SINGLE SIGN ON USING CLOUD COMPUTING

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Abstract : Single sign on implementation is a cloud venture or a system that enables clients and employees of an organization to seamlessly access various applications without re-entering the credentials. A custom login page and landing page are part of this proposed work, where a user is remembered. Single sign on system uses AWS cloud services and OKTA to provide seamless navigation among various websites. Token plays a crucial rule in this system. Single sign on system involves authentication process as well as access control of multiple software systems, that enables a client to get to numerous applications with one lot of login certifications. Cloud services are a new emerging trend in the IT industry and more and more companies are opting to shift their infrastructure on cloud as well as they can utilize various other software services offered by cloud service providers. Cloud services are relatively cheaper than maintaining an on premise infrastructure and provide additional features. The whole work will be deployed in an Amazon EC2 instance.

***IndexTerms* - OKTA, Cloud computing, Cloud service, Token.**

I. INTRODUCTION

The cloud computing is a remote virtual pool of on-request shared assets, offering to figure, stockpiling, database and system benefits that can be quickly sent at scale[1]. The expression distributed computing has been utilized vigorously inside the IT business for a long time now, and all the more as of late it's being utilized inside different divisions, for example, retail and fund, as it turns out to be progressively mainstream. Numerous individuals regularly allude to the innovation essentially as the Cloud. Distributed computing is a quickly developing innovation and the selection of this is a key methodology for some associations, and there is a generally amazing explanation for this. It is changing the scene of what number of organizations work on a tremendous scale, with huge business and specialized points of interest and advantages that can't be disregarded. Before fully understanding cloud computing, we must be aware of some existing technology[2] that it has based upon, that being, virtualization, and this is being used in on premise data centers for a long time. Virtualization augments the intensity of cloud computing, and without this virtualization, it would just not be conceivable .

II. VIRTUALIZATION

Virtualization refers to abstraction. It means that the Working framework or the OS is disconnected from hardware. OS never again must be bound to server or pc that it keeps running on.

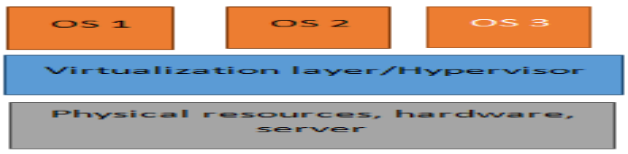


Figure 1: Type 1 hypervisor is stacked straightforwardly on an equipment though

Types of virtualization:

- Virtualization based on Server
- Virtualization based on Desktop
- Virtualization based on Network
- Virtualization based on Input and Output (I/O)
- Virtualization based on Storage
- Virtualization based on Application

2.1 What is a virtual machine?

Virtual machine is a collection of virtual hardware devices such as virtual CPU, virtual RAM and software that runs like a traditional OS. Virtual machines are very similar in that we have a physical server, a hypervisor, and an operating system that runs on top of that hypervisor creating the virtual server.

2.2 CLOUD MODELS BASED ON DEPLOYMENT STYLE

- Public cloud
- Private cloud
- Hybrid cloud
- Community cloud

2.3 CLOUD ADMINISTRATION MODELS BASED ON SERVICE

IaaS, or Infrastructure-as-a-Service, is minimal or lowest tier offering in a cloud environment. This offering most resembles the traditional on-premises approach of purchasing hardware and other components in order to build the necessary infrastructure to run and support a business. We may recall having “server rooms” in an office building that housed everything

from user home directories, file servers, and domain controllers to an intricate connection of networking components to allow seamless connections between users and resources. In Cloud, we have full control and flexibility over their servers, just in a cloud environment by controlling all software and services that run on top of these virtual servers including the working framework itself.

III. PROPOSED MCL FRAMEWORK

PaaS, or Platform-as-a-Service, is middle-tier offering where you do not focus on the virtual machine itself but rather on the actual platform offerings that allows you to build your own custom applications and software components. An example of this would **be Azure App Services**, which is a platform that enables you to assemble and send Web applications in Azure as an administration to clients. There is no need to worry specifically about the server virtualization, storage, and network plumbing happening underneath.

SaaS, or Software as a Service, which is the upper-tier offering when customers would like to simply consume existing software applications in the cloud. A perfect example of this is Office 365, where users access their email, which is hosted in the Azure cloud. In this scenario, Azure completely handles everything including the infrastructure and platform. Once setup, users consume the service directly from Azure.

