Lesson 4

Web APIs

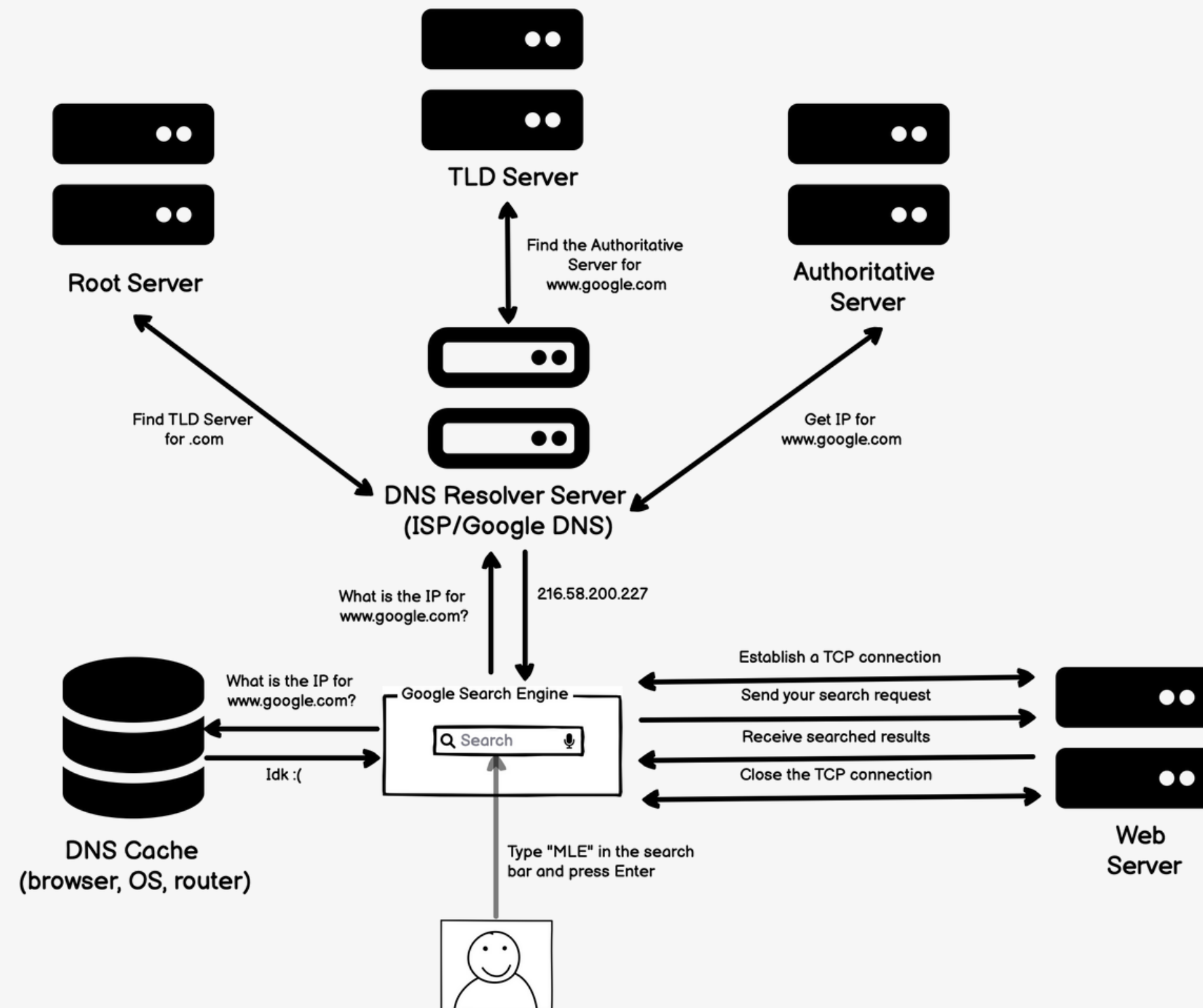How to communicate with a remote resource?

