Karl Palmskog
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Curriculum Vitae

Karl Palmskog

Research Interests

I am interested in techniques and tools for construction of correct and efficient distributed systems, in particular using proof assistants. I also take a broad interest in programming languages, software engineering, and formal verification.

Education

Feb 2009 - Nov 2014 — **Ph.D., Computer Science**, 240 ECTS credits, KTH Royal Institute of Technology, Stockholm, Sweden. Research on distributed systems and programming languages. Chairman of the Ph.D. student council at the School of Computer Science and Communication in 2013.

Aug 2001 - May 2007 — **M.Sc., Computer Science and Engineering**, 270 ECTS credits, KTH Royal Institute of Technology, Stockholm, Sweden. Master's project at Ericsson AB: "Verification of the Session Management Protocol".

Mar 2002 - Jan 2003 — Military service/training in the Swedish Armed Forces.

Employment

Jan 2018 - — **Research Fellow**, The University of Texas at Austin, TX, USA. Postdoctoral research on proof engineering.

Sep 2017 - Jan 2018 — **Visiting Scholar**, University of Illinois at Urbana-Champaign, IL, USA. Postdoctoral research on verification of software and proof engineering.

Jan 2015 - Aug 2017 — **Postdoctoral Research Associate**, University of Illinois at Urbana-Champaign, IL, USA. Postdoctoral research on programming languages.

Nov 2014 - Dec 2014 — **Researcher**, KTH Royal Institute of Technology, Stockholm, Sweden. Postdoctoral research on programming languages and distributed systems.

Feb 2014 - Sep 2014 — **Research Engineer**, KTH Royal Institute of Technology, Stockholm, Sweden. Research on programming languages and distributed systems.

Feb 2009 - Jan 2014 — **Doctoral Student**, KTH Royal Institute of Technology, Stockholm, Sweden. Lecturer, teaching assistant, and lab assistant in several computer science courses.

Feb 2007 - Jan 2009 — **Developer**, Jaycut AB, Stockholm, Sweden. Company co-founder and developer of a platform for online video editing. Company sold in 2011 to Research in Motion (now Blackberry).

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Contributions to Software

Algorand consensus protocol formalization	https://github.com/runtimeverification/algorand-verification
Blockchain formalization	https://github.com/certichain/toychain
Verdi verification framework	https://github.com/uwplse/verdi
Verdi Raft consensus protocol	https://github.com/uwplse/verdi-raft
Cheerios serialization library	https://github.com/uwplse/cheerios
Coq plugins for proof analysis	https://github.com/proofengineering
iCoq proof selection tool	http://cozy.ece.utexas.edu/icoq/
Ott tool for defining calculi	https://github.com/ott-lang/ott
Distributed separation logic	https://github.com/DistributedComponents/disel
SerAPI Coq library	https://github.com/ejgallego/coq-serapi
Coq-community	https://github.com/coq-community

GitHub profile: https://github.com/palmskog

Professional Service

Workshop on FM for Blockchains	Program Committee Member
CAV 2019	External Reviewer
ISSTA 2019	External Reviewer
SCICO	Reviewer 2019
FASE 2019	External Reviewer
ICSE 2019	External Reviewer
POPL 2019	Artifact Eval. Committee Member
ASE 2018	External Reviewer
FM 2018	External Reviewer
TOMACS	Reviewer 2018
QEST 2017	External Reviewer
COORDINATION 2017	External Reviewer
PDP 2017	External Reviewer
QEST 2016	Proceedings Chair
CONCUR 2016	External Reviewer
COORDINATION 2016	External Reviewer
FORTE 2016	External Reviewer
iFM 2016	External Reviewer
SRDS 2015	External Reviewer
COORDINATION 2015	External Reviewer
CPP 2013	External Reviewer

External Funding

"ReCoqtion: Meta-Certified Continuous Program Verification", Research Award from Facebook, joint with Zachary Tatlock, University of Washington (50k USD).

