Konstantinos Kallas

Contact Email: kallas@seas.upenn.edu – Website: angelhof.github.io

Education

University of Pennsylvania *September 2018 – present*
Computer and Information Science, PhD student
Advisor: Prof. Rajeev Alur

National Technical University of Athens *October 2012 – February 2018*
Electrical and Computer Engineering, Diploma
Thesis: *"HiPErJiT: A Profile-Driven Just-in-Time Compiler for Erlang"*
Advisor: Prof. Kostis Sagonas

Employment

Research Intern *Summer 2020*
Microsoft Research, Redmond, US
Internship in the RiSE group; advised by Sebastian Burckhardt.
Worked on Durable Functions, a programming model for serverless applications.

Research Intern *Summer 2019*
Amazon Web Services, New York, US
Internship in the Automated Reasoning Group; advised by Daniel Schwartz-Narbonne.
Worked on the verification of critical C code.

Big Data Application Developer *Summer 2016*
Everis, Barcelona, Spain
Internship at the Big Data Center of Excellence.
Developed Big Data Applications using tools in the Hadoop ecosystem.

Honors and Awards

A.G. Leventis Foundation PhD Grant *2021-2023*

ACM SRC Grand Finals *2021*
2nd place among SRC winners across all ACM conferences.

HotOS 2021 Distinguished Presentation Award *2021*
Awarded for "Unix Shell Programming: The Next 50 Years".

EuroSys 2021 Best Paper Award *2021*
Awarded for "PaSh: Light-touch Data-Parallel Shell Processing".

POPL Student Research Competition *2021*
1st place at the graduate category of the research competition.
Presented work on a parallelizing JiT compiler for shell scripts.

Gerondelis Foundation PhD Award *2020*

Publications

Executing Shell Scripts in the Wrong Order, Correctly.
Georgios Liargkovas, Konstantinos Kallas, Michael Greenberg, and Nikos Vasilakis.
Workshop on Hot Topics in Operating Systems (HotOS 23).

DiSh: Dynamic Shell-Script Distribution.
Tammam Mustafa, Konstantinos Kallas, Pratyush Das, and Nikos Vasilakis.
20th USENIX Symposium on Networked Systems Design and Implementation (NSDI 23).

Executing Microservice Applications on Serverless, Correctly.
Konstantinos Kallas*, Haoran Zhang*, Rajeev Alur, Sebastian Angel, and Vincent Liu.
Proceedings of the ACM on Programming Languages (POPL 2023).

Practically Correct, Just-in-Time Shell Script Parallelization.
Konstantinos Kallas, Tammam Mustafa, Jan Bielak, Dimitris Karnikis, Thurston Dang, Michael Greenberg, and Nikos Vasilakis.
16th USENIX Symposium on Operating Systems Design and Implementation (OSDI 22).

Netherite: Efficient Execution of Serverless Workflows.
Sebastian Burckhardt, Badrish Chandramouli, Chris Gillum, David Justo, Konstantinos Kallas, Connor McMahon, Christopher S. Meiklejohn, and Xiangfeng Zhu.
Proceedings of the VLDB Endowment (VLDB 2022).

Stream Processing with Dependency-Guided Synchronization.
Konstantinos Kallas*, Filip Niksic*, Caleb Stanford*, and Rajeev Alur.
Proceedings of the 27th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2022).

Charon: A Framework for Microservice Overload Control.
Jiali Xing, Max Demoulin, Konstantinos Kallas, and Benjamin C. Lee.
Proceedings of the 18th ACM Workshop on Hot Topics in Networks (HotNets 2021).

Durable Functions: Semantics for Stateful Serverless.
Sebastian Burckhardt, Chris Gillum, David Justo, Konstantinos Kallas, Connor McMahon, and Christopher S. Meiklejohn.
Proceedings of the ACM on Programming Languages (OOPSLA 2021).

An Order-aware Dataflow Model for Parallel Unix Pipelines.
Shivam Handa*, Konstantinos Kallas*, Nikos Vasilakis*, and Martin Rinard.
Proceedings of the ACM on Programming Languages (ICFP 2021).

