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Real-time scheduling mechanisms for cost efficient power consumption strategies

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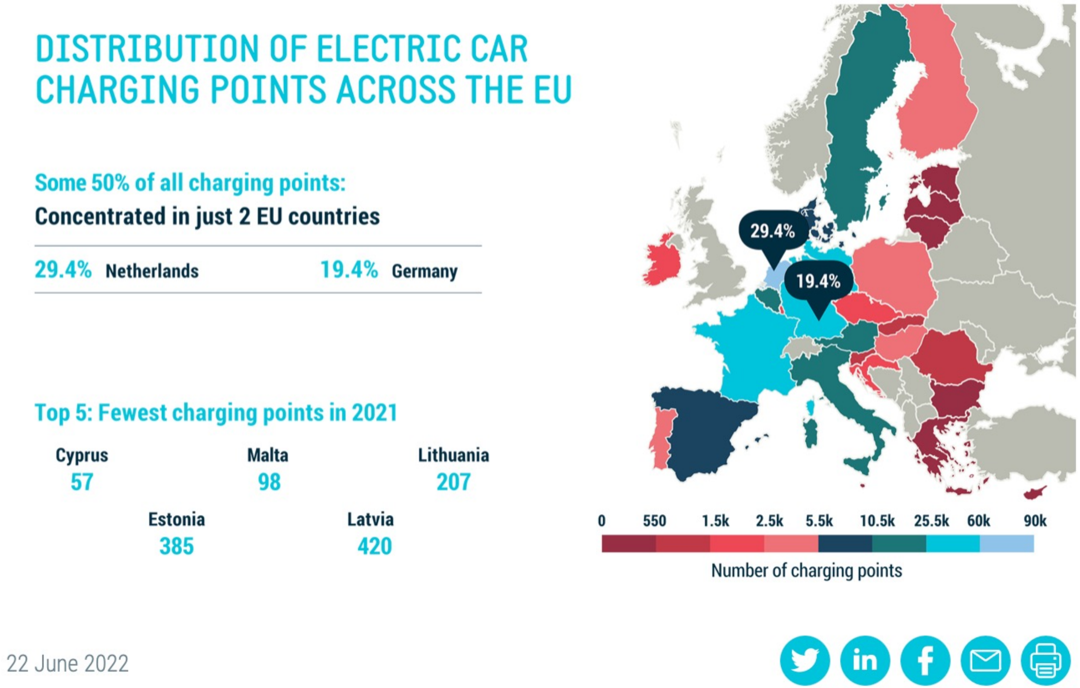
Outline

- Context & motivation
- Propose solution
- Proposed arhitecture
- Use case
- Impact and inovation
- Conclusions

Context and motivation



	Romania	Netherlands
Population	19.3 mil	18.45
Number of electric cars	12883	292000
Charging stations	1000	70000

