

**Akhila Nair**

**Cloud Computing – Sec 031**

**#Final Project**

## **MICROSOFT AZURE**

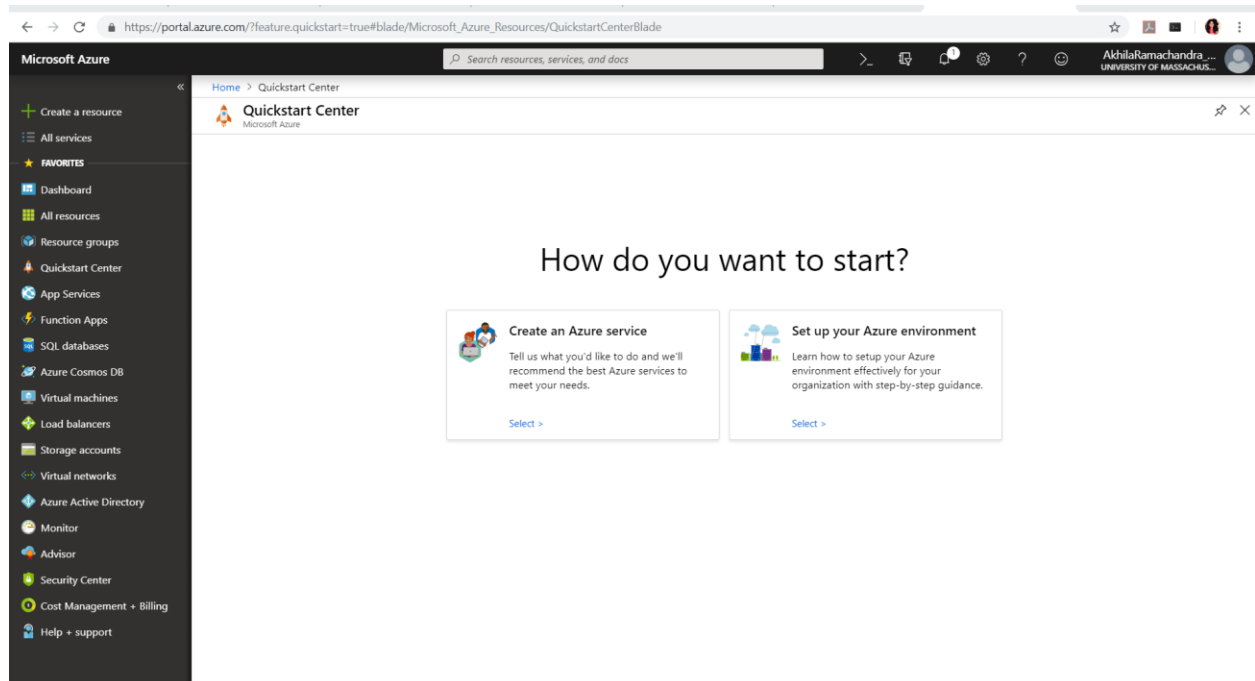
After exploring almost every cloud service, it was now time to dive into Microsoft Azure for the last project. Since Amazon Web Services and Microsoft Azure are one of the major competitors on field, I decided to implement my project in such a way that in the end, I could conclude which is the better option. For this matter, similar to AWS, I am developing a food blogging WordPress site called **foodisbae**. I plan to venture this business in future, so these projects are giving me a head start. Thanks to professor Bob!

### **ABSTRACT:**

Microsoft Azure is two distinct platform; the first is Infrastructure as a service (IaaS) which provides the ability to compute, store, network and backup services to the customers. The second is fully managed platform as a service (PaaS) to deliver and develop solution for application to your customers both in-cloud and mobile. Nowadays, cloud computing is a global phenomenon. Microsoft Azure provides the ability of customers to transition from capital expenditure where they have to pay upfront for the services to an operational model where they can pay as they go. It has open and integrated platforms to be able to develop and provision services and integrate public cloud solution with the existing environment. Microsoft Azure is flexible and hence can build applications using any language, tool or framework. It also has the function to be hybrid that means you have customers that have on premises infrastructure and depending on their requirements they can move their entire infrastructure into Microsoft Azure or they can move pieces of their infrastructure to cloud platform. Microsoft Azure is global infrastructure and has platforms across entire planet. In United States alone, they have five regions i.e. US East, US West, US North, Central and US South.

### **ACCOUNT CREATION AND VALIDATION:**

I read number of papers related to Microsoft Azure. I started with creating an account at Microsoft Azure. The procedure was self-explanatory. I clicked on free trial and filled in my details. After verification, I provided my card details. The free trial provides 200\$ credit. It is better to cancel your subscription after your project is done, to avoid unnecessary transactions to your card. Because Microsoft Azure charges for virtual machines on per month basis. After logging in, I got the Microsoft Azure dashboard which looks like the following:

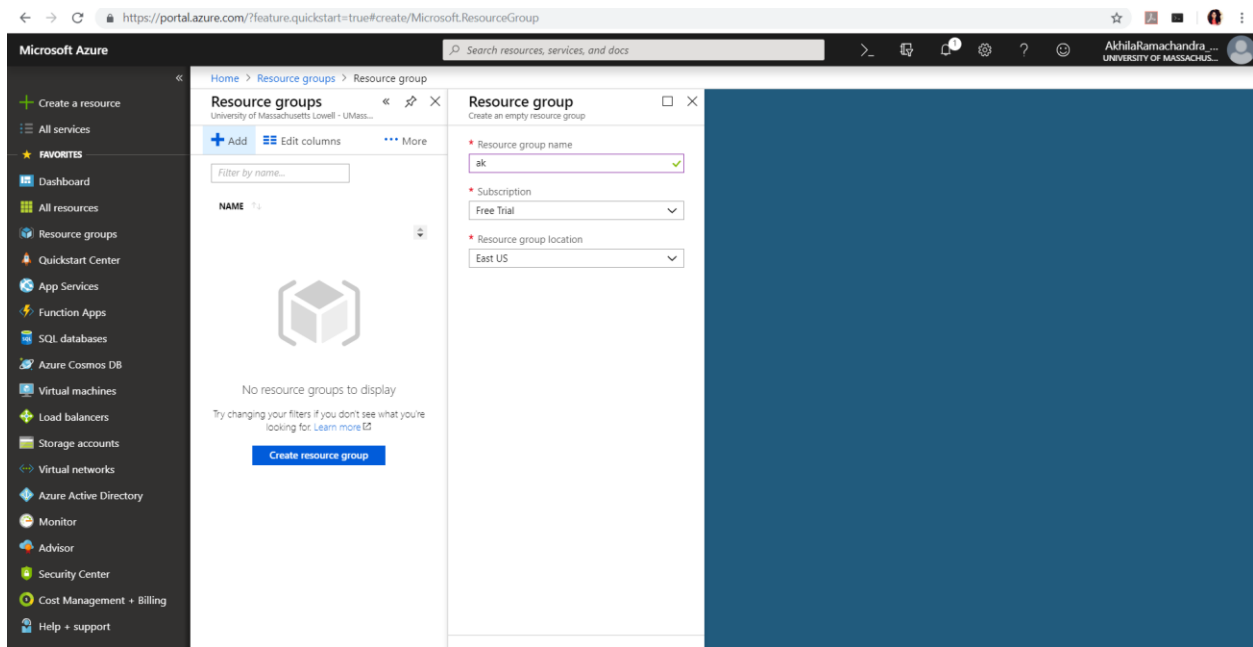


I checked the Azure startup tutorial, from which I got to know about whereabouts of all the services and where it is located. If I compare it with AWS, I feel AWS user interface was much better and well organized.

