

# Rethinking Resource Disaggregation

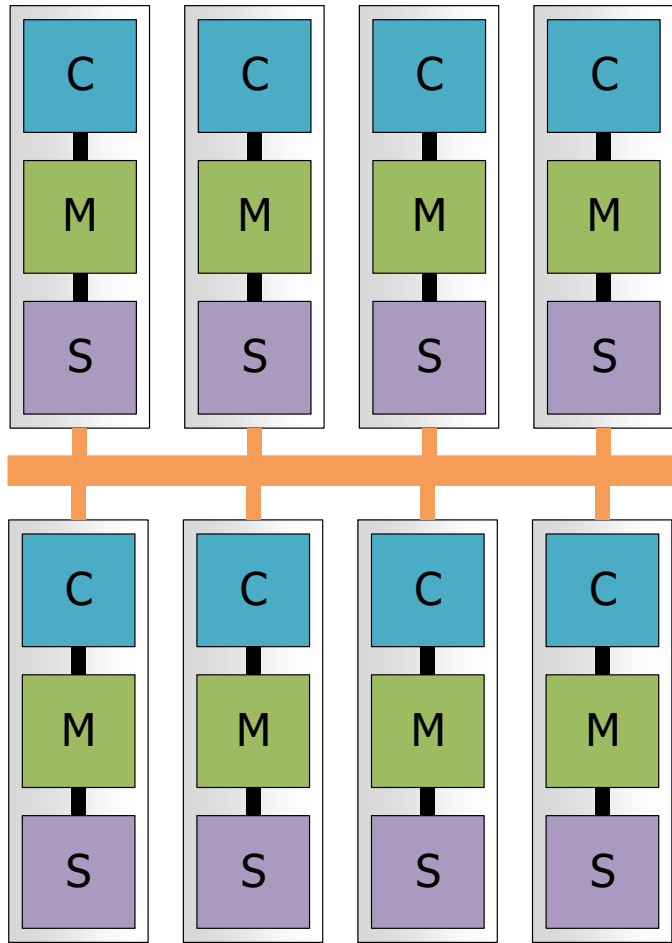
M. Talha Imran

Advisor: Prof. Aasheesh Kolli

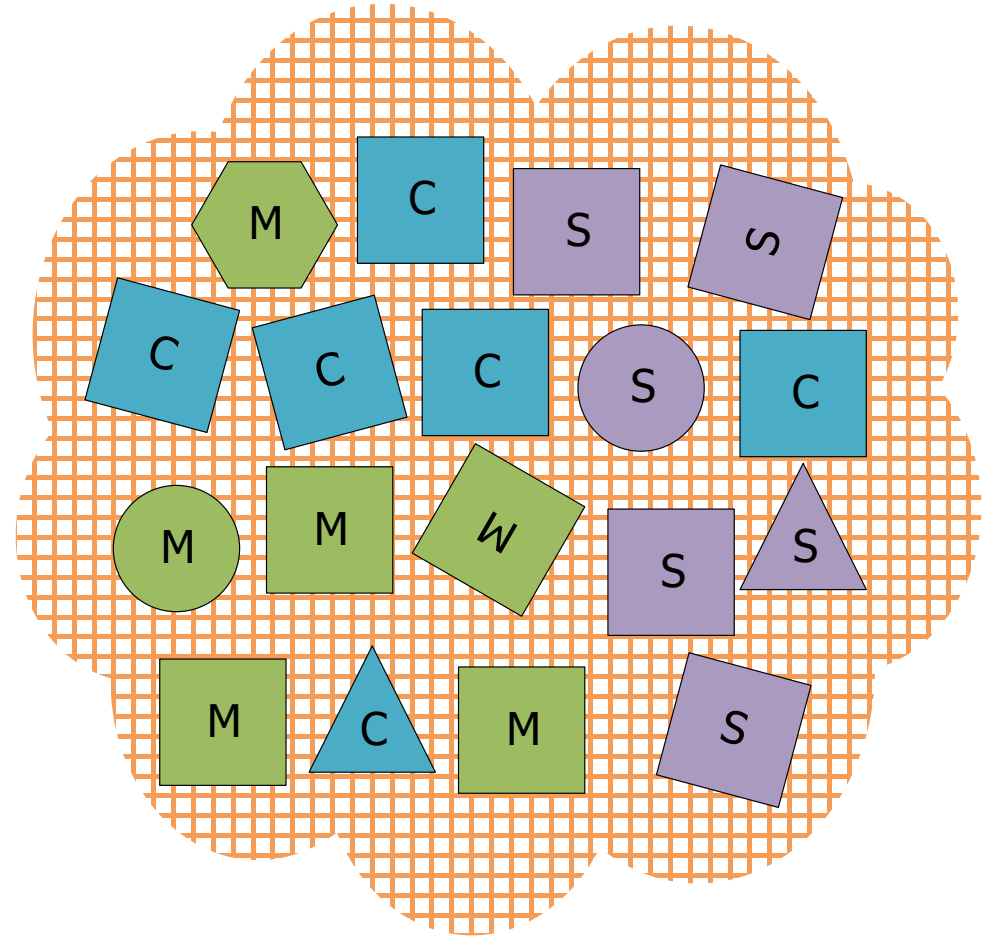
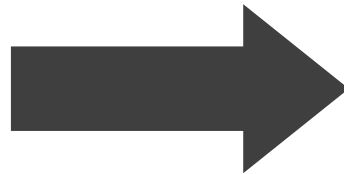


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# Introducing Resource Disaggregation



Rack Today



Rack Tomorrow?

