

A Versatile Canal For Effective Elearning on Cloud

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Abstract

A Learning Management System (LMS) is powerful software for managing complex databases combined with digital frameworks for managing curriculum, training materials, and evaluation tools to impart online learning. Colleges and universities use LMS systems to deliver online courses and augment on-campus courses [11]. This paper explains step by step process in detail with screen shots on how to deploy an open source learning management system Sakai into Amazon Web Services Cloud. The first section shows the step by step process of configuring AWS platform by selecting Amazon Machine Image (AMI), adding storage space, creating security groups to setup firewall, get remote system password and access cloud system. The second section addresses deployment of Open Source Learning Management System Sakai into AWS cloud. The step by step procedure shows the staging environment setup of installing java, configuring tomcat web server, setting up environment variables, placing binary into appropriate folder and instantiate the server. Finally access cloud enabled LMS system anywhere from the world through web browser.

Keywords: Learning Management System, LMS, Amazon Web Services, AWS, Cloud, Sakai, Deployment, EC2

Introduction

Cloud computing has become one of the most discussed IT paradigms of recent years. It builds on many of the advances in the IT industry over the past decade and presents

significant opportunities for organizations to shorten time to market and reduce costs. With cloud computing, organizations can consume shared computing and storage resources rather than building, operating, and improving infrastructure on their own [3]. The speed of change in markets creates significant pressure on the enterprise IT infrastructure to adapt and deliver. Cloud computing provides fresh solutions to address these changes. As defined by Gartner, “Cloud computing is a style of computing where scalable and elastic IT-enabled capabilities are delivered as a service to external customers using Internet technologies.” [5].

Using Amazon Web Services (AWS), you can requisition compute power, storage, and other services in minutes and have the flexibility to choose the development platform or programming model that makes the most sense for the problems they’re trying to solve. You pay only for what you use, with no up-front expenses or long-term commitments, making AWS a cost-effective way to deliver applications. Large enterprise quickly and economically deploys new internal applications, such as HR solutions, payroll applications, inventory management solutions, and online training to its distributed workforce. An e-commerce website accommodates sudden demand for a “hot” product caused by viral buzz from Facebook and Twitter without having to upgrade, its research firm executes large-scale simulations using computing power provided by AWS. Media companies serve unlimited video, music, and other media to their worldwide customer base [3].

Overview and Background

A. Reasons For Choosing AWS Cloud

As a cloud architect, it is important to understand the benefits of cloud computing. There are some clear business and technical benefits to building applications in the cloud [4]. A few of these are listed here:

Business Benefits of Cloud Computing:-

- Almost zero upfront infrastructure investment
- Just-in-time Infrastructure
- More efficient resource utilization
- Usage-based costing
- Reduced time to market

Technical Benefits of Cloud Computing:-

- Automation
- Auto-scaling
- Proactive Scaling
- More Efficient Development lifecycle
- Improved Testability
- Disaster Recovery and Business Continuity
- “Overflow” the traffic to the cloud

Characteristics of a truly scalable application (Building Scalable Architecture):-

- Increasing resources results in a proportional increase in performance.
- A scalable service is capable of handling heterogeneity.
- A scalable service is operationally efficient.
- A scalable service is resilient.

B. Why Sakai

Sakai is open-source Collaboration and Learning Environment (CLE) software. The Sakai Community develops and distributes the open-source Sakai CLE, an enterprise-ready collaboration and courseware management platform that provides users with a suite of learning, portfolio, library and project tools. Sakai is a community of academic institutions, commercial organizations and individuals who work together to develop a common CLE. It is a free, community source, educational software platform distributed under the Educational Community License (a type of open source license). It is used for teaching, research and collaboration. Systems of this type are also known as Course Management Systems (CMS), Learning Management Systems (LMS), or Virtual Learning Environments (VLE) [10].

Major Modules

Over all system can be split into 4 major modules as below:

- Communication Modules – Blogs, Forums, Chat, email, Announcements, Podcast, Polls, RSS Feed, News, Wiki, Web Content, etc.
- User Management – Creating Users, Assigning Roles, etc.
- Course Management – Syllabus, Assignments, Test & Quizzes, Course content, Grading, etc.
- Others or Miscellaneous – Virtual class room support, Frame work components etc.

