



Resource Management on Cloud

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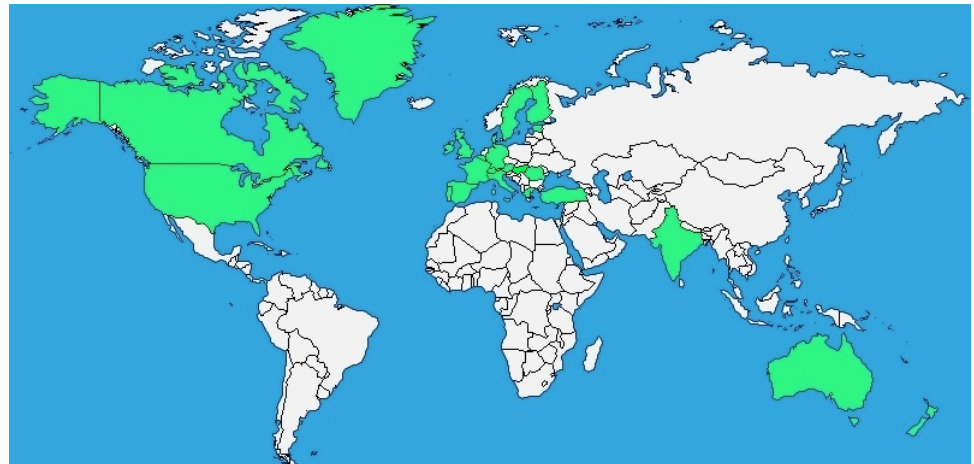
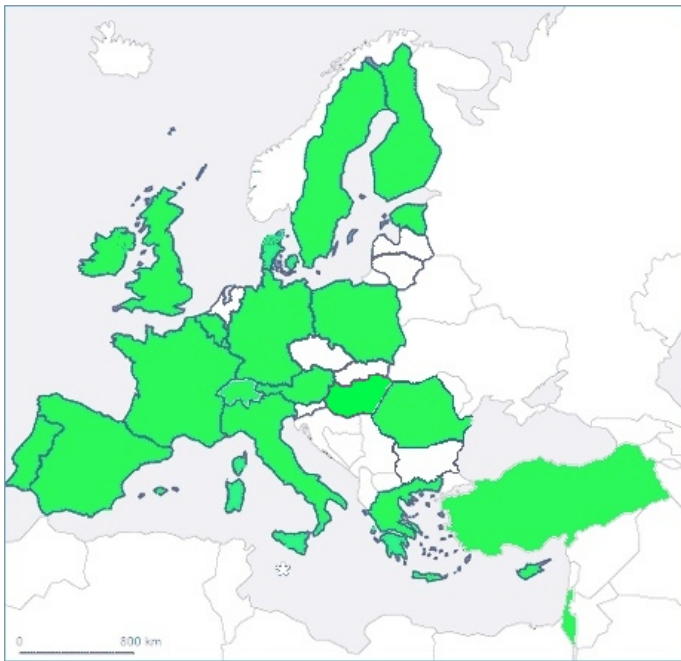
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Energy efficiency in large scale distributed systems



- ▶ **European COST Action IC0804, partner**
- ▶ **22 COST countries + 7 Non-COST Institutions**
- ▶ **Goal: Energy efficient and realistic solutions for large scale distributed systems**





Adaptive actions for distributed systems



- ▶ **WG1: State of the art and continuous learning of hardware adaptation possibilities**
- ▶ **WG2: Characterization of energy consumption and energy efficiency**
- ▶ **WG3: Adaptive actions for distributed systems**
- ▶ **WG4: Characterization of performance-energy saving trade-off**
- ▶ **WG5: Scientific coordination, dissemination, and definition of a common opened framework; identification of pertinent use-cases**





Energy efficiency in P2P Networks

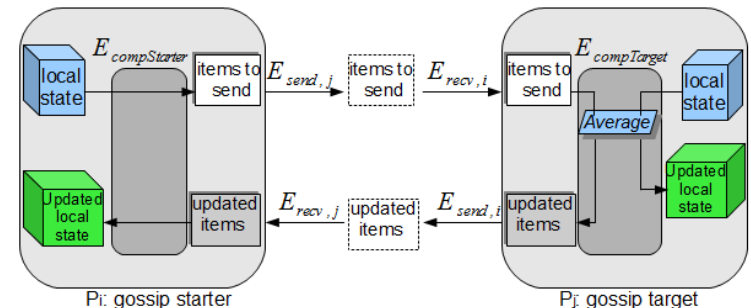


TÜBİTAK



▶ **Goal: To investigate and develop energy efficient algorithms and protocols by applying P2P principles:**

- ▶ Discovery of Frequent Items in P2P Networks
- ▶ Hierarchical Epidemics Model
- ▶ **P2P Cloud: Task scheduling**
- ▶ Secure and Energy Efficient Cloud Storage
- ▶ Epidemic Protocols for Inter-Vehicular Communication Networks





