# Power Cost Reduction in Distributed Data Center
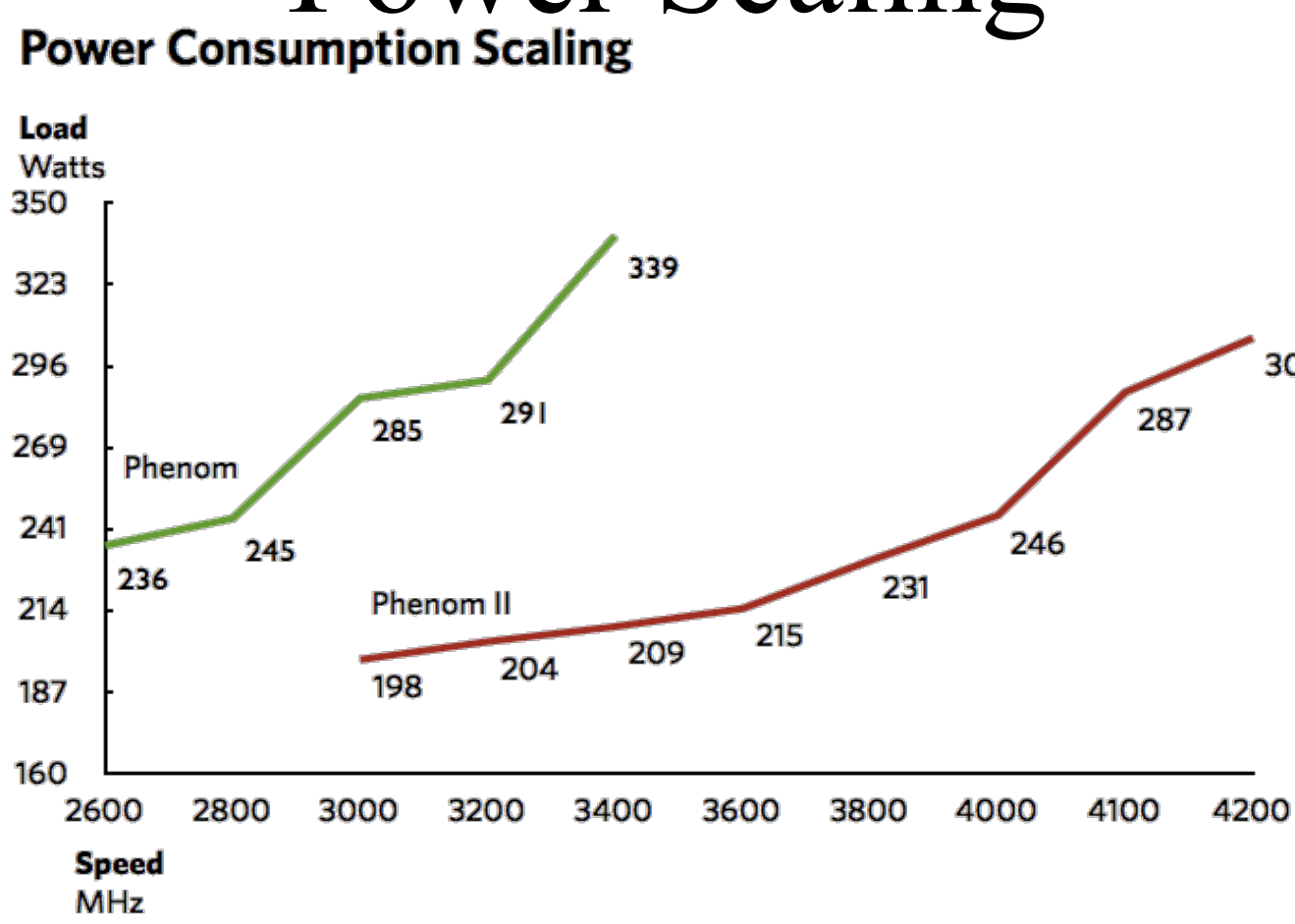
