**Cloud Economics Journey**

Introductory Guide

This infographic is designed to help new customers realise the full potential of AWS Cloud, by showing you ways to maximise business value throughout your cloud journey.

### What if you could:

- Significantly reduce IT costs and free up your IT budgets?
- Reduce undifferentiated heavy lifting and focus more time on innovation?
- Gain business agility and operational responsiveness?

#### Common reasons for using AWS

Millions of customers are using AWS at scale for reasons such as:

1. **Agility/Dev Productivity**
   - Acquisitions or Divestitures
   - Large scale compute intensive workloads
   - Innovation & Digital Transformation
   - Facility or Real Estate decisions
   - Colocation or outsourcing contract changes

2. **Cost Reduction**
   - Colocation or outsourcing contract changes

3. **Data Center Consolidation**
   - Acquisitions or Divestitures
   - Large scale compute intensive workloads
   - Facility or Real Estate decisions
   - Colocation or outsourcing contract changes

4. **Talent**
   - Agility and operational responsiveness

### The AWS Cloud Value Framework

Customers have realised business value beyond just cost savings.

#### Cost savings (TCO)

What is it? Infrastructure cost savings/avoidance from moving to the cloud

Example: 10% reduction in TCO (Globe)

#### Staff productivity

What is it? Efficiency improvement by function on a task-by-task basis

Example: Over 500 hours per year of server configuration time saved (Sage)

#### Operational resilience

What is it? Benefit of improving SLAs and reducing unplanned outage

Example: Critical workloads run in multiple AZs and Regions for robust DR (Expedia)

#### Business agility

What is it? Deploying new features/applications faster and reducing errors

Example: Migrated 30 applications in 50 days (National Australia Bank)

### On-Premises costs to include in any comparison with AWS

The cost of AWS includes cost drivers that are often hidden in an on-premises deployment. To create an like for like comparison, keep in mind the following components of on-premises and colocation environments.

1. **Server Costs**
   - Hardware – Server, Rack Chassis PDUs, ToR Switches (+Maintenance)
   - Software – OS, Virtualization Licenses (+Maintenance)
   - Facilities Cost
     - Space
     - Power
     - Cooling

2. **Storage Costs**
   - Hardware – Storage Disks, SAN/FC Switches
   - Software – Backup
   - Facilities Cost
     - Space
     - Power
     - Cooling

3. **Network Costs**
   - Network Hardware – LAN Switches, Load Balancer Bandwidth costs
   - Software – Network Monitoring
   - Facilities Cost
     - Space
     - Power
     - Cooling

4. **IT Labor Costs**
   - Server Admin, Virtualization Admin, Storage Admin, Network Admin, Support Team

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Most organisations operate to a budget and want to understand how much AWS will cost. In order to generate the right estimate, keep in mind the following suggestions.

1. Estimate your cost based on the best practices you plan to apply

   a) Match supply with demand
   
   With AWS you can align your cost to demand for IT, avoiding waste and meeting peak business demand.

   b) Pick the right pricing model
   
   Pick from one of the four pricing models (on-demand, Savings Plans, Reserved Instances, Amazon EC2 Spot) in your cost estimation. Learn more on pages 5 and 6 of this document.

   c) Fit storage to your needs
   
   Storage type can have a big impact on pricing and cost. For example, long-term archival storage (Amazon Glacier) can be 20x cheaper than persistent local storage (Amazon EBS-GP2).

2. Preparing cost estimates

   a) New workloads
   
   Net new workloads should consider the best practices above when using any tool suggested below.

   b) Migrating Workloads
   
   For migrations you should determine your peak resource utilisation (i.e. peak CPU and RAM), and the expected usage pattern (e.g. % of time unused) before creating your price estimate. Tools like your hypervisor resource utilisation report or TSO Logic will be able to provide the data points.

The following tools help you estimate your predicted spend on AWS Cloud:

**Self-serve**

- Simple Monthly Calculator
- AWS pricing calculator

**Supported options**

- Migration Acceleration Program (MAP)
- Contact AWS Sales

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Setup for Cost Visibility & Optimisation

AWS Cloud provides much greater transparency into your IT infrastructure spending. You can now see spend down to departments, teams or even an individual level. AWS also provides powerful tools allowing you to predict, manage and optimise your spend. The steps below will help you get started.