Synchronization Schemas.
Rajeev Alur, Phillip Hillard, Zachary G. Ives, Konstantinos Kallas, Konstantinos Mamouras, Filip Niksic, Caleb Stanford, Val Tannen, and Anton Xue.
Invited Paper at Proceedings of the 40th Symposium on Principles of Database Systems (PODS 2021).

Unix Shell Programming: The Next 50 Years.
Michael Greenberg*, Konstantinos Kallas*, and Nikos Vasilakis*.
Proceedings of the Workshop on Hot Topics in Operating Systems (HotOS 2021).
Distinguished Presentation Award.

The Future of the Shell: Unix and Beyond.
Michael Greenberg*, Konstantinos Kallas*, and Nikos Vasilakis*.
Panel at the Workshop on Hot Topics in Operating Systems (HotOS 2021).

PaSh: Light-touch Data-Parallel Shell Processing.
Nikos Vasilakis*, Konstantinos Kallas*, Konstantinos Mamouras, Achilleas Benetopoulos, and Lazar M. Cvetković.
Proceedings of the Sixteenth European Conference on Computer Systems (EuroSys 2021).
Best Paper Award.

Preventing Dynamic Library Compromise on Node. js via RWX-Based Privilege Reduction.
Nikos Vasilakis, Cristian-Alexandru Staicu, Grigoris Ntousakis, Konstantinos Kallas, Ben Karel, André DeHon, and Michael Pradel.
Proceedings of the ACM SIGSAC Conference on Computer and Communications Security (CCS'21).

Code-level model checking in the software development workflow at Amazon Web Services.
Nathan Chong, Byron Cook, Jonathan Eidelman, Konstantinos Kallas, Kareem Khazem, Felipe R. Monteiro, Daniel Schwartz-Narbonne, Serdar Tasiran, Michael Tautschnig, and Mark R. Tuttle.
Software: Practice and Experience 2021.

DiffStream: Differential Output Testing for Stream Processing Programs.
Konstantinos Kallas*, Filip Niksic*, Caleb Stanford*, and Rajeev Alur.
Proceedings of the ACM on Programming Languages (OOPSLA 2020).

Code-Level Model Checking in the Software Development Workflow.
Nathan Chong, Byron Cook, Konstantinos Kallas, Kareem Khazem, Felipe R. Monteiro, Daniel Schwartz-Narbonne, Serdar Tasiran, Michael Tautschnig, and Mark R. Tuttle.
42st International Conference on Software Engineering: Software Engineering in Practice (ICSE-SEIP 2020).

Security Criteria for a Transparent Encryption Layer.
Konstantinos Kallas, Clara Schneidewind, Benjamin C. Pierce, and Steve Zdancewic.
Workshop on Foundations of Computer Security (FCS 2019).

HiPErJiT: A Profile-Driven Just-in-Time Compiler for Erlang.
Konstantinos Kallas and Konstantinos Sagonas.
30th Symposium on Implementation and Application of Functional Languages (IFL 2018).

Note: * indicates equal contribution.

Open Source Software

PaSh (Link)
A bolt-on system that automatically parallelizes arbitrary shell programs with theoretical and practical correctness guarantees. Hosted by the Linux Foundation.

try (Link)
A tool that lets you run a command and inspect its effects before committing them to your system.

DiSh (Link)
A system that automatically scales out shell scripts that operate on files in HDFS.

mu2sls (Link)
A framework for correctly implementing stateful microservice applications on serverless using standard Python.

Flumina (Link)
A programming model and system for stateful distributed streaming computations.

DiffStream (Link)
A differential testing library for stream processing applications in Apache Flink.

Research Mentoring

Nikos Pagonas (NTUA, BSc) *2023 – present*
Design and development of a serverless shell.

Spyros Pavlatos (UPenn, PhD student) *2022 – present*
Development of correctness criteria for microservice applications.

Akis Giannoukos (UPenn, PhD student) *2022 – present*
Overload control for microservice applications.

Giorgos Liargovas (AUEB, BSc student) *2022 – present*
Out-of-order execution of shell scripts (paper at HotOS 2023).

Tianyu (Eric) Zhu (Stevens, BSc student) *2022 – present*
Design and development of `try`, a lightweight isolation tool for Linux (over 4k stars on Github).

Jiali Xing (UPenn PhD student) *2021 – present*
Overload control for microservice applications (paper at HotNets 2021).

