WebSocket

Performance Evaluation of WebSocket Protocol for Implementation of Full-Duplex Web Streams

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Università degli Studi di Salerno

1st Scalability Research Forum

We will talk about WebSockets and compare its performance with TCP Socket. But, before diving into analyzing the performance we need to understand why we needed WebSockets and what they are.

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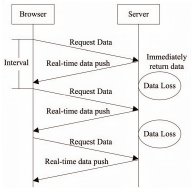
HTTP polling

Check whether the server is changed in a while, thereby performing incremental updates.



A client can send data and ask for data at the same time. But, if client has no data and server has no data, a request and response will still be generated with all the HTTP headers and thus wasting resources.No real-time data because while the client waits, an event could occur and the client will know about it only when the timeout expires.

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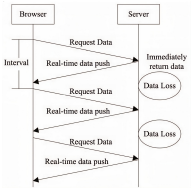

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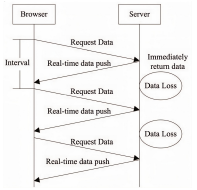

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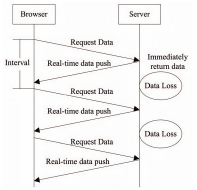

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- Continuously short interval requests will be washed away the server.
- Long interval will require more time to reach the client, no real-time data.

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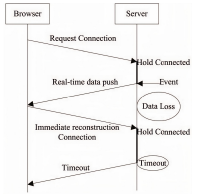

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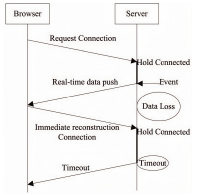

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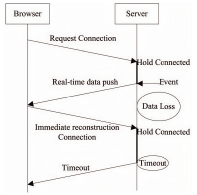

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- No bidirectional communication, server push data.

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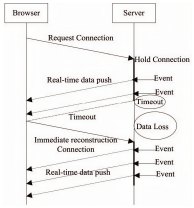

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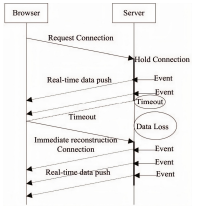

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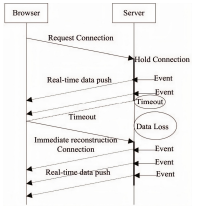

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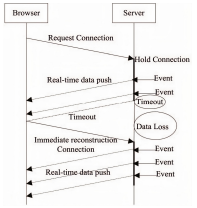

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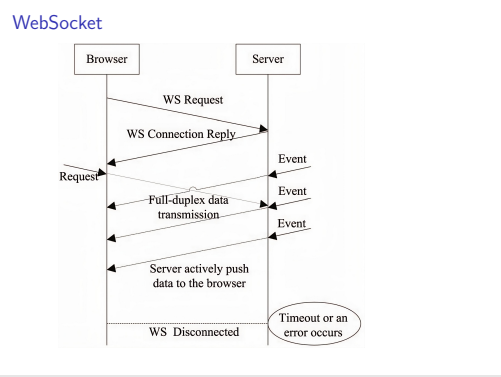

There is the initial handshake, after that, client and server can send and receive data at any moment without further interaction.There is no timeout. If it disconnects, it is because of an error and to establish the connection, the handshake has to be done again.

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- To establish a session, client sends a WebSocket Upgrade Request to the server, upon which server responds with a WebSocket Upgrade Response.
- From this point forward, the client and server can send data back and forth in asynchronous full-duplex mode.

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WebSocket
WebSocket protocol
Handshake
WebSocket Upgrade Request

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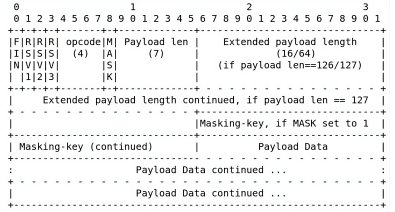
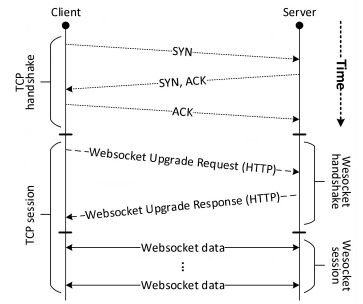
WebSocket Frame Structure



We will not go into the details because it is out of the scope of this presentation and, as mentioned earlier, the added overhead to the payload data is minimal.

We will now try to evaluate the WebSocket performance compared to the raw TCP Socket.

WebSocket TCP sequence diagram



WebSocket stay on top of TCP which means it will always add more overhead than the raw TCP Socket, but WebSocket is easier to use in a web environment.