How a U.S. Government Agency Accelerated Its Migration to GovCloud

AWS Online Tech Talk
March 25, 2020

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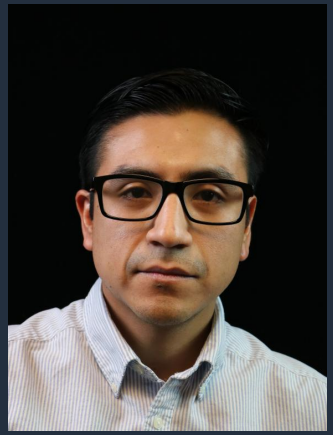
Speakers

Atul Mathur
Principal/CTO
Credence Management Solutions



Jonathan Trelles
Solutions Architect, Migrations
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Agenda

- Featured Use Case: Government Agency Migrates VMs to GovCloud
- Migrations Overview, Discovery, and Planning
- Technical Deep Dive: Using CloudEndure Migration for GovCloud

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Featured Use Case: Government Agency Migration to GovCloud

Atul Mathur, Principal/CTO, Credence Management Solutions

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Credence Management Solutions

- Provides program management, IT, cybersecurity, engineering, cloud, logistics, and AI/ML solutions to U.S. federal government
- Supports the mission and goals of customers
- Large-scale business transformation and IT modernization
- 1000+ professionals
- Worldwide presence
- Sample contracts: Army ITES-3S, OASIS SB, ENCORE III, 8(a) STARS II GWAC, DLA J6 Enterprise Technology

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Customer – U.S. Government Agency

- Headquartered in Fairfax County, VA
- Global enterprise (28 countries) with > 26K employees
- Manages 9 supply chains and > 5 million items
- Agency's hosting support contract was awarded to Credence in July 2019 for $15M with a ceiling of $76M

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Customer Requirements

- 5 applications – EDA, PALT, PPML, CLS, and e-commerce application
- 200+ VMs, 300 TB+ data
- 70 external interfaces
- IL5 GovCloud
- Authorization to Operate (ATO)
- Secure Cloud Computing Architecture (SCCA)
- Minimal downtime
- Limited to no access to source environments
- Tight deadline

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Migrations Overview, Discovery, and Planning

Jonathan Trelles, Solutions Architect, Migrations, AWS

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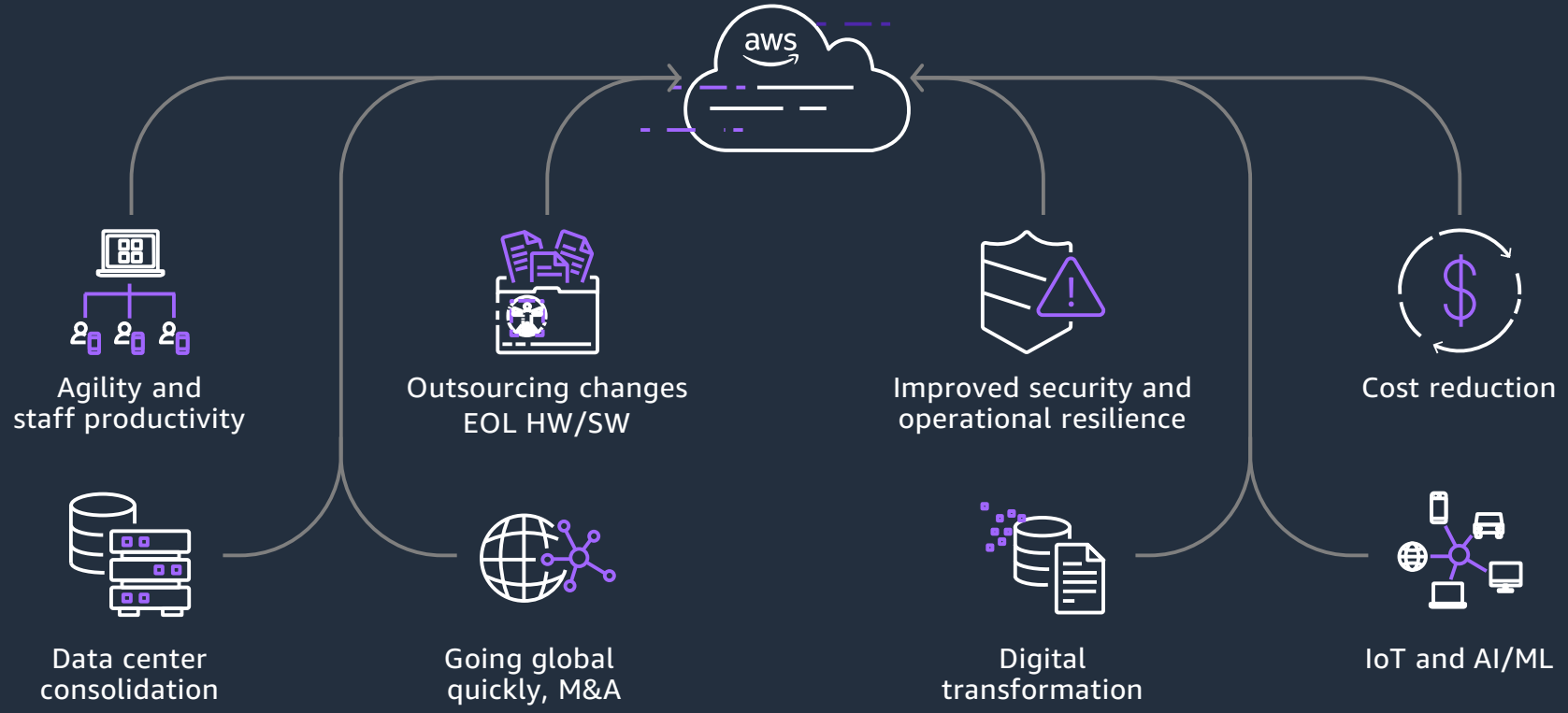
Business Drivers for Migrating to the Cloud



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Migration process

Assessment

Mobilize (Readiness & Planning)

Migrate & Modernize

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Migration Customer Journey

Assess

CART/Migration readiness assessment (MRA)/TSO Logic
Rapid migration business case (RMBC)

