



JS Short Polling, Long Polling, and Websockets

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By Ramla Mohammed

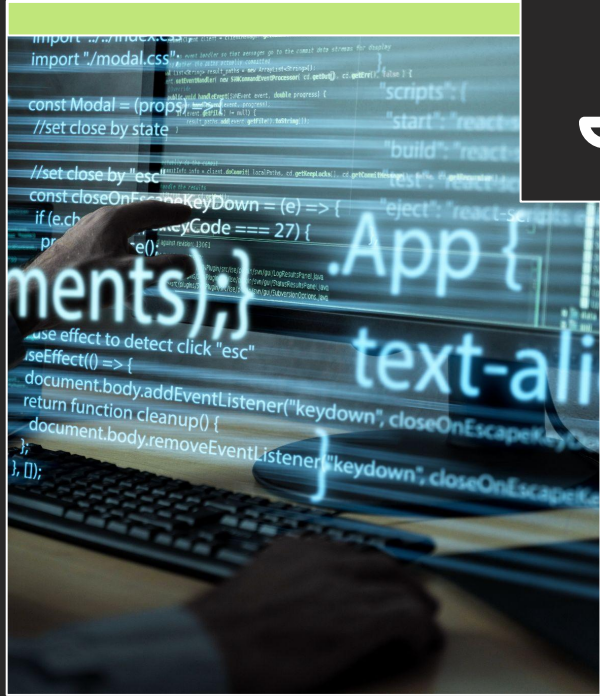
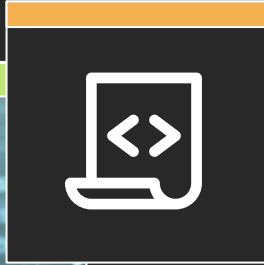


Real-Time Communication

- Is the instantaneous exchange of data between two or more parties over a network with minimal delay
 - Low latency
 - Bi-directional communication
 - Persistence
 - Scalability

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Short Polling

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What is Polling?

- ★ Is the process of continuously and successively making HTTP calls until a required response is received
- ★ Used to get Real-time updates in applications
- ★ Short vs Long



Without Polling

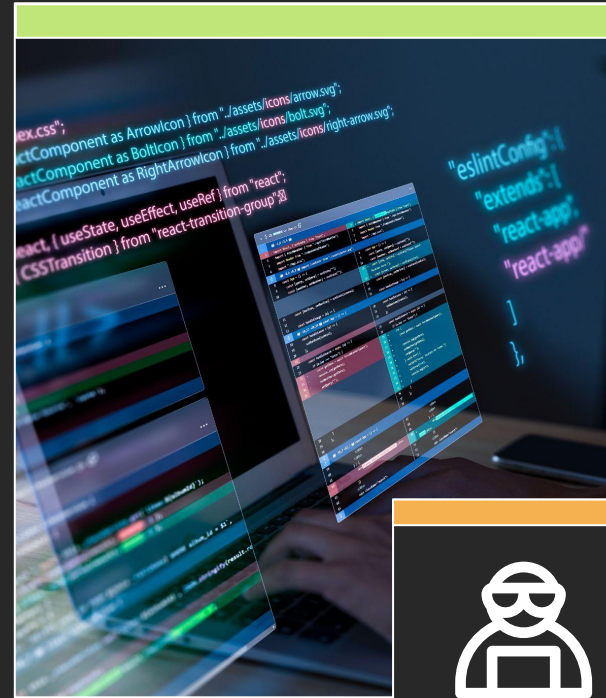
1. Client opens the connection and requests data from a server
2. The server processes the request and builds the response
3. the server sends the response back

