Serverless Architecture Solution to Automate Educational Organizations

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***Abstract*:-Educational Organizations refer to the administration of the education system within which a group individual combine together to supervise, plan strategies, and implement structures to accomplish the services in the education sector. The manual processing of the services included in these sectors would lead to errors and may also cause the loss of the recorded data. So, the main objective of the proposed system is to support and manage the activities held in the Educational Organizations through the modern technology Serverless Architecture solution. So, to achieve this microservices architecture in the cloud-based applications Function-As-A-Service, the concept of serverless computing via serverless architectures is used to build the application. In Serverless Architecture, a backend is provided as a service so that all the traffic handling is done by the vendor itself without any downtime. Through serverless technology, Fault tolerance is more and even the maintenance cost will be very less.**

Keywords: Automation, Educational Organization, Function-As-A-Service, Microservices, Serverless, Web Application.

1. INTRODUCTION

Educational Organizations refers to the administration of the education system in which a group combines human and material resources to supervise, plan, strategies, and implement structures to execute an education system. There are various Educational sectors that maintain the huge data records of individual students and the administration information. The manual processing of these services would lead to errors and may also cause the loss of the recorded data. So, these institutions need a management system to maintain and store the records and data related to their educational organizations. The proposed system provides ease in accessing and maintaining the different services provided by their sectors and through cloud-based management provides all time from anywhere access. Through this system, each service is provided as a microservice which is executed only when a function is invoked and thus decreases the maintenance cost as clients need not maintain any Virtual Machines.

2. LITERATURE SURVEY

Joseph M. Hellerstein has proposed a technique of serverless computing in 2019. Its computing offers the potential to program the cloud in autoscaling, pay-as-you-go manner. They used serverless computing for monitoring educational organizations using Functions-as-a-Service (FaaS), the commonly used and more descriptive name for the core of serverless offerings from the public cloud providers. [1]. model was proposed using Practical Cloud Workloads for Serverless FaaS by Jeongchul Kim et al in 2019. The new serverless applications function at run-time optimization and public service comparison. The advantages of this model are the data is secure as private key-based encryption and decryption are performed. [2]. Kalev Alpernas et al in 2018 developed a model by overcoming the limitations of security of the data in the cloud. The key benefits are elastic scalability, ease of deployment, pay-per-use scale achieved by decoupling application logic from resource management. [3]. C Yallamanda developed a system that deals with cloud computing technology with respect to the business organizations and how effectively it can be used by the developers to make better applications for the organizations in 2019. The merits monitored in this system are Mobility, Analytics, Streamline costs, High accessibility, and availability. [4]. A model of the organization management system (OMS) was implemented by Boris N. Gerasimov et al in. through which the contemporary development of organizations is determined by the necessity to respond to the current challenges and the market trends. They presented a model of the organization management system (OMS), and a model of development of organizational processes management system. The main focus of this system was based on solving existing issues**,** enabling high competitiveness, innovative proposals, and also reduces organization expenses. [5]. An Intranet-based model using Java and android platform was proposed by Prafulla S. Yevale1 in 2016. This system is mainly followed for profile forms, marking attendance, report generation, where the students fill-up the form and sign on the attendance sheets manually; teachers generate various reports by following the manual system. The main aim is to provide information to all the levels of management within the organization. Front-end client-side validation is done through Java and all business logics in .css, javascript, Ajax,JSON. Hibernate resides at Middleware and the third layer is MySQL database, the webserver will be Apache. The objective of this project is to provide technological tools for faculty to perform their jobs in an effective and efficient manner and also provide efficient tools for students and staff as well. Students can also view notice about seminars, activities related to college using the

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portal. They can provide as many input-output for general or specific domains. [6].

