Curriculum Vitae

Nuno Antunes

01 October 2016

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1. Summary

Nuno Manuel dos Santos Antunes, son of José Almeida Antunes and Maria do Carmo dos Santos, was born in *Freguesia de Vila Nova*, Council of Miranda do Corvo and District of Coimbra on the 18th of October 1985.

Contact Information
E-mail: nmsa@dei.uc.pt

Academic degree: PhD in Information Science and Technology, obtained at the Faculty of Sciences and Technology of the University of Coimbra, March 20, 2014.

Five selected publications:

- Nuno Antunes and Marco Vieira, *"Assessing and Comparing Vulnerability Detection Tools for Web Services: Benchmarking Approach and Examples"*, IEEE Transactions on Services Computing, vol. 8, no. 2, 2015. (impact factor: 3.049)

  In this work, published in one of the top journals in the Services area, we propose a complete and matured approach to define benchmarks for vulnerability detection tools for web services. The approach is instantiated in two different benchmarks, which were used in two campaigns to assess and compare several vulnerability detection tools.

- Nuno Antunes and Marco Vieira, *"On the Metrics for* Benchmarking *Vulnerability Detection Tools"*, The 45th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2015), Rio de Janeiro, Brazil, June 22-25, 2015. (acceptance rate: 21.8%)

  This paper was published in the premier conference in the Dependability Area and presents a discussion on the metrics that can be used in benchmarks for vulnerability detection tool. The analysis revealed that the metrics usually used are not always the best alternative and the selection of the metrics depends on the usage scenario.

- Nuno Antunes and Marco Vieira, *"Penetration Testing in Web Services"*, IEEE Computer, vol. 47, no. 02, ISSN: 0018-9162, IEEE, pp. 30-36, Feb. 2014, DOI:10.1109/MC.2013.409. (impact factor: 1.443)

  In this work, published in a top IEEE magazine, we present the problem of penetration testing in web services and the discuss the lessons learned from using well known commercial automated testing tools through more than 5 years, with focus on their real effectiveness and what can be done to improve it.

- Nuno Antunes and Marco Vieira, *"Enhancing Penetration Testing with Attack Signatures and Interface Monitoring for the Detection of Injection Vulnerabilities in Web Services"*, IEEE 8th International Conference on Services Computing (SCC 2011), Washington, D.C., USA: IEEE Press, ISBN: 978-1-4577-0863-3, July 4-9, 2011, DOI:10.1109/SCC.2011.67. (acceptance rate: 15.9%)

  In this work, published in one of the top conferences in the Services area, we propose a new technique to detect injection vulnerabilities in web services. The innovations introduced allow the approach to perform much better than state of the art tools while being available to be used in most of the scenarios.

- Nuno Antunes and Marco Vieira, *"Benchmarking Vulnerability Detection Tools for Web Services"*, IEEE 8th International Conference on Web Services (ICWS 2010), Miami, Florida, USA: IEEE Computer Society, ISBN: 978-1-4244-8146-0, July 5-10, 2010, DOI:10.1109/ICWS.2010.76. (acceptance rate: 17.6%)

  *In this work, published in one of the top conferences in the Web Services area, we propose the first complete approach to benchmark vulnerability detection tools for web services. The work was distinguished with the **best paper award** of the conference.*

Nuno Antunes is an **Assistant Professor at the Department of Informatics Engineering of the University of Coimbra** since September 2016. Since 2008 he has been with the Centre for Informatics and Systems of the University of Coimbra (CISUC). His research focuses on the development of secure and dependable software for applications and services, clouds, data management systems and virtualized environments.

Nuno Antunes submitted his PhD thesis in September 2013 and obtained his PhD degree in March 2014. He has authored a total of **38 publications**, in particular: **4** journal papers; **6** book chapters; **17** international conference papers (11 in tier A[1] conferences and the remaining 6 in conferences with peer-reviewing processes and with acceptance rates, in general, close to 35%); **4** workshop papers; **3** fast–abstracts; **2** theses; **2** technical reports and **5** posters. These publications have been cited **at least 289 times**. He participated in **10 research projects (7 international),** including **2 H2020 and 3 FP7 projects,** is currently involved in a **COST Action** and is member of the SPEC Research Group. Nuno Antunes is co-author of 3 scientific prototypes and participated in 12 international conferences where he presented **2 tutorials, 8 papers and 2 short papers**. He contributed to the organization of **3 scientific events**, and was member of the **program committee of 5 international conferences (4 tier A) and 2 international workshops**, and served as referee for other **26 conferences and 8 journals**.

At pedagogic level, Nuno Antunes was, as **invited assistant**, responsible for teaching the theoretical-practical classes of the *Databases* course at the Department of Informatics Engineering of the University of Coimbra in the 2014/2015 and 2015/2016 academic years. In 2015/2016, he was also lecturing practical classes of *Software Engineering*. As **visiting professor** at the Federal University of Alagoas (UFAL) he coordinated the second half of classes of the course on *Software Engineering* in the context of the Master in Informatics program. He has successfully supervised one MSc student and currently supervises 2 MSc research students at the CISUC-SSE and **3 MSc students in the context of international collaborations**. He was invited to present 10 seminars and workshops, 9 of which targeting an audience outside his host institution, including 8 outside Portugal.

*The **text in color** in the digital version of this document is a reference to a resource. All resources can be found under the 'resources' directory in the digital version of this document.*

[1] The conference ranking followed by this document is the Computing Research and Education Association of Australasia (CORE2014) – Excellence in Research for Australia (ERA), available at http://core.edu.au

2. Personal Information

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3. Education and Academic Degrees

[Sep 2009 – Mar 2014] PhD in Information Science and Technology, University of Coimbra – Portugal.

The thesis, entitled *"Software Vulnerability Detection in Service-Based Infrastructures: Techniques and Tools"*, was defended in March 20, 2014, with the final classification of *"Aprovado com Distinção e Louvor"*. The work has been conducted under supervision of Prof. Marco Vieira.
Work funded by the PhD individual scholarship SFRH/BD/65117/2009, granted by the Portuguese Foundation for Science and Technology from Ministry of Science, Technology and Higher Education (FCT-MCTES).

[Sep 2007 – Jul 2009] MSc in Informatics Engineering, University of Coimbra – Portugal.

The thesis, entitled *"Evaluating Web Services Security"*, was defended on the July 23, 2009, with the final thesis classification of 19 (out of 20). MSc concluded with a final grade of 17 (out of 20). The work has been conducted under supervision of Prof. Marco Vieira.

[Sep 2003 – Jul 2007] BSc in Informatics Engineering, University of Coimbra – Portugal.

The bachelor program consists on a three years engineering degree, concluded with a final classification of 14 (out of 20).

4. Professional Experience

[Sep 2016 – Now] Assistant Professor, Department of Informatics Engineering, *University of Coimbra*

Lecturing Practical (P) classes on *'Operating Systems'* and *'Databases'* of the Bachelor's degree in Informatics Engineering.

[Jan 2016 – Aug 2016] Postdoctoral Research Fellow, *University of Coimbra*

[Sep 2015 – Feb 2016] Teaching Assistant, Department of Informatics Engineering, *University of Coimbra*

Lecturing Practical (P) classes on *'Software Engineering'* and Theoretical-Practical (TP) classes on *'Databases'* of the Bachelor's degree in Informatics Engineering.

[May 2015 – Aug 2015] Visiting Professor, Institute of Computing of the *Federal University of Alagoas*

Responsible for the second part of the discipline on *'Software Engineering'* in the UFAL's Master in Informatics program, covering topics of Secure and Dependable development of systems.

[Sep 2014 – Feb 2015] Teaching Assistant, Department of Informatics Engineering, *University of Coimbra*

Lecturing the Theoretical-Practical (TP) classes on *'Databases'* of the Bachelor's degree in Informatics Engineering.

[Jun 2014 – Jun 2015] Postdoctoral Research Fellow, *University of Coimbra*

In the context of the project "V-SIS: Validation of Critical Systems".

[May 2014 – Jul 2014] Visiting Researcher, Institute of Computing of the *Federal University of Alagoas*

[Oct 2013 – Dec 2013] Visiting Researcher, Coordinated Science Laboratory of the *University of Illinois at Urbana-Champaign*

During his PhD was visiting researcher in the Coordinated Science Lab of the UIUC working under supervision of the Prof. Ravishankar K. Iyer.

[Sep 2009 – Mar 2014] PhD Student, *University of Coimbra*

Under supervision of Prof. Marco Vieira.

[Aug 2008 – Now] Researcher, Software and Systems Engineering Group of the *Centre for Informatics and Systems of the University of Coimbra*

[Nov 2007 – Jul 2008] Junior Software Engineer, *Critical Software, S.A.*

During his MSc in Informatics Engineering he accumulated a full-time internship as a **junior software engineer** working on the research and development project ADW.

5. Scientific Activity

This section presents Nuno Antunes' scientific activity, with emphasis to *published work*, *indicators of scientific recognition*, *participation in research projects*, and *intervention in the scientific community*.

Nuno Antunes had his first contact with research in 2007 with the participation in the development team of a Research & Development project.

His effective research activity started in September 2008, in the context of the work for his MSc thesis. Since this date he has been a member of the Software and Systems Engineering Group (SSE) of the Centre for Informatics and Systems of the University of Coimbra (CISUC). His research activities target the dependability and security of systems with focus on web services, SOAs and virtualized environments. He collaborated in several national and international research projects.

5.1. Publications

Nuno Antunes has authored or co-authored a total of 44 publications. This section presents all publications, including: journal papers (JP), book chapters (BC), conference papers (CP), workshop papers (WP), short paper (SP), technical reports (TR), project deliverables (PD), posters (PO), and theses (TH).

