Sara Salem Hamouda

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OBJECTIVE

- To enable researchers and industries to provide fast and "always-on" user experience by designing and implementing reliable large-scale distributed systems.

EDUCATION

- **Australian National University, Australia (2019)**
  PhD
  "Resilience in High-Level Parallel Programming Languages"
  Supervisor: Dr. Josh Milthorpe
- **Cairo University, Egypt (2010)**
  Masters in Computer Science
  "A Multi-Resource Ontology Builder"
  Supervisor: Samir AbdelRahman
- **Cairo University, Egypt (2006)**
  Bachelor of Computer Science
  Excellent grade with honor degree (94.14%), first rank.

AWARDS

- Best PhD Poster Presentation Award, IPDPS, 2015
- Most Impactful Idea Award, ACT Hackathon, 2014
- Australian National University PhD scholarship and HDR merit scholarship.
- Ideal Teaching Assistant Recognition, Faculty of Computers and Information, Cairo University, 2007, 2008, and 2012.
- Cairo University Graduation Honor for overall undergraduate excellence, 2006.

RESEARCH INTERESTS

- High Performance Computing (HPC)
- Fault tolerance
- Distributed systems design and implementation
- Automated verification of distributed protocols

TECHNICAL SKILLS

- Programming Languages: Java, C, C++, and a limited use of Python.
- HPC Programming: MPI, X10, and a limited use of OpenMP and CUDA.
- Formal Verification Languages: TLA+.
- Deployment Frameworks: Docker.
- Version Control: SVN, Git.
- Operating Systems: Linux, MacOS.

INDUSTRY EXPERIENCE

- **Software Engineer (Part-time), Centrivision, Egypt** **07/2006-01/2010**
  Promoted from Junior Engineer to Senior Engineer in 07/2010 **07/2010-06/2013**

  Played a major role in the design and implementation of multiple front-end and back-end systems for the telecommunication company 'Etisalat Misr'. My role involved interactions with different teams to ensure proper integration of different systems and coordinating with project managers to ensure timely delivery of business requirements.

  Selected projects:
  - Tariff Plan Migration Engine: a configurable rule-based engine for managing and executing tariff plan migration for millions of customers.
  - Customer Support System: a customer-care interface for viewing and updating customer profiles.
  - High-Usage Tracking System: a system for discovering suspected fraud cases.

  Used Technologies: J2EE, Java Server Faces (JSF), Web Services, Oracle Databases.

RESEARCH EXPERIENCE

- **Post-doctoral researcher, Inria, France** **02/2019-current**
  I work with the DELYS group on the design of geo-replicated databases for consistent highly-available cloud applications. I'm currently focusing on conducting performance benchmarking for an in-house geo-replicated database called AntidoteDB and designing a recovery mechanism for handling server (i.e. shard) failures.

- **PhD Student, Australian National University, Australia** **02/2014-09/2019**
  Thesis approval: 06/2019. Conferral of PhD degree: 09/2019.
  Thesis title: "Resilience in High-Level Parallel Programming Languages"
  The goal of my PhD is to provide a programming language for HPC that can reconcile performance, resilience, and programming productivity. I focused on improving the resilience support of a high-level language called X10 developed in IBM T. J. Watson research center.
  My main contributions are:
  - A control-flow recovery protocol for distributed task graphs (formally verified using TLA+).
  - A checkpointing framework for iterative applications.
  - A data replication framework with support for distributed transactions.
  - Performance benchmarking on supercomputer and cloud environments.

- **Research Intern, IBM T. J. Watson Research Center, USA** **07/2015-11/2015**
  During this 14-week internship, I integrated the X10 language with a fault tolerance library called MPI-ULFM for better scalability and portability and developed a resilient version of a scientific benchmarking application called LULESH.

- **Research Visitor, Habanero Group, Rice University, USA** **06/2016-07/2016**
  During this 6-week visit, I studied two HPC programming models developed by the Habanero team and their collaborators: the Open Community Runtime (OCR) and the Concurrent Collections (CnC) framework. I also completed a proof-of-concept implementation to demonstrate the applicability of user-level fault tolerance in OCR.

- **Masters Student, Cairo University, Egypt** **09/2006-12/2010**
  Thesis title: "A Multi-Resource Ontology Builder".
  An ontology is a dictionary for a specific domain written in a machine-processable format. My thesis identified misrepresentation problems that result from extracting an ontology from a multiple-domain corpus. Using simple clustering and word-sense disambiguation techniques, I developed an ontology builder that models a concept at different levels of abstraction to capture its different meanings more accurately.

TEACHING EXPERIENCE

- **Tutor, Australian National University, Australia** **02/2016-11/2017**
  COMP3320/6464 (High Performance Scientific Computation), 2016.
  COMP1100 (Programming as Problem Solving), 2016.
  COMP7240 (Introduction to Database Concepts), 2017.
  COMP4300/8300 (Parallel Systems – MPI, OpenMP, CUDA), 2017.
  COMP2400/6240 (Relational Databases), 2017.

- **Teaching Assistant, Cairo University, Egypt** **02/2007-02/2014**
  Logic Design, 2006.
  C++ Programming, 2006, 2007, 2008, 2009.
  Data Structures, 2007, 2009.
  Introduction to Computer Science, 2008, 2009, 2011, 2013.
  File Structures, 2008.
  Operating Systems, 2006, 2007, 2008, 2009, 2010, 2011.
  Compilers, 2010.
  Computer Organization, 2013.

PUBLICATIONS

- David Grove, **Sara S. Hamouda**, Benjamin Herta, Arun Iyengar, Kiyokuni Kawachiya, Josh Milthorpe, Vijay Saraswat, Avraham Shinnar, Mikio Takeuchi, and Olivier Tardieu. "Failure recovery in resilient X10." ACM Transactions on Programming Languages and Systems (TOPLAS) 41, no. 3, 2019.
- **Sara S. Hamouda**, and Josh Milthorpe. "Resilient Optimistic Termination Detection for the Async-Finish Model." International Conference on High Performance Computing (ISC-HPC), 2019.
- **Sara S. Hamouda**, Benjamin Herta, Josh Milthorpe, David Grove, and Olivier Tardieu. "Resilient X10 over MPI user level failure mitigation." SIGPLAN Workshop on X10, 2016.
- **Sara S. Hamouda**, Josh Milthorpe, Peter E. Strazdins, and Vijay Saraswat. "A resilient framework for iterative linear algebra applications in X10." IEEE International Parallel and Distributed Processing Symposium Workshop (IPDPSW), 2015.
- Eman Hossny, **Sara Salem**, and Sherif M. Khattab. "Towards automated user-centric cloud provisioning: Job provisioning and scheduling on heterogeneous virtual machines." International Conference on Informatics and Systems (INFOS), 2012.
- **Sara Salem**, and Samir AbdelRahman. "A multiple-domain ontology builder." International Conference on Computational Linguistics (COLING), 2010.