MAJOR-1 PROJECT

SYNOPSIS on

BUILDING A FAULT TOLERANT WEBSITE USING AWS

Submitted by:

Name	Roll No	Branch
Sajal Dubey	R110216134	CSE CCVT
Simar Singh	R110216156	CSE CCVT

Under the guidance of

Mr. Abhirup Khanna

Assistant Professor

School of Computer Science

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Dehradun-248007

2018-19

Approved By

Mr. Abhirup Khanna	**Dr. Deepshikha Bhargav**
Project Guide	**Department Head**

School of Computer Science

University of Petroleum & Energy Studies, Dehradun

Synopsis Report (2019-20)

1 Project Title

BUILDING A FAULT TOLERANT WEBSITE USING AMAZON WEB SERVICES

2 Abstract

Powering about a quarter of the web and publishing that is roughly 42 million new posts every month, WordPress holds a lasting status as one of the top content management systems (CMS) of choice on the internet today. I think blogging and content production remain popular startup marketing tools, WordPress is unlikely to be knocked from this place anytime soon. Merging the power of AWS technologies with WordPress ultimately helps to improve the end-user experience and the cost efficiency of deployment.

The CMS platform performs well enough out of the box that even the beginner website builder can manage their way around site development and blog publication with ease. However, there's always room for improvement, and some ways to optimize WordPress through AWS only attest to this fact.

3 Introduction

Amazon Web Services are the cloud services by amazon which are in the form of building blocks, these building blocks can be used to build and set up any type of application in the cloud. WordPress currently holds an enduring status as one of the top content management systems (CMS) on the internet. As blogging and content production are the two main popular startup marketing tools, WordPress is unlikely to be knocked from this position anytime soon. Combination of AWS technologies and WordPress will help in improving the end-user experience and the cost efficiency of deployment. The CMS platform performs in a great manner and the novice website builder can manage their way around site development and blog publication with ease. AWS provides first-rate cloud-computing capabilities for infrastructure and software development.

AWS is categorized under few domains namely:

- Compute
- Storage
- Database
- Migration
- Network and Content Delivery
- Management Tools
- Security & Identity Compliance
- Messaging

These Amazon web services are on-demand, available in seconds, with pay-as-you-go pricing. From data warehousing till deployment tools, directories to content delivery, more than 140 AWS services are accessible. New services can be provisioned quickly, without the upfront capital cost.

When a server crashes or a hard disk runs out of space in a working datacenter environment, administrators are informed immediately, because these are important events that require at least their attention — if not their intervention as well. The ideal state in a traditional, on-premises datacenter environment tends to be one where failure notifications are delivered reliably to a staff of administrators who are ready to spring into action in order to solve the problem. Many area units are able to reach this state of IT nirvana – but, doing so typically requires extensive experience, up-front financial investment, and significant human resources.

This is not the case once adopting the platform provided by Amazon Web Services. Ideally, failures in a application engineered on our platform is proscribed by the system itself, and as a result, are fairly uninteresting events.

Amazon Web Services gives you access to a vast amount of IT infrastructure–computing, storage, and communications– that you can allocate automatically (or nearly automatically) to account for almost any kind of failure. Individual will be only charged for resources that they actually use, so there is no direct financial investment to be done.

WordPress is a Content Management System (CMS), which is open source and was created to manage blogs. WordPress helps you in simply produce and govern your blogs and web sites content without doing coding and it won't be able to produce a fully operational website. The most vital characteristics of WordPress are that you simply will produce a dynamic website without none programming and style data. WordPress is theme-based that provides you choices for various open-source and premium style themes, which may be integrated simply without requirement of any designing knowledge. WordPress is free and an open-source platform under the GNU General Public License (GPL). Design themes customization in WordPress is very easy. It allows you to manage users with different roles and permission.

Why AWS and WordPress:

AWS provides best cloud-computing capabilities for infrastructure and software development. The platform allows you to utilize its highly distributed, fully-featured services without any upfront costs normally associated with migrating to the Cloud. Instead, users pay on pay per-use basis for all resources, additionally, gains the option to scale consumption and architecture as and when necessary.

