ENGENHARIA DE SOFTWARE

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Agenda

- AWS Educate
  - AWS Academy Cloud Foundations [27857]
    - Module 1: Cloud Concepts Overview
    - Module 2: Cloud Economics and Billing
    - Module 3: AWS Global Infrastructure Overview
    - Module 4: AWS Cloud Security
    - Module 5: Networking and Content Delivery
    - Module 6: Compute
    - Module 7: Storage
    - Module 8: Databases
    - **Module 9: Cloud Architecture**
    - Module 10: Automatic Scaling and Monitoring

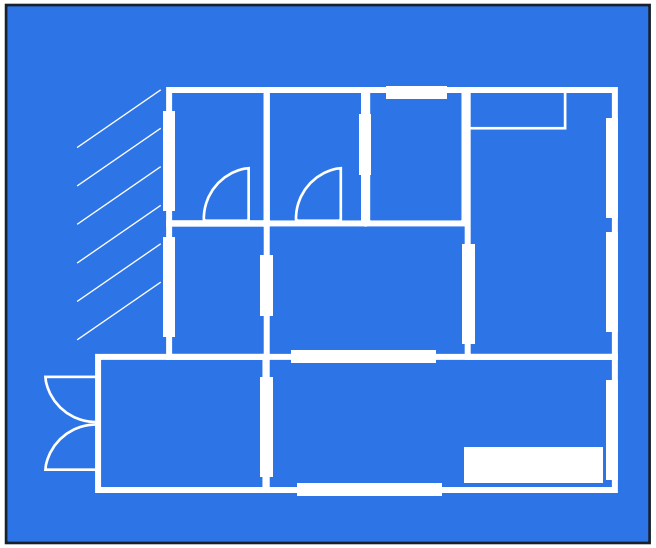
Week #10

CLOUD ARCHITECTURE

Module 9: Cloud Architecture

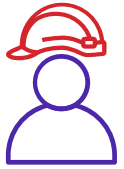
Section 1: AWS Well-Architected Framework

Architecture: designing and building

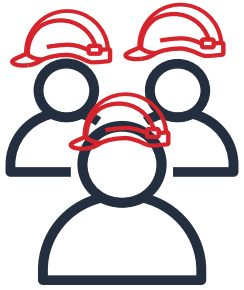


Structure design

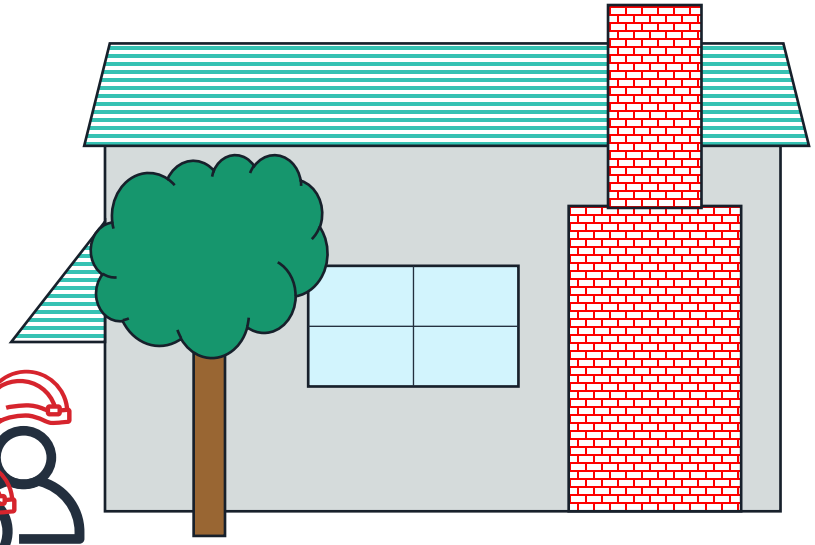
Customer
(Decision maker)



Architect



Building crew
(Delivery team)

