

A model-based approach for dynamically distributing graphical user interfaces

Keywords : Graphical user interface (GUI); Distributed system; DUI; Distribution graph.

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Abstract – The days when the desktop computer was the only computing device used by one single user at a time are over. Nowadays, one or more users share information across several devices, not only computers but also smartphones and tablets. In this document we describe how developers and users can handle this new situation.

Our goal is to provide a toolkit, called JayTk, for developers to create and manage Dynamic Distributed Graphical User Interfaces (DDGUIs) which is based on the concept of a Distributed User Interface (DUI). Distributed User Interfaces enable end users to distribute any user interface element at design- and/or run-time across different users, across different computing platforms, and across different physical environments. A Dynamic Distributed Graphical User Interface (DDGUI) is a DUI in which all components are graphical components that can be dynamically distributed at run-time. The whole distribution is neither known nor established at design-time.

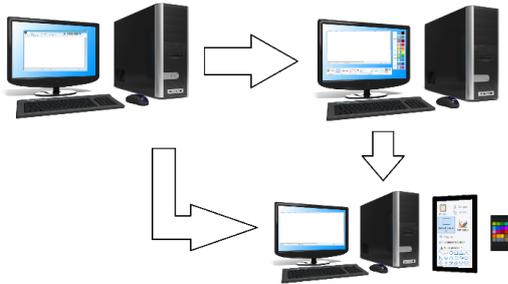


Figure 1: An example Dynamic Distributed Graphical User Interface.

In Fig.1, a drawing tool is used on a desktop computer. This application can be distributed in two different ways: either on the same device, or on several devices. On the same device, upper-right, the application can be remolded into another one or split into parts. With several devices, the toolbars can be displayed on a tablet and the colors of the pen can be chosen with a smartphone.

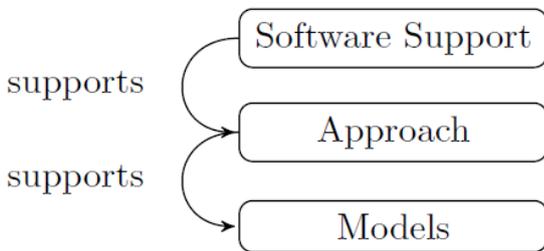


Figure 2: The three dimensions covered.

The research covers three dimensions: models, approach and software support (Fig.2). The toolkit we have developed is based on a specific approach that is model-based. We have defined new models to describe a distributed system.

The Distribution Graph (DG) is the representation of a distributed system in a directed graph where vertices are either devices or users

and arcs are links between them. Thus, it allows to model the users, devices and their connections. An example DG is depicted in Fig. 3.

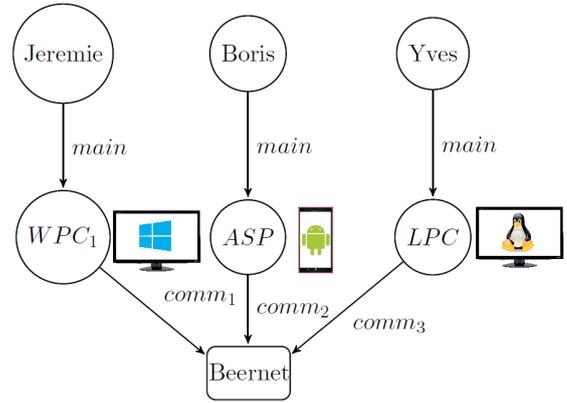


Figure 3: An example Distribution Graph.

This figure shows three named users: Jeremie, Boris and Yves. Jeremie has a Windows PC, Boris an Android smartphone, and Yves has a Linux PC. They are all connected to Beernet [2], a peer-to-peer system that provides a coherent view of the GUI state. Thanks to the DG, the toolkit knows who the users are and what devices they use.

The JayTk toolkit works on most current operating systems and is currently integrated in a SpinOff startup called Usidistrib [3]. The toolkit's structure is depicted in Fig.4.

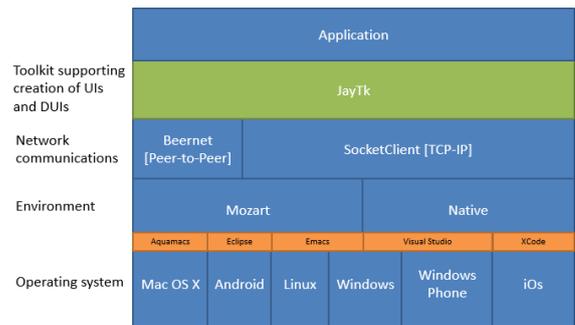


Figure 4: The structure of the JayTk toolkit.

References

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