**Cloud Computing for Hands-On Bioinformatics Education**

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We developed a suite of software to manage virtual machines (VMs) for the Essentials of Next Generation Sequencing (NGS) Workshop (https://ngs.csr.uky.edu/). The workshop, held for the fifth time in July 2017, aims to give researchers hands-on experience with new bioinformatics technologies. Participants run bioinformatic analyses on biological data, which requires significant computing power. Our software utilizes the cloud for this power, substantially saving time and money.

Our contribution to the new infrastructure consists of two parts. First, we developed scripts to assemble a virtual machine image that includes the required bioinformatics software. Our scripts automatically download, build, and install the latest versions of the necessary software, and prepare an Amazon Machine Image (AMI) that can be deployed to the Amazon Web Services (AWS) cloud. Second, we developed a collection of scripts for managing individual participant VMs based on their AMI. These scripts use the Amazon aws-cli software to deploy new VM instances, create user accounts, and install updated copies of the workshop data sets.

The software we developed has significantly accelerated the process of creating accounts and computing environment for the NGS workshop attendees. The full process of creating a new up-to-date image and deploying and configuring that image for twenty participants now takes around fifteen minutes, compared to several hours in previous years. We hope that, combined with the cost savings of the cloud, this will allow expanding the workshop to offer training to an even wider range of researchers in Kentucky.

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