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UMAR FAROOQ

Profile

- 6+ years experience in distributed, pervasive and network systems with demonstrated expertise in numerous technologies and frameworks ranging from computational, data and Lambda Grids to Web Services technologies, from application-controlled optical networks to middleware for wireless ad hoc networks.
- Highly motivated and dedicated individual with proven abilities to excel. Have won a number of highly competitive scholarships and awards, gold medals and Pakistan's national honor, *Medal of Excellence*, given by the president of Pakistan.
- Outstanding researcher with 5+ years experience in conducting cutting-edge industry sponsored research. Published, as a first author, numerous papers in top-notch refereed journals and conferences.
- Well versed in, and years of hands-on experience in, several software design methodologies, programming languages (JAVA and C), software testing techniques, and simulation and modeling of complex systems. Strong knowledge of communication and network protocols.

Computer Skills

Systems Design and Modeling:	Concurrent Object Modeling and Architectural Design Method (COMET); Unified Modeling Language (UML).
Languages:	7+ years of experience in JAVA, 5 years of experience in C and VB.
Distributed and Middleware Systems:	Strong knowledge of, and hands-on experience on, Web Services technologies and standards including XML, WSDL, SOAP, WS-Addressing and UDDI; Apache Axis; Java Message Service; OGSA, OGSI, WSRF and Globus Toolkit; Servlets; Remote Method Invocation, JINI and Java Spaces.
Operating Systems:	Windows (NT, XP), Linux, Solaris.
Simulators:	5+ Years of experience in simulation and modeling, have written my own discrete event simulators. Hands-on experience on simulators such as OPNet, NS2, NistNet, DEVS, Cell-DEVS and CD++.
Software Testing and Analysis:	Demonstrated knowledge in white box, black box and integration testing. Hands on experience on several testing tools such as SOATest, JUnit, Layered Queuing Network Solvers (LQNS).
Protocol Familiarity	Complete Internet Suite, IEEE 802.11, IEEE 812.16, UMTS, Several Routing Protocols, MPLS, Ad Hoc Networks Routing Protocols (AODV, DSDV, DSR etc), Bluetooth, IEEE 802.3, Mobile IP, Split TCP, Snoop TCP etc.

Professional Experience

Real-Time and Distributed Systems Laboratory, Carleton University, Ottawa, Canada. (2001 – Present)

Graduate Research Assistant: The research was funded by Nortel Networks and Natural Sciences and Engineering Research Council of Canada. Some of the significant research projects are listed.

- Designed and developed a complete resource management framework, *QoSMOS*, that enables soft real-time computing in geographically and administratively distributed large-scale systems. QoSMOS presents novel resource management strategies that can provide QoS guarantees to time sensitive applications and maintain high system performance. The framework provides components for each of the fabric, resource and collective layer of the Grid architecture. The application domain of QoSMOS ranges from computational Grids to Lambda Grids.

- Designed and actively participated in the implementation of several components of the QoSMOS framework in the form of add-on patches to the well-known Globus Toolkit. The contributions are being made public for users around the world.
- In collaboration with Nortel, engineered optical networks into manageable Grid resources. Developed strategies for optimizing usage of DWDM optical networks in Lambda Grids. Designed suitable admission control and scheduling strategies and exploited various traffic engineering mechanisms for data intensive Grid computing on application-controlled optical networks.
- In collaboration with Alcatel, actively involved in the development of service oriented web services, their deployment on the Apache Axis based platform and their testing through the SOATest software. Root administrator of the Carleton side of the Alcatel-Carleton lab for web services research.
- Designed novel middleware strategies for application-to-resource mapping and load balancing in multi-institutional Grids that outperforms all other strategies investigated in almost every respect for a wide range of workload parameters. Part of the research is also being integrated into Platform Computing's Community Scheduler Framework (CSF) as an effective meta-scheduler.
- In collaboration with Environment Canada and Department of Environmental Engineering at Carleton University, involved in the development of a data-mining architecture to trace and analyze various pollutants emitted from several sources.
- Explored resource management in modern resource sharing systems comprising thousands of resources and consumers, and developed configurable entities that adapt to meet the requirements of the system. Invented a dynamically adaptable scheduling algorithm for scheduling best-effort and real-time jobs on clusters and parallel resources. The algorithm has been deployed for scheduling on a cluster at Carleton.
- Analyzed performance and scalability of multi-tier distributed software patterns using layered queuing networks. The research helps in determining software bottlenecks and enables redesign (if necessary) without incurring substantial time and monetary costs.
- Engineered mobile wireless publish/subscribe systems for high performance through the design and development of a new technique that excels in highly dynamic and unreliable mobile wireless settings.
- Used the extension of DEVS to develop a simulator for modeling and analyzing wireless ad hoc networks. Also extended ad hoc routing techniques for internetworking and multicast routing.
- Designed a thin-client architecture for location-dependent mobile services over short-range communications.
- Co-supervised several junior and senior-year students working as interns in the department.