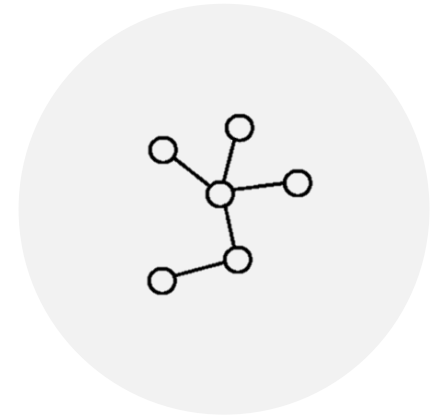
# Datacenter Applications



Machine Learning

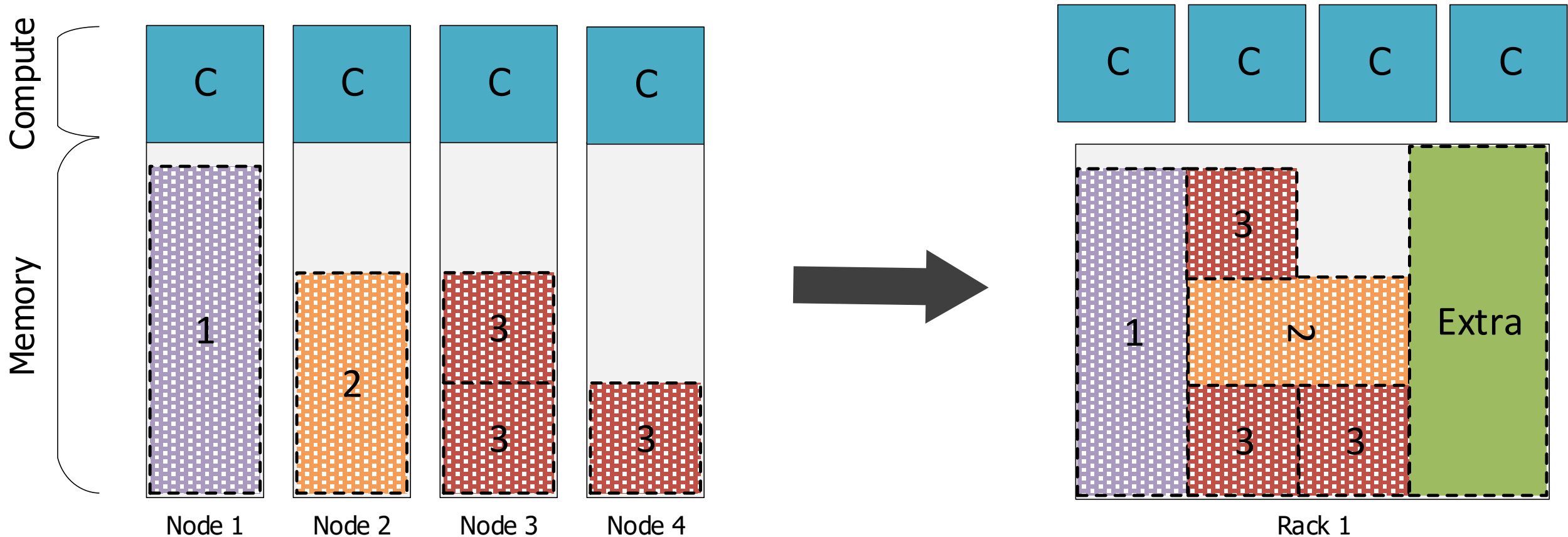


Serverless Computing



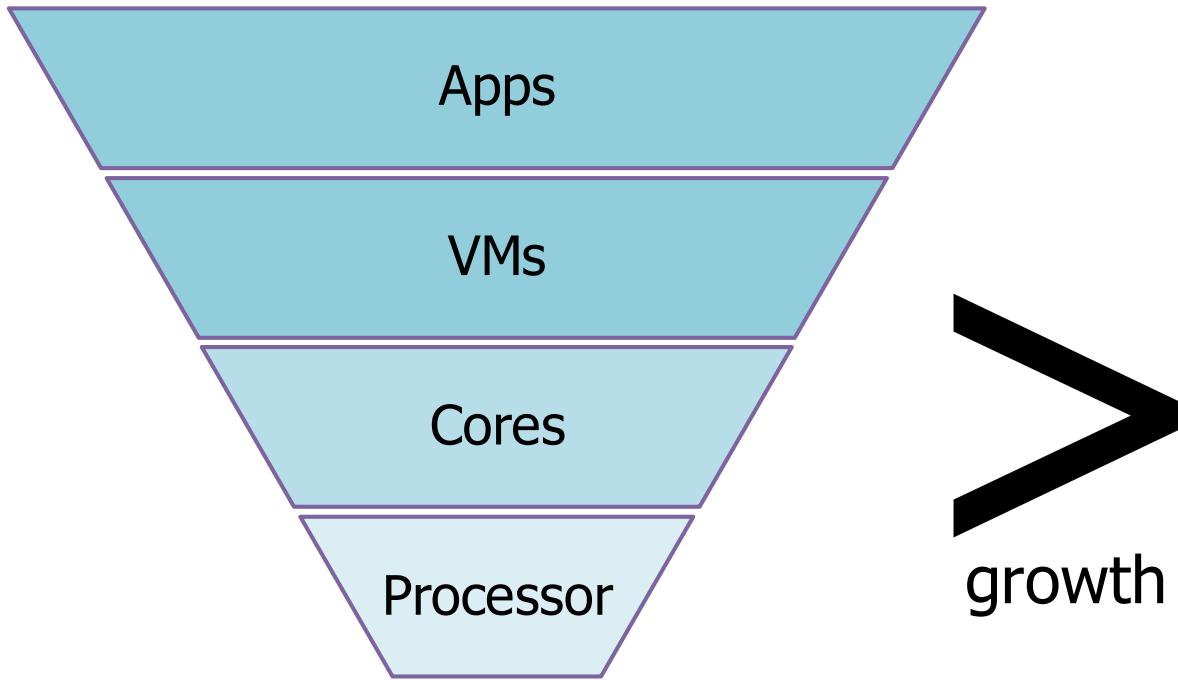
Graph Processing

# Why-1: improve resource utilization



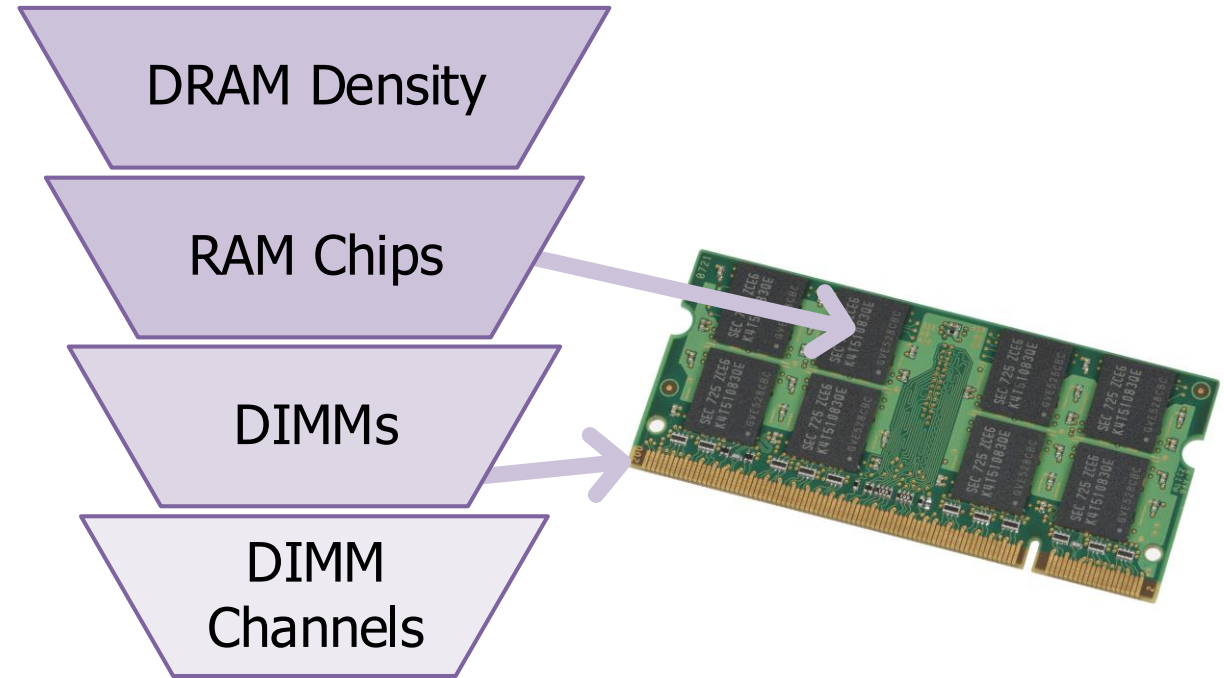
