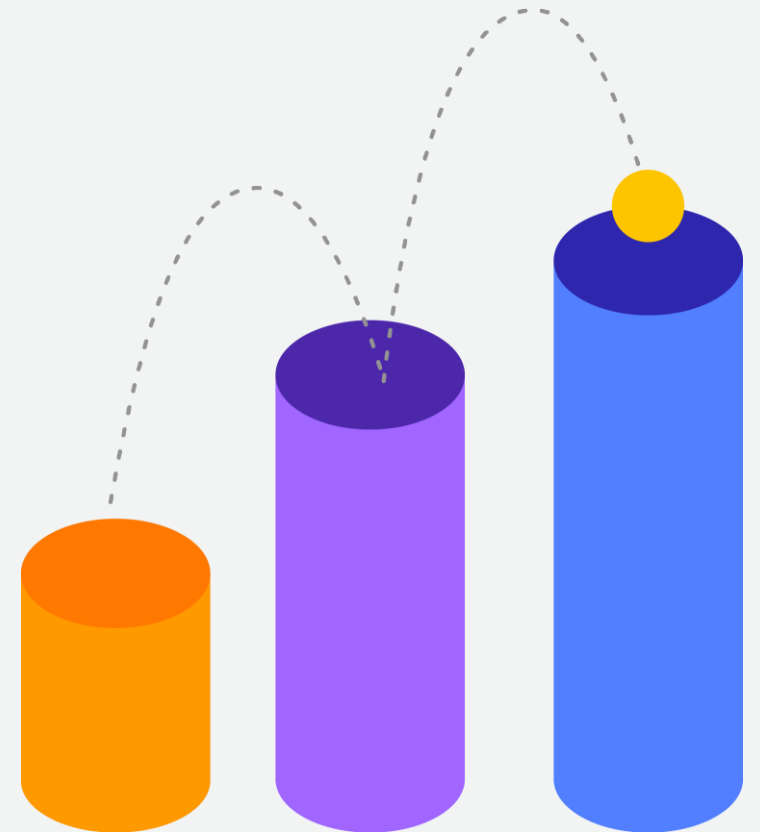




# AWS Builders Online Series

Welcome





# AWS Builders Online Series

## Introductory guide to AWS cost management and efficiency

Peter Shi, Cloud Financial Management Lead,  
APAC Business Development

AWS



# Agenda

The economics of AWS

Using AWS in a cost efficient way

How to manage your spend on AWS

# Agenda

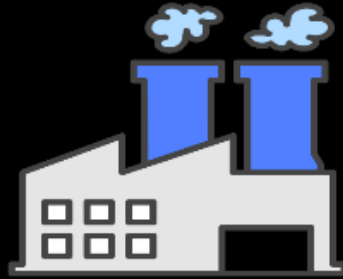
The economics of AWS

Using AWS in a cost efficient way

How to manage your spend on AWS

# Cloud is the new normal with fewer organisations asking “why” and more asking “how and how fast?”

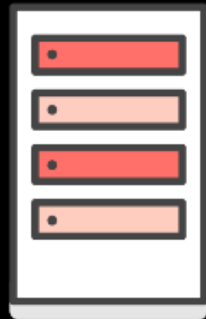
**Industrial  
Revolution**



Shift to on-demand  
power



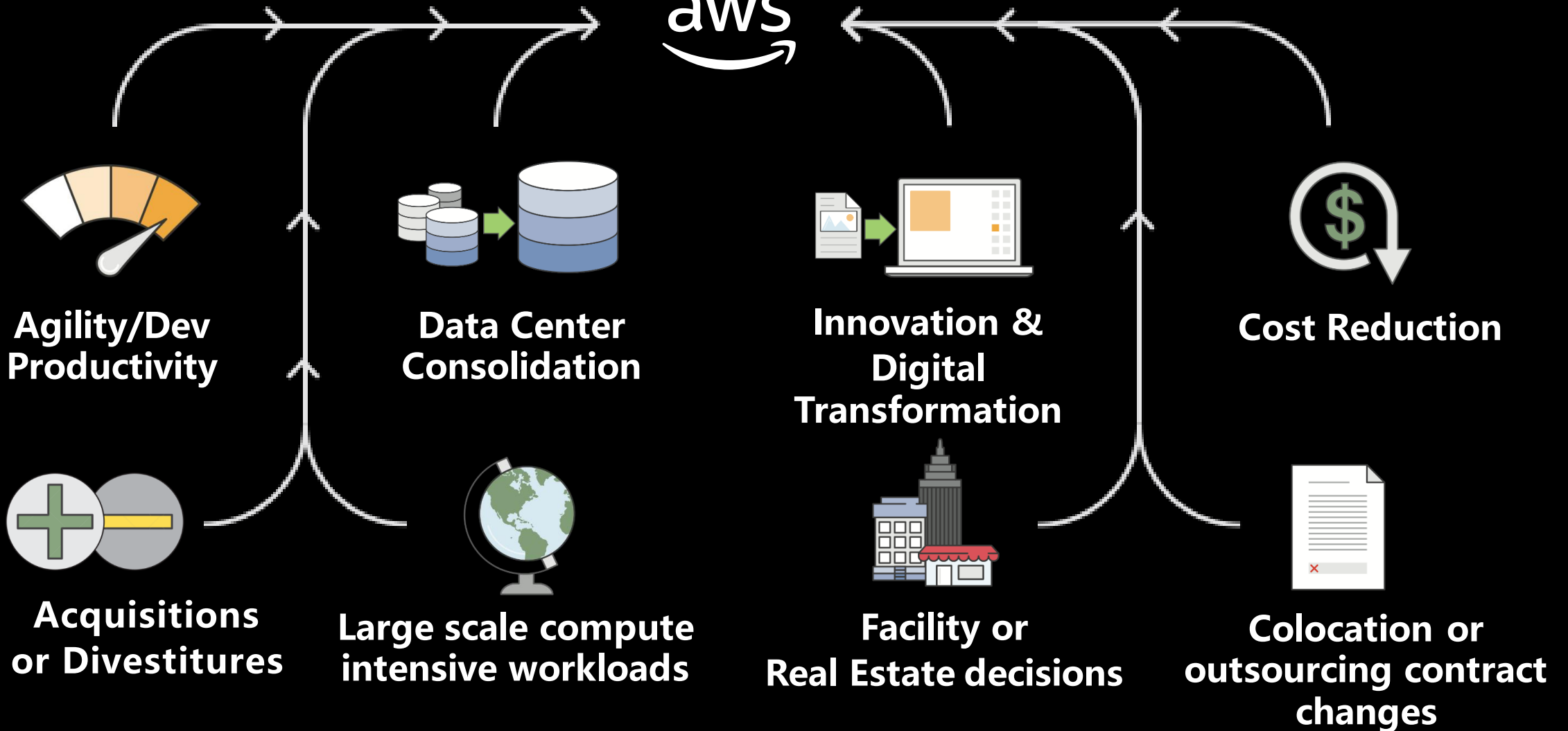
**Cloud  
Revolution**



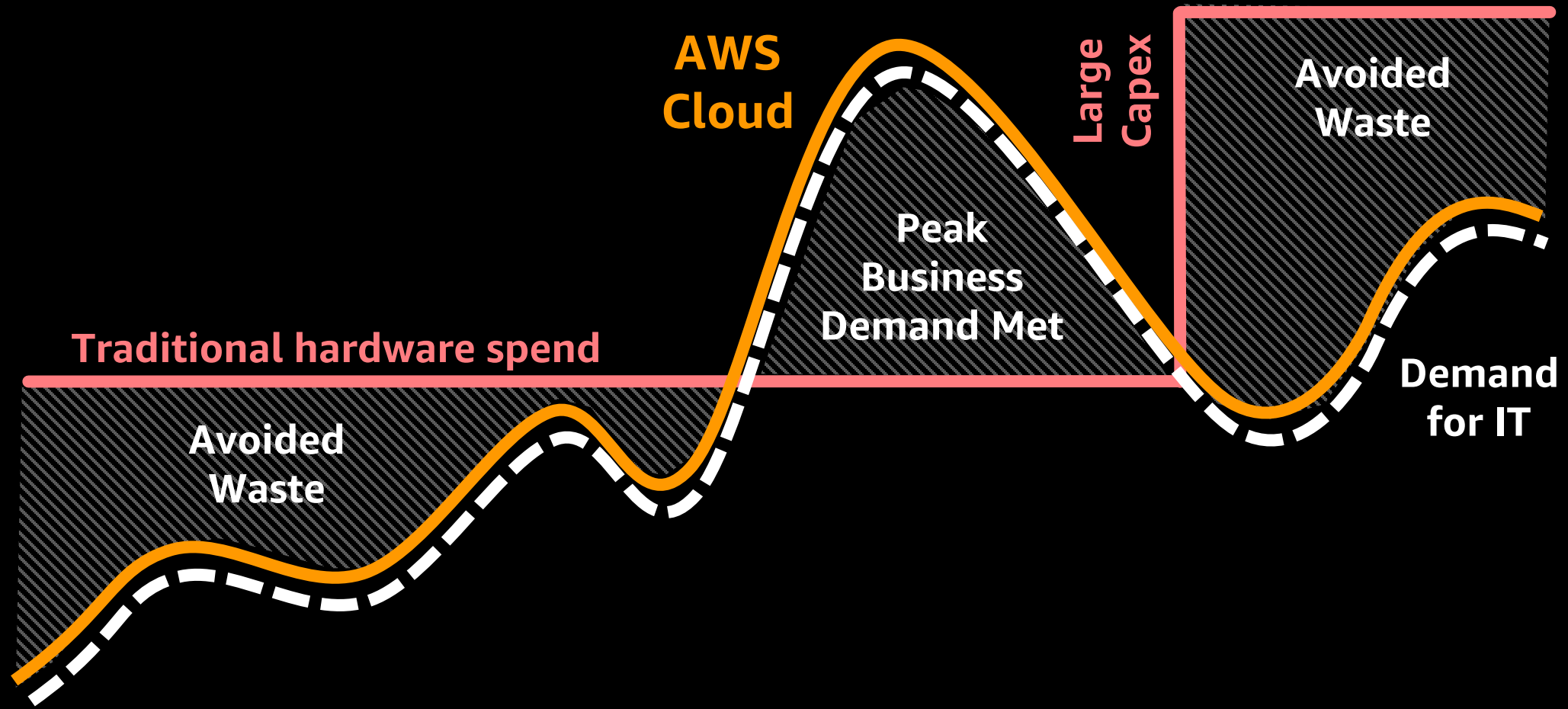
Shift to on-demand  
computing



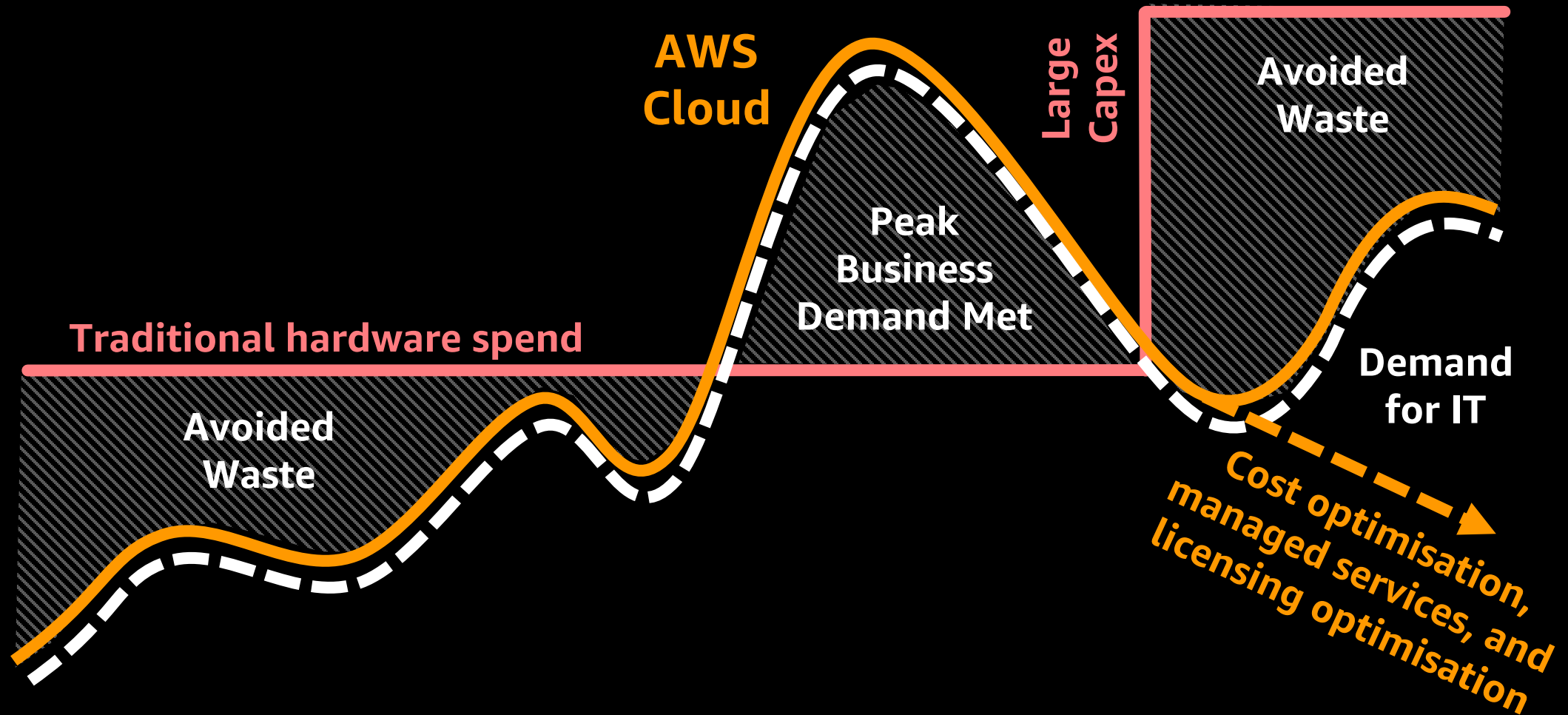
# Customers are adopting AWS at a rapid pace



# AWS allows you to eliminate waste and meet peak business demand



# AWS allows you to eliminate waste and meet peak business demand





# Customers have gained value beyond cost



## Cost Savings (TCO)



## Staff Productivity



## Operational Resilience



## Business Agility

### What is it?

Savings on infrastructure, on licensing, and from managed services

Efficiency improvement, reduced wait times and downtime

