Decentralized Fog Computing Infrastructure Control

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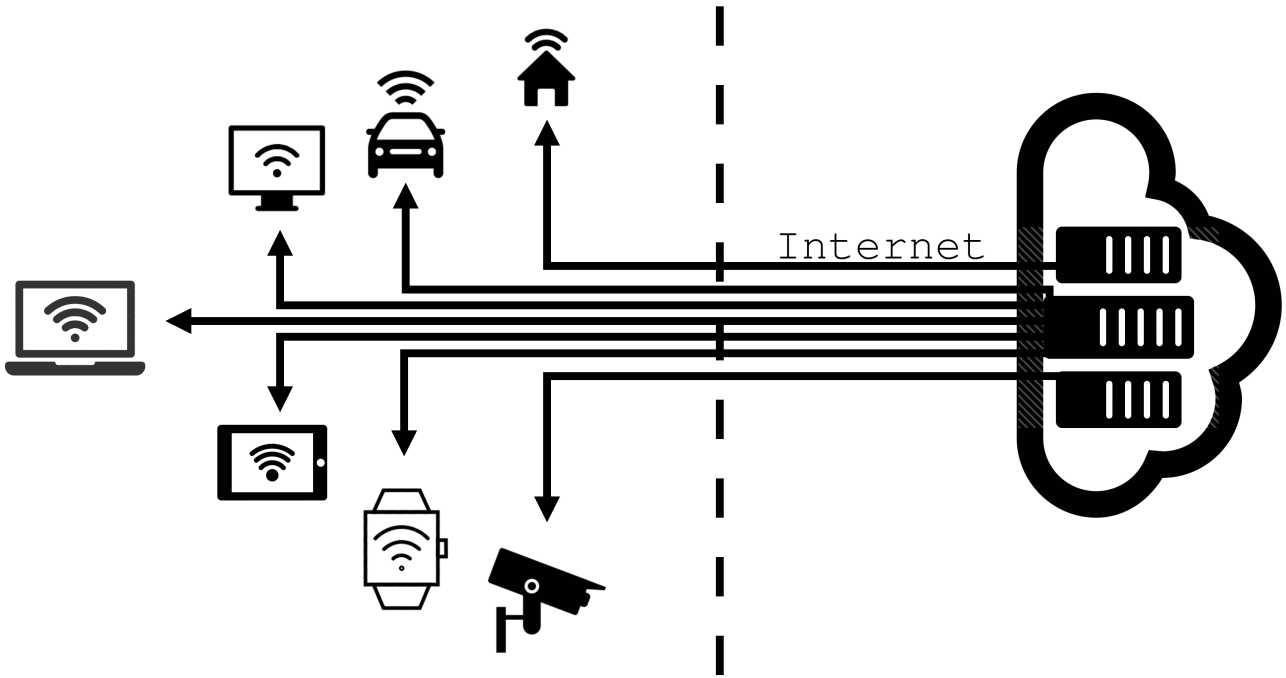
Outline

General Introduction

Centralized Data Centres

The Emergence of Centralized Data Centres

- Number of cloud users have reached 3.4 Billions in 2018.
- Centralized data centres are cost effective.
- The big players relay on nothing more than 15 data centres.

