Deployment of Virtualization Technology for Higher Engineering Education Data Communication Laboratory

Zulfiqar Ali, Raed AlThomali
Electronics and Instrumentation Department
Yanbu Industrial College (YIC)
Kingdom of Saudi Arabia
qadirz@rcyci.edu.sa, althomalir@rcyci.edu.sa

Abstract

This paper discusses the deployment of computer virtualization technology for higher education network laboratory. The higher education network laboratory is facility available at Yanbu Industrial Collage (YIC) Saudi Arabia for the students of bachelor of engineering technology students in order to perform 12 computer networks lab experiments every semester of 16 weeks. The program requires accommodation of 12 maximum students in single lab session. Each student requires 4-6 machines along with connectivity accessories to perform computer network engineering course lab experiments. Due to the shortage of space, equipment and time, it is extremely difficult to manage all 12 students at the same time in order to perform lab experiments. It is also expensive in terms of energy consuming in in KW-Hours per year. The results of the this paper demonstrates that by the deployment of computer virtual technology in the computer network engineering lab, 80 percent of the cost of equipment, space , time and energy can be saved in parallel with smooth operation of 12 lab experiments sessions for 12 students every week per semester. During this research, virtualization technology has deployed, tested and analyzed at layer 2, layer 3 and layer 7 of OSI model. Virtual machines and interface cards are created and operated at each single physical machine. These machines then connected and tested virtually to be communicated successfully. These virtual machines are connected to physical layer 2 device to confirm a successful communication between virtual machines and physical devices via physical connections. The same process design is deployed to all 12 machines available for 12 students for each lab session. In total 48 virtual machines are created, connected and tested successfully. The results demonstrated that by deployment of virtualization technology, up to 80 percent of equipment cost, energy, space and time can easily be saved. By the deployment of this technology, 12 students can easily be accommodate with no shortage of equipment, space, time and with no more consumption of energy for 24/7 over 365 days per year.

Keywords
Virtualization Techniques, Virtual Devices performance analysis, Data Center, Data Network, Virtualization for Engineering Technology Laboratories.

Acknowledgements
We acknowledge the research support form Professor Dr. Roslan Ismail, Dean, Malaysian Institute of Information Technology (MIIT), University Kuala Lumpur (UniKL), Malaysia.

Biography

Zulfiqar Ali is a PhD student at Malaysian Institute of Information Technology (MIIT), University Kuala Lumpur, Malaysai. He completed his BSc. (Electronics) and MSc.(Electronics) from Institute of Information and Communication Technology (IICT), university of Sindh, , Pakistan. He has also master degree (MBA) in technology and innovation management from University Technical Melaka, Malaysia (UTeM). He has a 15 years of working

experience in academic, research and industrial organizations. He worked as satellite R&D Manager, for Pakistan Space communication organization for 8 years. He worked in PAKSAT projects vis-à-vis international satellite systems and networks in Russia, China, Japan and UK. He worked as a lecture at University Technical Malaka (UTeM), Malaysia, University of Sindh Pakistan, Industrial University, Saudi Arabia and Transfinite System, UK. He is Cisco, Microsoft t and National Instrumentation and PMI certified professional. He has 12 international publications and presentations. His research interest include Data center, mobile and wireless communication

Dr Raed Althomali got the Associate Degree in Instrumentation technology, from Yanbu Industrial College, KSA, in 2000, then he finished his B.S. Electronics Engineering at YIC in 2008. He earned his M.S. in Electrical and Computer Engineering in south Illinois university of carbondale SIU (USA), in 2010.He earned his P.hD. in Electrical and Computer Engineering in south Illinois university of carbondale SIU (USA), in 2014. His research interested includes Telecommunications, Electronics and Instrumentation Technologies. Currently he is working as a Head of Department (HoD), Electronics and Instrumentation Engineering Technology (EIET) department.