



# HPC SUMMIT DIGITAL 2020 INTEGRATING CLOUD TOOLS TO HPC WORKFLOWS

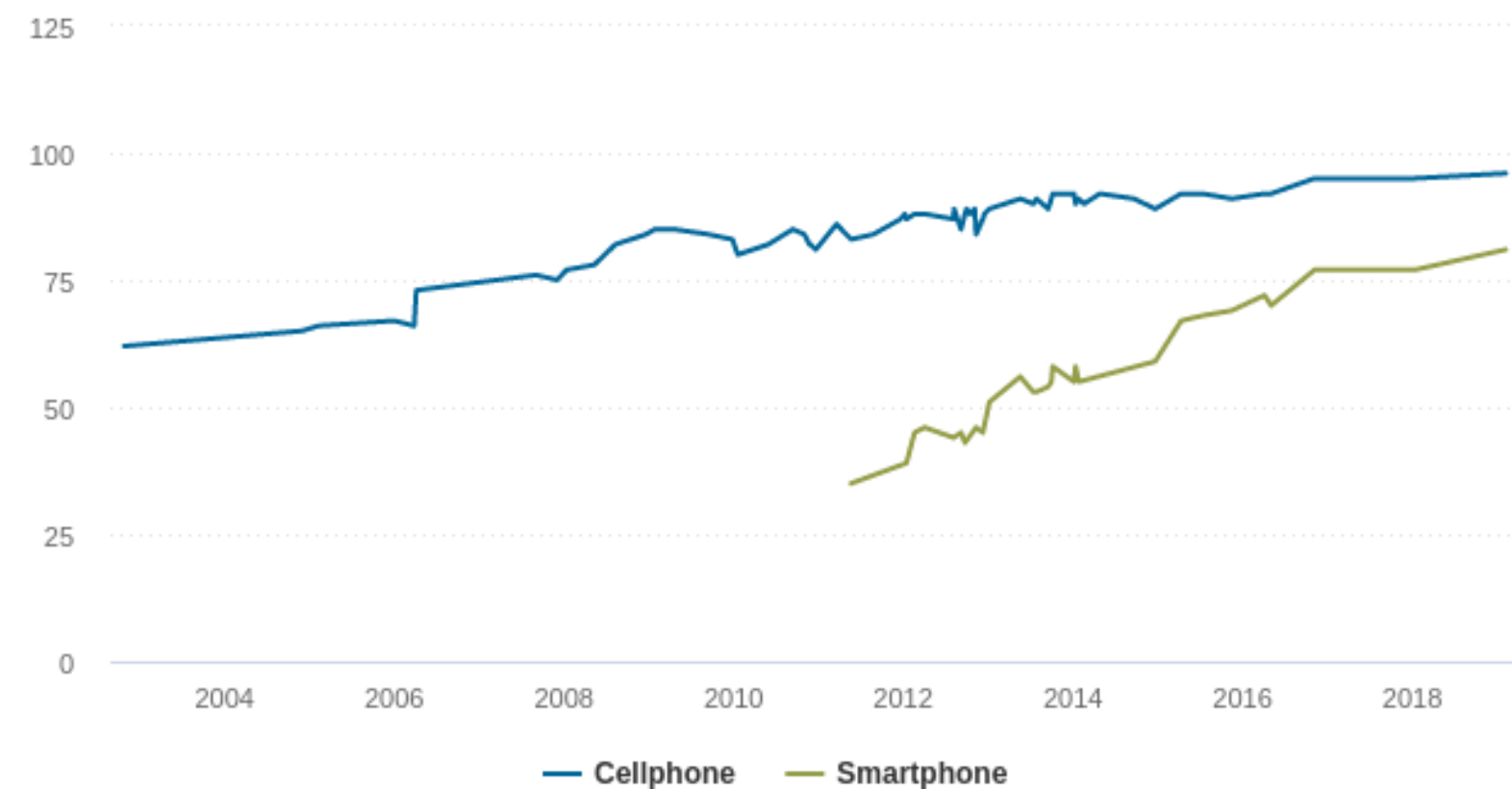
Alan Chalker, Ph.D. 7/2/20



# A DECADE OF CHANGING DEVICES

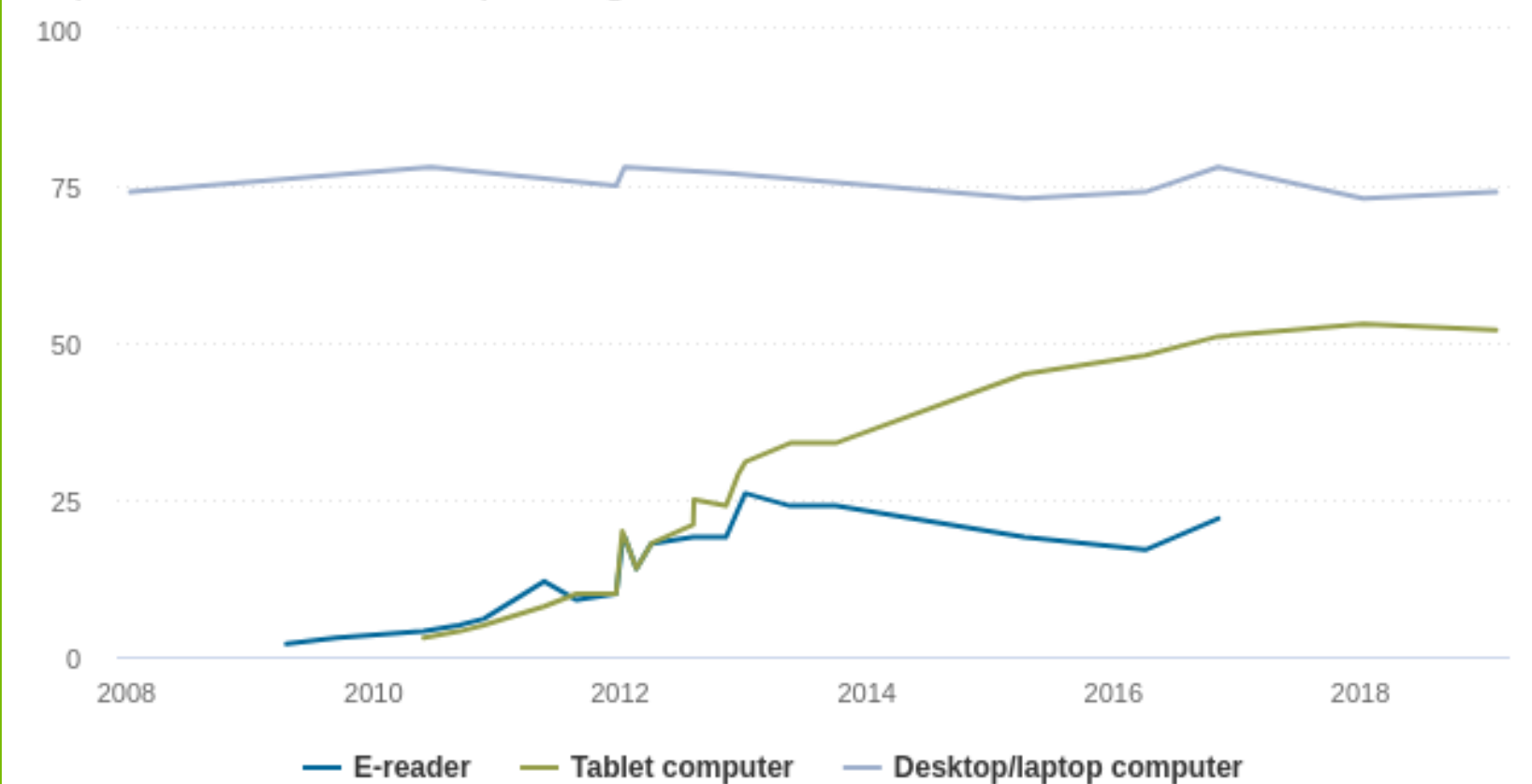
## Mobile phone ownership

% of U.S. adults who own the following devices



## Ownership of other devices

% of U.S. adults who own the following devices



***“In contrast to the largely stationary internet of the early 2000s, Americans today are increasingly connected to the world of digital information while “on the go” via smartphones and other mobile devices.”***

