Sprint 5 Demo

Building Cyber Infrastructure for Researchers

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Project Recap

Create Infrastructure for Earth Science Department at BU that allows researchers to submit code on large data sets and retrieve and display the results.

Last sprint:

- Created the Kubernetes cluster
- Simple OpenWhisk API request & response in the UI
- More UI enhancements; user hierarchy & joining new projects

What we learned this sprint

- Using Helm to enable Kubernetes cluster with OpenWhisk
- Working with Chameleon/GENI to add/remove worker nodes on a Kubernetes cluster
- Complex Request/Response with OpenWhisk on a cluster
- Working with Plotly & MongoDB for displaying results

Kubernetes Progress

- Cluster created with: kind create cluster --config kind-cluster.yaml
- Openwhisk deployed on Kubernetes Cluster using helm install
- Wsk cli running on deployment
- Wsk property apiHost = IP of invoker node

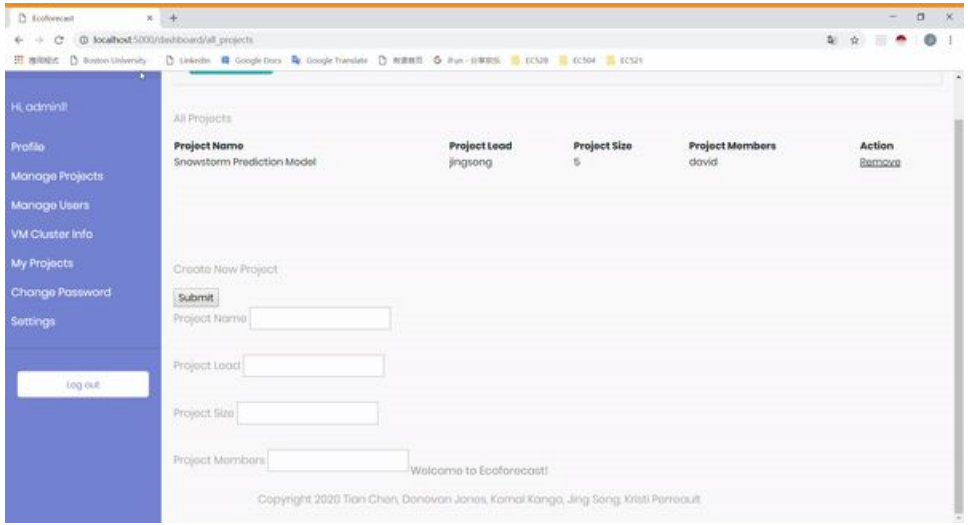
Kubernetes Progress

```
ubuntu@cluster-test:~$ wsk action invoke helloJS --blocking -i
ok: invoked /_/helloJS with id 92494b8332bc42af894b8332bcd2afb9
{
    "activationId": "92494b8332bc42af894b8332bcd2afb9",
    "annotations": [
        {
            "key": "path",
            "value": "guest/helloJS"
        },
        {
            "key": "waitTime",
            "value": 73
        },
        {
            "key": "kind",
            "value": "nodejs:10"
        },
        {
            "key": "timeout",
            "value": false
        },
        {
            "key": "limits",
            "value": {
                "concurrency": 1,
                "logs": 10,
                "memory": 256,
                "timeout": 60000
            }
        }
    ],
    "duration": 10,
    "end": 1586636681855,
    "logs": [],
    "name": "helloJS",
    "namespace": "guest",
    "publish": false,
    "response": {
        "result": {
            "payload": "Hello world"
        },
        "size": 25,
        "status": "success",
        "success": true
    },
    "start": 1586636681845
```

