Bashir Mohammed

Scientific Data Management Research Group
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RESEARCH INTERESTS

My research is focused on enabling the design of intelligent networks that allows improved reliability for exascale scientific workflows. I am working on building robust networks through the use of machine learning-based approaches, cloud computing, and software-defined networks (SDN). This couples deep learning methods with SDN for predicting real-time network behaviour, avoiding data traffic congestion and degraded network performance. My research interest lies at the intersection between network systems, control systems, and machine learning.

Research Position

Research Scientist, Lawrence Berkeley National Lab, Berkeley California US. April.2019 – Date

Working on the "Large-scale Deep Learning for Intelligent Networks" project, funded by the US Department of Energy (DOE), Office of Advanced Scientific Computing Research at Berkeley Lab.
I am currently focused on enabling the design of intelligent networks that allow improved response, utilization and reliability for exascale scientific workflows using deep learning approaches and control system.

Qualifications

PhD. Computer Science, University of Bradford, UK. Nov.2014 – Dec.2018

Thesis: “A Framework for Efficient Management of Fault Tolerance
in Cloud Data Centres and High-Performance Computing Systems”
Supervisors: Prof Irfan Awan and Prof Hass Ugail.
Examiners: Prof Demetres Kouvatsos and Prof Karim Djemame (University of Leeds).

MSc. Control Systems Engineering, University of Sheffield UK. Sept.2010 – Feb.2012
Thesis: “Combustor Temperature Measurement in Gas Turbine
Engines (GTE)” with Rolls Royce Group, University Technology Centre.
Sheffield United Kingdom.
Supervisors: Prof Peter Fleming and Dr Andy Mills (Rolls Royce University Technology Centre).

B.Eng. Electrical & Computer Engineering, Federal University of Tech Minna. Nigeria. Sept.2001 – Oct.2006
Second Class Upper Division (2:1)

Projects

Time-series prediction for HPC faults on NERSC 2018

Developed an efficient failure prediction data-driven model using machine learning and conducted an investigation into the trend of the failed components in a high-performance infrastructure.

Studied and developed an effective failure prediction model focusing on high-performance and cloud data centres using data in-production from the National Energy Research Scientific computing centre (NERSC).

Developed a time series model for failure prediction, then test and validate the prediction accuracy of the developed model using data collected for storage, networking and computational machines from the NERSC over a five-year period.

Hadoop deployments 2018

Configured and deployed Hadoop across Virtual Machines running Linux in the Big data systems and analytics (BDSA) laboratory in the University of Bradford.

Designed and prepared a hands-on lab. materials for the Big data system and analytics course at the University of Bradford where students are able to learn some optimization techniques by designing data models and data pipelines using real life applications data sets.

Analysis of Google dataset Trace Collected from a 12k-Node cluster (Borg Cluster Management system) 2017

Analysed a publicly available Google dataset containing workload and scheduler events emitted by the Borg cluster management system in a cluster of over 12,000 nodes during a one-month period.

Studied how machines in the cluster are managed, and how jobs are scheduled and processed in the cluster.

Investigated how the cluster resources are utilized especially, the amount of useful, wasted and idle resources.

Network Security Assessment and Evaluation (BradStack) 2017

Conducted a detailed security analysis of the Brad-Stack environment and addressed the discovered vulnerabilities, ensuring the entire infrastructure is secure.

Conducted a comparative security analysis study of an Enterprise LAN setup in BradStack environment against a physical enterprise LAN setup. Followed by a web application vulnerability assessment as well as a comparison between two existing vulnerability assessment tools against BradStack.

A comprehensive OpenStack API penetration testing against OpenStack core services was conducted to discover vulnerabilities.

BradStack Building OpenStack from ground up 2016

Deployed a customized OpenStack multi-node installation comprising of the Control, Compute and Network node where each node was configured to have two network interfaces namely the external network and the management network used for connectivity of the nodes. Each node was prepared and configured with the following services (Keystone, Glance, Cinder, Nova, Neutron), and several experiments were conducted (Pentest, Wireshark, network analysis using Packet analyser).
Deployed BradStack Cloud infrastructure using the developed OpenStack installation toolkit.

Awards

Winner, Berkeley Lab Research SLAM Award. 2019
For Early Career Scientists and Postdocs at the Lawrence Berkeley National Laboratory, Berkeley California, USA.

