



Making HPC Cloud a Reality in the Federal Space

72nd HPC User Forum – Santa Fe, NM

Martin Rieger - ISSM | April 02, 2019



Brief History of Federal Cloud Computing



OCT 2010

General Services Administration (GSA) awards first [Infrastructure-as-a-Service \(IaaS\)](#) Cloud Providers under a [Blanket Purchase Agreement \(BPA\)](#). 12 Cloud Providers were selected.

FEB 2011

White House Issues its [Federal Cloud Computing Strategy](#) “Cloud First Policy”

SEP 2011

NIST releases 800-145, “[The NIST Definition of Cloud Computing](#)”. This was followed in DEC 2011 by NIST 800-144 “[Guidelines on Security and Privacy in Public Cloud Computing](#)” and in MAY 2012 by NIST 800-146 “[Cloud Computing Synopsis and Recommendations](#).”

DEC 2011

The White House releases OMB Memo “[Security Authorization of Information Systems in Cloud Computing Environments](#)” which establishes FedRAMP.

JUN 2012

FedRAMP reaches initial operating capability (IOC) in accordance with OMB FedRAMP memo timelines and the 24 month clock starts for all clouds to meet FedRAMP requirements. [FedRAMP baseline and parameters established.](#)

JAN 2013

[First CSP](#) received a FedRAMP Provisional Authorization (P-ATO).

JUN 2014

All currently implemented cloud services and authorizations must meet the [FedRAMP requirements](#).

Jan 2015

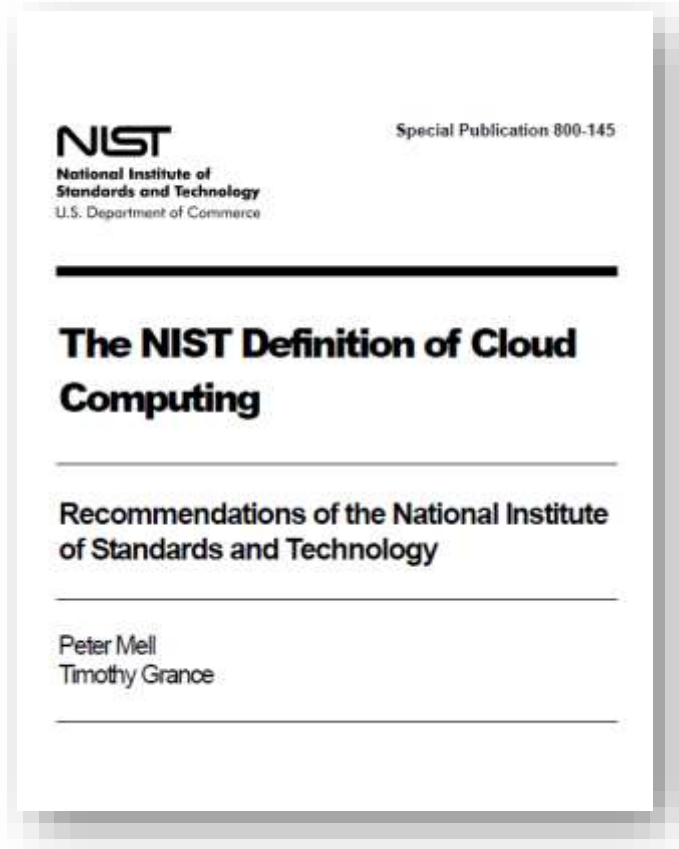
DoD (DISA) releases the Cloud Computing **Security Readiness Guide** (SRG) to supplement FedRAMP.

OCT 2018

OMB Released “[Cloud Smart](#)” as a second strategy to the “*Cloud First Policy*” from 2011.



