

ATTILA KLENIK, PhD

ICT Expert @ NAV

Research Fellow @ BME/VIK/MIT/ftsrg



CONTACT

✉ klenik.attila@nav.gov.hu

✉ attila.klenik@vik.bme.hu

🌐 aklenik

in attila-klenik

☎ +36 30 594 7282

SKILLS

DLT/Blockchain

Distributed Systems

Performability Analysis

Data Analysis

Service Monitoring

Log processing

System Design

System Devel.

Software Testing

Technical Lead

ABOUT ME

Computer scientist located in Budapest, HUN, working as an ICT expert at NAV and a part-time research fellow at ftsrg@BME on the model-based design and performability assessment of blockchain systems. PhD in empirical performance analysis from BME, Hungary. Feeling the most comfortable at the intersection of theory and practice, where the latest research results come to life in real-world solutions.

WORK

ICT Expert @ NAV

2024 - Present

Technological lead and quality assurance

I am the ICT lead on the innovative EMAP project at the National Tax and Customs Administration (NAV) targeting the consolidation of employer data reporting mechanisms.

More information (HUN): <https://kormany.hu/penzugyminiszterium/esemenyalapu-adatszolgaltatasi-platform>

Research Fellow @ ftsrg

2023 - Present

Design and perf. analysis of DLT-based solutions

Currently, the main focus points of my research are: i) the knowledge-base supported performance monitoring and analysis of service-oriented (mainly DLT) systems; ii) the model-based design of DLT smart contracts; and iii) privacy-aware data model design for DLT smart contracts.

Research Assistant @ ftsrg

2020 - 2022

Performance analysis of distributed ledger solutions

The scope of my research during this period was the rigorous measurement-based performance analysis of DLT frameworks. The main focus of my work was the systematic performance measurement and analysis of the Hyperledger Fabric DLT platform, including the detailed supporting methodologies across the entire life-cycle of the measurement campaign. The results are presented in my Ph.D. dissertation:

<http://hdl.handle.net/10890/18724>

PROJECTS

Technical lead, system design

2024 - Present

EMAP @ NAV

The project targets the consolidation of employer data reporting mechanisms.

More information (HUN): <https://kormany.hu/penzugyminiszterium/esemenyalapu-adatszolgaltatasi-platform>

Technical lead, system design and consultation

2023 - Present

Ongoing projects @ ftsrg

I provide technical-level system design and consultation for ongoing projects concerning DLT-based data management solutions.

LANGUAGES

Hungarian	Native
English (ICT)	C1
English (General)	B2
German (General)	B1

FURTHER NOTES

Students' Scientific Conference Advisor

1st prize, 3rd in national
*Data model-driven
goodput optimization for
execute-order-validate
blockchains*

Ph.D. Winter School

Jerusalem, 2018

I participated in the *3rd Advanced School in Computer Science and Engineering: Blockchains and Cryptocurrencies* Ph.D. winter school, organized in Jerusalem, Israel.

Conference Organizer

MINISY@DMIS 2019

I was among the organizers of the 26th Minisymposium of the Department of Measurement and Information Systems in 2019.

Students' Scientific Conference

1st prize, rector's special prize
*Configurable Stochastic
Analysis Framework for
Asynchronous Systems*
Co-author: Kristóf Marussy

National Students' Scientific Conference

3rd prize
*Configurable Stochastic
Analysis Framework for
Asynchronous Systems*
Co-author: Kristóf Marussy

Lead technical expert of perf. assessment track Development and performance assessment of a CBDC prototype system @ ftsrg

2020 - Present

I partially designed and developed components of a multi-tier, DLT-based prototype system for the handling of central bank digital currency (CBDC). Moreover, I was the lead technical expert of the research track targeting the performance measurement and assessment of the prototype. This work was created under the Cooperation Agreement between the Hungarian National Bank (MNB) and the Budapest University of Technology and Economics (BME) in the Digitisation, artificial intelligence and data age workgroup.

Key participant in research Fault Injection of Blockchain Systems @ ftsrg

2018 - 2019

The project targeted the performance and robustness assessment of the Hyperledger Fabric platform in the presence of faulty smart contracts, achieved using software fault injection. I designed and implemented the deployment, measurement, and workload generation aspects of the project. Furthermore, I was a key participant in the analysis of gathered measurement data.

Maintainer/principal developer Hyperledger Caliper @ Hyperledger

Since Oct 2018

Caliper is an open-source, scalable, and flexible tool for the benchmarking of blockchain technologies, governed by the Linux Foundation. I am among the principal developers of the project, shaping its architecture and feature set, following best practices I gather during my own research.