Better SLAs, reduced outages and MTTR, and security

Faster application deployment, global reach, and lower cost of experimentation

### Examples

30% reduction in total cost of ownership (Globe)

Deploys SAP 93% faster (Visy)

60% reduction in downtime (Trainline)

Scaled by 1000 percent in 1 year and reduced dev project time by months (iTrueMart)

← Typical  
Focus →

← Most Compelling  
Cloud Benefits →

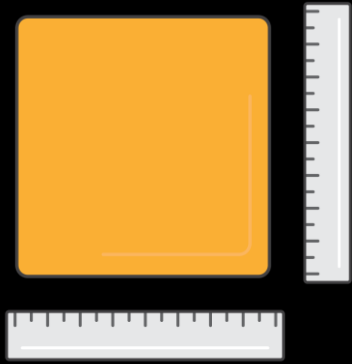
# Agenda

The economics of AWS

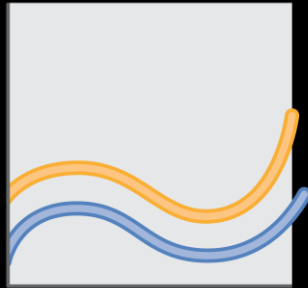
Using AWS in a cost efficient way

How to manage your spend on AWS

# The Technical Pillars of Optimisation



Right Size &  
Decommission  
unused Resources



Turn off resources  
outside of work  
hours



Use Reserved  
Instances



Design for  
Cost

# Right size by picking the right family from the start

General Purpose

A1	T3	T3a	T2	M5	M5a	M4
----	----	-----	----	----	-----	----

Compute Optimized

C5	C5n	C4
----	-----	----

Memory Optimized

R5	R5a	R4	X1e	X1	High Memory	z1d
----	-----	----	-----	----	-------------	-----

Accelerated Computing

P3	P2	G3	F1
----	----	----	----

Storage Optimized

I3	I3en	D2	H1
----	------	----	----

For migrations, consider using a tool like TSO Logic

# Sizing resources to fit to usage example



1. Use Cost Explorer: Resource Optimization Recommendations to find underutilised EC2 resources and understand 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

# Cost Explorer: Resource Optimization recommendations

The screenshot displays the AWS Cost Management Recommendations console. The interface includes a left-hand navigation menu with icons for home, search, documents, notifications, and a target icon (annotated with a '2'). The main content area is titled 'AWS Cost Management > Recommendations' and features a 'Settings' link. It presents three summary cards: 'Potential resource savings' (\$0, based on 3 resources), 'Potential reservation savings' (\$216, based on 5 reservations), and 'Resource optimization recommendations' (last updated: 2019-07-31 7:13PM). The 'Resource optimization recommendations' card lists '3 EC2 rightsizing opportunities found' (saving \$0 monthly) and '0 idle instances detected' (saving \$0 monthly). A 'View all' link (annotated with a '3') is located to the right of this card. Below the recommendations, a table titled 'Purchase recommendations' (annotated with a '1') shows the following data:

	Purchase recommendations	Estimated monthly savings
	2	\$3.41
	1	\$10.71
Redshift	2	\$201.90

The 'Services' and 'Resource Groups' tabs are visible at the top of the table. The 'AWS cost explorer' link is highlighted in the 'Services' tab, and the 'AWS Cost Explorer' description 'Visualize and Explore Your AWS Costs and Usage' is shown below it.