Rapid discovery

TCO report

Pre-MRP accelerators

Briefings & workshops

Immersion day

Mobilize

Discovery and planning

Landing zone

Skills/center of excellence

Migration experience

Business case/ TSO Logic

Migration plan

Operating model

Security and compliance

Migrate & Modernize

Migrate

Operate

Modernize

Create a case for change

Mobilization through experiences

Accelerate migration at scale

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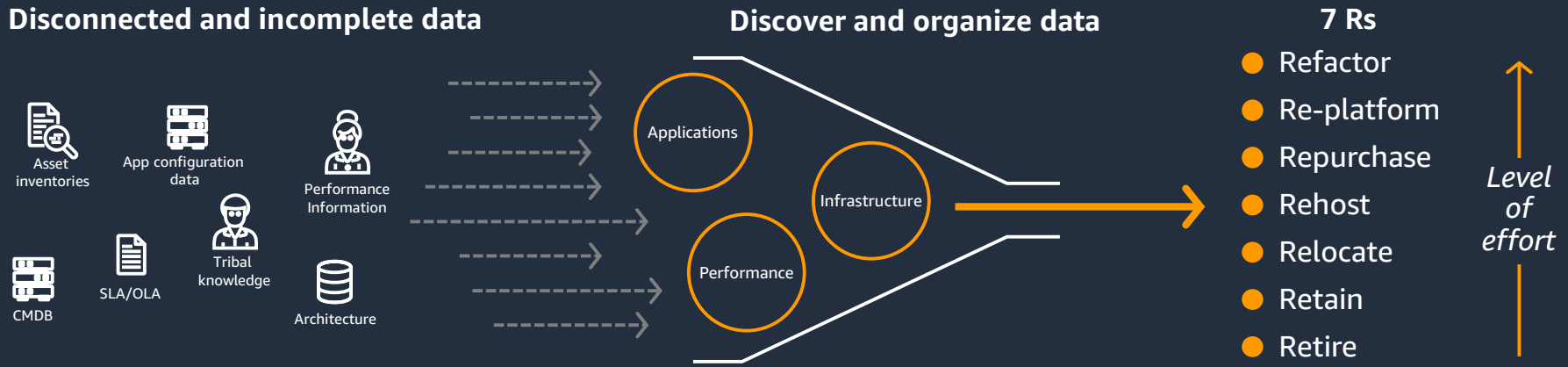
Discovery and Migration Patterns



Automation and guidance

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TSO Logic

AWS Application Discovery Service

Amazon Athena

aws marketplace

bmc

Cloudamize

RISC Networks

ATADATA

turbonomic

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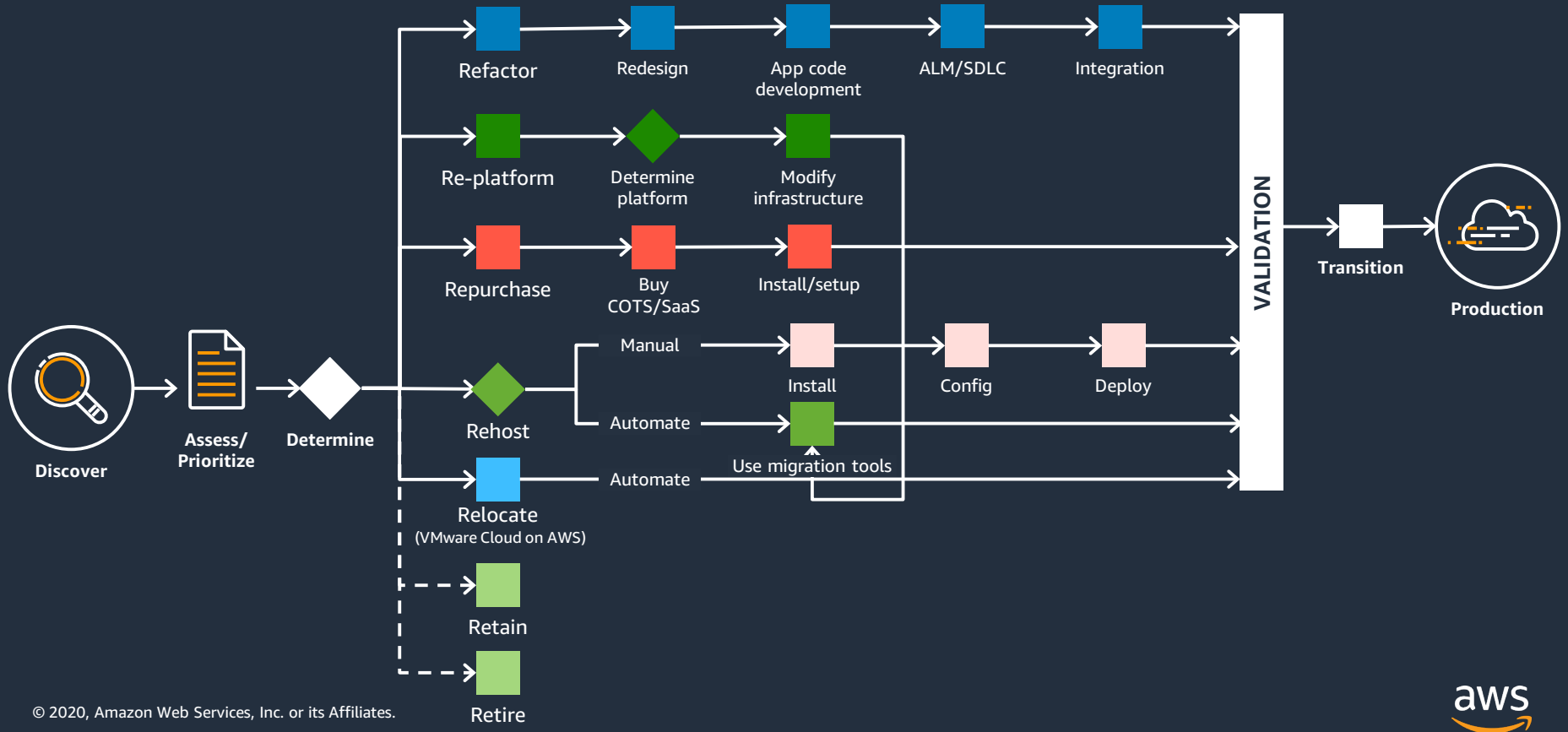
“The 7 Rs of migration”



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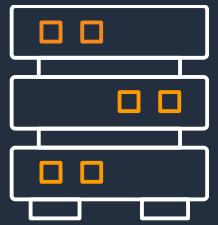
Discovery – Portfolio Data Gathering

Application

- Owners, criticality
- Characteristics
- Stack
- Infrastructure
- . . .



Server

- Physical/virtual
- OS version
- CPU, RAM, Disk
  - type, utilization
- . . .

Network

- Device type
- Firewall rule
- Network connection
- . . .

Storage

- Type
- Capacity
- Utilization
- . . .

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Analysis… What Should We Look For?

Apps, Servers, Connections

- No. of apps and servers
- Application and server dependencies

Performance metrics

- Allocate and right-size target resources

Service naming, tagging

- Identify patterns
- Group servers and applications

- Completeness and usability
  - If additional discovery is needed, determine tools and actions needed to complete discovery.

