RelevanceLab

Migrating Mission-Critical Engineering Simulations to AWS GovCloud with Research & Engineering Studio (RES)

How a leading aerospace engineering organization migrated mission-critical Ansys workloads from on-premises infrastructure to a secure, scalable AWS GovCloud platform powered by AWS Research & Engineering Studio.

Executive Summary

A leading aerospace and space technology organization sought to modernize its engineering simulation environment by migrating from a traditional on-premises tower-based HPC infrastructure running Ansys workloads to a secure, scalable cloud-native platform.

The organization relied on high-performance simulation applications including:

Ansys Thermal Dynamics	Ansys Premium SIwave Plus	Ansys CFD (Computational Fluid Dynamics)	Ansys Mechanical Enterprise

To improve scalability, reduce infrastructure constraints, accelerate simulation turnaround times, and support stringent government compliance requirements, Relevance Lab designed and implemented a secure AWS Research and Engineering Studio (RES) environment within AWS GovCloud.

The solution enabled engineers to seamlessly access cloud-based virtual workstations, elastically scale HPC resources on demand, and continue leveraging existing engineering workflows without disrupting ongoing research and development programs.

Customer Challenges

The customer's existing engineering environment faced several operational and technical limitations:

Infrastructure Constraints

- Fixed-capacity on-premises tower systems
- Lengthy procurement cycles for additional compute capacity
- Limited ability to support peak simulation demand

Engineering Productivity Challenges

- Long wait times for simulation execution
- Resource contention among engineering teams
- Manual provisioning of compute resources

Application Requirements

Support for resource intensive engineering workloads including

- Thermal analysis
- Electromagnetic simulation (SIwave)
- CFD simulations
- Structural and mechanical analysis

Security & Compliance Needs

- Government-regulated workloads
- Secure access controls
- Controlled engineering environments
- Auditable user management processes
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Solution

Relevance Lab implemented a private deployment of AWS Research & Engineering Studio (RES) in AWS GovCloud, integrated with enterprise identity services and high-performance storage.

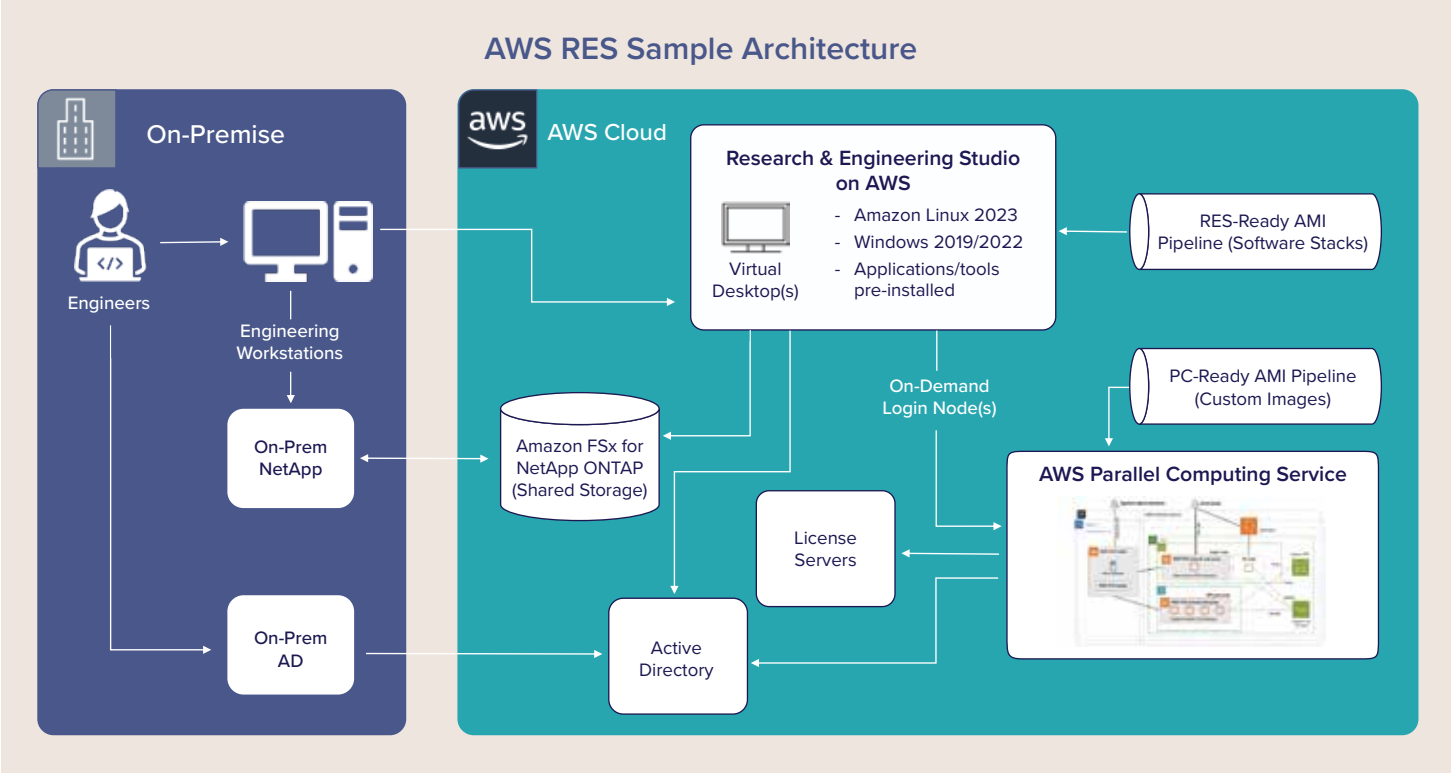
The solution provided:

- ✓ Cloud-hosted engineering workstations
- ✓ Elastic HPC clusters powered by AWS Parallel Computing Service (PCS)
- ✓ Centralized identity and access management
- ✓ Integrated Ansys license management
- ✓ Shared high-performance storage using Amazon FSx for NetApp ONTAP
- ✓ Automated user onboarding and desktop provisioning
- ✓ Secure remote access through VPN and controlled network boundaries

Target Architecture

AWS RES Reference Architecture

The engineering environment was built around AWS Research & Engineering Studio, providing engineers with virtual desktops connected to scalable HPC resources and shared storage.

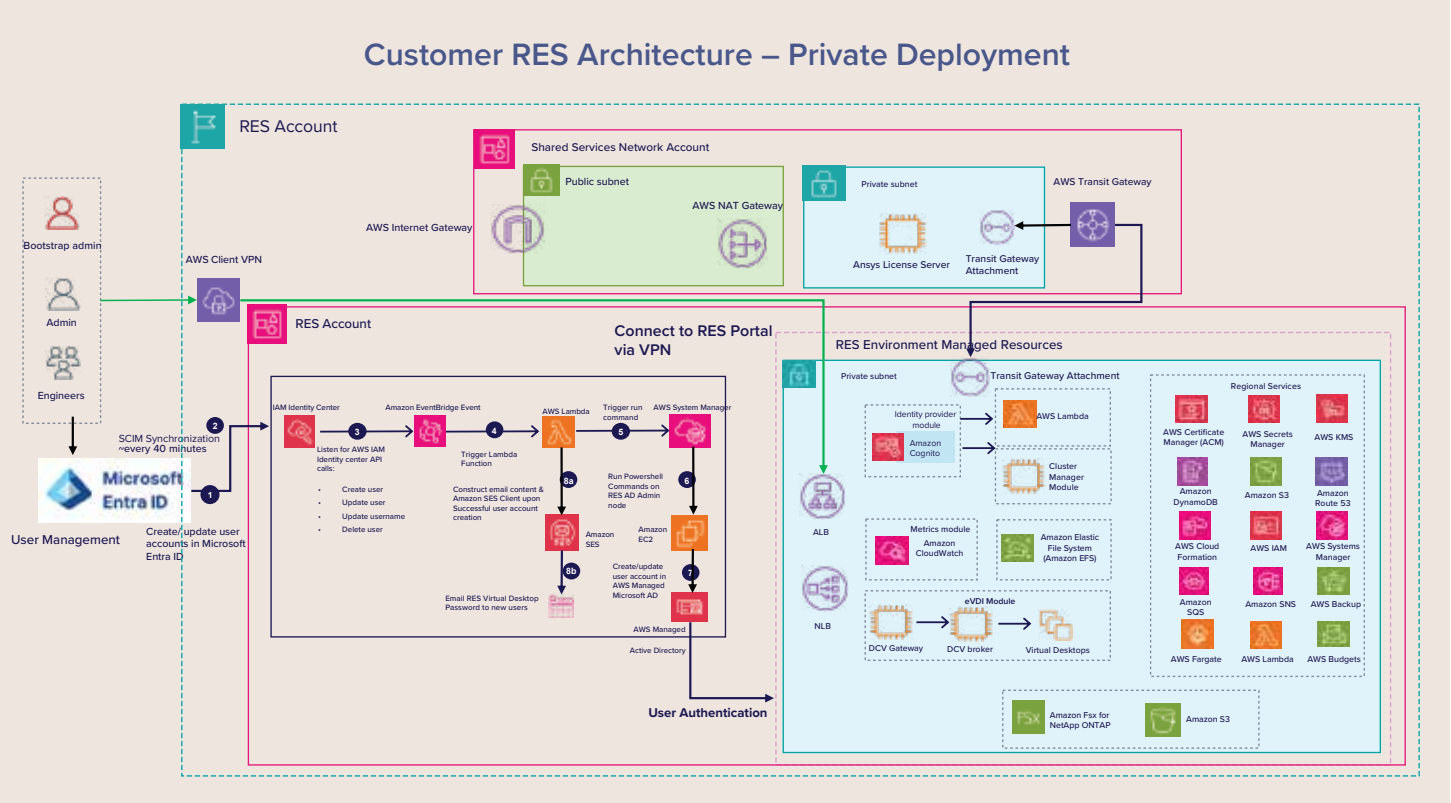


Key Capabilities

- ✓ Linux and Windows engineering desktops
- ✓ Pre-installed engineering applications
- ✓ Shared engineering datasets
- ✓ Integration with Active Directory
- ✓ Elastic HPC cluster provisioning
- ✓ License server integration
- ✓ Automated AMI management pipelines

Private AWS GovCloud Deployment Architecture

The production implementation was deployed in AWS GovCloud using a private architecture model.



The deployment included:

Identity & Access Mgmt.

- ✓ Microsoft entra ID integration
- ✓ SCIM-based user synchronization
- ✓ AWS IAM Identity centre
- ✓ AWS managed active directory

Secure Connectivity