# Cost Explorer: Resource Optimization recommendations

3

Optimization opportunities

\$110

Estimated monthly savings

50.00%

Estimated savings (%)

Based on the last 14 days, we have identified **3 instances** that have been idle and underutilized. Taking action on these instances could help you save an estimated \$110 monthly (50.00% of the EC2 On-Demand instance costs associated with these instances).

Download CSV

Recommendation	Instance ID	Account ID	Tag(s)	CPU (%)	Monthly estimated savings	
Modify instance	i-0b18d304a1...	AWS Insights Demo...	3 ▾	6.6%	\$72	<a href="#">View</a>
Modify instance	i-0196e32825...	AWS Insights Demo...	2 ▾	4.0%	\$33	<a href="#">View</a>
Modify instance	i-0a9909f442...	AWS Insights Demo...	2 ▾	7.5%	\$4	<a href="#">View</a>

< Viewing 1 to 3 of 3 recommendations >

\*Estimated Annual Savings and Purchase Recommendations are based on your past usage history and the relevant [EC2](#), [RDS](#), [ElastiCache](#), [Redshift](#), or [Elasticsearch](#) pricing. If your usage patterns change, it may affect the accuracy of the estimates and the purchase recommendations.

\*\*To maximize savings, On-Demand usage associated with instance families eligible for size flexible P1s is auto-detected, analyzed, and shown as a purchase recommendation for the smallest instance size available in that instance family. [Learn More](#)

\*\*\*Please note that for RDS recommendations with SQL and/or Oracle Database Engines, Cost Explorer will display the associated cost and usage inclusive of all database editions and/or license models for that Database Engine.

Show recommendations for

☒ Idle instances

☒ Underutilized instances

Additional Filters

Linked Account [Include all ▾](#)

Region [Include all ▾](#)

Tag [Include all](#)

# Find unused resources using tools like AWS Trusted Advisor (available via business support)



AWS Trusted  
Advisor



Old snapshots



Unattached  
Elastic IPs



Idle EC2, RDS  
instances



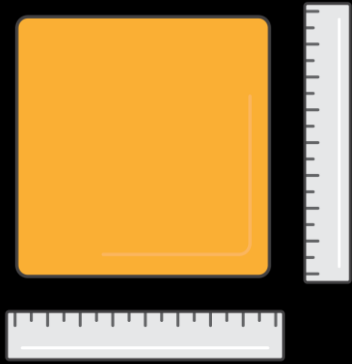
Unattached EBS



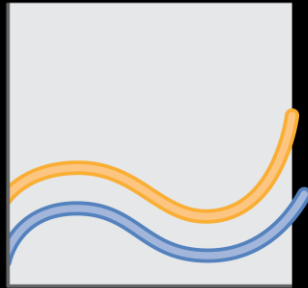
Idle or unattached  
load balancers



# The Technical Pillars of Optimisation



Right Size &  
Decommission  
unused Resources



**Turn off resources  
outside of work  
hours**



Use Reserved  
Instances



Design for  
Cost

Turning off non-production resources outside of work hours saved \$800 per day on weekends and \$400 per day on weekdays for this customer = \$15,600 per month saving



# Tools for turning off resources outside of work hours

- AWS Instance Scheduler  
<https://aws.amazon.com/answers/infrastructure-management/instance-scheduler/>
- 3<sup>rd</sup> party paid tools (including but not limited to)