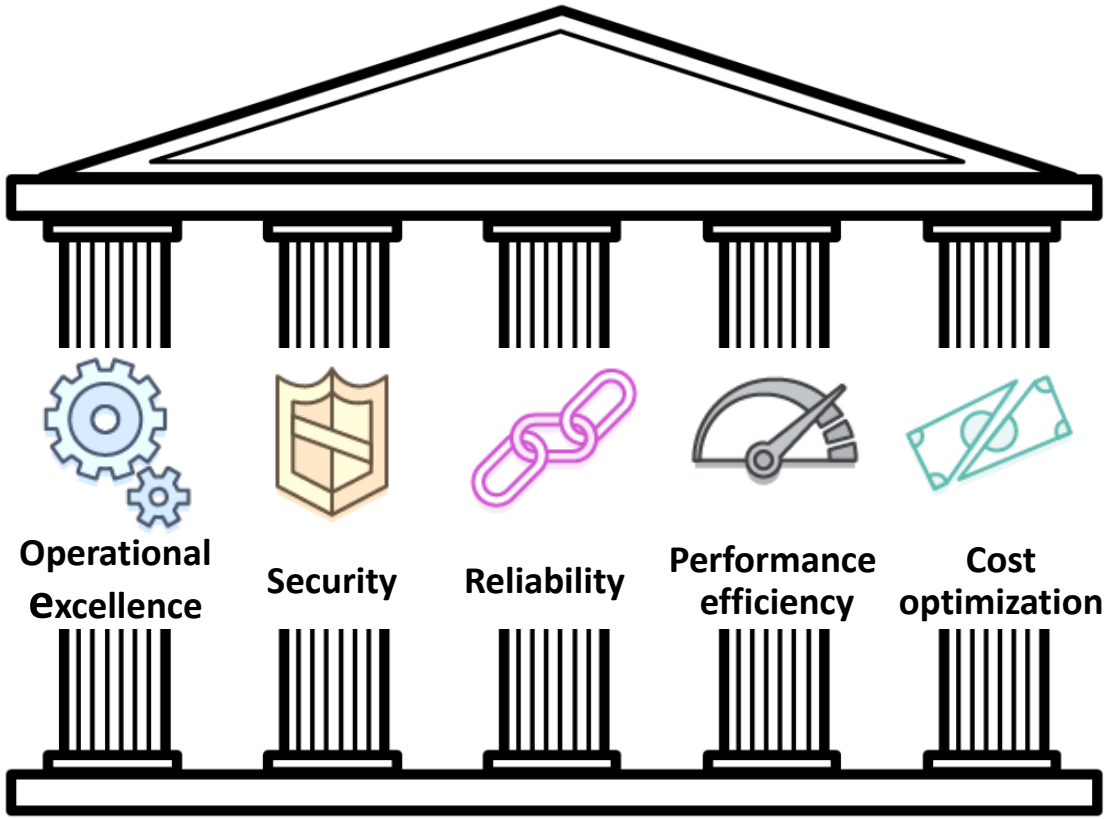


Completed structure

What is the AWS Well-Architected Framework?

- A guide for designing infrastructures that are:
  - ✓Secure
  - ✓High-performing
  - ✓Resilient
  - ✓Efficient
- A consistent approach to evaluating and implementing cloud architectures
- A way to provide best practices that were developed through lessons learned by reviewing customer architectures

Introduction to the AWS Well-Architected Framework Design Principles Activity



Operational Excellence pillar

Operational Excellence pillar

Operational Excellence pillar

Deliver business value

- Focus
  - Run and monitor systems to deliver business value, and to continually improve supporting processes and procedures.
- Key topics
  - Automating changes
  - Responding to events
  - Defining standards to manage daily operations

Operational excellence design principles

Operational Excellence pillar

Deliver business value

- Perform operations as code
- Make frequent, small, reversible changes
- Refine operations procedures frequently
- Anticipate failure
- Learn from all operational events and failures

Operational excellence questions

Organization

- How do you determine what your priorities are?
- How do you structure your organization to support your business outcomes?
- How does your organizational culture support your business outcomes?

Prepare

- How do you design your workload so that you can understand its state?
- How do you reduce defects, ease remediation, and improve flow into production?
- How do you mitigate deployment risks?
- How do you know that you are ready to support a workload?

Operate

- How do you understand the health of your workload?
- How do you understand the health of your operations?
- How do you manage workload and operations events?

Evolve

- How do you evolve operations?

