

# Pavel Parízek

## Curriculum Vitae

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### **Contact**

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### **Employment**

**Assistant Professor** **09/2012 –**  
Dep. of Distributed and Dependable Systems, Faculty of Mathematics and Physics,  
Charles University in Prague, Czech Republic

**Post-doctoral Fellow** **05/2010 – 08/2012**  
David R. Cheriton School of Computer Science, Faculty of Mathematics,  
University of Waterloo, Ontario, Canada

**Assistant Professor** **07/2009 – 04/2010**  
Dep. of Software Engineering, Faculty of Mathematics and Physics,  
Charles University in Prague, Czech Republic

**Researcher** **10/2008 – 06/2009**  
Dep. of Software Engineering, Faculty of Mathematics and Physics,  
Charles University in Prague, Czech Republic

### **Education**

**Ph.D. in Software Systems** **2008**  
Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic

**RNDr. (similar to Ph.D. candidate)** **2007**  
Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic

**Mgr. (MSc equivalent) in Computer Science** **2005**  
Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic

## **Research Projects**

Automated Incremental Verification and Debugging of Concurrent Systems

Funded by: Czech Science Foundation

Duration: January 2018 – December 2020

My role: Principal Investigator

Trust 4.0: Dataflow-based Privacy and Trust Modelling and Analysis in Industry 4.0 Systems

Funded by: Technology Agency of the Czech Republic

Duration: January 2018 – December 2019

My role: team member

<http://trust40.ipd.kit.edu/home/>

Verification and Bug Hunting for Advanced Software

Funded by: Czech Science Foundation

Duration: January 2017 – December 2019

My role: team member

Automatic Formal Analysis and Verification of Programs with Complex Unbounded Data and Control Structures

Funded by: Czech Science Foundation

Duration: January 2014 – December 2016

My role: team member

Practical Program Verification Using Combination of Static and Dynamic Analysis

Funded by: Czech Science Foundation

Duration: February 2013 – December 2015

My role: Principal Investigator

Quality Impact Prediction for Evolving Service-oriented Software (Q-ImPrESS)

Funded by: European Union under the ICT priority of the 7th Research Framework Programme

Duration: January 2008 – December 2010

My role: team member

<http://www.q-impress.eu>

Open Source Platform and Infrastructure for Run-time Integration of Services (OSIRIS)

Funded by: ITEA/EUREKA Programme

Duration: July 2005 – June 2008

My role: team member

<http://www.itea-osiris.org>

Component Reliability Extensions for the Fractal Component Model (CRE)

Funded by: France Telecom R&D

Duration: January 2005 – June 2006

My role: team member

[http://d3s.mff.cuni.cz/projects/formal\\_methods/ft/](http://d3s.mff.cuni.cz/projects/formal_methods/ft/)

## **Publications**

### **Journal Publications**

- [1] P. Parízek and O. Lhoták. Fast Detection of Concurrency Errors by State Space Traversal with Randomization and Early Backtracking. *International Journal on Software Tools for Technology Transfer*, accepted for publication, available online at <https://link.springer.com/article/10.1007/s10009-018-0484-7>
- [2] P. Parízek and O. Lhoták. Model Checking of Concurrent Programs with Static Analysis of Field Accesses. *Science of Computer Programming*, vol. 98, part 4, Elsevier, 2015
- [3] P. Parízek and F. Plášil. Assume-Guarantee Verification of Software Components in SOFA 2 Framework. *IET Software*, vol. 4, issue 3, IET, 2010

### **Conference/Workshop Proceedings**

- [4] P. Parízek. Hybrid Partial Order Reduction with Under-Approximate Dynamic Points-to and Determinacy Information. In *Proceedings of the 16th International Conference on Formal Methods in Computer Aided Design (FMCAD)*, IEEE, 2016
- [5] P. Parízek. Fast Error Detection with Hybrid Analyses of Future Accesses. In *Proceedings of the 31st ACM/SIGAPP Symposium on Applied Computing (SAC)*, MUSEPAT track, ACM, 2016
- [6] P. Parízek. Hybrid Analysis for Partial Order Reduction of Programs with Arrays. In *Proceedings of the 17th International Conference of Verification, Model Checking, and Abstract Interpretation (VMCAI)*, LNCS, vol. 9583, 2016
- [7] J. Daniel and P. Parízek. PANDA: Simultaneous Predicate Abstraction and Concrete Execution. In *Proceedings of the 11th International Haifa Verification Conference (HVC)*, LNCS, vol. 9434, 2015
- [8] J. Daniel and P. Parízek. Predicate Abstraction in Program Verification: Survey and Current Trends. In *Proceedings of 2014 Imperial College Computing Student Workshop (ICCSW)*, OpenAccess Series in Informatics (OASIs), vol. 43
- [9] P. Parízek and P. Jančík. Approximating Happens-Before Order: Interplay between Static Analysis and State Space Traversal. In *Proceedings of the 21st International Symposium on Model Checking of Software (SPIN)*, ACM, 2014
- [10] J. Daniel, P. Parízek, and C.S. Pasareanu. Predicate Abstraction in Java Pathfinder. In *Proceedings of the Java Pathfinder Workshop 2013*, ACM SIGSOFT Software Engineering Notes, vol. 39, issue 1
- [11] A. Khyzha, P. Parízek, and C.S. Pasareanu. Abstract Pathfinder. In *Proceedings of the Java Pathfinder Workshop 2012*, ACM SIGSOFT Software Engineering Notes, vol. 37, issue 6