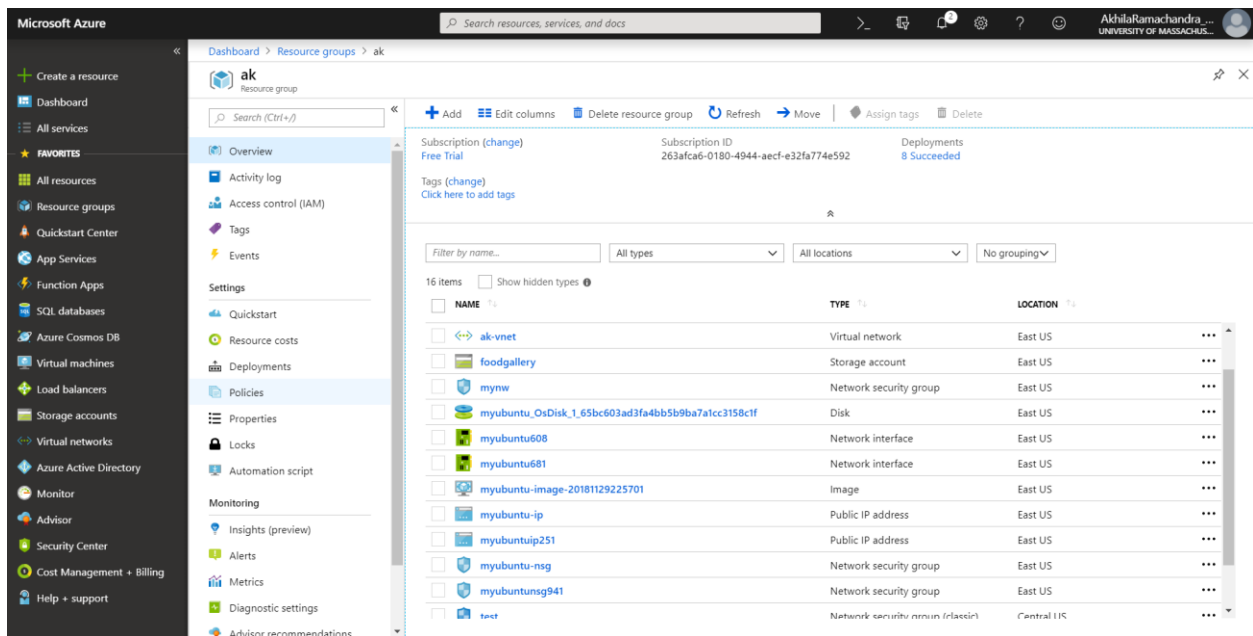
## RESOURCE GROUP:

At first, I didn't understand the concept of resource group and got confused with resources which is also present on the dashboard. After reading number of articles and watching few tutorials, got to know that resource group contains the resource required to successfully deploy the VM. Just like a container it holds related resources of your organization, project or networks for their solution. It is a group containing your storage accounts, virtual networks, virtual machines (VM's) to deploy so that it can be managed as a single entity. So, every time you are creating a virtual machine or a storage account that is linked to your project, it is important that the resource group selected matches the resource group you created for the project or else you will have no links whatsoever.

I decided to create a resource group for this project called "ak". From the menu services on the left, I clicked on resource groups. Here you can see all the resource group if you have created anything before in the list. Click on "add (+)" to create a new resource group and give it a suitable name. Under the subscription tab it automatically came as Free Trial and the last option is to select the region. It is always better to choose the region which is closest to you and where all other resources of your project will reside. I chose "US East" as the region and named the resource group as "ak". One point to note here is resource group cannot end with period and it also should be unique and satisfy naming condition. Click on "create" and under a minute you can see this resource group on the dashboard once you pin it there.



When you add resources, storage disk and virtual machines it should look like the following:



As you can see here, my storage account, VM, virtual network, Public Ip address is all linked to my resource group.

## **VIRTUAL MACHINE:**

Creating virtual machine was one of the requirements for this project. In AWS, I had directly created the instance with the help of service called Cloud formation to further develop a website on wordpress, because creating it manually was proving to be very difficult. It took me three days in AWS to finally come with a solution called cloud-formation. Here, the direct approach is easy, and the manual option is simple as well. Microsoft Azure provides Linux, Windows Server, SAP and IBM VM's for our use. I decided to create a Linux VM same as in AWS.

On the Menu services, click on the Virtual Machine" and then select "add (+)". In the next dialogue box, you have to fill in the details regarding name of VM and disk space require. Under the subscription tab "Free Trial is already mentioned". I then selected resource group as "ak" and named my virtual machine as "myubuntu".

**Region:** East US

**Image:** Ubuntu Server 18.04 LTS

**Size:** DS1\_V2 with 1 CPU and 3.5 GB RAM which costs \$54.31/per month or 0.0730 USD/hr.

The default selected is DS2\_V3 which I felt is not required for the current project.

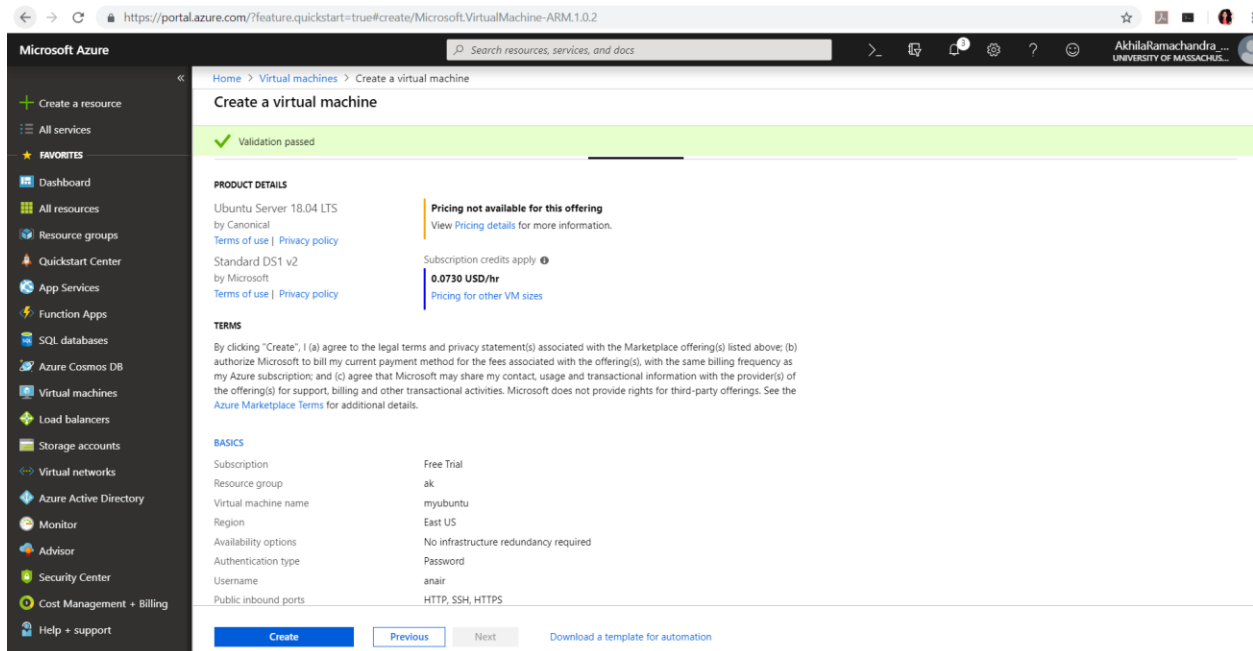
**Authentication Type:** Password (Abcde12345z!)

