



Ricardo Dias

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Personal Data

Identity

Name Ricardo Jorge Freire Dias
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Professional Departamento de Informática
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Education

Academic Degrees

... Doctor of Computer Science

title **Maintaining the Correctness of Transactional Memory Programs**
date Nov 2013
supervisor Prof. João M. Lourenço
summary Conception and implementation of several static analysis algorithms to detect concurrency bugs that arise from the application of strategies, which are based on the decrease of transactions' size and on the relaxation of transactional isolation level, to increase the parallelism of transactional memory applications.

... Master of Computer Science

title **Cooperative Memory and Database Transactions**
date Nov 2008
supervisor Prof. João Lourenço
grade 17 points (out of 20)
summary Implementation of a model that guarantees the transactional properties of transactions that contain accesses to both shared memory and a database.

... Licenciata in Computer Science

date Sep 2007

grade 15 points (out of 20)

Awards and Fellowships

Nov 2012 **Best Paper Award**, @ HVC '2012.

The paper "Precise Detection of Atomicity Violations" [9] won the *Best Paper Award* by the Haifa Verification Conference (HVC) '2012 committee.

Aug 2012 **Distinguished Paper Award**, @ Euro-Par '2012.

The paper "Efficient Support for In-Place Metadata in Transactional Memory" [8] was given a *Distinguished Paper Award* by the Euro-Par '2012 committee.

2008 ⇒ 2012 **PhD Grant**, *Fundação para a Ciência e Tecnologia*.

Ref. SFRH/BD/41765/2007

Positions

In Academe

Mar 2013 ⇒ ... **Post-doc Researcher**, *Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.*

Mar 2007 ⇒ **Teaching Assistant**, *Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.*
⇒ 2013

Oct 2005 ⇒ **Classroom technical support and network maintainance support**, *Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.*
⇒ Feb 2007

Research Visits

Nov 2010 ⇒ **Visiting PhD Student**, *Computer Science Department, Queen Mary, University of London.*
⇒ Feb 2011

In Scientific Organizations

May 2009 ⇒ ... **Researcher at Centre for Informatics and Information Technologies (CITI)**, *Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.*
Member of the Transactional Systems research team. (<http://asc.di.fct.unl.pt/trxsys>).

Sep 2007 ⇒ **Researcher at Centre for Informatics and Information Technologies (CITI)**, *Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.*
⇒ Apr 2009
Member of the Parallel and Distributed Processing Systems research stream.

Sep 2006 ⇒ **Researcher at Centre for Informatics and Information Technologies (CITI)**, *Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.*
⇒ Jul 2007
Member of the Interactive Multimedia Group (IMG) research team.

Teaching

Undergraduate

- ... BSc in Computer Science @ FCT-UNL
- ... Integrated Master in Computers and Electronic Engineering @ FCT-UNL
- ... Integrated Master in Environment Engineering @ FCT-UNL

Student Supervision

Co-advisory of PhD students

Sep 2013 ⇒ ... **Tiago Marques Vale**, *Co-advised by Prof. João Lourenço*, Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.

Collaboration in the supervision of master students

Sep 2011 ⇒ ... **Tiago Marques Vale**, *A Modular Distributed Transactional Memory Framework*, Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.

This thesis aimed at developing a generic infrastructure for the executing of Java transactional memory programs in a distributed setting. Work supported by the Synergy-VM project.

Oct 2010 ⇒ **Vasco Pessanha**, *Practical Verification of Transactional Memory Programs (in Portuguese)*, Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 19/20 points.

This thesis aimed at detecting atomicity violation in transactional memory programs by static analysis of Java bytecode. Work supported by the Byzantium and Synergy-VM projects.

Feb 2009 ⇒ **Bruno Cavaca Teixeira**, *Static Detection of Anomalies in Transactional Memory Programs*, Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 19/20 points.

This thesis aimed at detecting atomicity violation in transactional memory programs by static analysis of Java source code. Work supported by the Byzantium project.

Participation in Projects and Scientific Networks

Projects

- ... **Participation as Assistant Researcher**

Mar 2011 ⇒ **Synergy-VM - A Blueprint for the Next Generation Execution Environments**, (PTDC/EIA-EIA/113613/2009), National basic research or R&D project funded by National Science Foundation (FCT) / PIDDAC, 115 K€, URL: <https://projectos.fct.unl.pt/projects/di-synergy-vm/wiki>.

This project aims at investigating how to ease the application development in clusters of multi-core machines. It proposes to provide a single system image to the programmer, based on the abstraction of the transactional memory, allowing the programs running on different cluster nodes to share a set of objects, and making use of the transactional paradigm to control the overall system consistency.