Requirement: run any app on any compute

# Why-2: available memory per app



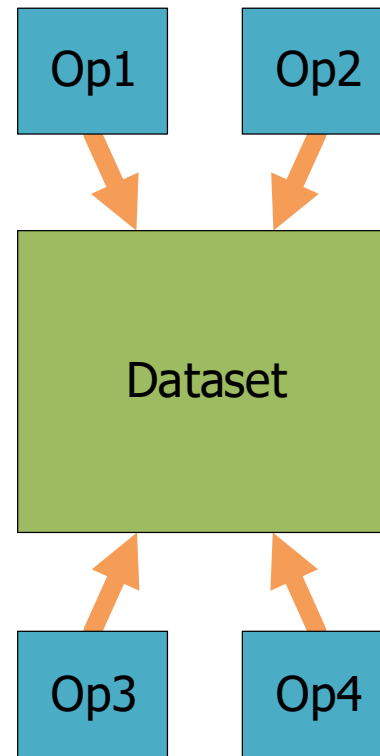
Demand Side

**>**  
growth



Supply Side

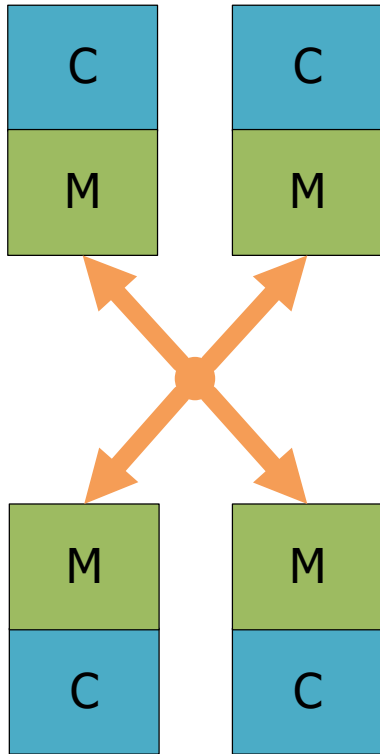
# Why-3: data is king



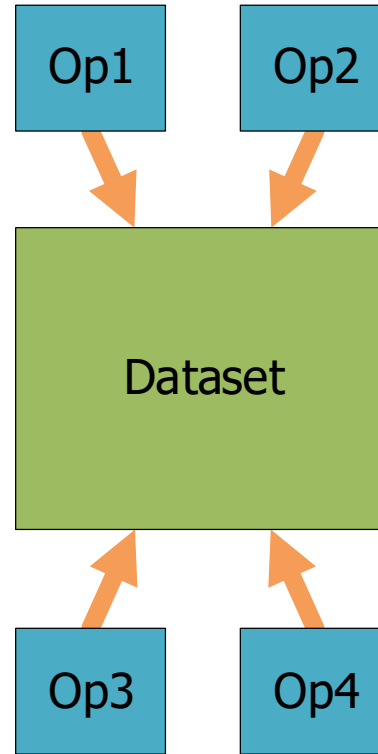
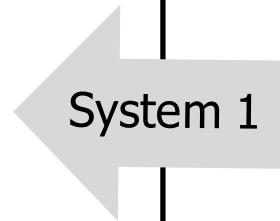
App Model