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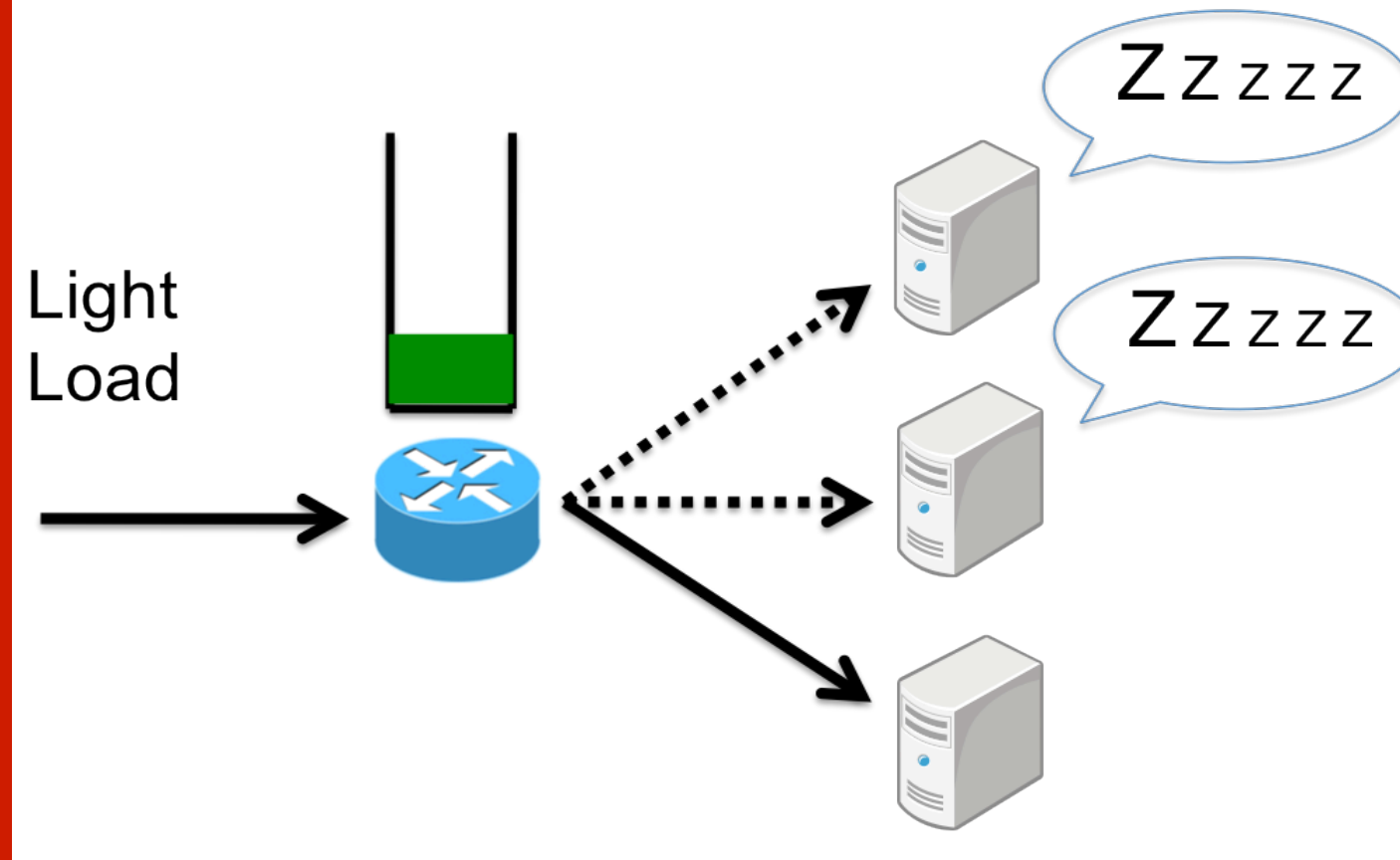
## Motivation

