Ghazanfar Ali

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EDUCATION

Texas Tech University (TTU), Lubbock, Texas
Doctor of Philosophy in Computer Science 1/2017 – 08/2023
Dissertation: Deterministic Control of High-End Computing Systems (Advisor: Dr. Yong Chen) **GPA: 3.7**
Quaid-i-Azam University, Islamabad, Pakistan
Master of Science in Computer Science 8/2001 – 9/2003
Master's Thesis: Internet Protocol (IP) based Private Automatic Branch eXchange (PABX) **GPA: 3.7**

PhD RESEARCH AND DEVELOPMENT

Ph.D. research work has collaborated with different organizations including the Lawrence Berkeley National Laboratory (LBNL), Los Alamos National Laboratory (LANL), Dell, and TTU's high-performance computing center (HPCC).

Selected Publications:

- ✓ **Ghazanfar Ali**, Sridutt Bhalachandra, Nicholas J. Wright, Mert Side, and Yong Chen. "Optimal GPU Frequency Selection using Multi-Objective Approaches for HPC Systems." In *2022 IEEE High Performance Extreme Computing Conference (HPEC)*, pp. 1-7. IEEE, 2022.
- ✓ **Ghazanfar Ali**, Lowell Wofford, Christopher Turner, and Yong Chen. "Automating CPU Dynamic Thermal Control for High Performance Computing." In *2022 22nd IEEE International Symposium on Cluster, Cloud and Internet Computing (CCGrid)*, pp. 514-523. IEEE, 2022.
- ✓ Li, Jie, **Ghazanfar Ali**, Ngan Nguyen, Jon Hass, Alan Sill, Tommy Dang, and Yong Chen. "Monster: an out-of-the-box monitoring tool for high performance computing systems." In *2020 IEEE International Conference on Cluster Computing (CLUSTER)*, pp. 119-129. IEEE, 2020.
- ✓ **Ghazanfar Ali**, Jon Hass, Alan Sill, Elham Hojati, Tommy Dang, and Yong Chen. "Redfish-Nagios: A Scalable Out-of-Band Data Center Monitoring Framework Based on Redfish Telemetry Model." In *Fifth International Workshop on Systems and Network Telemetry and Analytics*, pp. 3-11. 2022.

Entire list of publications and patents are available at: https://scholar.google.com/citations?user=qDH-G2UAAAAJ&hl=en

RESEARCH GRANT PARTICIPATION

"Phase-II IUCRC Texas Tech University:Center for Cloud and Autonomic Computing," awarded in 2019, PIs: Prof. Yong Chen

NSF CLOUD AUTONOMIC COMPUTING CENTER GRADUATE ELLOWSHIP

Texas Tech University, Lubbock Texas *2016 - 2018*
One of three graduate students from Texas Tech University's Computer Science Department to receive a NSF Cloud Autonomic Computing Center (Industry-Academic collaboration program) graduate fellowship in the Fall of 2016.

TECHNICAL SKILLS

- ✓ **Programming Languages/Frameworks:** Python, Go-lang, C/C++, Bash, MPI, OpenMP, CUDA, HIP, ROCm
- ✓ **Applications:** LAMMPS, NAMD, GROMACS, LSTM, SPEC ACCEL®, STREAM, DGEMM, FIRESTARTER
- ✓ **CPU/GPU Performance Tools:** AMD uProf, ROCm Profile (rocprof), ROCm Data Center (rdc), ROCm SMI, NVIDIA SMI, Data Center GPU Manager Interface (DCGMI), NVIDIA® Nsight™, nvprof, perf, LIKWID, Intel RAPL, PAPI, Redfish, IPMI