# Why-3: data is king

Monolithic  
Machines

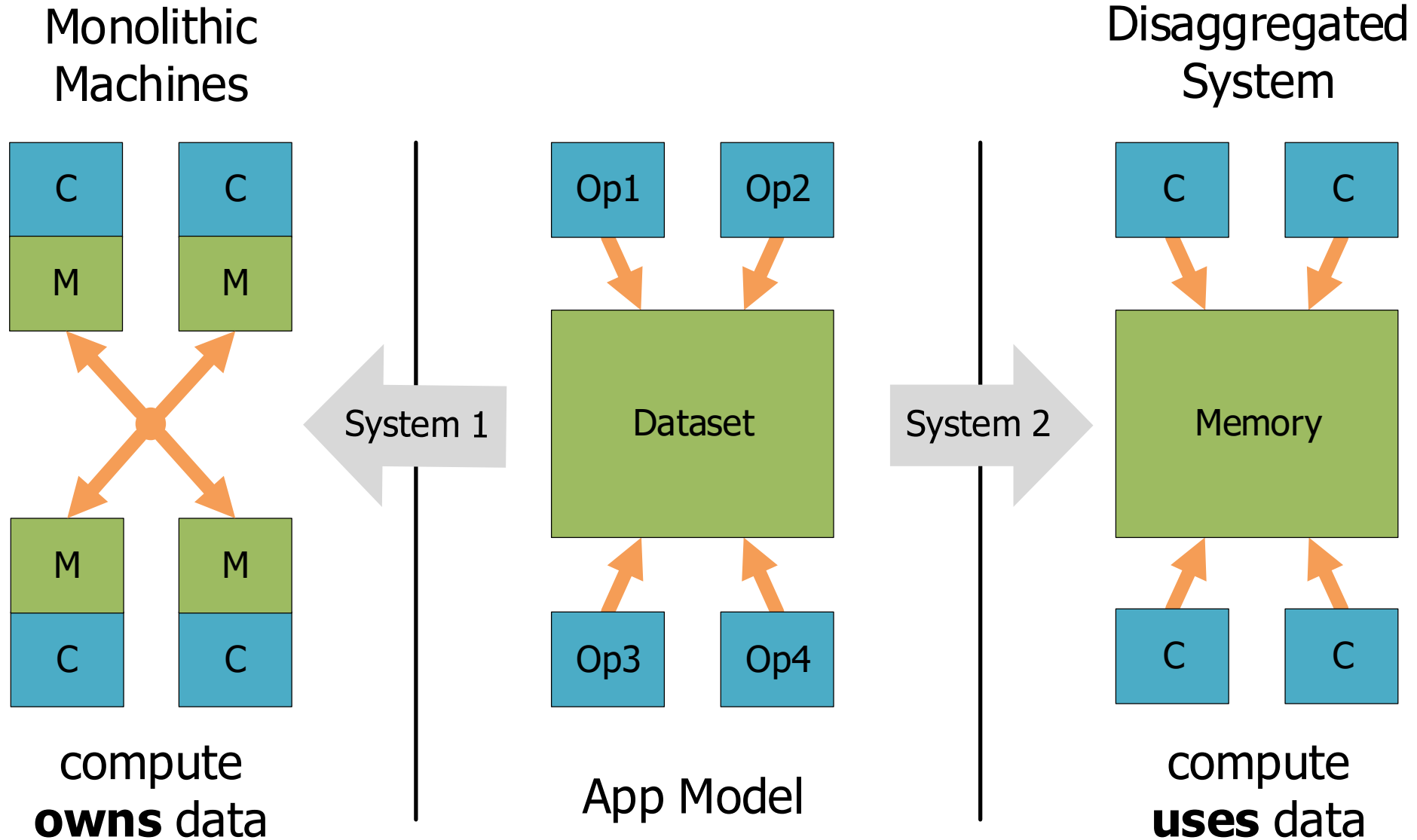


compute  
**owns** data



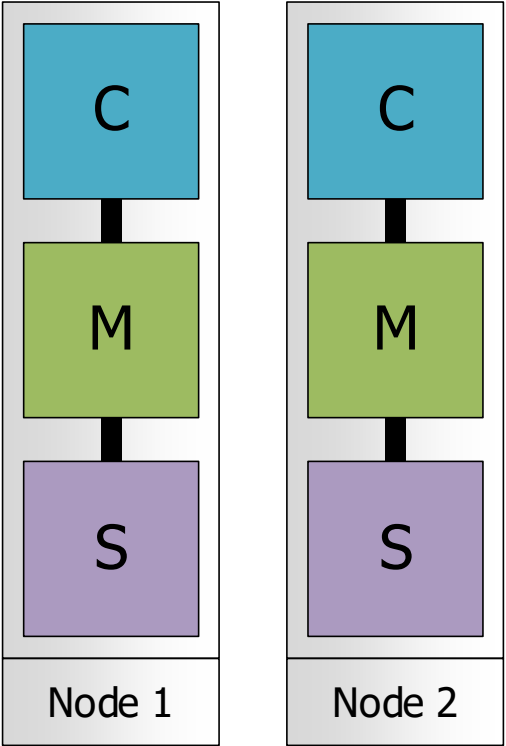
App Model

# Why-3: data is king

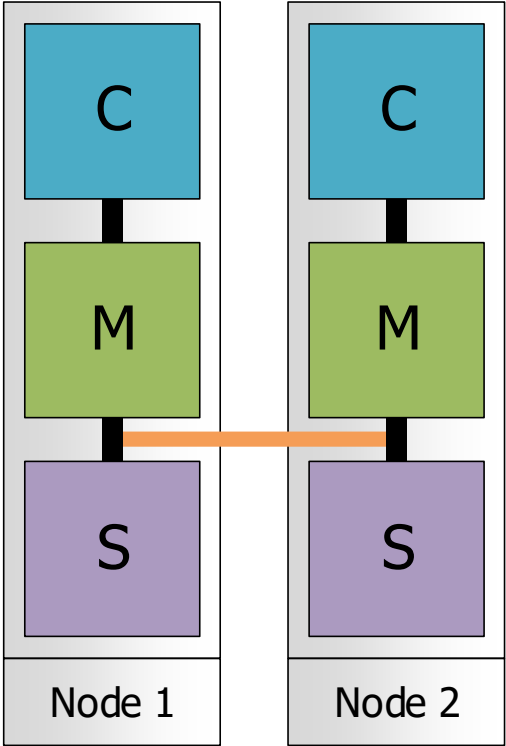




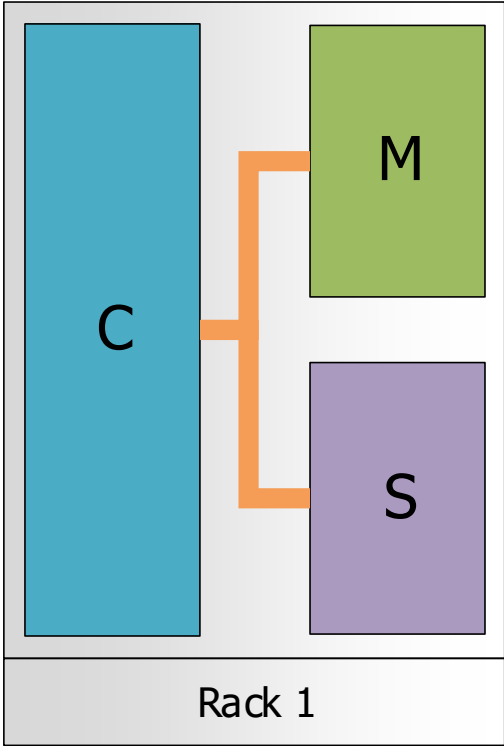
