Key note talk: Mehrnoosh Eshaghian-Wilner

Advances in Parallel Processing: From Nanoscale Chips to Cloud Computer Infrastructures

For the past several decades, parallel processing has been extensively studied and deployed as a promising methodology for speeding up the execution of computer programs. It involves the concurrent or simultaneous execution of program tasks by several processors which may operate in synchronous or asynchronous fashion. Processors may be integrated on a multi-processor chip, a multi-processor computer, a local network of computers, a geographically distributed platform of computers, or any other multi-processor/multi-computer organization. In this talk, I will first present an engaging introduction to Parallel Processing, and then will present a brief overview of its essential applications in advanced computing platforms such as Nanoscale and Cloud infrastructures. To let the audience experience some of the of the basic features of Parallel Processing, a few simple interactive examples will be illustrated. The attendees will be given an opportunity to participate in the exercises.

Frederick Harris: Nevada Research Data Center (NRDC)

Overview of NRDC data, how it is used, and proposed changes in infrastructure and implementation. Learn how the NRDC is connected to national data repositories such as DataOne and Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI)

Scotty Strachan: Connectivity

Scientists and engineers often have experiments or testing sites located far away from their offices and laboratories. For instance, researchers that study the effects of solar power stations on surrounding landscapes need to make their observations in place. That means that the equipment they use will be set up at the actual power station and around it, and usually the researchers need to take observations for weeks, months, or years in order to better understand the processes involved. More and more, scientists are relying on modern electronics technology to take their measurements using sensors, cameras, and other devices.

Most of these modern systems have the ability to collect and store data onboard. Sometimes, there are

even computers that are present onsite to control the systems. In order to gather the data and control the experiments or tests, researchers need to have network connectivity directly from their field sites to computers their laboratories and servers in their data center Networking is not always easy in places like Nevada, because in many cases the study areas do not have cell phone coverage or internet connections available right at the site. Also, sometimes the amount of data collected every day is so large that cell phone connectivity is unreliable or too expensive to pay for if many years of study are required.

In order to provide better and more useful connectivity, Cyberinfrastructure scientists and engineers in Nevada have employed a hybrid networking approach of wired and wireless data transport into distant and remote sites. New and affordable radio technology has allowed efficient connections as fast as or faster than DSL internet (10 to 100 Mbps) to work over long distances (5 to 50 miles). Private network administration employs modern tunneling protocols to seamlessly connect servers and routers over different Internet paths across Nevada. Researchers are able to connect to and control their field equipment in real time, which has transformed the effectiveness of how research is done in remote locations.

Yingtao Jiang: UNLV's Simulation Lab

During the demo, we will showcase how our cloud-based solution can support scientific computing. In particular, we will provide solid examples and use cases to show the following.

- Resource Sharing

  Certain tasks require huge storage and computing resources; through a private cloud, every authorized user can have access to large amount of resources, enabling these resources to be utilized more efficiently.

- Intuitive Computing

  With our bundled scalable packages, users can access multiple nodes of the computing cluster using a web-based approach. These software tools that are supported by the current UNLV CI provide an easy and transparent means to access, process and visualize massive datasets often seen in various scientific endeavors.

Joe Lombardo: UNLV's National Supercomputing Center for Energy and the Environment

Learn about this supercomputing facility that supports more than 200 scientific projects of national and international importance, related to global atmospheric modeling and fossil energy research.

Haroon Stephen: UNLV's Geovisualization Lab

The Geovisualization Facility at UNLV, funded by National Science Foundation EPSCoR Climate Change grant, provides infrastructure for researchers, decision and policy makers with integration of visualization tools and multidisciplinary expertise, and offers the capacity to visualize concepts and data on a multi-screen/multi-projection system with the option to interactively study behavior of models, data, and systems. Learn more about the lab and opportunities in research and workforce.

Michele Casella: Overview of Experimental Program to Stimulate Competitive Research (EPSCoR) and Current STEM Research Opportunities

Learn about the paid research and program opportunities for Nevada college students and teachers funded by the National Science Foundation (NSF) and other NSHE special sponsored programs.