

# Scientific Study of Serverless Architecture, Implementation and Pros and Cons

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## Abstract

This paper will explain the concept and need for the serverless architecture. In this concept the need for separate infrastructure to install application is not there. In order to exchange data, client and servers are needed where client will raise query to the server and the centralised server which has the information will respond with the results to the client. Here, the server is a centralised storage unit in which all the details are stored and that can be accessed remotely. In a server less architecture this server can be implemented without having the need for infrastructure which is known as serverless architecture. The paper will explain the process of implementation of the serverless architecture, its advantages, disadvantages, challenges and characteristics.

**Keywords:** - Serverless architecture, Implementation process, Benefits, challenges.

Introduction: - Serverless architecture is the process of designing of the server in such a way that the hardware and software needed for the applications is eliminated and it can be made available using cloud without the need of infrastructure. In this technique, instead of having a separate dedicated server to run the applications for which separate requirement of infrastructure is there, the access of the applications is made available by providing the services using cloud. This makes it easy for the implementation and accessing the data without having the need for separate hardware etc. Also, it eliminates the need for separate team whose work is to monitor traditional servers. Everything can be made available in cloud which can be accessed by all.

Characteristics of Server less Architecture: - [1]

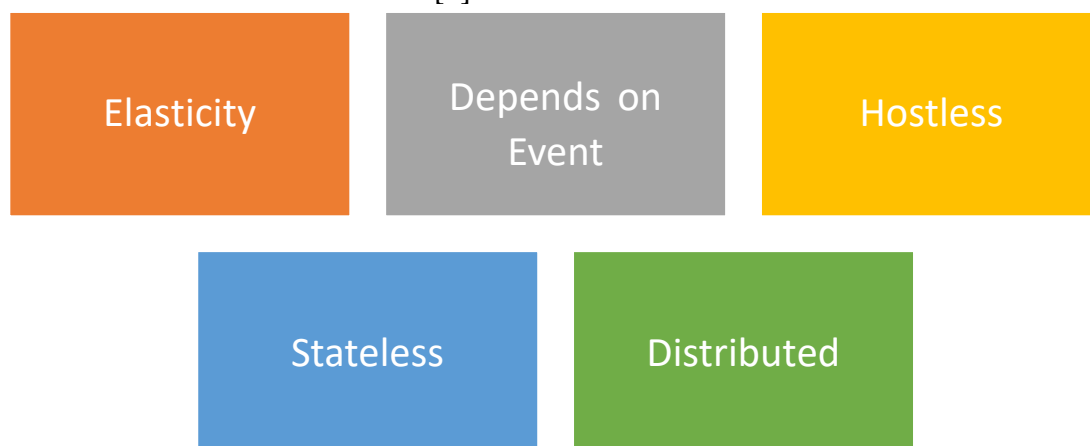


Figure 1 Serverless Architecture Features.

- Elasticity: - Server less architecture is elastic in nature. Which means there is no need to manage all the resources manually. They can be monitored automatically using this technique. In this technique

the user is only supposed to pay for the number of services he is using from the cloud service provider. He can add on or remove the subscription for the services whenever he wants. The cost will change accordingly. This elastic feature of the serverless architecture may not be compatible when it is implemented with the systems where the load on it increases.

- **Based on Events:** - The serverless architecture by itself is event driven, which means it is not necessary that everything in serverless need to be event driven. The event-driven provides the extended facility to the user to use their applications and services. The applications and services will be imported in back end using cloud technology and then the task of the service provider is to handle the front-end queries of the clients.
- **Host less:** - As the name describes, there is no need for separate servers to store the data, the host less architecture make it easy to maintain it as it is not required to monitor the hardware and software needed for the server implementation. In a traditional server model, one need to monitor any software and other updates but it is not necessary in the serverless architecture as there is no infrastructure required for its implementation. Implementation of serverless architecture requires knowledge about how to implement the applications of the business into cloud.
- **Stateless:** - The server less architecture is stateless which means that the state of the data is not stored in the application. It gives the facility to implement stateless due to which scaling of the data is easy to implement horizontally. The scope of error is also reduced as the state is not stored. The drawback of this is that it cannot be implemented in all application development.
- **Distributed:** - The services provided by the serverless architecture is distributed which means if the one space of the architecture is engaged then the other part can be used for the execution of the application. This increases the efficiency of this type of architecture and gives higher performance rate.

**Why Serverless Architecture is important:** -

This type of architecture is preferred over traditional methods of server implementation. In this type of architecture since the infrastructure to store data is not required, it is easy for the developers to implement it. The architecture implemented using this technique is efficient and gives higher performance rate. The responsibility of the developers to monitor the hardware and software update will also reduce as the serverless technique has back-end system where everything is managed at back end on its own. This will provide time to the developers to invest in other activities. This type of architecture is useful in small organisations which will have a smaller number of applications and services. The small number of services can easily be shifted from traditional methods to cloud based serverless architecture.

**Components of Serverless Architecture:** - [2]

The components of the Serverless architecture are: -

- a. **Web server:** -In order to access the services from cloud, there should be online medium. Any simple web server can be used to swerve the purpose. Foe example amazon provides such a server.
- b. **FaaS layer:** - This layer is the actual layer which helps to implement the services in serverless architecture. There are many solutions like AWS Lambda, Google cloud functions etc.
- c. **Security Layer:** -This layer makes sure that the data being accessed is safe and secure and there is no unauthorised access. The main purpose of this layer is to make sure that the information and service access is safe and secure and also to prevent any security attacks like fraud etc.

- d. Authentication and database: - All the users will have dedicated login details through which they can start using the services from the cloud based serverless architecture. The algorithm to check the authentication of those logins is also implemented to avoid unauthorised access. One of the many available data bases like NoSQL etc can be sued to store all this information.

