

salesforce

Real-time Salesforce Architecture

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TRAILHEAD
ACADEMY

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Agenda

Several degrees of urgent responses

01 Real-Time Architecture

02 Streaming And PubSub APIs

03 WebSockets

04 Q&A





Real-Time Architecture





What Is a Real-Time Architecture?

Get notified “immediately” when something happens

Several degrees of urgent responses

- MFA
- Password Reset
- Purchase Confirmation
- Shipping Confirmation



Other Real-Time Examples



- Get notified when Salesforce records have been ingested (CRUD)
- Get notified when an error has happened
 - Platform Event configured as publish immediately
- Ask questions and handle answers asynchronously when they arrive
 - Should be non-blocking
- Monitoring a call-center
 - Salesforce Service Cloud
- Chat or game engines
- Many more...



How To Know If Data Changed?



- Short Polling
 - Regular APIs
- Long Polling
 - Streaming API (Bayeux Protocol, CometD)
- gRPC
 - Pub/Sub API
- WebSockets
 - Socket.IO

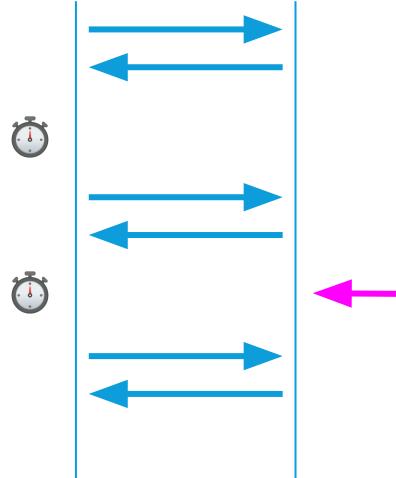


Comparing Technologies



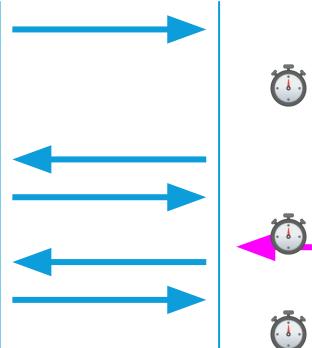
Short Polling

Client Server



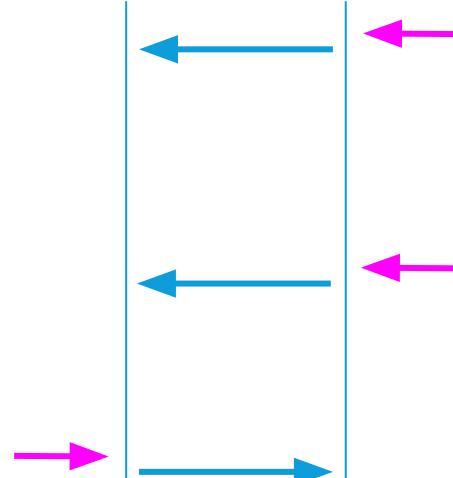
Long Polling

Client Server



gRPC

Client Server





Streaming And PubSub APIs



Long Polling: A Deeper Dive

Salesforce streaming API uses Long Polling



- Asynchronous communication
 - Fire and “forget”
- Decoupled
- Flexible
- Scalable

Components

- Publisher
- Subscriber
- Event Message (payload)



Long Polling: Web Service Requests

Bayeux Protocol implemented by open-source CometD library

0. Authentication
1. [/cometd/58.0/handshake](#)
 -  Response: clientId
2. [/cometd/58.0/subscribe](#)
 -  Request: clientId, subscription channel and replayId
3. [/cometd/58.0/connect](#)
 -  Request: clientId
 -  Response: Timeout or event data
4. Go to 3 (Infinite loop)



