Decentralized Fog Computing Infrastructure Control

Ali Jawad FAHS

Univ Rennes, INRIA, CNRS, IRISA.

Supervised by: Prof. Guillaume PIERRE

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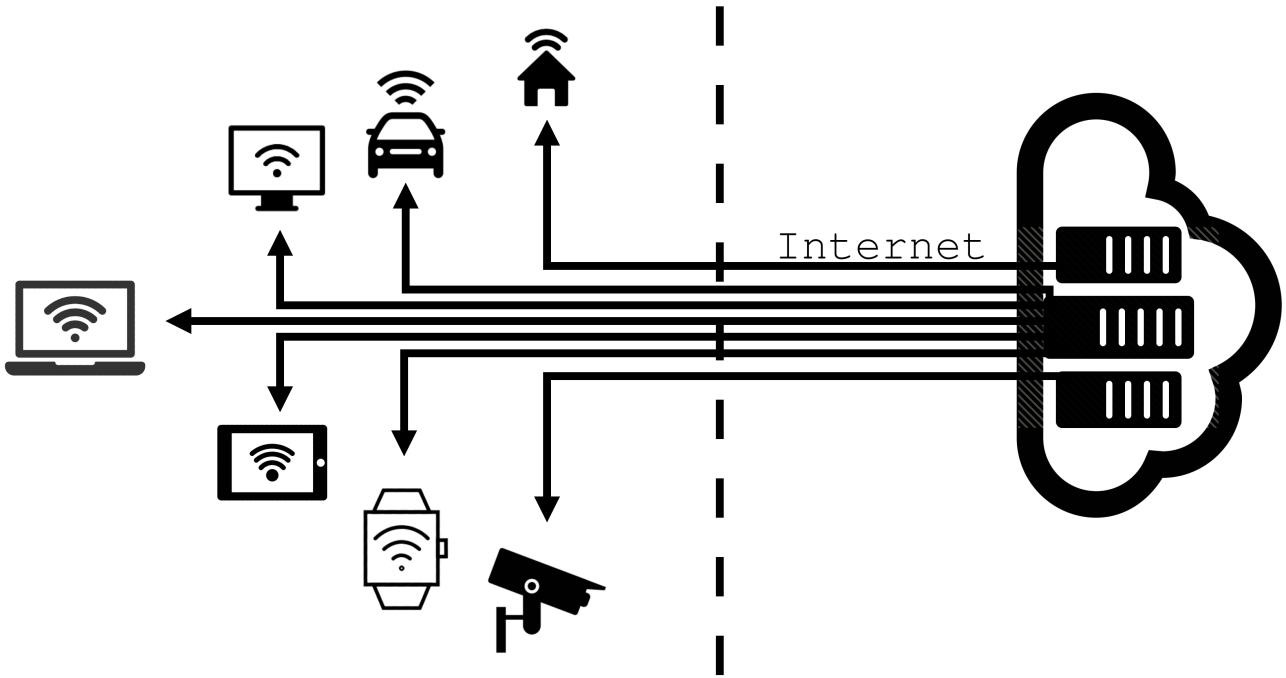
Outline

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 rely on nothing more than 15 data centres.

