Muhammad Aamir Shafi

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dblp: http://www.informatik.uni-trier.de/~ley/pers/hd/s/Shafi:Aamir

Educational History

Degree/Position	Institute	Research Topic/Grades	Duration
Post-doctorate in Computer Science	Massachusetts Institute of Technology (MIT), USA	Host: Prof. Charles E. Leiserson	Sept 10 to June 11
PhD in Computer Science	Institute of Cosmology and Gravitation, University of Portsmouth, UK	Nested Parallelism in Multicore Systems using Java Advisors: Prof Mark Baker & Dr Bryan Carpenter External Examiner: Prof David Walker	Sept 03 to Nov 06
Bachelors in Computer Software Engineering	National University of Sciences and Technology, Pakistan	CGPA: 3.22/4.00 ***Rector's Gold Medal for the Best Final Year Project of 2003***	Sept 99 to June 03

Experience

Position	Employer/Funded by	Duration	Place
Research Scientist	Ohio State University	Mar 20 to Present	Columbus, OH, USA
Associate Professor	National University of Computing and Emerging Sciences (FAST-NUCES)	July 19 to Feb 20	Lahore, Pakistan
Assistant Professor	National University of Computing and Emerging Sciences (FAST-NUCES)	Aug 18 to June 19	Lahore, Pakistan
Assistant Professor	University of Dammam	Aug 15 to July 18	Saudi Arabia
Technical Consultant (part-time)	xFlow Research Inc.	June 12 to Dec 13	Islamabad, Pakistan
Assistant Professor & Director of the HPC Lab	National University of Sciences and Technology	Jan 07 to Aug 15	Islamabad, Pakistan
Visiting Scholar	Fulbright Foundation (Placed at CSAIL, MIT, USA)	Sept 10 to June 11	Cambridge, MA, USA
Research Associate	University of Reading	Oct 06 to Dec 06	Reading, UK
Research Technician (Part-time)	University of Portsmouth	Oct 04 to May 06	Portsmouth, UK
Teaching Assistant (Part-time)	University of Portsmouth	Feb 04 to June 06 (one semester/yr)	Portsmouth, UK

Honors

1. Mar '23 - A research poster by J. Yao, A. Shafi, H. Subramoni, and D. K. Panda is selected as a Best Poster Finalist for Int'l Supercomputing Conference (ISC), 2023.
2. I was awarded the Rector's gold medal for the best project of the year 2003, at the National University of Sciences and Technology.

3. I advised a FYP titled "Design and Development of an Embedded OpenFlow Controller" that won the 2012 Global Multicore Challenge organized by Cavium Networks Inc. The winning project was awarded a cash prize of $7500.
4. A paper "Memory-Mapping Support for Reducer Hyperobjects" co-authored with colleagues from MIT got the Best Paper Award at the 24th ACM Symposium on Parallelism in Algorithms and Architecture (SPAA) held at Pittsburgh, Pennsylvania in June 2012.
5. I was part of the team that designed and commissioned a GPU-based cluster at NUST. News Clipping: http://www.hpcwire.com/hpcwire/2012-03-07/pakistan_deploys_132-teraflop_supercomputer.html
6. I was awarded the Visiting Fulbright grant to conduct research for ten months at CSAIL, MIT.
7. I was awarded a Spanish Government grant to teach Parallel Computing to a Masters course at the University of La Coruna, Spain in April 09.
8. I am the main developer of MPJ Express, a Java parallel computing software (http://mpj-express.org)
9. At NUST, I led the effort to setup the first of its kind High Performance Computing (HPC) lab that currently hosts four mid-sized Linux/UNIX-based compute clusters
10. A poster "Java-based High Performance Computing using MPJ Express" was awarded a cash prize of SAR 1000 in the Saudi-HPC conference held at Jeddah in March 2018.

Taught Courses

Course Name	Semester	Level	University
CSE-5449 Intro to High-Performance Deep Learning	Fall 22	UG/PG	Ohio State University
An AI Bootcamp for Cyberinfrastructure Professionals	Fall 22	PG	Ohio State University
An AI Bootcamp for Cyberinfrastructure Professionals	Spring 22, Spring 23	PG	Ohio State University
CS-559 High Performance Computing	Spring 19	PG	FAST-NUCES Lahore
CS-205 Operating System	Spring 19	UG	FAST-NUCES Lahore
EE 204 Computer Architecture	Fall 18	UG	FAST-NUCES Lahore
EE 213 Computer Organization and Assembly Language	Fall 18	UG	FAST-NUCES Lahore
CS-615 Parallel and Distributed Computing	Spring 18	PG	UoD, Saudi Arabia
CS-310 Data Structures	Summer 17	UG	UoD, Saudi Arabia
CS-321 OOP 2	Summer 17	UG	UoD, Saudi Arabia
CS-412 Algorithms Analysis and Design	Fall 15, Fall 16	UG	UoD, Saudi Arabia
CS-322 Operating Systems	Spring 16, Spring 17	UG	UoD, Saudi Arabia
CS-221 Fundamentals of Programming	Fall 15, Spring 16, Fall 17, Spring 17	UG	UoD, Saudi Arabia
CS-212 Object Oriented Programming	Spring 15	UG	NUST, Pakistan
CS-433 Applied Parallel Computing	Spring 15, Spring 14, Fall 09, Fall 08	UG	NUST, Pakistan
CS-330 Operating Systems	Fall 14, Fall 13, Spring 12, Fall 11, Fall 08, Spring 07, Fall 07	UG	NUST, Pakistan
CS-212 Object Oriented Programming	Spring 13	UG	NUST, Pakistan
CS-804 Advanced Operating Systems	Fall 11	PG	NUST, Pakistan
EE-310 Computer Organization & Architecture	Spring 10, Spring 09	PG	NUST, Pakistan
CS-212 Intro to Java Programming	Fall 08, Fall 09	UG	NUST, Pakistan
Network Programming with Sockets	Fall 04, 05, 06	UG	Portsmouth, UK
Web Technologies (TA)	Fall 02, 03	UG	NUST, Pakistan

Funded Projects

Title	Funding Agency	Role	Grant Amount	Duration
Co-Designing Programming Model Runtimes and Applications for Exascale	XSEDE/ACCESS	Co-PI	1.5 Mil ACCESS Credits	Jan 23 to Dec 23
HPC for Buckeyes: Preparing Next-Generation Buckeyes for a Career in HPC	Intel	Co-PI	$50,000	Aug 22 to Aug 23
Intelligent Cyberinfrastructure with Computational Learning in the Environment (ICICLE)	NSF	Senior Personnel	20 Million USD	Nov 21 to Nov 26
Student Travel Support for MVAPICH User Group (MUG) Meeting	NSF	Co-PI	$10,000	Aug 22 to July 23
MPJ Express 2.0: Towards the Next Generation Java Messaging Library for High-end Computing	National ICT R&D	Principal Investigator	~ 8 Million Pakistani Rupees	June 13 to Dec 14
Collaborative Multicore Programming using Scientific Java Messaging	British Council	Principal Investigator	40, 000 GBP	Sept 08 to Aug 11
Establishment of Grid Node at NUST	Higher Education Commission, Pakistan	Project Director	34.82 Mil Rs.	Jan 06 to July 08
Capacity Building of Lady Health Workers in Rural Mardan through the use of ICT base Tele-healthcare	Higher Education Commission, Pakistan and the US State Dept.	Co-Principal Investigator	200,000 USD	July 08 to June 10
High Performance Computing Research and Development	NUST, Pakistan	Principal Investigator	2.0 Mil Rs.	Aug 07 to July 08

