

DAYstributed

Serverless for Urgent Edge Computing Scenarios



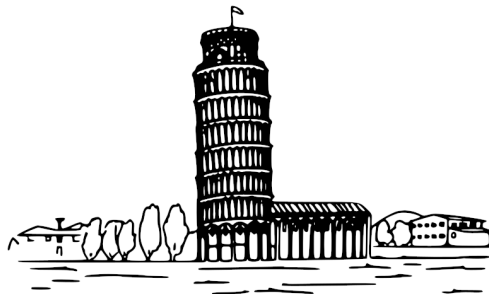
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Urgent Edge Computing (UEC)



Urgent Edge Computing (UEC) integrates the strengths of Urgent Computing and Edge Computing to meet critical, time-sensitive needs [2]:

- **Decentralized Processing:** Executes urgent tasks near data sources to achieve ultra-low latency.
- **Dynamic Resource Management:** Employs priority scheduling and on-demand provisioning to support critical operations.
- **Diverse Applications:** Supports disaster response, environmental monitoring, smart cities, and mass event coordination.



Serverless Computing



Serverless Computing

Serverless allows users to deploy and execute *granularly billed* and *automatically scaled* applications, without having to address the underlying operational logic.

Serverless Service Characteristics



NoOps



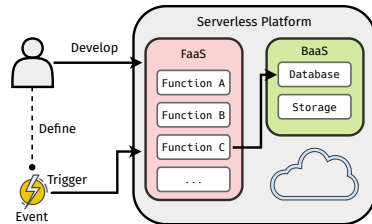
Auto-Scaling



Utilization-based
billing



Separation of computation
and storage



Serverless platforms relies on *containers* or other forms of *lightweight virtualization*.

SPARE: Serverless Computing × UEC

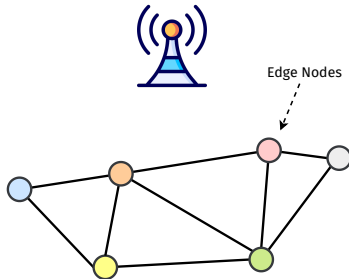


What is SPARE?

SPARE [1] is a decentralized, urgency-aware serverless platform designed to ensure service continuity in edge environments during emergency scenarios.

Key Features:

- **Decentralized Architecture:**
 - No centralized entry point is required.
 - Load balancing and task forwarding are handled transparently.
- **Urgency-aware:** Frees computational resources in disaster-affected areas.
- **Optimized for Edge:** Employs MicroVMs and Unikernels for lightweight virtualization.



SPARE: Serverless Computing \times UEC

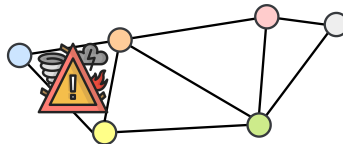
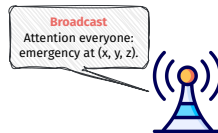


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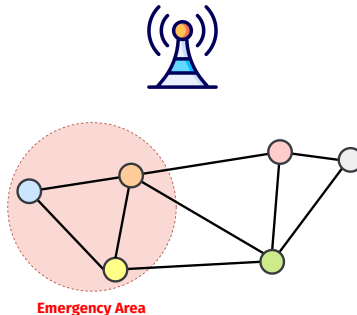


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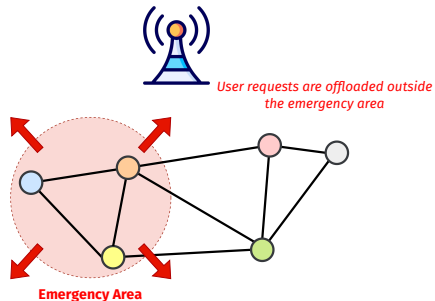


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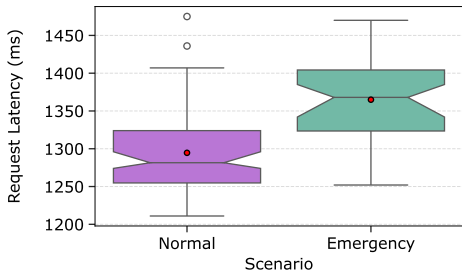
Experimental Evaluation

Emergency Allocation



- 8,400 user requests over 100 epochs.
- Simulated both *Normal* and *Emergency* scenarios.

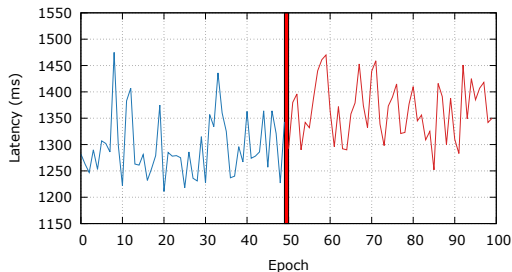
Mean Request Latency in Normal vs. Emergency Scenarios



Scenario	Avg. Latency (ms)	Median (CI)*
Normal	1294.62	1281.5 [1271.0, 1296.0]
Emergency	1364.94	1368.0 [1342.0, 1386.5]

* Confidence interval at 95%.

Latency Over Epochs



Only a +5.43% increase!



Q&A

Thank you for your attention!

Any Questions?

Bibliography



- [1] Valerio Besozzi et al. “SPARE: Self-adaptive Platform for Allocating Resources in Emergencies for Urgent Edge Computing”. In: *2025 33rd Euromicro International Conference on Parallel, Distributed, and Network-Based Processing (PDP)*. 2025, pp. 137–145. DOI: 10.1109/PDP66500.2025.00027.
- [2] Patrizio Dazzi et al. “Urgent Edge Computing”. In: *Proceedings of the 4th Workshop on Flexible Resource and Application Management on the Edge. FRAME '24*. Pisa, Italy: Association for Computing Machinery, 2024, pp. 7–14. ISBN: 9798400706417. DOI: 10.1145/3659994.3660315. URL: <https://doi.org/10.1145/3659994.3660315>.