Moab Solutions

Company Overview

- **10 Years of Complex Environment Management and Orchestration**

- Worldwide Customer Base Spanning from **Cluster** to **Data Center** including **Cloud Computing**

- Currently Managing the Worlds **Fastest Super Computers** and **Largest Grids**

- **98%** Customer **Retention** Rate (Subscription Software)

INTRO TO MOAB

Basic Moab

- **Moab Workload Manager - BRAIN**
  - Policy-based workload management and scheduling engine

- **Moab Cluster Manager - Admin - Point and Click**
  - Graphical cluster admin interface, monitor and reporting tool

- **Moab Access Portal - End User - Point and Click**
 - Web-based end user job submission and management portal

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Basic Moab Setup

Moab Workload Manager

Control Jobs   Query Jobs, Resources & Policies

Resource Manager

Definition: A Resource Manager is any service or data source that provides information about or control over the environment

Cluster

- Supports Almost all other Resources Managers. Including VMware and Citrix Xen.
- Simple Plug and Play
- Easy to set up and use
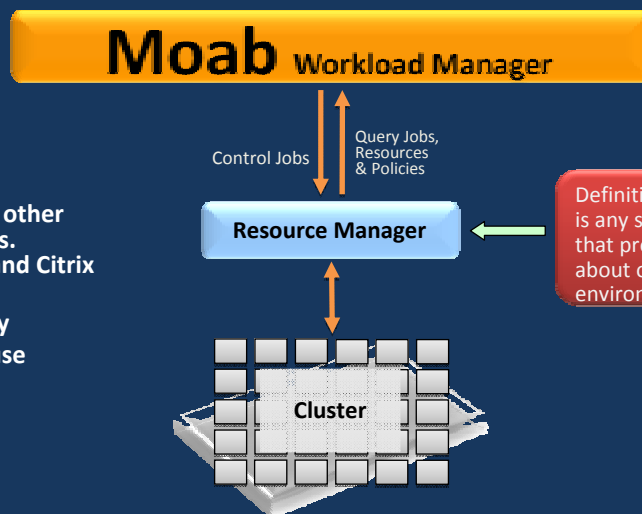
Moab Architecture
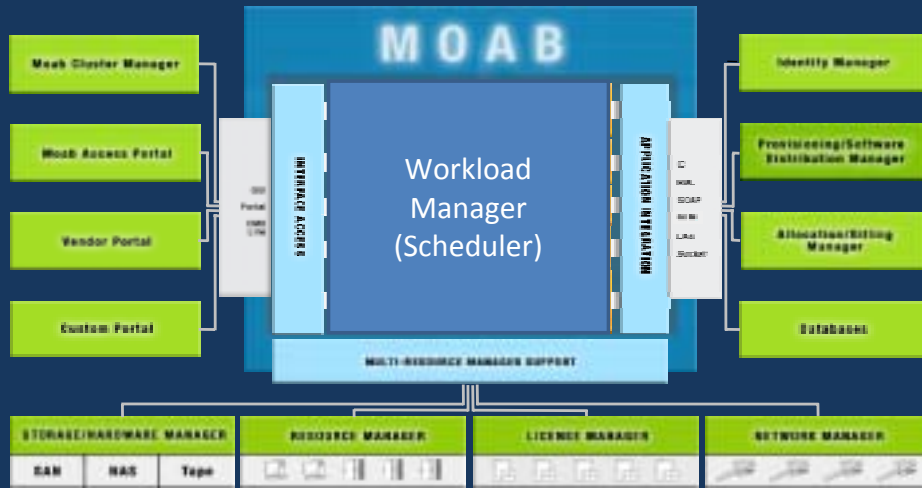
Benefits of Basic Moab

- Flexible Architecture
- Intelligent Scheduling
- Simplified Management

HPC – CLUSTER SOLUTION

Credential Overview

- Certain job attributes (such as user, group, account, class and Q.o.S) describe entities the job belongs to and can be used to associate policies with jobs.
- Every Job has credentials
  - Users (The only mandatory credential)
  - Groups (Standard Unix group or arbitrary collection of users)
  - Accounts (Associated with projects and billing)
  - Class (Associated with RM queues)
  - Quality Of Service (QoS) (Policy overrides, resource access, service targets, charge rates)
- All Credentials can have Usage Limits, Fairshare Targets, Priorities, Usage History, Credential Access Lists / Defaults

