

V. K. Cody Bumgardner

PROFESSIONAL PROFILE A 20 year career, comprised of strategic planning, technical, and leadership roles in the areas of technology architecture, software development, networking, research, systems, and security.

EDUCATION **University of Kentucky**, Lexington, Kentucky USA

Ph.D., Computer Science, 2017

- Dissertation: Contributions to Edge Computing
- Advisor: Victor W. Marek

B.S., Computer Engineering, 2009

Philosophy, 1996 - 1999

Morehead State University, Morehead, Kentucky USA

Pre-Engineering, 1995 - 1996

EXPERIENCE **University of Kentucky**, Lexington, Kentucky USA

Director of Research Computing

2016 - Present

Provides leadership and vision for advancing research computing strategies for university and broader state-wide efforts. Reporting to University of Kentucky Academics & Technologies (ITS), Center for Computational Sciences (CCS), and the Institute of Biomedical Informatics (BMI), our team serves a broad scientific community of researchers across academic and clinical disciplines. We seek to identify where the application of advanced cyberinfrastructure and computational techniques can advance fundamental research.

UKAT: Chief Technology Architect

2010 - 2016

Worked with stakeholders, both leadership and subject matter experts, to build a holistic view of the organization's strategy, processes, information, and information technology assets. My role as an Enterprise Architect is to take this knowledge and ensure that the business and IT are in alignment. I have consistently linked the business mission, strategy, and processes of the organization to its IT strategy, and document this using multiple architectural models and views that show how the current and future needs of an organization will be met in an efficient, sustainable, agile, and adaptable manner.

- Developed multi-year cloud migration strategy for all critical University software systems.
- Three year chair of the architecture group, reviewed and architected over 150 projects accounting for 10 million dollars of direct and 15 million dollars of indirect savings.
- Responsible for strategic collaboration with Fortune 50 technology company on product development related to storage, compute, and cloud technologies.
- Responsible for research cyberinfrastructure, including supercomputing, research networking, and management of related NSF-funded projects.
- Lead efforts in the creation of a 40/100G campus software defined (SDN) research network.
- Lead efforts to deploy multi-node 100G Internet2 service for the statewide Kentucky Regional Optical Network (KyRON).

UKIT: Director Enterprise Computing and Development **2008 - 2010**

Supervised group of 19 people responsible for the design, development, implementation, and operation of UK enterprise computing systems. The responsibilities of the position included management, staff development, customer coordination, strategic vision execution, and customer support. Areas of oversight included custom software development, Enterprise Mail (Exchange), SAP Enterprise Portal, Microsoft SQL and Oracle production database systems and application, campus course management systems (Blackboard), SharePoint, call center telephony, and all presence applications, search services and infrastructure virtualization.

- Developed and implemented physical to virtual hardware migration of critical software systems.
- Increased enterprise adoption of hardware virtualization by 600%.
- Introduced high availability through network load balancing and distributed systems to campus.

UKIT: Lead Systems Programmer **2003 - 2008**

Served as senior personal responsible for design, development, implementation, and operation of UK enterprise computing systems. Area of operation included server virtualization, network load balancing, clusters of web servers, databases, and file servers serving UK Healthcare, academic, and research divisions.

Center for Minimally Invasive Surgery: Lead Developer **2002 - 2003**

Developed stereoscopic 3D training and clinical visualization software utilizing immersive environments. UK lead for project in cooperation with NASA and Stanford University to stream near real-time video from the operating theater to remote PDAs. Managed live 24 hour webcast of surgery over the internet and on campus wireless network. Responsible for support and development of Internet2/Linux project to stream high resolution surgical training videos to developing countries.

Netsource, Lexington, Kentucky USA

Director of Technical Services

2001 - 2002

Managed day to day operations for ISP division. Responsible for ISP redesign and update. Designed statewide dialup backhaul network. Maintained all equipment on ISP network.

Nuvox Communications, Lexington, Kentucky USA

Senior Technical Manager

2000 - 2001

Analyze customer telecommunications services and design voice/data solutions. Conducted meetings to promote confidence in Nuvox products and provide technical support for applications proposed. Perform site surveys to assure customer equipment is compatible with solutions offered by Account Executive and communicate with local vendors to assist in a smooth transition to Nuvox services. Regularly provided assistance to Engineers and Account Executives in other markets by interfacing with appropriate marketing and technical personnel while responding to changes in product offerings as directed by Sales Marketing.

