540 Advanced Computer Networks

Lab Assignment

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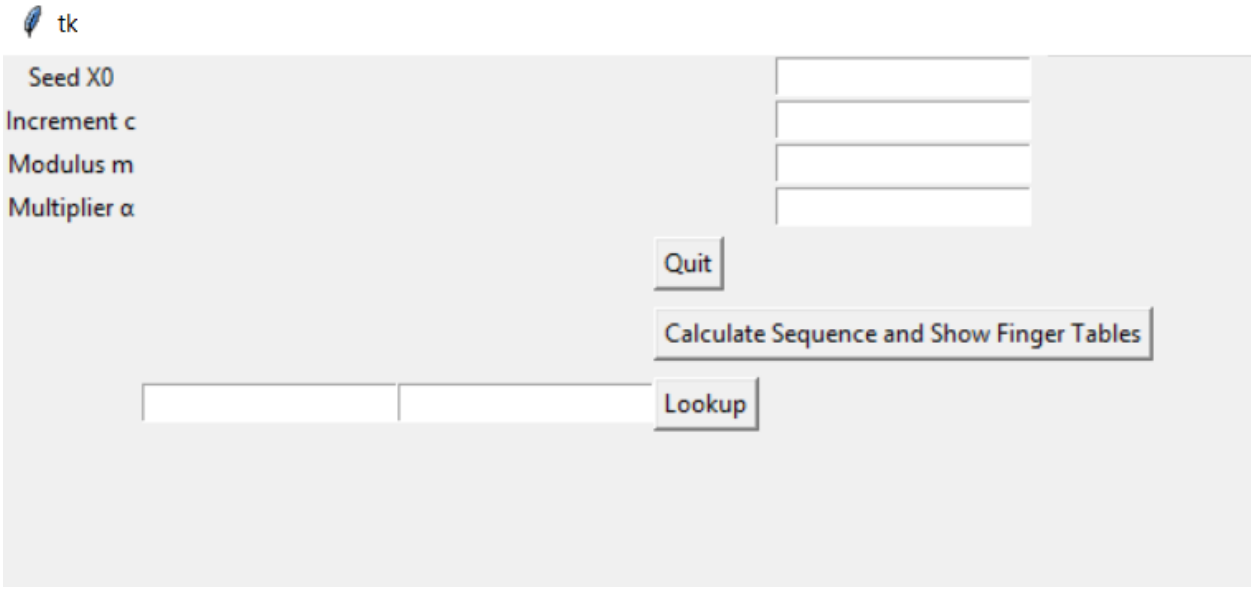
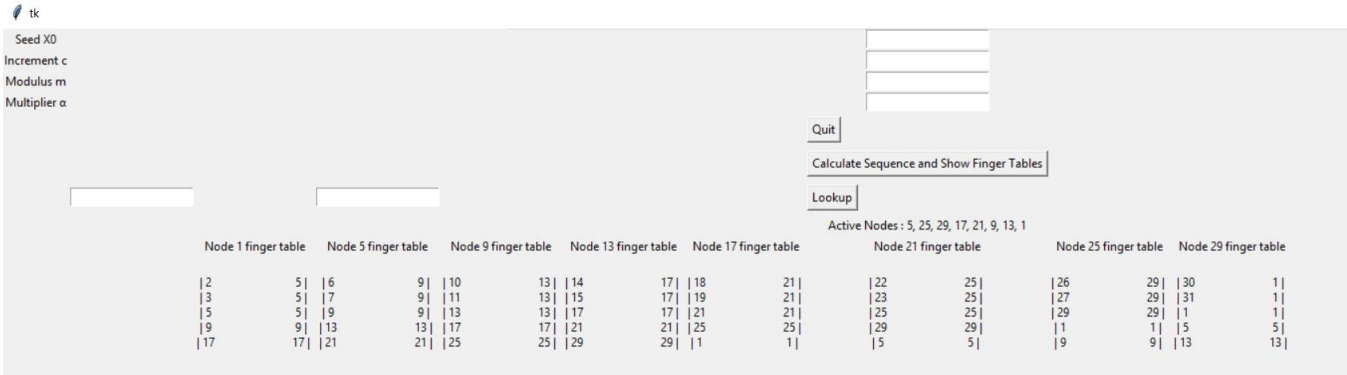
- Lab was implemented using Python and PyCharm IDE.
- By running the code in any Python environment, the following appears:



- First 4 entry labels are about the linear congruential generator. If no values are entered and the button “Calculate Sequence and Show Finger Tables” is clicked, there are some default values used. To be exact, the values used are X0 = 1, c = 0, m = 32 and a = 5. The sequence that remains after finding the period T of the sequence firstly generated, is 1 5 9 13 17 21 25 29. These are considered as the active nodes for the CHORD system implemented afterwards.
- At the left of the Lookup button, there are two entry labels. The first one is for the key to be searched in CHORD, i.e. lookup(key). The second one is for the starting node when executing lookup. If the second one remains empty, the first node is considered as the start of the lookup process. In this case (the default one), it would be node 1.
- The finger tables appear below these labels.



- Finger tables are constructed using the following algorithm:

```
m = total nodes in the CHORD network
For each active node keep an array of size m with 2 columns
      i = 0;     // row index
      While i < m:
            Row.firstColumn = node + 2^i;
```

  For the second column, for each element `entry` of the first column, the algorithm tries to find the immediate node that is bigger than `entry`.
- To execute lookup(key), the starting node given by the second label (or first node by default) will consult its finger table and check if the key lies between it and its next successor. If it does, then it consults its finger table for the IP address (node id for this exercise) of this next successor and it passes the query to it. If it is not found there, it will pass the query to the closest predecessor, which means to the largest node id that is smaller than the key. The process ends until a node finds out that the key is stored in its immediate successor.
- In the code I have extra comments explaining and defining everything I do. I keep one big table of # of nodes * # of entries per finger table.