5.1.1. Journal Papers

JP4 Nuno Antunes and Marco Vieira, *"Designing Vulnerability Testing Tools for Web Services: Approach, Components, and Tools"*, International Journal of Information Security, ISSN: 1615-5262, Springer;
JCR Impact factor: 0.963

JP3 Nuno Antunes and Marco Vieira, *"Assessing and Comparing Vulnerability Detection Tools for Web Services: Benchmarking Approach and Examples"*, IEEE Transactions on Services Computing, vol. 8, no. 2, pp. 269–283, 2015.
JCR Impact factor: 3.049 Cited by (2)

JP2 Nuno Antunes and Marco Vieira, *"Penetration Testing in Web Services"*, IEEE Computer, ISSN: 0018-9162, IEEE, Feb. 2014, DOI: 10.1109/MC.2013.409.
JCR Impact factor: 1.443 Cited by (5)

JP1 Nuno Antunes and Marco Vieira, *"Defending against Web Application Vulnerabilities"*, IEEE Computer, vol. 45, no. 2, ISSN: 0018-9162, IEEE, pp. 66-72, Feb. 2012, DOI:10.1109/MC.2011.259.
JCR Impact factor: 1.443 Cited by (29)
Selected by IEEE Computer Society to appear in ***InfoQ****:* *infoq.com/articles/defending-against-web-application-vulnerabilities*

5.1.2. Book Chapters

BC6 Nuno Antunes and Marco Vieira, "Security Testing in SOAs: Techniques and Tools", in *Innovative technologies for dependable OTS-based critical systems*, Springer Milan, (Eds. Domenico Cotroneo), 2013, pp. 159-174, DOI:10.1007/978-88-470-2772-5_12.
Cited by (2)

BC5 Aniello Napolitano (**SESM S.c.a.r.l.**, Italy), Gabriella Carrozza (SESM, Italy), Nuno Antunes and João Durães, "Survey on software faults injection in Java applications", in *Innovative technologies for dependable OTS-based critical systems*, Springer Milan, (Eds. Domenico Cotroneo), 2013, pp. 101–114, DOI:10.1007/978-88-470-2772-5_8.
Cited by (1)

BC4 Marco Vieira and Nuno Antunes, "Introduction to Software Security Concepts", in *Innovative technologies for dependable OTS-based critical systems*, Springer Milan, (Eds. Domenico Cotroneo), 2013, pp. 29-38, DOI:10.1007/978-88-470-2772-5_3.
Cited by (0)

BC3 Zoltán Micskei (**Budapest University of Technology and Economics (BME),** Hungary), Henrique Madeira, István Majzik (BME, Hungary), Alberto Avritzer (**Siemens Corporate Research,** EUA) Marco Vieira and Nuno Antunes, "Robustness Testing Techniques and Tools", in *Resilience Assessment and Evaluation: Past, Current and Future Trends*, Springer-Verlag Berlin Heidelberg, (Eds. Katinka Wolter, Alberto Avritzer, Marco Vieira, Aad van Moorsel), 2012, pp. 323–339, DOI:10.1007/978-3-642-29032-9_16.
Cited by (1)

BC2 Nuno Antunes and Marco Vieira, "Detecting Vulnerabilities in Web Services: Can Developers Rely on Existing Tools?", in *Performance and Dependability in Service Computing: Concepts, Techniques and Research Directions*, ISBN: 978-1-609-60794-4, (Eds. Valeria Cardellini, Emiliano Casalicchio, Kalinka C. Branco, Julio C. Estrella, and Francisco J. Monaco), IGI Global, June 2011, pp. 402–426, DOI:10.4018/978-1-60960-794-4.ch018.
Cited by (1)

BC1 Douglas Rodrigues (**University of São Paulo** - São Carlos **(USP)**, Brasil), Júlio Estrella (USP, Brasil), Nuno Antunes, Francisco Mónaco (USP, Brasil), Kalinka Branco (USP, Brasil), Marco Vieira, "Engineering Secure Web Services", in *Performance and Dependability in Service Computing: Concepts, Techniques and Research Directions*, ISBN: 978-1-609-60794-4, (Eds. Valeria Cardellini, Emiliano Casalicchio, Kalinka C. Branco, Julio C. Estrella, and Francisco J. Monaco), IGI Global, June 2011, pp. 360-380, DOI:10.4018/978-1-60960-794-4.ch016.
Cited by (6)

5.1.3. Papers in International Conferences

The papers presented in this section where published in the proceedings of international conferences that follow a rigorous peer reviewing process. It includes papers published in the most important conferences in the dependability, services and software reliability areas, namely DSN (IEEE/IFIP Dependable Systems and Networks Conference), ICWS (IEEE International Conference on Web Services) and SCC (IEEE International Conference on Services Computing), and the International Symposium on Software Reliability Engineering (ISSRE). These conferences are the most selective on their areas (DSN and ISSRE have rejection rates typically above 75%, ICWS and SCC reject typically more than 80% of the submitted papers).

CP17 Aleksandar Milenkoski (**University of Würzburg**, Germany), K. R. Jayaram (**IBM Research**, USA), Nuno Antunes, Marco Vieira, Samuel Kounev (University of Würzburg, Germany), *"Quantifying the Attack Detection Accuracy of Intrusion Detection Systems in Virtualized Environments"*, The 27th IEEE International Symposium on Software Reliability Engineering (ISSRE 2016), October 23-27, 2016, Ottawa, Canada.

Acceptance Rate: 34.6% (45/130) Cited by (0) CORE Rank: A

CP16 Ana Paula Sayuri Matsunaga (**Centro de Pesquisa e Desenvolvimento em Telecomunicaes (CPqD)**, Brazil), Regina Moraes (**University of Campinas (Unicamp)**, Brazil), Nuno Antunes, *"Coverage Metrics and Detection of Injection Vulnerabilities: An Experimental Study"*, 12th European Dependable Computing Conference (EDCC 2016), Gothenburg, Sweden, September 5-9, 2016.

Acceptance Rate: ??% (??/??) Cited by (0) CORE Rank: N/A

CP15 Luis Ventura, Nuno Antunes *"Experimental Assessment of NoSQL Engines Dependability"*, 12th European Dependable Computing Conference (EDCC 2016), Gothenburg, Sweden, September 5-9, 2016.

Acceptance Rate: ??% (??/??) Cited by (0) CORE Rank: N/A

CP14 Henrique Alves (**Federal University of Alagoas (UFAL)**, Brazil), Baldoino Fonseca (UFAL, Brazil), Nuno Antunes *"Software Metrics and Security Vulnerabilities: Dataset and Exploratory Study"*, 12th European Dependable Computing Conference (EDCC 2016), Gothenburg, Sweden, September 5-9, 2016.

Acceptance Rate: ??% (??/??) Cited by (0) CORE Rank: N/A

CP13 Aleksandar Milenkoski (**University of Würzburg**, Germany), Bryan D. Payne (**Netflix Inc.**, USA), Nuno Antunes, Marco Vieira, Samuel Kounev (University of Würzburg, Germany), Alberto Avritzer (**Siemens Corporate Research**, USA) and Matthias Luft (**Enno Rey Netzwerke GmbH**, Germany), *"Evaluation of Intrusion Detection Systems in Virtualized Environments Using Attack Injection"*, The 18th International Symposium on Research in Attacks, Intrusions and Defenses (RAID 2015), Kyoto, Japan, November 2-4, 2015.

Acceptance Rate: ??% (??/??) Cited by (0) CORE Rank: A

CP12 Lucas Amorim (**Federal University of Alagoas (UFAL)**, Brazil), Baldoino Fonseca (UFAL, Brazil), Nuno Antunes, Márcio Ribeiro (UFAL, Brazil), Evandro Costa (UFAL, Brazil), *"Experience Report: Evaluating the Effectiveness of Decision Trees for*

Detecting Code Smells", The 26th IEEE International Symposium on Software Reliability Engineering (ISSRE 2015), Gaithersburg, MD, USA, November 2-5, 2015.
Acceptance Rate: 29.5% (49/166) Cited by (0) CORE Rank: A

CP11 Nuno Antunes and Marco Vieira, *"On the Metrics for Benchmarking Vulnerability Detection Tools"*, The 45th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2015), Rio de Janeiro, Brazil, June 22-25, 2015.
Acceptance Rate: 21.8% (50/229) Cited by (0) CORE Rank: A

CP10 Aleksandar Milenkoski (**Karlsruhe Institute of Technology (KIT)**, Germany), Bryan D. Payne (**Nebula Inc.**, USA), Nuno Antunes, Marco Vieira, Samuel Kounev (KIT, Germany), *"An Analysis of Hypercall Handler Vulnerabilities "*, The 25th IEEE International Symposium on Software Reliability Engineering (ISSRE 2014), Naples, Italy, November 3-6, 2014.
Acceptance Rate: 25.0% (31/124) Cited by (1) CORE Rank: A

CP9 Tânia Basso (**University of Campinas (Unicamp)**, Brazil), Nuno Antunes, Regina Moraes (Unicamp, Brazil), and Marco Vieira, *"An XML-based Policy Model for Access Control in Web Applications"*, 24th International Conference on Database and Expert Systems Applications, Prague, Czech Republic, August 26-29, 2013, DOI:10.1007/978-3-642-40173-2_23.
Acceptance Rate: ??.?% (?/?) Cited by (0) CORE Rank: B

CP8 Nuno Antunes and Marco Vieira, *"SOA-Scanner: An Integrated Tool to Detect Vulnerabilities in Service-Based Infrastructures"*, *10th International Conference on Services Computing (SCC 2013)*, Santa Clara, CA, USA, June 27-July 2, 2013, DOI:10.1109/SCC.2013.28.
Acceptance Rate: 18% (?/?) Cited by (2) CORE Rank: A

CP7 Nuno Antunes and Marco Vieira, "*Evaluating and Improving Penetration Testing in Web Services"*, 23rd IEEE International Symposium on Software Reliability Engineering (ISSRE 2012), Dallas, TX, USA, November 27-30, 2012, DOI:10.1109/ISSRE.2012.26.
Acceptance Rate: 30.4% (38/125) Cited by (3) CORE Rank: A

CP6 Nuno Antunes and Marco Vieira, *"Enhancing Penetration Testing with Attack Signatures and Interface Monitoring for the Detection of Injection Vulnerabilities in Web Services"*, IEEE 8th International Conference on Services Computing (SCC 2011), Washington, D.C., USA: IEEE Press, ISBN: 978-1-4577-0863-3, July 4-9, 2011, DOI:10.1109/SCC.2011.67.
Acceptance Rate: 15.9% (27/170) Cited by (11) CORE Rank: A

CP5 Nuno Antunes and Marco Vieira, *"Benchmarking Vulnerability Detection Tools for Web Services"*, IEEE 8th International Conference on Web Services (ICWS 2010), Miami, Florida, USA: IEEE Computer Society, ISBN: 978-1-4244-8146-0, July 5-10, 2010, DOI:10.1109/ICWS.2010.76.
Acceptance Rate: 17.6% (39/222) Cited by (22) CORE Rank: A

CP4 Nuno Antunes and Marco Vieira, *"Comparing the Effectiveness of Penetration Testing and Static Code Analysis on the Detection of SQL Injection Vulnerabilities in Web*

Services", IEEE 15th Pacific Rim International Symposium on Dependable Computing (PRDC'09), Shanghai, China: IEEE Press, ISBN: 978-0-7695-3849-5, November 16-18, 2009, DOI:10.1109/PRDC.2009.54.