Learn About
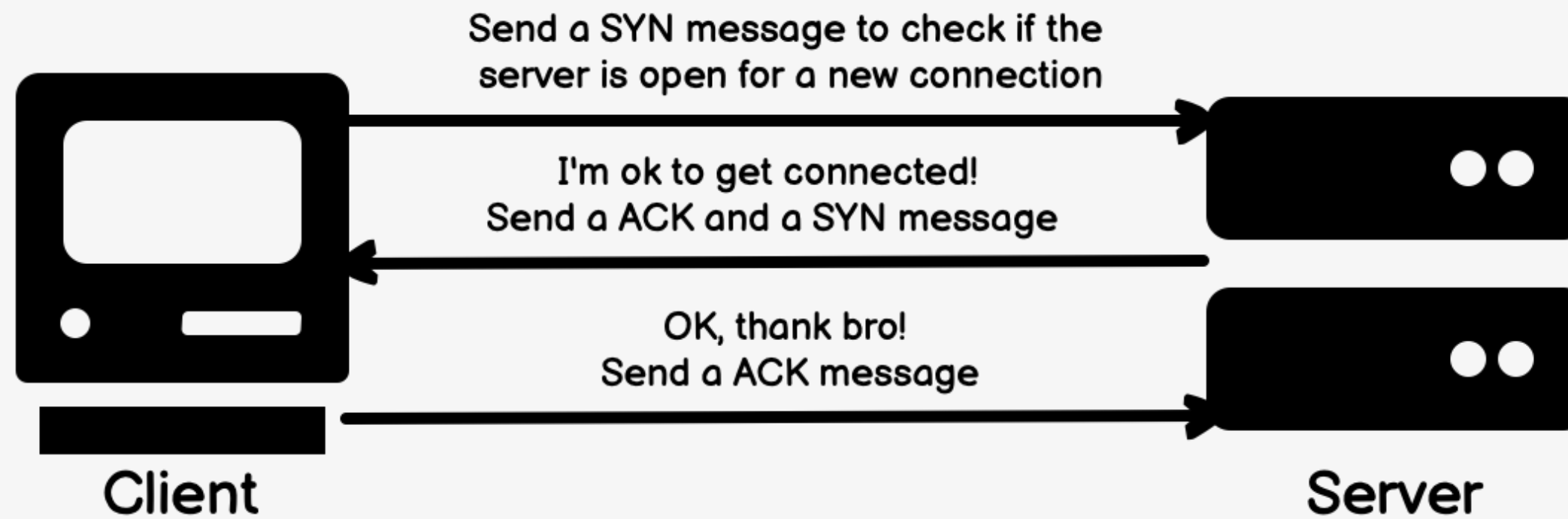
- **Behind a Google Search**
- **API Architecture Styles**
