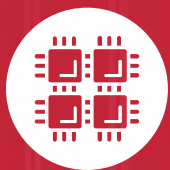




OWENS



JESSE OWENS
OLYMPIC CHAMPION, BEACON FOR EQUALITY, YOUTH ADVOCATE



Ohio Supercomputer Center

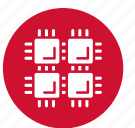
An OH·TECH Consortium Member

Deploying and Managing an OnDemand Instance



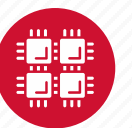
Doug Johnson, Trey Dockendorf
Ohio Supercomputer Center

This work is supported by the National Science Foundation of the United States under the award NSF SI2-SSE-1534949.



Outline

- OnDemand introduction and architectural overview
- Installation and configuration
- Considerations for production
- Build environment
- Questions/discussion and resources

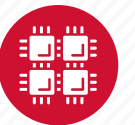


Open OnDemand Overview

Provides an easy to install and use, web-based access to supercomputers, resulting in intuitive, innovative support for interactive supercomputing.

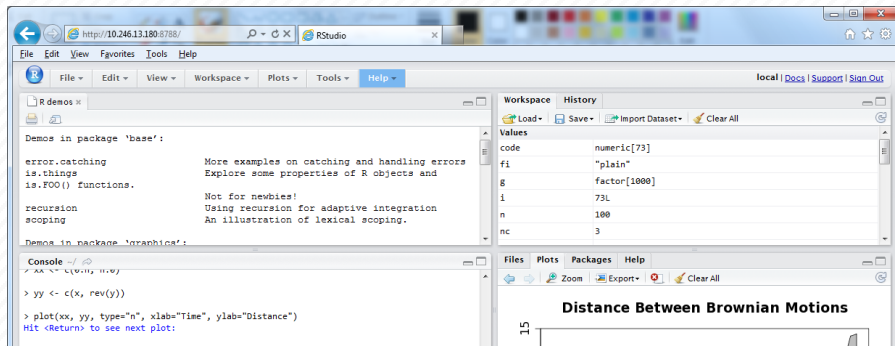
Features include:

- Plugin-free web experience for access to HPC resources
- Easy file management
- Command-line shell access
- Job management and monitoring
- Graphical desktop environments and applications

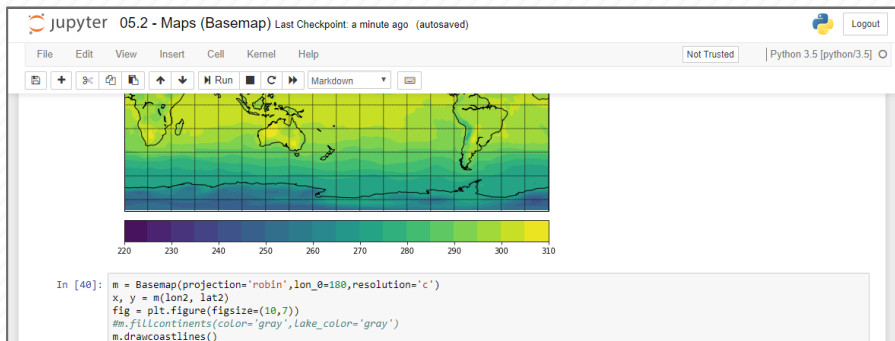


Interactive Apps and GUIs & Cluster Access

RStudio Server – R IDE

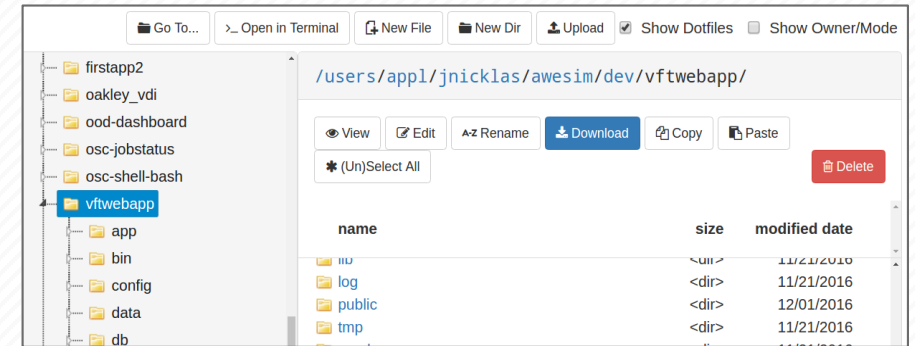


Jupyter Notebook – Python IDE



And many more, such as ANSYS Workbench, Abaqus/CAE, MATLAB, Paraview, COMSOL Multiphysics, VNC desktops and GUIs