Communitronics Inc., Lexington, Kentucky USA

Senior Network Engineer/Security Analyst

1997 - 2000

Responsible for the planning and implementation of secure WAN and LAN networks. Designed corporate networks utilizing Microsoft Server software, various commercial and free UNIX systems, Linux, and Novell NetWare. Worked closely with phone companies to configure customer equipment and identify problems. Provided Voice/Data connectivity including ATM, frame relay, Point to Point, ISDN, and ADSL circuits. Responsible for training and supervision of all other network engineers.

Pomeroy Computer Resources, Lexington, Kentucky USA

Systems Consultant

1996 - 1997

Assigned to University of Kentucky and surrounding areas for consultation and troubleshooting of PC's.

Rowan County Board of Education, Morehead, Kentucky USA
Network Consultant **1994 - 1996**
 Responsible for IS in Rowan County School System. Instruction in software systems for teachers and students. 1995 Supervisor of Student Technology and Leadership Program.

Morehead State University, Morehead, Kentucky USA
Physics Co-op, IT **1996 - 1996**
 Interface radiation analyzers, spectrum analyzers, sonic range finders, digital oscilloscopes, etc. to PC's. Trained students and faculty on software and equipment used in physics experiments. *IT Consultant* **1995 - 1995**
 Troubleshoot campus desktops and Novell NetWare networks.

Adkins TV & Electronics, Morehead, Kentucky USA
Technician **1992 - 1994**
 Troubleshoot PC's and other various electronic equipment.

HONORS AND AWARDS

- Outstanding PhD Student in Computer Science, University of Kentucky, Spring 2016.
- Honorable Order of Kentucky Colonels, Kentucky Colonel, 2016.

AFFILIATIONS

- Sigma Alpha Epsilon, Member
- Institute of Electrical and Electronics Engineers (IEEE), Member
- Association for Computing Machinery (ACM), Member

SKILLS

- Strategic planning: Lead efforts to reorganize infrastructure organization to align with future state cloud computing opportunities. I established a "virtual first - highly distributed" policy for resource acquisition and service delivery, transforming service delivery from a mode of single path failure to a model of high availability. Lead efforts to apply application profiles to computational and storage resources, which resulted in higher performance and lower cost, through assigning appropriate resources to projects based on strategic value.
- Leadership Development: Completed CIO Pathways Leadership Development Program (2011). Graduated the UKIT Leadership Development Program (2010 and 2011). Student supervisor of Kentucky Student Technology and Leadership Program of Rowan County (1995). I have been fortunate to receive ongoing mentoring from highly respected individuals in their fields, in turn I mentor others and actively engage in professional development inside and outside of my organization.
- Applications: Extensive experience in the design and deployment of highly redundant systems utilizing application load balancing, virtualization, and cloud services. Deep understanding of all aspects of application development, testing, deployment, and monitoring.
- Hardware: Experience ranging from hardware description (HDL and VHDL) through digital/analog circuits to analog power systems.
- Network: Extensive experience in network design on the enterprise and carrier level. I have supported and implemented routers, switches, firewalls, content switches/load balancers, and VPN concentrators from most major vendors.
- Development: Experience in languages and development practices ranging from machine specific assembly to high level languages.

REVIEWER

Van den Berg, Marcel. Managing Microsoft Hybrid Clouds. Birmingham, UK: PACKT, 2015. Print

PUBLICATIONS

Bumgardner, Vernon K., "Contributions to Edge Computing" (2017). Theses and Dissertations-Computer Science. 56. http://uknowledge.uky.edu/cs_etds/56

Bumgardner, V.K.C, et al. "Cresco: A distributed agent-based edge computing framework." The International Workshop on Green ICT and Smart Networking (GISN 2016). IEEE, 2016.

Bumgardner, V.K.C, et al. "Constellation: A Secure Self-Optimizing Framework for Genomic Processing." 18th International Conference on E-health Networking, Application & Services (Health-Com). IEEE, 2016.

Bumgardner, V.K.C, and Victor W. Marek. "Collating time-series resource data for system-wide job profiling." Proceedings of IEEE/IFIP International Workshop on Analytics for Network and Service Management AnNet. IEEE, 2016

Bumgardner, Vernon. OpenStack in Action. NewYork: Manning, 2016. Print

Bumgardner, V.K.C, Victor W. Marek, Doyle Friskney. Educational Applications of Cloud, Book Chapter Encyclopedia of Cloud Computing, Wiley-IEEE Publication, 2016, Print.

