



# AtlasTune: Coordinated Learned Database Optimizer Components with Multi-Agent Reinforcement Learning

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Tuning Background

### Tuning Challenges

Curse of dimensionality

Hundreds of system variables

Different component tuners

Hidden interdependencies

How can learned tuners be adapted to cooperate?

### Index Selector

Choose optimal subset of columns to index

ORDERKEY	INT
CUSTKEY	INT
PRICE	DECIMAL
...	...
ORDERDATE	DATE
CLERK	CHAR(15)

CREATE INDEX ...

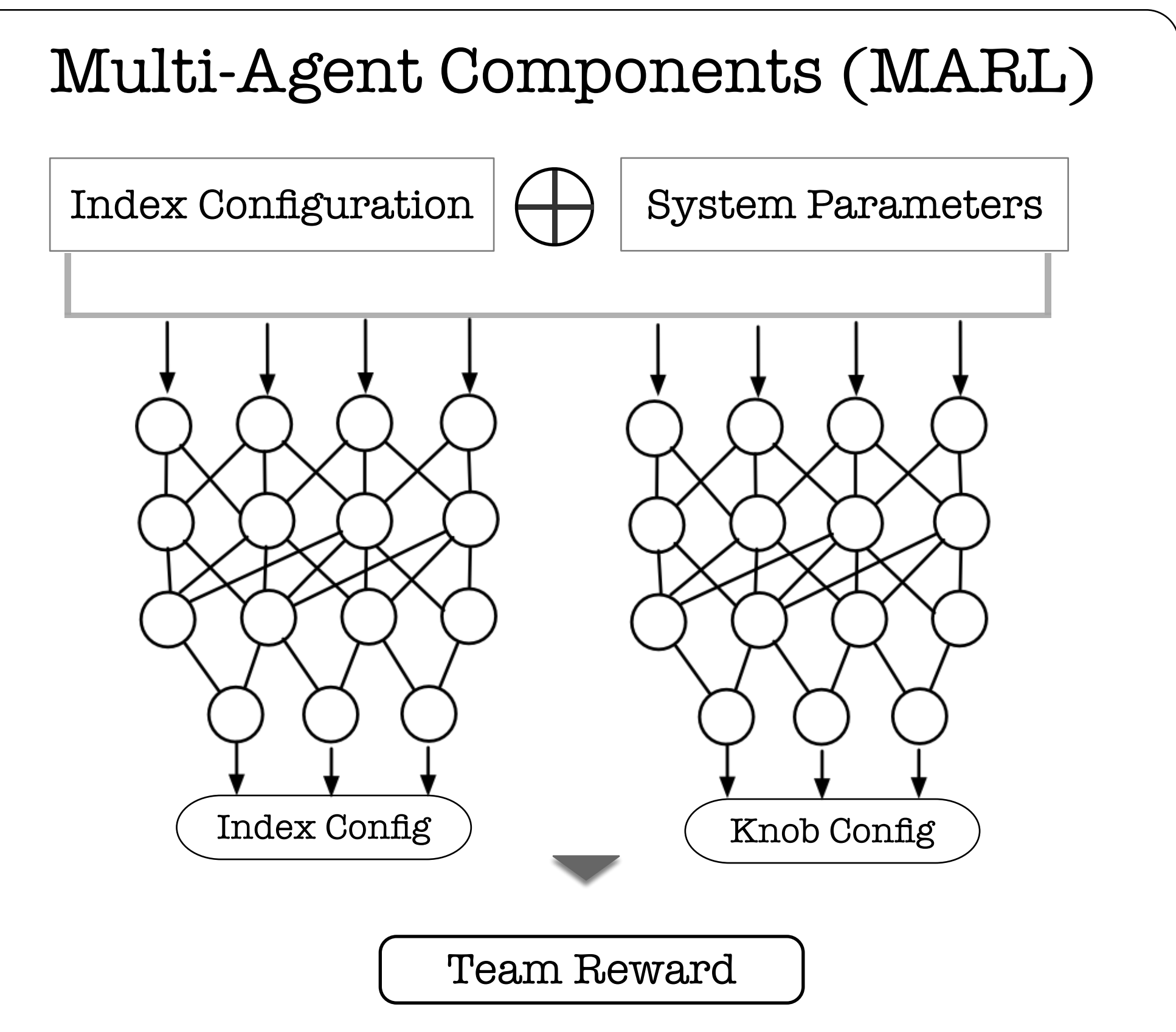