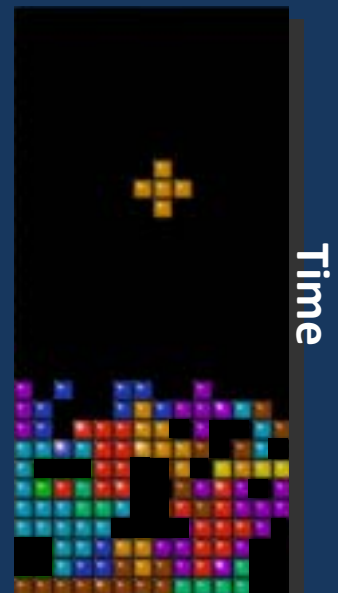# Reservations

A *Reservation* **consists of:**

- A set of resources
- A time range
- An access list

Backfill

- Predictive Scheduling
- Fills in "holes"
- Maximizes Resources

Available Resources

Time

Resources

Priority

- Credential
- Requested Resources
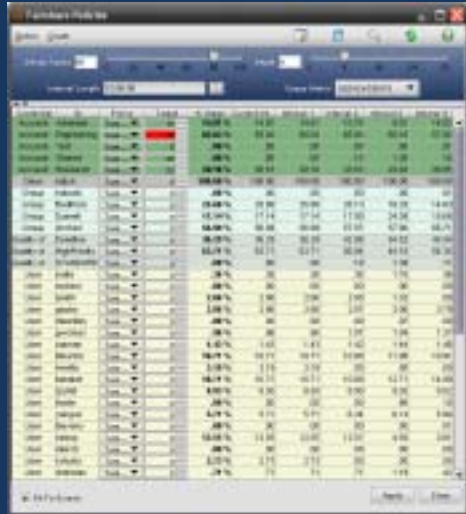- Time in Queue
- Job Attributes
- Utilized Resources

Preemption

- Associate with QoS
- Preemptor
- Preemptee

Fairshare

- Historical Usage
- Actual vs. Target
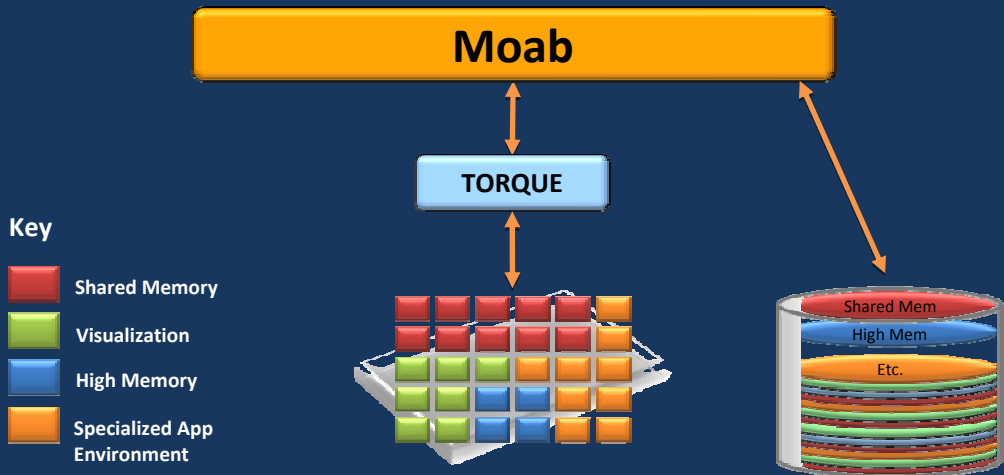 - Priority adjustments

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Events

- Anything happening on the cluster/environment
  - Recorded
  - Generic

Triggers

- An action that is triggered by the event
  - Object Oriented
  - Event
  - Action Desired Outcome

Heterogeneous Management

Moab

TORQUE

Key

- 🟥 **Shared Memory**
- 🟩 **Visualization**
- 🟦 **High Memory**
- 🟧 **Specialized App Environment**

Shared Mem
High Mem
Etc.

