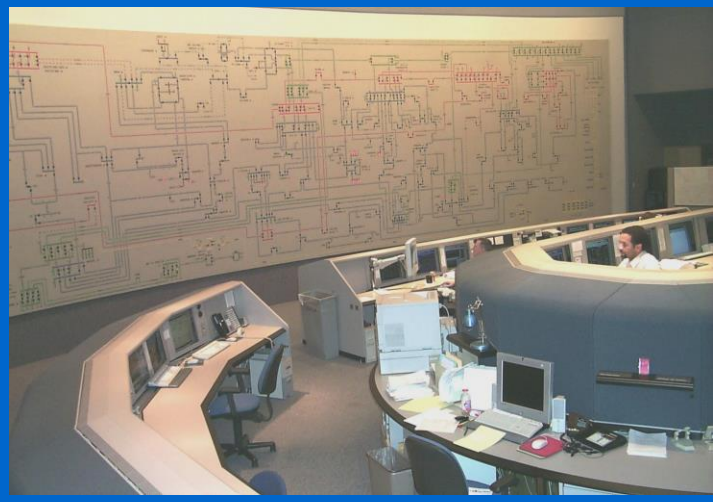
SDGE

A Sempra Energy® utility



IT Monitor at SDG&E

Ann Moore

San Diego Gas & Electric

September 16, 2004

PI T&D Users Group Meeting-St. Louis

Agenda

- SDGE – Who we are and What we do
- Why monitoring
- Monitoring what
- Why “IT Monitor”
- What is “IT Monitor”
- Implementation and Accomplishment
- Future Development

Sempra Energy

- Sempra Energy is a Fortune 500 energy services holding company with over 12,000 employees
  - **Sempra Energy Utilities**
    - ✓ **San Diego Gas & Electric (SDG&E)**
    - ✓ **Southern California Gas Company (SoCalGas)**
  - **Sempra Energy Global Enterprises**
    - ✓ **Sempra Energy International**
    - ✓ **Sempra Energy LNG Corp.**
    - ✓ **Sempra Energy Solutions**
    - ✓ **Sempra Energy Resources**
    - ✓ **Sempra Energy Trading**
    - ✓ **Sempra Fiber Links**

Sempra Energy headquarters San Diego, CA

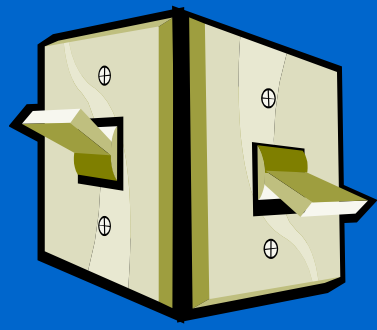
SDGE & Electric T&D

- 1.3 million customers
- 3 million population
- Service territory includes San Diego County and Southern Orange County
- 3,960 MW system peak load (8/31/98)
- 130 Transmission RTUs (69kV, 138kV, 230kV, and 500kV) – GE XA21 EMS
- 900 Distribution RTUs (12kV)
  - ACS Prism DMS

