Emad Heydari Beni

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Research Interests

Software and systems engineering: Middleware systems with a focus on the design, implementation, and deployment of highly scalable distributed systems.

Security and privacy: All aspects around storage systems, and in particular databases, e.g. encrypted search, oblivious pseudonymization, homomorphic encryption, highly-scalable attribute-based access control, and more.

Cloud computing: Cost-efficient resource allocation of multi-tenant distributed software with a focus on orchestration frameworks, e.g., Kubernetes and OpenStack.

Education

2016–**present** **Ph.D. in Computer Science**, KU Leuven, Belgium

imec-DistriNet research group

Advisor: Prof. dr. Wouter Joosen, and Dr. Bert Lagaisse (senior IOF)

Thesis title: Interoperability and security middleware for federated, multi-tenant cloud-based systems

2011–2014 **M.Sc. in Computer Science**, University of Antwerp, Belgium

Research-based Master's degree program @ the COMP research lab (now IDLAB)

Major: Computer networks and distributed systems

Thesis title: Migration and analysis of an existing JavaEE application to a cloud-based solution

The master's thesis was carried out at Nokia (formerly Alcatel-Lucent).

2006–2010 **B.Sc. in Computer Engineering**, University of Isfahan, Iran

Major: Computer hardware engineering

Employment

2016–present **Ph.D. student, imec-DistriNet**, KU Leuven

I am presently working on (1) designing distributed data protection systems using applied cryptography (e.g., encrypted search schemes and oblivious pseudonymization) and middleware concepts, and (2) lazy evaluation of attribute-based access control on hyper-scalable core content services in the cloud. Previously, my focus was on (1) the heterogeneity and security challenges of outsourcing workflows to external parties, and (2) adaptive and reflective execution of engineering workflows (in aerospace and automotive) on cloud infrastructures.

2015–2016 **Research Associate, imec-DistriNet**, KU Leuven

Our key research concerned the interoperability, security, and scalability of workflow management systems in the context of Business Process Outsourcing (BPO) and cloud computing. We have done this research in the scope of applied research together with Flemish industry partners (project D-BASE).

2013–2015 **Software Engineer, R&D Department, Taktik SA**, Belgium

I worked as a full-stack software engineer in various domains, healthcare in particular. I was involved in the design and development process of a secure electronic health records platform. The key challenging aspects were horizontal scalability, applied cryptography (encrypted search), and fault tolerance.

2012–2013 **Research Intern, MWS Department, Alcatel-Lucent (now Nokia)**, Belgium

My research was towards my master's thesis in the Mobile Wallet Service (MWS) team. I worked on different subjects such as cloud computing, horizontal scalability, auto-scaling, and DevOps.

Research Projects

I have been involved in:

ContentCloud	VLAIO, Content Cloud A: Agile, secure, hyper-scalable core content service in the cloud
SeClosed	imec ICON, Secure cloud-based storage and processing of sensitive documents
IDEaliSM	ITEA3, Integrated & Distributed Engineering Services framework for MDO
DynAMo	imec ICON, Dynamic architecture monitoring
D-BASE	imec ICON, Decentralized support for Business processes in Application Services

Teaching Assistant

2015–present	Distributed Systems (B-KUL-H04I4A)	KU Leuven
2017–2018	Software Design (B-KUL-G0Q40C)	KU Leuven
2015–2018	Object-Oriented Programming (B-KUL-H01P1A)	KU Leuven

Supervision

2020–present	Pieter-Jan Vrielynck, Master's thesis	KU Leuven
2020–present	Jonathan Du, Master's thesis	KU Leuven
2020–present	Arno Van Langendonck, Master's thesis	KU Leuven
2019–2020	Jordy Dieltjes, Master's thesis	KU Leuven
2018–2019	Stef Verreydt, Master's thesis	KU Leuven
2017–2018	Matthijs Kaminski, Master's thesis	KU Leuven

Schools attended

2019	Summer School on real-world crypto and privacy, Sibenik, Croatia
2018	School on Integrating Advanced Cryptography with Applications, Kos, Greece
2018	Summer School on real-world crypto and privacy, Sibenik, Croatia
2015	SecAppDev (secure application development), Leuven, Belgium
2015	Progressive Web Security, Leuven, Belgium

Grants

2019	Stipend for the summer school on real-world crypto and privacy, Sibenik, Croatia
2018	Stipend for the school school on integrating advanced cryptography with applications, Kos, Greece

Publications

Journals

[1] Ansar Rafique, Dimitri Van Landuyt, **Emad Heydari Beni**, Bert Lagaisse, and Wouter Joosen. "CryptDICE: Distributed data protection system for secure cloud data storage and computation".*Journal of Information Systems, 2021.*
DOI: 10.1016/j.is.2020.101671

[2] **Emad Heydari Beni**, Bert Lagaisse, and Wouter Joosen. "Infracomposer: Policy-driven adaptive and reflective middleware for the cloudification of simulation & optimization workflows." *Journal of Systems Architecture, 2019.*
DOI: 10.1016/j.sysarc.2019.03.001