Mentor Summer Mentorship Program @ Hyperledger

Q3 of 2023

I'm mentoring two projects related to mostly Hyperledger Fabric. The first project's goal is to aid the work of smart contract developers by providing ORM-like features for designing the data model of the contract. The second project (co-mentored by AMD Singapore) aims to provide a service-oriented solution for the monitoring and performance analysis of Fabric networks.

Mentor Summer Mentorship Program @ Hyperledger

Summer of 2022

I mentored a university student from the USA who designed and implemented an extension for the Visual Studio Code development environment to facilitate the usage of Hyperledger Caliper for users.

Mentor Summer Mentorship Program @ Hyperledger

Summer of 2021

I mentored a university student from India who designed and implemented a built-in workload module for Hyperledger Caliper that allows users the declarative, configuration file-based definition of workloads instead of directly implementing them in code.

Mentor Summer Mentorship Program @ Hyperledger

Summer of 2019

I co-mentored (with Huawei) a university student from the USA who conducted preliminary work on a GUI component for the Hyperledger Caliper project.

Intern Summer Mentorship Program @ Hyperledger

Summer of 2017

I researched and prototyped an approach for the automatic execution of business processes on the Hyperledger Fabric DLT platform. I applied standard- and model-based development techniques (BPMN, Petri nets, state machines), model transformation frameworks (Eclipse, Java, EMF, ATL), and model-based code generation (Xtend, Golang).

Designer & Developer
PetriDotNet Modeling Framework @ ftsrg

2011 - 2016

PetriDotNet is a modeling framework for editing, simulating and analyzing Petri nets. I researched, designed and implemented modular and scalable linear algebra algorithms (using .NET, C#, MEF), provided a graphical interface for a configurable model analysis workflow (using WinForms), and thoroughly unit tested the related algorithms (using IntelliTest, combinatorial testing, interval testing, and test generation techniques).

EDUCATION

Ph.D. - Computer Science Engineer
Budapest University of Technology and Economics

2016 - 2022

Measurement-based performance evaluation of DLTs
@ Critical Systems Research Group (ftsrg)

M.Sc. - Computer Science Engineer
Budapest University of Technology and Economics

2014 - 2016

Efficient stochastic analysis of asynchronous systems
@ Critical Systems Research Group (ftsrg)

B.Sc. - Engineering Information Technologist
Budapest University of Technology and Economics

2009 - 2014

Editor and analysis framework for Petri net-based models
@ Critical Systems Research Group (ftsrg)

TEACHING

Lecturer
Reliable Distr. and Decentralized Systems (BME)

2023 - Present

I participate in the assembly of selected course materials. I also teach lectures about micro-services, Hyperledger Fabric, and smart contract development.

Lecturer
Blockchain Technologies and Applications (BME)

2018 - Present

I participate in the assembly and correction of homework and selected course materials. I also teach lectures about Hyperledger Fabric and the performance and dependability of DLTs.

Assisting Participant
System Modelling (BME)

2013 - 2022

I participated in assembling and correcting midterm exams and also taught seminars.

Lecturer
Critical Systems Integration Laboratory (BME)

2018 - 2019

I taught the laboratory seminar about the exploratory performance data analysis of distributed workflows and maintained the related part of the course syllabus.

SELECTED PUBLICATIONS

Porting a benchmark with a classic workload to blockchain: TPC-C on Hyperledger Fabric
The 37th ACM/SIGAPP SAC (DOI: 10.1145/3477314.3507006), 2022

Open source

Transaction Conflict Control in Hyperledger Fabric: A Taxonomy, Gaps, and Design for Conflict Prevention
IEEE Access Vol. 12 (DOI: 10.1109/ACCESS.2024.3361318), 2024

Scopus

Using fault injection to assess blockchain systems in presence of faulty smart contracts
IEEE Access Vol 8 (DOI: 10.1109/ACCESS.2020.3032239), 2020

WoS, Scopus

Adding semantics to measurements: Ontology-guided, systematic performance analysis
Acta Cybernetica (DOI: 10.14232/actacyb.295182), 2022

Scopus

Systematic performance evaluation using component-in-the-loop approach
International Journal of Cloud Computing Vol. 7 (DOI: 10.1504/ijcc.2018.095401), 2018

Scopus

Towards Model-Driven Engineering of Smart Contracts for Cyber-Physical Systems
48th Annual IEEE/IFIP Int. Conf. on DSN-W (DOI: 10.1109/DSN-W.2018.00052), 2018