



Mindtree

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OPTIMIZING YOUR CLOUD

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GROWTH OF PUBLIC CLOUD & AMAZON WEB SERVICES (AWS)

The demand for public cloud infrastructure services continues to skyrocket. Also, considering the below key features, customers maintain Amazon Web Services (AWS) as their first choice of public cloud provider, to host their business critical applications.

- Fastest growing IaaS service platform
- Largest public cloud in the world
- Service API's for automation

Managing your infrastructure is not as easy as building IT! Controlling AWS costs is a pain point for many customers. The process is often complicated and can be tricky. Controlling and managing cloud services becomes easy only when you have your hands in it.



We take this use case to explain the most common issues faced by customers in AWS and the practical cost optimization techniques, defined by AWS.

CUSTOMER BACKGROUND:

The scope of a customer's cloud adoption journey has widened, due to which, they have started migrating their datacenters / applications to AWS. While they start migrating their loads to AWS, their monthly bill has also increased, which was not anticipated. Now, customers are looking for support from experts to take care of the optimization of their AWS accounts, keeping in mind the industry standards and best practices.

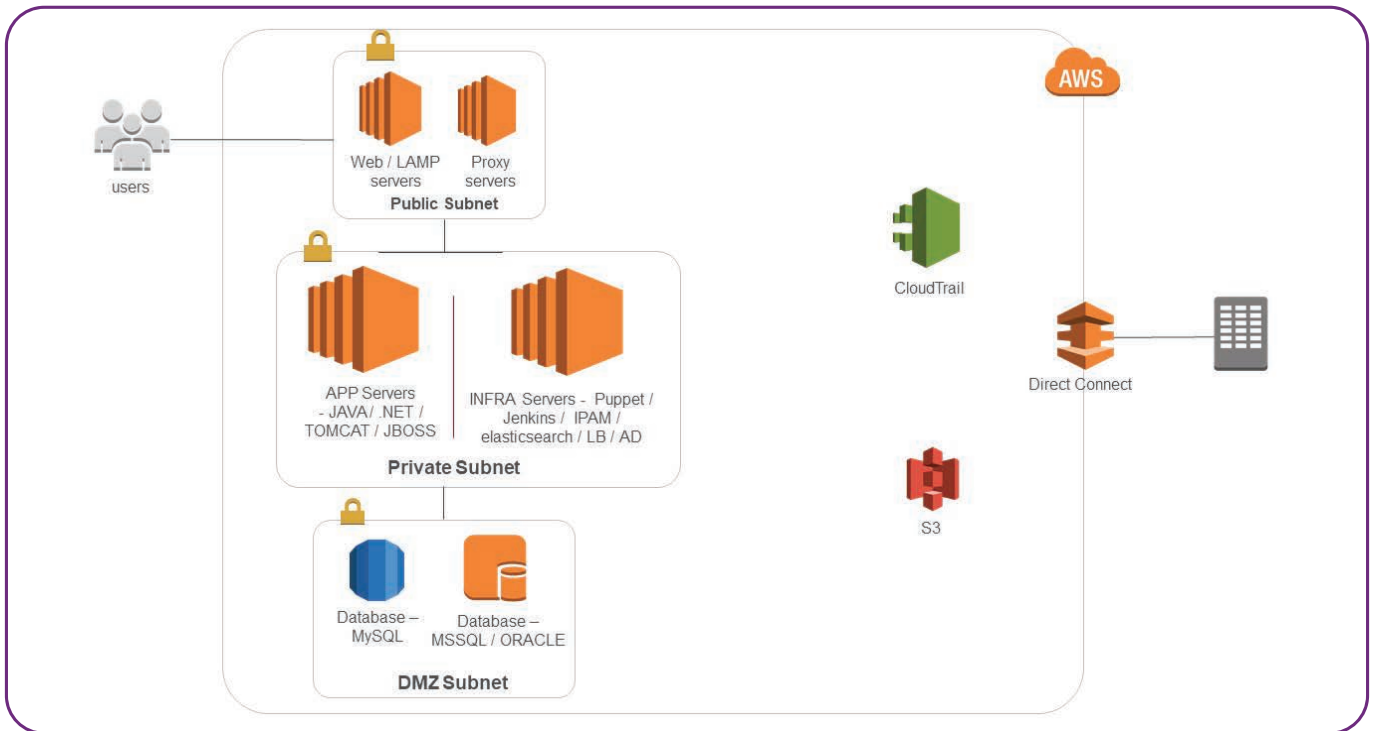
PROBLEM STATEMENT:

The customer's current AWS Account has 100+ EC2 instances, out of which >80% are in Linux distributions. Below is a quick snapshot of the technology Stack.

- OS Distribution – Ubuntu 14.04 or later, Windows 2008 or later
 - Application Technology Stack – Java, JBOSS, Apache-Tomcat, SOLR
 - Database Stack – MySQL, MSS SQL, Oracle
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- The migration strategy is purely based on Lift & Shift method, with most of their environment in an IaaS platform, while PaaS is not being used or considered
 - The customer's IaaS is spread across their environments – DEV, test & production. Reserve Instance is not used in any of their environments.
 - All the instances & services are used 24x7, while DEV/test environments are not in use over weekends, at least.
 - EBS volumes and snapshots lack tagging, which result in unused volume/snapshots drainage. Though the customer's RTO and RPO have been defined in their datacenter resources, it is not followed in their AWS Account.

CURRENT AWS ARCHITECTURE

This is the current AWS architecture of the customer's environment, which is heavily built on IaaS services.



COST OPTIMIZATION: ANALYSIS PHASE

Before we touch on the financial side of AWS, we need to have proper analysis. Optimization cannot be achieved, by just stopping the instances / converting to Reserved Instances. Optimization is a process that concentrates on cost reduction, standardization and architectural gap fixes.

Hence, we perform the analysis based on:

- Bill analysis
- Environment analysis
- Usage analysis
- AWS services analysis

Here's a quick Snapshot of activities to be carried out and the analysis areas of each phase in the AWS account:

ANALYSIS			
Bill Analysis	Environment Analysis	Usage Analysis	AWS Services Analysis
<ul style="list-style-type: none"> ▪ Get the latest 6-12 months bills for <u>Customer - AWS AP Account</u> ▪ Target the top 5 cost consuming AWS services (such as EC2, EBS). ▪ Analyze the instances usage in each of the selected services. ▪ Generate Various Cost / Usage Reports in AWS Billing Section such as, <ul style="list-style-type: none"> ➢ Instance Size Report ➢ EBS Volume Report ➢ EC2 Running Costs 	<ul style="list-style-type: none"> ▪ Discussion with Applications Team ▪ Understand their NON-PROD (DEV / QA / TEST) Environment ▪ Analyze the environment's running requirement ▪ Standardize the Non-PROD Environment Instance / EBS Sizing 	<ul style="list-style-type: none"> ▪ Use of AWS Trusted Advisor for usage Analysis reports such as, <ul style="list-style-type: none"> ➢ Low Utilization Amazon EC2 Instances ➢ Unassociated Elastic IP Addresses ➢ Amazon EC2 Reserved Instances Optimization ▪ Through Scripting find the below usage Reports <ul style="list-style-type: none"> ➢ Large Sized EC2 Instances Usage ➢ Heavy Sized (<250GB) EBS Volumes Usage ▪ For Large Sized Instances, Use OS tools such as sysbench, to find Baseline Performance. 	<ul style="list-style-type: none"> ▪ Find the Possibilities of using other AWS PaaS services such as, <ul style="list-style-type: none"> ➢ RDS, ➢ Lambda, ➢ EFS, ➢ S3, ➢ Glacier, ➢ Elastic Beanstalk, ➢ Cloud Formation, ➢ Code Commit, Code Deploy, ➢ Trusted Advisor, Inspector

Bill Analysis:

This analysis action targets the cost consumption of each service and aims at finding the highest used service / resource to contrast it from other services. The highlights of this phase are:

- Analysis of the AWS Account's monthly bills, based on the instance sizes, EBS sizes, running hours etc.
- Target the top 10 cost consuming resources in each of the AWS services (such as EC2, EBS, RDS).

