Monitoring
Detailed Overview

Updated
September 28, 2005

Product Management
SAP NetWeaver
Infrastructure Management
SAP AG
Agenda

The Challenge of Monitoring a Landscape

Overview of CCMS Monitoring

Architecture

Alert Handling

Monitoring Components

New Features at a Glance

Summary
The Challenge of Monitoring a Landscape

Overview of CCMS Monitoring Architecture
Alert Handling Monitoring Components
New Features at a Glance Summary
The Challenge of Monitoring Landscapes

A typical solution landscape such as mySAP CRM at a customer site:
- Many hardware and software components
- Many interfaces
- Business processes that span multiple components
- Is Complex.

What does an administrator have to check?
- Are all components available?
- Are transactions performed with sufficient performance?
- Are all interfaces working properly?
- If a problem occurs: What is the cause of it? How can it be resolved?
- Are yesterday’s backups complete and usable?
- …
Example: CRM / EBP Landscape

Enterprise Buyer

- SAP J2EE Engine
- ITS
- XI
- Supplier Self-Services
- Catalog Server
- IPC

CRM Internet Sales

- SAP J2EE Engine
- IMS
- IPC
- TREX

Vendor

- Vendor's Web Server

Customer

Employee

Intranet Employee

Middleware

SAP Backend System

Business Intelligence

Advanced Planner and Organizer
The Challenge

An administrator’s nightmare:

- Performance of crucial transactions is very low.
- Main components become unavailable.
- Business processes are delayed.

Action required:

- Locate the problem.
- Find out its cause.
- Tackle the problem.
- Prevent this from happening again.
SAP’s Monitoring Infrastructure has the following benefits:

- **Central monitoring in one single screen**
  Large landscapes can be centrally monitored at a low total cost of operation.

- **Full scalability**
  Landscapes with only a few components or a large number of components can be efficiently monitored.

- **Preventive monitoring with alerts**
  No admin activity is required except in case of alerts. Alert notifications (e-mail, SMS …) can be triggered automatically.

- **Assisted problem detection and resolution**
  From the central system, administrators can drill down to a monitored component to remove the cause of an alert using predefined analysis functions.
Agenda

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New Features at a Glance

Summary
Two Different Aspects

CCMS Monitoring Infrastructure
Overview data:
• in each component
• landscape-wide (in ABAP stack)

Workload Statistics
Aggregated data:
• in each component
• landscape-wide (in ABAP stack)

Detailed data:
• in each component
• landscape-wide (in ABAP stack)
Monitoring Overview

Central Monitoring Infrastructure

ABAP Stack

SAP NetWeaver Administrator

Java Stack

SAP Basis ≥ 3.0

SAP instance

SAP Web AS ABAP

SAP instance

Non-SAP component

Agent

Shared Memory Segment

Agent

Shared Memory Segment

Solution Manager

3rd Party Tools

Business Intelligence

Push

Push
Central Views of Local Monitoring Data

1. Central Monitoring
   - SAP Web AS ABAP
   - CEN
   - CCMS Monitoring Infrastructure

2. Local Monitoring
   - RFC
   - RZ20
   - Shared Memory
   - C11
   - CCMS Monitoring Infrastructure

SAP AG 2005, Monitoring Detailed Overview / 11
What is CCMS?

The **Computing Center Management System** is

- SAP’s open, integrated infrastructure for centrally monitoring SAP landscapes
- Provides alert monitor templates
- Part of any SAP Web AS ABAP and SAP Basis component
- Free of charge
What can be monitored?

Predefined templates provide different monitoring views of SAP solutions and components:

- Based on SAP Web Application Server
  (ABAP and Java, also Basis Releases as of 3.0)
  - Enterprise Buyer Professional / Customer Relationship Mgmt.
  - Supply Chain Management (APO / LiveCache)
  - Supplier Relationship Management (SCM)
  - Business Intelligence (BI)
  - Exchange Infrastructure
  - Mobile Infrastructure
  - Enterprise Portal
  - Interfaces: tRFC / qRFC / ALE

- Other SAP components
  - Internet Transaction Server
  - Index Management Server
  - Business Connector
  - SAProuter
  - ...

