

ASU Research Data Repository: Technical Infrastructure Snapshot

Architecture, operations, and sustainability in practice



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Outline

- Vision & Architecture
- Operations & Reliability
- Security & Governance
- Efficiency & Experience
- Key Takeaways

Dataverse in Context - the ASU Approach



Cloud-Based

AWS Infrastructure
Managed services
Scalable storage



Service-Oriented

Research workflows
Curation support
API integration

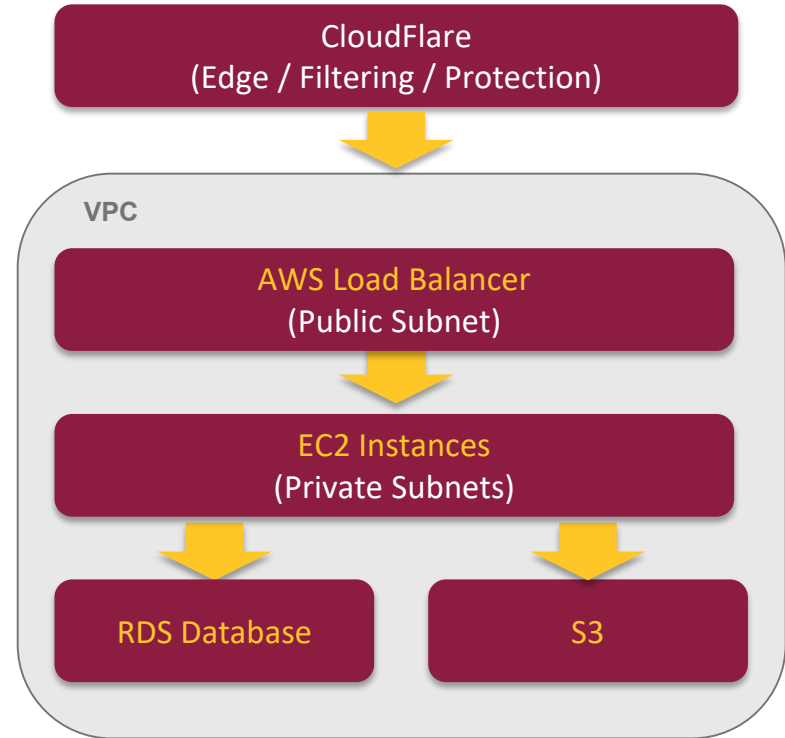


Sustainable

Cost-aware design
Long-term storage
Operational efficiency

Architecture Overview

- AWS-based infrastructure
- Load-balanced application layer
- Private compute environment
- Managed database (RDS)
- S3 for data storage and backups





Infrastructure Design Philosophy

- Reducing operational complexity
- Managed services for critical components
- Private network design
- Decoupled storage and compute
- Designed for long-term maintainability

Operational Practices

Daily practices to keep things running smoothly

Monitoring

- Cloudwatch
- Server logs

Maintenance

- Security
- Patching

Diagnosis

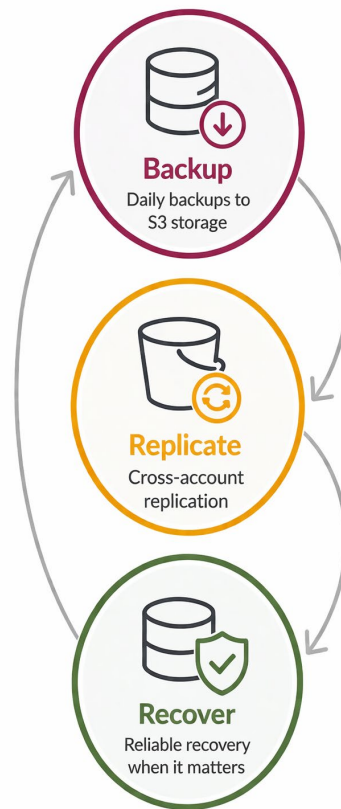
- Across system layers

Support

- Researchers
- Workflows

Reliability & Sustainability

- Daily database backups to S3
- S3-based file storage
- Cross-account replication (disaster recovery)
- Backup to external platform
- Designed for data durability and recovery



