# Visualizing Supercomputer Cluster Activity with Kivy to Improve Usability

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## Abstract

This project enhances the usability of supercomputers for domain scientists by streamlining cluster information. To express HPC activity in an intuitive way, this visualization displays pertinent data in a useful, easy to interpret format for a user with little supercomputing experience. It integrates concepts of usability, features that contribute to a meaningful user experience, and content about a cluster that benefits a user.

## Background

Without adequate knowledge of the command line, non-experts find supercomputers difficult to navigate and to understand. Providing interpreted data about a cluster may increase the efficiency of running a program on a cluster. Existing workload management software presents data about cluster activity, but the presentation does not describe the big picture view of the cluster in a format accessible to a scientist who lacks familiarity with supercomputing.

## Approach

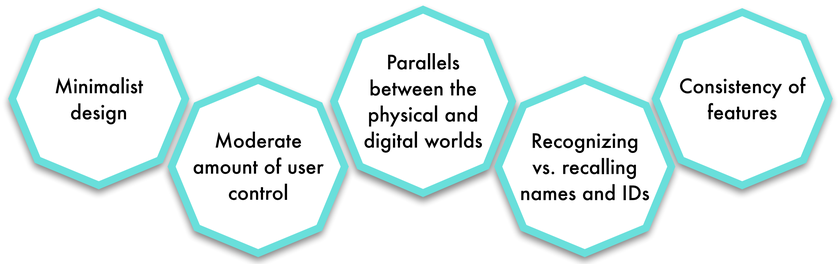
This project uses a program written with Python and Kivy to describe a cluster in a palatable way.

Kivy, a Python graphics library, offers portability for programming mobile and multi-touch applications. Kivy's functionality contributed to creating visualizations that complement HPC.

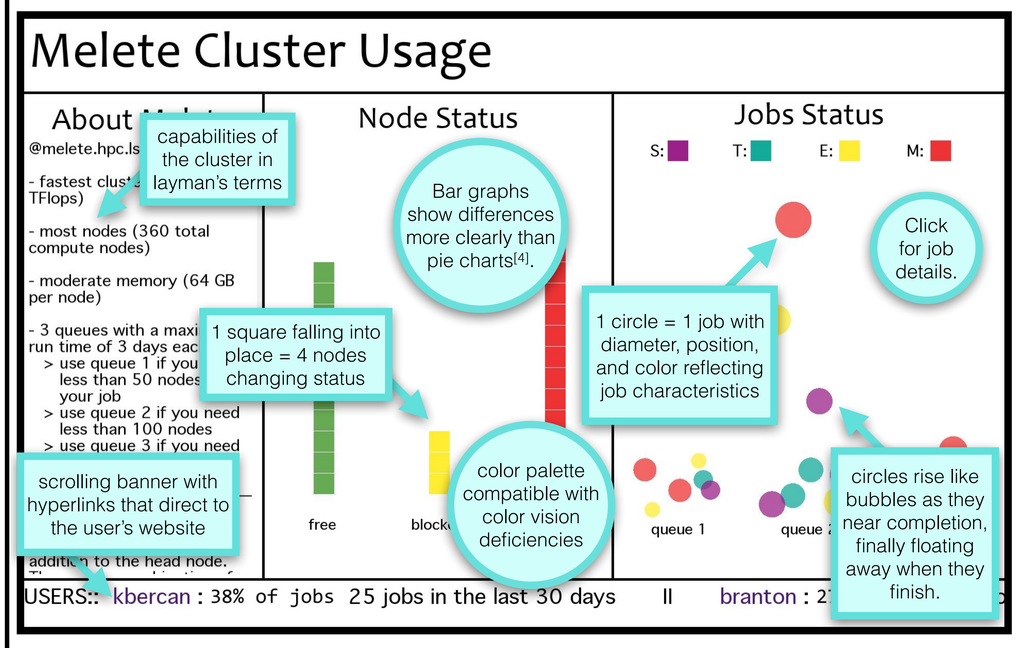
Visualizations share data, communicate their meaning, and help viewers clarify their understanding of the data. They often aim to capture multiple parameters of a system by maintaining meaningful context and without overwhelming the viewer. An effective visualization resonates with a user because it sums up the significance of a data set and enhances it by contributing to its meaning[2].

## Usability

The program applies key concepts of usability by presenting information in a way that requires little explanation. The visualizations especially contribute to its usability and to the user's understanding of the information.




## Results




This visualization for cluster usage conveys basic information about clusters: the benefits of using the cluster, how busy it is, and what types of jobs run on it. A glance at it can give the user a comprehensive overview of the system.

## Future Work

Further development includes adding portability—the program supports GUI interaction on a personal computer, but could gain mobile and tangible capabilities using Kivy. Especially with the goal of capturing multiple clusters' data, a touchscreen or tangible experience would increase the functionality of the program, as using a traditional mouse and pointer hinders exploration of the program's features.

Moreover, future work could apply similar concepts to cloud computing and Big Data. Like supercomputer clusters, both cloud computing and Big Data sets raise issues of complexity of information, constant changes to data, and numerous sources of data[1][6]. The ground work for this visualization could support efforts to capture and understand concepts larger in scope and with many variables and dimensions.

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