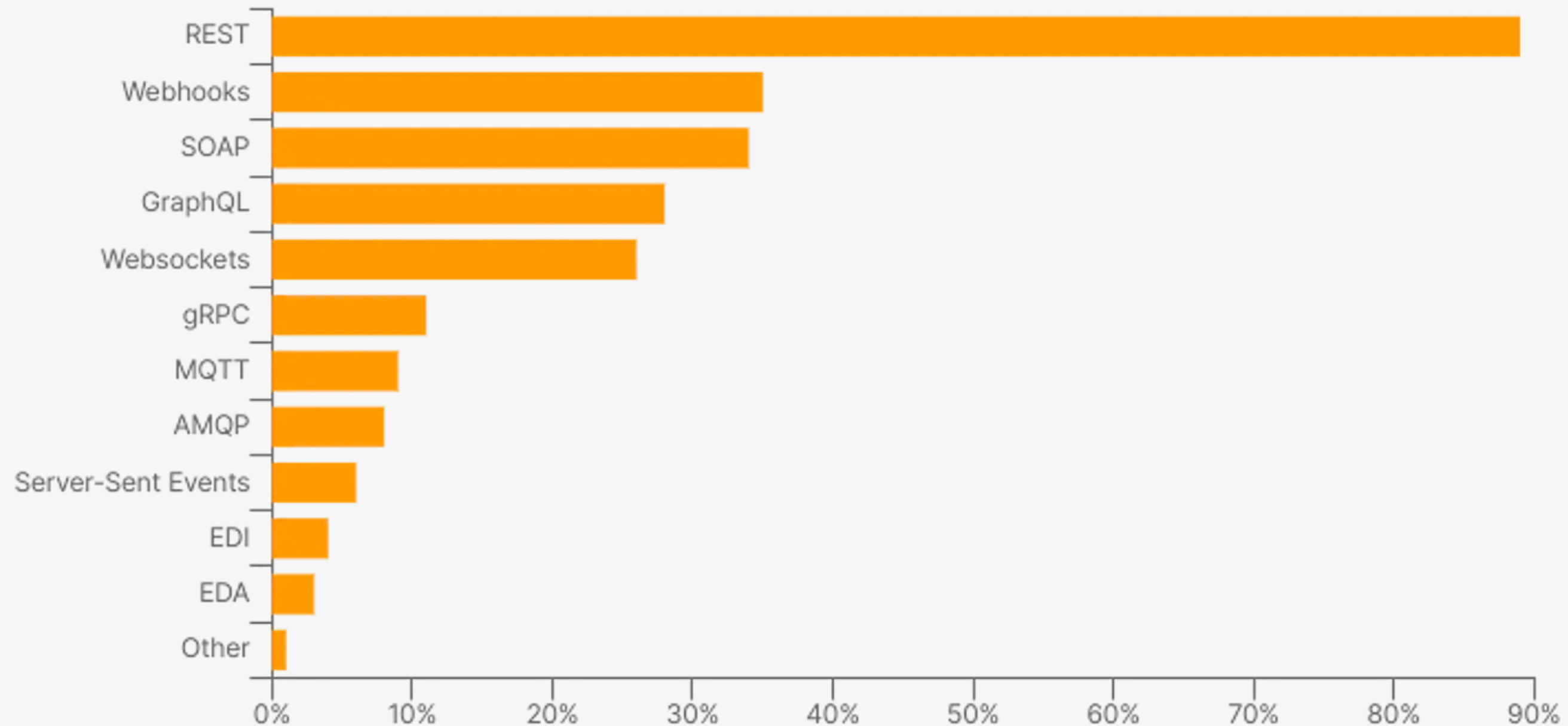- **Software Testing**
- **Improve API performance**

