Central PI Monitoring and Alerting

White Paper
Version 1.0

Active Global Support
SAP AG
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Central PI Monitoring and Alerting

Introduction

Customer’s business model is changing rapidly in phase with market trends. IT department is under pressure to provide tools to run the business efficiently, at the same time keeping the costs low and with minimal disruption to business. In order to achieve this, organizations find ways to integrate applications from partners and orchestrate them into their landscape for quick wins.

SAP NetWeaver Process Integration (PI) is SAP’s implementation of Service-oriented Architecture (SOA) middleware service bus; it facilitates the integration of business processes that span different software components, departments, organizations. It is not a challenge anymore to integrate SAP and non-SAP software components or third party applications quickly into the business processes. PI is based on web service standards that supports Application to Application, Business to Business and Web Services scenarios. It supports Business Process execution and monitoring.

Since Process Integration server is the heart of integration in an enterprise, it is very important to maintain high availability of the system for uninterrupted data exchange across the landscape. Central PI monitoring in Solution Manager 7.1 provides unified alert notifications, exceptions and status of PI components from a single entry point. It also provides options to navigate to details of such exceptions in the respective host system. It becomes easier for addressing the issues more quickly and efficiently.

This paper provides the basic concepts and the implementation methodology for the central PI monitoring using Solution Manager 7.1.

Goal

In an integration scenario, different software components interact together to send messages from source system to target system. These components are responsible for transforming data from one format to another, at runtime makes decision to route the messages based on the runtime context, choosing right protocol to transfer the message and technical connections to managed systems. It is very important to provide tools for the IT expert that monitors all of these components and provides centralized alerts and status to take proactive measures to resolve the issues before they are visible to the users. Central PI monitoring and alert application which is part of Technical monitoring in Solution manager 7.1 serves the purpose.

Benefits

Continuous business availability – Centralized monitoring of PI domain helps to accelerate the problem resolution process. This leads to high availability of process Integration server and the data exchange between the systems are un-interrupted and hence the high availability of the application.
Central entry point – Growing PI landscape complexity and distribution leads to growing requirements towards a central monitoring approach

Reduced TCO – Simplification of operations processes by providing one single entry point for all component monitors for overall PI domain status. Additional drill down option provides detailed information up to host level. This reduces the overall problem resolution time and the number of resources involved in the investigation of issues.

Integration – Tightly integrated with other solution manager tools such as System Monitoring and Root Cause Analysis, Alerting Infrastructure, Notification and Incident Management

Production Resources freed – Central collection of monitored data relieves the production system from additional burden of monitoring.

Self check – Self check features provides availability of monitored components

As a summary the central PI Monitoring application helps to quickly answer questions of this type:

- What's the overall status of all PI components of the productive PI domain? Do you have issues in the underlying technical systems?
- What's the error trend for your business critical interfaces?
- Which are the most prominent errors this year? Did these errors occur in the last 7 days? At what point in time during the day do these errors typically occur?
- What is the message backlog today? Is there a relation between the message backlog and the overall message volume?
- Business department calls you and wants to know if and since when messages stuck for their business critical interface? On which PI components did those messages fail?
- How many communication channels do have an issue and which are the relevant local monitors?
- On which PI components do you have most error messages and which interfaces are affected?
- How many messages have been received this month via communication channel "xyz"?
- Did we process a message for ‘CustomerNr = 12345’ and ‘MaterialNr = 46344’ this week and what is its status?
Getting Started with Central PI Monitoring

1. Software requirements
   - Central PI Monitoring is supported as of SAP NetWeaver PI Release 7.11, SP06 *
   - Additional improvements were done as of SAP NetWeaver PI 7.30
     1. Self test information of PI components were significantly improved
     2. Short log information for PI channels were improved
     3. The option to perform a PI channel PING got introduced
     4. In addition to message statuses the status details were introduced providing further information on the error root-cause
   - Central User Defined Search is supported as of SAP NetWeaver PI Release 7.31 and SAP Solution Manager 7.1 SP2
   - PI Message Alerting is available as of SAP NetWeaver PI Release 7.31 and SAP Solution Manager 7.1 SP4

2. Setup & Configuration
   The following setup and configuration steps are necessary in order to configure the central PI monitoring application.
   - Landscape Setup (once / per PI SLD)
   - Managed System Configuration (per Technical System)
   - System Monitoring Setup (per Technical System)
   - PI Monitoring Configuration (per PI Domain)

One of the important steps during setup is how technical landscape information from SLD is synchronized with LMDB of Solution Manager 7.1. The figure below illustrates different ways of synchronization. Although it is possible to synchronize several SLDs into one LMDB, it is recommended to use a central SLD which is connected to all PI SLDs before synchronizing it into LMDB of SAP Solution Manager. If the unidirectional content synch is established, the SLD bridging is no longer needed.