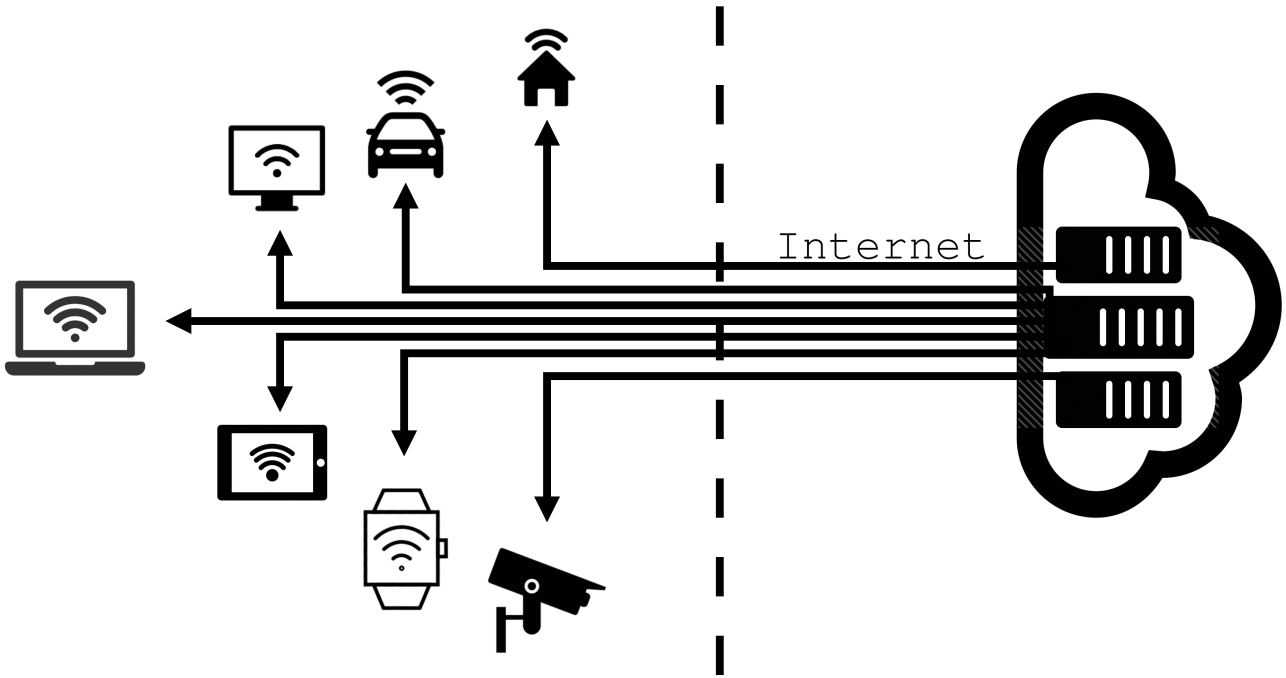


General Introduction

Centralized Data Centres

The Emergence of Centralized Data Centres

- Number of cloud users have reached 3.4 Billions in 2018.
- Centralized data centres are cost effective.
- The big players relay on nothing more than 15 data centres.
- Two main problems: internet traffic and high latency.

