Module 9: Cloud Architecture

Thursday, September 18, 2025 9:13 AM

A. Topics:

- AWS Well-Architectured Framework
- Reliability and high availability
- AWS Trust Advisor

B. AWS Well-Architected Framework

- Archietcture is the art and science of designing and building large structures
- Large systems needed to be manage their size and complexity by architects
- Cloud architects enage with decision makers
- AWS Well-Architected Framework;
  + A guide for designing infrastrucure that are:
    * Secure
    * High-performing
    * Resilent
    * Efficient
  + A coinsisent approach to evaluating and implementing cloud architectures
  + A way to provide best practices that were developed through lessons learned by reviewing customer architectures.
- Pillars of the AWS Well-Architected Framework:
  + Operational excellence
  + Security
  + Reliability
  + Performance efficiency
  + Cost Optimization

1. 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:
  + Managing and automating changes
  + Repsonding to events
  + Defining standards to successfully manage daily operations
- Operational excellence design principles:
  + Perform operations as code
  + Annotate documentation
  + Make frequent, small, reversible changes
  + Refine operations procedures frequently

Prepare * How do you determine what you promoyes are? * How do you design your workload so that you can understand its state? * How do you reduce defects, ease remedation, 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 evovle operations?

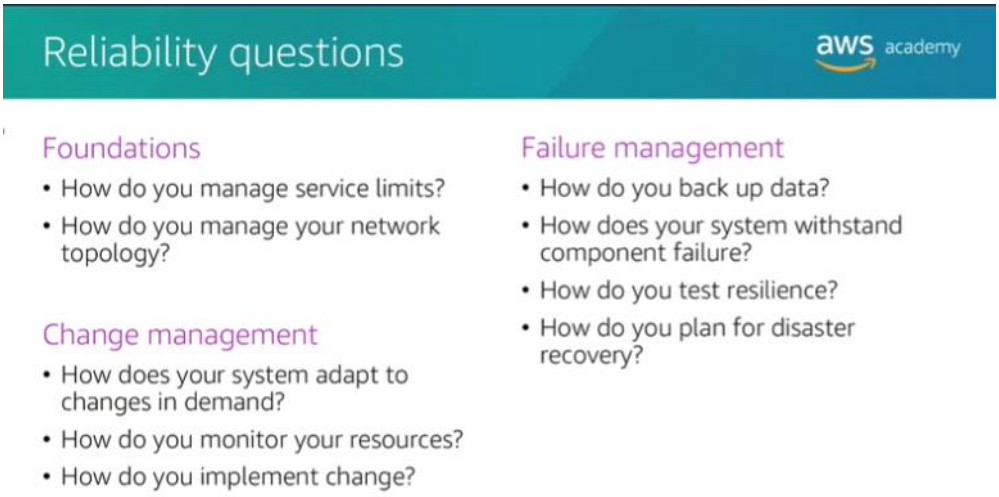
2. Security Pillar

- Focus: Protect information, systems, and assets while delivering business value through risk assessments and mitigation strategies
- Key Topics:
  + Identifying and managing cho can do what
  + Establishing controls to detect security events
  + Protecting systems and services
  + Protecting confidentially and integrity of data
- Security design principles:
  + Implement a strong identity foundation
  + Enable traceability

+ Apply security at all layers
+ Automate securty best practices
+ Protect data in transit and at rest
+ Keep people away from data
+ Prepare for security events.