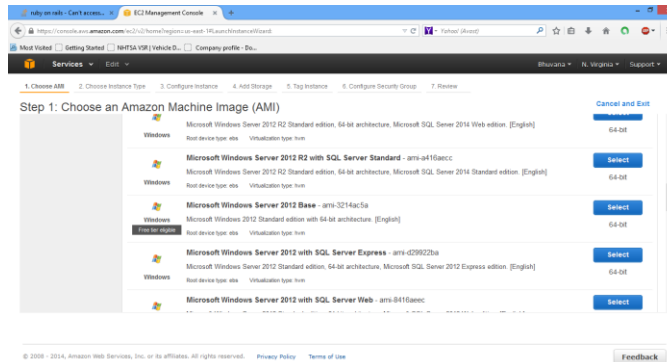
Deployment of Sakai Into Aws Windows Elastic Compute Cloud (Ec2)Instance

In this section, the steps for configuring Sakai in AWS EC2 are explained in 3 phases as System Design, Implementation and testing.

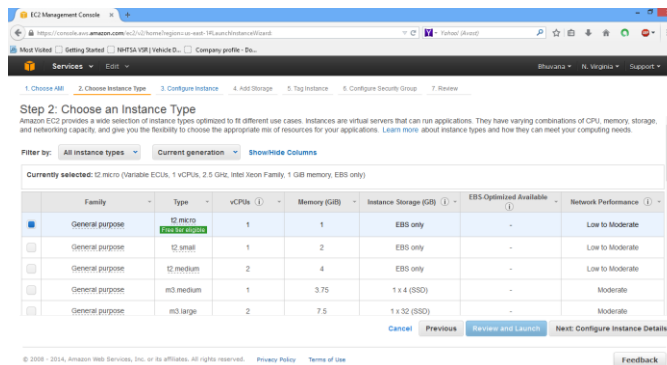
C. System Design – Sequence of Steps

To setup the EC2 environment through which our eLearning product will get deployed, get into Amazon console by signing to your account. Choose the availability zone and start creating the instance first by selecting the respective AMI. AMI is the Amazon machine image which has the inbuilt Operating system and the necessary software inside for you to use it readily. The Step by step configuration details are:-

