Partial POST Replay

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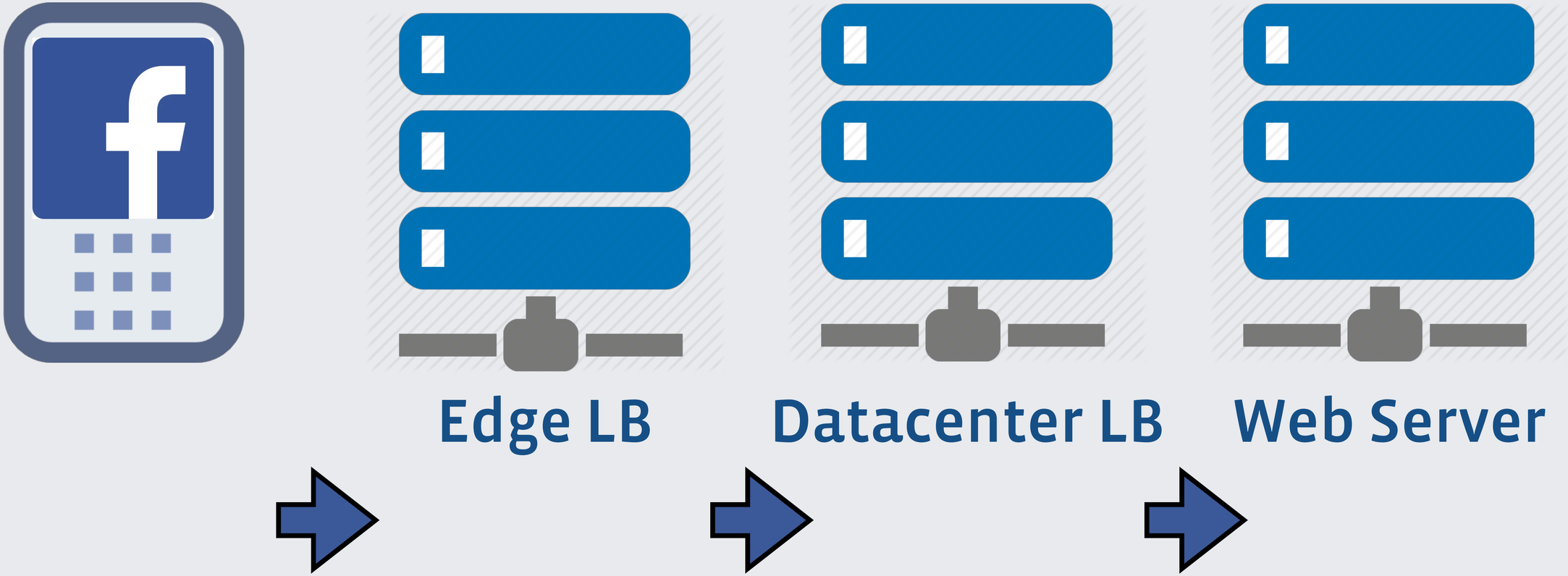
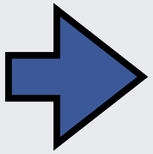
Facebook
HTTP Workshop, April 2019

Lifetime of an HTTP POST



What could go wrong?

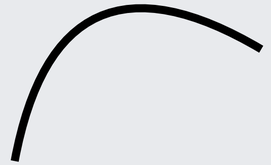
Web Server



Possible Solutions

- Fail the request, clients will retry
  - Added latency, wasted data, sad eyeballs

- Buffer POST body at load balancer
  - Not scalable



- Completely drain the web server
  - Reduces capacity for a undefined period of time
- Socket takeover
  - Requires 2x web server memory

Why doesn’t GOAWAY fix it?

