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MIRION Connect 24

Annual Users' Conference

July 29 - August 2 | Omni Dallas Hotel, Dallas, TX

MIRION TECHNOLOGIES

SIEM and NMS Configuration and Administration

Ben Ranayhossaini P.E.

Manager – System Architecture

Mirion Connect | Annual Users' Conference 2024

Dallas, Texas

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Manager, System Architecture, Secure Integrated Solutions

- B.S. in Electrical Engineering, Penn State University
- M.S. in Electrical Engineering, University of Pittsburgh
- Registered Professional Engineer, TX - PE-136350, OH - PE-82892
- CompTIA A+ - COMP001002734935
- Nuclear Power Tenure +16 years
  - Westinghouse Electric Company – Class Non-1E - Ovation Distributed Control and Information Systems (10 yrs)
  - Mirion - Secure Integrated Solutions – Nuclear Security (6 yrs)

- Sites Visited / Worked
  - International
    - Koeberg Nuclear Power Plant, Capetown South Africa, - Ovation Plant Computer Upgrade
    - Beznau Nuclear Power Station, Dottengen Switzerland, - Ovation Plant Computer Upgrade
    - Barakah Nuclear Power Plant, U.A.E., - APR 1400 Non-Safety Ovation Digital I&C, and Cyber Security
    - Shin Kori 3 & 4, APR 1400 Non-Safety Ovation Digital I&C
  - US
    - Vogtle 3&4, AIM SCS Project & Units 1 - 4 Transition/Cutover
    - J.A. Fitzpatrick, AIM SCS Project & Site Transition/Cutover
    - Riverbend, AIM SCS Project & Transition/Cutover
    - North Anna, AIM SCS Project & Backend Site Transition Support
    - Oconee Nuclear Station, AIM SCS Site Transition Support
    - Catawba Nuclear Station, AIM SCS Site Support
    - Davis Besse Nuclear Power Station, Site PSCS Walkdown
    - Palisades Nuclear Generating Station, Site PSCS Walkdown
    - Comanche Peak Nuclear Power Plant, Site PSCS Walkdown

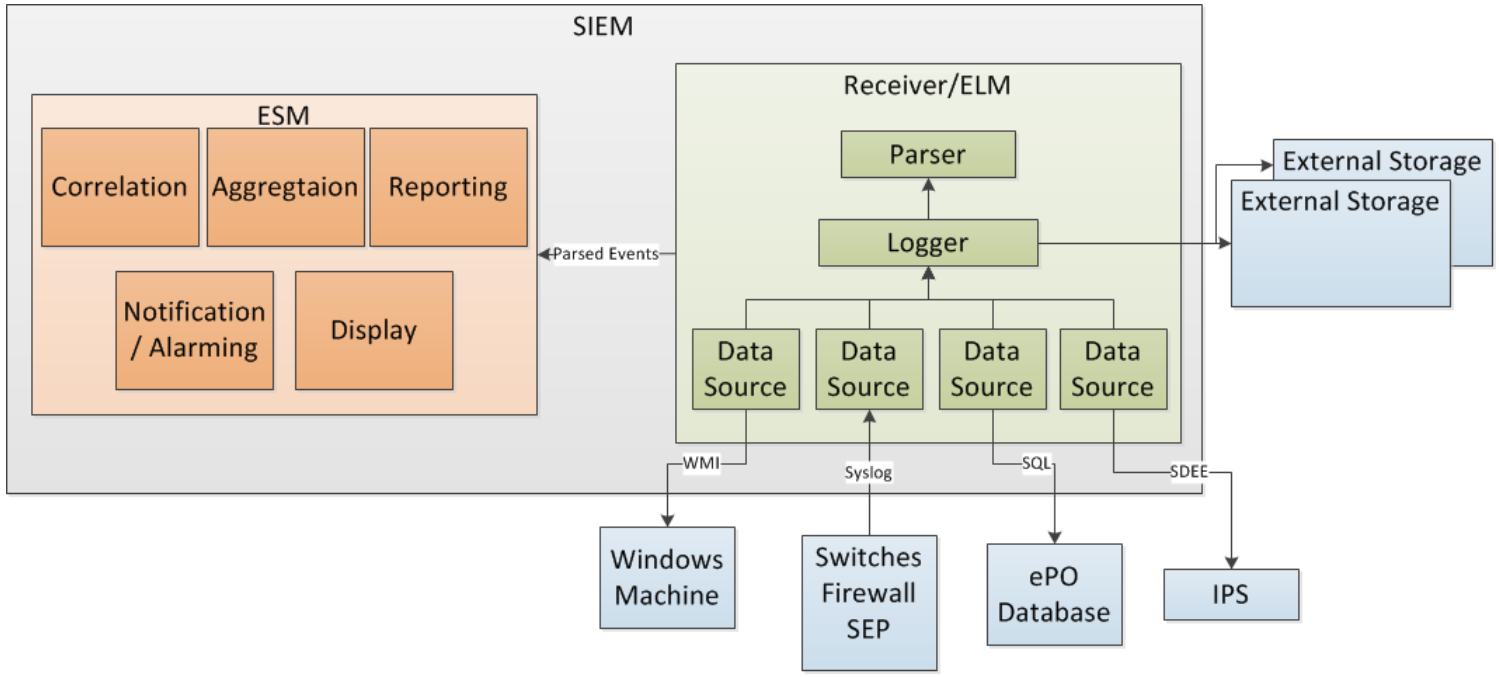
Agenda

- SIEM Configuration and Administration
  - SIEM Overview
  - SIEM Configuration
  - SIEM Administration
- NMS Configuration and Administration
  - NMS Overview
  - WhatsUp Gold Configuration
  - WhatsUp Gold Administration
- SIEM and NMS Dataflow
- Final Exam
- Questions

SIEM Configuration and Administration

- The Security Information and Event Manager (SIEM) is a device that provides real-time analysis of security alerts generated by network hardware and applications. Often used on several Nuclear systems to satisfy NEI 08-09 controls for centralized logging of events on systems.
  - Mirion SIS currently uses Trellix SIEM as the solution on AIM SCS systems (projected to be going to Splunk in 2025)
  - Trellix SIEM architecture consists of an Enterprise Log Manager (ELM) and Enterprise Security Manager (ESM)
- The ELM logs and parses the data from various sources (Workstations, Servers, Switches, NIDS, Anti Virus) on an AIM SCS system.
  - Source → Datasource
  - Data → Syslogs, WMI, Databases
  - Parsing → Parses the data obtained
  - Log → Logs the parsed data
- The ESM aggregates and correlates the logs to identify security threats and alarm on these events.
- If a threat is detected, the ESM is configured to alarm on the security incident(s) so that a site may investigate and respond.
  - Alarms and Notification → SIEM Alarms, Notifications
  - Reporting → Weekly autogenerated reports, Incident response
- Alarms
  - Some are configured as local alarms on the SIEM
  - Some are automatically forwarded to AIM.

- Common SIEM Datasources on an AIM SCS System
  - Network Switches and Devices
  - Servers and Workstations (Running Windows, Linux, etc.)
  - Cyber Security Devices and Software Applications (NIDS, Firewalls (HW and SW), Endpoint Protection, etc.)
  - Encoders
  - Other SIEMs
- Datasources provide data to the SIEM by
  - RFC 5424 Syslog
  - WMI (Windows Servers and Workstations)
  - Databases (Trellix ePO, Trellix IPS)
- WMI and Database Log Collection Process
  - Log retrieval occurs using credential based access
    - Access to the WMI on the machine
    - Access to Databases
  - Permissions controlled by Group Policy
  - Denied Local Logon



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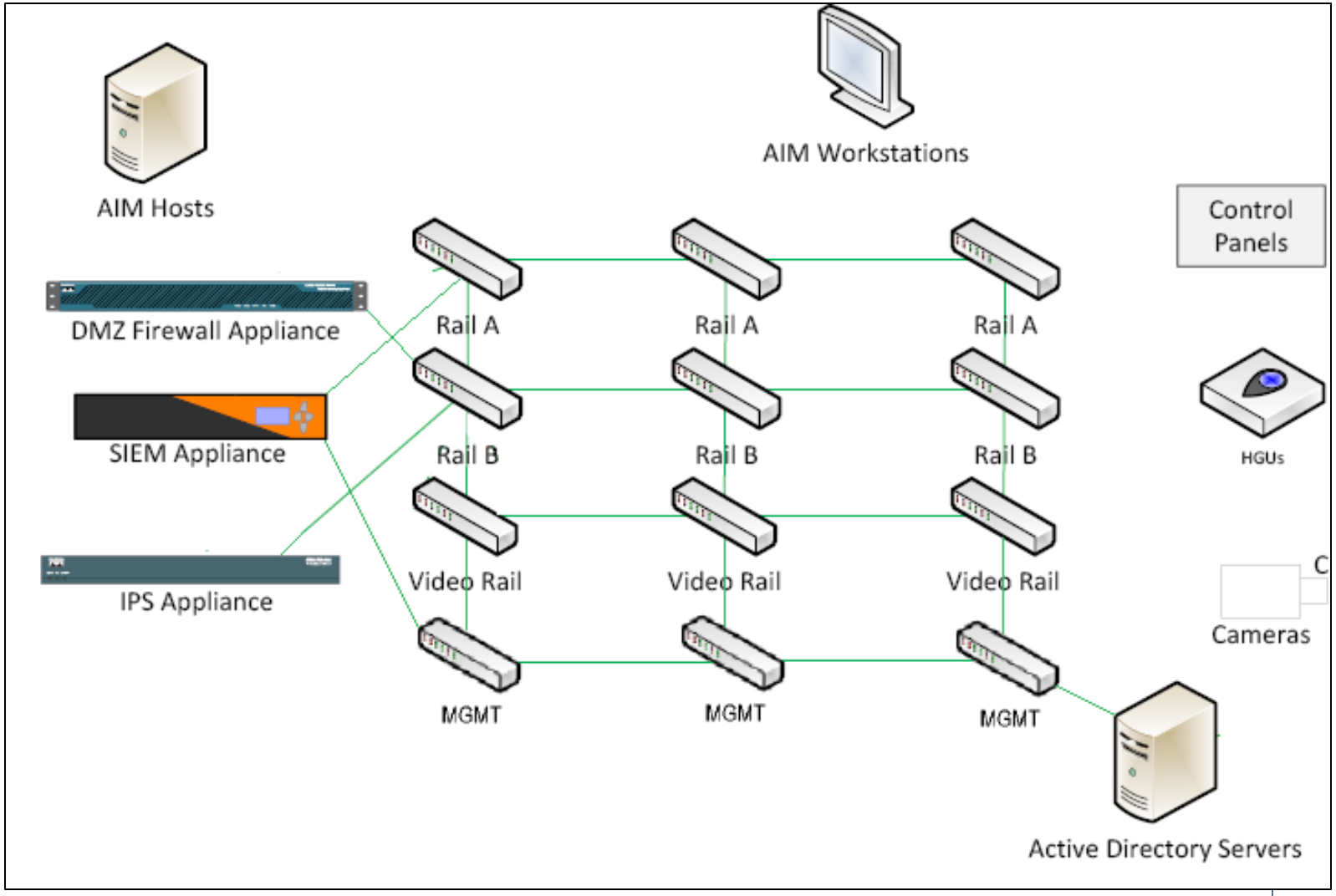
SIEM Overview – AIM SCS Architecture