# HPC HARDWARE BECOMING EASILY ACCESSIBLE



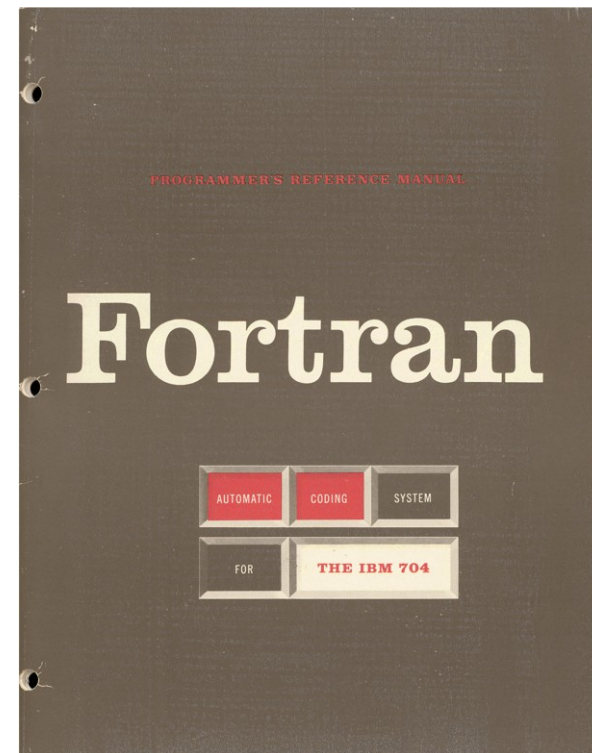
1990



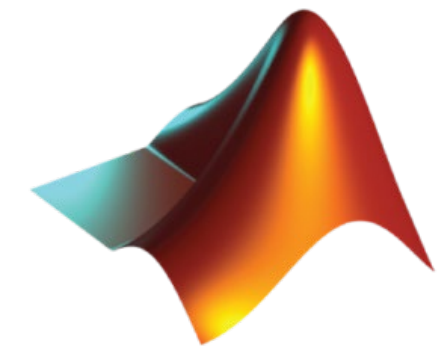
2020