NIST Definition of Cloud Computing



Special Publication 800-145

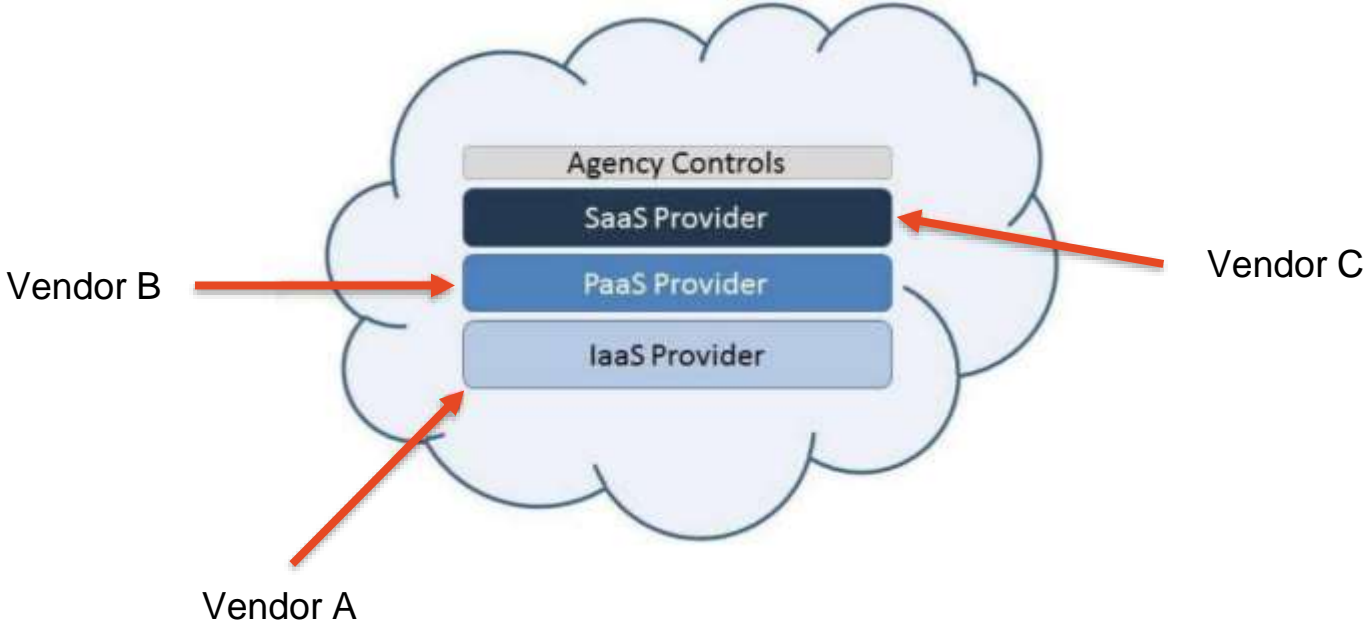
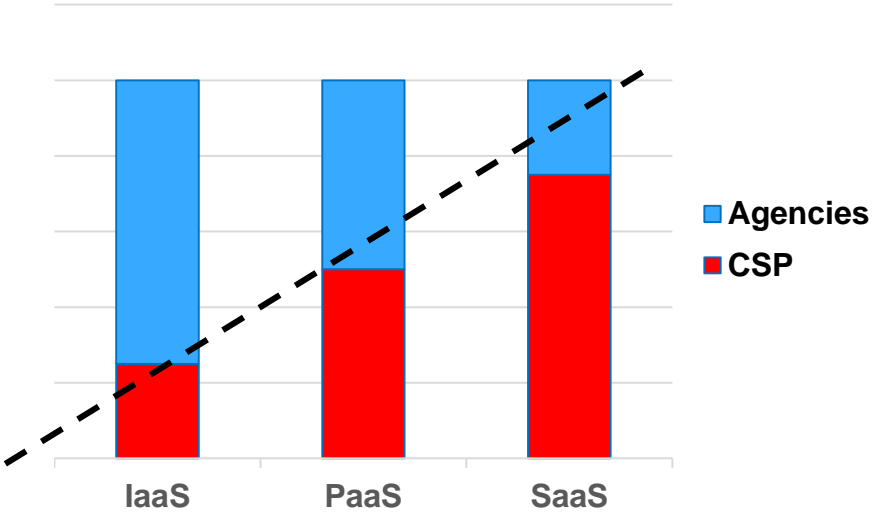
NIST

