

AUTOSCALING WEBSERVICES ON AMAZON EC2

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ABSTRACT

Fault tolerance, high availability, & scalability are essential prerequisites for any Enterprise application deployment. One of the major concerns of enterprise Application architects is avoiding single points of failure. There is a high cost associated with achieving high availability & scalability. We will look at an economical approach towards automatically scaling Web service applications while maintaining the availability & scalability guarantees at an optimum economical cost. This approach, involving the Amazon EC2 cloud computing infrastructure, makes it unnecessary to invest in safety-net capacity & unnecessary redundancy. The Web service application developer should only need to write the application once, and simply deploy it on the cloud. The scalability & availability guarantees should be provided automatically by the underlying infrastructure. Auto scaling refers to the behavior where the system scales up when the load increases & scales down when the load decreases. Auto-healing refers to an approach where a specified minimum deployment configuration is maintained even in the event of failures. Such an approach is essential for cloud deployments such as Amazon EC2 where the charge is based on the actual computing power consumed. Ideally, from the clients' point of view, in an auto scaling system, the response time should be constant and the overall throughput of the system should increase. We will describe in detail an economical approach towards building auto-scaling Apache Axis2 Web services on Amazon EC2. In the course of this article, we will introduce well-known address (WKA) based membership discovery for clustering deployments where multicast-based membership discovery is an impossibility. We will also introduce an approach towards dynamic load balancing, where the load balancer itself uses group communication & group membership mechanisms to discover the domains across which the load is distributed. In a traditional setup, a single load balancer fronts a group of application nodes. In such a scenario, the load balancer can be a single point of failure. Traditionally, techniques such as Linux HA have been used to overcome this. However, such traditional schemes have quite a bit of overhead and also require the backup system to be in close proximity to the primary system. In case of catastrophic situations, this approach can result in complete failure of the system. We will introduce an auto healing scheme in case of load balancer failure using Amazon Elastic fP addresses & a load balancer group, which can overcome these shortcomings.

Declaration

The work included in this report was done by me, and only by me, and the work has not been submitted for any other academic qualification at any institution.



25th February 2010

Afkham Azeez

Date

I certify that the declaration above by the candidate is true to the best of my knowledge and that this report is acceptable for evaluation for the CS6999 M.Sc. Research Project.



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Date

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TABLE OF CONTENTS

ABSTRACT.....	ii
ACKNOWLEDGMENTS	iii
TABLE OF CONTENTS.....	iv
LIST OF ABBREVIATIONS.....	viii
Chapter 1 Introduction	1
1.1 Amazon Elastic Compute Cloud (EC2).....	3
1.2 EC2 Features for Building Failure Resilient Applications	4
1.3 Apache Axis2.....	5
1.4 Apache Synapse Dynamic Load Balancing.....	6
1.5 The Problem.....	6
1.6 Objectives	7
1.7 Prior Work	8
Chapter 2 Literature Review	10
2.1 Terminology	11
2.2 Theoretical Aspects.....	12
2.2.1 Failure Detection	12
2.2.2 Overcoming Distributed System Failures.....	14
2.2.3 High Availability	15
2.2.4 Group Membership Service(GMS)	16
2.2.5 Data Replication Models	16
2.2.6 Virtual Synchrony.....	17
2.2.7 Membership.....	18
2.2.8 Load Balancing.....	18
2.2.9 Reliability & Web services.....	19
2.2.10 Group Communication Frameworks (GCF).....	20
2.3 Amazon EC2.....	20
2.3.1 Using EC2	20
2.3.2 Instance Types	21
2.3.3 Features for Building Failure Resilient Applications	21
2.3.4 Data Transfer Charges	22
2.4 Giga Spaces	23
Chapter 3 Methodology	24
3.1 Introduction.....	25
3.2 Well-known Address (WKA) based membership	26
3.3 Fault Resilient Dynamic Load Balancing.....	28
3.4 Dynamic Load Balancing with Load Analysis	34

