Ahmed Elhassany

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Born April 1ˢᵗ, 1986
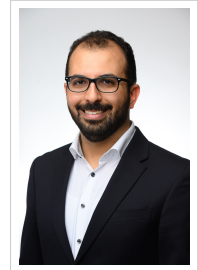
Interests

Applying principled approaches to build systems that solve challenging problems.

Professional Experience

Feb. '22 – Present   **Expert Software Engineer**, *Swisscom*, Switzerland.

- Building Swisscom's network telemetry platform.
- *Technologies used:* Apache Druid, BGP monitoring, IPFIX, NETCONF.

March '20 – Feb. 22   **Senior Software Engineer**, *Swisscom*, Switzerland.

- Building Swisscom's knowledge graph to improve the B2B customers' end-to-end experience across all Swisscom's products and services.
- Designing and building near-real-time time streaming ETL pipelines.
- Domain analysis and modeling (worked with Networking, Telco, Cloud, IT-inventory, Alerting, and Incidents management domains).
- Co/supervised 4 master's students in collaboration with Swisscom Digital Lab and EPFL Lausanne. Their projects were in graph embedding and network modeling.
- Active role in solving technical challenges across different teams, aligning product priorities with management, and mentoring students and junior engineers.
- *Technologies used:* Graph DB, Neo4j, Kafka Streams, Spring Boot, Java, Python, Ansible, Gradle, Jenkins.

June '15 – Oct. '19   **Research Assistant**, *ETH Zürich*, Switzerland.

- Developed systems to automatically synthesize router configurations from high-level requirements. https://github.com/nsg-ethz/synet-plus, https://github.com/nsg-ethz/synet. Published in [1, 2, 10].
- Developed a system to detect concurrency violations in production-grade controllers of Software-Defined Networks (SDN). https://github.com/nsg-ethz/sdnracer. Published in [3, 4, 6].
- *Technologies used:* Cisco IOS, BGP, OSPF, Python, SDN, Z3 SMT Solver, Git.

June – Sept. '18   **Software Engineer Intern**, *Facebook*, Menlo Park, CA, USA.

- Started a practical network verification initiative.
- Built a prototype system to verify the correctness of Facebook's network.
- *Technologies used:* Python, Thrift, Mercurial.

Jan – May '15 **Research Associate**, *Indiana University*, Bloomington, IN, USA.
- Measured garbage collector and data serialization overhead for unstructured data.
- Developed efficient method for representing unstructured data in Haskell's runtime system. Published in [5].
- *Technologies used:* Java, Continuous Integration/Deployment (CI/CD),Git.

July '13 – Nov. '14 **Research Scientist**, *International Computer Science Institute (ICSI)*, Berkeley, CA, USA.
- Worked in Prof. Scott Shenker's group on designing and building next-generation SDN architecture (SDNv2).
- Integrated a research system for quality assurance to run in a production environement with ONOS; a carrier-grade SDN open-source network operating system. http://onosproject.org/. Published in [7].
- *Technologies used:* Python, Java, Continuous Integration (CI), QA, Git.

May – July '13 **Summer Student**, *Lawrence Berkeley National Lab.*, Berkeley, CA, USA.
- Worked with the Energy Sciences Network (ESnet) team.
- Developed a scalable multi-domain Network Topology Service for dynamic multi-domain network circuits' setup. https://github.com/ahassany/topology-service
- *Technologies used:* Java, Jetty, Atmoshper Framework, REST API design, MongoDB.

Aug. '11 – July '13 **Research Associate**, *Indiana University*, Bloomington, IN, USA.
- Developed a RESTful Unified Network Information Services (UNIS) to represent topologies for large-scale multi-domain networks. Published in [8].
- Developed instrumentation and monitoring APIs and tools for GENI https://www.geni.net experiments and physical infrastructure; https://github.com/periscope-ps/unis.
- *Technologies used:* Java, Python, Tornado, REST API design, MongoDB, Django, Git.

August '10 **Summer Student**, *Lawrence Berkeley National Lab.*, Berkeley, CA, USA.
- Worked at the Center for Enabling Distributed Petascale Computing (CEDPS) project.
- Developed a system to collect, represent and analyze large scale monitoring data for high-speed data transfers in DOE networks.
- *Technologies used:* Python, Tornado, JavaScript, HTML, JQuery, MongoDB, Django.