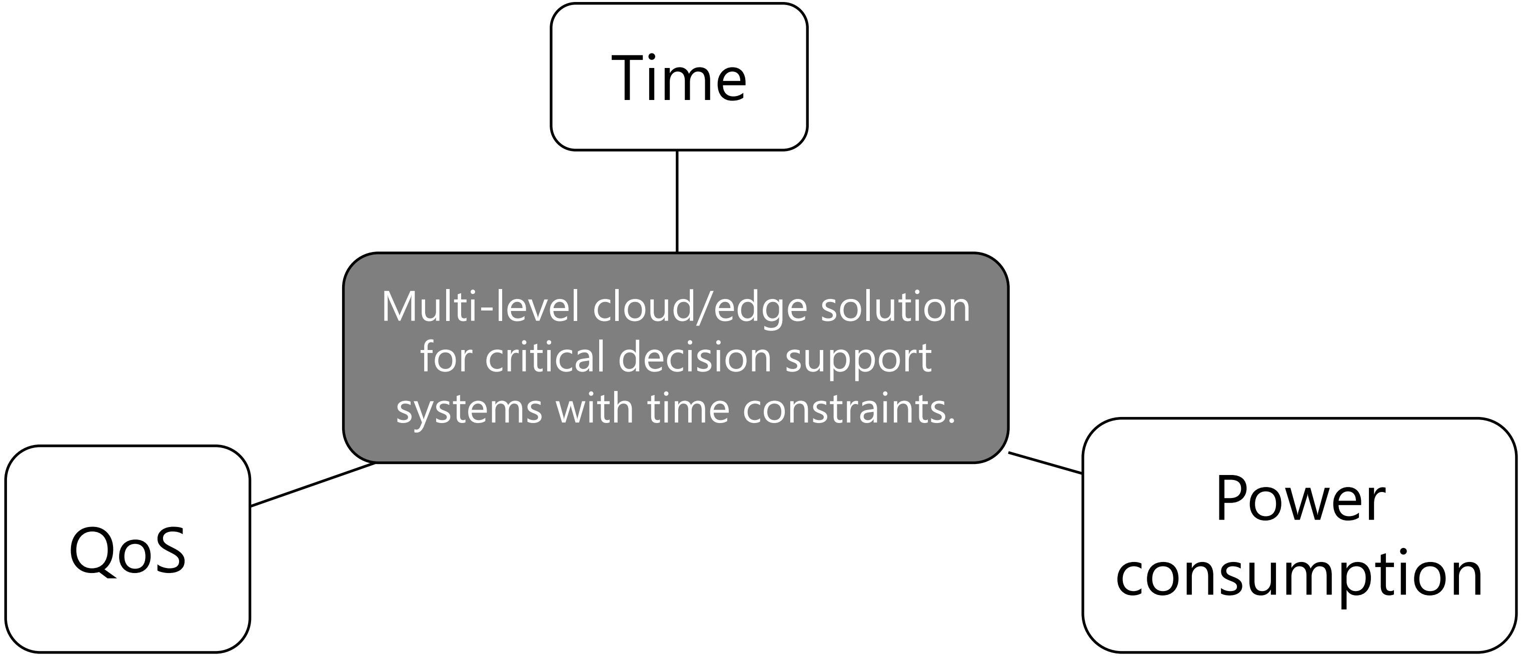
https://www.acea.auto/press-release/electric-cars-half-of-all-chargers-in-eu-concentrated-in-just-two-countries/

Context and motivation

Existing research in the optimization of scheduling algorithms

- Is largely limited to two objectives;
- Uses a-priori methods that do not approach the Pareto boundary;
- Aim to find a single compromise solution through aggregation and constraint planning;
- Focus on resource-orientated applications, not on real-time data processing in a distributed cloud/edge infrastructure.

Proposed solution

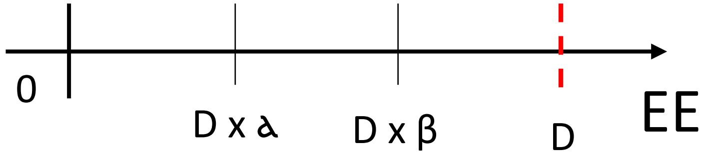


Proposed solution

Task model

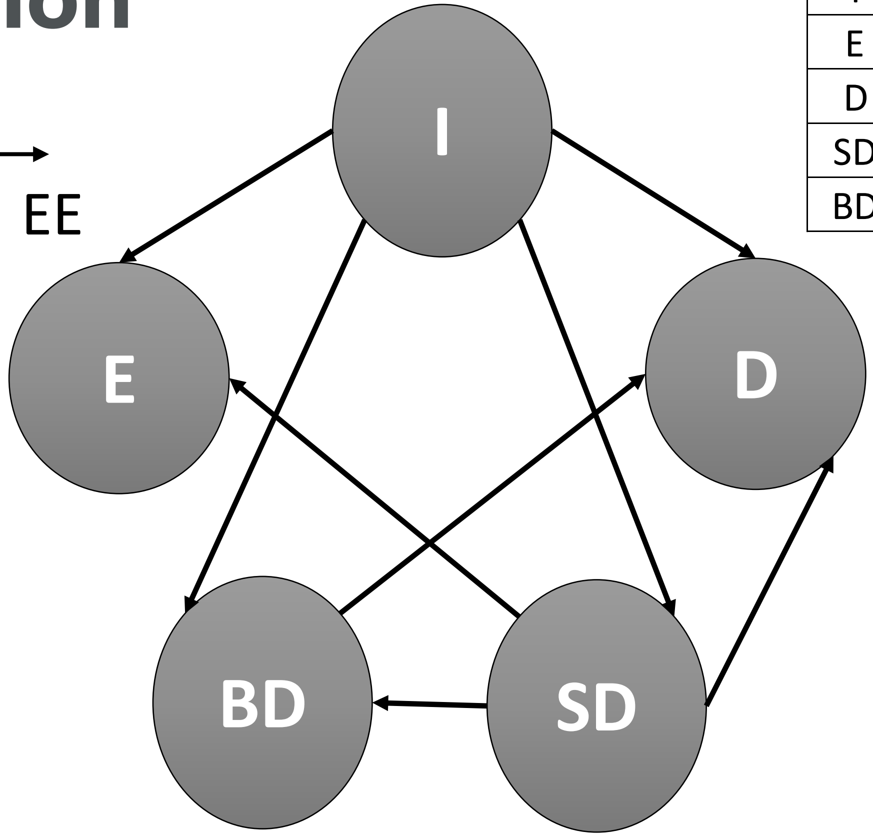
D	– relative deadline
EE	– Estimasted ececution time
RE	– Real execution time
Q	– value of QoS
P	– Power consumtion

