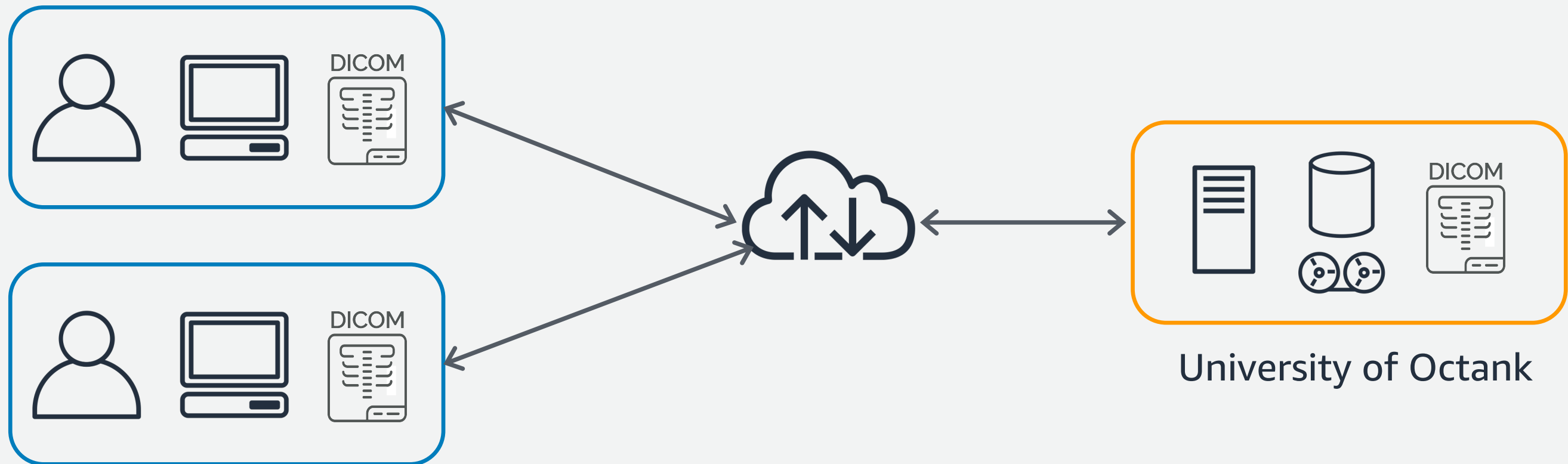# University of Octank

Cloud-based Research Medical Image Store

Andrew Crabb

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11 March, 2020

Review of Requirements

- Central repository for 12-month, multi-center medical imaging study
- DICOM images transferred using DICOMWeb protocol
- Peaky workflow, long-term storage requirements