Security pillar

Security pillar

Security pillar

Protect and monitor systems

- Focus
  - Protect information, systems, and assets while delivering business value through risk assessments and mitigation strategies.
- Key topics
  - Protecting confidentiality and integrity of data
  - Identifying and managing who can do what
  - Protecting systems
  - Establishing controls to detect security events

Security design principles

Security pillar

Protect and monitor systems

- Implement a strong identity foundation
- Enable traceability
- Apply security at all layers
- Automate security best practices
- Protect data in transit and at rest
- Keep people away from data
- Prepare for security events

Security questions

Security

- How do you securely operate your workload?

Identity and access management

- How do you manage identities for people and machines?
- How do you manage permissions for people and machines?

Detection

- How do you detect and investigate security events?

Infrastructure protection

- How do you protect your network resources?
- How do you protect your compute resources?

Data protection

- How do you classify your data?
- How do you protect your data at rest?
- How do you protect your data in transit?

Incident response

- How do you anticipate, respond to, and recover from incidents?

Reliability pillar

Reliability pillar

Reliability pillar

Recover from failure and mitigate disruption.

- Focus
  - Ensure a workload performs its intended function correctly and consistently when it’s expected to.
- Key topics
  - Designing distributed systems
  - Recovery planning
  - Handling change

Reliability design principles

Reliability pillar

Recover from failure and mitigate disruption.

- Automatically recover from failure
- Test recovery procedures
- Scale horizontally to increase aggregate workload availability
- Stop guessing capacity
- Manage change in automation

Reliability questions

Foundations

- How do you manage service quotas and constraints?
- How do you plan your network topology?

Workload architecture

- How do you design your workload service architecture?
- How do you design interactions in a distributed system to prevent failure?
- How do you design interactions in a distributed system to mitigate or withstand failures?

Change management

- How do you monitor workload resources?
- How do you design your workload to adapt to changes in demand?
- How do you implement change?

Failure management

- How do you back up data?
- How do you use fault isolation to protect your workload?
- How do you design your workload to withstand component failures?
- How do you test reliability?
- How do you plan for disaster recovery?

Performance Efficiency pillar

Performance Efficiency pillar

Performance Efficiency pillar

Use resources sparingly.

- Focus
  - Use IT and computing resources efficiently to meet system requirements and to maintain that efficiency as demand changes and technologies evolve.
- Key topics
  - Selecting the right resource types and sizes based on workload requirements
  - Monitoring performance
  - Making informed decisions to maintain efficiency as business needs evolve

Performance efficiency design principles

Performance Efficiency pillar

Use resources sparingly.

- Democratize advanced technologies
- Go global in minutes
- Use serverless architectures
- Experiment more often
- Consider mechanical sympathy

Performance efficiency questions

Selection

- How do you select the best performing architecture?
- How do you select your compute solution?
- How do you select your storage solution?
- How do you select your database solution?
- How do you configure your networking solution?

Review

- How do you evolve your workload to take advantage of new releases?

Monitoring

- How do you monitor your resources to ensure they are performing?

Tradeoffs

- How do you use tradeoffs to improve performance?

Cost Optimization pillar

Cost Optimization pillar

Cost Optimization pillar

Eliminate unneeded expense.

- Focus
  - Avoid unnecessary costs.
- Key topics
  - Understanding and controlling where money is being spent
  - Selecting the most appropriate and right number of resource types
  - Analyzing spend over time
  - Scaling to meeting business needs without overspending

Cost optimization design principles

Cost Optimization pillar

Eliminate unneeded expense.

- Implement Cloud Financial Management
- Adopt a consumption model
- Measure overall efficiency
- Stop spending money on undifferentiated heavy lifting
- Analyze and attribute expenditure

Cost optimization questions

Practice cloud financial management

- How do you implement cloud financial management?

Expenditure and usage awareness

- How do you govern usage?
- How do you monitor usage and cost?
- How do you decommission resources?

Cost-effective resources

- How do you evaluate cost when you select services?
- How do you meet cost targets when you select resource type, size, and number?
- How do you use pricing models to reduce cost?
- How do you plan for data transfer changes?