**User Name:** anair

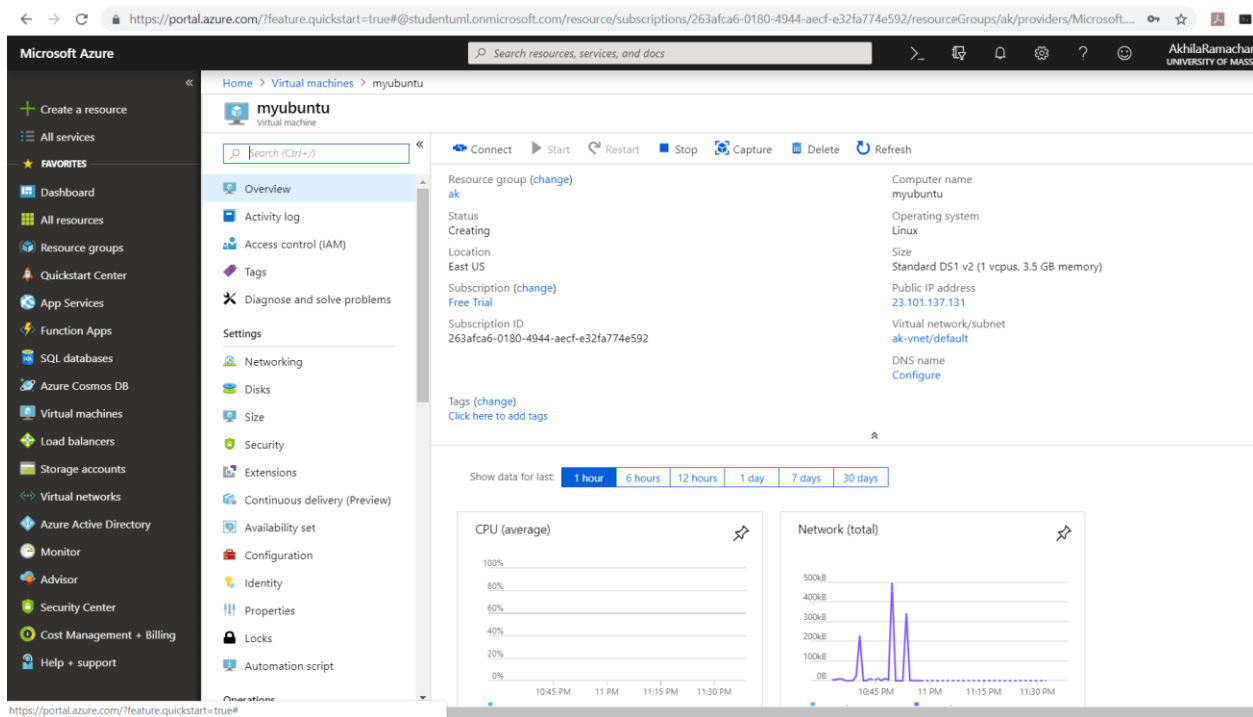
**Inbound Port Rules:** It is important to select "allow selected ports" and choose HTTP (80), HTTPS (443), SSH (22) as inbound rules.

**OS disk type:** Premium SSD. (I tried selecting Standard SSD but it mentioned that I have to use the premium SSD for the selected OS type).

I kept all other options as default and clicked on "review and create".

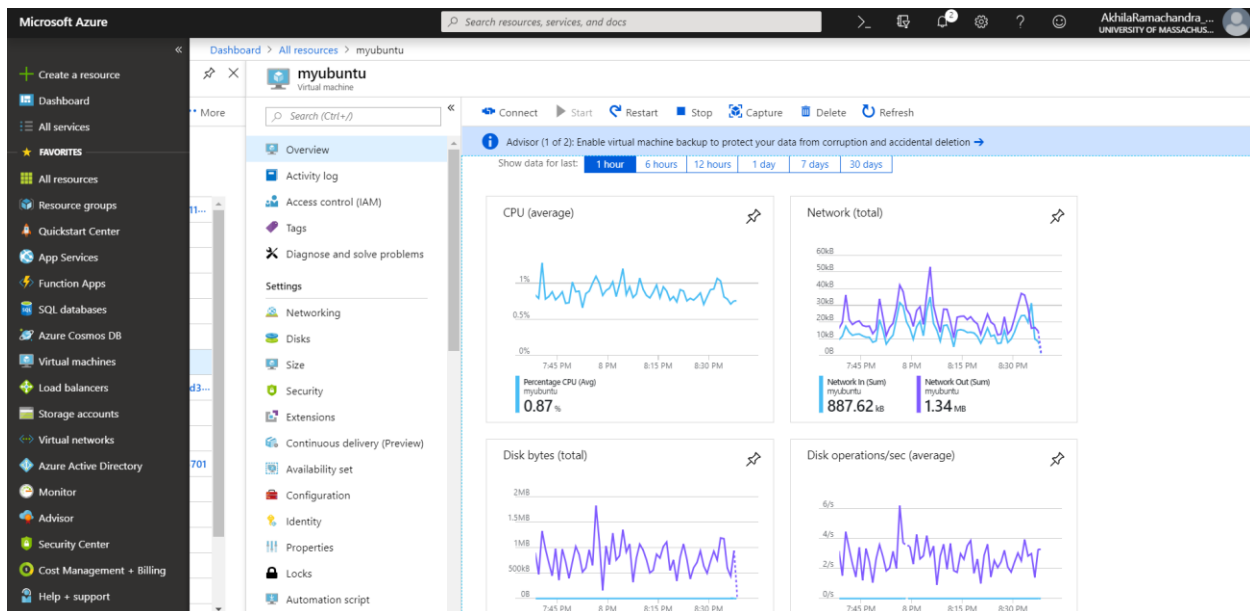


After validation is passed you can click on “create” and after the deployment is ready, your VM will look like following:



As you can see, my public IP address is **23.101.137.131**.