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Review of Requirements

Requirements

- HIPAA
- Scalability
- Ease of use
- Durability
- Cost

HIPAA

- BAA
- Services
- Procedures
  - Encryption in transit
  - Encryption at rest
  - Access control
  - Backup/archive
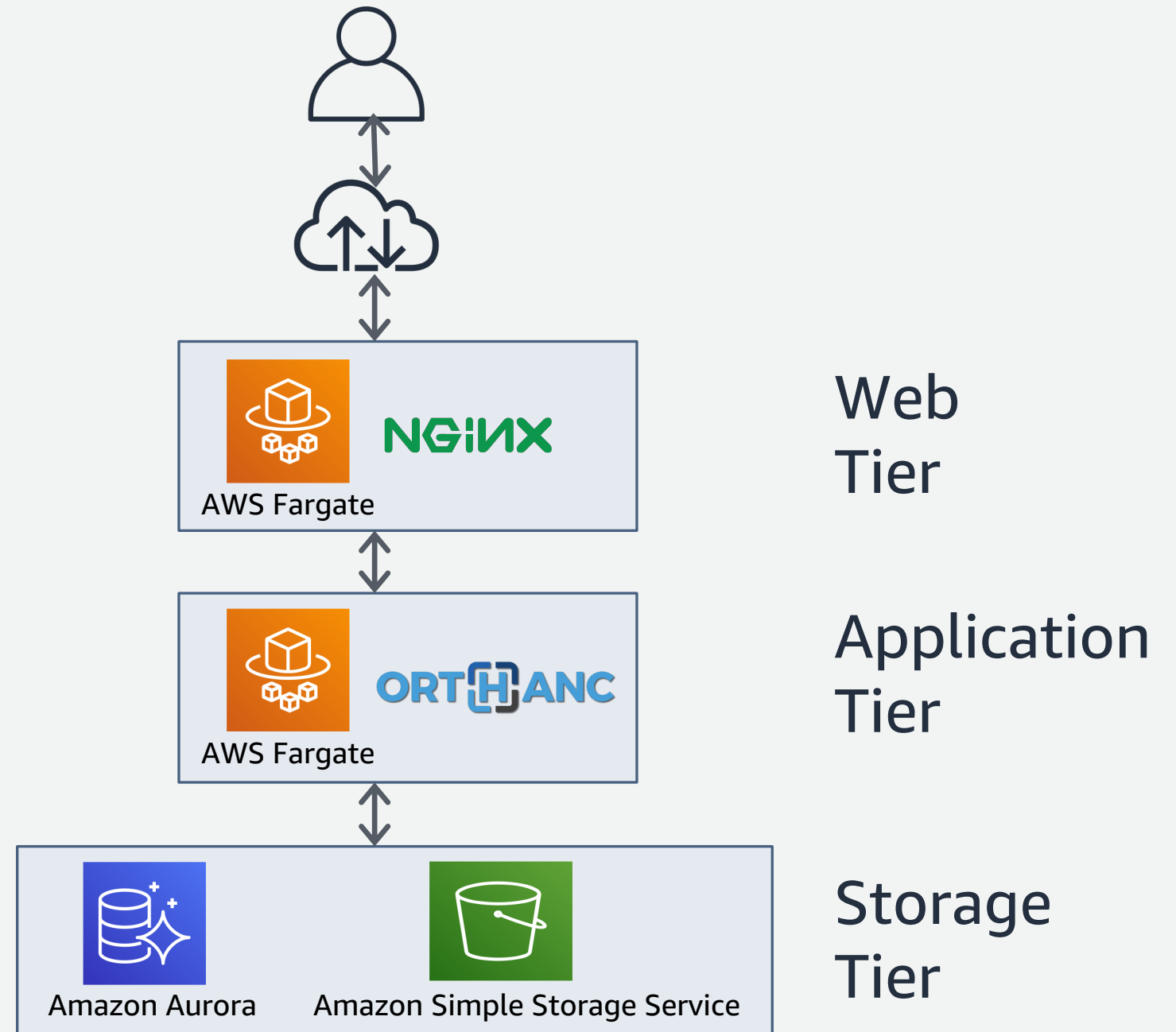 - Logging

