

BLUE WATERS

April 12, 2015

SUSTAINED PETASCALE COMPUTING

National Petascale Computing Facility

SYSTEMS CONTROLS

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GREAT LAKES CONSORTIUM
FOR PETASCALE COMPUTATION

CRAY®

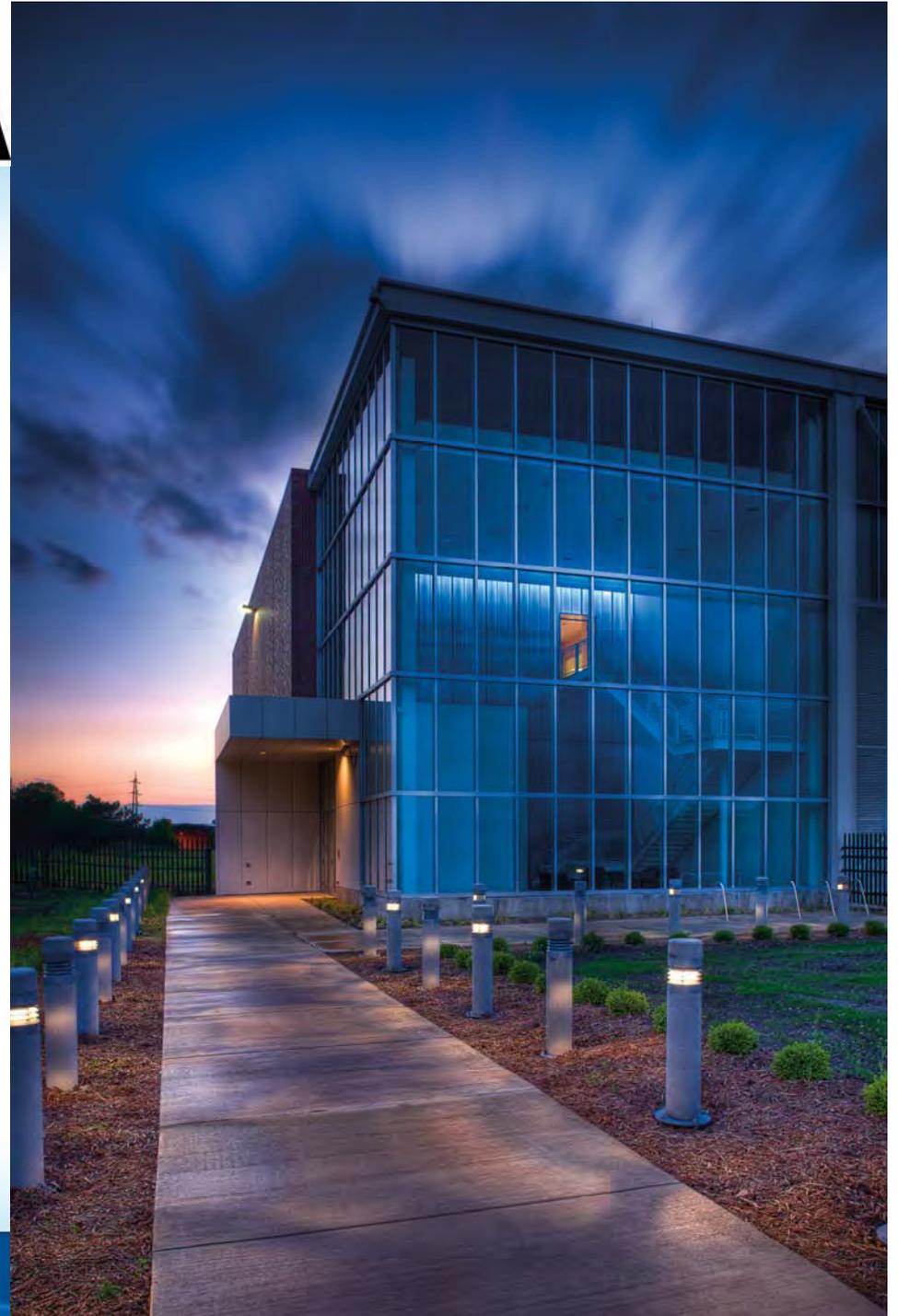


BLUE WATERS

- 288 CRAY CABINETS
- 26,864 COMPUTE NODES
- >49,000 AMD CPUS
- 405,248 CPU CORES
- 4,224 NVIDIA KEPLER GPUS
- 1.5 PETABYTES RAM
- 13.34 PETAFLUPS
- 72 XDP COOLING UNITS
- >95% LIQUID COOLING
- PEAK >3,500 TONS