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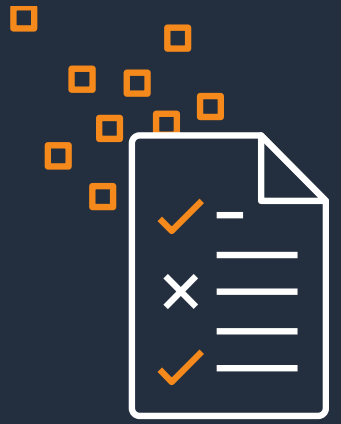
Migration Plan

- Migration Approach
  - 7 Rs: Rehost, Replatform, Refactor, Repurchase, Retire, Retain, Relocate
- Migration Waves
- Migration Solution
  - SMS, CloudEndure Migration, etc.
- Cost Estimate
- Application Scoring
- Communication Plans
- Change Management Plans



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What is AWS GovCloud (US)?

Isolated AWS infrastructure and services for customers with strict regulatory and compliance requirements and sensitive data.

2 AWS GovCloud regions

Bi-coastal infrastructure and services for regulated workloads

Data, network, and machine isolation

(separate AZs, endpoints)

Unique authentication

(unique GovCloud credentials)

Dedicated GovCloud AWS management console

Managed by U.S. citizens on U.S. soil

“Community Cloud” with restricted access

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AWS GovCloud Is About Compliance in the Cloud

DOD Cloud Security Req's Guide (SRG) IL 4 and 5

FedRAMP High

International Traffic and Arms Regulation (ITAR)

Criminal Justice Information Service Security Policy (CJIS)

IRS – 1075 (Section 6103 (p))

Federal Information Processing Standard Pub (FIPS) 140-2

SP 800-53 (rev 4) SP 800-171

Defense Federal Acquisition Regulation Supplement (DFARS)

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CC SRG Impact Levels

SRG v1r3 Impact Level	Maximum Data Type	Information Characterization
2	Non-Controlled Unclassified Information	Unclassified information approved for public release
		Unclassified, not designated as controlled unclassified information (CUI) or critical mission data, but requires some minimal level of access control
4	Controlled Unclassified Information	Requires protection from unauthorized disclosure as established by Executive Order 13556 (Nov 2010); Education, Training, SSN, Recruiting (if medical is not included), Credit card information for individuals (i.e., PX or MWR events)
		PII, PHI, SSN, Credit card information for individuals, Export Control, FOUO, Law Enforcement Sensitive, Email
5	Controlled Unclassified Information + NSS	National Security Systems and other information requiring a higher level of protection as deemed necessary by the information owner, public law, or other government regulations
6	Classified up to SECRET	Pursuant to EO 12958 as amended by EO 13292; classified national security information or pursuant to the Atomic Energy Act of 1954, as amended to be Restricted Data (RD)

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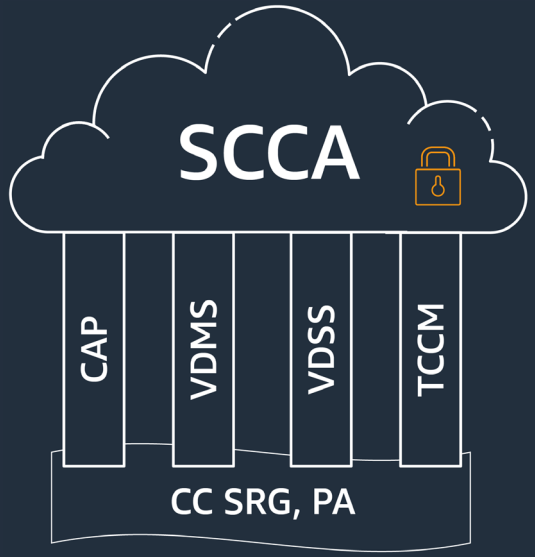
SCCA Component Functional Requirements

- **Virtual Datacenter Security Stack (VDSS)**
  Provides network and application security capabilities, such as an application-aware firewall and/or IPS.
- **Virtual Datacenter Management Stack (VDMS)**
  Provides support services for mission owner environments (AD/LDAP, DNS, Patch Repos, etc.)
- **Trusted Cloud Credential Manager (TCCM)**
  Individual or entity appointed by the Authorizing Official to establish policies for controlling privileged user access.
- **Cloud Access Point (CAP)**
  Provides network access to the cloud and boundary protection of DISN from the cloud.



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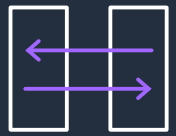
Simplify and Accelerate Migration With CloudEndure Migration

Fast

Simple setup lets you start in minutes

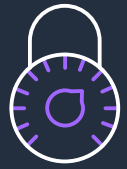
Flexible

Wide range of OS, application, and database support



Non-disruptive

Robust, predictable, nondisruptive continuous replication and minimal cutover windows



Secure

Highly secure for regulated environments

CloudEndure Migration is **free** to all AWS customers

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Click here to learn more

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Wide Platform Support*

* See documentation or contact Support for a complete list.

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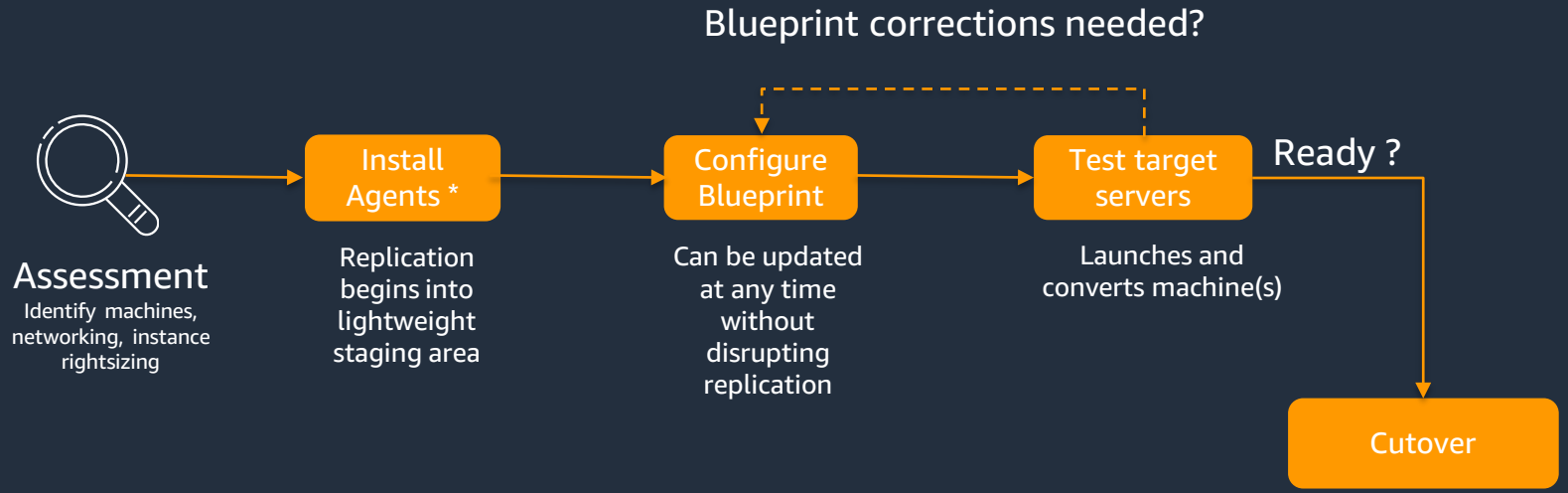
Migration Workflow