GREEN SOLUTION

Save Money with Moab

Control **Power-Saving Modes**

Temperature Based Scheduling
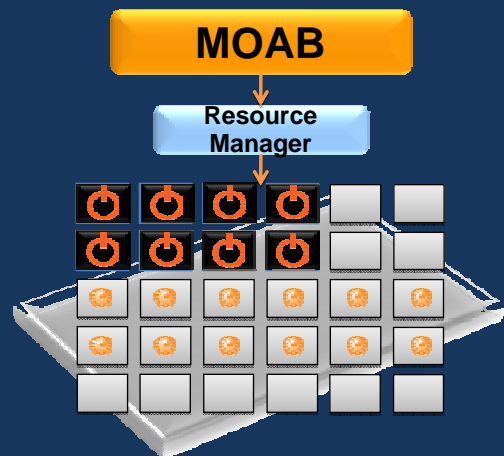
CPU Core Utilization

Report Usage

Industry-Leading Power Reduction Solution
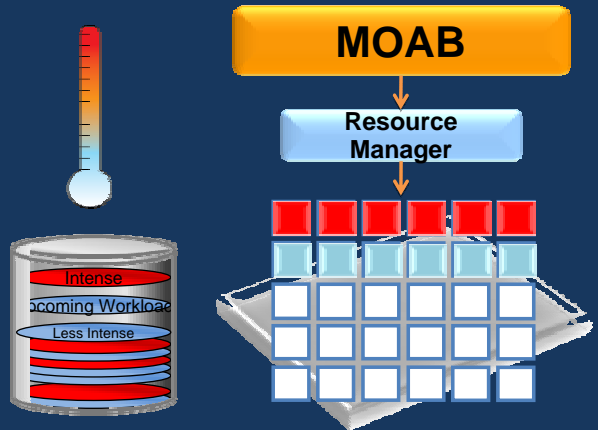
Idle Node Management

Moab:

- Workload Prediction
- Power Control
- Energy Savings

Thermal Balancing

Moab:

- Job Impact
- Node Information
- Temperature and Policies
- Sweet Spot
- Node Consolidation

MOAB

Resource Manager

Intense
Incoming Workload
Less Intense

CLUSTER RESOURCES

BEST SYSTEMS

Workload Packing

Moab:

- CPU and Core Utilization
- Controls VM's
- Lower Energy Use
- Resource Power Control

MOAB

RM

4 Core CPU

Job 1

Job 2

Job 3

CLUSTER RESOURCES

BEST SYSTEMS
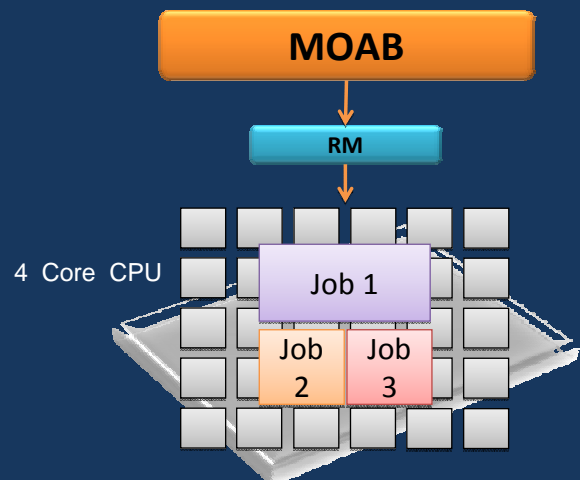
Energy Rate-Aware Processing

Moab:

- Energy Rate Scheduling
- Time of Day Scheduling
- Maximize Savings

Green Benefits

- Power Constricting Regulations

- Environmental Impact

- Energy Control

- Increase ROI

HYBRID SOLUTION

Save Money and Increase Performance

- Consolidate Multiple, Inefficient Resource Silos to a Single, Unified System
- Dynamically Manage Multi-OS Workloads
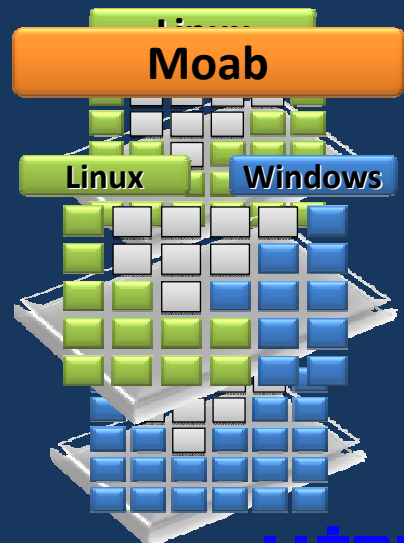- Reduce User and Admin Complexity