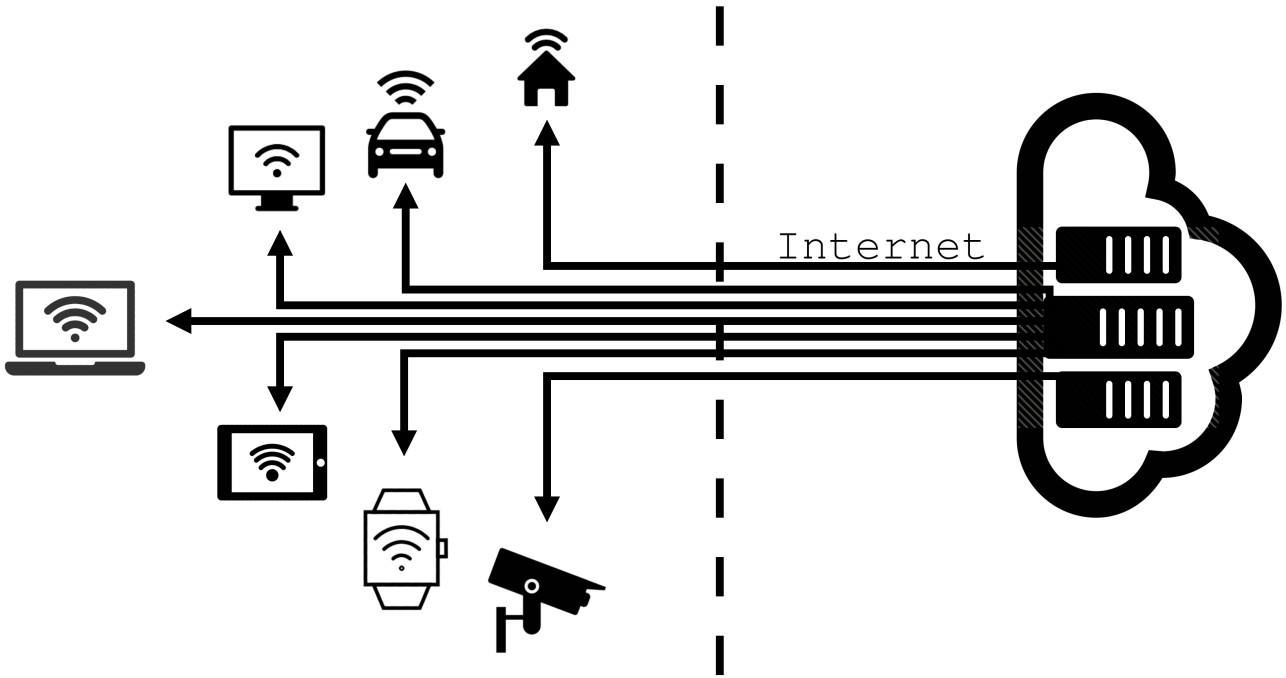


General Introduction

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 rely on nothing more than 15 data centres.
- Two main problems: internet traffic and high latency.



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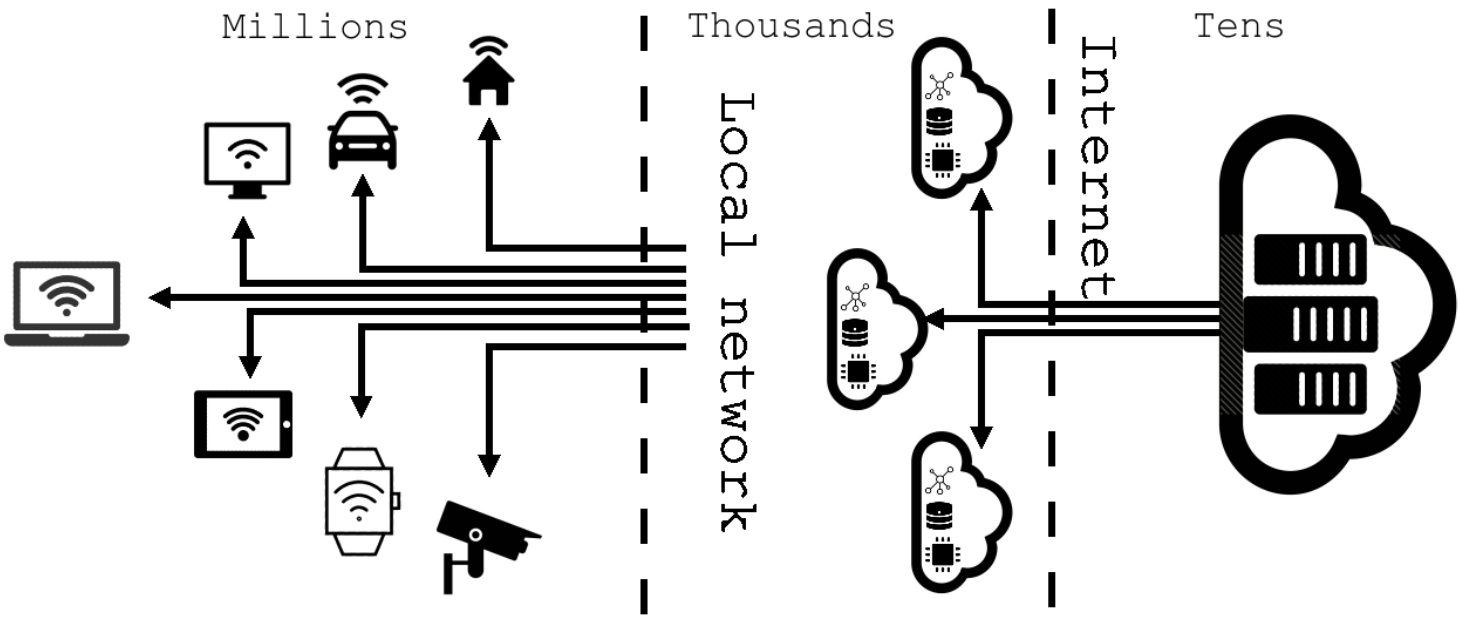
The Fog