- Non-SAP components
  - EMC² Symmetrix
  - ...

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Agenda

The Challenge: Monitoring a Landscape

Overview of CCMS Monitoring

Architecture

Alert Handling

Monitoring Components

New Features at a Glance

Summary
Architektur der CCMS-Monitoring-Infrastruktur

Administra- 

Local Analysis 3rd Party Products  

Central Auto Reaction

Central Data Display

CCMS Alert Monitors Solution Manager NetWeaver Administrator

Central Data Display

Local Shared Memory Segments

Monitoring Object Monitoring Object Monitoring Object Monitoring Object Monitoring Object

Data Supplier Data Supplier Data Supplier Data Supplier Data Supplier

DB OS ABAP Java Non-SAP
The Challenge: Monitoring Large Landscapes

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Architecture

Alert Handling

Monitoring Components

New Features at a Glance

Summary
Alert Handling Overview

- Non-SAP component
  - SAPCCMSR
    - Shared Memory Segment

- SAP Web AS Java
  - SAPCCMSR
    - Shared Memory Segment

- SAP Web AS ABAP
  - SAPCCM4X
    - Shared Memory Segment

- SAP Basis ≥ 3.0
  - SAP instance
    - SAPCM3X
    - Shared Memory Segment

- SAP NetWeaver Administrator
  - ABAP Stack
  - Java Stack

- Central Monitoring Infrastructure
- Alerts displayed
- Push
- e-mail
- Central Alert Notification

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Monitor Sets and Monitors

- **Monitoring Tree Elements**: All tree nodes
- **Monitoring Object**: Represents one physical or logical object
  - Summarizes alerts and propagates them to higher nodes
- **Monitoring Attributes**: Receive data and may create alerts
  - Use data for analysis alerts
History and Current View

Switch between views

Current

History
Displaying Alerts

Doubleclicking a node shows all corresponding alerts.
Removing the Cause of an Alert

1) Mark the alert

2) Start the analysis method in the monitored system
Analysis Method in Monitored System

Example

Load Analysis in System D46

Monitored system
3) Alert cause resolved in monitored component: Complete the alert in CEN
Agenda

The Challenge: Monitoring Large Landscapes

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New Features at a Glance

Summary
Monitoring Special Components

SLA Reporting

Availability Monitoring
Monitoring Components

Monitoring Special Components

CEN

RFC

Internet Pricing and Configurator Host

SAPCCMSR

IPC
Monitoring Components

Monitoring Special Components

Business Connector Host

SAPCCMSR

RFC

Jmon-API

RZ20

CEN

Overview:
- BC Server
- Hardware Properties
  - Availability
  - Disk Space
  - RAM
  - CPU Usage
  - System Parameters
- Performance
  - Processed Documents per Hour
  - Average Size of Documents
- System State
  - Listeners
    - HTTPListener02081
    - HTTPListener05058
    - HTTPListener02216
    - HTTPListener05555
    - HTTPListener02216
- R/3 Systems
  - Error Messages
  - SEC Error Messages
Monitoring Components

Monitoring Special Components

Central Monitoring

- ITS
- SAPCCMSR
- AGate

RZ20

- ITS
- SAPCCMSR
- AGate

RFC

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SLA Reporting

Important for Reporting on Service Level Agreements (SLA):

- Component availability
- Front-end response times (SAPGUI)
- Transaction-specific response times
- Standard response time
- ...
New Components and Applications, and Solutions

- Exchange Infrastructure 3.0
- Mobile Infrastructure as of 2.5
- Enterprise Portal 6/SP1; EP 5/SP6
- SAP Business Intelligence (BI) as of 3.1
- SAP Customer Relationship Management (CRM) as of 4.0
- AP Supply Chain Management (SCM) as of 4.1
- SAP Supplier Relationship Management (SRM) as of 2.0
Availability Monitoring

- Heartbeat
  Status of last availability check

- Availability
  Percentage of successful heartbeat checks over a given period of time
Availability: Different Levels – Different Mechanisms

Are all components up and running?

