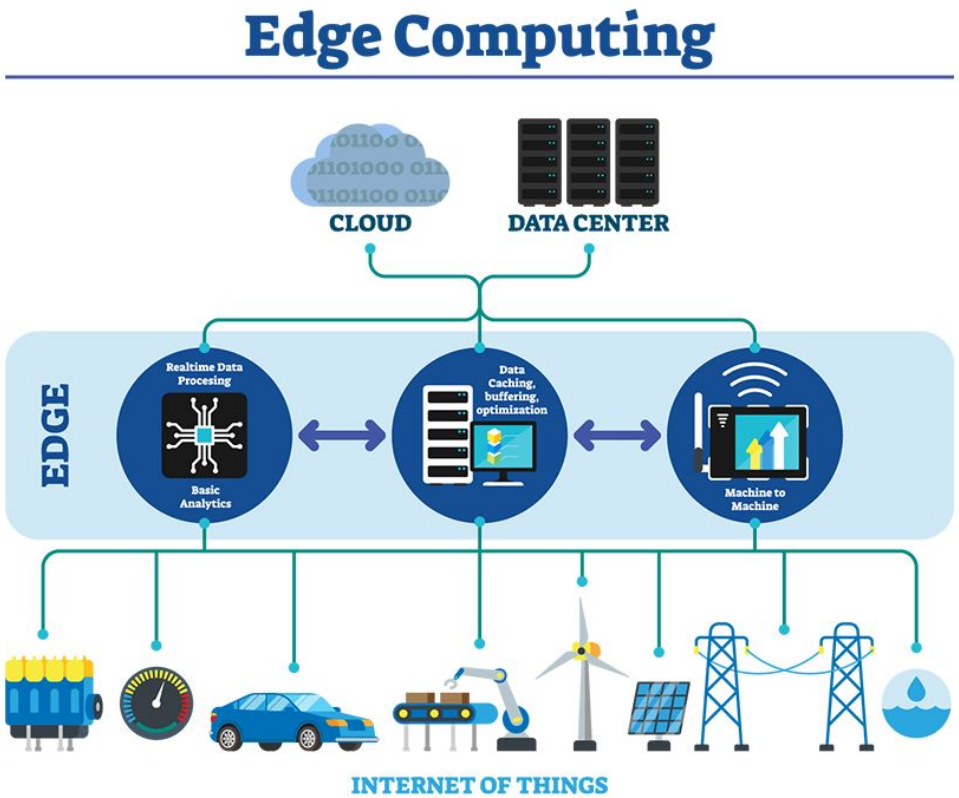
Christian-Albrechts-Universität zu Kiel
Technische Fakultät

Systematic Analysis and Improvement of Edge Computing Simulators

Proposal for a Master's Thesis

Motivation



Source: https://innovationatwork.ieee.org/real-life-edge-computing-use-cases/

Motivation

- Real-life testing inefficient and costly
- Many different simulators with different metrics, approaches, …

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What makes an edge computing simulator “proper” / “good” ?