Finalist, Berkeley Lab Research SLAM Award. 2019
For Early Career Scientists and Postdocs at Lawrence Berkeley National Laboratory, Berkeley California, USA.

Finalist, The IYPT Elemental Slam Award on Capitol Hill. 2019
The IYPT Elemental Slam Award on Capitol Hill Washington DC, representing Berkeley Lab.

Petroleum Technology Development Fund PhD Scholarship Award 2014
Awarded based on academic excellence and performance.

Petroleum Technology Development Fund MSc Scholarship Award 2010
Awarded based on merit.

MSc Project with Rolls Royce UTC Sheffield UK 2008
Project on Combustor Temperature Measurement in Gas Turbine Engines (GTE) with Rolls Royce University Technology Centre Sheffield UK.

TOTAL FINA ELF University Undergraduate Merit Scholarship Award 2003
Awarded based on merit academic performance.

Federal Government University Undergraduate Scholarship Award. 2001
Awarded based on merit.

Academic & Industrial Experience

Leeds Trinity University, Leeds. UK Sept.2018 to Feb 2019
Lecturer

Responsibilities: Contributing to the academic development, course management, teaching and research development. Teaching and mentoring Foundation and Second year students. Module leader for the Higher Education Funding Council of England (HEFCE) course on introduction to programming. Teaching the following courses:

- Introduction to Programming, Human Computer Interaction (HCI),
- Introduction to Coding using Python and Java.
- Introduction to JavaScript, Change Management, DevOps and Version Control using tools such as Visual Studio, Bracket, Code Academy, Code Pen, GitHub, and Glitch.

University of Bradford, UK Sept.2016 to June 2018
Graduate Teaching Assistant,

Responsibilities: Teaching, mentoring and advising postgraduate, undergraduate and interns with cloud computing, HPC systems and machine learning related projects. Taught the following courses:

- CM-0228L - Software Engineering with Group Projects (SEGP)- For Second Year Undergraduate Students.
- SD-0112L - Software Development-SD1 (JAVA)-For First Year Undergraduate Students.
- COS5010-B- Computer Communication and Networks (CCN) For Second Year Undergraduate Students.

- CM-1066D- Networks and Protocols for MSc Students in Network and Cyber Security.
- 2016-7 ACYR - Cisco Routing and Switching Labs, Computer Communication and Networks (CCN) For Second Year Undergraduate Students.
- 2017-8 ACYR - Cisco Routing and Switching Labs, Computer Communication and Networks (CCN) For Second Year Undergraduate Students.
  (This involves preparing a hands-on practical laboratory material and setting up the entire lab environment and the tools required such as Cisco Packet tracer and NS-2 Network simulators).

Leeds Trinity University, Horsforth Leeds. UK 2017-2018
Role: IT Support Specialist, IT Services Department

- Undertaking routine network user account administration duties using the Windows active directory (AD), which include password resets in relation to the University Network and the Virtual Learning Environment.
- Providing 2nd & 3rd line support to users requiring assistance with the University's IT system, including the suite of Microsoft products and other core University software and services, Office 365 services, the Virtual Learning Environment, the library management system, electronic resources, Intranet, remote access service, mobile device setup, wireless connectivity

The Central Bank of Nigeria. FCT Abuja Nigeria 2012 - 2014
Role: IT Core Infrastructure Support Engineer, IT Department

- Providing a structured framework for identifying, logging and resolving incidents at the Service Desk in a timely manner.
- Ensuring all user complains are logged into IT service helpdesk and resolved as soon as possible.
- Support and maintain MS server/ Desktop and MS exchange
- Reporting faults and maintaining logs on servers, desktops and laptops.
- Setting up and configuring new core servers.
- Ensuring patches and upgrades are applied to core servers.
- Ensuring all software purchased licensing are recorded and maintained
- Troubleshooting users reported issues and ensuring they are resolved within the specified allowable time according the SLA.

APT Securities and Funds Limited 2008 - 2010
Role: Network Support Engineer

- Setting up computer systems, monitoring and maintain them.
- Troubleshooting wide area networks (WAN), local area networks (LAN), servers, routers and switches.
- Installation and upgrading software and hardware.
- logging service and repair jobs, creating manuals and guides, as well as training clients, staff, and associates.