Four Event Types

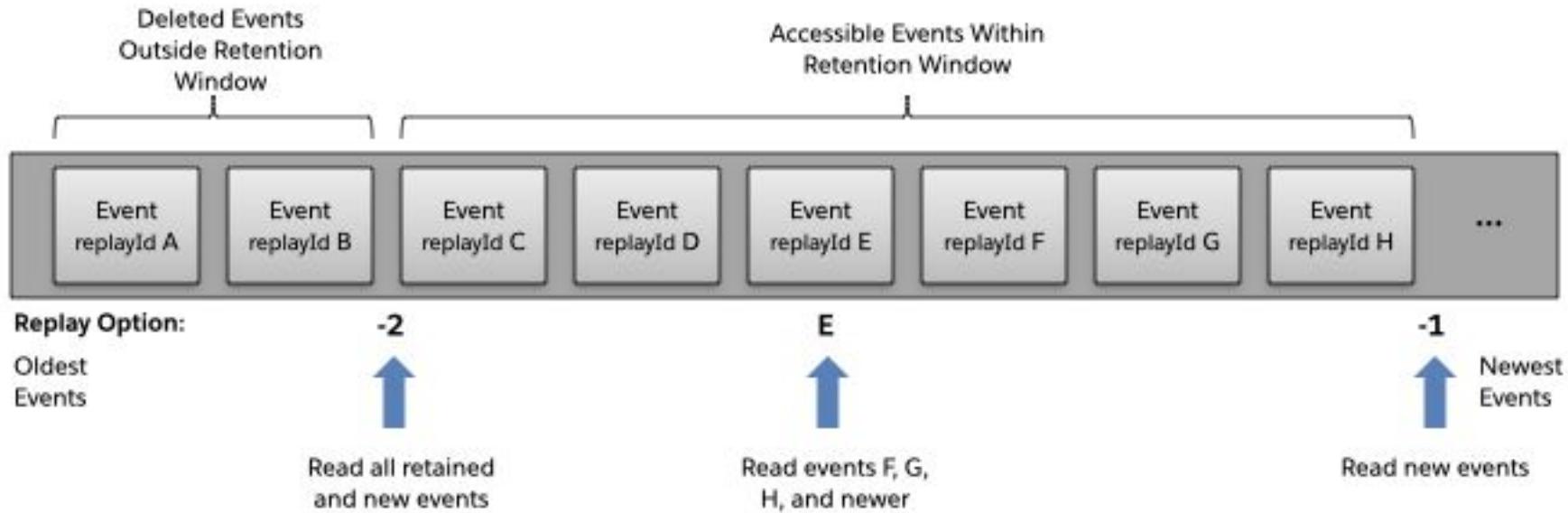


	Version	Publish	Streaming API Subscriber Channel
Generic Streaming	Legacy	✓	/u/MyGenericChannel
Pushtopic	Legacy	✗	/topic/AccountUpdates
Platform Event	Current	✓	/event/CloudNews__e
CDC (Change Data Capture)	Current	✗	/data/AccountChangeEvent

Legacy events are not supported by the PubSub API



Replay Id



This is only true for the Streaming API, not for the PubSub API

Demo: Streaming API

Postman Demo: Long Polling

Runner | Real-Time Salesforce

postman.com/cloudy-equinox-50498/workspace/real-time-salesforce/run/create?folder=9044268-446669c3-f643-4a02-904a-89719cc5059b&collection=9044268-61e9f1d9-7563-49d3-ab3e-...

Home Workspaces API Network Explore Search Postman Invite Upgrade

Real-Time Salesforce New Import POST UNPW OAuth Tester GET Query Account (OAuth) Subscriber (Run this!) Runner + No Environment

Collections Environments History

ELTORO.IT Salesforce Postman Demos

- SOAP API
- REST API
- Bulk API v2
- Composite REST API
- Streaming API
 - Publisher
 - Subscriber (Run this!)
 - POST Streaming API Handshake
 - POST Streaming API Subscribe
 - POST Streaming API Connect
 - ApexInbound
 - Test Limits
 - Call Apex Rest Service
 - URL For Web Login
 - UNPW OAuth Tester
- My Salesforce Client Demos

Run order Deselect All Select All Reset

Functional Performance

Choose how to run your collection

Run manually Run this collection in the Collection Runner.

Schedule runs Periodically run collection at a specified time on the Postman Cloud.

Automate runs via CLI Configure CLI command to run on your build pipeline.

Run configuration Iterations 1 Delay 0 ms Data Select File Persist responses for a session Advanced settings

Run ELTORO.IT Salesforce Post...