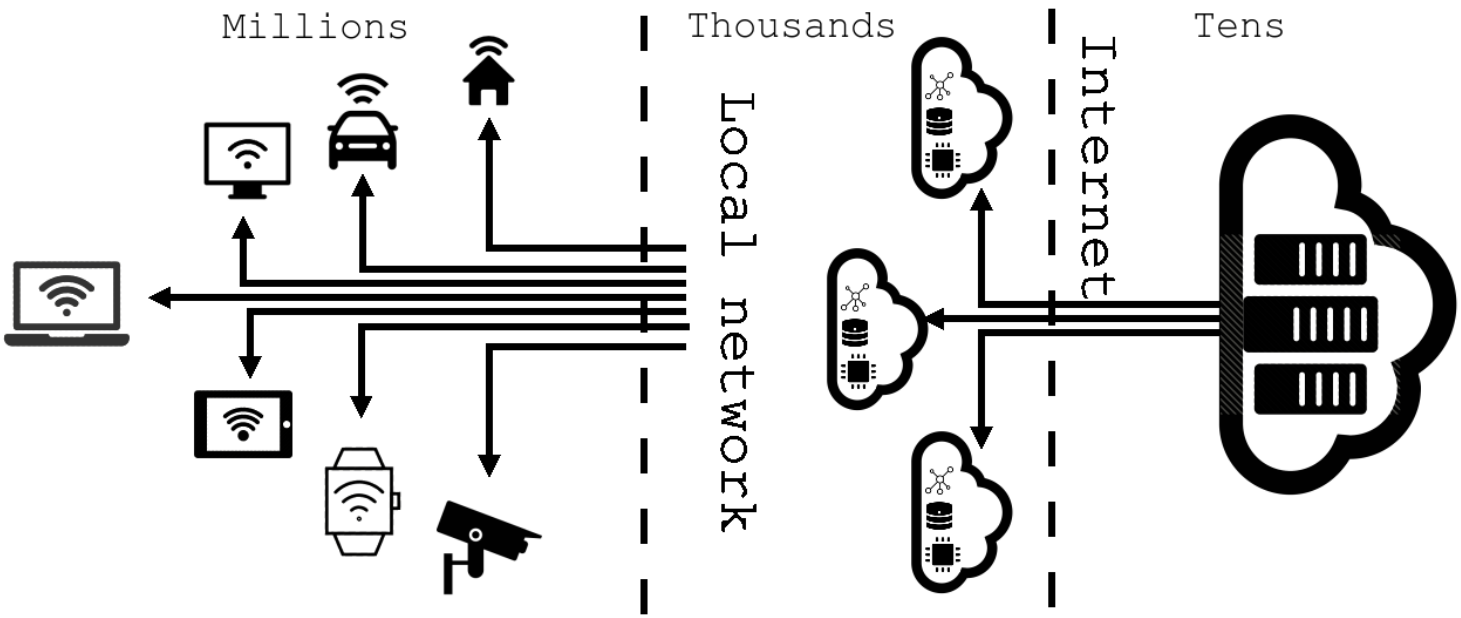


Outline

The Fog

Greedy Applications and The Fog

- Fog computing an extended paradigm of clouds.
- Nodes will be distributed in the end-user proximity.
- Fog will provide lower latencies and data localization.



The Fog

A Platform For The Fog

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A Platform For The Fog

- Fog computing is relatively new.
- The absence of a platform that assist fog architecture.
- A fog cluster can be built on top of cloud's platform like Kubernetes.