OSU – NSF AI Institute ICICILE

Currently Aamir is involved in various research topics and use-cases in the ICICLE project. These include:

CI4AI1: High Performance Model Training & Digital Agriculture – This topic investigates and utilizes high-performance data parallel training techniques, data and model parallelism, by distributing the workload on multiple GPUs/nodes. Techniques developed under this research topic were exploited by the Digital Agriculture use-case to predict the Soybean defoliation using DefoNet – this team was led by Aamir. The study depicted around 11x speedup with 16 A100 GPUs. Each node of the HPC system used here had 4 NVIDIA A100 (40 GB), two AMD EPYC 7713 64-core, and Mellanox InfiniBand interconnect. These performance results were featured by a talk by the NSF director that reviewed progress and achievements of the NSF AI institutes!

CI4AI3: Support for Edge Intelligence – A team led by Aamir recently conducted a study, using MLPerf Edge Inference benchmarks, to ascertain the benefits of using quantization to build efficient models with a smaller memory footprint. This is done by replacing FP32 computations with smaller bit representation format like INT8 for storing activations and gradients. A paper about this work has recently been accepted for publication in the 7th IEEE International Conference on Fog and Edge Computing 2023.

AI4CI1: Knowledge Graphs and Model Commons for CI – The CI proposed by the ICICLE project is a complex mix of hardware ranging from some of the fastest systems to energy-efficient edge devices. The main objective of this research topic is to apply AI techniques to improve CI. This is a complex because of the sheer large volume/heterogeneity of the CI data. This thrust proposes to tackle this issue by organizing the CI data as Knowledge Graphs.

Animal Ecology: As part of this effort, a team of students is collaborating with Aamir to measure and profile the power usage of the so-called camera trap devices. The team is exploiting software-based power measurement strategies.

OSU Experience

Since joining the group, I have been involved in R&D efforts under the umbrella of High-Performance Big Data (http://hibd.cse.ohio-state.edu/) and High Performance Deep Learning (http://hidl.cse.ohio-state.edu) area. Some projects include:

- MPI4Dask is a custom version of the Dask Distributed library that contains high-performance MPI communication backend for Dask. The MPI backend in MPI4Dask uses mpi4py over the MVAPICH2 library and targets modern HPC clusters. More details are here: http://hibd.cse.ohio-state.edu/#mpi4dask
- cuML is a distributed machine learning training framework with a focus on GPU acceleration and distributed computing. MVAPICH2-GDR provides many features to augment distributed training with cuML on GPUs. More details are here: http://hidl.cse.ohio-state.edu/features/#mpi4cuml
- The MVAPICH2-J library provides experimental Java bindings to the MVAPICH2 family of libraries. The implementation of the MVAPICH2-J software is inspired by MPJ Express and mpiJava and it follows the Open MPI Java bindings API. The software currently provides support for communicating data from basic Java datatypes as well as direct ByteBuffers from the Java New I/O (NIO) package. MVAPICH2-J does not support communication to/from GPU device memory. More details can be seen at: https://mvapich.cse.ohio-state.edu/userguide/mv2j/
- OMB-Py: Python Micro-Benchmarks for Evaluating Performance of MPI Libraries on HPC (https://arxiv.org/abs/2110.10659)
- Apache Spark and Apache Netty over MPI: This project implements MPI4Spark which uses MPI for communication in a parallel and distributed setting on HPC systems. This approach realizes the vision of "Converged Communication Stack" for Big Data, Deep Learning, and HPC workloads. Also, it provides portability and performance benefits since MPI4Spark is capable of utilizing popular HPC interconnects including InfiniBand, Omni-Path, Slingshot, and others. http://mug.mvapich.cse.ohio-state.edu/static/media/mug/presentations/22/Wed_OSU_Aamir.pdf

MIT Experience

I was a visiting Fulbright scholar at MIT for the 2010-11 academic year. My host at MIT was Prof Charles E. Leiserson. I was involved in various teaching and research activities with the Supertech research group headed by Prof. Leiserson. In terms of research, I collaborated with Prof. I-Ting Anglina Lee (http://www.cse.wustl.edu/~angelee/) who was a PhD candidate at that time. I contributed to the design and implementation of splitters and reducers (types of Cilk hyperobjects) in the Cilk-M runtime. I also implemented a high-level API for "reducer arrays". Cilk-M project website can be seen at http://groups.csail.mit.edu/sct/wiki/index.php?title=The_Cilk-M_Project. A paper about this work titled "Memory-Mapping Support for Reducer Hyperobjects" got the best paper award at the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) 2012.

Research and Development Projects

My research interests include design, implementation, and evaluation of parallel systems software—both distributed and shared memory. Also I am interested in exploiting my parallel programming skills to improve performance of real-world applications.

MPJ Express: I am the main architect and developer of the MPJ Express software, which is a Java-based message passing system. Such messaging libraries are typically written in languages like C, C++, and Fortran. In earlier studies, I have evaluated and compared performance of Java messaging libraries against their C counterparts. I continue to develop and maintain the MPJ Express software, which is now used in some universities and

organizations for teaching and development of parallel programs. Since the first release of the MPJ Express software, around <u>25,000 copies</u> have been downloaded with a <u>monthly average</u> of around <u>250-260</u>. More details about MPJ Express can be seen at http://mpj-express.org.

The MPJ Express software is used high profile research groups based at top international organizations. Some of these are:

- Ohio Supercomputer Center:
  https://www.osc.edu/resources/available_software/software_list/mpj_express
- Los Alamos National Lab (LANL): Researchers at LANL have used the MPJ Express software to develop a parallel version of Cartablana, which uses Jacobian-Free Newton-Krylov (JFNK) methods to solve non-linear physics simulations on unstructured meshes.
- SHARCNET (a consortium of Canadian academic institutions):
  https://www.sharcnet.ca/help/index.php/Parallel_Java:_Using_MPJ_Express_on_SHARCNET
- ACENET: https://www.ace-net.ca/wiki/MPJ_Express
- Advanced Research Computing Center at the University of Oxford:
  http://www.arc.ox.ac.uk/content/running-java
- One of the founders of the Java language—James Gosling—favored MPJ Express as his favorite MPI-like library in his blog "MPI Meets Multicore" (http://blogs.sun.com/jag/entry/mpi_meets_multicore)!
- In 2007, MPJ Express became part of the Pooch software; a news item can be seen here (http://daugerresearch.com/pr/poochv1.7.5.shtml).