Online Console Import Complete

- POST https://platform-dream-3455-dev-ed.scratch.my.salesforce.com/services/data/v58.0/sobjects/CloudNews__e
- POST https://test.salesforce.com/services/oauth2/token

pm.collectionVariables

```
GET https://connect-energy-4573-dev-ed.scratch.my.salesforce.com/services/data/v58.0/query/?q=SELECT%20Id,%20Name,%20BillingStreet,%20BillingCity,%20BillingState,%20BillingCountry,%20BillingPostalCode%20From%20Account%20WHERE%20N 200 260 ms
ame%20=%20N%20ELTORO.IT%27
```

2 Errors All Logs Clear

201	131 ms
201	118 ms
201	181 ms
201	429 ms
201	89 ms
201	90 ms
201	115 ms
200	326 ms

Postbot Runner Desktop Agent Cookies Trash



- Open source Remote Procedure Call (RPC) framework developed by Google
- Bidirectional Streaming
- Synchronous and not decoupled!
- Services provided described by Proto File
- Requires [gRPC-Web](#) to execute on a browser



Demo: gRPC

Node: Generic gRPC

The screenshot shows a code editor interface with the following details:

- EXPLORER:** Shows a project structure for "SIMPLEDEMO". The "protos" folder contains "helloworld.proto". Other files include ".gitignore", ".prettierrc", "greeter_client.js", "greeter_server.js", "package-lock.json", and "package.json".
- EDITOR:** The "helloworld.proto" file is open, displaying the following proto3 code:

```
syntax = "proto3";
package helloworld;

service Greeter {
    rpc SayHello (HelloRequest) returns (HelloReply) {}
    rpc SayHelloAgain (HelloRequest) returns (HelloReply) {}
}

message HelloRequest {
    string name = 1;
}

message HelloReply {
    string message = 1;
}
```
- TERMINAL:** Shows the output of running the client and server. The server logs requests for "sayHello" and "sayHelloAgain". The client logs responses.

```
aperez */GitHub/gRPC/SimpleDemo [BuildingDemo] $ npm run server
> dynamic_codegen@1.0.0 server
> node greeter_server.js
2023-10-08T12:40:54.606Z Server received request for [sayHello]
2023-10-08T12:40:54.614Z Server received request for [sayHelloAgain]

aperez */GitHub/gRPC/SimpleDemo [BuildingDemo] $ npm run client
> dynamic_codegen@1.0.0 client
> node greeter_client.js
2023-10-08T12:40:54.610Z - Hello <world>
2023-10-08T12:40:54.614Z - Hello again, <world>
```