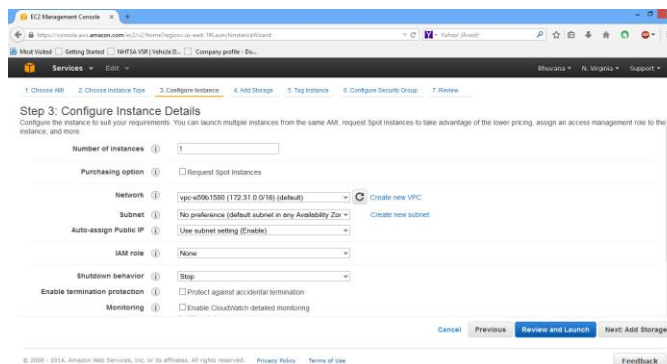
1. Choose AMI - Amazon Machine Image



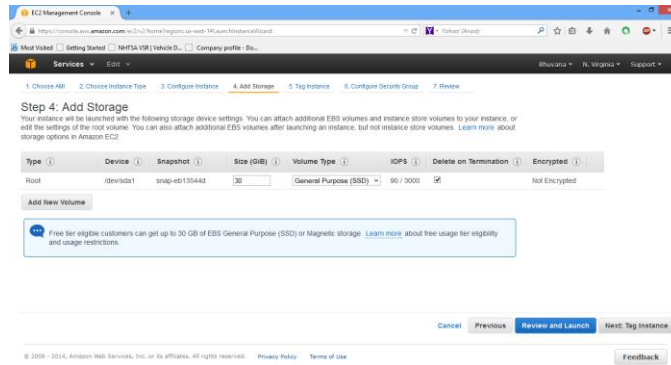
2. Choose an Instance Type



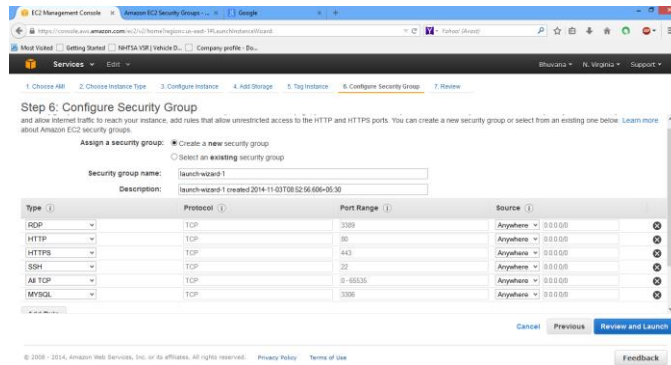
3. Configure Instance



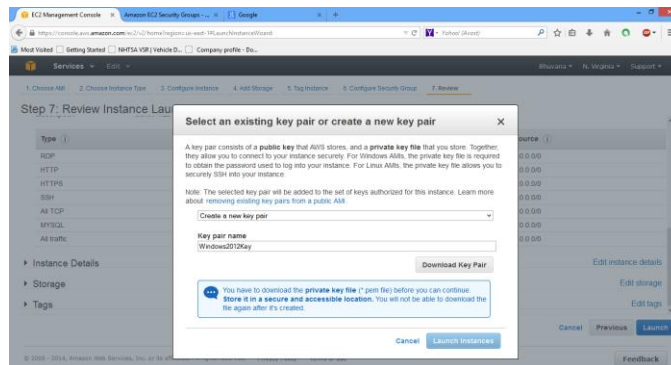
4. Add Storage



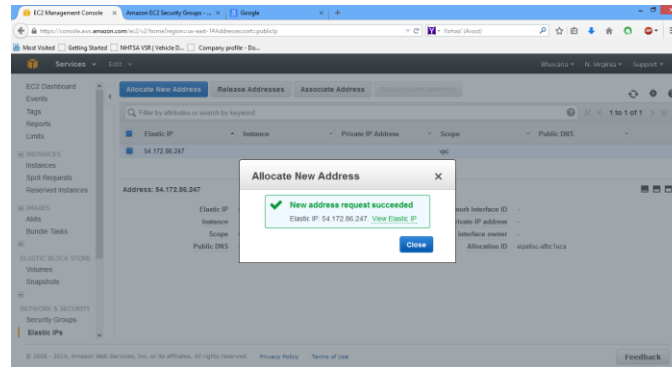
5. Configure Security Group



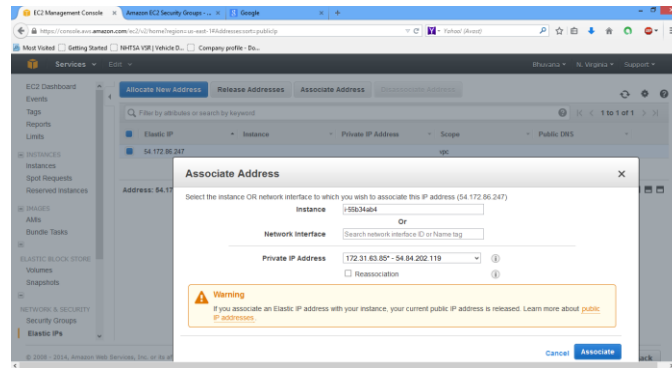
6. Launch Instance and download Key pair



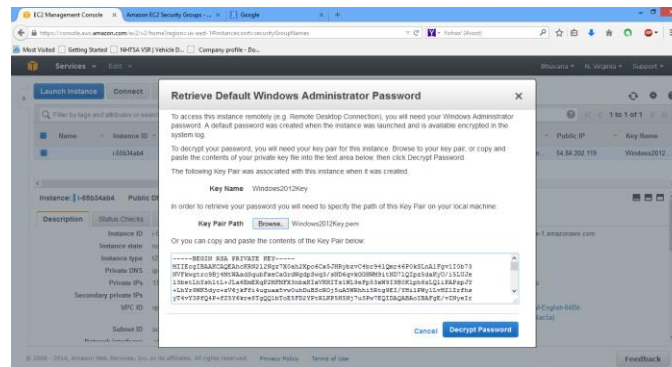
7. Get New Public IP



8. Associate Elastic IP address



9. Get Windows Password and Get in through RDP



10. Land up in EC2



The below Fig.1 Shows the screen shot for AWS EC2 Instance – Configuration details in the console information screen.

