AWS Well-Architected Framework

Cheat sheets, Practice Exams and Flash cards 👉 www.exampro.co/clf-c01

The AWS Well-Architected Framework is a Whitepaper created by AWS to help customers build using best-practices defined by AWS.

aws.amazon.com/architecture/well-architected

The framework is divided into 5 sections called pillars which address different aspects or "lenses" that can be applied to a cloud workload.

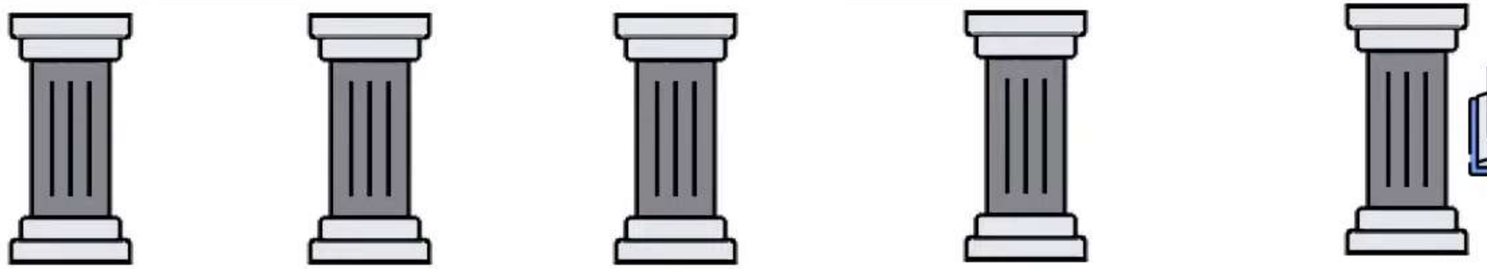
Your Cloud Workload

AWS Well-Architected Framework

- General Definitions
- General Design Principles
- The Review Process

If the Foundation is Not Solid Structural **Problems** will Arise

5 Pillars



Operational Excellence | Security | Reliability | Performance Efficiency | Cost Optimization

Each Pillar also has its own detailed whitepaper.

AWS Well-Architected – General Definitions

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*Business Value

- **Operational Excellent Pillar** — Run and monitor systems
- **Security Pillar** — Protect data and systems, mitigate risk
- **Reliability Pillar** — Mitigate and recover from disruptions
- **Performance Efficiency Pillar** — Use computing resources effectively
- **Cost Optimization Pillar** — Get the lowest price

***Trade-Off Pillars Based on Business Context**

General Definitions

Component — Code, Configuration and AWS Resource against a requirement

Workload — A set of components that work together to deliver business value

Milestones — Key changes of your architecture through product life cycle

Architecture — **How** components work together **in a** workload

Technology Portfolio — A collection of workloads required for the business to operate

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AWS Well-Architected – On Architecture

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The AWS Well-Architected Framework is designed around a different kind of team structure.
Enterprises generally have centralized teams with specific roles where AWS has distrubted teams with flexible roles.
Distributed teams can come with new risks, AWS mitigates these with Practices, Mechanisms and Leadership Principles

On-Premise Enterprise

VS

Amazon Web Services

Centralized team consisting of:

- Technical Architect (infrastructure)
- Solution Architect (software)
- Data Architect
- Networking Architect
- Security Architect

Managed by either **TOGAF** or **Zachman Framework**

Distributed teams consisting of:

- Practices
  - Team Experts (Raise the Bar)
- Mechanisms
  - Automated Checks for Standards
- *Amazon Leadership Principle

Supported by a virtual community of **SMEs**, **Principle Engineers**
eg. lunchtime talks - recycled into onboarding material

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Amazon Leadership Principles

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The **Amazon Leadership Principles are a set of principles** used during the company **decision-making, problem-solving, simple brainstorming, and hiring**.

1. Customer Obsession
2. Ownership
3. Invent and Simplify
4. Are Right, A Lot
5. Learn and Be Curious
6. Hire and Develop the Best
7. Insist on the Highest Standards
8. Think Big
9. Bias for Action
10. Frugality
11. Earn Trust
12. Dive Deep
13. Have Backbone; Disagree and Commit
14. Deliver Results
15. Strive to be Earth's Best Employer
16. Success and Scale Bring Broad Responsibility

You can read in detail about all 16 here:
https://www.amazon.jobs/en/principles

AWS Well-Architected – General Design Principles

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Stop guessing your capacity needs

eg. Cloud computing you use as little or much based **on demand.**

Test systems at production scale

eg. Clone production env to testing, Tear down testing not in use to save money.

