Forum TERATEC 24

Unlock the future

Navigating HPC Horizons: Architectures for Agility, Security, and Precision

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Agenda

Introduction

Drivers for the HPC in the Cloud

Architecture for:

- Cloud Native
- Global Enterprise
- Strategic/Defense

Conclusion

Market Drivers

- **Widespread Computational Science & Engineering** - simulation and modeling now widely used in new product R&D, universities are responding with new CSE programs to meet surge in talent demand.
- **Open collaboration** - Increasing co-development and data sharing across enterprises, governments, and academic institutions, requiring new security and data strategies.
- **Custom model development** - Scientists and engineers are developing more sophisticated models and simulations for a wide range of applications, from materials science to climate modeling.
- **AI-Physics** - Growing ecosystem of AI tools that use neural networks to optimize design of experiments and generative product design.
- **Simulation Governance** - growing focus on ensuring quality of simulation models and consistency in their use, also seen in AI model development and observation.
- **Software licensing constraints** - Users report availability and cost as a limitation on growth, seek ways to decrease software and scheduler costs.

Tailoring Benefits: Diverse Customer Perspectives

Cloud Native ≠ Global Enterprise ≠ Strategic/Defense

Cloud HPC platform - High Level Design

Any software. Any hardware. Any cloud.

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1000+ Applications

Full-stack performance optimization

- SW/HW performance intelligence
- HW scale & maturity Intelligence
- App performance Tuning
- Cost optimization

Open source applications | Commercial applications | Custom apps & containers

Application Lifecycle & Licensing Management

R&D automation & knowledge management | Control plane policy & automation | IT business management

Unified API | Connectors | Data Fabric | Lifecycle Hooks | Event Stream

Cloud hardware | On-premises hardware

Full-stack security & compliance

- E2E encryption
- Multi-org data sharing & isolation
- FedRAMP
- ITAR
- HIPAA
- AICPA
- SOC2
- Cloud Security Alliance