Conferences

[1] Kristof Jannes, **Emad Heydari Beni**, Bert Lagaisse, and Wouter Joosen. "WebLedger: a Byzantine Fault-Tolerant State-Based Ledger for a Decentralized Web without a Blockchain" *EuroSys, 2021* (in submission)

[2] **Emad Heydari Beni**, Jordy Dieltjens, Eddy Truyen, Bert Lagaisse, and Wouter Joosen. "Reducing cold starts during elastic scaling of containers in Kubernetes" *The 36th ACM/SIGAPP Symposium On Applied Computing (SAC), 2021*
DOI: 10.1145/3412841.3441887

[3] **Emad Heydari Beni**, Bert Lagaisse, Wouter Joosen, Abdelrahaman Aly, Michael Brackx. "DataBlinder: A distributed data protection middleware supporting search and computation on encrypted data" *International Middleware Conference, Industry Track, 2019*
DOI: 10.1145/3366626.3368132

[4] Eddy Truyen, Andre Jacobs, Stef Verreydt, **Emad Heydari Beni**, Bert Lagaisse, Wouter Joosen. "Feasibility of container orchestration for adaptive performance isolation in multi-tenant SaaS applications" *The 35th ACM/SIGAPP Symposium on Applied Computing (SAC), 2019*
DOI: 10.1145/3341105.3374034

[5] Marco Panzeri, Roberto d'Ippolito, **Emad Heydari Beni**, Bert Lagaisse, Martin Motzer, Franz Stockl "Smart deployment and execution of engineering simulation workflows on cloud architectures" *NAFEMS European Conference - Simulation Process and Data Management, 2018*

[6] **Emad Heydari Beni**, Bert Lagaisse, Ren Zhang, Danny De Cock, Filipe Beato, and Wouter Joosen. "A voucher-based security middleware for secure business process outsourcing." *In International Symposium on Engineering Secure Software and Systems (ESSoS), Springer, Cham, 2017.*
DOI: 10.1007/978-3-319-62105-0_2

Workshops

[1] Stef Verreydt, **Emad Heydari Beni**, Eddy Truyen, Bert Lagaisse, Wouter Joosen "Leveraging Kubernetes for adaptive and cost-efficient resource management" *Middleware Conference, WOC '19 The 5th International Workshop on Container Technologies and Container Clouds, 2019.*
DOI: 10.1145/3366615.3368357

[2] Matthijs Kaminski, Eddy Truyen, **Emad Heydari Beni**, Bert Lagaisse, Wouter Joosen "A framework for black-box SLO tuning of multi-tenant applications in Kubernetes" *Middleware Conference, WOC '19 The 5th International Workshop on Container Technologies and Container Clouds, 2019.*
DOI: 10.1145/3366615.336835

[3] **Emad Heydari Beni**, Bert Lagaisse, and Wouter Joosen. "Adaptive and reflective middleware for the cloudification of simulation & optimization workflows." *International Workshop on Adaptive and Reflective Middleware (ARM), 2017.*
DOI: 10.1145/3152881.3152883

[4] **Emad Heydari Beni**, Bert Lagaisse, and Wouter Joosen. "WF-Interop: Adaptive and Reflective REST Interfaces for Interoperability between Workflow Engines" *International Workshop on Adaptive and Reflective Middleware (ARM), 2015.*
DOI: 10.1145/2834965.2834966

Professional Activities

- Artifact Evaluation Program Committee: EuroSys'21, SOSP'19
- Reviewed: Middleware'21 (sub-review), Transactions on Emerging Telecommunications Technologies 2019 (external review), AIIPCC'19 (external review)
- Management, development and maintenance of the private cloud (OpenStack) of the DistriNet research group, KU Leuven, 2015–present.

Collaborations

Ren Zhang, *imec-COSIC*
Abdelrahaman Aly, *imec-COSIC*
Danny De Cock, *imec-COSIC*
Filipe Beato, *imec-COSIC*
Anja Lehmann, *IBM Research Zürich*
Koen Handekyn, *UnifiedPoset*
Michael Brackx, *UnifiedPost*
Paul Warren, *VMware*
Kris Verlaenen, *RedHat*
Ronny Timmermans, *XeniT*
Marco Panzeri, *Noesis*
Roberto D'ippolito, *Noesis*
Eddy Truyen, *imec-DistriNet*
Martin Motzer, *Draexlmaier*
Kristof Jannes, *imec-DistriNet*

Languages

English	Full professional proficiency
Dutch	Upper intermediate (B2)
Polish	Beginner (A1) – in progress
Persian (Farsi)	Native

Hobbies

I coordinate (& play) the CS & COSIC weekly football matches. Roller and inline skates are parts of my DNA. Last but not least, I am not a chef, but I am a fanatic when it comes to cooking and culinary experiences. Recently, I have been promoted to a full-time dad position; that means I have only one hobby these days, and there is no escape.

References

Available upon request.