Cost Awareness

Cost Drivers → Optimization → Sustainability



Storage (S3)

Lifecycle Rules
Tiering



Compute (EC2)

Savings Plan
Rightsizing



Database (RDS)

Reserved Instances



Data Transfer

Monitoring
Optimization

Security & Risk Management

Network Isolation

Firewalls • Private Subnets

Access Control

IAM • MFA

Infrastructure Protection

Security Groups • WAF

Endpoint Security

HTTPD • Cloudflare • Crowdstrike

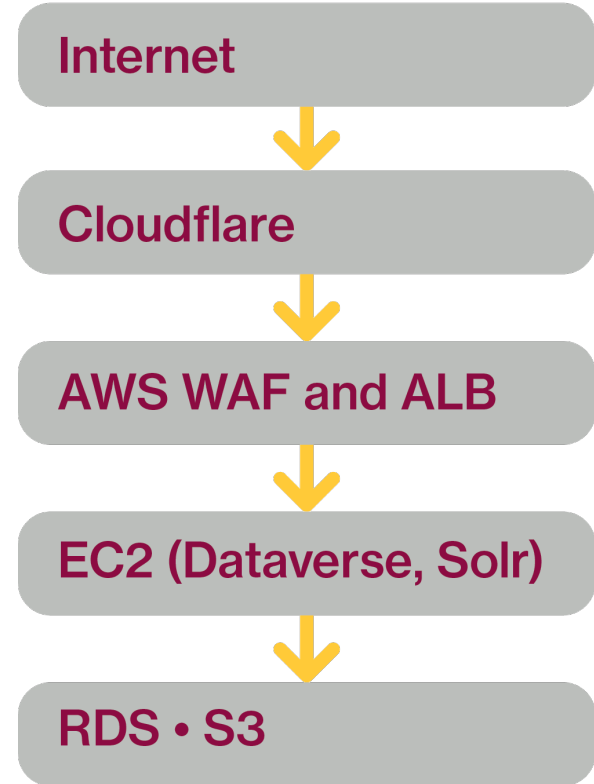
Vulnerability and Data Protection

Patching • CVEs • Backups

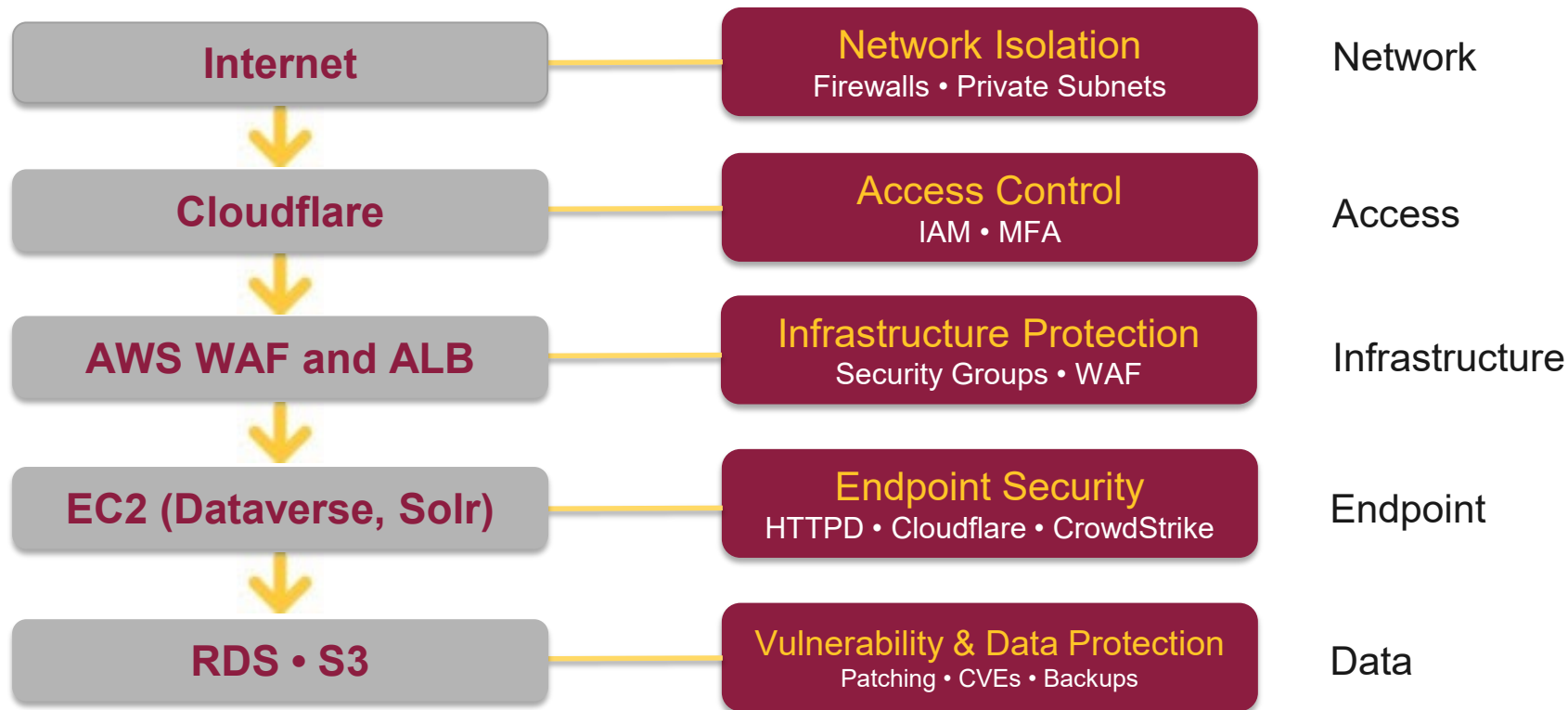
User Awareness & Training • Phishing Awareness • Security Practices