Acceptance Rate: ? % (?/?) Cited by (38) CORE Rank: B

CP3 Nuno Antunes, Nuno Laranjeiro, Marco Vieira, and Henrique Madeira, *"Effective Detection of SQL/XPath Injection Vulnerabilities in Web Services,"* IEEE International Conference on Services Computing (SCC 2009), 260-267, Bangalore, India: IEEE Computer Society, ISBN: 978-0-7695-3811-2, September 21-25, 2009, DOI:10.1109/SCC.2009.23.

Acceptance Rate: 18.5% (35/189) Cited by (42) CORE Rank: A

CP2 Nuno Antunes and Marco Vieira, *"Detecting SQL Injection Vulnerabilities in Web Services",* Fourth Latin-American Symposium on Dependable Computing (LADC 2009), João Pessoa, Paraíba, Brazil: IEEE Press, ISBN: 978-1-4244-4678-0, September 1-4, 2009, DOI:10.1109/LADC.2009.21.

Acceptance Rate: 39.0% (17/43) Cited by (36) CORE Rank: N/A

CP1 Marco Vieira, Nuno Antunes and Henrique Madeira, *"Using Web Security Scanners to Detect Vulnerabilities in Web Services",* 39th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2009), Estoril, Lisbon, Portugal: IEEE Press, ISBN: 978-1-4244-4422-9, June 29-July 2, 2009, DOI:10.1109/DSN.2009.5270294.

Acceptance Rate: 24.2% (63/260) Cited by (84) CORE Rank: A

5.1.4. Papers in International Workshops

WP4 Tania Basso (**University of Campinas (Unicamp)**, Brazil), Leandro Piardi (Unicamp, Brazil), Regina Moraes (Unicamp, Brazil), Mario Jino (Unicamp, Brazil), Nuno Antunes, Marco Vieira, "A Database Framework for Expressing and Enforcing Personal Privacy Preferences", **Workshop Paper**, XVI Workshop de Testes e Tolerância a Falhas (WTF 2015) co-located with the XXXIII Simpósio Brasileiro de Redes de Computadores e Sistemas Distribuídos (SBRC 2015), 18 May, 2015.

WP3 Cristiana Areias, Nuno Antunes, João Cunha *"On Applying FMEA to SOAs: A Proposal and Open Challenges"*, **Workshop Paper**, 6th International Workshop on Software Engineering for Resilient Systems (SERENE'14), Budapest, Hungary, October 15-16, 2014.

WP2 Fabio Duchi (**Resiltech S.r.l.,** Italy), Nuno Antunes, Andrea Ceccarelli (**University of Florence,** Italy), Giuseppe Vella (**Engineering Ing. Informatica S.p.A.**, Italy), Francesco Rossi (Resiltech S.r.l., Italy), Andrea Bondavalli (University of Florence, Italy) *"Cost-Effective Testing for Critical Off-The-Shelf Services"*, **Workshop Paper**, 1st International Workshop on DEvelopment, Verification and VAlidation of cRiTical Systems (DEVVARTS2014) co-located with the 33rd International Conference on Computer Safety, Reliability and Security (SafeComp 2014), Florence, Italy, Septembre 10-12, 2014.

WP1 Nuno Antunes, Francesco Brancati (**Resiltech S.r.l.,** Italy), Andrea Ceccarelli (**University of Florence,** Italy), Andrea Bondavalli (University of Florence, Italy), Marco Vieira *"A Monitoring and Testing Framework for Critical Off-The-Shelf Applications and Services"*, **Workshop Paper**, 3rd IEEE International Workshop on Software Certification (WoSoCer2013) co-located with the 24rd IEEE International

Symposium on Software Reliability Engineering (ISSRE 2013), Pasadena, CA, USA, November 18-21, 2013.

5.1.5. Short papers

SP3 Diogo Carvalho, Nuno Antunes, Marco Vieira, Aleksandar Milenkoski (**University of Würzburg**, Germany), Samuel Kounev (University of Würzburg, Germany), "Challenges of Assessing the Hypercall Interface Robustness", **Fast Abstract**, The 45th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2015), Rio de Janeiro, Brazil, June 22-25, 2015.

SP2 Cristiana Areias, Nuno Antunes, João Cunha and Marco Vieira *"Towards Runtime V&V for Service Oriented Architectures"*, **Fast Abstract**, *Sixth Latin-American Symposium on Dependable Computing (LADC 2013),* Rio de Janeiro, Brazil, April 1-5, 2013.

SP1 Nuno Antunes and Marco Vieira *"Detecting Vulnerabilities in Service Oriented Architectures"*, **Student Forum**, 23rd IEEE International Symposium on Software Reliability Engineering (ISSRE 2012), Dallas, TX, USA, November 27-30, 2012.

5.1.6. Technical reports

TR2 Aleksandar Milenkoski (**Karlsruhe Institute of Technology (KIT)**, Germany), Marco Vieira, Bryan D. Payne (**Nebula Inc.**, USA), Nuno Antunes, Samuel Kounev (KIT, Germany) *"Technical Information on Vulnerabilities of Hypercall Handlers"*, Technical Report SPEC-RG-2014-001 v.1.0, SPEC Research Group - IDS Benchmarking Working Group, Standard Performance Evaluation Corporation (SPEC), August 2014.

TR1 Aleksandar Milenkoski (**Karlsruhe Institute of Technology (KIT)**, Germany), Samuel Kounev (KIT, Germany), Alberto Avritzer (**Siemens Corporate Research**, USA), Nuno Antunes, Marco Vieira *"On Benchmarking Intrusion Detection Systems for Virtualized (Cloud) Environments"*, Technical Report SPEC-RG-2013-002 v.1.0, SPEC Research Group - IDS Benchmarking Working Group, Standard Performance Evaluation Corporation (SPEC), June 2013.

Cited by (2)

5.1.7. Project deliverables

DEsign, Verification and VAlidation of large scale, dynamic Service SystEmS – RP6

PD6 Andrea Ceccarelli, Andrea Bondavalli, Ariadne Carvalho, Cristiana Areias, Daniel Vecchiato, Eliane Martins, Enrico Schiavone, Lucas Carvalho Leal, Marco Vieira, Nuno Antunes, Tommaso Zoppi. **"***Prototype checker component scenarios & requirements"*, DEVASSES Deliverable 3.1.

PD5 Nuno Laranjeiro, Andrea Ceccarelli, Cecilia Rubira, Cristiana Areias, Eliane Martins, Leonardo Montechi, Nuno Antunes, Regina Moraes, Rômulo Carvalho, *"State of the art, scenarios and requirements"*, DEVASSES Deliverable 1.1.

PD4 Nuno Antunes, *"Website Description"*, DEVASSES Deliverable 6.2.

Certification of Critical Systems – RP5

PD3 "*Analysis of the interaction between safety and security concerning certified systems*", CECRIS Deliverable 1.2.

Critical Software Technology for an Evolutionary Partnership – RP2

PD2 João Cunha, Marco Vieira, Henrique Madeira, Nuno Laranjeiro, José Fonseca, Nuno Antunes, *"Quantitative methods and procedures for assessment of OTS based software systems"*, Critical STEP Deliverable 3.2.

PD1 Marco Vieira, Henrique Madeira, Nuno Antunes, Nuno Laranjeiro, João Durães, José Fonseca, João Cunha and Nuno Silva, *"Quantitative methods for assessment of OTS software components"*, Critical STEP Deliverable 3.1.

5.1.8. Poster presentations

PO5 Nuno Antunes and Marco Vieira, "SOA-Scanner: An Integrated Tool to Detect Vulnerabilities in Service-Based Infrastructures", CISUC Workshop 2014 – "CISUC 2015–2020" Coimbra, Portugal, September 23-24, 2014.

PO4 Aleksandar Milenkoski (**Karlsruhe Institute of Technology (KIT)**, Germany), Bryan D. Payne (**Nebula Inc.**, USA), Nuno Antunes, Marco Vieira, Samuel Kounev (Karlsruhe Institute of Technology (KIT), Germany), *"HInjector: Injecting Hypercall Attacks for Evaluating VMI-based Intrusion Detection Systems"*, 2013 Annual Computer Security Applications Conference (ACSAC 2013), New Orleans, Louisiana, USA, December 9-13, 2013. **(poster)**

Cited by (1)

PO3 Nuno Antunes and Marco Vieira, "SOA-Scanner: An Integrated Tool to Detect Vulnerabilities in Service-Based Infrastructures", 10th International Conference on Services Computing (SCC 2013), Santa Clara, CA, USA, June 27-July 2, 2013.

PO2 Nuno Antunes, "Methodologies and Tools for the Development of Non-vulnerable Web Services", National Week of Science and Technology, Faculty of Sciences and Technology of the University of Coimbra, Coimbra, Portugal, November 23, 2010.

PO1 Nuno Antunes, Nuno Laranjeiro, Marco Vieira, and Henrique Madeira, "Can We Trust Vulnerability Detection Tools for Web Services?" Innovation Forum on Security and Critical Infrastructure Protection (NET-SCIP), Information and Communication Technologies, Carnegie Mellon|Portugal – An International Partnership, Coimbra, Portugal, February 22, 2010.

5.1.9. Theses

TH2 Nuno Antunes, *"Software Vulnerability Detection in Service-Based Infrastructures: Techniques and Tools"*, MSc Thesis, University of Coimbra, Portugal, March 2009. (Submitted in September 2013)

TH1 Nuno Antunes, *"Evaluating Web Services Security"*, MSc Thesis, University of Coimbra, Portugal, July 2009.

5.1.10. Scientific tools and prototypes

TO3 **Sign-WS:** a tool *"Attack Signatures and Interface Monitoring for the Detection of Injection Vulnerabilities in Web Services"*,
The paper presenting it was published in the IEEE 8th International Conference on Services Computing (SCC 2011), Washington, D.C., USA, July 4-9, 2011.
Publicly available for download: http://eden.dei.uc.pt/~mvieira/signws.zip

TO2 **RAD-WS:** a tool for the detection of injection vulnerabilities based on anomalies in the internal behavior of the applications under test.
The paper presenting it was published in the IEEE International Conference on Services Computing (SCC 2009), 260-267, Bangalore, India, September 21-25, 2009.
Publicly available for download: http://eden.dei.uc.pt/~mvieira/civs-ws.zip

TO1 **IPT-WS:** an improved penetration testing tool to detect SQL injection vulnerabilities in web services.
The paper presenting it was published in the Fourth Latin-American Symposium on Dependable Computing (LADC 2009), João Pessoa, Paraíba, Brazil, September 1-4, 2009.
Publicly available for download: http://eden.dei.uc.pt/~mvieira/vs_ws.zip

5.1.11. Presentations and scientific meetings attended

International Conferences Program Committee Meetings

- Remote Participation, July 14-15, 2016. **Program Committee Meeting** to select the papers to appear in the *27th IEEE International Symposium on Software Reliability Engineering (ISSRE 2016)*.
- Raleigh, NC, USA, August 4-5, 2015. **Program Committee Meeting** to select the papers to appear in the *26th IEEE International Symposium on Software Reliability Engineering (ISSRE 2015)*.