- **GOAWAY** only tells the Load Balancer which requests can be safely retried
- The Load Balancer cannot retry any POSTs for which it has already received and forwarded the body
- Any requests lower than `Last-Stream-ID` can’t be retried without additional signal anyways

Partial POST Replay

- Simple protocol between load balancer and web server
- Allows load balancer to seamlessly retry POST requests with minimal memory commitment
- Works with HTTP/1.1, HTTP/2 and (*probably?*) HTTP/3

Partial POST Replay

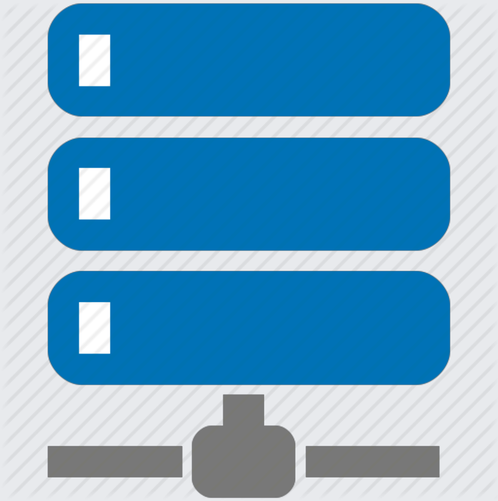
Load Balancer

- Counts POST bytes sent to the server
- On 379 Response:
  - Temporarily pause reading from the client
  - Select a new server and resend the original request
- As response data arrives, forward it to the new server as POST data
- When all response bytes have been replayed
  - Abort request to original server
  - Resume reading from the client

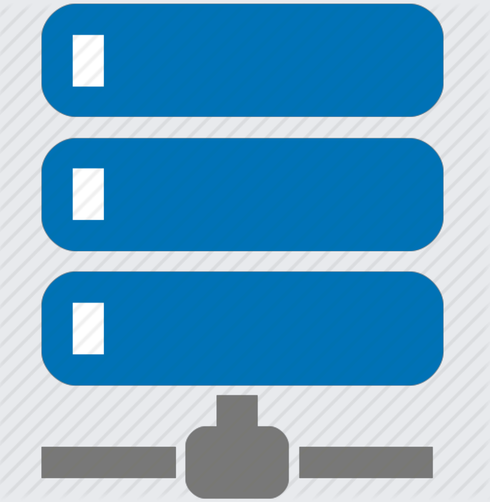
Web Server

- Buffers the entire POST until the request is processed
- During shutdown, send 379 Partial Post response
- Send all the buffered POST body as the response body
  - Response has no FIN bit or chunk terminator
  - Continue echoing POST data in the response
  - Wait for Load Balancer to abort

Animated Example



Datacenter LB



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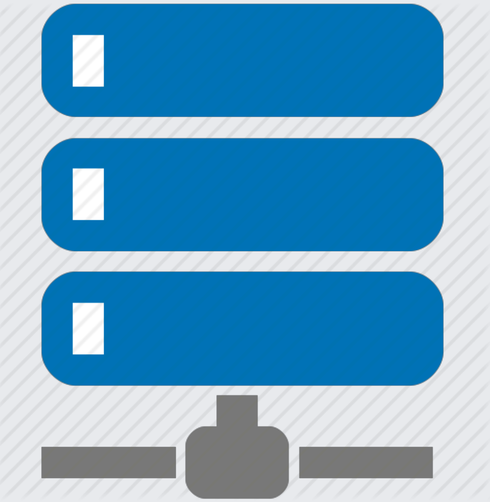

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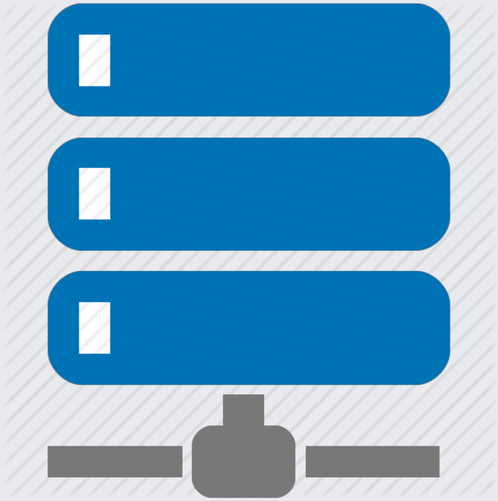