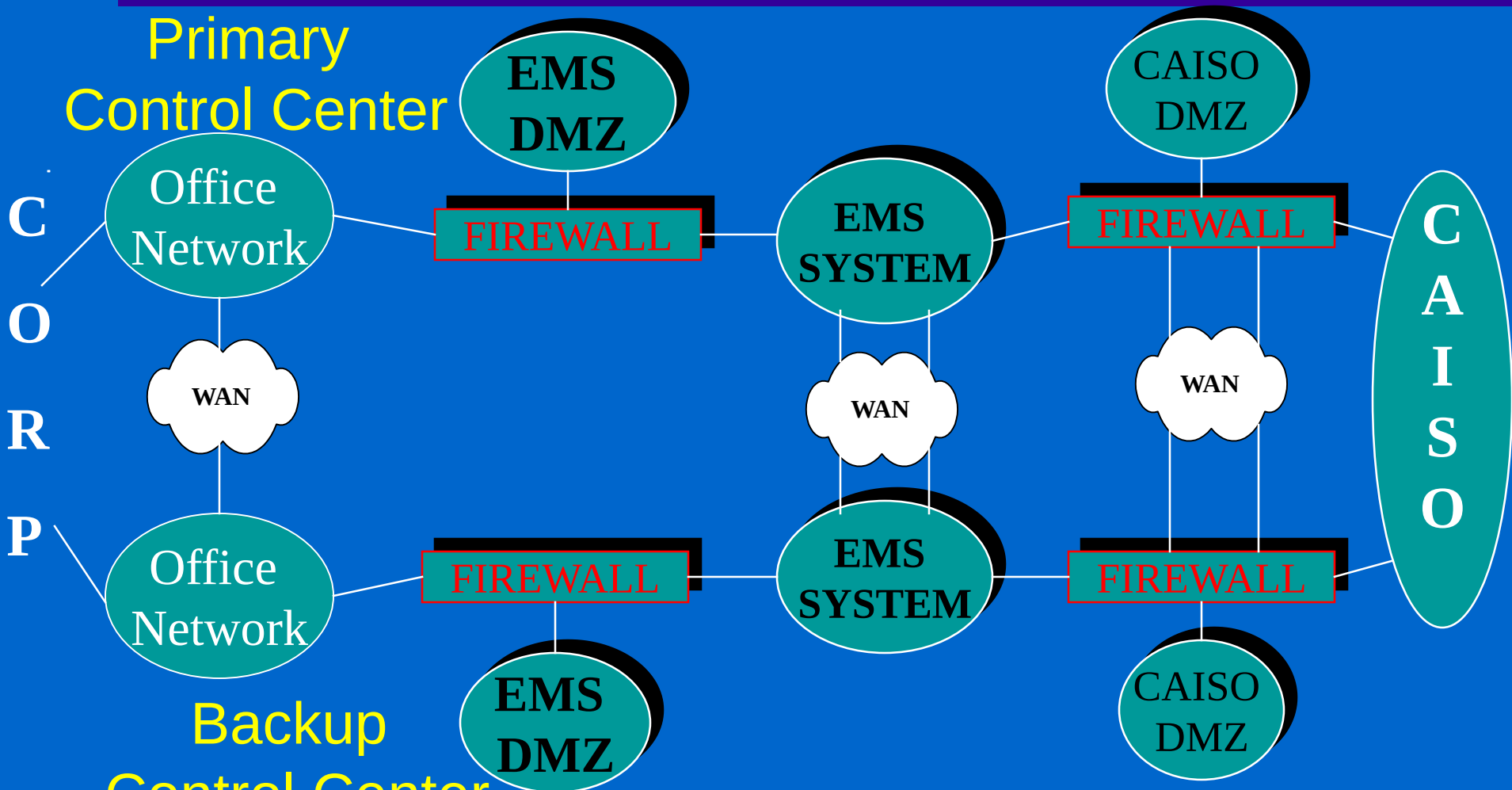
NERC Cyber Security Standard

- NERC Urgent Action Standard 1200 presents standards to "monitor" and protect critical cyber assets

- At Sempra, we take compliance seriously
  - SDGE Self-Certification – 3/1/04
  - "Substantial Compliance" – 3/1/04
  - "Full Compliance" – 3/1/05



EMS Infrastructure



Critical Cyber Assets

- EMS nodes: 40+ UNIX boxes
  - –Application Hosts: IBM AIX
  - –Oracles: IBM AIX
  - –Front End Processors: IBM AIX
  - –Dispatcher Workstations: SUN Solaris
- Windows Servers: 10+ servers
  - –PI Servers
  - –PI OPC/Interfaces