As we move from Programming as an Administration to Foundation as an Administration we notice an increase in responsibility. However, at the same time, we also gain the ability to further customize our solutions having more options at the compute, storage, and networking layers.

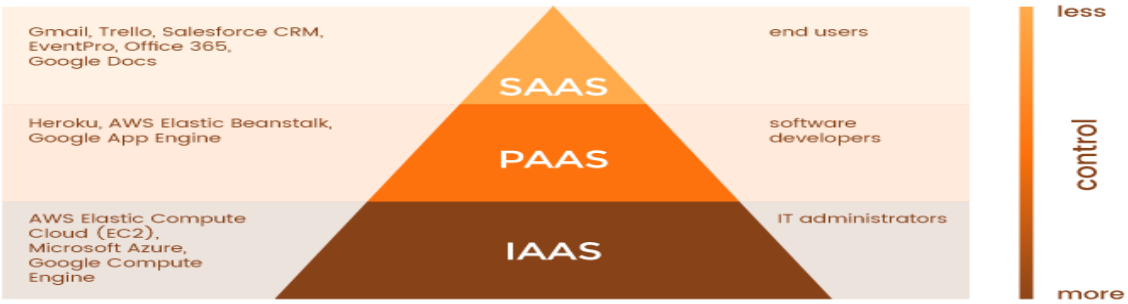


Figure 2: cloud administration models – reference taken from web.

There are various other administration models, for example,

- Disaster recovery
- Communications
- Monitoring
- Identity
- Security

3.1 COMPUTE, STORAGE and NETWORK

Compute objects gives the mind to process remaining task at hand. Including Counting what's required to process a run solicitation from applications and administrations. As a similarity check, if we think of gadgets and devices with CPU's and RAM, typically servers and how they perform in a traditional, on-premises setup, compute services in a cloud, are comparable to these.

Storage resources just enable us to store your information. Any resource that enable us to store our data in the web, is classed as a storage resource[7]. Again as the comparison, in the default traditional environment these will be seen as drivers, hard disks, network storage, which provides file shed storage through the internet, high performing storage area network, SAN, that is block mode storage accessed over a high speed internet. Database sources allow you to store structured sets of data used by applications. Again as a comparison, databases are widely used in Data Centers with some common database engine types being SQL Server, Oracle, and MySQL. Within the Cloud, there are a wide variety of database engines available for different use cases.

Network resources provide the connectivity allowing all other resources, compute, storage, and database, to speak with one another. In a typical environment, we can detect and observe hardware, same as routers to adjust traffic among network switches, that serve as the backbone of internet connection allowing the host to speak with each other and firewalls to enable or disable traffic flow into the model.

3.2 Key characteristics of cloud computing

Cloud computing[6] has various key attributes that enable it to be the ground-breaking administration that is it today, and it's a smart thought to have a comprehension and attention to these and what they offer.

On-demand resourcing: This basically implies when you need to arrangement an asset inside the cloud, it is very quickly accessible to you to distribute where and when you need it. Not any more looking out for equipment to be requested, introduced, cabled, and designed before utilizing it.

Scalability: Distributed computing offers you the capacity to quickly scale your condition's assets both here and there and in and out, contingent upon your prerequisites and requests of your application and administrations. When scaling here and there, you successfully change the power and execution of an occurrence, maybe utilizing one with a more prominent CPU or memory

control. When scaling in and out, you are just including or expelling the quantity of cases you're utilizing to your armada of process assets. This offers a critical favorable position contrasted with on-premise arrangements, from a cost-viewpoint alone.

Economy of scale: Because of the tremendous size of assets open cloud contributions give, which are streamlined and shared between various associations, the end client profit by extraordinarily low asset costs contrasted with customary facilitating.

Flexibility and elasticity: Distributed computing offers tremendous adaptability and flexibility to your structure approach. You can have the same number of or as couple of assets as you require. You choose how much and to what extent you need it for, and at what scale.

Development: Distributed computing offers your association the capacity to develop utilizing a wide scope of assets and administrations. Couple with the on-request component, and your development requirements are fundamentally decreased contrasted with an exemplary on-premises condition. This development additionally incorporates the capacity to achieve worldwide clients easily, by provisioning assets over the cloud seller's worldwide system.