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Short Polling

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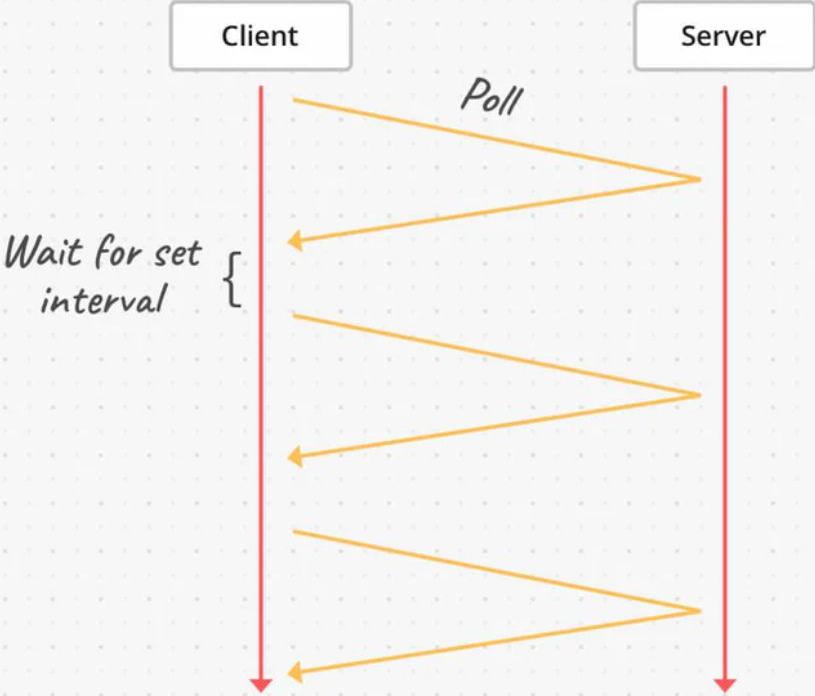
- ★ A client requests data from the server/source and the server will return the response if it is available
 - If no response is available it will return an empty response
 - The client has to wait a certain period of time before making another request
- ★ Repeated at regular intervals
 - Case-Specific
- ★ Can be considered stateless



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Short Polling



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Ajax and Fetch

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AJAX

- ★ Asynchronous JavaScript And XML
- ★ Used to make asynchronous HTTP calls using JavaScript
 - Used to communicate with the server without refreshing the web page and thus increasing the user experience and better performance
- ★ XMLHttpRequest (XHR) object
 - no reload
- ★ Asynchronous: browser continues to execute javascript code while waiting for the servers response

Fetch

- ★ An api that is used to make an HTTP request in Javascript
- ★ Based on promises: represent the state of an asynchronous action
- ★ Provides the fetch() method
- ★ Returns a promise which can be further used to retrieve the response to the request
- ★ Supports streaming responses which allows you to process large amounts of data progressively

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Code Examples



```
function shortPolling() {
  setInterval(() => {
    fetch('/short-polling-endpoint')
      .then(response => response.json())
      .then(data => {
        // Process the received data
        console.log('Received:', data);
      })
      .catch(error => {
        console.error('Error:', error);
      });
  }, 5000); // Poll every 5 seconds
}

// Start the short polling process
shortPolling();
```

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Pros and Cons

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- ★ Easy to implement
- ★ Compatible with many devices
- ★ Based on a timer it is used for apps that need to update data

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- ★ Inefficient when there is little to no data
- ★ Frequency of polling burdens on the network, server, or both

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Pop Quiz

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What is Short Polling?



What is Polling used for?



What is Real-Time Communication?

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Long
Polling

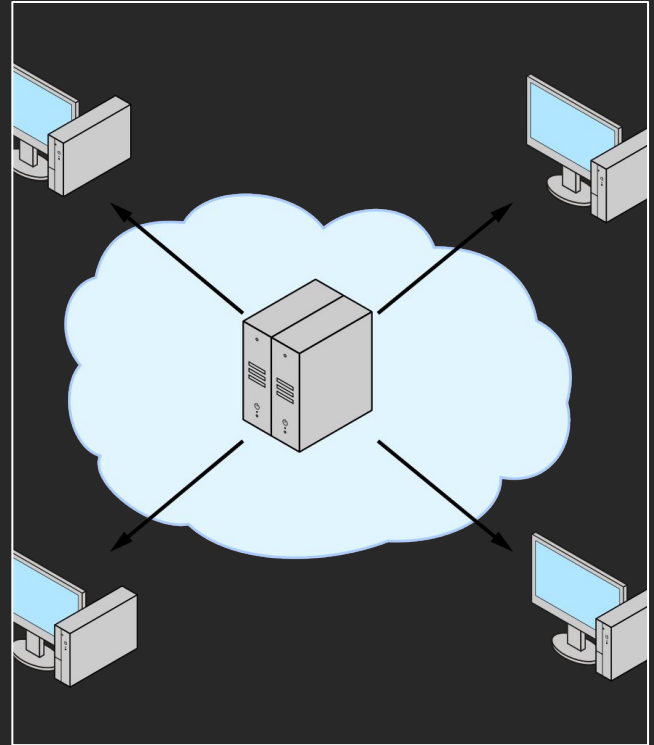
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Long Polling

