

A Proposed Architecture for the Generation of Adaptive Interfaces in Mobile Devices

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The increase of mobile devices diversity and their use in dynamic environments for some types of users and the adaptation of an interface for this new context has become a necessity. The development of interfaces for mobile devices involves some challenges, such as heterogeneous environments, physical limitations of the device among others. The adaptive interfaces present themselves promising in an attempt to surpass the current problems of complexity in the interaction between man and computer. To improve this interaction, it is necessary to create interfaces that are capable of adjusting themselves to the user's necessities.

The code reusability is the basic aspect on this context. The reuse of interfaces is complex when new device models with several characteristics appear. To make this process more flexible it is necessary to create and to use new form of development that are less dependent on the specific device properties.

In order to be able to visualized either in personal computers or in mobile devices the developer can choose one of the following approaches:

- To develop a site for each type of device;
- To develop the code of a site only once and adapt it through the code generation to be shown in other devices.

In the first approach, the effort demanded from the developer is great, therefore a site must be modeled for each type of device that accesses it. In the second approach, the site is only modeled once and the interface generator, based on the information of the device that effects the request, generates the code, so that the layout is adapted in agreement with the device screen. In contrast to the previous approach, in this one, the reusability of code occurs, once interfaces according to each device will not have to be remade.

The studied papers, such as, MUSA by Menkhaus (2002), and Dygimes by Coninx, and Luyten (2003), used the concept of separation for layers, having made a clear distinction between the implementation model of each layer, i.e., interface of the user and logical model. Sendin and Lores (2004) affirmed that the MUSA and Dygimes are limited; therefore they considered aspects such as, logical model, users, and platforms models, leaving without modelling the contextual aspects, except in some specific cases. For the authors, architectures for the anticipation of contextual changes are one of the main gaps in literature. Due to this fact, the authors developed an architecture that provides a dynamic adaptation, using the reflexive architecture. In this model, the separation among concepts is used, where the developer aims only at the functionality of the application, without worrying about the interface. This way, it is emphasized the reusability of code, where an application can be used with multiple interfaces.

The Generation of Adaptive Interfaces proposed architecture (GAI) is the generation of interfaces that adapt themselves to the mobile device characteristics, using the description of the generic interface. It has as main purpose to meet the requests of several users for only one application and dynamically return elements from the interface according to the distinct characteristics of each client on real time. Another prominent factor of the architecture is to allow an implementation that is directed to a multi-platform environment where only one application can dynamically generate many interfaces. The main advantages of the GAI are:

- The adaptation process of the interface to the type of device takes place in real time;
- The interface development process is faster, therefore the developer creates just one interface that will be presented in multiple devices;
- The interface designer and the application developer can work separately in the system project;
- It has the device recognition through automatic form;

- The architecture provides easiness of code maintenance, since the alterations (in case that new models appear) can be made updating only the metadata ones;
- The architecture is used through a graphical editor which supplies an environment of development with visualization in the emulator of the requested device and a metadata manager;
- The interface can be generated for several platforms and languages, being based on the metadata

The form of recognition for mobile devices proposed by the Consortium World Wide Web (W3C) is being used and is named Composite Capability Preference Profile (CC/PP) which has the purpose of providing the structuralized and universal mechanism to describe and transmit information about the characteristics of a mobile device for a server. The profile CC/PP is a description of the device potentialities and the user preferences, Hanumansetty (2004).

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