- ✓ **Performance Tuning**: with the Roofline Model on GPUs and CPUs
- ✓ **System architectures:** AMD EPYC 7763, AMD MI100, MI210, Intel Xeon, NVIDIA Ampere, Volta, and Pascal GPUs
- ✓ **Metrics Analysis:** Analysis of metrics using correlation techniques (Pearson,Spearman, Mutual Information)
- ✓ **Model Development:** Modeled performance and power consumption behaviors across CPU/GPU's DVFS design space to predict power consumption and performance for new applications and computing architectures
- ✓ **Energy-Performance Trade-offs:** optimal performance, power, and energy profile selection using energy-delay product
- ✓ **HPC Cluster Monitoring:** Monitoring of TTU's HPCC clusters using in-band and out-of-band protocols, Telegraf, Nagios
- ✓ **AI/ML:** Random Forest, XGBoost, SVM, DNN, cuDNN frameworks (TensorFlow, PyTorch, Keras)
- ✓ **HPC Workload Manager:** Setting up Slurm cluster and executing HPC workloads
- ✓ **Databases:** InfluxDB, TimescaleDB, MySQL
- ✓ **Scientific Writing:** developing technical write-ups (architectural designs, whitepapers, technical papers)
- ✓ **Collaborations/Presentations:** conducting presentations and managing collaborations with technical partners.

RESEARCH EXPERIENCE

Cloud and Autonomic Computing (CAC) Center, Texas Tech University **Lubbock, Texas**
Research Assistant 10/2021 – Current
Collaborated with the LBNL and automated the selection of optimal power, performance, and energy consumption profiles driven by analytical and machine learning models using SPEC ACCEL benchmarks and real-world GPU-enabled HPC applications (https://github.com/nsfcac/gpupowermodel).

High Performance Computing Center (HPCC), Texas Tech University **Lubbock, Texas**
Research Assistant 2/2017 – 6/2019
Collaborated with Dell Technologies and developed the following deliverables:

- ✓ Integrated Nagios Core with Redfish API for Data Center Monitoring using Python and Shell: https://github.com/nsfcac/Nagios-Redfish-API-Integration
- ✓ Created HPC cluster using OpenHPC stack
- ✓ Distributed Metric Collector for HPC cluster (https://github.com/nsfcac/DistributedMetricCollector)
- ✓ Acquired CPU and Memory Power usages via Intel RAPL (https://github.com/nsfcac/rf-emulator-likwid)

INTERNSHIP EXPERIENCE

Lawrence Berkeley National Laboratory (LBNL) **Remote**
HPC Architecture & Performance Student Assistant 6/2020 – 9/2020
Developed a framework to acquire GPU power and performance metrics and analyzed the impact of DVFS on the power and performance of several benchmark suites (DGEMM, BabelStream, and FIRESTARTER) (https://sc20.supercomputing.org/proceedings/tech_poster/poster_files/rpost131s2-file3.pdf)

Los Alamos National Laboratory (LANL) via New Mexico Consortium (NMC) **Los Alamos, New Mexico**
Graduate Research Assistant 7/2019 – 1/2020
Contributed to the research and development of dynamic thermal control of HPC using Kraken framework (https://github.com/kraken-hpc/kraken-legacy/tree/main/modules)

PROFESSIONAL EXPERIENCE

ZTE Corporation **Nanjing, China**

Senior Research Standardization System Engineer 1/2016 – 1/2017

- ✓ Researched, analyzed, and contributed to the development of Cloud standards
- ✓ Major contributions: ITU-T SG13 (Inter-Cloud) and ETSI Network Function Virtualization (interfaces and architecture)

NFV/SDN Research Engineer 1/2012 – 12/2015

- ✓ Researched and standardized Cloud and Virtualization technologies in DMTF and ETSI NFV
- ✓ Deliverables: Contribution to Network Function Virtualization interfaces and DMTF Open Virtualization Format (OVF) standard

Senior Standards Manager 1/2008 – 12/2011

- ✓ Worked in standard development and editor in ITU-T SG13 and OMA organizations
- ✓ Deliverables: service delivery platform (SDP) (ITU-T Y.2240, ITU-T Y.2025) & OMA Converged IP Messaging (CPM) standards

NGN Technical Engineer 10/2005 – 12/2007

- ✓ Investigated customer's requirements, designed solutions, liaised with sales and engineering
- ✓ Supported deployment of softswitch, media gateway, signaling gateway in carrier's networks

Advanced Communications **Islamabad, Pakistan**

Senior Software Engineer 9/2003 – 9/2005

- ✓ Developed voice-over IP (VoIP) products using VoIP protocols (H.323 and session initiation protocol (SIP)) in C++.