PubSub API

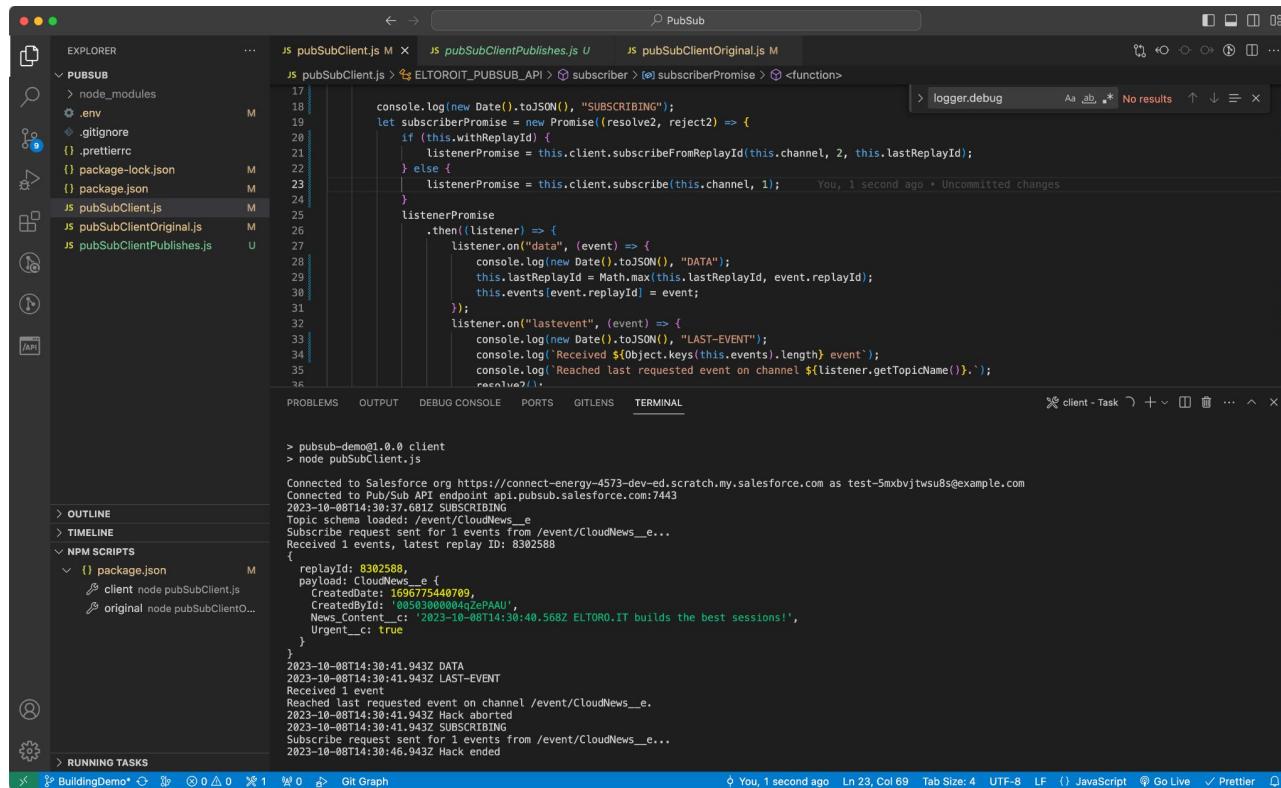


- Based on gRPC
- Replay Id works different than Streaming API
- For Node.js use this library: <https://github.com/pozil/pub-sub-api-node-client>



Demo: PubSub API

Salesforce PubSub (gRPC) Demo





WebSockets

WebSockets



gRPC vs. WebSockets

Similar but different

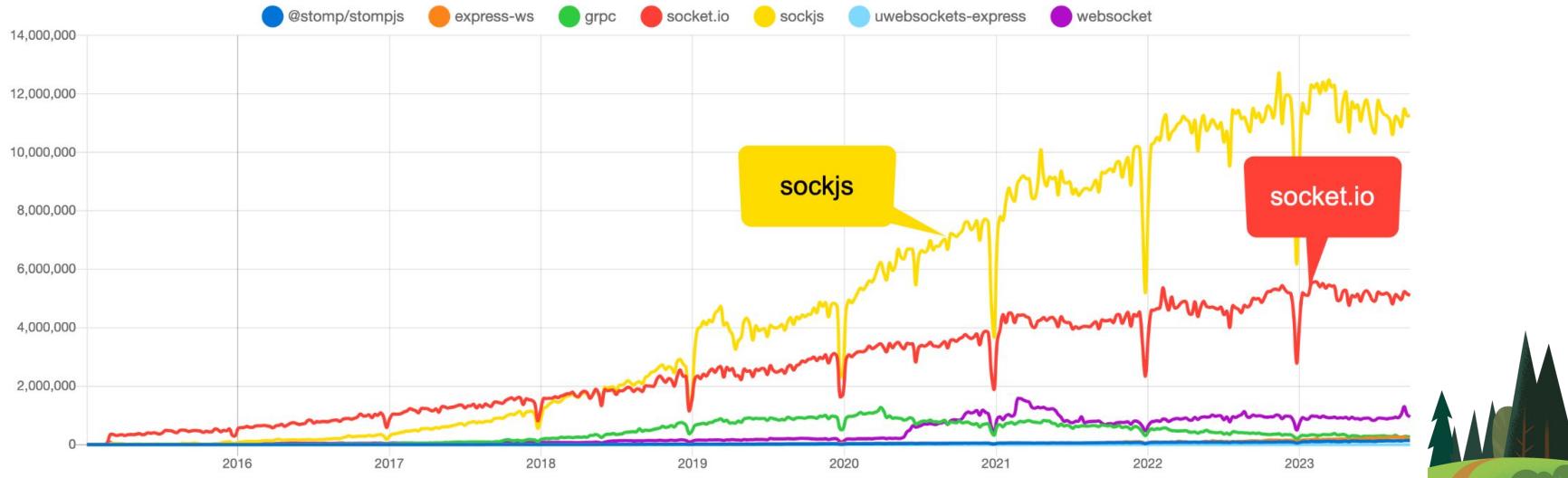


	gRPC	WebSockets
What is it?	Google's open source RPC framework	Application protocol for real-time data exchange
Protocol	HTTP/2 protocol	WebSockets (HTTP/1.1)
Data	Binary format, machine efficient	Text (JSON, MQTT), human readable
Use Cases	Microservices architecture and server-to-server communication	Client-to-server real-time web applications (chat, gaming, stock)
Security	Token-based and supports authentication	Must be implemented manually
Browsers	Limited browser support	Widely supported by browsers
Performance	HTTP/2 (multiplexing, concurrency), binary data (smaller payload)	HTTP/1.1, text data (larger, translation),

WebSockets & JavaScript



- Browsers support WebSockets natively ([Websockets API on MDN](#))
- Server (Node.js) require a library
- [Heroku documentation](#) mentions Socket.IO



What is Socket.IO?