Environment Analysis:

Environment analysis focuses on the different environments in the customer's AWS Account – production, development and testing.

Different reports of services and resources are generated for each environment. This helps us narrow down to the environments that are under or over-utilized. The reports below play major role in this phase.

SERVICE	DEV	TEST	PRODUCTION
EC2	No of Instances – Size-wise, maximum running hours instances		
EBS	No of volumes / snapshots, frequency of snapshot creation		
RDS	Instance utilization, data usage		

Usage Analysis:

This is an important phase - for optimization to isolate the under-utilized services, which are being charged unnecessarily. AWS provides native services to inspect and find these; so we don't need third party tools of any kind.

Make use of AWS Trusted Advisor to generate analysis reports such as,

- Low utilization Amazon EC2 instances
- Unassociated elastic IP addresses
- Amazon EC2 reserved instances optimization

Also, with AWS, CLI provides more actions. By scripting the below, the usage reports can be analyzed.

- Large sized EC2 Instances usage
- Heavy sized (<250GB) EBS volumes usage
- For large sized instances, use OS tools such as sysbench, to find baseline performance

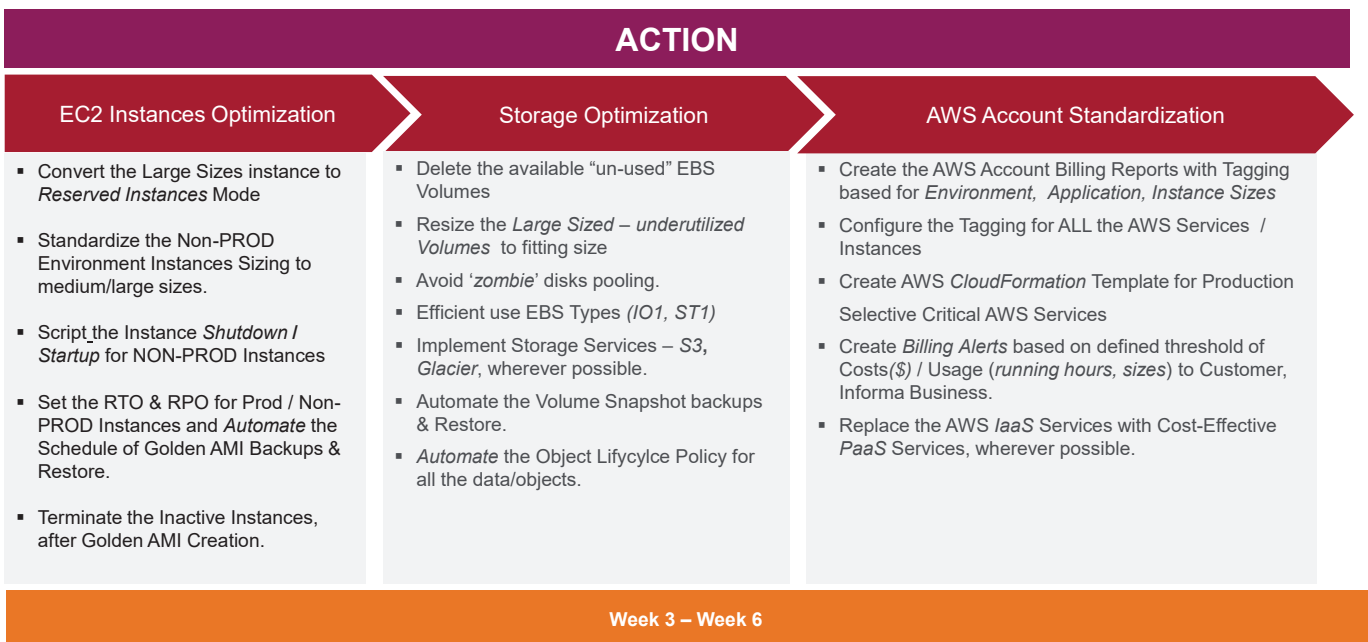
AWS Services Analysis:

