

**Are you well-
architected?**



Business

Introduction

Creating a software system is a lot like creating a building. There is a reason the term “architecture” is used in both industries. Building a software system requires solid foundations and reliable load-bearing pillars that will optimize the entire structure. If your infrastructure is not well-architected, you could lose money, time, opportunities or even your data.

Well-Architected Infrastructure (WAF) are the best practices focused on the pillars of operational excellence, security, reliability, performance efficiency, cost optimization and sustainability.

This document is an introduction into WAF: what it is, the problems it solves and the benefits it provides.

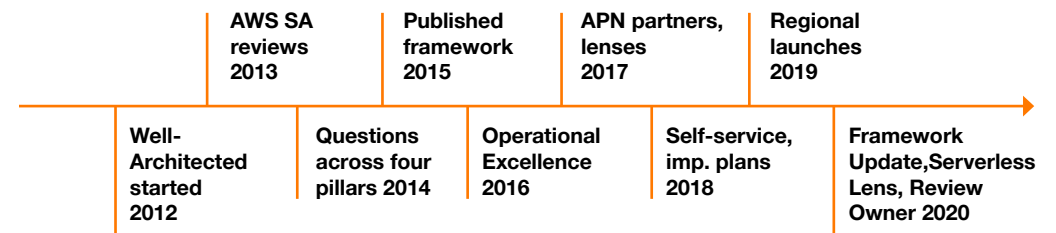
Topics covered

- What is the AWS Well-Architected Framework
- Overview of the Well-Architected Framework
- Challenges of working without WAF
- Benefits of using WAF
- Performing a Well-Architected Framework Review

What is the AWS well-architected framework?

When you look at the workloads your team is building, can you answer the question: “Are you well-architected?”

A brief history of well-architected



Why AWS well-architected framework?

After organizations have “lived” in the cloud for a while they start to understand how their cloud footprint continuously evolves. Sometimes many services are added but they are never used to their full potential. This ends up being costly, inefficient, and even non-compliant and insecure.

Best practices

By carefully studying thousands of companies in a wide variety of industries it is possible to identify criteria that successful cloud architecture plans have in common. This Well-Architected Framework is the collection of best practices which can make your cloud journey easier and more profitable.

- **Build and deploy faster**
- **Make informed decisions**
- **Lower or mitigate risks**
- **Learn AWS best practices**

A mechanism for your cloud journey

The Well-Architected Framework helps you understand the benefits and consequences of the decisions you make while building systems. It provides a method to consistently measure your architectures against the best practices in the industry. It helps you to learn from successes and failures, measure your performance, and to continuously improve. WAF is not an audit; it is a process to review your architectural decisions.



Overview of the well-architected frameworks

Pillars of AWS well-architected

The six pillars of the Well-Architected Framework are like the foundations and loadbearing structures of your systems. If you neglect operational excellence, security, reliability, performance efficiency, cost optimization and sustainability, it can become challenging to build a system that matches your expectations. When these key pillars are incorporated into your architecture you will be more likely to have stable and efficient systems, leaving you to focus on other aspects of design, like functional requirements.

- **Operational Excellence**
- **Security**
- **Performance Efficiency**
- **Cost Optimization**
- **Reliability**
- **Sustainability**

Design principles

General design principles

Pillar-specific design principles

Automate responses to security events:
Monitor and automatically trigger responses
to event-driven, or condition-driven, alerts

General design principles

We work in the real world, where human error, suboptimal design, and failure to think long-term are realities. Trying to fully eliminate these challenges with lengthy Quality Assurance processes can kill some of the major benefits of using the cloud. But with continuous cloud optimization you can manage the challenges of the real world while boosting security, reliability, and efficiency. A good place to start is with proven general design principles.

- Stop guessing your capacity needs
- Test systems at production scale
- Automate to make architectural experimentation easier
- Allow for evolutionary architectures
- Drive architectures using data
- Improve through game day

Design principles for Operational excellence

Workloads and platforms should be easy to operate, support the developers, give good insights, and have continuous improvements of the surrounding processes.

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

Use case: Jobmesse

Jobbmesse's journey with AWS and Orange Business started in late 2017 with a workshop. This was soon followed by a migration project in which Jobbmesse's application code was re-deployed to a new environment that Orange Business had created on AWS, using IaC. In simple terms, IaC defines the whole of the AWS infrastructure, resource by resource, in a set of templates, which are version controlled. Change is managed by updating the templates and applying them to the environment, causing infrastructure and other resources to be created, updated or deleted to match the templates. Changes can also be reverted by reapplying previous templates. By using IaC, management and operation of the environment is streamlined and automated, eliminating slow and error-prone manual operations.