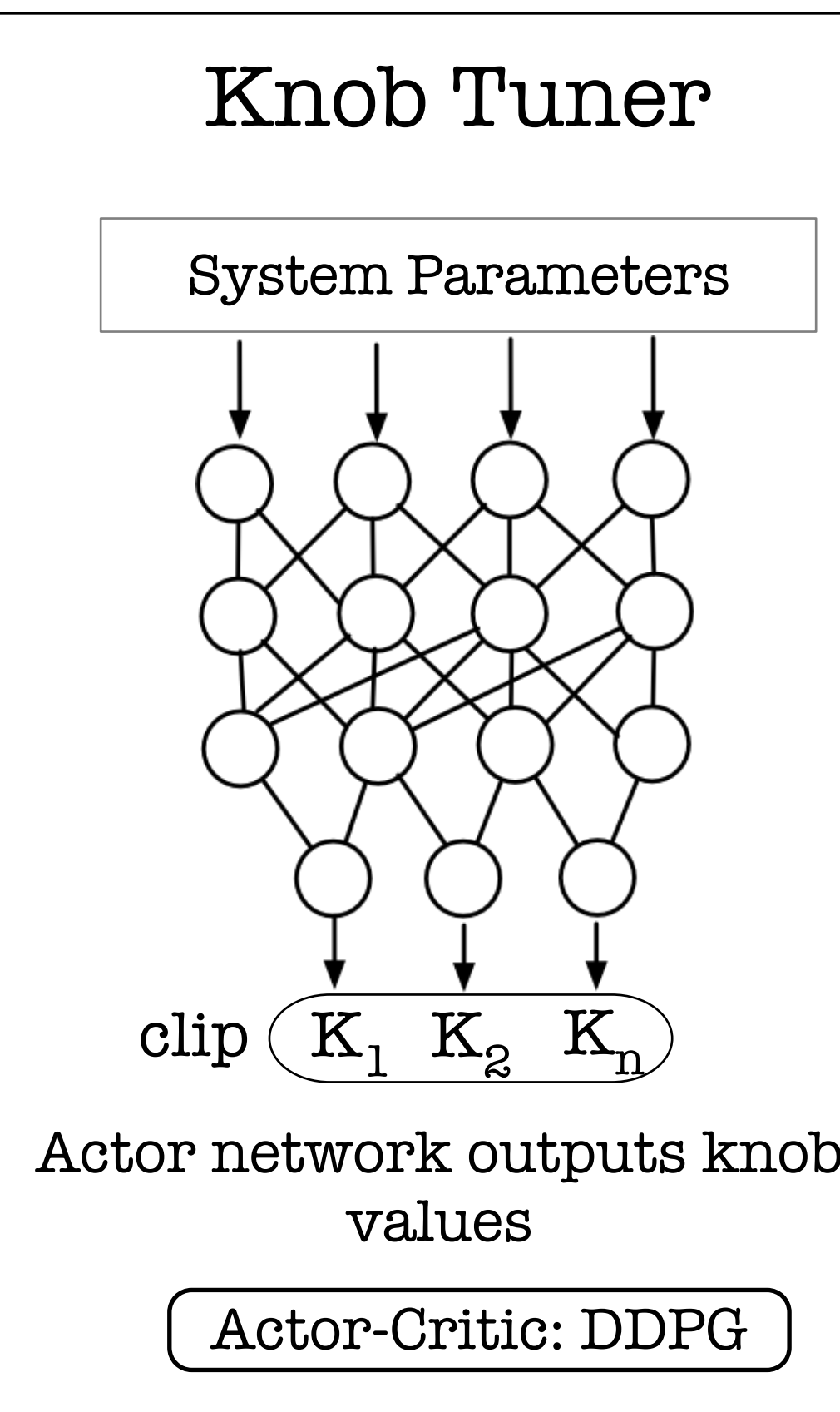
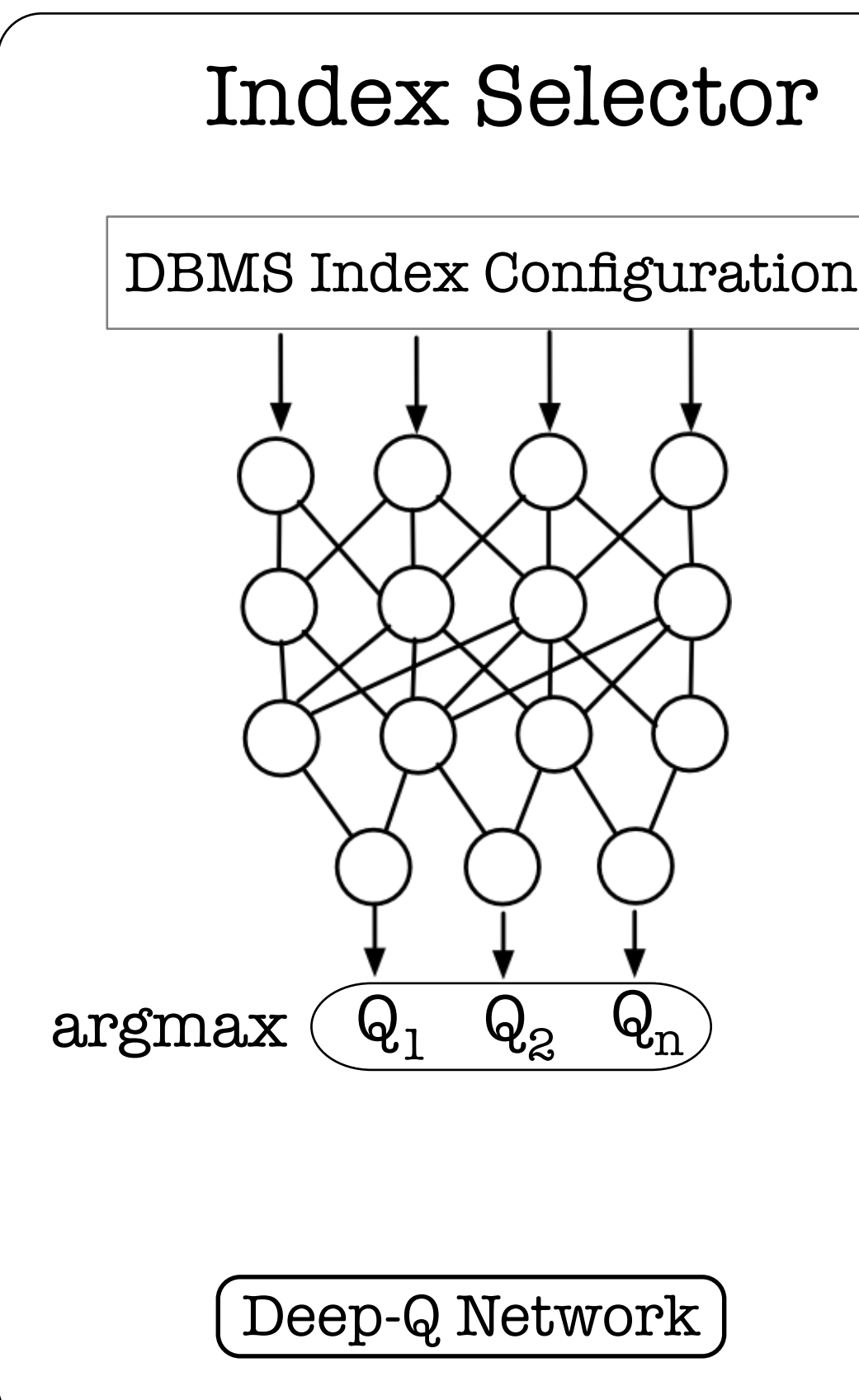
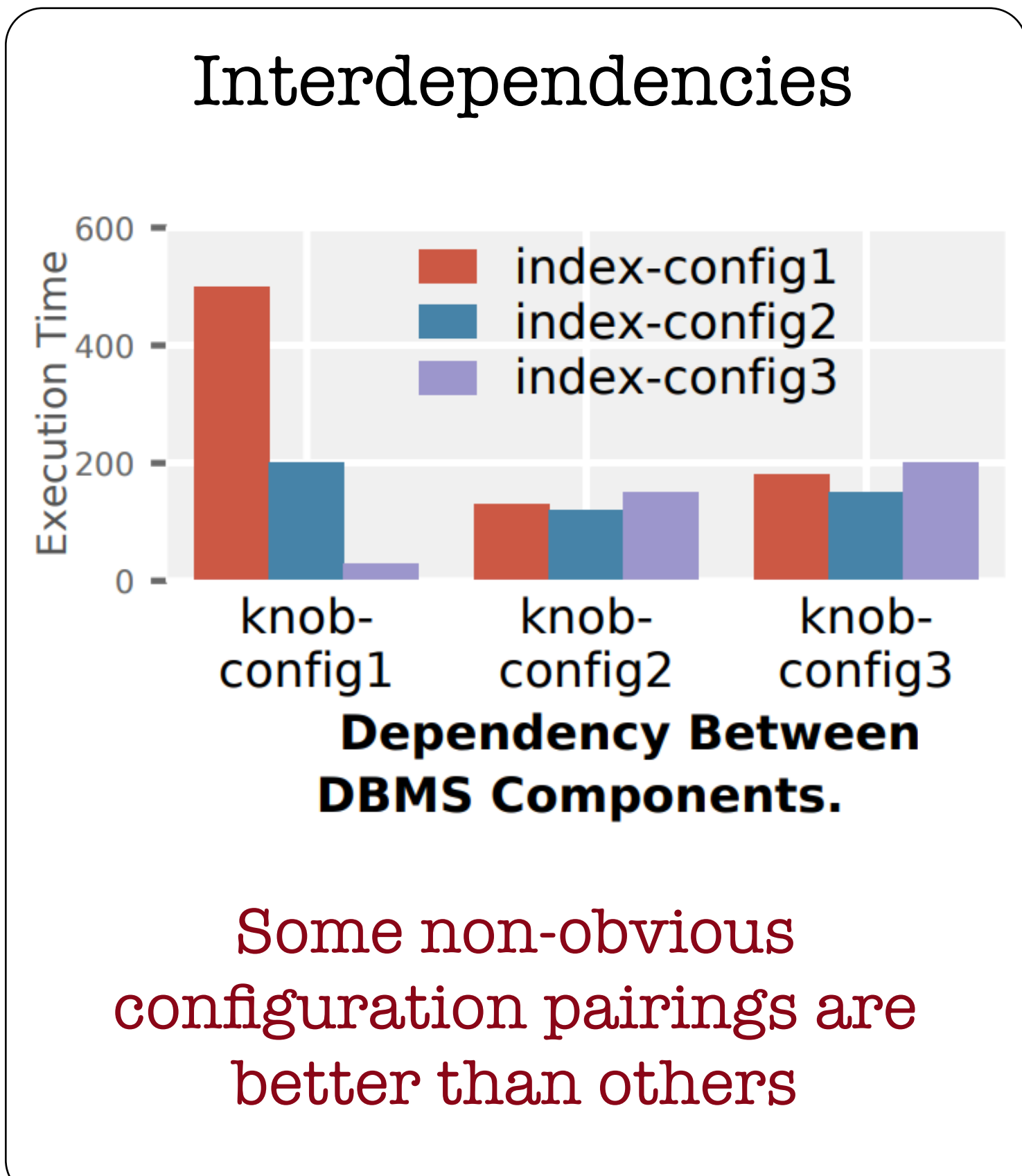
Discrete space      Selected Approach: Deep-Q Learning