Historical Resource Management

- Multiple Silos
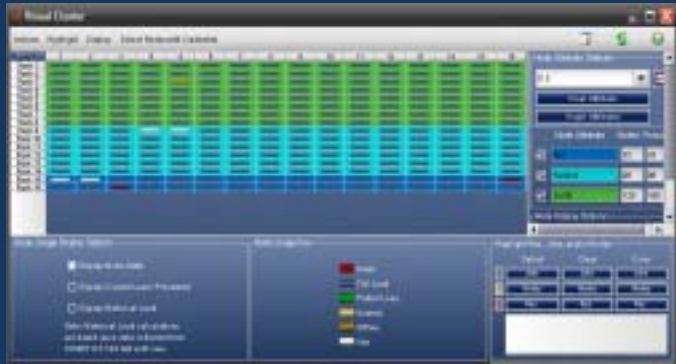- Additional Management
- Complexity
- Under Utilization

Linux

Windows

Moab Dynamic Hybrid

- Unified System
- Dynamic Resources
- Management
- Ease of Use
- Increased Utilization

Moab

Linux

Windows

Provisioning Options

- Dual Boot
- Imaging
- Virtualization

Hybrid Benefits

- Maximize Resources

- Eliminate Un-needed Silo's

- Dynamically Balance OS's

- Simplified Management

- Enforce SLA's

- Increase ROI

HPC – GRID SOLUTION

Moab Grid Suite

- Grid workload manager & meta-scheduler
- Maintains individual cluster and group sovereignty
- Works across heterogeneous resources and multi-RMs
- Orchestrates scheduling, managing, & monitoring
- Automates job & data migration
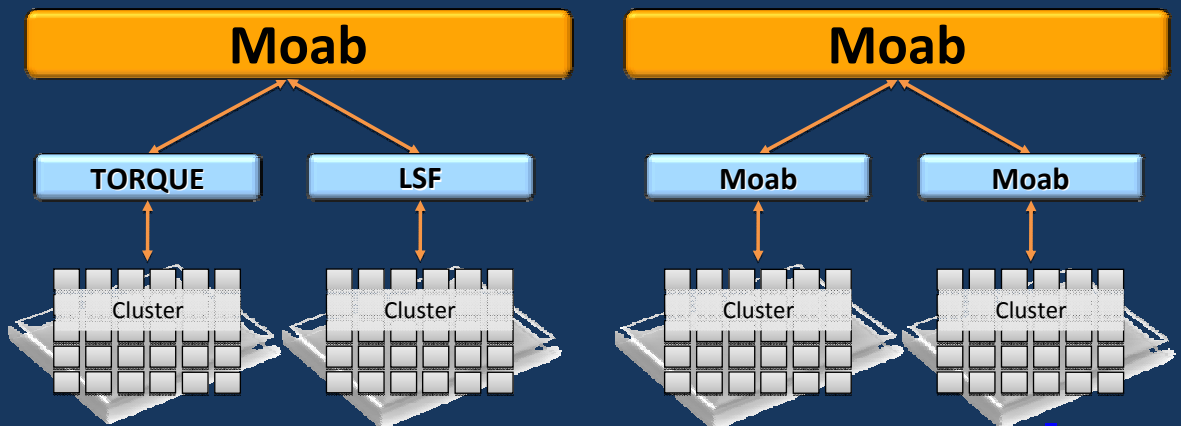- Enforces QoS/SLA policies