Proposed solution

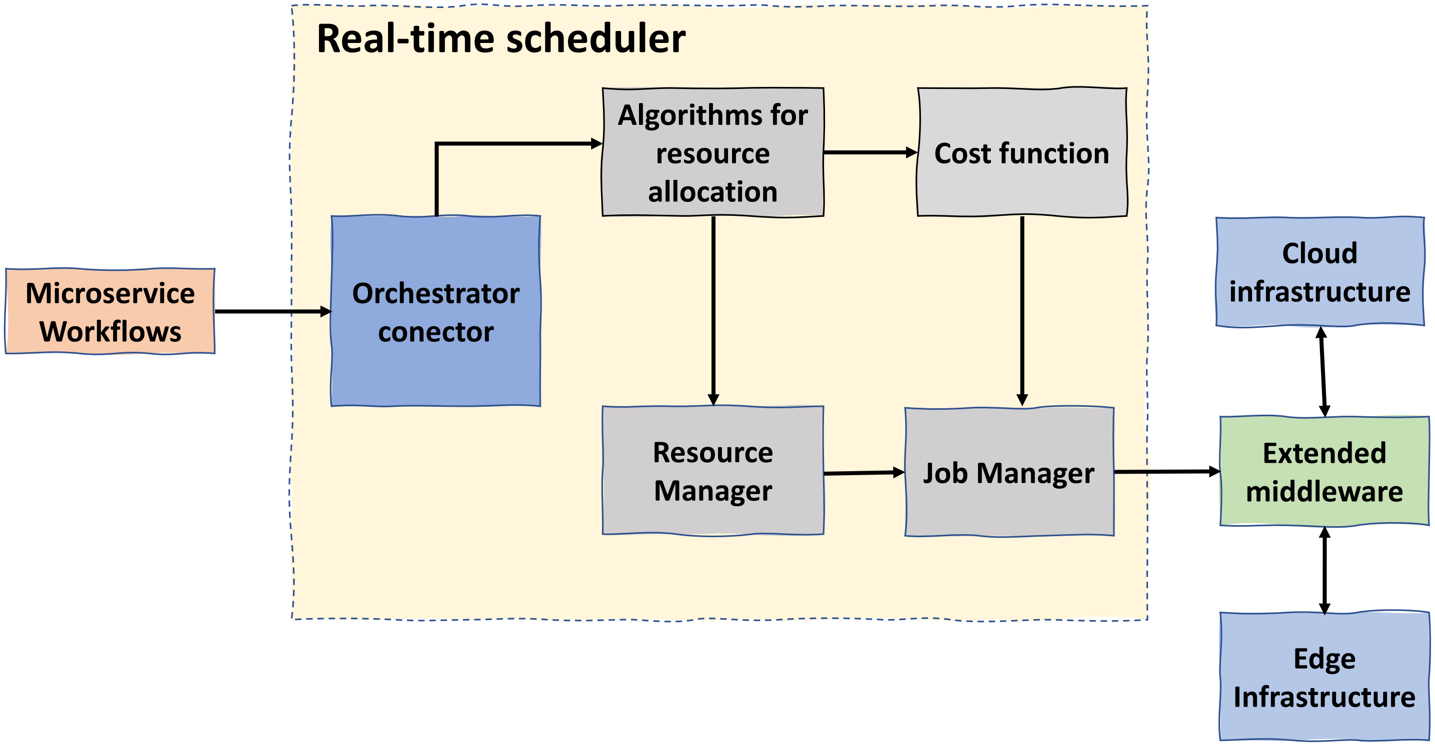


State	Name
I	Init
E	Execute
D	Drop
SD	Should drop
BD	Better drop

