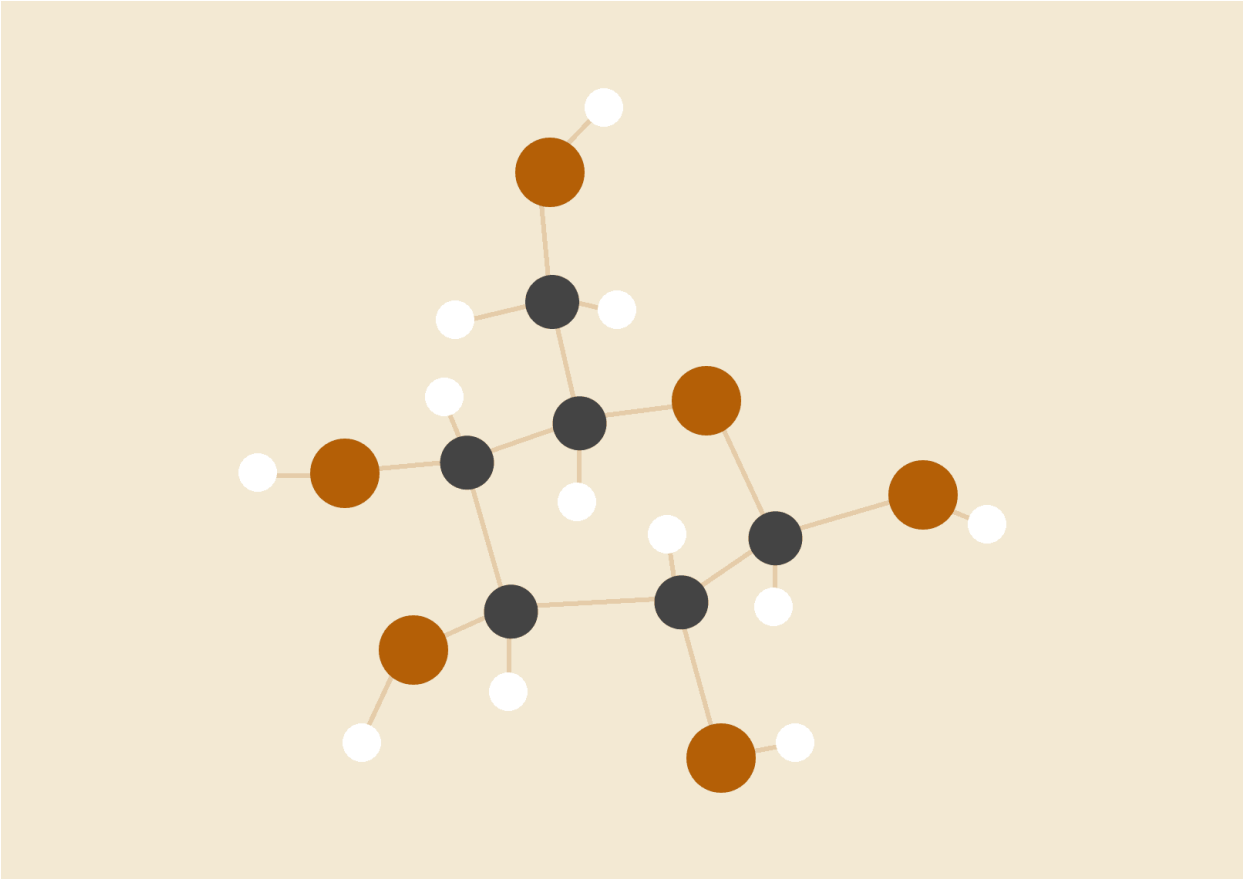
Computer Networks Lab 4



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1. Token Bucket:

Algorithm Outline:

1. **If the arrival time is greater than previous transmission time**
    a. **find the generated tokens from arrival time and previous transmission time and token rate**
2. **Truncate the number of tokens in the bucket if they exceed**
3. **If number of tokens is greater than the packet length then reduce the number of tokens by the packet length**
4. **Otherwise**
    a. **transmission time is the accumulation of the amount of time it needs to store up the required amount of tokens**

2. FIFO Queue:

Algorithm Outline:

The algorithm is designed using a single fifo queue which maintains the state of all the transmitted packets. Following is the description of the main loop in the algorithm:

1. **If packet length is less than the queue capacity**
    a. **check if the arrival time is less than the previous transmission time**
    b. **Go through the entire queue and check which all packets have transmission time greater than the current one**
    c. **sum all their capacities to find the remaining capacity**
    d. **if the remaining capacity is greater than the current packet length then transmission is possible**
    e. **Else reject the packet and read next arrival**

2. **else(if arrival time is greater than or equal to the previous transmission time) then it can be safely transmitted**

3. **enqueue the transmitted packets with the corresponding details.**
4. **Print the packet transmission time.**

3. Largest Rate:

Algorithm Outline:

Binary Search is used to find the optimal rate of the transmission. The output of the token bucket is passed to the input of the fifo queue and at each step of the binary search we are checking if the rate is giving the same number of entries in arrivals.txt i.e no packets are being lost.

Algorithm:

1. **Have index from the first and last of the search space i.e if the search space is 0-10 have the first and last indices as 0, 10 respectively. The high output is 10 because the maximum rate of fifo is 10. And hence it cant exceed anymore than this.**
2. **Calculate mid as the average of first and last**
3. **Test function here calculates the number of packets in the arrivals.txt by calculating the number of lines using wc program and then calculates the number of packets after passing the arrivals.txt through both shape.c program piped with fifo.c using wc program using the rate x as a parameter. This function returns 1 if both are equal and returns 0 otherwise.**
4. **This test function is used as the comparison to the mid variable in binary search i.e to find whether to move left in the search or right. If the output is 1 then we have to left closer to 0 and if its 0 move closer to 10.**
5. **Finally put a previous mid flag to check for the convergence of mid value.**
6. **We can see that the final mid value is 1.956591 which is the optimal rate.**