Nodejs library for real-time communication with WebSocket support

- Library provides abstraction layer
 - Built on top of the WebSocket protocol
 - Broadcast support, including rooms
 - Falls back to HTTP long polling
- Cross-browser compatibility
- Automatic reconnection



Demo: Basic Socket.IO

Basic chat engine using Socket.IO



Two side-by-side screenshots of a web browser showing a basic chat application. Both windows have the title "Socket.IO chat" and the URL "localhost:3000".

The left window shows the following messages:

- Hello
- Hi
- Can I ask you a question?
- 42

The right window shows the following messages:

- Hello
- Hi
- Can I ask you a question?
- 42

At the bottom of each window is a large input field and a "Send" button.



LWC + Socket.IO

What needs to change for LWC?



- Localhost can be used, but not very useful
 - Hosted web server in Heroku
- Users interactions
 - Create data in Salesforce, I can't use @wire
 - Use websocket to notify instructor
- Salesforce imposes security requirements
 - CSP (Setup > Security > Trusted URLs)
 - CORS
 - Socket.IO library must be in Static Resources



LWC + Socket.IO Basic Demo

Simple WebSockets demo

The image shows three separate browser windows side-by-side, each displaying a Lightning App Builder app page for a "Websockets" component.

- Left Window:** Title bar says "Websockets | Salesforce". The page content includes:
 - A sidebar with "LWC Demo", "Accounts", and "Websockets".
 - A main section titled "Websockets" with a "Text" input field containing "Hello World".
 - A JSON log area showing a message: {"text": "Hello World", "color": "#e100ff", "ping": "2023-10-08T15:08:26.854Z", "pong": "2023-10-08T15:08:26.999Z"}.
 - At the bottom, it says "Socket.io | Connection upgraded to websocket".
- Middle Window:** Title bar says "Socket.io Tester". It displays a JSON object:

```
{ Click Me
{
  "text": "Hello World",
  "color": "#e100ff",
  "ping": "2023-10-08T15:08:26.854Z",
  "pong": "2023-10-08T15:08:26.999Z"
}}
```
- Right Window:** Title bar says "Webssockets | Salesforce". The page content includes:
 - A sidebar with "LWC Demo", "Accounts", and "Websockets".
 - A main section titled "Webssockets" with a "Text" input field containing "Hello World".
 - A JSON log area showing a message: {"text": "Hello World", "color": "#e100ff", "ping": "2023-10-08T15:08:26.854Z", "pong": "2023-10-08T15:08:26.999Z"}.
 - At the bottom, it says "Socket.io | Connection upgraded to websocket".



Real-World Examples



Demo: LWC + Socket.IO



Quiz time 😊

Lightning Experience | Salesforce | Lightning Experience | Salesforce | Home

dream-customization-613-dev-ed.scratch.lightning.force.com/lightning/n/Instructor

You Have Lightning Components Debug Mode Enabled. Salesforce is slower in debug mode. Ask your admin how to disable it, or see [Enable Debug Mode for Lightning Components](#).

Questions Instructor Students Class Deliveries Quizzes Persons Questions Answers

Control Find

Question #1 (Review)

What is long-polling?
Please select 1 answer

- A. When the payload sent to the server is long
- B. When the server is far and the traceroute segments make up a long chain
- C. When the response from the server can take long time

Leaderboard

Person	Score
ELTORO.IT (#2)	(100%) 10
Andres (#1)	(100%) 8
Bob (#3)	(0%) 1

Registrations

3 Answers (100%)

Socket.io | Connection upgraded to websocket

Home

dream-customization...

Incognito (2)

TRAILHEAD ACADEMY

Andres (1) Registration

Question #1 (Review)

What is long-polling?

