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Cloud-Native Application

Prashant B. Wakhare [a], Harshvardhan D. Pawar [b]

[a] Assistant Professor, Information Technology, AISSMS IOIT, Savitribai Phule Pune University, Pune- 411 003, India
[b] *Student, Information Technology, AISSMS IOIT, Savitribai Phule Pune University, Pune- 411 003, India*

A B S T R A C T

This Cloud-native application is a term broadly used to classify applications that are built with a cloud-first approach making use of cloud computing models by cloud providers (both on and off-premise) to achieve increased speed, flexibility, and quality while reducing deployment risks. Container-based application development has gained prominence as it provides businesses with the capability to build applications that are highly scalable and fault tolerant.

It goes without saying that cloud-native apps (CNA) were created with the cloud in mind. Although this knowledge is widely applicable, it does not clearly define or describe what a cloud-native application is. The term “cloud-native” was used quite frequently in the birthday times of cloud computing (2006) which seems somehow obvious nowadays. But the term disappeared almost completely. Suddenly and in the last years, the term is used again more and more frequently and shows increasing momentum.

"Cloud native" allows you to create, manage, and use an application entirely in the cloud. Since the servers, databases, software, and hardware are all connected over the internet, your program does not reside on local servers and devices. Instead, it exists online. Your application is not cloud-native just because you deployed it there.

Keywords: Cloud-native, cloud computing, CNA, Container-based, servers, databases.

1. Introduction

With the advent of cloud computing and its rapid adoption by the industry at large for the purpose of delivering their business services at a large scale in a fault-tolerant and highly available manner, it has necessitated businesses to rethink the manner in which their services are designed, developed, delivered and maintained. This rethinking has resulted in a monumental shift in how applications are designed, developed, delivered, and maintained, thus giving rise to the term cloud-native applications.

1.1 Motivation

Migrating to cloud-native is a paradigm shift in the approach to designing, developing, and deployment of technology. By reducing the complexity of integration, cloud-native provides a tremendous opportunity for enterprises. They can drive growth by leveraging cloud-native environments to develop innovative applications without elaborate setups. Organizations are looking at a lifelong means of creating continuously scalable products with frequent releases, coupled with reduced complexities and open Cloud and cloud-native technologies signifying the building of resilient and efficient IT infrastructure minus the complications, for the future.

1.2 Aim and Objective(s) of the work

The aim of the project is to make it possible for different companies to help them to migrate to cloud-native applications.

The objectives of the project are as follows-

1) It is very important for companies to know and create a highly efficient IT Ecosystem where all the resources are pooled together.

2) Cost should be effective for the Company

3) The IT Ecosystem should scale quickly and easily and it should be cost-effective.

4) It should satisfy all the business requirements and needs. Also, the ecosystem which the company is using should be integrated and should have a manageable environment. The company should be able to access services and data from anywhere and from any place in the world.

So, this project aims to help various companies to choose between the major cloud service providers and help them consolidate an integrated ecosystem and have a manageable environment.

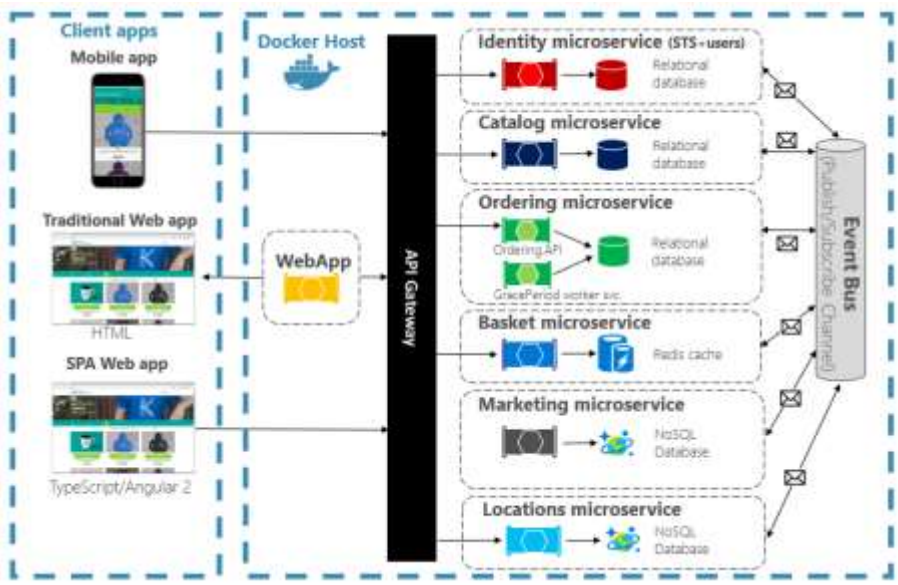
2. Literature Review

A lot of research work has been carried out in understanding the fundamental differences in packaging applications as virtual machines and as Docker containers. Z. Kozhirbayev and R. O. Sinnott [3] provide a broad overview and comparative study on popular open-source container orchestration tools Kubernetes and Docker in Swarm mode. J. Shetty et. al [5] provide a comparative study of the performance of workloads over hypervisor-based virtual machines and Docker containers. The primary focus of the study in [5] is on testing specific workloads on virtual machines and Docker containers and comparing them based on CPU and memory. Mohammad Ahmadi [6] provides a study on the Docker container technology, and various components of the Docker infrastructure and provides a comparative study with the help of workload based on SQL-based transactions on Docker and virtual machine.

Most of the recent work elaborated in the section focuses on the comparative study based on specific individual workload and largely do not focus on the delivery of the services by multi-component application deployment as a whole. This paper provides a comparative study on the performance of multi-component application deployment which provides a good metric of the performance of the system as a whole from the end users' perspective.

Characteristics

First, they emphasize high flexibility and agility, which means increased performance, better security, and an improved customer experience. You can apply changes, customize the application, and run new features, all at faster speeds. They don't rely on a single monolithic software codebase; rather, they are constructed in a modular way, taking advantage of cloud computing frameworks and multiple infrastructures. Finally, they consist of reusable, discrete components called microservices, designed to integrate into all types of cloud environments.



Each service is self-contained and encapsulates its own code, data, and dependencies. Each is deployed in a software container and managed by a container orchestrator. Instead of a large relational database, each service owns it own datastore, the type of which vary based upon the data needs. Note how some services depend on a relational database, but others on NoSQL databases. One service stores its state in a distributed cache. Note how all traffic routes through an API Gateway service that is responsible for routing traffic to the core back-end services and enforcing many cross-cutting concerns. Most importantly, the application takes full advantage of the scalability, availability, and resiliency features found in modern cloud platforms.

4. Methodology

Because each model has various levels of controls, offerings, the need for application migration to the cloud, security, and cost management, the customer must analyze and review a number of factors before moving on the cloud, such as the objective of moving on the cloud, the ideal deployment, and the service model. Customers must be knowledgeable of a variety of variables in order to choose the ideal service providers to meet their demands.

The parameters are:

- Infrastructure & computing services
- Network technologies services
- Storage technologies
- Database support
- Back-up services

- Key tools.

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