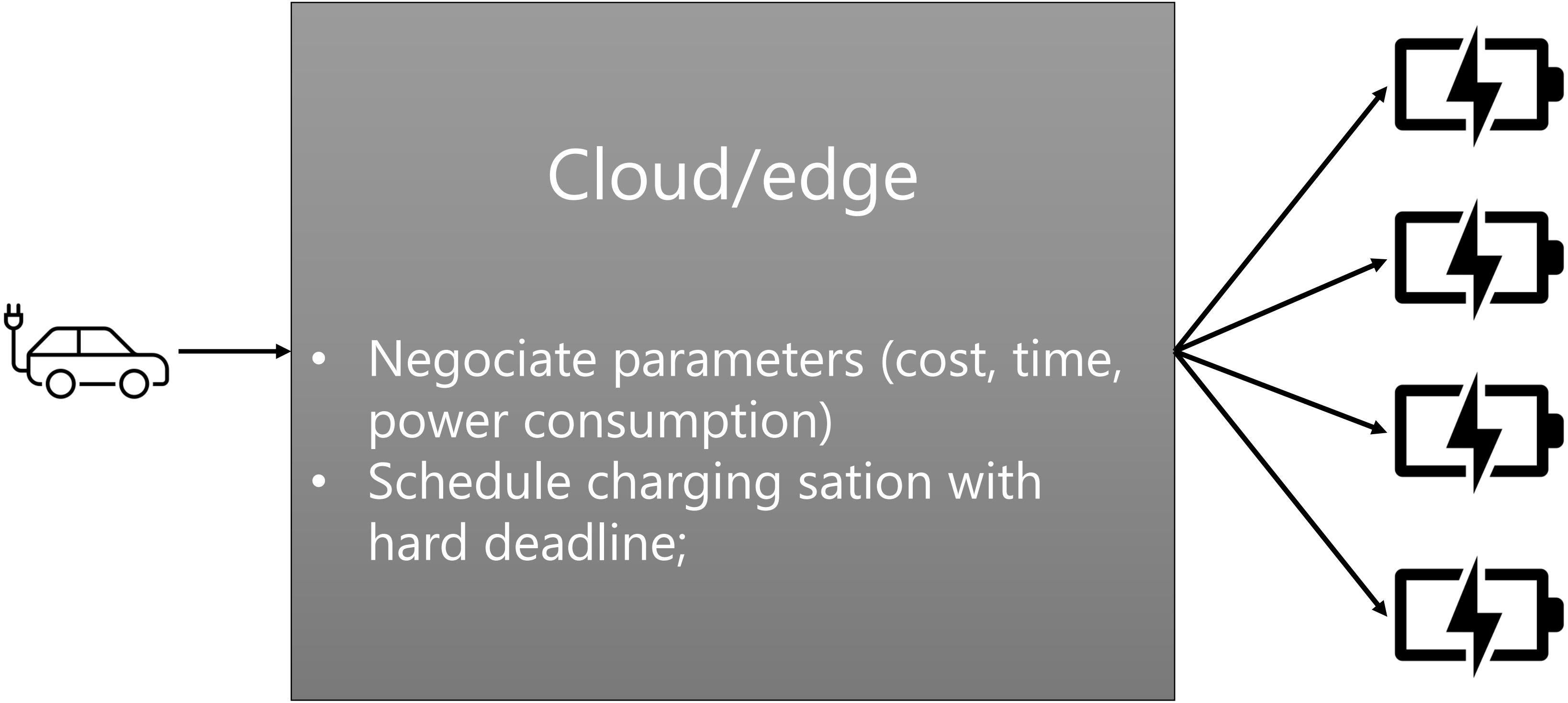
EE	Transition
[0,D x α]	I->E
(D x α, D x β]	I->SD
(D x β, D]	I->BD
(D,∞)	I->D
θ	SD->BD
ε	SD->E
λ	SD->D
ζ	BD->D



