DEMAND DRIVEN CLUSTER ELASTICITY

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Dow

SLUG '23

AGENDA

- Overview of HPC usage at Dow

- Premise behind the need

- Journey

- Outcome

ABOUT ME

- BS Computer Science – Michigan State University

- 12 years prior IT experience

- 5 years in HPC at Dow

Dow HPC Workload

- Highly heterogeneous
  - Multi-node MPI
  - Single/partial node SMP
  - Single threaded
  - Specialty hardware
- Broad spectrum of run time

Dow HPC Userbase

- Power Users
  - Utilize heavily scripted workflows
  - Command line comfortable
- Modelers
  - Domain experts
  - Prefer GUI
- Consumers
  - Enabled by modelers and power users' work
  - Little to no simulation background

PREMISE

Running
Pending

Underutilized Capital

Inconsistent wait time
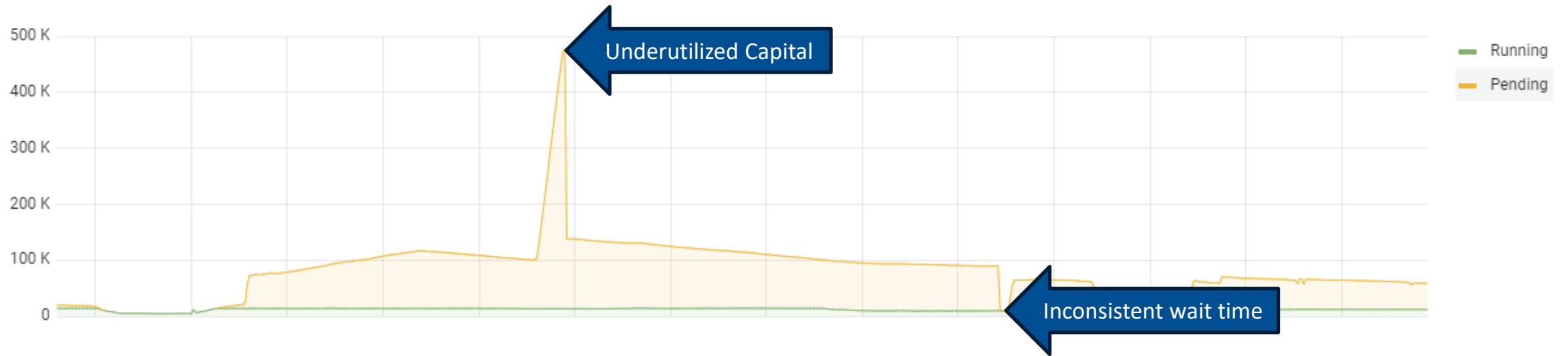
Pure consumption based

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Journey

- Turnkey
- Proof of value
- Shortcomings
- Requirements analysis
- Component selection
- Seamless solution

Early stage testing

Design

Implementation

Solution

- Low barrier of entry

- Provided guard rails

- Intuitive UI

- Leverage industry best practices without becoming Cloud SME

- Empowers users with increased resource flexibility

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Early stage testing | Design | Implementation

VALUE

- Flexible scale
- Exploratory work not competing with day to day
- Benchmarking
- Low cloud knowledge requirement

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Early stage testing → Design → Implementation

