

Blog of IEC Type 2 Release 5

IEC Type2 Release 5: LightWeight Multi-Access Edge Cloud (MEC) on AWS

Integrated Edge Cloud (IEC) is an Akraino approved blueprint family and part of Akraino Edge Stack, which intends to develop a fully integrated edge infrastructure solution, and the project is completely focused towards Edge Computing. This open source software stack provides critical infrastructure to enable high performance, reduce latency, improve availability, lower operational overhead, provide scalability, address security needs, and improve fault management. The IEC project will address multiple edge use cases and industry, not just Telco Industry. IEC intends to develop solutions and support for carriers, providers, and the IoT networks. IEC Type2 mainly focuses on medium deployment of edge clouds.

MEC offers cloud computing capabilities at the edge of the network. Collecting and processing data closer to the subscribers reduces latency, data congestion and increases subscriber experience by providing real-time experience. A cloud native implementation at the edge realises the full potential of cloud that allows developers to focus on writing scalable and highly reliable applications, instead of worrying about the operational constraints. Developing applications at the edge goes beyond the scalability requirements as these edge native applications need real time processing as they are latency sensitive and are hungry for high bandwidth.

- Modern Developer platforms should offer a unified experience for building both cloud and edge native applications seamlessly. Using these cloud and edge native sandbox environments, developers should be able to simulate a real time environment to test applications on mobility, test caching, performance etc. Out-of-the-box integrations like AI/ML frameworks like Kubeflow, data processing frameworks like EdgeX Foundry to synthesize data at the edge, monitoring and logging frameworks like Prometheus, Grafana, EFK/ELK stacks along with no code/low code experience can accelerate time to delivery and promote innovation amongst the developers.

Apart from providing a rich developer experience, these sandbox environments should be light weight which can be provisioned really quick and later can be extended to a production ready environment.

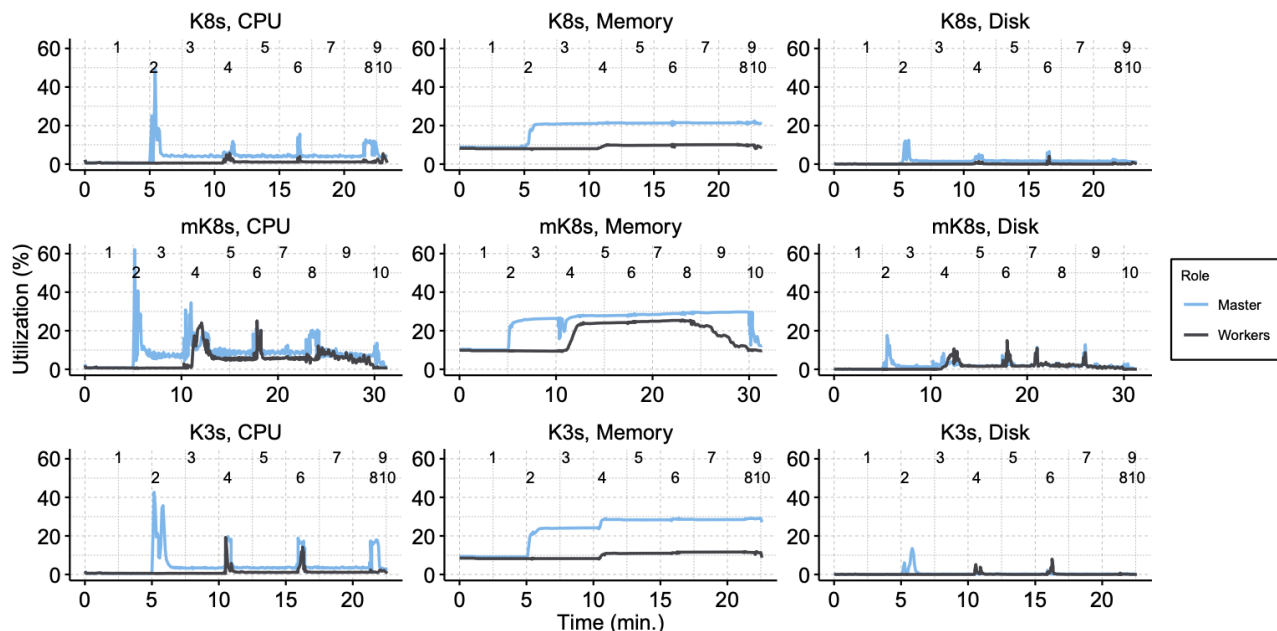
Leveraging public cloud providers like AWS for a distributed cloud at the edge can greatly reduce the CAPEX/OPEX to set up an MEC Cloud.

