**Assignment 3 – Time Complexity**

**Introduction & Background Information:**

* Use the given Java class ProvidedClient.java as either a model or edit the provided class.
* Download the provided.jar file from the assignment folder in canvas
* When running the class modeled after ProvidedClient.java, aka Model.java, make sure to be using the provided.jar file.
* Make sure in your Model.java class that in your constructor ProvidedClass(int key), that key = your BannerID. Ex: ProvidedClass(903713261)
* The time complexity will be proportional to Nk where k is some positive integer.

**Procedure:**

* Download all files pertaining to Assignment 3 from canvas.
* Open up jGRASP
* Create a new Project for this Assignment
* Open up ProvidedClient.java
* Modify or create a class that is similar to ProvidedClient.java.
* Make sure the Constructor includes your own BannerID
* Make sure that all times recorded in this lab are in seconds
* Link provided.jar to the project (more information on this can be found in the pdf document for this assignment
* Run your class
* Record the data you found in Table 1 like the one found bellow
* R = Timei/Timei-1
* k = log2R

**Data Collected:**

With the constructor being ProvidedClass(903713261)

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 1** | | | |
| **N** | **Time** | **R** | **k** |
| 2 | 0.034009975 | -- | -- |
| 4 | 0.024972671 | 0.7342749 | -0.44560781 |
| 8 | 0.129043589 | 5.167392347 | 2.369436428 |
| 16 | 0.290948917 | 2.254656115 | 1.172907407 |
| 32 | 1.0718941 | 3.684131603 | 1.881324598 |
| 64 | 2.297006039 | 2.142941209 | 1.099592271 |
| 128 | 9.250923181 | 4.027383047 | 2.009842695 |
| 256 | 39.49546866 | 4.269354299 | 2.094017892 |
| 512 | 154.5598425 | 3.913356336 | 1.968406483 |
| 1024 | 681.6567938 | 4.410309837 | 2.140880013 |

**Data Analysis:**

Using the data collected I was able to calculate R given the formula (R = Timei / Timei – 1). Using the R values calculated I was able to calculate k given the formula (k = log2R). Then using the k values found I was able to make an accurate hypothesis on the k

**Conclusion:**

Judging from the data collected above and time complexity formula in terms of big-Oh we can hypothesis that the method being timed has O(N2) time complexity.