Utility-based metering: With many cloud administrations, you pay for what you use. On the off chance that you just have an example running for two hours, and afterward closed it down, at that point you pay for two hours worth of register assets. So it's a similar charging process for some assets and administrations. You pay for assets when you are utilizing them.

Shared infrastructure: Hosts inside the cloud are virtualized. Therefore, different occupants can be running cases on a similar bit of equipment. This essentially lessens the measure of physical equipment required, which thus decreases the measure of intensity, cooling, and space required in the server farm. Also, thus, assists with the economy of scale, all subsequent in less expensive expenses to you as the client.

Highly available: By plan, a considerable lot of the center administrations inside the open cloud and its fundamental foundation are repeated crosswise over various geographic zones and districts. Having information duplicated to numerous better places naturally, encourages you to guarantee the strength and accessibility of your information and administrations, without arranging and modeler for this flexibility.

Security: Open cloud merchants, for example, AWS and Microsoft Purplish blue are viewed as more secure than your own server farm. This is down to the way that they need to stick to worldwide consistence programs over numerous enterprises and by applying the common duty model. The seller will work to an extraordinarily exclusive expectation of security for the fundamental framework of the cloud, and it's down to you, the end client, to then designer security in the cloud, utilizing the devices, administrations and applications accessible.

3.3. Single sign on

Problem definition

Single sign on is a client validation mechanism with a centralized session, in which users can access various applications with a solitary arrangement of client qualifications or credentials. It is the best way to oversee users. It is also used for access control. It is a third party, cloud based Identity management provider that to implement the Single Sign On.

Introduction to AWS

Amazon Web Services(AWS) is an exhaustive, advancing distributed computing platform given by Amazon[3].

- AWS gives administrations from many served farms known as "datacenters" spread crosswise over availability zones(AZs) .
- An AZ speaks to an area that typically contains multiple data centers, where as a region is a combination of AZs in geographic proximity.
- An AWS user can be able to turn up virtual machines (VMs) and recreate information in different AZs to obtain a profoundly dependable infrastructure that is resistant to failures of unique servers or the whole data centre.

