

Exploration of cost-reduction workflow scheduling models in cloud: a survey

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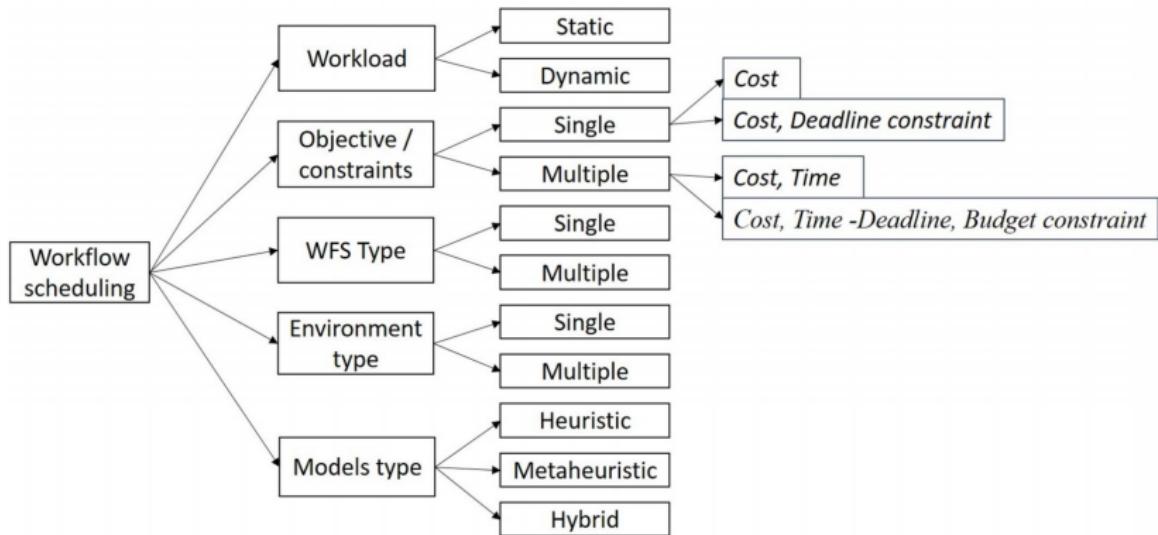
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Introduction

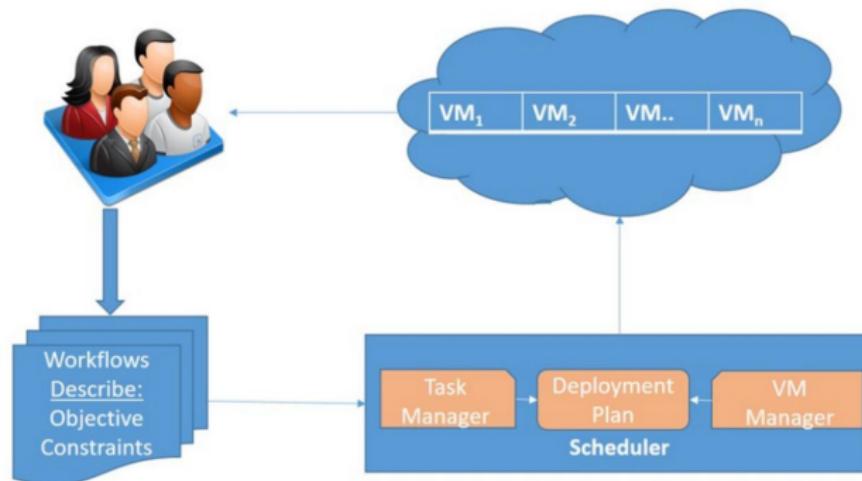
Background

- **Workflow** Is a set of independent tasks. It represent a process that consist of a series of steps that simplify the complexity of execution and management of application.
- **Scheduling** - Is a process of arranging, controlling and optimizing works and workloads in a production process.
- **Workflow scheduling** - Is a process of allocating machines capable of fulfilling users requirements.
- **Workflow scheduling objectives** -There exist a number of objectives to preform workflow scheduling: Cost, Time, Reliability, Energy, Security, Load balancing.

