

Energy Efficient Middleware: Design and Development for Mobile Applications

Fatimah Abdulaziz Almusalli , Noor Zaman , Raihan Rasool

King Faisal University, Saudi Arabia, King Faisal University, Saudi Arabia, Victoria University Melbourne, Australia

215002782@student.kfu.edu.sa , nzman@kfu.edu.sa , Raihan.Rasool@live.vu.edu.au

Abstract— Over the recent years, the popularity of smartphones has increased dramatically. The advanced integrated technology in smartphones like GPS, high-speed CPU, a real world coloured display, Wi-Fi and Bluetooth etc. All these within small size light weight device attracts people a lot to obtain them. The stated capacities of those components motivate developers to create millions of useful applications. However, smartphone devices are energy constraint as they rely on limited battery power supply that has not been increased at the same pace to support the power demands. As both the hardware and the software tend to drain the battery power, the demand for energy efficient applications has increased to keep the mobile devices useful. Optimization related to memory data access create significant difference to performance and power consumption of broad range of data-intensive application. Memory Data layout transformation represents a very interesting class of optimizations. Transform Array of Structure (AOS) to Structure of Array (SOA) is one of the commonly applied and recognized transformation. The transformation reduces the memory access count and subsequently reduces the memory access energy. Thereby, we introduce data layout transformation service as solution to minimize the power consumed by application. The Service will convert the data layout in memory from AOS to SOA. The conversion will reduce the power consumed by memory and processor. Eventually, result in efficient and extended battery life.

Keywords— *Data Layout Transformation DLT, Mobile Computing, Energy Efficiency, Array of structure AOS, Structure of arrays SOA*



Fatimah Abdulaziz Almusalli, received the B.A. degree in Computer science from college of science for girl in Dammam, King Faisal University in 2008. Currently, study Master in computer science at the College of Computer Science and Information Technology, King Faisal University, Saudi Arabia. Work as computer Trainer in Al-Hussan National Higher Training Institute for Ladies in Informatics Department. Current job, IT administrator in Rand International school, Sayhat, Saudi Arabia. her areas of interest include Software Engineering, Mobile Application Programming, Web Development, Network Management.



Dr. Noor Zaman acquired his degree in Engineering in 1998, and Master's in Computer Science at the University of Agriculture at Faisalabad in 2000. His academic achievements further extended with PhD in Information Technology at University Technology Petronas (UTP) Malaysia. He has vast experience of 16 years in the field of teaching and research. He is currently working as an Assistant Professor at the College of Computer Science and Information Technology, King Faisal University, Saudi Arabia since 2008. He has contributed well in King Faisal University for achieving ABET Accreditation twice, by working as an active member and Secretary for Accreditation and Quality cell for more than 08 years. He takes care of versatile operations including teaching, research activities, leading ERP projects, IT consultancy and IT management. He headed the department of IT, and administered the prometric center in the Institute of Business and Technology (BIZTEK), in Karachi Pakistan. He has worked as a consultant for Network and Server Management remotely in Apex Canada USA base Software house and call center. Dr. Noor Zaman has authored several research papers in indexed journals\international conferences, and edited six international reputed Computer Science area books, has many publications to his credit. He is an associate Editor, Regional Editor and reviewer for reputed international journals and conferences around the world. He has completed several international research grants\ funded projects and currently involved in different courtiers. His areas of interest include Wireless Sensor Network (WSN), Internet of Things IoT, Mobile Application Programming, Ad hoc Networks, Cloud Computing, Big Data, Mobile Computing, and Software Engineering.



Raihan ur Rasool is a Fulbright Alumnus of the University of Chicago, USA. He is currently affiliated with Victoria University, Melbourne. His research interests include large-scale systems, security and computer architecture. His research work, comprising over 42 articles is published in various international conferences and journals. He has published in leading avenues of research like ISCA, HiPEC, CCGrid, ACM SIGARCH, IEEE Transactions on Cloud Computing, JNCA & FGCS.