**GorillaStack**

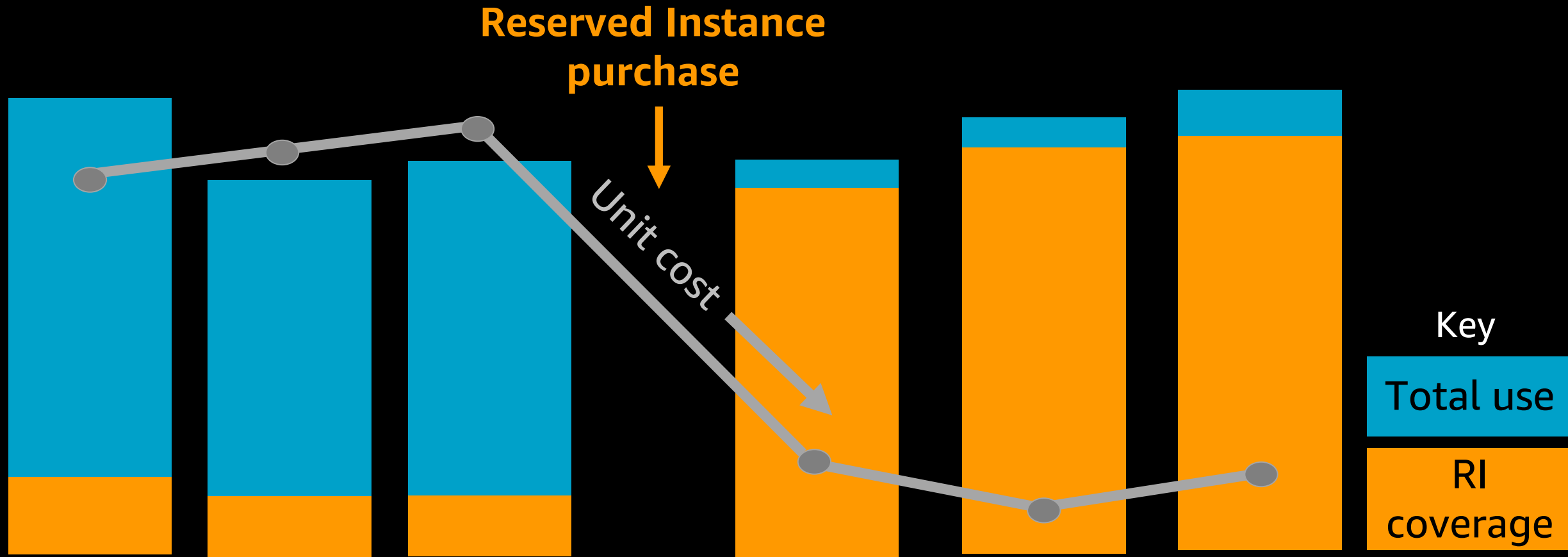


skeddly



**ParkMyCloud**

# Reserved Instances (RIs) for one customer resulted in a 39% decrease in unit cost



# What are Reserved Instances (RIs)?



RI coupon booklet

- RIs are a commitment in exchange for discount
- They behave like discount coupon booklets that last for 1-3 years
- Each hourly RI coupon in the booklet tries to match to a running instance, if matched it provides its full discount, if not it expires
- RIs are a financial construct/layer on top of your AWS infrastructure

RIs are most often used for always-on instances  
(can still be used to save for non-always on)

**Up to 75% savings**

**Approx. 20-40%  
savings  
for 1 year**

**Commitment level**

1 year (approx. payback 7-10 months)

3 year (approx. payback 10-20 months)

**AWS services offering RIs**

Amazon EC2 & EC2 Hosts

Amazon RDS

Amazon Redshift

Amazon ElastiCache

Amazon Elasticsearch

Amazon DynamoDB\*

Amazon CloudFront\*

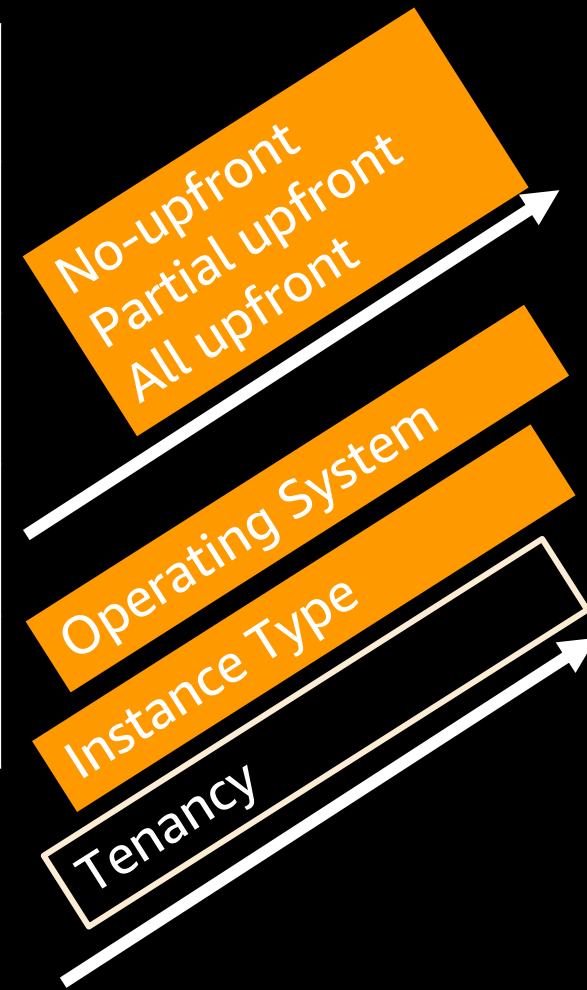
\*Discount for commitment, but not an RI

# EC2 RI types cater to a range of customer needs

	1 year	3 years
Standard	Regional (e.g. ap-southeast-2)	Regional
	Zonal (e.g. ap-southeast-2a)	Zonal
Convertible	Regional	Regional
	Zonal	Zonal

Note: You can easily switch between Regional and Zonal at no cost

Items shaded in Orange affect pricing



# Which EC2 RIs give greater discount?

**Less discount**

**Greater discount**

Payment option	No-upfront	Partial upfront	All upfront
Duration	1 year		3 year
Operating System	Others (typically)		Linux/Unix
Instance type	Older generations (typically)		Newer gen.
Class	Convertible		Standard



# Convertible RIs offer great flexibility as you can:

✓	Take advantage of new instance types
✓	Adapt your RIs as business needs change
✓	Drastically reduce the likelihood of unused RIs
✓	Take advantage of price reductions

## As Convertible RIs allow changes in:

✓	Instance Families (e.g. m4. -> c5.)
✓	Instance Sizes (e.g. .large -> .xlarge)
✓	Operating System (e.g. Linux -> Windows)
✓	Tenancy (e.g. shared -> dedicated)

# The commitment for Convertible RIs includes:



1yr or 3 yrs. (not refreshed on conversion)



An AWS Region (e.g. Singapore)



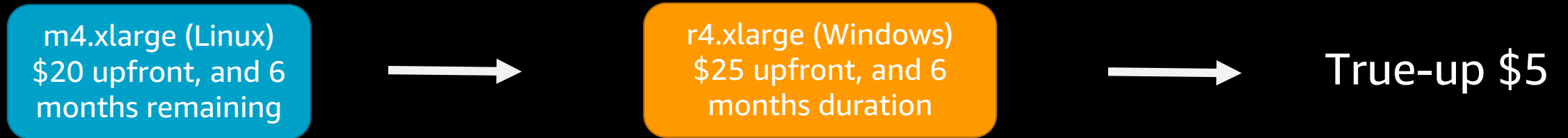
EC2 on AWS



Spend (convert to equal or greater \$)