1. Gain insights into your costs
AWS provides transparency into where your spend is being incurred.

We encourage customers to supplement their monthly spend review process with a more frequent (e.g. weekly) approach using AWS Cost Explorer to catch unexpected spend at the time it occurs. AWS Budgets can send warnings based on user defined thresholds.

1. AWS Cost Explorer

Move towards tools with greater speed to insight

2. AWS budgets

Learn more about AWS cost management tools at: https://aws.amazon.com/aws-cost-management/

2. What can AWS Cost Explorer do?
AWS Cost Explorer is available to all customers, free of charge in the AWS Console.

It visualises your costs ($ and usage) and allows you to drill down via grouping and filtering functionality. Both engineers and budget owners should use AWS Cost Explorer as part of a weekly cost review to avoid any spend surprises.

Questions that Cost Explorer can answer
• What is my spend by AWS Product (incl. AWS Marketplace)?
• How have costs changed over time by AWS Account?
• Which team has cost optimisation opportunity?

Setting up AWS Cost Explorer
Learn more about AWS Cost Explorer
Use Cost Explorer to Analyse spend & usage
Go to the AWS Cost Explorer Console

Click the icons to learn more

3. AWS Budgets for warnings
AWS Budgets can provide warnings (via email or SNS notifications) when user specified cost, usage, or reservation thresholds are reached.

AWS Budgets improves awareness of your AWS spend, enabling you to act quickly when actual values deviate from expectations.

Scenarios where AWS Budgets can help
• I want to spend at most $100 in my training account, inform me when it reaches 50%
• Let me know when my account is forecast to reach 110% of my monthly budget
• Warn me when my discounts are not applying as expected (e.g. RI Utilisation drops below 95%)

Setting up AWS Budgets
Learn more about AWS Budgets
How to create an AWS Budget
Go to the AWS Budgets dashboard

Click the icons to learn more

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Once customers start taking advantage of the tools that provide cost transparency, many also want to know: what is this spend for and who created these resources? The steps below will help you answer these questions.

4. Improve your cost allocation granularity

On AWS you can have multiple accounts grouped under a payer account. We encourage you to think about using a multi-account structure to categorise your spend, improving your ability to know where spend is being incurred.

Beyond accounts, resource tagging enables even more granular insight. Tagging can be used to let you know who created/owns a resource which is useful for informing those who have idle resources.

Multi-account structure (AWS Organizations)

A multi-account structure via AWS Organizations will separate your resources and spend by business unit, team, application, and environment.

When getting started, define and agree a multi-account structure and tagging policy with stakeholders such as Finance, Engineering, and Business teams.

Grouping spend and resources by accounts will save you time in the long-run as there is less need to implement tagging enforcement policies and tools.

The AWS Landing Zone solution helps customers more quickly set up a secure, multi-account AWS environment based on AWS best practices. An example multi-account structure is shown below.

Benefits

Visibility + granular allocation enables:
- Showback
- Chargeback
- Ownership
- Responsible & efficient behavior across larger orgs.

Getting started with multi-account structures

Learn more about AWS Organizations

Launch faster using AWS landing zone

Tagging resources and tagging enforcement

Resource tags can be used like accounts to allocate spend. Advantages of tags include: 1) supporting optimisation automation (e.g. resource turn-off can be based on tags), 2) providing greater detail than account-level categorisation. Disadvantages of tags are that they require enforcement (e.g. correct for misspelling / missing tags).

Similar to accounts, stakeholders from across the business should be engaged to define valid tag names (e.g. Cost Centre), valid values (e.g. Cost Centre A), and to agree the method of tagging enforcement.

Getting started with resource tagging

Tagging best practices whitepaper

AWS tagging strategies

Cloud Custodian: Enterprise grade tagging enforcement

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Cost Optimisation Levers

The following methods are commonly used by customers to improve cost efficiency on the cloud

1. Select the right instance size for your workloads

On-premises environments are often over-sized because they need to be provisioned for peak expected demand 3-6 months into the future (e.g. sized for end-of-year sales peak in July). AWS allows you can select the cheapest instance for what you actually need and up-size resources when required.