It also shows CPU usage and disk operations. At present my usage groups looks like this:



To SSH into this VM, I clicked on the Azure Cloud shell on the top which is marked with >\_.

```
Bash  [Power Icon] [Help Icon] [Settings Icon] [Copy Icon] [Paste Icon] [Terminal Icon]
Your cloud drive has been created in:

Subscription Id: 263afca6-0180-4944-aecf-e32fa774e592
Resource group: cloud-shell-storage-eastus
Storage account: cs2263afca60180x4944xaec
File share:      cs-akhilaramachandra-nair-student-uml-edu-10033fffa076520b

Initializing your account for Cloud Shell...\
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI 2.0
Type "help" to learn about Cloud Shell

akhilaramachandra_nair@Azure:~$
```

The first step was to open all the ports for web traffic. I used the command:

```
az vm open-port --port 80 --resource-group ak --name myubuntu
```

Then to SSH you will need the public IP address of your VM. If you don't have it one can run the command:

```
az network public-ip list --resource-group myResourceGroup --query [].IpAddress
```

One can also check the IP address in the Azure dashboard under the VM's overview. After getting the IP address, use this information to get into your VM remotely.

```
ssh anair@23.101.137.131
```

```
Bash
akhilaramachandra_nair@Azure:~$ ssh anair@23.101.137.131
The authenticity of host '23.101.137.131 (23.101.137.131)' can't be established.
ECDSA key fingerprint is SHA256://61kIILhDKvUIsTlFbNEuhCvk14nISyE1WDqMEunRM.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '23.101.137.131' (ECDSA) to the list of known hosts.
anair@23.101.137.131's password:
Welcome to Ubuntu 18.04.1 LTS (GNU/Linux 4.15.0-1030-azure x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Fri Nov 30 04:38:23 UTC 2018

System load:  0.08          Processes:      103
Usage of /:   4.0% of 28.9GB Users logged in: 0
Memory usage: 7%           IP address for eth0: 10.0.0.5
Swap usage:  0%

Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud

0 packages can be updated.
0 updates are security updates.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
```

## CREATING WORDPRESS WEBSITE:

**Step 1:** The first step is to update the ubuntu package sources and install Apache, MySQL and PHP, basically LAMP stack, on your VM.

```
sudo apt update && sudo apt install lamp-server^
```

You will be prompted to install the packages and other dependencies. Usually at this stage, when prompted, you have to set a root password for MySQL, but in my case, it never asked me to provide one. This command installs the required PHP extension needed to use PHP with MySQL.

**Step 2:** Check the version of Apache by typing *apache2 -v* and then check the version of MySQL by typing *mysql -V*.

**Step 3:** If everything so far went smoothly, if you now put your public IP address of your VM you will reach the Apache default page. I entered *23.101.137.131* in my url and got the following page:





```
← → ↻ https://portal.azure.com/?feature.quickstart=true#@studentuml.onmicrosoft.com/resource/subscriptions/263afca6-0180-4944-aecf-e32fa774e592/resou
Microsoft Azure Search resources, services, and docs >_
Bash ▾ | 🔌 ? ⚙️ 📄 {} ...

Remove test database and access to it? (Press y/Y for Yes, any other key for No) : y
- Dropping test database...
Success.

- Removing privileges on test database...
Success.

Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.

Reload privilege tables now? (Press y/Y for Yes, any other key for No) : y
Success.

All done!
anair@myubuntu:~$ mysql -u root -p
Enter password:
ERROR 1698 (28000): Access denied for user 'root'@'localhost'
anair@myubuntu:~$ mysql -u root -p
Enter password:
ERROR 1698 (28000): Access denied for user 'root'@'localhost'
anair@myubuntu:~$ sudo mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 16
Server version: 5.7.24-0ubuntu0.18.04.1 (Ubuntu)

Copyright (c) 2000, 2018, Oracle and/or its affiliates. All rights reserved.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> \q
Bye
```

To quit you can type \q and exit from MySQL.

## Step 6: Create php info page

```
sudo sh -c 'echo "<?php phpinfo(); ?>" > /var/www/html/info.php'
```

Now if you refresh the page where you had the apache page earlier you will get the php page.

← → ↻ Not secure | 23.101.137.131/info.php

PHP Version 7.2.10-0ubuntu0.18.04.1



System	Linux myubuntu 4.15.0-1030-azure #31-Ubuntu SMP Tue Oct 30 18:35:53 UTC 2018 x86_64
Build Date	Sep 13 2018 13:45:02
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.2/apache2
Loaded Configuration File	/etc/php/7.2/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.2/apache2/conf.d
Additional .ini files parsed	/etc/php/7.2/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.2/apache2/conf.d/10-opcache.ini, /etc/php/7.2/apache2/conf.d/10-pdo.ini, /etc/php/7.2/apache2/conf.d/20-calendar.ini, /etc/php/7.2/apache2/conf.d/20-type.ini, /etc/php/7.2/apache2/conf.d/20-xml.ini, /etc/php/7.2/apache2/conf.d/20-fileinfo.ini, /etc/php/7.2/apache2/conf.d/20-ftp.ini, /etc/php/7.2/apache2/conf.d/20-gettext.ini, /etc/php/7.2/apache2/conf.d/20-iconv.ini, /etc/php/7.2/apache2/conf.d/20-json.ini, /etc/php/7.2/apache2/conf.d/20-mysql.ini, /etc/php/7.2/apache2/conf.d/20-pdo_mysql.ini, /etc/php/7.2/apache2/conf.d/20-phar.ini, /etc/php/7.2/apache2/conf.d/20-posix.ini, /etc/php/7.2/apache2/conf.d/20-readline.ini, /etc/php/7.2/apache2/conf.d/20-shmop.ini, /etc/php/7.2/apache2/conf.d/20-sockets.ini, /etc/php/7.2/apache2/conf.d/20-sysmsg.ini, /etc/php/7.2/apache2/conf.d/20-syssem.ini, /etc/php/7.2/apache2/conf.d/20-sysvshm.ini, /etc/php/7.2/apache2/conf.d/20-tokenizer.ini
PHP API	20170718
PHP Extension	20170718
Zend Extension	320170718
Zend Extension Build	API320170718.NTS
PHP Extension Build	API20170718.NTS
Debug Build	no
Thread Safety	disabled
Zend Signal Handling	enabled
Zend Memory Manager	enabled
Zend Multibyte Support	disabled
IPv6 Support	enabled
DTrace Support	available, disabled
Registered PHP Streams	https, ftps, compress.zlib, php, file, glob, data, http, ftp, phar
Registered Stream Socket Transports	tcp, udp, unix, udg, ssl, tls, tlsv1.0, tlsv1.1, tlsv1.2
Registered Stream Filters	zlib *, string.rot13, string.toupper, string.tolower, string.strip_tags, convert.*, consumed, dechunk, convert.iconv.*

This program makes use of the Zend Scripting Language Engine

**Step 7:** The next step is to install the WordPress package

```
sudo apt install wordpress
```

**Step 8:** We now have to configure WordPress to use MySQL and PHP. For this purpose must create a text file called wordpress.sql in the working directory.

```
sudo sensible-editor wordpress.sql
```

We now have to add following commands and save it. One has to provide their password and resource group used in their project.

```
CREATE DATABASE ak;  
GRANT SELECT,INSERT,UPDATE,DELETE,CREATE,DROP,ALTER  
ON ak.*  
TO ak@23.101.137.131  
IDENTIFIED BY 'root1234';  
FLUSH PRIVILEGES;
```

**Step 9:** Creating a database

```
cat wordpress.sql | sudo mysql --defaults-extra-  
file=/etc/mysql/debian.cnf
```

It is important to delete the file wordpress.sql because it contains database credentials.

