DECENTRALIZED FUNCTION AS A SERVICE

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ABSTRACT

The objective of this research is to implement an automated, user-oriented, decentralized function as a service provider that replaces the existing centralized, single-authority FaaS providers in a way that can address the weaknesses in the global cloud infrastructure related to the serverless architecture. This refers to applications which heavily depends on third-party services running on the most well-known vendor temporary containers (or FaaS). Existing serverless architecture suffers from deficiencies such as vendor control, multi-tenancy issues, vendor lock-in, security issues, lack of monitoring tools, difficulty managing granular activity, and architectural complexity. The proposed system decentralizes granular functions across a peer-to-peer network to provide decentralized FaaS. A granular function is an atomic function with a single responsibility deployed on the Orb network. "Orb" is a peer-to-peer network of peers (nodes) and super peers (Supernodes/Trackers). Node detection on the network is done using the principles of "Satoshi Client Node Discovery". The user can register to the network as a node or super node by installing the client or server software as required. A node (represents a personal computer) provides the functionality of executing, deploying, and hosting functions. Supernodes keep a record of peers, live Supernodes, host particulate functions, and more. The user can apply an atomic particle function to the network through the server software. For deployment, users are charged in cryptocurrency (Ether). The payment form of "Orb" is based on ether smart contracts that use blockchain technology. The deployed function is sent to the Supernode and distributed across a network of peers across the network to achieve enhancement, reliability, and integrity. The confidentiality of a deployed function (a piece of code) is achieved through technologies such as private-key public-key encryption, proper obfuscation, and containerization. Users can restrict access to the function by keeping it private and opening it to a select group of users. For hosting a function, the user is paid in "ether" depending on the number of requests served and the uptime. When analyzing the response time by calling the function against an active set of peers will provide the real time analytics data about the availability and reliability. In the long run, “Orb” might support decentralized APIs.

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LIST OF ABBREVIATIONS

Abbreviation	Description
DHT	Distributed Hash Table
FAAS	Function as a Service
DFAAS	Decentralized Function as a Service
AWS	Amazon Web Services
JSON	JavaScript Object Notation
API	Application programming interface
LB	Load balancing/ Load balancer
S3	Amazon Simple Storage Service
EC2	Amazon Elastic Compute Cloud
EFS	Amazon Elastic File System
GCP	Google Cloud Project
DDoS	Denial-of-service attack
AI	Artificial intelligence
SaaS	Software as a service
IPFS	InterPlanetary File System
HTTP	Hypertext Transfer Protocol
SMT	Smart media token
DCS	Decentralized cloud storage
REST	Representational state transfer
URL	Universal resource locator
UI	User interface
MVP	Minimum viable product