Web Performance Evaluation for Internet of Things Applications

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References:


Abstract:

An area of intensive research under the umbrella of the Internet of Things (IoT) has resulted in intensive proliferation of globally deployed sensor devices that provide a basis for the development of different use-case applications working with real-time data and demanding a rich user interface. Overcoming the lack of the standard HTML platform, HTML5 specifications WebSocket and Canvas graphics strongly supported the development of rich real-time applications. Such support has been offered by browser plug-ins such as Adobe Flash and Microsoft Silverlight for years. In order to provide a deep insight into IoT Web application performance, we implemented two test applications. In the first application, we measured latencies induced by different communication protocols and message encodings, as well as graphics rendering performance, while comparing the performance of different Web platform implementations. In the second application, we compared Web performance of IoT messaging protocols such as MQTT, AMQP, XMPP, and DDS by measuring the latency of sensor data message delivery and the message throughput rate. Our tests have shown that although Adobe Flash has the best performance at the moment, HTML5 platform is also very capable of running real-time IoT Web applications, whereas Microsoft Silverlight is noticeably behind both platforms. On the other hand, MQTT is the most appropriate messaging protocol for a wide set of IoT Web applications. However, IoT application developers should be aware of certain MQTT message broker implementation shortcomings that could prevent the usage of this protocol.

Keywords:

Real-time systems; Web and internet services; Performance evaluation; Sensor systems and applications