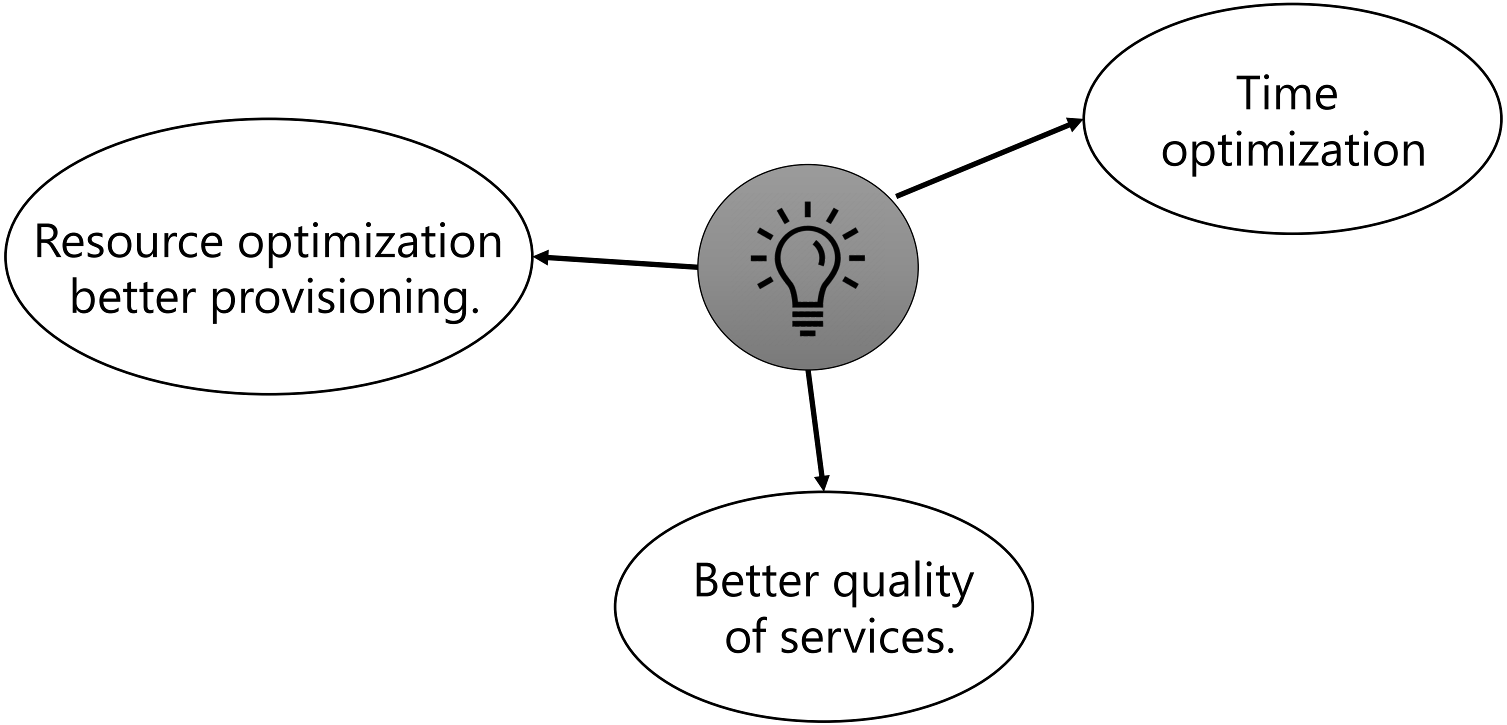
Proposed arhitecture



Use case


Cloud/edge
• Negociate parameters (cost, time, power consumption)
• Schedule charging sation with hard deadline;

Impact and inovation



Conclusions

- Propose a markov-based solution form task scheduling of hard deadline problems;
- Propose a novel multi-level cloud/edge
- arhitecture for multi-criteria scheduling;
- Propose a mobility use-case for task scheduling for electric cars charging stations;
- Describe the impact and the inovations of the proposed solution.

Thank you