# HPC SOFTWARE FOLLOWING SIMILAR TRENDS



1990

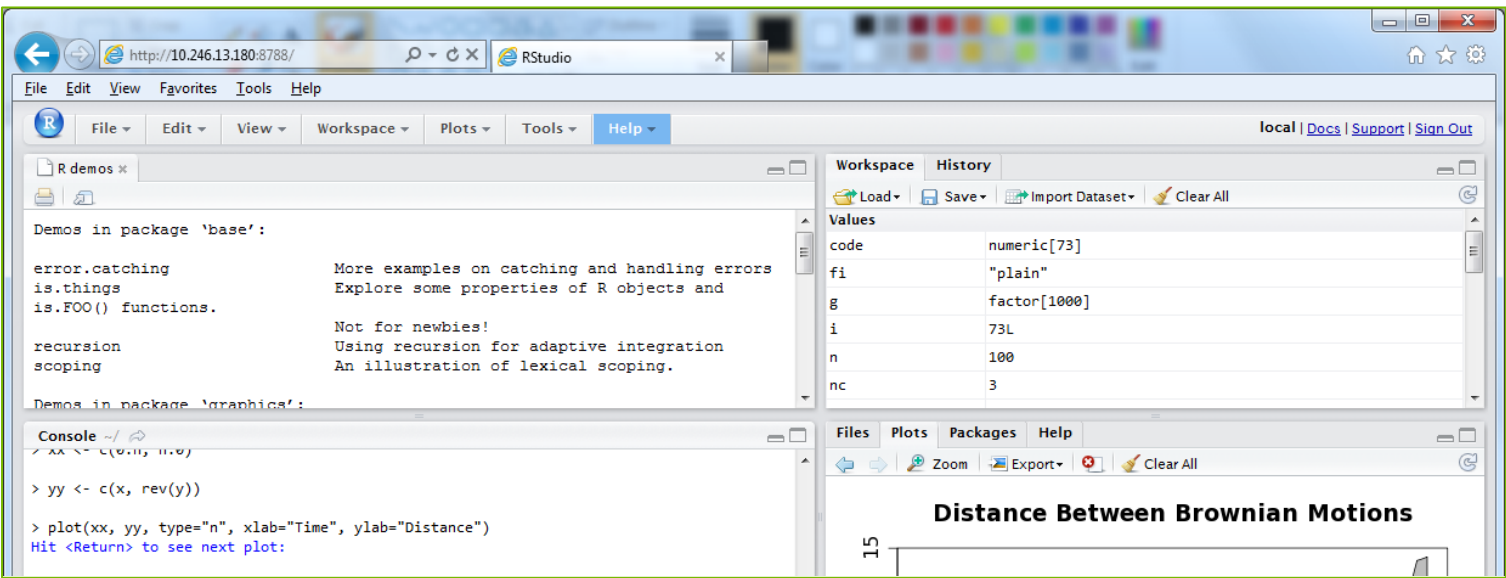


MATLAB

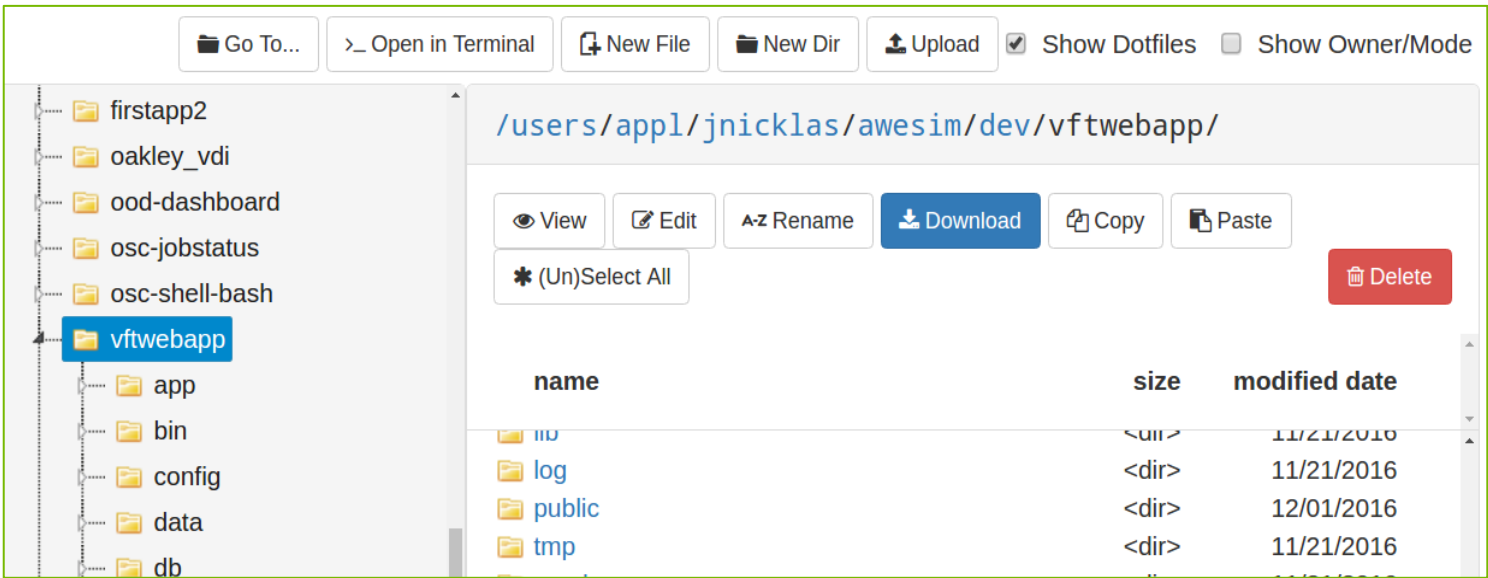


2020

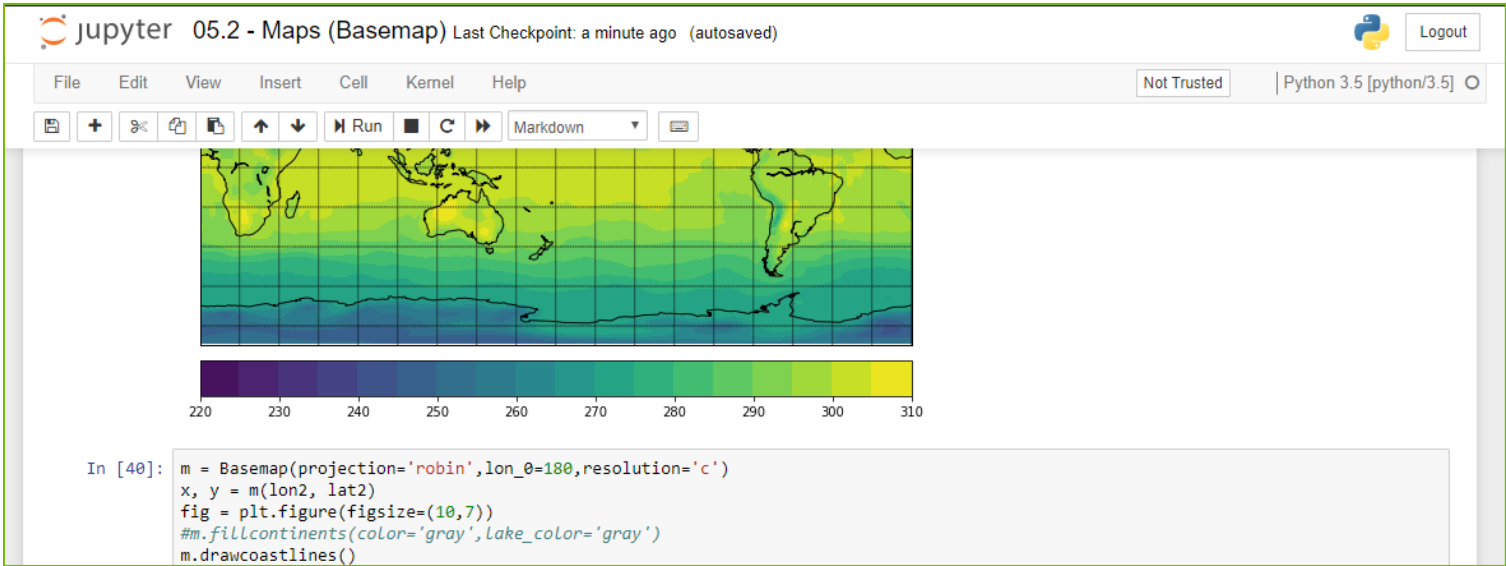