Managing Bots & Crawlers

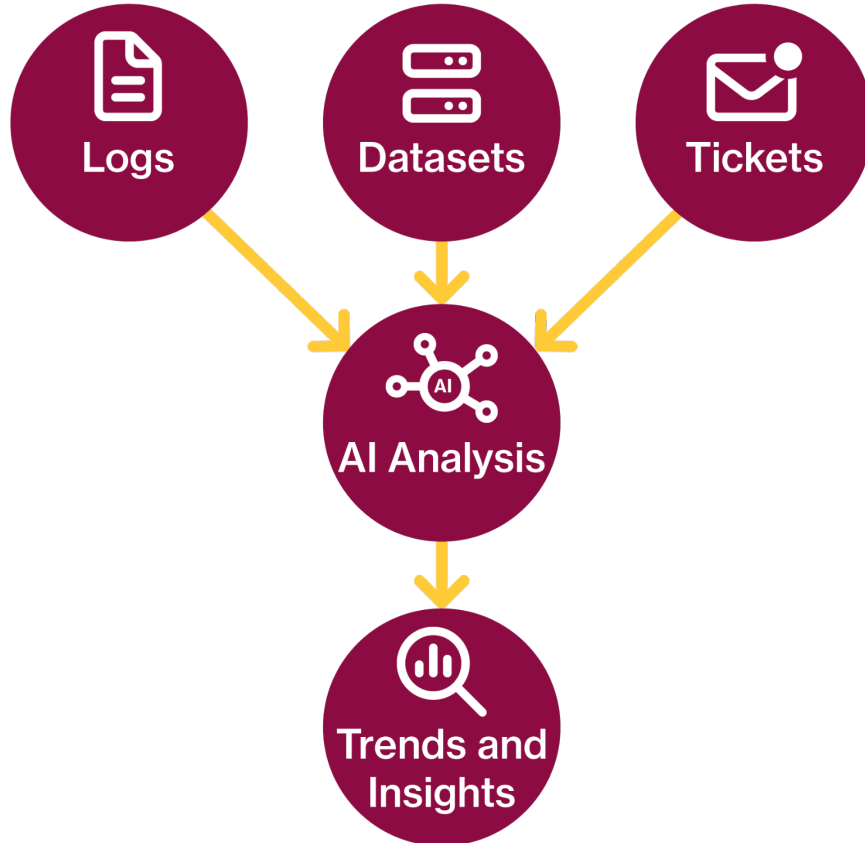
- High-volume automated access
- Bulk downloads and aggressive crawling
- Impacts:
 - performance
 - bandwidth
 - operational workload