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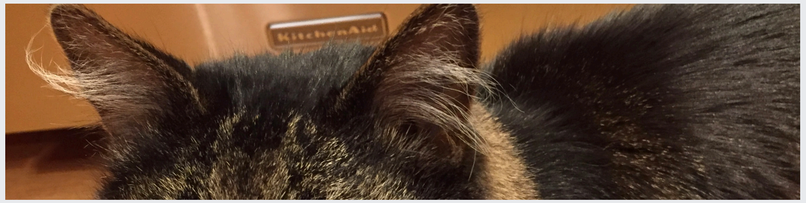
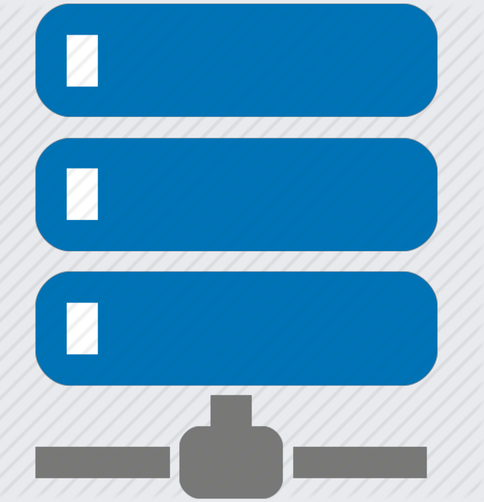
POST /kitty HTTP/1.1





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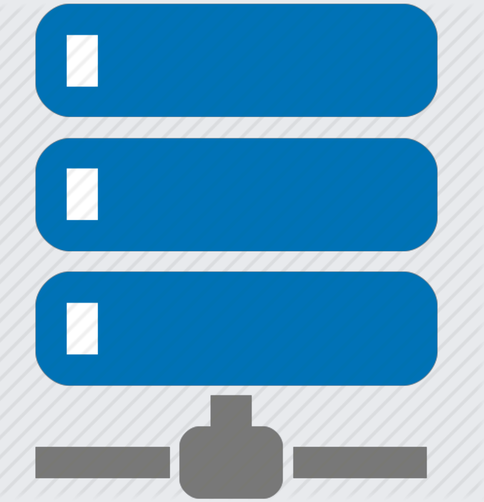

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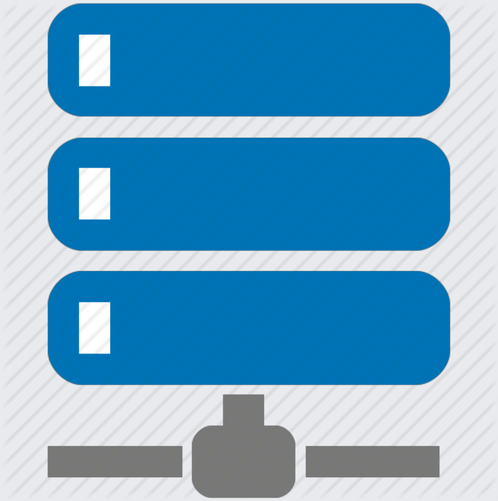

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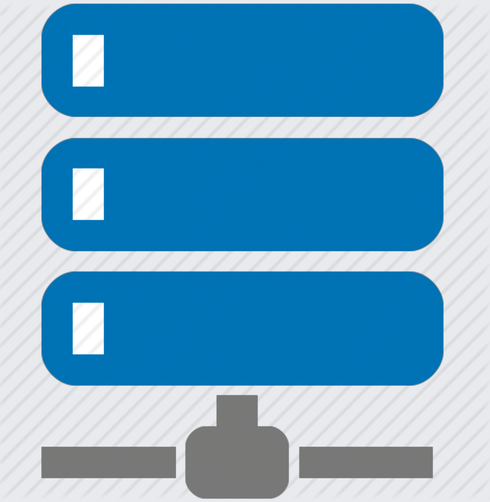

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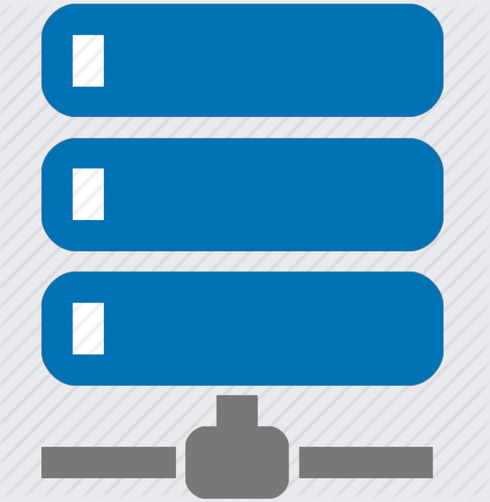

