

The background features a dark blue gradient with large, overlapping, semi-transparent shapes in shades of purple, magenta, and orange, creating a dynamic, abstract design.

# AWS re:Invent

NOV. 27 – DEC. 1, 2023 | LAS VEGAS, NV

CMP326

# Design, engineering & simulation on AWS using HPC & virtual desktops

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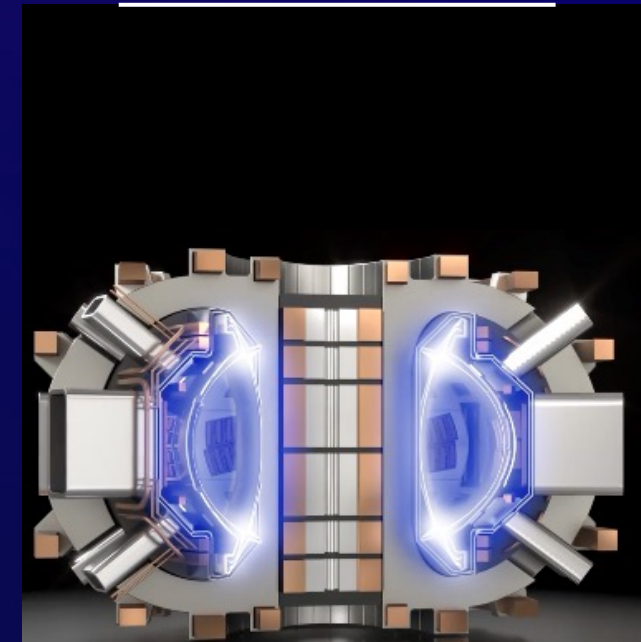
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AWS



# What tools do you need to design the next-generation fusion reactor?

CUSTOMER PROFILE



# Agenda

**01** Blockers to innovation

**02** Architecture of RES

**03** Key features

**04** Integration with AWS  
ParallelCluster

**05** Demo

**06** Q&A

# Innovation blockers in research and engineering



**Difficulty collaborating** among globally dispersed teams creates work silos leading to time-consuming ad hoc DIY solutions

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**IT complexity** takes time and focus away from critical research and engineering projects

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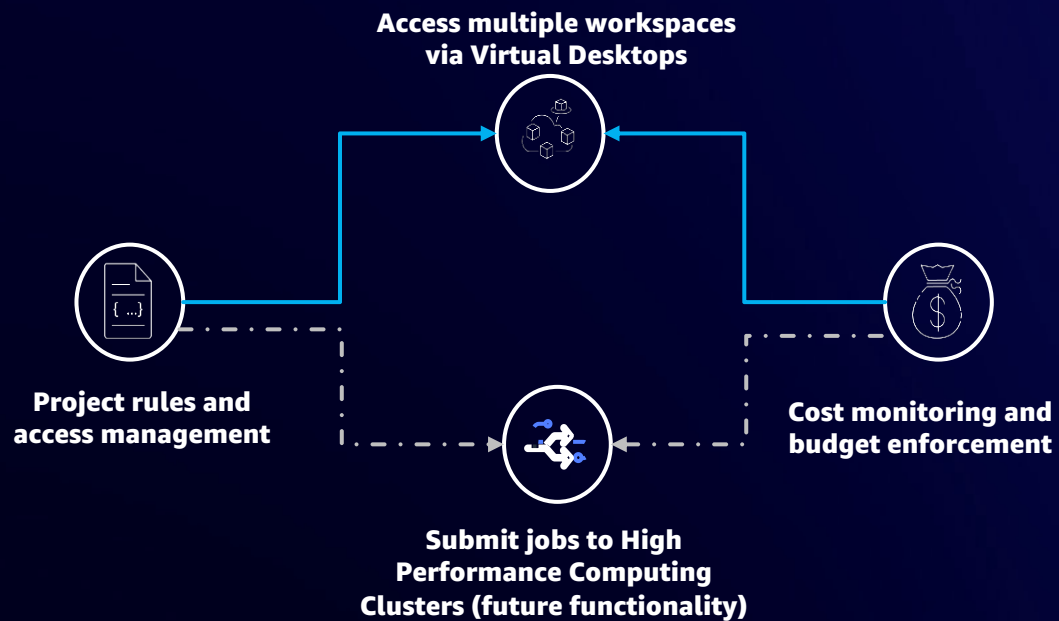
**Fixed compute resources are hard to scale**, leading to lack of agility and flexibility for expanding teams and fast-tracking projects