- Kubernetes lack some complementary features that will full-fill the definition of fog.

Outline

PhD Objectives

One broad Objective

- Creating the optimized infrastructure control for fog computing architecture.

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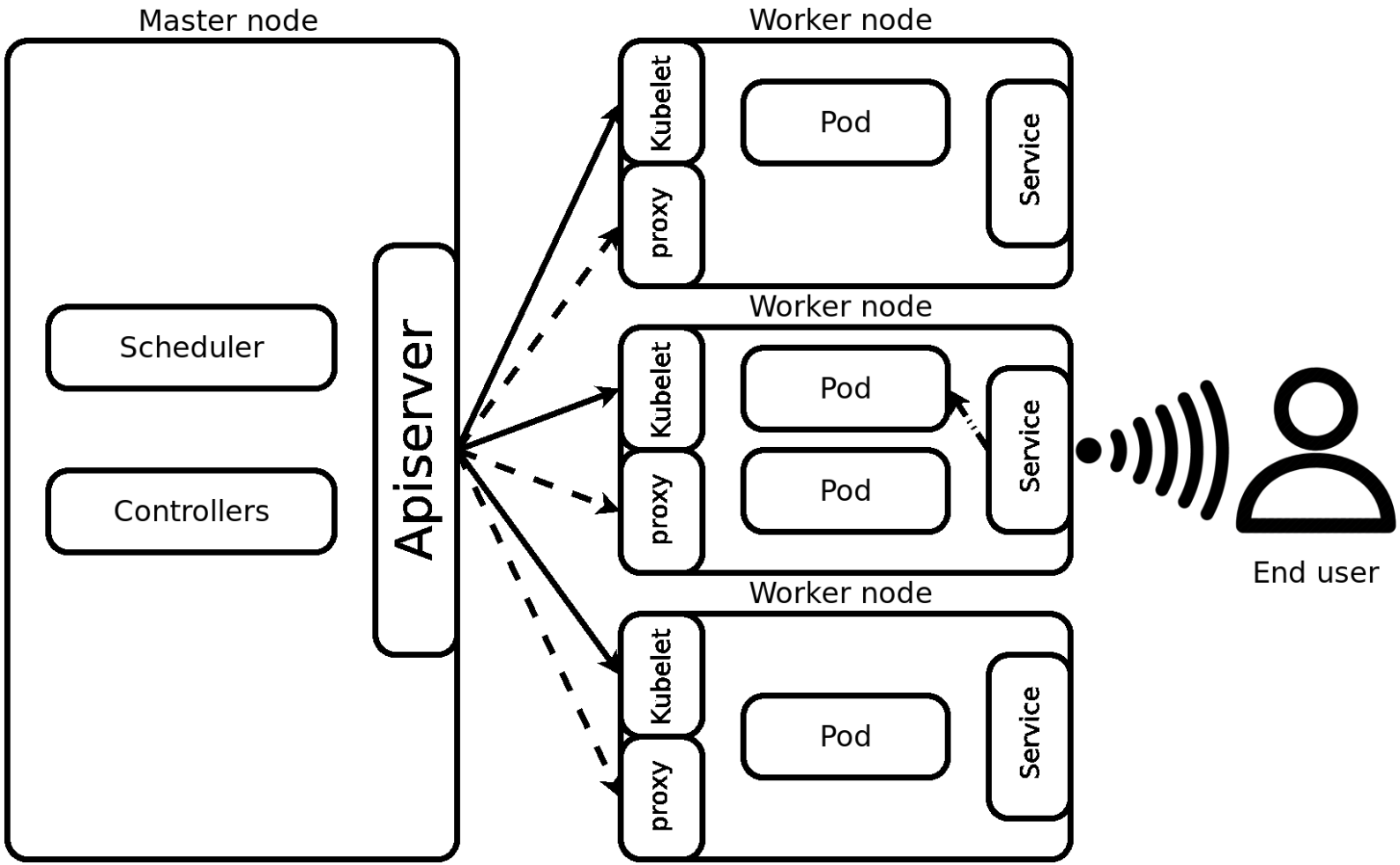
- Creating the optimized infrastructure control for fog computing architecture.
- This main objective will be achieved through 3 partial improvements.