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Fig. 1 Landscape synchronization
Using Central PI Monitoring

1. PI Domain
The SAP Process Integration scope is defined by a Process Integration Domain (PI Domain). A PI Domain comprises of several runtime components such as 'Central Integration Engine' which maps and transfers messages to different managed systems based on certain rules, 'Business Systems' that execute business processes which initiate the message transfer, BPM engine to execute and monitor business processes, design time and run time environment and the adapters to connect to non-standard proprietary software components. These components are distributed across multiple technical systems. In order for PI to function correctly, it is vital that all components involved in message processing be available at all times and perform effectively.

Fig. 2 Scope of a typical SAP NetWeaver PI Domain

The monitoring application lists all the PI domains that are setup for PI Monitoring and all monitoring data are viewed in the context of a single PI domain.
2. Overview Monitor

The overview monitor takes to a screen of aggregated view of the information collected from component monitoring, message monitoring and channel monitoring. This also includes availability and self-test data for the PI components, channel status and message status. The overview screen first displays three main categories “Integration Server” (including all central PI components), “De-central Adapter Engines” and the “Business Systems” (including ABAP Proxies and Business Systems) as shown in Fig 3.

Each of these categories provides details on the following metrics of the related PI components:

- Number of alerts
- Availability
- Self-Test of that application
- Communication channels per status group
- Number of messages in error, intermediate status as well as the overall data volume for the selected time period

Furthermore monitoring information from the System Monitoring information can be included which is grouped and aggregated by categories Availability, Configuration, Performance and Exception.
To facilitate a better accessibility for very large PI Domains with many runtime components, all monitoring information is also available in form of a tabular view (button “Show Tabular View”).

Each icon or number in the overview screen is configured to facilitate forward navigation into central PI Monitors, the central Alert Inbox or the System Monitoring application. Additionally a number of useful navigation options into local PI monitors for the different involved components is offered. In the
screenshot below you can find the context sensitive navigation from PI monitoring application to System Monitoring application.

![System Monitoring application with its system, host, database metrics](image)

**Fig. 6** System Monitoring application with its system, host, database metrics

### 3. Component Monitor

The Component monitor shows the availability status and the self check status in a tabular view for PI components for the selected domain in the landscape. These status information are constantly refreshed at regular intervals which is customizable. The menu buttons provides various functionalities such as triggering the self test on-demand for any of the components. The self test result is displayed in another tab below the tabular view. The self test data is specific for the selection PI component.
Fig. 7 Component overview

Besides the monitoring capabilities also integration with other functions is offered. Via button 'Manage' you can manually repeat the measurement of the component's availability or self-test status. The button 'Navigate To' offers options to navigate to local PI monitors and the button 'Create' enables to create PI component-specific incident tickets or notifications. In each case context information is inserted automatically.
4. Channel Monitor

SAP NetWeaver PI is used as an integration platform to support integration of multiple software components (SAP and non-SAP), and the messages are exchanged using different protocols and standards via PI communication channels.

The Channel Monitor lists all the PI communication channels from central and non-central adapter engines of the selected PI domain. It offers filtering facility to display the channels of specific interest. It provides the channel activation status, channel processing status after processing the last message, adapter type, component and the receiver or sender party etc. After selecting any channel further details in form of channel short-log are shown which gives more details on the error root-cause and last message processing.

The PI communication channels can be started or stopped and for some adapter types they can also be tested via the channel PING functionality. At any selection a set of suitable navigation options is available via button ‘Navigate To’.
5. Message Monitor

In an integration scenario, the messages flow seamlessly across different back end systems. The message processing can involve multiple PI components such as Central Integration Engine, Central Adapter Engine, Decentral Adapter Engine, ABAP Proxy, Java Proxy etc.

Central Message monitor provides all the information about the involved components for a message, thus analyzing an issue becomes easy and quicker. It consists of three views, Error Monitor, Backlog Monitor (scheduled messages) and the Message Flow Monitor which all cover different PI components of the selected PI domain.

Filter Section

The filter section is the same for all three sub-monitors and enables to preselect the output via defining a time window, specifying the message status and other message attributes. Beside there is the option to save these settings as a filter which can be reused at any time.
5.1 Error Monitor

The Error Monitor only considers messages in any error status and consists of two views.

