

# Dynamic Power-Aware Disk Storage Management in Database Servers

*Presented by:*

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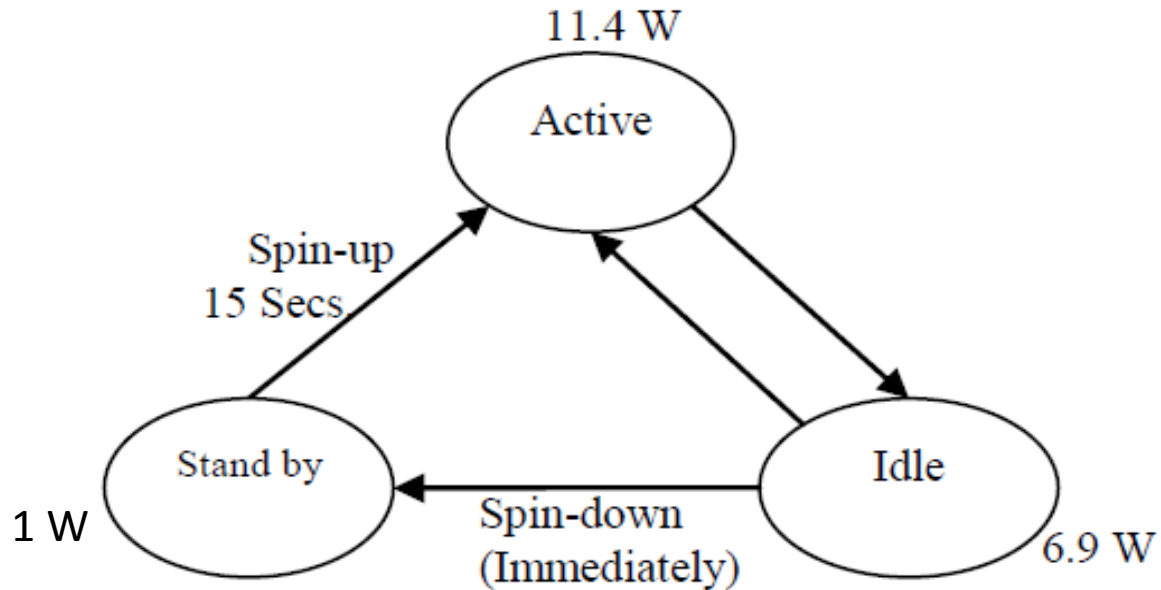


# Motivation

- Data centers consume massive and growing amount of energy (91 billion kWh, 7.5 billion US dollars in 2013).
- The major energy consumer component is *disk storage system* of Database Management System (DBMS)
- **Green Disk Storage Movement:** Dynamic Power Management (DPM) techniques are the most common methods used for saving energy.



# Disk Power Modes and Specifications

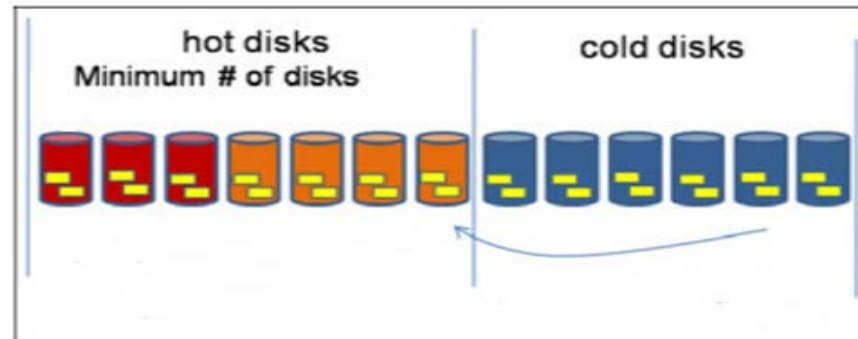


Mode	Rotation Speed (RPM)	Power (W)
Active	7200	11.4
Stand By (sleep)	3600	1



# Optimization DPM Model

- Key idea of an effective DPM technique:
  - ✓ Dynamically transitions disks to lower-power mode when experiencing long idle periods
  - ✓ Extends the idle periods by *data packing technique*



- The integrated optimization model dynamically determines the disk state configuration and inter-disk data migration
- The fast heuristic DPM algorithms find near-to-optimal solution



# Experimental Simulation Results:

## Power Saving Results

- Model: up to 60%
- Heuristic-m: up to 58%
- Heuristic-1 : up to 54%
- BLEX: up to 44%

## Response Time Results

- Model: Shortest
- Heuristic-1: 2<sup>nd</sup> shortest
- Heuristic-m: close to 2<sup>nd</sup>
- BLEX: Longest