- XML Message Request (GRMG)
- CCMSPING Agent
- RFC Destination Check
- Process Monitoring

Any SAP Web AS Application (Java or ABAP)

SAP Web AS

Message Server

SAP J2EE Engine

Application Server

Other SAP Components (SAProuter, ITS)

Any RFC-enabled Component

Web AS ≥ 6.20

Central Monitoring

CEN
Application Availability: GRMG and GRMG Lite

Central Monitoring

Infrastructure

GRMG Infrastructure

SAP Web AS ABAP ≥ 6.20

Configuration File

Any Web Page

GRMG Lite as of 6.40 SP11

http head / http get

http status code / http status code and html output

XML Request

XML Response

GRMG Application

ABAP Application

Java Application

GRMG = Generic Request and Message Generator

Available in %, Heartbeat

Any Web Page

SAP Web AS ABAP ≥ 6.20

Central Monitoring

GRMG Infrastructure

Any Web Page

GRMG Lite as of 6.40 SP11

http head / http get

http status code / http status code and html output

XML Request

XML Response

GRMG Application

ABAP Application

Java Application

GRMG = Generic Request and Message Generator
Newest Features of GRMG

- GRMG „classic“ for SAP applications;
  GRMG „Lite“ HTTP PING / HTML scan for any web page
- Password encryption and improved logon capabilities
- Easy-to-use scenario editor
- Analysis utilities
- Start/stop scenario execution
- Scenario monitoring pauses
- Scenario runtime measurement
Example from SAP CRM Interaction Center
Checking the Broadcast Messaging Server with GRMG

Component availability

Scenario availability
Are all components up and running?

Central Monitoring

CCMSPING Agent

Web AS ≥ 6.40

SAP Web AS

Message Server

Application Server

Other SAP Components (SAProuter, ITS)
Newest Features

- Multiple CCMSPING agents in one landscape, for example, one per system group
- CCMSPING pushes data to CEN in one-minute intervals
- Dynamic management of monitoring by way of reference system groups
Availability Monitor for SAP System Landscapes using the CCMSPING agent

One availability node per monitored system

System availability

ABAP Instance

Java Instance
RFC Destination Check

Central Monitoring

RFC Destination Check

RFCLIB
Any RFC-enabled Component
RFC Destination Check

Example from SAP CRM Internet Sales
Checking Availability of the Product Catalog Server’s RFC Destination

SAP CRM Monitor Templates (Component Monitor: C...)

View Current system status (16.07.2003, 17:23:04)
Node display off

Component Monitor: CAT Server
- Heartbeat
  - CONNECTOR_Q4C_100
  - CONNECTOR_Q4C_700
  - CONNECTOR_Q4C_10
  - CONNECTOR_Q4C_305
- Version and Configuration
  - CRM CAT Server
    - CONNECTOR_Q4C_700

RFC destination availability
Process Monitoring

Central Monitoring

SAP or Non-SAP Component

*SAPCCMSR

*CEN

**processX

**processY

**procmon.ini

**SAPOsCol
Process Monitoring

...\prfclog\procmon\<xyz>procmon.ini

MaxDB is alive
Windows Event Log Monitoring

The Windows Event Log in the Alert Monitor
(triggered by switch in SAPCCMSR.INI)
Agenda

The Challenge: Monitoring a Landscape

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New Features at a Glance

Summary
New Features at a Glance: ABAP Stack

- Enhanced Availability Checks
- Performance Data Persistence and BI Reporting
- CCMS and Alert Management
- Statistical Records Correlation (enhanced as of 6.20)
- Enhanced CCMS Agents
- Open Integration
- SNMP Data Exchange With Third-Party Tools
Enhanced Availability Checks

- **Availability of SAP System Landscapes** (using the CCMSPING Agent)
- **RFC Destination Check**
- **Application Availability** (GRMG)
New Features at a Glance: ABAP Stack

- Enhanced Availability Checks
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Performance Data Persistence — Why?

Monitoring data is displayed as views on shared main memory.

