Sara Salem Hamouda

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EDUCATION

Australian National University, Australia **02/2014-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 **09/2006-12/2010**
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 **09/2002-05/2006**
Bachelor of Computer Science, Faculty of Computers and Information
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.

RESEARCH POSITIONS

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

Resilient Termination Detection:

- Optimistic Finish: the thesis significant contribution is 'optimistic finish', a message-efficient resilient termination detection (TD) protocol for dynamic task graphs. By avoiding certain TD messages, the protocol introduces uncertainty about the task graph structure that can be resolved correctly during recovery.
- TLA+ Formal Specification: formal specification of X10's termination detection protocols, including optimistic finish.

Productive Resilient Frameworks:

- Transactional In-Memory Resilient Store: replication-based resilient store with support for dynamic distributed transactions designed to simply writing resilient X10 applications.
- Resilient Iterative Application Framework: a framework for writing resilient iterative applications based on coordinated checkpoint/restart.
- Resilient Global Matrix Library: a library of distributed vector and matrix interfaces for implementing resilient linear algebra algorithms.

Scalable Fault-Tolerant Communication:

- Ported X10 to MPI-ULFM (a fault-tolerant MPI implementation) to provide semantically-correct 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 that 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 (Casual), 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 (Full-time), 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: The main customer-care interface for viewing and updating customer profiles.
- High-Usage Tracking System: A system for identifying suspected high-usage fraud cases.

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, and the transactional resilient store.

Owner, X10 TLA+ Specifications

- https://github.com/shamouda/x10-formal-spec
- Formal specification for X10's termination detection protocols

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.