MPJ Express software has also been used at various universities for teaching parallel programming. These include:

- Vrije Universiteit Brussel, http://parallel.vub.ac.be/documentation/mpi/
- Workshop on Parallel Computing at NUST Pakistan,
  http://www.nust.edu.pk/INSTITUTIONS/Schools/SEECS/News/Pages/Workshop-on-Parallel-Computing-using-Java.aspx
- Applied Parallel Computing Course at NUST Pakistan, https://arxiv.org/abs/1410.0373
- Parallel and Distributed Computing, University of Portsmouth, UK

Cilk POV-Ray: As a sample application for the reducers development work done at MIT, I parallelized the POV-Ray software that is a popular ray tracing open source software.

Java-based Parallel Scientific Applications: To test performance of MPJ Express and Java in real-world HPC applications, I have developed Java versions of some real world scientific applications. These include Java Gadget-2 (Massively Parallel Astrophysics Code), Parallel Finite-Domain Time-Difference Code, and Parallel Network Anomaly Detection Systems. Some of these codes can be downloaded from http://hpc.seecs.nust.edu.pk/~aamir/software.html

HPC Lab Director: At NUST, I am also serving as the director for the Center for High Performance Scientific Computing (http://hpc.seecs.nust.edu.pk). The center is the first of its kind in Pakistani academia and aims to conduct research in parallel models and applications. The center currently hosts four compute clusters. A recently commissioned cluster is one of the fastest supercomputers in Pakistan.

Industrial Projects (with xFlow Research Inc. http://xflowresearch.com)

xFlow research is a services based startup company that operates in the area of Software Defined Networking (SDN). xFlow's clients include Dell, Cavium Networks, and Marvell amongst others.

xSwitch: xSwitch—based on the popular Open vSwitch (OVS) software—is an OpenFlow 1.0 enabled switch developed for intelligent Network Interface Cards (NICs). As part of this project, several new tunneling protocols that enable network virtualization in a data-center were developed—these included NVGRE, VXLAN, STT, IPSEC, and GTP-U. Comprehensive testing and performance evaluation, with emphasis towards scalability, was conducted. Floodlight controller was used as the reference OpenFlow controller in this project.

Stealth Cloud Startup: This stealth startup is developing software solutions for modern data centers. More specifically it is addressing TCAM scalability limitations in Top of the Rack (TOR) switches. The startup solution also ensures cost-reductions, for data center operators, by adopting the concept of virtual appliances. Some technologies used in this project include:

- o Switch Programming using their Proprietary APIs (Intel and Broadcom)
- o Porting Open vSwitch on hardware platforms
- o NFV (Network Functions Virtualization)
- o Packet classification algorithms
- o Virtualization Software (KVM and Xen)
- o OpenStack

US Patent

- Saleh Alrashed, Jamal Alhiyafi, Aamir Shafi, Nasro Min-Allah. Method for Determining Earliest Deadline First Schedulability of Non Pre-emptive Uni-Processor System, US Patent US 20180336064A1, Granted on 22/11/2018.

Impact Factor Journal Publications (An updated list can be seen at:
https://scholar.google.com.pk/citations?hl=en&user=V0XEUMAAAAAJ&view_op=list_works&sortby=pubdate)

1. K. Khorassani, C. Chen, B. Ramesh, A. Shafi, H. Subramoni, and DK Panda, High Performance MPI over the Slingshot Interconnect , Special Issue of Journal of Computer Science and Technology (JCST) , Feb 2023.

2. K. Suresh, K. Khorassani, C. Chen, B. Ramesh, M. Abduljabbar, A. Shafi, H. Subramoni, and DK Panda, Network Assisted Non-Contiguous Transfers for GPU-Aware MPI Libraries , Aug 2022.

3. A. Jain, N. Alnaasan, A. Shafi, H. Subramoni, and DK Panda, Optimizing Distributed DNN Training using CPUs and BlueField-2 DPUs, IEEE Micro, Volume: 42, Issue: 2, doi:10.1109/MM.2021.3139027, Mar - Apr 1 2022

4. Aamir Shafi, Saqib Saeed, Yasser. A. Bamarouf, Sardar Zafar Iqbal, Nasro Min-Allah and Mohammed A. Alqahtani, Student Outcomes Assessment Methodology for ABET Accreditation: A Case Study of Computer Science and Computer Information Systems Programs, in *IEEE Access*, vol. 7, pp. 13653-13667, 2019. doi: 10.1109/ACCESS.2019.2894066 (IF=3.577)

5. Tariq Saeed, Jamil Ahmad, Jan Baumbach, Josch Pauling, Aamir Shafi, Rehan Zafar Paracha, Asad Hayat, Amjad Ali. Parameter estimation of qualitative biological regulatory networks on high performance computing hardware. BMC Systems Biology. 2018 Dec 29;12(1):146. doi: 10.1186/s12918-018-0670-y. (IF=2.05)

6. Saleh Alrashed, Jamal Alhiyafi, Aamir Shafi, Nasro Min-Allah, An efficient schedulability condition for non-preemptive real-time systems at common scheduling points, The Journal of Supercomputing, Spring US, Volume 72, Issue 12, pp 4651–4661, December 2016. (IF=1.326)

7. Ansar Javed, Bibrak Qamar, Mohsan Jameel, Aamir Shafi, Bryan Carpenter, Towards Scalable Java HPC with Hybrid and Native Communication Devices in MPJ Express, International Journal of Parallel Programming (IJPP), Springer US, Volume 44, Issue 6, pp 1142–1172, December 2016. (IF=1.156)

8. Muhammad Tariq Saeed, Jamil Ahmad, Shahzina Kanwal, Andreana N. Holowatyj, Iftikhar A. Sheikh, Rehan Zafar Paracha, Aamir Shafi, et al. Formal modeling and analysis of the hexosamine biosynthetic pathway: role of O-linked N-acetylglucosamine transferase in oncogenesis and cancer progression, PeerJ 4:e2348 https://doi.org/10.7717/peerj.2348, Sept 2016. (IF=2.118)

9. Guillermo Taboada, Juan Tourino, Ramon Doalla, Aamir Shafi, Bryan Carpenter, and Mark Baker, Device level communication libraries for high performance computing in Java, Concurrency and Computation: Practice and Experience, pp 2382-2403, 23(18), December 2011. (IF=1.133)

10. Aamir Shafi, Bryan Carpenter, and Mark Baker, Nested Parallelism for Multi-core HPC Systems using Java, Journal of Parallel and Distributed Computing, pp 532-545, 69(6), June 2009, doi:10.1016/j.jpdc.2009.02.006 (IF=1.930)

11. Aamir Shafi, Bryan Carpenter, Mark Baker, and Aftab Hussain, A Comparative Study of Java and C Performance in Two Large Scale Parallel Applications, Concurrency and Computation: Practice and Experience, http://dx.doi.org/10.1002/cpe.1416, 2009 (IF=1.133)

Peer-Reviewed International Conference/Non-IF Journal/Workshop Publications (An updated list can be seen at: https://scholar.google.com.pk/citations?hl=en&user=V0XEUMAAAAAJ&view_op=list_works&sortby=pubdate)

12. K. Suresh, B. Michalowicz, B. Ramesh, N. Contini, J. Yao, S. Xu, A. Shafi, H. Subramoni, D. Panda, A Novel Framework for Efficient Offloading of Communication Operations to Bluefield SmartNICs, 37th IEEE International Parallel & Distributed Processing Symposium (IPDPS '23), May 2023.

