SkyLab: A Web Application for vCluster

Vincent Paul L. Carpio and Katrina Joy M. Abriol-Santos and Joseph Anthony C. Hermocilla

Background

- Most scientific applications require high performance computing (HPC) which needs CPU intensive computations and large data storage.
- There are several researches on hosting HPC applications in the cloud.

Background

- **Peak-Two Cloud** (P2C)
  Openstack-based private cloud on top of commodity hardware targeted for scientific and high-performance computing
- **vCluster**
  tool for automatic configuration and deployment of MPI cluster on demand
- **P2CTools**
  utility for setting up computation-intensive tools that use an MPI cluster to process data
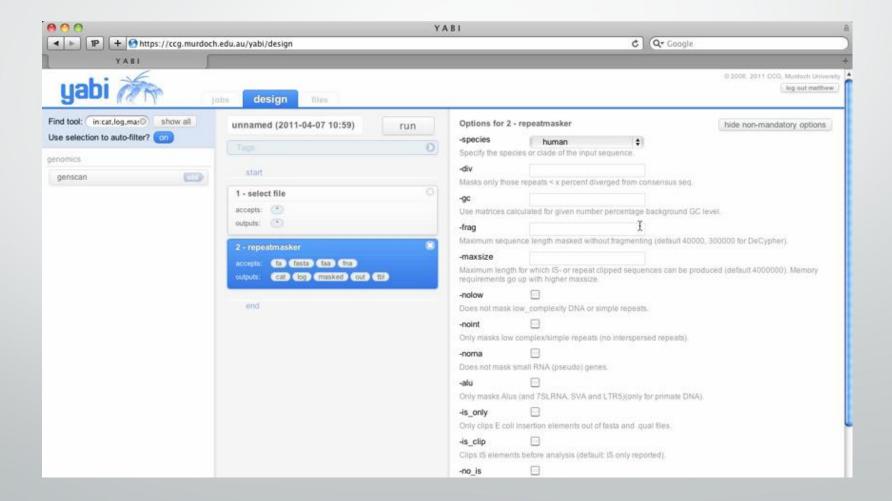
Statement of the Problem

- Users prefer to use tools via a graphical user interface (GUI) rather than via a command line interface (CLI).
- Creating an interface for vCluster would make the process more intuitive and promote use of HPC applications.

Objectives

- This study aims to develop SkyLab, a web application that would function as a front-end for vCluster.
Specifically, it should be able to:
  1) allow users to select tools and execute them via web interface;
  2) create an extensible platform that would accommodate additional tools; and
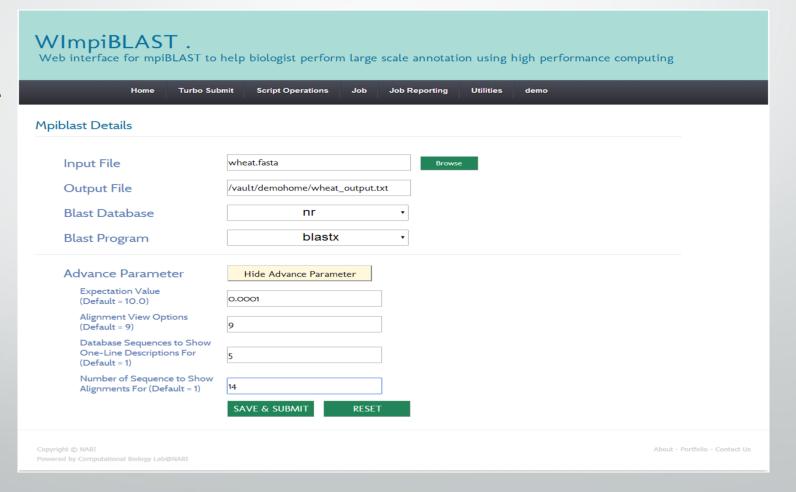 3) display output data of tools.

