DEPARTMENT OF INFORMATICS

TECHNISCHE UNIVERSITÄT MÜNCHEN

Master Practical Course
Computer Network Simulation

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Assignment 3
Part 2 - Results

Group 2

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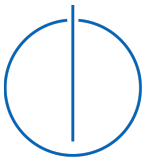

Summary and Interpretation of The Collected Data:

We ran our hypothetical messaging application for the inter-bunker communication on a bunker network in OMNeT++ for 300 seconds with different configurations.

During the simulation, the following values are recorded as vectors:

- The number of successful lookup requests (that the server answers with a record) sent from the clients to the server.
- The number of unsuccessful lookup requests (that the server answers with a not found error) sent from the clients to the server.
- Link Layer Throughput for each host, router, and the server.
- Application Layer Throughput for each host, router, and the server.
- Request-Response/Communication Latency for each host, router, and the server.
- Link Utilization for each host, router, and the server.

In this report, we will investigate some examples of the given records. Much more results are generated with our pipeline which can be investigated for detailed analysis. We added new records to our updated pipeline, however, after investigating the results we saw some abnormalities on some results. So we didn't want to put abnormal results since we think that there can be some errors while creating the data or the plot. We will investigate the issue on the next assignment.

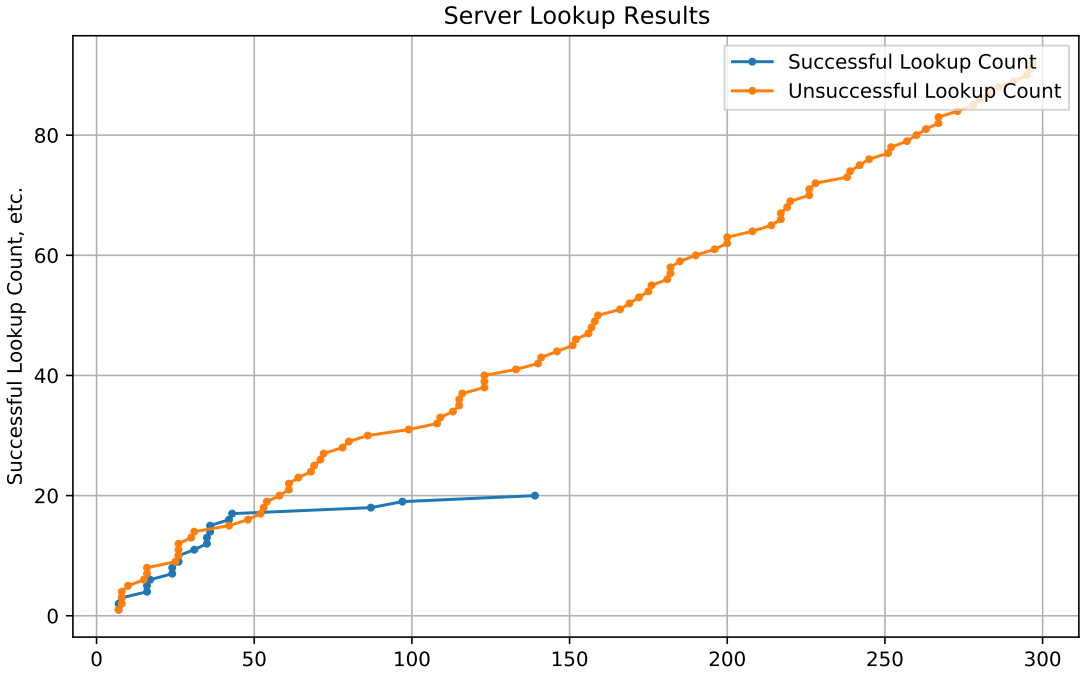

Figure 1: Server Lookup Results

Each host in the bunkers keeps a list of the people they are looking for. In addition, each host has an address book and they save the host they learn in these address books. To learn a host, they send a lookup message to the server. If a host knows all of the people that it is looking for, then it stops to send lookup messages and the whole system converges at a point in terms of sending lookup messages. However, to make it more interesting, we gave some names that are not exist in any of these bunkers to some of the hosts. Therefore, they keep looking for them until the end of the simulation. However, as we can also see in Figure 1, the number of successful lookup operations converges to a point and ends at a time since all hosts learns the people they can learn. There will be no more need to send lookup messages after this points.

Figure 2: S. Lookup: General

Figure 3: S. Lookup: ClearHeartBeatDropObs.