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Accepted Publications

[Kal+19] Faria Kalim, Karl Palmskog, Jayasi Mehar, Adithya Murali, P. Madhusudan, and Indranil Gupta. "Kaizen: Building a Verified and Performant Blockchain System". Accepted to appear in International Conference on Formal Methods in Computer-Aided Design. 2019.

[Rin+19] Talia Ringer, Karl Palmskog, Ilya Sergey, Milos Gligoric, and Zachary Tatlock. "QED at Large: A Survey of Engineering of Formally Verified Software". Accepted to appear in Foundations and Trends in Programming Languages. 2019.

Peer-Reviewed Publications

[CPA19] Minas Charalambides, Karl Palmskog, and Gul Agha. "Types for Progress in Actor Programs". In: *Models, Languages, and Tools for Concurrent and Distributed Programming: Essays Dedicated to Rocco De Nicola on the Occasion of His 65th Birthday*. 2019, pp. 315–339. DOI: 10.1007/978-3-030-21485-2_18.

[Pal+19] Karl Palmskog, Milos Gligoric, Lucas Peña, and Grigore Roşu. "Verifying Finality for Blockchain Systems". In: *International Workshop on Coq for Programming Languages*. Jan. 2019.

[AP18a] Gul Agha and Karl Palmskog. "A Survey of Statistical Model Checking". In: *ACM Trans. Model. Comput. Simul.* 28.1 (Jan. 2018), 6:1–6:39. DOI: 10.1145/3158668.

[AP18b] Gul Agha and Karl Palmskog. "Transforming Threads into Actors: Learning Concurrency Structure from Execution Traces". In: *Principles of Modeling: Essays Dedicated to Edward A. Lee on the Occasion of his 60th Birthday*. July 2018, pp. 16–37. DOI: 10.1007/978-3-319-95246-8_2.

[CPG18] Ahmet Celik, Karl Palmskog, and Milos Gligoric. "A Regression Proof Selection Tool for Coq". In: *International Conference on Software Engineering, Demo*. June 2018, pp. 117–120. DOI: 10.1145/3183440.3183493.

[PCG18] Karl Palmskog, Ahmet Celik, and Milos Gligoric. "piCoq: Parallel Regression Proving for Large-scale Verification Projects". In: *International Symposium on Software Testing and Analysis*. July 2018, pp. 344–355. DOI: 10.1145/3213846.3213877.

[CPG17] Ahmet Celik, Karl Palmskog, and Milos Gligoric. "iCoq: Regression Proof Selection for Large-Scale Verification Projects". In: *Automated Software Engineering*. Nov. 2017, pp. 171–182. DOI: 10.1109/ASE.2017.8115630.

[Doe+17] Ryan Doenges, James R. Wilcox, Doug Woos, Zachary Tatlock, and Karl Palmskog. "Verifying Implementations of Churn-Tolerant Distributed Systems". In: *International Workshop on Coq for Programming Languages*. Jan. 2017.

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[DP15] Mads Dam and Karl Palmskog. "Location-independent routing in process network overlays". In: *Service Oriented Computing and Applications* 9.3 (Sept. 2015), pp. 285–309. DOI: 10.1007/s11761-014-0173-7.

[PHM15] Karl Palmskog, Farah Hariri, and Darko Marinov. "A Case Study on Executing Instrumented Code in Java PathFinder". In: *SIGSOFT Softw. Eng. Notes* 40.6 (Nov. 2015), pp. 1–5. DOI: 10.1145/2830719.2830730.

[DP14] Mads Dam and Karl Palmskog. "Location Independent Routing in Process Network Overlays". In: *International Conference on Parallel, Distributed and Network-Based Processing*. Feb. 2014, pp. 715–724. DOI: 10.1109/PDP.2014.30.