# CLIENT NEEDS: INTERACTIVE APPS & CLUSTER ACCESS



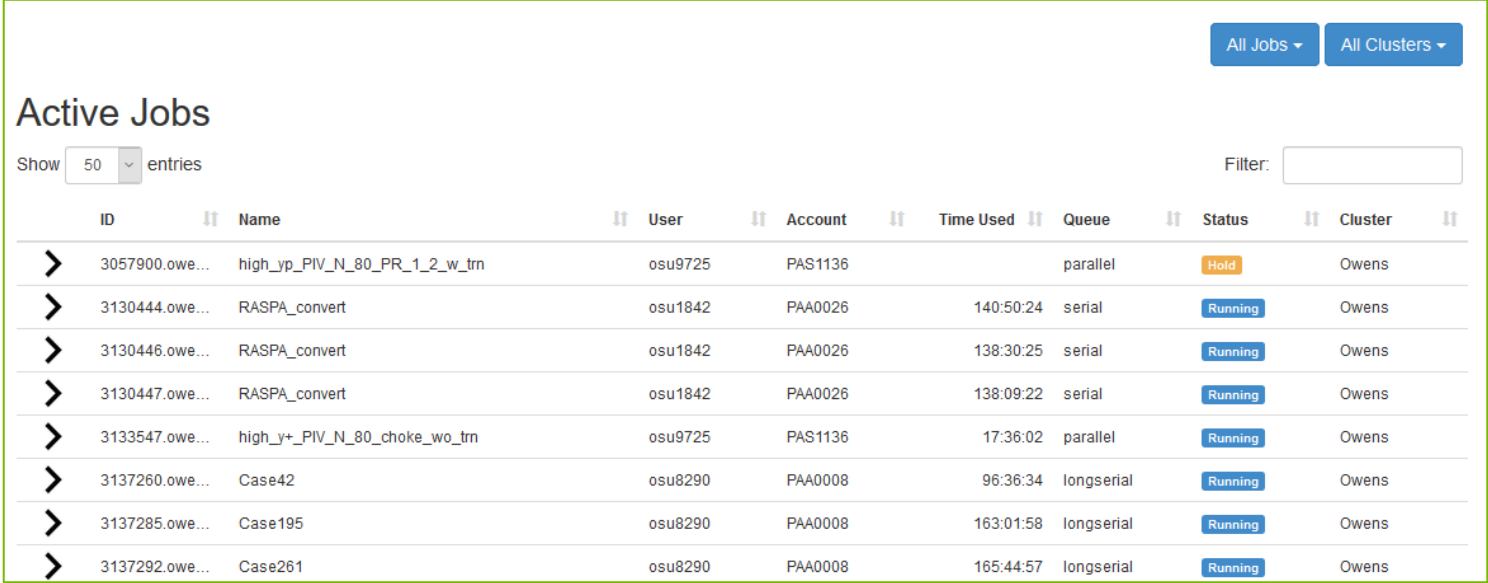
RStudio Server - R IDE



File Access (browse, edit)