Moab Grid - Capabilities

- Meta-scheduling
- Administrative
- Autonomy
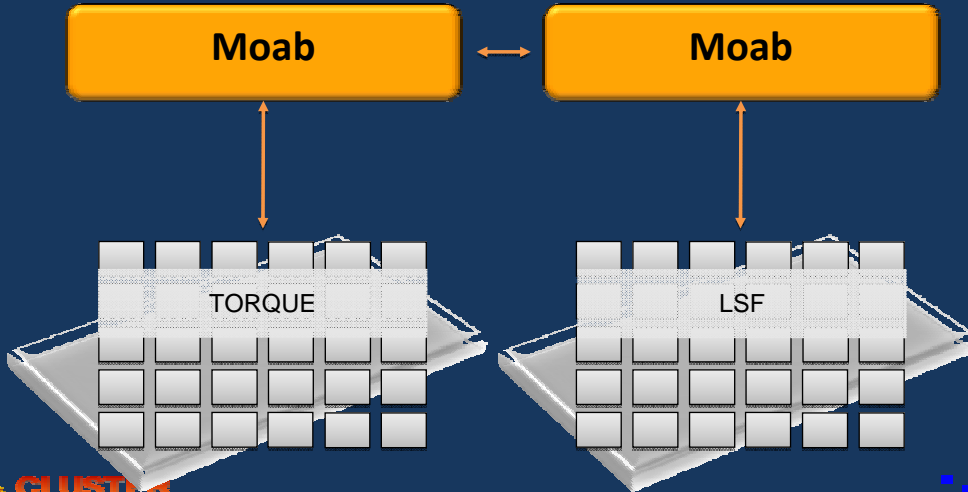- Credential Mapping
- Data Staging
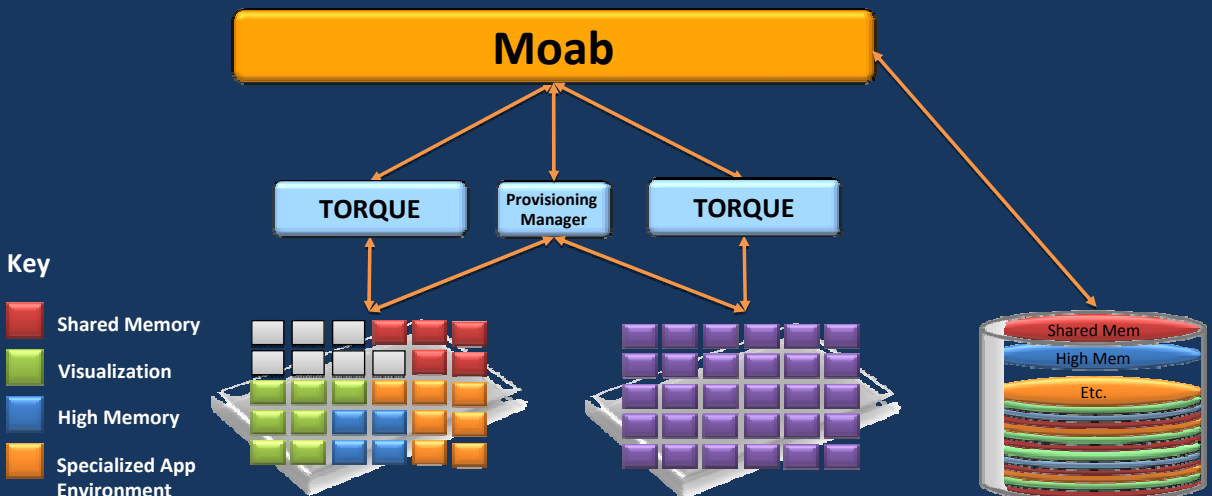- RM Translation

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Multiple Resource Manager Environments

Moab will manage multiple Resource Managers – or multiple Moabs. . .

Moab		Moab	
TORQUE	LSF	Moab	Moab
Cluster	Cluster	Cluster	Cluster

Moab Peer to Peer

Heterogeneous Architecture

Key

- Shared Memory
- Visualization
- High Memory
- Specialized App Environment

Benefits

- Unified Management
- Intelligent Scheduling
- Flexible Policies
- Simplified Reporting
- Increase Control and Visibility

MOAB ACCESS PORTAL

Moab Access Portal

- Web-based
- End-User Job Submission
- Completely Customizable
- Simplifies Admin Duties

MOAB CLUSTER MANAGER
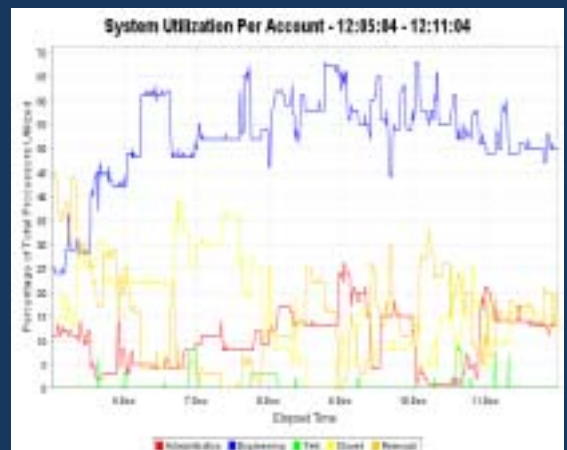
Moab Cluster Manager

- Visual Cluster Management
  - Extensive Reporting
  - User and Group Credential Management
  - Simple Fairshare Implementation
  - Simple Dependency Setup
  - *Note all features can be executed via command line.

Monitoring - Reporting

- Graphical Interface
- Utilization
- Resource Consumption
- Identify Problems
- Generic Events/Resources

Accounting - Reporting

- Utilization and ROI
- Track time, credit, or cost usage

Summary of Benefits

Return on Investment