# What happens when you Exchange a Convertible RI

## 1) Changing to a more expensive instance type, family, and operating system

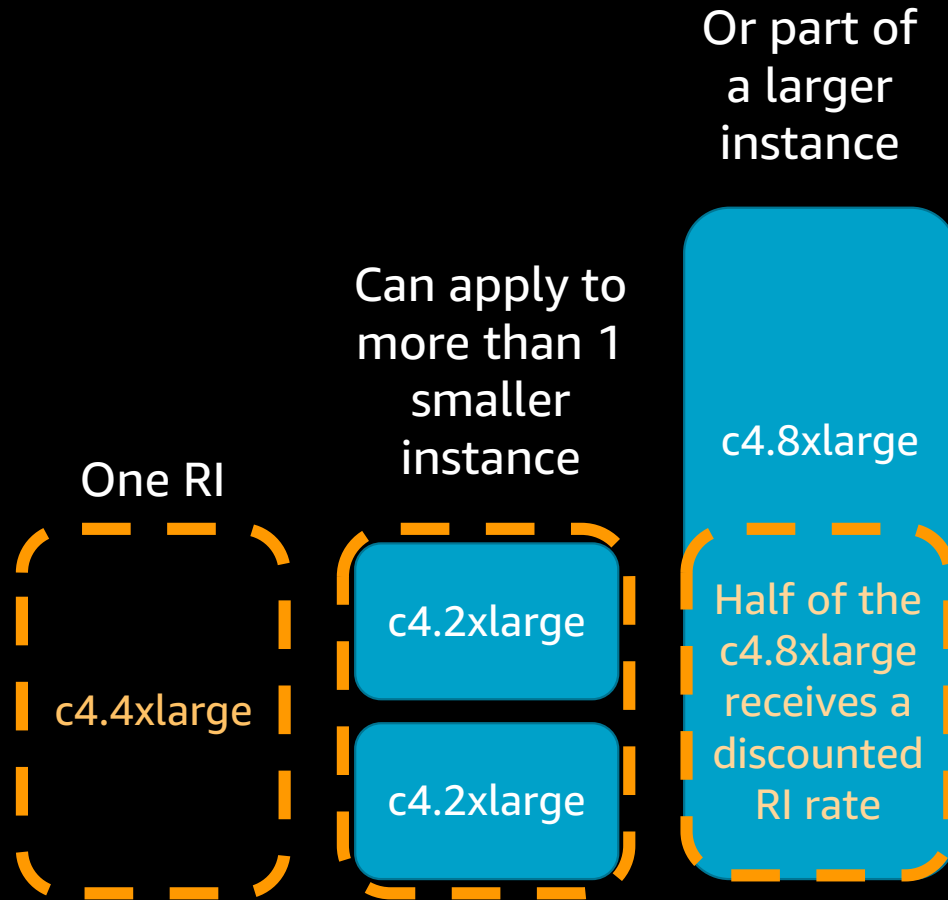


## 2) Sizing to cheaper instance type



\*Indicative values only

# Instance Size Flexibility reduces the need to match RI size to running instance size



**Note**, this only works if:

- RI is **Regional**
- RIs and instances are of **1 family** (e.g. m4)
- RI and matching instance are **Linux/UNIX** (incl. Amazon Linux, CentOS, Ubuntu) – this does not work for RHEL, SUSE or any other licensed OS, and
- RI and Instance are **Shared** tenancy

# See RI Recommendations and Estimated Savings via Cost Explorer accessed here:

**AWS Cost Management > Recommendations**

**Potential resource savings**  
\$0  
Monthly savings based on 3 resources

**Potential reservation savings**  
\$216  
Monthly savings based on 5 reservations

**Resource optimization recommendations**  
Last updated: 2019-07-31 7:13PM

**3 EC2 rightsizing opportunities found**  
Taking action could save you an estimated \$0 monthly


**0 idle instances detected**  
Terminating these instances could save you an estimated \$0 monthly

**3 underutilized instances detected**  
Modifying these instances could save you an estimated \$0 monthly

**Reservation purchase recommendations**

Service	Purchase recommendations	Estimated monthly savings
EC2	2	\$3.41
RDS	1	\$10.71
Redshift	2	\$201.90

# See RI Recommendations and estimated savings via Cost Explorer: RI Recommendations

 [Cost Explorer](#) > Reserved Instance Recommendations

## Reserved Instance Recommendations

<b>\$1,733</b>	<b>34%</b>	<b>3</b>
Estimated Annual Savings*	Savings vs. On-Demand	Purchase Recommendations

Based on your past 7 days of EC2 usage, we've identified **3 one-year, all-upfront, standard RI purchase recommendations** to save an estimated **\$1,733 annually**, representing a savings of **34% versus on-demand costs**. You can take action on these recommendations in the [EC2 RI Purchase Console](#).

Sort by:

Monthly Estimated Savings ▼

[Download CSV](#)

Purchase Recommendations (3)	Details
<b>Buy 38 t2.nano reserved instances</b> <span>Size flexible**</span> Asia Pacific (Sydney)   Linux/UNIX   Shared <i>Based on your past 7 days of on-demand usage, we recommend purchasing 38 t2.nano reserved instances to cover 9.5 normalized units per hour of t2 family usage to maximize savings.</i> <a href="#">View Associated EC2 Usage</a>	<b>\$74.82 monthly savings</b> Upfront Cost: \$1,520.00 Recurring Monthly Cost: \$0.00

### RI Recommendation Parameters ⓘ

**RI term**

☒ 1 year  
☐ 3 years

**Offering Class**

☒ Standard  
☐ Convertible

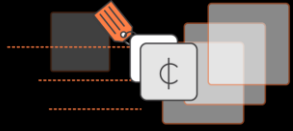
**Payment option**

☒ All upfront  
☐ Partial upfront  
☐ No upfront

**Based on the past**

☒ 7 days  
☐ 30 days  
☐ 60 days

# Designing for Cost



Amazon EC2 Spot



Serverless &  
AWS Lambda



Static Web Hosting on S3  
and using S3 Select



ELB to Application Load  
Balancer



Deliver content with  
AWS CloudFront and Caching  
(lower compute and data  
transfer)



Containerisation (staff productivity  
and compute utilisation)



AWS CloudFormation  
(developer time saving)



Open source platforms &  
databases (reduced licensing cost)