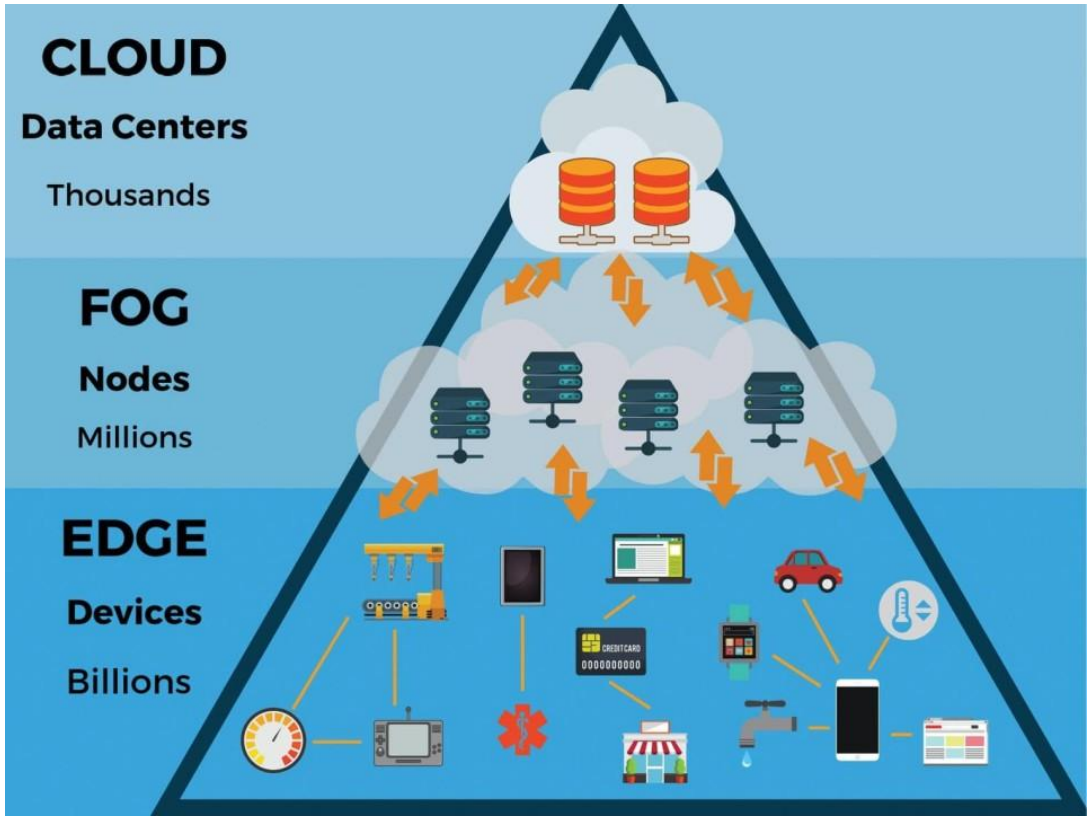
Goals

G1: Definition of Requirements Catalogue

- Criteria an edge computing simulator must meet
  - Features, Metrics, Characteristics, …

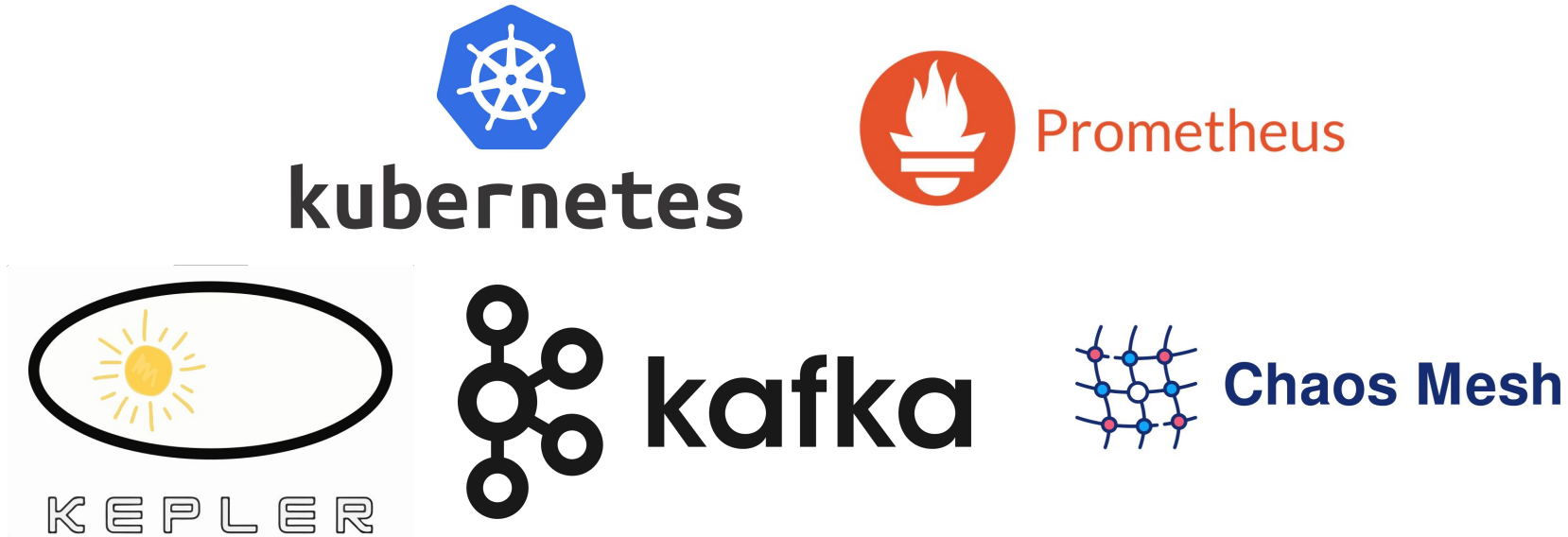
G2: Advancing Ecoscape to a proper Edge Computing Simulator

