Frankfurt University of Applied Sciences

High Integrity System

Cloud computing

Covid-19 Clearance Web Services using Microsoft Azure

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Contents

List of Figures

Chapter 1

Introduction

The word ”cloud” refers to the data’s floating nature, which allows it to travel between many physical servers and locations [8]. Cloud Computer (CC) is a technology that allows users to have flexible access to a variety of computing tools and support through the internet. Applications and tools such as servers, databases, data storage facilities, and software are among these resources. It’s known for its quick and smooth resource allocation, minimal operational costs, great flexibility, scalability, and safety. The storage resources are abstracted and virtualized, giving user the benefits of encapsulation of hardware and software parts [3]. The cost of using such services is often proportionate to the amount of time and resources consumed.

Cloud computing is a novel computing model in which dynamically scalable and often virtualized resources are delivered as services through the Internet. Cloud computing has emerged as a key technological trend, with many experts predicting that it would change IT operations and the IT industry. Users can utilize a range of devices, such as PCs, laptops, cellphones, and PDAs, to access programs, storage, and application-development platforms through the Internet via cloud computing services provided by cloud computing providers. Cost reductions, high availability, and simple scalability are all advantages of cloud computing technology [4].

Users may not need to be aware of the system’s specifics. Using the web browser account, they may immediately access the resources in the operator’s cloud. The cost of operating a data center is generally higher than the cost of employing a service that puts multiple data centers at one location at one time [3]. The quantity of storage and workload that a data center can handle is restricted. A cloud system, on the other hand, is extremely expandable to meet the demands of the company based on the use plan chosen. One downside of the cloud is that most of the control is controlled by a third party rather than the firm itself [3].

Furthermore, cloud computing is a concept in which third-party cloud providers supply services such as computer power, software, and storage through the Internet. The well-known cloud providers include Microsoft, Google, Amazon, and others. One of four categories of cloud services is Infrastructure as a Service (IaaS). It provides users with on-demand computation, storage, and network services. The majority of service providers use a pay-as-you-go billing approach. IaaS can able to construct sophisticated cloud architectures without the requirement for a cluster of physical servers. Typical examples include Amazon EC2 (Elastic Cloud Computing) and S3 (Simple Storage Service) [5].

Purposed Work

This project aims to solve current covid-19 clearance problem at shopping centers, barber's shop, airport etc. They all need covid-19 negative report of the person to enter in shop. So, for that we all need to keep covid report with us to get entry. For that we have built a web service where only authorized laboratories can upload Covid result of victim to the server so, shoppers can directly check the covid-19 report by our web service. Also, we have deployed our web service on cloud platform.

In the IT sector, the need to operationalize IT infrastructure in order to scale up and deploy applications and other associated services at rapid speeds has been a driving force. Microsoft Azure DevOps, Amazon web service and cloud computing, as well as other essential Cloud services, are far more effective at resolving issues that often occur from one phase of the Service Life Cycle to the next.

Our team focused on Azure DevOps as the cloud service of our choice. We utilized the feature of Azure DevOps Infrastructure as a Service (IAAS) and the Azure app service, CI/CD pipelines and azure pipelines offered for the deployment component as an application directory. We also used GitHub as our versioning control system, where we customized our web service using the command line feature of Azure Cloud shell; before pushing our various applications to Azure DevOps and loading them into Azure DevOps Repository and Azure Container Registry for further Pre-prod uction.

Finally, we release pipeline to deploy our web application on azure cloud platforms.

Chapter 2

Microsoft Azure

2.1 Overview

There are a number of cloud computing systems available, but Microsoft Azure is one of the most popular. Microsoft Azure is the corporate cloud platform of choice, with 95 percent of Fortune 500 organizations using it [6].

Microsoft Azure, originally known as Windows Azure, is a public cloud services platform that allows customers to create, test, deploy, and manage their applications utilizing Microsoft's cloud-based data centers. These data centers' servers are spread over 140 countries, and the number is rising. Microsoft Azure provides a variety of services in many sectors, including compute, database, content delivery, and networking. This opens up the option of connecting existing IT infrastructure with cloud-based public applications [3]. Users may utilize Microsoft Azure to acquire cloud resources using Microsoft accounts such as Outlook, Hotmail, and others. Virtual machine generations are performed via the management console, with the user having the option of picking the VM of his choice [3].

2.2 Application of Azure Cloud

Azure is a cloud platform that is fast, versatile, and, most crucially for businesses, inexpensive. A few Azure solutions are listed below [6]:

App Development Azure allows users to build almost any type of online application.

App Hosting You may then host the application on Azure when it has been developed.

Software Testing Users may also use Azure to test their applications.

Virtual Machine Creation Azure allows you to add virtual machines to your IT infrastructure.

Virtual Hard Drives Virtual hard drives can help you expand your virtual machine fleet (or cloud-based storage)

Integration and Synchronization Azure allows you to connect cloud-based apps to your current IT infrastructure.

Business Intelligence Azure is a strong business intelligence solution that lets you gather and save critical metrics that track the actions of your application.

These services are also accessible on other cloud platforms, such as Amazon Web Services (AWS). Azure, on the other hand, offers a number of distinguishing features that make Azure architecture training or Azure certification important.

2.3 Microsoft Azure Features

Improved Backup and Disaster Recovery

Flexibility, sophisticated site recovery, and built-in integration are all features of Microsoft Azure. Azure is intrinsically versatile due to its cloud-based structure, allowing you to backup your data in practically any programming language, operating system, or location. Azure also lets you plan backups for daily, weekly, monthly, or any other interval you choose [6].

Microsoft Azure's site recovery capabilities, on the other hand, may help you get the most out of your tape backup systems by offering remote replication and decades-long data retention with low onsite maintenance and operating costs. Azure also keeps three copies of your data in three separate data centers, as well as three copies in a distant data center.

Develop and Host Web/Mobile Apps Azure is a great place to build, host, and administer online and mobile apps because it has capabilities like automated patch management, AutoScale, and integration for on-premise systems that make them self-contained and adaptable.

Automatic patch management on your virtual machines saves you time maintaining your infrastructure and allows you to focus on enhancing your app's key features. Meanwhile, AutoScale, an Azure Web Apps feature, changes your resource threshold automatically based on user activity, saving you money outside of peak hours. Finally, Azure connects your online apps to on-premise programs, giving your stakeholders access to resources behind your firewall [6].

Integration with Active Directory Microsoft Azure can work with your Active Directory to extend your access and identity management capabilities. It also improves the security, global reach, and centralized control of your DNS.

Azure's ability to expand your Active Directory environment's reach internationally while keeping direct management is one of its distinguishing features. No other cloud platform can extend the scope of your domain controller and bring Active Directory management under one roof [6].

If you have numerous sites or utilize cloud programs like Office 365, Azure's Active Directory integration provides you a single solution for managing and maintaining access to your tools.

2.4 Architecture of Azure Cloud

Three distinct cloud services: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS) are defined by the National Institute of Standards and Technology (NIST) [7]. Figure 2.1 depicts the architecture of cloud computing.

Iaas: Infrastructure-as-a-Service

Infrastructure as a Service (IaaS)—provides a backbone for enterprises to rent services from companies like Google, Amazon, and Microsoft. A firm may opt to employ external infrastructure or host their own cloud platform, regardless of the various service types. The cloud service must not share its resources with any other organization in order to be termed a private cloud. A public cloud, on the other hand, is used by many clients, and it is where a cloud provider offers its cloud services. Public clouds utilize SaaS, PaaS, and IaaS services, according to cloud service paradigms. Customers may then use the public cloud to access the services they are paying for or renting through the Internet, which are hosted on remote servers that the supplier manages. In contrast to a private cloud, a public cloud will share its services with multiple clients, but each customer's data and applications will be kept private and inaccessible to other customers using the services [8].

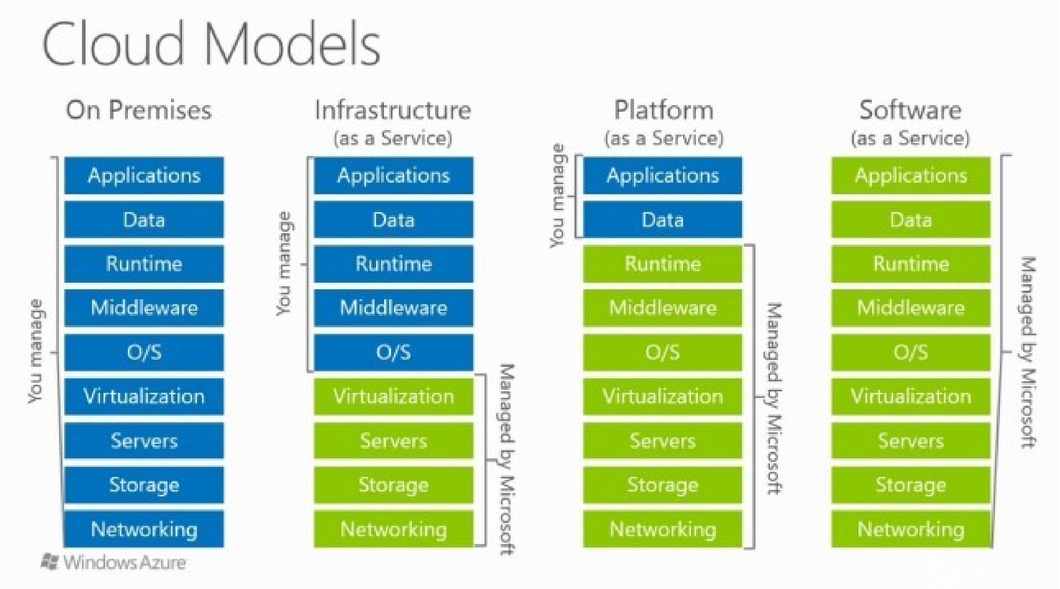


Figure 2.1: Architecture of cloud computing [1]

IaaS is a service that allows a company to outsource its infrastructure in order to support other activities such as network components, storage, and hardware. The user is responsible for paying for the service as he uses it. Virtual computers, network load balancers, firewalls, storage, and other resources are provided by cloud providers. These resources can be hired on demand, but because they are all handled by third-party suppliers, the safety and security of our apps cannot be guaranteed [9].

