



Architecture

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WebSphere Business Monitor architecture

The architecture of WebSphere® Business Monitor 6.0.1 comprises a set of internal components and a group of external components.

Business Measures Models, which are defined in WebSphere Business Modeler, are a key part of monitoring. In a business measures model, you define the measuring points, event filters, measurements, their correlations, and the sources of business data. When the business measures model is complete, you export it to WebSphere Business Monitor. WebSphere Business Monitor recognizes the models to be monitored and the measurements to be captured from incoming events.

Dashboard views display Key Performance Indicators (KPIs) that are created from the collected events, based on a model, to create graphical representations of those values through. Notifications are generated about situations and actions, according to a defined condition, to perform corrective actions and detect and prevent failures during operation.

All these actions are achieved through a set of internal components:

- **Monitor server:** Receives events, handles monitoring-context instances, and stores and persists runtime and historical metrics and KPI values of those instances.
- **Dashboards:** Display the monitored data. They provide a predefined set of views that can be customized to support different representations of data and offer enhanced data analysis.
- **Databases:** Provide the Monitor server with information for event processing. They also provide the dashboard client with information for populating views. Information is transferred across the databases through another monitor component, the Replication manager.
- **Adaptive Action manager:** Provides different types of business responses resulting from situations expressed within the incoming events.
- **Schema Generator:** Generates database scripts to be used for creating databases tables in State, Runtime, and Historical databases. These databases contain the business measures models data. The Schema Generator also generates the DB2® Cube Views™ metadata description of the historical database and generates the metadata mappings for the replication manager.

Other external components integral to the monitor operation are:

- **Business Measures editor:(BME)** It is used to create the business measures model that defines what should be monitored, for example, monitoring contexts, key performance indicators, metrics, and business situations.
- **Common Event Infrastructure:** Provides event management by receiving events from event sources and transferring them to the event consumers that have expressed interest in those events.
- **DB2 Alphablox and DB2 Cube Views:** Provide enhanced data analysis for dashboards.

The following diagram illustrates the interaction between the above components:

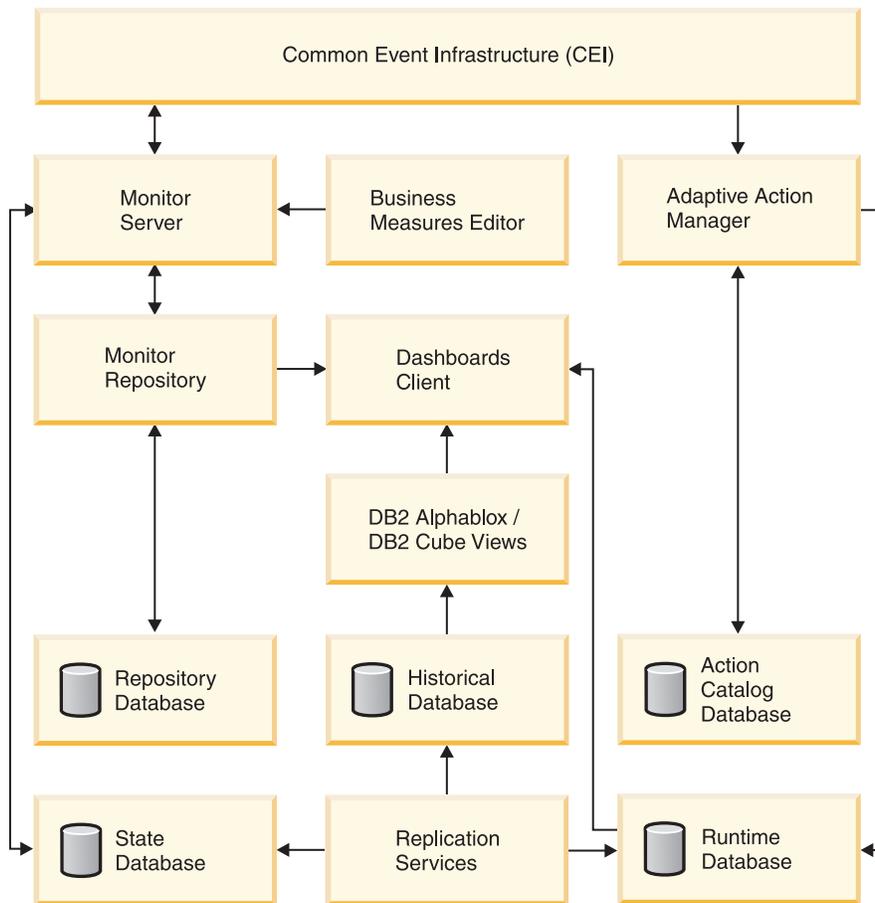


Figure 1. Monitor Architecture Diagram

Components

The WebSphere Business Monitor components interact to measure business performance, monitor processes and workflow, and create reports.