Foundations : Edge Computing

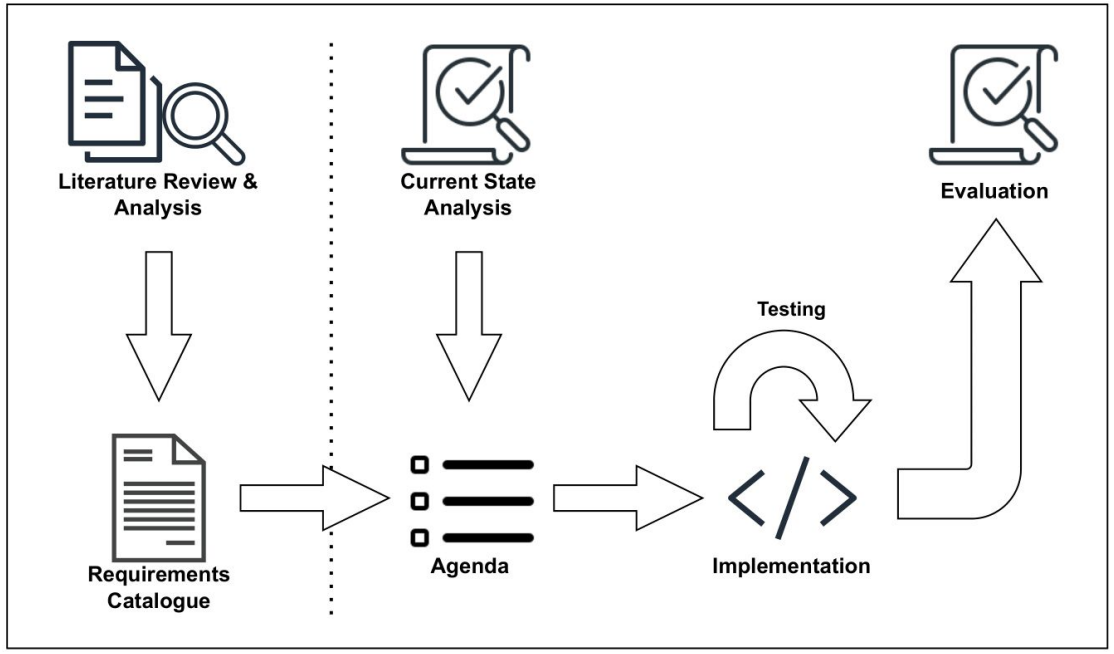


Source: https://zilliz.com/glossary/fog-computing

Foundations : Ecoscape



Envisioned Approach



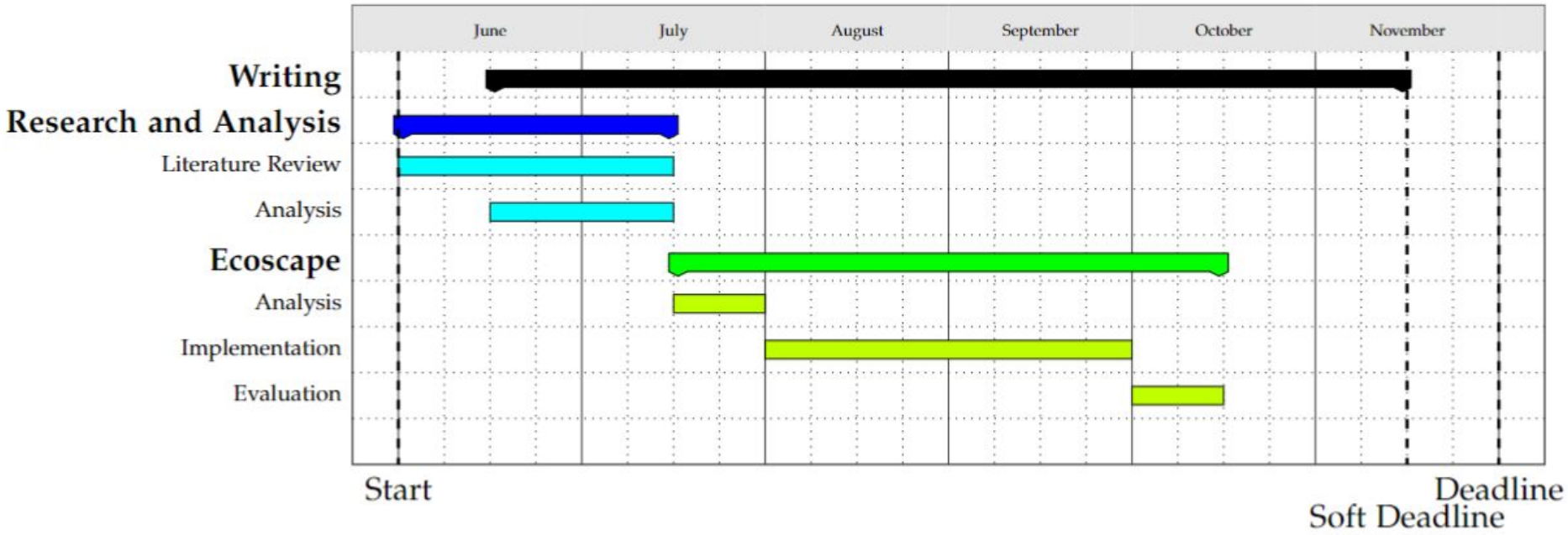
Envisioned Approach - Starting Point

- Representatives of the current state of art

  iFogSim2[1], EdgeCloudSim[2], YAFS[3], EdgeAISim[4], MockFog 2.0[5],

  FogNetSim++[6], EmuFog[7], FogTorch[8]

Schedule


June
July
August
September
October
November
Writing
Research and Analysis
Literature Review
Analysis
Ecoscape
Analysis
Implementation
Evaluation
Start
Deadline
Soft Deadline

References

- [1] Mahmud, R., Pallewatta, S., Goudarzi, M., & Buyya, R. (2022). iFogSim2: An extended iFogSim simulator for mobility, clustering, and microservice management in edge and fog computing environments. *Journal of Systems and Software*, 190, 111351.
- [2] Sonmez, C., Ozgovde, A., & Ersoy, C. (2018). EdgeCloudSim: An environment for performance evaluation of Edge Computing systems. *Transactions on Emerging Telecommunications Technologies*, 29(4), e3493.