Professional Training and Certification

Cisco Certified Network Associate (CCNA) 2018
Cisco Certified Network Associate Certification.

Microsoft Research Centre Cambridge-UK. 2016
Microsoft Azure for Research Training and Hands-on Lab at Microsoft Research Centre Cambridge-UK.

Amazon Web Services Summit Excel London-UK. 2016
AWS Technical Boot camp and Hands-on Lab at Amazon Web Services Summit Excel London-UK.
University of Bradford, UK 2015 - 2016
Associate Fellow of the Higher Education Academy (AFHEA)

AFHEA is a recognition certified by the Higher Education Academy for professional teaching according to the UK Professional Standards Framework.
Induction to Teaching, University of Bradford, UK.
Marking, Assessment & Feedback, University of Bradford, UK.
Diversity in the Workplace, University of Bradford, UK.

ITIL Foundation Certificate in IT Service Management 2013
PEOPLECERT GROUP (Official ITIL Accreditor) - ITIL Foundation Certificate in IT Service Management.

Selected Publications

Bashir Mohammed, Mariam Kiran, Nandini Krishnaswamy, DeepRoute on Chameleon: Experimenting with Large-scale Reinforcement Learning and SDN on Chameleon Testbed. 27th IEEE International Conference on Network Protocols (ICNP), Oct 2019.

Bashir Mohammed, Awan, I., Ugail, H. and Younas, M., Failure prediction using machine learning in a virtualised HPC system and application. Cluster Computing, 22(2), pp.471-485, June 2019.

Bashir Mohammed, Krishnaswamy, N. and Kiran, M., Multivariate Time-Series Prediction for Traffic in Large WAN Topology. In 2019 ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS) (pp. 1-4). IEEE, Sep 2019.

Bashir Mohammed, Babagana Modu, Kabiru. M. Maiyama, Hassan Ugail, Irfan Awan, Mariam Kiran. Failure Analysis Modelling in an Infrastructure as a Service (Iaas) Environment, ELSEVIER Journal of Electronic Notes in Theoretical Computer Sci, Vol. 340, Pages 41-54, ISSN15710661, Oct 2018.

Bashir Mohammed, Mariam Kiran, Kabiru M. Maiyama, Mumtaz M. Kamala, Irfan-Ullah Awan; Failover strategy for fault tolerance in cloud computing environment, Software: Practice and Experience 2017 DOI:10.1002/spe.2491, ISSN:00380644, April 2017.

Bashir Mohammed, Mariam Kiran, Irfan-Ullah Awan; Optimising Fault Tolerance in Real-Time Cloud Computing IaaS Environment. The 4th International Conference on Future Internet of Things and Cloud (FICLOUD 2016), Vienna, Austria, August 2016.

Bashir Mohammed, Mariam Kiran, Irfan-Ullah Awan; An Integrated Virtualized Strategy for Fault Tolerance in Cloud Computing Environment. The 16th IEEE International Conference on Scalable Communication and Communication (SCALCOM 2016), Toulouse, France, July 2016.

Bashir Mohammed, Mariam Kiran; Analysis of Cloud TestBeds using OpenSource Solutions, The 3rd International Conference on Future Internet of Things and Cloud (FICLOUD 2015), Rome, Italy, August 2015.

Bashir Mohammed, S Moyo, K.M Maiyama, S. Kinteh… Technical Report on Deploying a highly secured OpenStack Cloud Infrastructure using BradStack as a Case Study. arXiv preprint arXiv:1712.09152, 2017.
Bashir Mohammed, M Kiran; Experimental Report on Setting up a Cloud Computing Environment at the University of Bradford. Cornell University Library arXiv.org>cs>arXiv: 1412.4582. 2014.

K. M. Maiyama, D. Kouvatsos, **B. Mohammed,** M. Kiran and M. A. Kamala, "Performance Modelling and Analysis of an OpenStack IaaS Cloud Computing Platform," 2017 IEEE 5th International Conference on Future Internet of Things and Cloud (FiCloud), Prague, 2017.

Hussaini Adamu **Bashir Mohammed,** Irfan-Ullah Awan, Hassan Ugail, Ali Bukar Maina; An approach to failure prediction in a cloud-based environment. The 5th International Conference on Future Internet of Things and Cloud (FICLOUD 2017), Prague, Czech Republic, August 2017.

