Program Update

Creating Learning Opportunities in Developing Tech

Trident Technical College is soliciting education and industry partners to Beta test Cloud Computing labs developed as part of the **C**reating **L**earning **O**pportunities for **U**ndergraduates in **D**eveloping **Tech**nologies (**CLOUDTech**) NSF Grant 1601166.

The objective of the CLOUDTech grant is to develop hands-on labs for students to learn about Cloud Computing. The CLOUDTech Team has developed the first 24 Lab exercises grouped into 9 modules that students will perform to learn to build and interact with an OpenStack Infrastructure as a Service (IaaS) Cloud Environment.

The Lab instructions are written with the premise that students are undertaking an internship with the CLOUDTech Cloud Provider and will be assigned to various teams in the organization with the first assignment being with the team supporting customers using their OpenStack Cloud infrastructure. These 9 Modules and the 24 labs will help students learn how to use the OpenStack Dashboard to implement and support customer Cloud Instances based on the Infrastructure as a Service (IaaS) model. The team will develop 10-12 additional labs for the OpenStack Cloud environment that the intern will use to learn command line cloud provisioning when they are assigned to the Cloud Infrastructure team. Also included in the grant are Amazon Web Services (AWS) and Microsoft Azure labs that will be developed for the intern to complete when they are assigned to the Public Cloud provider team later in their internship.

Trident Technical College and the CLOUDTech team are asking NSF ATE Centers to disseminate the solicitation request to their various consortium institutions to provide a large and diverse Beta Test group.

Organizations wanting to participate as Beta testers should send an e-mail to the team via the cloudtech@tridenttech.edu email address with their contact information and which option they want to sign on to Beta test.

Those organizations taking part as Beta testers will be provided two options for how they participate in the beta test process.

Option 1: Beta testers will be provided access to all modules and labs through Trident Technical College's NETLAB Lab scheduling Servers. Each participant will be provided with a unique login and the NETLAB Server URL to access the labs and lab documents in a Web Browser.

Option 2: Beta Testers will test implementing the labs in a standalone class environment. Participants will need Lab computers with VMware Workstation software installed and CLOUDTech will provide Secure FTP access for participants to download the Lab virtual machine OVF files, setup instructions and lab documents needed to setup the lab environment and run the labs. The preferred Lab Computer hardware is I7 processor, 16 or 32 GB of RAM and at least 60 GB of free space on the hard drive.

During the test participants will be provided with phone numbers for direct communication and to receive support from the CLOUDTech team throughout the Beta testing process.

The following is a Module list and lab Synopsis for the labs to be Beta tested. Most of the labs will be completed using the OpenStack Dashboard web based Graphical User Interface (GUI) on a Virtual Machine connected to an OpenStack Cloud environment.

Lab Documents include step by step instructions for the early labs and require that students refer to earlier lab documents to perform certain steps in later labs to test student comprehension. A comprehensive lab is in development that provides a scenario for setting up a new customer's Cloud. Students will have to use what they have learned in the labs to successfully implement the Customer's Cloud using the OpenStack Dashboard. Each Lab is graded with a grade script providing immediate feedback to the students.

Module list and lab Synopsis

Module 1: Connect to and Navigate the OpenStack Dashboard
Labs 1-2: Familiarize student with OpenStack Dashboard
Students will learn about the Dashboard and what tasks can be completed.

Module 2: Manage OpenStack Projects, Users and Quotas
Labs 3-5: Add a Project, User and manage project quotas
Students will learn how to setup a Project for a customer, create a customer
User account and set Quota limits to provide resources specified in the customer contract.

Module 3: Configure OpenStack Networks and Routers
Labs 6-8: Add and configure networks and routers
Students will setup and configure networking to support the customer.

Module 4: Create a Key Pair and Launch a CentOS 7 Instance
Labs 9-10: Create a key pair and launch a Linux cloud instance
Students will create their first cloud instance for the customer specifying authentication using an SSH key pair instead of a user name and password for the customer to access the new instance.

Module 5: Upload Key Pair, add Security Group and Rules, Allocate Floating IP Address
Labs 11-13: Import key pair, manage security groups and publically routable IP address
Students will enable access via SSH, Open necessary ports via security groups and provide an IP address that will be used to access the new instance.

Module 6: Manage Key Pairs and Connect to an Instance using a Key Pair
Labs 14 -16: Manage key pairs, connect to cloud instances using PuTTY and SSH
Students will learn how to manage key pairs and use them to connect to the instance from a Windows virtual machine using PuTTY and from a Linux virtual machine using SSH.

Module 7: Launch a Server 2012 Instance and connect using RDP from Windows and Linux VMs
Labs 17-19: Launch Windows cloud instance, connect from Windows and Linux VMs

Module 8: Launch a CentOS 7 Instance with a customization script and verify the web server
Labs 20-21: Use script to customize instance and verify the web server function
Students will learn how to create a new instance running Server 2012 and configure the instance so that it is accessible from a client connecting to the web server.

Module 9: Launch a CentOS 7 Instance with a customization script and manage volumes
Labs 22-24: Use cloud-init to customize instance, attach and manage volumes
Students will learn how to attach and manage storage volumes for an instance.

All NETLAB Labs will be added to the CSSIA repository after all testing and revisions are complete. Commercial Cloud Labs and Stand-Alone OpenStack lab files and Documentation will continue to be available at Trident Technical College and ultimately archived at ATE Central.

The following pages provide more information on CLOUDTech and the CLOUDTech team.