

# Preface

This book grew out of the class notes around which a course on mobile computing was taught to the senior undergraduate and the masters' students at IIT Kanpur. These students unknowingly became guinea pigs in the process of my understanding of the subject.

The certain topics included in this book have been produced in different forms distributed over a number of other books or collections. In that sense, the uniqueness of the current text lies in putting the contents in an understandable form woven through a single thread. Giving a different orientation to the work of others is not quite easy. Most of the times I felt that the original text of the work is perhaps the best way to communicate. However, while teaching certain material in the class, a few interesting ideas emerged out of the queries by the students. These ideas provided cues for improved presentations. Maybe a discernable reader will find that some of the topics in this book have been presented in sufficient details, while a few other topics perhaps could have been presented in a better way. Specially, I feel a reasonable understanding of smart environment would require more space than I could allocate in this book. In trying to fit it within the scope of the book, context-aware infrastructure became a dominant theme in my presentation. However, I believe that building smart environment, in itself, is an engineering problem which is understood best by practice than by learning through literature or a book.

The book is organized into two parts consisting eight chapters each. Part I deals with wireless networking, while Part II addresses mobile data management issues. The effort was to strike a balance between the two parts and provide the readers what I believe is a comprehensive treatment of the subject. The material for the mobile data management part was more or less gathered directly from the original articles, as most of the available books in the area at the time when I start writing this book were just unrelated collections of research literature. Fortunately, there are many excellent texts on wireless networking part. But, these books were written with the target audiences having background either in electrical engineering or in physics. Very few books, if at all, dealt with protocol level details in somewhat sketchy manner. However, these texts did substantially influence the material presented in first part of the book. My class notes gradually developed over the

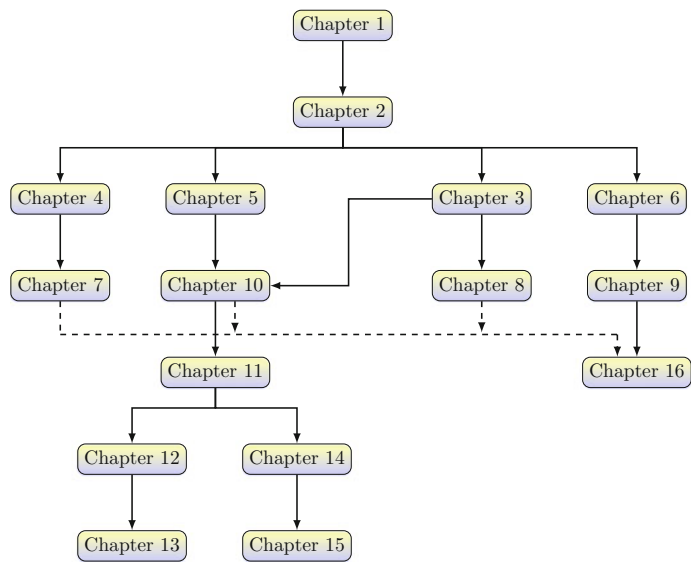
years and matured somewhat unconsciously in the form a monograph as it appears now.

Chapter 1 of the book is an introduction to mobile distributed environment and some interesting innovative applications in the area. Instead of a conventional introduction to book, this chapter provides the reader a general understanding of the issues that arise in the context building pervasive mobile applications and smart environment. The subsequent five chapters deal with the range of wireless networking technologies. It includes cellular-based wireless communication, telecommunication protocols such as GSM, GPRS, and UMTS, and short-range radio communication protocols such as WLAN, Bluetooth, IR, ZigBee, and 6LoWPAN. The remaining two chapters of the first part deal with routings in mobile ad hoc network, mobile operating systems and application-level protocols such as Mobile IP, WAP, and Mobile Shell (Mosh).

Part II of the book deals with mobile data management. This part begins with a chapter on WSN-related protocols, namely routing, interoperability, and multi-sensor integration. Though the contents of the chapter appear to lean more toward network than data, the two main reasons for clubbing it with mobile data management are as follows: (i) WSNs unlike IP-based network are data-centric networks and (ii) multisensor integrations employ sophisticated mathematical tools for fusion of data. More precisely, data is used as a communication token for routing in WSN. On the other hand, data fusion requires rich mathematical techniques that deal with detection, association, correlation, estimation, and combination of sensory data. The next chapter deals with the techniques for location management in GSM-type network for tracking personal and terminal mobilities. Here again, the decision to classify the chapter under mobile data management part is driven by the fact that the volume of location data far exceeds the size of a database that can be handled by a conventional database application. Specially, capturing location data related to personal mobility requires interesting data management and machine learning techniques. The remaining topics related to mobile distributed environment included in this part are as follows: design of algorithms, data dissemination, indexing, caching, replications, and storage management. The last chapter of the book does not directly deal with data management issues, but it talks about context-aware infrastructure for building smart environments.

The pre-requisite relationships between the contents of chapters are shown in Fig. 1. The solid lines show direct dependencies, and dotted line indicates indirect dependencies of the chapters. The book is written in a way, so that it does not require any pre-requisite other than the standard undergraduate knowledge of computer networks and algorithms. Having a bit of working knowledge about operating system (OS) could also help the reader to understand some of the practical issues described in the context of building mobile distributed applications.

The subject matter of the book has been chosen with a balanced assessment of the requirements of a target audience that would consist of senior undergraduates, masters, as well as research students. Practicing engineers perhaps may not get particularly excited about the book, as most of the content as well as the treatment



**Fig. 1** Pre-requisite structure of chapters

of the contents is biased more toward theory than implementation. However, I believe that the chapter on smart environment and context-aware computing would provide a few pointers to ideas on leveraging mobile cloud computing for building smart applications.

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