13. Q. Anthony, A. Awan, J. Rasley, Y. He, A. Shafi, M. Abduljabbar, H. Subramoni, D. Panda, MCR-DL: Mix-and-Match Communication Runtime for Deep Learning, 37th IEEE International Parallel & Distributed Processing Symposium (IPDPS '23), May 2023.

14. Q. Zhou, Q. Anthony, L. Xu, A. Shafi, M. Abduljabbar, H. Subramoni, D. Panda, Accelerating Distributed Deep Learning Training with Compression Assisted Allgather and Reduce-Scatter Communication, 37th IEEE International Parallel & Distributed Processing Symposium (IPDPS '23), May 2023

15. B. Michalowicz, K. Suresh, B. Ramesh, A. Shafi, H. Subramoni, M. Abduljabbar, D. Panda, In-Depth Evaluation of a Lower-Level Direct-Verbs API on InfiniBand-based Clusters: Early Experiences, 25th Workshop on Advances in Parallel and Distributed Computational Models, May 2023.

16. C. Chen, K. Khorassani, G. Kuncham, R. Vaidya, M. Abduljabbar, A. Shafi, H. Subramoni, D. Panda, Designing and Optimizing a GPU-aware MPI Library for Intel GPUs: Early Experiences, The 23rd IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing, May 2023.

17. A. Qasem et al., "Lightning Talks of EduHPC 2022," 2022 IEEE/ACM International Workshop on Education for High Performance Computing (EduHPC), Dallas, TX, USA, 2022, pp. 42-49, doi: 10.1109/EduHPC56719.2022.00011.

18. Q. Zhou, Q. Anthony, A. Shafi, H. Subramoni, D. Panda, Accelerating Broadcast Communication with GPU Compression for Deep Learning Workloads, 29th IEEE International Conference on High Performance Computing, Data, and Analytics, Dec 2022.

19. K. Suresh, A. Paniraja Guptha, B. Michalowicz, B. Ramesh, M. Abduljabbar, A. Shafi, D. Panda, Efficient Personalized and Non-Personalized Alltoall Communication for Modern Multi-HCA GPU-Based Clusters, 29th IEEE International Conference on High Performance Computing, Data, and Analytics, Dec 2022.

20. N. Alnaasan, A. Jain, A. Shafi, H. Subramoni, D. Panda, AccDP: Accelerated Data-Parallel Distributed DNN Training for Modern GPU-Based HPC Clusters, 29th IEEE International Conference on High Performance Computing, Data, and Analytics, Dec 2022.

21. B. Ramesh, Q. Zhou, A. Shafi, M. Abduljabbar, H. Subramoni, D. Panda, Designing Efficient Pipelined Communication Schemes using Compression in MPI Libraries, 29th IEEE International Conference on High Performance Computing, Data, and Analytics, Dec 2022.

22. K. Al Attar, A. Shafi, M. Abduljabbar, H. Subramoni, D. Panda, Spark Meets MPI: Towards High-Performance Communication Framework for Spark using MPI, IEEE Cluster '22, Sep 2022.

23. A. Tran, B. Michalowicz, B. Ramesh, H. Subramoni, A. Shafi, D. Panda, Designing Hierarchical Multi-HCA Aware Allgather in MPI, Fifteenth International Workshop on Parallel Programming Models and Systems Software for High-End Computing (P2S2), 2022, Aug 2022.

24. K. Suresh, K. Khorassani, C. Chen, B. Ramesh, M. Abduljabbar, A. Shafi, D. Panda, Network Assisted Non-Contiguous Transfers for GPU-Aware MPI Libraries, Hot Interconnects 29, Aug 2022.

25. K. Khorassani, C. Chen, B. Ramesh, A. Shafi, H. Subramoni, D. Panda, High Performance MPI over the Slingshot Interconnect: Early Experiences, Practice and Experience in Advanced Research Computing, Jul 2022. **(Best Student Paper Award)**

26. Arm meets Cloud: A Case Study of MPI Library Performance on AWS Arm-based HPC Cloud with Elastic Fabric Adapter. S. Xu, A. Shafi, H. Subramoni, D. Panda, 24th Workshop on Advances in Parallel and Distributed Computational Models, May 2022.

27. Towards Java-based HPC using the MVAPICH2 Library: Early Experiences, K. Al Attar, A. Shafi, H. Subramoni, D. Panda, HIPS '22 (IPDPSW), May 2022.

28. Highly Efficient Alltoall and Alltoallv Communication Algorithms for GPU Systems, C. Chen, K. Khorassani, Q. Anthony, A. Shafi, H. Subramoni, D. Panda, Heterogeneity in Computing Workshop (HCW 2022), May 2022.

29. OMB-Py: Python Micro-Benchmarks for Evaluating Performance of MPI Libraries on HPC Systems, N. Alnaasan, A. Jain, A. Shafi, H. Subramoni, D. Panda, 23rd Parallel and Distributed Scientific and Engineering Computing Workshop (PDSEC) at IPDPS22, May 2022.

30. Hy-Fi: Hybrid Five-Dimensional Parallel DNN Training on High-Performance GPU Clusters, A. Jain, A. Shafi, Q. Anthony, P. Kousha, H. Subramoni, D. Panda, ISC HIGH PERFORMANCE 2022, May 2022.

31. Accelerating MPI All-to-All Communication with Online Compression on Modern GPU Clusters, Q. Zhou, P. Kousha, Q. Anthony, K. Khorassani, A. Shafi, H. Subramoni, D. Panda, ISC HIGH PERFORMANCE 2022, May 2022.

32. Hey CAI - Enhancing User Productivity through a Conversational AI Enabled User Interface for HPC Tools, P. Kousha, A. Kolli, S. Miriyala, S. Sainath, A. Jain, H. Subramoni, A. Shafi, D. Panda, ISC HIGH PERFORMANCE 2022, May 2022.

33. Towards Architecture-aware Hierarchical Communication Trees on Modern HPC Systems, B. Ramesh, J. Hashmi, S. Xu, A. Shafi, M. Ghazimirsaeed, M. Bayatpour, H. Subramoni, D. Panda, 28th IEEE International Conference on High Performance Computing, Data, Analytics, and Data Science, Dec 2021.

34. Layout aware Hardware assisted Designs for Derived Data Types in MPI, K. Suresh, B. Ramesh, C. Chen, M. Ghazimirsaeed, M. Bayatpour, A. Shafi, H. Subramoni, D. Panda, 28th IEEE International Conference on High Performance Computing, Data, Analytics, and Data Science, Dec 2021.