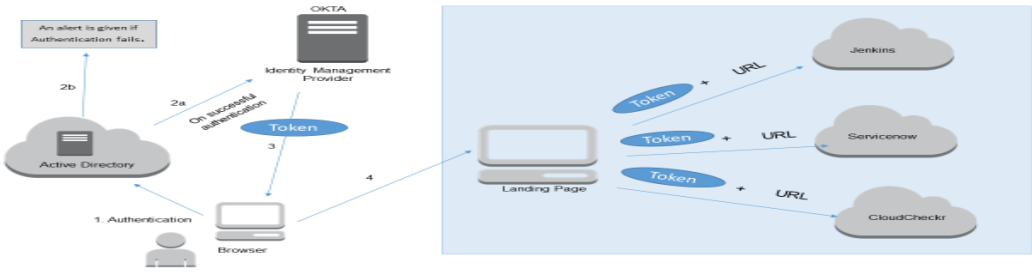


Figure 3 Single Sign On

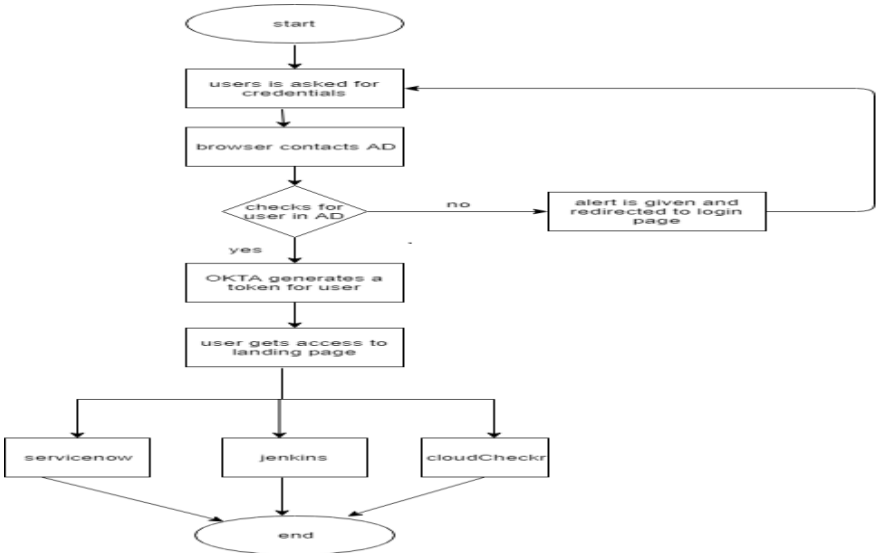


Figure4: Flow chart of the work

Steps

In this proposed work, we use amazon web services, to create an EC2 instance and a directory service.

Login in to AWS management console.

Create an EC2 Instance:

EC2 is a web administration that gives virtual process ability to clients.

Go to dashboard, select services. Under services, select **Launch instance**. Select the type of EC2 instance. In our case, it is Windows server 2008, free tier. Then go through various configuration details such as selecting CPU capacity, storage, security policies etc. After filling in all the required details, click on **Review and Launch**. Our new virtual machine will be ready in few minutes.

On successful creation of an instance, we will get a Public DNS address and Private IP address for our machine. For the Virtual Machine that I have created, the details are as follows:

Instance name: Windows-intern-dnd

Instance state: running

Instance type: t2.micro

PublicDNS:ec2-34-238-174-240.compute-1.amazonaws.com

IPV4 public ip: 34.238.174.240

Create an Active Directory:

Acive directory is a LDAP(**L**ight weight **D**irectory **A**ccess **P**rotocol) complaint database[4]. It is a server that is used for authentication and access control mechanism. LDAP is used to access the Active Directory.

In AWS console, select Services. Under Services tab, select Directory service. Under the various available options choose **AWS managed Microsoft AD.** Fill all the required details. It will take 20-30 minutes for the AD status to show active.

Directory DNS name

intern.local

Directory NetBIOS name

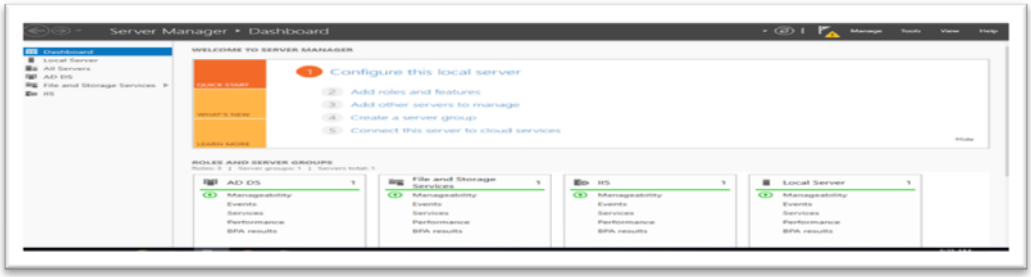
intern

DNS address

172.31.29.203,

172.31.40.233

Now, we have to get connected to the Virtual machine that we have created. Login using Admin credentials. A custom windows desktop page opens when you successfully login. Then go to start, search for Server Manager. You will get a dashboard as shown in the figure below. We have to install Aactive Dirirectory Domomain Servicices (ADcaDS) and InhdIS (Internet Information Services) in the Virtual Machine that we have created. This can be done by configuring the server, with **Add Roles and Features option**. Follow the instructions in the dashboard provided and install both of them in the virtual machine. After successful installation, they have to be listed under the Roles and Server Groups, with green highlighted status.

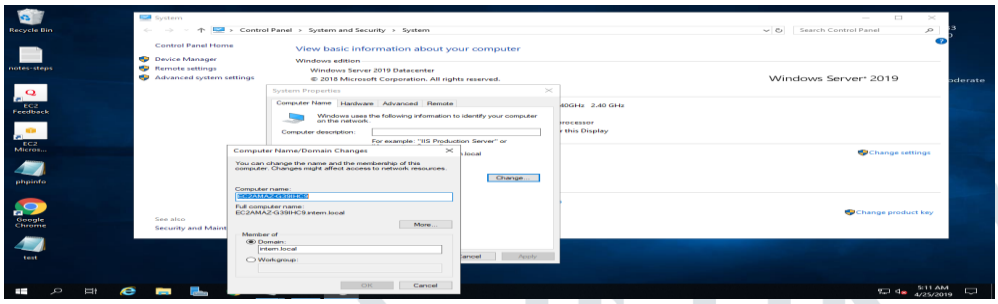


Now, we have successfully completed the installation of Aacctive Dioirectory Dommain Serervices (AaDDS) and InIS (Internet Information Services) in the Virtual Machine that we have created. Next step is to add this virtual machine to the Active directory Domain that we have created in the AWS management console. For that, we have navigate to Control Panel>System