  - –SQL-Servers
  - –Web Servers
- Network Devices: switches, routers, and firewalls

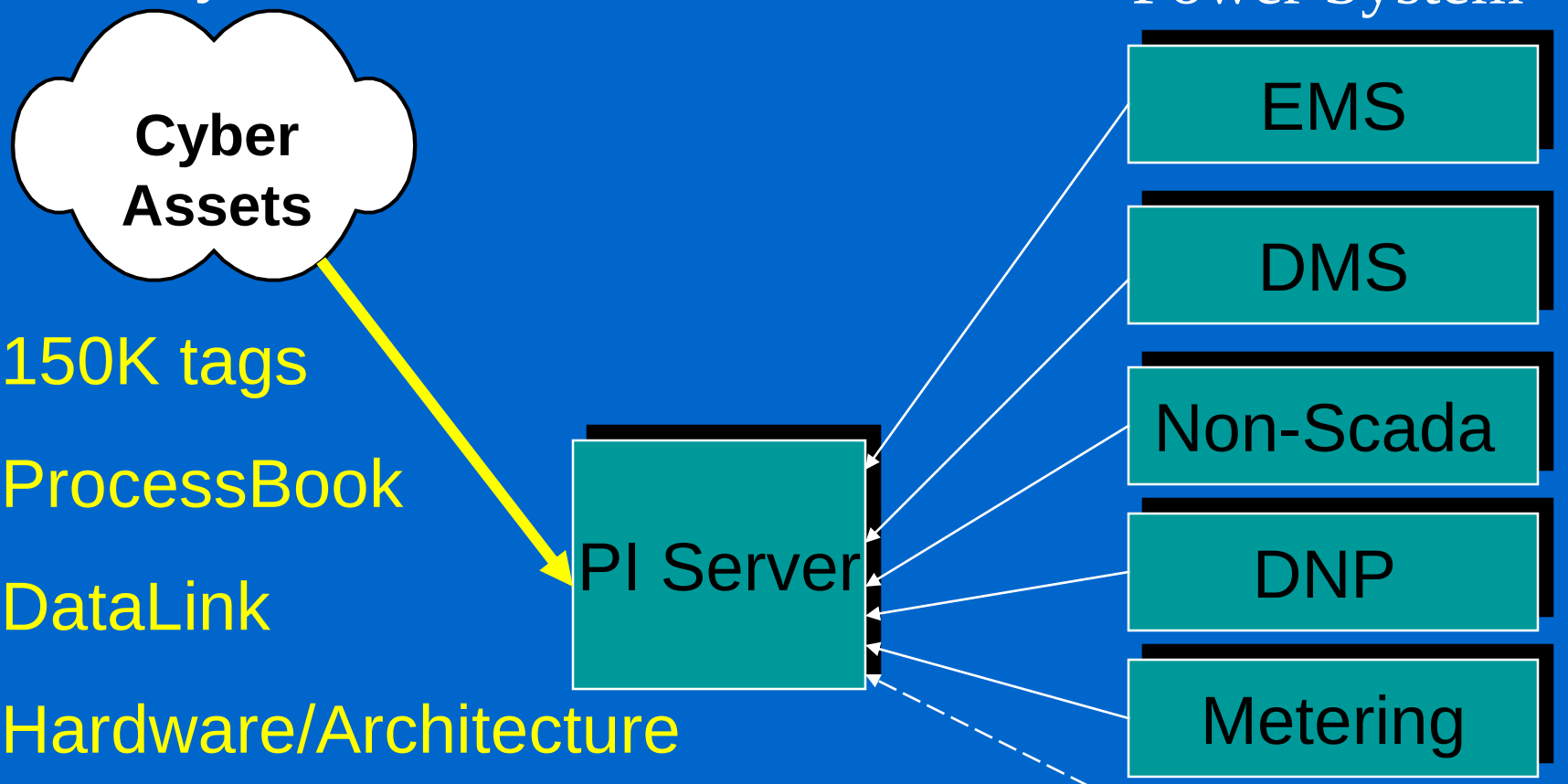
Monitoring All

- A proactive and preventive way to monitor EMS infrastructure resource health to ensure the system reliability and performance
- Monitoring all EMS infrastructure for disk, file, paging, cpu, swap and memory usage, …etc.
- Monitoring EMS processes and applications
- Establish performance baseline standards
- Avoid finger pointing
- Root cause analysis and problem solving
- Automatic notification via email and cell phone

Why IT Monitor?