- [12] P. Parízek and O. Lhoták. Predicate Abstraction of Java Programs with Collections. In Proceedings of the 27th ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), ACM, 2012
- [13] P. Parízek and O. Lhoták. Identifying Future Field Accesses in Exhaustive State Space Traversal. In Proceedings of the 26th International Conference on Automated Software Engineering (ASE), IEEE CS, 2011
- [14] P. Parízek and O. Lhoták. Randomized Backtracking: Next Steps. Java Pathfinder Workshop 2011
- [15] P. Jančík, J. Kofroň, and P. Parízek. Advanced Debugging with JPF-Inspector. Java Pathfinder Workshop 2011
- [16] P. Parízek and O. Lhoták. Randomized Backtracking in State Space Traversal. In Proceedings of the 18th International Workshop on Model Checking of Software (SPIN), LNCS, vol. 6823, 2011
- [17] T. Kalibera, P. Parízek, M. Malohlava, and M. Schoeberl. Exhaustive Testing of Safety Critical Java. In Proceedings of the 8th International Workshop on Java Technologies for Real-time and Embedded Systems ( JTRES), ACM, 2010
- [18] P. Parízek and T. Kalibera. Efficient Detection of Errors in Java Components Using Random Environment and Restarts. In Proceedings of the 16th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), LNCS, vol. 6015, 2010
- [19] P. Parízek and N. Yuldashev. Extraction of Component-Environment Interaction Model Using State Space Traversal. In Proceedings of the 25th ACM Symposium on Applied Computing (SAC 2010), ACM, 2010
- [20] T. Kalibera, P. Parízek, G. Haddad, G. Leavens, and J. Vitek. Challenge Benchmarks for Verification of Real-time Programs. In Proceedings of the 4th ACM SIGPLAN Workshop on Programming Languages meets Program Verification (PLPV'10), ACM, 2010
- [21] J. Kofroň, P. Parízek and O. Šerý. On Teaching Formal Methods: Behavior Models and Code Analysis. In Proceedings of the 2nd International FME Conference on Teaching Formal Methods (TFM 2009), LNCS, vol. 5846, 2009
- [22] P. Parízek and T. Kalibera. Platform-Specific Restrictions on Concurrency in Model Checking of Java Programs. In Proceedings of the 14th International Workshop on Formal Methods for Industrial Critical Systems (FMICS 2009), LNCS, vol. 5825, 2009

- [23] P. Parízek, J. Adámek, and T. Kalibera. Automated Construction of Reasonable Environment for Java Components. In Proceedings of the 6th International Workshop on Formal Engineering Approaches to Software Components and Architectures (FESCA 2009), ENTCS, vol. 253, issue 1, 2009
- [24] P. Parízek and J. Adámek. Checking Session-Oriented Interactions between Web Services. In Proceedings of 34th EUROMICRO SEAA conference, IEEE Computer Society, 2008
- [25] P. Parízek and F. Plášil. Modeling of Component Environment in Presence of Callbacks and Autonomous Activities. In Proceedings of TOOLS EUROPE 2008, Springer-Verlag, LNBIP, vol. 11, 2008
- [26] P. Parízek and F. Plášil. Partial Verification of Software Components: Heuristics for Environment Construction. In Proceedings of 33rd EUROMICRO SEAA conference, IEEE Computer Society, 2007
- [27] P. Parízek and F. Plášil. Modeling Environment for Component Model Checking from Hierarchical Architecture. In Proceedings of Formal Aspects of Component Software (FACS'06), ENTCS, vol. 182, 2007
- [28] P. Parízek and F. Plášil. Specification and Generation of Environment for Model Checking of Software Components. In Proceedings of International Workshop on Formal Foundations of Embedded Software and Component-Based Software Architectures (FESCA 2006), ENTCS, vol. 176, issue 2, 2007
- [29] P. Parízek, F. Plášil, and J. Kofroň. Model Checking of Software Components: Combining Java PathFinder and Behavior Protocol Model Checker. In Proceedings of 30th NASA Software Engineering Workshop (SEW-30), IEEE Computer Society, 2007