4 Literature Review

- Jeff Barr, Attila Narin, and Jinesh Varia [1] describes the building blocks of the whole architecture and how to implement various services for efficient working of the application. The very first entry point for application development is Amazon EC2, which greatly reduces the learning curve for developing applications for the cloud. But using Amazon EC2 server instances in the same manner as traditional hardware server instances is only a starting point – doing so will not greatly improve your fault-tolerance, performance, or even your overall cost. In order to build fault-tolerant applications on Amazon EC2, it's important to follow best practices such as quickly being able to commission replacement instances, using Amazon EBS for persistent storage, and taking advantage of multiple Availability Zones and elastic IP addresses. Using Auto Scaling enables you to greatly reduce the amount of time and resources you need to monitor your servers – if a failure occurs, a replacement will be automatically launched for you. Diagnosing an unhealthy server can be as simple as terminating it and letting Auto Scaling launch a new one for you. Elastic Load Balancing enables you to publish a single, well-known end point for your application. The ebb and flow of Amazon EC2 instances

launching, failing, being terminated and being re-launched will be hidden from your users. Amazon SQS, Amazon S3, and Amazon SimpleDB are higher-level building blocks that you can incorporate into your application. These services are excellent examples of how to achieve fault-tolerance, and they in turn increase the faulttolerance of your application. With Amazon RDS you have easy access to features that enable fault-tolerant database deployments, including automatic backups, snapshots, and Multi-AZ deployments. Above all, the pricing model of Amazon Web Services gives you the option to experiment – there is no upfront investment, you simply pay for what you use. If a particular aspect of the Amazon Web Services platform turns out not to be suitable for your application, your investment is complete as soon as you stop using it.

- Mohammadreza Rasol Roveicy and Amir Massoud Bidgoli [2] describes various fault tolerant techniques by proposing two techniques known as HA Proxy and Amazon Elastic Load Balancer. Both have implemented to deal with various software server applications in virtualize environment when a server goes down, connection automatically will be redirected to another server. For the purpose of arriving at empirical results related to fault tolerance in cloud computing, certain metrics have been taken into account to evaluate reliability and availability. According to the results obtained in our case study, Amazon ELB has been performing better HA Proxy. In the other hand, since Amazon ELB featuring Low Latency and being proactive and reactive, it is wise to use Amazon ELB as suitable fault tolerance architecture for our company.

- In [3] relation between AWS and WordPress is discussed, further the combined advantages of AWS and WordPress are also touched upon.

- [4] lets us know the problems faced by WordPress without AWS and also give various solutions to overcome the problems.

- Architecting a Highly Available and Scalable WordPress Site in AWS [5] gives the overview of the project and provide architectural insights to build highly available and scalable sites in AWS.

5 Problem Statement

WordPress is a PHP application using two different data storages: one a MySQL database and files on disk. Storing files on disk is a problem if you want to make use of a large number of EC2 instances to run WordPress in a fault tolerant and scalable fashion.

Fault Tolerance introduces to system design that permits a system to keep performing truly when one of its parts falls flat or it can be defined as capacity of a system to react quickly to an unexpected equipment or programming break down. If not fully operational, fault tolerance solutions may allow a system to continue operating at reduced capacity rather than shutting down completely following a failure.

6 Objective

- The main goal is to build a fault-tolerant WordPress website using AWS services which would help in building a website that would be highly scalable, free from storage issues and load balancing. High scalability or auto-scaling enables you to automatically scale your Amazon EC2 capacity up or down.

- To illustrate, here is an example with figure:

    1. Mary is uploading a new image for her blog post. The image file is stored on EC2 instance number 1.
    2. Mary is reading through her article. EC2 instance number 1 is answering her HTTP request to get the image.
    3. Bob is reading Mary's article. EC2 instance number 2 is answering his HTTP request with a 404 Not Found error, as the image is stored only on EC2 instance number 1.

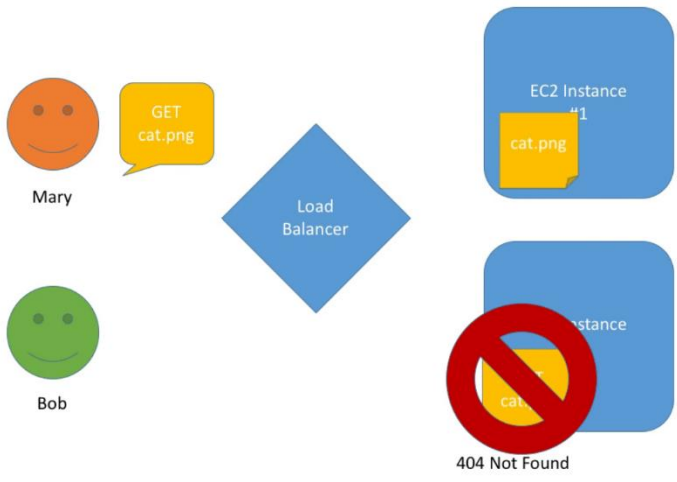


Figure 1:Problem Figure

7 Methodology

The process can be broken down into the following steps:

- Interface for user that is the internet.
- Establishing AWS CloudFront for Content Delivery. Also, in order to use website, we use Route 53 for DNS.
- Setting up AWS infrastructure for the fault tolerant

For our project, we will be using AWS for creating fault tolerant environment for a WordPress site.

Amazon Web Services provides services and infrastructure to build reliable, fault-tolerant, and highly available systems in the cloud. Amazon EC2 provides infrastructure building blocks that, by themselves, may not be fault-tolerant. Hard drives may fail, power supplies may fail, and racks may fail. It is important to use combinations of the features provided by AWS to achieve fault tolerance and high availability.

Following steps are involved:

- Creating a VPC.

- In a single region, creation of two EC2 servers with different availability zones as well as creation of two Relational Database Servers(RDS).

- Creating and integration of security groups which will have policies and user defined.

- Creation of S3 buckets for safekeeping of code and media assets.

- Elastic Load Balancer is used for auto-scaling and high-availability.

Figure 2 given below gives a pictorial representation of the architecture of the whole project.

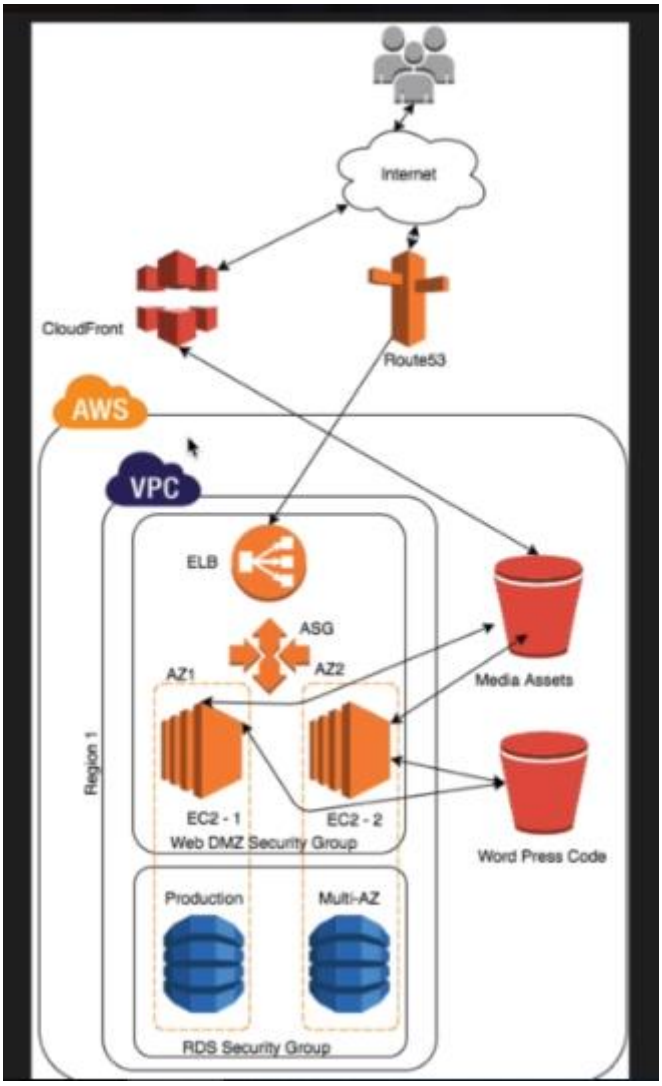
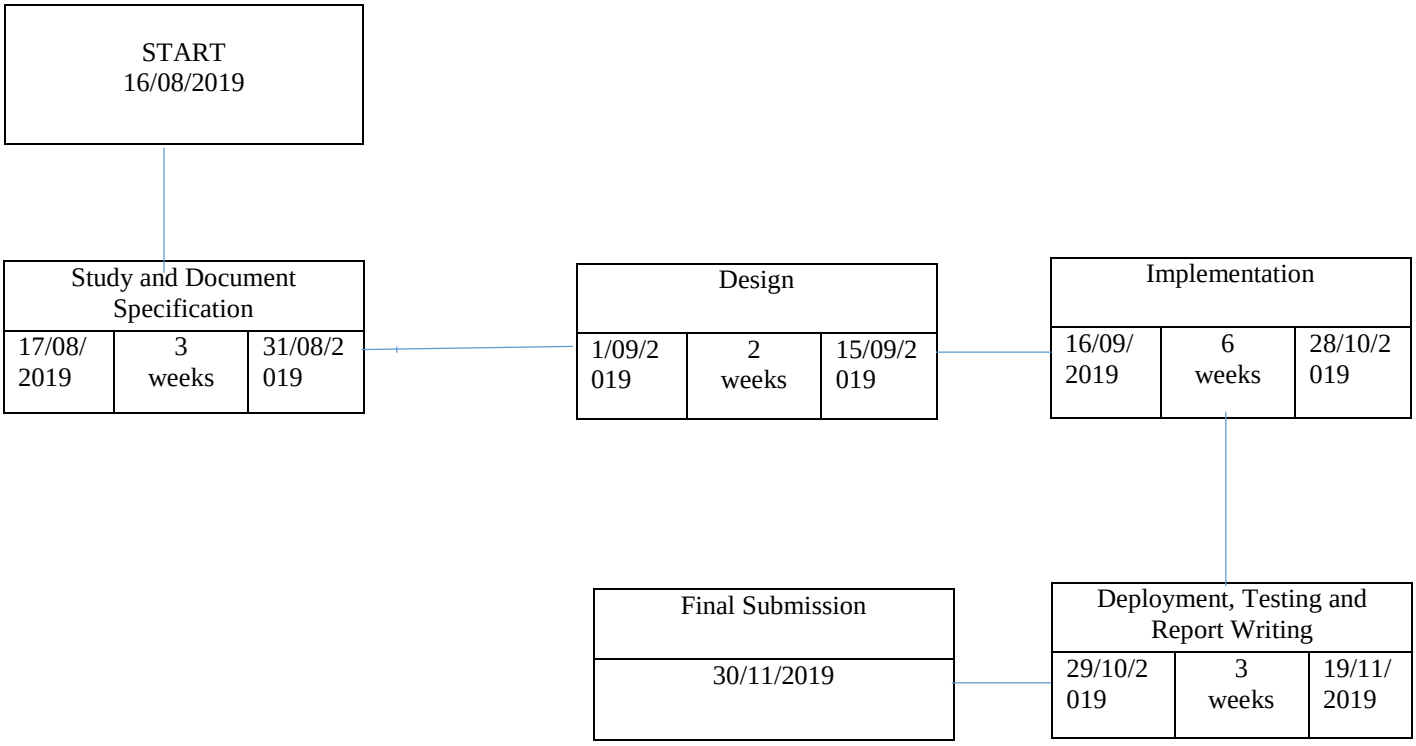


Figure 2:Architecture Of the Project

8 System Requirements (Software/Hardware)

- Hardware Interface:
  - 64 bits' processor architecture supported by windows.
  - Minimum RAM requirement for proper functioning is 2 GB.
  - Required input as well as output devices.
  - Internet Connection
- Software Interface:
  - This system uses AWS CLI and AWS management console (web API).

9 Schedule (PERT Chart)



References

1. Jeff Barr, Attila Narin, and Jinesh Varia - “Building Fault-Tolerant Applications on AWS.” (October 2011).

2. https://www.ibexlabs.com/solutions/aws-and-wordpress/

3. https://cloudonaut.io/wordpress-on-aws-smooth-and-pain-free/

4. https://www.slideshare.net/harishganesan/scaling-wordpress-in-aws-amazon-ec2

5. Comparative Analysis of Fault Tolerance Techniques in Cloud Computing: A Case of Armangerayan Co. - Mohammadreza Rasol Roveicy and Amir Massoud Bidgoli

Figure 1: https://cloudonaut.io/wordpress-on-aws-smooth-and-pain-free/
Figure 2: http://www.computepatterns.com/499/sample-fault-tolerant-deployment-in-aws/