Security & Risk Management (Layered Approach)



AI-Assisted Operations



- AI in Operations:
 - Logs & traffic
 - Anomaly detection
 - Dataset analysis
 - Support analysis
- What it enables:
 - Faster troubleshooting
 - Better decisions
 - Improved workflows
 - Researcher support

Accessibility Report

Missing accessible names and labels

- Links, buttons, images, and form fields without text alternatives or labels
- Example: over 2,300 links and 300+ images fixed

ARIA misuse and structural issues

- Invalid roles, missing required attributes, unsupported or incorrect ARIA usage
- Example: over 10,000 ARIA-related issues corrected

Keyboard and focus problems

- Hidden elements receiving focus, missing focus indicators
- Example: nearly 3,000 focus-related issues resolved

Document structure and semantics

- Empty headings, missing page titles, incorrect heading hierarchy
- Result: improved navigation and usability for assistive technologies

Visual accessibility issues

- Color contrast problems, small font sizes, and readability concerns
- Thousands of issues addressed across applications

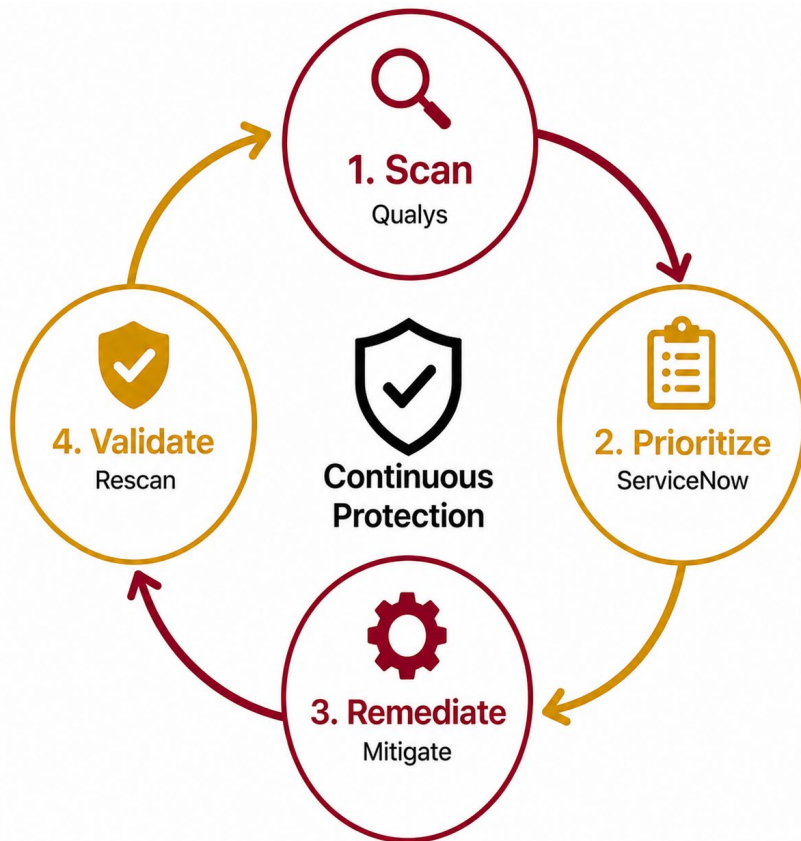
US Government ADA Title II requirements original deadline April 26, 2026 (now 2027)

Regulations

Use of SiteImprove



Vulnerability Management



Continuous Scanning

- We continuously scan our environment for vulnerabilities and outstanding CVEs

Managed in Custom Tool

- Findings are logged and managed through a custom portal for tracking, prioritization, and workflow

Remediation

- Most issues are related to OS or packages and remediated through regular patching

Validate and Repeat

- We re-scan to verify remediation and continuously improve our security posture

From Infrastructure to Service

These decisions affect:

- Data deposit
- Curation workflows
- Researcher experience



Key Takeaways

- Infrastructure decisions shape service outcomes
- Simplicity supports long-term sustainability
- Operational practices are critical to reliability
- Access and traffic management are ongoing challenges 🔥
- Technical and service layers are tightly connected

Thank You / Stay Connected

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