### **Book Chapters**

- [30] L. Bulej, T. Bureš, T. Coupaye, M. Děcký, P. Ježek, P. Parízek, F. Plášil, T. Poch, N. Rivierre, O. Šerý, and P. Tůma. CoCoME in Fractal. Chapter In The Common Component Modeling Example: Comparing Software Component Models, Springer-Verlag, LNCS, vol. 5153, 2008
- [31] T. Bureš, M. Děcký, P. Hnětynka, J. Kofroň, P. Parízek, F. Plášil, T. Poch, O. Šerý, and P. Tůma. CoCoME in SOFA. Chapter in The Common Component Modeling Example: Comparing Software Component Models, Springer-Verlag, LNCS, vol. 5153, 2008

### **Technical Reports**

- [32] P. Vysoký, P. Parízek, and V. Pech. INGRID: Creating Languages in MPS from ANTLR Grammars. Tech. Report No. D3S-TR-2018-01, Dep. of Distributed and Dependable Systems, Charles University, 2018

- [33] P. Parízek. Hybrid Analysis of Future Accesses and Heuristics for Fast Detection of Concurrency Errors. Tech. Report No. D3S-TR-2015-03, Dep. of Distributed and Dependable Systems, Charles University, 2015
- [34] P. Parízek and P. Jančík. Computing Approximate Happens-Before Order with Static and Dynamic Analysis. Tech. Report No. D3S-TR-2013-06, Dep. of Distributed and Dependable Systems, Charles University, 2013
- [35] P. Parízek, T. Kalibera, and J. Vitek. Model Checking Real-time Java. Tech. Report No. 2010/1, Dep. of Distributed and Dependable Systems, Charles University, 2010
- [36] P. Parízek and J. Adámek. Modeling and Verification of Session-Oriented Interactions between Web Services: Compliance of BPEL with Session Protocols. Tech. Report No. 2008/2, Dep. of SW Engineering, Charles University, 2008
- [37] P. Parízek and F. Plášil. Heuristic Reduction of Parallelism in Component Environment. Tech. Report No. 2007/2, Dep. of SW Engineering, Charles University, 2007
- [38] P. Parízek and F. Plášil. Modeling Environment for Component Model Checking from Hierarchical Architecture. Published in Preliminary Proceedings of 3rd International Workshop on Formal Aspects of Component Software (FACS'06), UNU-IIST Report No. 344, 2006
- [39] P. Parízek, F. Plášil, and J. Kofroň. Model Checking of Software Components: Making Java PathFinder Cooperate with Behavior Protocol Checker. Tech. Report No. 2006/2, Dep. of SW Engineering, Charles University, 2006
- [40] P. Parízek and F. Plášil. Specification and Generation of Environment for Model Checking of Software Components. Tech. Report No. 2005/5, Dep. of SW Engineering, Charles University, 2005

### **Theses**

- [41] P. Parízek. Formal Verification of Components in Java. Ph.D. thesis, advisor: František Plášil, 2008
- [42] P. Parízek. Transactions in Peer-to-Peer Systems. Mgr. thesis, advisor: Petr Tůma, 2005

### **Selected Talks**

1. Systematic Testing of Concurrent Programs Using Combination of Static and Dynamic Analysis. Imperial College London, 2014; ECOOP PC seminar, 2015
2. Practical Verification and Bug Finding with Java Pathfinder. Oxford University, 2012; Aarhus University, 2012

## **Software**

**Soothsharp:** C# front-end to the Viper verification framework

<https://github.com/soothsilver/soothsharp>

**JPF-Inspector:** GDB-like debugger that allows the developer to control and inspect execution of a Java program under Java Pathfinder

<https://github.com/d3sformal/jpf-inspector>

**PANDA:** Predicate Abstraction in Dynamic Analysis

<https://github.com/d3sformal/panda>

**JPF-static:** Practical verification using static analysis and Java Pathfinder

[http://d3s.mff.cuni.cz/projects/formal\\_methods/jpf-static](http://d3s.mff.cuni.cz/projects/formal_methods/jpf-static)