[DP13] Mads Dam and Karl Palmskog. "Efficient and Fully Abstract Routing of Futures in Object Network Overlays". In: *Workshop on Programming Based on Actors, Agents, and Decentralized Control*. 2013, pp. 49–60. DOI: 10.1145/2541329.2541340.

[Pal+13] Karl Palmskog, Mads Dam, Andreas Lundblad, and Ali Jafari. "ABS-NET: Fully Decentralized Runtime Adaptation for Distributed Objects". In: *Interaction and Concurrency Experience*. Vol. 131. EPTCS. 2013, pp. 85–100. DOI: 10.4204/EPTCS.131.8.

[JPV12] Kristján Valur Jónsson, Karl Palmskog, and Ymir Vigfússon. "Secure Distributed Top-k Aggregation". In: *International Conference on Communications*. June 2012, pp. 804–809. DOI: 10.1109/ICC.2012.6364049.

[Pal+10] Karl Palmskog, Alberto Gonzalez Prieto, Catalin Meirosu, Rolf Stadler, and Mads Dam. "Scalable Metadata-Directed Search in a Network of Information". In: *Future Network & Mobile Summit*. June 2010, pp. 1–8. URL: https://ieeexplore.ieee.org/document/5722376.

[Ism+07] Yuri Ismailov, Karl Palmskog, Micael Widell, Petter Arvidsson, and YaoShuang Wang. "Session Layer Resurgence: Towards Mobile, Disconnection- and Delay-Tolerant Communication". In: *European Conference on Universal Multiservice Networks*. Feb. 2007, pp. 337–345. DOI: 10.1109/ECUMN.2007.47.

Theses

[Pal14] Karl Palmskog. "Towards Correct and Efficient Program Execution in Decentralized Networks: Programming Languages, Semantics, and Resource Management". Ph.D. thesis. School of Computer Science and Communication, KTH Royal Institute of Technology, Nov. 2014. URL: http://kth.diva-portal.org/smash/record.jsf?pid=diva2%3A749552.

[Pal06] Karl Palmskog. "Verification of the Session Management Protocol". M.Sc. thesis. School of Computer Science and Communication, KTH Royal Institute of Technology, Nov. 2006. URL: https://www.nada.kth.se/utbildning/grukth/exjobb/rapportlistor/2006/rapporter06/palmskog_karl_06149.pdf.

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Book Chapters

[Agh+18] Gul Agha, Minas Charalambides, Kirill Mechitov, Karl Palmskog, Atul Sandur, and Reza Shiftehfar. "Theoretical Considerations: Inferring and Enforcing Use Patterns for Mobile Cloud Assurance". In: *Assured Cloud Computing*. John Wiley & Sons, Ltd, July 2018. Chap. 7, pp. 237–276. DOI: 10.1002/9781119428497.ch7.

Technical Reports

[Pal+18] Karl Palmskog, Milos Gligoric, Lucas Peña, Brandon Moore, and Grigore Roşu. *Verification of Casper in the Coq Proof Assistant*. Tech. rep. 2018. URL: http://hdl.handle.net/2142/102075.

[Pek+17] Edgar Pek, Pranav Garg, Muntasir Raihan Rahman, Karl Palmskog, Indranil Gupta, and P. Madhusudan. "Inferring Formal Properties of Production Key-Value Stores". In: *CoRR* abs/1712.10056 (2017). URL: http://arxiv.org/abs/1712.10056.