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.



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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, Docker swarm, Mesos, Openstack.
- cloud's platform lack some complementary features that will full-fill the definition of fog.

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PhD Objectives

One broad Objective

- Creating the optimized infrastructure control for fog computing architecture.

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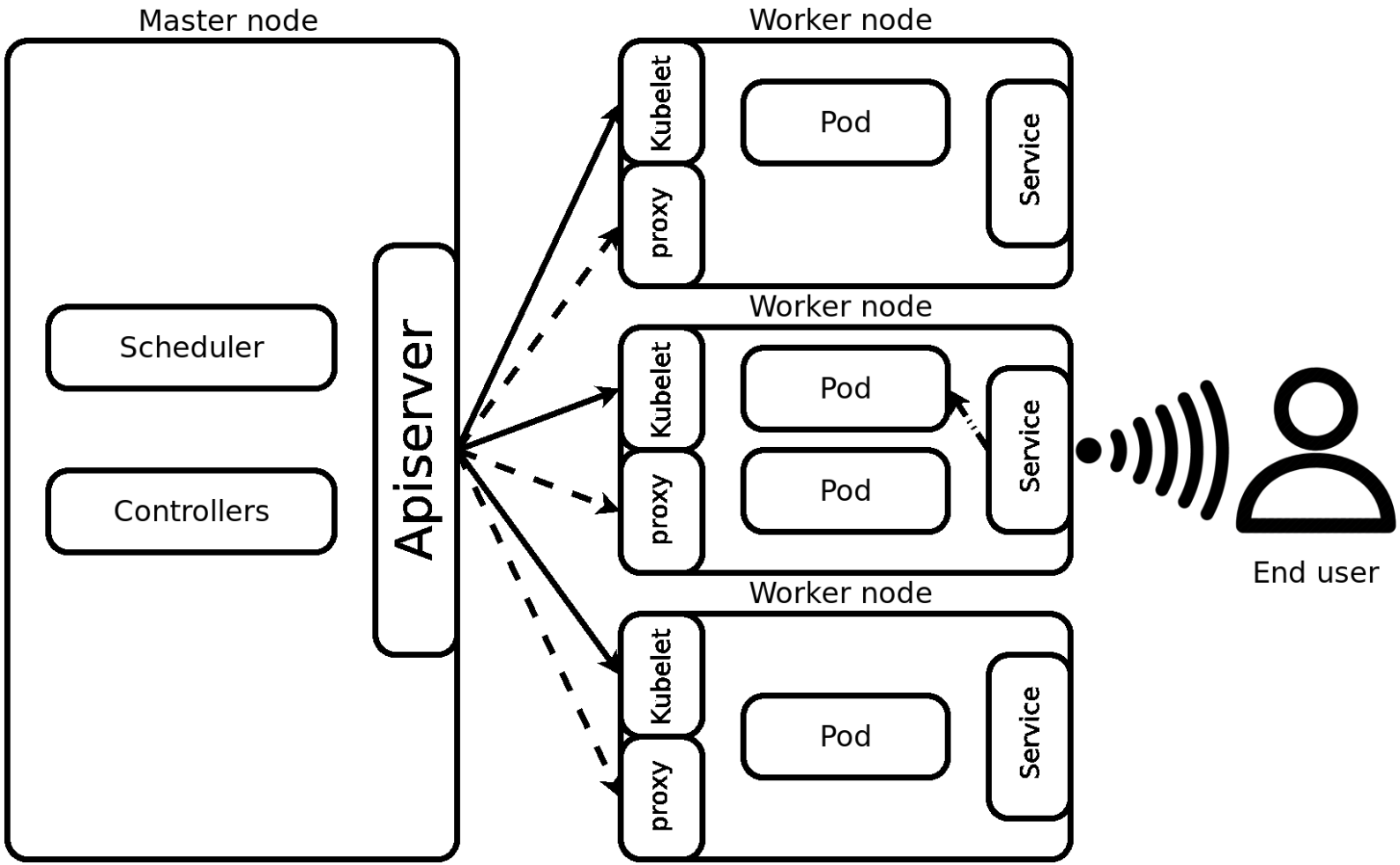
- Creating the optimized infrastructure control for fog computing architecture.
- This main objective will be achieved through 3 partial improvements:
  - Taking the location and latency into account when assigning users to containers.
  - Changing the Kubernetes deployment controller, to allocate the containers in an optimized manner.
  - Decentralizing the infrastructure control of Kubernetes.