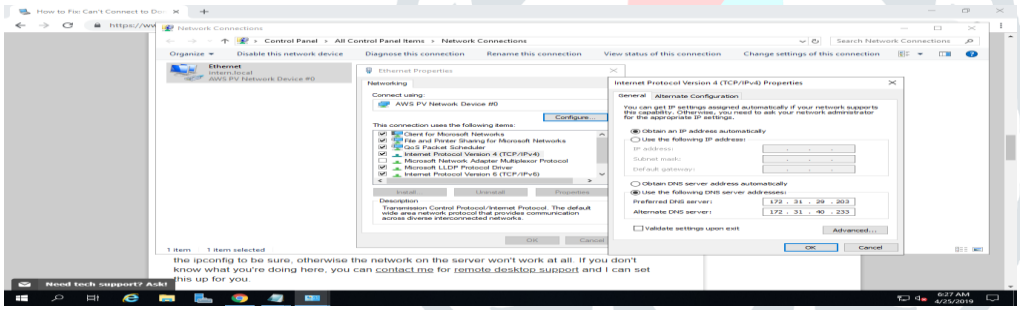
and Security>System. Under that, check the domain name to which the Virtual machine is attached to. To connect EC2 to a directory service, create a Role EC2RoleForSSM. Join the EC2 to a domain.

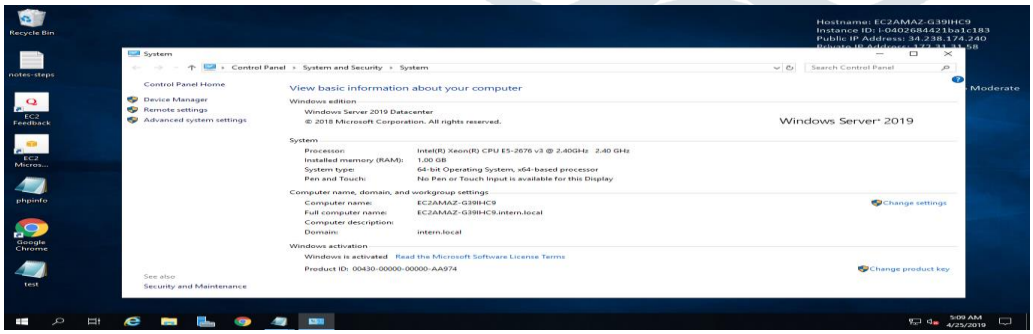
Single sign on implementation is a cloud venture[8] or a project that enables clients and employees of an organization to seamlessly access various applications without re-entering the credentials. A custom login page and landing page are part of this project, where a user is remembered. Single sign on project uses AWS cloud services and OKTA to provide seamless navigation among various websites. Token plays a crucial rule in this project. Single sign on project involves authentication process as well as access control of multiple software systems, that enables a client to get to numerous applications with one lot of login certifications. Cloud services are a new emerging trend in the IT industry and more and more companies are opting to shift their infrastructure on cloud as well as they can utilize various other software services offered by cloud service providers. Cloud services are relatively cheaper than maintaining an on premise infrastructure and provide additional features. The whole project will be deployed in an Amazon EC2 instance.

We have to change the domain by choosing the **Change domain** option. There we have to provide our domain name, which is **intern.local .** Then it will prompt for Admin credentials. Once the machine is connected to the domain, we have to restart the virtual machine and login using active directory credentials. Which means that, now actually we are accessing the domain that we have created.

