Unleashing Zero-Touch at the Network Edge

with FusionLayer and Nearby Computing

A White Paper by FusionLayer Inc.

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by FusionLayer Inc, September 2023.

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1. Introduction

Artificial Intelligence (AI) based on Large Learning Models (LLM) is expected to change the world during the 2020s. With the new breed of applications that can natively leverage the new capabilities of AI, the world economy may be in for a similar productivity boost that was seen when the original Internet went mainstream in the 1990s. Before that stage can be reached, however, the world needs a new computing infrastructure equipped to meet this innovative technology's requirements. This emerging technology trend is generally known as edge cloud computing.

2. Scaling Artificial intelligence with Edge Clouds

Although the public cloud was perceived as the platform of choice for innovative services during the 2010s, the AI trend is about to change the situation. In this day and age, applications are all about the user experience, which requires that the computing takes place as close to real-time as possible. Applications and services that are being deployed in the public clouds no longer meet this requirement, because of the time it takes for data to travel from the user to the public cloud, and back.
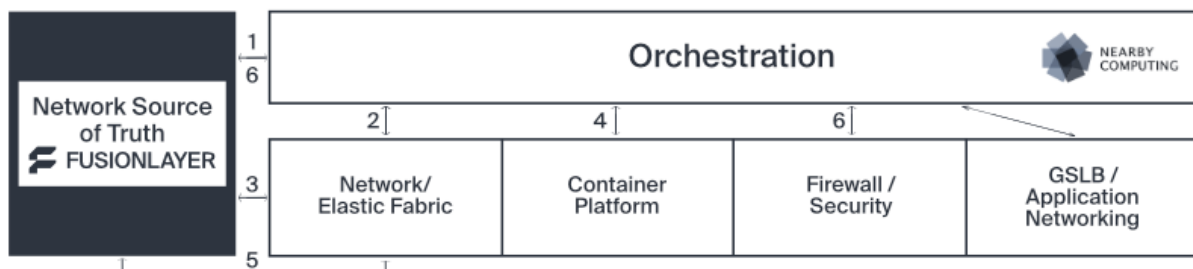
To eliminate the delays caused by the round-trip time between the users and applications, the technology industry is now ramping up with a distributed cloud infrastructure model known as edge cloud computing to host the AI-enabled apps close to the users. Sometimes also referred to as Multi-Access Edge Computing (MEC) based on the standardization work carried out by ETSI, the edge cloud trend results in applications that are closer to end users, and computing services that are closer to application data. By enabling near real-time interaction between the users and the applications that host both the data and the AI, the door will be open to AI-powered avatar representatives and other virtual services that change the world.

From the operational standpoint, the edge clouds of tomorrow will involve high levels of automation. This white paper outlines a solution blueprint that can be used to deploy cloud-native applications in the edge clouds on a zero-touch basis by leveraging Network Source of Truth -based release parameter automation by FusionLayer jointly with the cloud-native application automation and orchestration technologies from Nearby Computing.

AUTOMATION USE CASES FOR EDGE CLOUDS:

1. Configuration and deployment of AI-enabled application workloads

2. Zero-touch deployment of network functions and service pods

3. Automated operations with machine learning (MLOps)

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3. Example Workflow for Fully Automated Application and Network Function Deployment

Overview

The blueprint architecture depicted by this white paper consists of:

1. FusionLayer Infinity as the Network Source of Truth
2. NearbyOne orchestrator is used to manage the workload lifecycle.
3. Elastic network fabric that exposes an API to the outside
4. Container platform with orchestrator such as K8
5. Programmable firewall and other security services managed via API
6. Global Server Load Balancing (GSLB) and application networking managed via API

The goal of the presented workflow is to provide a high-level description of a zero-touch deployment methodology for automatically setting up networks; the service pods for running containerized network functions and/or AI-enabled application workloads; and the ongoing automated management of the said applications and services.

Workflow Description

The workflow starts when NearbyOne is requested to deploy a workload that needs a new network and a set of network services to be deployed at the edge cloud.

Step 1: Upon receiving a request to create a new SDN-enabled network, the orchestrator gathers all the information it needs to instantiate a new network in the SDN fabric. This information is workload-centric, and is included as part of the intents defined by each application vendor when uploading their software to Nearby Computing platform. A free network from a suitable network space can be queried from Infinity REST along with other relevant info stored in Infinity (as warranted by the use case).

Step 2: Once NearbyOne has gathered the relevant information specified for Step 1, it inserts the required parameters into the SDN fabric via its API. The SDN controller will then set up the new network in the elastic network fabric.

Step 3: Once the new network has been activated in the elastic network fabric, Infinity reads the configurations via the SDN fabric API, and stores them locally for network visibility and provisioning.

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Step 4: To deploy new workloads and/or service pods in the SDN-enabled networks in the elastic network fabric, the orchestrator instantiates the creation of a new service pod or a container using the API provided by the container platform.

Step 5: As NearbyOne deploys the new workload in the container platform, it requests release parameters such as IP address, a resolvable DNS name, and other required configuration parameters from Infinity REST. Infinity returns the IP address, the resolvable name, and the required parameters to the orchestrator and – if needed – inserts an automatically generated name into a default zone residing in an external primary DNS service.

Step 6: Once the SDN-enabled network has been set up and the workload released to the network, the orchestrator proceeds to set up a GSLB, application networking, and security for the network services and/or AI-enabled applications that have been deployed.

4. Summary

As Artificial Intelligence (AI) makes its way to the mainstream, it is becoming increasingly clear that the public cloud paradigm based on centralized data processing is not able to meet the scalability and security requirements introduced by AI. To address these shortcomings, the Information Technology and Communications (ICT) industry is now moving towards decentralized data processing models with edge cloud computing.

While distributing the AI-enabled applications across multiple edge cloud nodes improves the security, responsiveness, and scalability of these systems, the downside of this architecture is that it considerably increases the complexity of the underlying networks. This increased complexity is best tackled through network automation that ranges from simple network APIs exposing individual network configurations, to fully automated instantiation and management of both new networks and the network functions in them.

This white paper introduces a blueprint architecture and an automated workflow that can be used for fully automated instantiation and management of edge cloud networks used to host AI-enabled applications. Based on the patented Network Source of Truth technology by FusionLayer and the vendor-agnostic edge-to-cloud orchestrator developed by Nearby Computing, it simplifies the associated network management processes while providing real-time visibility into the network changes carried out by automation.

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About FusionLayer

The decentralized business infrastructure of tomorrow will be based on fast 5G connectivity and multi-access edge clouds that process data using Artificial Intelligence.

FusionLayer provides patented Network Source of Truth and IP addressing solutions that lay out the automation bedrock for the network functions, intelligent devices, and business applications that connect through the next-generation edge clouds.

The future of networks is here.

At scale. With ease.

About Nearby Computing

The company was founded in 2018 and operates globally from its headquarters in Barcelona, Spain as global leader in Edge Orchestration. Nearby Computing has been Named a 2023 Gartner Cool Vendor in Edge Computing and helps Telcos & Enterprise customers unleash the potential of Edge Computing through Orchestration and Automation of MEC and 5G.

NearbyOne is an orchestration platform that goes beyond market standards to manage all tiers of the network, from Cloud and Data Centre to Edge, from a single pane of glass. Using a cross-domain approach that is fully agnostic, NearbyOne manages hybrid networks at scale through domain-specific as well as comprehensive end-to-end orchestration. The solution covers all critical elements of deployment automation - from the initial Edge node provisioning to application on-boarding, to lifecycle management and LA monitoring.

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