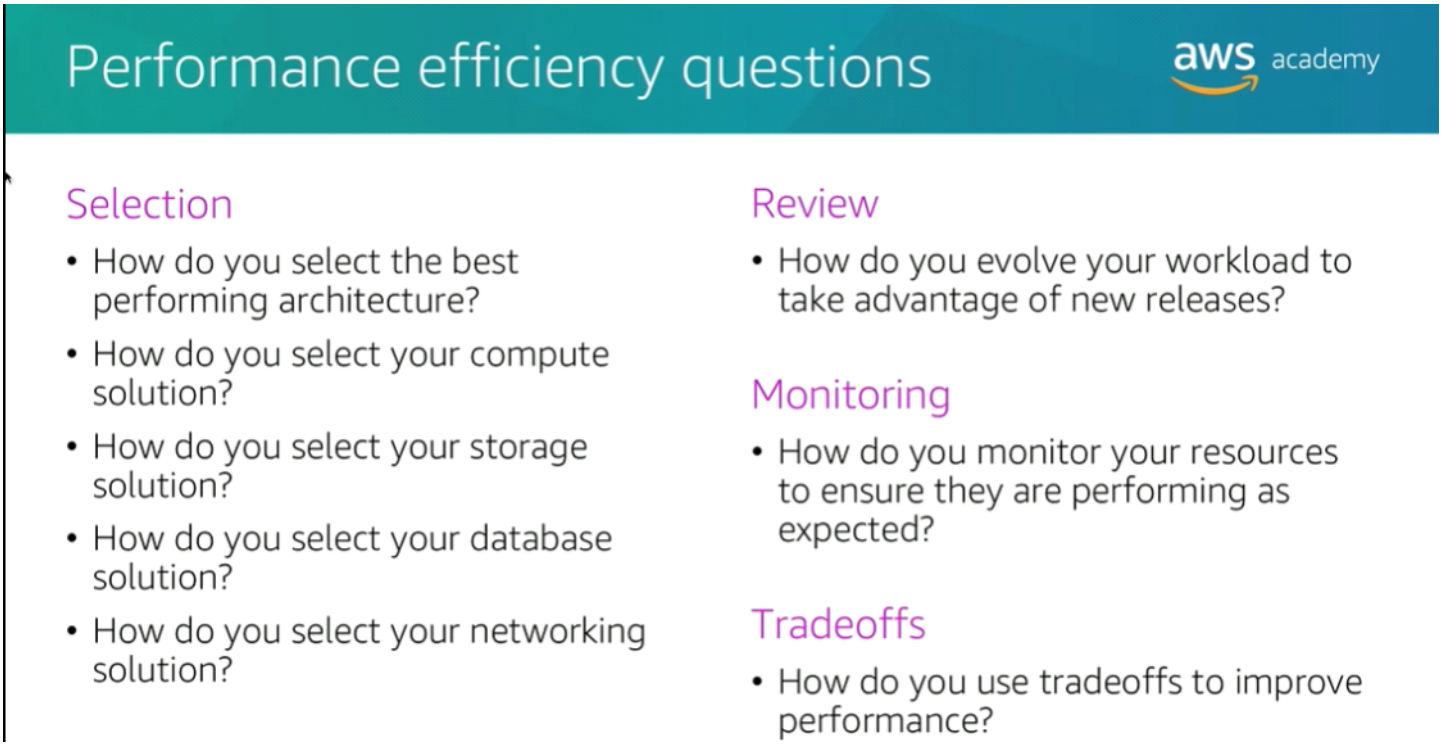
3. Reliability Pillar

- Focus: Prevent and quickly recover from failures to meet business and customer demand
- Key Topics:
  + Setting up
  + Cross-project requirements
  + Recovery planning
  + Handling change
- Reliability design principle:
  + Test recovery procedures
  + Automatically recover from failure
  + Scale horizontally to increase aggregate system availability
  + Stop guessing capacity
  + Manage change in automation



4. Performance Efficiency

- Focus: Use IT and computing resources efficiency to meet system requirements and to maintain that efficiency as demand changes and technologies evolve.
- Key Topics:
  + Selecting 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:
  + Democratic advanced technologies
  + Go global in minutes
  + Use serverless architectures
  + Experiment more often
  + Have mechanical sympathy



5. Cost Optimization => Eliminated unneeded expense

- Focus: Run systems to deliver business value at the lowest price point
- Key Points:
  + Understanding and controlling when money is being spent
  + Selecting the most appropriate and right number of resource types
  + Analyzing spending over time
  + Scaling to meeting business needs without overspending
- Cost Optimization design principles:
  + Adopt a consumption model
  + Measure overall efficiency
  + Stop spending money on data center operations
  + Analyze and attribute expenditure
  + Use managed and application-level services to reduce cost of ownership

Cost optimization questions

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Expenditure 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 and size?
- How do you use pricing models to reduce cost?
- How do you plan for data transfer changes?

Matching supply and demand

- How do you match supply of resources with demand?

Optimizing over time

- How do you evaluate new services?

6. Reliability

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

Understanding reliability metrics

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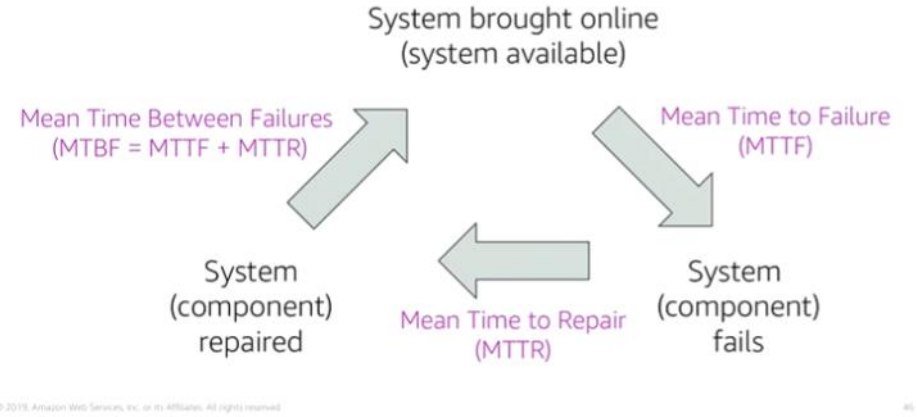

- Normal operation time/total time
- A percentage of uptime (for example, 999 percent) over time (for example, 1 year)
- Number of 9s - Five 9s means 99.999 percent availability
- High Availability:
  + System can withstand some measure of degradation while still remamining available
  + Downtime is 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, the policies, and procedures that are related to restoring service after a catastrophic event

C. AWS Trust Advisor

- Online tool that provides real-time guidance to help you provision your resources following AWS best practices
- Looks at user's entire AWS environment and gives user's real-time recommendations in five categories (Optimization, Performance, Security, Fault Tolerance, Service Limits)

- The traceability is not one of the four areas of the Performance Efficiency pillar of the AWS Well-Architected FrameWork