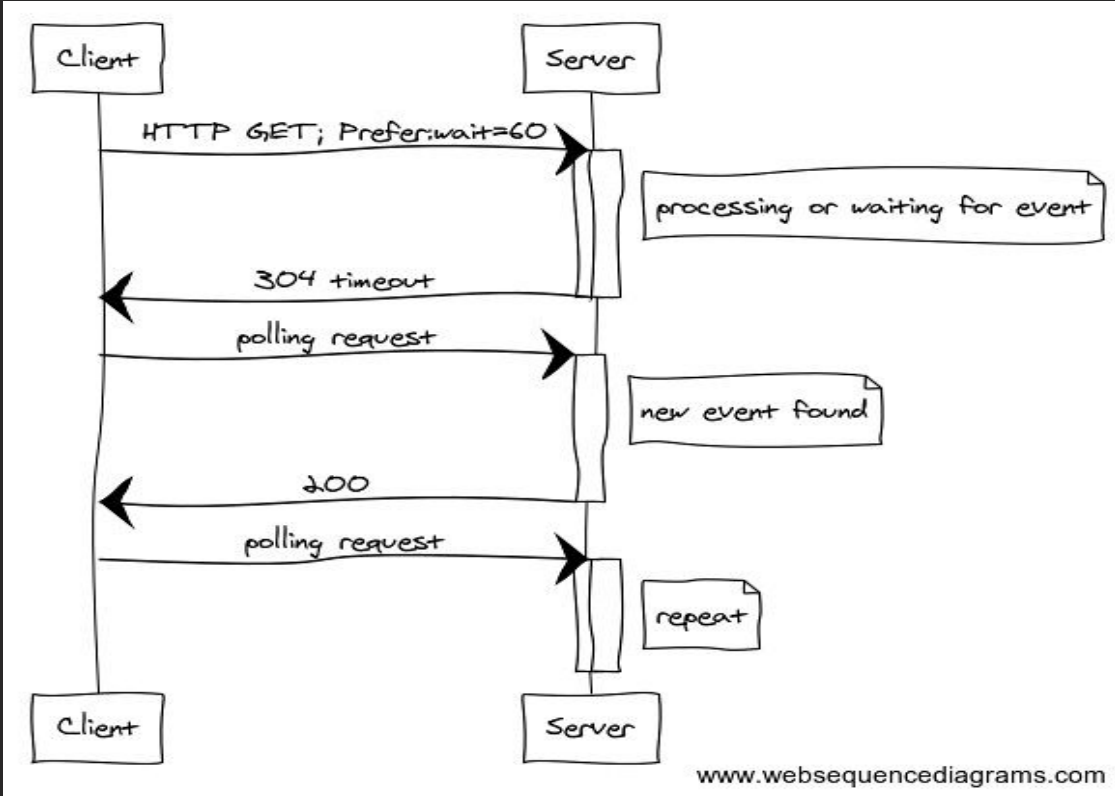
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- ★ The client sends a request to the server and if the response is not available then the server will hold the request until the response becomes available. It will then send the response back to the client.
- ★ After getting a response another request can be made immediately or after a period of time
 - Quick updates
 - New connections wait for the full transaction to be completed
- ★ Based on getting a response so its used for applications that do not want empty responses
 - An empty response can never be sent
 - Server keeps the connection open for a period of time until it has something to send back or it timeout
 - Live Connection