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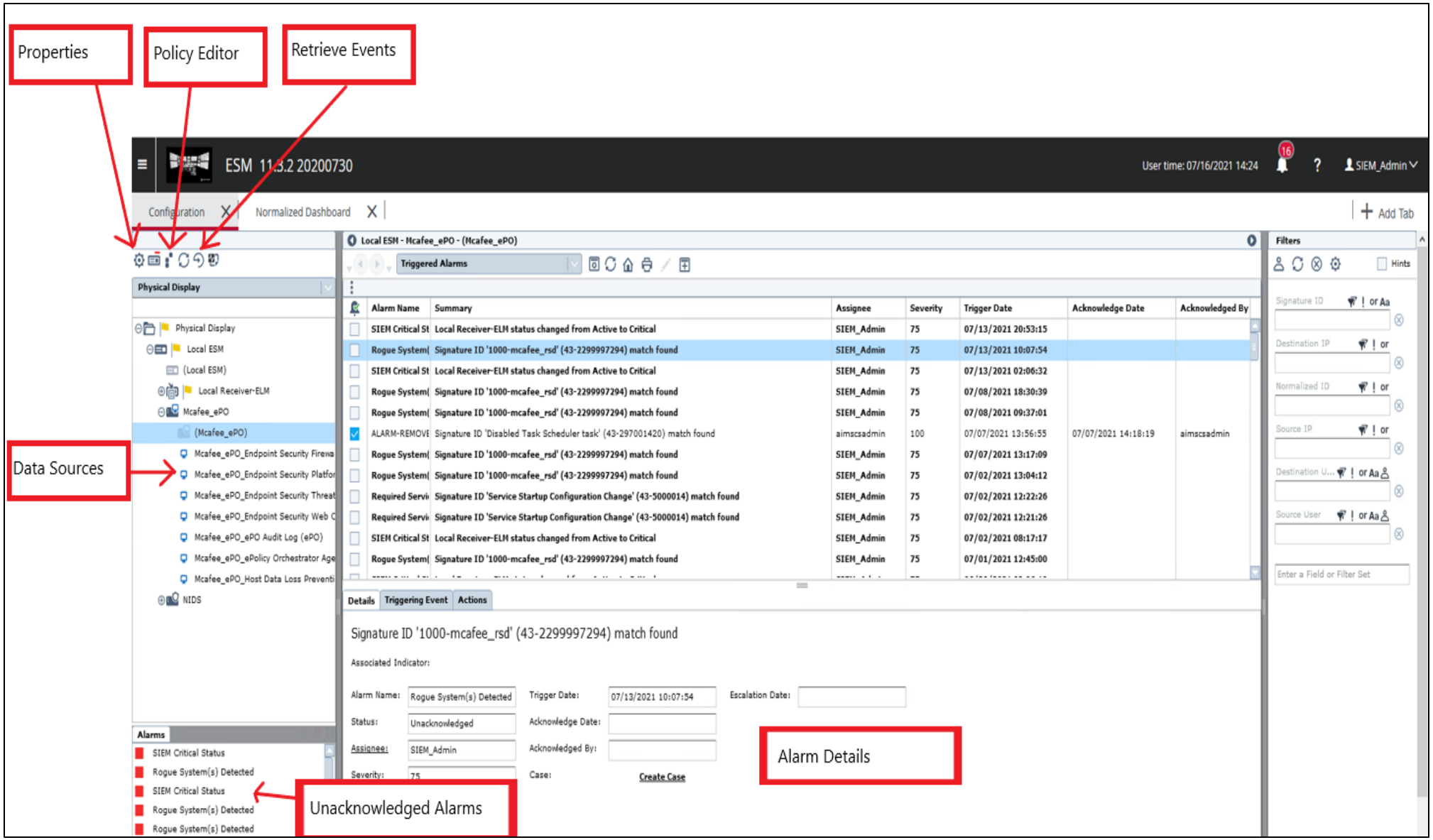

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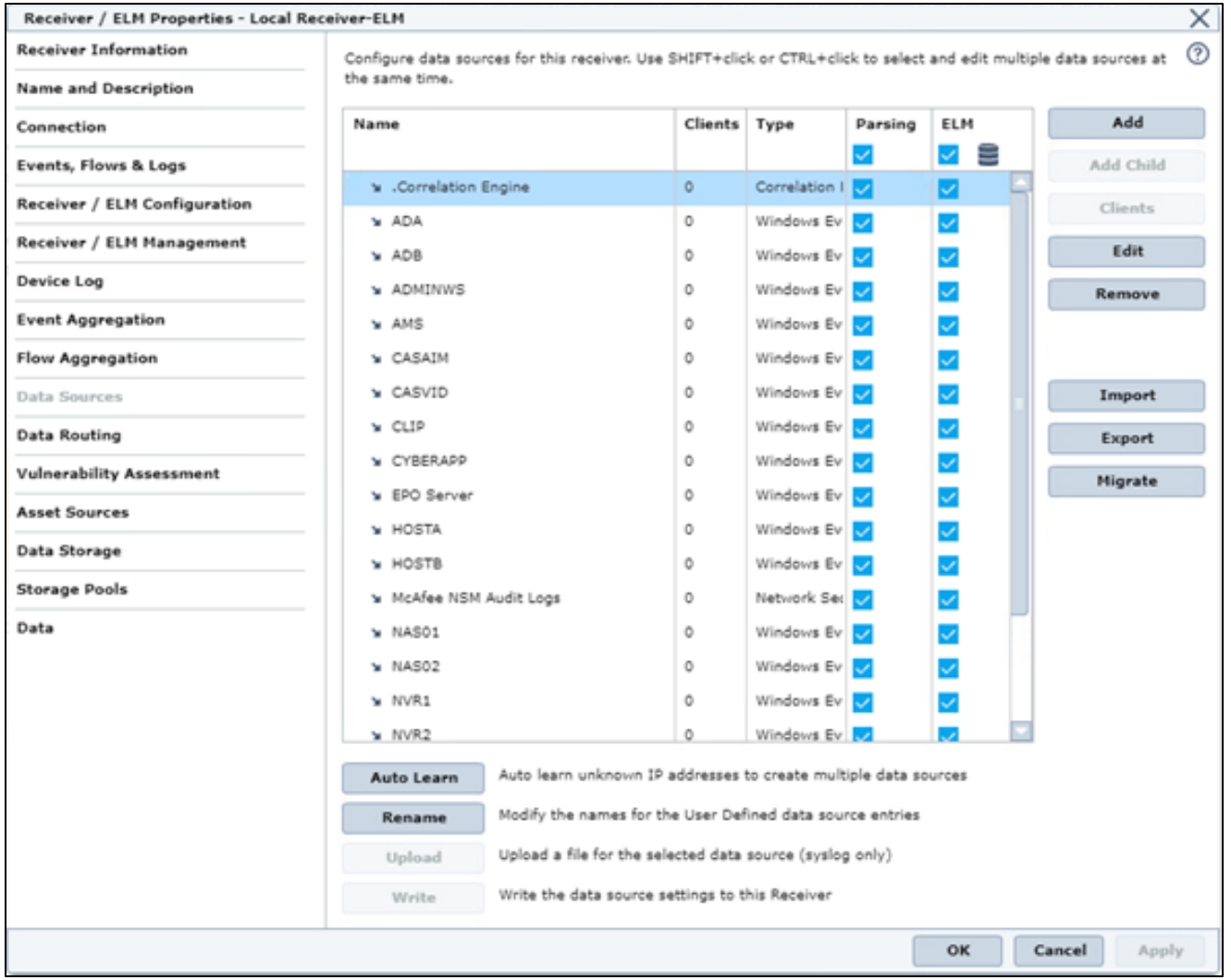
Initial conditions assume a Trellix SIEM with the latest version of SIEM ESM is installed and ready to configure:

- Add Datasources to the SIEM
  - Syslog Datasources need to be configured to forward logs to SIEM.
  - WMI and Database Datasources need to have an account created with the service account credentials
- Configure Rule sets
  - Mirion SIS has a standard ruleset which is imported
  - Create custom rules for any custom datasources
- Import Dashboards and Reports
  - Mirion SIS has standard Dashboards and Reports which are imported
- Configure Alarming
  - Mirion SIS has standard SIEM Alarms and Templates configured
  - SIEM Alarms can either be locally reported on the SIEM or configured to send an alarm to AIM



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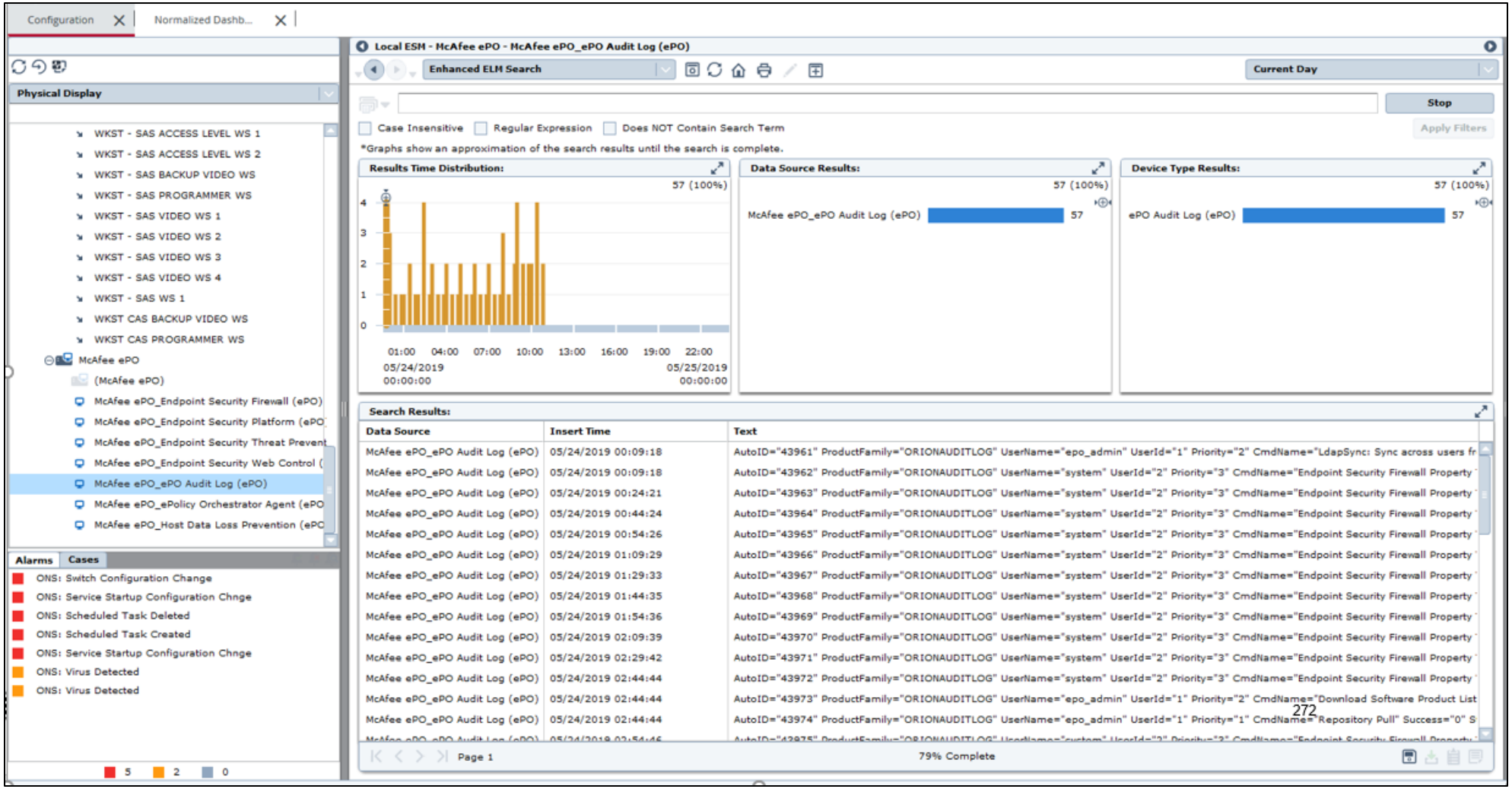
Searching the ELM Logs (Enterprise Log Manager)



