University Göttingen
GWDG/AG-C
Julian Kunkel-Zoya Masih

Exercise 1 / 2026-10-22
HPC System Administration / WiSe 26/27
25 Minutes Total

Performance Assessment Case Study

Work on the following case in your study group. The goal is not only to calculate a performance value, but to decide what the result tells you about the system.
Make reasonable assumptions where information is missing and discuss what additional information you would need.

Task 1: Assessing an I/O Performance Gap (20 min)

An application reads 20 GB of data from a storage service in 10 s.

The client and storage server are connected through a 100 Gb/s network.

A storage benchmark on the same service under comparable conditions achieves approximately 2.5 GB/s per client.

Steps

1. Calculate the application's observed throughput W.
2. Use the network link as an initial theoretical ceiling P. Calculate how much of the network-link peak is achieved.
3. Based only on this comparison:
   - Is the network link saturated?
   - Can you conclude that the application or system is inefficient?
   - Can you identify the bottleneck?
4. Now use the measured storage benchmark (2.5 GB/s) as a more realistic reference. Compare the application throughput with this value.
5. Does your interpretation change? Discuss why the theoretical network peak and the realistic storage baseline lead to different conclusions.
6. If you were the system administrator, what would you investigate next? Consider, for example:
   - network utilization,
   - storage activity,
   - request size and concurrency,
   - CPU and memory utilization,
   - system or job accounting information.

Task 2: Optional Extension: What if we add more clients? (5 min)

Assume four clients access the service concurrently.

The aggregate observed throughput is now 6 GB/s and a storage benchmark shows that the service can deliver approximately 8 GB/s under this level of concurrency.

Steps

1. Compare the observed throughput with the storage baseline.
2. Is the 100 Gb/s network now a likely limitation?
3. What other system characteristics would you need before making a stronger conclusion?

Discussion

Be prepared to briefly explain:

1. What was your first performance model?
2. Why was the theoretical network peak not sufficient?
3. What changed when you used a realistic baseline?
4. What would you measure next?