Optimization also goes in parallel with upgradation. This service analysis phase concentrates on the possibilities of introducing new AWS services to the customer's architecture and find possibilities of using other AWS PaaS services such as,

- RDS
- Lambda
- EFS
- S3
- Glacier
- Elastic Beanstalk
- Cloud Formation
- Code Commit, Code Deploy
- Trusted Advisor, Inspector

COST OPTIMIZATION: ACTION PHASE

Based on the reports of the above-mentioned analysis, actions will be taken to minimize the cost and widen the AWS space for the customer's account.



EC2 Instances Optimization:

EC2 - the compute service in AWS, provides three types of pricing – On-demand, reserved and spot. We take the following measurements and actions to optimize the instances.

- Convert the large sizes instance to Reserved Instances mode
- Standardize the non-PROD Environment Instances Sizing to medium/large sizes.
- Script the Instance Shutdown / Startup for non-PROD instances
- Set the RTO & RPO for PROD / non-PROD instances and automate the schedule of Golden AMI backups, & restore
- Terminate the inactive instances after Golden AMI creation.

Storage Optimization:

The storage part of AWS public cloud is being offered as EBS (Elastic Block Storage) – Block Volume Service in AWS. There are multiple ways to save the leakage cost in EBS. Below are some of the ideal options.

- Delete the available 'unused' EBS volumes
- Resize the Large Sized – underutilized Volumes to fitting size
- Avoid 'zombie' disks pooling
- Efficient use EBS types (IO1, ST1)
- Implement storage services – *S3, Glacier*, wherever possible
- Automate the volume snapshot backups & restore
- Automate the Object Lifecycle Policy for all the data/objects

AWS Account Standardization:

The action phase not only includes cost reduction, but also helps organizations to bring in ITIL standards for proper management & tracking.

- Create the AWS account billing reports with tagging, based on Environment, Application and Instance Sizes
- Configure the tagging for all AWS Services/ instances
- Create AWS CloudFormation template for production-critical AWS services
- Create Billing Alerts based on defined threshold of Costs(\$)/ Usage (running hours, sizes) to T&F, Informa Business
- Replace the AWS IaaS services with cost-effective PaaS services, wherever possible.

COST BENEFITS

With more infrastructure as a Service (IaaS) consumption in their public cloud, the customer is paying AWS cost of **\$16972.28** per month, which is way beyond their budget.

(Ref: <https://calculator.s3.amazonaws.com/index.html#key=calc-ABFDB438-E24C-41B8-8F61-8DC62F3C1D3B>)

Also bringing in more PaaS services will enable businesses to save more costs and upgrade their application / technology stack, with less burden of managing the infrastructure.

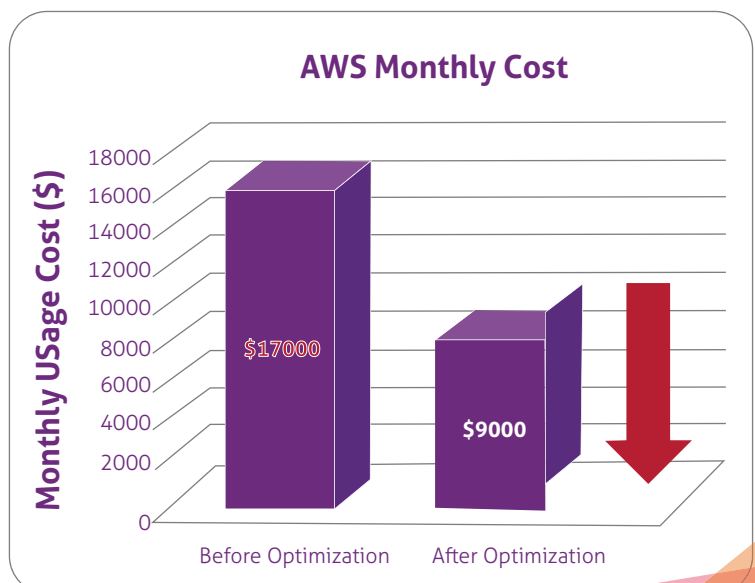
The below tariff shows the price difference of using IaaS Vs PaaS services.