- Data centers are growing in number, size, and power cost
- Our goal: Reduce cost of power while maintaining quality of service

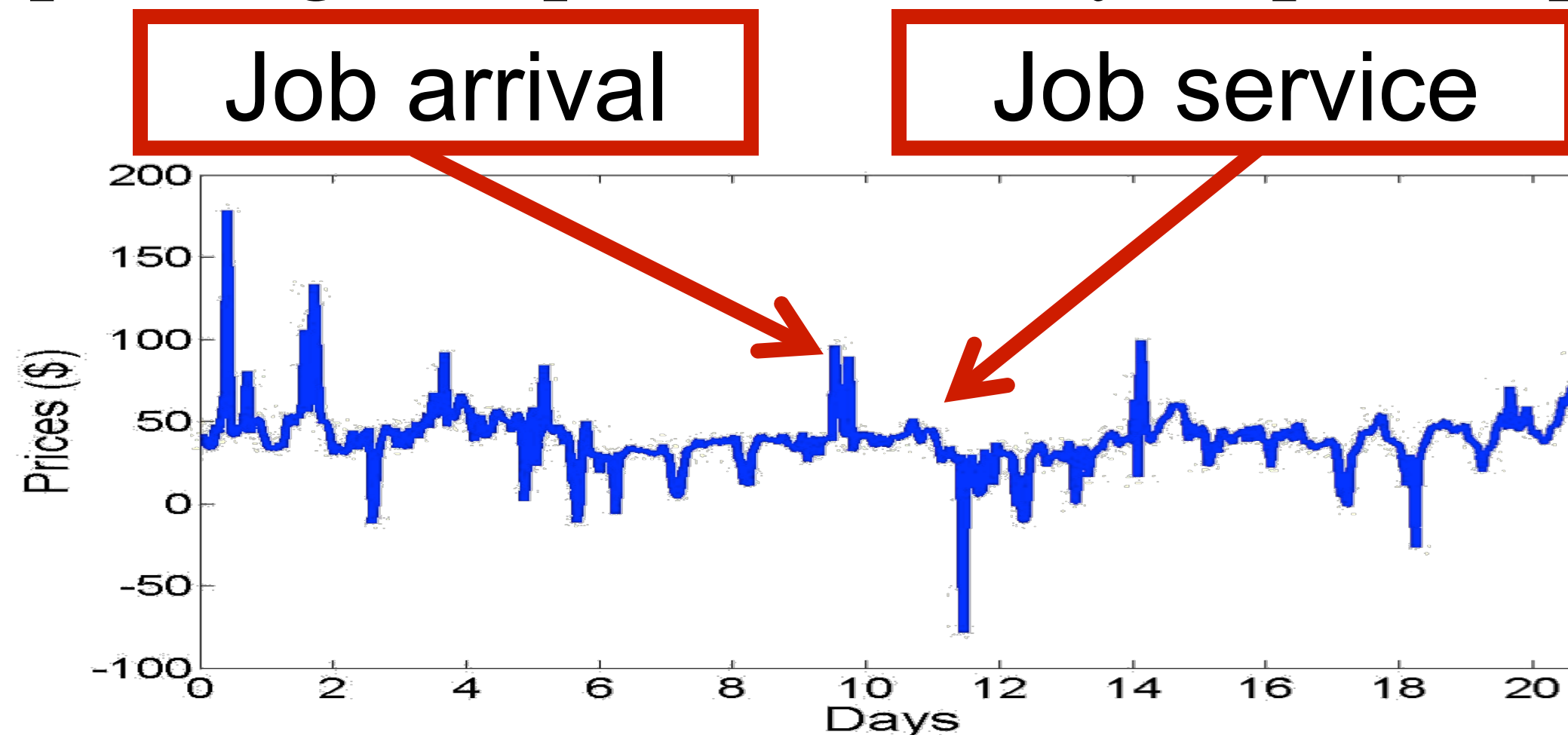## Our Approach: StochAstic power redUction schEme(SAVE)