Bumgardner, V.K.C, and Victor W. Marek. "Scalable hybrid stream and Hadoop network analysis system." Proceedings of the 5th ACM/SPEC international conference on Performance engineering. ACM, 2014.

Mueller, T., Neelakantan, S., Rienzi, E., Mijatovic, B., Castrignano, A., Pike, A., Bumgardner, C. 2012. Cloud Computing, Web-Based GIS, Terrain Analysis, Data Fusion, and Multivariate Statistics for Precision Conservation in the 21st Century.

Neelakantan, S., T.G. Mueller, B. Lee, B. Lee, P. Finnell, V. Bumgardner, and D. Carey. 2011. Web 2.0 spatial data browser for visualizing land-use assessment information from soil surveys. J. of Soil and Water Conservation and Management. 66:37A-39A

XGrid Implementation of the InterProScan for the Epichloe festucae Genome Project ISMB 2006 August 2006. Poster

Immersive Real-Time Tele-Collaboration of Complex Volumetric Medical Imaging for Surgical Planning. Mastrangelo MJ Jr, Sheetz M, Bumgardner C, George I, Mylniec P, Bellinghausen J. Internet2/National Library of Medicine / Radiological Society of North America Annual Meeting, Chicago, Illinois. November 30, 2004

Alex Gandsas, M. D., Katherine McIntire, Kevin Montgomery, Cody Bumgardner, and Linda Rice. "The personal digital assistant (PDA) as a tool for telementoring endoscopic procedures." Medicine Meets Virtual Reality 12: Building a Better You: The Next Tools for Medical Education, Diagnosis, and Care 98 (2004): 99.

Immersive Real-Time Tele-Collaboration of Complex Volumetric Medical Imaging for Surgical Planning. Mastrangelo MJ Jr, Sheetz M, Bumgardner C, George I, Mylniec P, Bellinghausen J. I2/NLM / Radiological Society of North America Annual Meeting, Chicago, Illinois. December 1, 2003

PANELIST NSF Panel 2015

GRANT SUPPORT 2016, NSF Grant No. ACI-1626364, "MRI: Acquisition of the Kentucky Research Informatics Cloud (KyRIC)", PI: GQ Zhang, SP: V. Bumgardner \$2,240,000 (8/2016 - 7/2019)

2016, NSF Grant No. ACI-1642134, "Collaborative Research: CICI: Secure and Resilient Architecture: NetSecOps – Policy-Driven, Knowledge-Centric, Holistic Network Security Operations Architecture", PI: J. Griffioen, co-PI: J. Hayes, co-PI: V. Bumgardner \$499,925 (9/2016 - 8/2019)

2016, NSF Grant No. CNS-1536090 Subcontract C.O. Raytheon BBN Technologies Corp., "GENI Going Forward", PI: J. Griffioen, co-PI: V. Bumgardner. \$258,112 (4/2016 - 3/2017)

2015, NSF Grant No. CNS-1346688 Subcontract 1939C C.O. Raytheon BBN Technologies Corp., "University of Kentucky Ops Transition (Additional Effort Funding Request for Agreement No. 1939C)", co-PI: V. Bumgardner. \$64,528 (4/2016 - 9/2016)

2015, NSF Grant No. CNS-1541380, "CC*DNI Networking Infrastructure: An Software Defined Networking-Enabled Research Infrastructure", PI: V. Bumgardner \$486,572 (10/2015 - 9/2017)

2015, NSF Grant No. IRNC-1450937, "IRNC: AMI: Collaborative Research: Software-Defined and Privacy-Preserving Network Measurement Instrument and Services for Understanding Data-Driven Science Discovery", PI/Co-PI: V. Bumgardner \$502,104 (4/2015 - 3/2018)

2015, NSF Grant No. CNS-1346688 Subcontract 1939C C.O. Raytheon BBN Technologies Corp., "University of Kentucky Ops Transition (Additional Effort Funding Request for Agreement No. 1939C)", PI: V. Bumgardner. \$39,846 (7/2015 - 6/2016)

2015, NSF Grant No. CNS-1346688 Subcontract 1939C C.O. Raytheon BBN Technologies Corp., "University of Kentucky Ops Transition (GENI Network Monitoring)", PI: V. Bumgardner. \$254,604 (10/2013 - 9/2015)

2012, NSF Grant OCI-1246332, U. of Kentucky, "CC-NIE Integration: Advancing Science through Next Generation SDN Networks", PI: V. Kellen, co-PI J. Griffioen, Serving as Senior Personnel: V. K. Cody Bumgardner \$997,437 (10/2012 - 9/2015)

PRESENTATIONS

Bumgardner, V.K.C. 2016. Cresco: A distributed agent-based edge computing framework. The International Workshop on Green ICT and Smart Networking (GISN 2016), Montreal Quebec Canada, November 2016.

