Cross-platform Development of Smart Conference Clients

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Abstract

Smart Conference System [1] intelligently assists conference operability automating conference organization and operation. The system is multi-service: the core conference service and a suite of extensions. A shared conference smart space is used to organize the system: (i) conference organizers provide infrastructural components that implement services and access to them and (ii) conference participants access the services from client applications running on user devices (the client side). This demo focuses on the client side of the core conference service and shows a cross-platform solution to development of native Smart Conference clients for various mobile operating systems.

The following infrastructural components of Smart Conference System realize the core conference service: projector to display the current slide, whiteboard to display the up-to-date session program, and Smart-M3 SIB to be an access point to the smart conference space. Additional services may require other components [2].

A Smart Conference client runs on a user device. The basic functionality allows a conference participant to browse the program of the conference session (the same information is displayed by whiteboard on the wall-screen), the current slide of the talk being presented, slides and other details about all talks of the session, available interests of other participants. When the participant presents her/his talk, the client allows her/him to control the slides displayed by the projector and available to other participants via their clients.

The original Smart Conference client supports N810 tablets (Maemo 4 platform) and N900 smartphones (Maemo 5 platform). It was written in Python using low-level Smart-M3 SDK. The prototype of a web-client was demonstrated at the 9th FRUCT Conference [3]. Although the web-client makes the core conference service potentially accessible from an arbitrary platform, a native client for a given platform can achieve better usability. The obvious benefits include native look-and-feel, reduced data exchange rate, and up-to-date information available without the need for additional actions like page refreshing.

We started the development of native Smart Conference clients for other operating systems. The reference cases are Symbian, Harmattan, and Android. We make the essential part of client code to be platform-independent. It is achieved by using the following development tools: C++ programming language for client logic, Qt Quick for user interface, and SmartSlog [4] for ontological data structures and interaction with conference smart space.

The use of C++ provides an effective tradeoff between the cross-platform requirement and the code complexity. In Symbian and Harmattan, C++ is the base programming language. Although Java is base programming language in Android, the native code mechanism supports C++. The object-oriented features of C++ fit well with the ontological knowledge representation models of Smart-M3.

SmartSlog is a development kit for programming Smart-M3 applications. It applies the code generation approach: an ontology library is generated for a given OWL ontology. For our clients,

we used the Smart Conference ontology from [1], [2] and the SmartSlog code generator for ANSI C. The generated SmartSlog library provides API to access the conference smart space as well as ontological data structures and functions to represent and maintain the conference-domain knowledge locally in client logic code.

The use of SmartSlog provides two important advantages. (1) The high-level ontological model of OWL simplifies the code. In contrast, the previous Smart Conference clients use the low-level RDF model, manipulating with a lot of RDF triples. (2) Intentional orientation on heterogeneous devices and portability: generated ontology libraries are modest to the device capacity and have low dependencies on external libraries (KPI_low, Scew, Expat), see details in [4]. Since SmartSlog supports both C/C++ and C# languages, the client logic can be potentially ported to Windows-based platforms. Moreover, data manipulations can be merely rewritten in C# since SmartSlog provides generic API structure, independent on platform.

Two minor modifications were made in SmartSlog to achieve successful compilation for Symbian. The reasons are in a file name collision with reserved names and Symbian deviation from the ANSI C standard for Boolean data type [5]. The modifications will be included into the SmartSlog mainstream code.

The client user interface is made on top of Qt Components, natively available on Symbian and Harmattan devices. For Android, we used Necessitas project [6], which enables the use of Qt and QML in this operating system. The initial port of Qt Components to Android platform [7] also shows itself quite functional to fit our needs.

The demonstrated version of the smart conference clients implements two modes of participation in the smart conference: presenter and attendant modes. In the presenter mode, the client allows controlling the slides. In the attendant mode, the client allows editing own presentation and user profile and browsing the conference program, presentation slides, talk descriptions, and other participants' profiles.

Index Terms: Smart Conference, Smart-M3, Cross-platform, Qt, SmartSlog.

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