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Reflection Report

Fundamentals of Distributed Systems

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Reflection Report

How does the buffer size affect the frequency and timing of message passing?

- Buffered channels don't have to have their contents emptied by a receiver, meaning messages can be sent to the channel more frequently. The timing of buffered channels is looser than an unbuffered channel. Buffered channels may have certain messages waiting in the buffer for a long time due to the lack of receivers. This will increase the latency of the messages (from the time they had been sent to the time they were received). Unbuffered channels won't send messages unless there is a receiver at the other end, which enables close synchronization.

What happens when the buffer is full?

- The channel won't accept any additional data until one of the receivers makes space by taking items from the buffer.

How does RabbitMQ handle load balancing between multiple consumers?

- RabbitMQ uses the Round-Robin approach to distribute messages to different consumers. Messages are sent to each consumer one at a time in a sequential manner. Once all consumers receive a message, the procedure repeats starting from the beginning.

What happens when a consumer disconnects?

- RabbitMQ has an acknowledgement system whereby messages won't be removed from the queue unless the consumer acknowledges that it has finished processing the message. This makes it so that any consumer that accepts a message but fails to finish processing the message will not end up losing the message all together. An unacknowledged message will stay in the queue until either the disconnected client receives the message, or a different client accepts the message. This continues until a client can process a message (and complete whatever task is needed) successfully, at which point the message is acknowledged and it is removed from the queue.

How does NATS handle different subjects?

- NATS maps the subjects to the subscribers under said subject. This makes it so that the internal routing forwards messages only to the correct subscribers. These subjects are structured hierarchically using dots, which also enables subject filtering.

What advantages does this give in message organization?

- The ability to have different subjects in a multicast environment enables clients to only receive the messages that are relevant to them. Subjects help organize and filter messages in such an environment. They also decrease the load on the network, as bandwidth won't be wasted on irrelevant data. They also decrease the load on the individual nodes because they don't have to deal with data that isn't required for their processes.