Manage demand and supply resources

- How do you manage demand and supply resources?

Optimize over time

- How do you evaluate new services?

Section 1 key takeaways

- The AWS Well-Architected Framework provides a consistent approach to evaluate cloud architectures and guidance to help implement designs.
- The AWS Well-Architected Framework documents a set of foundational questions that enable you to understand if a specific architecture aligns well with cloud best practices.
- The AWS Well-Architected Framework is organized into five pillars.
- Each pillar includes a set of design principles and best practices.

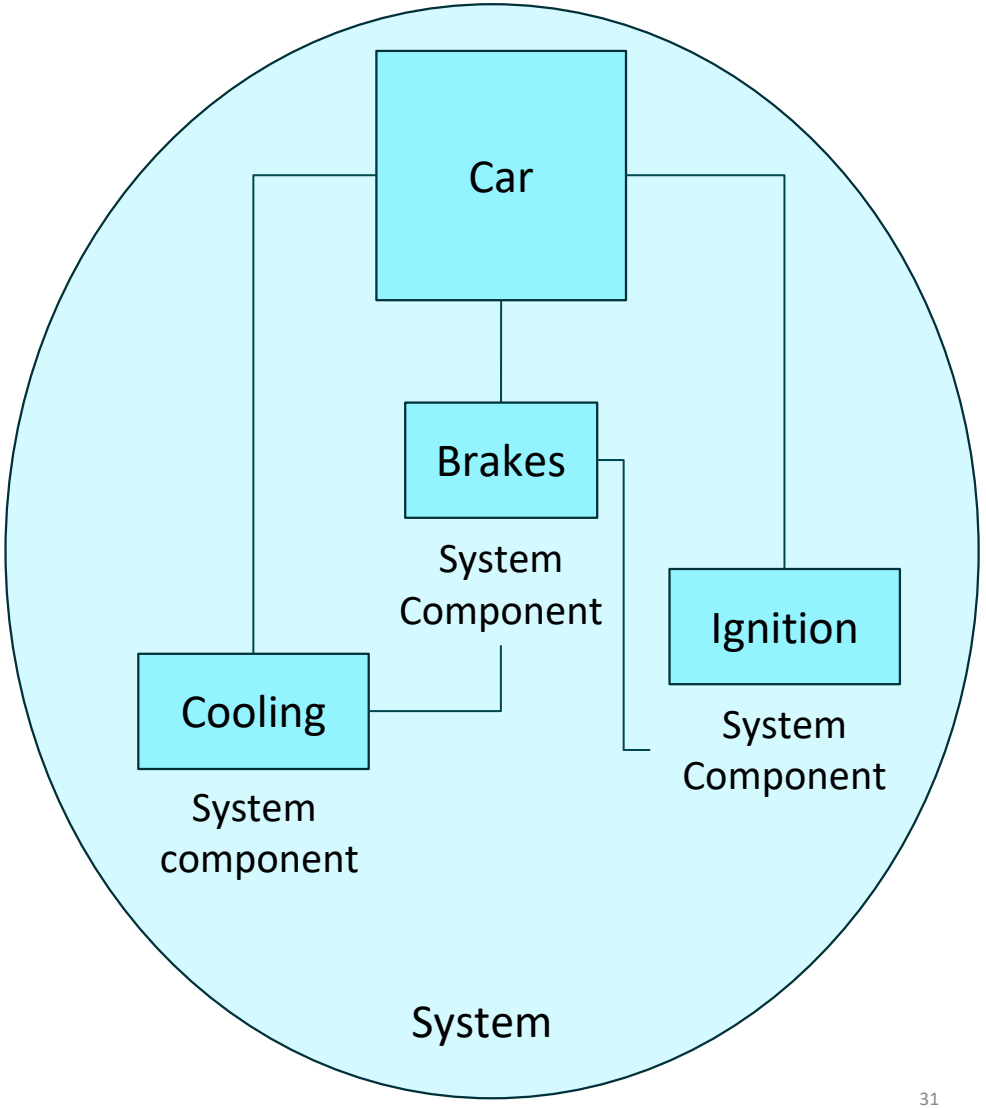
Reliability & Availability

“Everything fails, all the time.”