# Degree of Resource Disaggregation



Monolithic  
Machines



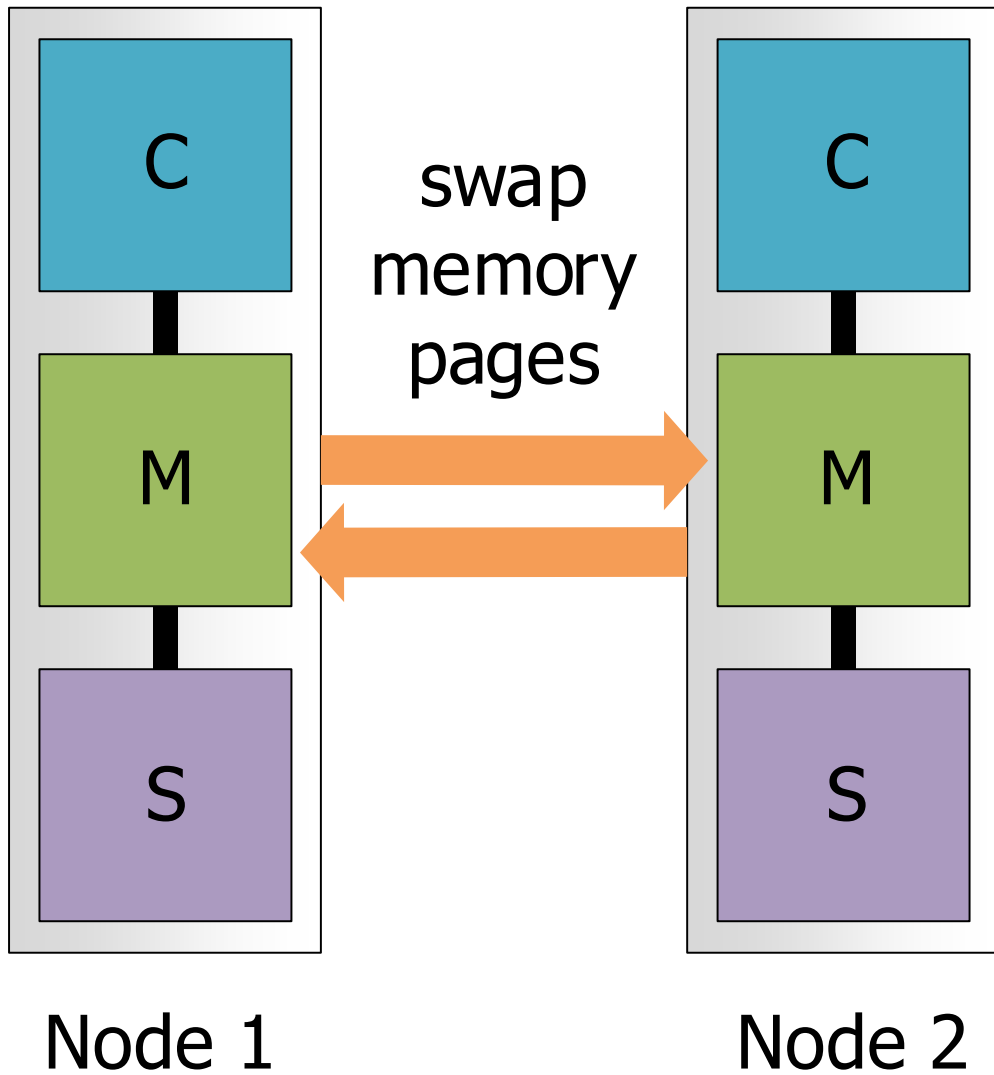
Remote Memory  
Access



Disaggregated  
System

# Network Requirements

[Gao' 16] quantify that Infiniband network with RDMA good enough!



