Fostering Innovation through Cost Optimization

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AWS Technical Account Manager
Fostering **Innovation**

through **Cost Optimization**
Who is the TAM?

Primary point of contact who provides guidance and advocacy to proactively help you optimize your environment.
Who is the TAM?

How can I optimize my costs without impacting Innovation?
Evolution of Cost Optimization

- Amazon EC2
- Amazon S3
- Elastic Load Balancing
- Amazon CloudFront

WE ESTIMATE A POTENTIAL SAVINGS OF 60-70% COMPARED TO PREVIOUS WEB HOSTING COSTS.

- Christian Kaiser
  Business Development and New Media Management

Traditional TCO Comparisons

- On-Premises
- Lift & Shift
- Instance Right Sizing
- Improved Elasticity
- Correct Purchasing Model
- Storage Optimization
- Serverless Architecture
- Managed Services
- True AWS Optimized...
+ MORE!
The Five Pillars of Cost Optimization

- Right Sizing Your Instances
- Increase Elasticity
- Pick the Right Pricing Model
- Match Usage to Storage Class
- Measuring & Monitoring
Pillar 1: Right Sizing

• Selecting the cheapest instance while meeting performance needs
• Look at CPU, RAM, storage and network utilization to identify instances that could be downsized
## Pillar 1: Right Sizing

<table>
<thead>
<tr>
<th>Area of Need</th>
<th>Instance Families</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>T2, T3, M4, M5, M5d</td>
</tr>
<tr>
<td>Compute optimized</td>
<td>C4, C5, C5d</td>
</tr>
<tr>
<td>Memory Optimized</td>
<td>R4, R5, R5d, X1, X1e, Z1d</td>
</tr>
<tr>
<td>Storage Optimized</td>
<td>D2, H1, I3</td>
</tr>
<tr>
<td>Accelerated Computing</td>
<td>F1 (FPGA), G3, P2, P3</td>
</tr>
</tbody>
</table>

Pillar 1: Right Sizing

Statistical analysis on nearly 105,000 OS Instances across NA

Only 16% OS instances were sized appropriately

84% could run on a smaller footprint

$55M (36%) savings annually
## Pillar 1: Right Sizing

### Instance Specifications

<table>
<thead>
<tr>
<th>Instance ID</th>
<th>Instance Type</th>
<th>On-Demand /m</th>
<th>Instance Specs</th>
<th>Utilization Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC-123</td>
<td>C3.xlarge</td>
<td>$193.45</td>
<td>4 vCPU 7.5GB RAM 80GB SSD</td>
<td>Max vCPU: 35% Max Disk IO: 0 Max NW: 302 Mbps</td>
</tr>
</tbody>
</table>

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<tr>
<th>Instance ID</th>
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<th>Instance Specs</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC-123</td>
<td>M4.large</td>
<td>$129.94</td>
<td>2 vCPU 8GB RAM EBS Only</td>
<td>33% savings</td>
</tr>
</tbody>
</table>
Pillar 1: Right Sizing

AWS EC2 Right Sizing Tool
https://aws.amazon.com/answers/account-management/cost-optimization-ec2-right-sizing/

AWS Trusted Advisor
• Comes with Business and Enterprise support
Pillar 2: Elasticity

“Hug your workloads, not your servers”
Pillar 2: Elasticity

Maximize savings via automatically turning off resources at night with manual turn-on in the morning
Pillar 2: Elasticity

24 m5.2xlarge instances @ $0.46/hr. on Linux in FRA = $8,213.76 / month

Autoscaling 51 m5.large instances @ $0.115/hr. on Linux in FRA = $4,363.56 / month (47% saving)
Pillar 3: Leveraging the Right Pricing Model
**Pillar 3: Leveraging the Right Pricing Model**

**Amazon EC2 Consumption Models**

**On-Demand**
Pay for compute capacity by the second or hour with no long-term commitments.

For spiky workloads, or apps being developed or tested on EC2 for the first time.

**Reserved**
Reserved Instances provide you with a significant discount compared to On-Demand instance pricing.

For applications that have steady state or predictable usage, Reserved Instances can provide significant savings compared to using On-Demand instances.