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 initiative trying the same with openstack.

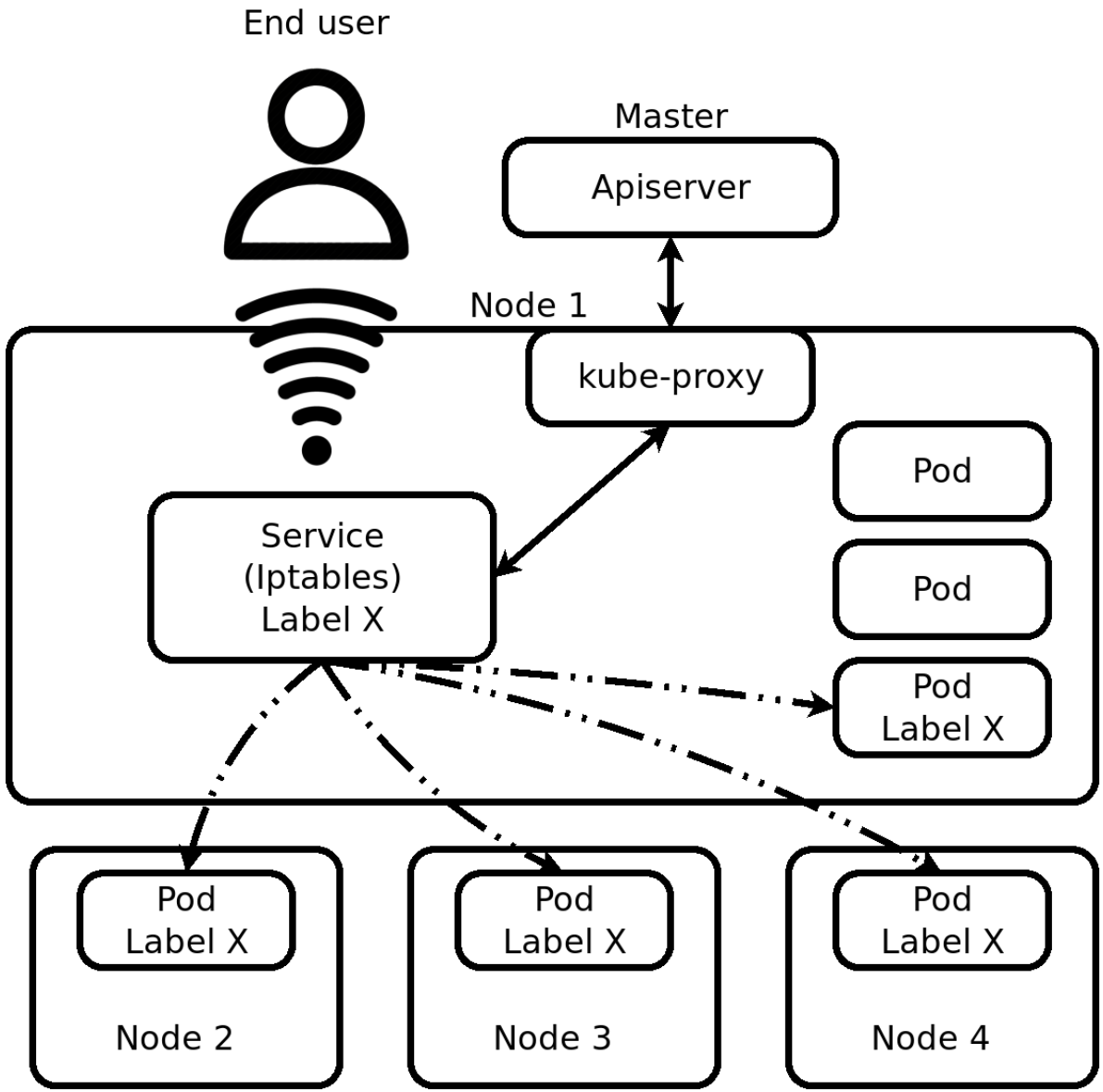