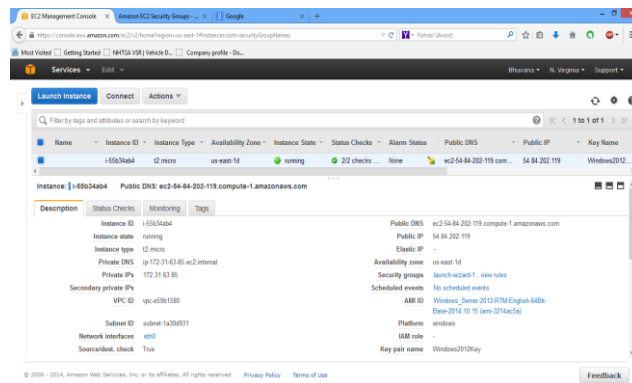
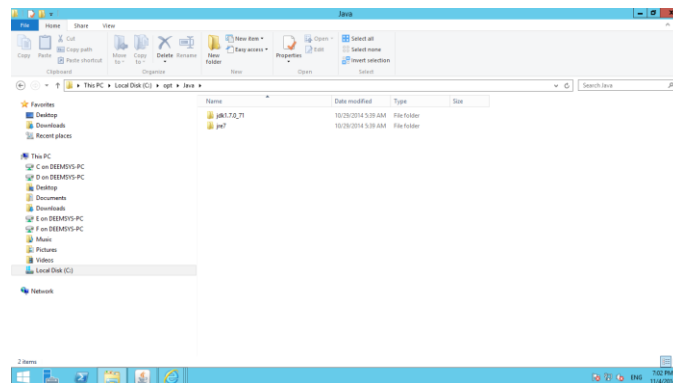


Figure 1: AWS EC2 Instance - Console Information Screen

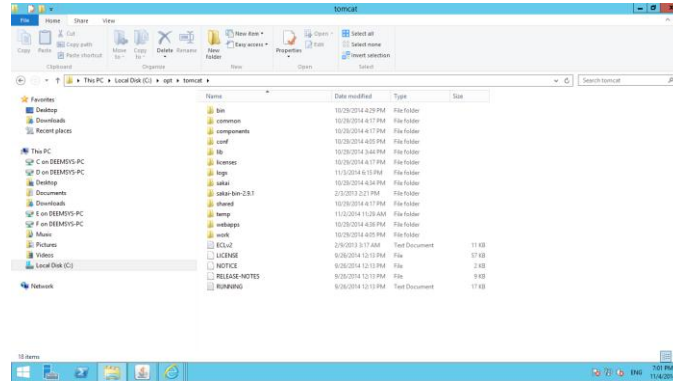
D. System Implementation – Sequence of Steps

Following are the step by step explanation of configuring Sakai LMS inside cloud system. Get into Windows EC2 instance through Remote Desktop Connectivity,