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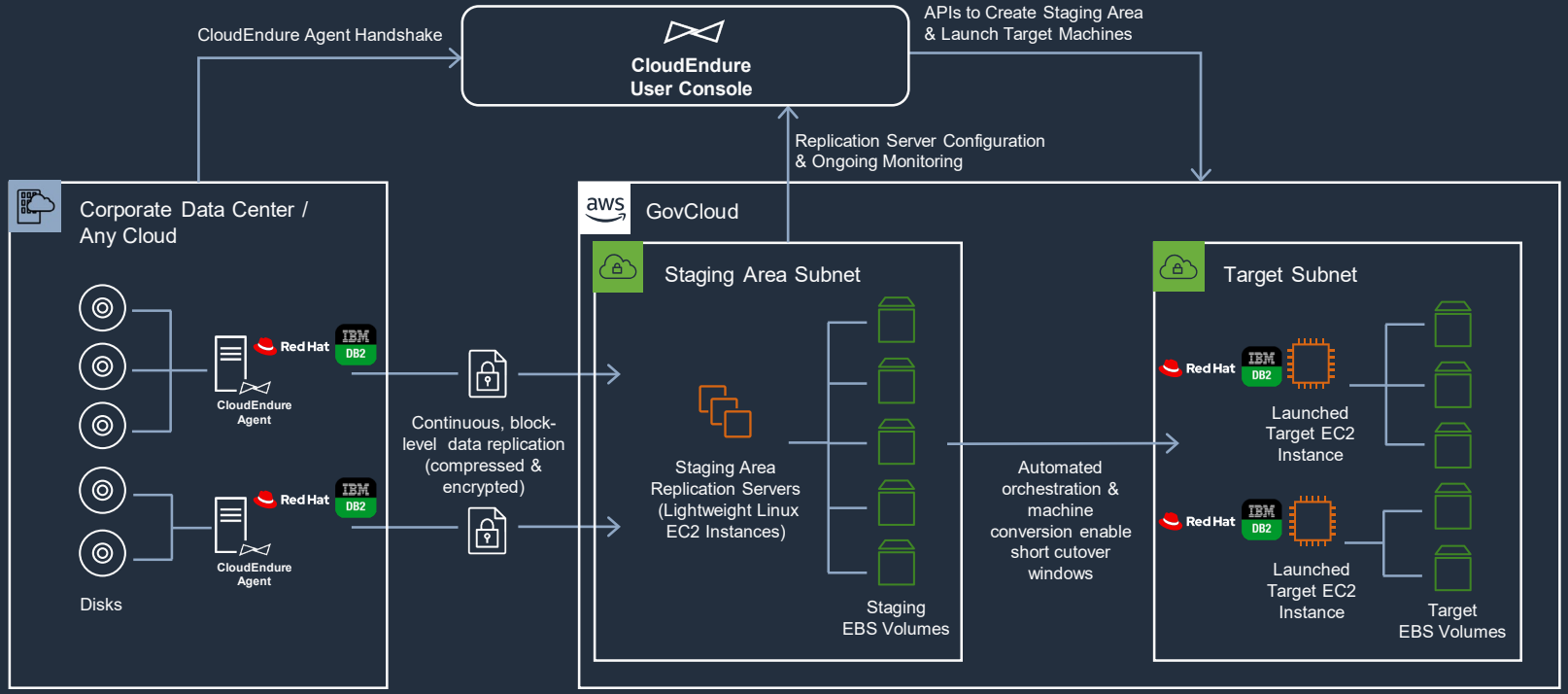
* No reboot, No performance impact, No OS / App / DB configuration

How CloudEndure Migration Works



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CloudEndure
An AWS Company

CloudEndure Migration Demo

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Technical Deep Dive: Using CloudEndure Migration for GovCloud

Carlo Tedesco, Technical Lead, Credence Management Solutions

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Technical Preparation

- Develop list of instances to be migrated
- Know source and target IPs/ranges
- Create firewall rule exception requests
- Build out target environments
- Acquire proper permissions to install agents on source instances

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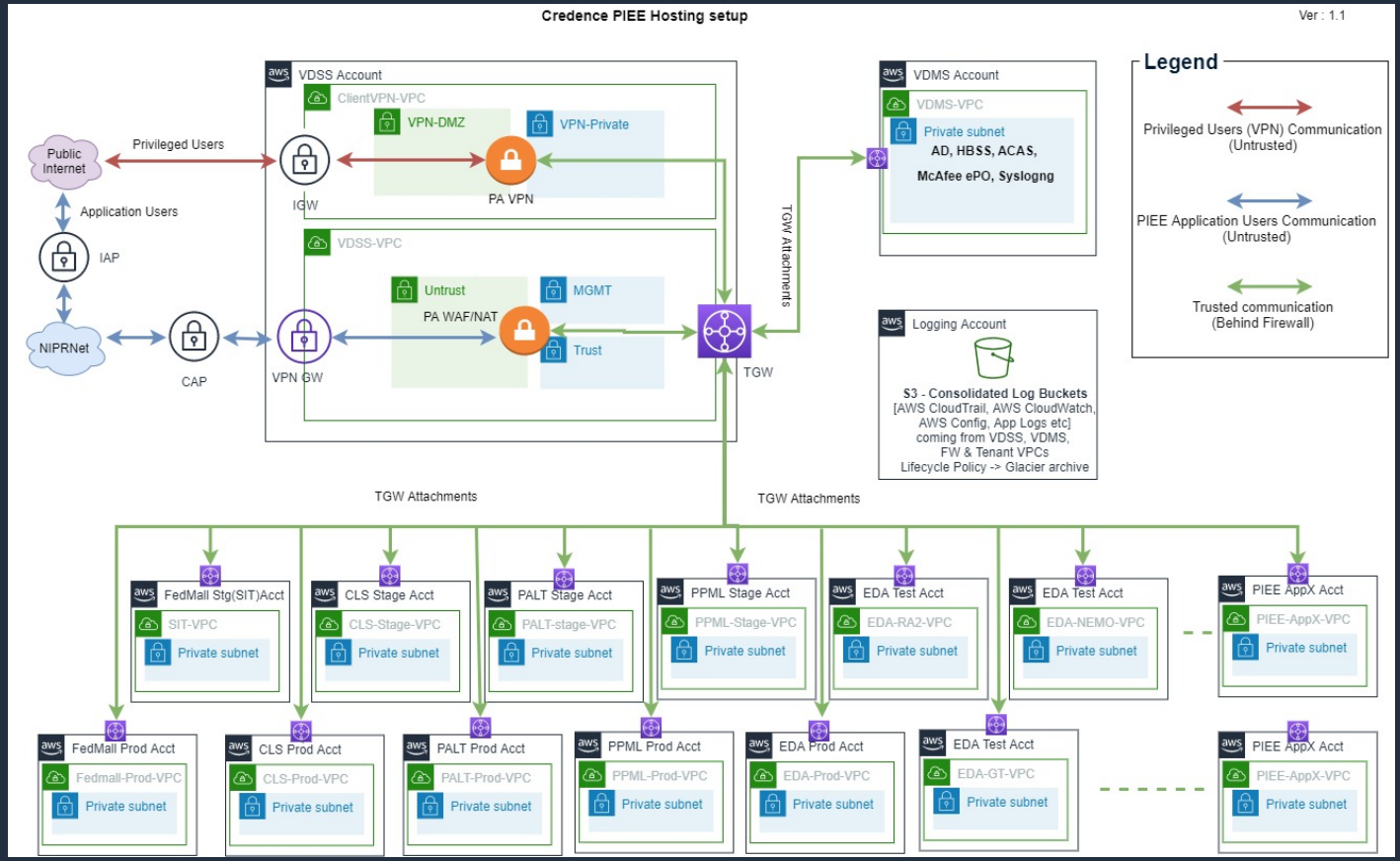
Target Environment – SCCA Compliant