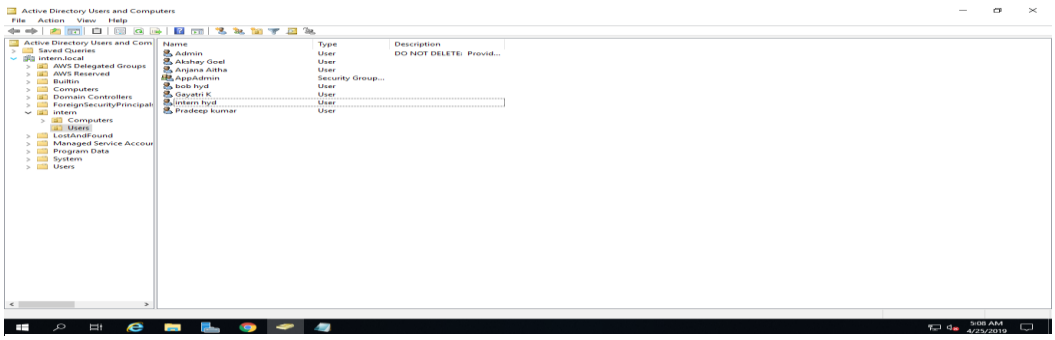


Sometimes, it will show an error while connecting the domain. In that case we have to provide the DNS of the Active directory we have created in the cloud, manually here in the virtual machine that we have created. In the Control Panel select All control Panel mode and choose Network Connections, followed by Ethernet. Select that by right clicking on Ethernet, choose IPV4 properties, There in the box provided, specify the DNS in the two boxes available and then click ok and save.This will fix the error.





Next step is to create Users in the active directory. In the start> search for the Active directory users and computers. There in the dashboard, find the BIOS name here it is intern. Under that folder, select USERS. Right click on it, and choose Add new User. Thus Users can be added in the active directory. The authentication in the project that we have created, will be done against this users in the active directory.



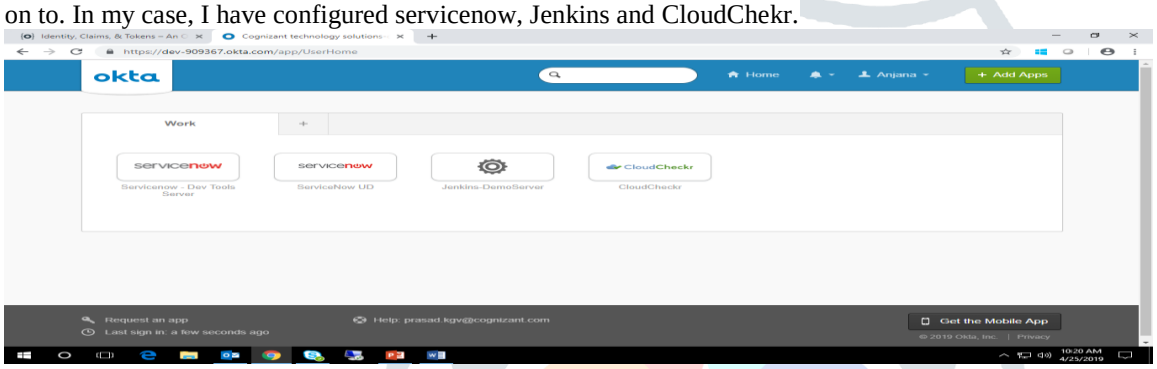
Install PHP in the EC2 machine.. Install PHP using WebPI (Web Platform Installer) PHP manager for IIS.

Installation steps for PHP by using Web Platform Installer

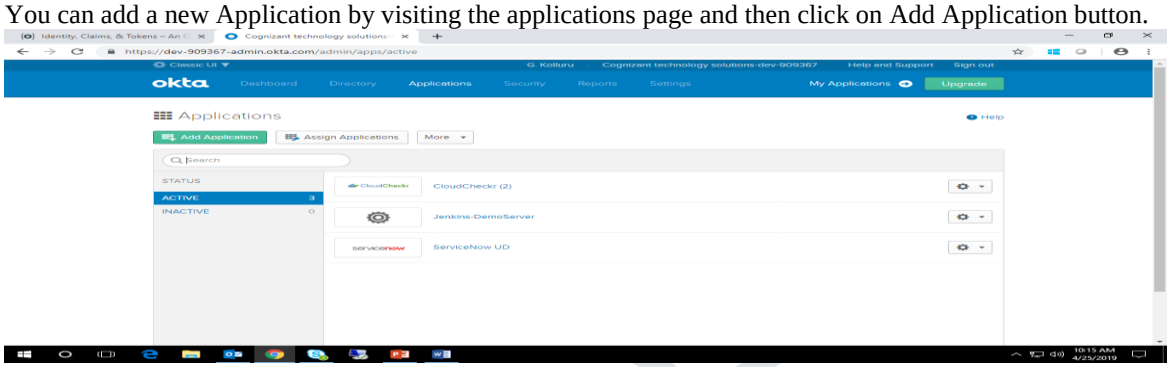
1. Open Microsoft Web Platform Installer 3.0. from a browser window.
2. Click Download option and then select Run.
3. At the right corner of the Web Platform Installer window, navigate to Products.
4. Select Frameworks, and then choose the latest version of PHP.
5. Click Install.
6. Select I Accept. Here, the Web PI installs all the required PHP packages.
7. Click on Finish button.