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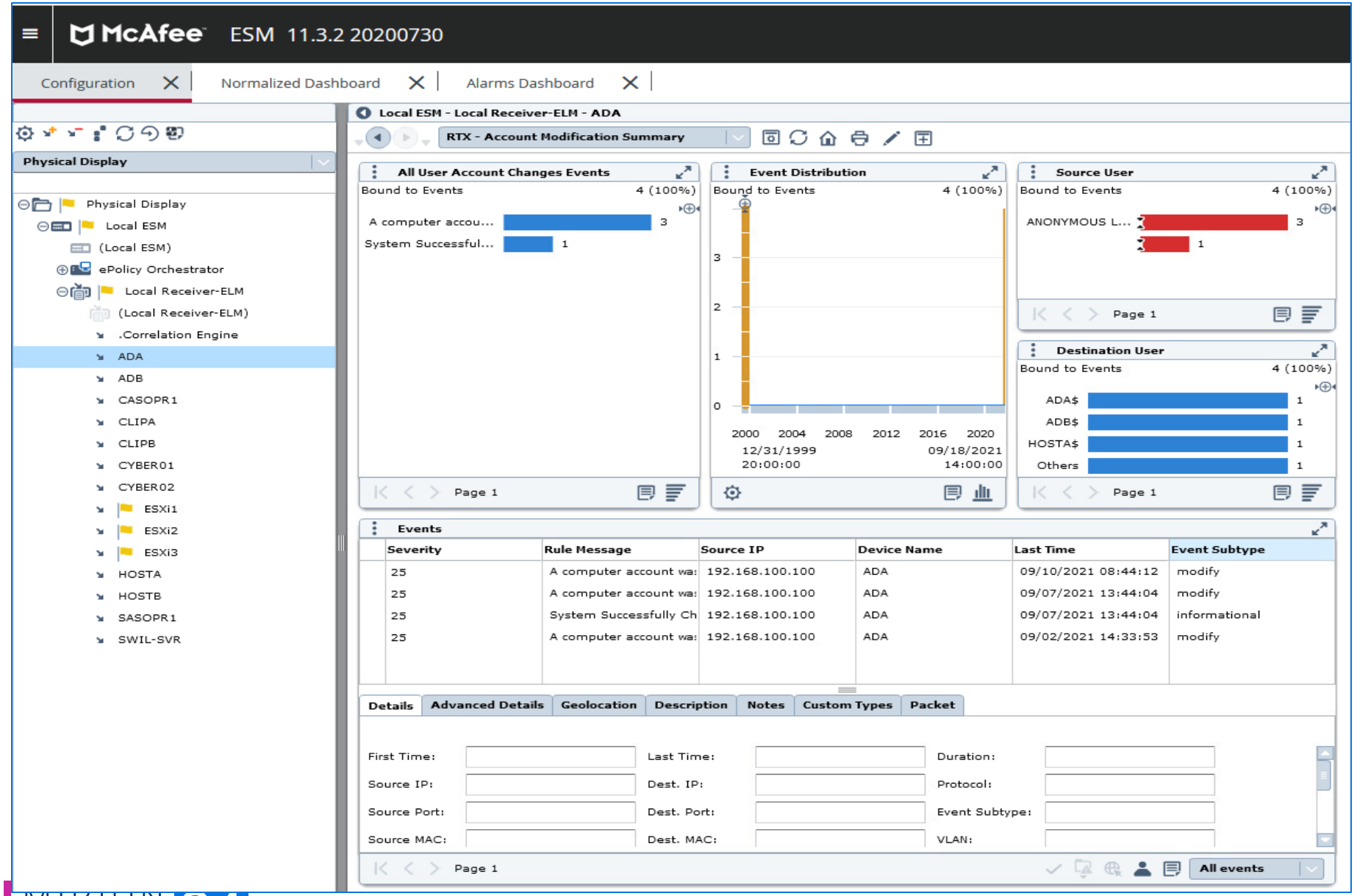
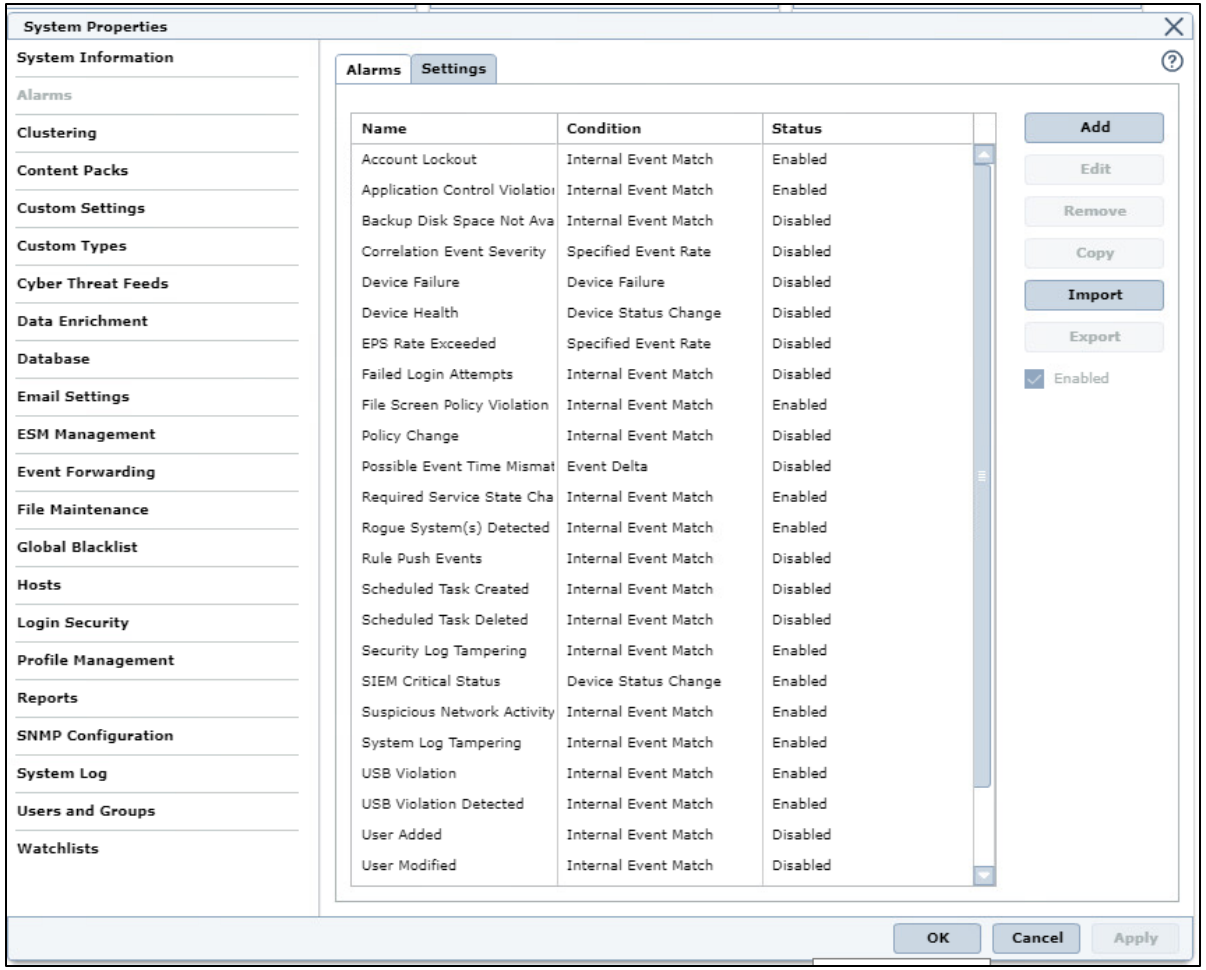
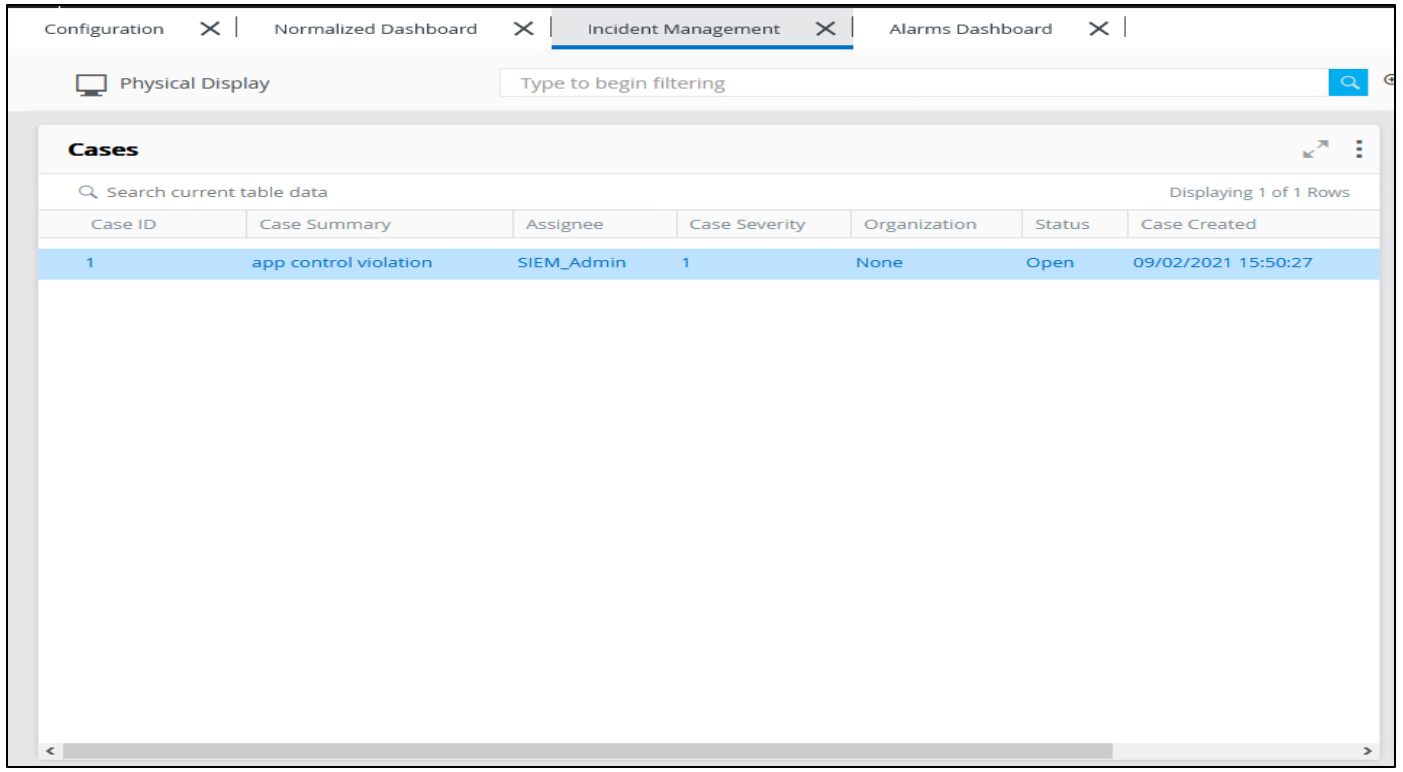


- SIS - Account Modification Summary
- SIS - Administrator Logon Summary
- SIS - Application Control Summary
- SIS - Audit Trail Modification Summary
- SIS - Backup Summary
- SIS - Critical Linux Events
- SIS - Failed Logon Summary
- SIS - Malware Exploit Summary
- SIS - Network Security Summary
- SIS - Policy Changes
- SIS - RADIUS Summary
- SIS - SIEM Alarm Summary
- SIS - USB Usage Summary

- Mirion Technologies' philosophy on alarms is to limit to two types:
  - Events that require immediate action by a cyber security incident response team
    - The system is under cyber attack
    - The cyber security posture of the system may be compromised/tampered with
  - Events to be brought to system administrators' attention but otherwise may be overlooked
    - Situations not monitored by AIM software
- Case Management
  - Cases can track investigation/incident response
  - Created automatically on alarms or manually