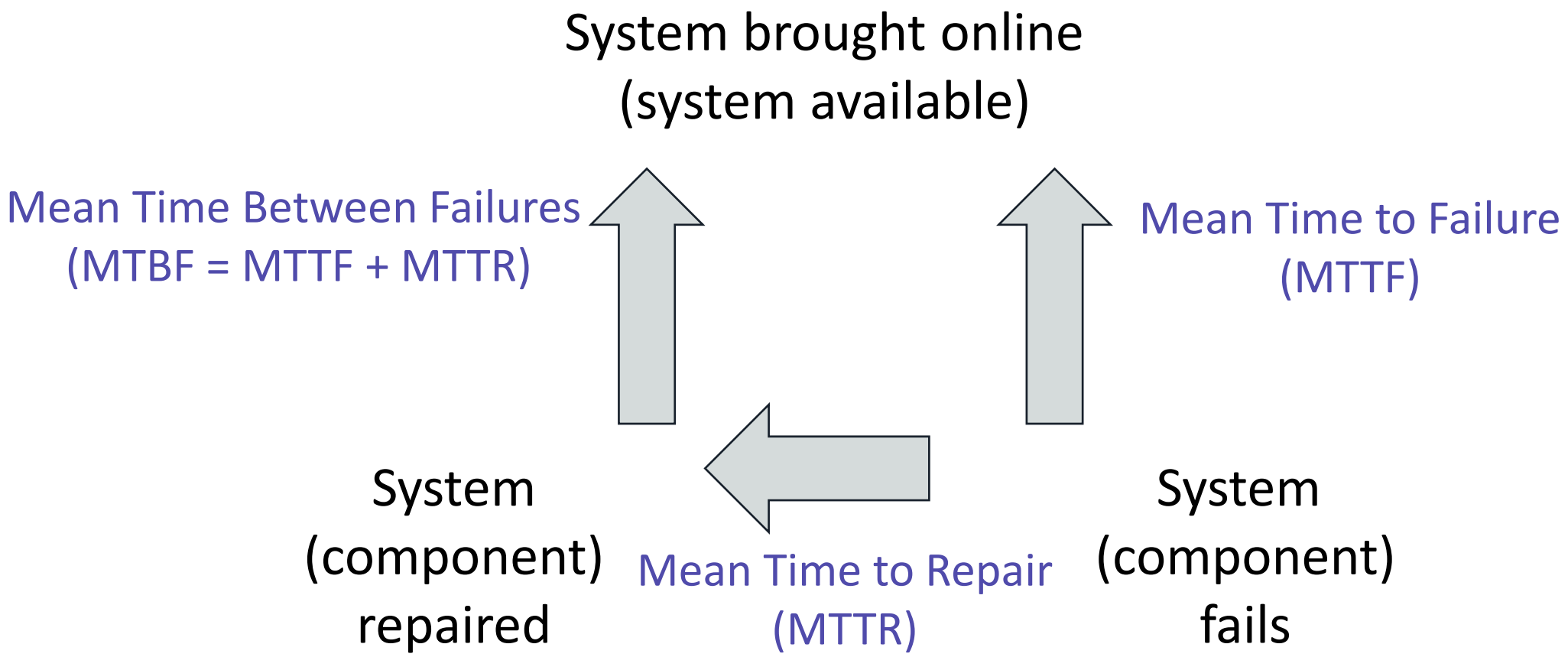
Werner Vogels, CTO, Amazon.com

Reliability

- A measure of your system's ability to provide functionality when desired by the user.
- System includes all system components: hardware, firmware, and software.
- Probability that your entire system will function as intended for a specified period.
- Mean time between failures (MTBF) = total time in service/number of failures



Reliability



Availability

- Normal operation time / total time
- A percentage of uptime (for example, 99.9 percent) over time (for example, 1 year)
- Number of 9s – Five 9s means 99.999 percent availability

High availability

- System can withstand some measure of degradation while still remaining available.
- Downtime is minimized.
- Minimal human intervention is required.

