Creating, Deploying and Managing a Software Defined Mobile Edge (SDME) Cloud

VERSION 1

June 7th, 2020
Introduction

Enterprises deploying Edge
Digital transformation in Enterprises is well underway. Enterprises are investing in infrastructure, connectivity, bandwidth, applications and the Cloud in order to get their businesses ready for the Digital world. Digital transformation refers to the process of using digital technologies to create new, or modify existing, business processes, culture, and customer experiences to meet changing business and market requirements. This reimagining of business in the digital age forms the crux of digital transformation. Competition in any industry is based on speed, precision in delivery, prompt and competent customer service, marketing, cost management and efficient manufacturing, and companies are spending liberally to make the leap. Worldwide spending to accelerate Digital Transformation is likely to be a high portion of the $4.3 T in Information & Communications Technology in 2020, according to IDC\(^1\).

\(^1\) Worldwide ICT Spending to Reach $4.3 Trillion in 2020 Led by Investments in Devices, Applications, and IT Services, According to a New IDC Spending Guide. Feb 20, 2020
https://www.idc.com/getdoc.jsp?containerId=prUS46047320
According to IDC, IT spending will make up more than half of all ICT (Information, Communications and Technology) spending in 2020, led by purchases of devices (mainly mobile phones and PCs) and enterprise applications. However, when combined, the three IT services categories (managed services, project-oriented services, and support services) will deliver more than $750 billion in spending this year as organizations look to accelerate their digital transformation efforts. The application development & deployment category will provide the strongest spending growth over the 2019-2023 forecast period with a five-year compound annual growth rates (CAGR) of 11.1%, as shown in Figure 1 above.

5G performance without upgrading

Digital transformation is being driven by new video, collaboration and productivity applications that demand high performance, low latency and superb quality. The conventional wisdom is 5G will usher in these new applications on mobile devices, and until then, none of this digital transformation will truly be possible.
Alef’s Software Defined Mobile Edge (SDME) can enable this new class of applications today on mobile devices without requiring any of the costly infrastructure upgrades to 5G. SDME is able to do this through a Software defined Mobile Edge computing architecture that handles high performance and low latency applications at the Edge close to the point of consumption by bringing connectivity and computing together in one programmable and open software architecture. By separating the control and user/data planes, which is the 5G imperative, SDME is able to accomplish the efficiencies and performance promise of 5G in a small footprint environment at the Mobile Edge today.

**Edge is hot, and it is predicted to be a huge market**

Edge computing is hot. Leading companies like Microsoft, Amazon, VMWare, Dell, HP, Intel, Nokia, Ericsson and many startups including AlefEdge have announced strategies and products to serve the burgeoning need for Edge computing and services as enterprises consider evolving their Cloud computing usage and deployments to this new Edge architecture.

Chetan Sharma Consulting estimates that by 2030, the Edge Internet economy will be over $4.1 Trillion worldwide; please see Figure 2 below. The initial growth will come from the Edge serving existing use cases, and will gradually accelerate and be driven by new use cases as deployment becomes more widespread, technology maturation occurs and developers are able to take advantage of an SDME architecture through use of open APIs and services.

In addition, Chetan Sharma Consulting predicts the economic impact of the Edge will be bigger than the cloud and similar to that of Internet and the mobile industry. It will influence all industry sectors and will help create new streams of innovation and disruption, new industries and companies, and new jobs and ecosystems.³

---

³ Edge Internet Economy by Chetan Sharma Consulting. How big is the Internet Economy, p 28. 2019
The promise of the Mobile Edge – Edge enhanced apps and Edge native apps
The mobile edge can enhance existing Cloud applications that require speed of delivery, low latency, targeting, high performance and ultra-high definition quality. It can also user in a whole new class of applications such as AR/VR, Autonomous cars, Live streaming of video, Stream Processing of simultaneous video streams, Industry 4.0 and others. It will be applications - both existing Edge apps as well as Edge enhanced apps - that will drive this growth as illustrated in Figure 3 below.  

All this will require a robust deployment architecture and SDME provides Enterprises one today to take advantage of, without having to wait for costly upgrades to 5G.

---

4 Edge Internet Economy by Chetan Sharma Consulting. Edge Internet Economy Segmentation, p 27. 2019
Figure 3 – Growth in Edge is driven by Applications and Services.
Future Innovation
There are several areas of innovation Alef is engaged in. A few of these are listed below.

EdgeOps™
DevOps refers to the practice of operations and development engineers participating together in the entire service lifecycle, from design through the development process to production support. DevOps is also characterized by operations staff making use of many of the same techniques as developers for their systems work. These techniques can range from using source control to testing to participating in an Agile development process. DevOps has a set of values, principles, methods, practices and tools.

There are three primary practice areas that are usually discussed in context of DevOps⁵.