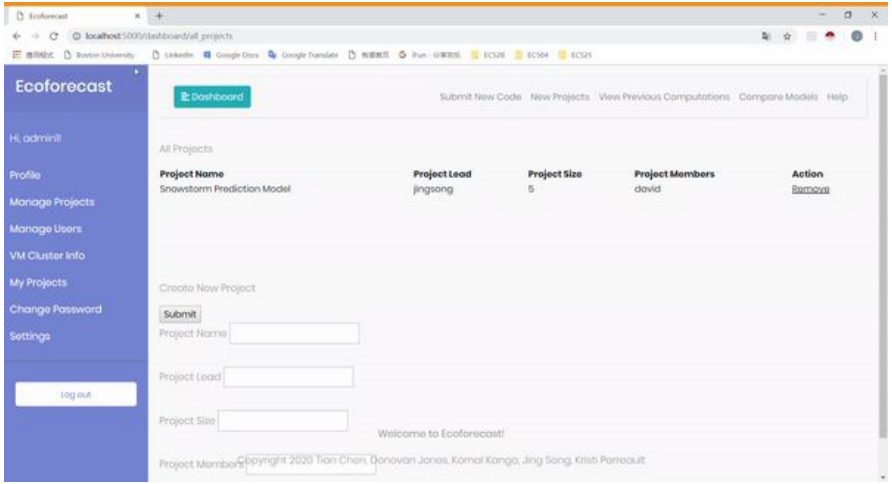
UI Progress

- User Hierarchy (Part II)
- Openwhisk Result Visualization

UI: User Hierarchy

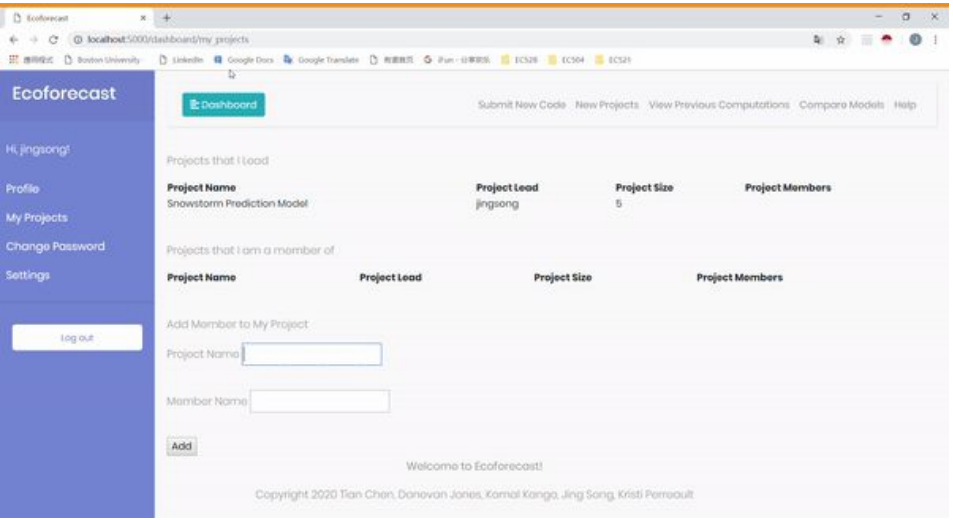


System Administrator: Manage Projects

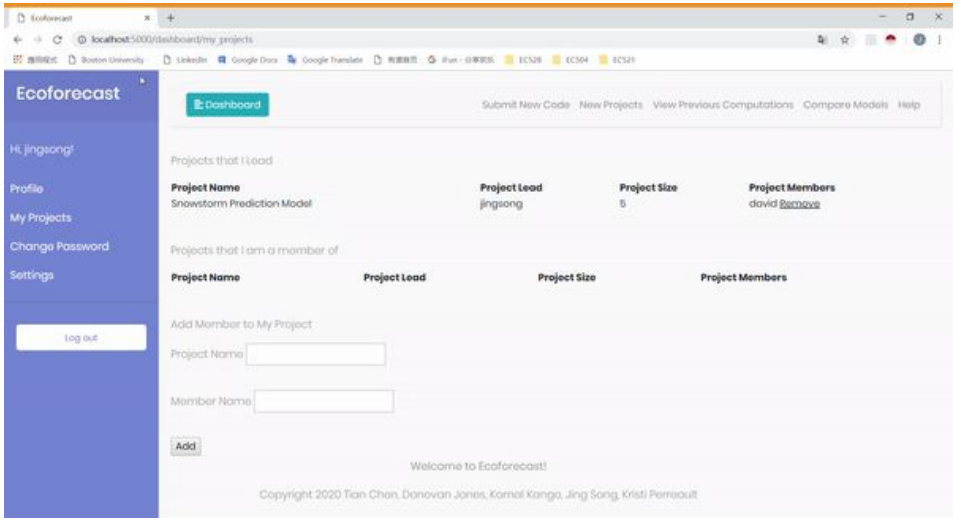


System Administrator: Manage Users

UI: User Hierarchy