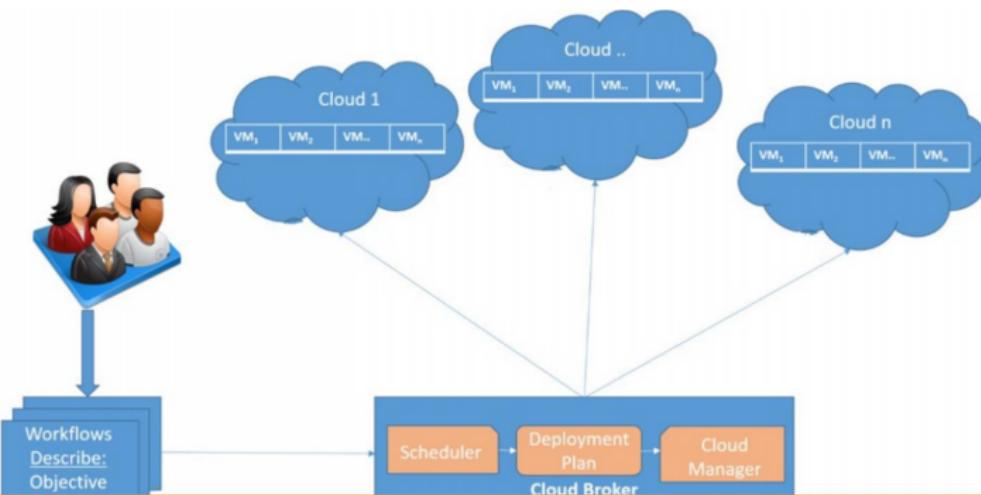
Taxonomy



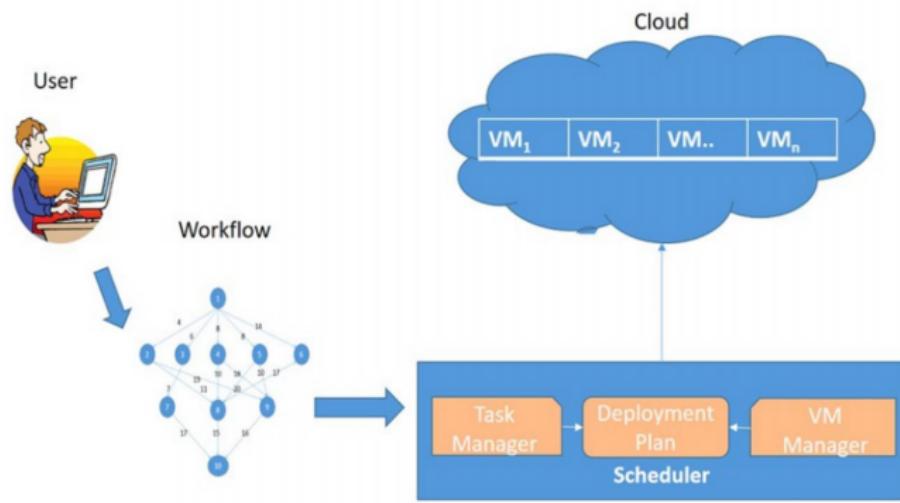
Environment Type Single cloud provider: -Users submit their workflows to Cloud provider's scheduler (Direct communication)



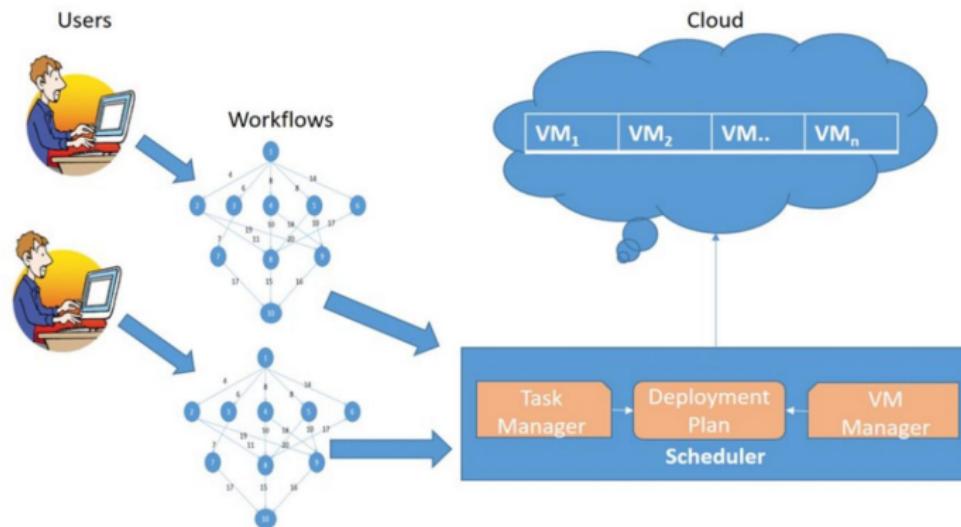
Multiple cloud providers: -Users submit their workflows to Cloud provider's broker and Broker select VM from different Cloud providers to schedule



Workflow scheduling Type Single workflow scheduling:



Multiple workflow scheduling:



Workflow scheduling Objectives

- **Single objective** In case of our objective(List latest models), the single objective is reduce the cost. Mostly, developed models had constraints, in this case we have Deadline as the constraint.
- **Multi-Objectives** Sometimes reduce cost can have accompanying objective like time. We may have cost and makespan reduction. Like in single objective, multi-objective also have constraints, in this case we may have Deadline and
- **Budget as constraints**

Models Type

- **Heuristics** Model of this type are simple and use short execution time.
- **Meta-heuristics** The model of this type produces scheduling results that is near to the global optimality.
- **Hybrids** The model of this type take combination of advantages of heuristics and meta-heuristics.

Type of workflow scheduling workload

- **Static** Number Of resources, number of Workflows, workflow arrive time number of tasks, Execution time of each task, are assumed to be known in advance.
- **Dynamic** Number Of resources, number of Workflows, workflow arrive time number of tasks, Execution time of each task, are assumed to be unknown. Which is normal for real word applications.

Challenges and Opportunities

Challenges

- **Structure of the environment:** Not easy to put different providers together.
- **Workflow format:** Rarely developed for cost reduction.
- **Pricing Schema:** More work have considered the time as main feature.

Opportunities

- Brokers based models.
- Dynamic scheduling models(Considering multiple workflows).
- QoS constrained based models(Deadline, Budget).

Conclusion

Conclusion

In this paper we have contributed: Demonstrate current works focused on cost reduction. Presented the challenges of designing cost effective models. Presented the opportunity to design cost reducer models. **Future works** Considering those opportunity presented, in our future we will: Develop models able to optimize the cost.