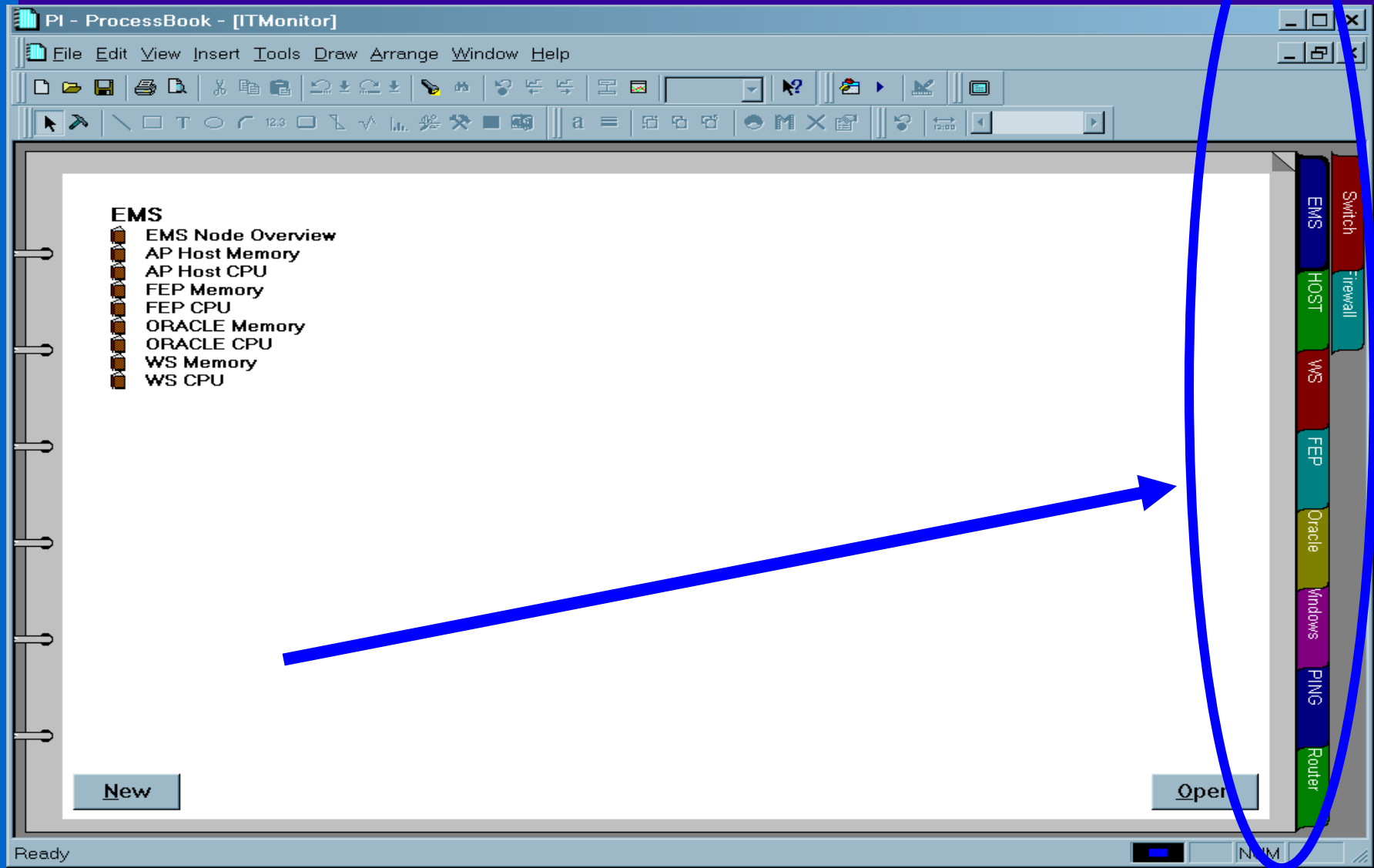
Control System Infrastructure

Power System



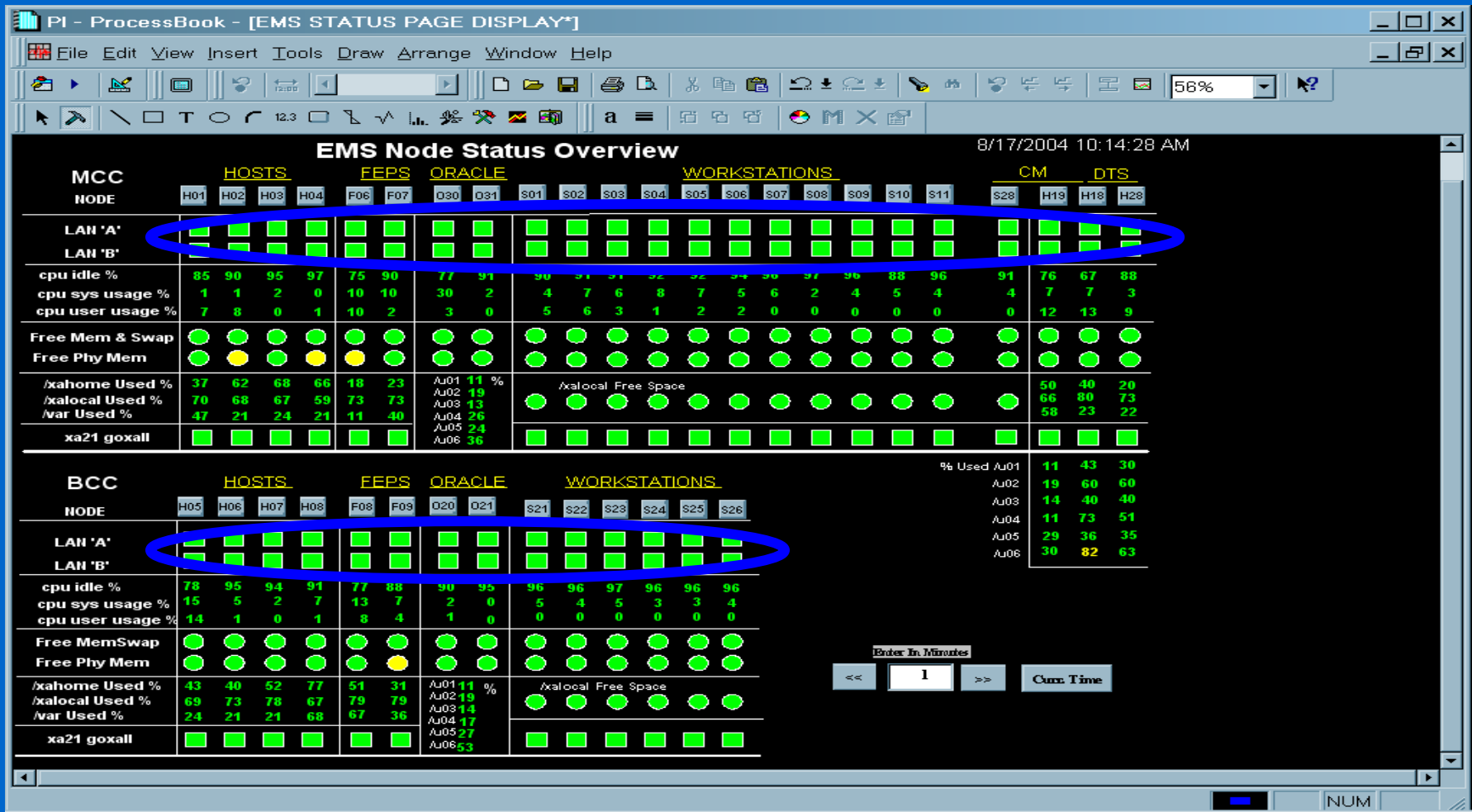
- ✓150K tags
- ✓ProcessBook
- ✓DataLink
- ✓Hardware/Architecture
- ✓Multiple interfaces/multiple devices