- Incident response/investigation best practices:
  - Start at SIEM
  - Drill down into data sources, events
  - Capture ELM logs (raw logs), store offline
  - Investigate at originating device if needed (e.g., at A/V manager)
  - Physical security and cyber security personnel working together!
  - Physical evidence may be needed
    - Who was sitting at the computer?
    - Badge records
    - AIM user logons
    - Alarm History (Cabinet Tamper Alarms)



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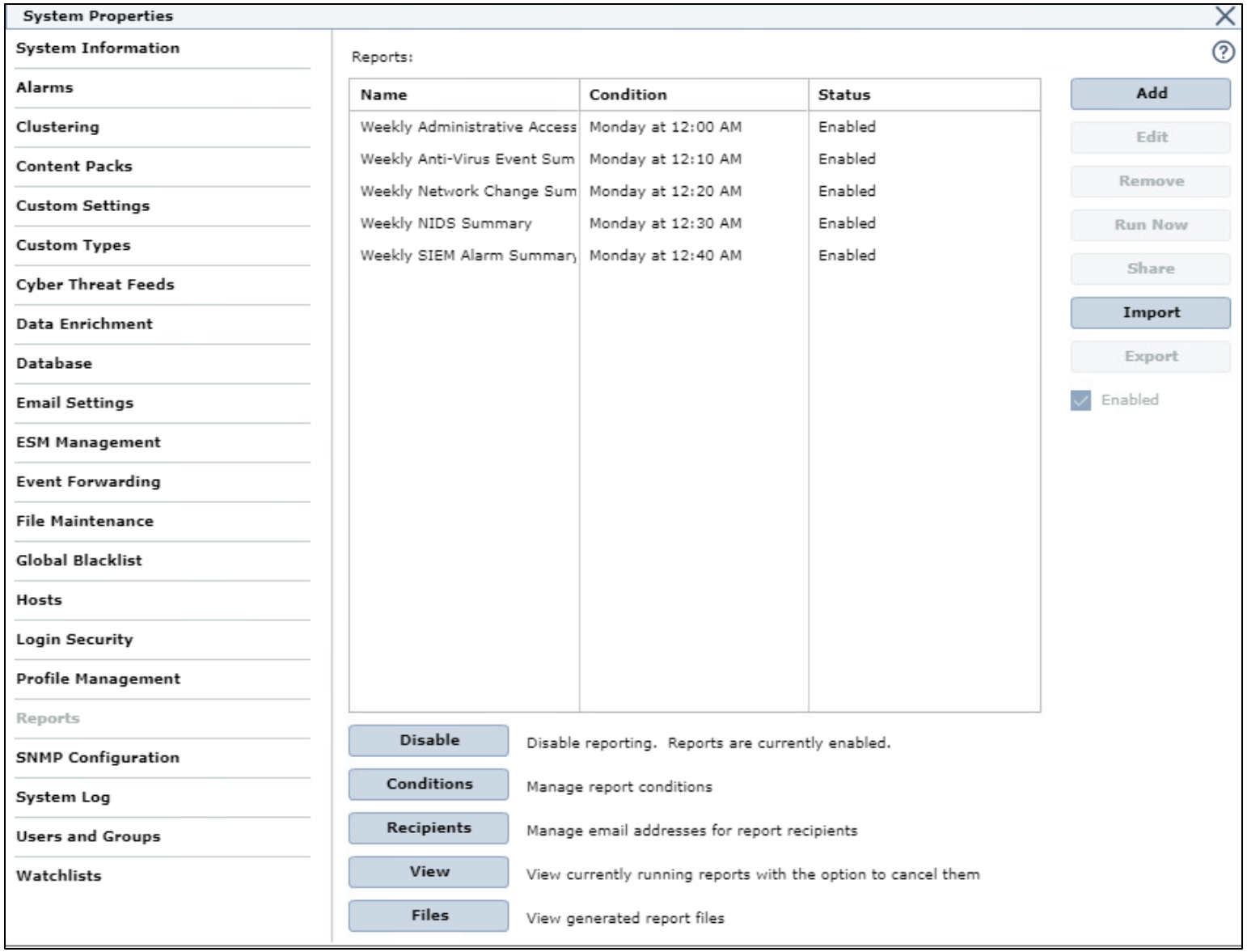
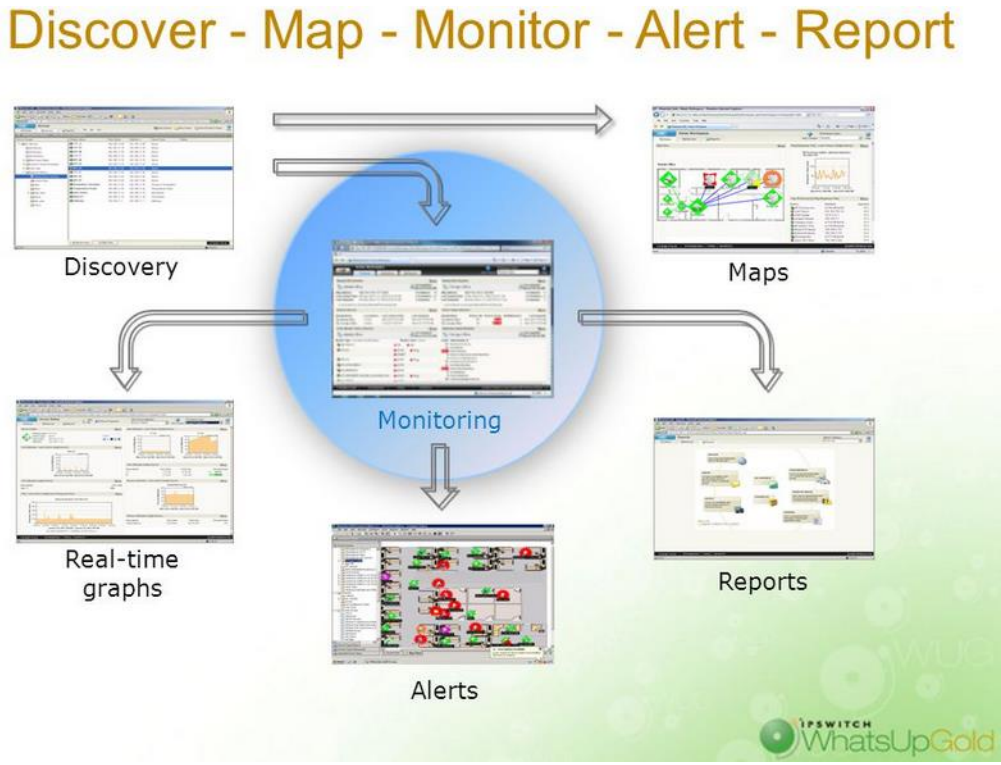
- What reports run?
- When do they run?
- Stored locally on SIEM or a file share.

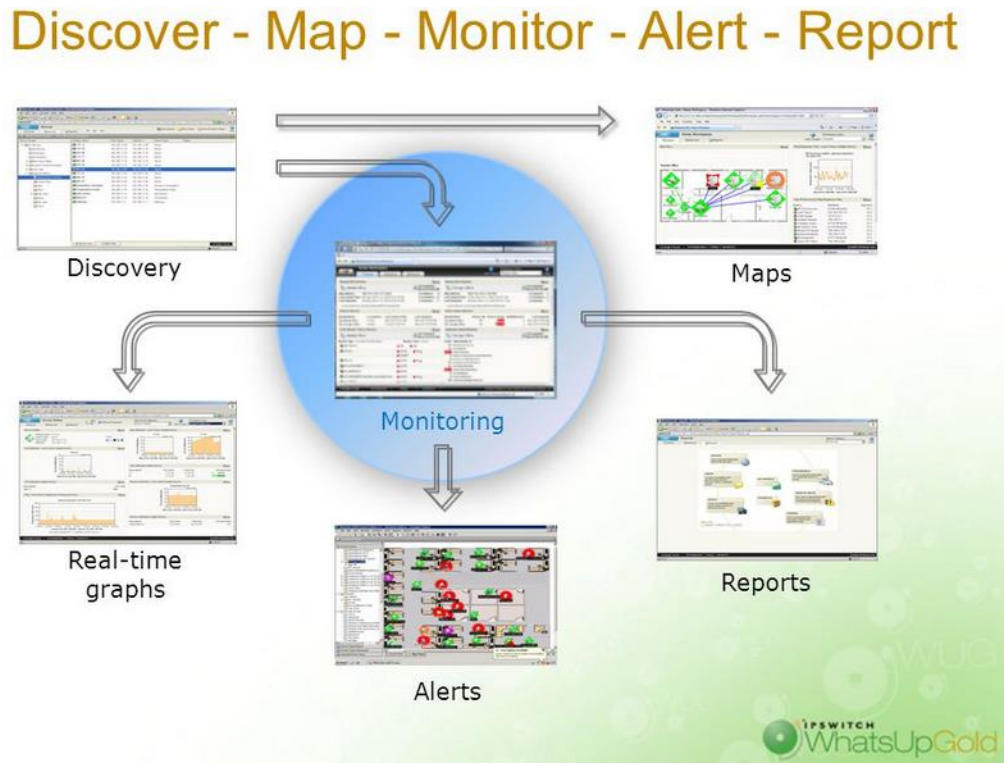


NMS Configuration and Administration

- The Network Management System (NMS) is a comprehensive network monitoring and management tool for optimizing and maintaining network infrastructure on a system.
    - Mirion SIS uses WhatsUp Gold as the NMS solution on AIM SCS systems.
- Using SNMP (Simple Network Management Protocol) and MIB (Management Information Base) the NMS interrogates network connected devices to obtain and monitor information of network attached devices including network status, hardware health and activity, and other performance indicators (disk space, memory utilization, processor utilization, network latency, and bandwidth utilization).
    - Interrogation → Polling
    - Monitoring Information → Active, Passive, and Performance monitors
- Depending on the returned value of the Active, Passive, or Performance monitors upon polling, the NMS is configured to take action by to sending a notification to AIM if an alarm threshold is met.
    - Active Monitors → Action Policies
    - Passive Monitors → SNMP trap messages
    - Performance Monitors → Mirion SIS configures a custom scheduled task and script to obtain the performance information from the WUG database and send an alarm to AIM.



