Louai Alarabi

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Research Interests

Lies in the board area of databases, data management systems, Large-scale spatio-temporal data management, and Location-based Services.

Education

Sep 2015 - Jun 2019 **Ph.D in Computer Science**
Computer Science and Engineering Dept.,University of Minnesota–Twin Cities, USA.
Advisor: Prof. Mohamed F. Mokbel
GPA: 3.604/4

Sep 2012 - JUN 2015 **M.S. in Computer Science**
Computer Science and Engineering Dept.,University of Minnesota–Twin Cities, USA.
Advisor: Prof. Mohamed F. Mokbel
Project: TAREEG, A MapReduce-Based System for Extracting Spatial Data from OpenStreetMap
GPA: 3.515/4

Sep 2003 - JUN 2008 **B.Sc. in Computer Science**
College of Computer and Information Systems , UMM-ALQURA University, KSA.
Advisor: Khaled Nasser ElSayed
Graduation Project: Multi-Agent Educational Examiner
GPA: 3.56/4, Over all grades : Excellent with Second honor.

Publications

Journal

1. **Louai Alarabi**. Summit: a scalable system for massive trajectory data management. *SIGSPATIAL Special*, 10(3):2–3, 2018a. doi: 10.1145/3307599.3307601. URL https://doi.org/10.1145/3307599.3307601
2. **Louai Alarabi**, Mohamed F. Mokbel, and Mashaal Musleh. ST-Hadoop: a mapreduce framework for spatio-temporal data. **GeoInformatica**, Jul 2018. ISSN 1573-7624. doi: 10.1007/s10707-018-0325-6. URL https://doi.org/10.1007/s10707-018-0325-6.
3. Xiaochuang Yao, Mohamed F. Mokbel, Sijing Ye, Guoqing Li, **Louai Alarabi**, Ahmed Eldawy, Zuliang Zhao, Long Zhao, and Dehai Zhu. LandQ^{v2}: A mapreduce-based system for processing arable land quality big data. **ISPRS Int. J. Geo-Information**, 7(7):271, 2018.
4. Xiaochuang Yao, Mohamed F. Mokbel, **Louai Alarabi**, Ahmed Eldawy, Jianyu Yang, Wenju Yun, Lin Li, Sijing Ye, and Dehai Zhu. Spatial coding-based approach for partitioning big spatial data in hadoop. **Computers & Geosciences**, 106:60–67, 2017.
5. Amr Magdy, Mashaal Musleh, Kareem Tarek, **Louai Alarabi**, Saif Al-Harthi, Hicham G. Elmongui, Thanaa M. Ghanem, Sohaib Ghani, and Mohamed F. Mokbel. Taqreer: A system for spatio-temporal analysis on microblogs. **IEEE Data Eng. Bull.**, 38(2):68–76, 2015a.

Conferences Papers

1. **Louai Alarabi**, Mohamed F. Mokbel, and Mashaal Musleh. ST-Hadoop: A mapreduce framework for spatio-temporal data. In **SSTD**, volume 10411 of *Lecture Notes in Computer Science*, pages 84–104. Springer, 2017.
2. Ahmed Eldawy, **Louai Alarabi**, and Mohamed F. Mokbel. Spatial partitioning techniques in spatial hadoop. **PVLDB**, 8(12):1602–1605, 2015.
3. Bin Cao, **Louai Alarabi**, Mohamed F. Mokbel, and Anas Basalamah. SHAREK: A scalable dynamic ride sharing system. In **MDM (1)**, pages 4–13. IEEE Computer Society, 2015.
4. Amr Magdy, **Louai Alarabi**, Saif Al-Harthi, Mashaal Musleh, Thanaa M. Ghanem, Sohaib Ghani, and Mohamed F. Mokbel. TAGHREED: a system for querying, analyzing, and visualizing geotagged microblogs. In **SIGSPATIAL/GIS**, pages 163–172. ACM, 2014.
5. **Louai Alarabi**, Ahmed Eldawy, Rami Alghamdi, and Mohamed F. Mokbel. TAREEG: a mapreduce-based system for extracting spatial data from openstreetmap. In **SIGSPATIAL/GIS**, pages 83–92. ACM, 2014a.
6. Mohamed F. Mokbel, **Louai Alarabi**, Jie Bao, Ahmed Eldawy, Amr Magdy, Mohamed Sarwat, Ethan Waytas, and Steven Yackel. MNTG: an extensible web-based traffic generator. In **SSTD**, volume 8098 of *Lecture Notes in Computer Science*, pages 38–55. Springer, 2013.