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Code Example



```
function longPolling() {
  fetch('/long-polling-endpoint')
    .then(response => response.json())
    .then(data => {
      // Process the received data
      console.log('Received:', data);

      // Initiate the next long polling request
      longPolling();
    })
    .catch(error => {
      console.error('Error:', error);

      // Retry the long polling request after a delay
      setTimeout(longPolling, 1000); // Retry after 1 second
    });
}

// Start the long polling process
longPolling();
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Pros and Cons

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- ★ Less network load
- ★ Real-time updates
- ★ Lower-latency

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- ★ More complex implementation
- ★ Can be resource intensive
- ★ Time outs and Error Handling

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Ways to Optimize Long Polling

- ★ Batched Responses: Group multiple updates into one response instead of a response per request
 - ★ Compression: Compress the data before sending it
- ★ Load Balancing: Distributing the requests among servers to prevent them from becoming overwhelmed
- ★ Connection Pooling: Keep a pool of reusable connections instead of new ones

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Pop Quiz.. part 2

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**How is long polling
different from short
polling?**

**What is the importance
of keeping connections
live?**

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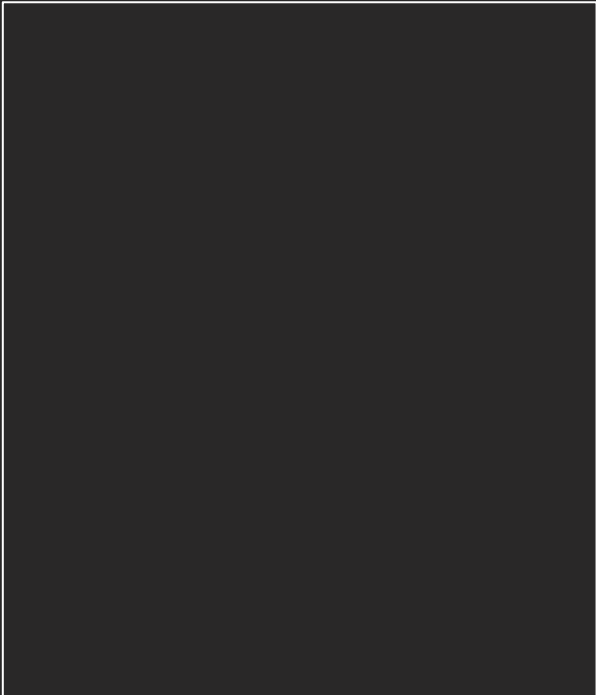
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WebSockets

WebSockets

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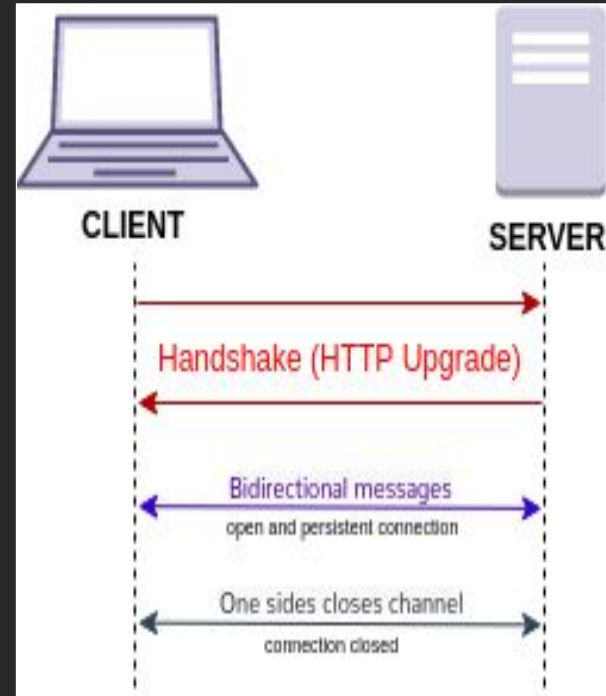
- ★ Provide a way to exchange data between browser and server via a persistent connection
- ★ Bi-directional: data can be passed from client to server and vice versa without breaking the connection
- ★ Used to achieve a real-time connection between a client (such as a web browser) and a server
- ★ Websocket connections are established once and kept open indefinitely
 - Allows for real-time low latency communication in both directions



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How does it Work?

- ★ The connection starts with a handshake process initiated by the client
 - The handshake ensures that both the client and server agree to switch
- ★ The client sends an HTTP request to the server to upgrade a WS connection
- ★ If the server supports WS connections it responds with an HTTP 101 status code and upgrade header indicating that it is switching to websocket



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Pros and Cons

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- ★ Reduces unnecessary network traffic
- ★ Low latency
- ★ Full-Duplex communication
- ★ Scalability

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- ★ Some proxy servers and firewalls may block websockets
- ★ Stateful

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Final Review

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Short Polling

- Client sends frequent requests to the server at predefined intervals
- Supports sending empty responses

Long Polling

- Client sends a request to the server and the server holds the connection open until new data is available or timeout

WebSocket

- Communication protocol that provides bi-directional communication channels

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Short Polling

- News Feeds
- Social media timelines
- Weather updates

Long Polling

- Chat applications:
 - Live Blogs
- Real-Time Monitoring

WebSocket

- Online Gaming: real time communication between players and the game server
- Live Streaming

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Works Cited

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