Paas: Platform-as-a-Service

Platform as a Service (PaaS)—the vendor offers higher-level application services that allow the company to build its own bespoke apps. In this manner, the company will prosper and can freely configure and deploy its application, while the provider retains control of its hardware and resources. Users can hire virtualized servers and a few services to utilize in their existing applications as well as for new ones. It is a delivery paradigm that enables customers to build, test, and utilize new applications in a low-cost environment while still allowing for application scalability [9].

Saas: Software-as-a-Service

Software as a Service (SaaS) refers to programs that organizations subscribe to and utilize to operate on cloud infrastructure through the Internet. Users can access cloud-based apps through the internet via SaaS. It's a software distribution approach that relies on the availability of cloud service provider-hosted apps. Its most essential feature is the system's efficiency when the workload is divided over several virtual machines. It's a software delivery paradigm for on-demand computing [9]. This method saves installation and maintenance costs, optimizes the use of physical resources, and eliminates the need for license fees, among other things. The following are the two sorts of models that can be delivered: The service-on-demand: This approach entails granting consumers network-based access to applications that are only available for SaaS distribution. Hosted application management: Just like an application service provider, a cloud service provider may host an application and make it available to customers through the internet.

Chapter 3

DevOps

The term DevOps was coined by Andrew Clay Shafer and Patrick Debois in 2008, and the idea gained traction with the inaugural DevOpsDays event in Belgium in 2009. DevOps is a fresh and creative approach to developing and delivering high-quality software. Because DevOps is about removing silos and integrating development and operations activities together, the word combines the final parts of software development and technology operations.

Since its inception more than a decade ago, DevOps has gone a long way. Systems administrators sought to keep up with increasingly productive Agile product development teams that were producing higher-quality software more often. Teams were improving at delivering software, but bottlenecks remained in other parts of the value stream, such as up-front planning and the deployment and administration of live systems. These constraints generated tension between development and operations teams back then, and they still do for many businesses today.

In other words, DevOps is a method of bridging the gap between the development and operations teams. DevOps emphasizes rapid delivery, continuous testing, and constant customer input, as well as the ability to react to changes more quickly [10]. It facilitates improved communication and collaboration between the two teams, resulting in faster and more effective application development and the deployment of new features to consumers.

3.1 Principles of DevOps

Customer-centric actions: A key objective of DevOps is customer satisfaction and the faster delivery of value [10], which helps to break down communication and cooperation barriers between development and IT operations teams.

End to End Responsibility: In a DevOps environment teams are vertically organised such that IT products or services created and delivered by these teams remain under the responsibility of these groups [10]. The teams also provide performance support.

Continuous improvement: Organizations need to adapt continuously according to customer needs and new technologies. A strong focus is put on continuous improvement, ease of delivery and to improve the product services offered [10].

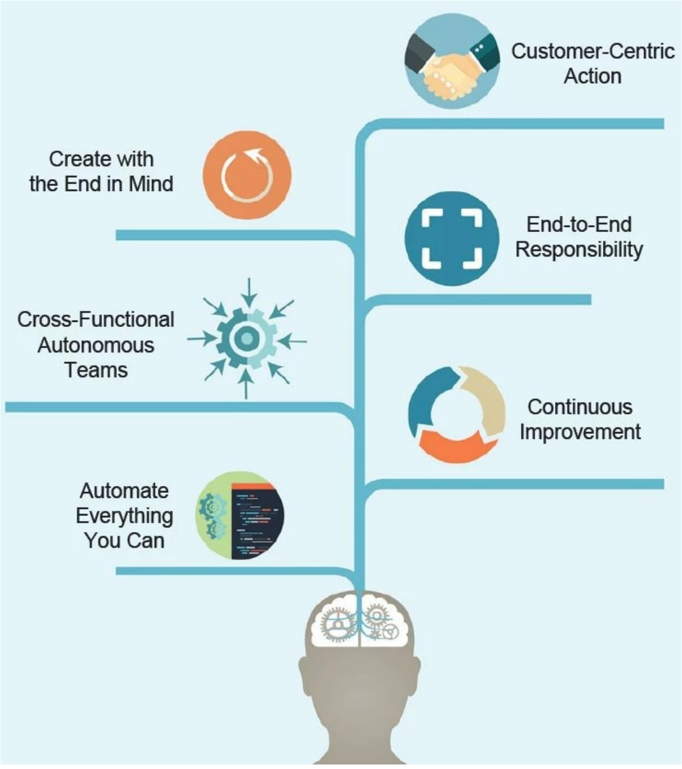

Customer-Centric Action
Create with the End in Mind
End-to-End Responsibility
Cross-Functional Autonomous Teams
Continuous Improvement
Automate Everything You Can

Figure 3.1: Principal of DevOps [2]

Create with the End in mind: The practice of DevOps encourages smoother communication, collaboration, integration and transparency between application development teams (Dev) and their IT operations team (Ops) counterparts which avoids the imbalance of tasks. [10]

Cross functional autonomous teams: The teams need to be entirely autonomous through- out the lifecycle which requires a balanced set of skills [10].

Automate everything you can: Write code that allows us to create the same environment anywhere for anyone [10].

3.2 DevOps Strategy

To operate and maintain our application, we employ a technological stack and tooling which is shown in Figure 3.2. Our DevOps deployment method is built around six key components:

Speed: We enable quicker innovation and execution with our DevOps methodology, which is critical for customer happiness and staying ahead of the competition.

Rapid Delivery: Our DevOps approach uses Continuous Integration to allow for frequent delivery cycles (which might be tiny updates) and a quick recovery time (in the event of a failure), allowing for more and quicker innovation.

Reliability: We assure functional, safe, and quality output using DevOps continuous integration and delivery processes, resulting in a pleasant end-user experience. Overall, our DevOps program assures developer productivity and operations dependability.

Rapid Delivery
Speed
Reliability
Security
Scale
Improved Collaboration

Figure 3.2: Devops strategy [1]

Scale: Our Infrastructure as a Code methodology aids in the effective administration of all phases of the software product lifecycle (development, testing and production).

Improved Collaboration: DevOps is based on a cultural concept that emphasizes development and operations working together in a collaborative setting, reducing numerous iterations, inefficiencies, and time complexity.

Security: Configuration management approaches and automatic compliance standards are used in our DevOps methodology to accomplish this factor. We also work on DevSecOps, a new integration that addresses the security problems that come with DevOps adoption.

3.3 DevOps Implementation

Continuous planning This is the first step in implementing DevOps. It entails comprehending the project's vision. During this period, no DevOps tools are utilized, although several versions are employed. The code is maintained using control tools. All developers, members of the operational team, and testers gather to discuss requirements and work toward a shared approach. During this phase, a stable version of the application code is created [11].

Continuous Integration This is the most important aspect of the DevOps Lifecycle. Because the most current changes must be reflected to end users, code updates must be continually merged. Issues and problems will be discovered early in the DevOps lifecycle since even the simplest modifications will result in integration. Various software development tasks, such as peer code review, testing, and packaging, are all integrated with the code of the updated feature, according to the flow [11].

Continuous testing During this stage, the program is continually checked for flaws. Instead of performing it manually, automated testing technologies like as JUnit, Selenium, and TestNG are utilized, which saves a lot of time and work. Docker containers are used to mimic a test environment. Continuous testing aids in the assessment of the testing process. It's also simple to decipher the failed test cases. After completing User Acceptance Testing [11], the test suite becomes simpler and bug-free.

Continuous Feedback It aids in the analysis of data from continuous testing and continuous integration phases, which aids in the overall development of the application. Customers can report their experiences after testing, which aids in the application's progress. Developers evaluate the input and begin incorporating new changes [11].

Continuous Monitoring During this phase, all aspects of the DevOps lifecycle are closely monitored. DevOps is a development and operations methodology. Developers maintain track of how the program is used, and this data may be analyzed in real time to monitor each function, allowing distinct issue areas to be identified. Typically, errors such as Server not found, or memory problems are rectified during this stage. This step also detects and resolves security problems. Continuous monitoring guarantees that services are available at all times [11].

Continuous Deployment In this step, the application is deployed to the server. This phase runs along with the phase of continuous monitoring. The objective is to keep this stage of the life cycle active. Configuration management technologies like as Puppet, chef, and Ansible are used to do this. Containerization technologies, such as Vagrant and Docker, assist to establish uniformity across development projects. These tools aid in the reduction of system faults, allowing the program to function on a variety of platforms [11].

Continuous Operations This is the final stage of the development process, and it automates the process of releasing the app and subsequent updates [11].

