Chapter XIII
Personalisation in Highly Dynamic Grid Services Environment

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ABSTRACT

Human Computer Interaction (HCI) challenges in highly dynamic computing environments can be solved by tailoring the access and use of services to user preferences. In this era of emerging standards for open and collaborative computing environments, the major challenge that is being addressed in this chapter is how personalisation information can be managed in order to support cross-service personalisation. The authors' investigation of state of the art work in personalisation and context-aware computing found that user preferences are assumed to be static across different context descriptions whilst in reality some user preferences are transient and vary with changes in context. Further more, the assumed preference models do not give an intuitive interpretation of a preference and lack user expressiveness. This chapter presents a user preference model for dynamic computing environments, based on an intuitive quantitative preference measure and a strict partial order preference representation, to address these issues. The authors present an approach for mining context-based user preferences and its evaluation in a synthetic m-commerce environment. This chapter also shows how the data needed for mining context-based preferences is gathered and managed in a Grid infrastructure for mobile devices.

INTRODUCTION

Given the accelerating pace of globalisation, liberalisation of market places, and the emergence of global e-market places, traditional boundaries no longer separate the vendor from the purchaser and competition has intensified. This makes it difficult for Small, Medium and Micro Enterprises (SMME) to survive competition from other well resourced enterprises, which can easily integrate state of the art IT solution in to their business operations. Neither adoption of enterprise-wide applications nor devising an enterprise-wide IT strategy has occurred for SMMEs in the world over. To remain in business, SMMEs must be able to identify the ICT infrastructures required to improve performance and global competitiveness. Unfortunately, most SMMEs lack the capacity to own ICT infrastructure and they are more conservative to adopt ICT infrastructure before they can be sure of the return on such investments.

Thus in summary, SMME ICT solution should be affordable, easy to use, bring fast Return On Investment (ROI), and require a short implementation cycle whilst giving them a competitive edge at minimum cost. Our core research niche area is aimed at providing just that through the Grid Utility Infrastructure for SMME Enabling Technologies (GUISET) (Migiro & Adigun, 2005), which employs a service oriented on-demand computing paradigm based on the utility Grid technology. In this technology SMMEs need not own the infrastructure but they can pay for what they use when they use it.

The emergence of the mobile telephony technology, with its affordability and ability to transfer data wirelessly is one of the key SMME enabling technologies that the GUISET infrastructure adopts to limit the hardware acquisition problem. Paradoxically, mobile computing presents both a dramatic step forward and a significant step backward from an information or service access standpoint. Mobile devices are hardly ideal information or services access devices owing to some constraints brought about by mobility. Context-awareness and personalisation have been adopted over the past decade as the solution to make mobile devices better computing devices. Context awareness involves the use of the context information to provide "relevant information and/or services to the user, where relevance depends on the user's task" (Dey & Abowd, 2000). Personalisation in our case involves tailoring the access and use of the web or grid services to user preferences. Unfortunately, user preferences in dynamic computing environments are heavily dependent on the dynamic user, environmental and application context (Gorgoglione et al, 2006). The major challenge to achieving advanced personalisation in this case is how we can make use of contextual information and exploit the change of context in the personalisation process, which most of the work on personalisation do not address. Attempts to address this problem from context-aware computing rather than from personalisation perspective, have led to the current mix-up between context and personalisation. Personalisation in mobile computing should contextually adapt content or services in order to enhance the quality of the user's interaction with the applications.

Traditionally, user preferences are captured in to the system explicitly from the users. However, given the fact that in dynamic computing environments, user preferences depend on the user, environment and application context, it will be a very cumbersome exercise for users to explicitly give their preferences for each and every context. Data mining is widely seen as the solution to this challenge. Over the past decade a lot of work has been done in the use of data mining techniques for automatically extracting user preferences from user session data. However, the mined user preferences are only as accurate as the preference model on ground. Data mining based preference models lack preference measures that give an intuitive measure and interpretation of a preference (Jung et al, 2005). Most user preference measures use scores or just distinguish liked and disliked items (Holland et al, 2003). Furthermore, most of the existing preferences models are found wanting when it comes to representing real user preferences because they lack user expressiveness, "I prefer A to B" semantics (Kiessling, 2002).