Systems Demonstration

1. **Louai Alarabi** and Mohamed F. Mokbel. A Demonstration of ST-Hadoop: A MapReduce Framework for Big Spatio-temporal Data. **PVLDB**, 10(12):1961–1964, 2017.
2. **Louai Alarabi**, Bin Cao, Liwei Zhao, Mohamed F. Mokbel, and Anas Basalamah. A Demonstration of SHAREK: an efficient matching framework for ride sharing systems. In **SIGSPATIAL/GIS**, pages 95:1–95:4. ACM, 2016.
3. Amr Magdy, **Louai Alarabi**, Saif Al-Harthi, Mashaal Musleh, Thanaa M. Ghanem, Sohaib Ghani, Saleh M. Basalamah, and Mohamed F. Mokbel. Demonstration of TAGHREED: A System for Querying, Analyzing, and Visualizing Geotagged Microblogs. In **ICDE**, pages 1416–1419. IEEE Computer Society, 2015b.
4. Mohamed F. Mokbel, **Louai Alarabi**, Jie Bao, Ahmed Eldawy, Amr Magdy, Mohamed Sarwat, Ethan Waytas, and Steven Yackel. A demonstration of MNTG - A web-based road network traffic generator. In **ICDE**, pages 1246–1249. IEEE Computer Society, 2014.
5. **Louai Alarabi**, Ahmed Eldawy, Rami Alghamdi, and Mohamed F. Mokbel. TAREEG: a mapreduce-based web service for extracting spatial data from openstreetmap. In **SIGMOD**, pages 897–900. ACM, 2014b.

Abstracts and Competitions

1. **Louai Alarabi**. Summit: A scalable system for massive trajectory data managment (src). In **SIGSPATIAL**. ACM, 2018b.
2. **Louai Alarabi**. ST-Hadoop: A mapreduce framework for big spatio-temporal data (src). In **SIGMOD**, pages 40–42. ACM, 2017.

Systems Developed

ST-Hadoop — *MapReduce Framework for Big spatio-temporal data*

ST-Hadoop is a MapReduce framework that acknowledges the fact that space and time play a crucial role in query processing. ST-Hadoop is an open-source extension of a Hadoop framework that injects spatio-temporal awareness in the codebase of four layers inside SpatialHadoop, namely, language, indexing, MapReduce, and operations layers. The spatio-temporal indexing techniques inside ST-Hadoop primarily tuned to provide the accommodation of new updated dataset efficiently without the need to rebuild its index. The key point behind the performance gain of ST-Hadoop is the idea of indexing, where data are temporally loaded and divided across computation nodes.

TAREEG — *TAREEG Map-Reduce Extraction System*

TAREEG; a web-service that makes real spatial data, from anywhere in the world, available at the fingertips of every researcher or individual. TAREEG gets all its data by leveraging the richness of OpenStreetMap dataset; the most comprehensive available spatial data of the world. Yet, it is still challenging to obtain OpenStreetMap data due to the size limitations, special data format, and the noisy nature of spatial data. TAREEG employs MapReduce-based techniques to make it efficient and easy to extract OpenStreetMap data in a standard form with minimal effort.

MNTG — *Minnesota Traffic Generator*

MinnesotaTG is a project developed at the University of Minnesota. MinnesotaTG is built based on two existing traffic generators: (1) BerlinMod and (2) Thomas-Brinkhoff. The purpose of MinnesotaTG is to take an arbitrary region in the United States and generate traffic data from that region. Without this tool, generating this traffic is a complicated and drawn out process because of the number of configuration steps necessary to get either Thomas-Brinkhoff or BerlinMod both up and running, and able to work on a user specified region. The generation of the traffic is not done by the tool itself, but rather it is performed by these two different traffic generators.

SHAREK — *SHAREK Dynamic Ride Sharing Framework*

Many ride sharing systems have been commercially introduced (e.g., Uber, Flinc, and Lyft) forming a multi-billion dollars industry. The main idea is to match people requesting a certain ride to other people who are acting as drivers on their own spare time. The matching algorithm run by these services is very simple and ignores a wide sector of users who can be exploited to maximize the benefits of these services. In this framework, we propose and demonstrate SHAREK; a driver-rider matching algorithm that can be embedded inside existing ride sharing services to enhance the quality of their matching. SHAREK has the potential to boost the performance and widen the user base and applicability of existing ride sharing services. This is mainly because within its matching technique, SHAREK takes into account user preferences in terms of maximum waiting time the rider is willing to have before being picked up as well as the maximum cost that the rider is willing to pay. Then, within its course of execution, SHAREK applies a set of smart filters that enable it to do the matching so efficiently without the need to many expensive shortest path computations.