**Step 10:** Configure PHP

```
sudo sensible-editor /etc/wordpress/config-localhost.php
```

Add the following lines and save it.

```
<?php  
define('DB_NAME', 'ak');  
define('DB_USER', 'ak');  
define('DB_PASSWORD', 'root1234');  
define('DB_HOST', '23.101.137.131');  
define('WP_CONTENT_DIR', '/usr/share/wordpress/wp-content');  
?>
```


**Step 11:** You now have to move this installation to web server document root.

```
sudo ln -s /usr/share/wordpress /var/www/html/wordpress
```

```
sudo mv/etc/wordpress/config-localhost.php /etc/wordpress/config-  
default.php
```

Now if I put `23.101.137.131/wordpress` on the URL I get the following:

← → ↻ Not secure | 40.117.154.13/wordpress/wp-admin/install.php ☆



## Welcome

Welcome to the famous five-minute WordPress installation process! Just fill in the information below and you'll be on your way to using the most extendable and powerful personal publishing platform in the world.

### Information needed

Please provide the following information. Don't worry, you can always change these settings later.

**Site Title**

**Username**   
Username can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

**Password**  [Hide](#)  
**Strong**  
**Important:** You will need this password to log in. Please store it in a secure location.


**Your Email**   
Double-check your email address before continuing.

**Search Engine Visibility** ☐ Discourage search engines from indexing this site  
It is up to search engines to honor this request.

[Install WordPress](#)

After putting in the required information I installed WordPress and got to reach WordPress dashboard which look like following:

← → ↻ Not secure | 23.101.137.131/wordpress/wp-admin/ ☆

[foodblog](#) 3 0 + New

Howdy, anair [Screen Options](#) [Help](#)

## Dashboard

[Home](#)  
[Updates 1](#)  
[Posts](#)  
[Media](#)  
[Pages](#)  
[Comments](#)  
[Appearance](#)  
[Plugins 1](#)  
[Users](#)  
[Tools](#)  
[Settings](#)  
[Collapse menu](#)

### Welcome to WordPress!

We've assembled some links to get you started:

**Get Started**  
[Customize Your Site](#)  
or, change your theme completely

**Next Steps**

- [Write your first blog post](#)
- [Add an About page](#)
- [View your site](#)

**More Actions**

- [Manage widgets or menus](#)
- [Turn comments on or off](#)
- [Learn more about getting started](#)

**At a Glance**


- 1 Post
- 1 Page
- 1 Comment

WordPress 4.9.5 running Twenty Seventeen theme.

**Quick Draft**[Save Draft](#)



**Activity**

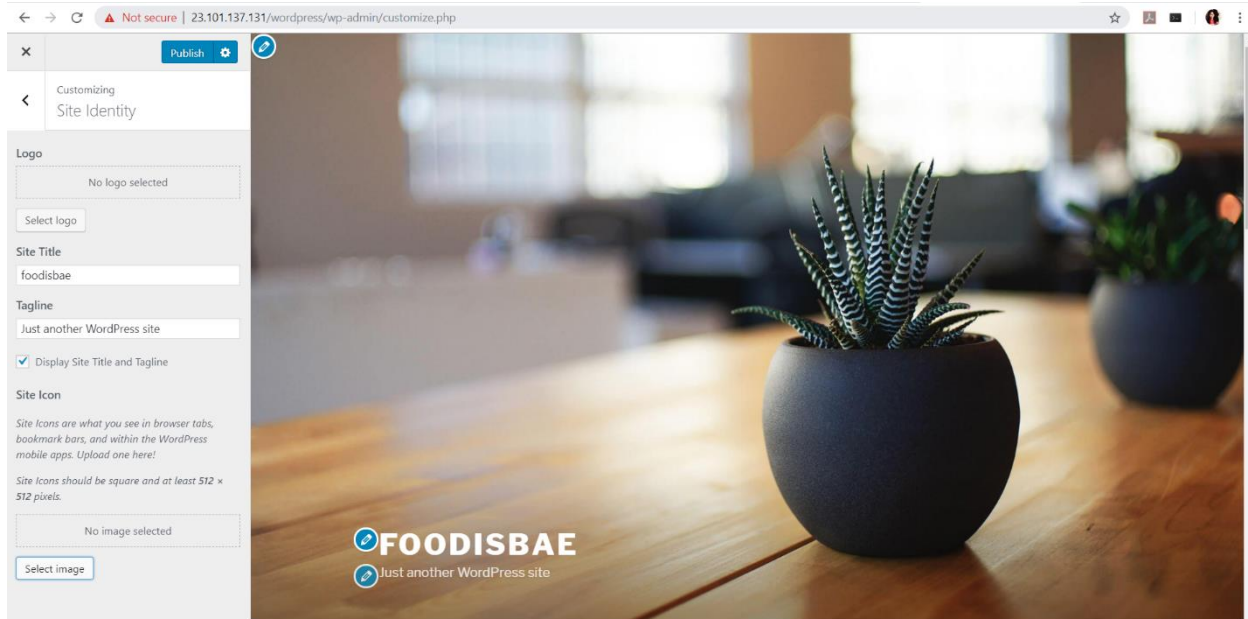
**Recently Published**  
Today, 4:56 am [Hello world!](#)

**Recent Comments**  
 From A WordPress Commenter on Hello world!  
Hi, this is a comment. To get started with moderating, editing, and deleting comments, please visit the Comments screen in...

**WordPress Events and News**

Attend an upcoming event near you.

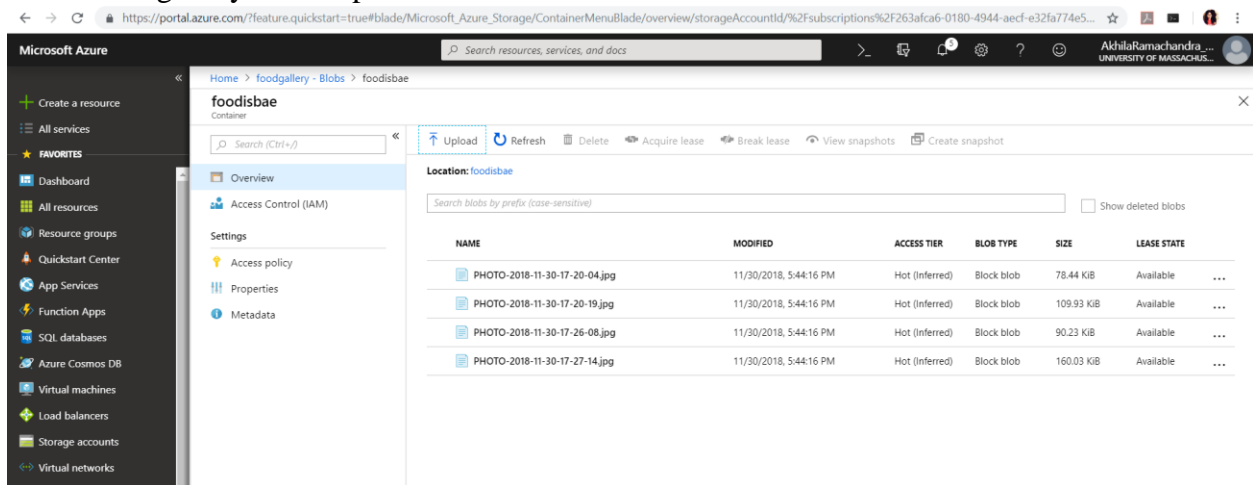
 <b>WordPress Lunch and Learn</b> Jamestown, RI, USA	Thursday, Nov 29, 2018 12:30 pm
 <b>Happiness Bar!</b>	Tuesday, Dec 4, 2018



