CELTIC-NEXT Proposers Day

5th February 2019, London

Pitch of the Project Proposal

Intelligent Edge of Things (I-EoT)

UNIVERSITY OF OULU

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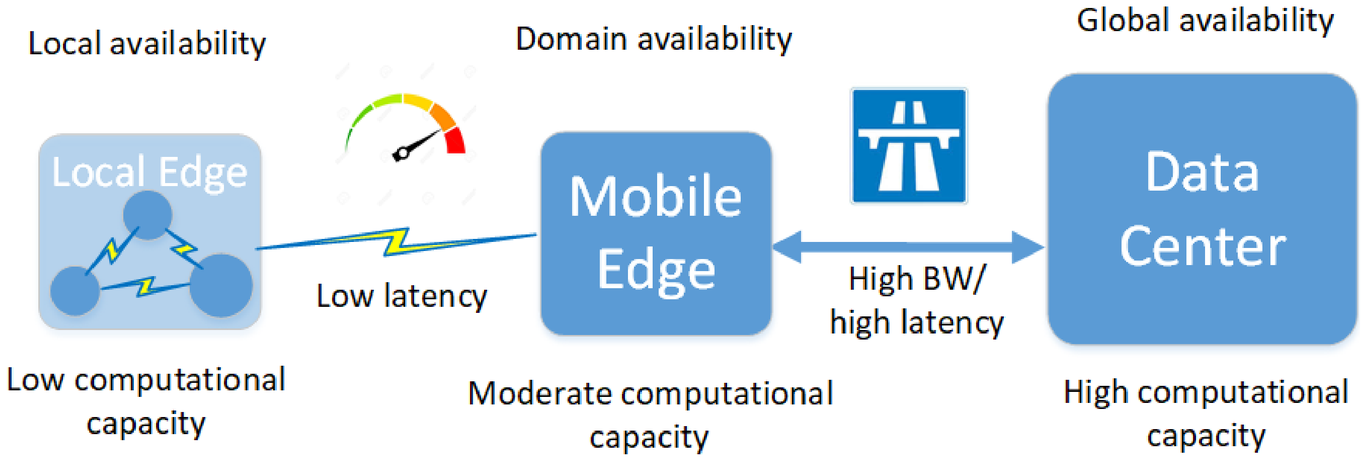
Teaser

- *Considering decentralized & virtualized three-tier Edge IoT architecture, in this proposal we focus on…*
- *How AI / machine learning can be used in:*
  - *Finding optimal placement of services and resources in the correct architectural tier?*
  - *Optimizing the resource utilization & management in the edge infrastructure?*
- *…to achieve:*
  - *Improved cost- & resource-efficiency*
  - *Higher QoE*
  - *Higher level of security & privacy*



Three-tier Edge IoT architecture

Organization Profile

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Next Generation Telecommunications

University of Oulu

- One of the largest universities in Finland: ~16 000 students, ~3 000 staff
- Focus research areas:
  - Information Technology
  - Biosciences and Health
  - Cultural Identity and Interaction
  - Environment, Natural Resources and Materials

Faculty of Information Technology and Electrical Engineering (ITEE)

- ~2 000 students, ~500 staff
- Strengths & success factors:
  - High-quality teaching and research
  - Multi- and interdisciplinary collaboration
  - Strong external funding
  - Close collaboration with industry & research organizations

Available research infrastructures

- World's first 5G test network: 5GTN
- Smart campus environment
- MEC development environment
- 6Genesis research program

CWC

- One of the leading research institutes globally in the area of wireless communications
- Focus areas include e.g.: 5G, 6G, IoT, Edge, Security, …

Ubicomp

- The largest cluster of ubiquitous computing & HCI researchers in Finland, and one of the largest in Europe
- Focus areas include e.g.: IoT + Edge, machine learning, Big data, UX, …