Feb. '09 – July '09 **Software Engineer**, *Municipality of Gaza*, Gaza, Palestine.
- Designed a system to extract information, categorize, and archive old building permits from the late 1800s.
- Designed a new business process and the required software for issuing new building permits in Gaza city.
- Lead a team of 50 civil engineers and 20 data entry persons to implement the project.
- *Technologies used:* Oracle DB, Visual Basic .NET, Delphi.

Dec. '08 – Mar. '09 **Independent Consultant**, *Palestinian National Internet Naming Authority (PNINA)*, Gaza, Palestine.
- Software quality assurance of in-house built system for registering and managing all *.ps* domain names; PNINA is the country code top-level domain (ccTLD) for Palestine.
- Consulting on deployment and integration for new domain registration system.
- *Technologies used:* PHP, Perl, PostgreSQL, MySQL, BIND, Apache.

June – Sept '08 **Student Developer**, *Google Inc. & Internet2*, Google Summer of Code 2008.
- This project is sponsored by Google and administrated by Internet2.
- Designed and developed open source web based configuration tools for perfSONAR-PS.
- *Technologies used:* Perl, JavaScript, Apache, HTML, CSS, SVN.

Sep. '07 – Mar. '08	**Software Engineer**, *AfkarIT*, Gaza, Palestine.

- Developed operating system level virtual machines monitoring system for VMWare ESX Infrastructure.

- *Technologies used:* Python, C#.

Sep. '04 – Oct. '05	**Contractor Software Engineer**, *Ard El-Insan*, Gaza, Palestine.

- Developed patients follow-up management system in four clinics for a project sponsored by European Commission's Humanitarian Aid Office (ECHO).

- *Technologies used:* Visual Basic .NET, Microsoft SQL Server.

Education

2015–2019 **Ph.D. at Department of Information Technology and Electrical Engineering**, *ETH Zürich*, Switzerland.
Dissertation: Towards Reliable Network Control Planes
Advised by: Prof. Laurent Vanbever

2009–2011 **M.Sc. Computer Science**, *University of Delaware*, Newark, DE, USA.

2003–2008 **B.Sc. Computer Engineering**, *Islamic University of Gaza*, Gaza, Palestine.

Awards

- Fulbright Foreign Student Scholarship for Master's program, 2009 – 2011.

- 2nd place winner team at IEEE/ACM Supercomputer Conference 2009 (SC '09) High Performance Computing Contest.

- Google Summer of Code, 2008.

- Palestinian Prime Minister's special award for undergraduate achievements, 2008.

Activities and Services

- Reviewer: IEEE/ACM Transactions on Networking.

- ParLab Boot Camp. Course on parallel programming, UC Berkeley, 2010.

- SCinet volunteer. ACM/IEEE Supercomputing Conference (SC '10, SC '11, and SC '12). http://sc12.supercomputing.org/content/scinet.html 2010 – 2012.

- President of Graduate Students Association for Computer Science Department at University of Delaware, 2010 – 2011.

- From Lab to Market, Fulbright Enrichment Seminar, Austin TX, June 2009.

Presentations and Invited Talks

Network-wide Configuration Synthesis.
- Facebook's network platform team. July 2018. Palo Alto, CA, USA.

- In the International Conference on Computer-Aided Verification (CAV'17), https://youtu.be/dUbFWtHLTCI. July 2017. Heidelberg Germany.

- Workshop on Network Verification. http://network-programming.org/wnv. April 2017. Palo Alto, CA, USA.

BigBug: Practical Concurrency Analysis for SDN .
- ACM Symposium on SDN Research (SOSR '17). April 2017. Santa Clara, CA, USA.

SDNRacer: Concurrency Analysis for Software-Defined Networks.

- ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI'16). https://youtu.be/QzYBOc3G9FU. June 2016. Santa Barbara, CA, USA.

UNIS: Design and Implementation of a Unified Network Information Service.

- IEEE Conference on Services Computing (SCC '13). July 2013. Santa Clara, CA USA.

Supervised Students

- Germain Zouein, Master Thesis, "Graph-based Management and Visualization of Network Infrastructure," Swisscom Digitial Lab/EPFL, 2021.