**Spot**
Spot instances allow you to request spare Amazon EC2 computing capacity for up to 90% off the On-Demand price.

For fault tolerant instance flexible or time-insensitive workloads.
Pillar 3: Leveraging the Right Pricing Model

Reserved Instances

Commitment level
- 1 year (approx. payback 7-8 months)
- 3 year (approx. payback 12-18 months)

AWS services offering RIs
- Amazon EC2
- Amazon RDS
- Amazon RedShift
- Amazon Aurora
- Amazon ElastiCache
- Amazon DynamoDB
- Amazon CloudFront

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Pillar 3: Leveraging the Right Pricing Model

Reserved Instances

Flatiron Health

$1M in approx. 360 EC2 Instances

215 x 3 Years All-Upfront Convertible RIs

$750k savings in 3 years
Pillar 3: Leveraging the Right Pricing Model

Reserved Instances

- RIs are a commitment in exchange for discount
- They behave like discount coupon booklets
- Each hourly RI coupon is matched to a running instance and used, or expires at the end of each hour
- RIs are a financial construct / layer on top of your AWS infrastructure
Pillar 3: Leveraging the Right Pricing Model

Reserved Instances

- **Instance type**: m4.xlarge
- **Operating System**: Linux/Unix, Windows, Windows with SQL Server Standard, etc.
- **Region**: eu-central-1 (Frankfurt) (for Regional RIs)
  - or **Availability Zone**: eu-central-1a (for Zonal RIs)
- **Tenancy**: Shared, dedicated, host
### Reserved Instances

#### Payment option
- **Less discount**: No-upfront
- **Greater discount**: All upfront

#### Duration
- **Less discount**: 1 year
- **Greater discount**: 3 year

#### Operating System
- **Less discount**: Others (typically)
- **Greater discount**: Linux/Unix

#### Instance type
- **Less discount**: Older generations (typically)
- **Greater discount**: Newer gen

#### Class
- **Less discount**: Convertible
- **Greater discount**: Standard
Pillar 3: Leveraging the Right Pricing Model

Reserved Instances

RIs have priority to apply to instances in the same account as the RI

RIs can also live here and this account will get priority to use the RI. Be sure to have RI console access to modify RIs if needed & billing console access to check RI utilisation.

Paying Account

Linked Account 1

Linked Account 2

RI can live here and this account will get priority to use it first

Pillar 3: Leveraging the Right Pricing Model

Reserved Instances

**Reserved Instance Recommendations**

- **$12,361** Estimated Annual Savings
- **42%** Savings vs. On-Demand
- **6** Purchase Recommendations

Based on your past 7 days of EC2 usage, we’ve identified 6 one-year, all-upfront, standard RI purchase recommendations to save an estimated $12,361 annually, representing a savings of 42% versus on-demand costs. You can take action on these recommendations in the EC2 RI Purchase Console.

**Pricing Recommendations**

- **Buy 31 m4.large reserved instances**
  - **$652.82 monthly savings**
  - **On-Demand Cost Equivalent**: $757.13
  - **Effective RI Cost**: $500.00
  - **Total Net Savings**: $257.13
  - **Total Potential Savings**: $257.13

**RI Utilization**

- **On-Demand Cost Equivalent**: $10,987.95
- **Effective RI Cost**: $8,772.09
- **Total Net Savings**: $2,215.86
- **Total Potential Savings**: $4,538.07

May 01, 2018 - May 31, 2018

**Filters**
- **Service**: Include all
- **Linked Account**: Include all
- **Region**: Include all
- **Availability Zone**: Include all
- **Instance Type**: Include all
- **Platform**: Include all
- **Tenancy**: Include all
- **Scope**: Include all
- **Display Options**: Include all

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Pillar 3: Leveraging the Right Pricing Model

Amazon EC2 Spot

- Big Data
- Containerized Workloads
- HPC
- Batch processing
- Stateless Web Servers
- Rendering
- …
Pillar 3: Leveraging the Right Pricing Model

Amazon EC2 Spot

The price changes infrequently based on supply and demand of spare capacity.