Introduction

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- ***Some of today's most relevant technology trends:***
  - ***Artificial Intelligence (AI)***
    - *The most active field of AI is* ***Machine Learning (ML) with a new trend distributed ML methods***
  - ***Virtualization***
    - *One of the most active fields is* ***decentralized virtual microservice architectures***
    - ***Lightweight container technologies***
  - ***Edge computing***
    - *Lot of buzz around* ***Mobile Edge Computing (MEC)***
    - *The newest trend is Local edge computing, e.g.* ***IoT Edge***

Our proposal: I-EoT (1)

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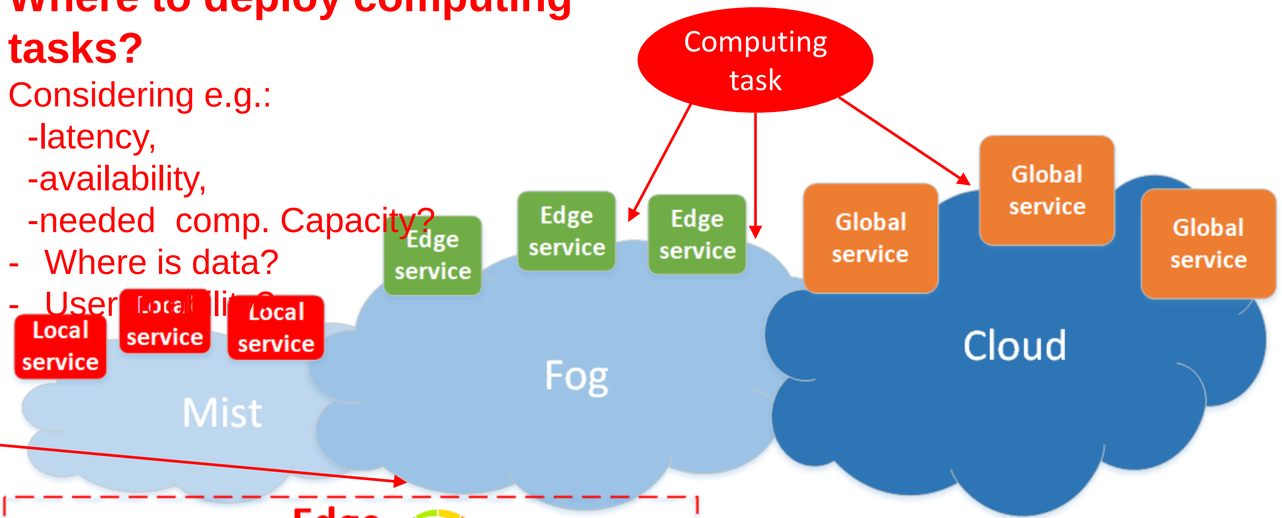
AI

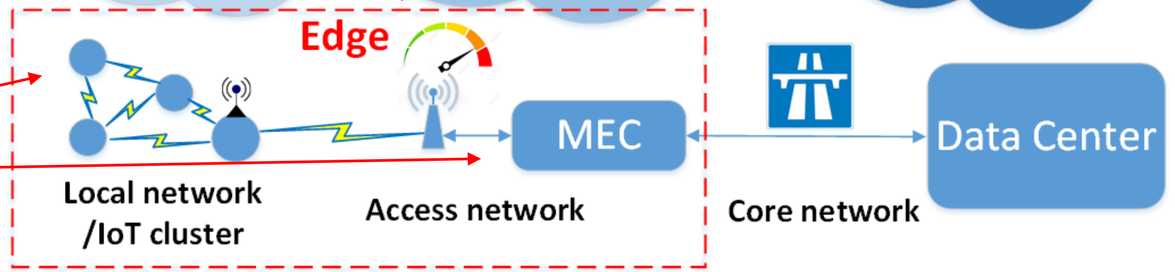
This proposal: How can AI/ML be used in this context?
-Goal: to research & develop methods to address the challenges,
-Bidirectional approach: AI=>Edge, Edge=>AI