Easily manage, deploy and run cloud-based research and engineering environments

**Research and Engineering Studio on AWS (RES) is an open source, easy-to-use web-based portal for administrators to manage and create environments to enable researchers and engineers to run workloads without the need for cloud expertise.**

# What is Research and Engineering Studio?



## Research and Engineering Studio on AWS

Deploy and operate computationally intensive workloads.

### Features and Benefits

#### Accelerate time to result

Let your users focus on what they do best by simplifying access to a broad range of AWS infrastructure and services.

#### Improve collaboration

Enable your engineers and researchers to collaborate in a common environment with access to shared data.

#### Security and compliance

Allows IT administrators to standardize engineering and research workspaces and maintain consistent security, compliance and governance.

#### Web-based user interface

Research and Engineering Studio includes a simple web UI designed to simplify user interactions.

#### Simplify user management

Easily integrate with you existing identity management infrastructure to minimize administrative overhead.

#### Management and governance

Manage access to resources and data at a project level. Monitor and manage costs for each project with a simple interface.

### Getting started [🔗](#)

[What is Research and Engineering Studio on AWS? \[🔗\]\(#\)](#)

[Getting started with Research and Engineering Studio on AWS](#)

### More resources [🔗](#)

[Documentation](#)

[Report an Issue](#)

# Virtual desktop access

WINDOWS AND LINUX

The screenshot displays the AWS Virtual Desktops console interface. At the top, there are navigation tabs for 'All', 'Windows', and 'Linux', along with buttons for 'Join Session' and 'Launch new Virtual Desktop'. The main area shows five desktop sessions in a grid:

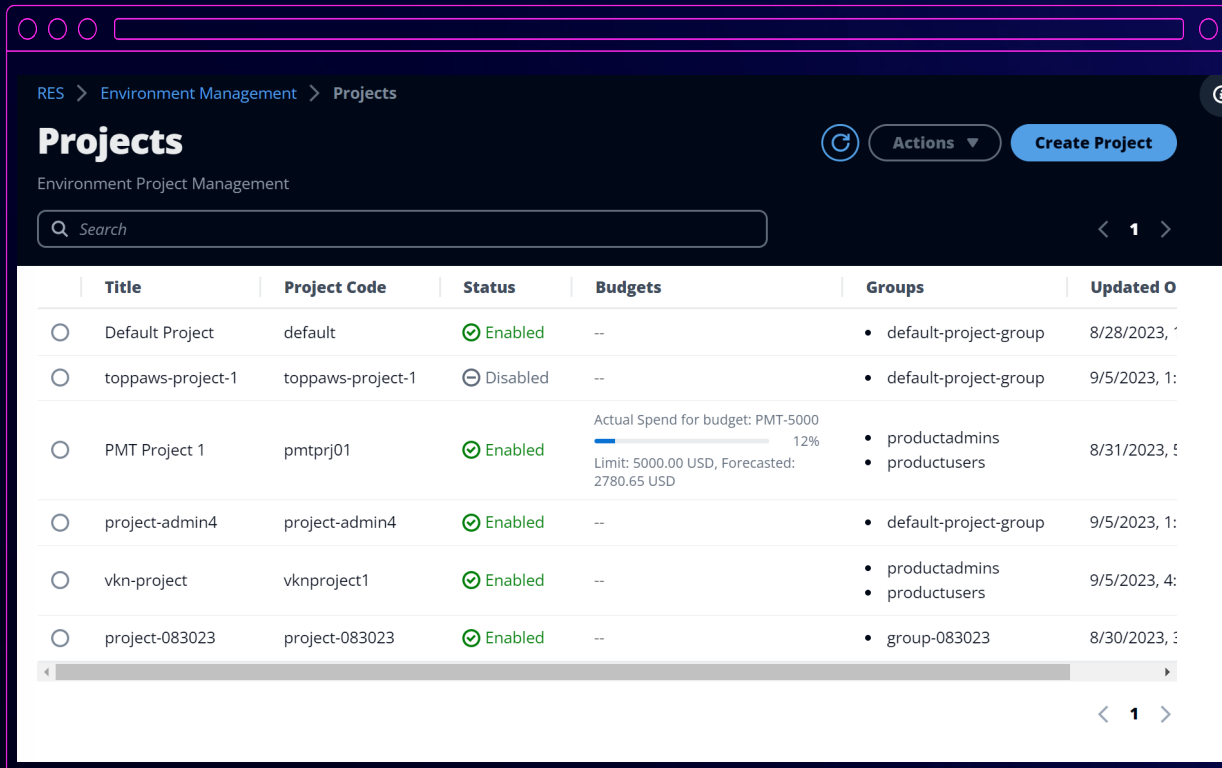
- MyDesktop1:** Amazon Linux 2, t3.small, No Schedule. Desktop environment shows a blue background with icons for Home, WWORD.EEXE, Trash, and Myt.
- Centos7:** CentOS 7, t3.medium, Working Hours. Desktop environment shows a blue background with icons for Home, WWORD.EEXE, Trash, and Myt. A notification for software updates is visible.
- windooooows:** Windows, g4dn.xlarge, No Schedule. Desktop environment shows the Windows 10 desktop with the blue background.
- CAE:** Windows, g4dn.4xlarge, No Schedule. Desktop environment shows a 3D CAD application interface.
- MyDesktop5:** Amazon Linux 2, c5a.24xlarge, No Schedule. Desktop environment shows a blue background with a terminal window and a file explorer.

