Sliding Window Algorithm for Mobile Communication Networks

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Preface

The primary objective of this book is to discuss how to improve the throughput of Mobile Switching Center (MSC) in Global System for Mobile Communications (GSM) network.

The book begins by building the core knowledge of Global System for Mobile Communications in Chapter 'Introduction.' It presents an overview of GSM network architecture and databases. Many approaches relevant to prior work are discussed.

Chapter 'Sliding Window Algorithm' discusses fixed block of seven days algorithm and develops an approach for maximizing GSM network throughput and minimizing the call setup time by using proposed sliding window of size seven days algorithm. The key advantage of this model is to reduce call setup time between the caller and the receiver in a network.

Chapter 'Performance Measurement of Sliding Window Algorithm' discusses a simulation model for evaluating the performance of fixed block of seven days and sliding window of size seven days algorithms. Chapter 'A Model for Determining Optimal Sliding Window Size' discusses a model to determine optimal window size in order to maximize the network throughput and minimize call setup time.

Chapter 'Integrating Sliding Window Algorithm with a Single Server Finite Queuing Model' presents integration of sliding window algorithm with a single server finite queuing model. Then, a simulation model is developed for evaluating the performance of sliding window of size seven days algorithm and integrated model (IM) at an MSC service area employing call setup time and throughput as performance criterion.

Chapter 'Integrating Sliding Window Algorithm with a Multiple Server Finite Queuing Model' presents integration of sliding window algorithm with a multiple finite queuing model. Later, a simulation model is developed for evaluating the performance of sliding window of size seven days algorithm and integrated model with a multiple channel (IMMC) at an MSC service area with regard to call setup time and throughput. Through simulation results, there is a significant increase in performance metrics of the proposed integrated model (IM) and IMMC for one

MSC service area. Obviously, it is recommended to consider adopting IM and IMMC for the entire GSM network for improving its throughput by 4.78%.

Chapter 'Method for Determining Optimal Number of Channels' discusses a decision model for determining the optimal number of channels. Average call setup waiting time in system and idleness percentage of channels are used as criteria of optimization. A simulation model is formulated by employing the aspiration decision model for profiling the behaviour of average call setup waiting time in system and idleness percentage of channel as a function of number of channels. It is employed to simulate assuming sliding window of size seven days. It is found that as the number of channels increases, the average call setup waiting time in system decreases and idleness percentage of channels increases. It facilitates the decision maker to choose the optimal number of channels for the chosen aspiration/service levels.

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I am grateful beyond expression to my dearest family. I feel that now, at the end of this work, is the relevant time to express my best thanks to them for their unconditional support, encouragement, and faith in me throughout my whole life, in particular during the last four months. I hope that I will be able to compensate them in the future. I dedicate this book to them, with love and gratitude.

Contents

About the Authors

Nuka Mallikharjuna Rao received his B.Sc. in Computer Science from Andhra University, Visakhapatnam, Andhra Pradesh, India, in 2005 and MCA in Computer Applications and Ph.D. in Computer Science and Engineering from Acharya Nagarjuna University, Guntur, in 2008 and 2015, respectively. He is a Life Member of the Indian Society for Technical Education (ISTE) and a Member of IEEE, IACSIT, and CSTA. He is presently working as a Professor of Computer Applications and Director of the Internal Quality Assurance Cell (IQAC) at the Annamacharya Institute of Technology and Sciences, Rajampet. He has more than 18 years of teaching experience, and his current research interests include mobile computing, mobile networks, distributed networks, and queuing theory.

Mannava Muniratnam Naidu received his B.E. in Mechanical Engineering from Sri Venkateswara (SV) University, Tirupati, and master's degree in Engineering and Ph.D. from the Indian Institute of Technology Delhi (IIT Delhi), Delhi, India. He served as a convener and member of many committees on behalf of the All India Council for Technical Education (AICTE). He is a Life Member of ISTE, ORSI, ISME, CSI, IEEE, and ACM. He served as a Professor, Dean, and Principal at the SV University College of Engineering, Tirupati. He also worked as a Professor in the Department of Computer Science and Engineering, Vignan University, Guntur, Andhra Pradesh. Currently, he is working as the Dean of Computing at Vel Tech University, Avadi, Chennai, India. His research interests include data mining, computer networks, soft computing techniques, and performance evaluation for algorithms.

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