Outline

Kubernetes architecture



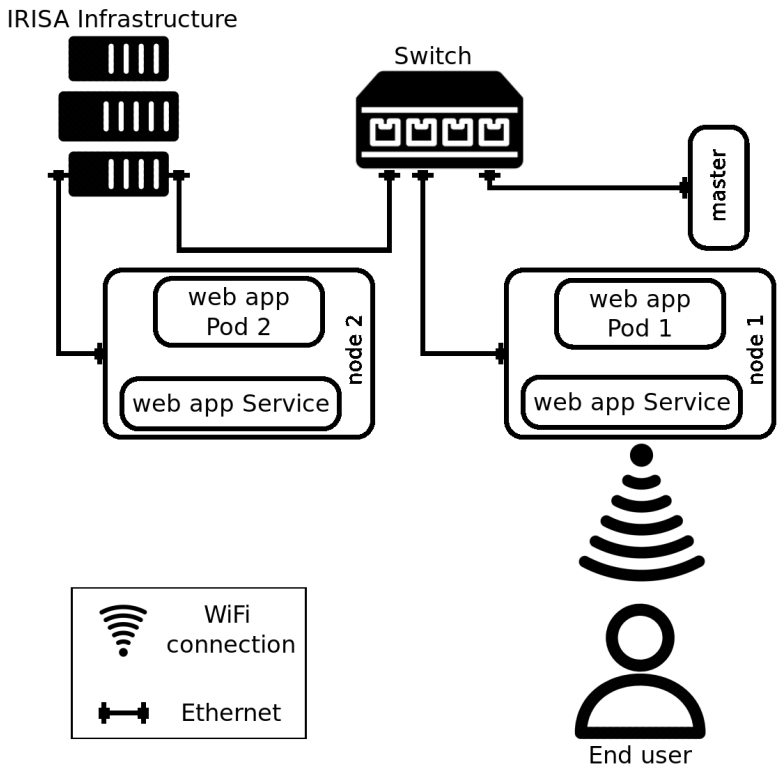
Outline

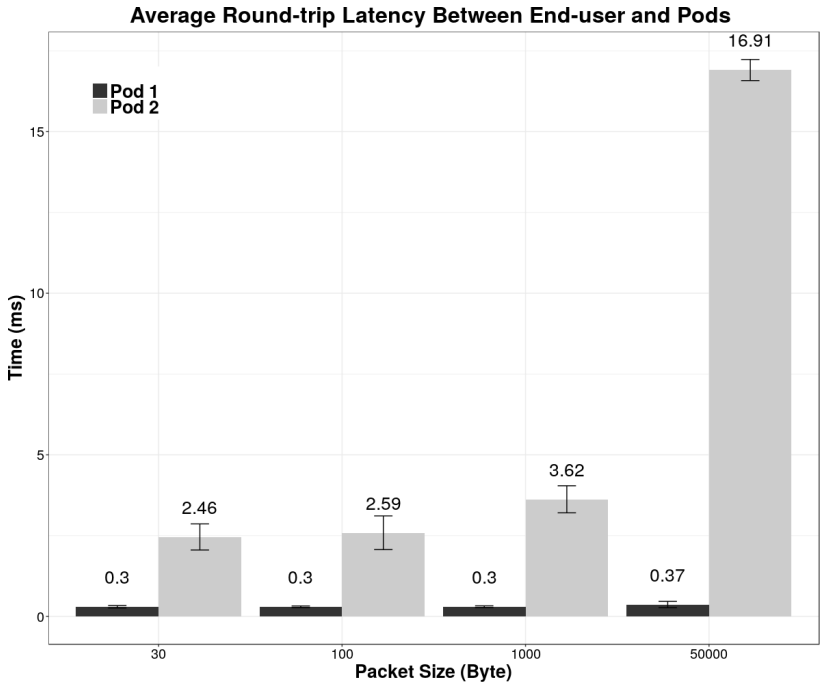