Scientific groups meetings

As invited participant:

- "68th IFIP WG 10.4 Meeting", IFIP Working Group 10.4 on Dependable Computing and Fault Tolerance, June 26-27, Buzios, Brazil.

As a Member of COST Action IC1402 - ARVI (see Section 5.4.4):

- "Consolidation Meeting", Tallinn, Estonia, December 10-11, 2015.
- "ARVI@RV", Vienna, Austria, September 21, 2015.
- "ARVI Kick-off Meeting", Valleta, Malta, April 9-10, 2015.

As a Member of SPEC Research Group (see Section 5.4.4):

- "IDS Benchmarking Working Group Face-to-Face Meeting", at the sixth SPEC Research Group Annual Meeting, Delft, March 13, 2016.
- "IDS Benchmarking Working Group Face-to-Face Meeting", at the fourth SPEC Research Group Annual Meeting, Dublin, March 27, 2014.
- "Cloud Working Group Face-to-Face Meeting", at the fourth SPEC Research Group Annual Meeting, Dublin, March 27, 2014.

- "Fourth SPEC Research Group Annual Meeting", Dublin, March 26-27, 2014. Over 30 member representatives from industry and academia as well as additional interested ICPE participants attended the face-to-face meeting in Ireland. **Presented the talk** *"Benchmarking Vulnerability Detection Tools for Web Services"*.
- "IDS Benchmarking Working Group Face-to-Face Meeting", at the third SPEC Research Group Annual Meeting, Prague, April 25, 2013.
- "Cloud Working Group Face-to-Face Meeting", at the third SPEC Research Group Annual Meeting, Prague, April 24, 2013.
- "Third SPEC Research Group Annual Meeting", Prague, April 24-25, 2013. Over 30 member representatives from industry and academia attended the face-to-face meeting in Prague. The meeting included a look back on the achievements of the past year. Furthermore, several issues including proposals for new research projects, working groups, research tools and benchmarks were discussed vividly.

International conferences

- *26th IEEE International Symposium on Software Reliability Engineering (ISSRE 2015), Gaithersburg, MD, USA, November 2-5, 2015*. **Presented the paper** *"Experience Report: Evaluating the Effectiveness of Decision Trees for Detecting Code Smells"* and served as **chair** in one session.
- *The 45rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2015)*, Rio de Janeiro, Brazil, June 22-25, 2015. **Presented the paper** *"On the Metrics for Benchmarking Vulnerability Detection Tool"*, **the tutorial** "*Techniques and Tools to Defend against Web Application's Software Vulnerabilities*", and **the fast abstract** *"Challenges of Assessing the Hypercall Interface Robustness"*;
- *25th IEEE International Symposium on Software Reliability Engineering (ISSRE 2014),* Nov 3-6, 2014, Naples, Italy;
- The 33rd International Conference on Computer Safety, Reliability and Security (SAFECOMP 2014), September 10-12, 2014, Florence, Italy;
- Buenos Aires Concurrency and Dependability Week 2013, Buenos Aires, August 26-30, 2013. **Presented the tutorial** Marco Vieira, Nuno Antunes, *"Benchmarking the Dependability of Computer Systems"* in 10th International Conference on Quantitative Evaluation of SysTems (QEST 2013). The event also included the 24th International Conference on Concurrency Theory (CONCUR 2013);
- *IEEE 9th World Congress on Services (SERVICES 2013)*, Santa Clara, CA, USA, June 27-July 2, 2013. Sponsored by IEEE Computer Society's TC-SVC, the congress aims to serve as a federation of conferences to explore the deep knowledge space of Services Computing. **Presented the paper** "SOA-Scanner: An Integrated Tool to Detect Vulnerabilities in Service-Based Infrastructures" in *10th International Conference on Services Computing (SCC 2013)*;
- *The 43rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2013)*, Budapest, Hungary, June 24-27, 2013;

- *Sixth Latin-American Symposium on Dependable Computing (LADC 2013),* Rio de Janeiro, Brazil, April 1-5, 2013. **Presented the fast abstract** "Towards Runtime V&V for Service Oriented Architectures";
- *23rd IEEE International Symposium on Software Reliability Engineering (ISSRE 2012),* Nov 27-30, 2012, Dallas, TX, USA. **Presented the paper** "Evaluating and Improving Penetration Testing in Web Services" and **the student paper**: "Detecting Vulnerabilities in Service Oriented Architectures";
- *IEEE 7th World Congress on Services (SERVICES 2011)*, Washington, D.C., USA, July 4-9, 2011. **Presented the paper** "Enhancing Penetration Testing with Attack Signatures and Interface Monitoring for the Detection of Injection Vulnerabilities in Web Services" and **the paper**: Rui Oliveira, Nuno Laranjeiro, Marco Vieira, "A Composed Approach for Automatic Classification of Web Services Robustness" both in the *8th International Conference on Services (SCC 2011)*;
- *IEEE 6th World Congress on Services (SERVICES 2010)*, Miami, Florida, USA, July 5-10, 2010. **Presented the paper** "Benchmarking Vulnerability Detection Tools for Web Services" in the *8th International Conference on Web Services (ICWS 2010)*;
- The 39th Annual *IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2009),* Lisbon, Portugal, June 29 –July 2, 2009. **Presented the paper** "Using Web Security Scanners to Detect Vulnerabilities in Web Services".

International workshops & seminars

- *5th International Workshop on Software Certification (WoSoCER)* at 26th IEEE International Symposium on Software Reliability Engineering (ISSRE 2015), Gaithersburg, MD, USA, November 2-5, 2015.
- *3rd IEEE International Workshop on Measurement and Networking (M&N 2015)*, Coimbra, Portugal, October 12-13, 2015.
- *4th International Workshop on Software Certification (WoSoCER)* at 25th IEEE International Symposium on Software Reliability Engineering (ISSRE 2014), Naples, Italy, November 3, 2014.
- *6th International Workshop on Software Engineering for Resilient Systems* (SERENE'14), Budapest, Hungary, October 15-16, 2014.
- *1st International Workshop on DEvelopment, Verification and VAlidation of cRiTical Systems* (DEVVARTS 2014), September 8, 2014, Florence, Italy.
- *Workshop on Reliability and Security Data Analysis (RSDA 2013)*, at the 43th IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2013), Budapest, Hungary, June 24-27, 2013.
- *14th European Workshop On Dependable Computing (EWDC 2013)*, Coimbra, Portugal, May 15-16, 2013.
- *2nd International Workshop on Software Certification (WoSoCER)* at 23rd IEEE International Symposium on Software Reliability Engineering (ISSRE 2012), Dallas, TX, USA, November 27-30, 2012.

- *Critical Software Workshop on Dependability and Certification*, Coimbra, Portugal, September 28-29, 2011.

International projects meetings and workshops

RP10 EUBra-BIGSEA

- *EUBra-BIGSEA Kick-Off Meeting*, UPV, February 22-24, 2016, Valencia, Spain. Participated as UC researcher;

RP9 EUBrasilCloudFORUM

- *EUBrasilCloudFORUM Kick-Off Meeting*, UC, January 28-29, 2016, Coimbra, Portugal. Participated as UC researcher;

RP8 TEMPUS IV CABRIOLET

- TEMPUS CABRIOLET Workshop: *The Ecosystem for Entrepreneurship and Transfer of Technology between Academia and Industry in Coimbra,* University of Coimbra, September 29 – October 1, 2014, Coimbra, Portugal.

RP7 Validation of Critical Systems – V-SIS

- *V-SIS Final Review Meeting*, Critical Software, November 27, 2015, Coimbra, Portugal.

RP6 DEsign, Verification and VAlidation of large scale dynamic Service SystEmS

- *DEVASSES Face-to-Face Meeting and ToK Workshop #5,* UC, February 1-2, 2016, Coimbra, Portugal. Participated as UC researcher **presenting the talk** *"Europe-Brazil Collaboration of BIG Data Scientific Research through Cloud-Centric Applications"* and a **talk** promoting the dissemination of the RADIANCE 2016 workshop.
- *DEVASSES Face-to-Face Meeting and ToK Workshop #4,* UNICAMP, June 30-July 1, 2015, Campinas-SP, Brazil. Participated as UC researcher **presenting the talk** *"Evaluation of Intrusion Detection Systems in Virtualization Environments Using Attack Injection"*, and as UFAL seconded researcher **presenting the talk** *"On the Relevance of Code Complexity and Change History for Recognizing Software Vulnerability"*.
- *DEVASSES Face-to-Face Meeting and ToK Workshop #3,* UNIFI, January 27-28, 2015, Florence, Italy. Participated as UC researcher **presenting the talk** *"Using Code Coverage Analysis to Estimate the Quality of Vulnerability Detection Tests"* and a **talk** promoting the dissemination of the RADIANCE workshop.
- *DEVASSES ToK Workshop #2: "Design and V&V Methodologies for Dynamic Systems",* IC-UNICAMP, August 21-22, 2014, Campinas-SP, Brazil. Participated as UC researcher **presenting the talk** *"An Analysis of Hypercall Handler Vulnerabilities"* at the Testing and Analysis session.
- *DEVASSES Face-to-Face Meeting,* IC-UNICAMP, August 21, 2014, Campinas-SP, Brazil. Participated as UC researcher and UNICAMP seconded researcher.
- *II Workshop DEVASSES@FT,* FT-UNICAMP, July 24, 2014, Limeira-SP, Brazil. Participated as UC researcher and UNICAMP seconded researcher, **presenting the talk** *"Detecting Injection Vulnerabilities in Web Services: state-of-the-art and research opportunities";*

- *DEVASSES ToK Workshop #1: "Start-Up TOK"*, UNIFI, January 21-22, 2014, Florence, Italy. Participated as UC researcher **presenting the talk** *"Runtime V&V in Business-Critical Service Oriented Architectures"*.
- *DEVASSES Kick-Off Meeting*, UNIFI, January 20, 2014, Florence, Italy. Participated as UC researcher;