TAGHREED — *TAGHREED Microblogs System*

TAGHREED; a full-fledged system implemented from scratch to efficiently scale querying, analyzing, and visualizing geotagged microblogs, e.g., tweets. Taghreed supports arbitrary queries on a large number millions of microblogs that go up to several years in the past. Taghreed consists of four main components: (1) Indexer, (2) query engine, (3) recovery manager,and (4) visualizer. Taghreed indexer efficiently digests incoming microblogs with high arrival rates in light memory-resident indexes. When the memory becomes full, a flushing policy manager transfers the memory contents to disk into a spatio-temporal logical structure.

ADDAD | *Power Management System*

ADDAD4DLMS Parameterization Software; Desktop application runs under WIndows OS allows user to read and configure most of ADDAD4DLMS setting like thresholds, relays, screens, tarrifs . The ADDAD-4 Smart Meters are designed to meet the needs of residential, commercial and industrial energy consumers. AECL's IEC-Standard Multi Tariff Digital Energy Meters set a new standard for revenue-grade energy meters. It provides a highly accurate energy and demand metering system with a comprehensive information display on an extended temperature large LCD. It is capable of remote access via a various types of communication ports in meters. The ADDAD-4 poly phase smart meter series comprises of 10(100) A, 20(160) A, 1.5(6) A, 3-Phase-4-Wires, 3-Phase-3-Wires, Direct (Whole current) connection, Transformer operated CT and CT-VT through connection meters. The emerging AMR technologies in the metering industry call for smart meters that have enormous communication capabilities.

Employment Experience

Jan 2017 – *Current* | Teaching Assistance

Department of Computer Science and Engineering , University of Minnesota

Responsibilities included : Preparing and discussing homework exercises and programming assignments, delivering lab tutorials and recitations, and grading exams and quizzes.
Courses: CSCI-4061:Operating System, CSCI-4707:Practice of Database Systems, and CSCI-1133 Introduction to Programming

Feb 2014 – Aug 2014 | Research Assistant

KACST GIS Technology Innovation Center

Member of the Data Management group doing research in microblog data management and big spatio-temporal data processing, building these systems as a proof of concept using and extending SpatialHadoop to support processing and indexing the temporal dimension, document the outputs as research papers, and giving demonstrations for business purposes.

Sep 2010 – *Aug 2011* | Teaching Assistance

College of Computer and Information Systems , UMM-ALQURA University

Responsibilities included : Preparing and discussing homework exercises and programming assignments, delivering lab tutorials and recitations, and grading exams and quizzes, finally publishing a free online tutorial of Clips an artificial intelligent language for students.
Courses: Computer Graphics, Advanced Programming Languages, Structured Programming Languages, Expert System , and Software Engineering

Apr 2010 – Sep 2010 | Software Engineer

Advanced Electronics Company

Member of a research and development team mainly working on implementing a DLMS protocol on ARM Processor. Also, developed Electronic Gateway desktop application called Parameterization Software *PS*, where it has designed and developed as a second generation of Digital Meters for Saudi Electrical Company under the Authority of AEC.

Dec 2008 – Apr 2010 | Associate Software Engineer

Advanced Electronics Company

Member of a research and development team working on several projects. Generally, involved with a complete software development life cycle for implementing a DLMS protocol for a digital meters. Also, developed a Digital Meter desktop application called Parameterization Software *PS*, where it has multiple software and library designed and developed for Saudi Electrical Company under the Authority of AEC. This project implemented with aim to read and configure the digital meters using various media, such as GPRS , Optical infrared and PLC. In addition, worked in the testing team to individually develop a "Monitoring software", which evaluates, tests the efficiency and the correctness of the *PS* in the scope of reading and configuring the data from/to meters.