### Knob Configuration Tuner

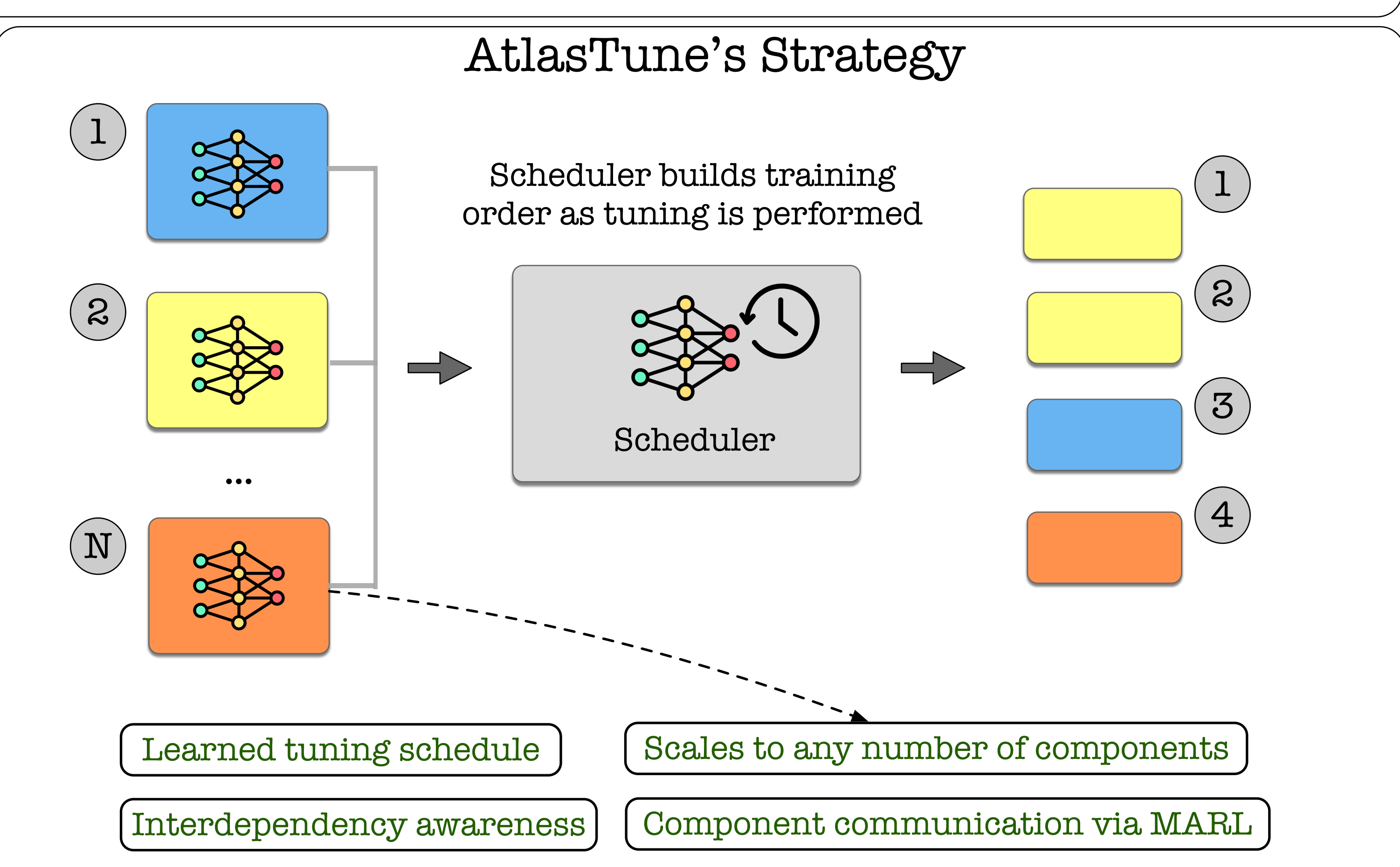
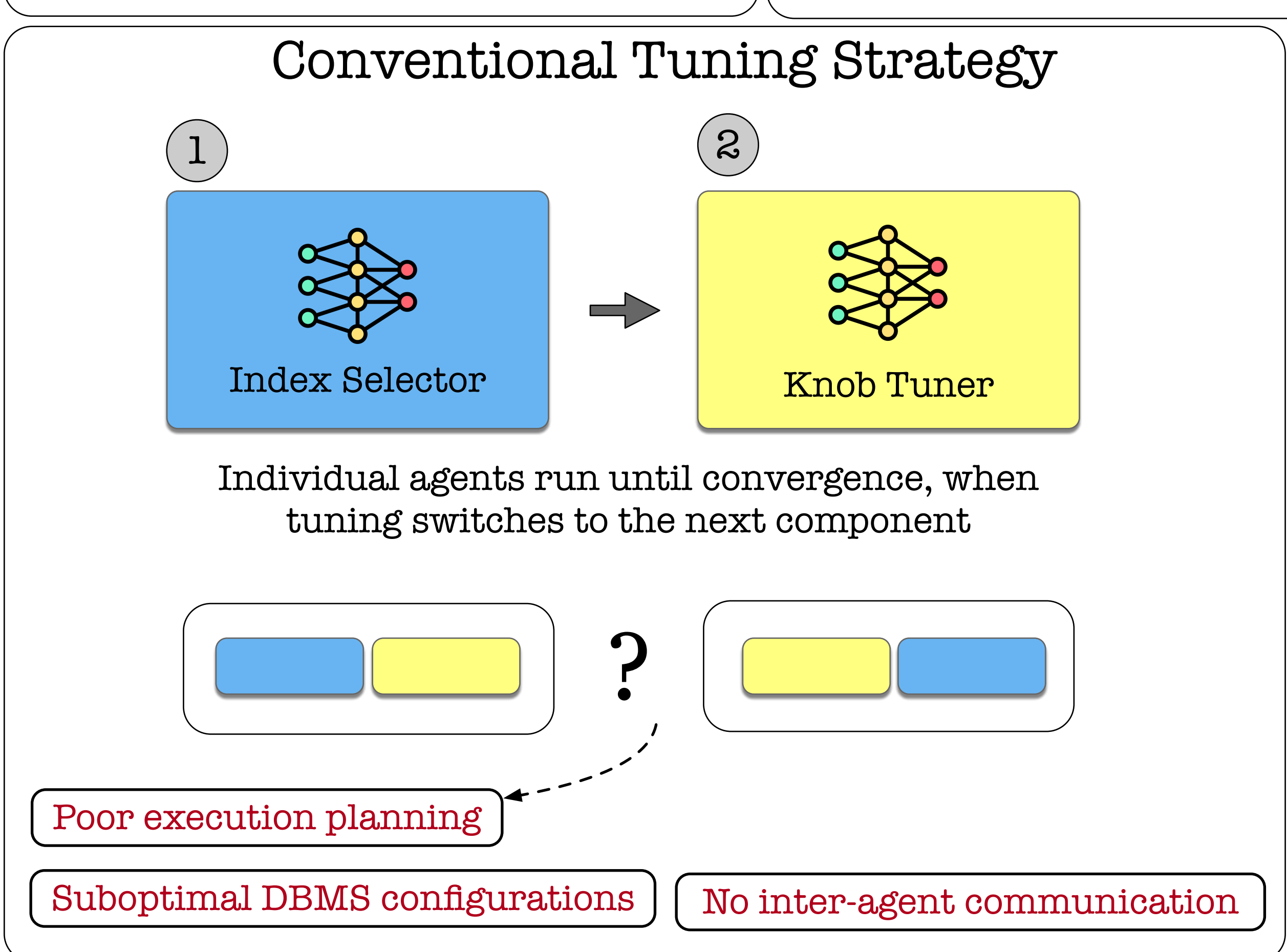
	MIN	MAX	OUT
table_open_cache	1	10240	5670
buffer_pool_size	5e6	5e10	8.4e8
thread_cache_size	0	1000	672
...	...	...	...
write_io_threads	1	64	52
lru_scan_depth	100	10240	4562

