

DISCORD ARCHITECTURE

Handle millions/minute Push Notifications in burst

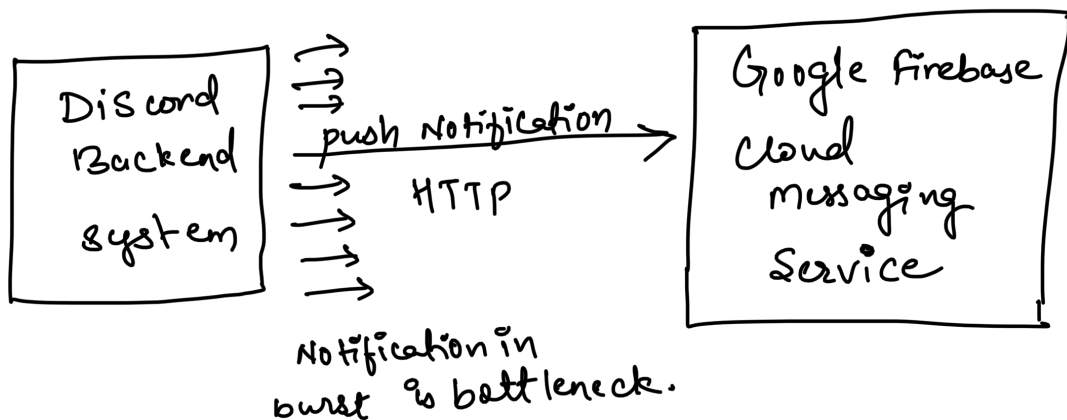
YouTube Channel- MsDeep Singh

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Requirement →

- ↳ Burst notifications can make entire Notification System slow or bring it to halt.
- ↳ Discord passed >25,000 concurrent users.
- ↳ A very important Non functional requirement would be - system should be available and operational even if there is burst traffic.

Current Architecture



→ The throughput could be improved by sending push requests to Firebase via XMPP rather than HTTP.

↳ It is extensively used by chat applications like WhatsApp.

↳ XMPP can send messages from server to client and client to server.

↳ XMPP provides asynchronous messages whereas HTTP provides synchronous messaging.

↳ Each XMPP connection can have max of 100 messages in queue.

↑
The system should be designed in a way that XMPP connection adhere to limit of 100 msgs.

New Architecture

① Discord backend is written in Elixir.

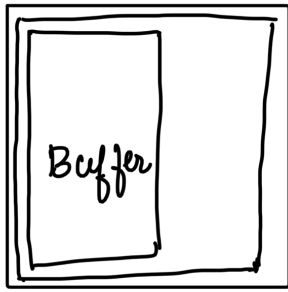
② Elixir's GenStage is helpful in designing such pipeline to control the rate of messages.

↳ GenStage is new Elixir behaviour for exchanging events with back pressure between Elixir processes.

↳ multiple stages can be configured in GenStage as per requirement.

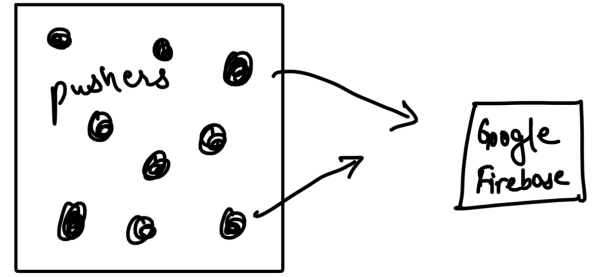
↳ The stages can take role of Producer, Consumer or both.

Discord introduced 2 stages →



Stage 1
"Push Collector"
↑

- Collects push requests. "Producer"
- One Push Collector Erlang process per machine.



Stage 2
"Pusher"

- Demands Request from Push Collector and publish to Firebase.
- Only demands 100 requests
- Multiple Pusher Erlang processes per machine.

How Genstage helps in maintaining load?

Back Pressure

- ① Pusher use Genstage's demand functionality to ask Pusher for no of requests it can handle.
- ② Once request is ack by Firebase, Pusher demands more.
- ③ Push Collector only sends requests when demanded.

Load Shedding

- ① If there is burst traffic, Push collector will be overloaded with requests.
- ② Extra requests are moved to "buffered events".

③ If buffer fills up with max limit, Push Collector drops these messages.

↑ It is good to lose some notifications as compared to bringing entire system down.

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Happy Learning 😊