Publication Profiles

Google Scholar: https://scholar.google.com/citations?user=myVdnacAAAAJ

DBLP: https://dblp.org/pers/hd/p/Palmskog:Karl

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Recent Presentations

2019-03-08	Regression Proving in Deductive Program Verification: Theory and Practice. UT Austin colloquium presentation.
2019-01-28	Regression Proving with Proof Assistants: Theory and Practice. Invited presentation at Uppsala University.
2019-01-19	Verifying Finality for Blockchain Systems. Presentation at CoqPL Workshop.
2019-01-09	Regression proving with Dependent Types: Theory and Practice. Presentation at Lean Together workshop.
2018-09-05	Guest lecturer, UT EE328V, Continuous Development and Build Systems.
2018-07-18	piCoq: Parallel Regression Proving for Large-Scale Verification Projects. Presentation at the International Symposium on Software Testing and Analysis (ISSTA).
2018-06-13	An Introduction to Verification of Software Systems. Invited presentation at Klarna AB.
2018-06-12	Regression Proving in Large-Scale Verification Projects: Theory and Practice. Invited presentation at KTH Royal Institute of Technology.
2018-05-31	A Regression Proof Selection Tool For Coq. Demonstration at the International Conference on Software Engineering (ICSE).
2018-02-07	Guest lecturer, UIUC CS477, Verification of Imperative Programs using Dafny.
2017-10-31	iCoq: Regression Proof Selection for Large-Scale Verification Projects. Presentation at International Conference on Automated Software Engineering (ASE).
2017-10-30	Guest lecturer, UIUC CS524, The π-Calculus.
2017-10-25	Guest lecturer, UIUC CS524, Concurrent Processes and Bisimulation.
2017-10-23	Guest lecturer, UIUC CS524, Proofs by Induction.
2017-03-14	Guest lecturer, UIUC CS598, Stochastic Computing.
2017-01-23	iCoq: Regression Proof Selection for Large-Scale Coq Projects. Invited presentation at University of Washington Proof Assistant User Group.
2016-09-29	Guest lecturer, UIUC CS173, Intro to Discrete Structures: Graph Colorings.
2016-08-25	Guest lecturer, UIUC CS173, Intro to Discrete Structures: Graph Problems.
2016-08-23	Guest lecturer, UIUC CS173, Intro to Discrete Structures: Course Overview.
2015-11-09	A Case Study on Executing Instrumented Code in Java PathFinder. Presentation at Java PathFinder workshop.
2015-10-30	Guest lecturer, UIUC CS477, Temporal Logic.
2015-10-27	Hybrid Inference of Semantics for Software Adaptation. Invited presentation at the Workshop on Software Engineering for Parallel Systems (SEPS).
2015-05-05	Guest lecturer, UIUC CS421, Logic Programming.
2015-05-01	Automatic Conversion of Shared-Memory Programs to the Message-Passing Model Using Dynamic Probabilistic Inference. Invited presentation at BBN Technologies.
2015-04-29	Network-Oblivious Programmers, Network-Aware Program Execution. Invited presentations at MIT.

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Teaching Experience

Graduate student advising	UT		Co-advising of 2 junior PhD students.
Software Evolution	UT	EE328V	Guest lecturer.
Student supervision	UIUC		Co-supervision of 5 undergraduate students and junior PhD students.
Concurrent Programming Languages	UIUC	CS524	Guest lecturer. Development of exercises and exams.
Programming Languages for Next Generation Applications	UIUC	CS598	Guest lecturer.
Discrete Structures	UIUC	CS173	Guest lecturer.
Formal Software Development Methods	UIUC	CS477	Guest lecturer.
Logic for Computer Science	KTH	DD1350	Held recitation classes. Gave lab assistance to students. Corrected written assignments and exams. Developed course material.
Program System Construction Using C++	KTH	DD2387	Held recitation classes. Gave lab assistance to students. Corrected exams. Developed course material.
Software Engineering	KTH	DD2385	Held recitation classes. Gave lab assistance to students. Developed course material.
Network Security	KTH	DD2495	Guest lecturer. Gave lab assistance to students. Developed course material.
Advanced Algorithms	KTH	DD2440	Corrected written assignments. Conducted oral exams.
Algorithms, Data Structures and Complexity	KTH	DD1352	Gave lab assistance to students. Conducted oral exams.
Compiler Construction	KTH	DD2488	Conducted oral exams.
Numerical Methods	KTH	DN1240	Gave lab assistance to students.