Chapter 4

Services of Azure DevOps

4.1 Azure Repos

Azure Repos is a version control service that you may use to keep track of the code in your project. It is simple to use and has an endless number of private git repositories. This makes keeping track of changes and creating new versions of the project code more easy. Every time the implementation is updated, this version control takes a snapshot of the files and saves it permanently so we may examine it later if necessary. It helps you to keep your work safe and maintain code coordination consistency among teams. It aids the rollback option to return to any earlier version of your implementation [12] by preserving the history of development when issues are resolved and new features are added. Azure Repos supports both Team Foundation Version Control (TFVC), which is a centralized version control, and Git, which is a distributed version control.

Git : This is a normal Azure Repos Git Repository. You may use any client or tool you choose, including Git for Windows and Mac, Visual Studio, and Visual Studio Code. Connect to any of the programming environments IntelliJ, Visual Studio, or Command Line. Pull requests may be used to examine the code, forks can be used to separate the code, and so on [12].

TFVC: TVFC is a centralized version control system. On their workstations, each team member will have one copy of each code file, and the server will maintain track of all previous data. There are two types of workflows to choose from:

Server workspaces - Team members must first check out the files before making any changes. Several files per branch and huge binary files can be utilized to scale up to large code bases [12].

Local workspaces - Everyone in the team keeps a local copy of the most recent version of the codebase to work offline. After that, the developers commit the changes and, if required, resolve any disagreements [12].

It's possible to use both TFVC repos and Git in the same project, making it easier to integrate TFVC later if centralized version control is needed [12].

4.2 Azure Artifacts

Teams may publish packages to Artifacts feeds and registries like npmjs.com and NuGet.org using Azure Artifacts. It's a pre-installed add-on for Microsoft's Azure DevOps services. Packages are provided, build artifacts are published, and the application is tested and deployed using Azure artifacts and Azure pipelines [13].

Azure Artifacts is a service that lets teams manage their dependencies by utilizing feeds and upstream sources. Using Azure artifacts, we can create project- and organization-specific feeds [13]. Public fields that can only be created within public projects are known as project scoped fields. Azure Pipelines may be used to publish and consume various types of artifacts as part of our "Covid Clearence Web Service using Microsoft Azure" workflow. Development tools such as Python,.NET, Maven, and Node.js/JavaScript have their own set of artifacts. Other types of artifacts, such as pipeline artifacts and Universal Packages, store files in a more generic way. In our project, we used Python to develop web applications [13]. At any stage during the pipeline, artifacts can be made public. You may use YAML or the standard Azure DevOps editor to publish your packages.

4.3 Azure Pipeline

Azure pipeline automates the creation and testing of code projects before making them publicly available. Azure pipelines combine continuous integration (CI) with continuous delivery (CD) to meet the goal of doing consistent testing and developing code and sending it to any target. This combination helps to guarantee that consumers have access to consistent and high-quality code [14].

We have chosen Azure Pipelines for its robust support in below scenarios [14]:

Facilitates builds on Windows, Linux or mac.

GitHub integration

Open-source projects supported.

Supports numerous platform and language.

At a time, deployment possible to multiple targets.

Azure deployment integration

Azure Pipelines are known as cloud-native build server for Azure. Azure Pipelines have following key points [14]:

Cloud native: Unlike third-part build server azure pipelines being cloud native makes numerous capabilities.

YAML based: It is completely YAML based like all the latest build servers. YAML being the subset of JSON, provides and supports a rich set of tools.

Templates: Templates like Linux web apps, python packages, .NET applications, etc are available for Azure Pipelines. This facilitates you for a rapid deploying of a variety of resources

Trigger notifies a Pipeline to run. A pipeline can include one or more phases and can be deployed to many environments. A stage, which can include one or several occupations [14], represents the way jobs are structured. A job can either be agentless or require one agent for each. Each agent is in charge of multiple-step jobs. A script or job is provided as a pipeline building block. Task may be further defined as a bundled script that is designed to accomplish a certain activity, such as producing a build artifact in our example. A run's artifact might be a series of packages or a collection of files.

4.4 Create Build Pipeline

Continuous delivery: Building the code, testing it, and deploying it to various test and production servers are all part of the process. When an application is deployed and evaluated in phases, it helps to improve its quality. The continuous integration process produces deployable artifacts like as infrastructure and apps. Automated release pipelines use these assets to distribute new versions and updates to existing systems. The monitoring and alerting systems are maintained running constantly to maintain visibility into the whole CD process, ensuring that problems are discovered more frequently and at an earlier stage [14].

Continuous integration: The development teams have used the continuous integration approach to make testing and developing code easier. Bugs or issues are discovered early in the development process and may be readily rectified. Automated tests and builds are part of the CI process and are maintained running indefinitely. The procedure can run on a specified schedule whenever code is pushed. Continuous integration systems generate the artifacts that are needed by continuous delivery release pipelines to automate deployments [14].

Deployment group : A deployment group is a collection of target computers that have agents deployed on them. It's also known as an agent pool. A deployment target can be established for a specific task in a single pipeline using a deployment group [14].

Agent : At the very least, a single agent is required for the development or deployment of code, with the number of agents increasing over time dependent on the code. When a pipeline runs, the system starts one or more jobs. As a result, the agent may be described as an infrastructure that computes with pre-installed agent software that simultaneously executes jobs. Jobs can be run directly in the container or on the host computer of the agent [14].

Microsoft-hosted agents

One of the convenient option for running job in azure pipelines is by using Microsoft hosted agent, where update and maintenance is taken care from service provider. A

new Virtual Machine(VM) is allocated each time a job is run in pipeline, same is discarded once the execution is completed. A job can be run directly in VM or in container [14]. A default agent pool with the name Azure pipelines is present with Microsoft hosted agents[12] .

Self-hosted agents

A self-hosted agent is the one which we set up and manage for running jobs. A self-hosted agent or Team Foundation Server (TFS) either one can be used. A flexible control to install required dependent soft wares for the build and deployment is provided by self-hosted agents [15]. added advantage of configuration and machines cache which is persistent with each run, helps to speedup execution. An agent can be installed on Windows machine/ Linux / macOS or a docker container. For process of installation reference documentation can be referred [14].

Parallel jobs

A set of jobs is defined whenever a pipeline is defined. Thus we can run multiple jobs when we run pipeline where each of the running job uses a parallel job which is running on a single agent. The jobs may get queued up as well and run sequentially if the parallel jobs are exhausted [15]. Azure pipelines provides infrastructure which is either Microsoft-hosted or self-hosted. In your organization on azure DevOps portal every parallel job facilitates you to run single job at a time. Using on premise sever will not charge for parallel jobs. Parallel jobs applies to Azure DevOps Services only.

Microsoft-hosted: If you want to use machines which is managed by Microsoft for running jobs then this option can be preferred.Thus the jobs will be running on Microsoft-hosted agents which has added advantage of maintenance and upgrades

is not a over head for us and is taken care by Microsoft [14]. For our project we have preferred the option of Microsoft-hosted parallel jobs .

Self-hosted parallel jobs: This is alternative for adapting the build and releases by using own machines with self-hosted parallel jobs. Thus the deployment will be on self hosted agent. However there is another advantage that we can register any number of self hosted agents [14].

4.5 Deploying Application with Azure Devops

We may use Azure DevOps to deploy any application to any cloud service or platform. We were able to use Azure App service to deploy our application in our project [14]. There are some steps that we have to follow when we deploy any application with Azure Devops.

Plan phase The DevOps team uses Scrum to design and define the system's major features, build backlogs and monitor faults, and use kanban boards to track progress on the dashboard [12].

Develop phase Teams write, evaluate, integrate, and produce build artifacts using automated tests and continuous integration in tiny increments [12].

Delivery phase The deployment and configuration of completely controlled infrastructure are handled as part of the release management process.

Operate phase The application is managed and monitored in production environments, guaranteeing system dependability and high availability with minimal downtime [12].

Continuous Integration and Continuous Development, version control, Agile software development, Configuration management, and continuous monitoring are some of the fundamental DevOps methods in the application lifecycle [12].

Chapter 5

Deploying Web Service to Azure Cloud App Service

5.1 System Architecture

At an initial stage we have our existing web application on our machine. Also, it is on Git and connected with all developer's machines to keep it up to date and we utilize git to connect it with azure services by Azure cloud shell. The application code is submitted in the source code repository in Azure Repos. Continuous integration (CI) triggers the application build process and unit tests with Azure Test Plans. Continuous deployment (CD) in Azure Pipelines triggers automated deployment of application artifacts with environment-specific configuration values. The artifacts are provided in Azure App Service. By running the build and deploy task, the Azure pipeline is initiated, allowing the newest code to be deployed and artifacts to be created. As a result, CI/CD can be completed entirely with a single code push. After that we deploy our web service to azure app service by releasing our pipelines.

