 0 ms, processed by Server Zone:4)

  447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 145 ms, execution time: 83 ms, waiting time: 60 ms, processed by Server
   Zone:2)

  276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 101 ms, execution time: 81 ms, waiting time: 16 ms, processed by Server Zone:1)

  30376 getPopulationofCountry Palau Zone:4 (turnaround time: 85 ms, execution time: 84 ms, waiting time: 0 ms, processed by Server Zone:4)

  276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 152 ms, execution time: 84 ms, waiting time: 65 ms, processed by Server Zone:1)

  7571439 getPopulationofCountry Kenya Zone:2 (turnaround time: 84 ms, execution time: 81 ms, waiting time: 0 ms, processed by Server Zone:2)

  3645095 getPopulationofCountry Uganda Zone:4 (turnaround time: 139 ms, execution time: 81 ms, waiting time: 56 ms, processed by Server Zone:4)
```

50ms delay with server and client cache (write to client_cache.txt):

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.client.Client --delay 50 --cache client --output client_cache.txt

Client up, writing to file output/client_cache.txt, with delay 50ms
189578 getPopulationofCountry French Guiana Zone:4 (turnaround time: 106 ms, execution time: 94 ms, waiting time: 1 ms, processed by Server Zone
:4)

48029 getPopulationofCountry Seychelles Zone:1 (turnaround time: 88 ms, execution time: 85 ms, waiting time: 0 ms, processed by Server Zone:1)

31731367 getPopulationofCountry Canada Zone:1 (turnaround time: 113 ms, execution time: 82 ms, waiting time: 30 ms, processed by Server Zone:1)

447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 83 ms, execution time: 81 ms, waiting time: 0 ms, processed by Server Z
one:2)

447039 getPopulationofCountry Equatorial Guinea Zone:2 (turnaround time: 108 ms, execution time: 85 ms, waiting time: 21 ms, processed by Server
 Zone:2)

1070 getPopulationofCountry Tokelau Zone:4 (turnaround time: 85 ms, execution time: 83 ms, waiting time: 0 ms, processed by Server Zone:4)

276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 85 ms, execution time: 83 ms, waiting time: 0 ms, processed by Server Zone:1)

276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 0 ms, execution time: 0 ms, waiting time: 0 ms, processed by Server Zone:0)

276340 getPopulationofCountry Swaziland Zone:1 (turnaround time: 112 ms, execution time: 86 ms, waiting time: 24 ms, processed by Server Zone:1)

30376 getPopulationofCountry Palau Zone:4 (turnaround time: 83 ms, execution time: 81 ms, waiting time: 0 ms, processed by Server Zone:4)

3645095 getPopulationofCountry Uganda Zone:4 (turnaround time: 109 ms, execution time: 85 ms, waiting time: 22 ms, processed by Server Zone:4)
```

Proxy under execution

```
an-nhu.le~$java -cp target/solution-1.0-SNAPSHOT.jar com.ass1.proxy.Proxy
Proxy up and ready
```

Division of Workload:
We divided the workload into three main parts:
Anju took primarily responsibility for the client-side implementation, writing user guide and put together the pdf file. Henrik focused on implementing the methods on the server side and also contributed to the client and made the graphs. Kevin handled the interfaces and proxy and also implemented caching on both server and client side and some additional tweaks on the client code. While each member had their specific area of focus, we collaborated and supported each other across tasks when needed. In this way we could all focus on setting up functional client/server side and bind it all together with the proxy afterwards. The graphs and results were reviewed together.