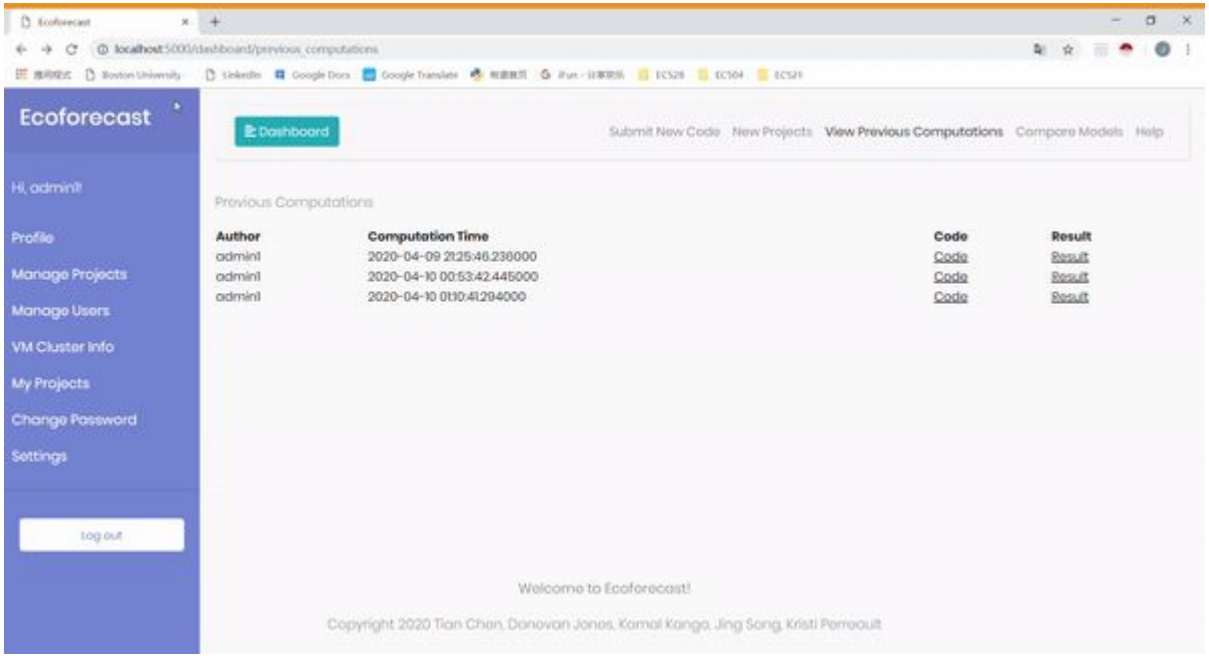


Project Lead: Add Project Member



Project Lead: Remove Project Member

UI: Openwhisk Result Visualization



Plotly Javascript

UI Current Limitations

- Wait for access to BU Web Server http://ecoforecast.bu.edu
- Local Front-end
- Local MongoDB

If we could...