5.OKTA CONFIGURATION

Sign in to your OKTA account, then configure the dashboard page with various applications that you want to provide single sign on to. In my case, I have configured servicenow, Jenkins and CloudChekr.

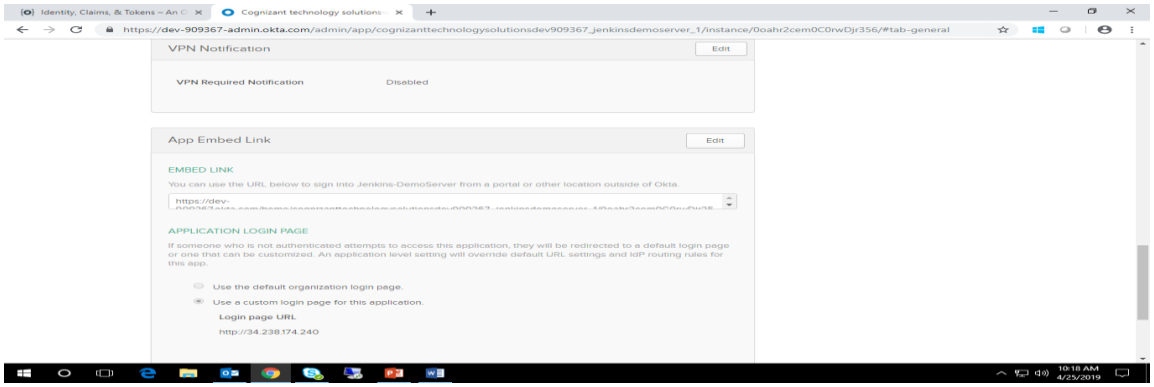


You can add a new Application by visiting the applications page and then click on Add Application button.



For a particular Application, in the security tab, click API and then choose Token. Create a new token and save it somewhere in external location since we use it in the programming part or implementation code that we are going to develop. Single sign on implementation is a cloud venture or a project that enables clients and employees of an organization to seamlessly access various applications without re-entering the credentials. A custom login page and landing page are part of this project, where a user is remembered. Single sign on project uses AWS cloud services and OKTA to provide seamless navigation among various websites. Token plays a crucial rule in this project. Single sign on project involves authentication process as well as access control of multiple software systems, that enables a client to get to numerous applications with one lot of login certifications. Cloud services are a new emerging trend in the IT industry and more and more companies are opting to shift their infrastructure on cloud as well as they can utilize various other software services offered by cloud service providers. Cloud services are relatively cheaper than maintaining an on premise infrastructure and provide additional features. The whole project will be deployed in an Amazon EC2 instance.

OKTA-> Admin-> Applications-> Specific Application- > General -> Embed Link



This application embed link is used along with the token for redirecting from landing page to various applications. Single sign on implementation is a cloud venture or a project that enables clients and employees of an organization to seamlessly access various applications without re-entering the credentials. A custom login page and landing page are part of this project, where a user is remembered. Single sign on project uses AWS cloud services and OKTA[5] to provide seamless navigation among various websites. Token plays a crucial rule in this project. Single sign on project involves authentication process as well as access control of multiple software systems, that enables a client to get to numerous applications with one lot of login certifications. Cloud services are a new emerging trend in the IT industry and more and more companies are opting to shift their infrastructure on cloud as well as they can utilize various other software services offered by cloud service providers. Cloud services are relatively cheaper than maintaining an on premise infrastructure and provide additional features. The whole project will be deployed in an Amazon EC2 instance.