3. IMPLEMENTATION

Since technology is evolving every day newer and efficient solutions along with the problem can be found. Among that the latest solution in technology is the microservices where the entire application will be divided into multiple services and each service works individually. So, to achieve this microservices architecture in the cloud-based applications FaaS is the efficient and easiest way. Here a backend is provided as a service so that all the traffic handling is done by the vendor itself without any downtime. It also makes services work individually through instances so more reliable. FaaS is the concept of serverless computing via serverless architectures. Software developers can leverage this to deploy an individual "function", action, or piece of business logic. They are expected to start within milliseconds and process individual requests and then the process ends.

3.1 SYSTEM ARCHITECTURE

Now, in educational organizations, this FaaS will make the modules work as microservices and individually. Fault tolerance is more and even the maintenance cost will be very less since only whenever invocation is made then it starts the count or else not. Once the service is deployed no much maintenance is required since everything is automatic with a distributed serverless architecture. Serverless architectures may benefit from significantly reduced operational cost, complexity, and engineering lead time, at a cost of increased reliance on vendor dependencies and comparatively immature supporting services.
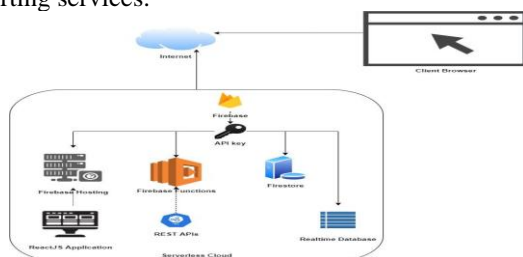

Figure 1.1 Architecture

Objective:
The main objective of the proposed system is to
- Optimize most of the applications through better scalability, reliability, and availability of them.
- Provide security through multiple levels like server, middleware, and cloud.
- Using this type of architecture in the cloud-based applications will reduce the cost and maintenance.

3.2 MODULES:

Microservices are an approach to application development in which a large application is built as a suite of modular components or services. The microservice architecture allows maximizing deployment velocity and application reliability by helping to move at the speed of the market. Since applications each run in their own containerized environment, applications can be moved anywhere without altering the environment. Each microservice developed in the application is mentioned:

- **Authentication** is a process of verifying the identity of a user i.e Recognizing the user's identity and providing access to the system.
- **Authorization** is a security mechanism used to determine the user/client privileges or access levels related to system resources.
- **User Management** allows managing the users, their accounts and roles, permissions and access levels.
- **Role Management** mainly deals with the roles set up and the granting of permissions to the authenticated user based on their level of the hierarchy.
- **Service Management** describes all the services available in the system and maps the respective authorized roles concerned with it.
- **Administration** can be defined as the process by which goals are achieved through collective and cooperative human effort such as Chairman, Principal, Dean and Staff in a suitable environment.
- **Academics Management** mainly deals with the management of the curriculum-courses, subjects mapping and provides better scheduling of academics.
- **Attendance management** is the act of maintaining the daily attendance of the user (students and staff) in the organization based on the scheduled time tables.
- **Marks management** is the service to maintain the marks reports of individual students department wise.

4. RESULTS
The microservices to manage the functionalities of Educational Organizations, to manage users, roles, services, academics and attendance with the following capabilities-
- Microservices running on a serverless architecture.
- Reduced cost of the cloud resources for the organization.
- High availability of the services.
- Reliability and Scalability of the modules developed.
Future Scope
The application can be extended with other services of Educational Organizations like library management, manage the examination booklet templates, ID cards management and any event management and even transport and hostel services.

5. CONCLUSION
The application consists of microservices that help in automating the services included in Educational Organizations through the technology Serverless Architecture. Existing applications that are used to automate the educational organizations which are built on PaaS or IaaS in the Cloud may exhibit better performance compared to applications that running on local environments. However, there is a loss in performance and huge downtime in real-time through these applications and even requires more maintenance of the applications. Through Serverless technology, the performance is improved and the fault tolerance is increased as each service is maintained through

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individual instances. Load balancing is provided for each individual function invocation. If any function overloads only that particular instance is affected.

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