"By Components" This view shows all runtime components and the number of messages which are in any error status there. In the drill-down section these messages can be filtered by the ‘Top 10’ sender or receiver components or interfaces. On the right side you see the message trend for the last 7 days and the last 24 hours. The below example shows that out of the 39,780 messages in error state around 25428 messages failed on the Central Adapter Engine. At the same time one can derive the information that actually there was no message processing at all in the last couple of days and this is obviously the reason why there were no erroneous messages in the last days.

![Message Error Monitor - Component View](image)

"By Status" This view lists all the different root causes and the number of failed messages for the selected time window. In the below example one can see that most erroneous messages of the current month can be traced back to issues in the ‘File Adapter’ and this issue occurred in the last 7 days.

![Message Error Monitor - Status View](image)
5.2 Backlog Monitor
The Backlog Monitor is identical with the Error Monitor just that it considers only messages in status category Scheduled which are messages that did not reach their final status yet since the eventually got stuck in a queue.

5.3 Message Flow Monitor
The Message Flow Monitor considers messages of any status. You can restrict messages by their attributes and do not have to care about the actual runtime component on which these were processed.

Here as well there is anytime the option to navigate to the local detail monitors of the corresponding runtime component in the context of the selected messages or just to cancel or restart those messages.

Fig. 13  Message Flow Monitor
You can download the monitoring data for reporting reasons and use the "View Trend" function to show the message trend for the selected messages scenario.

Fig. 14  Message Flow Monitor - Message Trend View
In the below example messages which came from the Sender Component "XI2_105" were selected. The below section shows that actually 15 messages were successfully processed on the 'ABAP Proxy: XI2_105' but they failed later on their way on the 'Central Integration Engine: XI2_001'. One of the next steps might be to display the status details to understand the root-cause.

Fig. 15  Message Flow Monitor - View by Sender Component
6. Central PI Message Search

Have you ever faced the task to find a specific message with a specific customer name e.g. "Smith" and a specific order number, e.g. "123445"? Such a message search could end up being a very time consuming activity, not just that you had to search on each single runtime component individual but also as this message meanwhile could have been archived and you had to scan the runtime persistency as well as the archives.

The Central PI Message Search functionality enables to search messages via their payload attributes. This functionality is based on the 'User Defined Search' (UDS) which has to be configured on the local runtime components. From a central point you can kick off the message search on all or several PI components in a PI domain simultaneously and display the search result centrally at one glance. You can search the indexed messages by using the predefined attributes via value help or entering free search criteria.

The below example shows a message search with 'Firstname = Hans' and any 'Lastname = *'. At the same time the search has been restricted via a defined time window and four selected runtime components.

![Central PI Message Search - Selection Criteria](image)

The result of the message search first shows you the runtime components on which messages were found and the message count. In the lower section you see the single messages with their attributes.

From here again you can send out emails or SMS or create tickets to notify someone. Also the navigation to the local monitors is offered where you eventually could edit the message etc.
7. PI Message Alerting

PI can be customized to raise alert events for messages in error status. You can define alerting rules for message attributes, like integrated configurations. The SAP Solution Manager is able to consume those alert events and visualize these alerts in the central alert inbox.

It is possible to raise one alert for each single message or to generate aggregated alerts on the level of PI runtime component, alert rule, status details and integration flow if applicable.

8. Central Alert Inbox

Central Alert inbox is a central access point to handle alerts such as exceptions in message processing, availability status and self test data for PI components and PI communication channels. The alerts are generated by the event calculation engine for various monitored objects in PI the domain based on thresholds set for the metrics.

It offers drilldown capability from alert type to alert group and single metrics. Root cause analysis and incident creation feature are integrated in this application as well as alert handling mechanisms like status tracking, incident ticket and notification creation via (e-mail or SMS).
Fig. 18  Central Alert Inbox

Fig. 19  Alert details
9. Notification and Incident Management Integration

If there is an issue, for example if the Central Integration Engine stopped working, an incident ticket can be created in the incident management application of SAP Solution Manager to address the issue to the responsible person. All the relevant information is filled in automatically in the incident ticket thus reducing the time to create a ticket.

It is also possible to create an e-mail or SMS notification from the component monitor to alert the responsible person to take necessary steps.

Summary
Central PI monitoring application provides all the capabilities for efficient issue handling that surface in any PI domain. Offering information and functions centrally, featuring navigation options into local PI monitors in the different PI components, it reduces time and effort from issue detection until issue resolution and thus is reducing TCO.