- Active Monitors
  - These monitors include hardware status (Boolean).
    - Switch Port Interfaces
    - Hard Drives
    - Fans
    - NIC → Ping and SNMP
    - Power Supplies
- Passive Monitors
  - These monitors include software status (Boolean)
    - Time Synchronization
    - OS Services
- Performance Monitors
  - These monitors include hardware status (Numeric)
    - CPU Utilization (frequency)
    - Memory Utilization (percentage)
    - Disk Utilization (percentage)
    - NIC Bandwidth (percentage)



WhatsUp NMS Gold Configuration - Monitors

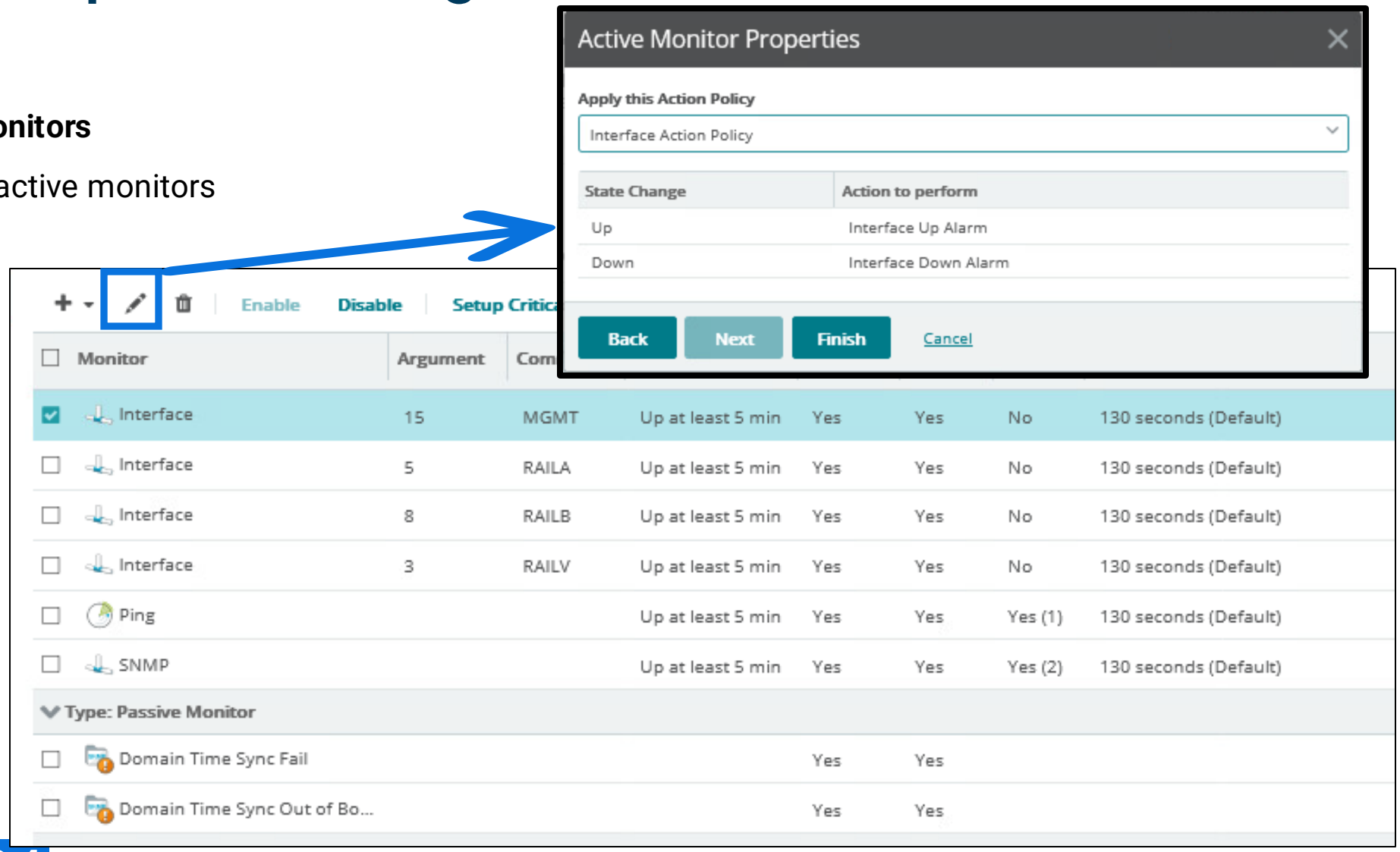
Active Monitors

- SNMP OID that WUG actively polls on a configurable basis
- Active monitor polls a MIB, and expects a certain value back
  - As defined in Monitor Library in Admin Console
- If polling returns a value other than the expected value, or no value at all, monitor is “Down”

WhatsUp Gold Configuration NMS - Monitors

Active Monitors

Example active monitors



WhatsUp Gold Configuration NMS - Monitors

Passive Monitors

- SNMP OID that WUG passively listens for via SNMP trap
- Originator of trap must be configured to send the trap to WUG
- In AIM, most monitoring is active
- Passive monitors limited to
  - Domain Time II time sync failures
  - Monitored Applications or services

WhatsUp Gold Configuration NMS - Monitors

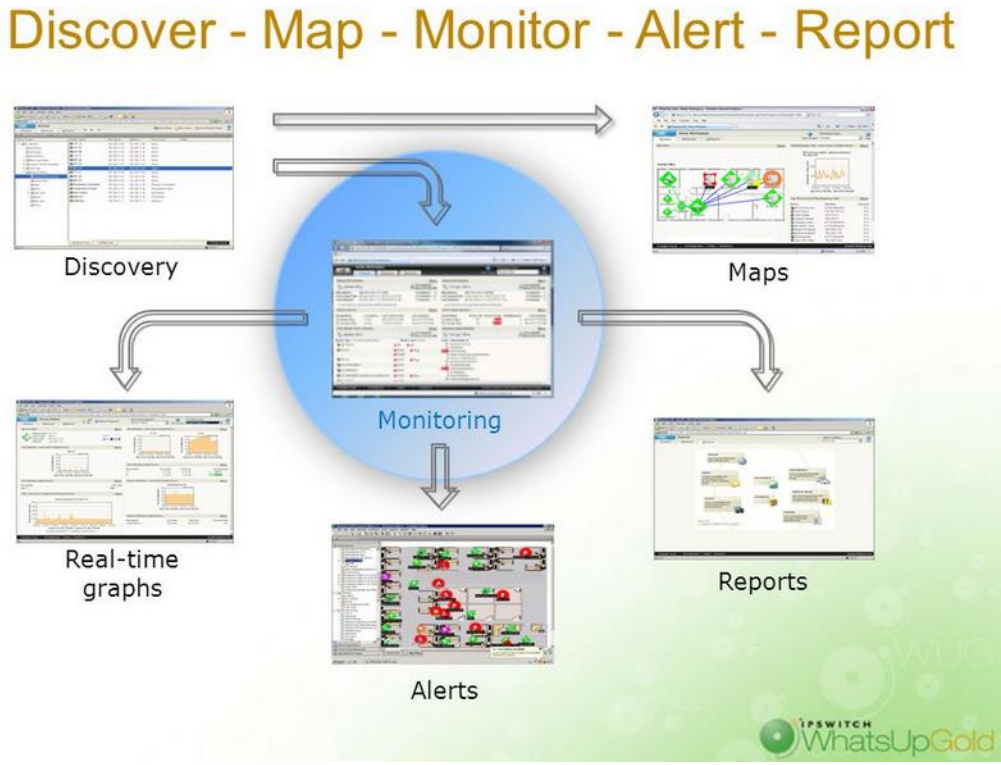
Performance Monitors

What performance indicators are relevant for this machine?

Type: Performance Monitor			
CPU Utilization	Yes	Yes	10 Minutes
Disk Utilization	Yes	Yes	10 Minutes
Memory Utilization	Yes	Yes	10 Minutes
Ping Latency and Availability	Yes	Yes	10 Minutes
VMware Datastore IOPS	No	No	

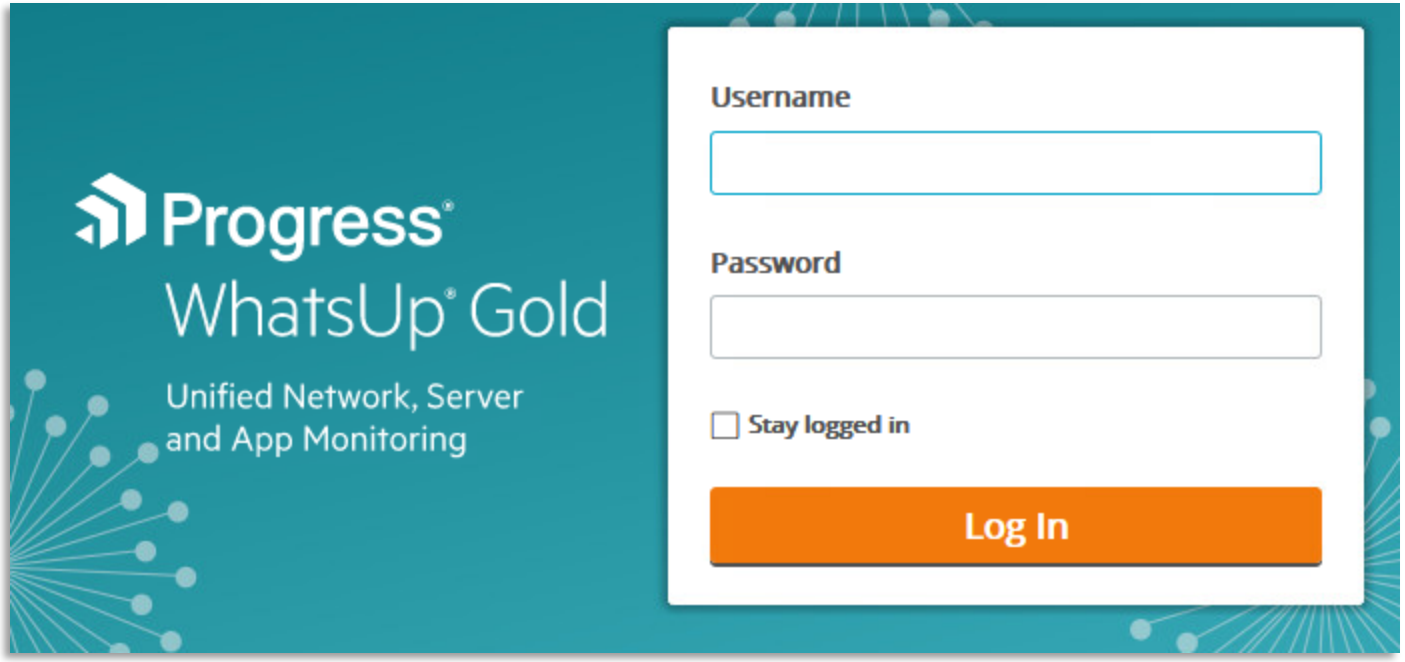
Initial conditions assume a WhatsUp Gold instance is installed and ready to configure:

- Network Discovery
  - Discover network attached devices using a Discovery Scan via SNMP credentials
- Device Configuration
  - Once a device is discovered, the properties of the device are configured
    - Active, Passive, and Performance monitors are configured
    - Ensuring correct arguments are assigned to the Active monitors
    - Setting Polling frequency for device (30s, 60s, 120s)
- Configure Actions / Alarming
    - Configure Actions
      - Assigning Action Policies to each of the Active monitors (Interface, Ping, Monitor policies) →CreateAIMAlarm.exe
      - Configuring action on SNMP trap messages for Passive monitors →CreateAIMAlarm.exe
      - Configuring scheduled task to pull performance data from the database for the passive monitors → WUGNotify.ps1.