Carrier Telephone Industries (CTI), **Islamabad, Pakistan**

Trainee 1/2003 – 8/2003

- ✓ Researched computer telephony integration (CTI) topic and implemented "Internet protocol (IP) based private automated branch exchange (IP-PABX)" in C++.

TEACHING EXPERIENCE

Whitacre College of Engineering, Texas Tech University **Lubbock, Texas**

Guest Lecturer 10/2022 – 12/2022

- ✓ Provided guest lectures about the GPU architecture and programing model for course CS-5375 (Computer Architecture).

Teaching Assistant 10/2020 – 9/2021

- ✓ Assisted in teaching the course ENGR 1330 (Computational Thinking with Data Science) and provided hands-on experience to enable students to solve various engineering problems using Machine Learning in Python.

Graduate Assistant 1/2020 – 6/2020

- ✓ Assisted in grading CS-4352 (Operating Systems) and CS-5379 (Parallel Processing) courses.

MENTORSHIP

Mentored 8 Master students, 3 Undergraduate students, and 1 Clark Scholar in their research projects

INTERNATIONAL CONFERENCES AND MEETINGS:

Before joining Texas Tech, I have been deeply involved as contributor and technical editor of different Recommendations and Standards developed at ITU-T, OMA, and DMTF. I am honored to present approximately 400 technical (industry) proposals to different international Standards, various proposals have been presented and agreed for different standards at the following meetings (selected):

- ✓ DMTF OVFWG meeting in San Jose (CA), USA Mar 5 - 7, 2013
- ✓ ITU-T SG13 WP6 meeting in Seattle (WA), USA Oct 14 - 20, 2012
- ✓ DMTF SVPC WG meeting in Broomfield (CO), USA Oct 02 - 04, 2012
- ✓ DMTF SVPC WG meeting in San Jose (CA), USA Aug 22 - 25, 2012
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland Jun 04 - 15, 2012
- ✓ DMTF SVPC WG meeting in Boeblingen, Germany May 07 - 11, 2012
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland Feb 06 - 17, 2012
- ✓ SNIA Winter Symposium in San Jose, USA Jan 22 – 26, 2012
- ✓ DMTF CM WG meeting in San Francisco, CA USA Dec 06 - 08, 2011
- ✓ SNIA cloudtwg meeting in SunnyVale, CA USA Nov 28 – Dec 01, 2011
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland Oct 10 - 21, 2011
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland May 09 - 20, 2011
- ✓ OMA meeting in Sorrento, Italy Apr 10 - 15, 2011
- ✓ OMA meeting in Honolulu (Hawaii), USA Feb 08 - 12, 2011
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland Jan 17 - 28, 2011
- ✓ ITU-T FG Cloud Computing meeting in Nanjing, China Jan 10 - 13, 2011
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland Sep 06 - 16, 2010
- ✓ Global Standard Collaboration meeting in Beijing, China Aug 30 - Sept 02, 2010
- ✓ China/Japan/Korea UNIOT meeting in Seoul, Korea Aug 18 - 20, 2010
- ✓ ITU-T SG13 interim meeting in Dalian, China Jul 05 - 09, 2010
- ✓ OMA meeting in Las Vegas, USA Jun 26 - Jul 03, 2010
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland Apr 18 - 30, 2010
- ✓ OMA meeting in Sorrento, Italy Jan 31 - Feb 04, 2010
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland Jan 18 - 29, 2010
- ✓ ITU-T SG13 interim meeting in Sanya, China Nov 15 - 20, 2009
- ✓ OMA meeting in Los Angeles, USA Oct 19 - 24, 2009
- ✓ OMA interim meeting in Shenzhen, China Sep 22 - 25, 2009
- ✓ OMA meeting in Singapore, Singapore Aug 24 - 28, 2009
- ✓ OMA interim meeting in Montreal, Canada Jul 21 - 24, 2009
- ✓ OMA meeting in Boston, USA Jun 21 - 26, 2009
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland May 11 - 22, 2009
- ✓ OMA meeting in Helsinki, Finland Apr 18 - 25, 2009
- ✓ OMA meeting in Macau, China Feb 09 - 14, 2009
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland Jan 12 - 23, 2009
- ✓ OMA meeting in Osaka, Japan Oct 22 - 27, 2008
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland Sep 01 - 12, 2008
- ✓ ITU-T SG13 interim meeting in Seoul, republic of Korea Jul 14 - 18, 2008
- ✓ OMA meeting in Prague, Czech Republic Jun 23 - 27, 2008
- ✓ ITU-T NGN-GSI meeting in Geneva, Switzerland May 10 - 24, 2008
- ✓ OMA meeting in Paris, France Apr 14 - 18, 2008