Behind a Google Search

TLD Server

Root Server

Find the Authoritative Server for www.google.com

Authoritative Server

Find TLD Server for .com

Get IP for www.google.com

DNS Resolver Server (ISP/Google DNS)

What is the IP for www.google.com?

216.58.200.227

What is the IP for www.google.com?

Google Search Engine

Q Search

Idk :(

Establish a TCP connection

Send your search request

Receive searched results

Close the TCP connection

Web Server

DNS Cache (browser, OS, router)

Type "MLE" in the search bar and press Enter

TCP 3-way handshake

Send a SYN message to check if the
server is open for a new connection

I'm ok to get connected!
Send a ACK and a SYN message

OK, thank bro!
Send a ACK message

Client

Server

API Architecture Styles

Multiple choices allowed

REST API

Handshake: TCP 3-way

Take action on a resource using HTTP verbs (GET/POST/UPDATE/DELETE)

Wait for a response in JSON, XML or HTML format

Connection closes immediately after response, or based on timeout
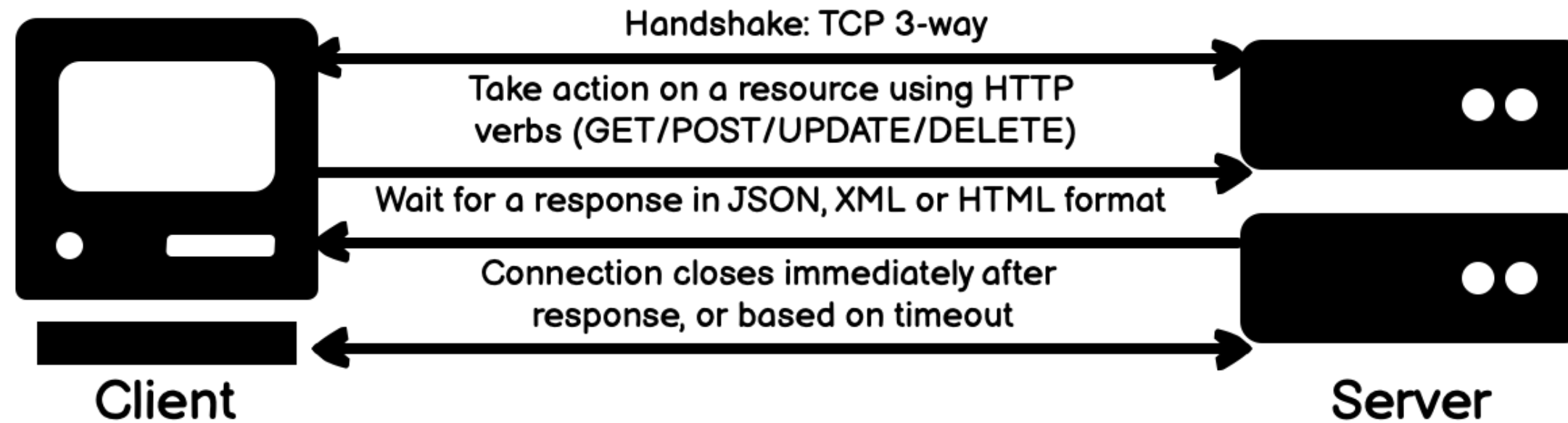
Client