Each session card includes a 'Connect' button, a 'DCV Session File' download button, and an 'Actions' dropdown menu.



# Project-based accounting

TRACK COSTS BY PROJECT



The screenshot displays the AWS Project-based accounting interface. At the top, there is a breadcrumb trail: RES > Environment Management > Projects. Below this, the title 'Projects' is shown, along with a refresh icon, an 'Actions' dropdown menu, and a 'Create Project' button. A search bar is located below the title. The main content is a table with the following columns: Title, Project Code, Status, Budgets, Groups, and Updated On. The table lists several projects, including 'Default Project', 'toppaws-project-1', 'PMT Project 1', 'project-admin4', 'vkn-project', and 'project-083023'. The 'PMT Project 1' row includes a budget progress bar showing 12% actual spend for a 5000.00 USD limit, with a forecasted spend of 2780.65 USD.

	Title	Project Code	Status	Budgets	Groups	Updated On
<input type="radio"/>	Default Project	default	Enabled	--	• default-project-group	8/28/2023, 1:
<input type="radio"/>	toppaws-project-1	toppaws-project-1	Disabled	--	• default-project-group	9/5/2023, 1:
<input type="radio"/>	PMT Project 1	pmtprj01	Enabled	Actual Spend for budget: PMT-5000 12% Limit: 5000.00 USD, Forecasted: 2780.65 USD	• productadmins • productusers	8/31/2023, 5:
<input type="radio"/>	project-admin4	project-admin4	Enabled	--	• default-project-group	9/5/2023, 1:
<input type="radio"/>	vkn-project	vknproject1	Enabled	--	• productadmins • productusers	9/5/2023, 4:
<input type="radio"/>	project-083023	project-083023	Enabled	--	• group-083023	8/30/2023, 3:

- Track individual team costs using AWS Budgets
- Control access on a project level
- Integrated with Active Directory user and groups

