Mobile Computing Application Design and Development Issues

Ankur O. Bang[1], Prabhakar L. Ramteke[2]

[1]M.E. (CSE) Scholar, HVPM's COET, Amravati
Sant Gadge Baba Amravati University, Amravati
Buldhana-443001 Maharashtra
ankur77977@gmail.com

[2]HOD (IT),HVPM'sCOET,Amravati
SantGadge Baba Amravati University, Amravati
Amravati-444601

Abstract: *This paper gives a brief introduction of the mobile computing, and the particular issues regarding the design and the development tools of the mobile computing application. The paper aims to cover all the basic points which are useful for the designing and the development of the applications which are being developed and use now-a-days .We also focused on some application development strategies and some traditional platforms and some modern mobile applications development tools.*

Keywords: Mobile computing, Application Issues, Development Strategies

1. Introduction

In this paper we have given a introduction about mobile computing , and also have discussed the high and low tier telecommunication systems the paper further is divided into four sections in which the first one involves the basic mobile application development issues in which we have discussed about the issue topics such as - technical design, network design , The Capacity Planning & response time Calculations, Data compression considerations, System availability Design, Security issues .The next section is of the mobile application development in which we have discussed the application development platforms along with Wireless Network specific development and Data synchronization products and in the next part we have discussed some modern application tools, and finally we have conclusion for this paper.

2. Mobile Computing

Mobile computing is the discipline for creating an information management platform, which is free from spatial and temporal constraints. The freedom from these constraints allows its users to access and process desired information from anywhere in the space. The state of the user, static or mobile, does not affect the information management capability of the mobile platform. A user can continue to access and manipulate desired data while traveling on plane, in car, on ship, etc. Thus, the discipline creates an illusion that the desired data and sufficient processing power are available on the spot, where as in reality they may be located far away.

The discipline of mobile computing has its origin in Personal Communications Services (PCS). PCS refers to a wide variety of wireless access and personal mobility services provided through a small terminal (e.g., cell phone), with the goal of enabling communications at any time, at any place, and in any form. PCS are connected to Public Switched Telephone Network (PSTN) to provide access to wired telephones. PCS include high-tier digital cellular systems for widespread vehicular and pedestrian services and low-tier telecommunication system standards for residential, business, and public cordless access applications.

High-tier digital cellular systems include

- Global System for Mobile Communications (GSM)

- IS-136 TDMA based Digital Advanced Mobile Phone Services (DAMPS)

- Personal Digital Cellular (PDC)

- IS-95 CDMA-based cdmaOne System

Low-tier telecommunication systems include

- Cordless Telephone 2 (CT2)

- Digital Enhanced Cordless Telephone (DECT)

- Personal Access Communication Systems (PACS)

- Personal Handy Phone Systems (PHS)

Several wideband wireless systems and special data systems have been developed to accommodate internet and multimedia services. We do not include these specialized systems in this course. We will discuss in detail all essential aspects of PCS and use this platform to introduce the discipline of mobile computing. However, from now on we will always use the term mobile computing in our discussion.
In mobile computing platform information between processing units flows through wireless channels. The processing units (client in client/server paradigm) are free from temporal and spatial constraints. That is, a processing unit (client) is free to move about in the space while being

connected to the server. This temporal and spatial freedom provides a powerful facility allowing users to reach the data site (site where the desired data is stored) and the processing site (the geographical location where a processing must be performed) from anywhere. This capability allows organizations to set their offices at any location.

3. Mobile Computing Application Issues

The programs used in mobile devices like mobile phones, laptops, palm computers, etc. for internet connectivity and other computer related activities are called mobile computing applications. The various issues and designs of mobile computing application are discussed under various headings below.

3.1 Technical Design

First come the Technical Design Issues, which consist of network design, capacity planning, response time calculations, data compression considerations, system availability design and security issues. The technical design plays a key role in a mobile computing project and offers unique challenges to the system professionals.

3.2 Network Design

Issues regarding Wireless LAN design and Wide Area Radio Network Design which network design comprises are discussed below.

➢ **Wireless LAN design issues**
- The number of mobile users who will use wireless LAN and the number of them active during the peak period.
- The types of LAN application accessed by them. (Keeping in mind that wireless LANs will not be acceptable for the intended users as they operate at much slower speeds than wired LANs).
- Use of notebook with a wireless NIC as a primary and user device.
- Roaming areas, location & range of needed access point.
- Impact of construction materials in single penetration.
- Preferred technology-spread spectrum or frequency hopping.
- Radio frequency interference from any other devices in office, factory or campus etc.

➢ **Wide Area Radio Network Design Issues**
- The need of building a private radio network.
- Most appropriate radio network technology for the suite of applications.
- Matching of user application-usage profiles to a given network capacity.
- Integration of RNA technology with a radio network infrastructure.
- Ensuring good coverage & minimum number of dead spots.
- If distributed wireless network design with several MCSSs must be used?

- Managing the way logic networks will be influenced by network design options.

3.3 The Capacity Planning & response time Calculations

A mobile computing application transaction has to cover a synchronous set of hardware as well as software components before it reaches the destination server. Diverse physical links, wireless & wired line in between the end user's client application software and the information server are present in its reverse path too. So scheduling on a network requires complex rules, which makes it difficult to build a mathematical model to estimate response times. Planning reliable capacities in advance is a hard task still. The network providers give an estimate using complex queuing models or rule-of thumb calculation based on the other customer's experience.