Server

✅ Pros	❌ Cons
• Easy to learn and code	• Must document to communicate b/w client and server

gRPC

Handshake: TCP 3-way

Proto request

010101010010101...
(binary instead of textual in HTTP)

Proto response

Connection stopped when one side closes

Client

Server
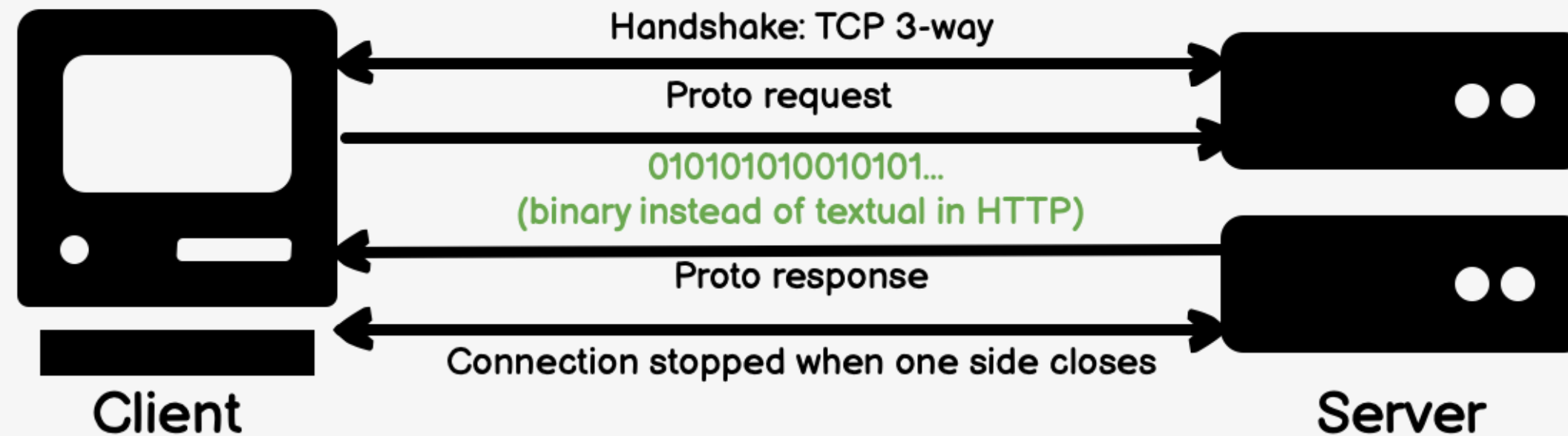
✅ **Pros**

❌ **Cons**

- **Strongly typed**
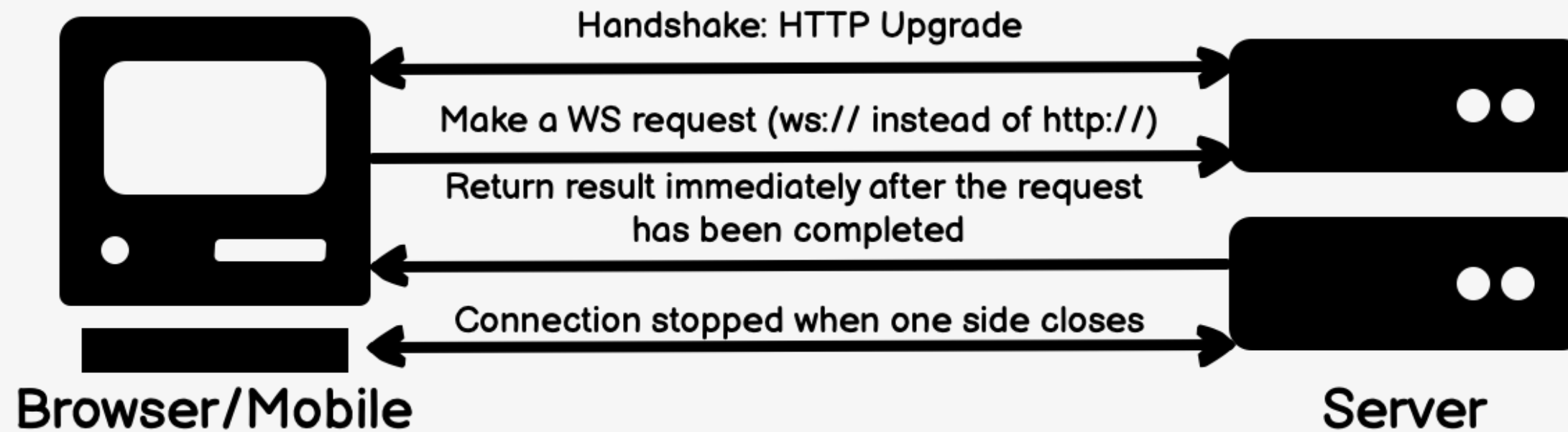- **Lightweight messages result in faster communication**
- **Support streaming**

- **Lack of maturity**
- **Can't call a gRPC service from a web browser directly**

WebSocket

Handshake: HTTP Upgrade

Make a WS request (ws:// instead of http://)