Availability tiers

Availability	Max Disruption (per year)	Application Category
99%	3 days 15 hours	Batch processing, data extraction, transfer, and load jobs
99.9%	8 hours 45 minutes	Internal tools like knowledge management, project tracking
99.95%	4 hours 22 minutes	Online commerce, point of sale
99.99%	52 minutes	Video delivery, broadcast systems
99.999%	5 minutes	ATM transactions, telecommunications systems

Factors that influence availability

Fault tolerance

- The built-in redundancy of an application's components and its ability to remain operational.

Scalability

- The ability of an application to accommodate increases in capacity needs without changing design.

Recoverability

- The process, policies, and procedures that are related to restoring service after a catastrophic event.

Section 2 key takeaways

- Reliability is a measure of your system's ability to provide functionality when desired by the user, and it can be measured in terms of MTBF.
- Availability is the percentage of time that a system is operating normally or correctly performing the operations expected of it (or normal operation time over total time).
- Three factors that influence the availability of your applications are fault tolerance, scalability, and recoverability.
- You can design your workloads and applications to be highly available, but there is a cost tradeoff to consider.

Module 9: Cloud Architecture

Section 3: AWS Trusted Advisor

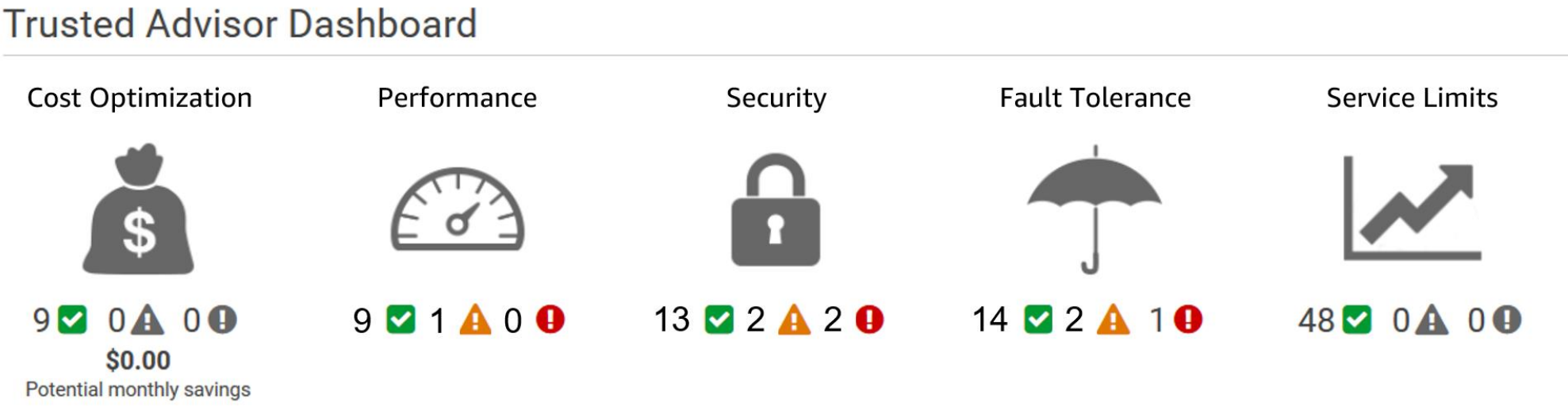
AWS Trusted Advisor

AWS Trusted Advisor

- Online tool that provides real-time guidance to help you provision your resources following AWS best practices.
- Looks at your entire AWS environment and gives you real-time recommendations in five categories.

Cost Optimization	Performance	Security	Fault Tolerance	Service Limits
				
0 9 0	3 7 0	2 4 11	0 15 5	37 0 1
$7,516.85 Potential monthly savings				

Activity: Interpret AWS Trusted Advisor recommendations



Section 3 key takeaways

- AWS Trusted Advisor is an online tool that provides real-time guidance to help you provision your resources by following AWS best practices.
- AWS Trusted Advisor looks at your entire AWS environment and gives you real-time recommendations in five categories.
- You can use AWS Trusted Advisor to help you optimize your AWS environment as soon as you start implementing your architecture designs.

Additional resources

- AWS Well-Architected website
- AWS Well-Architected Framework whitepaper
- AWS Well-Architected Labs
- AWS Trusted Advisor Best Practice Checks

Thank you

aws academy