6. Testing

The reason for testing is to find mistakes. Testing is the way toward attempting to find each possible flaw or shortcoming in a work item. It gives an approach to check the usefulness of parts, sub congregations as well as a completed item. It is the way toward practicing programming with the purpose of guaranteeing that the product framework live up to its prerequisites and client desires and does not bomb in an unsuitable way. There are different kinds of tests. Each test type tends to a particular testing necessity.

Utilitarian Testing:

Utilitarian testing is a quality affirmation (QA) process and a kind of discovery testing that puts together its experiments with respect to the particulars of the product segment under test. Capacities are tried by nourishing them input and inspecting the yield, and inward program structure is once in a while considered. Utilitarian testing normally depicts what the framework does. Utilitarian Testing is fixated on the accompanying things:

Substantial Info: Distinguishes classes of legitimate information must be acknowledged

Invalid Information: Distinguished classes of invalid information must be rejected

Capacities: Distinguished capacities must be worked out

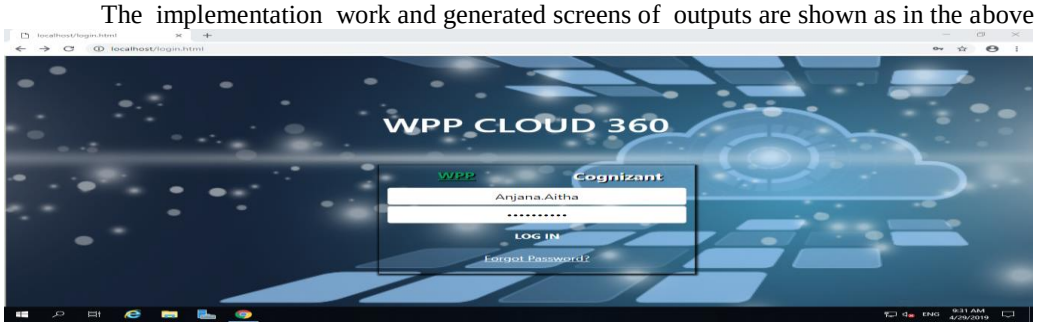
Yield: Distinguished classes of use yield must be worked out.

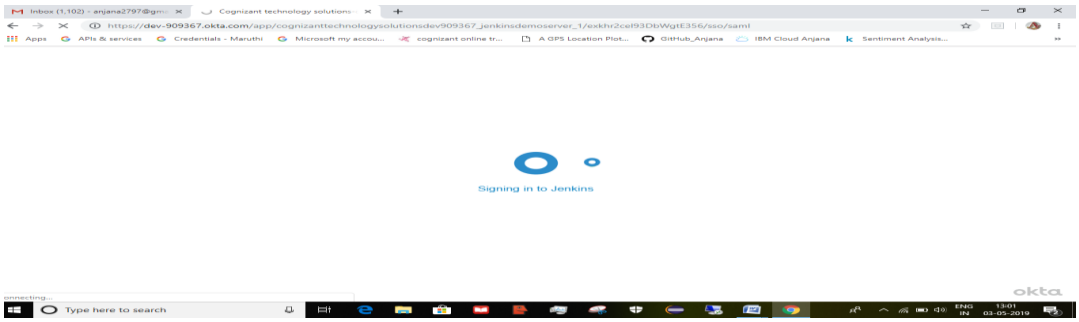
Framework Test

Framework testing guarantees that the whole coordinated programming framework meets prerequisites. It tests a design to guarantee known and predictable outcomes. A case of framework testing is the setup arranged framework incorporation test. Framework testing depends on procedure portrayals and streams, underscoring pre driven procedure connections and coordination focuses.

IV. IMPLEMENTATION RESULTS

The implementation work and generated screens of outputs are shown as in the above and following figures.





V. CONCLUSION AND FUTURE WORK

The single sign on implementation for an organization is a best way to allow users i.e. employees of the company to access various on-premises or any other applications seamlessly without the heck of remembering multiple set of credentials. PHP provides supportive code implementation to connect to Active Directory using LDAP protocol. There is a way in Active Directory to group various users under a single category and provide restrictions or special provisions for a particular group.

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