- [3] Lera, I., Guerrero, C., & Juiz, C. (2019). YAFS: A simulator for IoT scenarios in fog computing. *IEEE Access*, 7, 91745-91758.
- [4] Nandhakumar, A. R., Baranwal, A., Choudhary, P., Golec, M., & Gill, S.S. (2024). EdgeAISim: A Toolkit for Simulation and Modelling of AI Models in Edge Computing Environments. *Elsevier Measurement : Sensors 31*, 100939.
- [5] Hasenburg, J., Grambow, M., Bermbach, D. (2020). MockFog 2.0: Automated execution of fog application experiments in the cloud. *IEEE Transactions on Cloud Computing*, 9(2), 522-536.
- [6] Qayyum, T., Malik, A. W., Khattak, M. A. K., Khalid, O., & Khan, S. U. (2018). FogNetSim++: A toolkit for modeling and simulation of distributed fog environment. *IEEE Access*, 6, 63570-63583.
- [7] Mayer, R., Graser, L., Gupta, H., Sommer, C., & Dressler, F. (2017). EmuFog: Extensible and scalable emulation of large-scale fog computing infrastructures. *IEEE International Conference on Fog and Edge Computing (ICFEC)*, 33-42.
- [8] A. Brogi and S. Forti, "QoS-Aware Deployment of IoT Applications Through the Fog," in IEEE Internet of Things Journal, vol. 4, no. 5, pp.1185-1192