

Sara Salem Hamouda

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<https://shamouda.github.io>

- 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: Dr. 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, 2014-2018
 - Ideal Teaching Assistant Recognition, Faculty of Computers and Information, Cairo University, 2007, 2008, and 2012.
 - Cairo University Graduation Honor for overall undergraduate excellence, 2006.
- TECHNICAL SKILLS**
- Programming Languages: Java, C, C++, Erlang
 - Parallel Programming: MPI, OpenMP, X10
 - Formal Verification Languages: TLA+
 - Deployment Frameworks: Docker
 - Web Programming: Java Enterprise Edition, Ruby on Rails, NodeJS
 - Version Control: Git
 - Operating Systems: Linux, MacOS
 - ... confident in my ability to learn other languages and frameworks
- INDUSTRY EXPERIENCE**
- **Software Engineer (Part-time), Centrivision, Egypt** **07/2006-01/2010**
Outsourced from Centrivision to Etisalat Misr. **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 INTERESTS

- Distributed systems design and implementation
- High-performance computing
- Fault tolerant distributed protocols
- Fault tolerant application frameworks
- Automatic formal verification of distributed protocols

RESEARCH POSITIONS

- **Post-doctoral researcher, Inria, France** **02/2019-current**
I work with the DELYS group on the design of programming models and distributed protocols for highly-available geo-replicated databases. I am currently focusing on designing a shard replication protocol for AntidoteDB (an Erlang-based geo-replicated database developed through multiple European projects, antidotedb.eu). I also collaborate with the team on designing a programming framework that aims at simplifying geo-replicated application development.
- **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 was 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+).
 - Scalability and portability enhancements to X10 by integrating the language with a modern communication library called, MPI-ULFM.
 - 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.
Internship Mentors: Dr. Josh Milthorpe and Dr. David Grove.
- **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.
Supervisor: Prof. Vivek Sarkar
- **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 the concepts with different levels of abstraction to capture the different meanings of concepts in a more accurate way.

TEACHING POSITIONS

- **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), 2017.
COMP2400/6240 (Relational Databases), 2017.
- **Tutor, 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): 15.
- **Sara S. Hamouda**, and Josh Milthorpe. "Resilient Optimistic Termination Detection for the Async-Finish Model." In International Conference on High Performance Computing, pp. 291-311. Springer, Cham, 2019.
- **Sara S. Hamouda**, Benjamin Herta, Josh Milthorpe, David Grove, and Olivier Tardieu. "Resilient X10 over MPI user level failure mitigation." In Proceedings of the 6th ACM SIGPLAN Workshop on X10, pp. 18-23. ACM, 2016.
- **Sara S. Hamouda**, Josh Milthorpe, Peter E. Strazdins, and Vijay Saraswat. "A resilient framework for iterative linear algebra applications in X10." In 2015 IEEE International Parallel and Distributed Processing Symposium Workshop, pp. 970-979. IEEE, 2015.
- Eman Hossny, **Sara Salem**, and Sherif M. Khattab. "Towards automated user-centric cloud provisioning: Job provisioning and scheduling on heterogeneous virtual machines." In 2012 8th International Conference on Informatics and Systems (INFOS), pp. CC-18. IEEE, 2012.
- **Sara Salem**, and Samir AbdelRahman. "A multiple-domain ontology builder." In Proceedings of the 23rd International Conference on Computational Linguistics, pp. 967-975. Association for Computational Linguistics, 2010.

REFERENCES

- **Dr. Josh Milthorpe**, josh.milthorpe@anu.edu.au
Lecturer, Australian National University
Primary PhD Supervisor
- **Prof. Steve Blackburn**, steve.blackburn@anu.edu.au
Professor, Australian National University
Chair of PhD Supervisory Panel
- **Dr. David Grove**, groved@us.ibm.com
Distinguished Research Staff Member, IBM T. J. Watson Research Center.
Leader of the X10 Language Team and Internship co-supervisor.