- ✓ AWS client VPN
- ✓ Transit gateway architecture
- ✓ Private subnets for engineering resources
- ✓ Controlled ingress and egress

Engineering Services

- ✓ RES virtual desktops
- ✓ Cluster manager services
- ✓ Engineering workload orchestration
- ✓ AWS parallel computing service (PCS)

Shared Storage

- ✓ Amazon FSx for NetApp ONTAP
- ✓ Amazon S3 integration
- ✓ Persistent engineering datasets

Relevance Lab Implementation Approach

01 Environment Assessment

- Reviewed existing tower-based engineering infrastructure
- Analyzed application dependencies
- Assessed Ansys licensing requirements
- Identified performance and storage requirements

02 AWS GovCloud Foundation

- Designed secure network architecture
- Implemented private connectivity model
- Established identity federation and governance controls

03 RES Deployment

- Deployed AWS Research & Engineering Studio
- Configured engineer virtual desktop environments
- Integrated enterprise authentication

04 Engineering Application Migration

Migrated and validated:

- Ansys Thermal Dynamics
- Ansys Premium SIwave Plus
- Ansys CFD
- Ansys Mechanical Enterprise

05 Storage & Data Migration

- Migrated engineering datasets
- Implemented FSx for NetApp ONTAP
- Established high-performance shared storage architecture