Automate to make architectural experimentation easier

eg. Using CloudFormation with ChangeSets, StackUpdate and Drift Detection

Allow for evolutionary architectures

eg. CI/CD, rapid or nightly releases, Lambdas deprecating run-times forcing you to evolve

Drive architectures using data

eg. CloudWatch, Cloud Trail automatically turned on collecting data

Improve through game days

eg. simulate traffic on production or purposely kill EC2 instances to see test recovery

AWS Well-Architected - Anatomy of a Pillar

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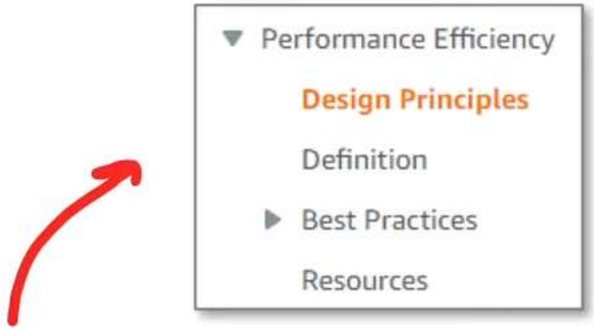

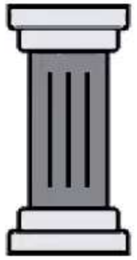

Performance Efficiency

A Pillar of the Well-Architected Framework is **structured** as follows:

- Design Principles
  - A list of design principles that need to be considered during implementation
- Definition
  - overview of the best practice categories
- Best Practices
  - detailed information about each best practice with AWS Services
- Resources
  - Additional documentation, whitepapers and videos to implement this pillar

AWS Well-Architected - Design Principles

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Operational Excellence Design Principles

Perform operations as code
Apply the same engineering discipline you would to application code to your cloud infrastructure.
By treating your operations as code you can limit human error and enable consistent responses to events.
eg. Infrastructure as Code

Make frequent, small, reversible changes
Design workloads to allow components to be updated regulary.
eg. rollbacks, incremental changes, Blue/Green, CI/CD

Refine operations procedures frequently
Look for continuous opportunities to improve your operations
eg. Use game days to simulate traffic or event failure on your production workloads

Anticipate failure
Perform post-mortems on system failures to better improve, write test code, kill production serves to test recovery

Learn from all operational failures
share lessons learned in a knowledge base for operational events and failures across your entire organization

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Security Design Principles

Implement a strong identity foundation
Implement Principle of Least Privilege (PoLP). Use Centralized identity. Avoid Long-lived credentials

Enable traceability
Monitor alert and audit actions and changes to your environment in real-time
Integrate log and metric collection and automate investigation and remediation

Apply security at all layers
Take Defense in depth approach with multiple security controls for everything eg. Edge Network, VPC, Load Balancing Instances, OS, Application Code

Automate security best practices

Protect data in transit and at rest

Keep people away from data

Prepare for security events
Incident management systems and investigation policy and processes. Tools to detect, investigate and recover from incidences

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Reliability Design Principles

Automatically recover from failure
Monitor Key Performance Indicators (KPIs) and trigger automation when threshold is breached.

Test recovery procedures
Test how your workload fails, and you validate your recovery procedures.
You can use automation to simulate different failures or to recreate scenarios that led to failures before.

Scale horizontally to increase aggregate system availability
Replace one large resource with multiple small resources to reduce the impact of a single failure on the overall workload.
Distribute requests across multiple, smaller resources to ensure that they don't share a common point of failure.

Stop guessing capacity
In on-premise it takes a lot of guess work to determine the elasticity of your workload demands.
With Cloud you don't need to guess how much you need because you can request the right size of resources on-demand.

Manage change in automation
Making changes via Infrastructure as Code, will allow for a formal process to track and review infrastructure

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Performance Efficiency Design Principles

Democratize advanced technologies:
Focus on product development rather than procurement, provisioning and management of services.
Take advantage of advanced technology specialized and optimized for your use-case with on-demand cloud services.