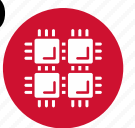
File Access (browse, edit, etc)



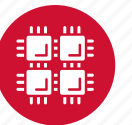
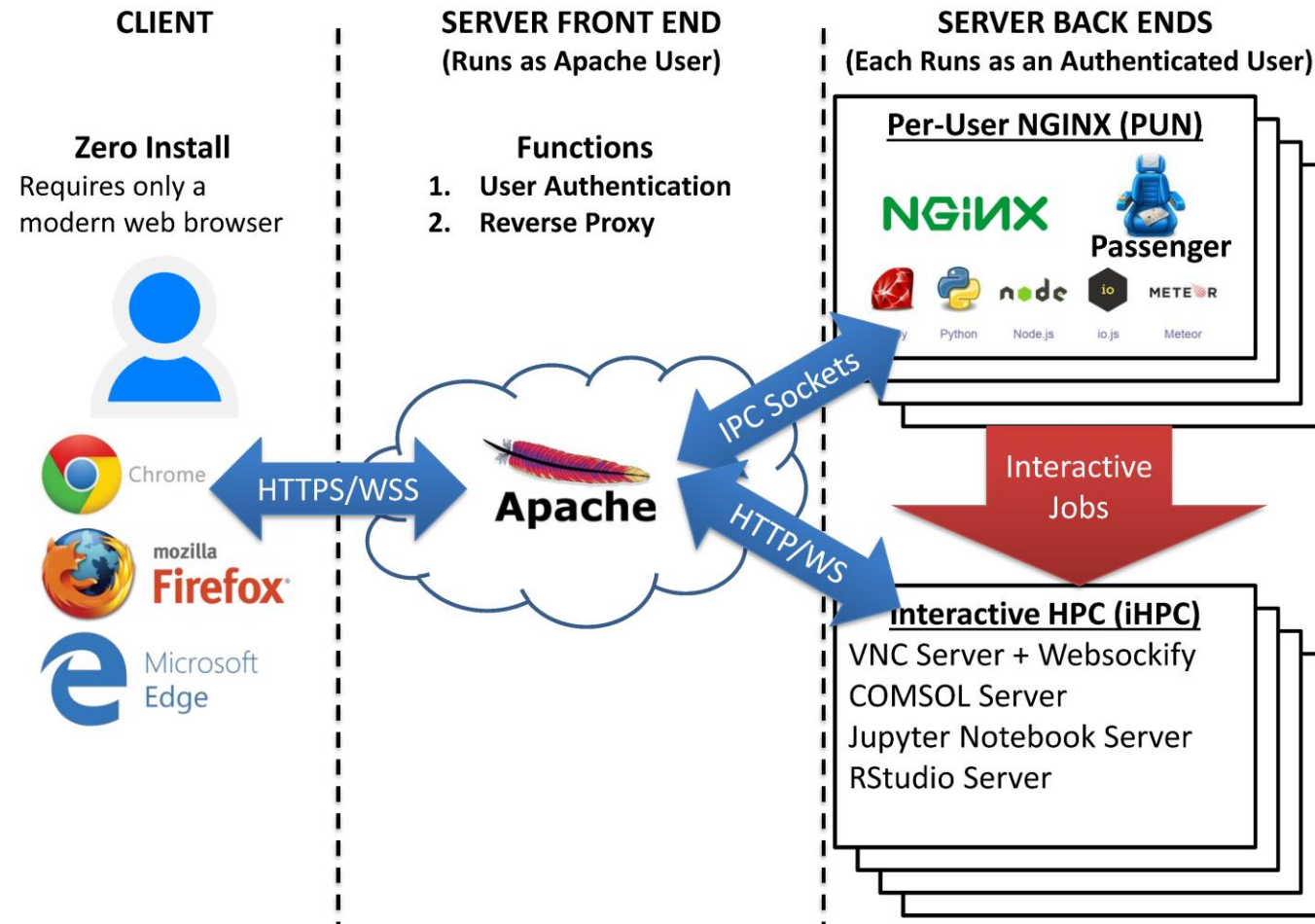
Manage Jobs (view, submit, etc)