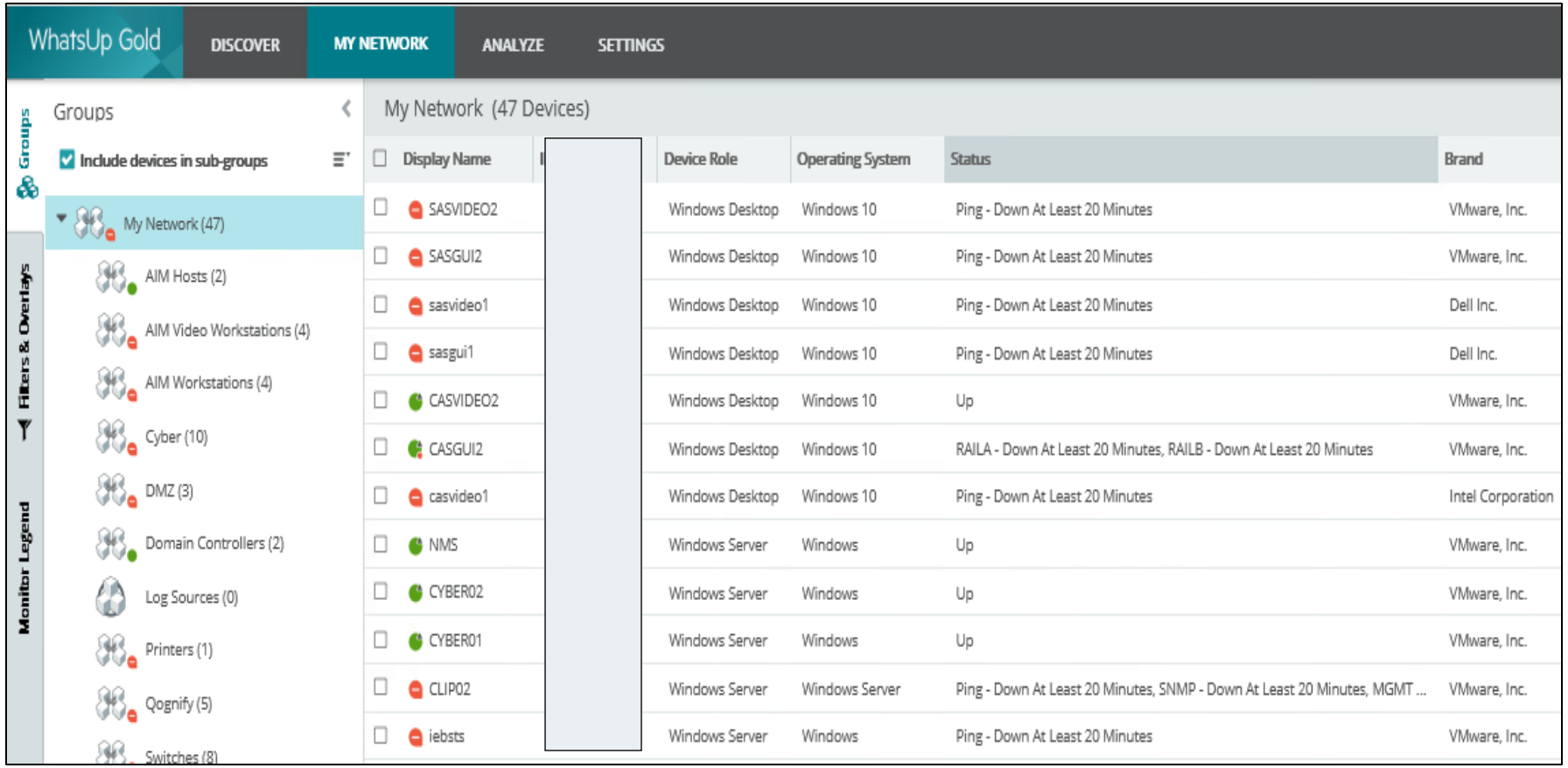
WhatsUp Gold NMS Administration - Website

Log In with domain administrator credentials



WhatsUp Gold NMS Administration - Website

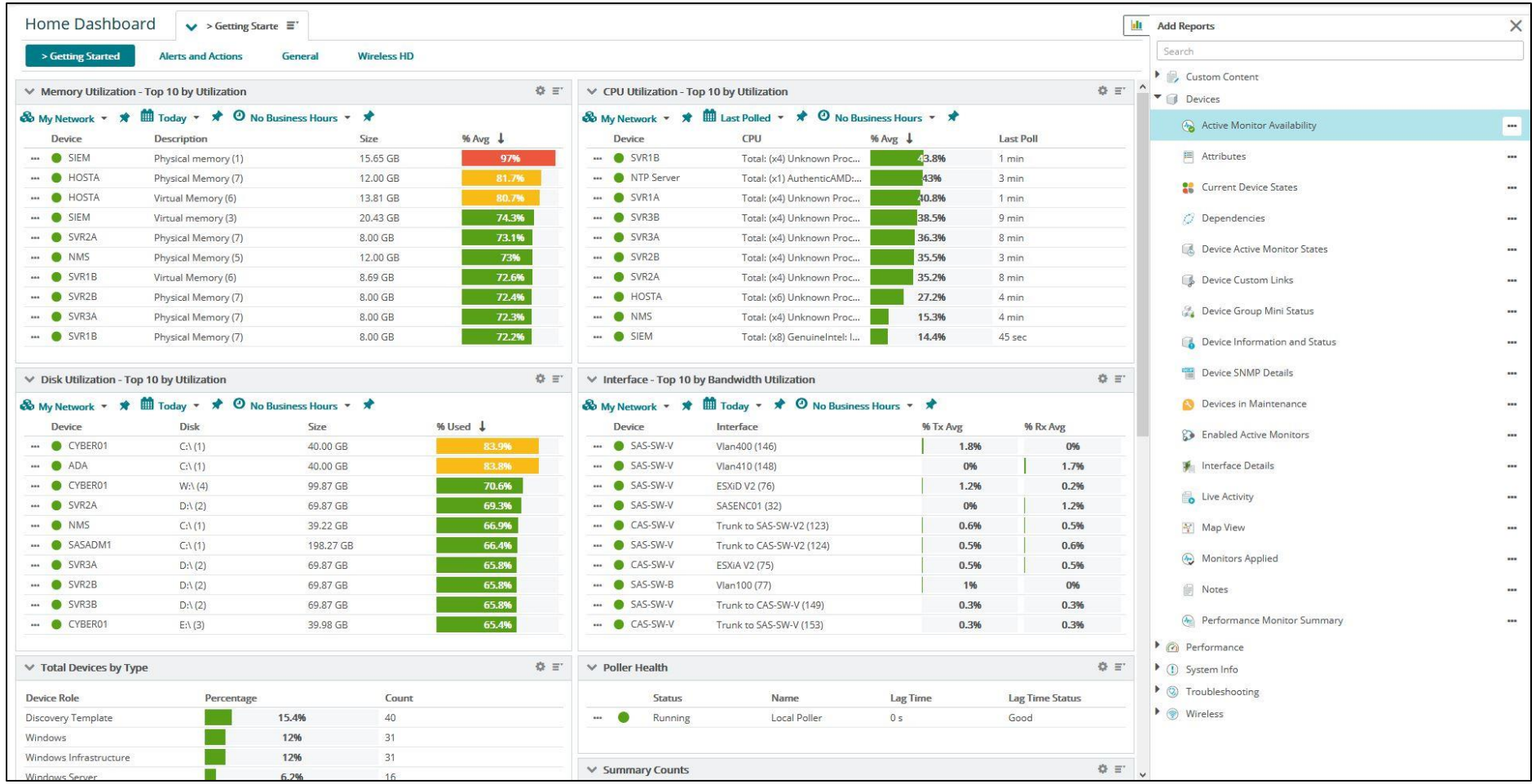
Devices tab – Detail view



WhatsUp Gold NMS Administration - Website

Home screen is configurable

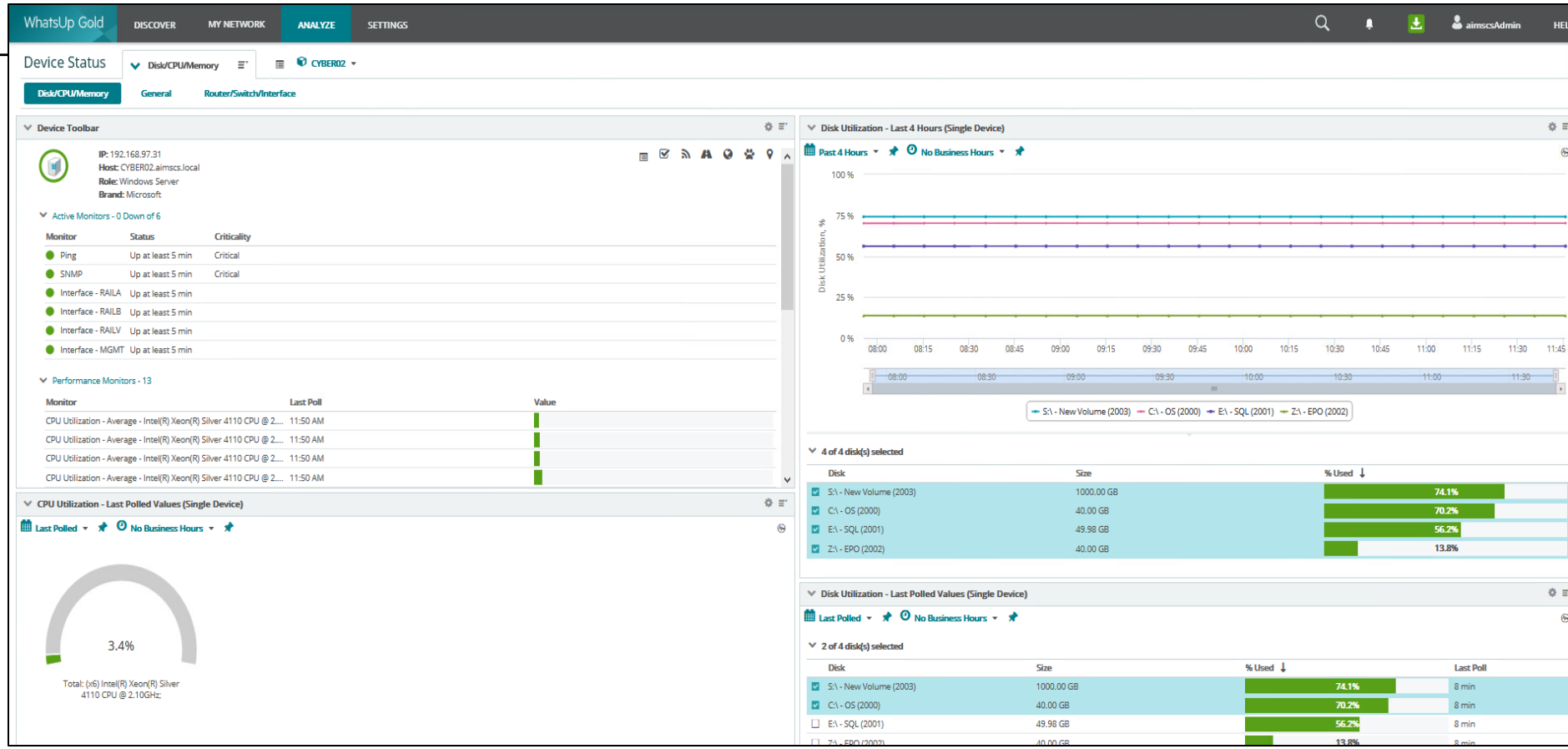
- Drag and drop displays
- Configure size, etc.