**J2BP:** Tool for automated construction of predicate abstraction of Java classes

<http://d3s.mff.cuni.cz/~parizek/j2bp>

**RTEEmbed:** Java Pathfinder extension for exhaustive testing of Java programs for real-time and embedded platforms (RTSJ and SCJ)

<http://babelfish.arc.nasa.gov/trac/jpf/wiki/projects/rteembed>

**COMBAT:** Component Behavior Analysis Toolset

[http://d3s.mff.cuni.cz/projects/formal\\_methods/combat](http://d3s.mff.cuni.cz/projects/formal_methods/combat)

## **Teaching Experience**

**Courses taught at Charles University:**

Program Analysis and Code Verification: 2008-2009, 2013-2018

Formal Foundations of Software Engineering: 2015-2017

Advanced Tools for Software Development and Monitoring: 2014-2018

Software Development Tools: 2013-2017

NetBeans and Eclipse Platforms: 2013-2014

Recommended Programming Practices – labs: 2010, 2013

Embedded and Real-Time Systems – labs: 2010

Java – labs: 2009

Software Development and Monitoring Tools: 2008, 2012 (labs)

Internet – labs: 2007-2008

## **Students**

**Current Students**

1. Filip Kliber, Mgr (MSc equivalent), started in January 2018
2. Vlastimil Dort, PhD, started in October 2016
3. István Satmári, Mgr, started in June 2016

4. Jakub Daniel, PhD, started in October 2013

### **Past Students**

1. Roman Kápl, Mgr (MSc equivalent), November 2017 – June 2018  
Dynamic Analysis for Finding Endianity Bugs
2. Petr Hudeček, Mgr, October 2016 – September 2017  
Soothsharp: A C#-to-Viper Translator
3. Jakub Háva, Mgr, March 2016 – June 2017  
Monitoring Tool for Distributed Java Applications
4. Filip Kliber, Bc, May 2016 – September 2016  
Design and Implementation of a Language for Code-golf Challenge
5. Přemysl Vysoký, Mgr, April 2016 – September 2016  
Grammar to JetBrains MPS Convertor
6. Vlastimil Dort, Mgr, February 2015 – September 2016  
String Analysis for Code Contracts
7. Jan Škvařil, Mgr, September 2014 – September 2016  
Web System for Crowdfunding Based on Selling Items with Custom Imprint
8. Tomáš Šafařík, Mgr, June 2015 – June 2016  
Java Bytecode Preprocessor for Program Verification Tools
9. Jonáš Klimeš, Mgr, May 2014 – June 2016  
Domain-Specific Language for Learning Programming
10. Pavel Jančík, Mgr, April 2009 – September 2010  
Checking Compliance of Java Implementation with TBP Specification
11. Rudolf Tomori, Bc, October 2008 – June 2009  
Automatic Detection of Web Application Vulnerabilities
12. Nodir Yuldashev, Mgr, December 2006 – May 2009  
Using Java PathFinder for Construction of Abstractions of Java Programs
13. Zdeněk Bouška, Bc, October 2007 – January 2009  
Traffic Monitoring in TCP/IP Networks
14. David Brodský, Bc, November 2006 – August 2007  
Distributed Hash Table for BitTorrent Client

### **Professional Service**

#### **Program Committees**

1. European Conference on Object-Oriented Programming (ECOOP): 2015
2. Symposium on Applied Computing, special track on Object Oriented Programming Languages and Systems (OOPS track, SAC): 2015, 2016, 2018
3. Java Pathfinder Workshop: 2011-2013, 2017-2018
4. International Workshop on Java Technologies for Real-time and Embedded Systems (JTRES): 2010

#### **Journal Referee**

1. Science of Computer Programming
2. Software Testing, Verification and Reliability (STVR)



3. ACM Transactions on Software Engineering and Methodology
4. Concurrency and Computation: Practice and Experience
5. IET Software

#### **External Reviewer**

1. Formal Methods in Computer-Aided Design (FMCAD): 2016
2. European Conference on Object-Oriented Programming (ECOOP): 2008, 2016
3. International Symposium on Static Analysis (SAS): 2011
4. International Symposium on Component-Based Software Engineering (CBSE): 2010
5. World Congress on Formal Methods (FM): 2009

#### **Other**

1. Member of the subject-area board for computer science (informatics) of the Charles University Grant Agency (GAUK): from September 2016
2. Local organizer for conferences and workshops: ECOOP 2015
3. Mentor in the Google Summer of Code (GSoC) program for the Java Pathfinder team: 2010-2013, 2016