### Server Level: Power Scaling



Power Consumption Scaling

### Data Center Level: Dynamic Rightsizing



Light Load

Zzzzz
Zzzzz

### Inter Data Center Level: Load Balancing



5/kwh    $2/kwh

### Exploiting Temporal volatility of power prices

Job arrival          Job service



### Multi Timescale System Model



$Q_i^F(t)$  Front End

$N_j(t)$

ZZzzzz

$\mu_{ij}(t)$

$Q_j^F(t)$

$Q_j^B(t)$  Back End

Front End
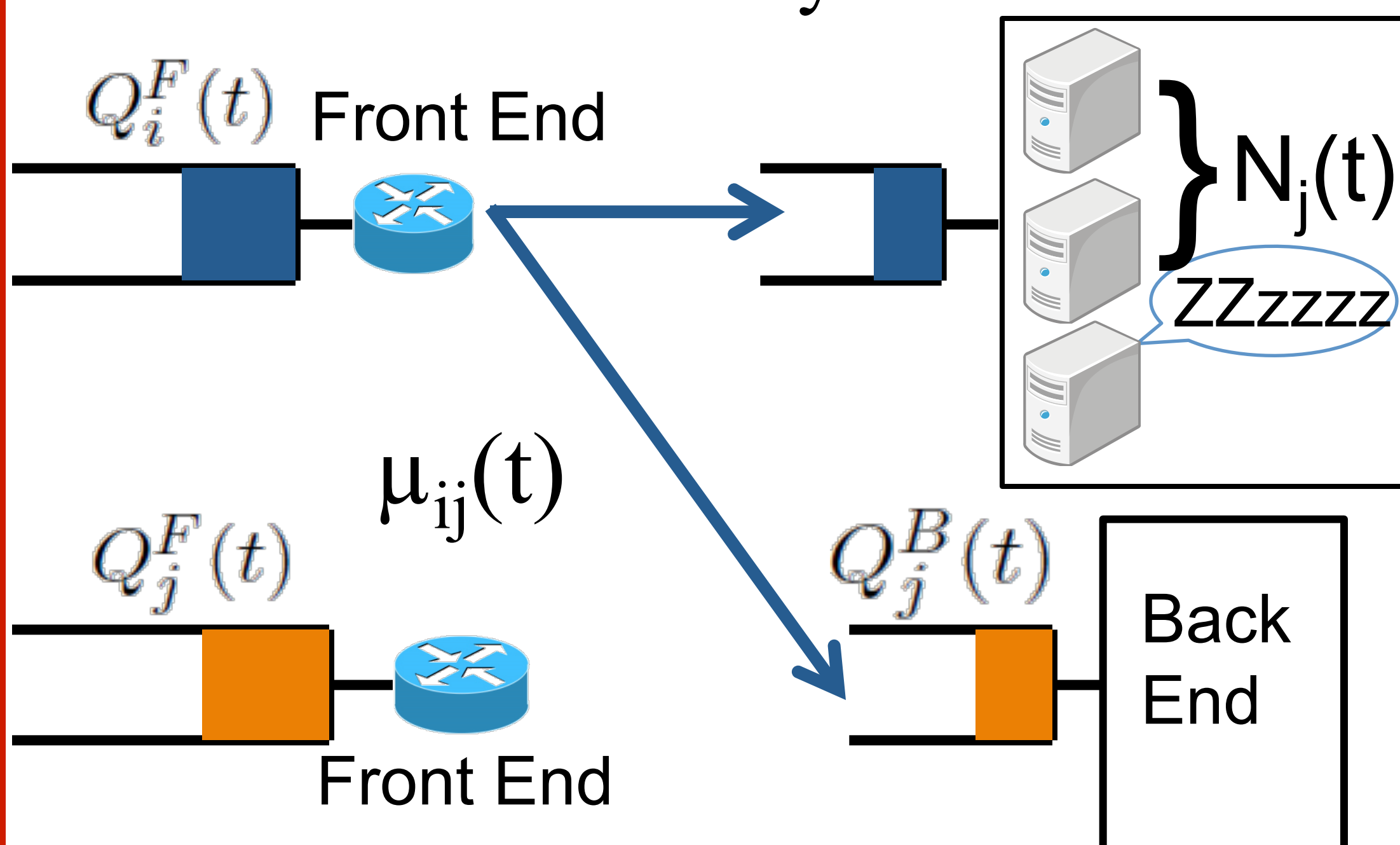
### Performance of SAVE

- Average Delay $\leq O(V)$
- Average Power Cost $\leq$ Optimal $+ O(1/V)$



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