AWS Service	Service Charge Tarrif
AWS Service	t2.medium - \$0.05 per Hour m3.large - \$0.146 per Hour c3.large - \$0.12 per Hour - c4.2xlarge - \$0.453 per Hour
EBS Volume	\$0.11 per GB / month / General Purpose
EBS Snapshot	\$0.05 per GB / month of data stored
S3	Standard \$0.023 per GB Standard Infrequent Access \$0.0125 per GB
Glacier	\$0.004 per GB
EFS	\$0.33/GB per month
Elastic IP	\$3.66 per IP, Data Transfer 0.09\$/GB
CodeCommit	\$1 active user per month (After 5 users) 10 GB-month of storage per active user 2,000 Git requests/month per active user
CodeBuild	build.general1.medium - 0.010 Price per build minute (\$)
ElasticBeanstalk	Standard EC2 / S3 pricing
AWS Lambda	\$0.20 per 2 million requests 1 GB Memory - 0.000001667\$

After upgrading their architecture with more PaaS services, the cost has come down to around **\$9,000**.

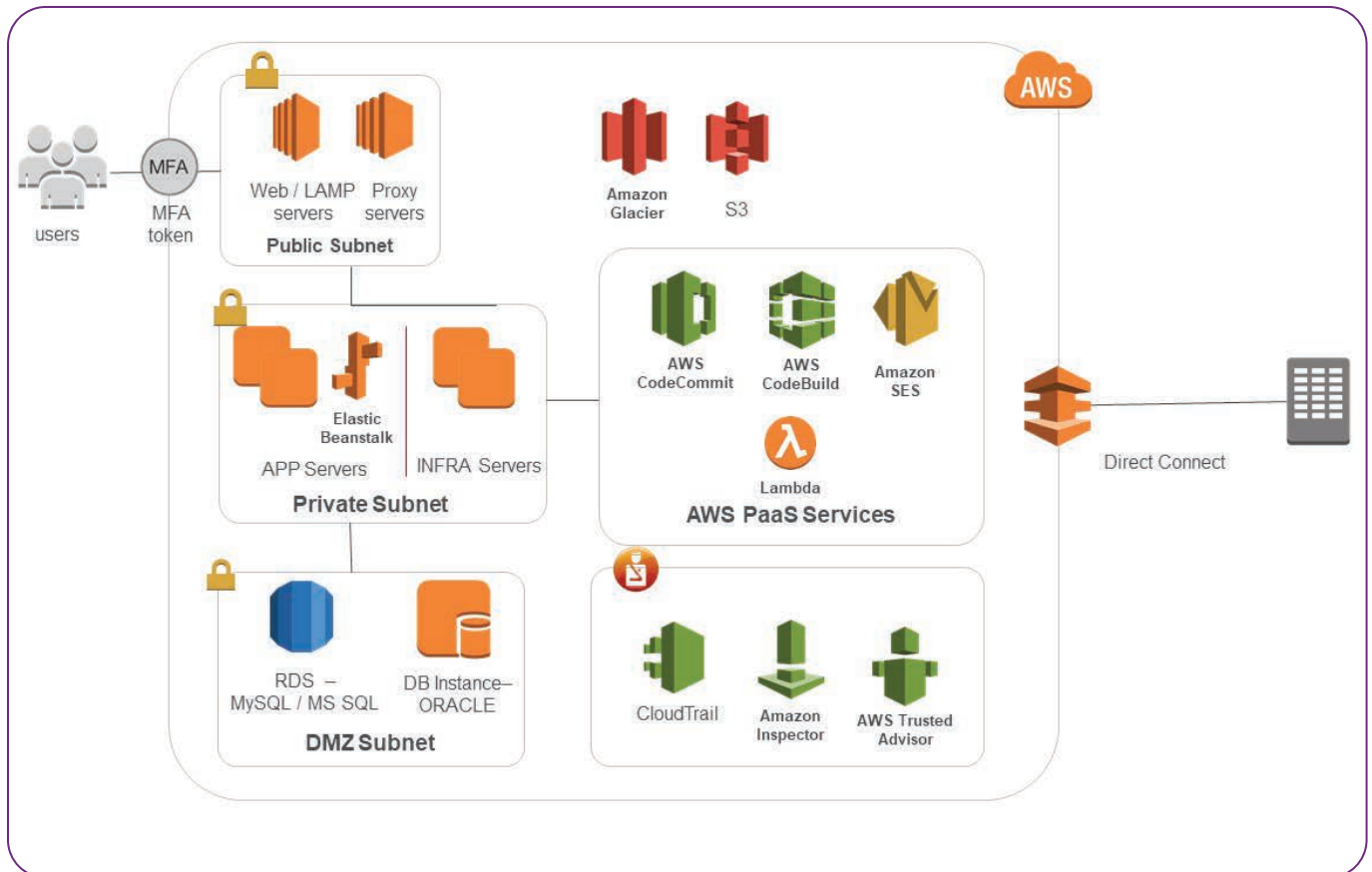
(Ref: <https://calculator.s3.amazonaws.com/index.html#key=calc-EBO10669-5FD6-44EF-964C-AFDB92482E21>)

