Project Plan
Simplifying High Performance Computing

The Capstone Experience
Team Michigan State University HPCC

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Functional Specifications

• HPCC uses SSH/terminal and bash scripts to submit jobs.
• Researchers may not have strong technical background and find this difficult.
• Purpose is to create a Web app to view job statistics and create bash scripts for them.
• This will make HPCC more accessible and friendlier to researchers.
Design Specifications

• Webpage User Interface
• UI to view job statistics
• Bash Script Generator
• Group/Admin Tools (stretch goal)
• Job Test Environment (stretch goal)
Screen Mockup: Job Overview
Screen Mockup: Administrator

HPCC Dashboard

HPCC Username Here

Summary  Current Jobs  History  Other  Other

Current Running Jobs

<table>
<thead>
<tr>
<th>Job Name</th>
<th>Status</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorem</td>
<td>Running</td>
<td>34%</td>
</tr>
</tbody>
</table>

Jobs in queue

Node Usage
Screen Mockup: Script Generator

HPCC Dashboard

SLURM Script Generator

- Resources
- Constraints
- Advanced

Wall time
(DD-)HH:MM:SS

Job name

Script path

Call Executable

Nodes
- Range
- Memory

Cores
- Parallel

Preview of script will populate here

Preview
Submit
Screen Mockup: Playground

HPCC Dashboard

HPCC Username Here

Summary  Current Jobs  History  Test Ground  Other

Select Job  Test_Job.sh  ▼

Begin Test

Requested Resources
- Walltime: 000:00:10
- Nodes: 4
- Processors per Node: 1
- Memory: 4gb

Resources Utilized
- Walltime: 000:00:10
- Nodes: 8
- Processors per Node: 4
- Memory: 16gb
Technical Specifications

• Cluster Job Scheduler – Slurm

• Web Server – CentOS, Apache2, MySQL, Python

• Web full stack framework – Django

• Frontend UX - JavaScript with jQuery
System Architecture

Users

High Performance Computing Center

Web Server

Frontend

slurm
workload manager

LAMP

Linux
Apache
MySQL
PHP, Perl, Python

django

jQuery
write less, do more.
System Components

• Hardware Platforms
  ▪ The HPCC
  ▪ Dell Servers

• Software Platforms / Technologies
  ▪ OpenHPC
  ▪ JQuery
  ▪ Django
  ▪ SLURM
  ▪ MySQL Database
Risks

- **Simulating the HPCC**
  - Cluster setup has stalled due to hardware limitations.
  - Working with system admin on alternative cluster setup. Also looking into different workflows which will support script testing without cluster.

- **Connecting cluster to website**
  - Connect website to scheduler without a cluster
  - Prototype simple echo application to test/debug Slurm to Django interface.

- **Unsure how to implement admin privileges**
  - HPCC has various levels of administrator privilege for controlling user actions
  - Discuss with HPCC admins the hierarchy and organization of privileges

- **Don't know how to implement an isolated playground cluster**
  - Need a testing environment to see if a job utilizes appropriate resources
  - Examine similar testing environments. Stretch goal that isn't required.