Participants (local coordinator): CITI (Dr. João Lourenço), Inesc-Id (Dr. Luís Veiga), Univ. Manchester (Prof. Ian Watson — advisor).

- Mar 2011 ⇒
⇒ Feb 2014 **RepComp — Replicated Components for Improved Performance or Reliability in Multi-core Systems**, (PTDC/EIA-EIA/108963/2008), National basic research or R&D project funded by National Science Foundation (FCT) / PIDDAC, 91 K€, PI: Dr. Nuno Preguiça, DI-FCT-UNL, URL: <http://citi.di.fct.unl.pt/project/project.php?id=77>.
Aims at investigating how the multiple processing units in emerging multicore platforms can be used to improve the performance and reliability of applications. The idea is to use these cores to run replicated components that use alternate implementations (algorithms, data structures, etc.). Performance will be improved by using the best implementation for a particular operation, while reliability will be improved by using the redundancy available.
Participants (local coordinator): CITI (Dr. Nuno Preguiça), INESC-Id (Dr. Luís Veiga), INRIA (Dr. Marc Shapiro – advisor).
- Jan 2008 ⇒
⇒ Jun 2011 **Byzantium — Efficient Byzantine fault-tolerant database replication**, (PTDC/EIA-EIA/108963/2008), National basic research or R&D project funded by National Science Foundation (FCT) / PIDDAC, 130 K€, PI: Dr. Nuno Preguiça, DI-FCT-UNL.
The central goal of this project is to build a replicated database system that tolerates Byzantine faults. The main challenge resides in the fact that Byzantine fault tolerance replication introduces a non-negligible performance overhead. This fact, combined with the necessity of the use of eager replication, has led to a low adoption of Byzantine fault tolerance in database replication. This project aims at developing novel techniques for improving the performance of Byzantine fault tolerant replicated databases.
Participants (local coordinator): CITI (Dr. Nuno Preguiça), INESC-Id (Dr. João Barreto), MPI (Dr. Rodrigo Rodrigues).

Services to the Scientific Community

... Program Committees

SLATE'13 **Symposium on Languages, Applications and Technologies**, Jun 2013, Porto, Portugal.

Reviewing of Scientific Publications

... Reviews of Papers Submitted to Conferences

CONCUR **International Conference on Concurrency Theory**, 2012

InForum **INForum — Portuguese Informatics Symposium**, 2011.

PPPJ **International Conference on the Principles and Practice of Programming in Java**, 2010.

CISIS **International Conference on Complex, Intelligent, and Software Intensive Systems**, 2009.

Participation in Conferences and Other Scientific Meetings

Participation in Conferences with Proceedings

>> *Conf ⇒ Participation includes the presentation of one or more articles. <<

Euro-Par'12 **European Conference on Parallel Processing**, Aug 2012, Rhodes, Greece.

ECOOP'12 **European Conference on Object-Oriented Programming**, Jun 2012, Beijing, China.

Participation in Meetings without Proceedings

>> *Conf ⇒ Participation includes the presentation of one or more articles. <<

WTM'13 **3rd Euro-TM Workshop on Transactional Memory**, Apr 2013, Prague, Czech Republic.
Funded by the Euro-TM COST IC1001 Network.

WTM'12 **2nd Euro-TM Workshop on Transactional Memory**, Apr 2012, Bern, Switzerland.
Funded by the Euro-TM COST IC1001 Network.

WDTM'12 **1st Workshop on Distributed Transactional Memories**, Feb 2012, Lisboa, Portugal.
Funded by the Euro-TM COST IC1001 Network.

WTM'11 **1st Euro-TM Workshop on Transactional Memory**, May 2012, Paris, France.
Funded by the Euro-TM COST IC1001 Network.

— Posters Presentation

Hotpar'11 **3rd USENIX Workshop on Hot Topics on Parallelism**, May 2012, Berkley, CA, USA.
HVC'10 **Haifa Verification Conference**, Nov 2010, Haifa, Israel.

— Demonstrations

SIGIR'07 **International ACM-SIGIR Conference on Research and development in information retrieval**, Jul 2007, Amsterdam, The Netherlands.

