TASK SCHEDULING IN DISTRIBUTED HETEROGENEOUS ENVIRONMENTS

SANTIAGO ITURRIAGA (UNIVERSIDAD DE LA REPÚBLICA, URUGUAY)

TASK SCHEDULING PROBLEMS

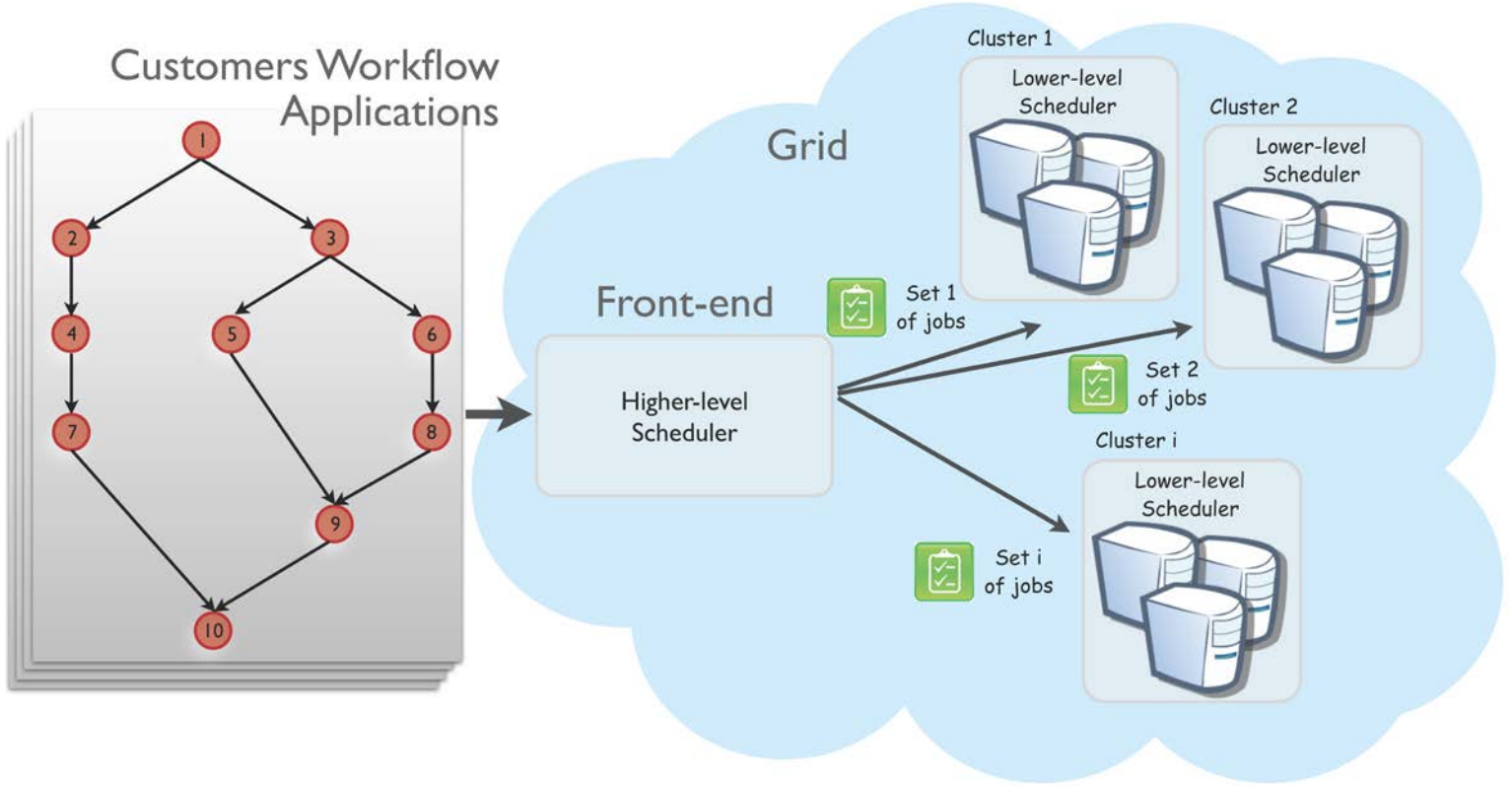
- Given a set of tasks and a set of machines → find a schedule which minimizes some criteria
- Usually NP-hard problems
- Heuristics and metaheuristics to tackle them
- Parallel programming to improve their efficiency
  - Multithreading, MPI, CUDA, etc.