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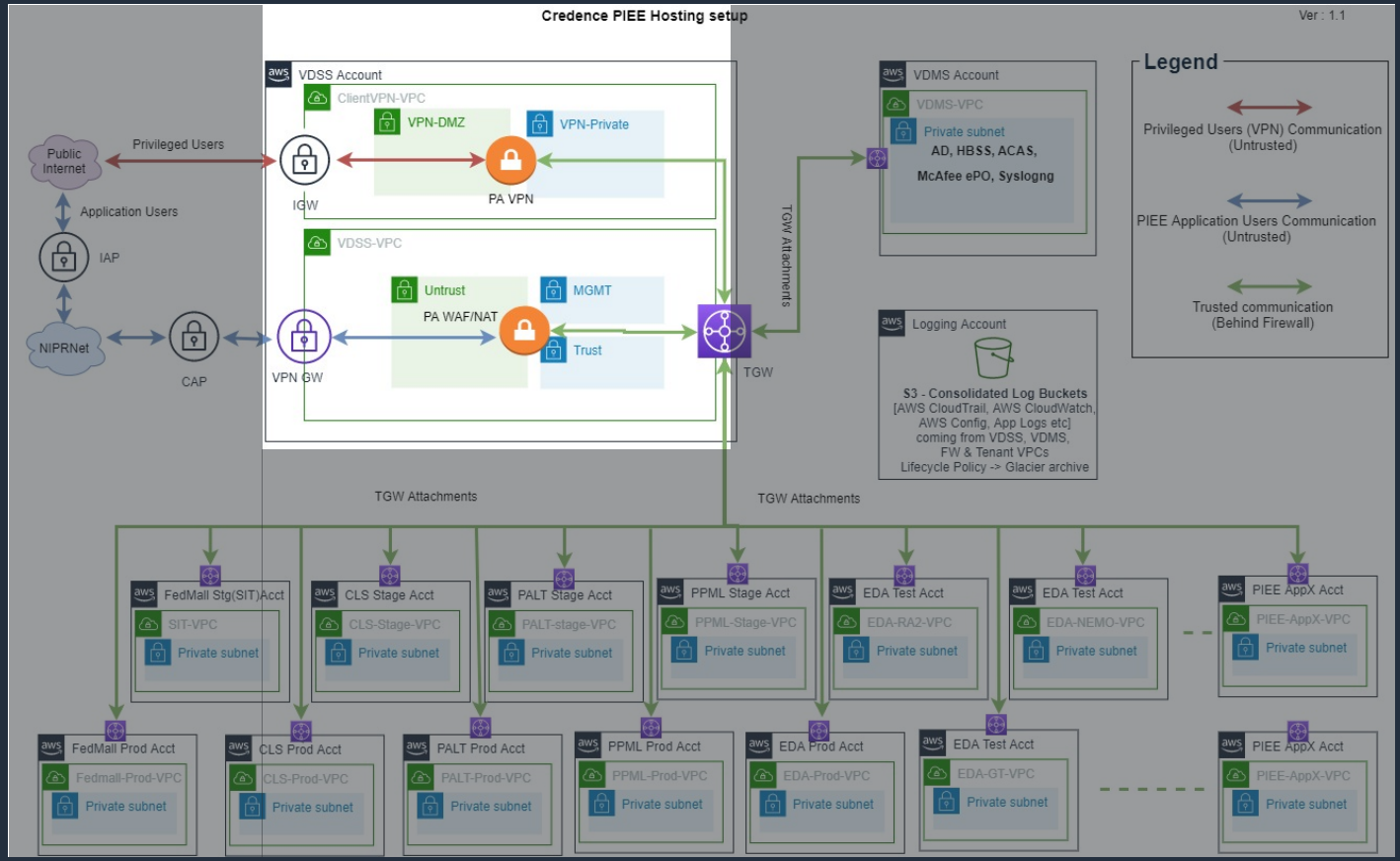