PARTICIPATION IN INTERNATIONAL STANDARDS AND SPECIFICATIONS DEVELOPMENT

Major standards and publication in different standard bodies (DMTF, ITU-T, OMA, 3GPP):

- ✓ **Out-of-band (BMC based) Data Center Monitoring via DMTF Redfish API Integration with Nagios**
  This paper provides system integration details about combining DMTF Redfish API with Nagios monitoring framework in high performance computing (HPC) to enable out-of-band monitoring.

Role: First Author
Publication: Accepted by Data Center Automation Analytics and Control (DAAC) workshop at super computing (SC) 2018 conference scheduled on November 12-16, 2018

- ✓ **ETSI NFV Vi-Vnfm reference point**
  Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification
  Role: Contributor
  Publication: https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=54096

- ✓ **ITU-T Y.E2ECSLM**
  ITU-T End to End Cloud Service Lifecycle Management (CSLM) standard
  Role: Technical editor and Contributor
  Publication: https://www.itu.int/md/T13-SG13-160627-TD-PLEN-0293

- ✓ **ITU-T/ISO Y.CCRA**
  ITU-T/ISO Cloud Computing Reference Architecture (CCRA) standard
  Role: Participant
  Publication: https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=12209

- ✓ **DMTF CIMI V1.0 (DSP0263)**
  Cloud Infrastructure Management Interface (CIMI) Model and REST Interface over HTTP
  Role: Contributor
  Publication: https://www.dmtf.org/sites/default/files/standards/documents/DSP0263_2.0.0.pdf

- ✓ **DMTF OVF V2.0 (DSP0243)**
  DMTF Open Virtualization Format (OVF)
  Role: Contributor
  Publication: https://www.dmtf.org/sites/default/files/standards/documents/DSP0243_2.1.1.pdf

- ✓ **ITU-T Y.2025**
  Functional architecture of next generation network service integration and delivery environment
  Role: Technical editor, Contributor
  Publication: https://www.itu.int/rec/T-REC-Y.2025-201207-I/en

- ✓ **ITU-T Y.2240**
  Requirements and capabilities for next generation network service integration and delivery environment
  Role: Technical editor, Contributor
  Publication: https://www.itu.int/rec/T-REC-Y.2240-201104-I/_page.print

- ✓ **ITU-TY.2214**
  Service requirements and functional models for customized multimedia ring services
  Role: Technical editor, Contributor
  Publication: https://www.itu.int/rec/T-REC-Y.2214/en

- ✓ **ITU-T Q.3610**
  Signaling requirements and protocol profiles for customized ring-back tone service
  Role: Contributor
  Publication: https://www.itu.int/rec/T-REC-Q.3610/_page.print

- ✓ **ITU-T Q.3611**
  Signaling requirements and protocol profiles for customized ringing tone service
  Role: Contributor
  Publication: https://www.itu.int/rec/T-REC-Q.3611/en

- ✓ **OMA CPM**
  Converged IP Messaging (CPM) enabler
  Role: Technical editor in some specs, Contributor
  Publication: http://www.openmobilealliance.org/release/CPM/V2_0-20150113-C/OMA-AD-CPM-V2_0-20130611-C.pdf

- ✓ **3GPP IP-SM-GW enhancement**
  Enhancements to IP Short Message Gateway
  Role: Participant
  Publication:
  https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=904

ESSENTIAL PATENTS

Co-inventor in the following essential patents (EPs) embodied in different industry standards:

- ✓ US Patent App. 13/259,474: Method and system for transmitting a large message mode cpm message to group.
  Ghazanfar, A. and Huang, Z., ZTE Corp.
- ✓ US Patent 8,165,158: Method/system for processing messages and converged service system.
  Ghazanfar Ali and Li Fengjun
- ✓ US Patent App. 13/376,711: Method for Negotiating Message Session Relay Protocol Connection Parameters.
  Lu, Yan, Ghazanfar Ali, Jun Chen, Lizhe Yao, Man Xie, and Huan Guo
- ✓ US Patent 13/257,309: Method and system for transmitting large message mode converged IP messaging.
  Lu Yan, and Ghazanfar Ali
- ✓ US Patent 8,745,145: Method and system for transmitting large message mode CPM messages.
  Lu Yan, and Ghazanfar Ali
- ✓ US Patent 8,688,848: Method of establishing a media link for transmitting a large message mode CPM message to a group.
  Lu Yan, Ghazanfar Ali, Jun Chen, Lizhe Yao, Man Xie, and Huan Guo
- ✓ US Patent 8,719,370: Method and system for transmitting large message mode converged IP messaging.
  Lu Yan, Ghazanfar Ali, and Lizhe Yao
- ✓ US Patent 9,237,587: Method and system for implementing group message service based on converged service system.
  Li Fengjun, Zheng Huang, and Ali Ghazanfar
- ✓ US Patent App. 13/123,688: Method for realizing a message interaction and a converged service system.
  Li Fengjun and Ali Ghazanfar
- ✓ US Patent 8,706,825: Method and system for implementing instant message and e-mail interworking.
  Huang Zheng, Fengjun Li, and Ghazanfar Ali
- ✓ US Patent App. 13/257,309: Method and system for transmitting large message mode converged IP messaging
  Lu, Yan and Ali, Ghazanfar

LEADERSHIP EXPERIENCE

- ✓ Represented ZTE as Vice-Chair of DMTF Cloud Management Sub-Committee (CMSC)
- ✓ Represented ZTE as Chair of DMTF Cloud Management Working Group (CMWG)

SELECTED CONTRIBUTED TALKS/WORKSHOPS

- ✓ Speaker at ITU Workshop on "Cloud Computing Standards - Today and the Future" (Geneva, Switzerland) (http://www.itu.int/en/ITU-T/Workshops-and-Seminars/cc/Pages/GHAZANFAR-Ali.aspx)
- ✓ Speaker at ITU Workshop on "Service Delivery Platforms (SDP) for Telecommunication Ecosystems: from today's realities to requirements and challenges of the future" (Geneva, Switzerland) (http://www.itu.int/ITU-T/worksem/sdp/bios.html)
- ✓ Speaker at Global Standardization Collaboration (GSC-15) Beijing, China (http://gsc15.ccsa.org.cn)

INVOLVEMENT

Distributed Management Task Force (DMTF)

Active Member January 2012 – Present

- ✓ Contribute to the development of virtualization, cloud, and data center management standards
- ✓ Redfish API, Open Virtualization Format (OVF), Cloud Infrastructure Management Interface (CIMI)

AWARDS/ACHIEVEMENTS

- ✓ DMTF 2014 Star Award
- ✓ Earned four supper ("S") grades in bi-annual ZTE Corp. evaluations;
- ✓ Attended approx. 60 face-to-face meetings in different continents including Pacific Asia, Europe, and North America;
- ✓ Active contributor and technical editor of the 10 technical standards;
- ✓ Delivered and presented about 400 technical proposals/contributions in different technical standards developed at ITU SG13, ETSI NFV, OMA, and DMTF

PROFESSIONAL TRAININGS

- ✓ Advanced NGN Product Suite Training (SoftSwitch, Media Gateway, and Signaling Gateway) from ZTE University, China
- ✓ NGN Product Suite Training (SoftSwitch, Media Gateway, Signaling Gateway, and Terminals) from Nanjing R&D Center, ZTE Corporation, China
- ✓ Advanced Data Communication Training from ZTE University, China
- ✓ Intelligent Network (IN) Training from Nanjing R&D Center, ZTE Corporation, China
- ✓ Integrated Services over Packet Network (ISPN) training from CASE institute, Pakistan