The performance data displayed in a CCMS Performance Monitor is volatile:

- The size of the shared memory monitoring segments is limited.
- Monitoring data slots are continuously overwritten.

Is there a need for persistent performance data?

Yes!

Long-term performance history reporting is needed, particularly for reporting purposes in the context of Service Level Agreements (SLA).
Performance Data Persistence

- Non-SAP component
  - Shared Memory

- SAP Web AS Java
  - Shared Memory

- SAP System for Central Monitoring
  - SAP Web AS ≥ 6.20
  - SAP Basis ≥ 3.0
  - SAP Web Application Server

Shared Memory

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Performance Data Persistence

Features of the Central Performance History (CPH):

- Central collection of monitoring data of the complete system landscape in a performant way.
- Handles minute, quarter-hourly and hourly monitoring data.
- Aggregations from minute values to hourly, monthly and yearly averages
- Reorganization provided
- Accessible from the Alert Monitor
- Configurable, scheduled reporting
- Export of reported data to operating system level supported
Analyzing Monitoring Data in BI — Why?

The CPH provides limited reporting on CCMS data stored in the central monitoring system.

Highly sophisticated reporting on such data can be achieved using SAP Business Intelligence (BI).

BI has the following benefits:

- Central part of SAP NetWeaver
- Optimized for saving and analyzing huge amounts of data
- Flexible and personalizable reports
- Linking of reports (drill-down analysis)
- Correlation of independent data sources (CCMS, CRM, FI)
- Powerful SAP BI analysis tools (correlations, trends, ....)
- Low-cost Service Level Management
Data Flow Overview

Central Monitoring

- Monitoring Infrastructure
- CPH (≥ 6.40)

SAP Web AS

STAT

- Extractors

Workload Statistics

Alert Monitor displays data of the last 24 hours

CPH stores data older than 24 hours

Business Intelligence

- Info Cube
- BI Content 3.52

As of 2006

Performance Data

Report

Monitored Systems

ABC
DEF
XYZ
Facts and Benefits:

- All performance data (from ABAP and Java stack) is collected in CPH:
  - Central data collection, aggregation, and reorganization
  - Delivered for CEN releases as of SAP Web AS ABAP 6.20 SP17

- All data collected in CPH is transferred into BI
  - CCMS data is stored in several BI data containers (info cubes).
  - Demo reports are available.
  - Powerful reporting design using BI reporting tools.
  - Available as of SAP Web AS ABAP 6.20, Basis Plug-In 2004, and BI Content release 3.52.

- Statistical data from (from ABAP and Java stack) is transferred to BI
  - BI as a central data platform for powerful root cause and performance analysis and SLA reporting.
  - To be delivered in 2006.
SAP Business Intelligence can link any data from various containers to create a new, virtual container.

Advantage: Innovative and highly flexible analysis options
New Features at a Glance: ABAP Stack

- Enhanced Availability Checks
- Performance Data Persistence and BI Reporting
- CCMS and Alert Management
- SNMP Data Exchange With Third-Party Tools
- Statistical Records Correlation
- Enhanced CCMS Agents
- Bi-directional Open Integration
CCMS and Alert Management

What is Alert Management?

An SAP standard framework for active real-time delivery of mission critical information:

- Support for e-mail, SMS/Pager, Fax, WAP, Web Interface ...

Personalized alert content and delivery

- Easy-to-use definition environment
- Preferred channels for messages
- Publish and subscribe mechanism for alert topics
- Displayed in EP universal worklist

Escalation of alert notifications
in case of inactivity

Supported by CCMS as of SAP Web AS 6.20
New Features at a Glance: ABAP Stack

- Enhanced Availability Checks
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What are workload statistics used for?