RP5 Certification of Critical Systems

- *CECRIS Mid Term Review meeting review,* September 9, 2014, Florence, Italy. Participated as UC researcher and presented his secondments at Prolan Zrt. and Resiltech Srl.
- *CECRIS Seminar Series 1,* Prolan Zrt., June 18-23, 2013, Budapest, Hungary. Participated as UC researcher and Prolan seconded researcher.
- *CECRIS Meeting 2*, May 29, 2013, Pontedera, Italy. A series of presentations by UC researchers presenting their research interests and activities to promote *Transfer of Knowledge* collaborations. Participated as UC researcher **presenting the talk** *"Detecting vulnerabilities in Service Oriented Architectures"* and ResilTech seconded researcher.
- *ADVISE,* ResilTech, May 22, 2013, Pontedera, Italy. A Seminar presented by UNIFI researchers Leonardo Montecchi and Marco Casciaro introducing the ADVISE method and several case studies. Participated as UC researcher and ResilTech seconded researcher.
- *CECRIS Workshop 1 Meeting*, April 22-23, 2013, Pontedera, Italy. Participated as UC researcher **presenting the talk** *"Robustness and Vulnerability Testing in Services"* in the *Monitoring and Testing* session.
- *CECRIS Kick-Off Meeting*, January 14-15, 2013, Florence, Italy. Participated as UC researcher and member of the project's Dissemination Board;

RP4 Intelligent Computing in the Internet of Services

- *iCIS Task 1.2 3rd Meeting*, Coimbra, Portugal, 19th July 2013. The meeting served to finalize the discussion about the relations between the topics of the project.
- *iCIS Task 1.2 2nd Meeting*, Coimbra, Portugal, 17th June 2013. The meeting served to present and discuss the topics that belong to the scope of the Task 1.2. It was discussed also the relations and links between topics.
- *iCIS Task 1.2 1st Meeting*, Coimbra, Portugal, 31st May 2013. The meeting served as Kick-Off of Task 1.2, with the main objective of defining concretely the scope of the task.

RP3 Methodologies for development of Non-Vulnerable Web Services

- Was as **visiting researcher** during 1 week in University of Campinas, Campinas – SP, Brazil in August 2011. During this period has developed several research activities as presenting to the students and attending to talks presented by the students of the Institute of Computing and Faculty of Technology. Has also participated in multiple meetings with the Professors Eliane Martins, Regina Moraes and Cecilia Rubira, and their students (Marcelo Palma, Juliana, Alan Braz, Gizelle S. Lemos), in order to know their work and plan future collaborations.

- Was as **visiting researcher** during 2 weeks in University of Campinas, Campinas – SP, Brazil in August 2011. During this period has developed several research activities as presenting to the students and attending to multiple talks presented by the students of the Institute of Computing and Faculty of Technology. Has also participated in multiple meetings with the Professors Eliane Martins and Regina Moraes, and their students (Tânia Basso, Marcelo Palma, Gizelle S. Lemos), in order to know their work and plan future collaborations.

RP2 Critical Software Technology for an Evolutionary Partnership

- *Critical-STEP Workshop* held together with the *2nd Critical Software Workshop on Dependability and Certification,* Coimbra, Portugal, 20th-21st February 2013. Participated as UC researcher **presenting the talk** *"Defending against web application vulnerabilities"* in the *Security* track.
- *2nd International Workshop on Software Certification (WoSoCER)*, Dallas, TX, USA, 27th-30th November 2012. With a balanced committee of industrial practitioners, certification authorities and researchers, the workshop aims to discuss the theme of certification of software systems used in safety domains such as avionics, railway, automotive, nuclear and medical. Participated as UC researcher.
- *What can we do with Robustness Testing?* Giugliano in Campania, Italy, 24th November 2011. Seminar organized at SESM premises on the use of Robustness Testing. Participated as UC researcher and SESM seconded researcher, and **presented the talk** *"Penetration Testing in Web Services: Limitations and New Approaches"*.
- *Transfer of Knowledge Meeting IV*, Coimbra, Portugal, 24th November 2011. TOK IV meeting has been planned to analyze requirements for tool development and system reconfiguration.
- *Transfer of Knowledge Meeting III*, Coimbra, Portugal, 7th October 2011. TOK III meeting had the purpose of checking integration and synergies among fault injection, dependability and robustness and fault characterization and to discuss about the State of the art on the existing fault diagnosis techniques.
- *Critical Software Workshop on Dependability and Certification*, Coimbra, Portugal, 28th-29th September 2011. Participated as UC researcher.
- *Transfer of Knowledge Meeting II*, Naples, Italy, 25th January 2011. TOK II meeting is to check the current state of project activities, to deal with fault injection tools and to argue on the goal of secondments plans.

5.2. Scientific recognition

5.2.1. Awards

Third most downloaded article from the Computer Society's Digital Library during 2014:

"Penetration Testing in Web Services", by Nuno Antunes and Marco Vieira, *IEEE Computer*, ISSN: 0018-9162, IEEE, Feb. 2014.
According to information received from Mark Gallaher, Staff Editor of Computer

ICWS 2010 Best Paper Award:

"Benchmarking Vulnerability Detection Tools for Web Services", by Nuno Antunes and Marco Vieira, The 8th IEEE International Conference on Web Services, ICWS 2010, Miami, FL, EUA, 5-10 de July de 2010. (Acceptance Rate: 17.6%: 39 de 222)

5.2.2. Tutorials in International Conferences

- Nuno Antunes, Marco Vieira, *"Techniques and Tools to Defend against Web Application's Software Vulnerabilities"*, The 45th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2015), Rio de Janeiro, Brazil, June 22-25, 2015.
- Marco Vieira, Nuno Antunes, *"Benchmarking the Dependability of Computer Systems"*, 10th International Conference on Quantitative Evaluation of SysTems (QEST 2013), Buenos Aires, Argentina, August 27, 2013.

5.2.3. Citations known in the literature

A total of **289 citations** referring publications authored/co-authored by Nuno Antunes are known currently. These citations do not include the citations from authors that are directly or indirectly connect to his research group or that are co-authors of the cited papers.

5.3. Research projects

RP10 [Jan 2016 – Dec 2017] EUBra-BIGSEA – Europe-Brazil Collaboration of BIG Data Scientific Research through Cloud-Centric Applications

The EUBra-BIGSEA is a collaborative project under the **EUB-1-2015** topic "Cloud Computing, including security aspects", whose main goal is to create a sustainable international (European and Brazilian) cooperation activity in the area of cloud services for Big Data analytics. In 24 months the project aims at providing an abstract framework for the development of distributed data analytics applications. Multiple data models will be supported (data streams, multidimensional data, etc.) and efficient mechanisms will ensure privacy, on top of a layer for the smart and rapid provisioning of resources.

EUBra-BIGSEA starts from the requirements of a scenario with high social and business relevance: the processing and analysis of huge quantities of data from massively connected societies. Services in the cloud will address the needs of a Big Data scenario but multiple challenges, dealing with resource provision, performance, QoS and privacy, are yet to be overcome. The project capitalizes on the expertise and knowledge of the partners of the consortium in cloud computing, massive data analytics, security and software-defined services to fulfill the objectives of the proposal.

The **consortium** includes: Universitat Politècnica de València, Barcelona Supercomputing Centre, Centro Euro-Mediterraneo sui Cambiamenti Climatici, Trust-IT Services Ltd., Universidade de Coimbra, Politecnico di Milano *(European partners)* and Universidade Federal de Minas Gerais, Universidade Federal de Campina Grande, Universidade Tecnológica Federal do Paraná, IBM Research, Universidade Estadual de Campinas *(Brazilian partners)*.

RP9 [Jan 2016 – Dec 2017] EUBrasilCloudFORUM – Fostering an International dialogue between Europe & Brazil

The EUBrasilCloudFORUM, a 24 month Coordination and Support Action (CSA), is the consolidated result of the efforts pooled together by representatives of the EU-Brazil Working Group set up at the EU-Brazil workshop held in July 2014, in Brasilia. The group was formed to create a report for the European Commission (EC) and for the Brazilian Ministry of Science, Technology, and Innovation (MCTI) on the future of EU-Brazil calls. The findings list a number of ICT related topics that could be considered in future calls that have been selected taking into account their expected societal importance and the capabilities and expertise of both European and Brazilian research communities. Based on interactions with a stakeholder group, the findings also presented a proposal to tune the existing EU-BR collaboration model by addressing aspects such as funding, technical and bureaucratic support, and procedures.

The shaping of the Digital Single Market (DSM) requires revitalizing open exchange with stakeholders is critical for building consensus between the regions and delivering practical guides on how Cloud Services can help business and research activity.

The **consortium** includes: Universidade de Coimbra, Trust-IT Services Ltd. (TRUST-IT), Waterford Institute of Technology *(European partners)* and Universidade de Brasilia, Universidade de Sao Paulo, Universidade Federal de Santa Catarina *(Brazilian partners)*

RP8 [Jan 2014 – Dec 2016] CABRIOLET – Model-Oriented Approach and Intelligent Knowledge-Based System for Evolvable Academia-Industry Cooperation in Electronic and Computer Engineering

Project founded by the European Commission within the context of the TEMPUS IV Programme. The project aims the curricular development of courses in the areas of electrical and computer engineering in Ukraine through: the introduction of an approach that allows an higher cooperation between academia and the industry, the development of a knowledge-based system, the development of a web portal as a mechanism for communication and implementation of capacity creation actions based on multiple blocks of education and training.
The **consortium** includes: University of Newcastle (United Kingdom), Royal Institute of Technology (Sweden), University of Coimbra, Critiware S.r.l. (Italy), Inercia Digital S.L. (Spain), Ukraine partners: National Aerospace University "KhAI", Odessa National Polytechnic University, Chernihiv State Technological University, Petro Mohyla Black Sea State University, Chernivtsi National University, Sevastopol National Technical University, Institute of Cybernetics of National Academy of Science of UA, Association of Information Technology Enterprises of Ukraine, Seal-Point LTD, Ministry of Education and Science of Ukraine.

RP7 [Jan 2014 – Jun 2015] Validation of Critical Systems – V-SIS

The V-SIS project aims at providing services for the validation of critical systems through the improvement of the V&V and RAMS processes focusing on functional security and the validation of critical electronic systems. The project will take advantage of the context of change, uncertainty and need created by recent regulation changes as the introduction of the standard ISO26262 (automotive) and the evolution of the standard DO-178C (aeronautics).
The work to be performed is organized in (i) process level innovations – RAMS, model-based V&V, multiple criticality systems and injection of security faults; and (ii) development of validation systems.
Main responsibility in the project:

- Research, propose and develop representative fault models for supporting the assessment of security attributes and dependability of critical systems.