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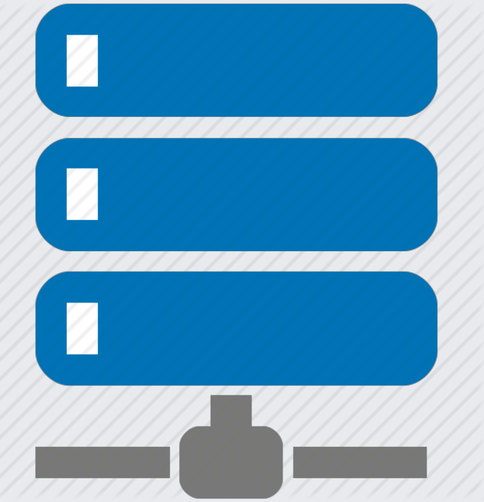
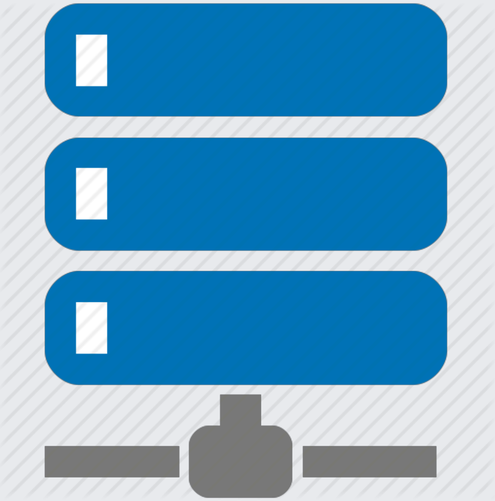


Web Server

HTTP/1.1 379 Partial



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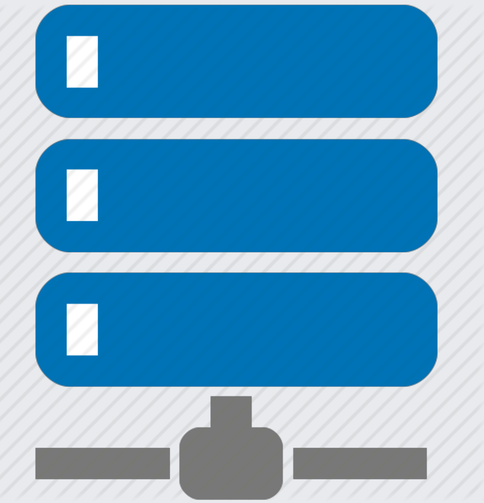

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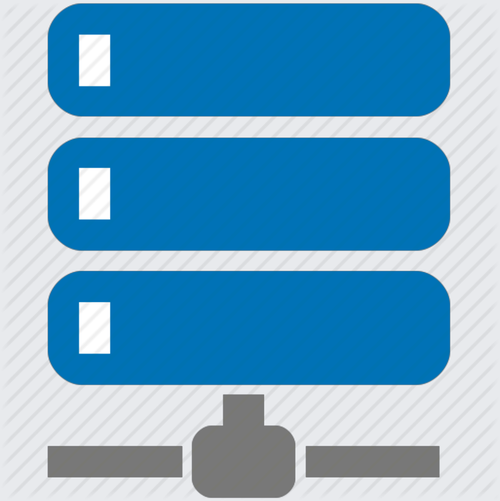

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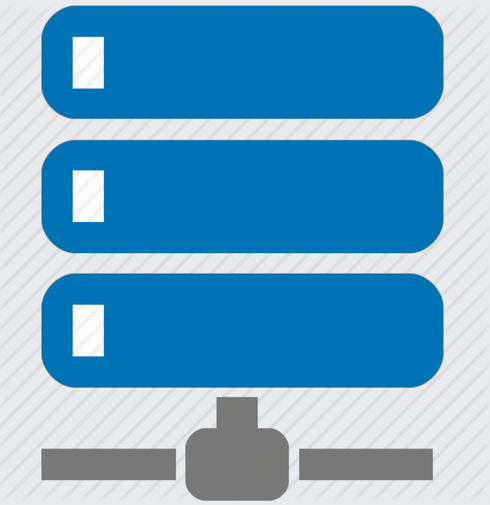