CURRENTLY WORKING

- Multiobjective job scheduling in grid environments using a hierarchical approach
- Internet Shopping Optimization Project (IShOP): shopping in the clouds

MULTIOBJECTIVE JOB SCHEDULING IN GRID ENVIRONMENTS USING A HIERARCHICAL APPROACH

- Set of jobs
  - Tasks with dependencies
  - Parallel tasks
  - Jobs with deadlines
- Set of computer clusters
  - Multicore machines
- Bi-level scheduling
  - Higher-level: assigns jobs to clusters
  - Lower-level: schedules tasks inside a cluster



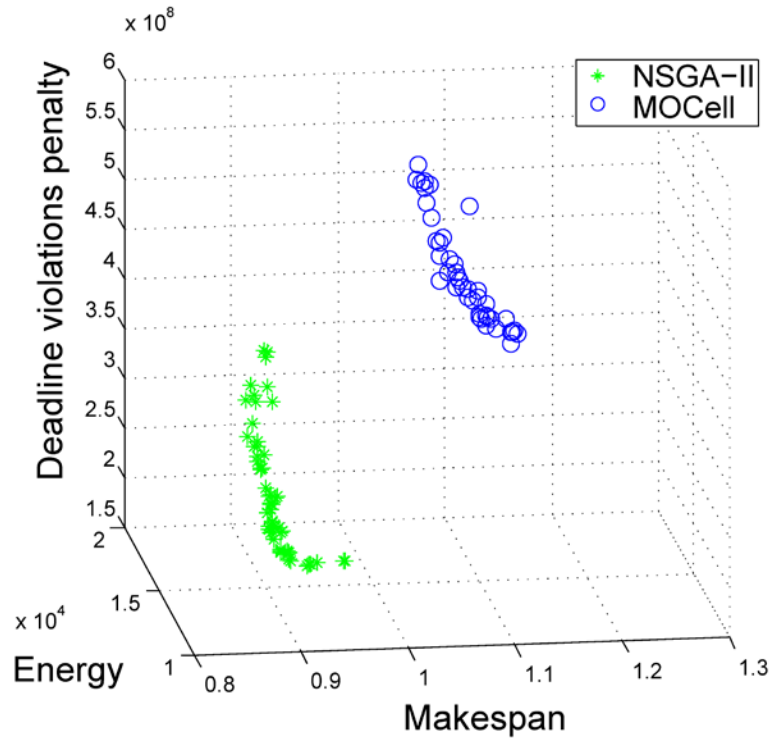
MULTIOBJECTIVE JOB SCHEDULING IN GRID ENVIRONMENTS USING A HIERARCHICAL APPROACH

- This problem was originally proposed in:
  - B. Dorronsoro, S. Nesmachnow, J. Taheri, A. Y. Zomaya, E.-G. Talbi, and P. Bouvry, "A hierarchical approach for energy-efficient scheduling of large workloads in multicore distributed systems", Sustainable Computing: Informatics and Systems, pp.–, 2014, In press.