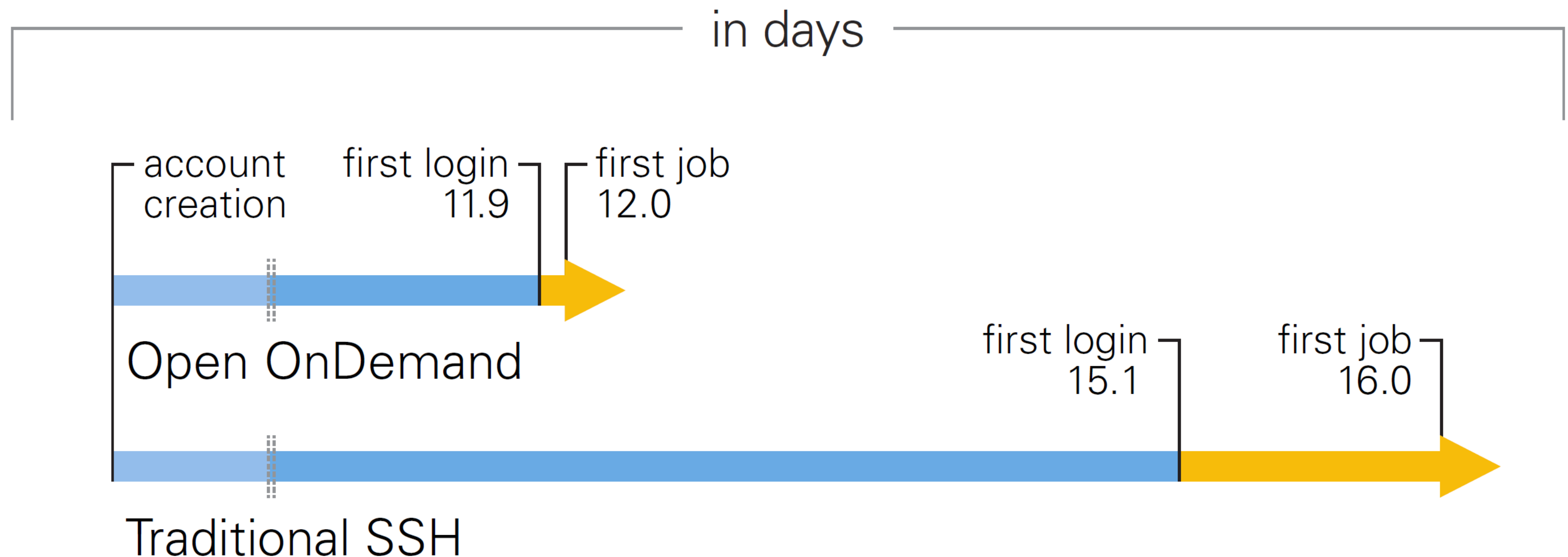
Jupyter Notebook - Python IDE  
and many more! ANSYS, Abaqus,  
MATLAB, COMSOL



								All Jobs	All Clusters
Active Jobs									
Show	50	entries						Filter:	
ID	Name	User	Account	Time Used	Queue	Status	Cluster		
> 3057900.owe...	high_yp_PIV_N_80_PR_1_2_w_trn	osu9725	PAS1136		parallel	Hold	Owens		
> 3130444.owe...	RASPA_convert	osu1842	PAA0026	140:50:24	serial	Running	Owens		
> 3130446.owe...	RASPA_convert	osu1842	PAA0026	138:30:25	serial	Running	Owens		
> 3130447.owe...	RASPA_convert	osu1842	PAA0026	138:09:22	serial	Running	Owens		
> 3133547.owe...	high_y+_PIV_N_80_choke_wo_trn	osu9725	PAS1136	17:36:02	parallel	Running	Owens		
> 3137260.owe...	Case42	osu8290	PAA0008	96:36:34	longserial	Running	Owens		
> 3137285.owe...	Case195	osu8290	PAA0008	163:01:58	longserial	Running	Owens		
> 3137292.owe...	Case261	osu8290	PAA0008	165:44:57	longserial	Running	Owens		

Manage Jobs  
and much more! SSH, VNC, Job  
constructors

# RESULTS: FASTER TIME TO SCIENCE AND ENGINEERING



Web-based users start work faster than traditional users, both in terms of first login and job submission