Multiple Devices



PING

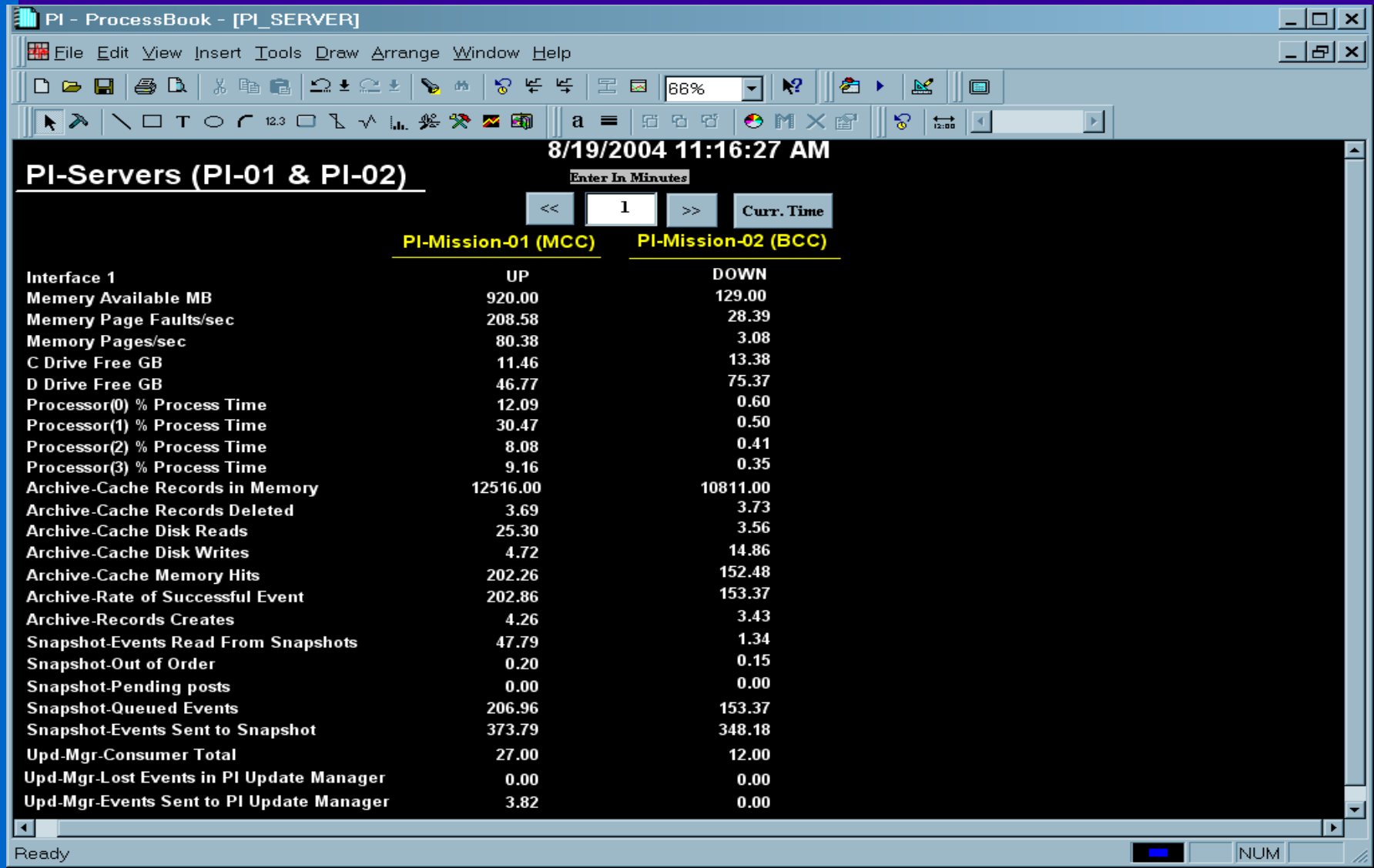
- Monitoring the network connectivity



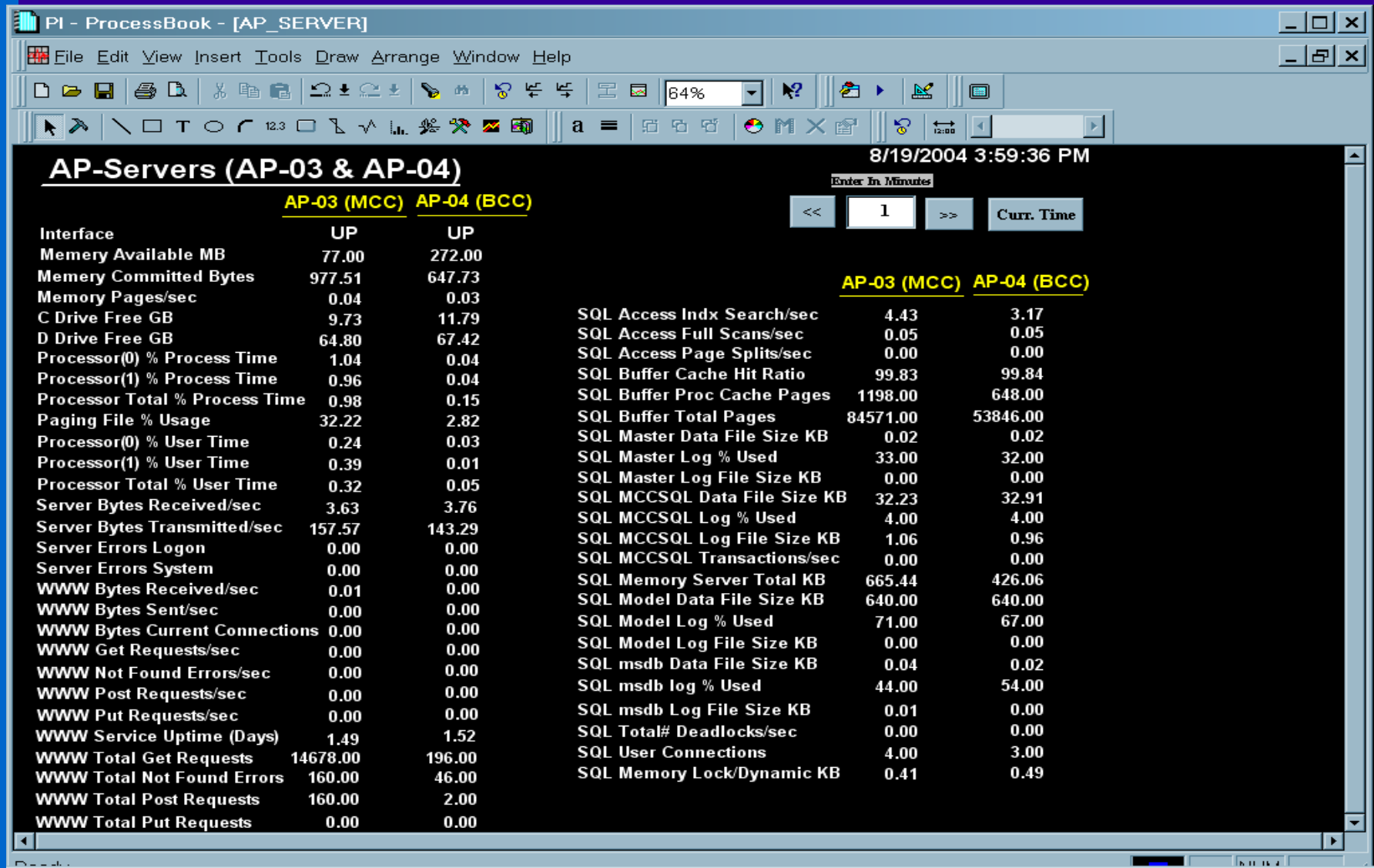
TCP Response/NetFlow/PerfMon

- TCP Response
  - Monitoring network service response times, like telnet, ftp, …etc.
- NetFlow
  - Monitoring network traffic, to and from the device
- PerfMon
  - Monitoring Windows servers performance counter and statistics