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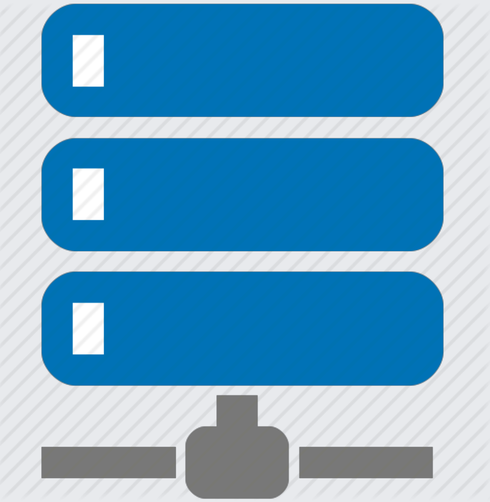

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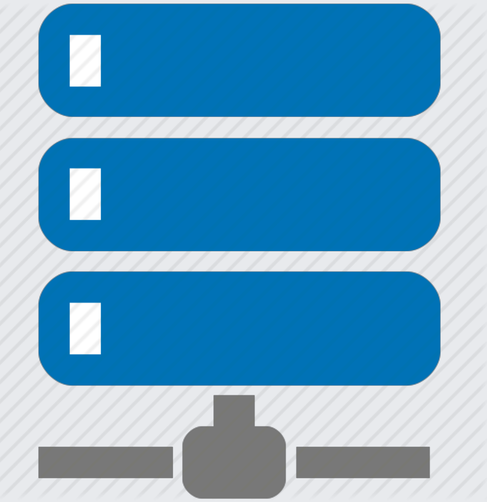

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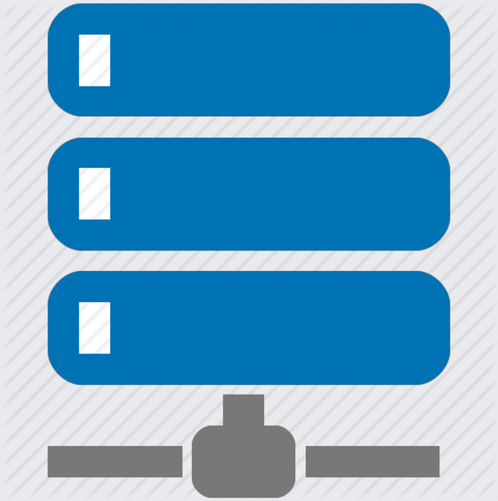

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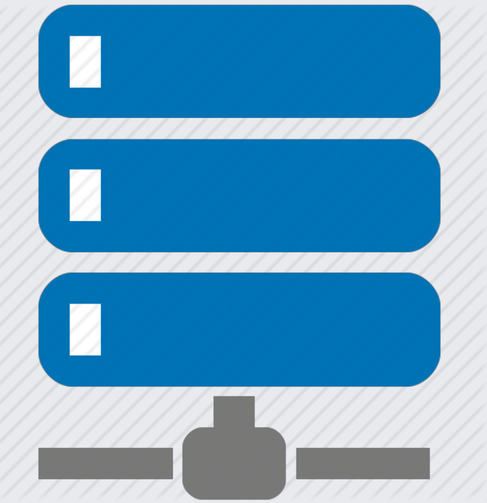

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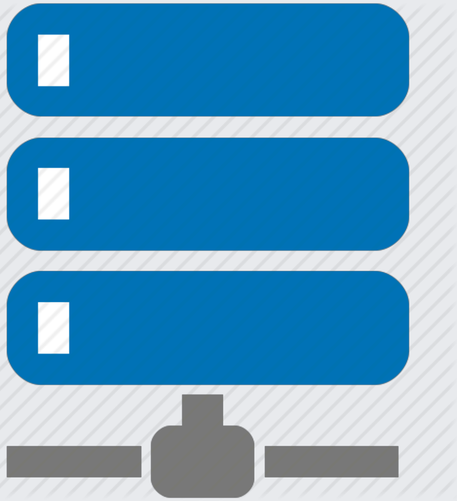