- To trace a business process running across multiple components
- To find out how often a component has been called
  - By whom?
  - For what reason?
  - From where?
- To discover all parts and response times of a process
- To analyze problems in CCMS monitoring using the appropriate analysis function
Statistical Records Correlation

Cross-Component Correlation
Java writes distributed statistical records (DSRs)

Data is correlated across components using the GUID contained in the passport

Central display
• aggregated
• detailed
New Features at a Glance: ABAP Stack

- Enhanced Availability Checks
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Enhanced CCMS Agents

All monitoring data is pushed to CEN as of 6.20

SAP Basis ≥ 3.0

SAP Web AS ABAP

SAP Web AS Java

Central Monitoring

SAPCCMSR

SAPCCMSR

SAPCCM4X

SAPCM3X

Non-SAP component

Shared Memory Segment

Shared Memory Segment

Shared Memory Segment

Shared Memory Segment

Push

Push

CEN
Enhanced CCMS Agents — Details

Central Monitoring

CEN

Agent

Data Supplier

RFC

JAVA Interface

JAVA

SAP Instance

Monitoring Segment

External Components

External Software

Log File

Alert File

SAPOsCol

Process

Process

SAP Instance

JAVA

Enhanced CCMS Agents — Details
Enhanced CCMS Agents — Types

Different Types of Agents for Different Components

- **SAPCCMSR**
  - Monitors the SAP J2EE Engine and components without any active SAP instance.
  - Transfers detailed OS data to CEN by help of SAPOsCol.

- **SAPCCM4X**
  - Transfers CCMS alert monitoring data from any SAP System as of Release 4.0 to CEN
  - Requires no dialog work process on central system
  - Can be registered at several central systems to ensure high availability.

- **SAPCM3X**
  - Connects SAP Systems 3.X to a central monitoring system delivering the dispatcher's performance data.

- **CCMSPING**
  - New: Now an active data supplier for SAP system landscape monitoring (pushes availability data to CEN)
  - No longer requires a dialog work process on central system
New Features at a Glance: ABAP Stack

- Enhanced Availability Checks
- Performance Data Persistence and BI Reporting
- CCMS and Alert Management
- Statistical Records Correlation
- Enhanced CCMS Agents
- Open Integration
- SNMP Data Exchange With Third-Party Tools
- NetWeaver Administrator (as of SAP NetWeaver 04, SP 12)
Open Integration with Third-Party Tools

Outbound Interface (XAL)

- Tight integration with third-party monitoring solutions.
- Provides access to a central SAP monitoring system with SAP landscape monitoring data, including data from Java components.

New: Inbound Interface (XMW)

- With XMW, third-party monitoring data can be reported into CCMS.
- Administrators can drill down into and trigger the third-party monitoring tool as an analysis method for further analysis.

Both interfaces are available for certification.
New Inbound XML Interface

- XML data is converted in a CCMS monitoring tree.
- XML interface is delivered with SAP Web AS 6.20 and patched down to 6.10.

Central Monitoring

CCMS Monitoring Infrastructure

SAP Web AS ≥ 6.10

HTTP Post

BAPI Call

SAPCCM4X Agent

XML
New Features at a Glance: ABAP Stack

- Enhanced Availability Checks
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- SNMP Data Exchange With Third-Party Tools
SNMP Data Exchange With Third-Party Tools

Exchange of Monitoring Data with Third-Party Tools Using The SNMP Protocol

- SNMP is a de-facto standard for system management and monitoring
- No additional interfaces required on the part of third-party tools
- Low-cost solution implies reduced TCO
- Central monitoring of components that support SNMP
- Supports status reporting of devices and components
  (such as: SAP components or instances, network routers, switches, and printers)
- Various SNMP versions supported
SNMP Data Exchange With Third-Party Tools

Monitored Components

Central Monitoring

Third-Party Monitoring Console

No additional interfaces

Alerts exchanged as SNMP traps

Monitored Components
New Features at a Glance: Java Stack

- J2EE Integration into CCMS Monitoring Infrastructure
- Log Viewer Types
- Distributed Statistics Records
- One Agent Per J2EE Instance (as of 6.40)
- SAP NetWeaver Administrator

The following slides provide a quick overview of these new features.