Data Security: Safeguarding data is the top priority

Encryption of data in transfer with high-grade TLS

Multi-layered encryption of data at rest with AES-256

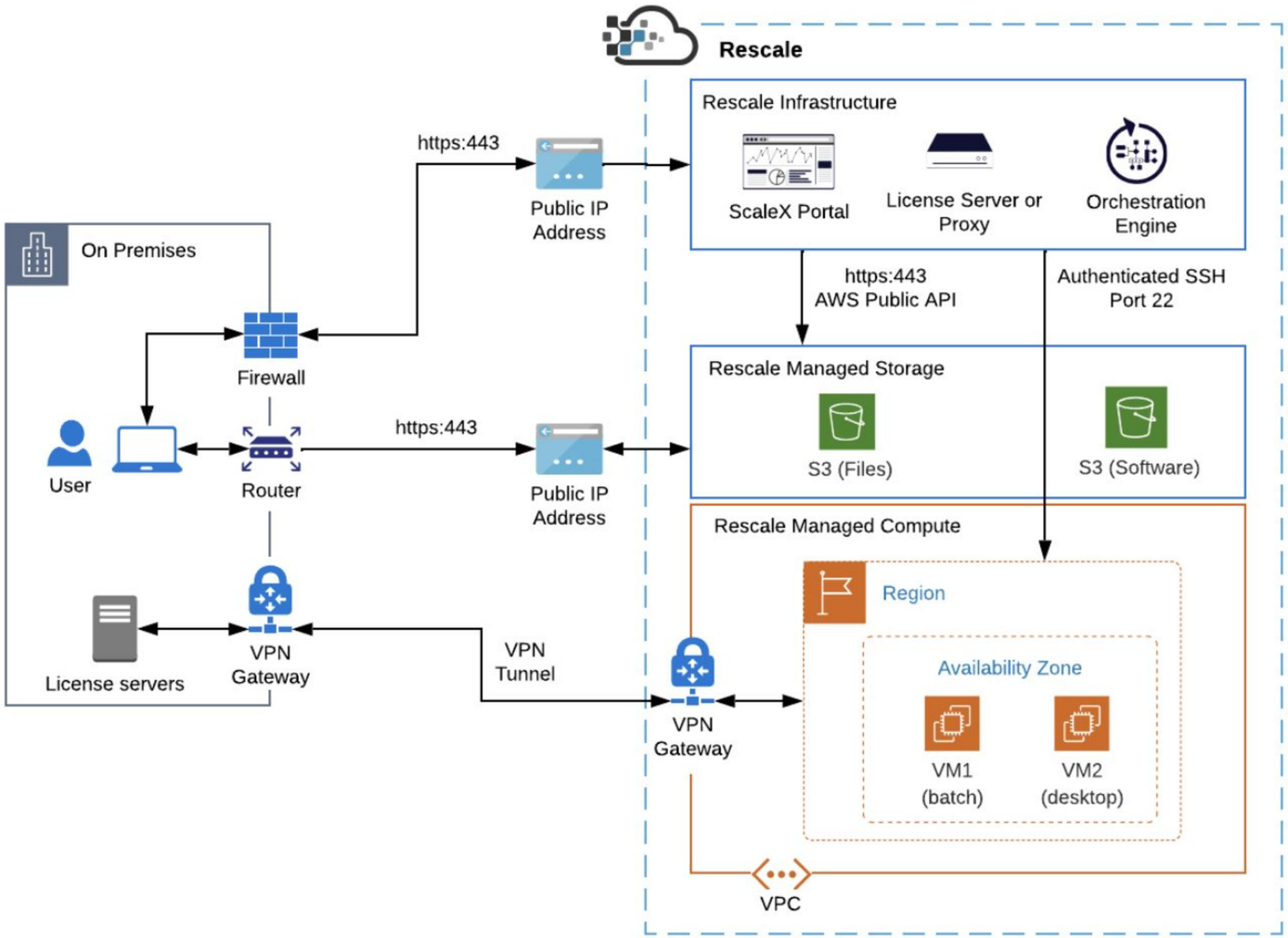
Customer-isolated encryption

Multi-Factor Authentication

Data Residency Enforcement

Customer data is secured in transit and at rest and is stored only where customers authorize

Cloud Native



Benefits:

Scalability: Efficiently adjust resources based on demand

Agility: Focus on core business

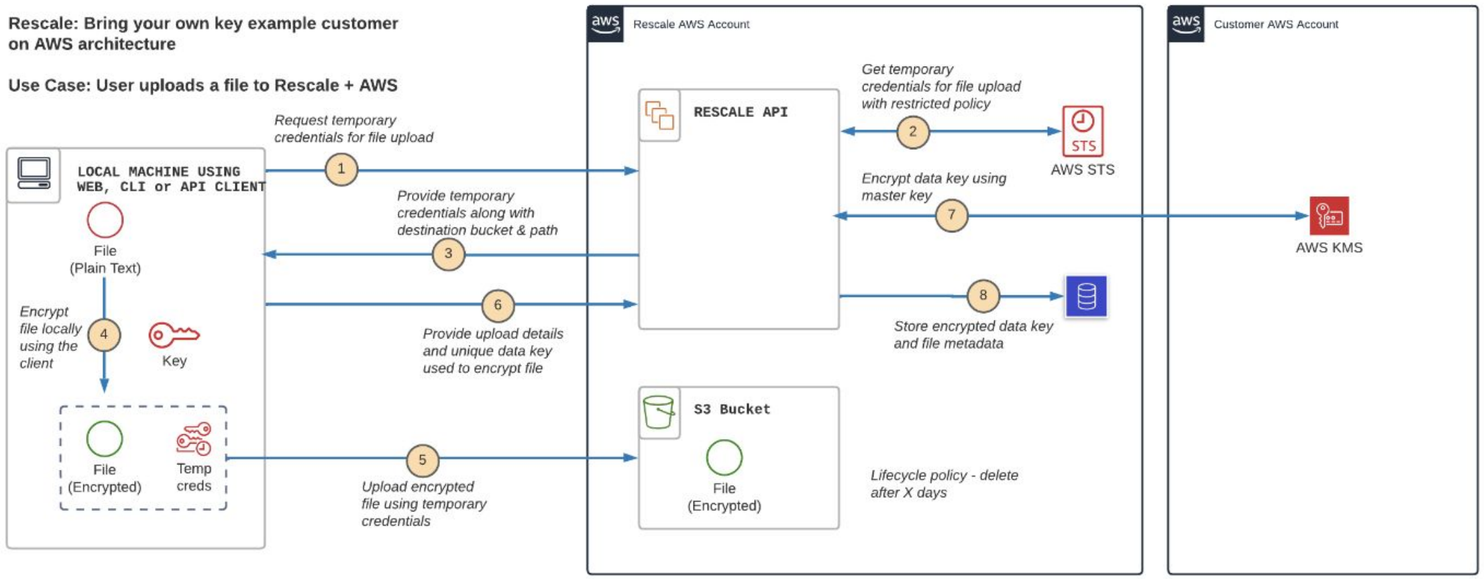
Cost Efficiency: Pay-as-you-go model

Managed Service: Focus on core business

Limitations:

Data Gravity: Isolated CAD/CAE data

Global Enterprise



Benefits:

Global Reach: Expanding services worldwide

Innovation: Experimentation and prototyping

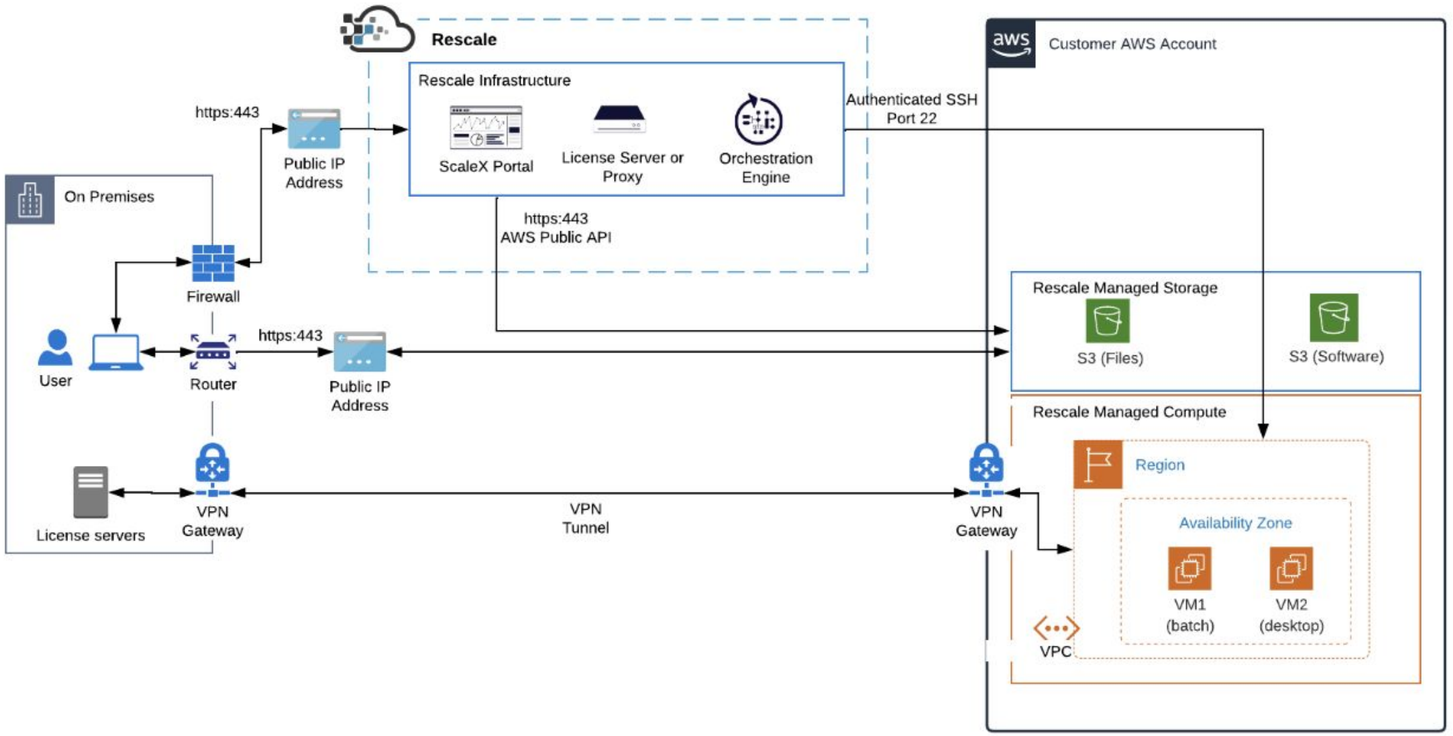
Security: Robust measures, compliance

Collaboration: Seamless integration, cross-functionality

Limitations:

Aligned Pricing with Corporate rates

Strategic / Defence



Benefits:

Trusted Architecture: In-house managed

Cost: Leverage corporate pricing

Data Gravity: Unified Data Lakes

Collaboration: E2E - From RFQ to BOM

Limitations:

Internal Overhead: Cloud Complexity Strain

Geographic Zones Impact: Accessibility, Quota, Selection

Conclusion

1. **Agility Unleashed:** Cloud-based architectures empower organizations to swiftly deploy and scale HPC resources, adapting to dynamic workloads and market demands.

2. **Security Reinforced:** Leveraging cloud services ensures robust security measures, compliance, and data protection, allowing HPC workloads to thrive without compromising safety.

3. **Global Reach, Local Impact:** Cloud solutions transcend geographical boundaries, enabling HPC accessibility worldwide while maintaining precision for mission-critical applications.

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Workload Optimization

Intelligent Automation

Security & Compliance

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