WhatsUp Gold NMS Administration - Website

Device status

- Disk/CPU/Memory Tab – vital usage statistics
- General Tab – last alarms/alerts, etc.
- Router/Switch/Interface Tab – bandwidth and interfaces statistics



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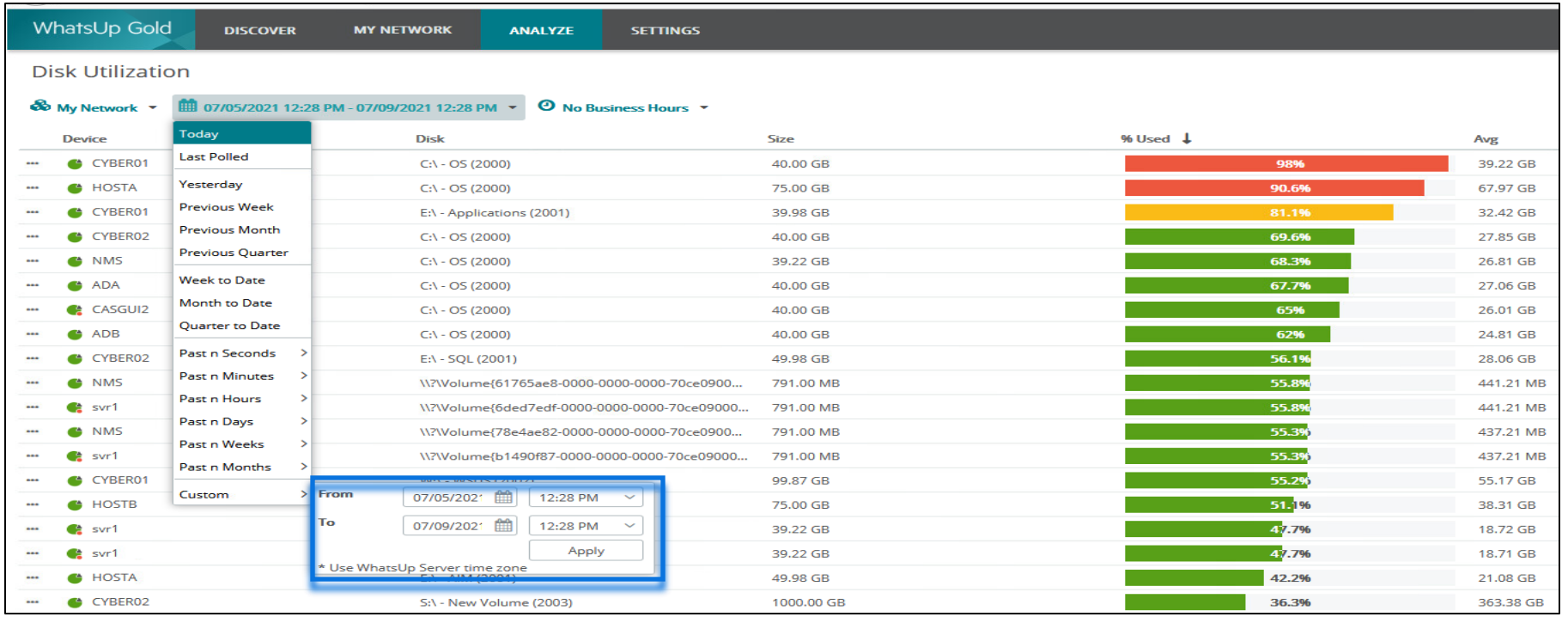
WhatsUp Gold NMS Administration - Website

Analyze

WUG Performance searches give normalized historical data on components over a period of time

- Bandwidth utilization over last 24 hours
- Processor utilization over last 2 weeks

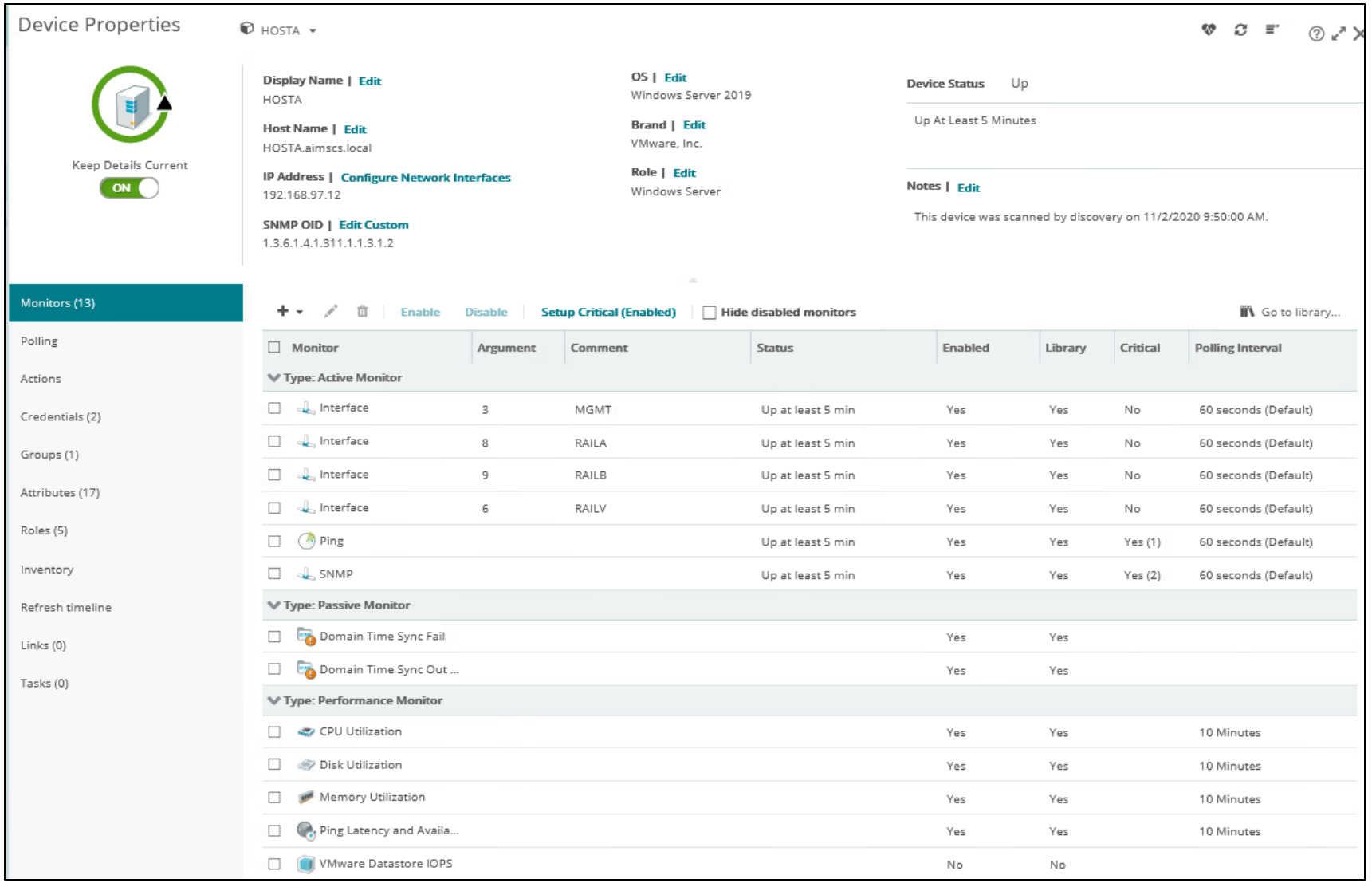
WUG is set to purge data after 60 days to prevent database growth



WhatsUp Gold NMS Administration - Device Properties

Device properties

- Name: no spaces or special characters
- Polling type: Host Name vs Network Address



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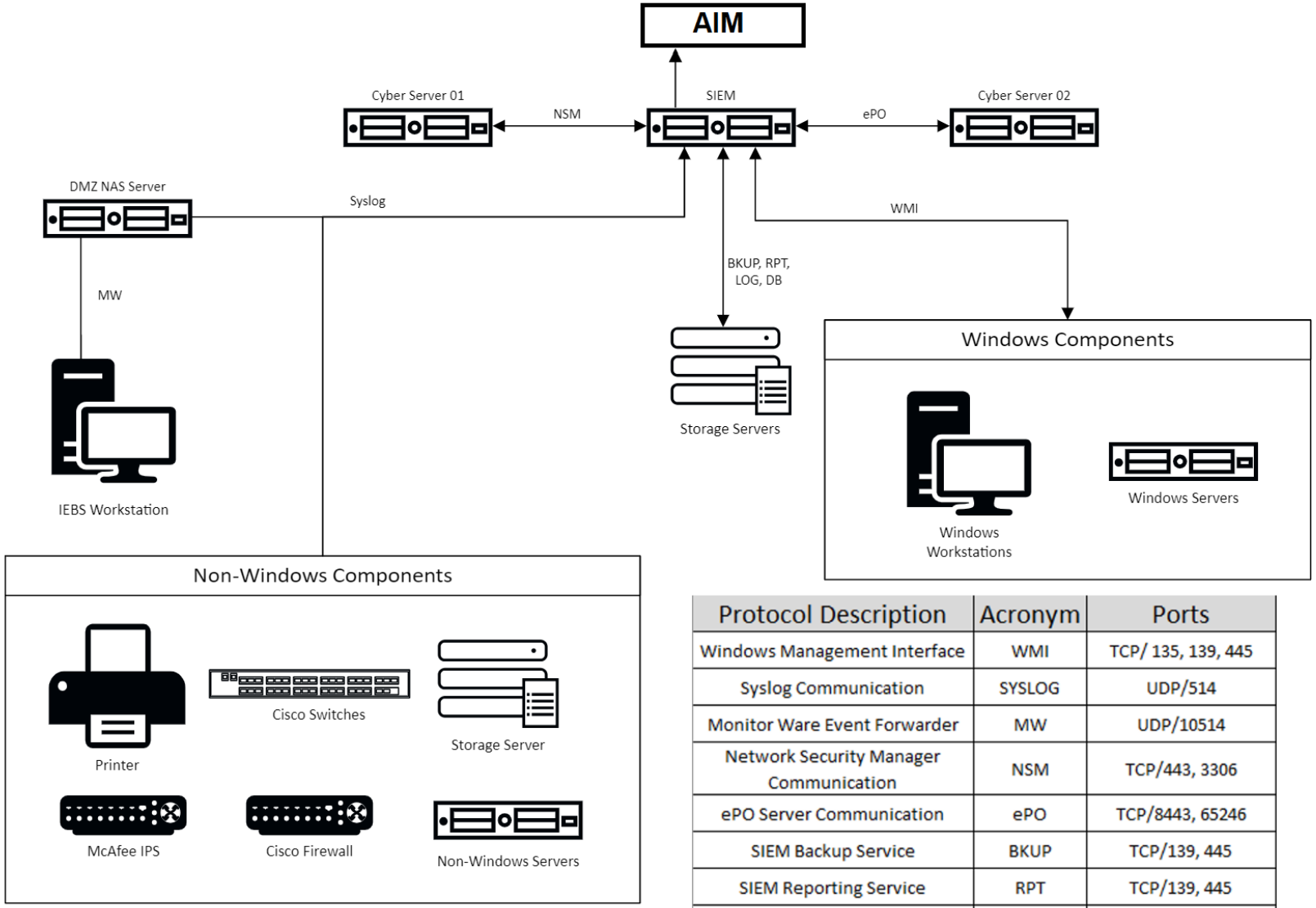
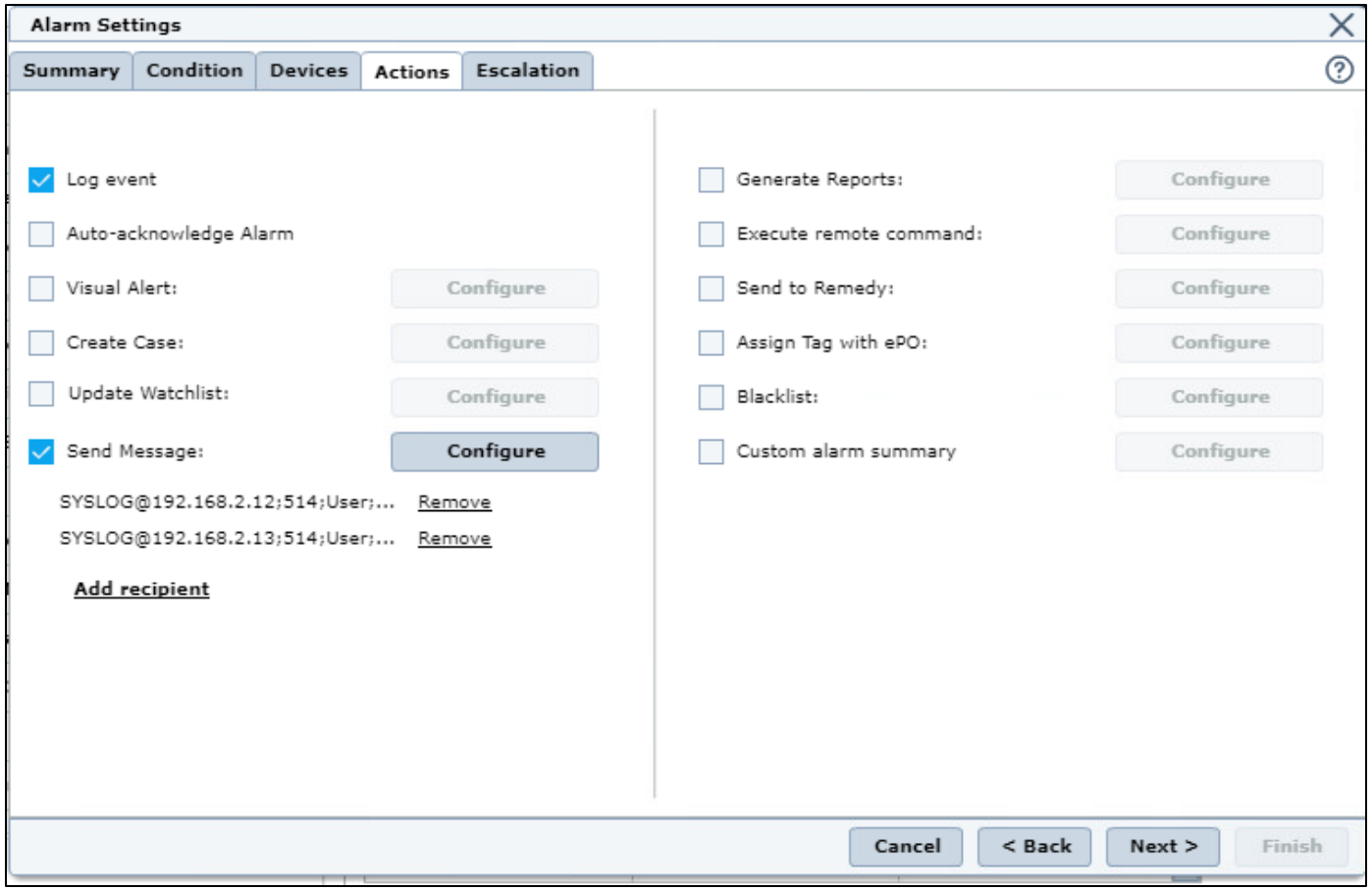
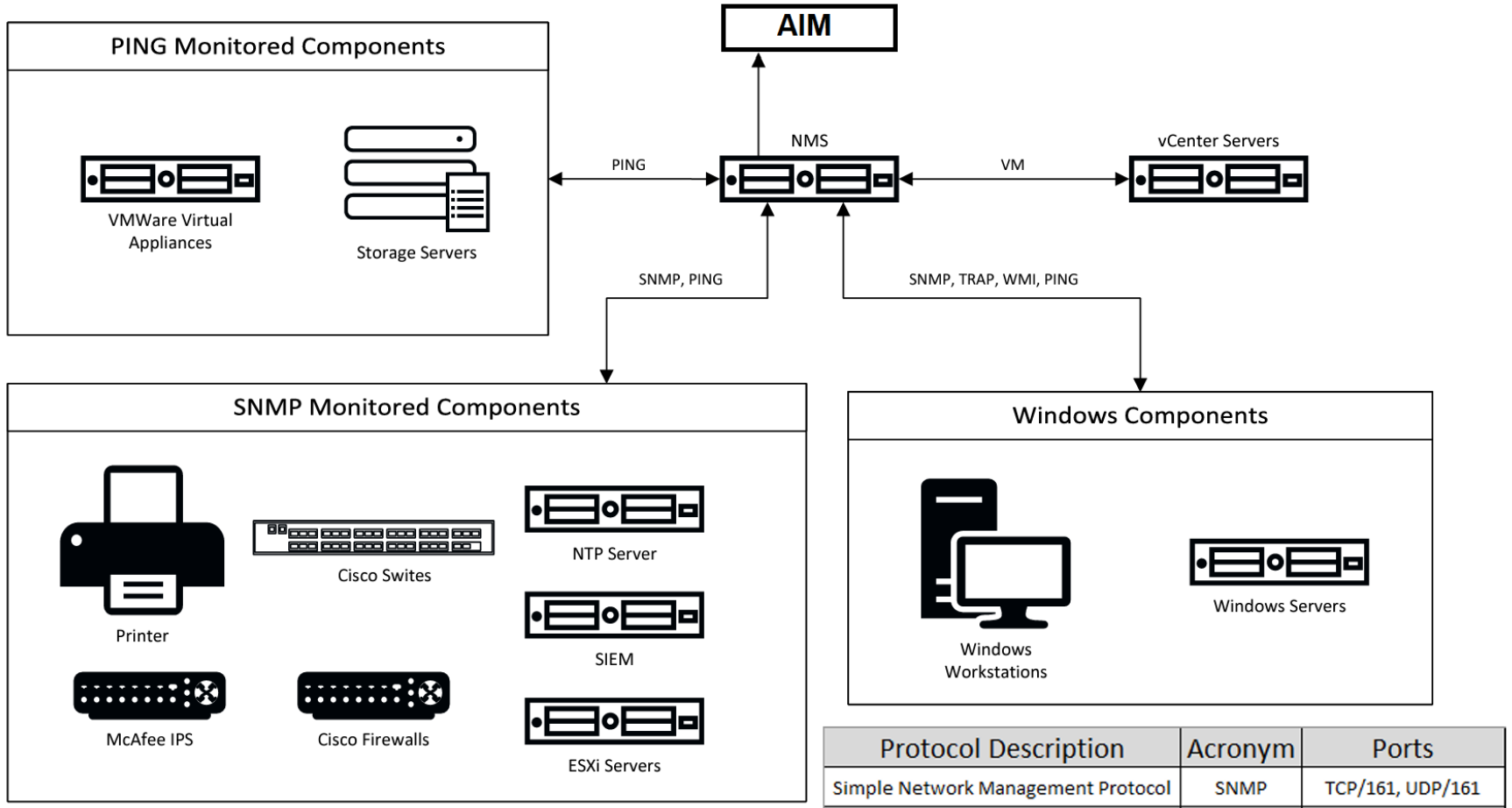
SIEM and NMS Dataflow