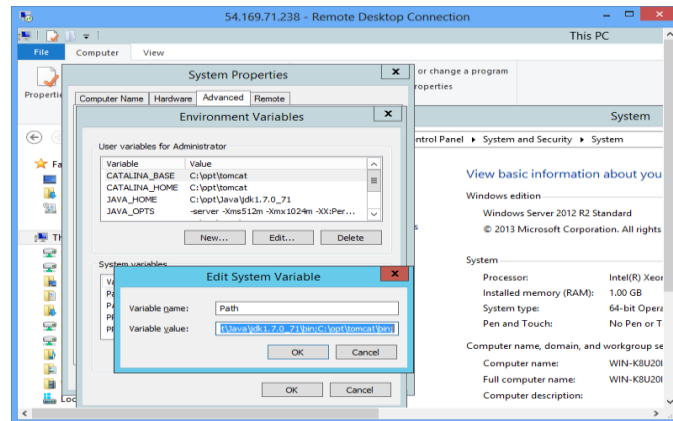
1. Install Java



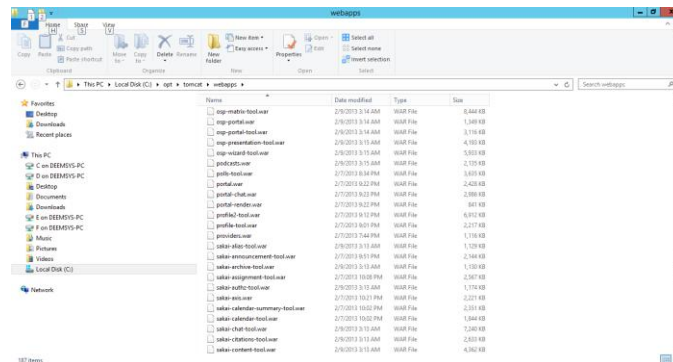
2. Setup Tomcat



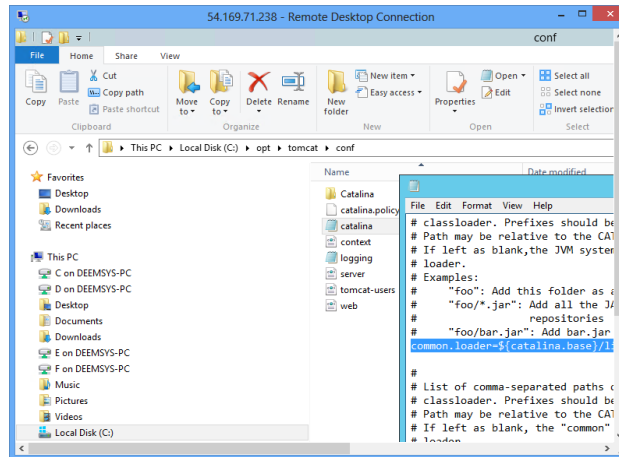
3. Setup Environment variables



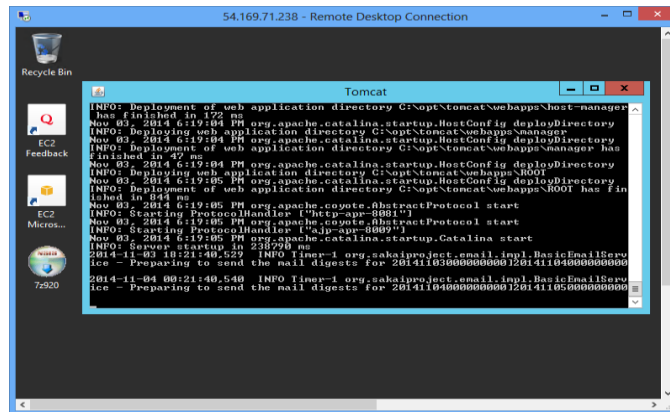
4. Place the binary in appropriate folder



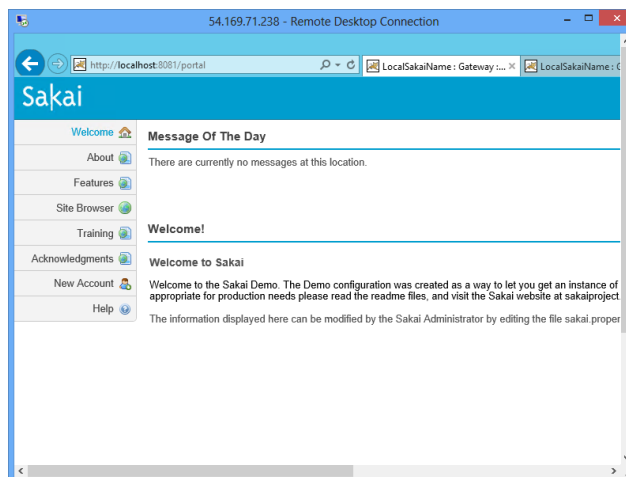
5. Configure Server



6. Start up the server



7. Access the system



E. System Testing – Access Cloud Enabled LMS

There are varieties of ways you could access the system as long as the instance is running in the AWS EC2 server.

- Access from the EC2 Instance directly.
- Access with complete FQDN Name.

Note: This FQDN is provided by the AWS system which will be used internally to collaborate with other components of its architecture.

- Access through Elastic IP
- Access through Public IP of AWS

Note: Once EIP is assigned to the instance, both the public IP and the Elastic IP would be the same.

The below Fig. 2 shows the screen shot of Sakai LMS home page screen while accessing it with the cloud enabled IP.

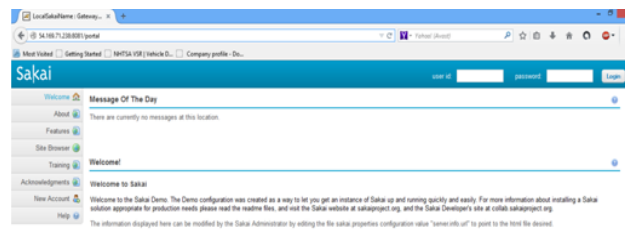


Figure 2: Accessing Cloud Enabled LMS System

Conclusion

Sakai, the learning management system is one of the proven open source eLearning methodologies that are already been widely accepted and wide spread across many countries. Amazon web services is one of the leading pioneer as cloud service providers and is a trusted business partner across the world by many multinational companies. Now enabling access by deploying Sakai LMS in AWS cloud is a way for any educational institution to offer their course online in a cost effective way. With this paper, by following all the given steps, one can easily make use of Sakai LMS system in the cloud.

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