RP6 [Jan 2014 – Dec 2017] DEsign, Verification and VAlidation of large scale, dynamic Service SystEmS – DEVASSES

The DEVASSES project aims at taking a step forward in the design and deployment of large-scale, dynamic service-based software systems by supporting the transfer of knowledge on novel state of the art methods, techniques, and tools for both design time and run time verification and validation. The goal is to reinforce existing partners' cooperation through a coordinated program of exchange of researchers, taking as context a common research problem, which provides the frame for the project scientific activities and cannot currently be tackled by any of the partners individually. The project includes joint research activities, focused training activities, and joint workshops, designed to exploit complementary expertise and to create synergies among the partners, establishing the basis for sustainable future cooperation at different levels, including: co-advising of PhD candidates, joint organization of international events (workshops, conferences, summer schools, etc.),

participation in bilateral project proposals, participation in large-scale international project proposals, etc.
The **consortium** includes: University of Coimbra (Portugal), University of Florence (Italy), Unicamp - University of Campinas (Brazil), Federal University of Alagoas (Brazil).
Main activities/responsibilities in the project:

- **Secretary** of the project;
- **Manager** of the Project website (**www.devasses.eu**);
- **Seconded researcher** 8 weeks at Unicamp, Campinas, Brazil in 2014;
- **Seconded researcher** 12 weeks at UFAL, Maceió, Brazil in 2015;
- **Seconded researcher** 4 weeks at Unicamp, Campinas, Brazil in 2016;
- **Seconded researcher** 4 weeks at UFAL, Maceió, Brazil in 2016;

RP5 [Jan 2013 – Dec 2016] Certification of Critical Systems – CECRIS

The CECRIS project is a Marie-Curie Industry-Academia Partnerships and Pathways (IAPP) belonging to call FP7-PEOPLE-2012-IAPP. The project aims at taking a step forward in development, verification and validation and certification of critical systems by supporting the introduction of novel state-of-the art methods with a special emphasis on technology and human skill development at SMEs Researchers.
The **consortium** includes: ResilTech S.R.L. (Italy), Consorzio Interuniversitario Nazionale per l'Informatica (Italy), University of Coimbra (Portugal), Budapesti Muszaki es Gazdasagtudomanyi Egyetem (Hungary), Prolan Zrt. (Hungary), Critical Software SA (Portugal).
Main activities/responsibilities in the project:

- Represent the University of Coimbra in the **Dissemination Board**;
- **Seconded researcher** 14 weeks at ResilTech S.R.L., Pisa, Italy in 2013;
- **Seconded researcher** 4 weeks at Prolan Zrt., Budapest, Hungary in 2013;
- **Seconded researcher** 4 weeks at ResilTech S.R.L., Pisa, Italy in 2014;
- **Seconded researcher** 8 weeks at Prolan Zrt., Budapest, Hungary in 2014;
- **Seconded researcher** 8 weeks at ResilTech S.R.L., Pisa, Italy in 2016;

RP4 [Apr 2013 – Oct 2015] Intelligent Computing in the Internet of Services – iCIS

The goal of iCIS is to perform world class research in intelligent computing for the Internet of Services and Things, and to achieve a continuum and an increased momentum in national and international cooperation on these scientific challenges, sustainable increase in critical mass and international impact, as well as a long-term financial sustainability of the consortium by preparing it for national (e.g., QREN) and international (FP7, FP8) framework programmes and for technology transfer and start-up promotion. Research in iCIS will be focused in two complementary, yet interrelated, directions: advanced algorithms and infrastructures for information capture and management in the Internet, and intelligent algorithms for data analysis and knowledge extraction for smart Internet services. The former will investigate key solutions for the future internet related mainly to cloud computing, internet of services and things, internet security, and advanced software engineering, whereas the latter will concentrate on intelligent algorithms for data analysis and knowledge extraction over Internet-based solutions focusing on relevant scientific and socio-economic problems involving complex, multi-parametric

and high volumes of data. More specifically, the consortium will focus on three main application areas where considerable expertise exists in the team: computational intelligence for personal health systems (PHS) directed to chronic cardiovascular and neurological disease management, intelligent transportation systems (ITS) and information retrieval systems. To achieve the strategic goals of the research line within iCIS, a twofold strategy shall be followed: first, existing networks and international research projects shall be used as anchors, i.e. research where the team has proven excellence (e.g., in next generation networks technology, sensor network solutions, in PHS for cardiovascular and neurological diseases, in ITS, in security and dependability of large scale computer systems) will be pursued by tackling central research questions in the field and with a high degree of alignment with FP7 and FP8 challenges. Second, throughout the project, project concepts will be defined and developed. Concept definition aims at identifying the scientific, social and economic requirements of relevant project ideas, key technologies and know-how from inside the consortium to solve the problem, but also expertise outside the consortium (either using existing networks or seeking new partners).
Participation on iCIS Work Package 1:

- Task 1.2 – Cloud Computing, Internet of Services and Advanced S/W Engineering
- Task 1.4 – Trustworthy ICT

RP3 [Jan 2011 – Dez 2012] Methodologies for development of Non-Vulnerable Web Services - Menon@WS

Menon@WS is a FCT/CAPES Partnership between University of Coimbra and Unicamp (University of Campinas). The main goal of the project is to integrate the knowledge and work of both partners in order to validate Web Service based applications in the presence of security attacks.
The project included visits to Unicamp in the following periods:

- 1 week in August 2011;
- 2 weeks in August 2012;

RP2 [Oct 2010 – Mar 2013] Critical Software Technology for an Evolutionary Partnership – CRITICAL STEP

The CRITICAL STEP is a Marie-Curie Industry-Academia Partnerships and Pathways (IAPP) belonging to call FP7-PEOPLE-2008-IAPP. It aims at establishing the basis for a long term strategic research collaboration between partners involved in this project in the growing and challenging domain of software for large-scale Safety-Critical Systems (SCSs) based on the use of Off-The-Shelf (OTS) software components for the control of complex distributed infrastructures such as Air Traffic Management (ATM) systems, complex industrial plants, etc. Partners feel they are in need of sharing and combining their knowledge and use the existing synergies/complementarities to set long term strategic bases to deal with the complexity of the next generation SCSs, resist market competition and win the challenge of developing new safe technologies and standards. The consortium includes: CINI/UoN Laboratory "Carlo Savy" of the CINI Consortium and the University of Naples, Italy; Faculty of Sciences and Technology of the University of Coimbra (FCTUC): Centre for Informatics and Systems of the University of Coimbra (CISUC); Critical Software S.A., Portugal; SESM S.c.a.r.l.: Surveillance & Supervision System Unit, Italy.

Main activities/responsibilities in the project:

- **Seconded researcher** 14 weeks at SESM S.c.a.r.l., Giugliano in Campania, Italy in 2011;
- **Seconded researcher** 10 weeks at SESM S.c.a.r.l., Giugliano in Campania, Italy in 2012;

RP1 [Nov 2007 – July 2008] Affordable Data Warehouses – ADW

ADW was a research and development partnership between Critical Software S.A. and the University of Coimbra funded by the Portuguese Innovation Agency (ADI). The main goal of the project was to develop a technology that allows a dramatic reduction of the hardware, software, and administration cost when compared to traditional data warehouses.
Main activities/responsibilities in the project:

- Member of the **development** team;
- Development of tools to install, monitor and manage the cluster of nodes and to implement the data distribution and re-distribution algorithms.

5.4. Intervention on the Scientific Community

5.4.1. Participation in Evaluation Panels

PA01 H2020-MSCA-ITN-2016 – Innovative Training Networks

Selected by *European Commission Research Executive Agency* (EC-REA) to act as evaluator in the frame of the **ITN 2016 Evaluation – ENG Panel**.
9 project proposals reviewed *(3 of which as rapporteur).*

5.4.2. Organization of scientific events

WO3 RADIANCE 2016 – *International Workshop on Recent Advances in the DependabIlity AssessmeNt of Complex systEms*

Co-located with the DSN 2016, Toulouse, France

Member of the Organization Committee

With Ariadne Carvalho, UNICAMP, Andrea Ceccarelli, CINI/UNIFI, and András Zentai, Prolan

WO2 M&N 2015 – *IEEE International Workshop on Measurements & Networking 2015*

Publication Chair

WO1 RADIANCE 2015 – *International Workshop on Recent Advances in the DependabIlity AssessmeNt of Complex systEms*

Co-located with the DSN 2015, Rio de Janeiro, Brazil

Member of the Organization Committee

With Ariadne Carvalho, UNICAMP, Andrea Ceccarelli, CINI/UNIFI, and András Zentai, Prolan

5.4.3. Participation in scientific committees

Member of Program Committee in Conferences

CC7 **ISSRE 2016** – *The 27th IEEE International Symposium on Software Reliability Engineering*, October 23-27, 2016, Ottawa, Canada.
Ranked A in CORE2014

CC6 **EDCC 2016** – *12th European Dependable Computing Conference*, September 5-9, 2016, Gothenburg, Sweden.

CC5 **SIN'16** – *9th International Conference on Security of Information and Networks*, July 20-22, 2016, Rutgers University, New Jersey, USA
Ranked C in CORE2014

CC4 **SCC 2016** – *12th IEEE International Conference on Services Computing*, June 27 - July 2, 2016, San Francisco, USA
Ranked A in CORE2014

CC3 **ISSRE 2015** – *The 26th IEEE International Symposium on Software Reliability Engineering*, November 2–5, 2015, Gaithersburg, MD, USA
Ranked A in CORE2014

CC2 **SIN'15** – *8th International Conference on Security of Information and Networks*, September 8-10, 2015 Sochi, Russia
Ranked C in CORE2014

CC1 **SCC 2015** – *12th IEEE International Conference on Services Computing*, June 27 - July 2, 2015, New York, USA
Ranked A in CORE2014

Member of Program Committee in Workshops

WC4 **WoSoCer 2016** – *The 6th IEEE International Workshop on Software Certification*
Co-located with ISSRE 2016

WC3 **SQAMIA 2016** – *5th Workshop on Software Quality Analysis, Monitoring*
August 29-31, 2016, Budapest, Hungary.

WC2 **WoSoCer 2015** – *The 5th IEEE International Workshop on Software Certification*
Co-located with ISSRE 2015

WC1 **DSS 2015** – *IEEE Services 2015 Visionary Track: Dependable and Secure Services*
Co-located with IEEE SERVICES 2015

5.4.4. Participation in international organizations

COST Action IC1402 – Runtime Verification beyond Monitoring (ARVI)

Nominated as **MC Substitute [IC1402 PT]** to COST Action IC1402 by Dr. Paula Mesquita (COST National Coordinator [PT]).
Runtime verification (RV) is a computing analysis paradigm based on observing a system at runtime to check its expected behavior. RV has emerged in recent years as a practical application of formal verification, and a less ad-hoc approach to conventional testing by building monitors from formal specifications.
There is a great potential applicability of RV beyond software reliability, if one allows monitors to interact back with the observed system, and generalizes to new domains beyond computers programs (like hardware, devices, cloud computing and even human centric systems). Given the European leadership in computer-based industries, novel applications of RV to these areas can have an enormous impact in terms of the new class of designs enabled and their reliability and cost effectiveness.
This Action aims to build expertise by putting together active researchers in different aspects of runtime verification, and meeting with experts from potential application disciplines. The main goal is to overcome the fragmentation of RV research by *1)* the design of common input formats for tool cooperation and comparison; *2)* the evaluation of different tools, building a growing sets benchmarks and running tool competitions; and *3)* by designing a road-map and grand challenges extracted from application domains.

