Proposed Solution

# **Problem Statement:**

Consider a monolithic java application stack. Apache Web Server, Apache Tomcat application server with Active MQ and Oracle and MongoDB backend. Propose a solution to migrate this application stack to cloud of your choice (AWS/OpenStack/Azure).Mention all the provider services you would use and how you would maintain HA and Load Balancing (consider app to be stateless). Mention rationale for each decision.

# **Assumptions :**

I used AWS for Proposed solution.

Adhere to IAM best practice.

# **Solution :**

#### Apache Web Server and tomcat server:

The Apache Web Server and the Apache Tomcat application are to be deployed as part of an LC-ASG-ELB setup spanning across more than one AZ's.

This would ensure HA w.r.t unavailability of Availability Zones.

To maintain stateless-ness we need store the session data / user data off-server using memcache/RDS. This is a sorted issue if we are already using the existing DB's for this purpose (Mongo DB or Oracle as mentioned)

During launching of new servers, the application will automatically be deployed using a repo such as GitHub or AWS code commit. Further to automate the process AWS Code Deploy can be used which automatically keeps track of new instances and deploys the code as required. If there is any pre compilation required as part of the deployment a Jenkins server can be created which will do the needful, this Jenkins job can be triggered using a web-hook which is configured into the user data of the Launch Configuration.

To maintain true statelessness, it is also needed that the logs are stored away from the instance –

(a) By enabling access logs on the ELB

(b) Enabling VPC flow logs on the ELB NIC.

(c) using X\_HTTP\_Forwaded and further offloading from the server , while this will store the access logs to store the error logs persistently auto scaling hooks can be used so that once the server is being scaled in by the ASG, the error logs and other required data will be offloaded to another server or cloud watch Logs.

The Security group rules of the webservers would permit only HTTP traffic only from ELB, no other ports will be opened for security reasons.

Every instance launched is associated with an IAM role to facilitate EC2-run-commands for any adhoc requirements; this is also useful for various other purposes like for code deployment or for authenticating for other services.

To serve static images/videos and fonts, they will be placed in an S3 bucket maintaining uniformity in referencing. If the application is to be catered to a global audience or to reduce latency even further, AWS Cloud Front can be used to server from the S3.

#### ActiveMQ :

The Active MQ messaging service will be replaced with AWS Simple Queue Service (SQS), the in-depth features of SQS is beyond the scope of this document but can be readily referred from AWS documentation.

The functionalities of SQS and Active MQ are almost same with pro's and con's on both sides. However, the weighted advantage in SQS' side is the compatibility of it being an AWS provided managed service in an AWS stack - bringing in a pool of advantages.

Notably unlike Active MQ, SQS is a polling based mechanism and not push based mechanism. This can be tackled by configuring work around using SNS and HTTP; a more custom solution can be made based on the specific application needs

#### Oracle:

Oracle is offered as a managed service from AWS as part of the AWS RDS service offering. In order to maintain HA, RDS comes with an inbuilt option for a multi-AZ deployment with automatic synchronous replication among these instances.

All the standard set of features of RDS are as applicable. Oracle AWS RDS comes with a BYOL model to facilitate usage of the existing license hassle free.

Based on the application stack, if the RDS need not be accessed via internet, it will not be made publicly accessible and traffic will be restricted to AWS services using SG.

#### Mongo DB :

Mongo DB, an open source document oriented database program is like a NoSQL DB. Though this is directly not offered as part of the AWS managed services stack, a very similar NoSQL DB - DynamoDB is offered from AWS.

https://ci6.googleusercontent.com/proxy/RnNZfQn2o2xpggJQqefCOervMbPIci5mujDPJnvl43kv6Rtxjyh5gHN_JKVzeU-aaGz3pePFgxfoAAtZJZNx8mveVTc-11j98EfuAJVcumUenA=s0-d-e1-ft#https://ssl.gstatic.com/ui/v1/icons/mail/images/cleardot.gif While AWS elastic search, a tool which queries based on JSON formats and documents is primarily used for searching and indexing, given the true nature of application this can be used in addition to the DynamoDB or as a replacement all together.

**AWS services used for Migration:**

• **Route 53:** Amazon Route 53 is a highly available and scalable cloud Domain Name System (DNS) web service.

It is designed to give developers and businesses an extremely reliable and cost effective way to route end users to Internet applications by translating names like [www.XYZ.com](http://www.XYZ.com)

• **ELB (Elastic Load Balancing):** Elastic Load Balancing offers two types of load balancers that both feature high availability,

Automatic scaling and robust security. Here we are implementing ELB for High availability.

**• EC2 (Elastic Cloud Compute):** It provides you with complete control of your computing resources and lets you run on Amazon’s proven computing environment. Amazon EC2 reduces the time required to obtain and boot new server instances to minutes,

Allowing you to quickly scale capacity both up and down as your computing requirements change.

• **S3 (Simple storage service):** Amazon S3 has a simple web services interface that you can use to store and retrieve any amount of data, at any time, from anywhere on the web. It gives any developer access to the same highly scalable, reliable, fast, inexpensive

Data storage infrastructure that Amazon uses to run its oqn global network of web sites. Here we are using S3 for taking Backup of

Both the DB instance (Oracle DB and Mongo DB).

**• CloudFront:** Amazon CloudFront is a global content delivery network (CDN) service that accelerates delivery of your websites, APIs, video content or other web assets. It integrates with other Amazon Web Services products to give developers and businesses an easy way to accelerate content to end users with no minimum usage commitments. Here we are using CloudFront for high volume

Edge content caching purpose.

**• EBS (Elastic Block Storage):** Amazon Elastic Block Store (Amazon EBS) provides persistent block storage volumes for use with Amazon EC2 instances in the AWS Cloud. Each Amazon EBS volume is automatically replicated within its Availability Zone to protect you from component failure, offering high availability and durability. Amazon EBS volumes offer the consistent and low-

Latency performance needed to run your workloads.

**• VPC (Virtual Private Cloud):** Amazon Virtual Private Cloud (Amazon VPC) lets you provision a logically isolated section of the Amazon Web Services (AWS) cloud where you can launch AWS resources in a virtual network that you define. You have complete control over your virtual networking environment, including selection of your own IP address range, creation of subnets,

And configuration of route tables and network gateways.

**• RDS (Relational database service):** Amazon Relational Database Service (Amazon RDS) makes it easy to set up, operate, and scale a relational database in the cloud. It provides cost-efficient and resizable capacity while managing time-consuming database administration tasks, freeing you up to focus on your applications and business. Here we are using RDS for Oracle database.  
Note: This Oracle RDS instance must be launched in Multi-AZ. It must have Fixed amount of backup window for maintenance.

**• Cloud Formation:** Create your own templates to describe the AWS resources, and any associated dependencies or runtime parameters, required to run your application. You don’t need to figure out the order for provisioning AWS services or the subtleties of making those dependencies work. We are using Cloud formation for creating custom template for Mongo DB as we don’t have any RDS instance for Mongo db. The custom template also take care of high availability and replication.

**• IAM (Identity and access management):** AWS Identity and Access Management (IAM) enables you to securely control access to AWS services and resources for your users. Using IAM, you can create and manage AWS users and groups, and use permissions to allow and deny their access to AWS resources.