Protocol Description	Acronym	Ports
Windows Management Interface	WMI	TCP/ 135, 139, 445
Syslog Communication	SYSLOG	UDP/514
Monitor Ware Event Forwarder	MW	UDP/10514
Network Security Manager Communication	NSM	TCP/443, 3306
ePO Server Communication	ePO	TCP/8443, 65246
SIEM Backup Service	BKUP	TCP/139, 445
SIEM Reporting Service	RPT	TCP/139, 445
SIEM Log Storage Service	LOG	TCP/111
SIEM DB Storage Service	DB	TCP/111

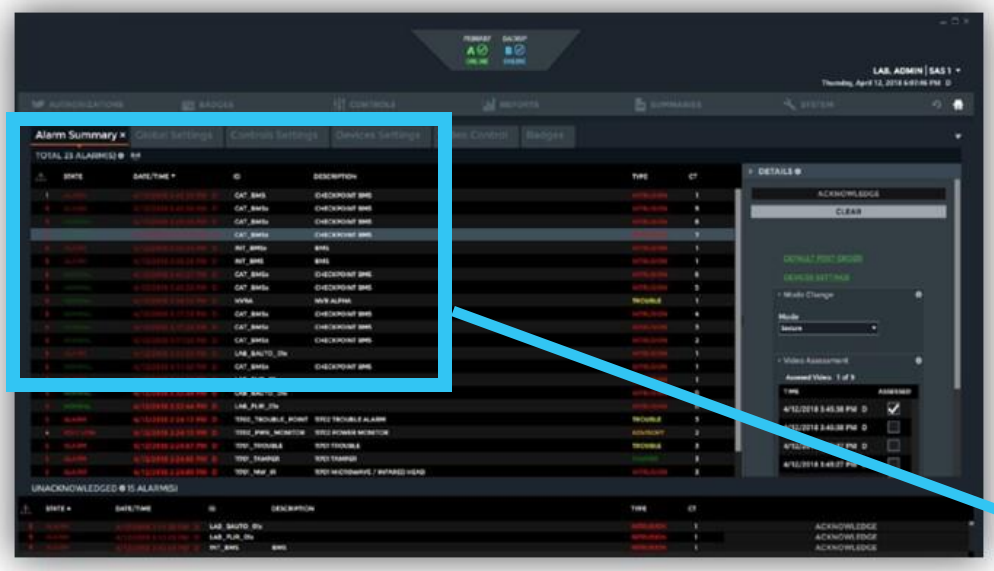
- Alarming to AIM works by configuring an Alarm action for the SIEM Alarm to forward to AIM.
  - When and alarm is generated, the SIEM Sends a Syslog Message to both Hosts.
  - The Primary Host parses the syslog and processes an AIM Alarm in the UI.
- Configure Alarming to AIM
  - Alarm Settings -> Actions -> Send Message -> Configure.





Protocol Description	Acronym	Ports
Simple Network Management Protocol	SNMP	TCP/161, UDP/161
SNMP Traps	TRAP	UDP/162
Windows Management Interface	WMI	TCP/135
vSphere Monitoring	VM	TCP/80, 443
PING Monitor	PING	ICMP

- Alarming to AIM works by a custom executable created by Mirion SIS ‘CreateAIMAlarm.exe’
  - When and alarm is generated, WUG passes parameters to CreateAIMAlarm.exe, which then parses through a custom XML file to provide the appropriate alarm message and formatting for the alarm state.
  - The Alarm is then transmitted as a message to AIM.
  - AIM receives the message and then produces the Alarm in the Alarm List on the UI.
- Configure Alarming
  - Active and Passive monitors directly call CreateAIMAlarm.exe
  - Performance Monitors call WUGNotify.ps1 via Scheduled Task
    - Parses WUG Database
    - Writes any new alarm states which have been generated (WUGsize.txt)
    - Calls CreateAIMAlarm.exe to send new alarms to AIM



SIEM Alarm

WUG NMS Alarm

AUTHORIZATIONS BADGES CONTROLS

Alarm Summary × Devices Settings Global Settings

TOTAL 31 ALARM(S)

	STATE	DATE/TIME	ID	DESCRIPTION
4	ALARM	5/24/2019 12:39:40 PM D	SIEM	USB violation on AD-B
4	ALARM	5/24/2019 12:25:39 PM D	SIEM	Scheduled task modified on MTS-SAS-OP2
4	ALARM	5/24/2019 12:25:19 PM D	SIEM	USB violation on AD-A
4	ALARM	5/24/2019 12:12:59 PM D	SIEM	Scheduled task modified on MTS-SAS-OP2
4	ALARM	5/24/2019 12:02:39 PM D	SIEM	Scheduled task modified on MTS-SAS-OP2
4	ALARM	5/24/2019 11:59:39 AM D	SIEM	Scheduled task modified on AIM Host Server B
4	ALARM	5/24/2019 11:41:19 AM D	SIEM	IP address spoofing detected by DMZ Firewall
4	ALARM	5/24/2019 11:38:19 AM D	SIEM	Antivirus Client was disabled on IEBS-WS1
4	ALARM	5/24/2019 10:57:19 AM D	SIEM	IP address spoofing detected by DMZ Firewall
4	ALARM	5/24/2019 10:15:39 AM D	SIEM	Scheduled task modified on MTS-CAS-OP2
4	ALARM	5/24/2019 10:02:19 AM D	SIEM	Multiple application control violations on cas-op2.aimscs.local
4	ALARM	5/24/2019 9:48:38 AM D	SIEM	Scheduled task modified on MTS-SAS-OP2
5	ALARM	5/23/2019 4:06:57 PM D	U3-CAS-PRT.SNMP	SNMP on U3-CAS-PRT is down
4	ALARM	5/22/2019 4:07:21 PM D	SIEM	

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Final Exam

- How does WhatsUp Gold obtain status information from system components?
- Where do you go to access the WhatsUp Gold interface?
- How are WhatsUp Gold alarms sent to AIM?
- What are the main functions of the SIEM?
- What is the difference between the ELM and the ESM?
- What are some of the alarms already defined in the system?
- Where do you go to start investigation of alarms?

Who is ready for their next NRC Cyber Inspection?

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Questions?

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