# Logical Disaggregation

similar nodes share memory

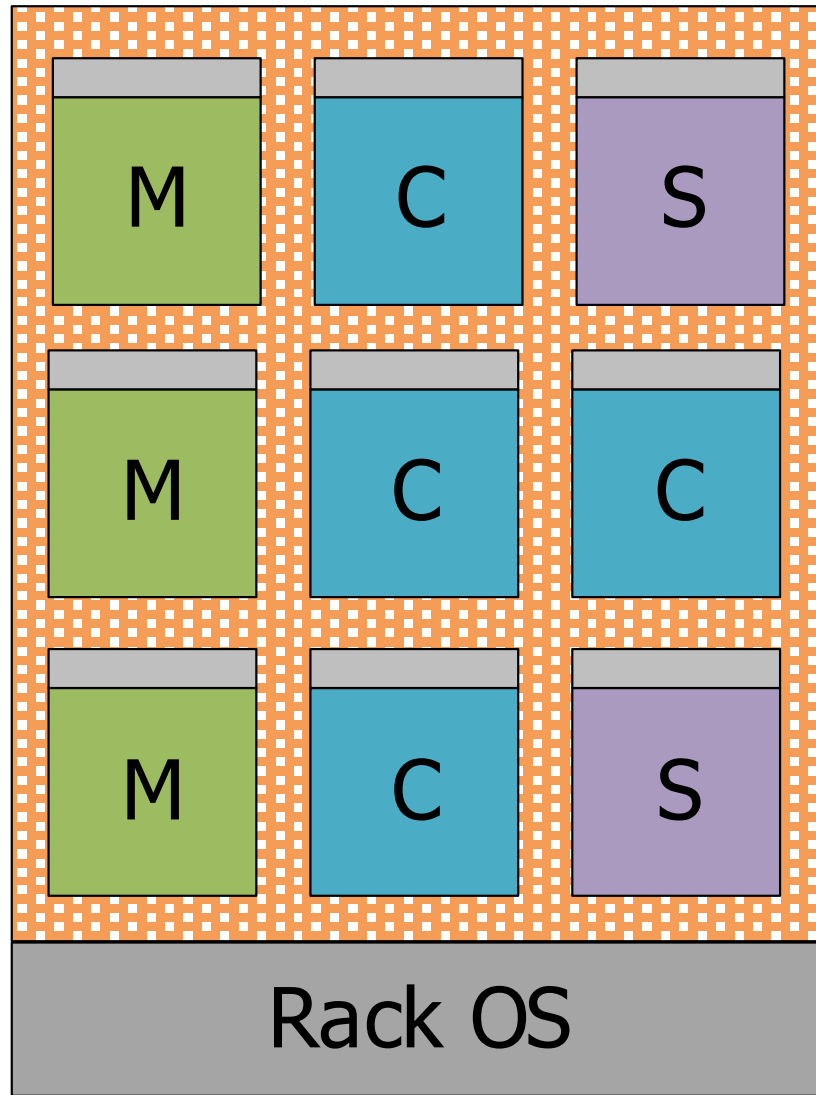
Infiniswap [Gu' 17]

Remote Regions [Aguilera' 18]

# Physical Disaggregation

specialized nodes, partitioned OS

LegoOS [Shan' 18]