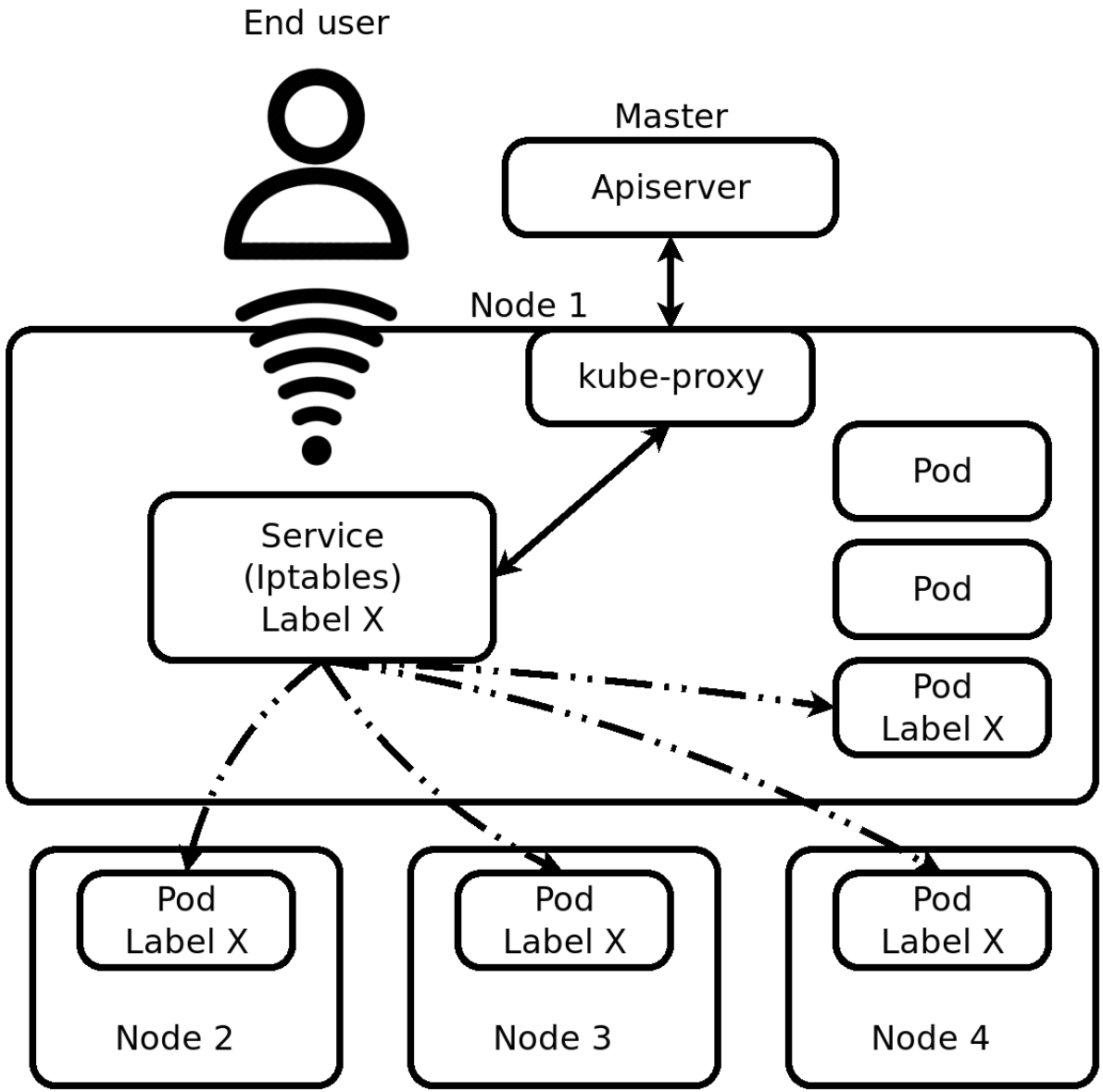
Outline

Kubernetes architecture



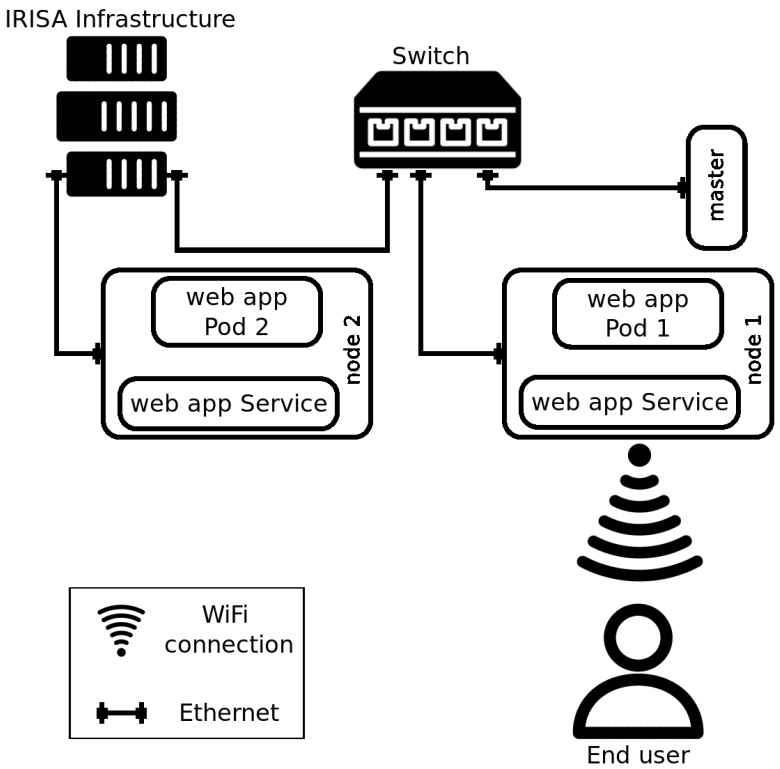
Outline

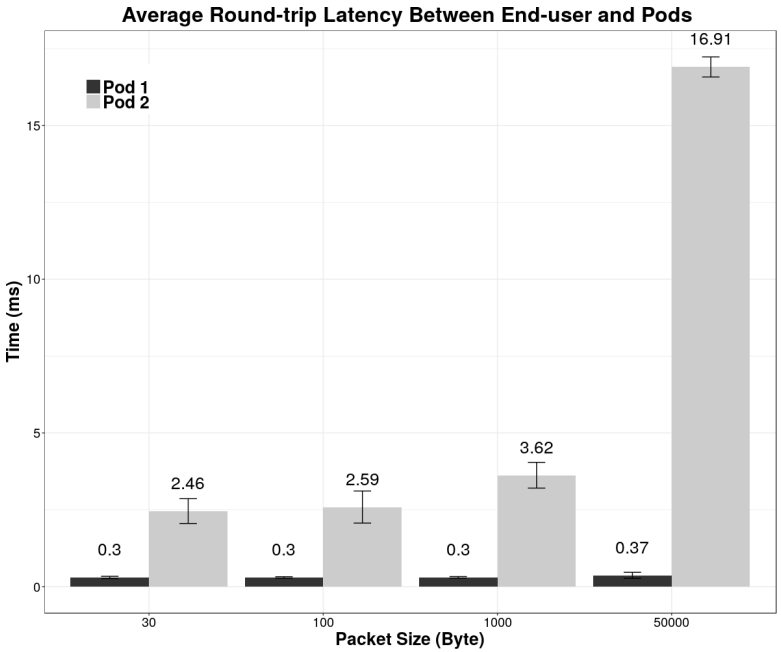