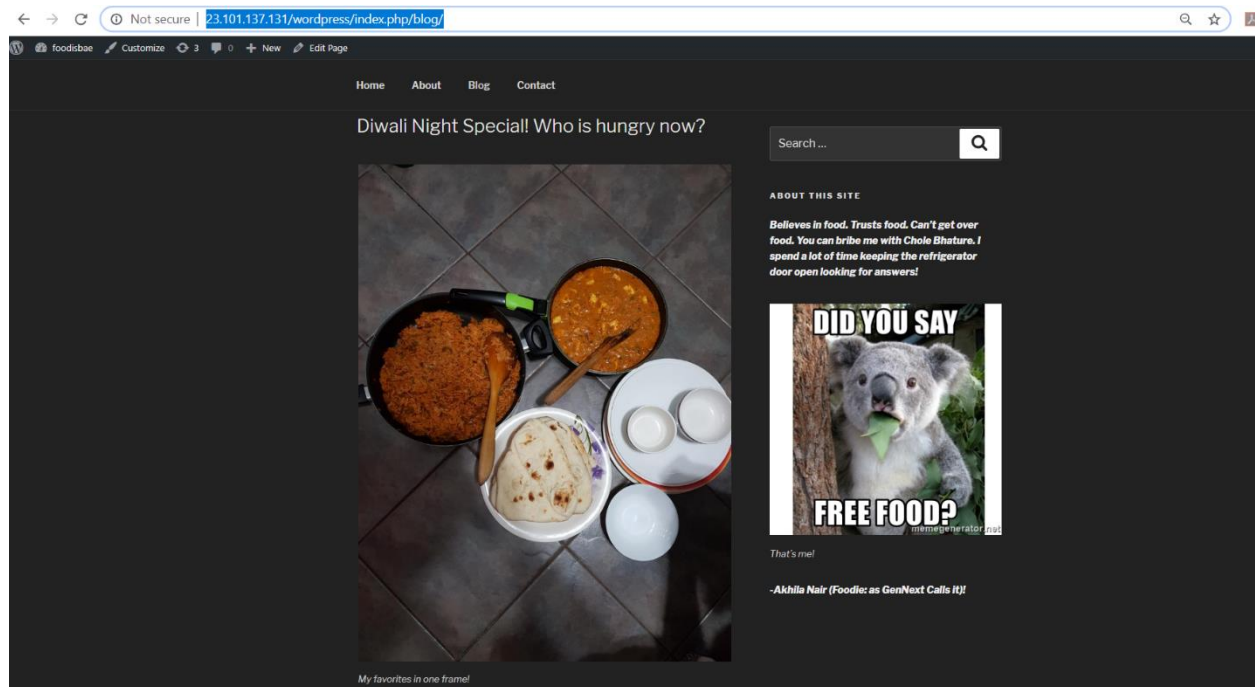
## CREATING STORAGE ACCOUNT:

To further add images on my WordPress website, I decided to create a storage account in Azure and link to my VM so that I can just add the URL of the images. Microsoft Azure allows users to store table, blobs and message queue which can be accessed through HTTP. A copy of the data is kept so that it is durable and available at high speed. This data is retained even in case of hardware failure.

To create a storage account, click on “add (+)” and fill in the basic information. I gave the storage name “foodgallery” and kept all other information as default and created it.



After creating the account under that I clicked on “Blob” and inside that I created a container called “foodisbae” which will act like folder where I can store my pictures for my blogs. I uploaded some pictures here and then copied the URL in the WordPress post creation page. The result is following:



My WordPress blog can be seen at:

<http://23.101.137.131/wordpress/index.php/blog/>

I have uploaded more photos and posted some blogs over there!

Creating storage account in AWS was much simpler according to me. There were no different subfolder or container and it was easier to understand.


## ALERT:

When maintaining dozens, or even hundreds of Azure resources it is crucial to keep track of what is going on and how they behave. To achieve this, Azure provides a set of functionalities and services to help you monitor them. One of those functionalities is the ability to configure Azure Alerts on your assets. By creating an alert you define how and under what circumstances you want to be notified of a specific event, ie. sending an email when DTU capacity is over 90% of your production database.

I clicked on “Monitor” on the left tool bar → Set up Alerts and Action.

I selected my resources as virtual machine and in that I selected myubuntu, so that I could keep a track of my VM. Under the condition tab I selected “whenever the percentage CPU is greater than 0.2% (threshold is set as 0.2%). It showed me a monthly cost of \$0.10. I then created an action group where I specified my email ID where the alert will be sent. After putting in the required information and naming the alert as CPU Alert I clicked on create rule. Within two minutes I got mail stating that my CPU percentage has crossed the threshold value.

← Reply   ← Reply all   → Forward   📁 Archive   🗑 Delete   🚩 Set flag   ...



### 🚨 Your Azure Monitor alert was triggered

Azure monitor alert rule CPU Alert was triggered for myubuntu at December 3, 2018 5:55 UTC.

Rule description	Take a look
Rule ID	/subscriptions/263afca6-0180-4944-aecf-e32fa774e592/resourceGroups/cloud-shell-storage-eastus/providers/microsoft.insights/metricAlerts/CPU%20Alert <a href="#">View Rule &gt;</a>
Resource ID	/subscriptions/263afca6-0180-4944-aecf-e32fa774e592/resourceGroups/cloud-shell-storage-eastus/providers/Microsoft.Compute/virtualMachines/myubuntu <a href="#">View Resource &gt;</a>

Alert Activated Because:

Metric name	Percentage CPU
Metric namespace	virtualMachines/myubuntu
Dimensions	ResourceId = 57ad5765-dd3a-464b-8dd2-e76eeec125aa
Time Aggregation	Minimum
Period	Over the last 5 mins
Value	0.73
Operator	GreaterThan
Threshold	0.2
Criterion Type	StaticThresholdCriterion

## AZURE MARKETPLACE:

I wanted something which keeps a tab on my profile on WordPress such as how many views I acquire, web traffic to my blogs. I searched the Azure Market place and got hold of a service called “Application Insights”. With the help of this service one can monitor website for availability and performance and usage. It is easy to diagnose errors in your application. It provides with server side monitoring as well as client/browser side monitoring capabilities. It can gather telemetry data from the internet connected application.

The only problem I faced was I couldn’t apply this service to my WordPress Blog, because that required ASP.Net SDK and that is chargeable. So, I thought of creating a sample HTML file for this purpose.

On the menu services I clicked on add new resources and under Management tools I searched for Application Insights. I created the service by entering basic information. The name I gave is wordpress\_tracker and Application type as general. I selected the resource group as “use existing” and chose “ak” for the same.

The next step is to create a file called hello\_world.html and write the following script in it:

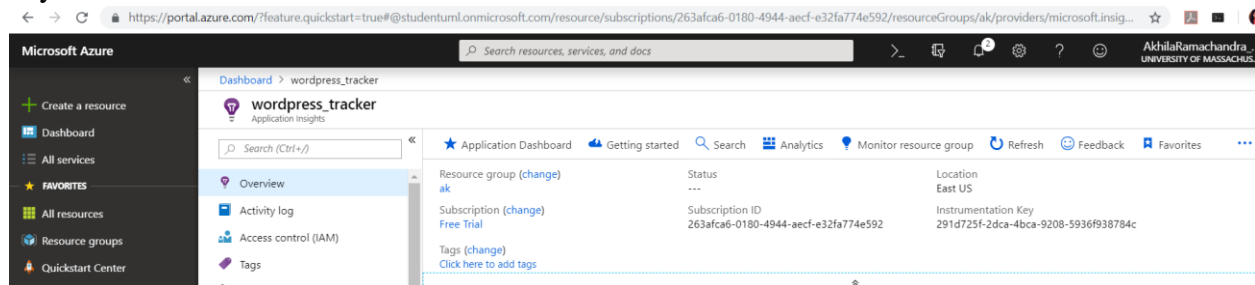
```
<!DOCTYPE html>
<html>
<head>
<title>Azure Monitor Application Insights</title>
```

```

</head>
<body>
<h1>Azure Monitor Application Insights Hello World!</h1>
</body>
</html>

```

I then went to overview of my application insights page and copied my application instrumentation key.