Running resources in a  
cheaper region



Auto Scaling up and down to  
match peak demand

# Agenda

The economics of AWS

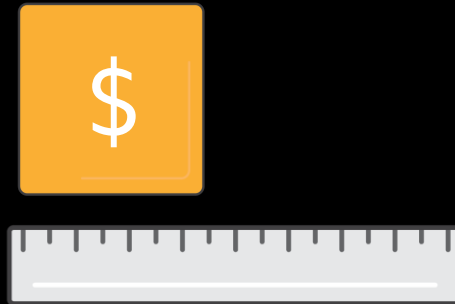
Using AWS in a cost efficient way

How to manage your spend on AWS

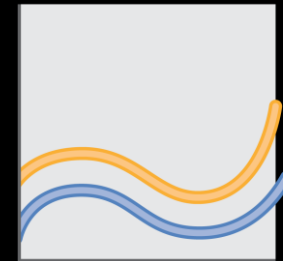




Estimating spend



Measuring &  
monitoring spend



Metrics to know  
how efficient  
your spend is

# Consider optimisation when estimating spend

## Tips for new workloads

- Design for cost upfront
- Include turn-off time
- Include reserved instances

## Tips for migrating workloads

- Understand peak utilisation (i.e. peak CPU and RAM) via tools like hypervisor monitoring or TSO Logic
- Understand usage pattern (e.g. % of time off)

## Self-serve tools

1) Simple Monthly Calculator



2) AWS pricing calculator

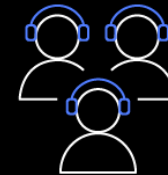


## Supported options

3) Migration Acceleration Program (MAP)



4) Contact AWS Sales (incl. for TSO Logic)



# Cost Savings: Modeling On-Premises Cost

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	Storage Software Costs (+Maintenance)	Facilities Cost		
				Space	Power	Cooling
3	Network Costs	Network Hardware—LAN Switches, Load Balancer	Recurring ISP / Bandwidth costs	Facilities Cost		
				Space	Power	Cooling

Diagram doesn't include every cost item. For example, software costs can include database, management, middle tier software costs. Facilities cost can include costs associated with upgrades, maintenance, building security, taxes, and others.

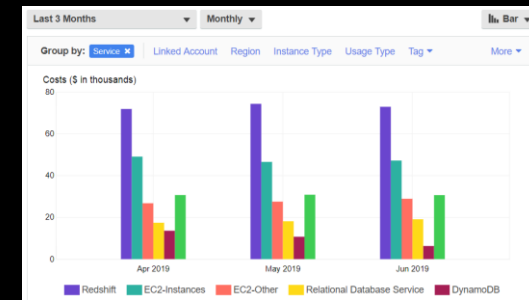
# To measure your spend, use AWS Cost Explorer



Monthly  
AWS invoice

Move towards  
tools with greater  
speed to insight

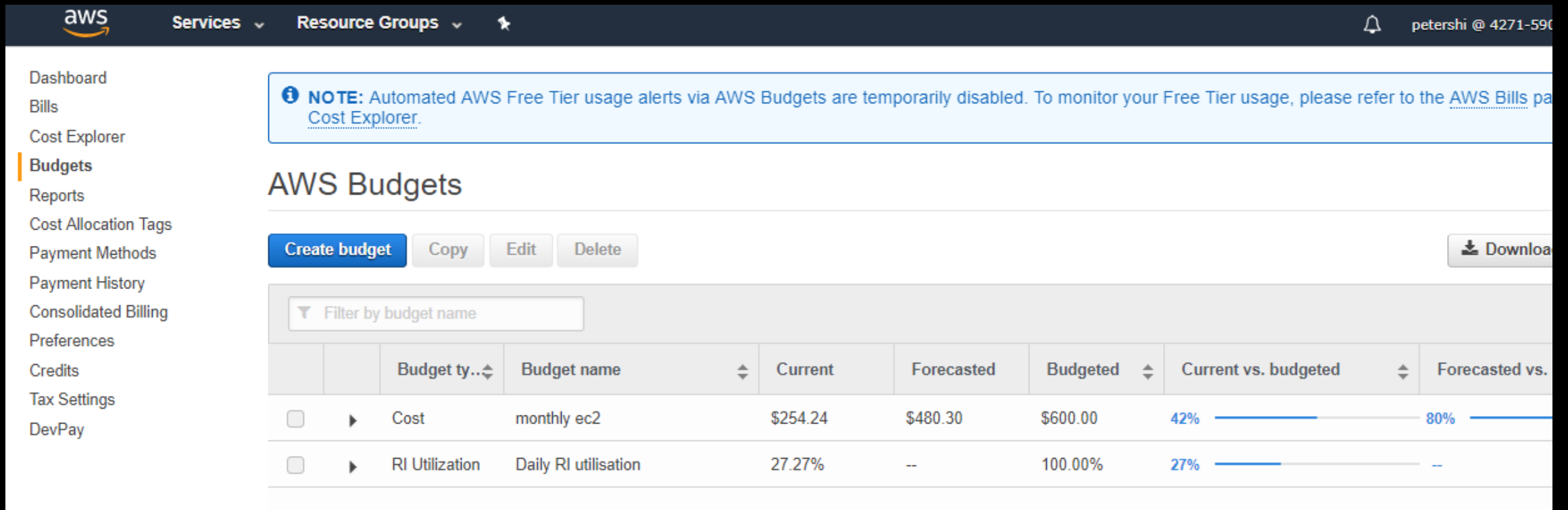
## 1. AWS Cost Explorer



## 2. AWS budgets

## 3. Use Tags

# AWS Budgets send you email or SNS notifications when spend thresholds are reached



The screenshot shows the AWS Budgets console interface. At the top, there's a navigation bar with the AWS logo, 'Services', 'Resource Groups', and a user profile 'petershi @ 4271-590'. A left-hand sidebar lists various AWS services and tools. The main content area is titled 'AWS Budgets' and includes a 'NOTE' about Free Tier usage alerts. Below the title are buttons for 'Create budget', 'Copy', 'Edit', 'Delete', and 'Download'. A search bar labeled 'Filter by budget name' is present. A table lists two budgets: 'monthly ec2' (Cost type) and 'Daily RI utilisation' (RI Utilization type). The 'monthly ec2' budget shows a current spend of \$254.24, a forecast of \$480.30, and a budgeted amount of \$600.00. A progress bar indicates that the current spend is at 42% of the budgeted amount, with a forecasted reach of 80%.