Normally heartbeat messages are needed to be renewed at least every 15 seconds. If one host does send a new heartbeat message after 15 seconds, the server accepts that the given host is disconnected from the system, so the lookup request fails. With the ClearHeartBeatDropObservation configuration, we decreased this time to 3 seconds. Figure 2 shows the result for the general configuration in which the threshold is 15 seconds. Figure 3 shows the result when the threshold is 3 seconds. When we investigate both figures we can clearly see that unsuccessful lookups are much higher for the 3-second threshold configuration as expected since much more hosts will be accepted as disconnected. Also, the 3-second threshold configuration converges later.

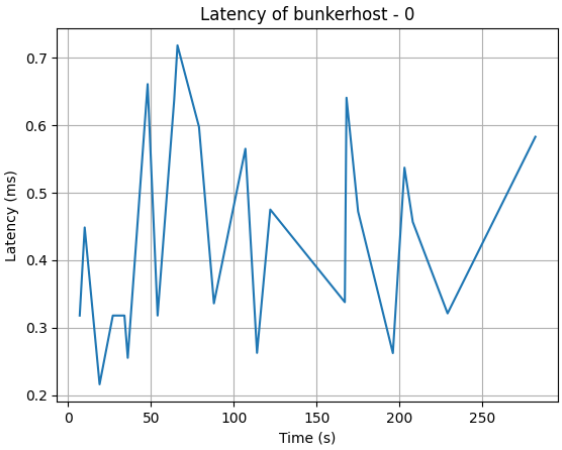

Figure 4: Latency: Cable Length is 20km

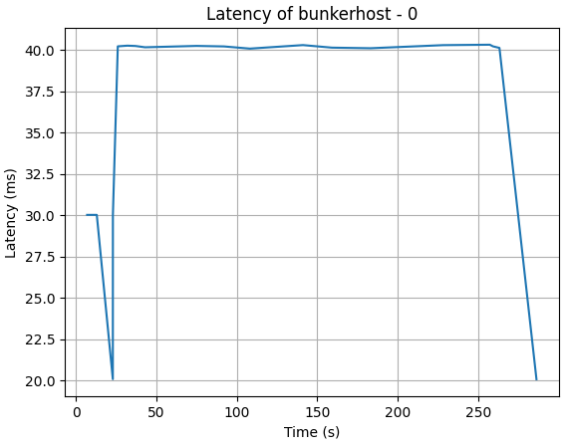

Figure 5: Latency: Cable Length is 2000km

Figure 4 shows the latency for one host when the cable length is 20km while Figure 5 shows the latency for the same host when the cable length is 2000km. As expected much longer cable increased the latency drastically.

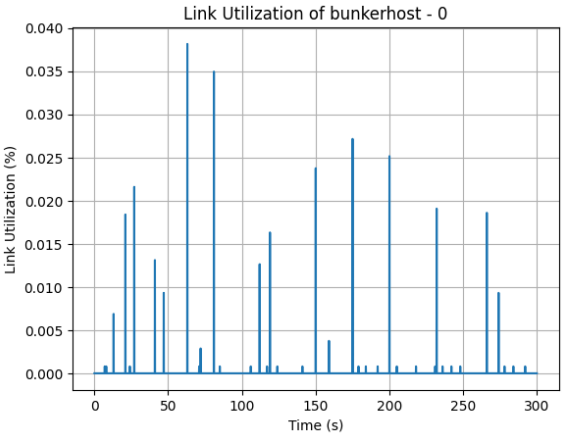

Figure 6: Link Utilization: Link Bandwidth is 100Mpbs

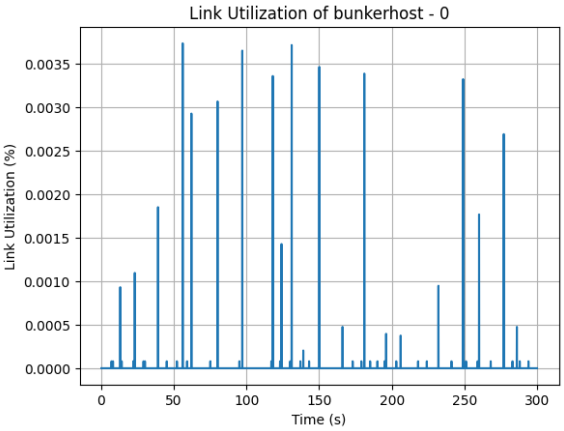

Figure 7: Link Utilization: Link Bandwidth is 1000Mpbs

Figure 6 shows the link utilization for a link when the cable bandwidth is 100Mpbs while Figure 7 shows the link utilization for the same link when the cable bandwidth is 1000Mpbs. As expected link utilization is much less with a higher bandwidth link since we only changed the bandwidth of the link, not the traffic behavior or intensity. So there is much more resource to utilize on higher bandwidth.