— Other Talks

Jan 2011 **Using Separation Logic to Detect Snapshot Isolation Anomalies in Software Transactional Memory**, *Computer Science Department, Queen Mary, University of Londond, UK.*

Dec 2009 **Unifying Memory and Database Transactions**, *Computer Science Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Portugal.*
Seminar CITI

Mar 2009 **A Transactional Model for Cluster Computing**, *HTDC'09 Winter School, La Plagne, France.*

Jan 2009 **Software Transactional Memory @ FCT/UNL**, *Computer Science Department, University of Manchester, UK.*
Seminar CITI

— Software Products and Prototypes

Sep 2012 **TribuSTM - Java STM Framework**, URL: <https://github.com/tvale/DeuceSTM>.
TribuSTM is an extension of the DeuceSTM transactional memory framework that implements the support of in-place metadata associated with each memory location. This support is implementend using Java bytecode instrumentation and is completely transparent for the programmer.

Jun 2011 **StarTM - Static Verifier of Write-Skew Anomalies**.
StarTM is a verification software that statically certifies that a transactional memory Java program, using snapshot isolation as isolation level at runtime, is free from write-skew anomalies. The verification process is a shape analysis technique based on separation logic.

Nov 2011 **MoTH: Practical Verification of High-Level Dataraces in Transactional Memory Programs**, URL: <http://projectos.fct.unl.pt/projects/di-moth>.
MoTH allows to detect atomicity violation in transactional memory Java-based programs that execute in strong atomicity, through static analysis of the Java bytecode programs. MoTH is an extensible and flexible framework, which can be extended with plugins that detect specific types of anomalies. Developed by Vasco Pessanha as part of his MSc thesis.

Apr 2010 **DeTraMA - Static Detection of Anomalies in Transactional Memory Programs**.
A tool to statically identify possible runtime anomalies in TM programs, addressing both low-level and high-level dataraces, the former resulting from unprotected code regions and the latter from incorrect definitions of a transaction's scope. Developed by Bruno Teixeira as part of his MSc thesis

Apr 2008 **JTraceView - Monitoring and Visualization of Transactional Memory Programs**.
JTraceView is a tool the logs the starting and ending of memory transactions and all the memory accesses within those memory transactions. This log is then used to visualize the program behavior, graphically displaying both statistical information and a time-space diagram.

Sep 2007 **InStory Server - backend of the InStory system**.
Server development to support storytelling, access, sharing and visualization of multimedia information. An important aspect of this work was the development of a domain specific language to describe interactive stories and the implementation of the respective runtime environment. Developed in the context of the Final Diploma Project for the Degree in Computer Science.

Development of the mobile interface (PDA — Windows Mobile) of the MEMORIA project. This interface has the purpose of being used while visiting points of interest, offering services of multimedia information retrieval.

Publications

Scientific Publications

--- Dissertations

- [1] R. J. Dias. “Maintaining the Correctness of Transactional Memory Programs”. PhD thesis. Universidade Nova de Lisboa, Nov. 2013.
- [2] R. J. Dias. “Cooperative Memory and Database Transactions”. MA thesis. Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Nov. 2008.

--- Journal Articles

- [3] R. J. Dias, T. M. Vale, and J. M. Lourenço. “Efficient support for in-place metadata in Java software transactional memory”. In: *Concurrency and Computation: Practice and Experience* 25.17 (2013), pp. 2394–2411.
- [4] J. M. Lourenço, D. Sousa, B. C. Teixeira, and R. J. Dias. “Detecting concurrency anomalies in transactional memory programs”. In: *Computer Science and Information Systems* 8.2 (Apr. 2011).
- [5] R. J. Dias, J. M. Lourenço, and G. Cunha. “Developing Libraries Using Software Transactional Memory”. In: *Computer Science and Information Systems* 5.2 (Dec. 2008), pp. 103–117.