PI Server Status



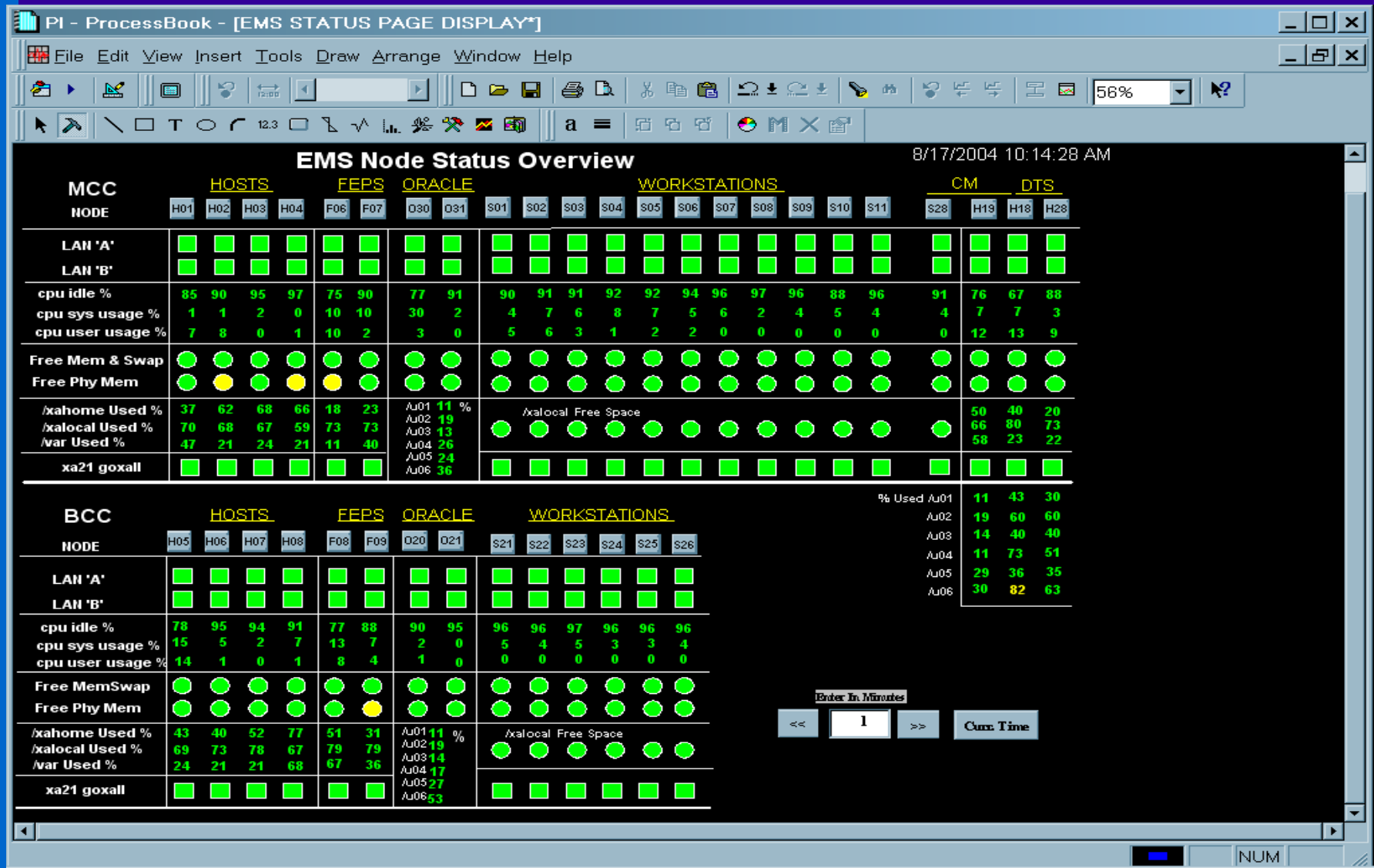
SQL & Web Server Status



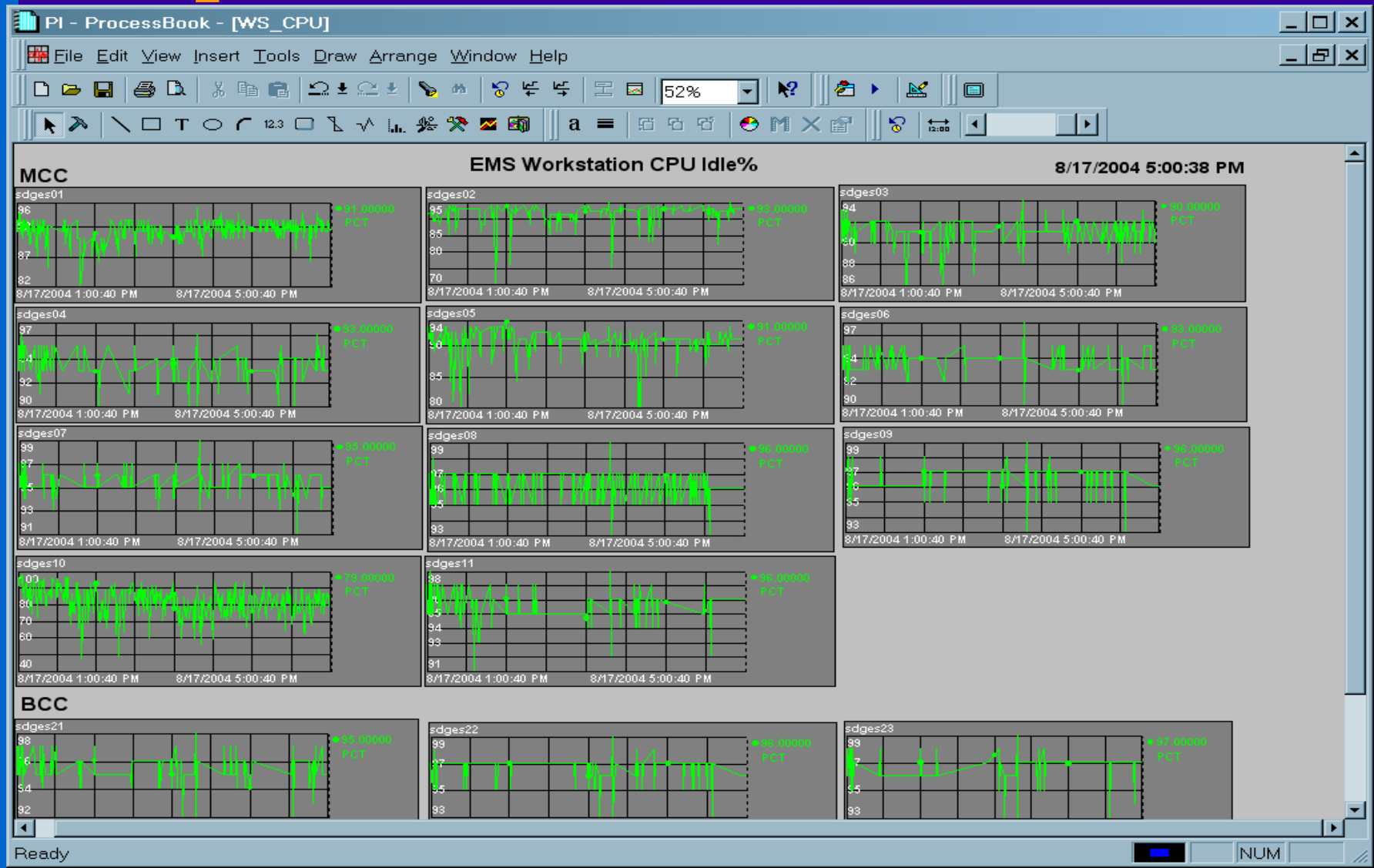
SNMP

- Simple Network Management Protocol
- Get statistics from any SNMP enabled devices
- SNMP query agent configuration in IBM AIX and SUN Solaris - very challenging
- Different MIB (Management Information Base) variables (containing OID's-Object Identifier) describing different aspects of computer/device operations
- Matching snmpd.conf, Getif info and OID's in PI tag "exdesc"

