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Monitoring Performance and User Experience

of HTML5-based Web Application

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Most web applications are based on HTML4 [1], but the HTML5 standard [2] is currently under development by the W3C [3] and will add a lot of new functionality. The following figure shows some of the new features available in HTML5.

HTML4   HTML5 & related technologies
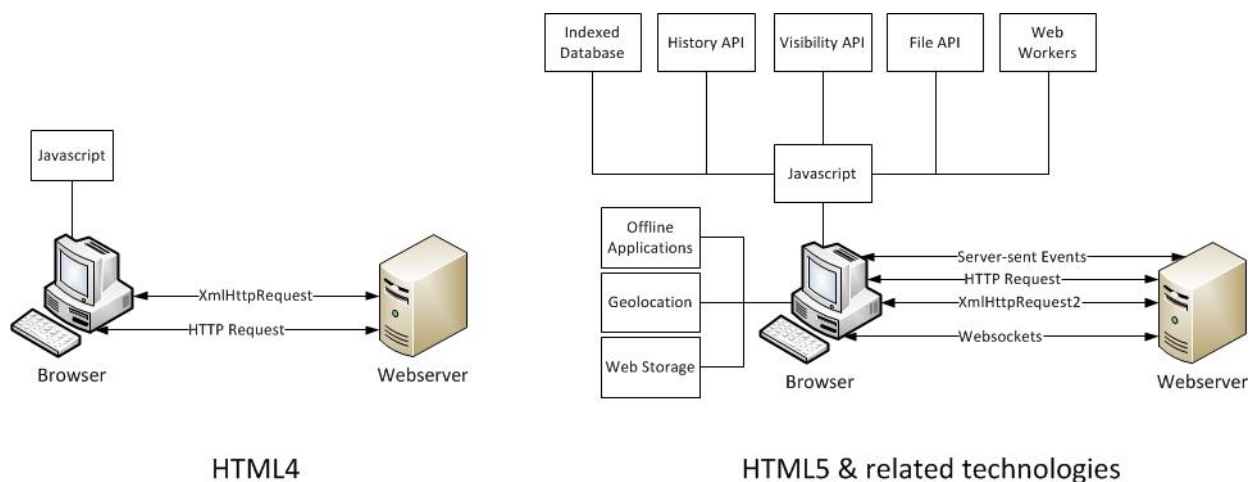
The goal of this master thesis is to investigate the new possibilities of HTML5 for web browsers and to assess their impact on the user experience. It should also be studied which information is used by different target groups (application owners, business analysts, developers, architects, operators). Finally, a prototype is to be developed that captures this information.

The prototype has to be integrated in dynaTrace [4], a performance management solution for distributed applications developed by dynaTrace software GmbH [5]. A special focus will be on the following topics:

- **Communication between browser and server** [6] [7]: HTML5 adds new ways of communicating with the server. The prototype should be able to trace messages between the browser and the server.

- **Tracing user interactions in offline applications** [8]: HTML5 adds a way to use web applications offline. The prototype should be able to gather information about the user interactions while the application is used offline. After the browser has established a connection to the internet again, the data should be made available for further inspection.

- **Extend tracing of user interactions** (optional): dynaTrace [4] is able to trace user interactions specified in HTML4, but HTML5 adds more possibilities to interact with a page or application such as Touch Events [9], the History API [10] and Drag & Drop Support [11]. These possibilities should be investigated and if possible integrated into the prototype.

The prototype should consist of the following parts:

- **Agent**: The agent consists of JavaScript running in the browser of the users. It consists of multiple modules which allows enabling and disabling of different features of the agent. The agent will collect data from the browser and send it to the server for further analysis.

- **Sensors**: Sensors are placed in the web server. They are collecting information about the web server to trace the communication between the browser and the server. The sensors will also send the collected data to the server for further analysis.

- **Server**: The server will analyze all data sent by the agents and the sensors. It will correlate all user interactions from a single user and show the message flow between the browser and the server.

The following figure shows the general architecture of the desired prototype.
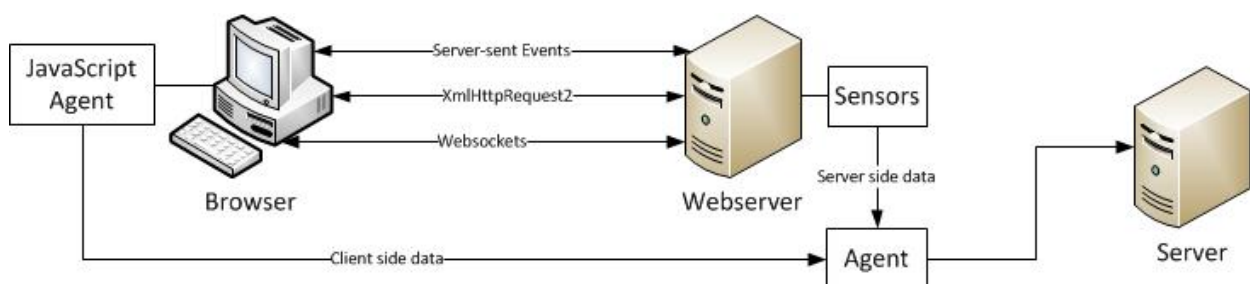
Approach

To achieve the desired goals, the following steps have to be taken:

1. **Investigate the new communication methods in HTML5**

   How does it work? How can communication from the browser to the server be traced? How can this be implemented without breaking any functionality? How can the communication be traced without requiring the application developers to change existing code?

2. **Investigate how to handle offline web applications**

   How can data about user interactions be collected while the user is offline? Where can this data be stored? How can the data be transferred once the user is online again?

3. **User Interactions**

   Which user interactions are new to HTML5 and what data do they provide? Does the data provide valuable information and should therefore be captured by the agent?

4. **Implementation of the Prototype**

   What data needs to be collected in the browser? What data needs to be collected on the server? How can everything be integrated into dynaTrace [4]?

5. **Case Study/Benchmarks**

   Test the prototype in an HTML5 application to verify its functionality and test its performance.

The work should be discussed regularly with the advisor and with the responsible people at dynaTrace.

Advisor: o.Univ.-Prof. Dr. Hanspeter Mössenböck together with dynaTrace
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[1]   "HTML4.01 Specification," [Online]. Available: http://www.w3.org/TR/REC-html40/
[2]   "HTML5," [Online]. Available: http://www.w3.org/TR/html5/
[3]   "W3C," [Online]. Available: http://www.w3.org/
[4]   B. Greifeneder: Introspection of Distributed J2EE Applications for Load Testing and Performance Monitoring, Master Thesis, JKU Linz, 2004.
[5]   "dynaTrace software GmbH," [Online]. Available: http://www.dynatrace.com
[6]   "The WebSocket API," [Online]. Available: http://dev.w3.org/html5/websockets/
[7]   "Server-Sent Events," [Online]. Available: http://dev.w3.org/html5/eventsource/
[8]   "Offline Web Applications," [Online]. Available: http://www.w3.org/TR/offline-webapps/
[9]   "Touch Events," [Online]. Available: http://www.w3.org/TR/touch-events/
[10]   "History API," [Online]. Available: http://www.w3.org/TR/html5/history.html
[11]   "Drag & Drop," [Online]. Available: http://www.w3.org/TR/html5/dnd.html