Rack 1

# Open Problems



Resource  
Organization



Specialized  
Node Design



Data Sharing &  
Coherence

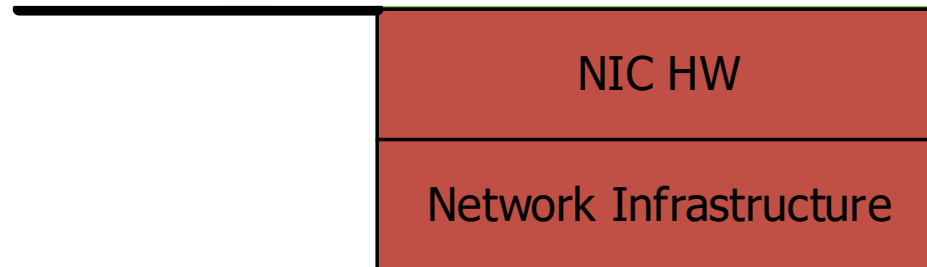


Fault  
Tolerance

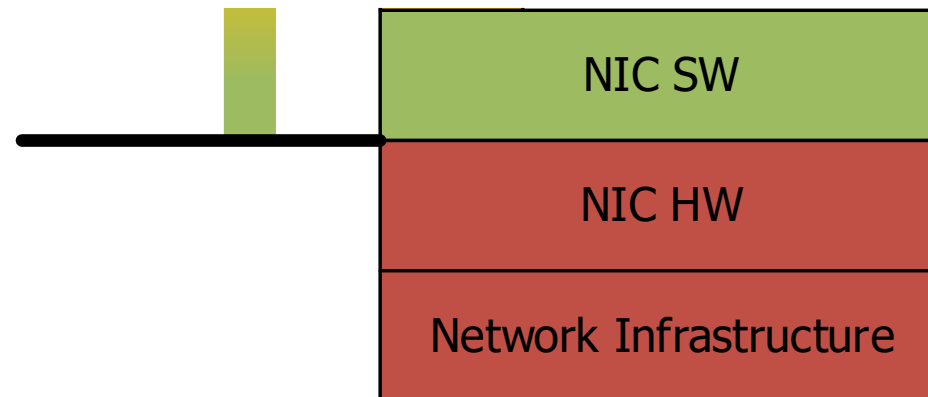
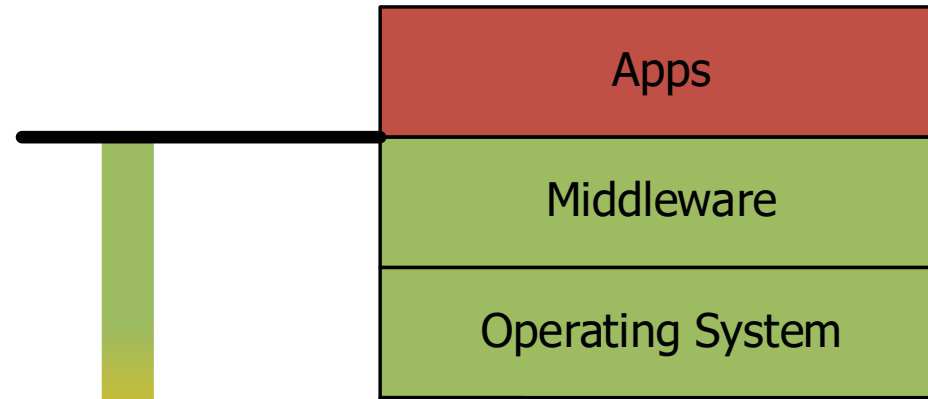


Security &  
Privacy

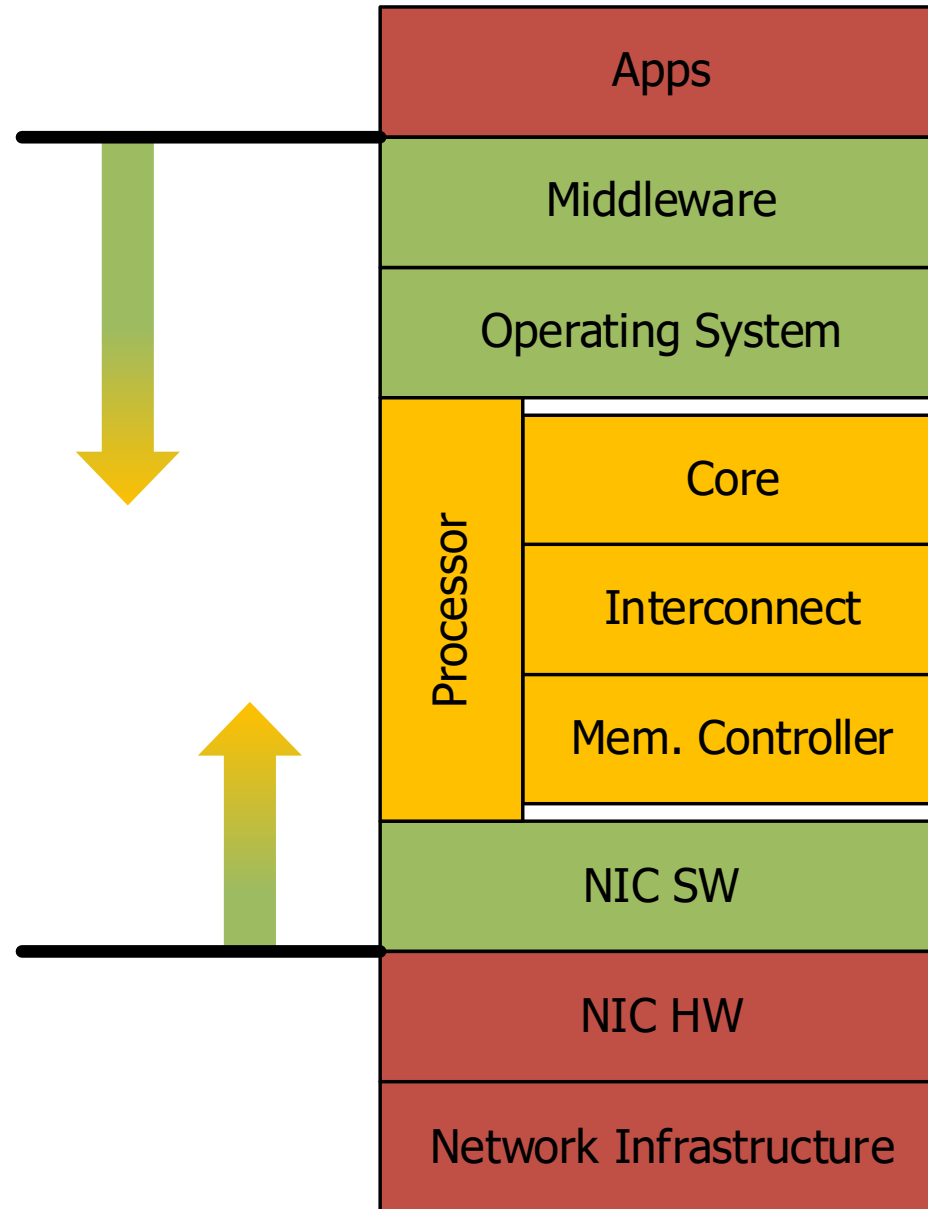
# Scope of Work



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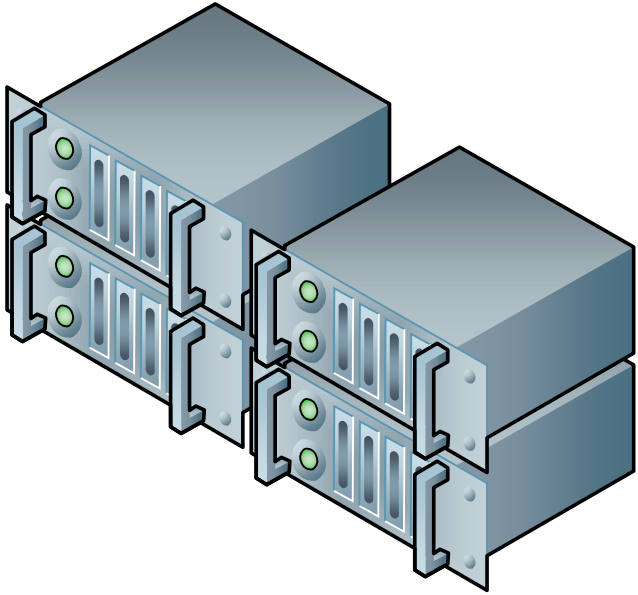