Active Jobs									
ID	Name	User	Account	Time Used	Queue	Status	Cluster		
> 3057900.owe...	high_vp_PIV_N_80_PR_1_2_w_tm	osu9725	PAS1136		parallel	Hold	Owens		
> 3130444.owe...	RASPA_convert	osu1842	PA00026	140:50:24	serial	Running	Owens		
> 3130446.owe...	RASPA_convert	osu1842	PA00026	138:30:25	serial	Running	Owens		
> 3130447.owe...	RASPA_convert	osu1842	PA00026	138:09:22	serial	Running	Owens		
> 3133547.owe...	high_vp_PIV_N_80_choke_wo_tm	osu9725	PAS1136	17:36:02	parallel	Running	Owens		
> 3137260.owe...	Case42	osu8290	PA00008	96:36:34	longserial	Running	Owens		
> 3137285.owe...	Case195	osu8290	PA00008	163:01:58	longserial	Running	Owens		
> 3137292.owe...	Case261	osu8290	PA00008	165:44:57	longserial	Running	Owens		

And many more, such as in-browser SSH terminal, job constructors

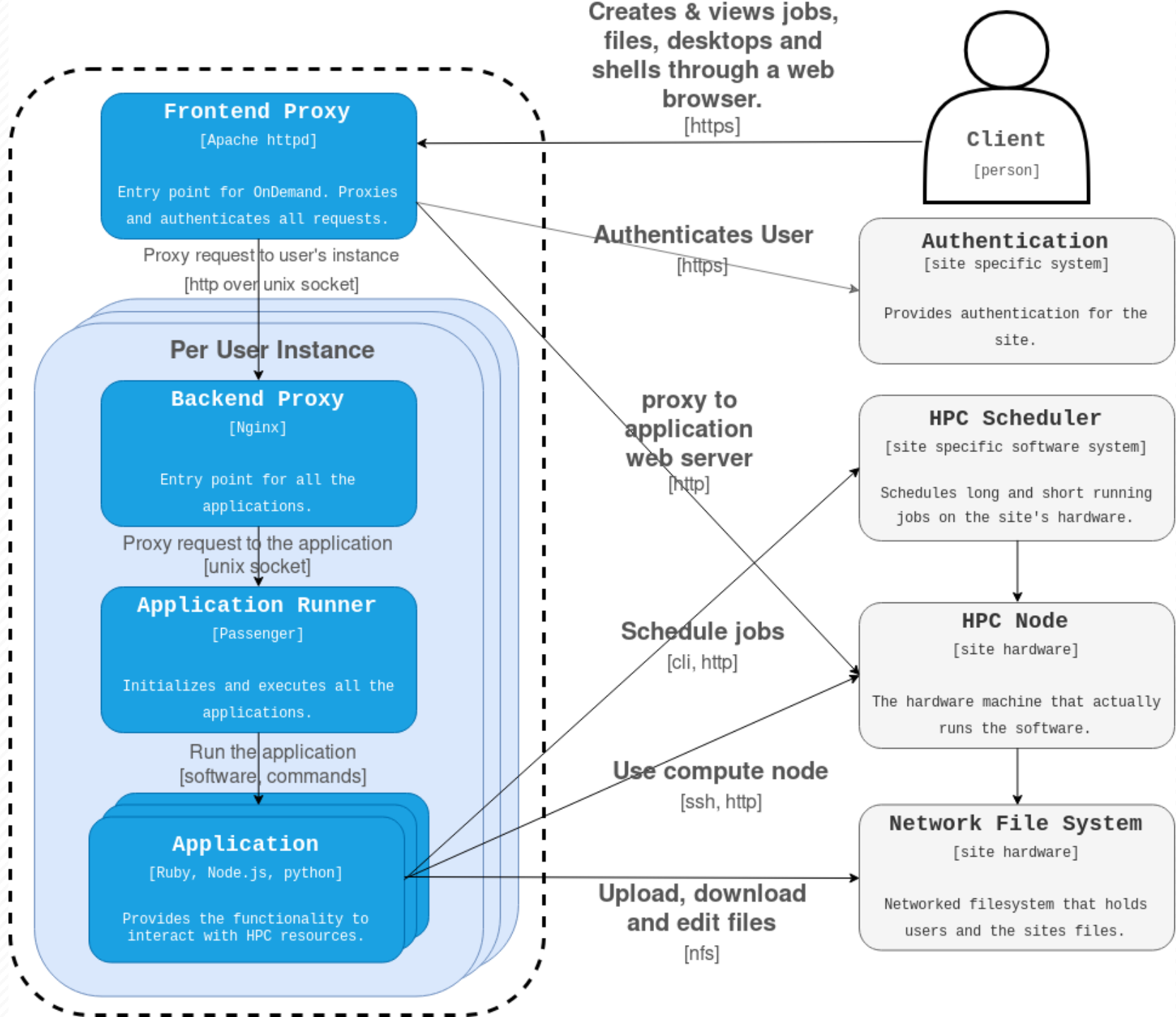


Architecture at a High Level



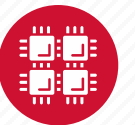
Visualizing the software architecture

- PUN is running as the authenticated user, performs operations as that user
 - Submit jobs
 - Operate on files
 - Phusion Passenger for web application execution
 - Can support user developed web applications securely
- PUNs are started via scripts executed through `sudo`
- Reverse proxy completes secure HTTP communication over SSL to HPC compute resources
 - Replaces the need for user managed SSH tunnels



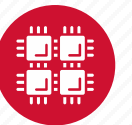
Installation and configuration: System Requirements

- **Hardware**
 - OSC – VMware VM w/ 16 vCPU & 64GB RAM (~120 concurrent users)
- **Operating System**
 - Red Hat based OS – version 6 or 7
