Niranda Perera *January 10, 1990*

Last update on August 25, 2021

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Research Interests

High Performance Computing, Data Engineering, *Dataframes*, Distributed Programming, Distributed Deep Learning

Experience

Voltron Data Inc. (*FKA* Ursa Computing Inc.) — Remote - Bloomington, Indiana

Software Engineering Intern — *May 2021 – Aug 2021*

Working on **Apache Arrow C++ Compute API** development

- Developing compute kernels, bug fixes, and extending the C++ compute APIs.
- Extensively working on **Template Metaprogramming (TMP)and Object Oriented Programming (OOP) in C++**. *Hash Join Node*, *If-else Kernel*, *Bitmap Word Visitor API* were some noteworthy contributions.
- Apache Arrow JIRAs worked on can be accessed here.
- Apache Arrow Github Pull Requests can be accessed here.

Digital Science Center, Indiana University — Bloomington, USA

Research Assistant — *Aug 2018 – Present*

Working on high performance computing, data engineering, and AI/ML

- Developing **Cylon**, a distributed high performance data engineering framework based on **Apache Arrow** format, with a **C++** backend and a **Python** frontend using **Cython** wrappers.
- Developing a *dataframe* abstraction for Bulk Synchronous Parallel (**MPI**) environments to seamlessly integrate data engineering with parallel deep learning
- Integrating Cylon with **Python Pandas**, **Dask**, and **Nvidia Rapids CuDF**
- Working on parallel DNN training in **PyTorch** (ex:**Pipedream**, **GPipe**)
- Developing **Twister2**, a **Java** based composable Big Data toolkit for cloud and high performance computing infrastructure

Teaching Assistant — *Aug 2019 – Apr 2020*

Engineering Cloud Computing (E516)

- Assisted students with their Cloudmesh projects
- Technologies covered: Cloud infrastructure (**Azure**, **AWS**, **GCP**, **OpenStack**), Container management (**Docker**, **Kubernetes**), **REST APIs**

Department of Computer Science and Engineering, University of Moratuwa — Moratuwa, Sri Lanka

Research Assistant — *Jan 2017 – Jun 2018*

Developing a Cloud Based, Real-Time Weather Modeling and Forecasting Framework for Center for Flood Control and Water Management, Sri Lanka.

- Worked on statistical and numerical weather prediction models (WRF, SHER, and HEC-HMS)
- Developed a **Python** based distributed execution framework to run models in production using **Apache Airflow**, **Google Cloud Platform** and **Docker**

WSO2 Inc — Colombo, Sri Lanka

Senior Software Engineer — *Apr 2016 – Dec 2016*

Open source middleware software stack based on OSGi spec. Been a member of WSO2 Data Analytics Server (DAS), an enterprise data analytics platform for batch, streaming, and predictive data analytics.

- Headed integrating **Apache Spark** analytics engine into DAS
- Developed analytics solutions for WSO2 Enterprise Service Bus, WSO2 API Manager and WSO2 Identity Server
- Acquired thorough understanding in OSGI architecture, Open Source Software development practices, and enterprise production and support

Software Engineer — *Mar 2014 – Apr 2016*

Please refer my LinkedIn profile for a more complete list of work experiences along with recommendations.

Education

Indiana University — Bloomington, USA

Doctor of Philosophy, *Intelligent Systems Engineering* — *2018 – Present*

GPA of 3.98. PhD Candidate advised by Prof. Geoffrey Fox. *Major: Computer Engineering, Minor: Cyber-Physical Systems*

University of Moratuwa (UoM) — Katubedda, Sri Lanka

B. Sc. Eng. (Hons), Electronic and Telecommunication Engineering — *2009 – 2014*

First Class with a GPA of 3.76. With the Undergraduate Final Year Project "Air travel planning and search optimization using GPUs", gained experience in parallel programming and hardware optimization applications using **NVIDIA CUDA**.

Publications

[1] V. Abeykoon, S. Kamburugamuve, C. Widanage, N. Perera, A. Uyar, T. A. Kanewala, G. von Laszewski, and G. Fox, "Hptmt parallel operators for high performance data science & data engineering," *arXiv preprint arXiv:2108.06001*, 2021.

