Nabil Abubaker

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Profile

I work in Parallel Computing research. Specifically, I investigate and design combinatorial algorithms and methods for reducing communication overhead of parallel scientific and machine learning applications running on HPC systems. Experienced in dealing with sparse data at scale as well as graph/hypergraph partitioning.

Education

Ph.D. in Computer Engineering *@Bilkent University, Turkey* **2022**
Thesis: Novel Algorithms and Models for Scaling Parallel Sparse Tensor and Matrix Factorizations. **Advisor:** Prof. Cevdet Aykanat

M.Sc. in Computer Engineering *@Bilkent University, Turkey* **2016**
Thesis: Reordering Methods for Exploiting Spatial and Temporal Localities in Parallel Matrix-Vector Multiplication

B.Sc. in Computer Engineering *(summa cum laude) @An-Najah National Univeristy, Palestine* **2014**

Experience

Research & Teaching Assistant *@Bilkent University* **2016-2022**

- Research: Full-stack (motivate, design, implement, experiment, document) researcher for several funded projects focusing on parallel sparse computations.
- Teaching: Assistant for several courses, mainly Algorithms I (design and analysis), Digital Design, Fundamentals of Data Structures and Algorithms, Software Verification and Validation, and Introductory OO programming courses using JAVA.

Instructor (Part-time, remote) *@An-Najah National University* **Jan 2021 - May 2021**
I taught the course "Computer Architecture II" for senior undergrad students.

Software Engineer (Part-time) *@Etgi Grup, Ankara, Turkey* **2017 - 2018**

- Investigated, implemented and integrated several services for the company's E-learning platform: Vedubox
- SQL queries optimization, back-end services optimization.

Software Engineer *@Sina Research Institute, Birzeit University* **May 2014- Aug 2014**

Software Engineering Intern *@Exalt Technologies, Ramallah, Palestine* **June 2013 - Aug 2013**

Research Projects

Store-And-Forward Communication Models For Scaling Latency-Bound Parallel Applications
Funded Project, Principal Investigator: Cevdet Aykanat | My role: Senior Researcher and Sub-Task Leader 2021-2024

Parallel Stochastic Gradient Descent Algorithms for Large-Scale Recommendation Systems
Funded Project, Principal Investigator: Cevdet Aykanat | My role: PhD Researcher and Sub-Task Leader 2019-2021

High Performance Tensor Methods for Distributed and Shared Memory Parallel Systems
Funded Project, Principal Investigator: Cevdet Aykanat | My role: PhD Researcher and Sub-Task Leader 2017-2019

Technical Skills

As an HPC Researcher:

- **Writing the code:** C, C++, MPI, openMP
- **Dev environment:** Vim, tmux, Linux
- **Experimentation setup:** Bash scripts, slurm
- **Data collection & wrangling:** Bash, awk, sed
- **Data analysis & reporting:** R, Pandas, PGFPlots
- **Preparing articles & figures:** LaTeX, TikZ, Inkscape

As a Software Engineer:

C#, Java, SQL, Python, Julia, Git, EntityFramework, RESTful API, Goolg App Engine, Matlab, JavaScript, AngularJS, VHDL, Verilog.

Publications

Scaling Stratified Stochastic Gradient Descent for Distributed Matrix Completion. **2022**
Nabil Abubaker, M. Ozan Karsavuran, Cevdet Aykanat. *TechRxiv Preprints (to appear in IEEE TKDE)*

Scalable Unsupervised ML: Latency Hiding in Distributed Sparse Tensor Decomposition. **2022**
Nabil Abubaker, M. Ozan Karsavuran, Cevdet Aykanat. *In IEEE Transactions on Parallel and Distributed Systems*

True Load Balancing for Matricized Tensor Times Khatri-Rao Product. **2021**
Nabil Abubaker, Seher Acer, Cevdet Aykanat. *In IEEE Transactions on Parallel and Distributed Systems*

Spatiotemporal Graph and Hypergraph Part. Models for SpMV on Many-Core Architectures. **2019**
Nabil Abubaker, Kadir Akbudak, Cevdet Aykanat. *In IEEE Transactions on Parallel and Distributed Systems*

Privacy-Preserving Fog Computing Paradigm. **2017**
Nabil Abubaker, Leonard Dervishi, Erman Ayday. *IEEE CNS'17* Las Vegas, NV, USA

Talks

Novel Algorithms and Models for Scaling Parallel Sparse Tensor and Matrix Factorizations. **2022**
PhD Dissertation Talk at Bilkent University.

Sparse Tensor Partitioning for Scalable Distributed CPD-ALS. **2022**
SIAM Conference on Parallel Processing for Scientific Computing (PP22). Seattle, WA, USA

Awards & Honors

- Recipient of the "Bilkent University best journal article by a PhD student" award two years in a row.
- UYBT incentive award by the The Scientific and Technological Research Institution of Turkey (TÜBİTAK).
- Bilkent University tuition waiver & full support scholarship for MSc and PhD studies.
- The CocaCola - Injaz exchange program scholarship award - 2012/2013
- Ranked 1st in province and 7th country-wide in nation-wide high school diploma exams - industrial stream. Honored by the mayor.

Miscellaneous

Professional Society Membership

- Society of Industrial and Applied Mathematics (SIAM)
- The Institute of Electrical and Elecronic Engineers (IEEE)

Academic Review Service

- IEEE Transactions on Big Data.
- International Parallel & Distributed Processing Symposium (IPDPS) - 2018

Languages

- Arabic: Native
- English: Fluent
- Turkish: Intermediate

Leadership / Extracurricular

- Served as vice-chair for the university's IEEE Student Branch in 2011-2012.
- Co-founded and co-organized the first Palestine Programming Olympiad event (PPO), a 24-hours programming contest for students and young professionals.
- Participated in IEEEXtreme competition 5.0, 6.0, 7.0 and 8.0 (2011,2012, 2013, 2014). *Our team won the 2^{nd} place country-wise in 2013.*