

Sara Salem Hamouda

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OBJECTIVE	To design high-performance, resilient, productive programming models for unreliable cluster systems.	
RESEARCH INTERESTS	<ul style="list-style-type: none">• Resilient runtime systems• Productive programming models• Distributed transactional data stores• Automated formal verification of distributed protocols	
EDUCATION	Australian National University, Australia PhD Student, Research School of Computer Science Topic: Resilience in High-Level Parallel Programming Languages Advisors: Josh Milthorpe, Steve Blackburn, and Peter Strazdins Expected Submission Date: 08/2018	2014-current
	Cairo University, Egypt Master of Computer Science, Faculty of Computers and Information Topic: A Multi-Resource Ontology Builder Advisors: Samir AbdelRahman, Amr Badr, and Ibrahim Farag	2010
	Cairo University, Egypt Bachelor of Computer Science, Faculty of Computers and Information Excellent grade with honor degree (94.14%), first rank.	2006
PUBLICATIONS	<ul style="list-style-type: none">• (Under review) D. Grove, S. S. Hamouda, B. Herta, A. Iyengar, K. Kawachiya, J. Milthorpe, V. Saraswat, A. Shinnar, M. Takeuchi, O. Tardieu, Failure Recovery in Resilient X10, TOPLAS Journal.• S. S. Hamouda, B. Herta, J. Milthorpe, D. Grove, and O. Tardieu, Resilient X10 over MPI User Level Failure Mitigation, X10 workshop, PLDI, 2016.• S. S. Hamouda, J. Milthorpe, P. E. Strazdins, V. Saraswat, A Resilient Framework for Iterative Linear Algebra Applications in X10, PDSEC workshop, IPDPS, 2015.• E. Hossny, S. Salem, and S. M. Khattab, Towards Automated User-Centric Cloud Provisioning: Job Provisioning and Scheduling on Heterogeneous Virtual Machines, INFOS 2012.• S. Salem, S. AbdelRahman, A Multiple-Domain Ontology Builder, COLING 2010.	
AWARDS	<ul style="list-style-type: none">• 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.	

RESEARCH POSITIONS**PhD Student, Australian National University****02/2014-current**

The objective of my PhD project has been improving the resilience support of high-level parallel programming languages. I choose the X10 language as a basis for my study for its productivity features, and recent support for user-level fault tolerance. My research identified performance and productivity issues in Resilient X10 and contributed efficient resilient protocols and easy-to-use application frameworks to address these issues.

My main contributions are:

- a message-efficient resilient termination detection protocol, that is formally verified using TLA+.
- a double in-memory replication protocol for storing critical runtime data consistently in the presence of failures. The protocol is formally verified using TLA+.
- an in-memory resilient store with transactional support for asynchronous data updates.
- a checkpoint/restart framework for iterative applications.
- integrating X10 with [MPI-ULFM](#) to provide scalable failure detection, fault-tolerant collective and agreement operations to X10.

Research Intern, IBM T. J. Watson Research Center**07/2015-11/2015**

- Internship Mentors: Josh Milthorpe and David Grove
- Ported Resilient X10 to MPI-ULFM (User Level Failure Mitigation).
- Extended [LULESH](#) benchmarking application with Checkpoint/Restart support.

Masters Student, Cairo University**09/2006-12/2010**

Automatic Extraction of Ontologies from Multiple-Domain Content:

- The thesis identified two problems occurring when generating a single ontology from a multiple-domain corpus: inaccurate estimation of concept significance, and loss of relevant definitions for concepts that have different meanings in different domains.
- Using clustering and simple word-sense disambiguation techniques, we extract a multi-layered ontology that models the abstract concepts, their specialized meanings, and their concrete instances in different domains. More precise answers to ontology queries were obtained using our ontology.

RESEARCH VISITS**Habanero Group, Rice University****06/2016-07/2016**

- Supervisor: Vivek Sarkar
- Studied the implementation of data-driven task-based runtime systems and their resilience challenges, using the Open Community Runtime (OCR) and the Concurrent Collections (CnC) framework.
- Completed a basic proof-of-concept implementation to demonstrate the applicability of user-level fault tolerance in OCR using two simple applications.

TEACHING POSITIONS**Tutor, Australian National University****02/2016-11/2017**

Practical Lab Sessions:

- 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.

Teaching Assistant, Cairo University**02/2007-02/2014**

Practical Lab Sessions:

- 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.

INDUSTRY EXPERIENCE

Software Engineer (Part-time), Centrivision, Egypt

07/2006-01/2010

07/2010-06/2013

Helped develop enterprise systems for the telecommunication company 'Etisalat Misr'.

Selected Projects:

- Tariff Plan Migration Engine: A configurable rule-based engine for managing and executing tariff plan migration rules.
- Customer Support System: A customer-care interface for viewing and updating customer profiles.
- High-Usage Tracking System: A system for identifying suspected high-usage fraud cases.
- Used Technologies: J2EE, Java Server Faces (JSF), Web Services, Oracle Databases.

OPEN SOURCE

External Contributor, X10 Programming Language and Applications

- <https://github.com/x10-lang/x10>
- <https://github.com/x10-lang/x10-applications>
- Main contributions: productive resilient frameworks, integration with MPI-ULFM, and resilient LULESH application.

Owner, X10 Programming Language (Fork)

- <https://github.com/shamouda/x10>
- Optimistic finish (resilient termination detection protocol), and the transactional resilient store.

Owner, X10 TLA+ Specifications

- <https://github.com/shamouda/x10-formal-spec>
- Formal specification of replication and termination detection protocols I developed during my PhD.