

Role of P2P in Complex Disconnected Networks: Applications to Mobile e-Business and Enterprise Computing

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Abstract

With the tremendous advances in hand-held computing and communication capabilities, rapid proliferation of mobile computing environments, and decreasing device costs, we are seeing a growth in mobile e-business in various consumer and business markets. In the coming years we expect hundreds of millions of users worldwide to depend on mobile devices and computers for social and business activities. The trend is also picking up in large enterprises where dependency on mobile e-business environments has become routine for thousands of employees conducting daily business activities. For such a large collection of users, new reliable methods of search-find-obtain-transact (SFOT) have to be devised that are decentralized and self-managing.

In this paper, we present the grand challenges involved in designing and implementing reliable and transparent e-business applications in a decentralized and autonomous fashion that can handle business-critical applications in Enterprises and virtual organizations. We present a novel architecture and framework for end-to-end mobile e-business applications based on concepts from P2P, dynamic socio-economic networks (overlays) and resource allocation from Grid computing. The architecture takes into consideration disconnection, application context, synchronization, transactions and self-managing failure recovery modes to provide mobile users with seamless and transparent access to data and resources when needed. In addition, the mechanisms designed consider decentralized resource management for providing data availability and fast access. In our architecture, we consider a business process design based on state-machines and failure event management to handle disconnection, resource limitations and failures in open dynamic networks. We consider simple cost-based P2P networks as the underlying framework for connecting millions of mobile devices to thousands computational servers. A first-version of this system was designed, implemented and deployed a network of mobile clients using open web-services standards.

Bio

Dr. Jakka Sairamesh is a project manager and senior research staff member at IBM Watson Research, Hawthorne, New York. He obtained his M.S and M. Phil. from Columbia University in 1992, and Ph.D. from Columbia University in 1995. Since then has been working with IBM Research on e-business platforms, auctions and trading systems, mobile e-business, information economies, and decentralized computing systems. He has published numerous papers on trading systems, e-business platforms, market-based control, and information economies and cities. He was one of the architects from Research for IBM's e-business products such as Websphere Marketplace Edition and Websphere Business Edition, and recently helped drive the vision, strategy and architecture for Business Portals for Value-chain management and collaboration. He currently leads projects in the areas of dynamic e-business solutions, early warning systems, large-scale mobile and peer-to-peer computing, dynamic resource management in Grids, and Internet economics.