# Research and Engineering Studio (RES)



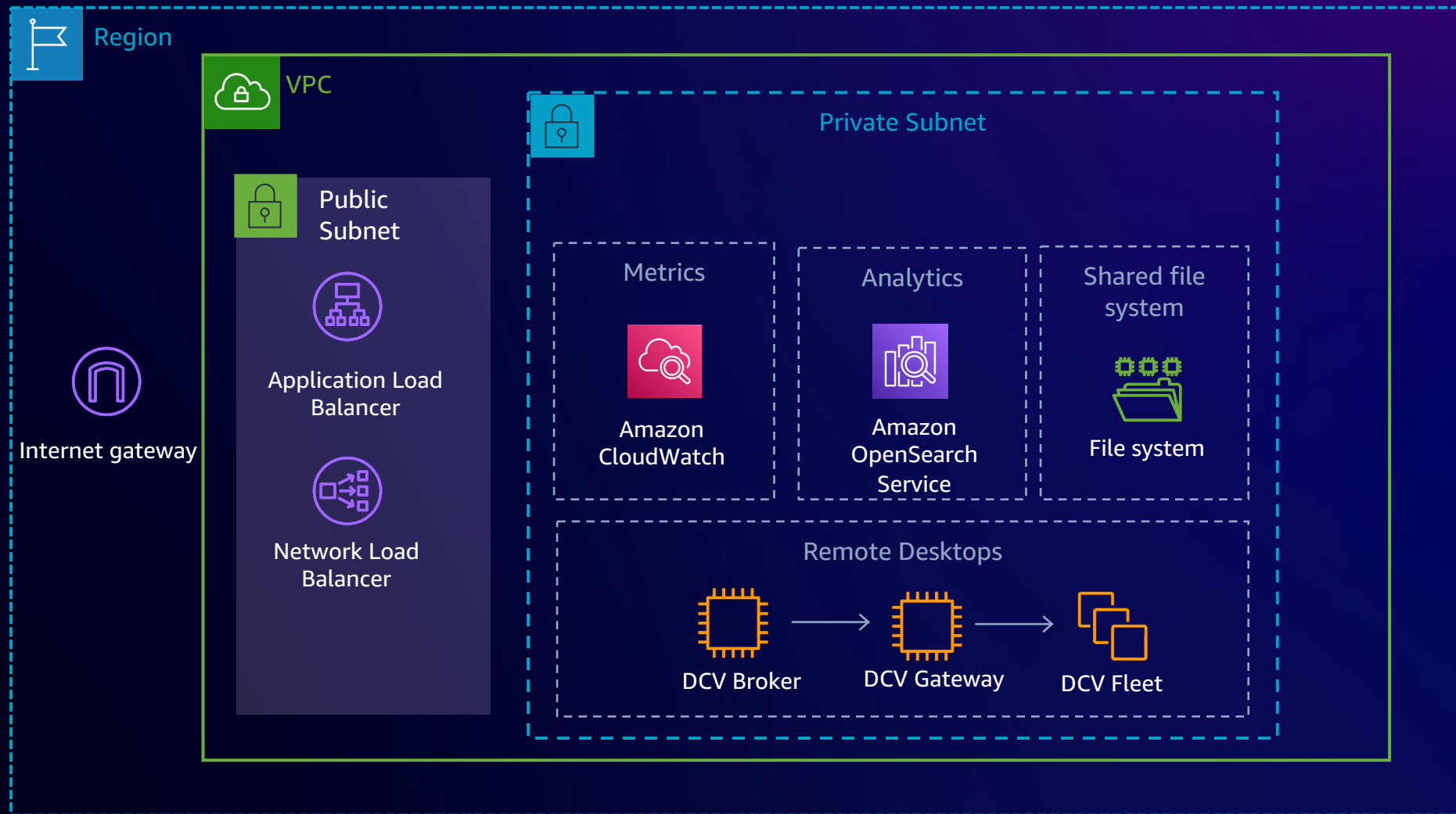
Administrators



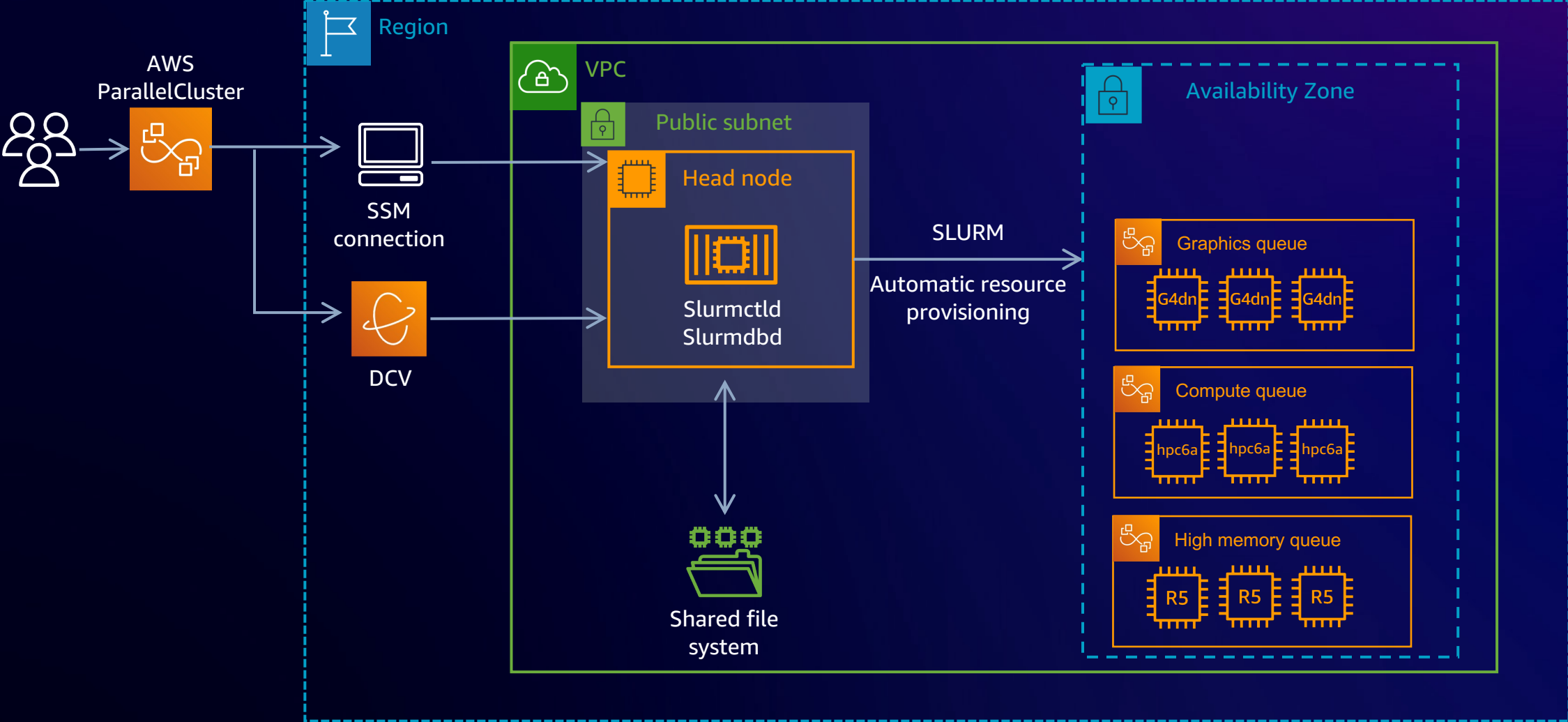
Power users



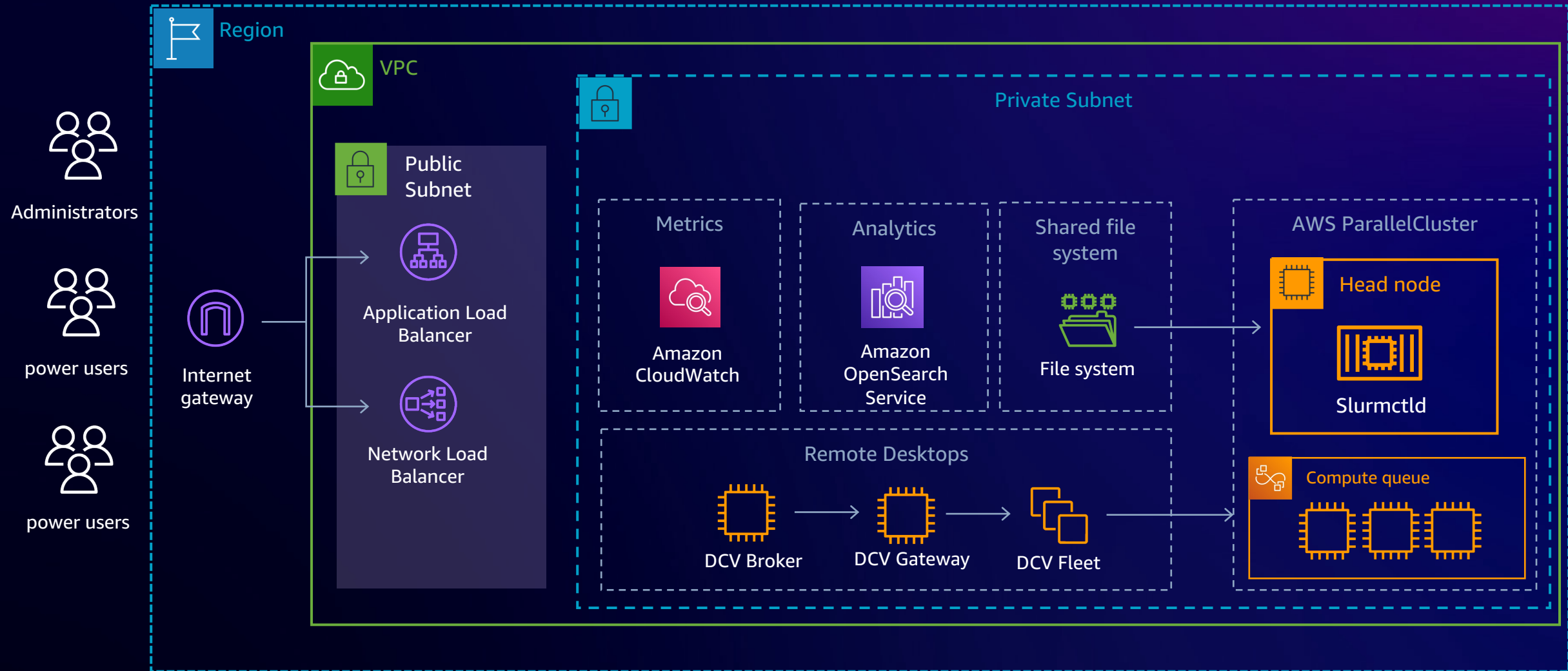
Power users



# AWS ParallelCluster architecture



# Research and Engineering Studio + AWS ParallelCluster



# Two distinct personas – Two distinct advantages

Install, configure, manage

**Admin**



Sys admins

Single pane of glass monitoring  
for AWS usage across projects

Login to a web portal and focus on their tasks