Right Sizing

Pre-migration, use your hypervisor resource utilisation report or a discovery tool like TSO Logic to fit your AWS environment to your actual IT need. Sizing down pre-migration reduces total effort as re-sizing resources in Production is more difficult. The example below shows basic steps to right size resources that are already running.

1. Use a tool to find underutilised resources and total savings potential
2. Agree when to resize, how many to resize, and understand any other constraints
3. Size to what’s needed (m4.4xlarge -> m4.xlarge saves 87%)
4. Review application Performance
5. Celebrate the savings win

Getting started with Right Sizing

Blog: EC2 Resource optimisation tool
Learn more about Cost Explorer: Rightsizing Recommendations

Click the icons to learn more

2. Use Savings Plan for Compute (EC2, ECS, EKS, EMR, and Fargate), and RIs for RDS, Redshift, ElastiCache, and Elasticsearch

Savings Plan is a new commitment for discount model that applies up to 72 percent discount (vs. on-demand) on Amazon EC2 and AWS Fargate usage. They are much more flexible than Reserved Instances, illustrated in the table below.

### Savings Plans

<table>
<thead>
<tr>
<th>Discounts</th>
<th>Up to 66%</th>
<th>Up to 72%</th>
<th>Up to 66%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change instance family (e.g. m4 to m5)</td>
<td>✔</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Change instance size (e.g. large to 2Xlarge)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Change OS (e.g. Windows to Linux)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Sharing commit across tenancies (e.g. Shared-Dedicated)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Using Fargate and leverage existing commits</td>
<td>✔</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Change AWS Regions (e.g. Sydney to Singapore)</td>
<td>✔</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Similar to RIs, Savings Plans come in 1 year or 3 year terms, the commitment in each hour cannot be saved to be used in the next hour if no matching no-demand instances were running, and will first apply benefits to resources in the account it was purchased in then share any remaining benefits with other linked accounts.

Different to RIs, Savings Plans discounts will first apply to on-demand resources with the highest discount and they apply automatically to matching resources without manual work. This automatically applied flexibility allows customers to purchase Savings Plans before waiting for other cost optimisation work (e.g. right sizing) to complete.

Services that should still use RIs for a discount

- Amazon RDS
- Amazon Redshift
- Amazon Elasticache
- Amazon Elasticsearch
- Amazon DynamoDB
- Amazon CloudFront

*Reserved Capacity, but not an RI

Getting started with Savings Plans and RIs

Learn about Savings Plans
How to purchase Savings Plan and RIs

AWS Console RI Tools

- Savings Plan Monitoring
- RI Budget Warnings
- RI Expiration Alerts

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**Cost Optimisation Levers**
The following methods are commonly used by customers to improve cost efficiency

3. **Schedule on-off your non-production workloads**

One simple method to reduce costs is to stop resources that are not in use, and then start those resources again when their capacity is needed.

**Benefits of Scheduling**

- Typically one of the easiest ways to optimise spend
- Turning off unused instances outside work hours saves approx. 70%
- Low effort to maintain once the scheduler is running

**Shut down unused instances with AWS Instance Scheduler**

AWS Instance Scheduler enables customers to configure custom start and stop schedules for their EC2 and RDS instances.

**Setting up AWS Instance Scheduler**

- Instance Scheduler landing page
- View the implementation guide

4. **Use Amazon EC2 Spot Instances**

Amazon EC2 Spot Instances let you take advantage of unused EC2 capacity in the AWS Cloud. Spot Instances are available at up to a 90% discount compared to On-Demand prices.

**How best to use Spot Instances**

With the right architecture, customers can use Spot even in production environments. For example, Spot can be architected in a way (via EC2 Fleet) that can switch between on-demand, RI, and Spot based on the cheapest available instance without interruption to your application.

**Workloads suitable for Spot**

- Big Data
- Containerised Workloads
- Web App/Services
- CI/CD
- HPC

**Getting Started with Spot Instances**

- New Spot pricing model
- Getting started guide
- Introduction to EC2 Fleet

5. **Ongoing training and learning**

Recommended resources to continue learning about AWS Cost include:

- AWS Cost Labs
- AWS Well Architected
- AWS Cost Management Blog

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