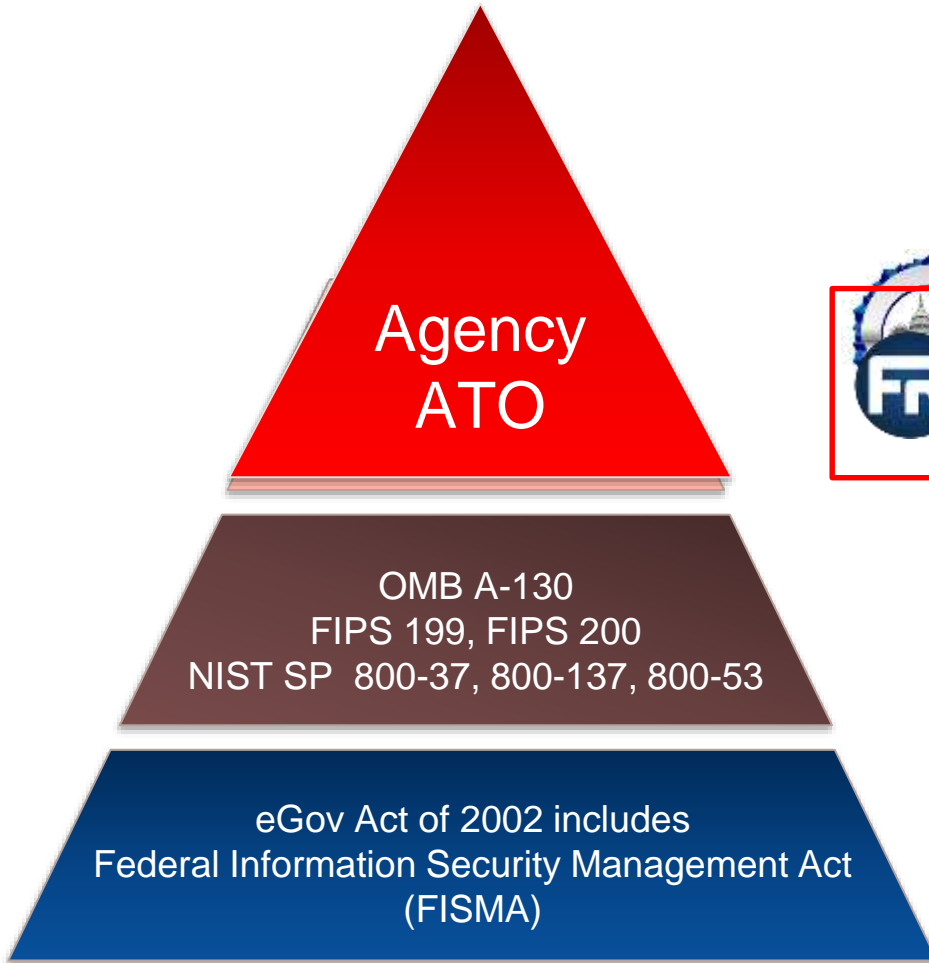
- On-demand Self-service
- Broad network access
- Resource Pooling (*Multi-Tenant Only*)
- Rapid Elasticity
- Measured Service

Definition of Cloud Computing – Service Models



- Software as a Service - *SaaS*
- Platform as a Service – *PaaS*
- Infrastructure as a Service - *IaaS*





Agencies leverage NIST process, heads of agencies (Authorizing Officials) review packages and risk, accept risk, and grant ATOs. FedRAMP builds upon NIST SPs establishing common cloud computing baseline requirements

