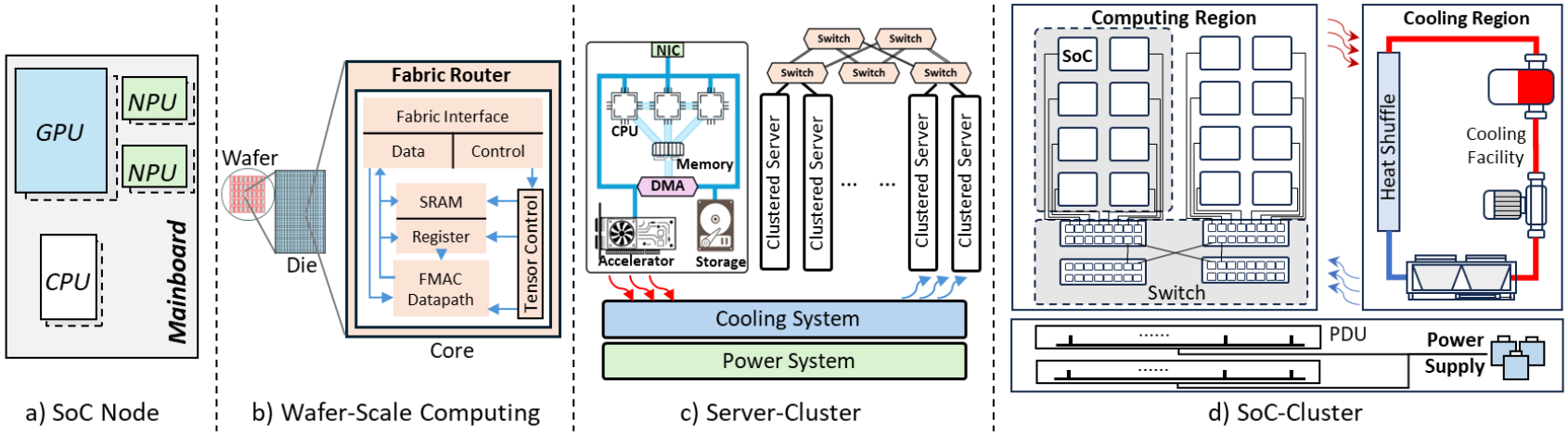
A Comprehensive Survey of Micro Datacenter: Current Technologies and Future Possibilities

Jinyang GUO, Mingxuan ZHANG, Yunwei LI, Chao LI, Mingyi GUO

Frontiers of Computer Science, DOI: 10.1007/s11704-025-50819-w

Problems & Ideas

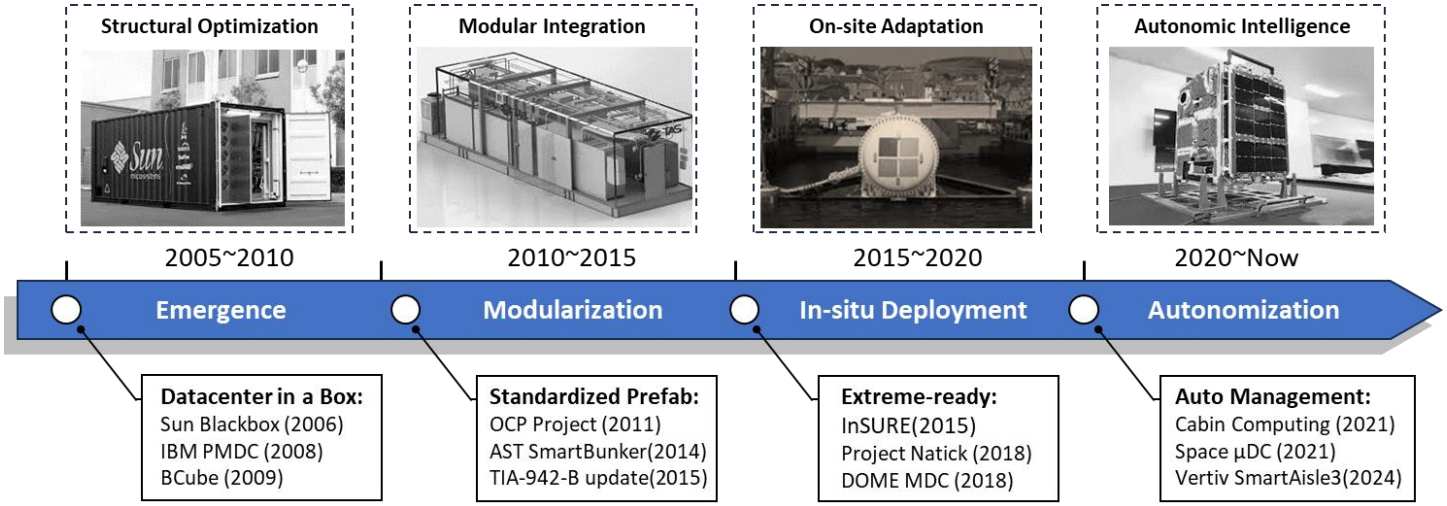
- Problems of existing micro datacenter research:
  - Micro datacenters are studied in isolated domains with inconsistent definitions and taxonomies.
  - Most works focus on a single layer (infrastructure / platform / application), lacking a unified cross-layer view and clear challenge–opportunity mapping.
- Ideas: A unified three-layer (Infrastructure–Platform–Application) framework with deployment-grounded taxonomy and a challenge–opportunity–technique matrix that connects real µDC deployments, key metrics, and enabling techniques.



An overview of promising µDC architectures

Main Contributions

- Contributions:
  - A comprehensive, deployment-grounded survey that consolidates fragmented micro datacenter definitions, scenarios, and architectures into a consistent terminology and taxonomy;
  - A unified three-layer (Infrastructure–Platform–Application) analytical framework that organizes existing technologies and design trade-offs across heterogeneous µDC deployments;
  - A cross-layer challenge–opportunity–technique matrix that links practical constraints to key metrics and enabling methods, outlining open problems and future research directions



The timeline of µDCs evolution.