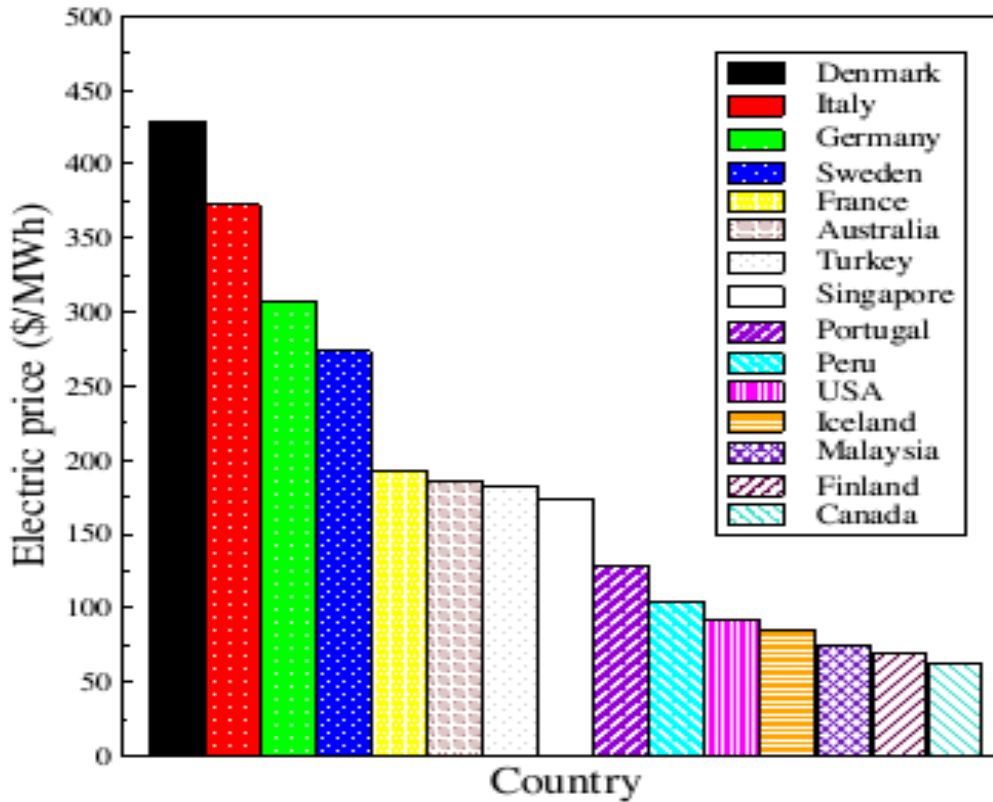
P2P Cloud: Task Scheduling

- **Geographically distributed peers**
- **Time and space variation of electricity prices**
- **Budget per peer**
- **Heuristics to decide when to run tasks on each peer**
- **Efficient resource management:**
 - **Given the budgets of peers, maximize the total number of processed tasks on the cloud**



Electricity Prices: Time and Space Variation

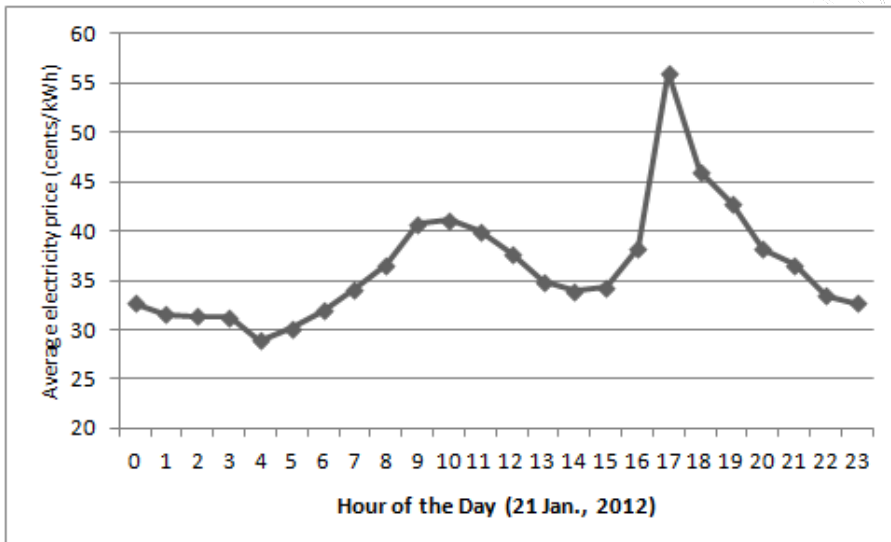
▪ Average Electricity Prices of some Countries



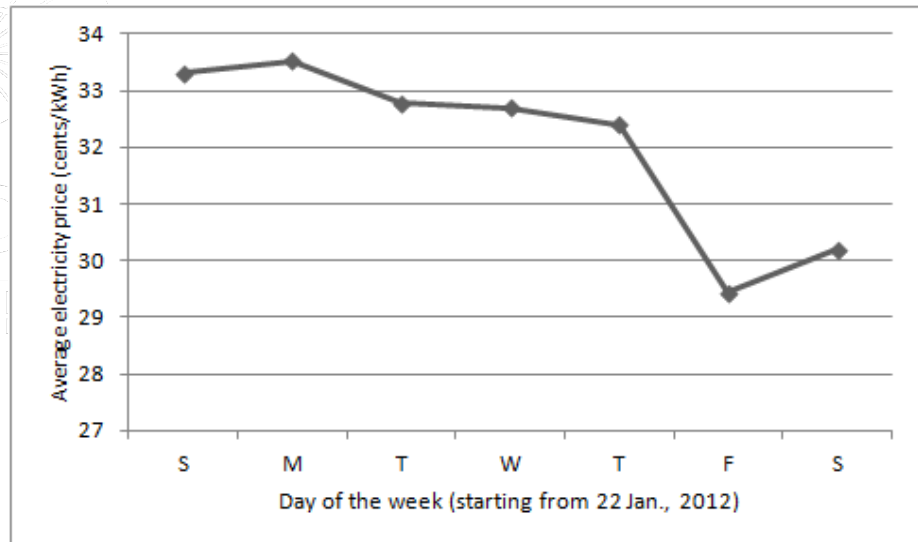


Electricity Prices: Time and Space Variation

Hourly Electricity Price Variation



Daily Electricity Price Variation



Averaged prices over 15 different zones in the East Coast of the US
(source: NYISO)



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