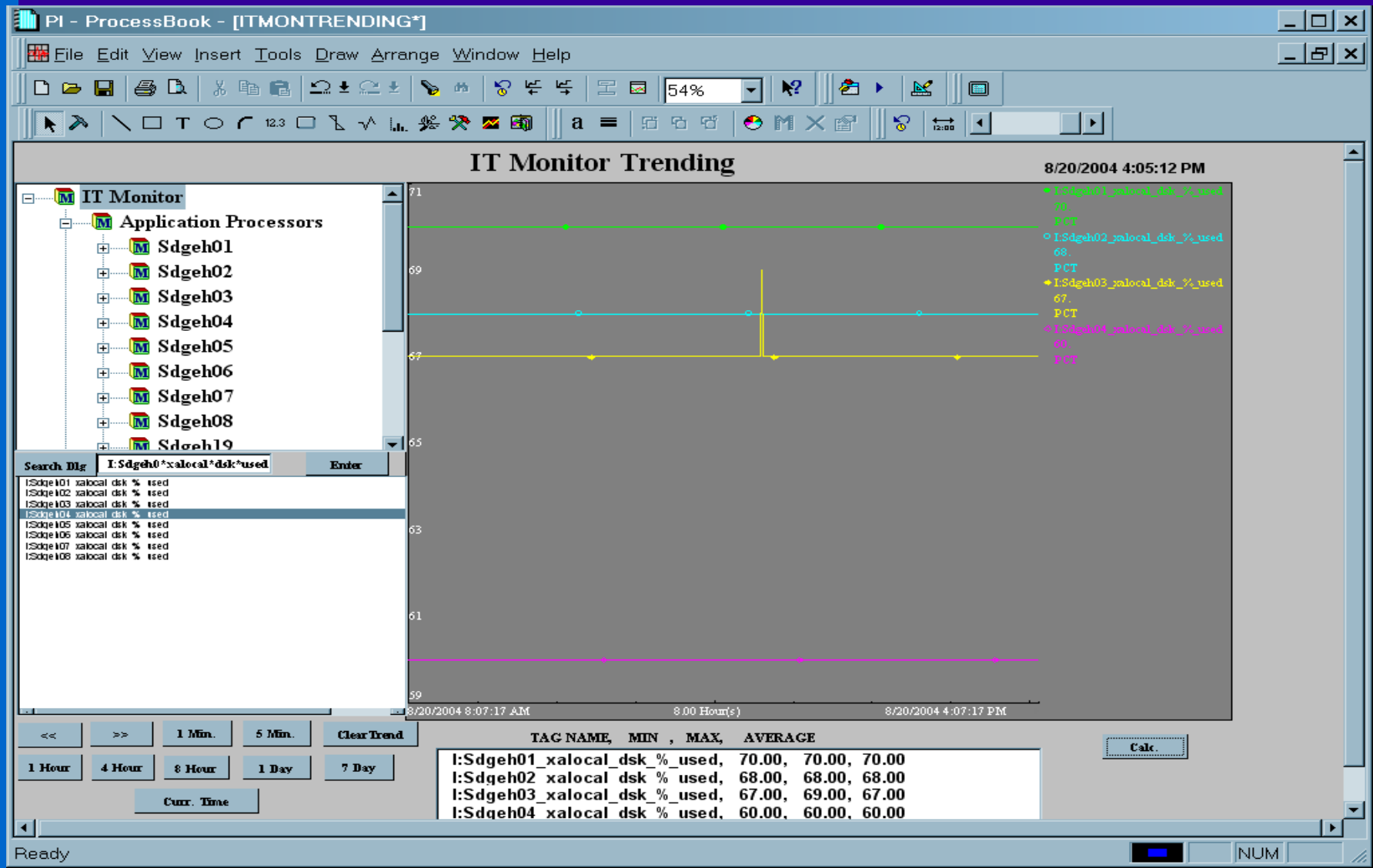
EMS Node Status Overview



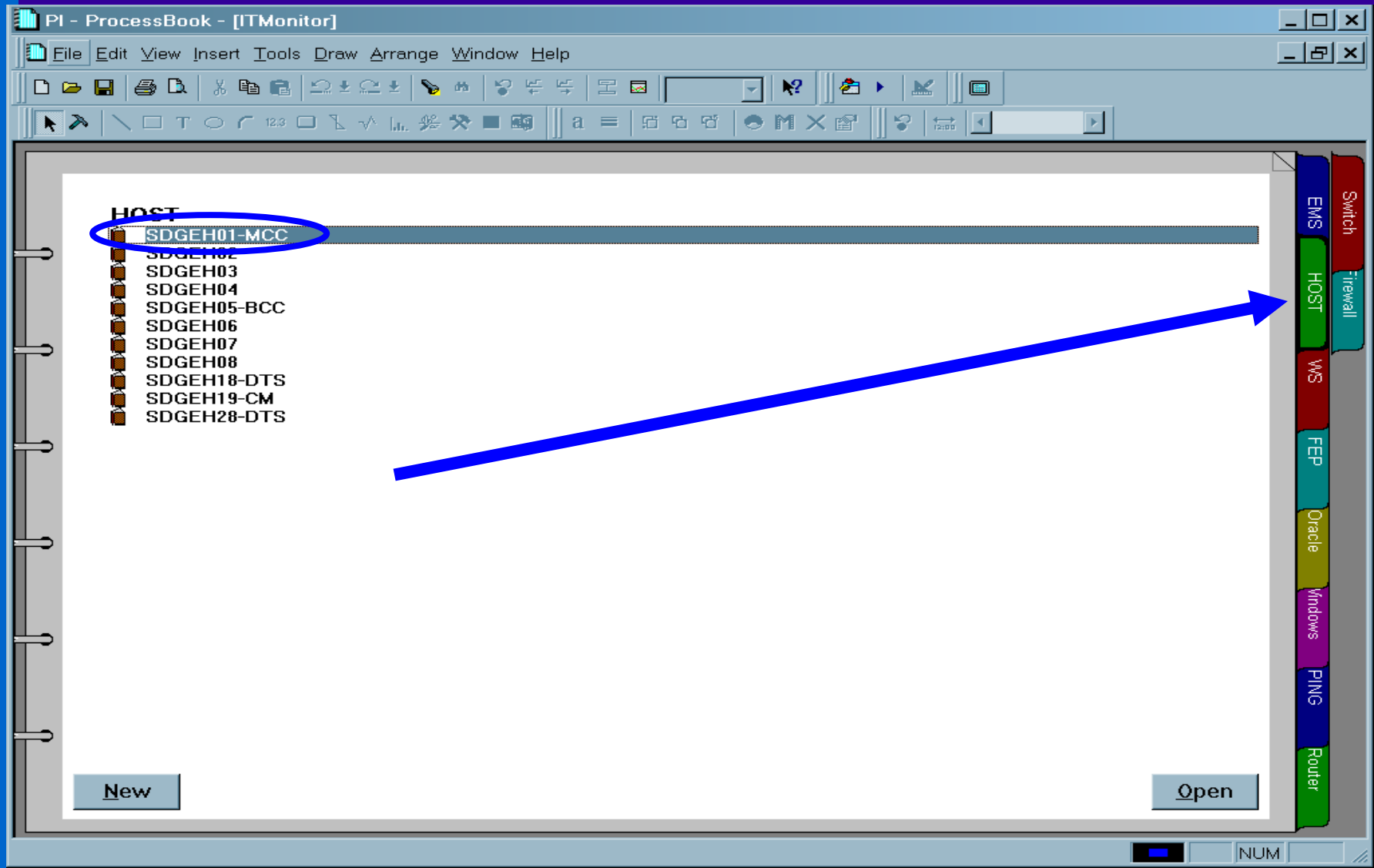
Dispatcher Workstation CPU



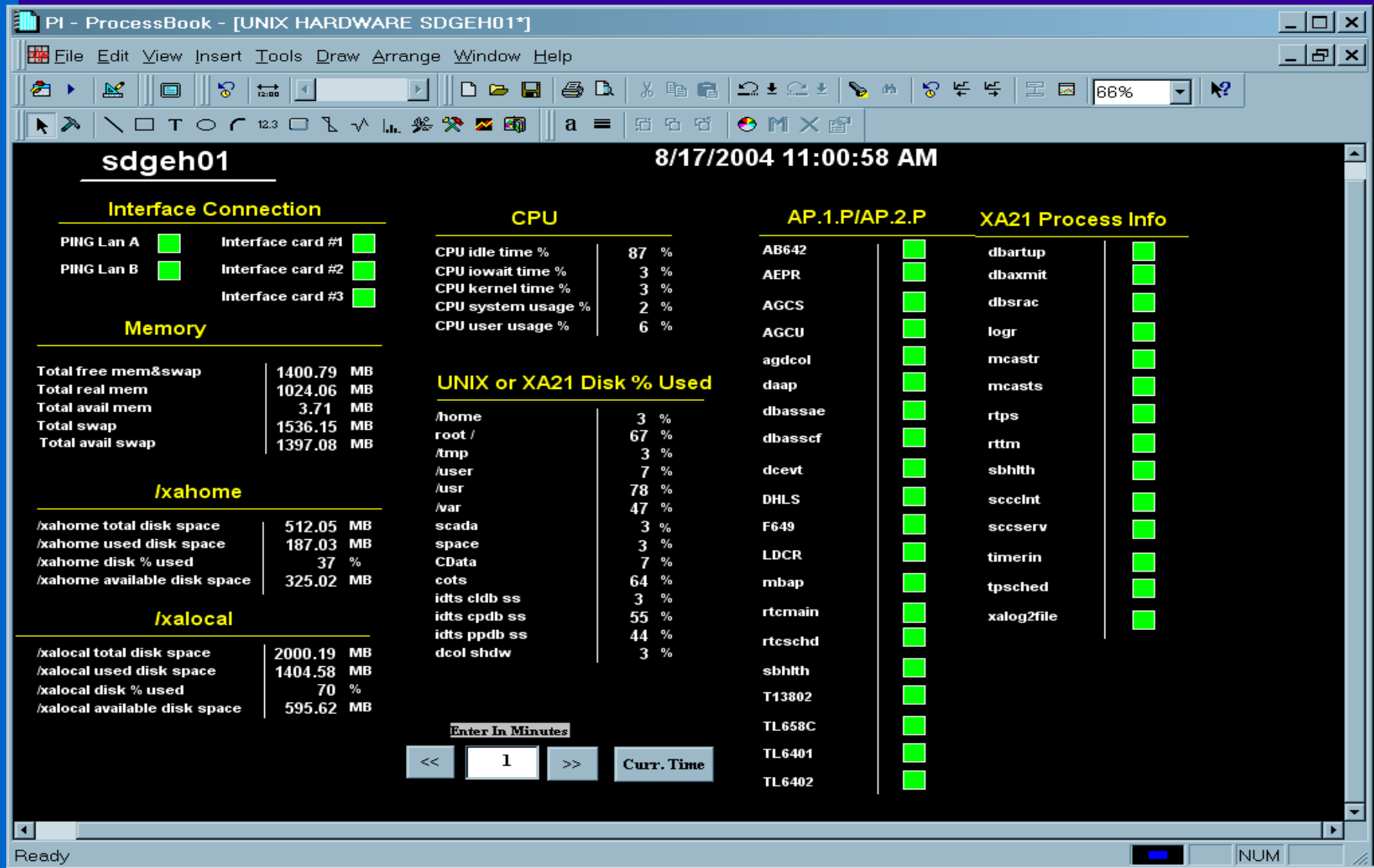
IT Monitor Trending



Application Host Index



Application Host 1



Future Development

- Monitoring Oracle database – Using SNMP
- Monitoring ipcs
- Implementing SNMP Traps
- SNMP agent in facility equipments
- Secured SNMP traffic (encrypting SNMP?)
- Utilizing Syslog interface
- Integrating with Cisco Works, IDS and HP Openview, …etc.

THANKS!!