PEcAn to the cloud

Moving ecological forecasting from high performance computer to cloud

Christopher Tate
Principal Software Engineer in Red Hat Research

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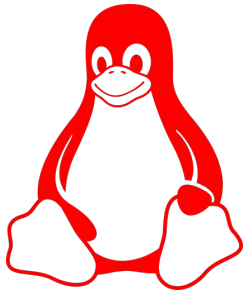
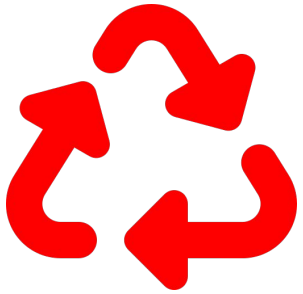
Software tools

What kind of software tools do forecasting researchers need?

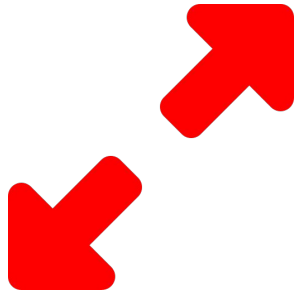


Open source

Accessible



Reusable



Scalable

Source:
https://fontawesome.com/

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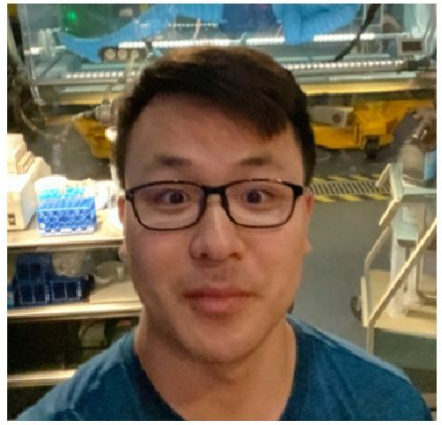
Meet the Ecological Forecasting Team

Jeff Simeon - BU SAIL

Greg Frasco - BU SAIL

Shashank Karthikeyan - BU SAIL



Dongchen Zhang - BU PHD Student

Michael Dietze - BU Professor

Christopher Tate - Red Hat

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Red Hat Collaboratory with Boston University

A partnership advancing research and learning in emerging technologies

Source:
https://www.bu.edu/rhcollab/

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2023

Prototyping a Distributed, Asynchronous Workflow for Iterative Near-Term Ecological Forecasting

Michael Dietze (BU), Christopher Tate (Red Hat), Yannis Paschalidis (BU), Atefeh Hosseini (BU) will prototype an accessible community infrastructure to generate ecological forecasts at scale, focusing on the development of a cloud-native workflow that can handle an asynchronous, event-driven, distributed approach to execution.

Source:
https://www.bu.edu/rhcollab/2023/01/27/2023-red-hat-collaboratory-research-incubation-awards-recipients/

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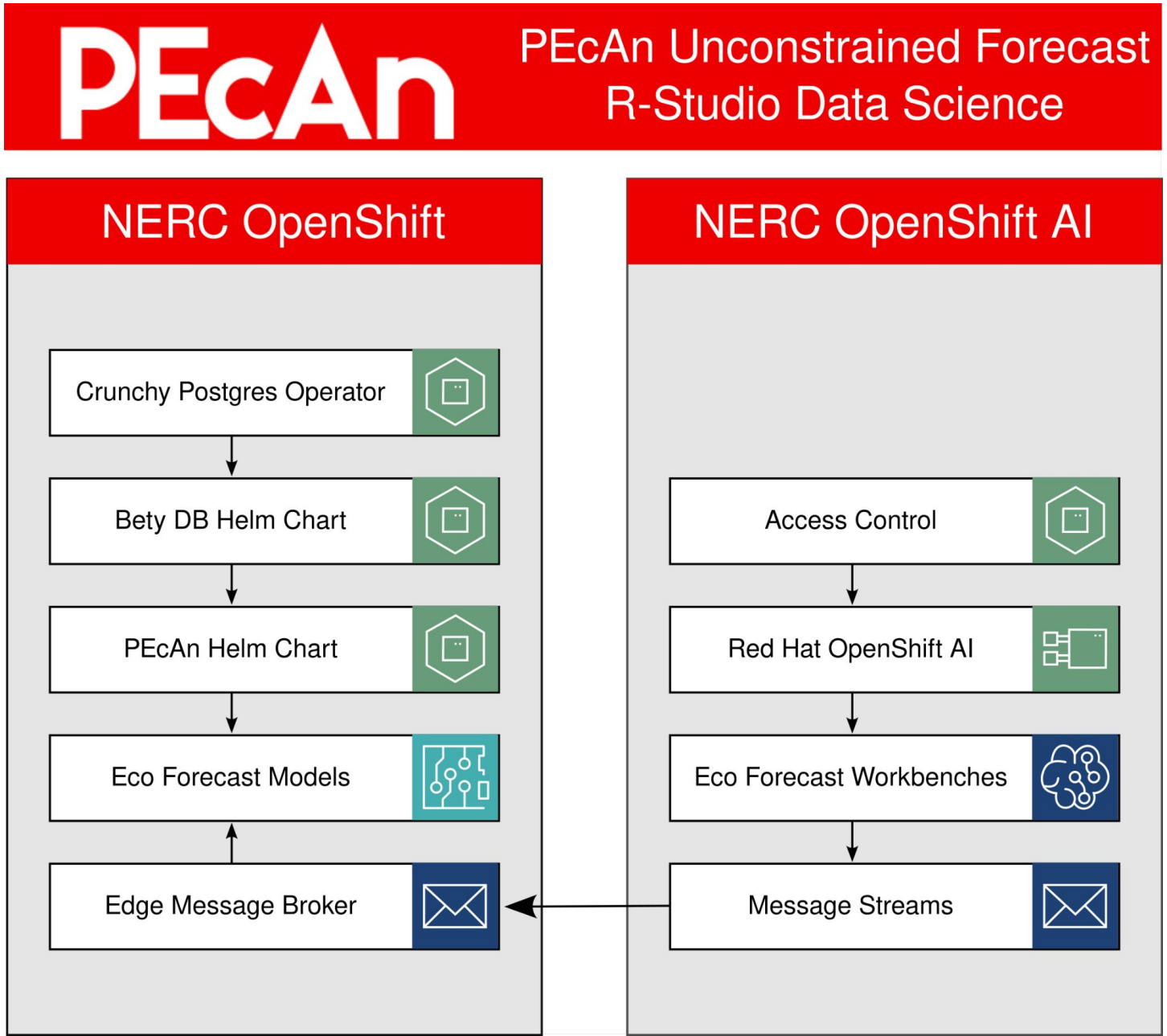
New cloud architecture for PEcAn



