

Amine Mhedhbi

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- EDUCATION** **University of Waterloo, Waterloo, ON**
Doctor of Philosophy, Computer Science Jan. 2017 - May. 2023
- Concordia University, Montréal, QC**
Bachelor of Engineering, Computer Engineering Sep. 2012 - Apr. 2016
- RESEARCH INTEREST** The overarching goal of my research is to *build data systems capable of efficient processing of graph data at scale*. My Ph.D. research focuses on developing novel query processing, optimization, and storage techniques for querying graph-structured relations. To that end, I have been designing and implementing the GraphflowDB in-memory analytical DBMS which allows me to rethink core DBMS components. *In the future, I aim to research data systems for machine learning on graphs in addition to analytical query processing problems*. I have completed two internships at Microsoft Research leading to two on-going collaborations, both of which expanded my research into transactional processing and cloud infrastructure.
- CONFERENCE & JOURNAL PUBLICATIONS** [9] **Optimizing One-time and Continuous Subgraph Queries using Worst-Case Optimal Joins.** A. Mhedhbi, C. Kankanamge, S. Salihoglu. ACM Transactions on Database Systems (TODS) 2021.
- [8] **A+ Indexes: Tunable and Space-Efficient Adjacency Lists in Graph Database Management Systems.** A. Mhedhbi, P. Gupta, S. Khaliq, S. Salihoglu. IEEE International Conference on Data Engineering (ICDE) 2021.
- [7] **Columnar Storage and List-Based Processing for Graph Database Management Systems.** P. Gupta, A. Mhedhbi, S. Salihoglu. Proceedings VLDB Endowment (PVLDB) 2021.
- [6] **Optimizing Subgraph Queries by Combining Binary and Worst-case Optimal Joins.** A. Mhedhbi, S. Salihoglu. Proceedings VLDB Endowment (PVLDB) 2019.
- [5] **The Ubiquity of Large Graphs and Surprising Challenges of Graph Processing: Extended Survey.** S. Sahu, A. Mhedhbi, S. Salihoglu, J. Lin, MT. Özsu. VLDB Journal (VLDBJ) 2019.
- [4] **The Ubiquity of Large Graphs and Surprising Challenges of Graph Processing.** S. Sahu, A. Mhedhbi, S. Salihoglu, J. Lin, MT. Özsu. Proceedings VLDB Endowment (PVLDB) 2018. **(Best Paper Award)**
- WORKSHOP & DEMO PAPERS + TUTORIALS** [3] **Modern Techniques for Querying Graph-Structured Relations: Foundations, System Implementations, and Open Challenges.** A. Mhedhbi, S. Salihoglu. Proceedings VLDB Endowment (PVLDB), Tutorial 2022.
- [2] **LSQB: A Large-Scale Subgraph Query Benchmark.** A. Mhedhbi, M. Lissandrini, L. Kuiper, J. Waudby, G. Szárnyas. ACM GRADES-NDA: Joint Workshop on Graph Data Management Experiences & Systems (GRADES) and Network Data Analytics (NDA) 2021.

[1] **Graphflow: An Active Graph Database.** C. Kankanamge, S. Sahu, A. Mhedbhi, J. Chen, and S. Salihoglu. ACM International Conference on Management of Data (SIGMOD), Demonstration, 2017.

RESEARCH IMPACT

- 2021: Our query processor and optimizer combining binary and worst-case optimal joins [6, 9] is integrated in Alibaba's graph processing engine GraphScope .
- 2021: Huawei's R&D group exploring the integration of A+ indexes [8] and our compressed columnar storage [6] for the design of a new graph DBMS.
- 2021: The large-scale subgraph query benchmark (LSQB) [2] is used as part of the continuous integration performance pipelines for the commercial products at RelationalAI , MemGraph, and Neo4j .

INVITED TALKS

- Taming Large Intermediate Results using Factorization: A system perspective. Factorized Databases Workshop. Zurich, Switzerland. Aug. 2022.
- Taming Large Intermediate Results for Joins over Graph-Structured Relations. DATA lab at Northeastern University. Boston, MA, USA. Nov. 2022.
Huawei-Edinburgh University Joint Lab. Edinburgh, Scotland. Apr. 2022.
Centrum Wiskunde & Informatica. Amsterdam, Netherlands. May 2022.