aws

Review of Proposed Solution

Containers
- Reduced administration
- Easier upgrades

Serverless Architecture
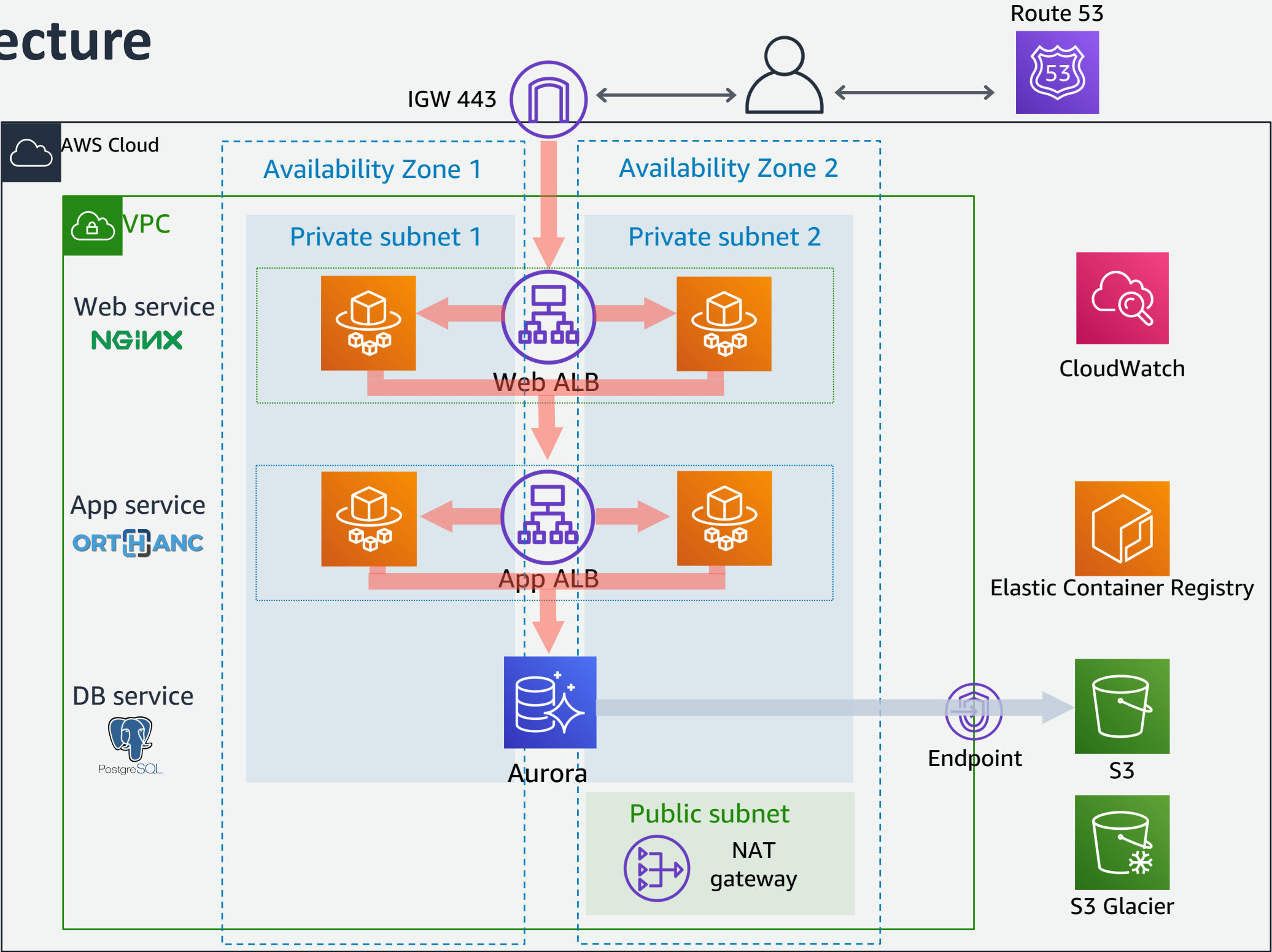- No servers to manage
- Pay by consumption