**End users**



Engineers



Analysts



Designers



Researchers

Accelerate time to results – with no learning  
curve to manage AWS resources

# Commonwealth Fusion Systems (CFS)

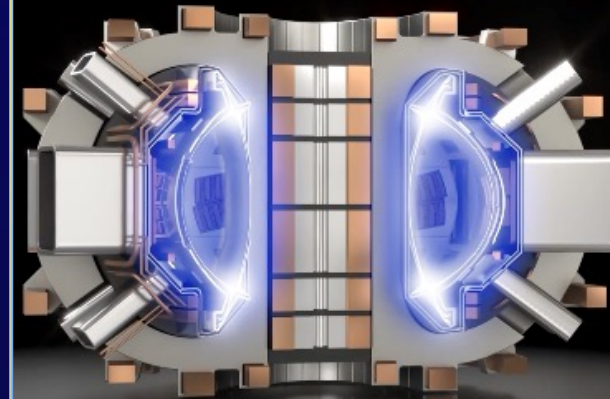
- Ansys Fluent, EM/Maxwell, mechanical
- **10,000+** AWS compute cores to run detailed simulations
- Almost **50%** reduction in runtime
- Reduce compute costs by more than **50%**
- Using Amazon EC2 Hpc6a.48xlarge instances to massively scale up simulations

“CFS has benefited greatly from high performance computing. The new Amazon EC2 Hpc6a has been a game changer. . . . We’ve been able to increase the speed of many simulation tasks, cut runtimes approximately in half, and reduce our computing costs by over 50%. As CFS works to bring clean, limitless commercial fusion energy to the grid, we’re excited to work with AWS and their HPC team.”

**Nate O’Farrell**

Head of IT Infrastructure, Commonwealth Fusion Systems

## CUSTOMER PROFILE



# Thank you!

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Please complete the session survey in the mobile app