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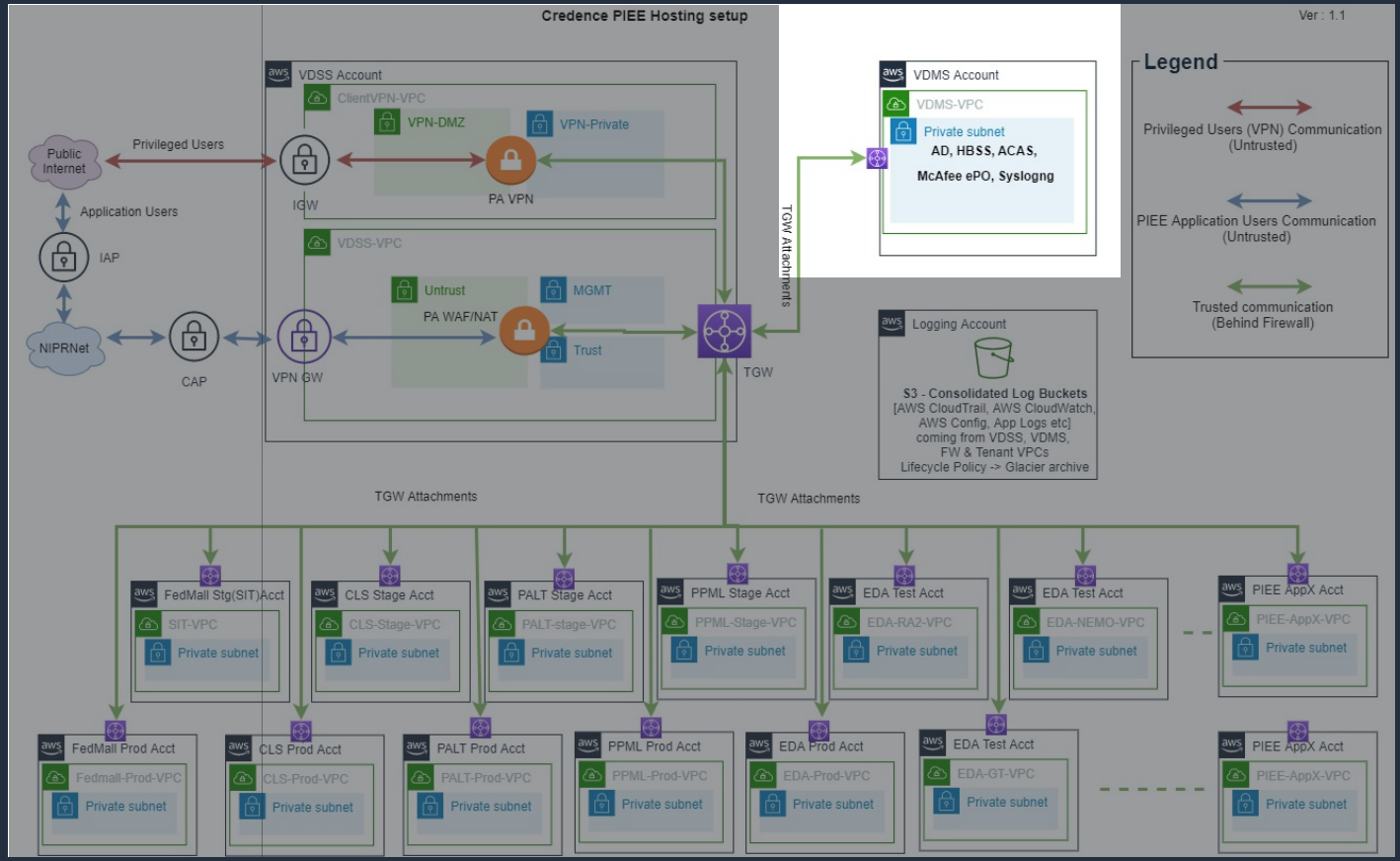

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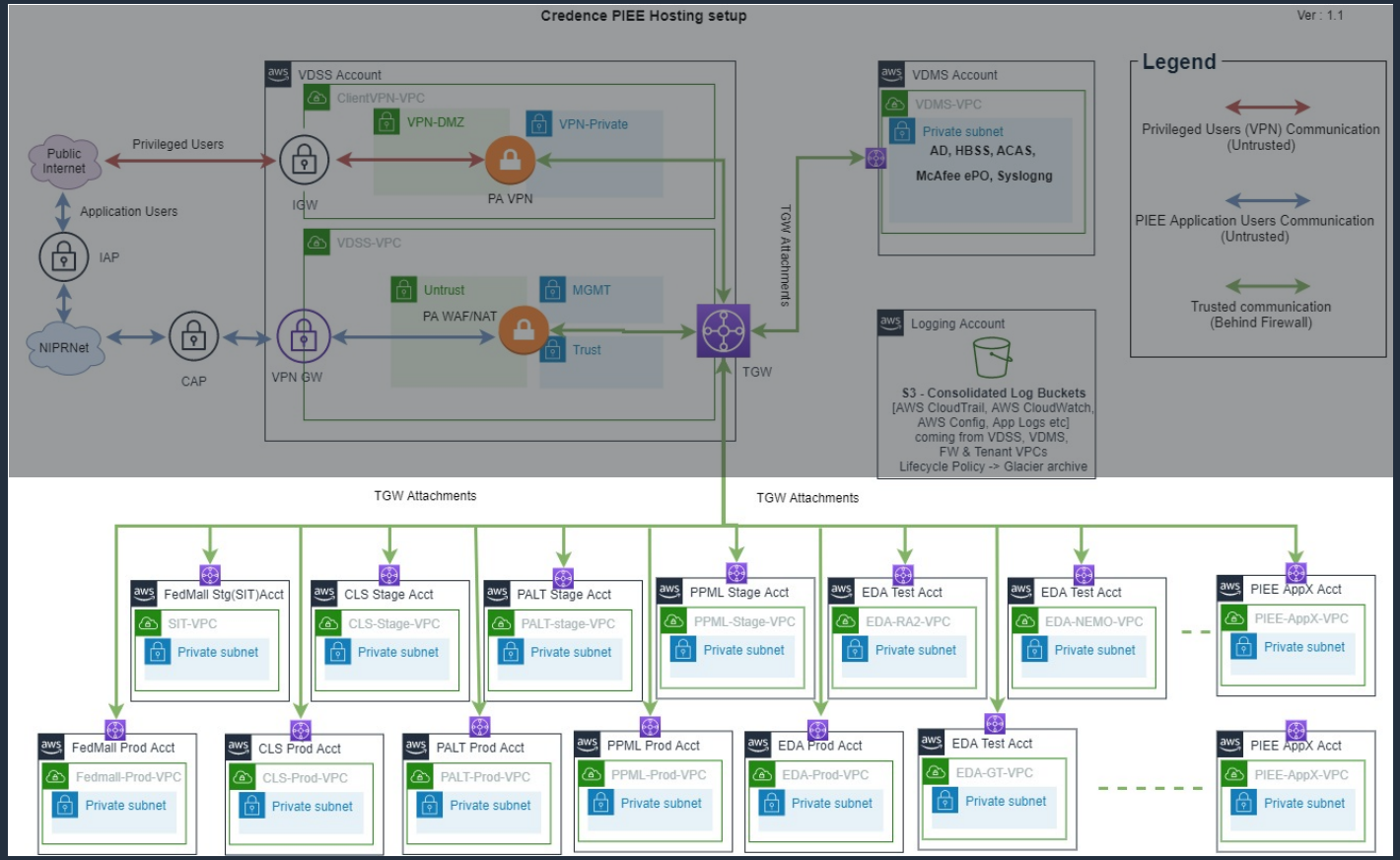
Target Environment – SCCA Compliant