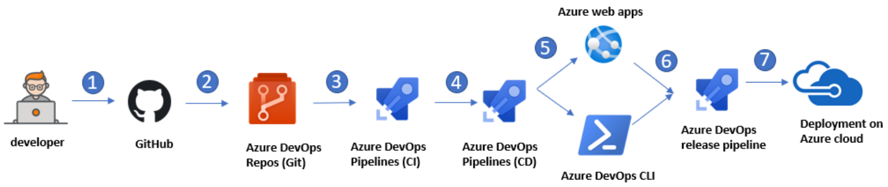

Azure web apps
developer
1
GitHub
2
Azure DevOps Repos (Git)
3
Azure DevOps Pipelines (CI)
4
Azure DevOps Pipelines (CD)
5
Azure DevOps CLI
6
Azure DevOps release pipeline
7
Deployment on Azure cloud

Figure 5.1: System Architecture

5.2 Prerequisite

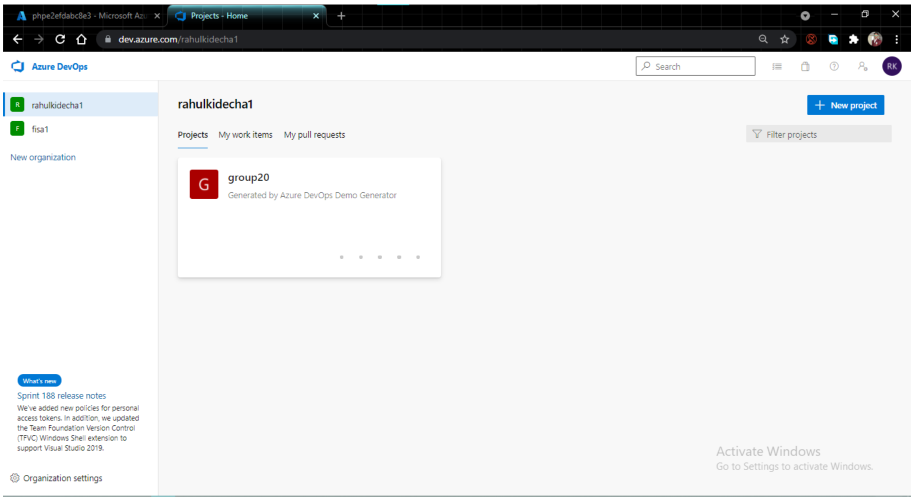
- Microsoft Azure subscription
- Azure DevOps pipelines

You must choose a production environment in which your application will be used. It is the Azure App service in this scenario. The artifacts from your CI build pipeline are handed over to the release pipeline, which finally deploys the application to Azure. Also, we used other technologies before creating CI/CD pipelines on azure, such as web developing platform (visual studio code) and git to connect all resources. Now, incoming sub chapter will explain step by step process of deploying web app to Azure app service.

5.3 Process

5.3.1 Continuous Delivery with Azure DevOps

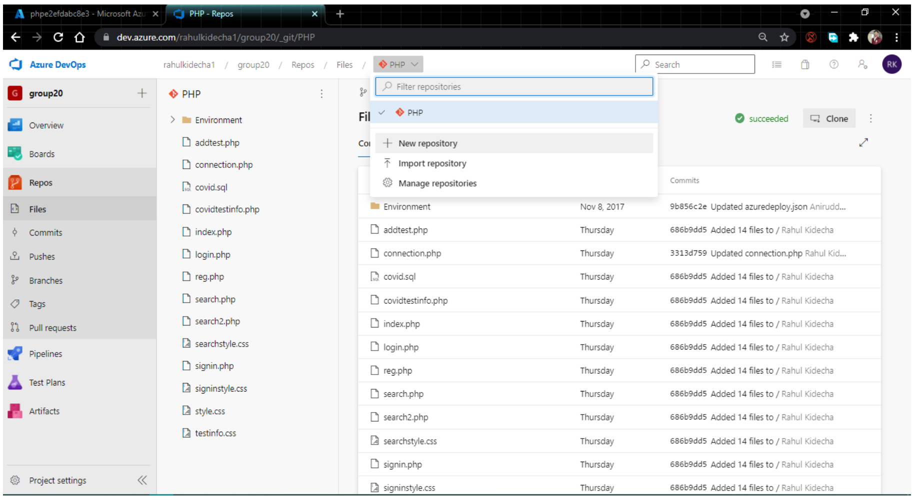
1. Create new project in azure Devops.



We've added new policies for personal access tokens. In addition, we updated the Team Foundation Version Control (TFVC) Windows Shell extension to support Visual Studio 2019.

Figure 5.2: Creating new project in azure

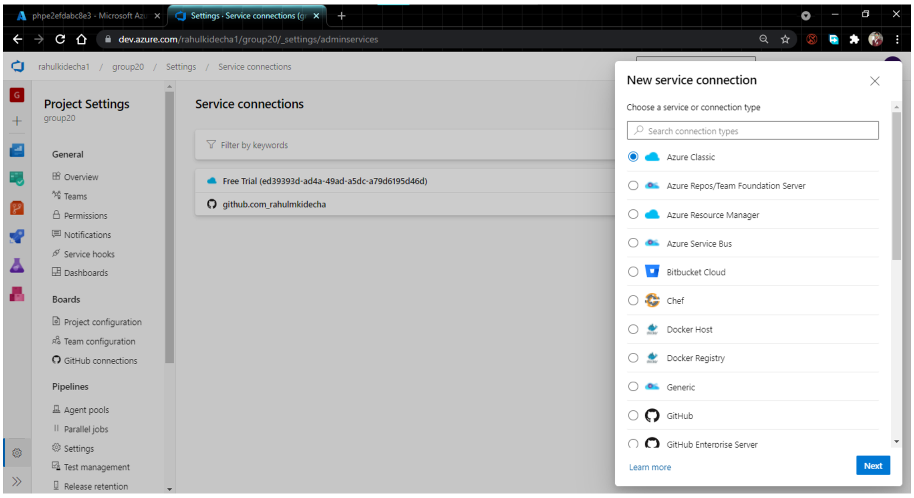
2. Now, We set git and service connections. first, We have to create DevOps repository. So, We can directly clone from git repository to devops by git repository link or CMD. Here, we use directly clone from git repository. After that you can Check the cloned repository in ”repos”.



PHP
- Environment
- addtest.php
- connection.php
- covid.sql
- covidtestinfo.php
- index.php
- login.php
- reg.php
- search.php
- search2.php
- searchstyle.css
- signin.php
- signinstyle.css
- style.css
- testinfo.css

		Commits
Environment	Nov 8, 2017	9b856c2e Updated azuredeploy.json Anirudd...
addtest.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
connection.php	Thursday	3313d759 Updated connection.php Rahul Kid...
covid.sql	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
covidtestinfo.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
index.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
login.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
reg.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
search.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
search2.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
searchstyle.css	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
signin.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
signinstyle.css	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha

Figure 5.3: Creating new repository



Service connections

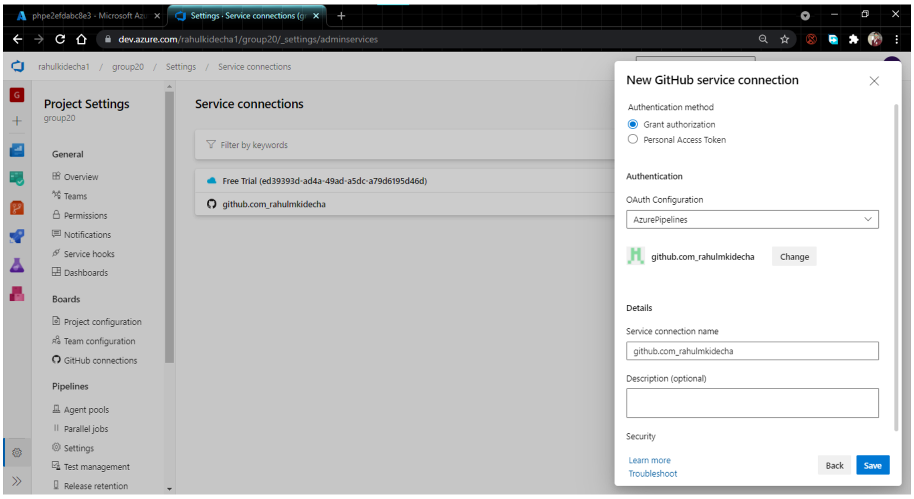
- Free Trial (ed39393d-ad4a-49ad-a5dc-a79d6195d46d)
- github.com_rahulmkidecha

New service connection

Choose a service or connection type

● Azure Classic
○ Azure Repos/Team Foundation Server
○ Azure Resource Manager
○ Azure Service Bus
○ Bitbucket Cloud
○ Chef
○ Docker Host
○ Docker Registry
○ Generic
○ GitHub
○ GitHub Enterprise Server

Figure 5.4: Creating new service connection



New GitHub service connection

Authentication method

● Grant authorization
○ Personal Access Token

Authentication

OAuth Configuration: AzurePipelines

github.com_rahulmkidecha Change

Details

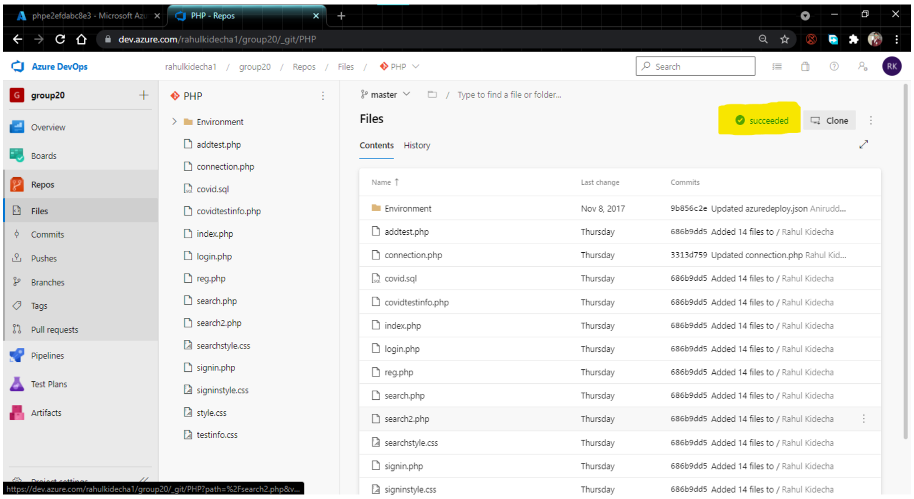
Service connection name: github.com_rahulmkidecha