- Andrej Janchevski, Master Thesis, "Graph Embedding Methods for Graph Completion," Swisscom Digitial Lab/EPFL, 2021.

- Vincent Coriou, Master Thesis, "Knowledge Graph Reasoning for Infrastructure Elements," Swisscom Digitial Lab/EPFL, 2021.

- Nicolas Zimmermann, Master Thesis, "Link Prediction on Knowledge Graphs for Infrastructure Elements," Swisscom Digitial Lab/EPFL, 2021.

- Alexander Hedges, Semester Thesis, "Grigori: Continuous Integration Testing of Synthesize Router Configurations," ETH Zürich, 2018.

- Christelle Gloor, Semester Thesis, "Chronos: Finding the Configurations Recipe for Fast Convergence," ETH Zürich, 2017.

- Roman May, Master Thesis, "BigBug: Practical Concurrenty Analaysis for SDN," ETH Zürich, 2016.

Languages

- English: Fluent.
- German: Basic knowledge (A1 course).
- Arabic: Mother tongue.

Publications

Conferences

[1] **A. El-Hassany**, P. Tsankov, L. Vanbever, and M. Vechev, "NetComplete: Practical Network-Wide Configuration Synthesis with Autocompletion," in *USENIX Symposium on Networked Systems Design and Implementation (NSDI 2018)*.

[2] **A. El-Hassany**, P. Tsankov, L. Vanbever, and M. Vechev., "Network-wide Configuration Synthesis," in *International Conference on Computer-Aided Verification (CAV 2017)*.

[3] R. May, **A. El-Hassany**, L. Vanbever, and M. Vechev, "BigBug: Practical Concurrency Analysis for SDN," in *ACM Symposium on SDN Research (SOSR 2017)*.

[4] **A. El-Hassany**, J. Miserez, P. Bielik, M. Vechev, and L. Vanbever, "SDNRacer: Concurrency Analysis for Software-Defined Networks," in *ACM Programming Language Design and Implementation (PLDI 2016)*.

[5] E. Z. Yang, G. Campagna, O. S. Ağacan, **A. El-Hassany**, A. Kulkarni, and R. R. Newton, "Efficient Communication and Collection with Compact Normal Forms," in *ACM SIGPLAN International Conference on Functional Programming (ICFP 2015)*.

[6] J. Miserez, P. Bielik, **A. El-Hassany**, L. Vanbever, and M. Vechev, "SDNRacer: Detecting Concurrency Violations in Software-defined Networks," in *ACM Symposium on SDN Research (SOSR 2015)*.

[7] C. Scott, A. Wundsam, B. Raghavan, A. Panda, A. Or, J. Lai, E. Huang, Z. Liu, **A. El-Hassany**, S. Whitlock, H. Acharya, K. Zarifis, and S. Shenker, "Troubleshooting Blackbox SDN Control Software with Minimal Causal Sequences," in *ACM Special Interest Group on Data Communication (SIGCOMM 2014)*.

[8] **A. El-Hassany**, E. Kissel, D. Gunter, and M. Swany, "Design and Implementation of a Unified Network Information Service," in *IEEE International Conference on Services Computing (SCC 2013)*.

Workshops

[9] E. Kissel, **A. El-Hassany**, G. Fernandes, M. Swany, D. Gunter, T. Samak, and J. M. Schopf, "Scalable Integrated Performance Analysis of Multi-Gigabit Networks," in *IEEE Network Operations and Management Symposium (NOMS)*, 2012.

Technical Reports

[10] **A. El-Hassany**, P. Tsankov, L. Vanbever, and M. Vechev, "Network-wide Configuration Synthesis," *arXiv preprint arXiv:1611.02537*, 2016.

Demos

[11] **A. El-Hassany**, E. Kissel, and J. Griffioen, "GEMINI Tutorial: Measuring and instrumenting GENI experiment. GEC 13-16, 2012–2013," ser. GENI Engineering Conference (GEC 13–16), 2012-2013.

[12] **A. El-Hassany**. E. Pouyoul, V. Singh, B. Tierney, I. Monga, S. Gangualy, M. Ikeda, M. Swany, and E. Kissel, "Using Periscope to monitor End-to-End Circuit Service at Layer2 (ECSEL). SC '11," ser. ACM/IEEE Supercomputing Conference, 2011.

References

References available upon request.