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CS:3620 Homework 4

bank\_global\_lock:

|  |  |  |  |
| --- | --- | --- | --- |
| num\_threads[down] /  num\_accouts[right] | 1 | 10 | 100 |
| 1 | 0.000064 | 0.000174 | 0.000092 |
| 10 | 0.042373 | 0.136084 | 0.196583 |
| 100 | 0.328464 | 0.747386 | 2.292940 |
| 1000 | 2.691783 | 5.411587 | 28.690565 |

bank\_account\_lock:

|  |  |  |  |
| --- | --- | --- | --- |
| num\_threads[down] /  num\_accouts[right] | 1 | 10 | 100 |
| 1 | 0.000088 | 0.000167 | 0.000156 |
| 10 | 0.001538 | 0.003722 | 0.005886 |
| 100 | 0.030708 | 0.034103 | 0.032702 |
| 1000 | 0.780133 | 0.681443 | 1.109133 |

From the above chart, we can see that bank\_account\_lock is usually faster than bank\_global\_lock, except for when there is only one thread. In the situation where there is only one thread, which could simply be because there are less locks, and so because there is only one thread, there is never any wait time to acquire a lock, except for the time it takes to execute the instruction. The global lock does not have to do this as much as the account and read/write lock.

After charting bank\_account\_lock and bank\_global\_lock for 1 account:

* The slope of the line is 0.0027 for global and 0.0008 for account.
* We can see from the slope that for the same number of accounts, as the number of threads increases, the run time of bank\_global\_lock grows at a much faster rate than bank\_account\_lock, but the run time of both increases as the number of threads increases.
* The highest slope we might expect is 0.0027 from bank\_global\_lock
* It just says that it takes more instructions to implement read/write locks and an account lock than just a global account, because when there is only one thread locking does not matter.

After charting bank\_account\_lock and bank\_global\_lock for 100 accounts:

* The slope was 0.0289 for global, and 0.0011 for account
* In the previous case of one account, when we are locking down the whole ledger to make changes, it was not as big of a deal because there was only ever one account to deal with. Now that we have more accounts, locking down the whole ledger to access an account also prevents access to all the other accounts, resulting in a significantly larger run-time and slope. Note that bank\_account\_lock had a much less significant increase in run-time.