Shortcomings

- Data sensitivity

- Data movement

- Rework job submission

- Users assumed increased responsibility/retraining

- Scalability
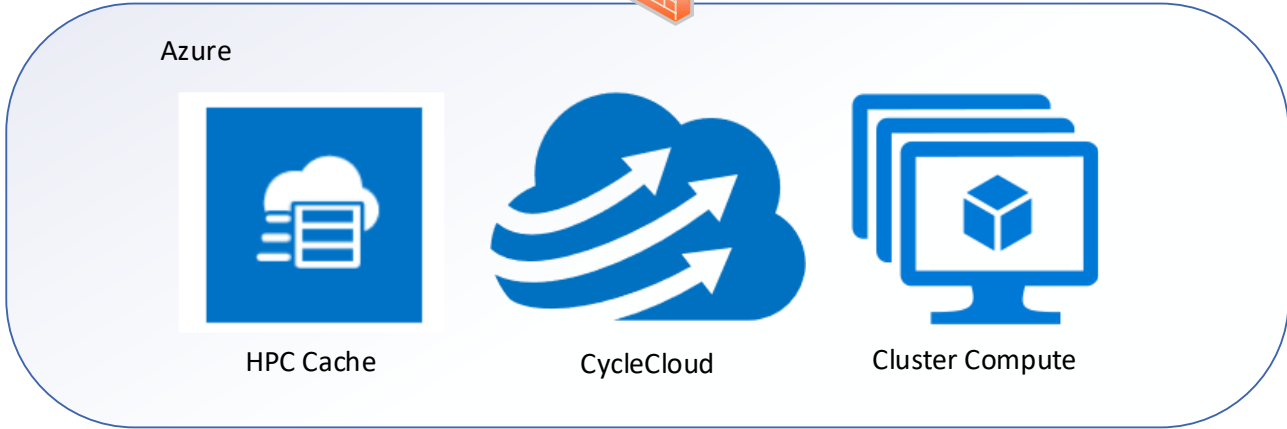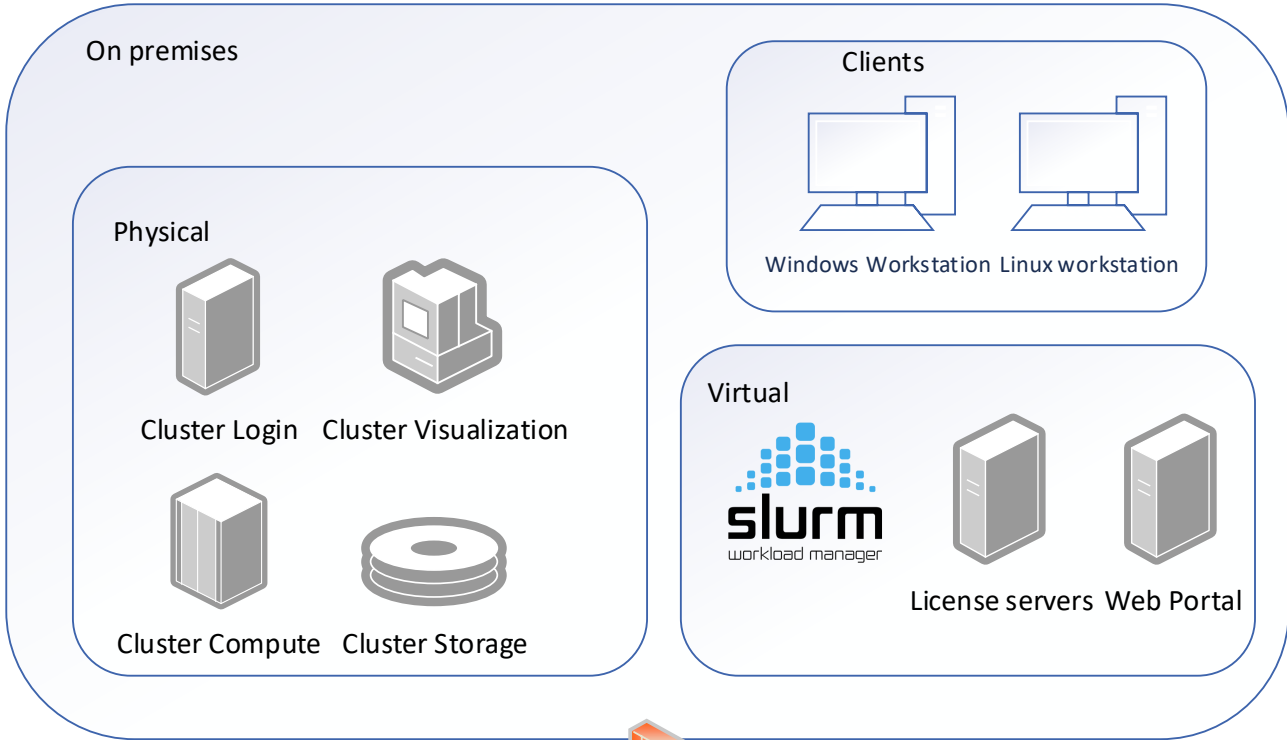
- Disruptive workflow