Cold storage
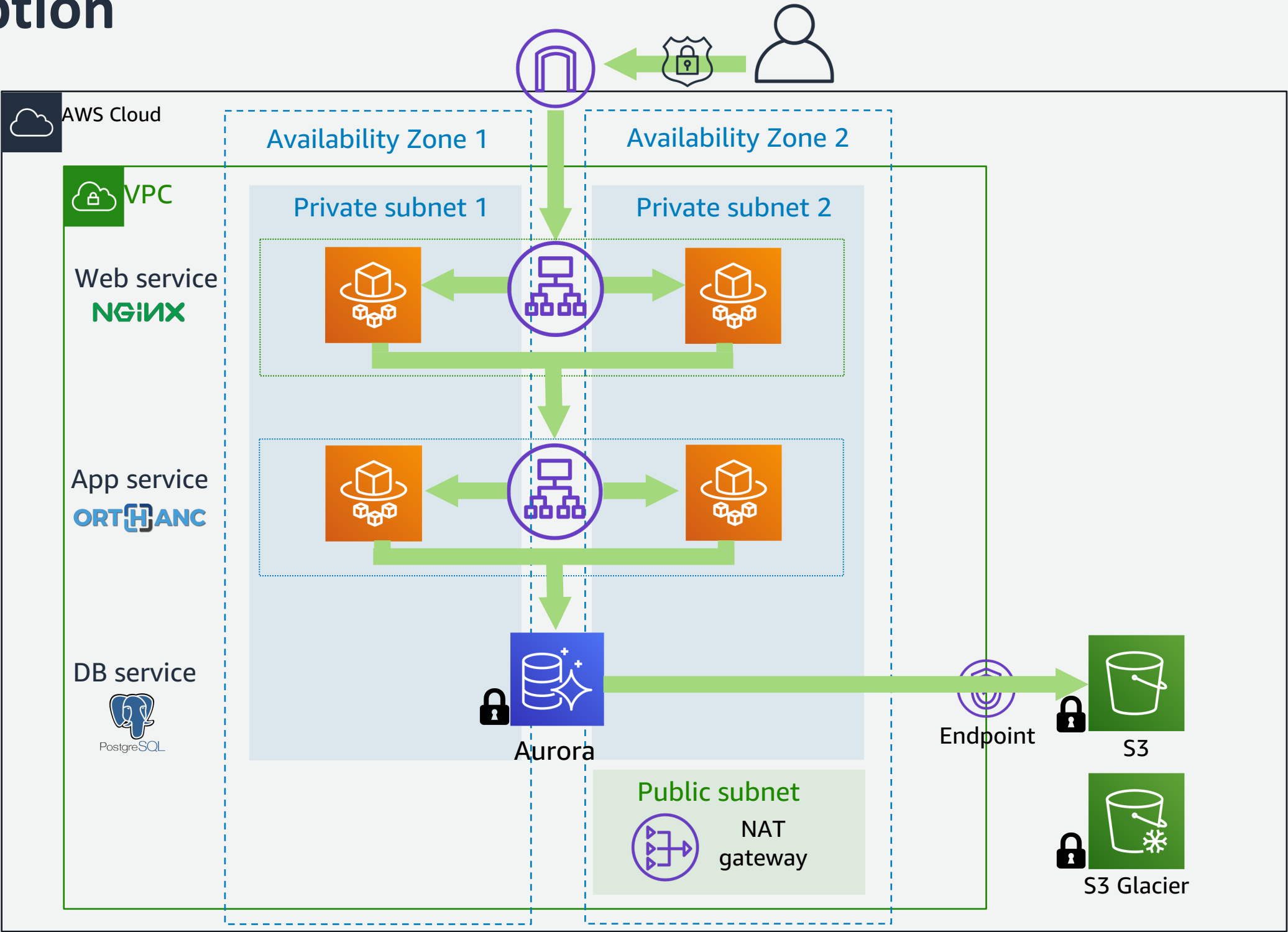- Extreme durability
- Low cost

Web Tier

AWS Fargate — NGINX

Application Tier

AWS Fargate — ORTHANC

Storage Tier

Amazon Aurora

Amazon Simple Storage Service

Architecture

Encryption

Demonstration

Note:

- Demonstration as shown is implemented in public subnets
- Web tier traffic from load balancer to Nginx instances is not encrypted
- Authentication is disabled in Orthanc
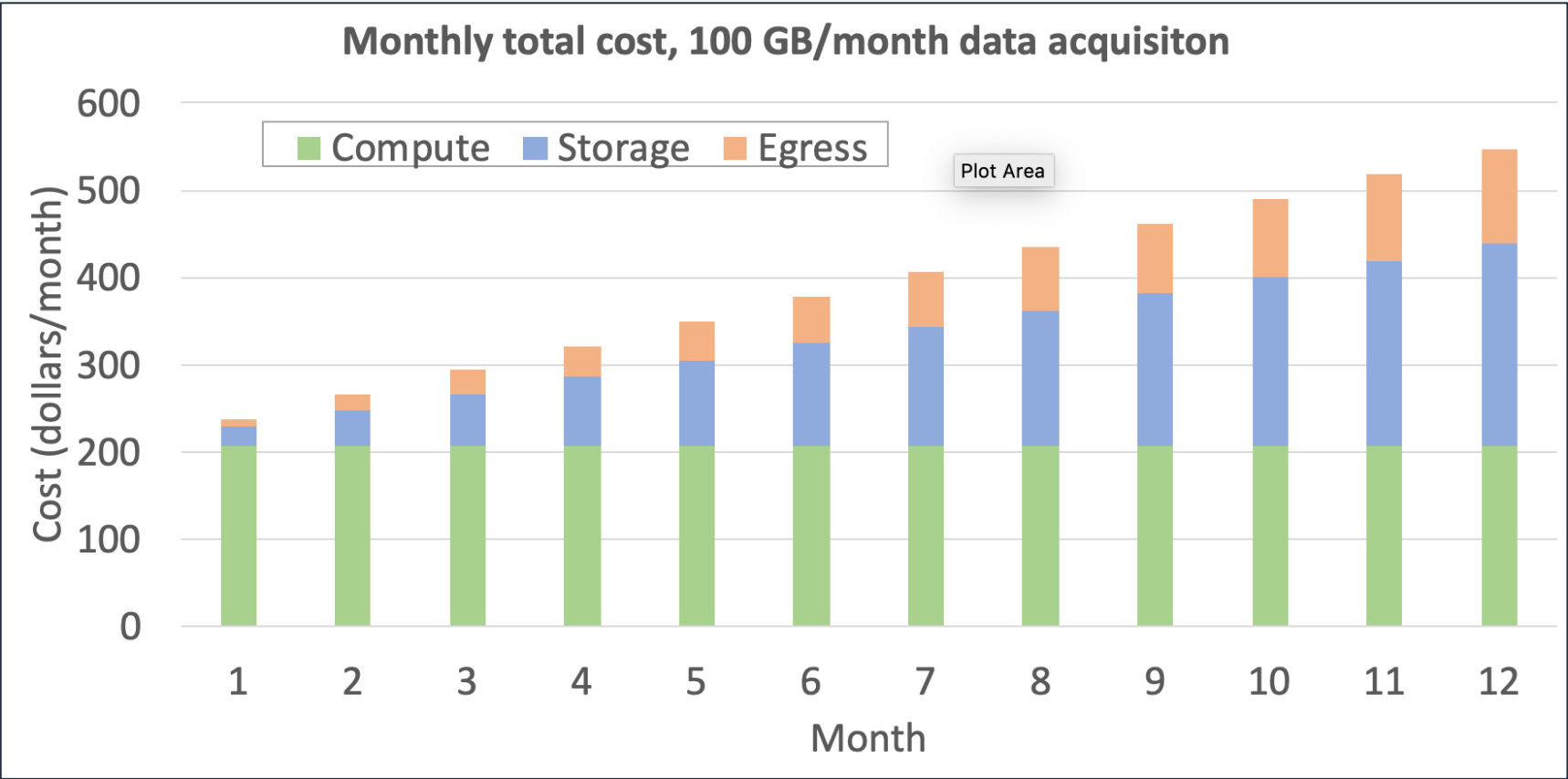
aws

Pricing

Compute (Fargate + Aurora) Cost

Period	Hours/Week	Load	$ / month
Standard	55	1	88
Burst	5	4	32
Quiet	108	0.5	87
			207