Considering these requirements, gopaddle team has proposed and developed an Akraino blueprint that provisions a light weight Multi-Access Edge Cloud on AWS leveraging microk8s.

A word about microk8s

Microk8s is a lightweight Kubernetes distribution from Canonical. It uses snap manager to spin up a Kubernetes cluster in less than a minute. Snap installer consumes as little as 192 MB RAM and K8s distribution consumes as little as 540 MB. It is fairly simple to spin up a single node cluster, which later can be extended to a multi-node cluster. Once there are 3+ nodes, then a High Availability mode can be enabled making the cluster production ready. Microk8s offers out-of-the-box tool chains like Kubeflow for Machine Learning workloads, Prometheus for monitoring, in-built image registry etc.

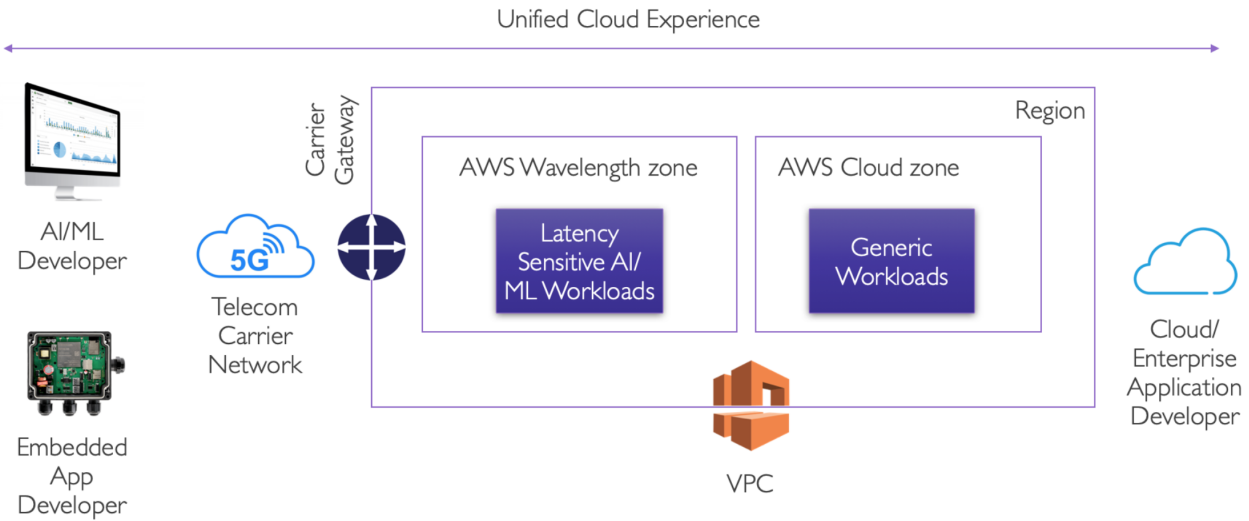
While there are other light weight Kubernetes distributions, microk8s offers better CPU/Memory/Disk utilization. Thus microk8s stands out as a good candidate for a developer sandbox environment which can be scaled to a production environment.



Reference: Sebastian B"ohm and Guido Wirtz
Distributed Systems Group, University of Bamberg, Bamberg, Germany
<http://ceur-ws.org/Vol-2839/paper11.pdf>

AWS Wavelength - Bringing Cloud Experience to the Edge

AWS has partnered with a few telecom carrier providers like Verizon, Vodafone etc to offer edge environments called AWS Wavelength zones in a few selected regions/zones. AWS VPCs can be extended to AWS Wavelength zones bringing AWS experience to the edge environment.