Kubernetes Services



Outline

Services Random Selection Of Pods

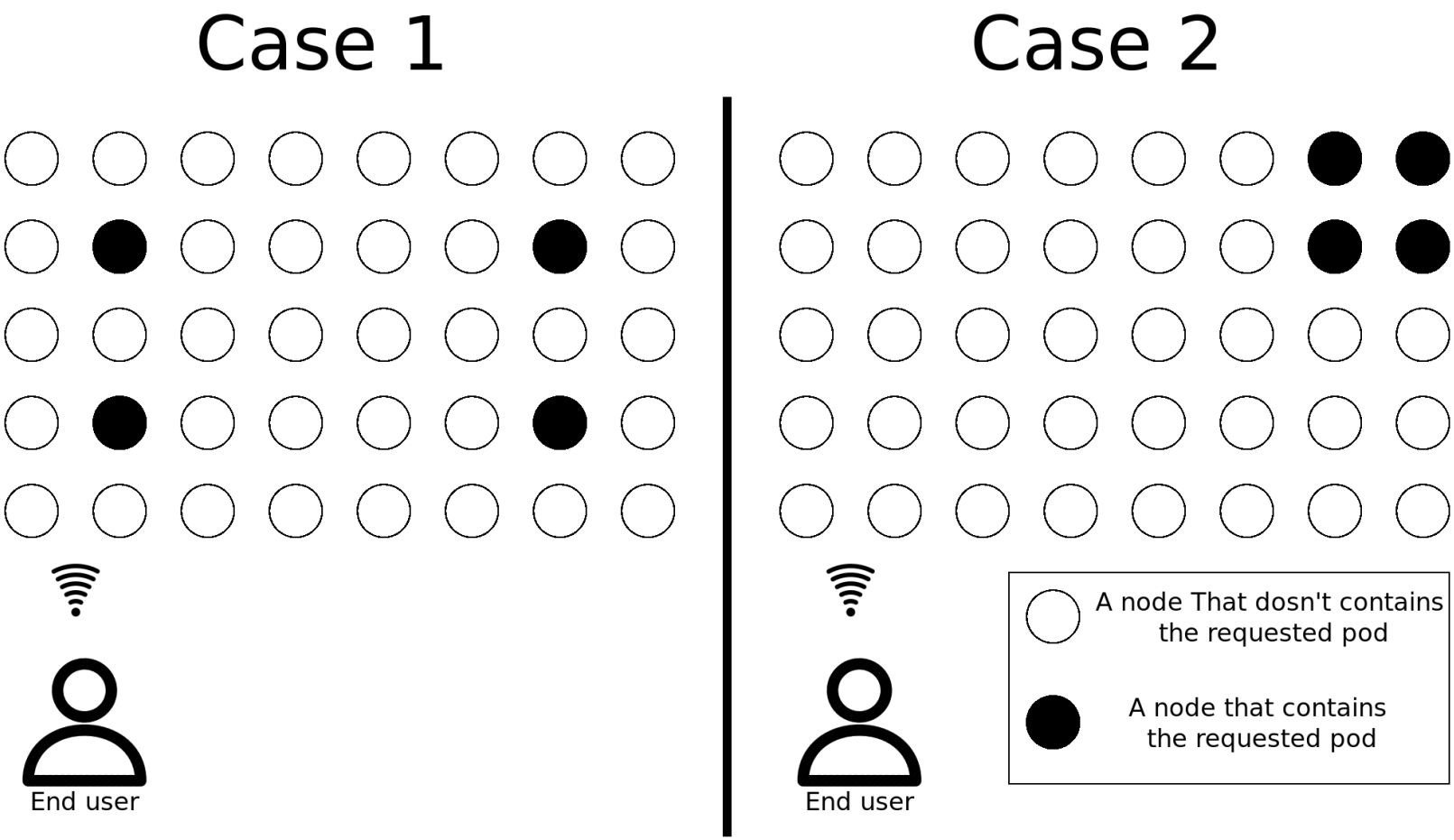




(To be done before August 2018)