In my HTML file I added the following script file with respective Instrumentation Key I got in the above step and save it.

```

<script type="text/javascript">
    var appInsights=window.appInsights||function(a){
        function
            b(a){c[a]=function(){var
b=arguments;c.queue.push(function(){c[a].apply(c,b)}}}var
c={config:a},d=document,e=window;setTimeout(function(){var
b=d.createElement("script");b.src=a.url||"https://az416426.vo.ms
ecnd.net/scripts/a/ai.0.js",d.getElementsByTagName("script")[0].
parentNode.appendChild(b)});try{c.cookie=d.cookie}catch(a){}c.qu
eue=[];for(var
f=["Event","Exception","Metric","PageView","Trace","Dependency"]
;f.length;)b("track"+f.pop());if(b("setAuthenticatedUserContext"
),b("clearAuthenticatedUserContext"),b("startTrackEvent"),b("sto
pTrackEvent"),b("startTrackPage"),b("stopTrackPage"),b("flush"),
!a.disableExceptionTracking){f="onerror",b("_"+f);var
g=e[f];e[f]=function(a,b,d,e,h){var
i=g&&g(a,b,d,e,h);return!0!==i&&c["_"+f](a,b,d,e,h),i}}return c
}({

instrumentationKey: "291d725f-2dca-4bca-9208-5936f938784c"
});
window.appInsights=appInsights,appInsights.queue&&0===appInsight
s.queue.length&&appInsights.trackPageView();
</script>

```

Now if I open this file in my browser it will create 1-page view. I refreshed it few times to increase the count.

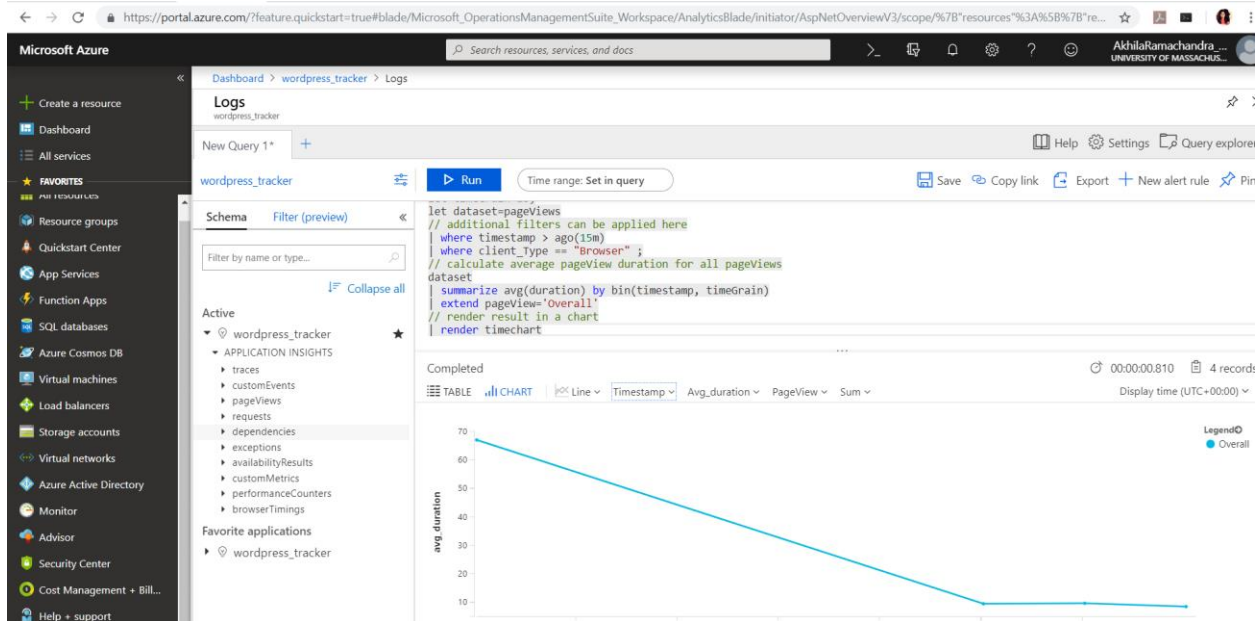


## Azure Monitor Application Insights Hello World!

I Clicked on analytics tab in Application Insights which provides a rich query language for analyzing all data collected by this service. To see the client-side browser requests run the following query:

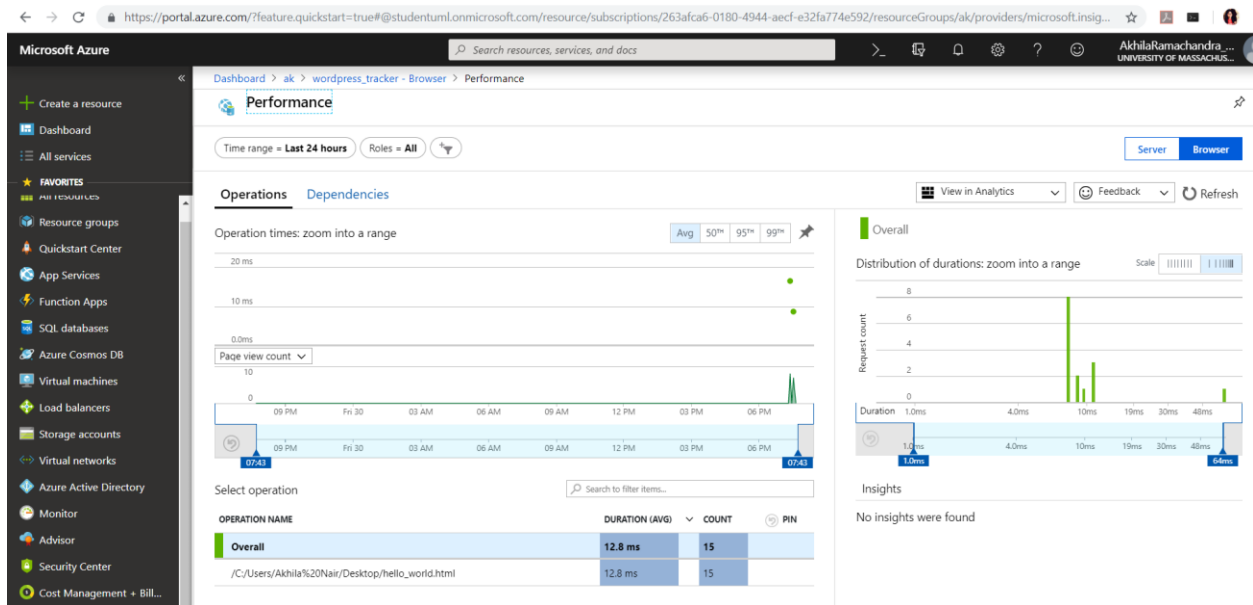
```
// average pageView duration by name
let timeGrain=1s;
let dataset=pageViews
// additional filters can be applied here
| where timestamp > ago(15m)
| where client_Type == "Browser" ;
// calculate average pageView duration for all pageViews
dataset
| summarize avg(duration) by bin(timestamp, timeGrain)
| extend pageView='Overall'
// render result in a chart
| render timechart
```