For more details, use quick link [JAVAMONITORING](#) in the SAP Service Marketplace
CCMS Alert Monitors also display the data collected by the J2EE Engine.
Availability checks of monitored J2EE components
Central data push to CEN by CCMSR agent
NetWeaver Administrator will replace CCMS Alert Monitors and Visual Administrator.
Monitoring Tree in Visual Administrator

![Monitoring Tree in Visual Administrator](image)

**General Info:**
- **Name:** MaximumThreadPoolSize
- **Description:** Maximum size of the thread pool
- **Type:** IntegerMonitor
- **Configuration group:** MANAGER, MaximumThreadPoolCount
- **Creation date:** Thu May 27 2004
- **Last change date:** Thu May 27 2004

**Monitored Data:**
- **Value:** 40
- **Maximum:** 40
- **Minimum:** 40

**History**

**Configuration**
Log Viewer Types

Central Log Viewer (NetWeaver Admin)
  ■ Web-based

Integrated Log Viewer (Visual Administrator)
  ■ All the logs written from the Engine and the running applications are automatically registered
  ■ Customizing the properties, switching on Log Monitoring ...

Standalone Log Viewer for Central Log Viewing
  ■ Consists of Log Viewer Server and Log Viewer Client. Logs from a System Landscape can be viewed centrally in one Standalone Log Viewer Client, if one Log Viewer Server runs on every host.

Command Line Log Viewer
Usage: lv.bat, delivered with Standalone Log Viewer
  ■ Only for viewing local logs on console
  ■ Can be switched on during deployment
  ■ Converts binary data into human readable data
Distributed Statistics Records (DSRs)

- statistical data written by the J2EE Engine
- administered in the DSR Service of the Visual Administrator

Diagrams showing:
- SAP System for Central Monitoring
- SAP Web AS ABAP $\geq 6.20$
- SAP Web AS Java $\geq 6.20$
- Collector Database
- Direct call for last minutes' load
- Hourly data pull for statistics aggregation
- Non-aggregated single records
- DSR Collector
- SAPCCMSR Agent
- DB
- File System
One Agent Per J2EE Instance

- Performance increase
- Easy-to-read monitors
- Thresholds of J2EE counters are maintained from CEN or Visual Administrator and stored in the J2EE database.
- SAPCCMSR with its monitoring data is treated like an SAP system.
SAP NetWeaver Administrator is the new browser-based central administration and monitoring solution for your SAP NetWeaver system landscape.

It will replace both CCMS Alerts Monitors and Visual Administrator.

SAP NetWeaver Administrator is a Java application that is part of the shipment of SAP NetWeaver ’04 from 6.40 SP 12 on and NW2004S.
Key Capabilities

- NetWeaver Administrator will replace CCMS Alert Monitors and Visual Administrator.
- Monitors ABAP and Java components together in a new Web application
- Clear and structured data presentation
- State-of-the-art application based on WebDynpro, which meets latest SAP UI standards
- Deals with current / historical data and alerts
- Central Web-based log viewer
Agenda

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Summary
Central Monitoring of SAP Landscapes

- **NetWeaver Administrator** will replace CCMS Alert Monitors and Visual Administrator.
- SAP’s central monitoring infrastructure is flexible and fully scalable.
- Monitoring data is displayed centrally by
  - CCMS Alert Monitors
  - Solution Manager
  - SAP NetWeaver Administrator
  - Third-party monitoring tools

- **Workload Statistics**
  - Correlated across components (including Java)
  - Displayed centrally in the Global Workload Monitor

- Open integration with third-party products
- CCMS is an integral part of SAP technology
- Free of charge
When third-party software is successfully certified, a company:

- Receives the right to use the SAP tagline

- Receives an SAP Interface Certificate

- Acquires a listing in the SAP online partner and product directory -- a valuable resource for customers and consequently an opportunity for vendors to market their software [www.sap.com/icc](http://www.sap.com/icc)

- Satisfies one of the criteria for becoming an SAP partner [www.sap.com/partner](http://www.sap.com/partner)
Further Information

SAP Service Marketplace
For more information, use the quicklinks /monitoring and /javamonitoting.

Related SAP Training
http://www.sap.com/ → Education
ADM106, Advanced System Monitoring
ADM100, SAP Technology Administration
ADM200, SAP Web AS Java Administration

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