Data Cost

Item	$ / 100 GB
Storage	12
Egress	9
	21

12-Month Project Cost

Item	Total	$ / Month
Compute	2,484	207
Data	2,219	185
	4,703	**392**

Monthly total cost, 100 GB/month data acquisiton

aws

Review: Addressing Requirements

Requirements

- Scalability
- Ease of use
- Cost
- Durability

HIPAA Practices

- Encryption in transit
- Encryption at rest
- Access control
- Backup/archive
- Logging

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Next Steps

- AWS Training and Certification
  - Digital, classroom, on-site, partners
- AWS Professional Services
  - Help you achieve specific outcomes
- AWS Partner Network
  - Technology and consulting businesses building customer solutions

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Follow-up Items

- Can we extend our network virtually to AWS?
    - AWS Site-to-Site VPN, Client VPN
- Can we use our existing Active Directory authentication?
    - AWS Single Sign-On
- Can we log to our existing Splunk implementation?
    - Stream CloudWatch logs to Splunk

aws

Configuration

Elastic Container Service Task Definition

Environment variables

Key

DICOM_AET	Value ▾	MASTERBUILDER
DICOM_PORT	Value ▾	104
PG_PASSWORD	ValueFrom ▾	arn:aws:secretsmanager:us-east-1:618
PG_USER	ValueFrom ▾	arn:aws:secretsmanager:us-east-1:618

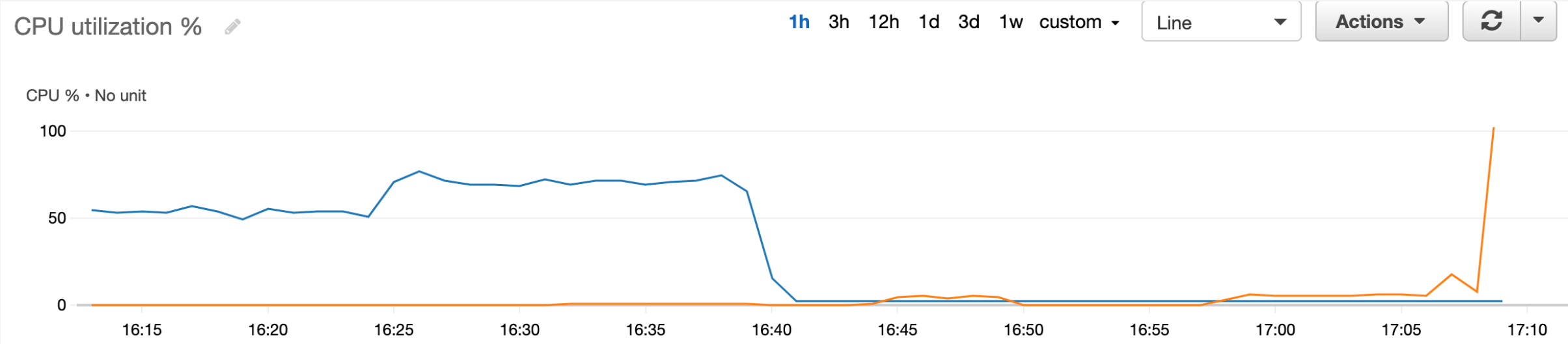## Secrets Manager

AWS Secrets Manager > Secrets

Secrets

Secrets   **Store a new secret**

🔍 *Search by secret name*   ‹ ›
                                                ⚙

Secret name	Description	Last retrieved (UTC)
mb-db-password	-	03/10/2020
mb-db-user	-	03/10/2020

aws

Performance

Web and App Tier Load Test

Performance

CPU utilization %

No unit

Load increases

Web & App Task Count

Count

Task stopped

App Tier Scaling and Resilience

Web & App Task Count ✎

1h **3h** 12h 1d 3d 1w