Kubernetes Services



Outline

Services Random Selection Of Pods

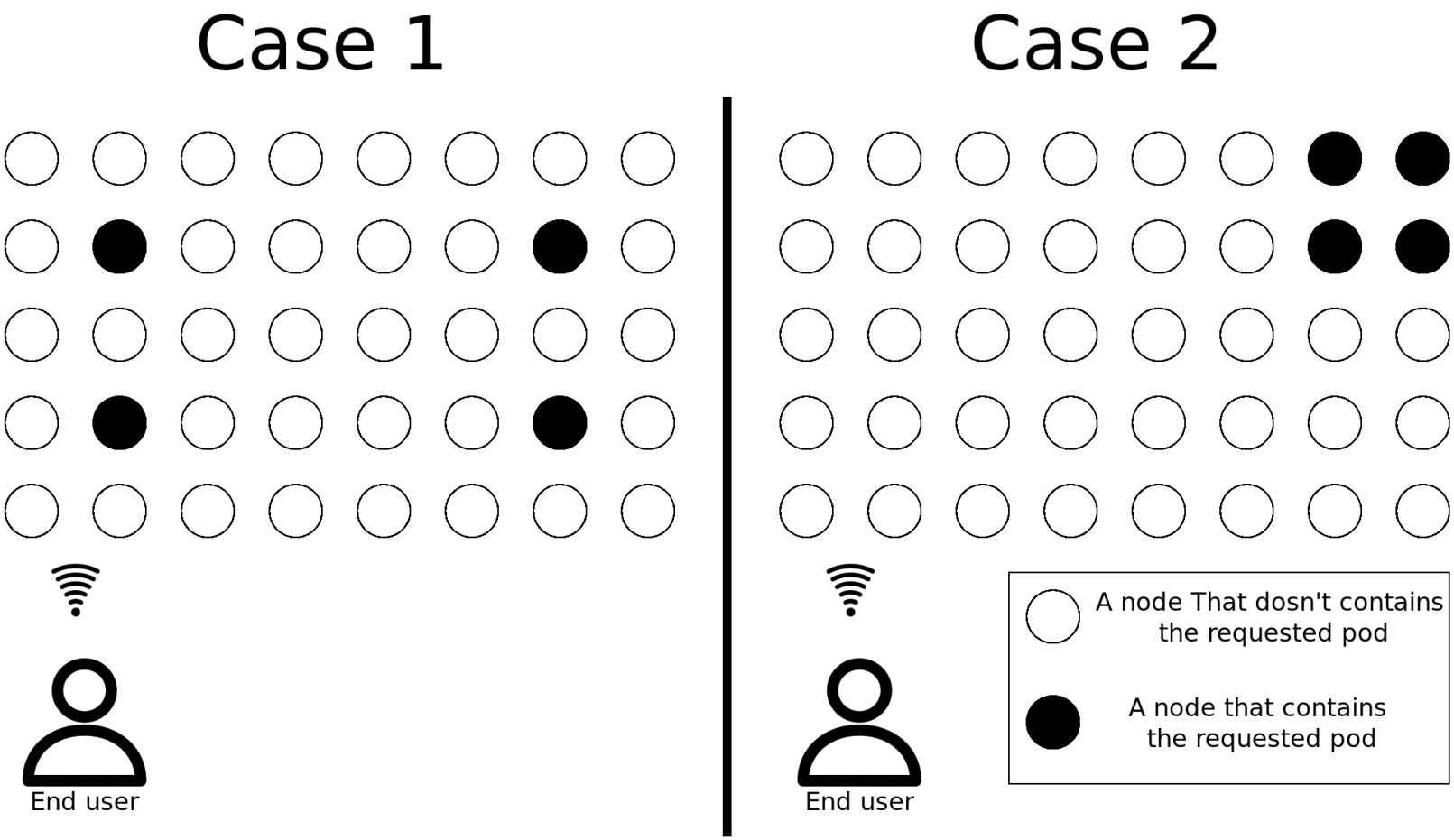




(To be done before 01/08/2018)