REQUIREMENTS ANALYSIS

- Scalable

- Provide agency for user to decide where job is run

- Retain control of data and platform

- Non-disruptive
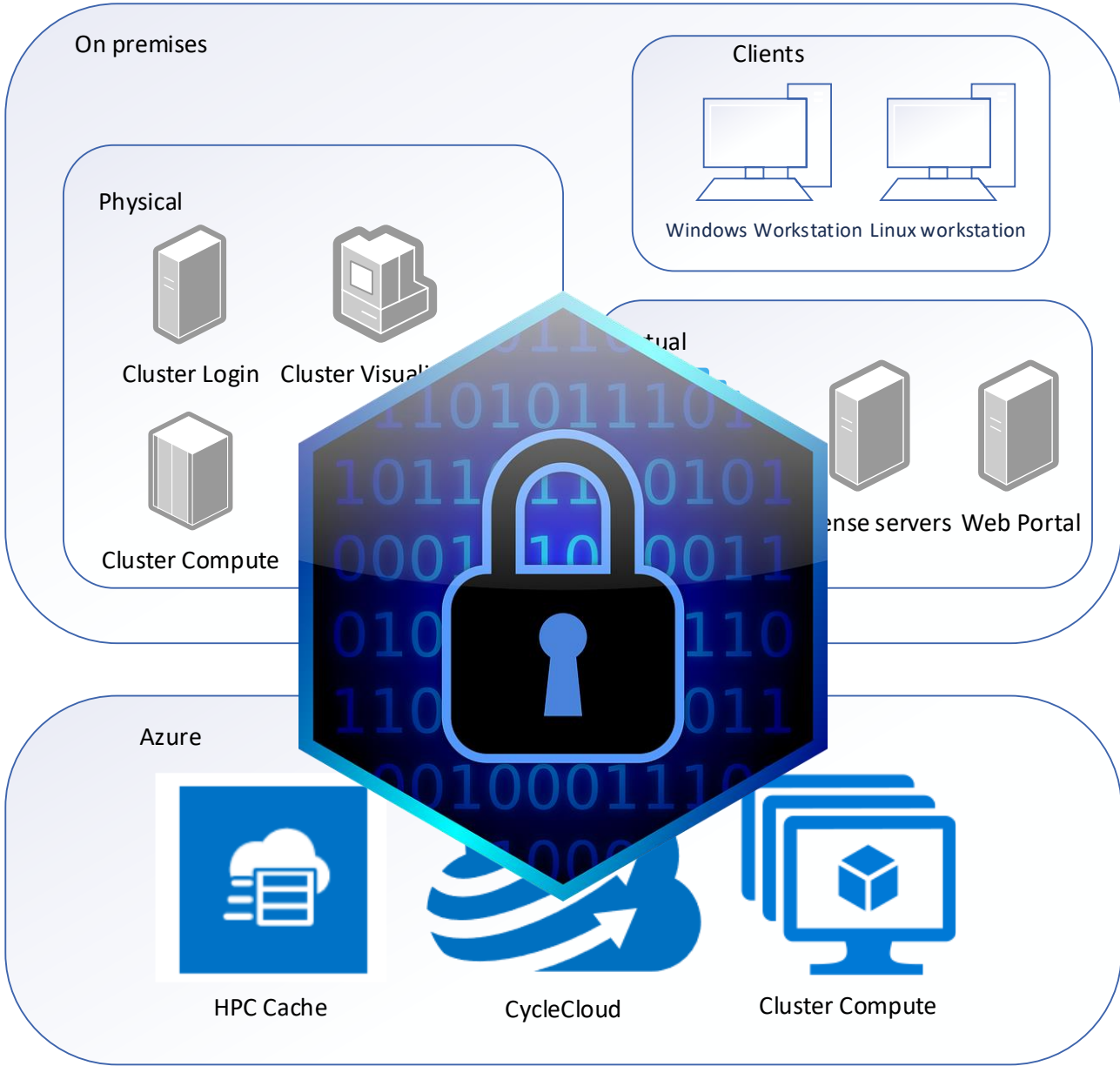
- Minimize user responsibility scope increase

Early stage testing | Design | Implementation

COMPONENT SELECTION

- User interfaces
- Scheduler
- Cloud resource manager
- Data movement

CycleCloud

slurm
workload manager

HPC Cache

Early stage testing

Design

Implementation

SEAMLESS SOLUTION

- Single familiar point of job submission
- No rework of jobs
- Minimal retraining
- Users are given agency to decide where job is run
- Control of data

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Questions?