[2] N. Perera, V. Abeykoon, C. Widanage, S. Kamburugamuve, T. A. Kanewala, P. Wickramasinghe, A. Uyar, H. Maithree, D. Lenadora, and G. Fox, "A fast, scalable, universal approach for distributed data reductions," *arXiv preprint arXiv:2010.14596*, 2020.

[3] V. Abeykoon, N. Perera, C. Widanage, S. Kamburugamuve, T. A. Kanewala, H. Maithree, P. Wickramasinghe, A. Uyar, and G. Fox, "Data engineering for hpc with python," in *2020 IEEE/ACM 9th Workshop on Python for High-Performance and Scientific Computing (PyHPC)*, IEEE, 2020, pp. 13–21.

[4] C. Widanage, N. Perera, V. Abeykoon, S. Kamburugamuve, T. A. Kanewala, H. Maithree, P. Wickramasinghe, A. Uyar, G. Gunduz, and G. Fox, "High performance data engineering everywhere," in *2020 IEEE International Conference on Smart Data Services (SMDS)*, IEEE, 2020, pp. 122–132.

[5] P. Wickramasinghe, N. Perera, S. Kamburugamuve, K. Govindarajan, V. Abeykoon, C. Widanage, A. Uyar, G. Gunduz, S. Akkas, and G. Fox, "High-performance iterative dataflow abstractions in twister2: Tset," *Concurrency and Computation: Practice and Experience*, e5998, 2020.

[6] P. Wickramasinghe, S. Kamburugamuve, K. Govindarajan, V. Abeykoon, C. Widanage, N. Perera, A. Uyar, G. Gunduz, S. Akkas, and G. Fox, "Twister2: Tset high-performance iterative dataflow," in *2019 International Conference on High Performance Big Data and Intelligent Systems (HPBD&IS)*, IEEE, 2019, pp. 55–60.

[7] A. Uyar, G. Gunduz, S. Kamburugamuve, P. Wickramasinghe, C. Widanage, K. Govindarajan, N. Perera, V. Abeykoon, S. Akkas, and G. Fox, "Twister2 cross-platform resource scheduler for big data,"

Presentations

IEEE BigData 2020 - IWBDR Workshop: Presenting *A Fast, Scalable, Universal Approach For Distributed Data Aggregations* (Video Link), Dec 2020

ApacheCon @Home 2020 Conference: Presenting **Cylon** to Apache Community (Video Link), Sep 2020

Skills

Programming Languages: C/C++, Python, Java, Cython
Data Engineering: SQL, Apache Spark, Apache Hadoop/ HDFS, NumPy, Python Pandas, Rapids CuDF
Technologies: OpenMPI, Dask, Docker, Kubernetes, Apache Airflow, REST Services
Deep Learning: PyTorch, Tensorflow
Hardware Languages: x86 Assembly with AVX/2/512, Verilog (moderate fluency)
Languages: Sinhalese (mother tongue), English

Honors, Awards, and Achievements

Hiking and travel: Achieved a height of 16,200ft (4950m) on foot in Junarghali Pass, Roopkund Trek, Uttarkund, India in June, 2016.

Basketball, WSO2: *Captained* the team which emerged *champions* at the Mercantile Services Basketball Association League Tournament 2016 - Division E.

Dean's List, Faculty of Engineering, UoM: During the Semesters 1 and 8

Basketball, UoM: *Colorsman* during the years 2010, 2011, 2013. Emerged *champions* at the Inter University Basketball Championship 2011.

G.C.E. Advanced Level Examination, Sri Lanka: *Ranked Island 21st, Colombo District 9th* with a Z-Score of 2.9127 from Physical Science

Nalanda College, Colombo: Awards for the ***Most Outstanding Student of the Year***, *Best Result – Science Section*, *Best Result – Physical Science* & *Best Student in General Knowledge* in the year 2008

Dept. Electronic & Telecommunication, UoM: *Student Representative* of the 2009 Batch for the year 2010/2011

Electronic Club, UoM: *Treasurer* for the year 2013 & Chief Organizer, Sri Lanka Robotics Challenge 2012

English Literary Association, UoM: *Vice President* for the year 2011/2012

English Debating Team, UoM: *Captained* the Team B in 2012

IEEE XTREME Programming Competition: Participant in 2011, 2012 & 2013

CIMA Global Business Challenge: *Country Runner-Up*, Team Unorthodox in 2012

Precipice Business Fest: *International Finalist*, held in Malaysia in 2010 organized by the Jain University, India