#### Process of Implementation of Serverless architecture: -

The implementation process is divided into following sub tasks in order to convert the traditional server into serverless architecture:

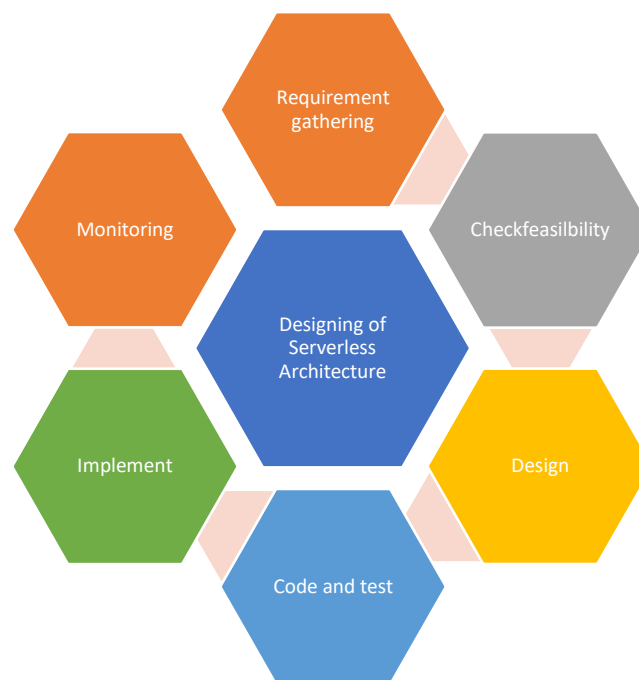


Figure 2 Designing of Serverless architecture

1. Requirement Analysis: -In this stage, first of all the designer will start gathering necessary information about the aims and goals of the organisation. He will understand the type of server being used and how many and which category of the data is being shared using that server. He will also gather information as what all services and applications of the business is required to be implemented in the serverless architecture. This stage is very important and first step to proceed in the direction of implementation of the serverless architecture.
2. Feasibility: - Once the requirement is gathered in the first stage, then based on the output of the first stage the designer will start analysing the requirements whether they are feasible for the serverless implementation. The designer will also check the feasibility of the existing services of the business in the serverless architecture to check whether all can be implemented in new architecture. This is the most important step. If he needs to reject or add any services, he can do it in this step.
3. Design: - Based on the analysis of all the requirements and understanding the business goals, the designer will start designing the architecture. This stage will include the information flow, the operations of all the components, the work flow stating how the components will interact with each other, how the clients query will be resolved etc. Everything will be designed using flow charts, graphs etc in this stage.

4. **Coding and Testing:** - In this stage the actual technical team will start coding the design into actual working model. They will create and code each component and then integrate everything to give prototype of the architecture. It is then tested to understand whether it is working as per the requirements and also if all the services and applications mentioned in the design stage is properly changed into serverless architecture. If there is any issue like if any one of the applications is left out then the whole process will be repeated until they create a model or architecture which meets all the requirements mentioned in the first stage.
5. **Implementation:** - In this step the final product is delivered to the client. The client with the help of the technical team will implement the serverless architecture in the real environment. If the client is not satisfied with the final product, then he will again give his specifications and the technical team will again develop new architecture which will have new details.
6. **Monitoring:** - If the customer is satisfied with the final product, he has received then the technical team will help the client to monitor the working of the serverless architecture till the time customer needs. This is to make sure that there is smooth functioning of the serverless architecture. Also, they need to monitor for any type of security attacks and get rid of them.

#### Advantages of Serverless Architecture: -

1. **Reduced Cost:** -The Server less architecture provides the facility to use only those services which the user wants to access. The user subscription plan is made as per the number of services used by the user. So, the overall cost is reduced as the user need to pay only how much he is using.
2. **No dedicated monitoring team:** - The services and applications used by the business is now shifted to the server to cloud provided by the vendor so the developers need not worry to monitor it. In old traditional methods of client server, the developers should continuously monitor for any updates required for hardware and software used in the servers. But no monitoring of serverless architecture is required as everything will be taken care by the vendor providing the services. Hence, the developers can use that time to enhance their skills which can be utilised to increase the efficiency and performance of the business.
3. **Flexible architecture:** - Serverless architecture is flexible, it has the capability to be modified at any given point of time. If the user wants to add or remove any service then it can be done and the user need to pay for only those services which they are using.
4. **Easy deployment:** - The developers can easily deploy code in parts and incorporate in the architecture. Hence it takes less time to deliver new product using serverless architecture.
5. **Reduced Latency:** - The latency issue is decreased if serverless architecture is used as the code running to access data will run closer to the customer. It is different from traditional ways where the code is running at a different location.

#### Disadvantages of Serverless Architecture: -

- **Useful for small organisations:** - This type of architecture is useful for small organisations where there are smaller number of services to be implemented in serverless architecture. For complex applications the implementation will be difficult and will not give desired results.
- **Poor performance in complex applications:** - When a particular service is not used for a long time then the time taken to invoke will be more and the boot up will also create performance issues. The performance will also degrade if it is used for using complex applications in the cloud data base.

- Higher costs: - The services can be used for some amount of money. If the service takes more time to run and have more processing time then the cost for this facility will be more for that particular user.
- Security issues: - The serverless architecture uses multiple data bases and provide the services in the cloud to be used by the clients. If there are any errors in those databases then the same will be implemented in the serverless architecture and there is increased risk of security attack.

Conclusion: - Serverless architecture is useful for small organisations where there are small number of services and can be implemented without using infrastructure. It is popular and in demand because of its elastic, event-driven reason. The efficiency with which it works is higher than the old traditional client server methods of data exchange. The process should be followed by expert technical team to implement accurate and desired serverless architecture.

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