- A. When the payload sent to the server is long
- B. When the server is far and the traceroute segments make up a long chain
- C. When the response from the server can take long time

-121*

GitHub Open Repo

GitHub repo with scratch org, includes bonus content

Slides View Slides

Session slides for you to take home



Classroom Management



Chrome File Edit View History Bookmarks Profiles Tab Window Help

dream-platform-3305-dev-ed.scratch.lightning.force.com/lightning/n/instructorApp

You Have Lightning Components Debug Mode Enabled. Salesforce is slower in debug mode. Ask your admin how to disable it, or see [Enable Debug Mode for Lightning Components](#).

EPT: 8.96 s | 432.4 kB

Attendees Report Instructor App Attendee App Courses Deliveries Attendees Exercises Polls Quizzes

Search...

Current Exercise Attendee

Delivery: 2023.09.26 | DELL AMER Virtual

Course: DELL 2023.09

Exercise: Exercise 8-1: Create Flow to Change Weekend Delivery to Virtual

Start: 03:18 PM

Duration: 2 m 33 s

Completion: 75%

Attendees (8) Knowledge Check Polls

Name	Duration	Use
Jyothi		adm
Andres Perez (ELTOROIT)		adm
Navnit		adm
Nurul Rozaidi	31 m	adm
Nikhil	28 m	adm
Mark	24 m	adm
Dan	15 m	adm

Socket.io | th-attendee-reporting-staging | Upgraded to websocket

QR Code Student Report

Attendees (8) Knowledge Check Polls

Question Controller

Lessons: Lesson 8 - Record Triggered ...

Questions: 5. Which type of flow can be ...

7 answers

C 6

A 1

EPT: 8.96 s | 432.4 kB

Student

Delivery: 2023.09.26 | DELL AMER Virtual

Attendee: Andres Perez (ELTOROIT)

Register

Question #5 (Lesson 8 - Record Triggered Flows)

Which type of flow can be a Subscriber to a platform event?

A. Record-Triggered Flow

B. Screen Flow

C. Platform Event-Triggered Flow

D. Login Flow

Exercise

Exercise: Exercise 8-1: Create Flow to Change Weekend Delivery to Virtual

I'm done

I'm working

I'll finish later

Additional Information

E-Book Code: US6RS5TMS8VQ

Username: admin@arc101.741.com

Password Assigned: P@SSWOrD!

Socket.io | th-attendee-reporting-staging | Upgraded to websocket

DF23 HOW Competition



Chrome File Edit View History Bookmarks Profiles Tab Window Help

ruby-ruby-1696-dev-ed.scratch.lightning.force.com Real-time Sales

You Have Lightning!

Questions Instructor Students Class Deli

Control Find

Question #15 (Exercise 2: Populate family lookup field)

From the flow, we are passing and receiving only

Please select 2 answers

- A. Automatic Bulkification
- B. Flow Interview vs. Flow Transaction
- C. Contacts have last names
- D. Family record have last names

Leaderboard

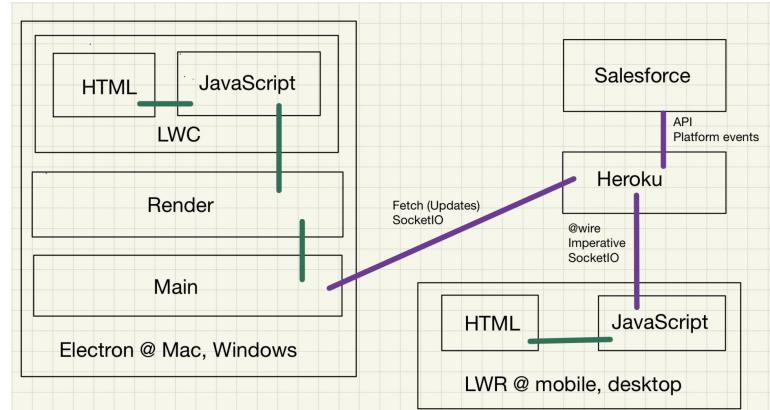
Person	Score
John (#31)	(100%) 221
Emily (#63)	(93.75%) 219
Andy (#6)	(96.88%) 217
clara (#10)	
vinh (#42)	
amy (#135)	
Peter (#245)	
Erasmo (#33)	
Priyanka (#21)	

ONE MINION
THE UNITED STATES OF THE WORLD
L 11180916 G
WASHINGTON, D.C.
L 11180916 G
ONE MINION

DF23 Computer Monitoring



- Control computers at Trailhead Academy events
 - Dreamforce '23
 - TrailheaDX '24
- Monitor computers (detect computer loses WIFI)
- 1000 computers at DF23





salesforce

Thank you