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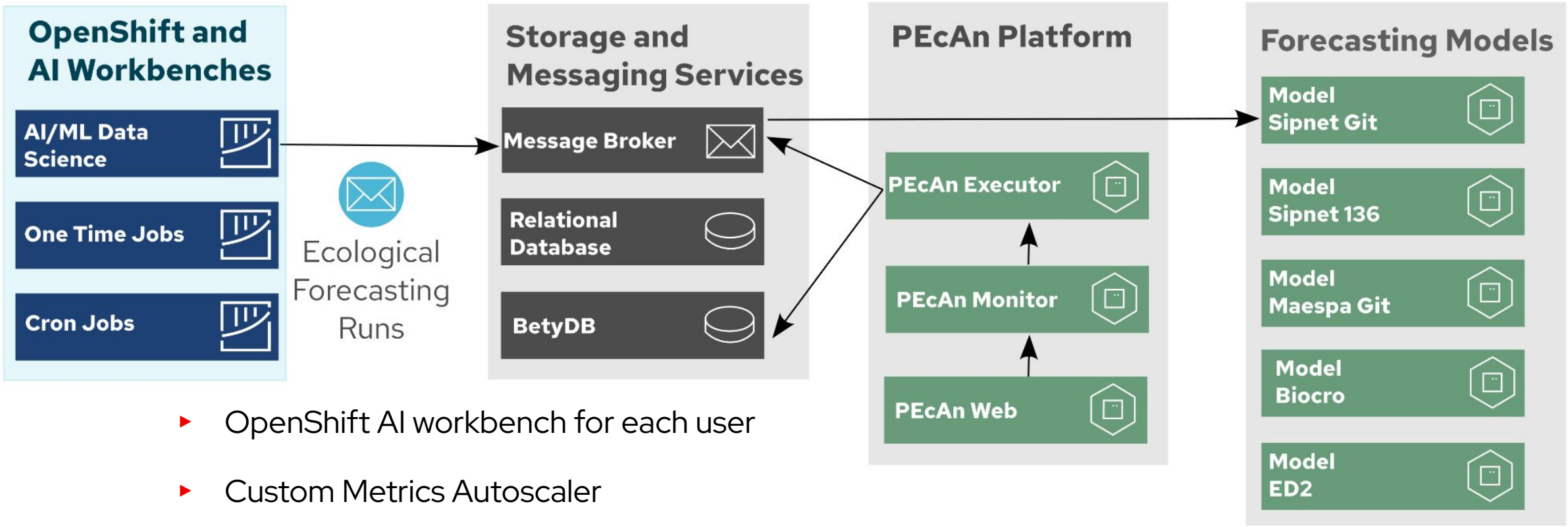
PEcAn in the New England Research Cloud



- OpenShift AI workbench for each user
- Custom Metrics Autoscaler
- One Time Jobs
- Cron Jobs
- Object Storage
- Microservices in the same project

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Open cloud solutions

PEcAn's new event-driven, distributed design

Open source branching

Prototyping new cloud-native software relies on branching

Distributed storage

Consider object storage, ephemeral storage, and persistent storage needs

Pod autoscaling

Scale the number of running model pods based on the number of messages

Rsync strategy

Pull forecast data from one pod and back with ephemeral storage

Why ecological forecasting on Red Hat OpenShift?