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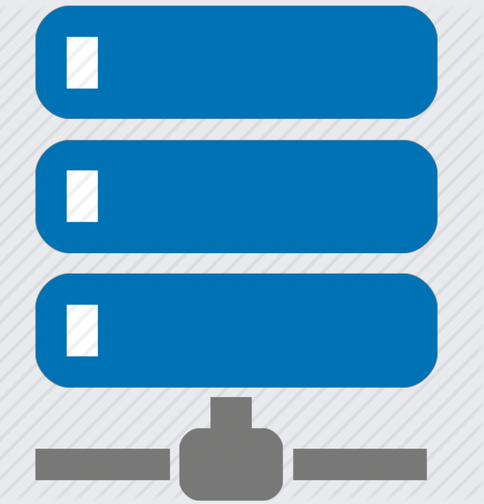

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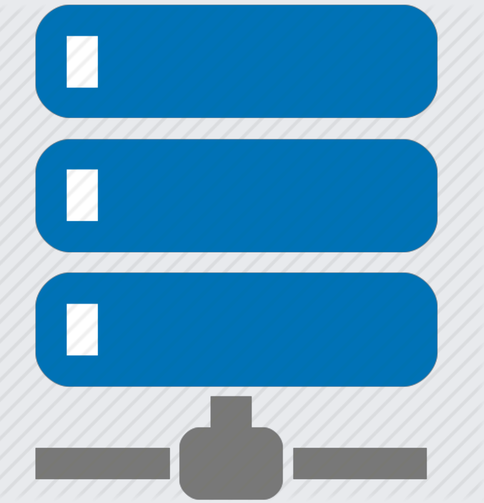

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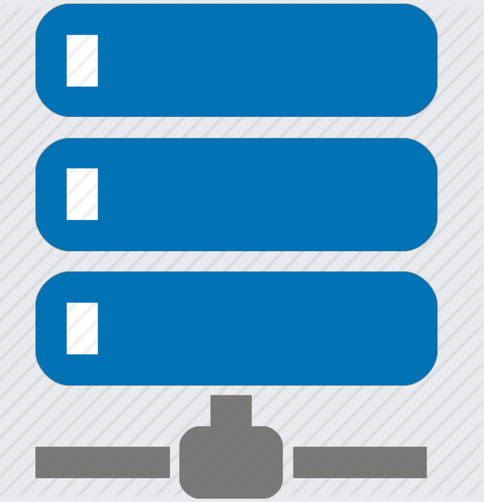

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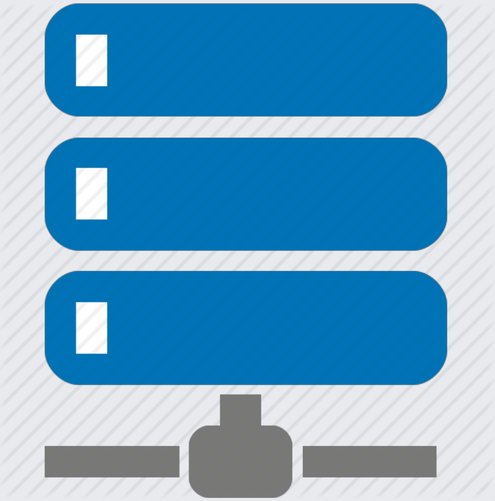

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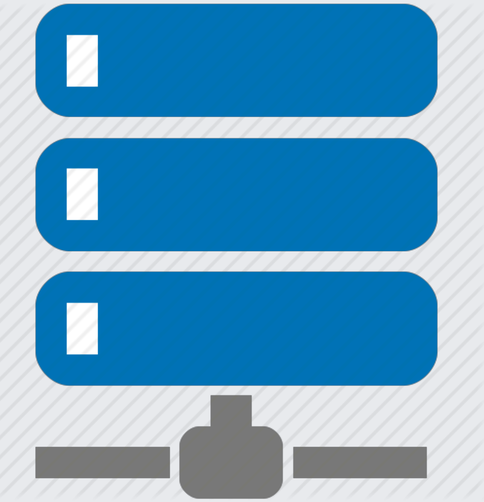

Edge Cases

- Set a reasonable maximum for the number of times a POST can replay
- Be careful if you want to preserve chunk/frame boundaries

Questions?