NPCF

- LEED GOLD CERTIFIED

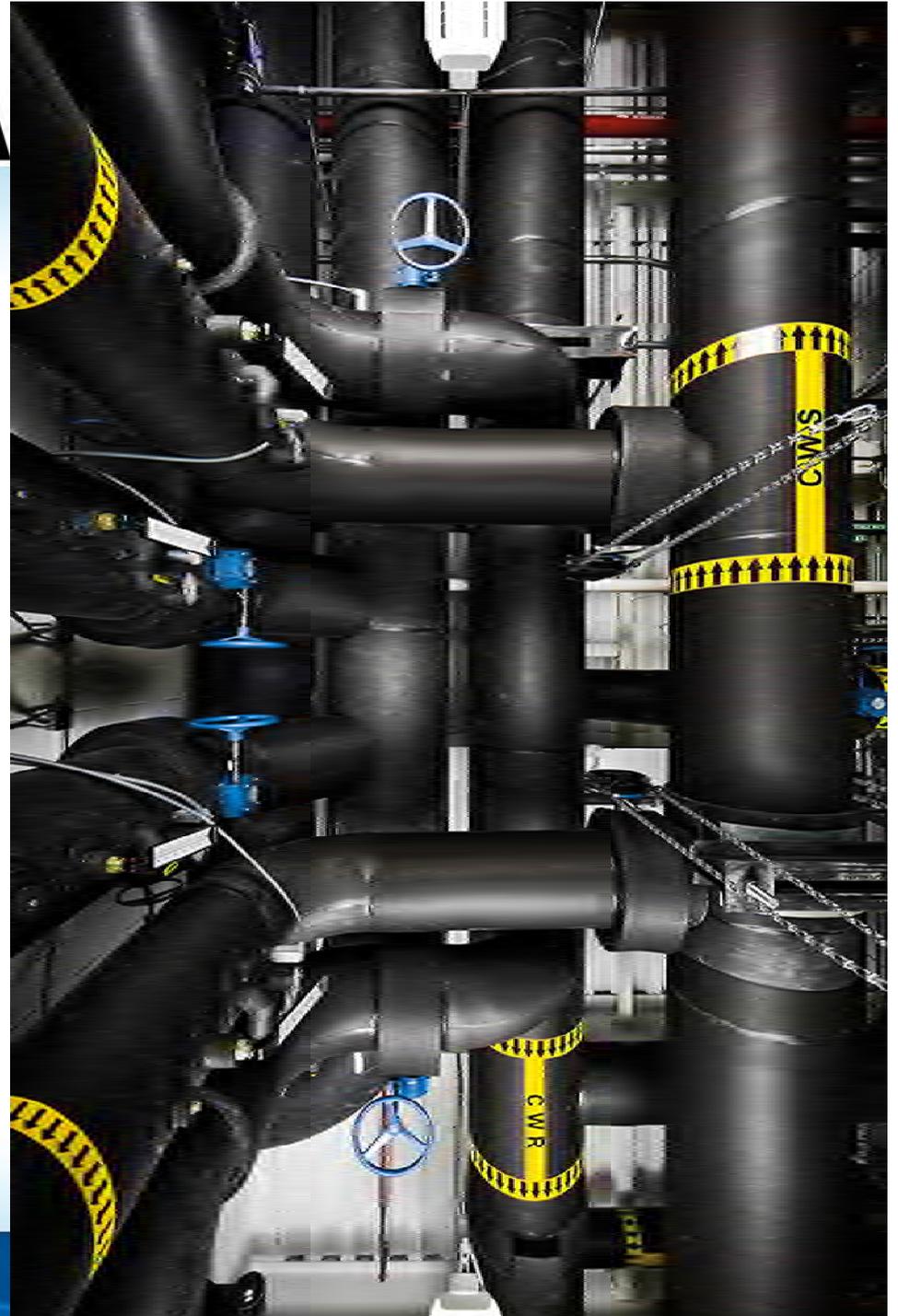


- BAS – Siemens, Campus monitoring and programming
- Water Leak Detection (Trace Tek)
- Fire Alarm panels
- VESDA

- HPC Equipment and Integral Cooling equipment (Operating point info, fans, valve position and Utility consumption)
- HPC Computing Load