Continuous Space      Selected Approach: DDPG

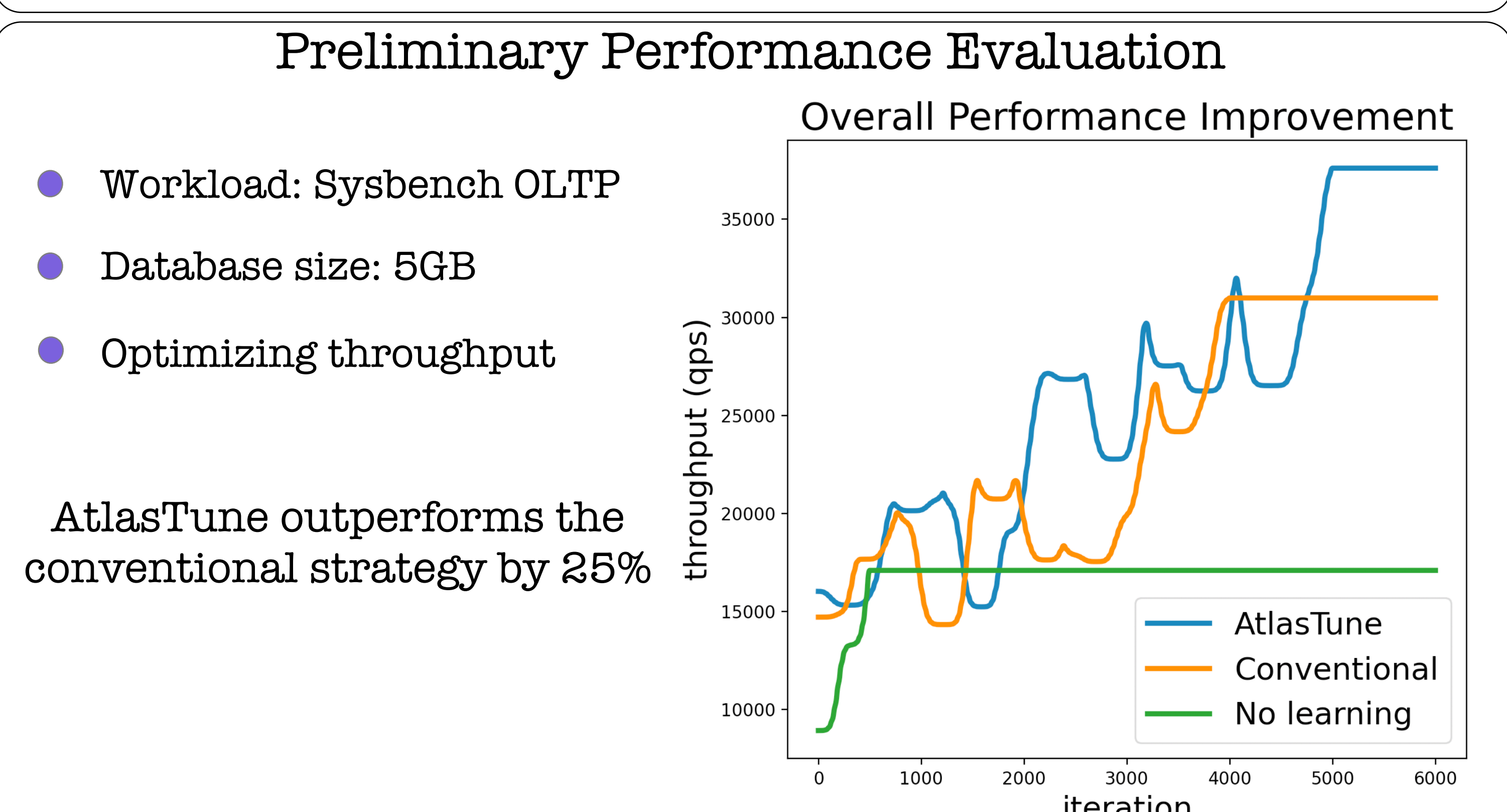
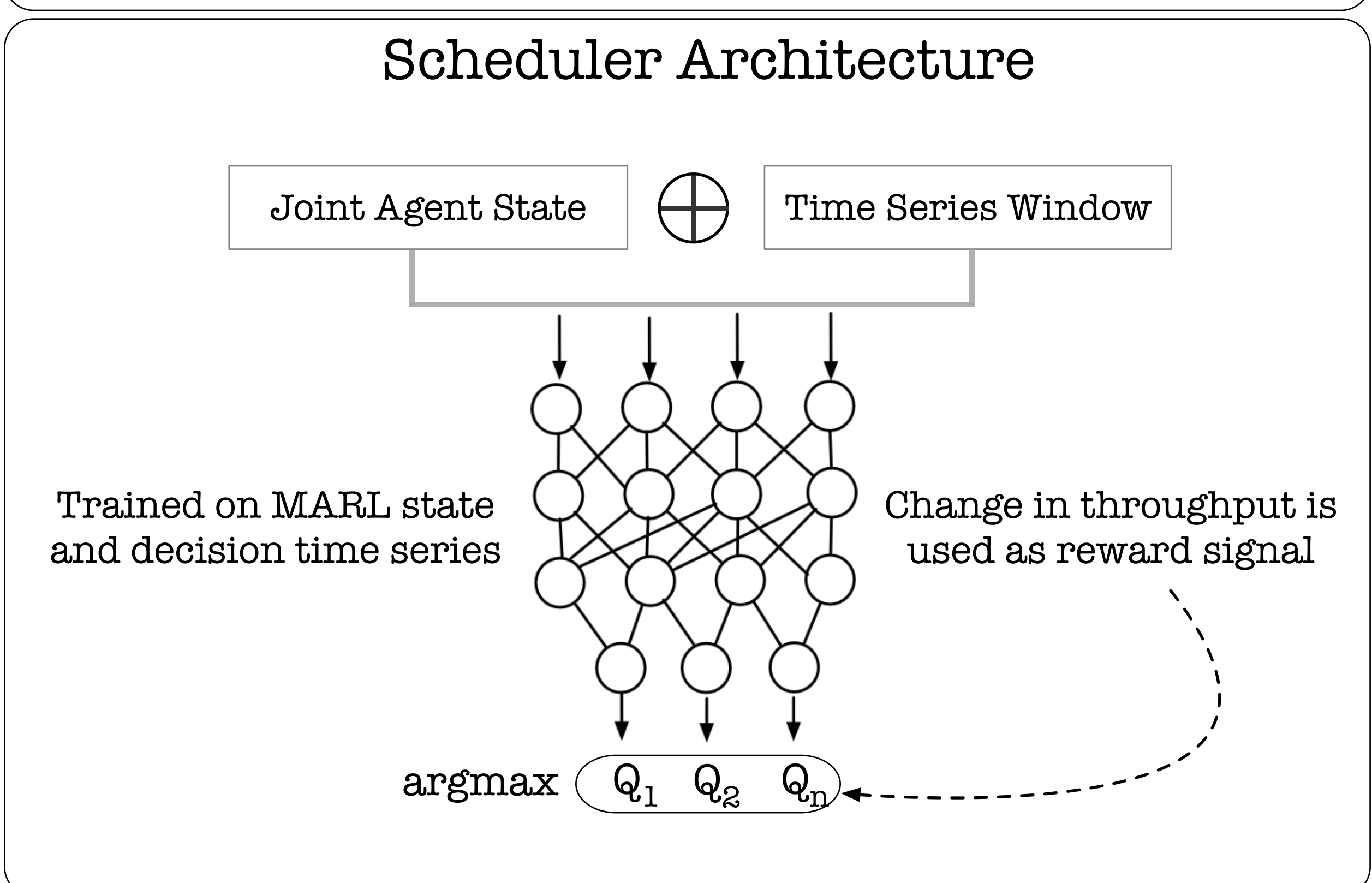
Learned Components



Tuner Scheduling



Scheduler and Results



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