--- Refereed Papers in Commercially Published Proceedings

- [6] T. M. Vale, R. J. Dias, and J. M. Lourenço. “On the Relevance of Total-Order Broadcast Implementations in Replicated Software Transactional Memories”. In: *MUSEPAT*. 2013, pp. 49–60.
- [7] R. J. Dias, D. Distefano, J. C. Seco, and J. M. Lourenço. “Verification of Snapshot Isolation in Transactional Memory Java Programs”. In: *Proceedings of the 26th European conference on Object-oriented programming*. ECOOP’12. Springer-Verlag, June 2012.
- [8] R. J. Dias, J. M. Lourenço, and T. M. Vale. “Efficient Support for In-Place Metadata in Transactional Memory (distinguished paper award)”. In: *Euro-Par ’12: Proceedings of the 18th international Euro-Par conference on Parallel Processing*. LNCS. Springer-Verlag, Aug. 2012.
- [9] R. J. Dias, V. Pessanha, and J. M. Lourenço. “Precise Detection of Atomicity Violations”. In: *Haifa Verification Conference*. 2012, pp. 8–23.
- [10] R. J. Dias, J. M. Lourenço, and N. Preguiça. “Efficient and Correct Transactional Memory Programs Combining Snapshot Isolation and Static Analysis”. In: *Proceedings of the 3rd USENIX conference on Hot topics in parallelism (HotPar’11)*. HotPar’11. Usenix Association, May 2011.
- [11] V. Pessanha, R. J. Dias, J. M. Lourenço, E. Farchi, and D. Sousa. “Practical Verification of Transactional Memory Programs”. In: *Proceedings of PADTAD 2011: Workshop on Parallel and Distributed Testing, Analysis and Debugging*. ACM Electronic Library, July 2011.
- [12] R. J. Dias, J. C. Seco, and J. M. Lourenço. “Snapshot Isolation Anomalies Detection in Software Transactional Memory”. In: *Proceedings of InForum 2010*. Universidade do Minho, Sept. 2010.
- [13] B. C. Teixeira, J. M. Lourenço, E. Farchi, R. J. Dias, and D. Sousa. “Detection of Transactional Memory Anomalies using Static Analysis”. In: *Proceedings of the International Workshop on Parallel and Distributed Systems: Testing, Analysis, and Debugging*. Ed. by S. U. João Lourenço Eitan Farchi. ACM Electronic Library, July 2010, pp. 26–36.
- [14] R. J. Dias and J. M. Lourenço. “Unifying Memory and Database Transactions”. In: *Euro-Par ’09: Proceedings of the 15th international Euro-Par conference on Parallel Processing*. Delft, The Netherlands: Springer-Verlag, Aug. 2009.

- [15] J. M. Lourenço, R. J. Dias, J. Luís, M. Rebelo, and V. Pessanha. “Understanding the Behavior of Transactional Memory Applications”. In: *PADTAD '09: Proceedings of the 2009 ACM workshop on Parallel and distributed systems: testing and debugging*. Chicago, Illinois: ACM, 2009.
- [16] G. Cunha, J. M. Lourenço, and R. J. Dias. “Consistent State Software Transactional Memory”. In: *IV Jornadas de Engenharia de Electrónica e Telecomunicações e de Computadores*. Ed. by I. 9789729580949. ISEL - Instituto Superior de Engenharia de Lisboa, Nov. 2008, pp. 251–256.
- [17] R. J. Dias, J. M. Lourenço, and G. Cunha. “Developing Libraries Using Software Transactional Memory”. In: *Proceedings of CoRTA (Compilers, Related Technologies and Applications)*. URL=<http://corta.ipb.pt>. Instituto Politécnico de Bragança - ESTG, July 2008.
- [18] R. Jesus, R. J. Dias, R. Frias, A. Abrantes, and N. Correia. “Memoria Mobile: Sharing Pictures of a Point of Interest”. In: *AVI '08: Proceedings of the working conference on Advanced visual interfaces*. Napoli, Italy: ACM, May 2008.
- [19] R. J. Dias, R. Jesus, R. Frias, and N. Correia. “Mobile interface of the memoria project”. In: *SIGIR '07: Proceedings of the 30th annual international ACM SIGIR conference on Research and development in information retrieval*. Amsterdam, The Netherlands: ACM, July 2007, pp. 904–904. ISBN: 978-1-59593-597-7. DOI: <http://doi.acm.org/10.1145/1277741.1277972>.
- [20] R. Jesus, R. J. Dias, R. Frias, and N. Correia. “Sharing Personal Experiences while Navigating in Physical Spaces”. In: *5th Workshop on Multimedia Information Retrieval in 30th international ACM Information Retrieval Conf (SIGIR, Amsterdam, Netherlands)*. July 2007.
- [21] R. Jesus, R. J. Dias, R. Frias, and N. Correia. “Geographic image retrieval in mobile guides”. In: *GIR '07: Proceedings of the 4th ACM workshop on Geographical information retrieval*. Lisbon, Portugal: ACM, Oct. 2007, pp. 37–38. ISBN: 978-1-59593-828-2. DOI: <http://doi.acm.org/10.1145/1316948.1316958>.

--- Technical Reports

- [22] R. J. Dias. *Sistema para suporte de narrativas, acesso, partilha e visualização de informação multimédia*. Diploma Project Report. Departamento de Informática, Faculdade de Ciências e Tecnologia, UNL, Sept. 2007.