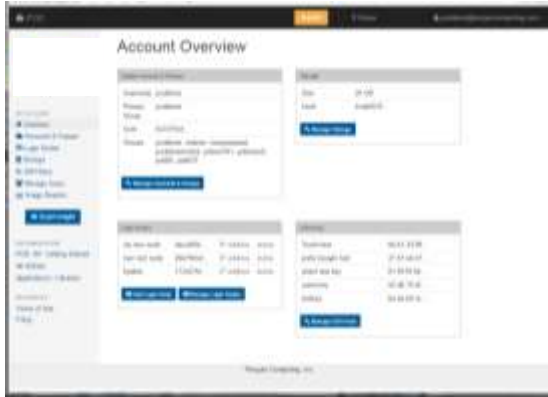


OMB A-130 provides policy, NIST provides what is known as the Risk Management Framework (RMF)

Congress passes FISMA as part of 2002 eGov Act

Source: FedRAMP PMO (modified)

Penguin On-Demand Self Service & Accessibility



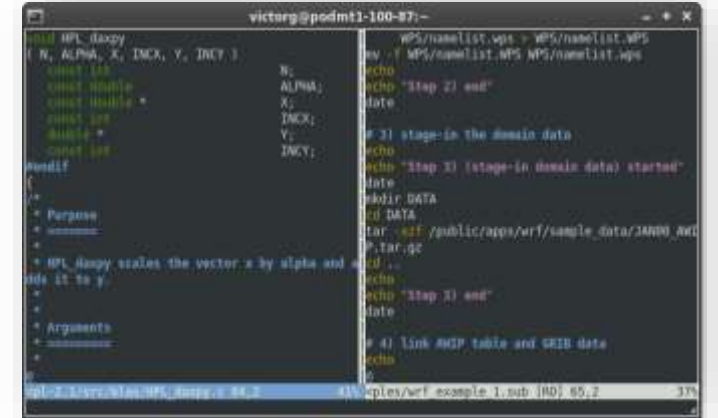
Self Service Web Portal

Account Management
GUI Job Submission
On-demand Usage Reporting



Remote Desktops

GPU Accelerated GFX
3D Accelerated Post-processing
Interactive Visualization



Traditional SSH CLI

Development Environment
Familiar Scheduler Commands
Fine Tune Workflow

Resource Management

PENGUIN COMPUTING | Scyld ClusterWare®

Nodes ▾ Images Boot Groups Attributes Users

Node Status Grid:

Node Filtering:

`node.status.state == "up"` Filters ▾

Color Mapping: Odd-Node-Out

`node.hardware.ram_total` Variables ▾

Colors: common rare other bad none

Show Dimension Controls

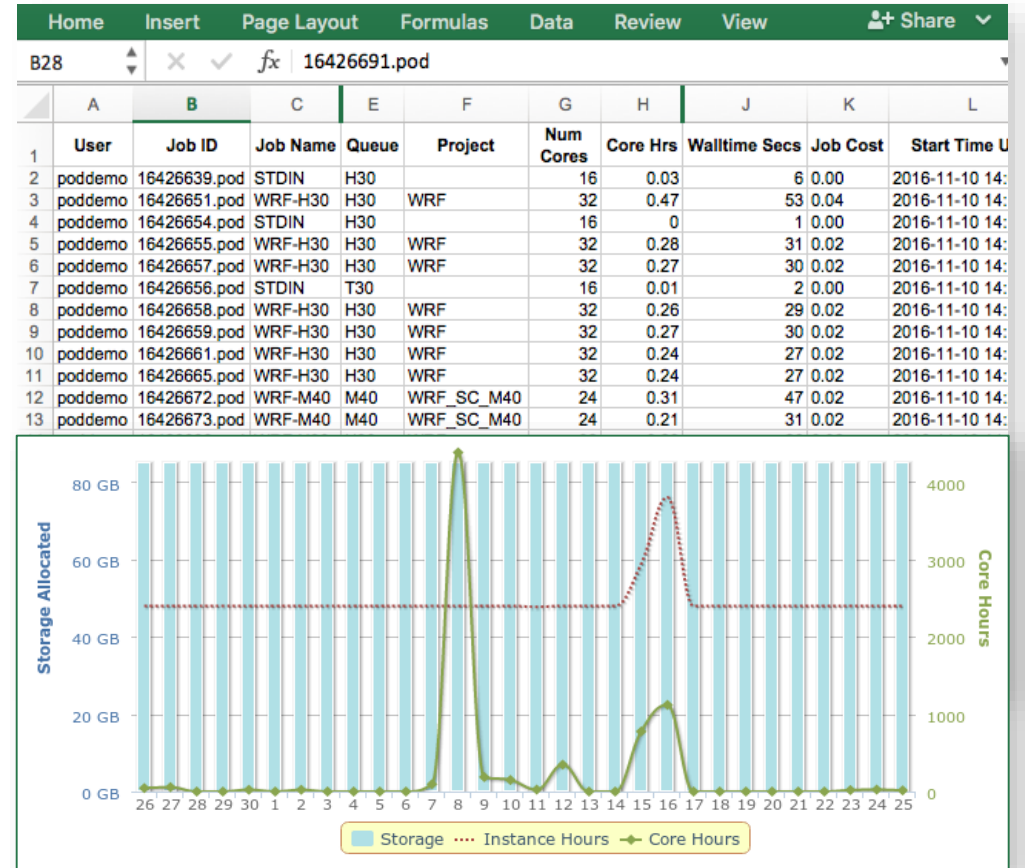
n8	n1	n2	n3	n4	n5	n6	n7	n8
n16	n17	n18	n19	n20	n21	n22	n23	n24
n32	n33	n34	n35	n36	n37	n38	n39	n40
n48	n49	n50	n51	n52	n53	n54	n55	n56
n64	n65	n66	n67	n68	n69	n70	n71	n72
n80	n81	n82	n83	n84	n85	n86	n87	n88
n96	n97	n98	n99	n100	n101	n102	n103	n104
n112	n113	n114	n115	n116	n117	n118	n119	n120
n128	n129	n130	n131	n132	n133	n134	n135	n136
n144	n145	n146	n147	n148	n149	n150	n151	n152
n160	n161	n162	n163	n164	n165	n166	n167	n168
n176	n177	n178	n179	n180	n181	n182	n183	n184




- Easy to use tools for monitoring and alerting
- Manageable node attributes and boot options
- Visualization of "odd node out" to quickly identify problem nodes

Clear Measured Service & Predictable Billing

- Pay per use, no commitment required
- Compute by core hour, metered to 3 seconds
- Storage by average GB per month
- No network bandwidth charges
- Private Login Node included
- Detailed accounting and reporting in XLS format
- Monitor and control charges for your organization



Federal Needs– On Demand HPC Cloud Services



PENGUIN COMPUTING
ON DEMAND

MY ACCOUNT

- Overview
- Accounts & Groups
- Login Nodes
- Storage
- SSH Keys
- Manage Users
- Usage Reports