Description (optional):

Security

Figure 5.5: Select git project

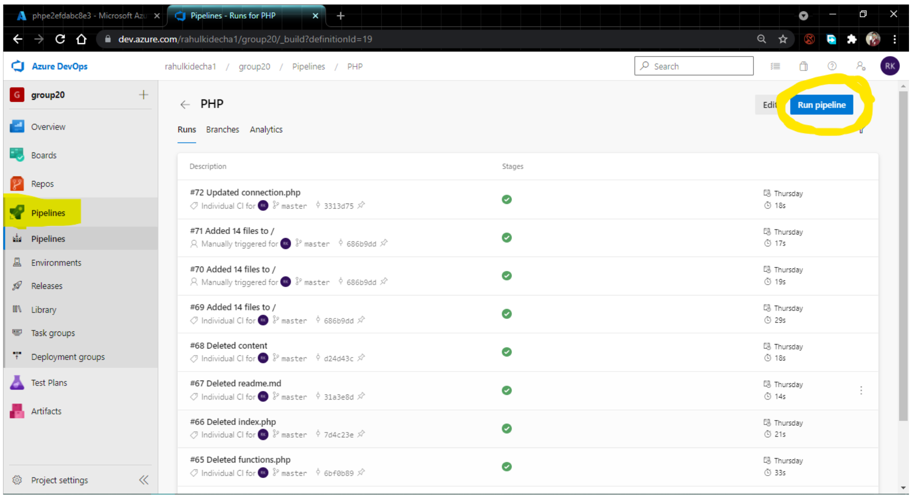
3. After cloned repository, Devops build pipelines.



Name	Last change	Commits
Environment	Nov 8, 2017	9b856c2e Updated azuredeploy.json Anirudd...
addtest.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
connection.php	Thursday	3313d759 Updated connection.php Rahul Kid...
covid.sql	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
covidtestinfo.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
index.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
login.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
reg.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
search.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
search2.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
searchstyle.css	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
signin.php	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha
signinstyle.css	Thursday	686b9dd5 Added 14 files to / Rahul Kidecha

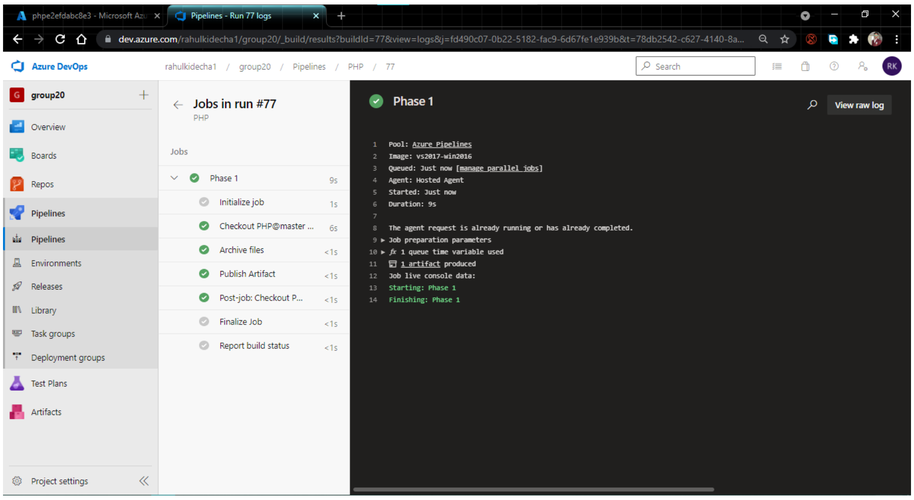
Figure 5.6: Successfully created Repos

4. In pipeline, we can see new pipeline. After choosing new pipeline, click on run pipeline that we can see in image 5.7. Now after running pipeline, in image 5.8 we can see success of building pipeline.



Description	Stages	
#72 Updated connection.php Individual CI for master 3313d75	✓	Thursday 18s
#71 Added 14 files to / Manually triggered for master 686b9dd	✓	Thursday 17s
#70 Added 14 files to / Manually triggered for master 686b9dd	✓	Thursday 19s
#69 Added 14 files to / Individual CI for master 686b9dd	✓	Thursday 29s
#68 Deleted content Individual CI for master d24d43c	✓	Thursday 18s
#67 Deleted readme.md Individual CI for master 31a3e8d	✓	Thursday 14s
#66 Deleted index.php Individual CI for master 7d4c23e	✓	Thursday 21s
#65 Deleted functions.php Individual CI for master 6bf0b89	✓	Thursday 33s

Figure 5.7: Run pipeline


phpe2efdabc8e3 - Microsoft Azu
Pipelines - Run 77 logs
dev.azure.com/rahulkidecha1/group20/_build/results?buildId=77&view=logs&j=fd490c07-0b22-5182-fac9-6d67fe1e939b&t=78db2542-c627-4140-8a...
Azure DevOps
rahulkidecha1 / group20 / Pipelines / PHP / 77
Search
RK
group20
Overview
Boards
Repos
Pipelines
Pipelines
Environments
Releases
Library
Task groups
Deployment groups
Test Plans
Artifacts
Project settings
Jobs in run #77
PHP
Jobs
View raw log

Jobs	
Phase 1	9s
Initialize job	1s
Checkout PHP@master ...	6s
Archive files	<1s
Publish Artifact	<1s
Post-job: Checkout P...	<1s
Finalize Job	<1s
Report build status	<1s

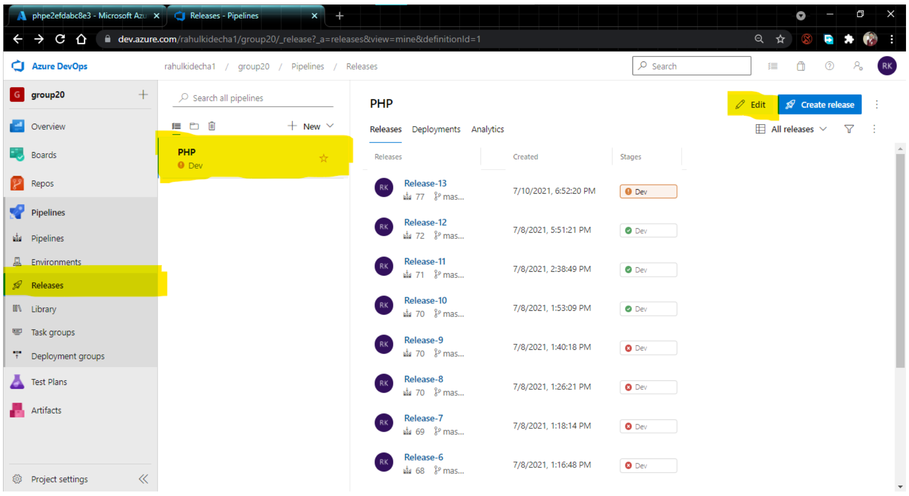
Phase 1

```
Pool: Azure Pipelines
Image: vs2017-win2016
Queued: Just now [manage parallel jobs]
Agent: Hosted Agent
Started: Just now
Duration: 9s

The agent request is already running or has already completed.
▶ Job preparation parameters
▶ fx 1 queue time variable used
1 artifact produced
Job live console data:
Starting: Phase 1
Finishing: Phase 1
```

Figure 5.8: Successfully building pipeline

5. Now, go to release of pipelines and edit it. then create release. Add task to deploy PHP website azure CLI and azure Webapp deploy release of pipeline.



PHP

Releases	Created	Stages
Release-13 77 mas...	7/10/2021, 6:52:20 PM	Dev
Release-12 72 mas...	7/8/2021, 5:51:21 PM	Dev
Release-11 71 mas...	7/8/2021, 2:38:49 PM	Dev
Release-10 70 mas...	7/8/2021, 1:53:09 PM	Dev
Release-9 70 mas...	7/8/2021, 1:40:18 PM	Dev
Release-8 70 mas...	7/8/2021, 1:26:21 PM	Dev
Release-7 69 mas...	7/8/2021, 1:18:14 PM	Dev
Release-6 68 mas...	7/8/2021, 1:16:48 PM	Dev