Now with optimization, we have helped the customer reduce the monthly cost by around 60%. We are sure that this can be used for other IT investment projects in the organization.



UPGRADED ARCHITECTURE (AFTER OPTIMIZATION):

Bringing in optimization not only reduces the cost, but also gives options to developers to explore more AWS services.



Features of this Approach:

The key benefits of this Approach are:

- Cost-effective AWS solution with performance betterment
- More PaaS services which reduce the burden of managing infrastructure services
- AWS account alignment with cloud governance standards
- More streamlined AWS account standardization to track IAM users' activities
- Logging of All the activities in the AWS account
- Complete Optimization has been achieved, with the native utilities / services of AWS. No third party tool usage (effective utilization of AWS services)
- Technology upgradation of the customer's AWS architecture

Mindtree's Expertise in Cloud:

Mindtree delivers a holistic approach to cloud transformation—from advisory to build, and from migration to management—which accelerates a company's move to digital business. As an anchor partner, Mindtree delivers:

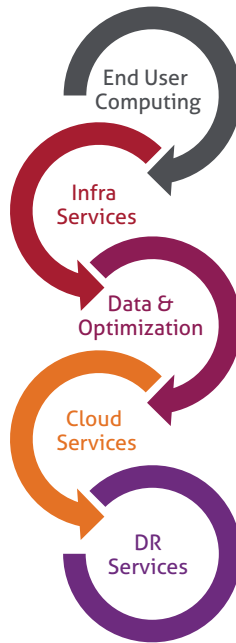
Strategy: Mindtree helps identify and assess the key decisions to embark and manage the deployment of cloud to disrupt new business models and revolutionize the customer experience.

Speed: Mindtree enables companies to quickly migrate to the cloud and scale in a factory-based model, which ensures efficiency and the flexibility to align with business needs.

Next-generation platforms: Mindtree has developed 12 cloud-native, industry-specific business platforms to enhance productivity, inclusivity and innovation of workforce and partners.