- Objetive is to minimize makespan and energy consumption
  - Deadline violations where not considered
- A set of 16 heuristics where proposed for solving the problem

MULTIOBJECTIVE JOB SCHEDULING IN GRID ENVIRONMENTS USING A HIERARCHICAL APPROACH

- Objetive is to minimize makespan, energy consumption, and deadline violations
- Higher-level scheduling
  - Two MOEA based on NSGA-II and MOCell
- Lower-level scheduling
  - A EFT-based heuristic with backfilling: EFTH
- Analyzed the results and compared them with previously proposed heuristics



ISHOP: SHOPPING IN THE CLOUDS

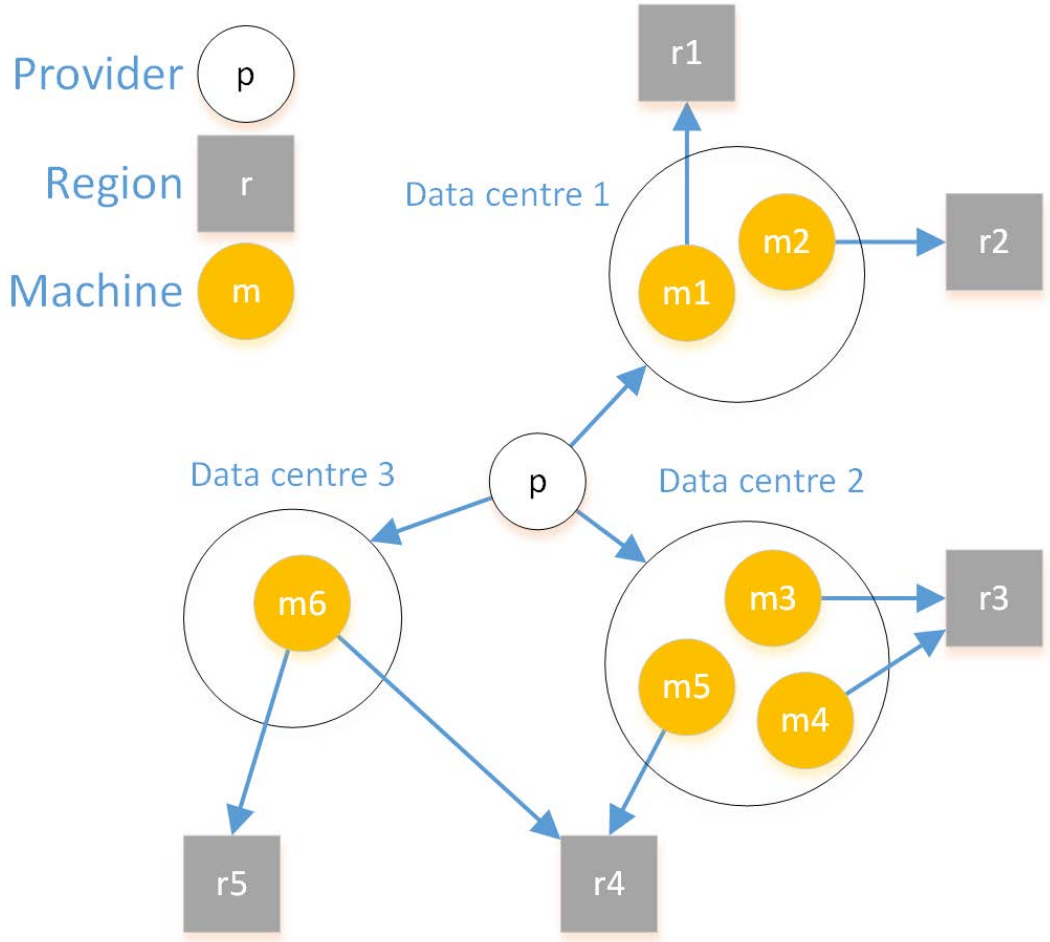
- Application for the IShOP in the cloud
- Shops → Cloud providers
- Customers → Cloud users
- Books → Cloud resources (bandwidth, storage, cpu)

- Cloud-based Content Distribution Network (CDN)
- Cloud enables elastic cost-effective CDNs
- For example: Netflix uses Amazon cloud services

ISHOP: SHOPPING IN THE CLOUDS

- Provider p shares some content k
- Users in regions r_i consume k

- Objective is to minimize the economic cost and maximize the QoS
- Economic cost: storage cost of k + bandwidth cost + machine lease cost
- Considering bandwidth and storage constraints



THAT'S IT

Thanks for your attention!

Questions?