Figure 5.9: Create release pipeline

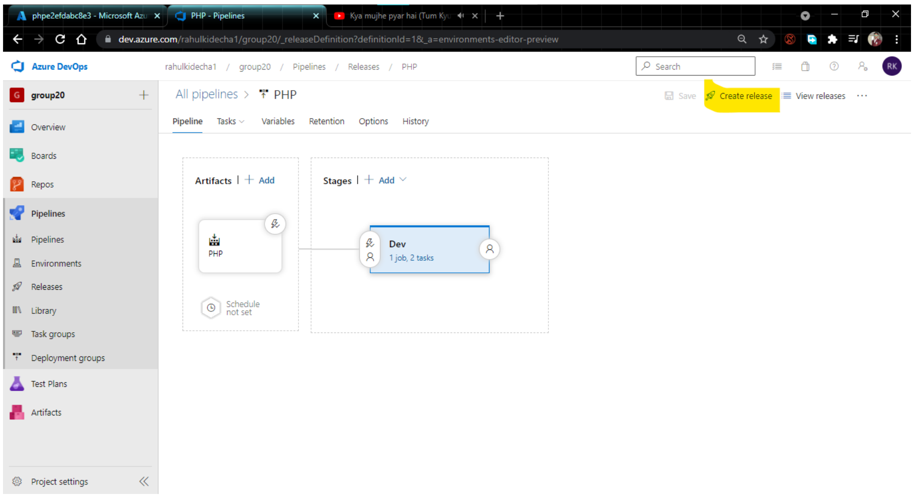


Figure 5.10: Select project

6. Start Deployment. Successfully deployed website on azure portal.

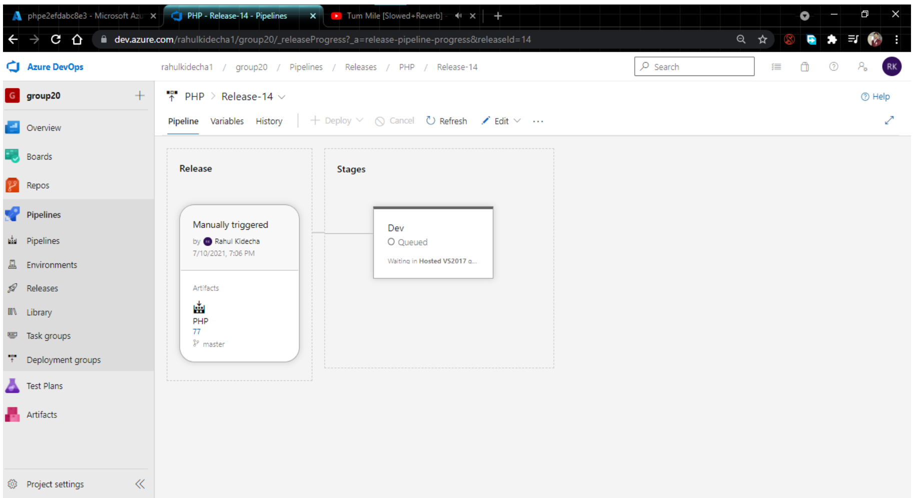


Figure 5.11: Create release pipeline

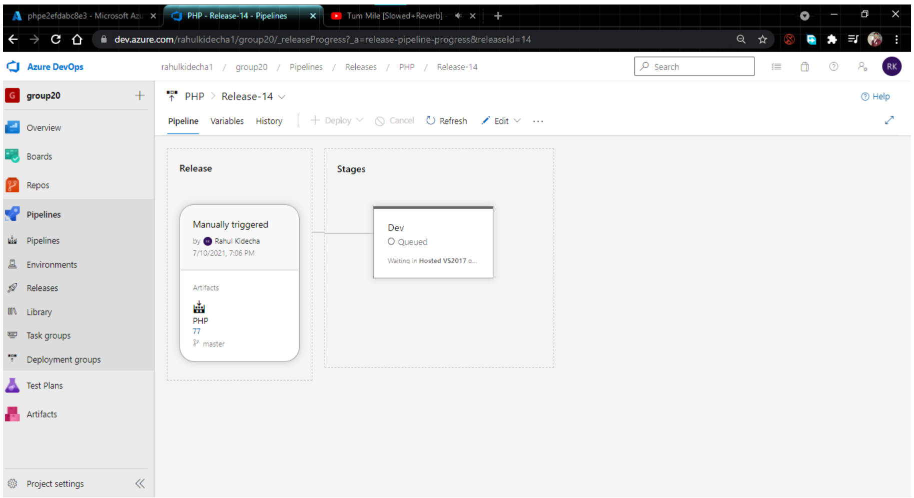
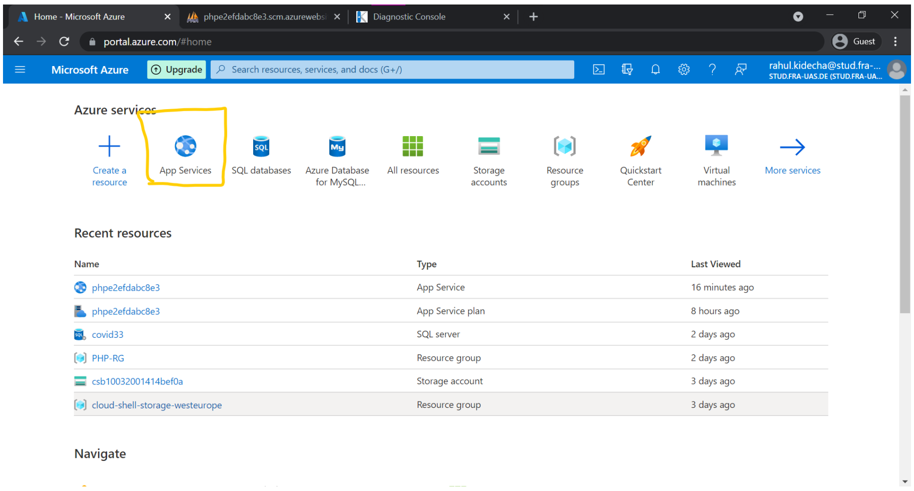


Figure 5.12: Select project

5.3.2 Service provided by Azure portal

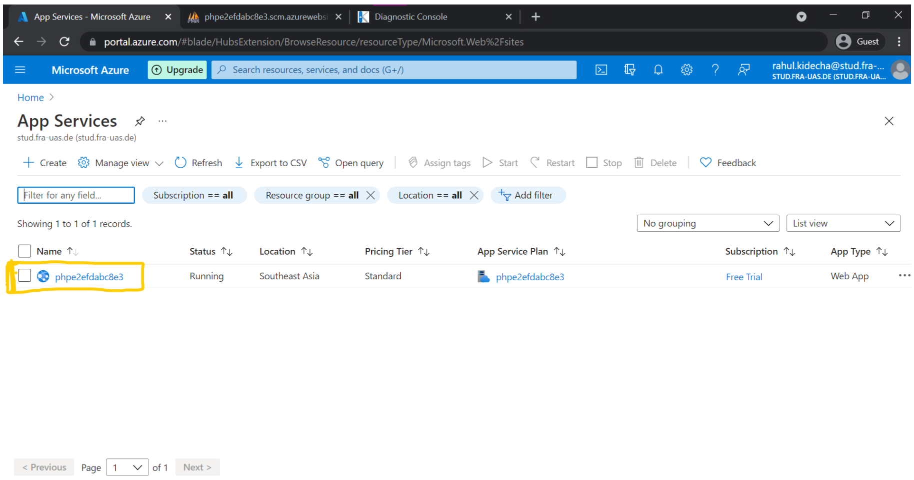
1. Login to Azure portal and click on app service.



Name	Type	Last Viewed
phpe2efdabc8e3	App Service	16 minutes ago
phpe2efdabc8e3	App Service plan	8 hours ago
covid33	SQL server	2 days ago
PHP-RG	Resource group	2 days ago
csb10032001414bef0a	Storage account	3 days ago
cloud-shell-storage-westeurope	Resource group	3 days ago

Figure 5.13: Azure portal

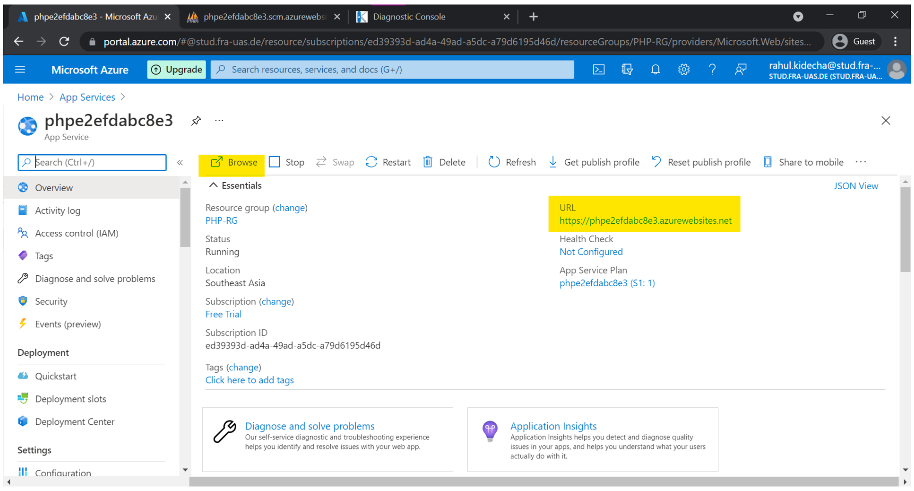
2. See the Webapp service which is deployed from azure Devops.