- **Batch client software**
 - Needs to be able to submit and query jobs (sbatch, squeue, qsub, qstat, etc)
- **Shared filesystems**
 - Home directories and other cluster filesystems
 - OSC uses NFSv4 home and GPFS over NFS using CES
- **An OnDemand server is more similar to a login node than a standard web server**



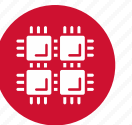
Installation and configuration:

- **YUM repos and RPMs**
 - Enable EPEL and Software Collections (SCL) repos
 - Install OnDemand YUM repo then RPM package
 - We provide Passenger and NGINX as SCL versions were deprecated
- **Configuration files**
 - YAML file per cluster – used to define login and batch environment
 - YAML file to generate Apache configuration
 - All configuration files under `/etc/ood`
- **Services**
 - Manage PUNs via `nginx_stage`
 - `httpd24-httpd`
- **Puppet module**
 - Yumrepo -> Package -> File -> Service



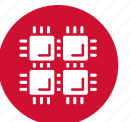
Installation and configuration: Compute Environment

- **Dependencies for Interactive Apps (ie. Desktop)**
 - TurboVNC, websockify, nmap-ncat
 - Modules or installed to system – RPMs available
 - Desktop environment (XFCE, MATE, etc)
- **Modules environment**
 - Lmod or TCL, something to load modules
- **Singularity**
 - Mostly for RStudio Server
 - More apps using Singularity in the future
- **Firewall**
 - Reverse proxy for OnDemand needs to connect to HPC resources



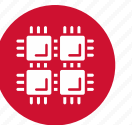
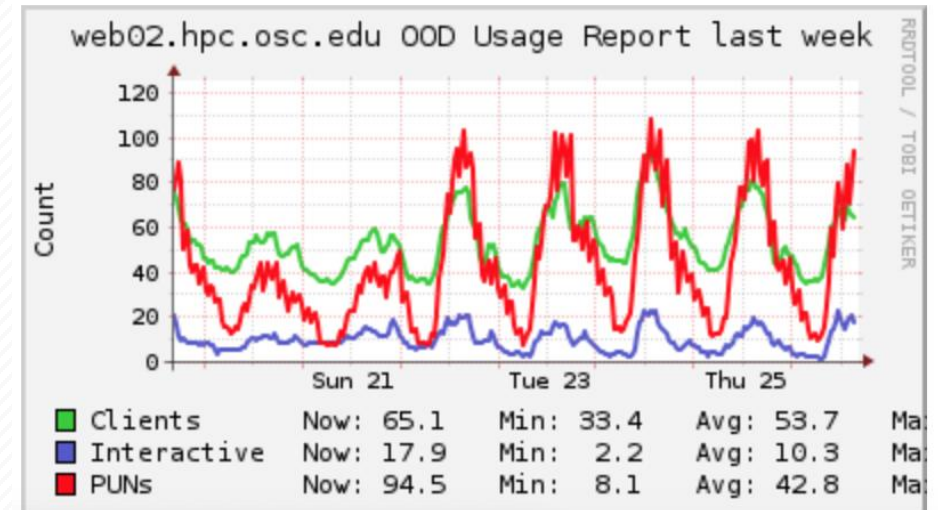
Installation and configuration: Interactive application considerations