GRADUATE RESEARCH EXPERIENCE

Microsoft Corporation Jun. 2022 - Sep. 2022
Research Intern, DMX Group (Mentor: Phil Bernstein)

- Researched the architecture and performance characteristics of data-sharing database management systems such as Azure SQL Hyperscale.
- Implemented a new lock manager and researched various optimizations to locking protocols under contention.

Microsoft Corporation Jun. 2021 - Sep. 2021
Research Intern, DMX Group (Mentors: Christian Konig & Vivek Narasayya)

- Researched orchestration of database as a service (DBaaS) tenants to minimize failovers during automatic cluster upgrades.
- Formulated the problem as an optimization problem and produced an approach that is capable of taking the specific cluster deployment instance into account when creating a cluster upgrade schedule.

TEACHING EXPERIENCE

(F=Fall, W=Winter, S=Spring)

Teaching Assistant at the University of Waterloo:

CS 492/CS 692 - Social Implications of Computing. W23.

CS 338 - Computer Applications in Business: Databases. S17, F17, W18, S18 & F19.

CS 330 - Management Information Systems. W19, F19 S20, F20, W21 & F21.

CS 348 - Introduction to Database Management. F18 & W22.

CS 115 - Introduction to Computer Science 1. F16, W17 & F22.

Instructor at Concordia University:

ELEC/COEN 390 - Principles of Design and Development. F15 & W16.

AWARDS

Microsoft Research Ph.D. Fellowship, 2020-2022.

Facebook Research Ph.D. Fellowship, 2020-2022. (declined)

VLDB Best Paper Award, 2018.

David R. Cheriton Scholarship, University of Waterloo, 2017-2018.

Cheriton Symposium Poster Presentation - 1st Place, University of Waterloo, 2018.

SIGMOD Travel Award, 2017.

Graduate Entrance Scholarship, University of Waterloo, 2016-2017.

SERVICE**External Reviewer**

IEEE Transactions on Knowledge and Data Engineering (TKDE) 2020 - Present.
Semantic Web journal (SWJ) 2021.
The Web Conference (WWW) 2020.

**INTERN
EXPERIENCES**

Société Générale (Corporate & Investment Banking) May 2016 - Aug. 2016
Technology Analyst Intern

- Rearchitected a hedge fund lending app from monolithic to service-oriented.
- Helped reduce the length of the release cycle from 6 to 4 weeks.

Ericsson Sep. 2015 - Mar. 2016
Software Engineering Intern

- Researched virtualization for physical IP Multimedia Subsystem (IMS) nodes.
- Prepared a fully functional demo for World Mobile Congress 2016.

Concordia University, Montréal, QC May 2015 - Aug. 2015
Undergraduate Research Assistant (Advisor: Jelena Trajkovic)

- Verified empirically the theoretical foundations and guarantees of an existing Optical Network-on-Chip design.

InterDigital, Inc. Jan. 2015 - Mar. 2015
Software Developer Intern

- Revamped the UX of a smart network access manager mobile application.
- Prepared a demo to showcase the app's features in a congested network.

Thales Group (Academic Partnership) Nov. 2013 - Nov. 2014
Research Intern (Advisors: Prof. William Lynch & Prof. Glenn Cowan)

- Researched and designed various digital filters and amplitude detection algorithms for aerospace use cases.

Immersion Corporation Sep. 2013 - Dec. 2013, May 2014 - Aug. 2014
Software Engineering Intern

- Implementation of haptic effect lib APIs exposed in C and Java for mobile developers to abstract hardware details and remove parameterization.
- Upgraded and integrated a haptic effects lib for the AOSP kitkat release.
- Automated manual complex AOSP framework builds with our lib integration.

**COMPUTER
SKILLS**

Technology: C++, Python, Java, Javascript, SQL, Shell Scripting.
Tools: Git, Numpy, Pandas, Scikit-learn, PyTorch.
Languages: English, French, Arabic.

MISC

Member of a research team studying "Fostering Experiential Partnerships with Theatre and Mental Health: Realistic Family Therapy Training for Psychology and Acting Students". Work presented at University of Waterloo Teaching and Learning (UWTL) Conference 2022.

INTERESTS

Improvisational theatre, cooking, football freestyle, running, boxing, and lifting weights.