35. Accelerating CPU-based Distributed DNN Training on Modern HPC Clusters using BlueField-2 DPUs, A. Jain, N. Alnaasan, A. Shafi, H. Subramoni, D. Panda, 28th IEEE Hot Interconnects, Aug 2021.

36. INAM: Cross-stack Profiling and Analysis of Communication in MPI-based Applications, P. Kousha, Kamal Raj Sankarapandian Dayala Ganesh Ram, M. Kedia, H. Subramoni, A. Jain, A. Shafi, D. Panda, Trey Dockendorf, Heechang Na, K. Tomko, Practice and Experience in Advanced Research Computing 2021, Jul 2021.

37. Aamir Shafi, Jahanzeb Hashmi, Hari Subramoni, and Dhabaleswar K. Panda, Efficient MPI-based Communication for GPU-Accelerated Dask Applications, The 21st IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing, May 2021.

38. Aamir Shafi, Jahanzeb Hashmi, Hari Subramoni, and Dhabaleswar K. Panda, Blink: Towards Efficient RDMA-based Communication Coroutines for Parallel Python Applications, 27th IEEE International Conference on High Performance Computing, Data, and Analytics, Dec 2020.

39. S. Mahdieh Ghazimirsaeed, Quentin Anthony, Aamir Shafi, Hari Subramoni, and Dhabaleswar K. Panda, Accelerating GPU-based Machine Learning in Python using MPI Library: A Case Study with MVAPICH2-GDR, 6th Workshop on Machine Learning in HPC Environments, Nov 2020.

40. Junaid Qadir, Aamir Shafi, Ala Al-Fuqaha, Abd-Elhamid M. Taha, Kok-Lim A. Yau, Joao Ponciano, Sajjad Hussain, et al. 2020. "Outcome-based Engineering Education: A Global Report of International OBE Accreditation and Assessment Practices." EdArXiv. April 13. doi:10.35542/osf.io/rde62.

41. Christina Diedhiou, Bryan Carpenter, Aamir Shafi, Soumabha Sarkar, Ramazan Esmeli, Ryan Gadsdon. Performance Comparison of a Parallel Recommender Algorithm across three Hadoop-based Frameworks, High Performance Machine Learning Workshop, Paris France, 24th September 2018.

42. Hamza Zafar, Farrukh Aftab Khan, Bryan Carpenter, Aamir Shafi, Asad Waqar Malik, MPJ Express Meets YARN: Towards Java HPC on Hadoop Systems, Procedia Computer Science (International Conference on Computational Science (ICCS)), Volume 51, 2015, Pages 2678-2682, ISSN 1877-0509, http://dx.doi.org/10.1016/j.procs.2015.05.379.

43. Shahid Nawaz, Asad W. Malik, Aamir Shafi, Samee U. Khan, Cloud and E-commerce adoption, 12th International Conference on High-Capacity Optical Networks and Enabling/Emerging Technologies (HONET), IEEE, 21-23 Dec 2015.

44. Aamir Shafi, Aleem Akhtar, Ansar Javed, and Bryan Carpenter. 2014. Teaching parallel programming using Java. In Proceedings of the Workshop on Education for High-Performance Computing (EduHPC '14). IEEE Press, Piscataway, NJ, USA, 56-63. DOI=10.1109/EduHPC.2014.7 http://dx.doi.org/10.1109/EduHPC.2014.7

45. Bibrak Qamar, Ansar Javed, Mohsan Jameel, and Aamir Shafi, Design and Implementation of Hybrid and Native Communication Devices for Java HPC, Procedia Computer Science (International Conference on Computational Science (ICCS)), Volume 29, 2014, Pages 184-197, ISSN 1877-0509.

46. Omar Khan, Mohsan Jameel, and Aamir Shafi, High Performance Message-passing InfiniBand Communication Device for Java HPC, Procedia Computer Science (International Conference on Computational Science (ICCS)), Volume 29, 2014, Pages 1468-1479, ISSN 1877-0509.

47. Ammar Ahmad Awan, Muhammad Bilal Amin, Shujaat Hussain, Aamir Shafi, Sungyoung Lee, "An MPI-IO Compliant Java based Parallel I/O Library", 13th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid2013), Delft, Netherlands, May 13-16 2013.

48. Syed Abdullah Shah, Jannet Faiz, Maham Farooq, Aamir Shafi and Syed Akbar Mehdi, An Architectural Evaluation of SDN Controllers, IEEE International Conference on Communications, June 9-13, 2013, Budapest, Hungary.

49. I-Ting Angelina Lee, Aamir Shafi, Charles E Leiserson, Memory-Mapping Support for Reducer Hyperobjects, 24th ACM Symposium on Parallelism in Algorithms and Architectures, Pittsburgh, Pennsylvania, USA, June 25 - 27, 2012. **(Best Paper Award)**

50. Muhammad Bilal Amin, Aamir Shafi, Shujaat Hussain, Wajahat Ali Khan, Sungyoung Lee, High performance Java sockets (HPJS) for scientific health clouds, 14th International Conference on e-Health Networking, Applications and Services (Healthcom), IEEE, pp. 477-480, 10-13 Oct 2012, Beijing, China.

51. Ammar Ahmad Awan, Muhammad Sohaib Ayub, Aamir Shafi, and Sungyoung Lee, Towards Efficient Support for Parallel I/O in Java HPC, In Proceedings of 13th International Conference on Parallel and Distributed Computing, Applications, and Technologies (PDCAT '12), Beijing, China, Dec 14th-16th, 2012.

52. Wakeel Ahmad, Bryan Carpenter, Aamir Shafi, Collective Asynchronous Remote Invocation (CARI): A High-Level and Efficient Communication API for Irregular Applications, Procedia Computer Science, Volume 4, 2011, Pages 26-35, ISSN 1877-0509, 10.1016/j.procs.2011.04.004.

53. Aamir Shafi, Jawad Manzoor, Kamran Hameed, Bryan Carpenter, and Mark Baker, Multicore-enabling the MPJ Express Messaging Library, 8th International Conference on the Principles and Practice of Programming in Java (PPPJ), September 15-17 2010, Vienna, Austria

54. Aamir Shafi and Jawad Manzoor, Towards Efficient Shared Memory Communications in MPJ Express, 23rd IEEE International Parallel and Distributed Processing Symposium, Rome Italy, May 2009.

55. Aftab Hussain, Aamir Shafi, and Jamil Raza, Using Unified Parallel C (UPC) to Parallelize the FDTD method of Computational Electrodynamics, 13th IEEE International Conference (INMIC), pp.1-6, http://dx.doi.org/10.1109/INMIC.2009.5383096, 14-15 Dec. 2009

56. K. Chanchio, C. Leangsuksun, H. Ong, V. Ratanasamoot, and A. Shafi, An Efficient Virtual Machine Checkpointing Mechanism for Hypervisor-based HPC System, High Availability and Performance Computing Workshop, Denver USA, 2008.

57. Aamir Shafi, Aftab Hussain, and Jamil Raza, A Parallel Implementation of the Finite-Domain Time-Difference Algorithm using MPJ Express 22nd IEEE International Parallel and Distributed Processing Symposium, Miami Florida USA, April 2008.