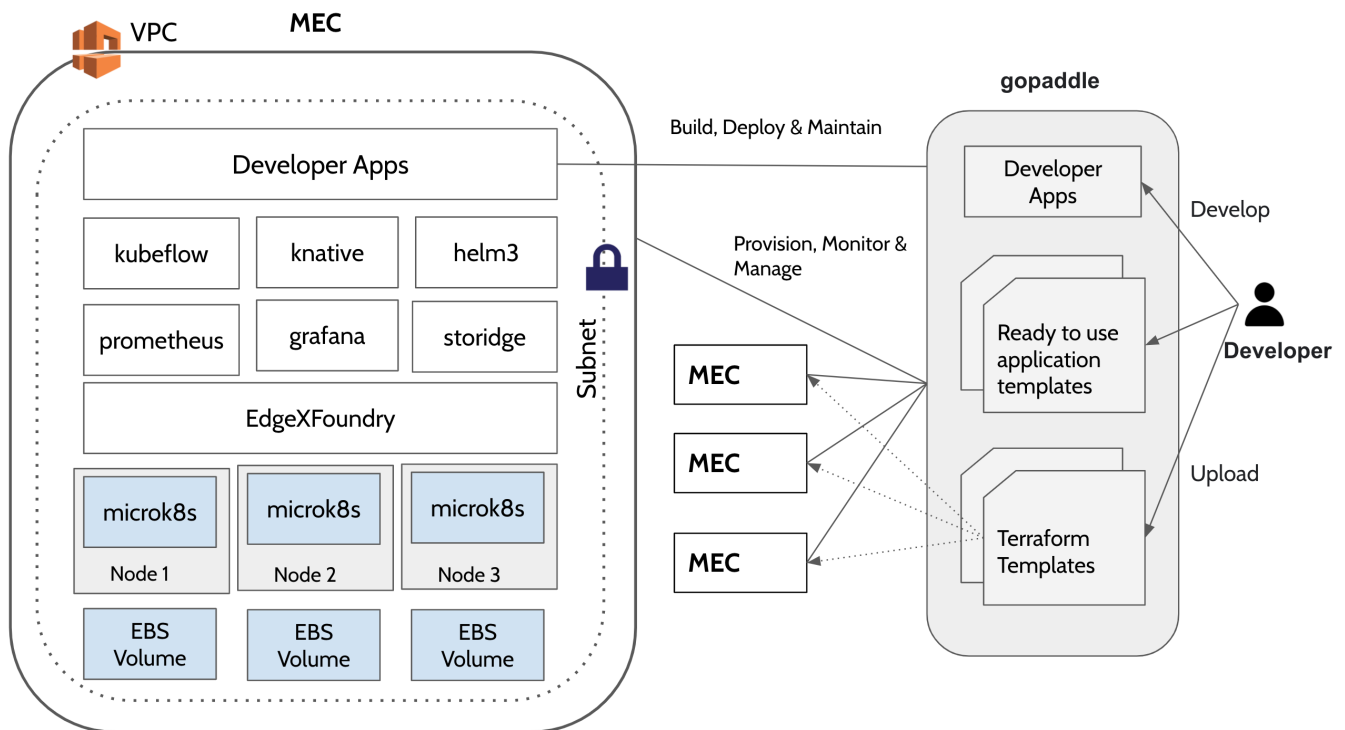
Using AWS carrier gateway, developers can connect to the carrier network and use their 5G network for developing AI/ML or embedded applications. This gives a real time development experience to validate their application performance, latency, and caching in real time. This also gives a unified experience for enterprise cloud development and edge development as well.

gopaddle - No Code for Cloud & Edge Native Development

[gopaddle](#) is a no code platform to build, deploy and maintain Cloud and Edge native applications across hybrid environments across cloud and edge. The platform helps in easy onboarding of applications using intelligent scaffolding, provides out-of-the-box DevSecOps automation by integrating with 30+ third party tools, pre-built ready-to-use application templates like [EdgeXFoundry](#) and provides a centralized provisioning and governance of Multi Cloud and Hybrid Kubernetes environments.

LightWeight MEC Blueprint

The blueprint leverages the three main building blocks - microk8s, AWS and gopaddle to provision a light weight MEC that acts as a developer sandbox which can be extended for production deployments. The provisioning of the microk8s based MEC environment on AWS is automated using terraform templates. These templates can be uploaded and centrally managed through gopaddle. Using these templates, multiple environments can be provisioned and centrally managed.



<https://wiki.akraino.org/display/AK/IEC+Type+2+Architecture+Document+for+R5>

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Note

The blueprint is in incubation phase and we are looking forward to enhancing this for more broader use in the upcoming releases.

Thanks to the Akraino community for the motivation, guidance and reviews. Special thanks to [Trevor Tao](#) san and [Jingzhao Ni](#) san for relentless support in reviewing the architecture and suggesting improvements time to time, [Tina Tsou](#) for guiding us through the process, and the sub-committee heads - [Ike Alisson](#) for reviewing the documentation for completeness, [Randy Stricklin](#) and [Jeff Brower](#) for ensuring the blueprint meets the Security and API compliance requirements respectively.