- Implement a Kubernetes Cluster info page for system administrators

Release Planning

Release #5 (due week 10) - DONE

- Call OpenWhisk through Kubernetes
- User Hierarchy Part II
- Join new project feature completed
- Data from OpenWhisk stored in MongoDB
- User can visualize and plot result data from code submission in UI

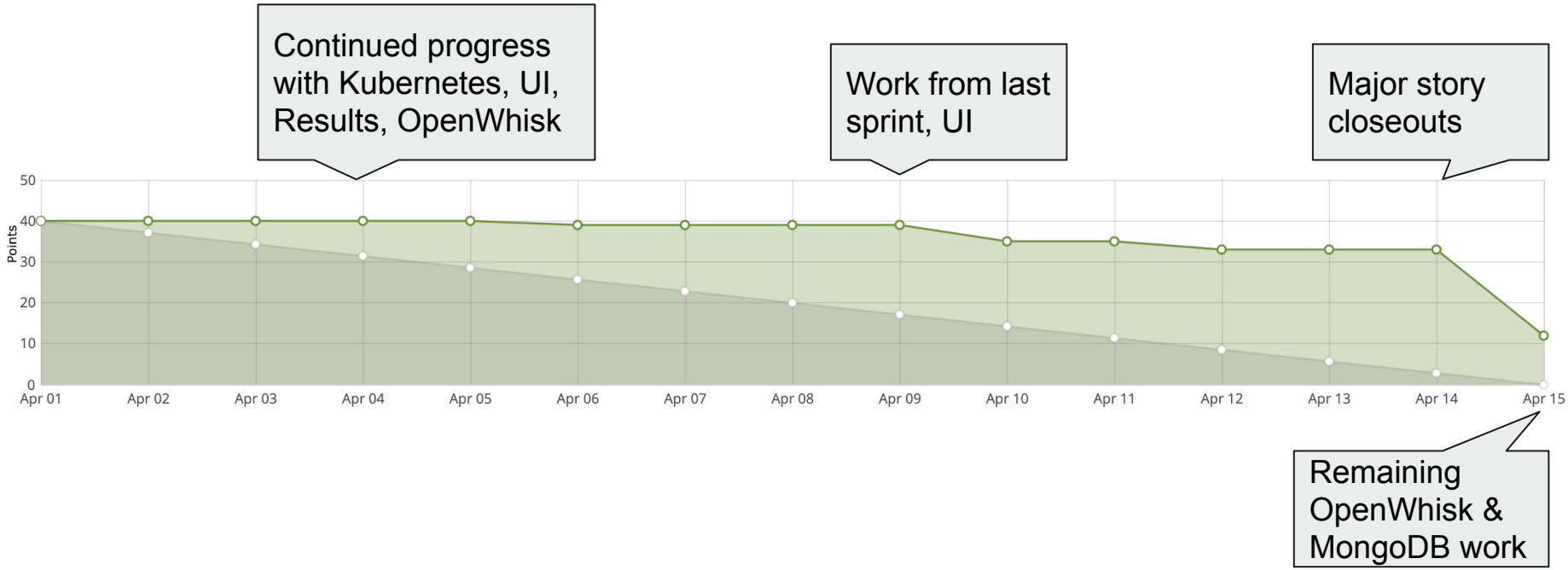
To Finish Up…

- Add/remove worker node on cluster
- Complex function with OpenWhisk and stored on MongoDB

Sprint 5 Problems

- Working with Helm to create Kubernetes cluster took some time
- Ran out of space on the Kubernetes cluster when trying to run OpenWhisk commands
- Waiting on mentors to deploy MongoDB & for server access

Sprint 5 Burndown Chart



Semester Summary

- Created a Kubernetes cluster on MOC to facilitate Chameleon & GENI worker nodes
- Installed OpenWhisk on cluster to run functions for researchers
- Created MongoDB databases for storing user data and computation results
- Created a new, cleaner UI featuring:
  - User login & registration
  - Dashboard
  - User hierarchy (admin, project leads, project members)
  - Code submission and results

Future Work

- Results comparison with other computations
- More plotting options to view data
- More Kubernetes clusters, worker nodes
- System Admin UI to monitor worker nodes
    - View which nodes are up or down
    - See geographic distribution of data & nodes

Questions?