**NOTE:** Automated AWS Free Tier usage alerts via AWS Budgets are temporarily disabled. To monitor your Free Tier usage, please refer to the [AWS Bills page](#) in [Cost Explorer](#).

## AWS Budgets

[Create budget](#) [Copy](#) [Edit](#) [Delete](#) [Download](#)

Filter by budget name

		Budget type	Budget name	Current	Forecasted	Budgeted	Current vs. budgeted	Forecasted vs.
<input type="checkbox"/>	▶	Cost	monthly ec2	\$254.24	\$480.30	\$600.00	42% <div><div></div></div>	80% <div><div></div></div>
<input type="checkbox"/>	▶	RI Utilization	Daily RI utilisation	27.27%	--	100.00%	27% <div><div></div></div>	-- <div><div></div></div>

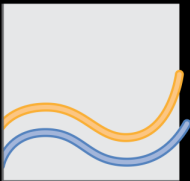
“Email me if my EC2 spend is expected to reach 105% of forecast”

# Cost Explorer provides metrics that tell you if you're running efficiently



1) **Spend** against budgets (split by BU, account, service, etc.), and % valid tagging

*In which areas am I spending the expected amount?*



3) **On-off scheduling**: ratio of weekday vs. weekend average spend for EC2 and RDS instances via AWS Cost Explorer

*Are non-production costs turning on-off as expected outside of work hours?*



2) **Rightsizing**: ratio of right sizing savings vs. EC2 total spend via AWS Cost Explorer

*Are my resources fit to need?*



4) **RI Efficiency**: % RI coverage, % RI utilisation, and \$ unused RIs

*Am I paying less for the same capacity & am I using that capacity I paid for?*

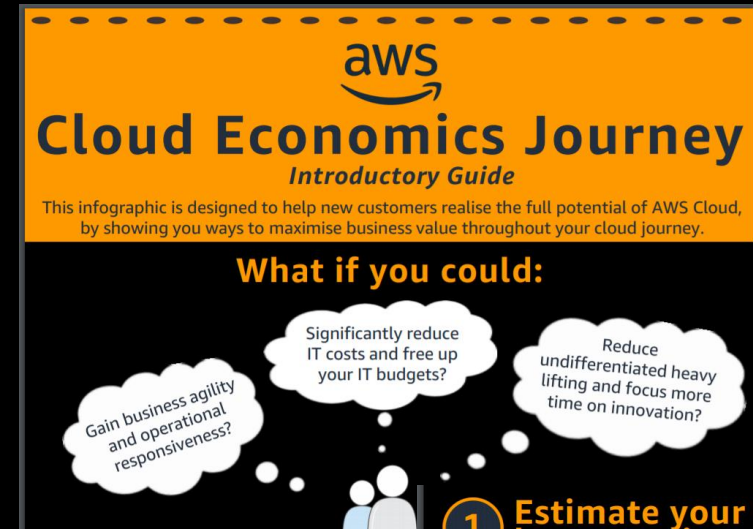
# Summary of this session

## The economics of AWS

## Using AWS in a cost efficient way

## How to manage your spend on AWS

<http://bit.ly/cloudeconintro2019>



**1 Estimate your cost based on the best practices you plan to apply**  
Consider the following cost efficiency levers when forming your price estimate.

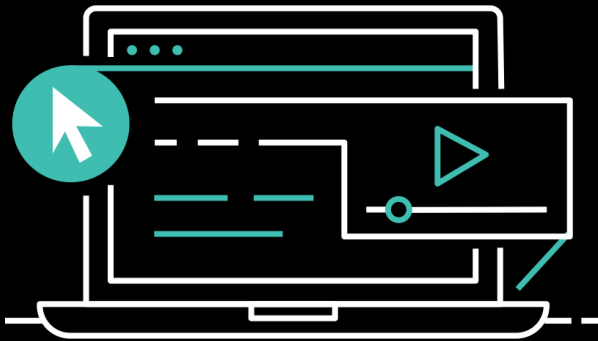
**i) Match supply with demand**  
With AWS you can align your cost to demand for IT, avoiding waste and meeting peak business demand.

The graph shows two lines: a solid red line for 'Traditional hardware spend' and a dashed orange line for 'AWS Cloud'. The traditional spend is a flat line, while the AWS Cloud spend follows the 'Demand for IT' (a fluctuating line). The area between the traditional spend and the peak of the demand curve is labeled 'Large Capex'. The area between the AWS Cloud spend and the peak of the demand curve is labeled 'Avoided Waste'. The peak of the demand curve is labeled 'Peak Business Demand Met'.

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

**iii) 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).

# AWS Digital Training



## Learn at Your Own Pace

AWS Digital Training offers free on-demand digital courses that help you learn new cloud skills and services when and where it's convenient for you.

## Featured Courses

- [AWS Cloud Practitioner Essentials \(Second Edition\)](#)  
Learn the fundamentals of the AWS Cloud and prepare for the AWS Certified Cloud Practitioner exam.
- [Amazon DynamoDB for Serverless Architectures](#)  
An introduction to Amazon DynamoDB and how it's leveraged in building a serverless architecture
- [AWS Security Fundamentals](#)  
Learn fundamental cloud computing and AWS security concepts, including AWS access control and management, governance, logging, and encryption methods.
- [Getting Started with Amazon Simple Storage Service \(Amazon S3\)](#)  
Learn the knowledge to determine when to use Amazon S3 by reviewing typical use cases and understanding how the service provides object storage for your applications



# Thank you for attending AWS Builders Online Series

We hope you found it interesting! A kind reminder to **complete the survey**.  
Let us know what you thought of today's event and how we can improve the event experience for you in the future.



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