Standard Performance Evaluation Corporation (SPEC) – Research Group

The SPEC RG (http://research.spec.org/) is a new group within the SPEC established to serve as a platform for collaborative research efforts in the area of quantitative system evaluation and analysis, fostering the interaction between industry and academia in the field. The group includes representatives of multiple companies and organizations. The scope of the group includes computer benchmarking, performance evaluation, and experimental system analysis in general, considering both classical performance metrics such as response time, throughput, scalability and efficiency, as well as other non-functional system properties included under the term dependability, e.g., availability, reliability, and security.

SPEC RG IDS Benchmarking Working Group – *Member since February 2013*

Given that security concerns are one of the greatest showstoppers for the wide adoption of cloud computing, many academic and industrial organizations are nowadays conducting extensive research on novel intrusion detection systems (IDSes) specifically designed to operate in virtualized cloud environments. As the amount and the popularity of such IDSes increase, benchmarking IDSes for cloud environments becomes imperative since it provides insight and deeper understanding of their behavior and performance. The group aims to contribute towards addressing the increasing demand for representative and rigorous IDS benchmarks for cloud platforms. The goal is to foster and facilitate innovative research through exchange of ideas and experiences. Its membership body includes representatives of Siemens Corporate Research (USA), University of Coimbra (Portugal), and Karlsruhe Institute of Technology (Germany).
The **activities** include the participation in the group meetings and the contribution to the outputs of the group including the SPEC technical reports (see **TR1, TR2** in Section 5.1.6) and joint publications (see **CP10** and **CP13** in Section 5.1.3, **SP7** in Section 5.1.4, and the **poster** in Section 5.1.8).

5.4.5. Session chairing

In International Conferences:

- *12th European Dependable Computing Conference (EDCC 2016)*. **Research session TS5:** Testing
- *46th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2016)*. **Research session MT6A:** Clouds & Networks
- *The 26th IEEE International Symposium on Software Reliability Engineering (ISSRE 2015)*. **Research session:** Mobile GUI

In International Workshops:

- *Int. Workshop on Recent Advances in the DependabIlity AssessmeNt of Complex systEms* (RADIANCE 2016). **Session #3**: Analysis and Model-based techniques
- *1st International Workshop on DEvelopment, Verification and VAlidation of cRiTical Systems* (DEVVARTS 2014). **Session #3**: System and tool assessment
- *DEVASSES ToK Workshop #2*, Campinas-SP, Brazil, August 21-22, 2014. **Session #6:** Clustering and Anomaly Detection.

5.4.6. Service as referee

Reviewer for the following international journals:

IEEE Transactions on Services Computing (JCR IF: 3.049)

- 4 papers reviewed in 2016
- 3 papers reviewed in 2015

Elsevier Reliability Engineering & System Safety (JCR IF: 2.410)

- 1 papers reviewed in 2016

IEEE Transactions on Reliability (JCR IF: 1.934)

- 1 paper reviewed in 2016
- 1 paper reviewed in 2015

IEEE Computer (JCR IF: 1.443)

- 1 paper reviewed in 2013

Elsevier JSS (JCR IF: 1.424)

- 3 paper reviewed in 2016

IEEE Software (JCR IF: 1.053)

- 1 paper reviewed in 2016
- 1 paper reviewed in 2015

ACM TAAS

- 1 paper reviewed in 2016

IET Software (JCR IF: 0. 595)

- 2 papers reviewed in 2015
- 3 paper reviewed in 2014

Computing (Springer) (JCR IF: 0. 593)

- 1 paper reviewed in 2015

IJCCBS - International Journal of Critical Computer-Based Systems (JCR n/a)

- 2 paper reviewed in 2016
- 1 paper reviewed in 2015
- 1 paper reviewed in 2014

JECE - Journal of Electrical and Computer Engineering (JCR n/a)

- 1 paper reviewed in 2016

Reviewer for the following international conferences:

- The 27th IEEE International Symposium on Software Reliability Engineering, October 23-27, 2016, Ottawa, Canada. (**7 papers reviewed**, member of PC)
- 12th European Dependable Computing Conference, September 5-9, 2016, Gothenburg, Sweden. (**4 paper reviewed**, member of PC)
- 9th International Conference on Security of Information and Networks, July 20-22, 2016, Rutgers University, New Jersey, USA. (**1 papers reviewed**, member of PC)
- 13th IEEE International Conf. on Services Computing (SCC 2016), June 27-July 2, 2016, San Francisco, USA. (**4 papers reviewed**, area co-chair, member of PC)
- 46th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2016), Toulouse, France, June 28-July 1, 2016. (2 papers reviewed)
- 7th ACM/SPEC International Conference on Performance Engineering (ICPE 2016), Delft, Netherlands, March 12-18, 2016. (1 paper reviewed)
- IEEE High Assurance Systems Engineering Symposium (HASE 2016), January 7 - 9, 2016, Orlando, Florida, USA. (1 paper reviewed)
- The 26th IEEE International Symposium on Software Reliability Engineering, November 2–5, 2015, Gaithersburg, MD, USA. (**11 papers reviewed**, member of PC)
- The 8th International Conference on Security of Information and Networks, September 8-10, 2015, Sochi, Russia. (**5 papers reviewed**, member of PC)
- 11th European Dependable Computing Conference, September 7-11, Paris, France. (1 paper reviewed)
- 26th International Conference on Database and Expert Systems Applications, September 1-4, 2015, Valencia, Spain. (1 paper reviewed)
- 12th IEEE International Conference on Services Computing SCC 2015, June 27 - July 2, 2015, New York, USA. (**4 papers reviewed**, member of PC)

- 45th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2015), Rio de Janeiro, Brazil, June 22-25, 2015. (2 papers reviewed)
- 6th ACM/SPEC International Conference on Performance Engineering (ICPE 2015), Austin, TX, USA, Jan 31-Feb 4, 2015. (1 paper reviewed)
- The Sixth TPC Technology Conference on Performance Evaluation & Benchmarking (TPCTC 2014), Hangzhou, China, 29 August 2014. (1 paper reviewed)
- INFORUM 2014 - Simpósio de Informática, Porto, Portugal, 4-5 September 2014. (1 paper reviewed)
- 11th IEEE International Conference on Services Computing (SCC 2014), Anchorage, Alaska, USA, June 27-July 2 2014. (1 paper reviewed)
- The 44th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2014), Atlanta, Georgia, USA, 23-26th June 2014 (1 paper reviewed)
- The 43rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2013), Budapest, Hungary, 24-27th June 2013. (1 paper reviewed)
- Sixth Latin-American Symposium on Dependable Computing (LADC 2013), Rio de Janeiro, Brazil, 1-5 April 2013. (1 paper reviewed)
- 23rd IEEE International Symposium on Software Reliability Engineering (ISSRE 2012), Dallas, TX, USA, 27-30 November 2012. (1 paper reviewed)
- IEEE 19th International Conference on Web Services (ICWS 2012), Honolulu, Hawaii, USA, 24-29 June 2012. (1 paper reviewed)
- The 42nd Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2012), Boston, Massachusetts, USA, 25-28 June 2012. (1 paper reviewed)
- The 13th International Conference on Information Integration and Web-based Applications & Services (iiWAS2011), Ho Chi Minh City, Vietnam, 5-7 December 2011. (1 paper reviewed)
- The 30th IEEE International Symposium on Reliable Distributed Systems (SRDS 2011), Madrid, Spain, 4-7 October 2011. (1 paper reviewed)
- INFORUM 2011 - Simpósio de Informática, Coimbra, Portugal, 8-9 September 2011. (1 paper reviewed)
- The 3rd TPC Technology Conference on Performance Evaluation & Benchmarking (TPCTC 2011), Seattle, Washington, USA, 29 August 2011. (1 paper reviewed)
- The IEEE 9th International Conference on Web Services (ICWS 2011), Washington, D.C., USA, 4-9 July 2011. (2 papers reviewed)
- The IEEE 8th International Conference on Web Services (ICWS 2010), Miami, Florida, USA, 5-10 July 2010. (1 paper reviewed)

Reviewer for the following international workshops:

- *The 6th International Workshop on Software Certification* (WoSoCER) (co-located with ISSRE 2016). **1 paper reviewed,** member of PC
- *5th Workshop on Software Quality Analysis, Monitoring* (SQAMIA 2016), August 29-31, 2016, Budapest, Hungary. **3 paper reviewed,** member of PC
- *International Workshop on Recent Advances in the DependabIlity AssessmeNt of Complex systEms* (RADIANCE 2016) (co-located with DSN 2016). **1 paper reviewed,** member of organization
- *The 5th International Workshop on Software Certification* (WoSoCER) (co-located with ISSRE 2015). **1 paper reviewed,** member of PC
- *IEEE Services 2015 Visionary Track: Dependable and Secure Services* (DSS 2015) (co-located with SERVICES 2015). **1 paper reviewed,** member of PC
- *The 2nd International Workshop on Software Certification* (WoSoCER) (co-located with ISSRE 2012). **1 paper reviewed**

5.4.7. Invited talks

Was invited to present the following talks:

- *"Detecting Injection Vulnerabilities in Web Services: state-of-the-art and research opportunities",* invited by Prof. Eliane Martins to **present the talk** to the students of the Institute of Computing-UNICAMP, Campinas-SP, Brasil, 31 July, 2014;
- *"Software Vulnerability Detection in Service-Based Infrastructures Techniques and Tools",* invited by Prof. Patrick Brito **present the talk** to the researchers and students of the IC, IC-UFAL, Maceió-AL, Brasil, 3 June, 2014;
- *"SOA-Scanner An Integrated Tool to Detect Vulnerabilities in Service-Based Infrastructures?",* invited by Prof. Eliane Martins **present the talk** to the students of the IC, IC-Unicamp, Campinas, 19 August, 2013;
- *"The Devils Behind Web Application Vulnerabilities",* invited by Prof. Eliane Martins to **present the talk** in Institute of Computing of Unicamp (University of Campinas), IC-Unicamp, Campinas, 24 August, 2012;
- *OSMOSIS Security webinar* "Opportunities, Ideas and Collaborations for the FP7 Security Call for Proposals", July 26, 2011. **Presented the talk** "Detecting Vulnerabilities in Web Services: Can Developers Rely on Existing Tools?";
- *"Developing Non-Vulnerable Web Services"*, invited by Prof. Domenico Cotroneo to **present the talk** in CINI MobiLab, University of Naples Federico II, Naples, Italy, 4 May 2011.