3.4 Data compression considerations.

As the bandwidth of wireless network is scarce & inexpensive it is necessary to compress data to get the maximum out of this bandwidth. This is usually done in the modem by going beyond the modem hardware in reducing the quantity of traffic on wireless networks using client application programs.

3.5 System availability Design

Rather than sticking on with the general base station hardware & network controllers, redundancy & message switches are typically built on fault-tolerant platforms. Public shared network providers must be approached for details of their redundancies. MCSS is another vital component that badly needs inbuilt redundancy.

3.6 Security issues

It is tough to track down securing information by unauthorized access. Common security breaches of mobile computing applications include,
- Network by criminal elements.
- Physical breach security at communication centers mainly unmanned base stations.
- Interception of credit card authorization over wireless network.
- Careful security considerations including on-the-air encryption & firewalls must be used.

3.7 Other issues

Other than technical design the next major issue under Mobile computing application is Ergonomics & Logistics Design where the designers evaluate the following.

- Form factor of end user device
- Battery life
- Input method-keyboard, pen, touch or voice
- Ruggedness
- Whether Portable or fixed

- Safety & Health issues.

Mobile computing application deals with the future of computer usage and is therefore of great relevance.

4. Mobile Application Development Platforms

Mobile application development platforms are aided by various specific as well as generic sets of tools. The following are the various choices in development tools.

- Traditional Microsoft Windows 98 / 2000 / NT / XP tools.
- Palm OS Application Development tools: Java being the standard dominant application development tool for server side programming has made it easier to write safe and reliable code through features, like automatic memorizing and standard exception-handling. Java interfaces are supported by several application servers.
- Modern Application Server Tools offer application server solutions in a web environment based on conventional application servers and this extension is moulded for mobile applications and wireless networks.

4.1 Wireless Network specific development

Several mobile gateway vendors like IBM, Broad beam, Oracle, Sybase, and Telecordia technologies offer mobile application development tools kit. Investigating specialized middleware for wireless and mobile applications are conducted to find the vendors who address all these requirements.

4.2 Data synchronization products

Numerous files & DBMS synchronization products are available to solve the problem of synchronizing information in notebook and PDAs with master information in the desktop or the server. Customization can be done through APIs.

The various choices in development tools being furnished for Mobile application development platforms, decision-making regarding use of the same.

5. Mobile Application Development Strategies & Issues

Care needs to be taken regarding the following mobile application development strategies and issues, while choosing application development tools.

- Application design should be based on the concept of mobile aware nature of users work profile and business process.
- The "client-agent-server" or "thin client-mobile server-enterprise server architectural paradigm should be considered seriously.
- Security matters like leakage, theft and fraud.

- Assess the pros and cons of Java based independent platform development versus platform specific development.
- Mobile applications must be on the foundation of internet development tools and current application servers.

5.1 Application Development

Modern Mobile Application Server Tools: The tools which provide application server solutions in a web environment are based on conventional application servers. Some are extensions, while few others are specifically designed for mobile application and wireless networks.

i.IBMs AS/400 Mobile Application Development tools have their own development environment, which ensures easier and attractive integration.

ii. Oracles Mobile Agents and Oracle Lite, which enables enterprises in developing mobile applications that run over a variety of wireless networks and dial-up LAN connections. Its 3-tiered clients / agents / server architecture replaces session-based connection oriented computing with an asynchronous, store and forward messaging system. The Oracle mobile Agents eliminate the need for constant connection.

iii. Sybase's SQL Anywhere Studio is used for developing mobile applications. This software can reside on multiple server and client platforms.

6. Conclusion

The Paper gives a introductory information and knowledge about the cloud computing and it provide the basis classification of it on the basis of the height tier and low tier communication system. In this paper we have provided with the topics about the application development, which includes a brief summery about all the topics that must be considered while developing any application for mobile computing .The paper aims to put forth all the introductory and fundamental information about the issues in the development and design of the mobile applications

References

[1] Lu, Q., Satyanarayanan, M. Improving Data Consistency in Mobile Computing Using Isolation-Only Transactions.
[2] Mummert, L.B., Satyanarayanan, M.Large Granularity Cache Coherence for Intermittent Connectivity.
[3] Dartmouth Computer Science Technical Report TR2000-381
[4] Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML: Reza B'Far
[5] A methodology for building mobile computing applications - Minder Chen
[6] http://eetimes.com/electronics-news/4204684/Mobile-Application-Development
[7] http://mobileinfo.com/Appl_Dev/ApplServers.htm
[8] http://mobileinfo.com/Appl_Dev/Choices.htm

[9] http://www.informationweek.com/mobility/business/application-development-in-the-age-of-mo/240005686

[10] http://searchcloudapplications.techtarget.com/feature/Mobile-cloud-apps-vs-native-apps-The-developers-perspective

Author Profiles

Mr. Ankur O. Bang is student of first year M.E. (Computer Science and Engineering) HVPM's College of Engineering And Technology, Amravati – Sant Gadge Baba Amravati University, Amravati, India

Mr. Prabhakar L. Ramteke is H.O.D (I.T) HVPM's College of Engineering and Technology, Sant Gadge Baba Amravati University, Amravati, India