

Systems Research Group (SRG) Department of Computer Science University of Cambridge

Distributed Global Scheduling in Datacenters

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Underutilised Datacenter resources

Azure*

♦ 60% VMs have <= 20% CPU usage!</p>

Alibaba** -

- Server CPU 50% and memory usage
- ♦ Memory <= 60%</p>

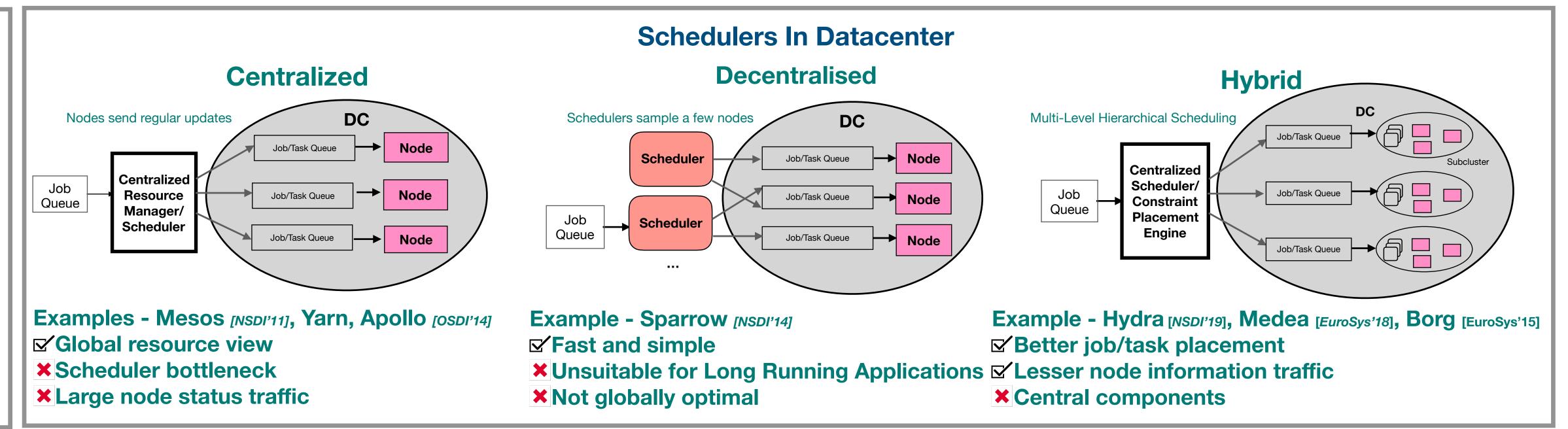
100MW DC***

1% compute cycles = Small City Energy-Saving

Datacenter resources can be better utilised!