Newcore Networks Inc., Mountain View, California, USA *(Worked in Lahore).* ***(July 2000 - March 2001)***

Computer Consultant: Part of a four-member team involved in porting part of the bootup kernel code of RT-Linux to a PowerPC-based embedded processor used in a network switch. Developed real-time Linux kernel modules for a StrongArm architecture-based multi-processor system. Extensively programmed in C.

Web Carriers Inc., Lahore, Pakistan. ***(August 1999 to June 2000)***

Software Developer Co-op Position: Part of a team involved in the design and management of e-commerce software systems. Extensively programmed in JAVA.

Education

Ph.D. Candidate, Electrical Engineering (2003 – Present; Expected: June 2007) GPA: 11.7/12
Dept. of Systems and Computer Engineering (SCE), Carleton University, Ottawa, ON, Canada

M.A.Sc. Electrical Engineering (2001 – 2003) GPA: 11.5/12.
Dept. of Systems and Computer Engineering (SCE), Carleton University, Ottawa, ON, Canada

B. Sc. (Honors), Electrical Engineering (1997 – 2001) GPA: 91%.
Dept. of Electrical Engineering (EE), University of Engineering & Technology (UET), Lahore, Pakistan

Recent Selected Publications

- U. Farooq, S. Majumdar, E. W. Parsons, "Providing QoS Guarantees under Uncertain Runtimes of Jobs in Multi-Institutional Grid Computing," *Journal Paper in review*.
- U. Farooq, S. Majumdar, E. W. Parsons, "High Performance Middleware for Mobile Wireless Networks," in *Mobile Information Systems (in press)*.
- U. Farooq, B. Balya, G. Wainer, "DEVS Modeling of Mobile Wireless Ad Hoc Networks", in *Elsevier Simulation Modelling Practice and Theory*, March 2007.
- U. Farooq, S. Majumdar, E. W. Parsons, "Engineering Grids Applications and Middleware for High Performance", in the *Proceedings of the 6th ACM International Workshop on Software and Performance(WOSP'07)*, Buenos Aires, Argentina, February 2007.
- U. Farooq, S. Majumdar, E. W. Parsons, "A Framework to Achieve Guaranteed QoS for Applications and High System Performance in Multi-Institutional Grid Computing," in the *Proceedings of the 35th International Conference on Parallel Processing (ICPP'06)*, pp. 373-380, Columbus, OH, August 2006.
- U. Farooq, S. Majumdar, E. W. Parsons, "Dynamic Scheduling of Lightpaths in Lambda Grids," in the *Proceedings of the 2nd IEEE International Workshop on Networks for Grid Applications (GRIDNETS'05)*, pp. 540-549, Boston, MA, October 2005.
- U. Farooq, S. Majumdar, E. W. Parsons, "Impact of Laxity on Scheduling with Advance Reservations in Grids," in the *Proceedings of the 13th IEEE International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems*, pp. 319-324, Atlanta, GA, September 2005.
- U. Farooq, K. I. Siddiqui, "Scalability Analysis of Multi-Tier Distributed Software Patterns using Layered Queuing Networks," in the *Proceedings of the 18th IEEE Annual Canadian Conference on Electrical and Computer Engineering (CCECE'06)*, pp. 1025-1028, Saskatoon, SK, Canada, May 2005.
- U. Farooq, S. Majumdar, E. W. Parsons, "Engineering Mobile Wireless Publish/Subscribe Systems for High Performance," in the *Proceedings of the 12th IEEE International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems*, pp. 295-305, Netherlands, October 2004.
- U. Farooq, E. W. Parsons, S. Majumdar, "Performance of Publish/Subscribe Middleware in Mobile Wireless Networks," in the *Proceedings of the 4th ACM International Workshop on Software and Performance (WOSP'04)*, pp. 278-289, Redwood City, CA, January 2004.

Awards and Honors

- Pakistan's National Award *Medal of Excellence for Academic Achievements* given by the President of Pakistan in 1999.
- Best Project Award for "Modeling Routing in Wireless Ad Hoc Networks using Cell-DEVS" in Modeling and Simulation Mini-Conference, Carleton University, Ottawa, Canada, 2003.
- Best Project Award for "Intelligent, Impromptu, Embedded Computing with JINI and JAVA Spaces" in All UET Final Year project Exhibition, Lahore, Pakistan, May 2001.
- Won numerous highly competitive scholarships including Ontario Graduate Scholarship (OGS) for two consecutive years (2003-2005), Carleton Academic Excellence Scholarship for four straight years (2003-2007), Carleton Graduate Scholarship for six straight years (2001-2007), UET merit certificates and scholarships for all four undergraduate years (1997-2001), Pakistan's top scholarship *Nishan-e-Haider* for five successive years (1996-2001) and Government of Pakistan National Talent Scholarship for two years (1994-1996).
- *The Talented Student of the Year* Award by Punjab Group of Colleges, Pakistan, 1994.
- Gold Medals for Overall First position in both *Higher Secondary and Secondary School Examinations* among over 60,000 students from all over Pakistan in 1996 and 1994 respectively.