Recognition and Awards

- **Best Publication**
  - NOV 2018. Gold medal and 1^{st} place winner of ACM SIGSPATIAL GIS'18 Student Research Competition.
  - Nov 2017. Selected for submission to a special issue of GeoInformatica Journal.
  - Aug 2017. Selected among Best Papers Award in SSTD'15.
  - May 2017. Finalist of ACM SIGMOD'17 Student Research Competition.
  - Nov 2014. Best Overall Demonstration Award, U-Spatial Symposium.
- **Outstanding**
  - May 2015. Outstanding Graduate student award provided by Saudi Cultural Mission.
  - Jul 2008. Certificate of Academic Distinction for an outstanding academic achievements in obtaining Bachelor of Science in Computer Science, UMM-ALQURA University.
  - Jul 2008. Award a Magna Cum Laude (i.e., Second Class honors), UMM-ALQURA University.
  - Jul 2008. Cumulatively 2^{nd} rank in the Collage of Computer and Information Systems (UMM-ALQURA University) among around 1000 students.
- **NSF Travel Grants**
  - Nov 2018. Microsoft Research sponsored ACM Travel Grant Award to SRC selected student to present at the ACM SIGSPATIAL GIS Conference, November 06-09, 2018, held in Seattle, Washington, USA.
  - Nov 2018. Student Travel Grant Award from NSF to attend and present at the ACM SIGSPATIAL GIS Conference, November 06-09, 2018, held in Seattle, Washington, USA.
  - May 2017. Microsoft Research sponsored ACM Travel Grant Award to SRC selected student to present poster at the ACM SIGMOD/PODS Conference, May 14-19, 2017, held in Chicago, IL, USA.
  - Jun 2015. Student Travel Grant Award from NSF to present a paper at the 16^{th} IEEE International Conference on Mobile Data Management 15 - 18 June, 2015, Pittsburgh, Pennsylvania, USA.
  - Nov 2014.Student Travel Grant Award from NSF to present a paper at the 22^{nd} ACM International Conference on Advanced in Geographic Information Systems (ACM SIGSPATIAL 2014) November 4-7, 2014 — Dallas, Texas, USA.
  - Aug 2011. NSF Travel Grants Awards for 12^{th} International Symposium on Spatial and Temporal Databases.
- **International Travel Grants**
  - Aug 2017. SACM Grant to present a paper at the 15^{th} International Symposium on Spatial and Temporal Databases SSTD, August 21 – 23, held in Arlington, VA, USA.
  - Sep 2016. SACM Grant to present a demonstration paper at the ACM SIGSPATIAL GIS Conference, Sep 31- Nov 3, held in San Francisco, CA, USA.
  - Jun 2014. International Travel Grant from GISTIC to present a demonstration paper at the ACM SIGMOD/PODS Conference, Jun 22-27, held in Snowbird, Utah, USA.
  - Mar 2014. International Travel Grant from GISTIC to present a demonstration paper at the 30^{th} ICDE IEEE International Conference on Data Engineering, March 31-April 4, 2014. held in Chicago, IL, USA,

Scholarships

Sept 2015. Scholarship for graduate students with an outstanding curriculum from The Government of Saudi Arabia to obtain Ph.D in computer Science. The scholarship covers the full tuition and other relevant required academic fees for 3 years.

Sept 2012. Scholarship for graduate students with an outstanding curriculum from The Government of Saudi Arabia to obtain M.Sc in computer Science. The scholarship covers the full tuition and other relevant required academic fees.

Sept 2004. Scholarship for under-graduate students with an outstanding curriculum from UMM ALQURA University to obtain B.Sc in computer Science. The fellowship covers the full tuition and a monthly stipend for 4 years.

Service and Activities

- **External Conferences Reviewer:** VLDB '12-'18, ICDE '12-'18, SIGSPTIAL '12-'18, SIGMOD '12-'18,ICDCS '12, TKDE '14-'18, MDM '12-'18, SSDBM '12-'18, and ICPADS '17.
- **PC member (Research, Systems, Industrial Experience, and Demo Papers):** SIGSPATIAL 2019
- **Journal Reviewer: Listed by the year start reviewing.**
  - (2019) Data Mining and Knowledge Discovery, Springer.
  - (2019) Geoinformatica, Springer.
  - (2018) Transaction on Cloud Computing, IEEE.
  - (2018) Distributed and Parallel Databases Journal, Springer.
  - (2017) Complexity Journal, Hindawi.
  - (2017) Computers and Electronics in Agriculture Journal, Elsevier.
  - (2015) Transactions on Knowledge and Data Engineering TKDE, IEEE.
  - (2012) Very Large Data Base Journal.
- **Volunteer:**
  - Student volunteer at the International Conference on Advances in Geographic Information Systems, ACM SIGSPATIAL GIS 2018.
  - Student volunteer at the International Conference on Advances in Geographic Information Systems, ACM SIGSPATIAL GIS 2014.
- **Community Volunteer:**
  - (July 2018-July 2019) **Board Director - Commonwealth Terrace Cooperative**: The board member is one of nine directors. The board member is elected at large and serves as a representative of the CTC community. The board of directors has fiduciary responsibility of the corporation and sets overall policies for the operation of CTC with the community in mind. The primary purpose of the policies is to address the needs and best interests of the entire CTC community in such a way that builds a vibrant, welcoming community and complies with the requirements of the owner.
  - (July 2018-July 2019) **Executive Treasure Officer - Commonwealth Terrace Cooperative**: The treasure officer maintains a complete and accurate of all financial transaction of CTC by working closely with finance committee managment. Serve as liaison between the borad directors and the finance committee. Performs all other duties required by law.