Just request capacity and pay the current rate. When we need the capacity back you’ll get a 2 minute warning.
Pillar 3: Leveraging the Right Pricing Model

Amazon EC2 Spot

Novartis

Project: 10 Million compounds screening in less than 1 week  
Estimation: 50,000 cores and $40M investment

Solution: 10,600 Spot Instances and 87,000 cores

39 years in only 9 hours

$4,232 total spend

3 compounds identified
Pillar 3: Leveraging the Right Pricing Model

Volume Tiered Pricing

First 50 TB per month
0.024 GB/month

Next 450 TB per month
0.023 GB/month

Over 500 TB per month
0.022 GB/month
Pillar 4: Match usage to Storage Class
Pillar 4: Match usage to Storage Class

Elastic Block Storage (EBS)

Amazon EBS General Purpose SSD (gp2)
$0.119 per GB-month of provisioned storage

Amazon EBS Provisioned IOPS SSD (io1)
$0.149 per GB-month of provisioned storage
$0.078 per provisioned IOPS-month

Amazon EBS Throughput Optimized HDD (st1)
$0.054 per GB-month of provisioned storage

Amazon EBS Cold HDD (sc1)
$0.03 per GB-month of provisioned storage
Elastic Block Storage (EBS)

Infor
Challenge:
• 2PB of SQL Server data
• Daily backups which last >12h
Solution: Move from gp2 to st1

“We’ve seen much stronger performance for our database-backup workloads with the Amazon EBS st1 volumes, and we’re also saving 75% on our monthly backup costs.”
Pillar 4: Match usage to Storage Class

Amazon S3

**Hot**
- Standard (default)
  - Active data
  - Archive data

**Warm**
- Standard - Infrequent Access
  - Infrequently accessed data

**Cold**
- Amazon Glacier
Pillar 4: Match usage to Storage Class

Amazon S3

SoundCloud
Challenge:
• Continuity of operation
• Backup of large amounts of data
Solution: Amazon Glacier

“We don’t need to worry about storage. AWS lets us sleep well at night.”
Pillar 5: Measuring & Monitoring

“Good intentions never work, you need good mechanisms to make anything happen”

-- Jeff Bezos
Pillar 5: Measuring & Monitoring

Define, agree and enforce cost allocation tagging

Tagging Categories:

- Technical Tags
  - Name, Application ID, Environment, Version
- Tags for Automation
  - Date/Time, Security
- Business Tags
  - Owner, Cost Center / Business Unit, Project
- Security Tags
  - Confidentiality, Compliance

Enable teams to architect for cost

Drive cost-optimization behaviors:

- Incentives
- Chargeback of costs to users
- Removal of process barriers
- Agile working methods
- Training and onboarding
Pillar 5: Measuring & Monitoring

Define metrics, set targets, and review

100-level metrics
• General spend trending
• % Right Sized
• Elasticity
• % RI Coverage, % RI Utilization

200-level metrics and beyond
• $ cost per request
• $ cost per customer minute
• $ cost per $ revenue
• $ cost per developer
Pillar 5: Measuring & Monitoring

Assign Optimization responsibility

The realm of a CCoE:

- Research
- Evangelise
- Apply
- Lead
- Mentor
The **Five Pillars** of Cost Optimization

- **Right Sizing Your Instances**
- **Increase Elasticity**
- **Pick the Right Pricing Model**
- **Match Usage to Storage Class**
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There are many more ...

Consolidated Billing

Release unused Elastic IPs

Deliver content with AWS CloudFront

Automation via AWS CloudFormation

Developer productivity via AWS Cloud9

Serverless & AWS Lambda

ELB to Application Load Balancer (typically)

Productivity and utilization via Containerization

Migration to open source platforms & databases

Lower security monitoring cost via AWS GuardDuty
What’s next?

Optimize your costs when using AWS
https://aws.amazon.com/pricing/cost-optimization/

Cost Optimization Monitor
https://aws.amazon.com/answers/account-management/cost-optimization-monitor/

AWS Cloud Economics Center
http://aws.amazon.com/economics/

Speak to your TAM, SA or AM today!