Scyld Insight

DOCUMENTATION

- POD 101: Getting Started
- All Articles
- Applications / Libraries

RESOURCES

- Terms of Use
- FAQs

Account Overview

System Account & Groups

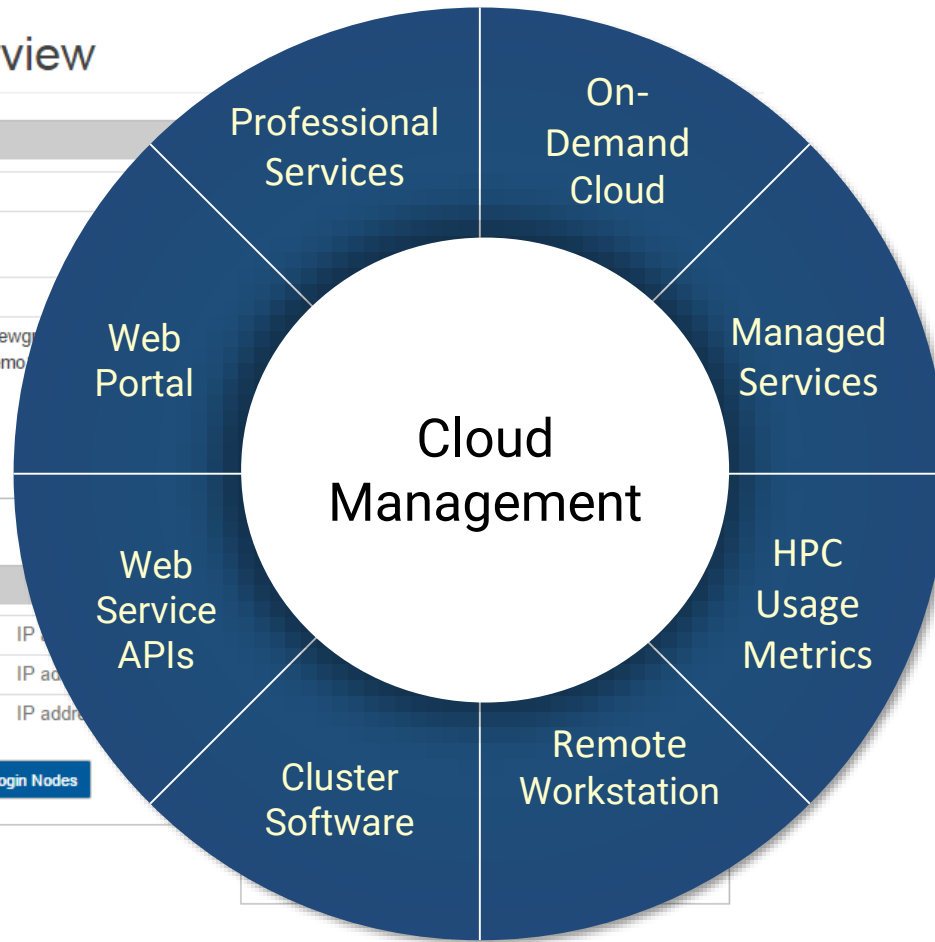
Username	poddemo
Primary Group	poddemo
Uuid	0a7d79cd...
Groups	poddemo, mdemo, newg poddemoinvite2, pdemo pd405, pd4037

Manage Accounts & Groups

Login Nodes

my new node	daccd6fd...	IP
new test node	b9e78e5d...	IP ad
freebie	172c67fd...	IP addr

Add Login Node Manage Login Nodes



On-premise HPC Cloud solution tailored to meet federal compute, storage, and workflow needs.

Simplified ACL management of user access to HPC resources.

Optimized IT processes by eliminating the mundane tasks of user onboarding.

HPC Public Cloud Expectations

Account Overview

JOB	CORE HOURS	STORAGE GB	VM HOURS	CURRENT CHARGES
0	0.00	107.27	0.00	\$10.73

Usage to-date for current billing cycle ending on July 25. All Usage Reports

Login Nodes

POD MT1
To create a VM at this location, set an optional storage quota.
[+ Create a Login Node and Storage](#)

POD MT2

Hostname / IP	VM Type	Image	Status
	pod.acw	MT2 Login Node (CentOS 7)	SHUTOFF

Users & Groups

Username	Name	Registered On
victorg	.me	2013-03-07
victordemo	Victor Gregorio	2017-08-22
victorpenguin	Victor Gregorio	2013-11-13
victorgregorio	Victor Gregorio	2013-09-11

[Manage Users & Groups](#) [User Invitations](#)

- Storage reporting and quota management
- Integration with technologies like TORQUE, Slurm, and GE
- Easy on-boarding with for federal users
- Secure Portal for government access
- Detailed reporting for CIOs and managers
- Enables remote desktop provisioning
- Resource ACL controls with **MFA** support for agency PIV, DoD CAC or HSPD-12

What are Federal Agencies asking for?

HPC Advanced Technologies

- ✓ Ready-to-go HPC
- ✓ Bare metal computing
- ✓ InfiniBand or Omni-Path
- ✓ HPC Support
- ✓ Installed optimized HPC applications
- ✓ Parallel file systems





Thank you for listening.



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