DSPRS: Dispersed Computing via Successive Refinement and Pricing with Resilience and Scale
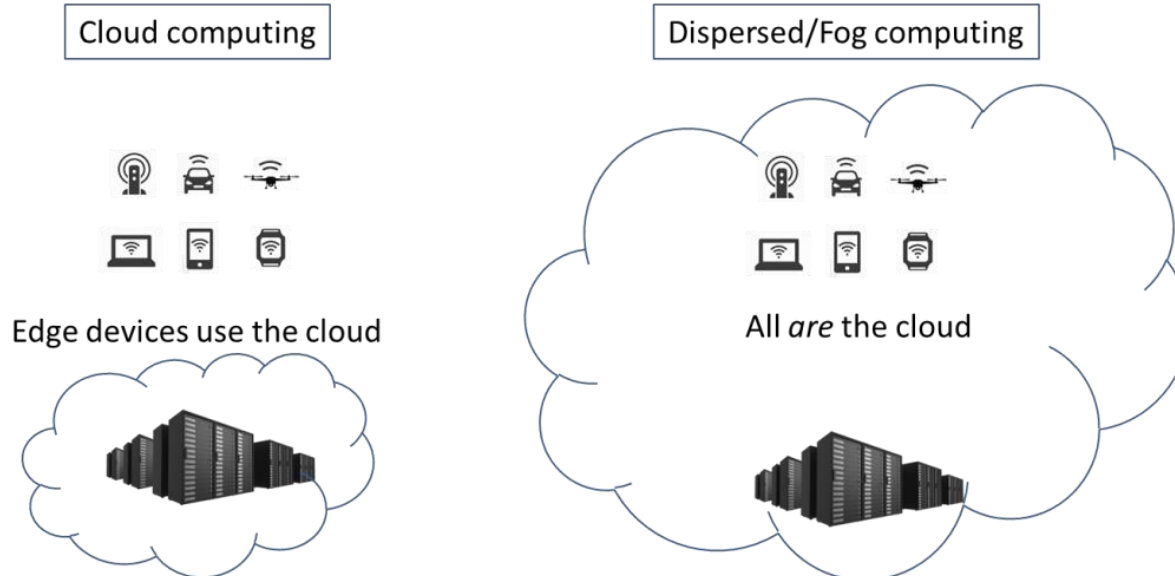
Edge 10 Conference
Dr. Siun-Chuon Mau
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INFORMATION DEPLOYED.   **SOLUTIONS** ADVANCED.   **MISSIONS** ACCOMPLISHED.

Overview

- **Needs:** On demand computing, communication, storage and control services

- **Current arts:** Conventional datacenter cloud computing has drawbacks: long data distance and excessive data transport cause latency and congestion and weaken security and privacy

- **Approach & benefits:** Include local/edge devices into the resource pool to avoid QoS and security bottlenecks of conventional cloud computing
  - Enhanced by breaking the end-to-end principle, with similarities to active networking

- **Goals:** Decentralized, efficient & automated allocation of dispersed, variable and heterogeneous computing and network resources to generic jobs

Cloud computing — Edge devices use the cloud

Dispersed/Fog computing — All *are* the cloud

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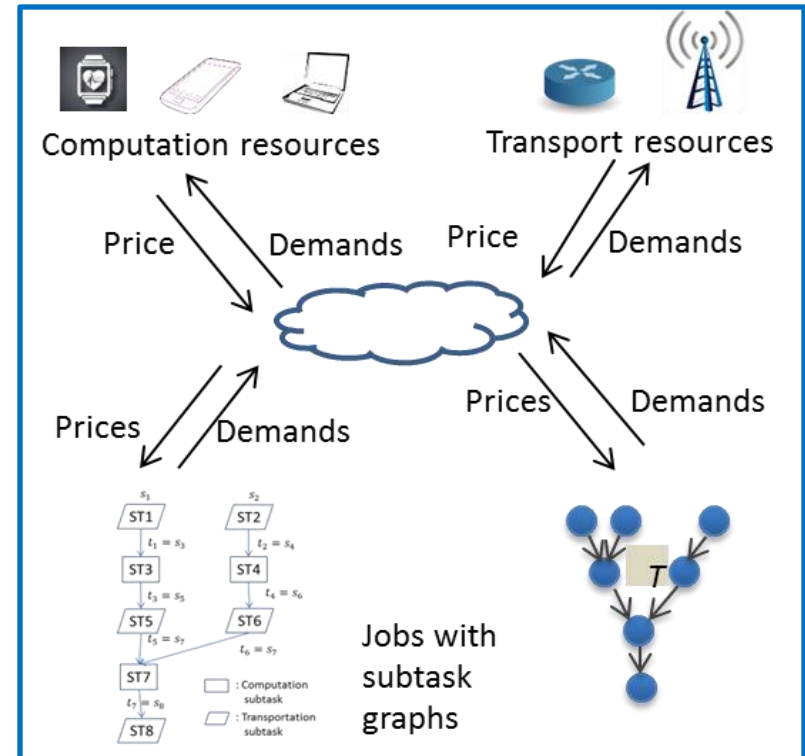
Technical Approach

- **Resource Allocation:**
  - Extended Network Utility Maximization (NUM) to treat task graphs
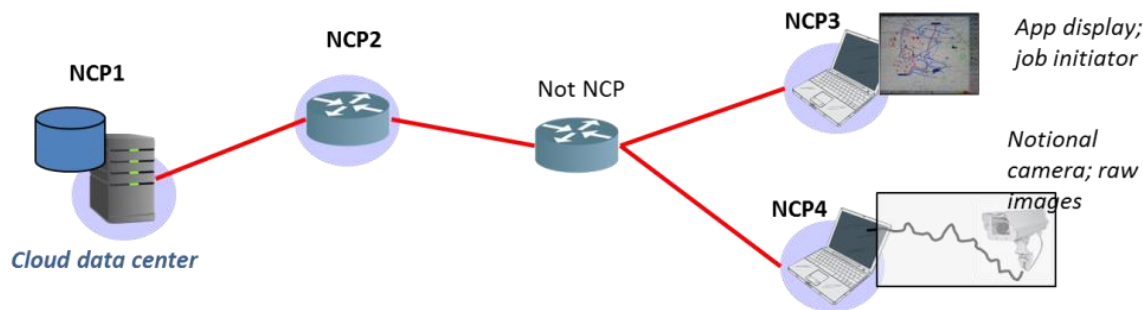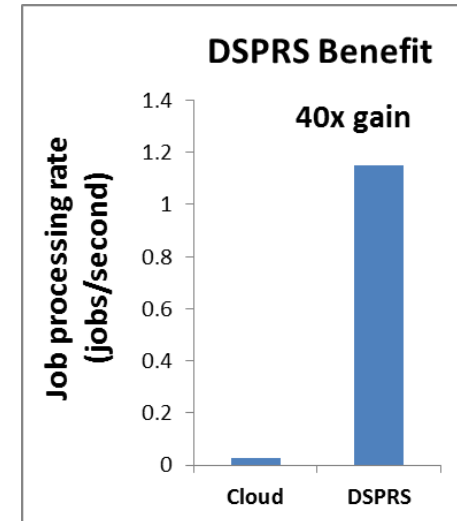 - Decentralized approximate NUM for routing and rate allocation

- **Coded Dispersed Computing:**
  - Leverage coded redundancies to speed up job completion and reduce errors

Main Results

- DSPRS achieves **large gain over cloud-only computing** under harsh network conditions by leveraging both local and cloud computing resources

NCP= network computation point