58. Mark Baker, Bryan Carpenter, and Aamir Shafi, A Buffering Layer to Support Derived Types and Proprietary Networks for Java HPC, Scalable Computing: Practice and Experience, pp 343-358, 8(4), ISSN 1895-1767, 2007.

59. Mark Baker, Bryan Carpenter, and Aamir Shafi, MPJ Express Meets Gadget: Towards a Java Code for Cosmological Simulations, In Proceedings of the 13th European PVM/MPI Users' Group Meeting (EuroPVM/MPI 2006), Bonn, Germany, September 17-20, 2006.

60. Mark Baker, Bryan Carpenter, and Aamir Shafi, MPJ Express: Towards Thread Safe Java HPC, In Proceeding of the IEEE International Conference on Cluster Computing (Cluster 2006), Barcelona, Spain, September 25-28, 2006.
61. Mark Baker, Matthew Grove, and Aamir Shafi, Parallel and Distributed Computing with Java, In Proceedings of the 5th International Symposium on Parallel and Distributed Computing (ISPDC 06), Timisoara, Romania, CS Press, July 6-9, 2006.
62. Mark Baker, Bryan Carpenter, and Aamir Shafi, An Approach to Buffer Management in Java HPC Messaging, V. Alexandrov, D. van Albada, P. Sloot, and J. Dongarra (Eds), In Proceedings of the International Conference on Computational Science (ICCS 2006), LNCS. Springer, May 28-31, 2006.
63. Mark Baker, Aamir Shafi, Bryan Carpenter, Sylvia C. Wong, Victor Tan, Weijian Fang, Simon Miles, Luc Moreau: Cluster Computing and Grid 2005Works in Progress. IEEE Distributed Systems Online 6(10), 2005
64. Mark Baker, Bryan Carpenter, and Aamir Shafi, A Pluggable Architecture for Java HPC Messaging, In Proceedings of the Work-in-Progress Workshop at CCGrid 05, May 2005.
65. Mark Baker, Bryan Carpenter, and Aamir Shafi, MPJ: A New Look at MPI for Java, Poster Paper in All Hands Meeting (AHM) 2005, Nottingham, UK, April 2005.
66. Aamir Shafi, Maria Riaz, Anjum Shehzad, Umer Farooq, Arshad Ali, Iosif Legrand, Harvey Newman, Distributed Agents for Mobile and Dynamics Services, In Proceedings of Computing in High Energy Physics 2003 (CHEP03), San Diego, La Jolla, California, USA, March 23-28, 2003.

Talks

1. High-Performance and Scalable Support for Big Data Stacks with MPI, OFA Virtual Workshop, April 2023
2. High-Performance and Scalable Data Science using MPI4Dask, NVDIA GTC Talk, Mar 23, 2023
3. Accelerating Spark and Dask using MVAPICH2, SC OSU Booth Talk, Dallas, Texas, Nov 16, 2022
4. MPI4Spark: A High-Performance Communication Framework for Spark using MPI, The Ohio State University, MVAPICH User Group (MUG) Meeting, Aug 2022
5. Benchmarking Parallel Python and Java Applications using OMB and MVAPICH2, The Ohio State University, MVAPICH User Group (MUG) Meeting, Aug 2022 (with Nawras Alnassan)
6. High Performance Machine Learning and Deep Learning with MVAPICH2, The Ohio State University, MVAPICH User Group (MUG) Meeting, Aug 2022 (with Arpan Jain)
7. The Checkpoint/Restart Support in the High-Performance MVAPICH2 Library, Checkpoint/Restart Requirements Gathering Workshop, July 12-13, 2022.
8. Performance Characterization of MPI Libraries on Arm-based AWS HPC Cloud Instances with Elastic Fabric Adapters, https://www.openfabrics.org/wp-content/uploads/2022-workshop/2022-workshop-presentations/104_AShafi.pdf, OFA Virtual Workshop, March 2022
9. Towards Java-based HPC using the MVAPICH2 Library, The Ohio State University, MVAPICH User Group (MUG) Meeting, Aug 2021
10. Efficient Communication support for Dask using MVAPICH2-GDR, MVAPICH User Group (MUG) Meeting, Aug 2020
11. Blink: Towards Efficient RDMA-based Communication Coroutines for Parallel Python Applications, HiPC, Dec 2020
12. RDMA Spark Meets OSU INAM: Performance Engineering Big Data Applications on HPC Clusters, https://www.youtube.com/watch?v=8pGBGGTV3MQ, OFA Virtual Workshop, March 2021
13. Optimizing Communication on GPU-Based HPC Systems for Dask and cuML Using MVAPICH2-GDR [S31627], GTC Talk, April 2021
14. Efficient MPI-based Communication for GPU-Accelerated Dask Applications, https://www.youtube.com/watch?v=6--uV_utpRk, CCGrid, May 2021
15. Efficient MPI-based Communication for GPU-Accelerated Dask Applications, "Dask in HPC" workshop as part of Dask Distributed Summit, May 2021
16. MPJ Express: Towards Java-based High Performance Computing, Invited Talk at the National Software Engineering Conference, Military College of Signals, NUST, Rawalpindi, 11-12 November 2014.

17. An Architectural Evaluation of SDN Controllers, Paper presentation at the IEEE International Conference on Communications, June 9-13, 2013, Budapest, Hungary.
18. Programming HPC Hardware using MPJ Express, Invited Talk at the International Conference on Advanced Modeling and Simulation, 28-30 November 2011, EME College, NUST, Islamabad
19. Programming Parallel Hardware using MPJ Express, The SuperTech Group Meeting, CSAIL, MIT, USA, 28th Feb, 2011.
20. Early Experiences of GPU-enabling the Gadget-2 Simulation Code, Invited Talk at the International Symposium on Frontiers of Computational Sciences (ISFCS 2010) arranged by GIKI, Pakistan, June 7, 2010.
21. Parallel Programming with MPJ Express, Invited Talk at the University of A Coruna, Spain, April 14, 2009.
22. Collaborative Multicore Programming Using Scientifc Java Messaging, British Council Monitoring Session, Iqra University, October 17, Islamabad.
23. Nested Parallelism for Multi-core Systems Using Java, Invited Talk at the Workshop on Trends, Technologies and Collaborative Opportunities in High Performance and Grid Computing, Century Park Hotel, Bangkok, Thailand, June 4-5, 2007.
24. Beyond MPI: A Look at Emerging HPC Languages, Invited Talk at the University of A Coruna, Spain, November 9, 2006.
25. Nested Parallelism for Multi-core Systems Using Java, Invited Talk at the University of A Coruna, Spain, November 8, 2006.
26. Programming Next Generation SMP and Multi-core Systems Using Java, Institute of Cosmology and Gravitation Seminar, University of Portsmouth, UK, November 7, 2006.
27. An Approach to Buffer Management in Java HPC Messaging, International Conference on Computational Science (ICCS) 2006, University of Reading, UK, May 29, 2006.
28. MPJ: A Parallel Java Computing System, Institute of Cosmology and Gravitation Seminar, University of Portsmouth, UK, June 10, 2005.
29. MPJ: Pluggable Architecture of Java HPC Messaging, CCGrid Work-in-Progress, Cardiff, UK, May 12, 2005.
30. MPJ: The Second Generation `MPI for Java', DSG Seminar, University of Portsmouth, UK, April 26, 2005.
31. MPJ: Implementing Advanced Features of the MPI Standard, Distributed Systems Group Seminar, University of Portsmouth, UK, February 22, 2005.
32. Message Passing in Java (MPJ), The Past, Present, and Future, Distributed Systems Group Seminar, University of Portsmouth, UK, November 4, 2004.
33. Message Passing in Java (MPJ), Institute of Cosmology and Gravitation Seminar, University of Portsmouth, UK, June 3, 2004.