Security & privacy

Edge infrastructure

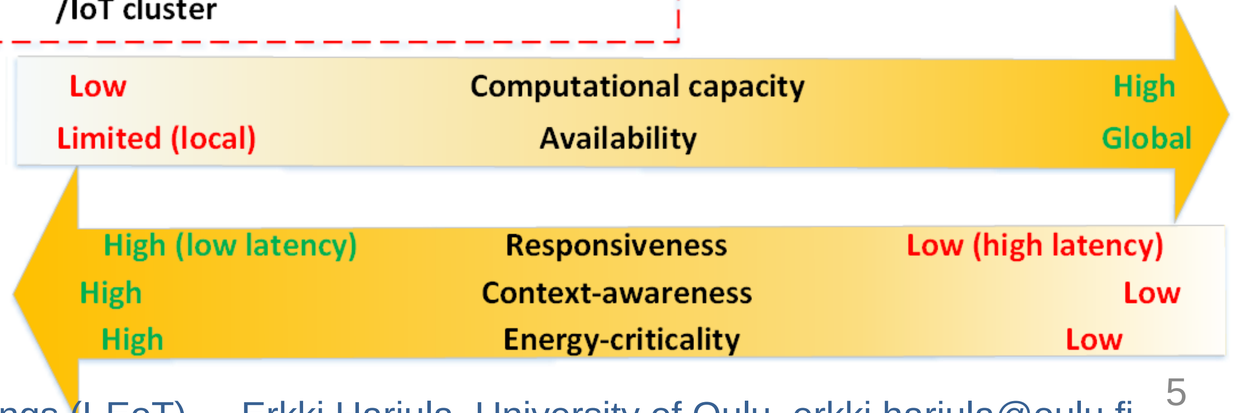
Where to deploy computing tasks?
Considering e.g.:
-latency,
-availability,
-needed comp. Capacity?
- Where is data?
- User [illegible]?





How to limit propagation of sensitive data?
Considering e.g.:
-who needs what kind of data?
-can raw data be kept local, while only analysis results are sent to public cloud?
-is there enough local computing capacity for local processing?
-which organization controls the infra and can it be trusted?

How to optimize capacity/resource placement?
Considering e.g.:
-performance
-resource-efficiency,
-user mobility,
-manageability&maintenance?



Our proposal: I-EoT (2)

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- ***Benefits / Business potential of AI-assisted Edge computing***
  - ***Subscribers/users*** *will benefit from:*
    - *Faster low latency content delivery and increased privacy, interactivity and reliability*
  - ***3rd party developers*** *will benefit from:*
    - *Cost-effective deployment of applications and advanced data-analytic capabilities for resource utilization*
  - ***Network / system / edge platform Operators*** *will benefit from:*
    - *Optimized utilization and intelligent management and maintenance of their resources*
- ***Overall business value based on reductions in operational costs and improved QoE***

Potential partners:

- ***We are looking for project collaboration within the scope of the proposal***
  - *For initiating a new project proposal (or alternatively joining in a related existing proposal)*
- ***The potential partners include:***
  - *Cloud infrastructure providers*
  - *Big data / data analytics providers*
  - *Edge/ Fog infrastructure providers*
  - *Telecom infrastructure providers and operators*
  - *IoT device manufacturers*
  - *Potential customer organizations on application areas such as industry/office/home automation/surveillance, e-health, smart traffic, logistics, city infrastructure, etc.*
  - *Cybersecurity specialists*
  - *Research partners focusing on e.g. Edge, AI/ML, Security, Distributed systems*

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Join the follow-up Telco
13 Feb. 9-10 CET

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Join Webex meeting
Meeting number (access code): **959 805 643**
Meeting password: **KtmB3pMf**

Join by phone
+49-6925511-4400 Germany toll
Global call-in numbers

Can't join the meeting?