06 User Onboarding Automation

- Automated account provisioning
- Automated desktop creation
- Automated access management workflows

Business Outcomes

Engineering Agility

- Reviewed existing tower-based engineering infrastructure
- Analyzed application dependencies
- Assessed Ansys licensing requirements
- Identified performance and storage ruirements

Scalability

- Elastic HPC capacity for peak simulation periods
- Ability to scale compute resources based on project demands
- Elimination of hardware procurement delays

Improved Resource Utilization

- Pay-for-use cloud infrastructure
- Reduced idle compute capacity
- Optimized workload placement

Enhanced Security

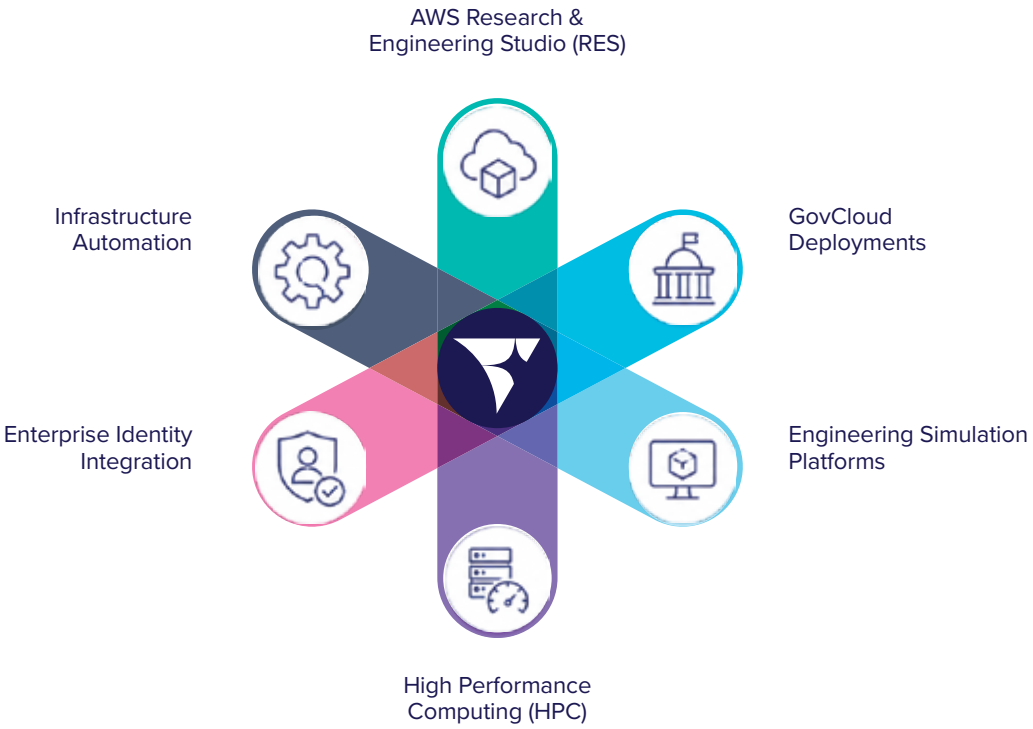
- GovCloud deployment for regulated workloads
- Centralized identity management
- Secure VPN-based access controls
- Auditable user lifecycle management

Operational Efficiency

- Automated user onboarding
- Simplified workstation management
- Centralized monitoring and operations

Why Relevance Lab

Relevance Lab combines deep expertise across:



Our team delivered a secure, scalable engineering platform that enables engineering teams to innovate faster while maintaining governance, security, and operational excellence.

Ready to Modernize Your Engineering Environment?

Relevance Lab helps organizations securely migrate and modernize engineering simulation and HPC workloads on AWS.

Let's discuss how you can:

- Migrate HPC and engineering workloads to AWS
- Deploy secure Research & Engineering Studio (RES) environments
- Scale compute resources on demand
- Integrate enterprise identity and access controls

Talk to Our AWS GovCloud & RES Experts

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