Outline

Deployment Random Selection Of Nodes



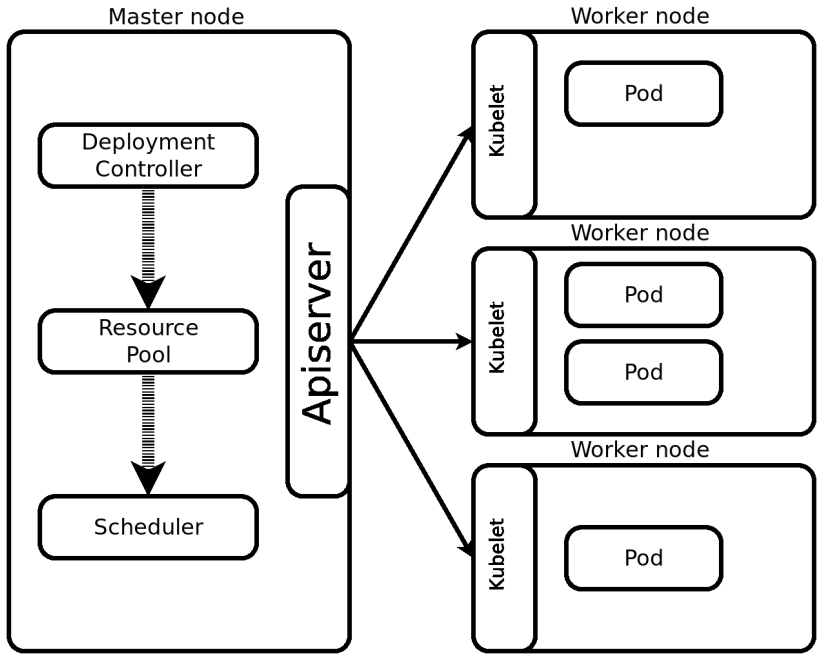
(To be done 01/08/2018 - 01/03/2019)

Outline

Kubernetes Control Decentralization

Related Work

- The pod deployment process is split into three steps.
- Deployment controller.
- Provisioning the resource pool.
- Scheduling the new deployment pods.
- All these steps are centralized and executed by the master.



(To be done 01/03/2019 - 01/03/2020)

Outline

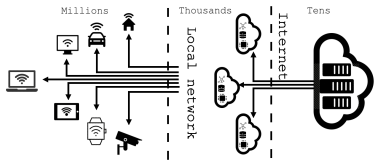
Related Work

- Each objective has it's own set of related work.
- For the broad objective, PiCasso is a new platform created for fog.
- For the Kubernetes service, Xie et al changing the services implementation by using IPVS instead of Iptables.
- For the platform decentralization, The Discovery imitative trying the same with openstack.

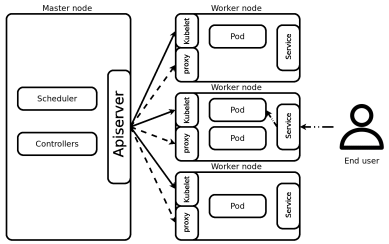
The Fog

Greedy Applications and The Fog

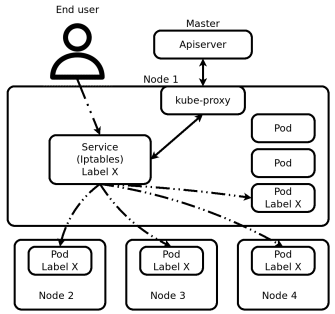
- New types of applications requires lower latencies and location awareness.
- Fog computing an extended paradigm of clouds.
- Nodes will be distributed in the end-user proximity.
- Fog will provide lower latencies and data localization.



Kubernetes architecture



Kubernetes Services



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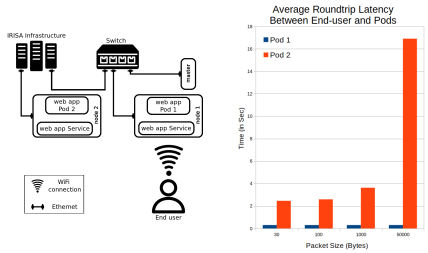
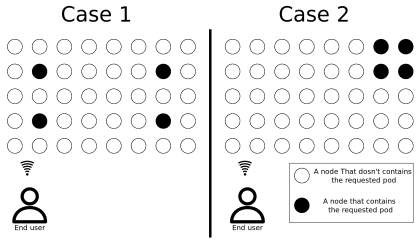


Deployment Random Selection Of Nodes



Deployment Random Selection Of Nodes

The Emergence of Centralized Data Centres

- Updating the Pod to have a location measure.
- Improving the selection methods used by Kubernetes' services.
- Changing the deployment controller.

Thanks for your attention!
Questions?