- **Infrastructure Automation** – create your own systems, OS configs, and app deployments as code.
- **Continuous Delivery** – build, test, deploy your apps in a fast and automated manner.
- **Site Reliability Engineering** – operate your systems; monitoring and orchestration, but also designing for operability in the first place.

DevOps can be implemented on an Enterprise prem or as a service. When it is deployed as a Service, it is referred to DevOps as a Service. DaaS is a managed, cloud-based service that provides a unified DevOps toolchain⁶. All or most of the tools necessary for a continuous integration/continuous delivery (CI/CD) pipeline are collected in a single platform. This platform is then provided to teams with the support of dedicated DevOps professionals. The goal of DaaS is to enable organizations to focus on developing and delivering software without having to worry about managing or maintaining tools. It is designed to abstract away the intricacies of tool integration, deployment and maintenance. This enables teams to focus on higher-level tasks, and outsources significant manual effort. DaaS can provide small to medium businesses with enterprise-level infrastructure and tooling without needing to hire more staff or build extensive expertise. Instead, these businesses can rely on the experience of DaaS providers to create, deploy and optimize a pipeline for them. These pipelines are created to be intuitive and to facilitate the smooth collaboration of all team members.

EdgeOps is a new area that will see traction in the future. Just like DevOps, EdgeOps will have a set of values, principles, methods, practices and tools related to Edge apps and services development, testing and delivery. EdgeOps will have its own set of tools and processes that can be deployed within Enterprises or it will be offered as a Service on Alef’s SDME platform. This is referred to EdgeOps as a Service (EOaaS).

**Edge Application Environment – Mulesoft for the Edge**
Mulesoft is a company that provides the Anypoint platform. Anypoint is one of the leading integration and API platforms in the industry. An Enterprise developer can Develop, Deploy, Secure, Manage and Reuse code easily, and convert legacy monolithic applications that are

---

⁵ [https://theagileadmin.com/what-is-devops/](https://theagileadmin.com/what-is-devops/)
running on-prem to fully cloud-native applications that can run on-prem, in the cloud or in hybrid environments. Just as Mulesoft revolutionized and accelerated the development of applications and made them Cloud ready, by modeling on this vision, Alef will provide a platform with connectors, APIs, and SDKs to easily convert existing applications that are running in the Cloud or on-prem to Alef’s SDME platform. This will enable developers of all stripes to easily harness the power of the Edge by Edge enhancing their existing applications and being able to build a whole new class of native Edge applications. Intelligently rearchitecting applications for the Edge is one of Alef’s core competencies. We apply our knowledge of CUPS principles to keep certain microservices at the Edge and the rest in the Cloud services layer, so those microservices that are performance sensitive stay on the Edge and the rest are in the Cloud. This lowers the TCO of our deployments significantly.

**Ops Automation - AI Ops for the Edge**

AIOps stands for artificial intelligence for IT operations. It refers to multi-layered technology platforms that automate and enhance IT operations through analytics and machine learning (ML). AIOps platforms leverage big data, collecting a variety of data from various IT operations tools and devices in order to automatically spot and react to issues in real-time while still providing traditional historical analytics.

This is particularly important for the Edge where workloads are dynamic, and not static as they are with the traditional hypercloud, where workloads don’t change from one server to another. In a traditional hypercloud environment, if a server goes down, redundancy ensures another server starts up, and workload dimensioning is generally predictable and static.

With the Mobile Edge, things are very different – because of mobility and the user plane moving around, servers, storage and switching capacity have to be able to dynamically sense, calibrate and adjust to continuously changing Edge compute demands. So the level of measurement, allocation and automation needed is significant. Likewise, there is a huge premium on observation, data analysis, anomaly detection, performance analysis and knowledge management. Dashboards are very critical as well - making everything visible and actionable for network administrators.

The diagram below from Gartner shows how an AIOps platform works. AIOps has two main components: big data and ML. It requires a move away from compartmentalized IT data in order to aggregate observational data (such as that found in monitoring systems and job logs) alongside engagement data (usually found in ticket, incident, and event recording) inside a big data platform. AIOps then implements a comprehensive analytics and ML strategy against the combined IT data. The desired outcome is automation-driven insights that yield continuous improvements and fixes. AIOps can be thought of as continuous integration and deployment (CI/CD) for core IT functions.

---

7 Gartner’s Visualization of the AIOps platform. BMC Blogs - AIOps in 2020: A Beginner’s Guide
AIOps bridges three different IT disciplines—service management (Engage), performance management (Observe), and automation (Act)—to accomplish the goal of continuous insights and improvements. AIOps creates a new approach within fast-moving and dynamic IT environments that is underpinned by advances in big data and ML.

AIOps will be a significant differentiator for a successful Software defined Mobile Edge deployment and will be an area of investment and innovation leadership for Alef.