Sara Salem Hamouda

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OBJECTIVE	To design high-performance, resilient, productive programming models for unreliable cluster systems.

RESEARCH INTERESTS

- High-level distributed programming models
- Resilient termination detection protocols for dynamic task graphs
- Resilient distributed in-memory data stores
- Automated formal verification of distributed protocols

EDUCATION

Australian National University, Australia 2014-current
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

Cairo University, Egypt 2010
Master of Computer Science, Faculty of Computers and Information
Topic: A Multi-Resource Ontology Builder
Advisors: Samir AbdelRahman, Amr Badr, and Ibrahim Farag

Cairo University, Egypt 2006
Bachelor of Computer Science, Faculty of Computers and Information
Excellent grade with honor degree (94.14%), first rank.

PUBLICATIONS

- (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.
- (Under review) S. S. Hamouda and J. Milthorpe, Resilient Optimistic Termination Detection for the Async-Finish Model, PODC 2018.
- 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

- 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.
- 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.