# SHAMELESS PLUG FOR ONE SOLUTION

**Open OnDemand: Open, Interactive HPC Via the Web**

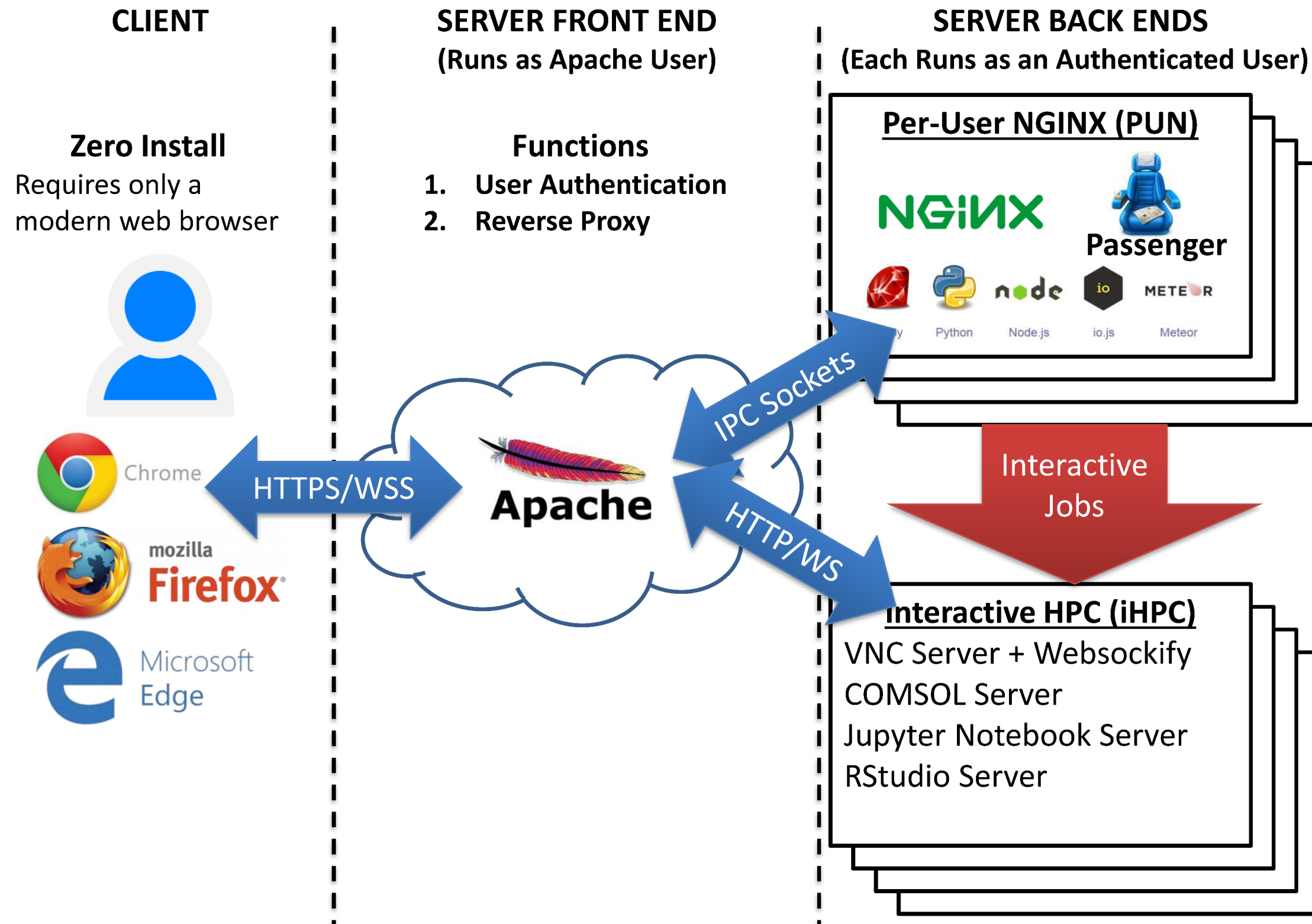
Provides an easy to install and use, web-based access to supercomputers, resulting in intuitive, innovative support for interactive supercomputing.

Features include:

- Fully open-sourced and audited
- Plugin-free web experience
- Easy file management
- Command-line shell access
- Job management and monitoring
- Graphical desktop environments and applications