When I run this query in Kusto I get the following graph:

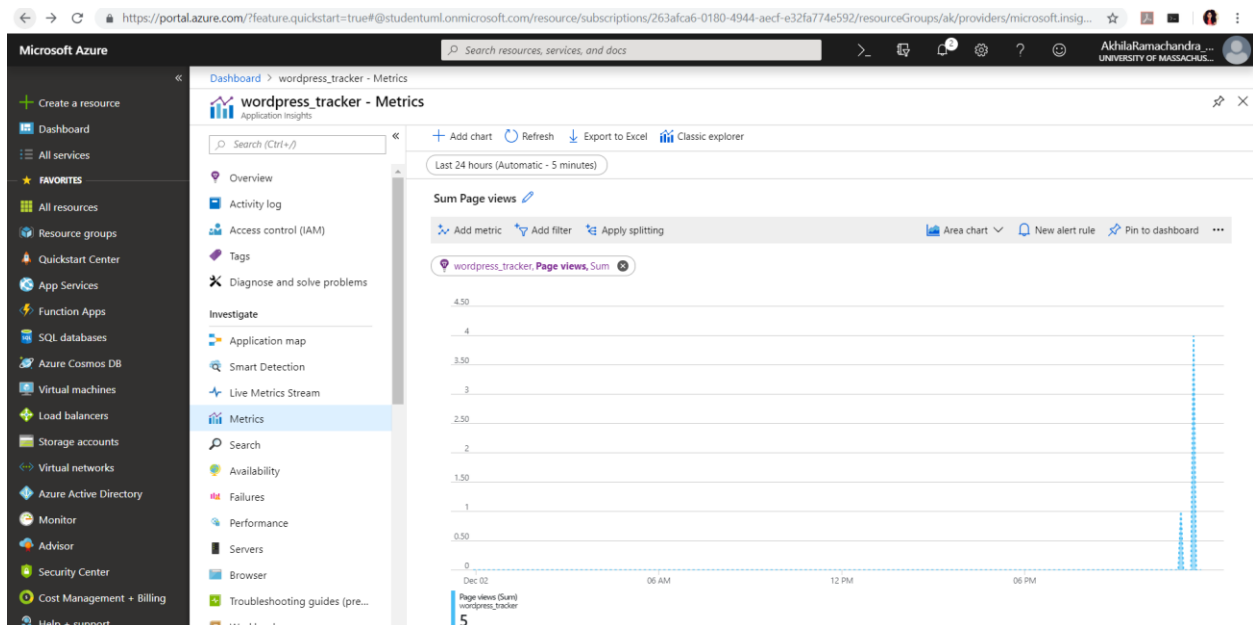


I then went to my application insights service and clicked on performance. The next step is to click on Browser tab under the investigate header to get metrics related to performance of your website and I got the following result:





I then clicked on the metrics tab on the left to get a graphical representation of number of counts.



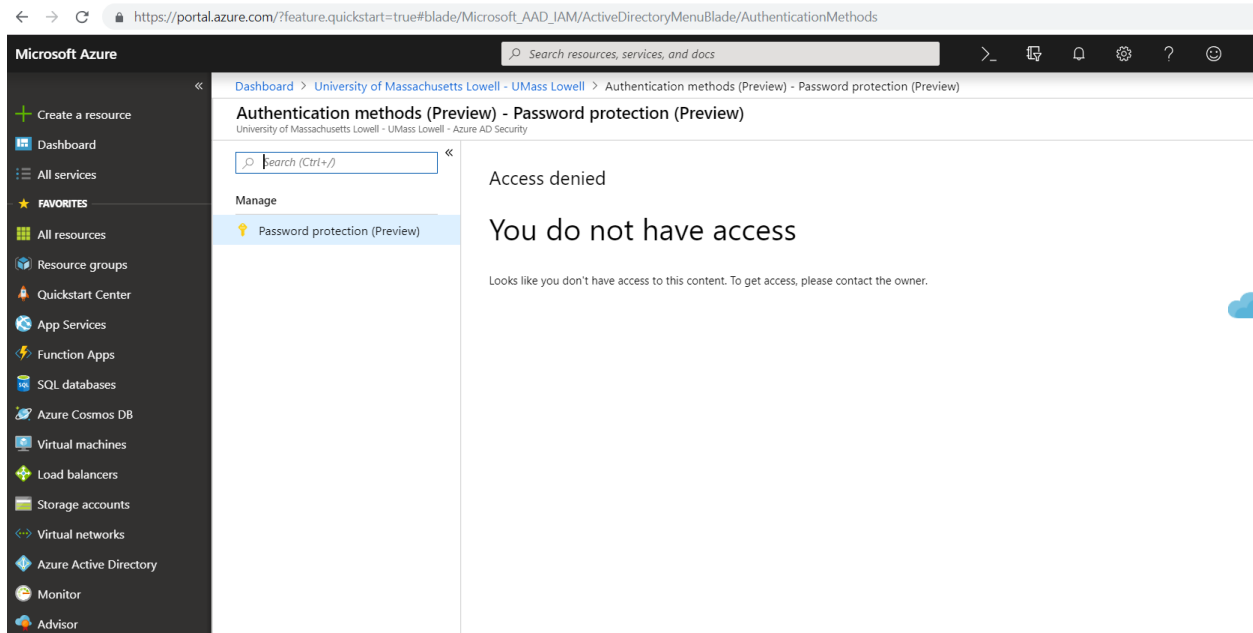
Live Metrics Stream shows you key metrics within seconds. Monitor your app through deployments or critical periods.

It's available if you install version 2.2.0 (or later) of the Application Insights SDK for ASP.NET in your app.

I wish I could implement this service on my WordPress Blog. I read many articles, but it supports only paid version. This service in Azure could have been great if the user interface was easy and easy to implement. I felt this service was unnecessarily complicated with too many options and scattered throughout. It was difficult to actually go through each service and decide which will be necessary.

## MULTIFACTOR AUTHENTICATION:

I clicked on active directory to search for MFA but that was not available. I clicked on authentication methods and it said I don't have access. This is probably because of the trial account. It needed a premium subscription. Implementing this in AWS was easy and available.



## CONCLUSION:

After implementing and working inside out with both leading cloud computing services, I feel amazon web services has far more options and services to choose from. Though Microsoft Azure has some good market place apps, I feel understanding these apps is difficult for a common man. The reason may be, there are less tutorials and documentation for the same. Whereas in Amazon web Services, each service is well documented and easy to understand. Since I had worked on AWS first, Microsoft Azure was bit easy to tackle. I am sure I would have had a difficult time just understanding the concept if I had to work on Microsoft Azure first. Since I plan to start my blog in business, I would hands down go with Amazon web services over Azure. Nevertheless, I enjoyed this exercise as I got to know a lot about azure and how services can be implemented.

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