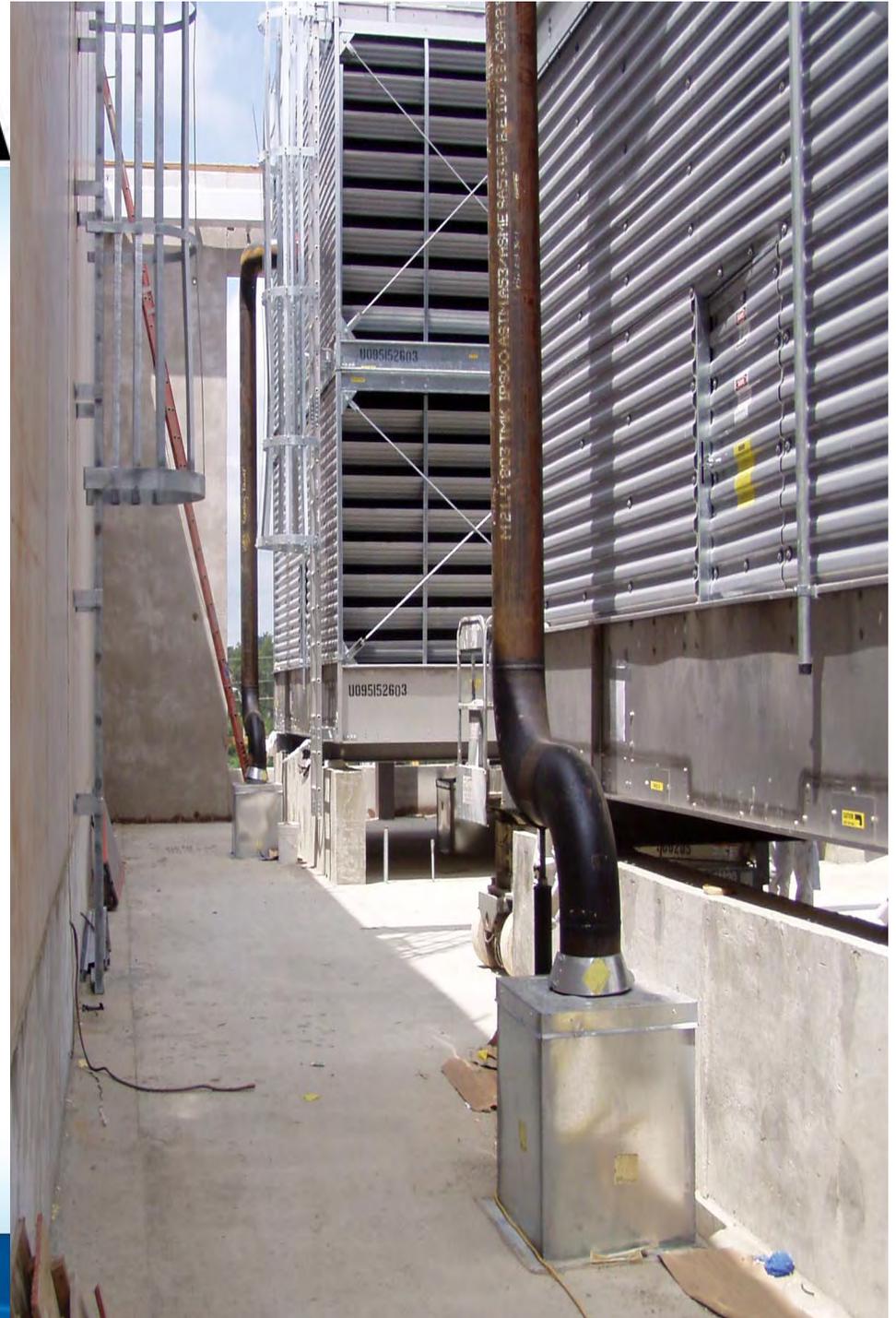
- Electricity Meters and other Utility consumption data (Shark meters)
- Building lighting
- Security cameras and sensors (prox cards, door position, etc) (IGT, Pelco)
- Trending
- Alarms

- PROBLEM STATEMENT:
CONTROL OF CHILLED
WATER FLOW FROM
MULTIPLE SOURCES TO
ONE LOAD WAS
DIFFICULT TO ACHIEVE
BECAUSE OF VARYING
PRESSURES IN THE TWO
SUPPLY PIPES.



CONSEQUENCES

- WHEN CHILLED WATER FLOW TO THE LOAD IS COMPROMISED, THE HPC SYSTEM REACHES HIGH TEMPERATURE ALARM IN LESS THAN 2 MINUTES AND DEACTIVATES.
- IT TAKES SEVERAL HOURS TO REBOOT THE SYSTEM AND JOBS MUST BE RESTARTED.



ROOT CAUSE

- DIFFERENCES IN SUPPLY PRESSURES WERE TOO LARGE WHEN THE CAMPUS SYSTEM PRESSURE DROPPED, CAUSING A DECREASE IN FLOW TO THE LOAD AND FLOW TO REVERSE IN THE CAMPUS SUPPLY PIPES.

CORRECTIVE ACTIONS

- COORDINATE UTILITY OPERATIONS WITH CAMPUS UTILITY PERSONNEL AND MODIFY THE CONTROLS PROGRAMMING

FORWARD ADOPTION

- INCORPORATED INTO SYSTEMATIC APPROACH FOR UNIVERSAL COMMISSIONING FOR LIQUID-COOLED SYSTEMS



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QUESTIONS

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