App Services - Microsoft Azure
phpe2efdabc8e3.scm.azurewebs
Diagnostic Console
portal.azure.com/#blade/HubsExtension/BrowseResource/resourceType/Microsoft.Web%2Fsites
Guest
Microsoft Azure
Upgrade
Search resources, services, and docs (G+/)
rahul.kidecha@stud.fra-...
STUD.FRA-UAS.DE (STUD.FRA-UA...
Home
App Services
stud.fra-uas.de (stud.fra-uas.de)
Create
Manage view
Refresh
Export to CSV
Open query
Assign tags
Start
Restart
Stop
Delete
Feedback
Filter for any field...
Subscription == all
Resource group == all
Location == all
Add filter
Showing 1 to 1 of 1 records.
No grouping
List view
< Previous
Page 1 of 1
Next >

Name	Status	Location	Pricing Tier	App Service Plan	Subscription	App Type
phpe2efdabc8e3	Running	Southeast Asia	Standard	phpe2efdabc8e3	Free Trial	Web App

Figure 5.14: List of projects

3. Dashboard of the Webapp service, click the link of deployed Webapp.



Resource group (change)
PHP-RG

Status
Running

Location
Southeast Asia

Subscription (change)
Free Trial

Subscription ID
ed39393d-ad4a-49ad-a5dc-a79d6195d46d

Tags (change)
Click here to add tags

URL
https://phpe2efdabc8e3.azurewebsites.net

Health Check
Not Configured

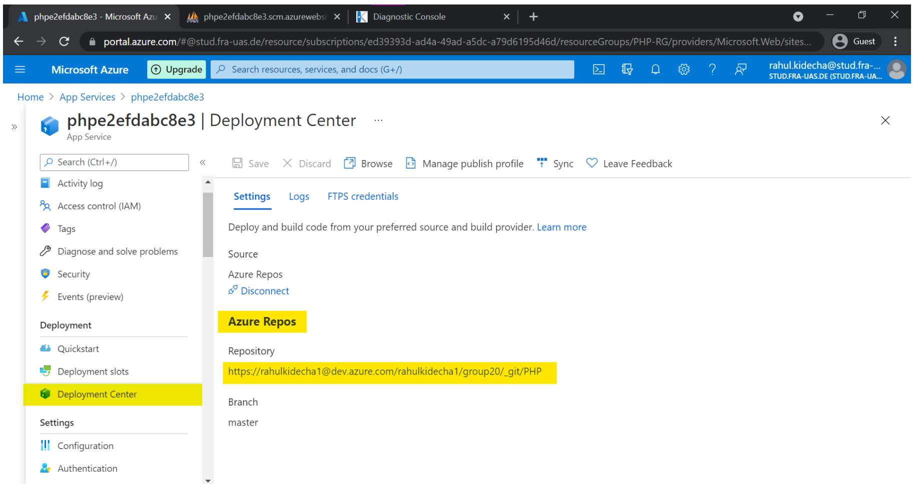
App Service Plan
phpe2efdabc8e3 (S1: 1)

Diagnose and solve problems
Our self-service diagnostic and troubleshooting experience helps you identify and resolve issues with your web app.

Application Insights
Application Insights helps you detect and diagnose quality issues in your apps, and helps you understand what your users actually do with it.

Figure 5.15: Select the link of deployed web app

4. Deployment center of azure devops.


phpe2efdabc8e3 - Microsoft Azu
phpe2efdabc8e3.scm.azurewebsi
Diagnostic Console
portal.azure.com/#@stud.fra-uas.de/resource/subscriptions/ed39393d-ad4a-49ad-a5dc-a79d6195d46d/resourceGroups/PHP-RG/providers/Microsoft.Web/sites...
Guest
Microsoft Azure
Upgrade
Search resources, services, and docs (G+/)
rahul.kidecha@stud.fra-...
STUD.FRA-UAS.DE (STUD.FRA-UA...
Home > App Services > phpe2efdabc8e3
phpe2efdabc8e3 | Deployment Center
App Service
Search (Ctrl+/)
Save
Discard
Browse
Manage publish profile
Sync
Leave Feedback
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Security
Events (preview)
Deployment
Quickstart
Deployment slots
Deployment Center
Settings
Configuration
Authentication
Settings
Logs
FTPS credentials

Deploy and build code from your preferred source and build provider. Learn more

Source
Azure Repos
Disconnect

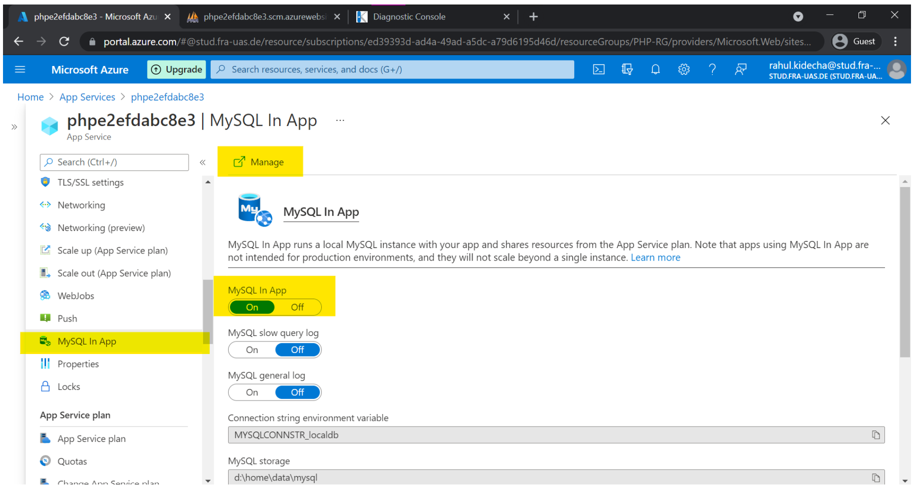
Azure Repos

Repository
https://rahulkidecha1@dev.azure.com/rahulkidecha1/group20/_git/PHP

Branch
master

Figure 5.16: Deployment centre

5. Turn on MYSQL in app to manage Database in MySQL.



phpe2efdabc8e3 - Microsoft Azure
phpe2efdabc8e3.scm.azurewebsites
Diagnostic Console
portal.azure.com/#@stud.fra-uas.de/resource/subscriptions/ed39393d-ad4a-49ad-a5dc-a79d6195d46d/resourceGroups/PHP-RG/providers/Microsoft.Web/sites...
Guest
Microsoft Azure
Upgrade
Search resources, services, and docs (G+/)
rahul.kidecha@stud.fra-...
STUD.FRA-UAS.DE (STUD.FRA-UA...
Home > App Services > phpe2efdabc8e3
phpe2efdabc8e3 | MySQL In App
App Service
Search (Ctrl+/)
TLS/SSL settings
Networking
Networking (preview)
Scale up (App Service plan)
Scale out (App Service plan)
WebJobs
Push
MySQL In App
Properties
Locks
App Service plan
App Service plan
Quotas
Change App Service plan
Manage
MySQL In App

MySQL In App runs a local MySQL instance with your app and shares resources from the App Service plan. Note that apps using MySQL In App are not intended for production environments, and they will not scale beyond a single instance. Learn more

MySQL In App: [✓ On] Off

MySQL slow query log: On [✓ Off]

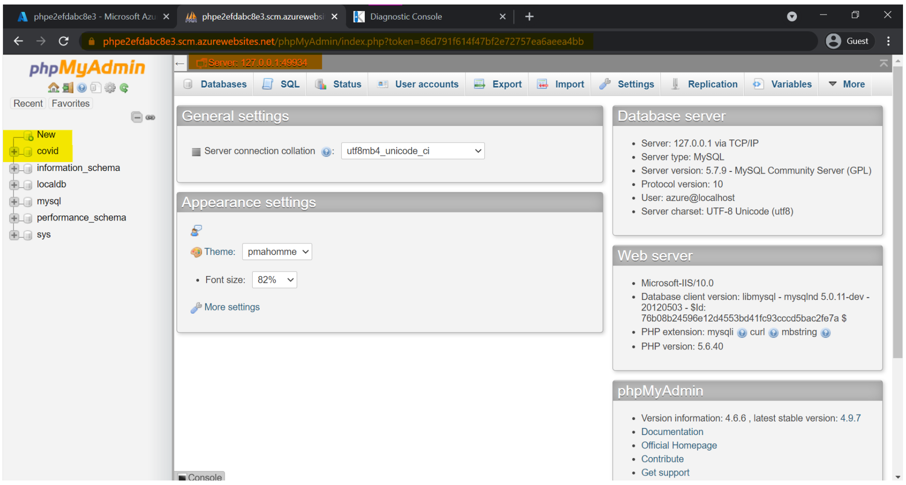
MySQL general log: On [✓ Off]

Connection string environment variable: MYSQLCONNSTR_localdb

MySQL storage: d:\home\data\mysql

Figure 5.17: MYSQL in app

6. PhpMyAdmin, here we can look and manage our database.



General settings

Server connection collation: utf8mb4_unicode_ci

Appearance settings

Theme: pmahomme

Font size: 82%

More settings

Database server

- Server: 127.0.0.1 via TCP/IP
- Server type: MySQL
- Server version: 5.7.9 - MySQL Community Server (GPL)
- Protocol version: 10
- User: azure@localhost
- Server charset: UTF-8 Unicode (utf8)

Web server

- Microsoft-IIS/10.0
- Database client version: libmysql - mysqlnd 5.0.11-dev - 20120503 - $Id: 76b08b24596e12d4553bd41fc93cccd5bac2fe7a $
- PHP extension: mysqli curl mbstring
- PHP version: 5.6.40

phpMyAdmin

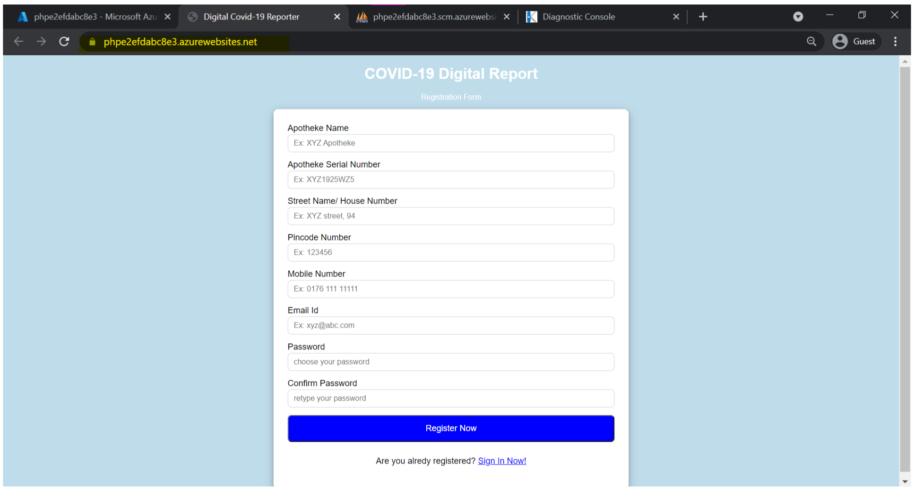
- Version information: 4.6.6 , latest stable version: 4.9.7
- Documentation
- Official Homepage
- Contribute
- Get support

