Development of Cloud-Based Biomedical Research Learning Tools

Ming Lei
Division for Research Capacity Building
Cloud-Computing: Opportunities and Barriers

- Provides end users access to (big) data, high performance computation, and storage space without heavy infrastructure investment

- A potential game changer for students and investigators at under-resourced institutions

However

- Students in biosciences have limited access to cloud-based learning

- Most biomedical researchers have yet to master cloud-based research tools/methods
NIGMS Pilots: Developing Tools that Enable Cloud-Based Learning

Objectives

○ Providing students biomedical research skills including those using data science approaches such as AI/ML/DL;

○ Providing faculty investigators programming skills to use Cloud infrastructure (Train-the-Trainer);

○ Broad access to students interested in biomedical research;

○ Interactive and suitable for self-learning

Approaches

○ Inviting two GM-funded investigator groups with expertise on teaching genomics and proteomics research methods, respectively;

○ Pairing them with Google engineers (through NIH STRIDES) to convert their teaching materials into cloud-based learning modules
Developing Cloud-based Learning Tools: Process & Outcomes

Train-the-Trainer:
GM-supported investigators gain programing skills to develop similar packages, help establish their institutions’ Cloud accounts taking advantage of NIH STRIDES

Cloud Computing Usage Workshop, September 13 -14, 2021
https://web.cvent.com/event/1810b41efcaa-4466-b607-3dde288d545/summary
An NIGMS “Sandbox” with Multiple Learning Modules

NIGMS Biomed Research Learning Sandbox

- Basics of Cloud Computing (Google / Amazon)
- MassSpec Data Analysis
- RNA-Seq Analysis
- Univ of Arkansas Med Sci
- Univ of Maine, MDIBL

By NIH STRIDES
By NIGMS Pilots

New Learning Modules

Examples: Image Analysis, Metagenomics, CRISPR, GWAS, Phylogeny, AL/ML/DL...
Support for the Development of New Learning Modules

**Objective** Support biomedical researchers, with help from Cloud service providers if needed, to convert curricula in biomedical research including those using data science approaches such as AI/ML/DL into cloud-based learning modules

**Expectations** Interactive, enabling self-learning;
Commitment to disseminate the products for public access through venues such as the NIGMS Sandbox;
Commitment to deliver robust learning modules within one year

**Mechanism** Administrative Supplements to GM Awards with expertise in developing and conducting research training;
1 year award to cover grantee’s effort and fees to a Cloud service provider
Questions?

Cloud Computing Usage Workshop, September 13-14, 2021
https://web.event.com/event/1810b41e-ffaa-4466-b607-3ddea288d545/summary
Post-Development Plans

• Deployment of the Sandbox to a Cloud infrastructure
  - BMRLearning.net (NIGMS)

• Management and maintenance of the Sandbox
  - By a service provider, supported by NIGMS