Tammam Mustafa (MIT, BSc → Google) *2021 – 2023*
Design and development of DiSh (paper at NSDI 2023).

Achilles Benetopoulos (NTUA, BSc → UCSC, PhD Student) *2019 – 2021*
Development of PaSh's runtime and benchmarking of shell programs (paper at EuroSys 2021).

Lazar Cvetkovic (University of Belgrade, BSc → ETH, PhD Student) *2019 – 2021*
Specification framework for POSIX and GNU Coreutils commands (paper at EuroSys 2021).

Outreach

CS PhD MentoRes *2021 – present*
Co-organizer of mentoring initiative for students that are interested in applying for PhD programs in CS but lack adequate resources. We have provided mentoring and resources to more than 40 students since the initiative's start.

SIGPLAN-M *2021 – present*
Participating mentor for students in the programming languages community.

Service

POPL 2023 Student Volunteer Co-Chair *2023*

OOPSLA 2023 External Review and Artifact Evaluation Committee *2023*

POPL 2022 Student Volunteer Co-Chair *2022*

HotOS 2021 Co-organizer of a panel on the future of the shell (link) *2021*

VMCAI 2021 Artifact Evaluation Committee *2021*

POPL 2020 External Reviewer *2020*

Teaching Experience

Teaching Assistant *Fall 2021*
Institution: University of Pennsylvania
Course: *Computer-Aided Verification*, Graduate level
Professor: Rajeev Alur

Teaching Assistant *Fall 2019*
Institution: University of Pennsylvania
Course: *Software Foundations*, Graduate level
Professor: Benjamin Pierce

Lab Assistant *Fall 2017*
Institution: National Technical University of Athens
Course: *Introduction to Programming*, Undergraduate level
Professors: S. Zachos, N. Papaspyrou, V. Kantere, and P. Potikas

Invited Talks

PaSh: Practically Correct, Just-in-Time Shell Script Parallelization. *2023*
Event: DTU Compute Seminar @ DTU.
Host: Christian Gram Kalhauge.

Executing Microservices on Serverless, Correctly. *2023*
Event: Sysread Seminar @ Brown University.
Host: Shriram Krishnamurthi.

Advancing the Serverless Paradigm. *2023*
Event: Invited Lecture at Systems Transforming Systems Course @ Brown University.
Host: Nikos Vasilakis.

PaSh: Practically Correct, Just-in-Time Shell Script Parallelization. *2023*
Event: Portland PLV Seminar @ Portland State University.
Host: Yao Li.

Executing Microservices on Serverless, Correctly. *2023*
Event: PL Seminar @ Harvard University.
Host: Stephen Chong.

PaSh: Practically Correct, Just-in-Time Shell Script Parallelization. *2023*
Event: CSLab Computing Systems Day @ National Technical University of Athens.
Host: Georgios Goumas.

PaSh: Practically Correct, Just-in-Time Shell Script Parallelization. *2022*
Event: Invited Lecture at Systems Transforming Systems Course @ Brown University.
Host: Nikos Vasilakis.

PaSh: Practically Correct, Just-in-Time Shell Script Parallelization. *2022*
Event: New England Programming Languages and Systems Symposium (NEPLS).

PaSh: Practically Correct, Just-in-Time Shell Script Parallelization. *2022*
Event: New Jersey Programming Languages and Systems Seminar (NJPLS).

PaSh: Practically Correct, Just-in-Time Shell Script Parallelization. *2022*
Event: LSD group seminar @ University of California Santa Cruz.
Host: Lindsey Kuper.

PaSh: Data-parallel shell scripting. *2022*
Event: PRL Seminar @ Northeastern University (Virtual).
Host: Arjun Guha.

Flumina: Correct Distribution of Stateful Streaming Computations. *2020*
Event: PL Tea @ UC San Diego.
Host: Nadia Polikarpova.

Flumina: Correct Distribution of Stateful Streaming Computations. *2019*
Event: Athens PL Seminar @ National Technical University of Athens.
Host: Kostis Sagonas and Nikos Papaspirou.

HiPErJiT: A Profile-Driven Just-in-Time Compiler for Erlang. *2018*
Event: Athens PL Seminar @ National Technical University of Athens.
Host: Kostis Sagonas and Nikos Papaspirou.