Back to “What kind of software tools do forecasting researchers need?”

Open source

The trusted enterprise open source cloud platform

Accessible

- Test your forecasts in the free OpenShift Developer Sandbox
- Develop open source models and microservices with OpenShift Local
- OpenShift Local microshift preset runs on laptops with fewer resources

Reusable

- Easily migrate your forecasting to OpenShift clusters On Premise, or on AWS, Azure, or Google
- Also deploys to Red Hat MicroShift at the Edge

Scalable

Scale from your laptop to a datacenter like the New England Research Cloud

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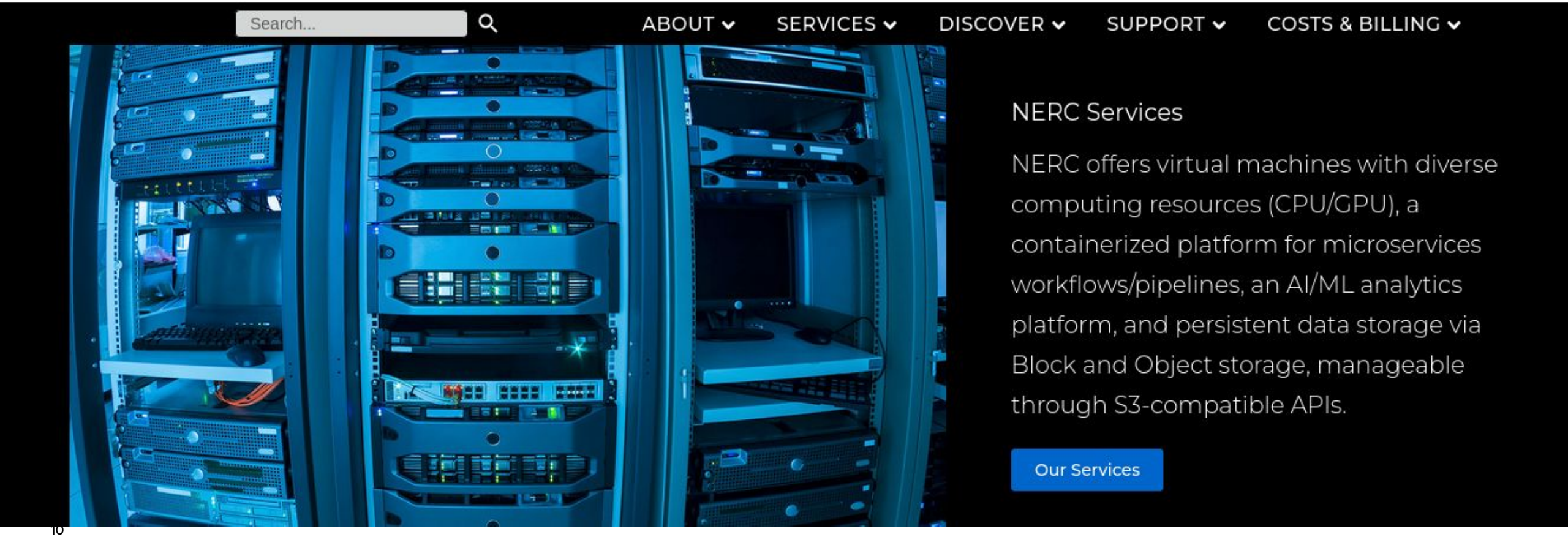
New England Research Cloud



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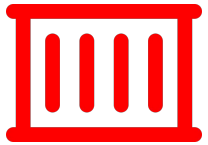
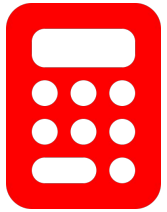
Future milestones

Asynchronous, event-driven scheduler



Elastically launch data ingest containers



More sites, data constraints, and models

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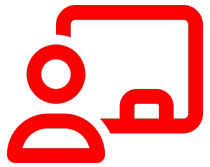
Who makes a successful research collaboration?

Subject matter experts

Support from ecological forecasting community experts

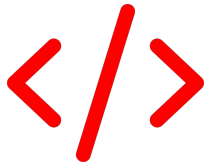


University professors

Proposals, and high level design, support, and organization

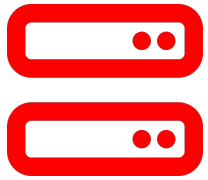
Graduate students

Academic knowledge and technical domain expertise working with the data



Software engineers

Industry experience in cloud software development and deployment



New England Research Cloud

Computing resources for innovation for academic researchers and technology professionals

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