

# Sara Salem Hamouda

[sara.salem@anu.edu.au](mailto:sara.salem@anu.edu.au) | <https://shamouda.github.io> | +61 45 024 5151

OBJECTIVE	To design high-performance, resilient, productive programming models for unreliable cluster systems.	
RESEARCH INTERESTS	<ul style="list-style-type: none"><li>• High-level distributed programming models</li><li>• Resilient termination detection protocols for dynamic task graphs</li><li>• Resilient distributed in-memory data stores</li><li>• Automated formal verification of distributed protocols</li></ul>	
EDUCATION	<b>Australian National University, Australia</b> 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	<b>2014-current</b>
	<b>Cairo University, Egypt</b> Master of Computer Science, Faculty of Computers and Information Topic: A Multi-Resource Ontology Builder Advisors: Samir AbdelRahman, Amr Badr, and Ibrahim Farag	<b>2010</b>
	<b>Cairo University, Egypt</b> Bachelor of Computer Science, Faculty of Computers and Information Excellent grade with honor degree (94.14%), first rank.	<b>2006</b>
PUBLICATIONS	<ul style="list-style-type: none"><li>• (Under review) D. Grove, S. S. Hamouda, B. Herta, A. Iyengar, K. Kawachiya, J. Milthorpe, V. Saraswat, A. Shinnar, M. Takeuchi, O. Tardieu, <a href="#">Failure Recovery in Resilient X10</a>, TOPLAS Journal.</li><li>• (Under review) S. S. Hamouda and J. Milthorpe, Resilient Optimistic Termination Detection for the Async-Finish Model, PODC 2018.</li><li>• S. S. Hamouda, B. Herta, J. Milthorpe, D. Grove, and O. Tardieu, <a href="#">Resilient X10 over MPI User Level Failure Mitigation</a>, X10 workshop, PLDI, 2016.</li><li>• S. S. Hamouda, J. Milthorpe, P. E. Strazdins, V. Saraswat, <a href="#">A Resilient Framework for Iterative Linear Algebra Applications in X10</a>, PDSEC workshop, IPDPS, 2015.</li><li>• E. Hossny, S. Salem, and S. M. Khattab, <a href="#">Towards Automated User-Centric Cloud Provisioning: Job Provisioning and Scheduling on Heterogeneous Virtual Machines</a>, INFOS 2012.</li><li>• S. Salem, S. AbdelRahman, <a href="#">A Multiple-Domain Ontology Builder</a>, COLING 2010.</li></ul>	
AWARDS	<ul style="list-style-type: none"><li>• Best PhD Poster Presentation Award, IPDPS, 2015</li><li>• Most Impactful Idea Award, ACT Hackathon, 2014</li><li>• Australian National University PhD scholarship and HDR merit scholarship, 2014-2018</li><li>• Ideal Teaching Assistant Recognition, Faculty of Computers and Information, Cairo University, 2007, 2008, and 2012.</li><li>• Cairo University Graduation Honor for overall undergraduate excellence, 2006.</li></ul>	

**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.
- 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.

### Owner, Resilient Transaction Benchmark

- <https://github.com/shamouda/apgas-tx-bench>
- Java benchmarking program for [Hazelcast](#) transactions performance with multiple asynchronous updates.