Related Work
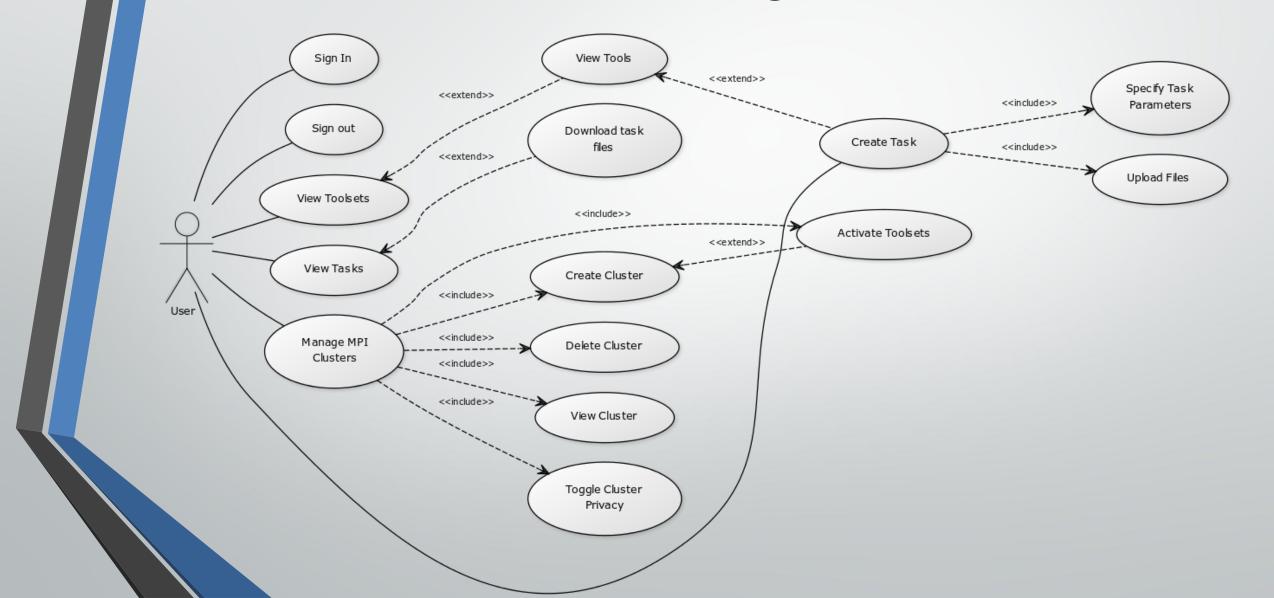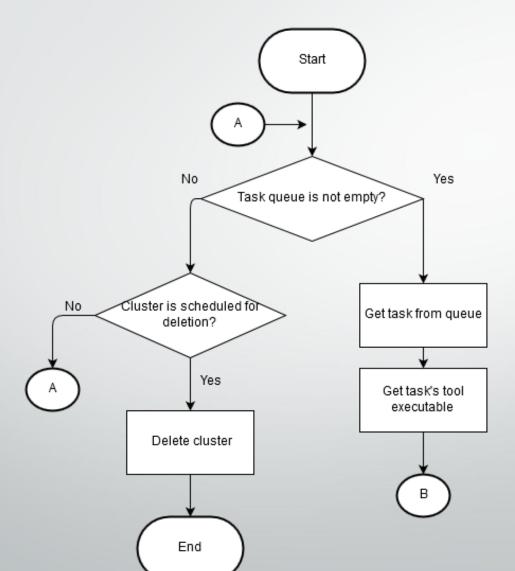
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Related Work
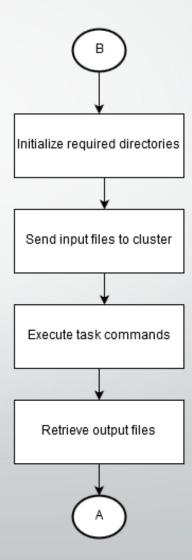
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Materials

- Programming Language: Python
- Web Framework: Django
- Cloud Infrastructure: Peak-Two Cloud
- DBMS: MariaDB

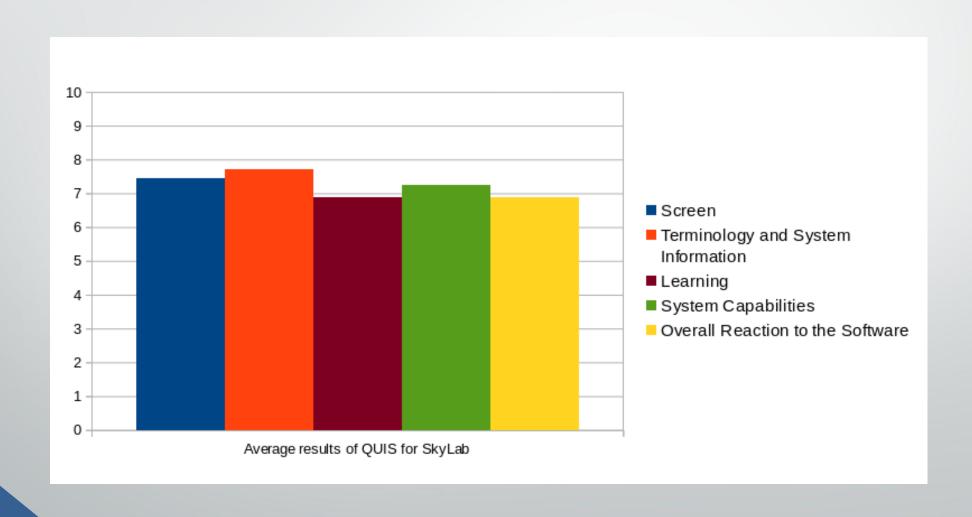# Use Case Diagram

Task Execution Flow

System Features

- User can create or delete MPI clusters
- User can make created cluster public or private
- User can make a private cluster visible by entering a valid share key
- User can activate toolsets for an MPI cluster
- User can submit task for selected tool to be executed on selected cluster
- User can view and download task files

User Acceptance

Average results of QUIS for SkyLab

Conclusion and Future Work

- The system created allows users to manage MPI clusters and MPI tasks without the need for the need for technical expertise in scripting.
- Task files are available for download and are rendered with JSmol, if compatible.
- The system is designed to accommodate additional tools.
- In general, the test users have positive remarks about the system.

Conclusion and Future Work

Recommendations for future work:
- Support for additional use cases of tools
- Support for input file generation
- Improved parameter checking and error handling
- Support for workflow design
- Task scheduling and resource management algorithms

References

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