Workshops/Tutorials Conducted

1. Dhabaleswar K. (DK) Panda, Hari Subramoni, Arpan Jain, Nawras Alnassan, and Aamir Shafi, Principles and Practice of High Performance Deep/Machine Learning, PPoPP '23, February 25, 2023
2. Dhabaleswar K. (DK) Panda, Hari Subramoni, Arpan Jain, Nawras Alnassan, and Aamir Shafi, Exploiting High-performance Computing for Deep Learning: Why and How? High Performance Machine Learning, Deep Learning, and Data Science, DeepLearn '23, January 19-20, 2023
3. Dhabaleswar K. (DK) Panda and Aamir Shafi, High Performance BigData Processing with Dask and Spark using MPI, Accepted for Presentation at the IEEE BigData Conference, Dec 2022, Osaka, Japan
4. Dhabaleswar K. (DK) Panda, Hari Subramoni, Arpan Jain, and Aamir Shafi, High Performance Machine Learning, Deep Learning, and Data Science, A tutorial presented at ICS 2021: International Conference on Supercomputing 2021, June 14 - 17, 2021, Virtual (Due to COVID-19), https://web.cse.ohio-state.edu/~panda.2/ics21_dl_tut.html
5. Dhabaleswar K. (DK) Panda, Hari Subramoni, Arpan Jain, and Aamir Shafi, Boosting Performance of Machine Learning/Deep Learning and Dask Applications using the MVAPICH2-GDR Library, A tutorial presented at PEARC 2021: Practice & Experience in Advanced Research Computing 2021, June 10 - 14, 2021, Virtual (Due to COVID-19), https://pearc21.sched.com/event/kLnA/tutorial-boosting-performance-of-machine-learningdeep-learning-and-dask-applications-using-the-mvapich2-gdr-library

6. Dhabaleswar K. (DK) Panda, Hari Subramoni, Arpan Jain, and Aamir Shafi, High Performance Distributed Deep Learning: A Beginner's Guide, A tutorial presented at ISCA 2021, June 18, 2021, Virtual (Due to COVID-19), https://web.cse.ohio-state.edu/~panda.2/isca21_dl_tut.html
7. Dhabaleswar K. (DK) Panda, Arpan Jain, and Aamir Shafi, High Performance Machine Learning, Deep Learning, and Data Science, SC 21, Nov 2021, St Louis, MO https://sc21.supercomputing.org/presentation/?id=tut150&sess=sess194
8. Dhabaleswar K. (DK) Panda, Hari Subramoni, Arpan Jain, and Aamir Shafi, High Performance Machine Learning, Deep Learning, and Data Science, Hot Interconnects (HotI) '21, Virtual, https://old.hoti.org/2021/assets/txt/dl_abstract.txt and https://old.hoti.org/2021/program.html
9. Dhabaleswar K. (DK) Panda, Hari Subramoni, Arpan Jain, and Aamir Shafi, High Performance Machine Learning, Deep Learning, and Data Science, PPoPP '22, Virtual, https://web.cse.ohio-state.edu/~panda.2/ppopp22_dl_tut.html
10. Dhabaleswar K. (DK) Panda, Hari Subramoni, Arpan Jain, and Aamir Shafi, High Performance Machine Learning, Deep Learning, and Data Science, 2022 OFA Virtual Workshop, https://www.openfabrics.org/2022-ofa-workshop-agenda/
11. Aamir Shafi, Arpan Jain, and Quentin Anthony, Boosting Performance of Deep Learning, Machine Learning, and Dask with MVAPICH2, http://mug.mvapich.cse.ohio-state.edu/mug/21/, Aug 2021, Virtual
12. "High Performance Computing" workshop conducted at NUST, Islamabad, July 2019.
13. 3 Days Workshop on "Parallel Computing using Java" 16th - 18th September, NUST, Islamabad, 2014.
14. 3-Days Workshop on Cloud Computing, 3-5 Dec 2013, NUST, Islamabad
15. International Workshop on "High Performance Computing using Multicore Processors", 6-8 February, 2012, COMSTECH Islamabad
16. Workshop on "Multicore Computing using PThreads, OpenMP, and Cilk++", June 2010, NUST, Islamabad
17. Workshop on "Introduction to Parallel Computing", Oct 2009, NUST, Islamabad
18. Workshop on "Introduction to High Performance Computing on Linux Compute Clusters", Sept, 2009, NUST, Islamabad
19. Workshop on "Scientific Computing using Graphics Processing Units", 6-7 August 2008, NUST, Islamabad
20. Workshop on "Introduction to Linux OS and Shell Scripting", March 2008, NUST, Islamabad

Professional Activities:

1. NSF Panelist '22
2. Workshop Co-Organizer:
   a. The International IEEE Workshop on Extreme Scale Programming Models and Middleware (ESPM 2) in conjunction with Supercomputing Conference (http://nowlab.cse.ohio-state.edu/espm2/)
   b. The International Workshop on Communication Architectures for HPC, Big Data, Deep Learning and Clouds at Extreme Scale (ExaComm) in conjunction with International Supercomputing Conference (ISC) (https://nowlab.cse.ohio-state.edu/exacomm/)
   c. Workshop Organizer for the International Workshop on Communication Architectures for HPC, Big Data, Deep Learning and Clouds at Extreme Scale (ExaComm) in conjunction with International Supercomputing Conference (ISC) (https://nowlab.cse.ohio-state.edu/exacomm/)
3. Member of Program Committee:
   a. International Parallel and Distributed Processing Symposium (IPDPS) '23
   b. CCGrid '21-'23 (Posters), CCGrid '13, '23
   c. International Conference on Computational Science (ICCS) '11, '12, '14, '15, '16
   d. Practical Aspects of Parallel Programming (PAPP) '09, '10, '11, '12,
   e. IEEE International Symposium on Parallel and Distributed Processing with Applications (ISPA) '08
   f. International Conference on Parallel and Distributed Systems (ICPADS) '07
   g. International Symposium on Parallel Architectures, Algorithms, and Networks (ISPAN) '11
4. External Reviewer for International Conferences:
   a. ICPP 22, ISC 22, SC 22, ScaDL 22, UCC 21, Cluster 21,
   b. ICS 21, ICCCN 21, SuperCheck 21
   c. SC '20

      d. NeuroIPS ('19)
      e. IEEE Cluster
      f. IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing
      g. International Conference on Grid and Cooperative Computing
      h. International ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC)
      i. International Conference on Parallel and Distributed Systems (ICPADS)
      j. International Conference on Parallel Processing (ICPP)
      k. International Symposium on Parallel and Distributed Computing (ISPDC)
      l. Supercomputing Conference
5. Regular Reviewer for Journals:
      a. Concurrency and Computation: Practice and Experience (CCPE)
6. Departmental Services:
      a. Member of the faculty search committee
      b. Head of Computer Systems department
      c. Member of curriculum review committee