3.5 Failure Detection.....	35
3.6 Deployment Architecture.....	36
3.7 Apache Synapse Autoscaling Load Balancer	40
3.7.1 Normal Message Flow.....	40
3.7.2 Error Message Flow.....	42
3.8 Load Analyzer Task.....	44
3.8.1 Load Analysis Task Configuration.....	44
3.9 Load Analysis Algorithm.....	46
3.9.1 Making the Scale-Up Decision.....	47
3.9.2 Making the Scale-Down Decision.....	47
3.10 EC2 Client Library.....	48
3.11 Handling Primary Load Balancer Failure.....	48
3.12 Axis2 Application Cluster	48
3.13 Deployment on EC2.....	50
3.13.1 Starting up an Axis2 Instance.....	52
3.13.2 Starting up a Synapse Load Balancer Instance.....	53
3.13.3 Auto-starting & Auto-healing a Cluster	54
3.14 Failure Scenarios.....	55
3.14.1 Load Balancer Failure	55
3.14.2 Axis2 Application Process Failures.....	55
Chapter 4 Observations, Results & Analysis.....	57
4.1 Performance Testing Methodology.....	58
4.1.1 Scenario 1 – No autoscaling	59
4.1.2 Scenario 2 – Autoscaling Enabled.....	60
4.2 Test Results.....	61
4.3 Analysis of Test Results	62
Chapter 5 Conclusion.....	64
5.1 Future Work.....	67
REFERENCES	68

LIST OF FIGURES

Figure 1: Scale-up when the system load increases	7
Figure 2: Scale-down when the system load decreases	8
Figure 3: Passive Replication.....	16
Figure 4: Multicast from client	17
Figure 5: Replies from replicas.....	17
Figure 6: Member joins group	27
Figure 7: Well-known member rejoins after crashing	27
Figure 8: Load balancer & application groups.....	29
Figure 9: Active-passive load balancers with Elastic IP	29
Figure 10: Membership channel architecture.....	30
Figure 11: Initialization channel architecture	31
Figure 12: Application member joins. A load balancer is also a well-known member	32
Figure 13: A non-WK load balancer joins	33
Figure 14: A well-known load balancer rejoins after crashing	34
Figure 15: Deployment on EC2	36
Figure 16: Normal message flow	40
Figure 17: Error flow	42
Figure 18: synapse.xml	43
Figure 19: LoadAnalyzerTask configuration in synapse.xml	45
Figure 20: axis2.xml in application node.....	49
Figure 21: autoscale-init.sh script	51
Figure 22: Axis2 instance bootup	52
Figure 23: Synapse load balancer instance startup	53
Figure 24: Bootstrapping the system	54
Figure 25: Performance Testing Scenario 1. Non-autoscaling single worker instance.....	60
Figure 26: Performance Testing Scenario 2. Autoscaling system	61
Figure 27: Response Time Variation	61
Figure 28: Throughput Variation	62

LIST OF TABLES

Table 1: EC2 Instance Types	21
Table 2: LoadAnalyzerTask configuration parameters	45



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Table 1: EC2 Instance Types	21
Table 2: LoadAnalyzerTask configuration parameters.....	45



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LIST OF ABBREVIATIONS

AMI	Amazon Machine Image
AWS	Amazon Web Services
CPU	Central Processing Unit
CORBA	Common Object Request Broker Architecture
EC2	(Amazon) Elastic Compute Cloud
ESB	Enterprise Service Bus
JVM	Java Virtual Machine
GCF	Group Communication Framework
GMP	Group Membership Protocol
GMS	Group Membership Service
HA	High Availability
HTTP	Hypertext Transfer Protocol
SLA	Service Level Agreement
SOAP	Historically, Simple Object Access Protocol. Now simply SOAP
S3	(Amazon) Simple Storage Service
WKA	Well-known Address, Well-known Addressing
WSDL	Web Services Description Language



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