Bumgardner, V.K.C, et al. 2016. Programmable Privacy-Preserving Network Measurement for Network Usage Analysis and Troubleshooting. Internet2 Technology Exchange, Miami, FL, USA, September 2016.

Bumgardner, V.K.C. 2016. Constellation: A Secure Self-Optimizing Framework for Genomic Processing. Healthcom Conference on E-health Networking, Application & Services, Munich, Germany, September 2016.

Bumgardner, V.K.C. 2016. Collating time-series resource data for system-wide job profiling. Workshop on Analytics for Network and Service Management presented at AnNet 2016, Istanbul, Turkey, April 2016.

Bumgardner, V.K.C. 2016. Demonstration of GENI monitoring session. Operations session presented at the 24th GENI Engineering Conference, Tempe, AZ, USA, March 2016.

Bumgardner, V.K.C. 2015. IRNC: AMI: Collaborative Research: Software-Defined and Privacy-Preserving Network Measurement Instrument and Services for Understanding Data-Driven Science Discovery. Global LambdaGrid Workshop and GLIF Conference, Prague, Czech Republic, September 2015.

Bumgardner, V.K.C. 2015. Software Defined Networks (SDN) and Experiment-based Research. Panel participant at 2nd International Workshop on Computer and Networking Experimental Research Using Testbeds, Columbus, Ohio, USA, June 2015.

Bumgardner, V.K.C. 2015. Demonstration of multi-level real-time stream reporting system. Demo/Poster session presented at the 22st GENI Engineering Conference, Washington, D.C., USA, March 2015.

Bumgardner, V.K.C. 2014. Demonstration of GENI aggregate-based reporting and alerting system. Operations session presented at the 21st GENI Engineering Conference, Bloomington, Indiana, USA, October 2014.

Bumgardner, V.K.C., Hutcheson, C., Augar C., 2014. Future of Information Technology. Closing general session conducted from the Gaylord Opryland Delta Ballroom, Nashville, TN.

Bumgardner, V.K.C. 2014. Scalable hybrid stream and Hadoop network analysis system. Session on distributed system performance presented at ICPE14, Dublin, Ireland, March 2014.

Bumgardner, V.K.C. 2014. Demonstration of GENI aggregate-based reporting and alerting system prototype. Poster/Demo session presented at the 19th GENI Engineering Conference, Atlanta, Georgia, USA, March 2014.

Bumgardner, V.K.C. 2013. Optimization of Storage and Compute Clouds for the Enterprise. Dell Enterprise Forum, San Jose, California, USA, June 2013.

Bumgardner, V.K.C. 2013. Cloud Computing and Virtualization in SuperComputing. University of California Santa Cruz: DellXL, Santa Cruz, California, USA, April 2013.

Bumgardner, V.K.C. 2012. Regional Resource Cloud. State CIO Meeting, Frankfort, Kentucky, USA, July 2012.

Bumgardner, V.K.C., Friskney D. 2012. Transformation of Student Spaces. Southeast regional Educause, TampaBay, Florida, USA, May 2012.

Bumgardner, V.K.C. 2011. Research and Hybrid Cloud. SC11: International Conference for High Performance Computing, Networking, Storage, and Analysis, Seattle, Washington, USA, November, 2011.

Bumgardner, V.K.C. 2011. Converged Computing. Enabling Discovery Lexington, Lexington, Kentucky, USA, October, 2011.

Bumgardner, V.K.C. 2011. Current Topics in Cloud Computing. University of Kentucky Computer Science: Keeping Current Seminar, Lexington, Kentucky, USA, September 2011.

Bumgardner, V.K.C, Mueller, T.G. Growing Research Through Hybrid Cloud. International Meeting of American Society of Agricultural and Biological Engineers, Louisville, Kentucky, August 2011.

Bumgardner, V.K.C. 2011. Higher Education Computing. Dell Storage Forum, Orlando, Florida, USA, June 2011.