# System Performance Simulation

Product backlog 2019-04-08

1. [SPRINT 1] As an engineer, I want to run the simulation with a particular day's data rates, so that I can compare actual system performance with the simulation result.
2. [SPRINT 1] As an engineer, I want to know average message latency and throughput, so that I can evaluate if my design is acceptable.
3. [SPRINT 1] As an engineer, I want to try monolithic design in simulation, so that I can evaluate the size of the buffer needed to process all data with no loss.
4. [SPRINT 2] As an engineer, I want confidence that the simulation results are correct, so that I can trust the simulation.
5. [SPRINT 2] As an engineer, I want to use more realistic input data rate model, so that the simulation produces more realistic results.
   a. Instead of queuing all messages once per second, they need to arrive every micro-second.
   b. Example: if the data rate specified in a file is 1000000 messages per second, then 1 message is added to the queue every microsecond (thus resulting in 1000000 messages a second).
6. [SPRINT 2] As an engineer, I want to know the distribution of latency as 50th, 75th, 90th, 99th, and 99.9^{th} percentiles.

   An example distribution is shown below. In this chart, 50% of messages had latency of 1000 nanoseconds or less, and 99.9% of messages had latency of 9000 nanoseconds or less. Note, that providing the data for the chart is sufficient (no need to make the chart).
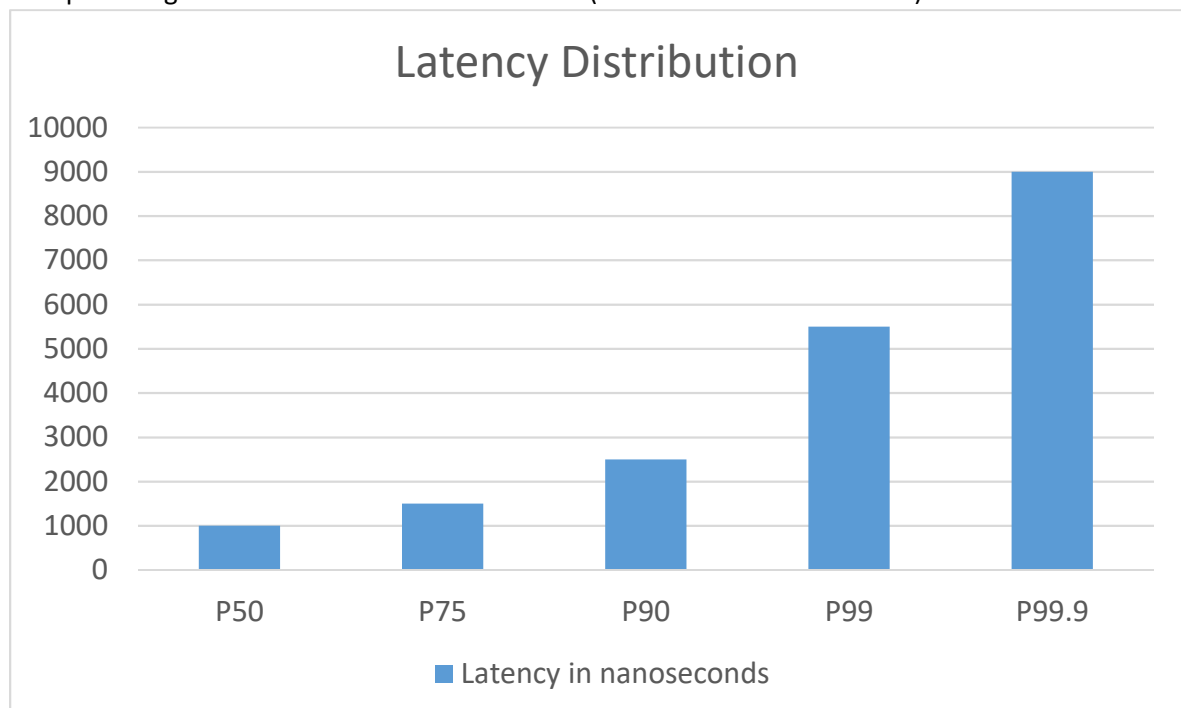
7. **[SPRINT 3]** As an engineer, I want to try "task parallel" design in simulation, so that I can evaluate the advantage of splitting monolithic system into an "assembly line".
8. **[SPRINT 3]** As an engineer, I want to provide per-microsecond data rates to the simulation, so that simulation could be realistic.
    a. The simulation needs to support previous mode of operation, where data file provided per-second data rates, which got split into per-microsecond rates (as in user story 5).
    b. The simulation needs to support an additional mode of operation, where input data file provides per-microsecond data rates. Sample input file will be provided.
9. As an engineer, I want to combine "task parallelism" with "data parallelism" in a design simulation, to determine the minimal resources needed to meet latency and throughput expectations.
10. As a product owner, I want to test various data rates scenarios, so that I can plan future product improvements.