The application infrastructure was configured to utilise auto-scaling and the applications themselves were optimized to use cloud-native services and support the auto-scaling features. Thanks to IaC, Jobbmesse's platform can be rapidly provided with new functionality, which can easily be tested in other environments prior to deployment.

Design principles for Security

It is critical to ensure that confidentiality measures are in place and that the integrity of information, systems, and assets are protected.

- 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

Use case: Bokbasen

Bokbasen required a service to continuously monitor and manage the compliance of their architecture and the configuration of the underlying AWS services and tools, the solution should be policy based, auditable, and have the capability to alert upon the introduction of non-compliant change within the various environments. The solution should also recommend and help to enforce security best practices for services deployed on Windows or Linux instances in Amazon EC2.

As part of the security solution, a concept consisted of AWS Security Hub, AWS Inspector, AWS Config, AWS CloudTrail, Amazon CloudWatch and Amazon GuardDuty where developed. The services will identify common security issues and potential threats, while allowing Bokbasen to maintain their development velocity. Security events are raised as tickets within Orange Business ITSM solution, allowing security incidents to be managed using Orange Business mature and battle tested incident management processes.

Using AWS Security Hub with the CIS AWS Foundations compliance standard, Orange Business can ensure that all of Bokbasen's AWS accounts are maintained at a minimum level of security hygiene, which complies with the Centre for Internet Security's best practices. If any element of the account configuration is discovered not to meet these standards, then a security incident is automatically raised.

Design principles for Performance efficiency

Selecting, using, and deploying resources efficiently will help you meet performance needs and business goals.

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

Use case: Ecoonline

As part of Orange Business Managed services portfolio, AWS Aurora Serverless databases are used in accordance with EcoOnline's requirements where usage and costs scale up and down automatically, without human interference.

Use case: Bokbasen

For the customer Bokbasen the use of AWS Serverless technology allows the company to scale almost limitless, at a fraction of the cost of alternative solutions. The engagement with Orange Business has provided a sound footing for Bokbasen to undertake further migration activity towards AWS.

Design principles for Cost optimization

Costs have a way of getting out of control in a business, but it is possible to control the way money is spent. By following prudent design principles you can optimize capital investments and operating expenses.

- Adopt a consumption model
- Measure overall efficiency
- Stop spending money on data center operations
- Analyze and attribute expenditure
- Use managed services to reduce cost of ownership

Use case: Ecoonline

When supporting EcoOnline 'Infrastructure as Code' (IaC) is used to implement and manage CI/CD through AWS Pipelines. For the developers, this automation transforms their normal workday from one filled with traditional technology and manual tasks to one that virtually boils down to the simple click of a button. Automation also ensures a reliable end result – every single time. EcoOnline can thus focus on application development instead of deployment and operation - at a significant lower cost.

Design principles for Operational reliability

Prevention is the best cure, so preventing failures is a key design principle. Yet failures do occur, so it is important to be able to recover quickly when they happen.

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

Use case: Ruter

In order to meet Ruter's requirements Orange Business initiated the leading Monitoring and Security platform Datadog. Datadog collects a wide range of metrics from heterogeneous sources, it employs predictive algorithms to predict how specific metrics will continue to rise or fall, based on identified trends.

Orange Business is responsible for managing different Cassandra Clusters for Ruter, forecasting growth in compute or storage of the cluster enables Orange Business to plan scaling and maintenance activity before performance begins to degrade. This ensures responsiveness of the cluster, without hugely overprovisioning cluster resources.

Design principles for Sustainability

Sustainability is the process of maximizing resource efficiency and reducing waste. It is the right thing to do not only from a business standpoint, but also from a human standpoint.

- Utilize sustainability through the cloud
- Region selection
- User behavior patterns
- Implement software and architecture patterns for resource high utilization
- Implement data management practices to reduce the provisioned storage
- Hardware patterns
- Development and deployment process

Use case: Ruter

Together with the customer, Orange Business has developed a monitoring solution for load distribution and anomalies. Orange Business monitors the Apache Cassandra clusters using statistical analysis algorithms, these are used to identify outliers and anomalies in metrics to gain improved insight into how the service is being used and how it is performing. Orange Business has configured an outlier monitor to detect when nodes experience a high load condition. This enables Orange Business to track usage patterns and to optimize the cluster for increased performance.