K. M. Maiyama, A. P. Namanya, **B. Mohammed,** M. Kiran, D. D. Kouvatsos and M. A. Kamala; Analytical Performance Evaluation of OpenStack IaaS Cloud Using M/M/1 and M/M/c Queues, 32nd Annual UK Performance Engineering Workshop & Cyber Security Workshop (UKPEW & CyberSecW - 2016).

Mariam Kiran, Haroon Mir, **Bashir Mohammed,** Ashraf Al Oun, Kabiru Maiyama; Agent-based Modelling as a Service on Amazon EC2 Opportunities and Challenges, 8th IEEE/ACM International Conference on Utility and Cloud Computing (UCC 2015), Limassol, Cyprus.

Presentation and Talks

Paper Presentation, "Optimizing Fault Tolerance in Real-Time Cloud Computing IaaS Environment." The 4th International Conference on Future Internet of Things and Cloud (FICLOUD 2016), Vienna, Austria, August 2016.

Progression Presentation, "Fault Tolerance in Cloud Computing Environment", MPhil to PhD Progression Presentation, 2016 at The University of Bradford.

Workshop, "Failover Strategy for Cloud Fault Tolerance approach", Network Security and Performance Engineering Workshop, 2015 at The University of Bradford (NeTSPen 2015).

Paper Presentation, "Analysis of Cloud TestBeds using OpenSource Solutions", The 3rd International Conference on Future Internet of Things and Cloud (FICLOUD 2015), Rome, Italy, August 2015.

Paper Presentation, "Experimental Case study using OpenStack," Bradford Cloud research group visit to EPSRC Centre for Doctorial Training (CDT) Newcastle UK. 2015.

Professional Affiliations

Member, **Association of Computing Machinery (ACM).**

Treasurer, **University of Bradford ACM Student Chapter**

Member, **Institute of Electrical and Electronics Engineers (IEEE).**

Member, **IEEE Computer Society**

Member, **Institute of Engineering and Technology (IET).**

Member, **The British Computer Society (BCS).**

Professional Services

Programme Committee Member - The 5th International Conference on Future Internet of Things and Cloud (FICLOUD 2017), Prague, Czech Republic, August 2017.

Reviewer- IEEE's Transactions on Services Computing 2017

Reviewer - The 5th International Conference on Future Internet of Things and Cloud (FICLOUD2017), Prague, Czech Republic, August 2017.

Session Chair- ICI Symposium. ICI Session 2: Intercloud and IoT 2, FICLOUD August 2017

Programme Committee Member - 32nd Annual UK Performance Engineering Workshop & Cyber Security Workshop (UKPEW & CyberSecW) – September 2016

Programme Committee Member - The 4th International Conference on Future Internet of Things and Cloud (FICLOUD 2016), Vienna, Austria, August 2016.

Technical Skills & Area of Expertise

(Acquired Expertise under academic and professional Industrial experience).

Programming: Java, Python, C#, R, JavaScript.

Applications: MatLab, Cisco Packet Tracer, NS-2, LabView, Hadoop, Spark, OpenStack, CloudSim, Microsoft Azure, Amazon Web Services (AWS), Zookeeper, TensorFlow, Scikit Learn, Keras, Anaconda, R-Studio, Wireshark,

Platforms: Windows, Linux, Unix, Mac OS

Mathematics: Strong Engineering Mathematics background, Foundation of industrial Mathematics and control systems, Differential equation, Probabilistic and statistical modeling, Selection and estimation of statistical model base.

Machine Learning: Data processing and purification techniques.
Supervised learning (Classification, Regression, dimensional reduction, structured prediction, anomaly detection),
Unsupervised learning (Clustering-hierarchical clustering), (Anomaly Detection-Local Outlier factor), (Neural Network - Generative adversarial network), Incremental clustering of large database, Times series analysis.

Network Administrator: Nagios, Wireshark, Tshark, iPerf, Nmap, NTOPNG, Putty, Ansible, Real-time network flow analyser, DNS, FTP, SMTP,

References

Dr Andy Mills.
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Prof Hassan Ugail.
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Dr. Mariam Kiran.
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