# Scope of Work

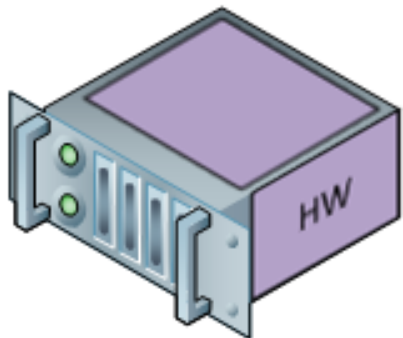
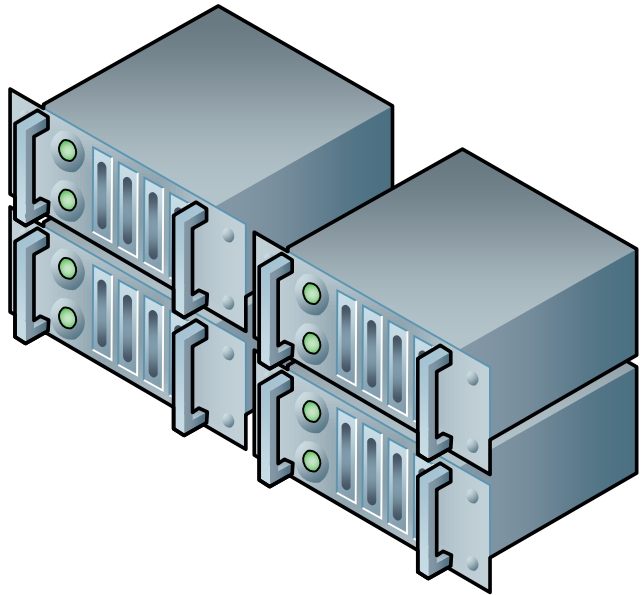




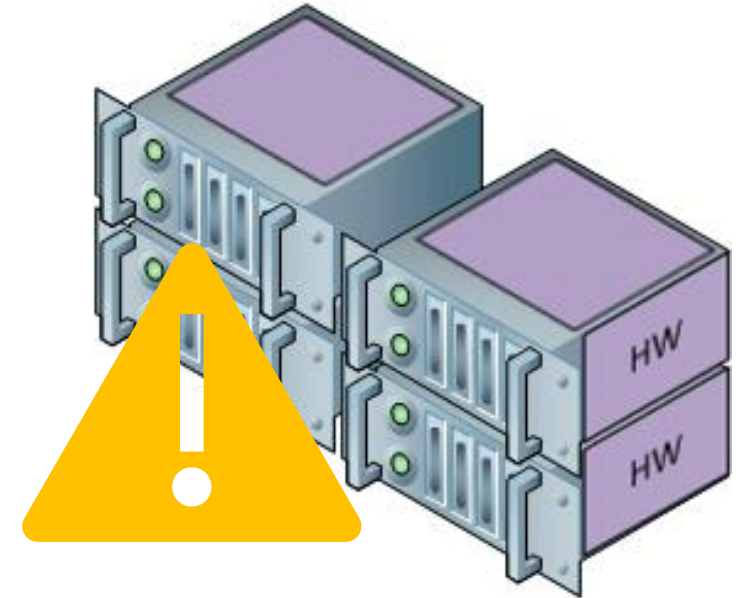
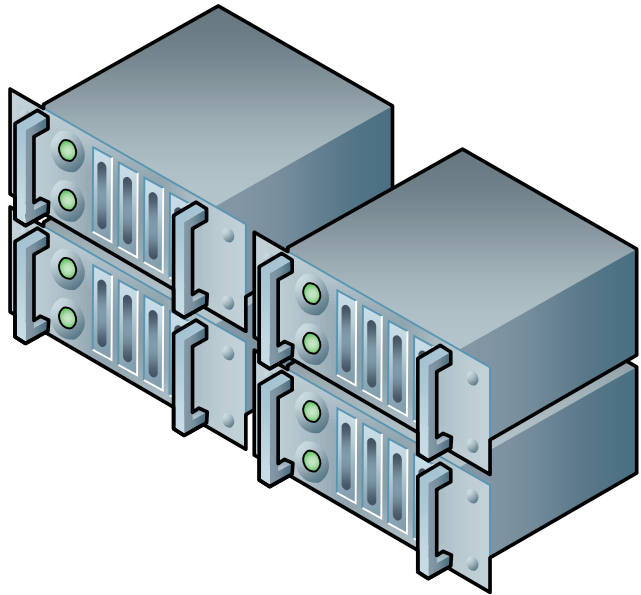
# Evaluation Challenges



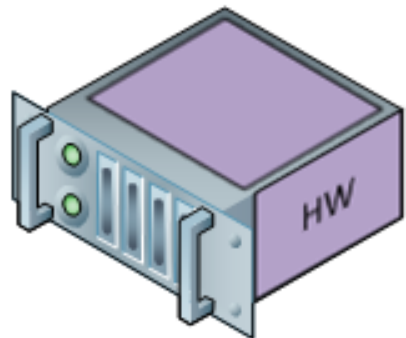
# Evaluation Challenges



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FireSim [Karandikar' 18]



CloudLab

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