Go global in minutes
Deploying your workload in multiple AWS Regions around the world allows you to provide lower latency and a better experience for your customers at minimal cost.

Use serverless architectures:
Serverless architectures remove the need for you to run and maintain physical servers for traditional compute activities.
Removes the operational burden of managing physical servers, and can lower transactional costs because managed services operate at cloud scale.

Experiment more often:
With virtual and automatable resources, you can quickly carry out comparative testing using different types of instances, storage, or configurations.

Consider mechanical sympathy
Understand how cloud services are consumed and always use the technology approach that aligns best with your workload goals. For example, consider data access patterns when you select database or storage approaches.

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Cost Optimization Design Principles

Implement Cloud Financial Management:
Dedicate time and resources to build capability Cloud Financial Management and Cost Optimization tooling.

Adopt a consumption model
Pay only for the computing resources that you require and increase or decrease usage depending on business requirements

Measure overall efficiency
Measure the business output of the workload and the costs associated with delivering it.
Use this measure to know the gains you make from increasing output and reducing costs.

Stop spending money on undifferentiated heavy lifting
AWS does the heavy lifting of data center operations like racking, stacking, and powering servers.
It also removes the operational burden of managing operating systems and applications with managed services.
This allows you to focus on your customers and business projects rather than on IT infrastructure.

Analyze and attribute expenditure
The cloud makes it easier to accurately identify the usage and cost of systems, which then allows transparent attribution of IT costs to individual workload owners. This helps measure return on investment (ROI) and gives workload owners an opportunity to optimize their resources and reduce costs.

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AWS Well-Architected Tool

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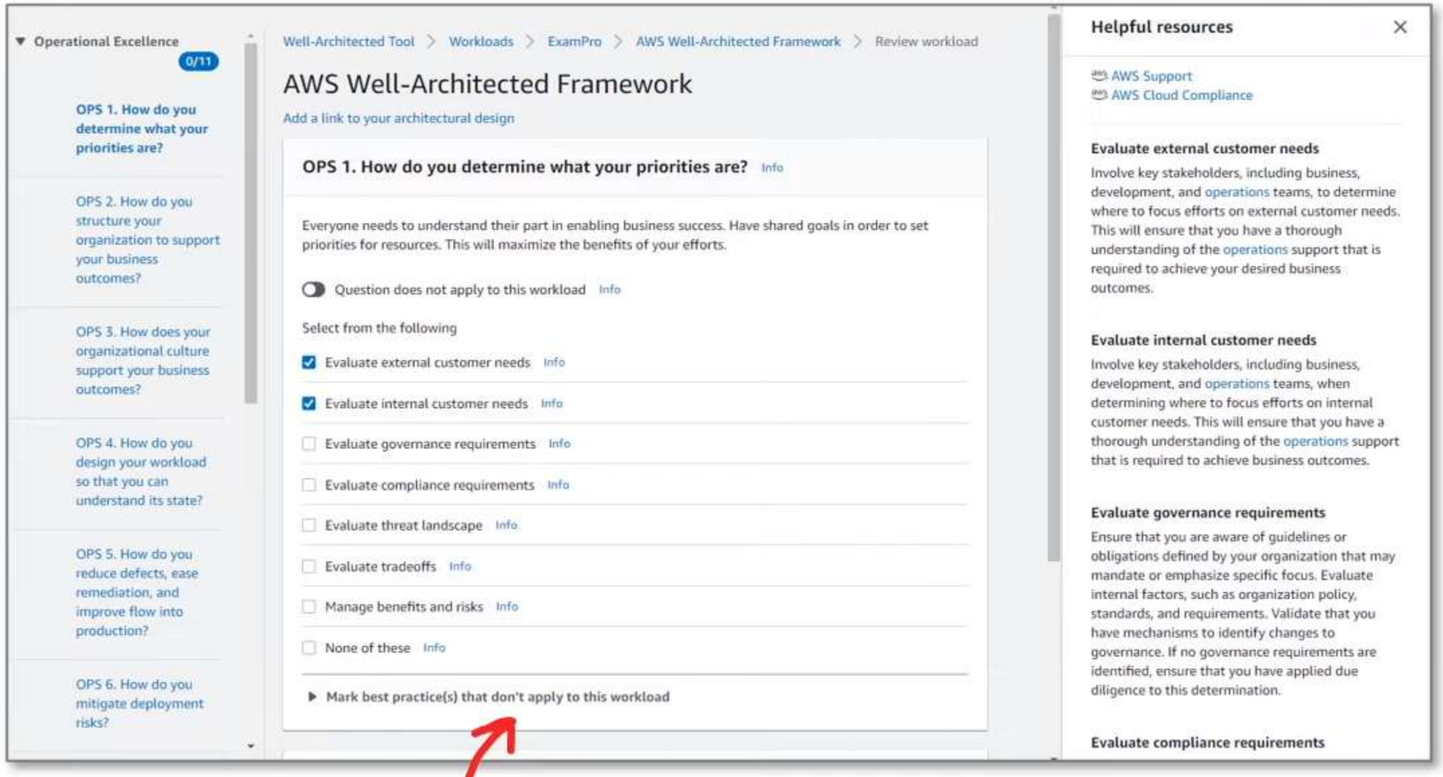
The Well-Architected Tool is **an auditing tool** to be used to asset your cloud workloads for alignment with the AWS Well Architected Framework.