Challenges of working without WAF

It is easy to get started in the cloud, and many organizations embarking on their cloud journey set up a variety of services. They add new pieces as needed, each aiming to achieve a particular goal. The challenge is that this piecemeal building of cloud solutions isn't holistic. The optimization of the entire architecture is neglected. In this environment you often see:

- Poor capacity decisions
- Test environments are limited and costly
- Automation is neglected for manual effort
- Architectural decisions are made as static, onetime events
- Architectural decisions are made with limited useful data

What tends to happen is that decisions are made without fully understanding the costs and benefits, and how they can impact other aspects of your operation. The financial costs associated with different decisions and workloads aren't fully appreciated and tend to spiral upwards. Your performance isn't measured against best practices and areas for improvement aren't identified. This scenario can result in many aspects of your system not being leveraged to their full potential, increasing costs, inefficiencies and security concerns.



Working without a well-architected infrastructure can be:

- **Costly**
- **Inefficient**
- **Non-compliant**
- **Unsecure**

Benefits of using WAF

By using the Well-Architected Infrastructure process you can adopt best practices and optimize your cloud architecture in the following ways:
Gain the benefits of faster build and deployment timeframes.
Use cloud-native approaches that are more efficient and easier to scale.
Efficiently and easily identify and mitigate potential risks.

A WAF helps you build consistency throughout all your cloud operations. A company can also gain the benefits of better insight into potential impacts of changes before they are made, helping them to continuously improve.

Benefits of using WAF

- Improve cost control and profitability
- Boost efficiency
- Be compliant with national, industry and company standards
- Lower security risks
- Improve sustainability
- Increase reliability
- Continuously improve operations

WAF can improve your overall operation



Performing well-architected framework review

Intent of review

In reality, boosting one pillar can negatively impact another. For example, a high level of security can hurt the user experience. It is important to work with a specialist Managed Service Provider to discover where you are today and where you can improve.

- Not an audit
Working together to improve
- Not architecture astronauts
Pragmatic, proven advice
- Not a one-time check
Throughout lifecycle

Learnings

Some of the most common issues Orange Business discovers include underutilization of resources, unsecure access management, unsecure data storage, and non-compliant infrastructure.

- Pre-launch only?
Earlier is better
- Make bad decisions?
Not considered decisions
- Findings?
Most workloads can be improved

Use cases

By doing a Business Impact Analysis with you, Orange Business can obtain an in-depth understanding of your business requirements. We look at which of your assets are most prioritized and most critical in order to create a design to maximize the six pillars of WAF.

- Learning best practices for the cloud
- Technology governance
- Portfolio management

Define a workload

Every organization has a unique set of business requirements. Orange Business can help you design and implement in a way that is future-proof and can be easily adapted for your changing needs and scaling up when required.

- People and Teams
- Infrastructure and Services
- Plans and Procedures

Key concepts

Without WAF, the cloud tends to end up costing more and delivering less than it should. Using WAF correctly will allow you to reduce your long-term costs and to build a cloud infrastructure that is more flexible, secure, and agile than ever before.

Identify
key workloads

Identify
workload
sponsor

Identify
pillar sponsors

Three phases to the review

With our cutting-edge cloud experience, Orange Business has the expertise to help you get the most of out the cloud and to ensure that you are secure, compliant, and efficient, in accordance with WAF best practices.

- | | | |
|---------------------|-----------------------|-------------------|
| ■ Identify Sponsors | ■ Review the Workload | ■ Prioritize HRIs |
| ■ Scope Workload | ■ Record the Review | ■ Customer Review |
| ■ Prep the customer | ■ Publish Report | ■ Treatment Plan |

Review format options

Without WAF, the cloud tends to end up costing more and delivering less than it should. Using WAF correctly will allow you to reduce your long-term costs and to build a cloud infrastructure that is more flexible, secure, and agile than ever before.

Self-service individual

- Done by individual team member
- Good for first review / learning
- Should be marked as non-prod
- Can be done iteratively
- Good for planning
- Use the W-A Tool

Self-service as a team

- Done with crossfunctional team
- Good to prepare for AWS/Partner
- Requires time commitment
- Can be done iteratively
- Good for team learning
- Use the W-A Tool

AWS-led review

- Use the W-A Tool
- Share the results
- Best for critical workloads
- Good for deeper insight / expertise
- More limited overall availability

Partner-led review

- Use the W-A Tool
- Share the results
- Partner credits for resolving HRIs
- Good for deeper insight/expertise
- Partners can give hands on support

The well-architected process

The Well-Architected Framework helps you to design and operate reliable, efficient, cost-effective and sustainable systems in the cloud. It does this by providing you with the best practices in operational excellence, security, reliability, performance efficiency, cost optimization and sustainability. WAF allows you to optimize your system and continuously improve.

If you would like to learn how WAF works in practice – and the practical benefits of using it – please get in touch.