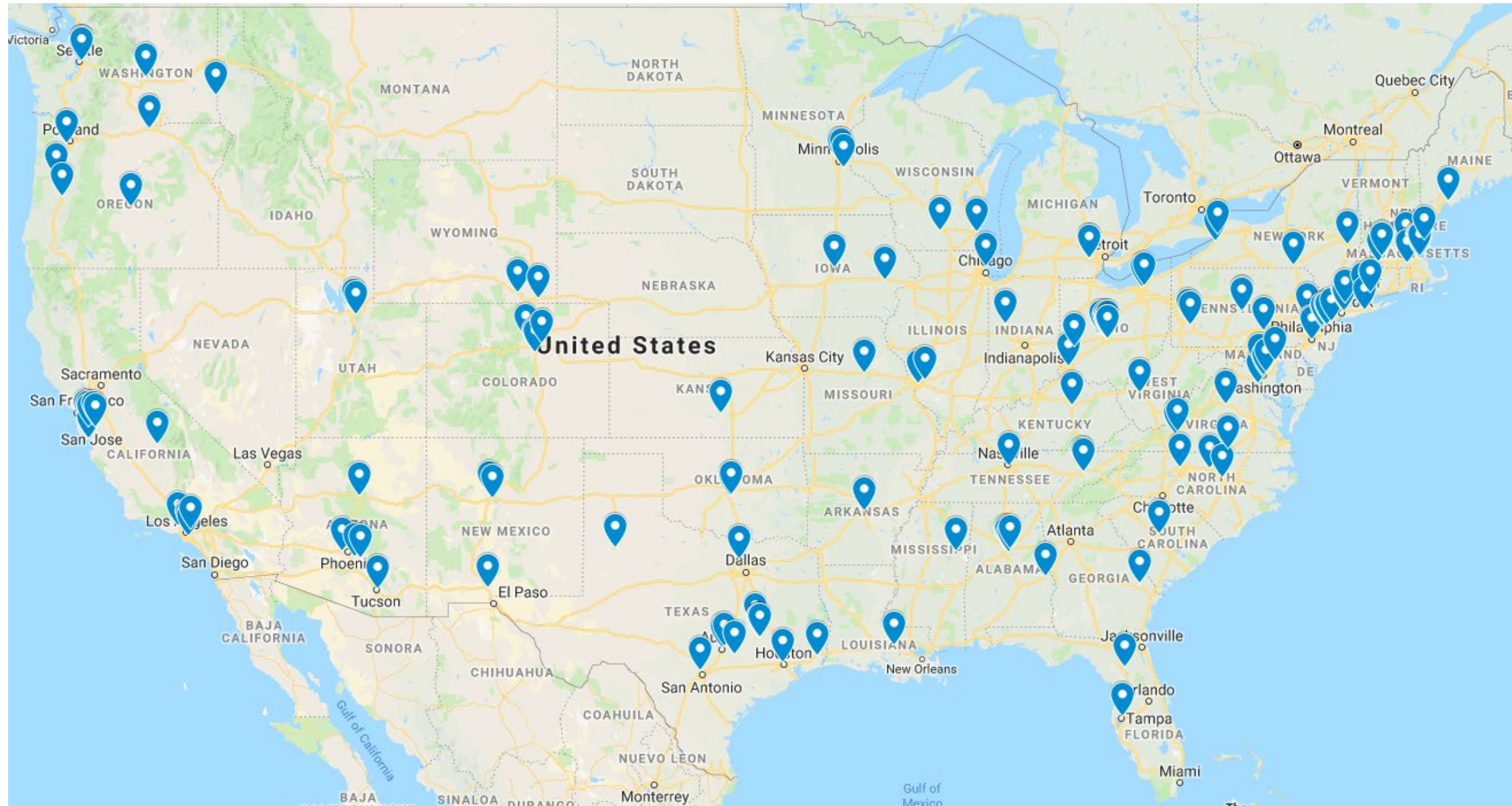


# OPEN ONDEMAND ARCHITECTURE





# APPROX NUMBER OF INSTITUTIONS BASED ON RPM LOGS



136 unique US locations  
70 unique international locations

# EXAMPLE CURRENT ENGAGEMENTS AND DEPLOYMENTS

## Production Deployments



## In Process of Installing



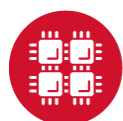


# EIGHT KEY LESSONS LEARNED

- Engage the community on features (Examples: Webinars, Discourse, GitHub issues)
- Be responsive to the community (Example: Rapid Jupyter adoption in recent years)
- Lower the barrier to testing the platform (Example: VM instances, SGCI hosting)
- Think about installation and configuration (Example: RPM-based installation)
- Streamline the user interface (Example: dynamic menu creation based upon permissions)
- Centers want a unified interface (Example: integration with monitoring tools)
- Think about security (Example: TrustedCI review)
- Retain an escape hatch (Example: site-specific temporary hotfixes)

# **OPEN** **nDemand**

 **University at Buffalo**  
Center for Computational Research



**Ohio Supercomputer Center**



[openondemand.org](https://openondemand.org)