MASS-ACCESSIBLE CONTROLS DATA FOR WEB CONSUMERS

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Abstract

The past few years in computing have seen the emergence of smart mobile devices, sporting multi-core embedded processors, powerful graphical processing units, and pervasive high-speed wireless network connections (supported by WIFI or EDGE/UMTS). The relatively limited capacity of these devices, when compared to desktop computers, requires relying on dedicated embedded operating systems (such as Android, or iOS), while their diverse form factors (from mobile phone screens to large tablet screens) require the adoption of programming techniques and technologies that are both resource-efficient and standards-based for better platform independence.

We will consider the available options for hybrid desktop/mobile web development today, from native software development kits (Android, iOS) to platform-independent solutions (mobile Google Web toolkit, JQuery mobile, Apache Cordova, Opensocial). Through the authors' successive attempts at implementing a range of solutions for LHC-related data broadcasting, from data acquisition systems and LHC middleware such as DIP and CMW, on to the World Wide Web, we will investigate what are the valid choices to make and what pitfalls to avoid in today's web development landscape.

Objective

Bridge the gap between critical industrial control systems employed at CERN and massive numbers of world wide web visitors, without any compromise in the matter of operation availability and critical process integrity.

Requirements

Light and efficient

Memory and network-efficient data distribution with a push-style mechanism, so as to cope with demand in a cost-efficient way.

Scalable

Scalability, replication and caching capabilities, so as to minimize the load placed upon critical process control devices.

Web Native

Support for efficient data format that are native to web consumers, so as to bring the amount of client-based data processing to a minimum.

Portable

Adaptation to a large number of different data sources, for instance, support for multiple proprietary industrial protocols.

Technologies

Websockets

A W3C standard web protocol that replaces HTTP Polling and provides server-push capabilities.
Websocket can fallback to HTTP streaming or long-polling if necessary.

Atmosphere framework

The Atmosphere Framework is a technology that implements memory-efficient, websocket-compatible data broadcast mechanisms.

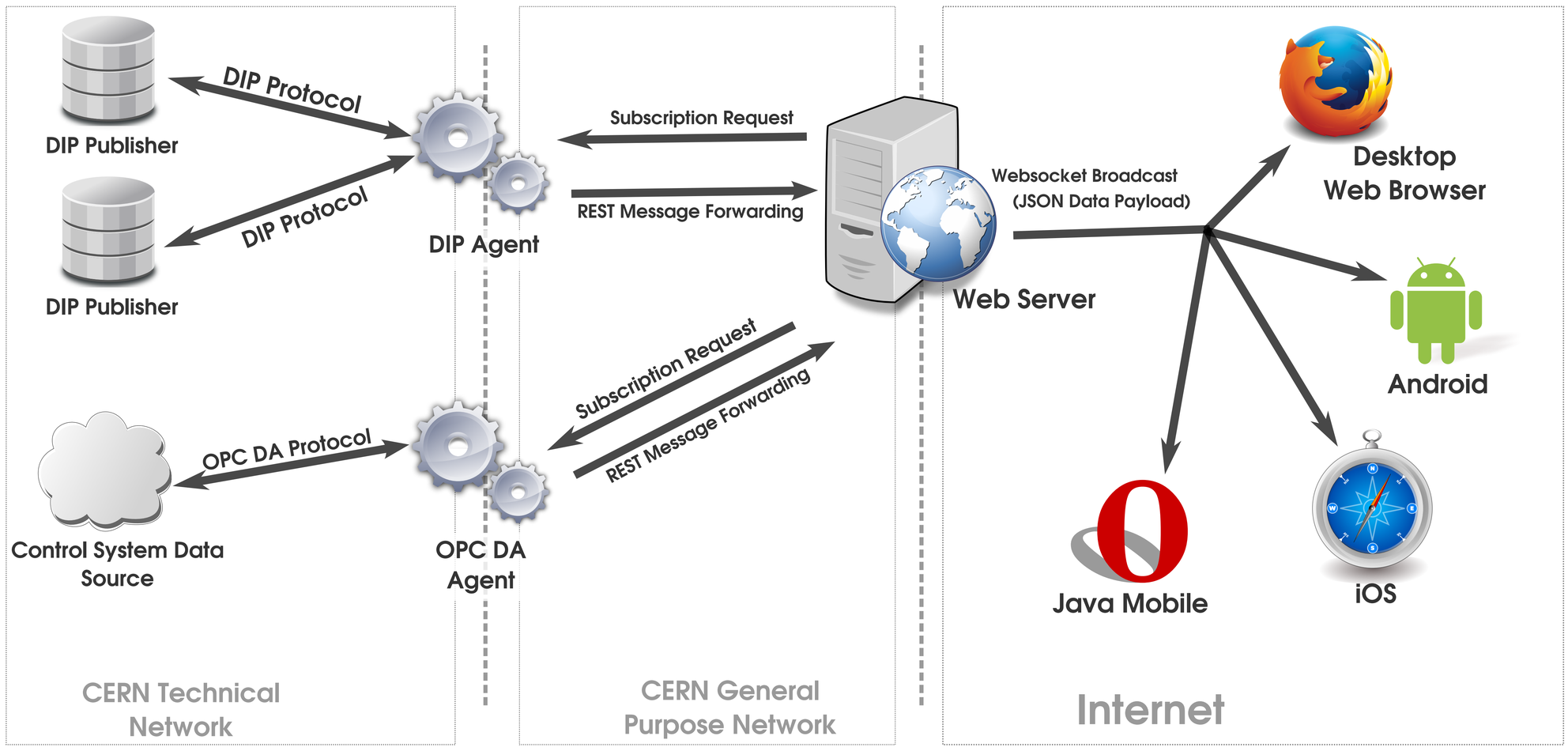
REST + JSON

A way to represent object-oriented data which any web client can also interpret out of the box in a computationally efficient way.

Java + JNA

A simple cross-platform agent process that subscribes on demand to native data and forwards the data through HTTP to the broadcasting webserver.

Architecture



Conclusions

Distributing data in provenance of the LHC to a wide audience has been the goal of many. LHC status information is already widely available, from official sources such as the LHC PAGE 1 and other so-called VISTAR displays presented on television screens scattered across the various CERN sites.

Previous attempts at CERN all encountered limitations due to the lack of existing web data distribution standards, which forced them to rely on legacy technologies, bulky data transfers and non-scalable implementations based on HTTP exchanges and image production.

Our broadcast prototypes demonstrate that data formats must be tailored to the client platform, so as to maximize data bandwidth usage, and rely on scalable and backwards-compatible data transfer implementations.

Initiated in the spring 2012, our Broadcast platform aims at identifying the best modern approach that would allow CERN to distribute copious amounts of control data to a large audience. More generally, data access should be possible from the simplest web-enabled mobile devices, yet take advantage to the fullest of their advanced capabilities for graphical data rendering.

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