Return result immediately after the request has been completed

Connection stopped when one side closes

Browser/Mobile

Server

✅ **Pros**

❌ **Cons**

- **Support streaming**
- **Faster than REST**
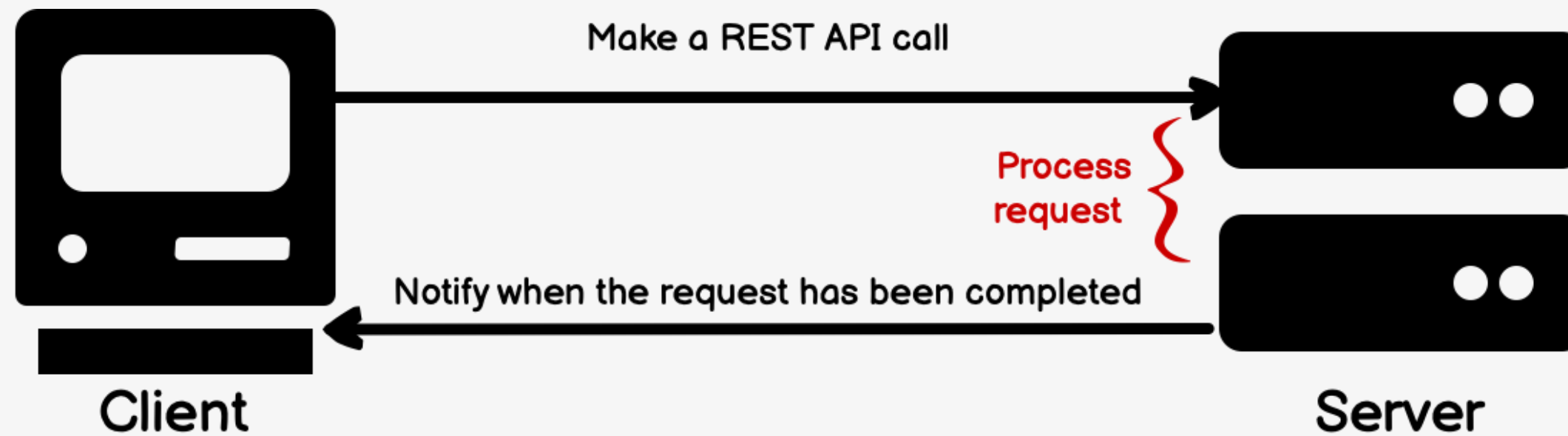- **Call and receive a response directly from browser and mobile**
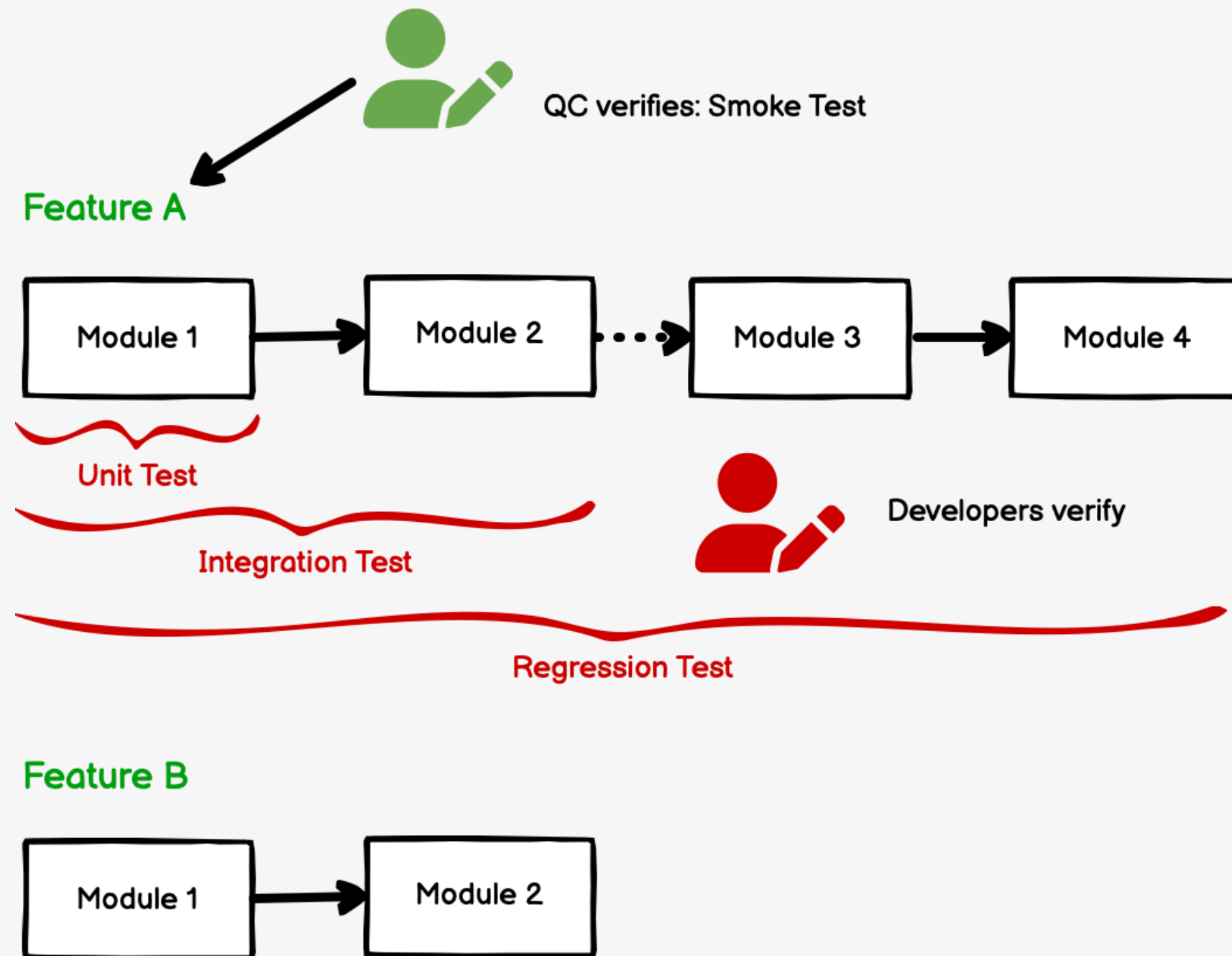
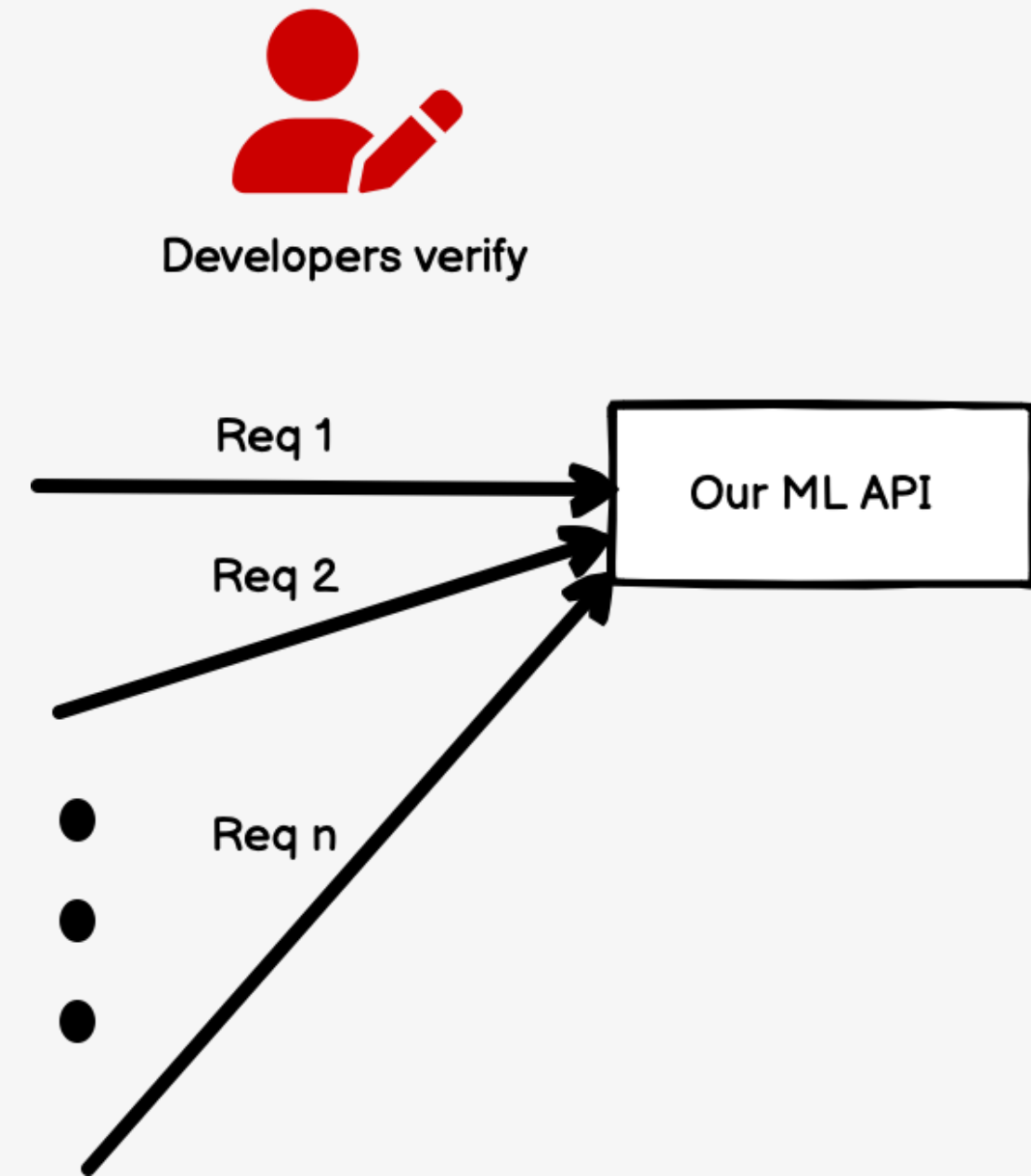- **More difficult to develop than REST**