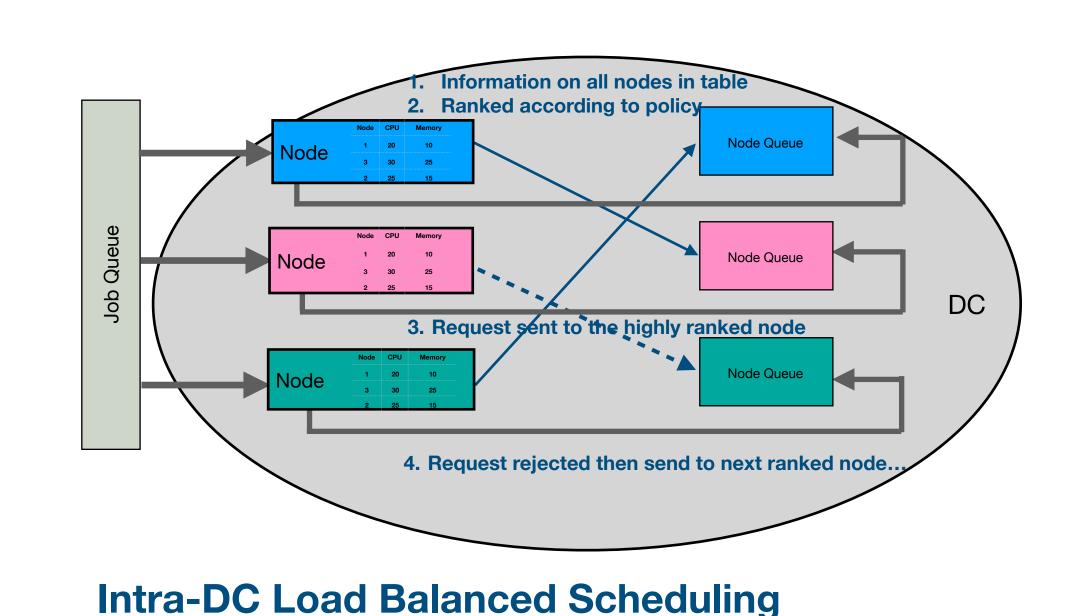
*Resource Central, SOSP'17

- **https://github.com/alibaba/clusterdata
- ***Scalable system scheduling for HPC and big data, JPDC'17



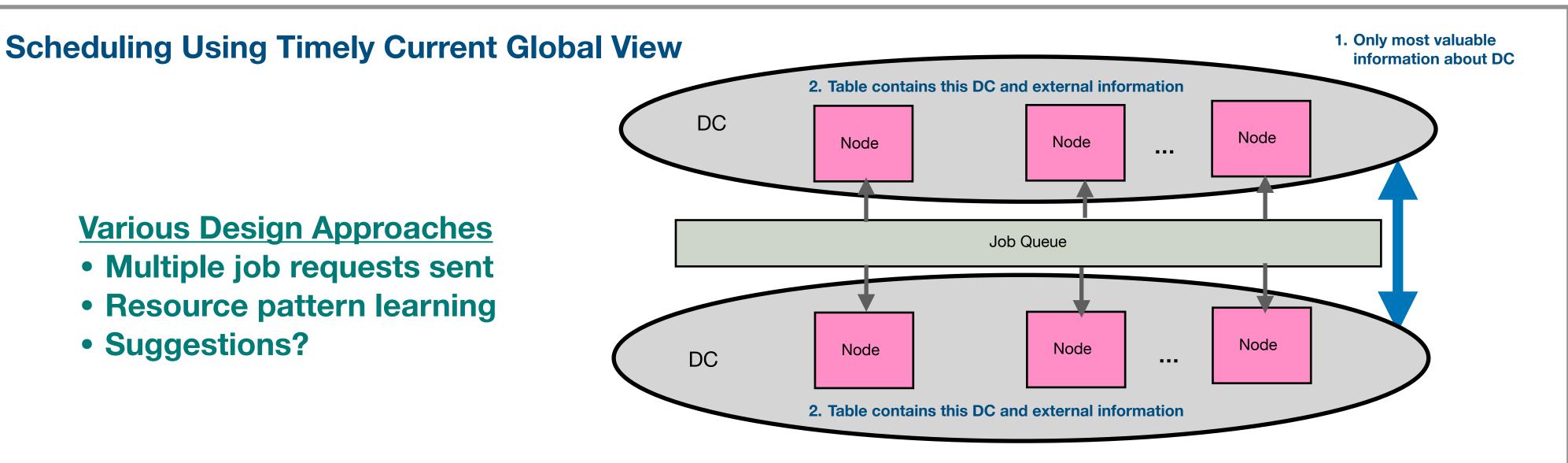
Node Level Global Scheduling Intelligence Timely global No single convergence bottleneck Unsuited for short jobs Flexible ranking ★ Large node status traffic policy Non-trivial convergence time

Timely Current Global View At Each Node Proposed solution inspired by routing protocols **☑** Resource Information DC Current resource utilisation Predicted future utilisation **⊠** BGP, OSPF, ... **⊠** Resource information propagated **☑** Global convergence Node D **⊠** Ranking **☑** Identical ranking policy Better load balancing Higher utilisation Node C * Best fit, worst fit, ...



Various Design Approaches

- Multiple job requests sent
- Resource pattern learning
- Suggestions?



Inter-DC Load Balanced Scheduling