- **Ensure short wait times for Interactive apps**
 - OSC uses “quick” batch environment with dedicated nodes
 - Moab tuned for 3s scheduling interval
 - SLURM sites could use dedicated partition or high priority QoS
 - Another possible solution is over subscription
 - Management of interactive access to HPC resources is not a solved problem
- **Must be enabled in Apache**
 - Interactive reverse proxy Apache configs not enabled by default



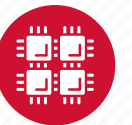
Considerations for Production:

- **Upgrades – “yum update ondemand”**
 - OnDemand Apache changes outside YAML will be lost but old config backed up
 - PUN cleanup and restarts can be slow if lots of logged in users
 - Any steps needed outside RPM update will be in Release Notes
 - In-service upgrades possible
- **Separate environments: dev -> test -> production**
 - dev: Developers have elevated privileges, soon will pull RPMs from CI/CD
 - test: A mirror of production but receives all updates first
- **Backups**
 - Configuration files - /etc/ood
 - Custom apps - /var/www/ood
 - Apache configs - /opt/rh/httpd24/root/etc/httpd/conf.d
- **Monitoring**
 - <https://github.com/OSC/ondemand-metrics>
 - Ganglia – nginx_stage + procfs + Apache status
- **App Development**
 - Enable per-user or for everyone
 - Code run on OnDemand web node as user, becomes login node



Build Environment

- **ondemand-packaging**
 - <https://github.com/OSC/ondemand-packaging>
 - Builds RPMs for ondemand and apps using docker + mock
 - Intended to facilitate custom app packaging
- **CI/CD**
 - Build RPM for every tag (includes pre-release tags)
 - Github to Gitlab CI/CD utilizing ondemand-packaging
- **Images for testing**
 - <https://github.com/OSC/ood-images>
 - Docker, Vagrant, Vagrant w/ SLURM, VMware images



Questions/discussion and Resources

- Open OnDemand User Group at PEARC19
 - **July 30, 5:15-6:15pm, room “Crystal C”**
- Visit our website
 - <http://openondemand.org>
- Use our Discourse
 - <https://discourse.osc.edu/c/open-ondemand>
- Join our mailing list
 - <https://lists.osu.edu/mailman/listinfo/ood-users>
- Our webinars are planned roughly quarterly
 - Let us know what you'd like to learn about next

OPEN OnDemand

Open-source project based on the Ohio Supercomputer Center's OnDemand platform

[View On GitHub](#) [Read The Docs](#) [Join the Mailing List](#)

Open OnDemand is an NSF-funded open-source HPC portal based on OSC's original OnDemand portal. The goal of Open OnDemand is to provide an easy way for system administrators to provide web access to their HPC resources, including, but not limited to:

- Plugin-free web experience
- Easy file management
- Command-line shell access
- Job management and monitoring across different batch servers and resource managers
- Graphical desktop environments and desktop applications

See the [documentation](#) for installation directions, app development tutorials, and an overview of the components and applications that make up OnDemand.

Webinars

Date	Title	Slides	Media
2017-03-08	Introducing Open OnDemand	Download	Video
2017-06-07	Open OnDemand: Supporting your HPC needs now more than ever	Download	Video
2017-09-06	Open OnDemand - Jupyter, iHPC, and Authentication	Download	Video - Missing 1st 9.5 min Audio - Complete

Further reading after reading the documentation:

- [OSC App Deployment Strategy](#)
- [OSC CILogon Authentication Strategy](#)

This project is maintained by the Ohio Supercomputer Center (OSC), a member of the Ohio Technology Consortium, the technology and information division of the Ohio Department of Higher Education.

This material is based upon work supported by the National Science Foundation under grant numbers 1534949.