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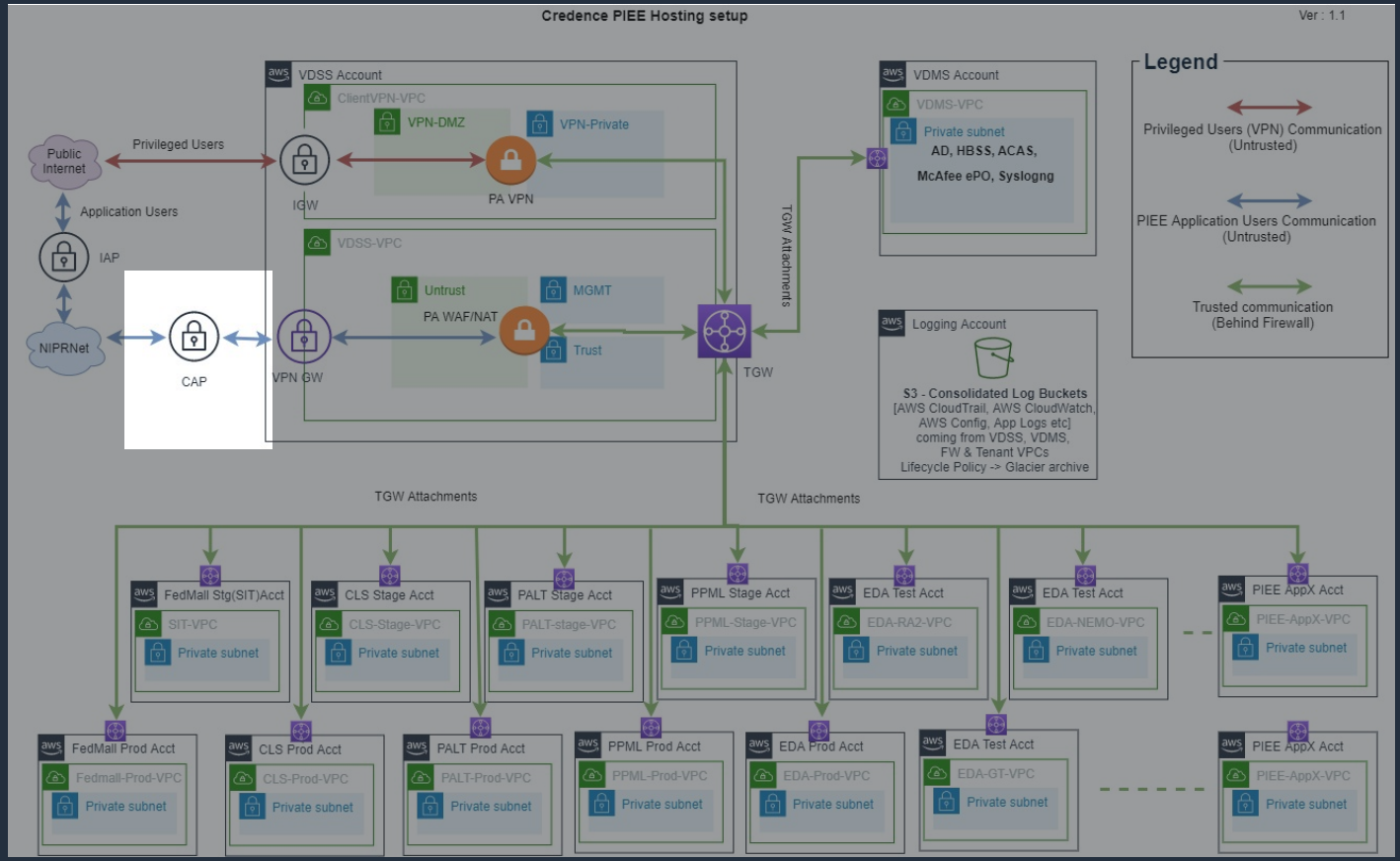
Target Environment – SCCA Compliant



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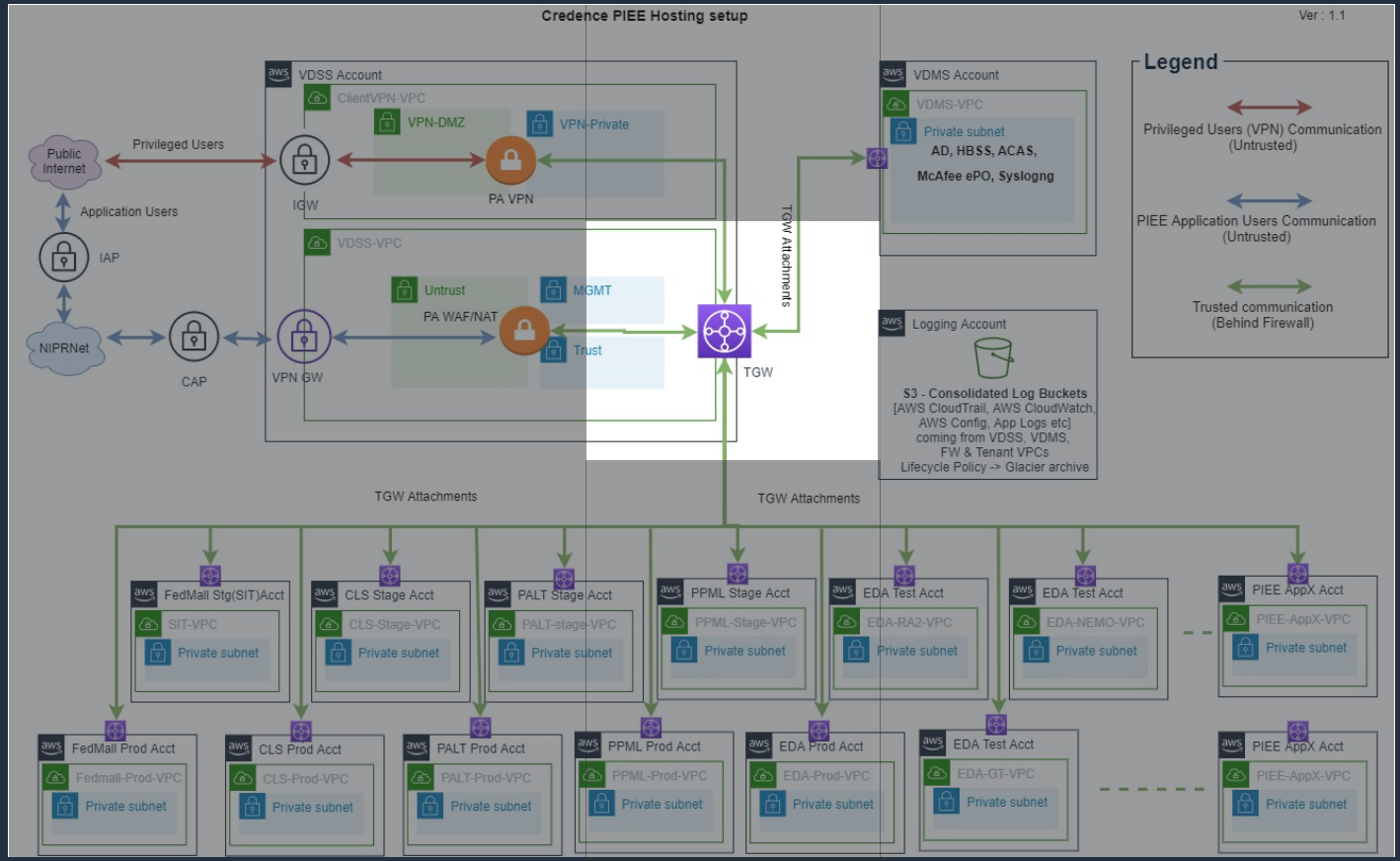