Webhook

Make a REST API call

Process
request

Notify when the request has been completed

Client

Server

Software Testing

Functional Testing

QC verifies: Smoke Test

Feature A

| Module 1 | → | Module 2 | ⋯▶ | Module 3 | → | Module 4 |

Unit Test

Integration Test

Developers verify
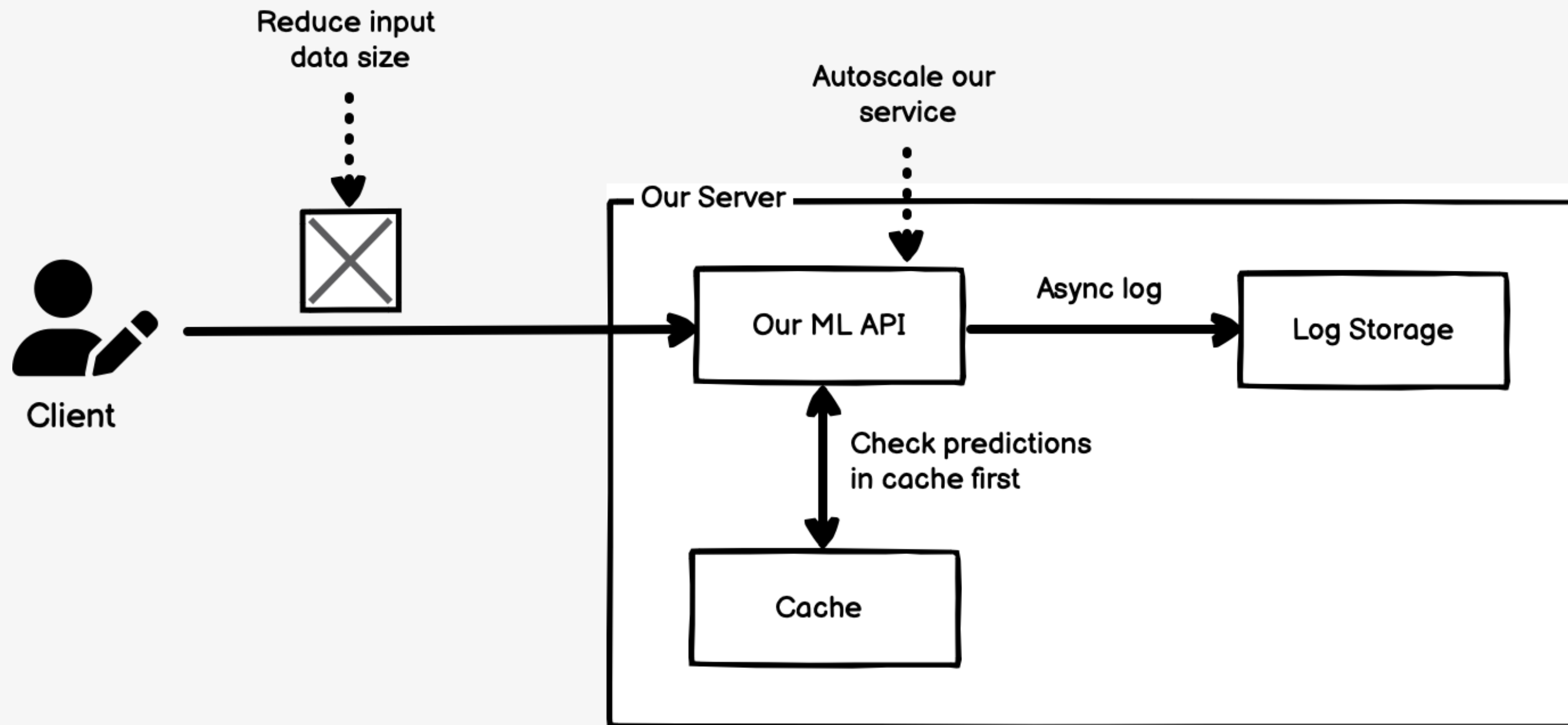
Regression Test

Feature B

| Module 1 | → | Module 2 |

Software Testing

Non-Functional Testing

- **Load Test: what is the upper limit?**
- **Stress Test: how the system reacts under unexpected load?**

Developers verify

Req 1

Req 2

Req n

Our ML API

Improve API performance

Reduce input
data size

Autoscale our
service

Our Server

Client

Our ML API

Async log

Log Storage

Check predictions
in cache first

Cache

Thank You!

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