Outline

Deployment Random Selection Of Nodes

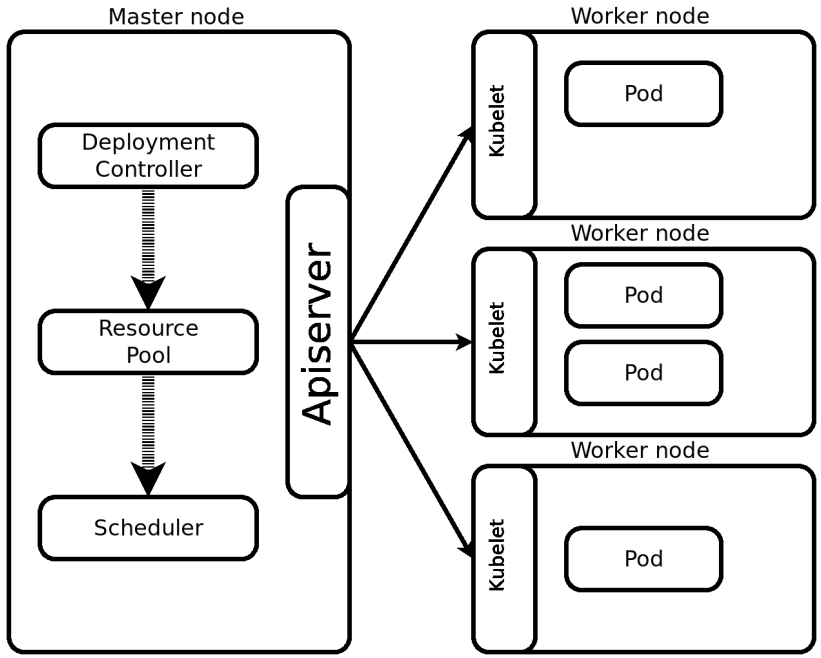


(To be done August 2018 - April 2019)

Outline

Kubernetes Control Decentralization

- 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.



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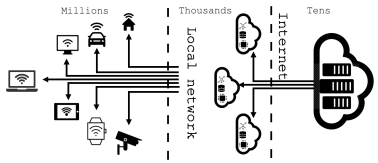

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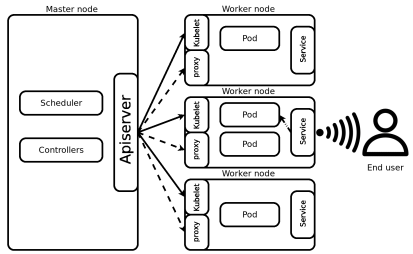

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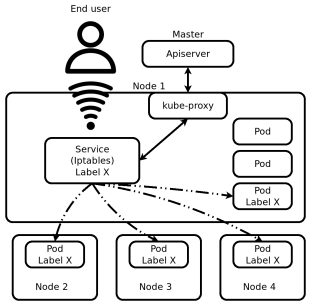

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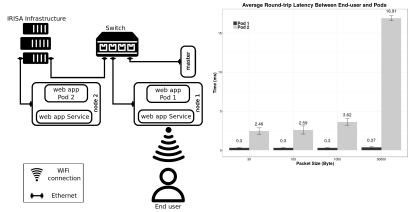

(To be done before 01/08/2018)

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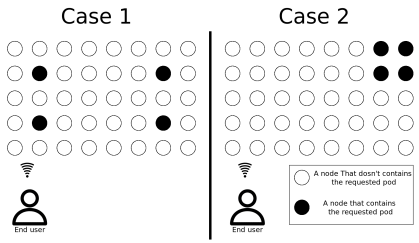

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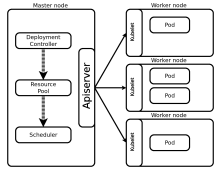

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Thanks for your attention!
Questions?