Figure 5.18: PhpMyAdmin

5.4 Testing

- Test Link: https://phpe2efdabc8e3.azurewebsites.net

This link will open our web service which we have deployed in azure app services. The first page represents the"Register page", where only registered laboratories are supposed to register.


phpe2efdabc8e3 - Microsoft Azu
Digital Covid-19 Reporter
phpe2efdabc8e3.scm.azurewebsi
Diagnostic Console
phpe2efdabc8e3.azurewebsites.net
Guest

COVID-19 Digital Report

Registration Form

Apotheke Name

Ex: XYZ Apotheke

Apotheke Serial Number

Ex: XYZ1925WZ5

Street Name/ House Number

Ex: XYZ street, 94

Pincode Number

Ex: 123456

Mobile Number

Ex: 0176 111 11111

Email Id

Ex: xyz@abc.com

Password

choose your password

Confirm Password

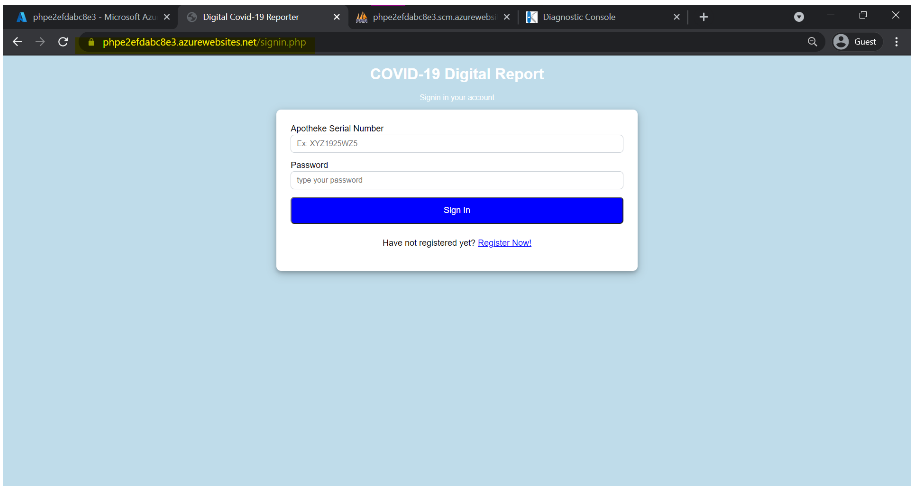
retype your password

Register Now

Are you alredy registered? Sign In Now!

Figure 5.19: Register page

After that they can login to the website and submit Covid-19 report to the cloud which will be stored in the database.


phpe2efdabc8e3 - Microsoft Azu
Digital Covid-19 Reporter
phpe2efdabc8e3.scm.azurewebsi
Diagnostic Console
phpe2efdabc8e3.azurewebsites.net/signin.php
Guest

COVID-19 Digital Report

Signin in your account

Apotheke Serial Number

Ex: XYZ1925WZ5

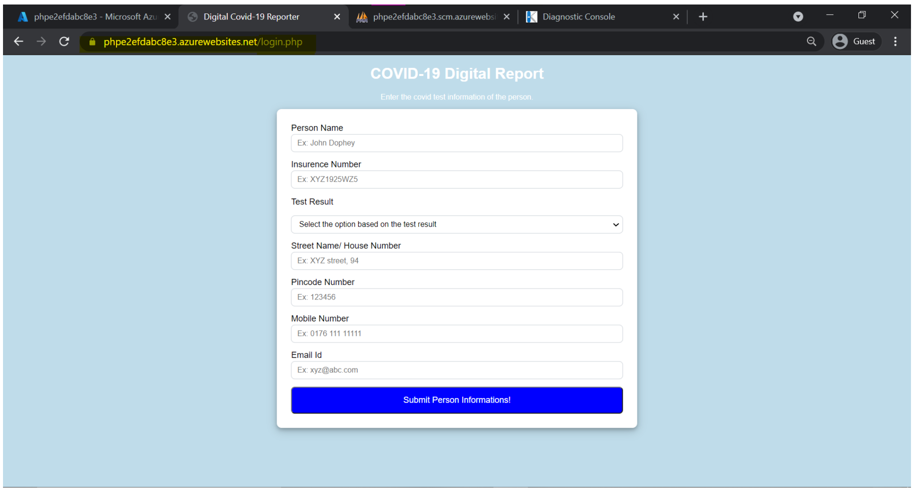
Password

type your password

Sign In

Have not registered yet? Register Now!

Figure 5.20: Login page


phpe2efdabc8e3 - Microsoft Azu
Digital Covid-19 Reporter
phpe2efdabc8e3.scm.azurewebsi
Diagnostic Console
phpe2efdabc8e3.azurewebsites.net/login.php
Guest

COVID-19 Digital Report

Enter the covid test information of the person.

Person Name
Ex: John Dophey

Insurence Number
Ex: XYZ1925WZ5

Test Result
Select the option based on the test result

Street Name/ House Number
Ex: XYZ street, 94

Pincode Number
Ex: 123456

Mobile Number
Ex: 0176 111 11111

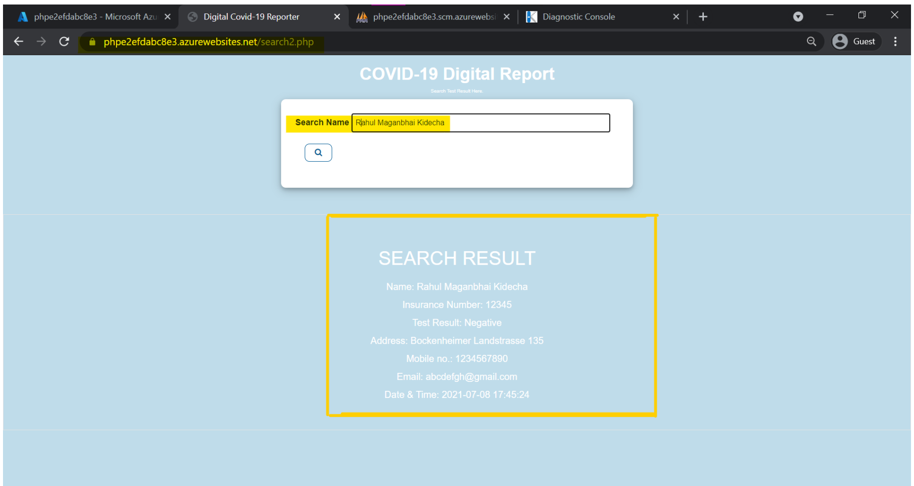
Email Id
Ex: xyz@abc.com

Submit Person Informations!

Figure 5.21: Add report page

Here, Figure 5.22 depicts the report of a search person. its also shows the time when report is submitted in cloud. So, The Report checker can the time that when person was tested and how old person's report is.

- Test Link: https://phpe2efdabc8e3.azurewebsites.net/search.php


phpe2efdabc8e3 - Microsoft Azu
Digital Covid-19 Reporter
phpe2efdabc8e3.scm.azurewebsi
Diagnostic Console
phpe2efdabc8e3.azurewebsites.net/search2.php
Guest

COVID-19 Digital Report

Search Test Result Here.

Search Name Rahul Maganbhai Kidecha

SEARCH RESULT

Name: Rahul Maganbhai Kidecha

Insurance Number: 12345

Test Result: Negative

Address: Bockenheimer Landstrasse 135

Mobile no.: 1234567890

Email: abcdefgh@gmail.com

Date & Time: 2021-07-08 17:45:24

Figure 5.22: Search report page

Chapter 6

Conclusions

We worked on Azure DevOps services, features followed by a comprehensive set of instructions for deploying apps across various cloud services and settings as part of this project. Our primary goal is to use this IaaS platform to deploy apps in a variety of settings. To showcase the deployment, we have put our web service on a cloud platform. To do these activities, we utilized the free version of the cloud by providing the infrastructure as a service.

Furthermore, this work intends to address the existing problem of Covid-19 clearance in retail malls, salons, and airports, among several other places using cloud systems. To enter the business, they all require a Covid-19 negative report of the person. As a result, we must all have a copy of the Covid-19 report with us in order to get access. For this reason, we created a web service that allows only approved laboratories to submit Covid-19 results of victims to the server, allowing customers to verify the Covid-19 report immediately through our online service.

6.1 Future work

In future, we will work on adding one more feature, adding the database of vaccinated people, in this application. This feature will help us to check either the person is already vaccinated or not. If the person is already vaccinated then they do not require to have Covid-19 negative test. In case, they are not vaccinated already, they need to have Covid-19 negative test to enter the restricted places.

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[15] https://www.smicrosoft.com/en-us/azure/devops/pipelines/?view=azure devops.