Its essentially **a checklist**, with nearby references to help you assemble a report to share with executives and key stake-holders

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AWS Architecture Center

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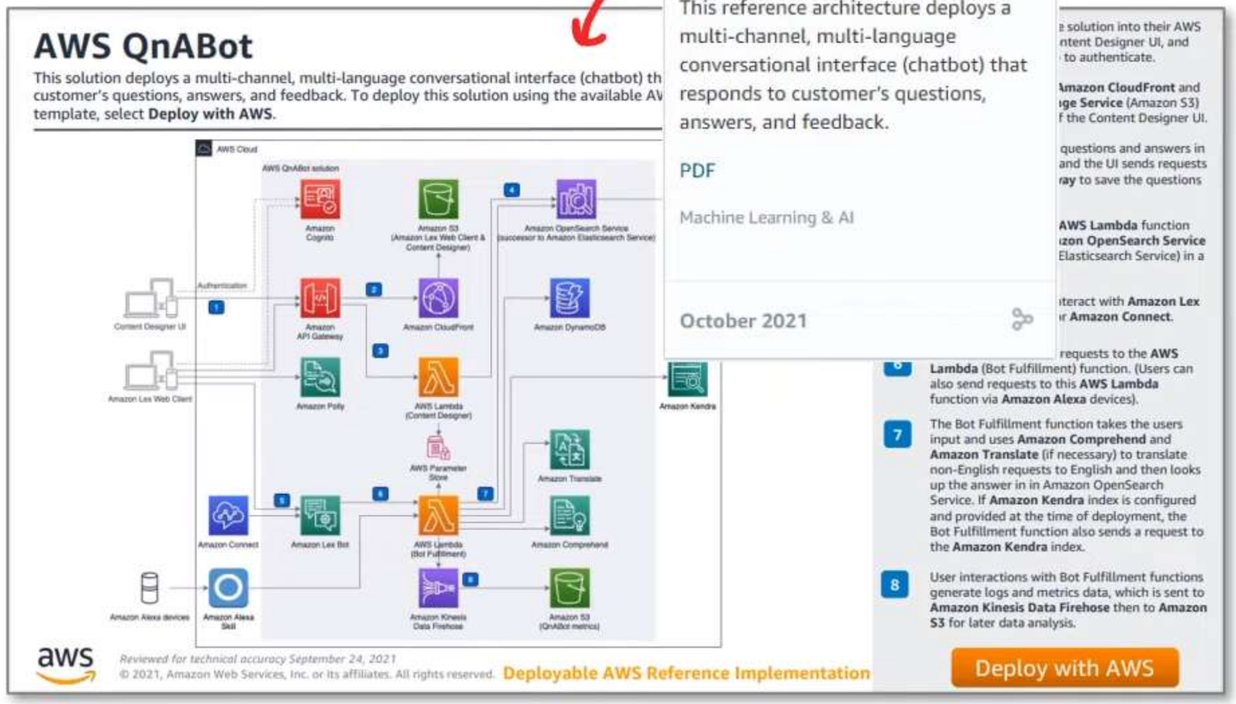
The AWS Architecture Center is a web-portal that contains **best practices** and **reference architectures** for a variety of different workloads.

aws.amazon.com/architecture