6. Pedagogic Activity

This section presents the pedagogic activities, in particular, teaching service, post-graduate activity, pedagogic material produced, and knowledge transfer.

6.1. Teaching Service

As Visiting Professor, IC – *Federal University of Alagoas*

Software Engineering – Masters in Informatics [2015 Semester 1]
Coordinator (regente) for the second half of the course

This part of the course was modified to introduce the students in the concepts of dependable and secure development of the systems, which had never been lectured in the degree.
The goal of the classes is to cover the development of secure and dependable systems, discuss these techniques in the context of the development enterprise applications and apply this knowledge in practice.

Hours of contact: 40 (4 p/ week)
Students: 15
Student Survey: Not applicable

As Teaching Assistant, DEI – *University of Coimbra*

2015/16 Sem. 1	**Software Engineering** – BSc in Informatics Lecturing the Practical (P) classes	Contact: 32h
	Databases – BSc in Informatics Lecturing the Theoretical-Practical (TP) classes	Contact: 16h
2014/15 Sem. 1	**Databases** – BSc in Informatics Lecturing the Theoretical-Practical (TP) classes	Contact: 15h Students: 64 Student Survey: 3.6

6.2. Supervised students

This section presents the work as supervisor, including supervisions of M. Sc. thesis students that finished or are currently enrolled in a M. Sc. Program and also temporary supervision activity of students from foreign universities during their visits to the University of Coimbra or during Nuno's visits to foreign universities.

6.2.1. M. Sc. Students

Henrique Ferreira Alves, M. Sc. student at the Federal University of Alagoas (UFAL)

Co-Supervised with Prof. Baldoino Fonseca (UFAL), form March 2015 to the present. His thesis work is on the analysis of the software modification patterns, software metrics and code smells for the prediction of software vulnerabilities.

Marcus Piancó, M. Sc. student at the Federal University of Alagoas (UFAL)

Co-Supervised with Prof. Baldoino Fonseca (UFAL), form March 2015 to the present. His thesis work is on the prediction of software vulnerabilities based on the information of change history of software projects.

Diogo Carvalho, M. Sc. Student at the DEI / University of Coimbra

"Robustness Assessment of Virtualized environments"
The goal is to use robustness testing techniques to evaluate the robustness of the hypercall interfaces in virtualization infrastructures. The ideas and the preliminary results are presented in the fast abstract **SP3** (see Section 5.1.5.).
M.Sc. thesis works start in September.

Luís Ventura, M. Sc. Student at the DEI / University of Coimbra

"Dependability Evaluation in NoSQL engines"
The goal is to define fault models for the domain and to experimentally evaluate the behavior of NoSQL engines in the context of these faults.
M.Sc. thesis works start in September.

Rafael Ventura, M. Sc. Student at the DEI / University of Coimbra

"An Integrated Tool to Detect Vulnerabilities in Service-Based Infrastructures", Co-Advised with Marco Vieira, 2014. The result was the implementation of a modular tool for monitoring and testing of SOAs, coping with their dynamicity and capacity to evolve.

6.2.2. Students in international cooperation programs

Ana Paula Matsunaga, M. Sc. student at the University of Campinas (Unicamp), Brazil

Supervised by Regina Moraes (Unicamp), from May to June 2015 in the context of the project DEVASSES (see **RP6** in Section 0). The work focused the use of coverage analysis techniques to the vulnerability detection tools proposed by the University of Coimbra.

Tânia Basso, Ph. D. student at the University of Campinas (Unicamp), Brazil

Supervised by Mario Jino, Regina Moraes (Unicamp) and Marco Vieira, from August to December 2012 in the context of the project Menon-WS (see **RP3** in Section 0). This collaboration contributed to the publication of *"An XML-based Policy Model for Access Control in Web Applications"* (DEXA 2013, see **CP9** in Section 5.1.3.).

6.3. Pedagogic material

[2015] Software Engineering – IC-UFAL

PM3 ***Practical Assignment***
Wrote the practical assignment that served for the evaluation of the course. The goal of the assignment is that the students apply in practice the techniques and patterns that guide the development of dependable and secure enterprise applications.

PM2 ***Theoretical Slides***
As this part of the course was never lectured in the IC-UFAL, a whole new set of material was necessary to produce. In the case of some topics (marked with *), not the main author of the slides, but format changes in all materials available from previous editions. Content and scope adjustments were also made according to the direction and the goals of the course.
Covered topics: Web Services*, SOAs*, Dependable Systems*, Tests*, Dependability in SOAs, Secure Development of Systems and Security in SOAs.

[2014-2015] Databases – DEI-UC

PM1 ***Theoretical-Practical slides***
As this was the first year that the databases course had TP classes, it was necessary to produce a new slide of slides including exercises, resolutions and some auxiliary theoretical material.
The slides about relational operations and PL/SQL where based on the theoretical slides from previous editions of the course.

6.4. Knowledge Transfer

Was invited to lecture the following seminars or workshops to students and workers of Universities and companies:

- *"Evaluating Intrusion Detection Systems in Virtualization Environments",* invited by Prof. Baldoino Fonseca to **present the talk** to the students of the UFAL, IC-UFAL, Maceio-AL, Brasil, 7 July, 2015;
- *"Software Vulnerability Detection in Service-Based Infrastructures Techniques and Tools",* invited by Prof. Patrick Brito to **present the talk** to the students of the Arapiraca Campus, IC-UFAL, Arapiraca-AL, Brasil, 4 June, 2014;
- *"Defending against Web Application Vulnerabilities",* invited by Csaba Kaptany to **present the seminar** in to the workers of Prolan. The seminar was realized in the Prolan facilities in Budakalasz, Budapest, Hungary, 19 June 2013;
- *"Security assessment for Web Services",* invited by Dr. Gabriella Carrozza to **present the seminar** in University of Naples Federico II, Naples, Italy, 10 June 2013;

- *OSMOSIS Security webinar* "Web Services Security Assessment: the Research and the Industry Perspectives", May 27, 2011. **Presented the seminar** "Detecting Vulnerabilities in Web Services: Can Developers Rely on Existing Tools?";
- *"Detecting Vulnerabilities in Web Services: Can Developers Rely on Existing Tools?"* invited by Prof. Regina Moraes, Faculty of Technology of Unicamp (University of Campinas) to **present the seminar** to the students of the faculty, FT-Unicamp, Limeira, 22 August 2011;
- *"Detecting Vulnerabilities in Web Services: Can Developers Rely on Existing Tools?",* invited by Prof. Eliane Martins, Institute of Computing of Unicamp (University of Campinas) to **present the seminar** in "Série de Seminários 2011 da Pós-Graduação", IC-Unicamp, Campinas, 19 August, 2011;
- *"Developing Non-Vulnerable Web Services"*, invited by Dr. Gabriella Carrozza to **present the seminar** to the workers of the SESM S.c.a.r.l. and SELEX, Giugliano in Campania, Italy, 24 May 2011;
- *"Attacking Web Applications"*, invited by organization to **present the workshop** at Summer School of the Department of Informatics Engineering, University of Coimbra, Coimbra Institute of Engineering, Coimbra, Portugal, 24 March 2010;
- *"Attacking Web Applications"*, invited by organization to **present the workshop** at HandsOn@DEIS 2.0, Department of Informatics and System Engineering, Polytechnic Institute of Coimbra, Coimbra Institute of Engineering, Coimbra, Portugal, 24 March 2010.

7. Additional information

This section describes technical and personal skills, competences and interests.

7.1. Technical skills

Java™ Technologies

- Extensive development experience with Java SE including multi-threaded/concurrent applications, and network based applications (using Sockets, RMI and NIO) and the use of Java Swing applications;
- Extensive programming experience in J2EE and Java EE 5 environments;
- Experienced developer of Java data-centric applications using of JDBC, Java Persistence API (JPA 2.0) and/or Hibernate. Contact with of the Spring framework;
- Experience in configuring and using application servers and servlet containers, namely JBoss, Glasshfish, Tomcat;
- User of Java Aspect Oriented Programming (AOP) since 2008, AspectJ specifically;
- Experienced in developing Java Web Services and respective SOAP stacks and associated technologies, namely JAX-WS and Axis.

Data Management Systems

- Extensive experience with traditional Database Management Systems as Oracle®, Microsoft® SQL Server, PostgreSQL e MySQL™;
- Experienced user of SQL and PL/SQL;
- Experienced user of Embedded database management systems, namely SQLite and BerkleyDB;
- Solid knowledge of Data Warehousing and Data Mining and respective processes, including experience with related tools as Oracle Warehouse Builder and Oracle Discoverer;
- Experience with Object-relational mapping (ORM) libraries as Hibernate or Oracle® TopLink;
- Experience with Non-SQL engines such as MongoDB, Redis and Cassandra.

Web, XML and .NET Technologies

- Experience with Web development technologies as JSP, Servlets ASP.NET, XHMTL, php, JavaScript and CSS;
- Strong knowledge in Service Oriented Architectures (SOA) and related technologies (XML, Web Services, BPEL);
- Use of several XML technologies (DTD, XSD, XSLT, XPATH) and AJAX;
- Contact with of the Extensible Messaging and Presence Protocol (XMPP);
- Experienced in developing with programming languages C, C++, C#;
- Experienced in developing Windows Forms Applications.

Development process

- Extensive experience with several version control systems (e.g. Subversion, CVS, Git, and Mercurial);
- Experienced user of building automation tools as Apache Ant™ and software project management tools as Apache Maven;
- Extensive experience with several IDEs (e.g. NetBeans, Eclipse, IntelliJ IDEA and Microsoft Visual Studio®);
- Knowledge of Software Design Patterns;
- Knowledge of Code smells;
- Experience with Waterfall development model and contact with Agile software development methodologies.

Other computing skills

- Contact with of Python;
- Knowledge of ANSI Common Lisp;
- Knowledge of OpenGL®;
- Proficient user of Microsoft Windows, Apple Mac OS X and Unix/Linux operating systems and its applications;
- Experience with building websites using Joomla.

7.2. Other competences and activities

- Member of IEEE Computer Society since 2009;
- Experience in tutoring high school students in programming, mathematics and physics topics.

Coimbra, 01 October 2016

Nuno Manuel dos Santos Antunes