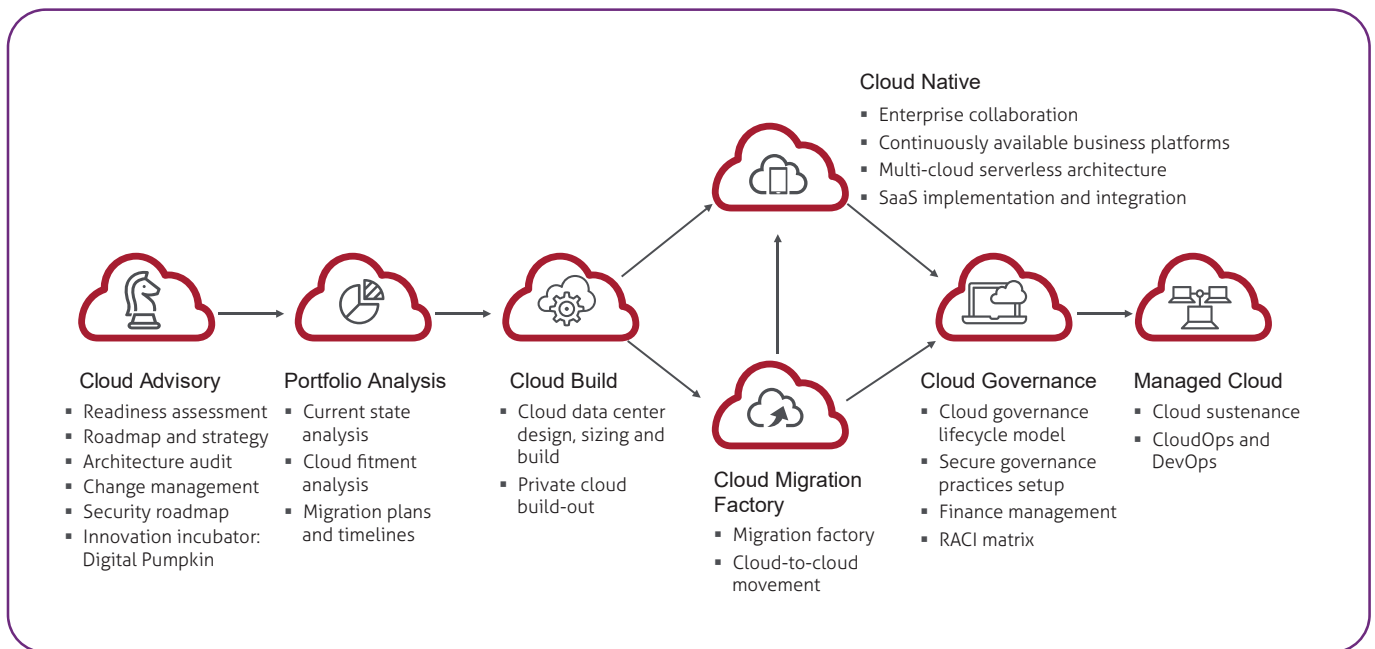
IMS Consulting Services

- Infrastructure Assessment & Architecting
- Datacenter Consolidation & Migrations
- OS Platform Migration
- Network Security & SDN Services
- Disaster Recovery & High Availability
- Cloud Advisory
- Cloud Transformation Solutions
- Cloud Migration Factory
- Cloud Optimization Services
- Cloud Governance



- Desktop & EOL Migrations
- AD & Messaging Services
- Unified Communication Services & VDI Solutions
- Database Migration, Upgradation & Optimization
- Bigdata Services
- Server Hardening & Performance Tuning
- Automated DR Services
- Infrastructure as Code
- Cloud / hybrid DR Services

Mindtree helps enterprises with a holistic approach from advisory to operations to transform businesses, and drive innovation and efficiency.



For more details on securing your cloud, please reach out to ims.consulting@mindtree.com / Imssolution.Architect@mindtree.com

About Mindtree

Mindtree [NSE: MINDTREE] is a global technology consulting and services company, helping enterprises marry scale with agility to achieve competitive advantage. "Born digital," in 1999 and now a Larsen & Toubro Group Company, Mindtree applies its deep domain knowledge to 350+ enterprise client engagements to break down silos, make sense of digital complexity and bring new initiatives to market faster. We enable IT to move at the speed of business, leveraging emerging technologies and the efficiencies of Continuous Delivery to spur business innovation. Operating in more than 15 countries across the world, we're consistently regarded as one of the best places to work, embodied every day by our winning culture made up of 21,000 entrepreneurial, collaborative and dedicated "Mindtree Minds."