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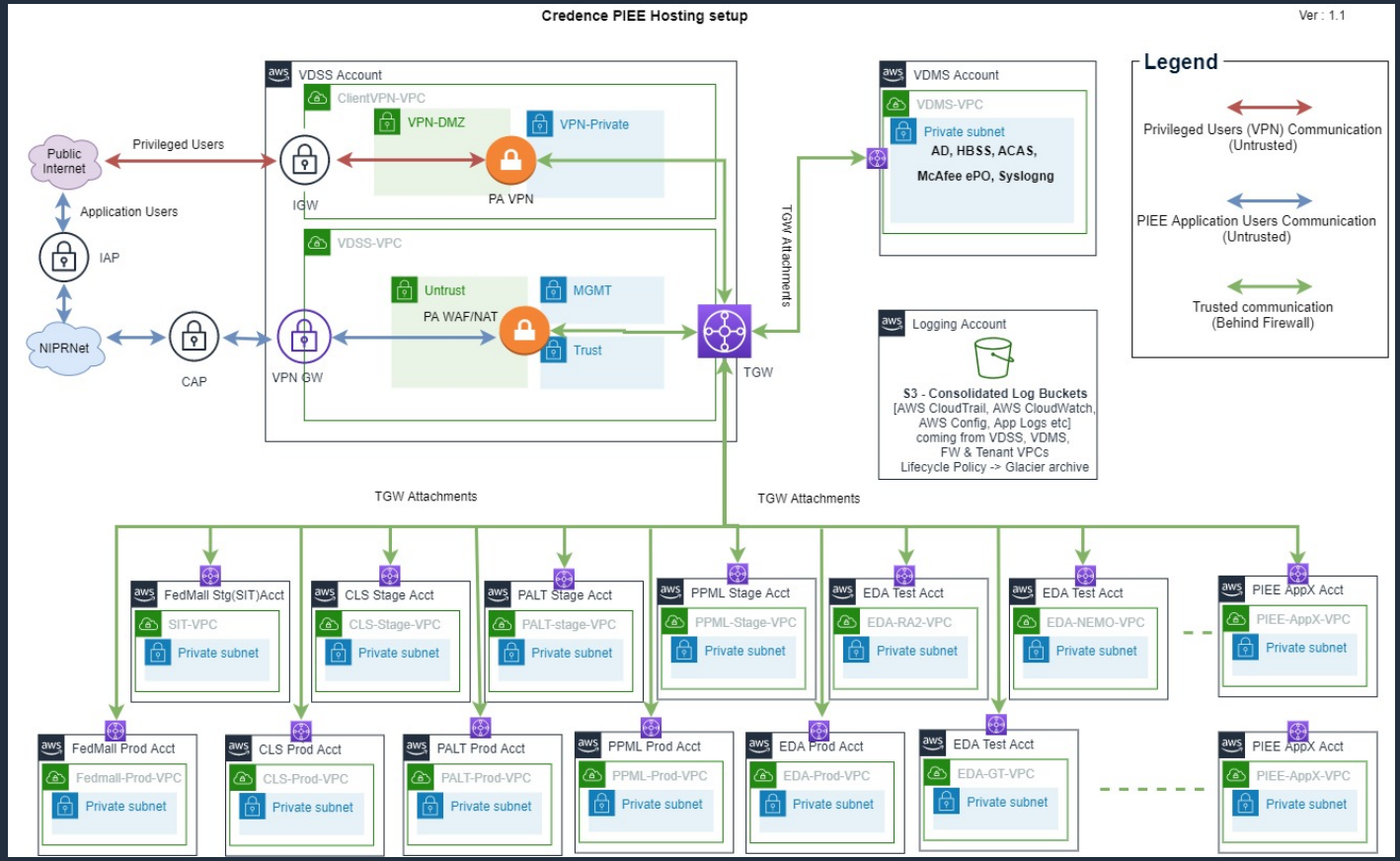
Target Environment – SCCA Compliant



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Mitigating Risks – 2 Proofs of Concept

PoC #1:

- ✓ Migrated 18 instances from commercial AWS account through public internet to GovCloud

PoC #2:

- ✓ Migrated 2 instances from source environment to GovCloud environment account through NIPR

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Technical Challenges & Solutions

Challenge	Solution
Because of SCCA compliant architecture of target environment, destination of target instances were not in same account as initial target VPCs.	Replicated and staged instances in initial target VPC and then moved everything to final target VPC during cutover. **Update:** CloudEndure Migration now supports hosting replication servers in one AWS account while launching replicated source machines (which will become target machines after launch) in a separate target AWS account.
Cost of resources (EBS volumes and snapshots)	Minimized amount of time for replication. **Update:** The new capability described above will eliminate duplication of resources from staging account to target account.

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Technical Challenges & Solutions

Challenge	Solution
Migration of very large instances (15 TB per instance)	Started replication well ahead of time. Also asked source environment admins to not reboot servers.
Managing connections through firewalls	Designated one person to “own” change management and requests.
Configuration of some source instances led to bottlenecks with IOPS which led to slow replication speeds	Use of “courier” servers to replicate large blocks of data.

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Technical Challenges & Solutions

Challenge	Solution
Limits of EC2 instance types in target accounts	Request limit increases in target accounts for desired instance types.
Limited in EC2 instance family generation selection due to OS.	Only choose compatible instance types.

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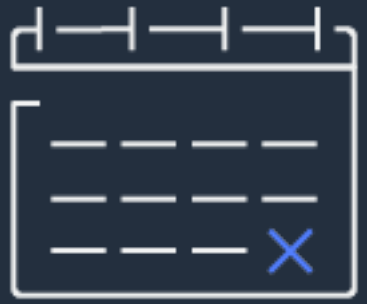
Results

- 11 waves total
- Largest instances had 15TB of EBS
- Averaged 450+ Gbps per instance
- Met all security requirements
- Minimal downtime



Completed migration 138 days – 6 weeks ahead of schedule!

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Best Practices & Lessons Learned

- Request limit increases on accounts early
- Request firewall rule exceptions early
- Use security groups to limit exposure of target environment
- Limit number of instances per wave to allow for higher fidelity of control over migration
- Use of bootstrapping to clean up legacy processes on instance and install new processes (backup, antivirus, AD, etc.)
- Remove CloudEndure agents from target instances after migration is complete

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Conclusion

- CloudEndure Migration and AWS Prescriptive Guidance enabled efficient and rapid migration
- Minimal downtime of complex mission-essential applications
- Application performance improved as direct result of migration
- Gained customer confidence to migrate mission-critical applications

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For More Information

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Thank You

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