Final Year Projects Supervised

1. Tian Chen, High-Performance Inference with MLPerf (Co-supervised with Dr. DK. Panda), The Ohio State University (2022 – Present)
2. Saiyada Noor Fatima, Syed Mehdi Raza Jaffery, Noor Zehra, Project Title: Towards Adopting MPI Standard 2.0 in MPJ Express Software, CS-4 Students at NUST, August 2016.
3. Hamza Zafar, Muhammad Nouman Shahzad, Saad Hussain Syed, CS-3 students at NUST, Project Title: MPJ Express Runtime for Hadoop YARN, August 2015. **(Declared the Best Industry Project during Open House '15)**
4. Haider Adeel Agha, Salman Saeed, CS-3 students at NUST, Project Title: Deep Learning using MPJ Express, August 2015.
5. Gulraiz Khan, Muhammad Adeel Ehasn, Muhammad Adnan Sharif, SE-2 UG students at NUST, Project Title: Developing N-body, structured grids, and spectral methods simulation benchmarks for MPJ Express, August 2015.
6. Mohsan Riaz, Muhammad Muaaz Saleem, Muhammad Umer, SE-2 UG students at NUST, Project Title: Developing N-body, structured grids, and spectral methods simulation benchmarks for MPJ Express, August 2015.
7. Haider Adeel Agha, Salman Saeed, CS-3 students at NUST, Project Title: Deep Learning using MPJ Express, August 2015.
8. Rida Saleem, Sara Hassan Soomro, Haleema Sadia, SE-1 UG students at NUST, Project Title: *easyInstall (an Open Stack Installer)*, August 2014.
9. Syed Abdullah Shah, Jannet Faiz, and Maham Farooq, BEE-5 UG students at NUST, Project Title: *Design and Development of an Embedded OpenFlow Controller*, August 2012 **(Won Cavium Networks Inc. Global Multicore Competition 2012)**
10. Rizwan Hanif, Amjad Aziz BIT-9 UG student at NUST, Project Title: *Profiling and Debugging Tools of MPJ Express*, August 2011
11. Faisal Zahid, BIT-7 UG student at NUST, Project Title: *Karnage- A 3D FPS multiplayer Game*, August 2009. **(Declared the Best Industry Project during Open House '09)**
12. Zafar Gilani, BIT-7 UG student at NUST, Project Title: *MPJ Express on Infiniband*, August 2009. **(Won the Best Project Award in 2009)**
13. Kamran Hamid, BIT-7 UG student at NUST, Project Title: *Native MPI device driver for MPJ Express*, August 2009
14. Ahmad Ali Gul, BIT-7 UG student at NUST, Project Title: *Profiling tool for MPJ Express*, August 2009
15. Ammar Ahmad Awan, BIT-6 UG student at NUST, Project Title: *Optimizing N-Body Simulations for Multi-core Compute Clusters*, August 2008 **(Won the Best Project Award in 2008)**
16. Jawad Manzoor, BIT-6 UG student at NUST, Project Title: *High Performance Communication on Symmetric Multi-Processor (SMP) and Multi-core Clusters using MPJ Express*, August 2008

Graduate Students Advised

1. Hyunho Ahn, High-Performance Edge Inference (Co-supervised with Dr. DK. Panda), The Ohio State University (2022)
2. Goutham Kuncham, Optimizing MVAPICH2 using Libfabric on Slingshot 11 Systems (Co-supervised with Dr. DK. Panda), The Ohio State University (2022 – Present)
3. Rahul Vaidya, Optimizing MVAPICH2 using Libfabric on Omni-Path Express Systems (Co-supervised with Dr. DK. Panda), The Ohio State University (2022 – Present)
4. Jinghan Yao, Large Scale Data Science using MPI4Dask (Co-supervised with Dr. DK. Panda), The Ohio State University (2022 – Present)
5. Mingzhe Han, Using Machine Learning for Tuning Collective Communication Algorithms in MPI (Co-supervised with Dr. DK. Panda), The Ohio State University (2022 – Present)
6. Nawras Alnassan, High-Performance Deep Learning (Co-supervised with Dr. DK. Panda), The Ohio State University (2021 – Present)
7. Kinan Alattar, MPI4Spark: Enabling MPI-based Communcation in Spark (Co-supervised with Dr. DK. Panda), The Ohio State University (2021 – Present)
8. Sainath Prasana, High-Performance Machine Learning with cuML (Co-supervised with Dr. DK. Panda), The Ohio State University (2021)
9. Saisree Mirayala, MPI4Dask: Efficient MPI-based Communication for Dask (Co-supervised with Dr. DK. Panda), The Ohio State University (2021)
10. Mansa Kedia, Profiling Communication Performance of Apache Spark using OSU INAM, The Ohio State University (2020 -2021)
11. Zack Ryan, Evaluating Performance of Big Data Applications using Spark and Dask, The Ohio State University (2020 – 2021)
12. Kaixin Luo, Characterization of GPU-Support in Apache Spark (Co-supervised with Dr. DK. Panda), The Ohio State University (2020 – 2021)
13. Abdul Jabbar Saeed Tipu, MSCS graduate student at SEECS NUST, Thesis Topic: Parallelizing Matrix Exponential based Algorithm using Cilk Plus, May 2014. (completed)
14. Aftab Hussain, MSEE graduate student at SEECS NUST, Thesis Topic: Competitive Performance Analysis and Optimization of 3D Body-Tracking Applications on GPUs and Multicore Computers, May 2012 (completed)
15. M Wakeel Ahmad, MSIT graduate student at SEECS NUST, Thesis Topic: *High Productivity Communication Models for Multicore Clusters*, April 2010 (completed)
16. Tahir Rauf, MSIT graduate student at SEECS NUST, Thesis Topic: *A Novel High Performance Parallel Sorting Algorithm*, Dec 2011 (completed)
17. Omar Khan, MSCS graduate student at SEECS NUST, Thesis Topic: One Sided Communication in MPJ Express, May 2012 (completed)
18. Khurram Shahzad, MSCS graduate student at SEECS NUST, Thesis Topic: Dynamic Process Management in MPJ Express, May 2012 (completed)
19. Ammar Ahmad Awan, MS student at Kyunghee University Korea, Thesis Topic: Design and Implementation of a Parallel I/O API in Java, May 2012 (completed), Co-advised with Prof. SY Lee.