Monitor Server

The Monitor Server, a core component of WebSphere Business Monitor, is responsible for event processing and calculating measurements and values. It is hosted on WebSphere Process Version 6.0. It provides server functions through three main components: the observation manager, the persistence manager, and the Common Event Infrastructure (CEI) access layer. Those components are internal components that are only used inside the Monitor Server.

Observation Manager

The observation manager acts as the execution engine for the business measures model that is exported from WebSphere Business Modeler and imported to WebSphere Business Monitor. In this model, you can define the metrics and KPIs to monitor and the events used in calculating them. The observation manager then uses the model, receives the events and calculates the metrics to be displayed on the dashboard views.

The observation manager handles all the process instance metric operations that are required for the management of business process at runtime. It creates, reads, updates, and terminates context instances, and calculates the metric values of these instances.

The observation manager consumes events from the CEI to update the metrics and KPIs displayed in dashboard views.

Persistence Manager

The persistence of runtime values of business measures groups, metrics and KPIs is done through the persistence manager. It provides persistence functions to the observation manager. The observation manager does not access the database directly. Instead, the persistence manager encapsulates all the database retrieval and storage operations.

CEI access layer:

The CEI access layer is the component responsible for accessing CEI and Common Base Events for components that are the sources and consumers of the events. For example, the Observation Manager can be the event source that sends events to the CEI to be used by the Action Manager, the event consumer in this example. The CEI access layer provides an abstraction layer that hides the direct interaction with the CEI APIs and Common Base Events details.

The main functions of the CEI access layer are:

- Creating Common Base Events
- Submitting Common Base Events to CEI
- Querying and retrieving Common Base Events from CEI
- Setting and getting Common Base Events data fields

Dashboards

Dashboards are the client component of WebSphere Business Monitor. They operate within the WebSphere Portal environment.

Business performance-management dashboards are used to view financial and operational data of a business. The dashboards operate in a real-time environment to monitor business situations so that users can manage appropriate actions.

Dashboards are implemented as portal pages in the WebSphere Portal. A dashboard displaying specific business performance consists of a variety of data snapshots, known as views. The views are implemented as portlets that are added to portal pages, which represent dashboards. Each dashboard consists of one or more views. WebSphere Business Monitor supports a number of views that can be used to assemble dashboards.

Dashboards interact with WebSphere Business Monitor Runtime and Repository databases to retrieve all the required information for the views. Examples of the information are key performance indicators (KPIs) details, business measures groups details, process and organizational information. Dashboards also receive alert notifications from the Adaptive Action Manager, which notifies users of a defined business situation. In addition, the Historical database is used to generate multidimensional analysis of data using the DB2 Alphablox technology so that it can be displayed in the dashboards.

Databases

WebSphere Business Monitor databases are the data storage component that provides the Monitor Server with information for event processing and the dashboards with information for views.

WebSphere Business Monitor includes five databases:

- **State:** Stores information about the current state of all business measures groups. It is used for event processing by the Monitor Server component.
- **Runtime:** Stores the running process instances and the corresponding metrics and KPIs that the dashboards use for retrieving information for views and that the Action Manager uses for storing alert notifications.
- **Historical:** Stores all completed and running process instances data. The dashboards use it for enhanced data analysis in conjunction with IBM® DB2 Alphablox.
- **Repository:** Stores the definitions of the deployed business measures model along with other WebSphere Business Monitor information from other databases.
- **Action Catalog:** Stores the action services that are defined in the Adaptive Action Manager component.

Adaptive Action Manager

The Adaptive Action Manager is the WebSphere Business Monitor component that receives situation events emitted by the Observation Manager. It selects appropriate actions based on predefined bindings between the situations and actions that are set by the user, and invokes one or more action services.

The Common Event Infrastructure (CEI) sends these situation events to the Adaptive Action Manager, which parses them, selects appropriate actions based on predefined rules created by the user, and invokes a selected action or set of actions.

The Adaptive Action Manager performs two types of actions: notification actions and service invocation actions. Notification actions take the form of e-mail, cell phone message, pager message, or a dashboard alert. Service invocation actions invoke a Web service, or a BPEL process through a Web service invocation.

Every action requires the definition of an action service template that holds the information needed for the invocation of the action. The action also requires the binding of situation events to the defined action service templates to execute the appropriate action for each event. The definition of action service templates and the binding of those templates with the situation events is done through the WebSphere Business Monitor administration extension on the WebSphere Application Server administrative console.

The Adaptive Action Manager parses the received situation event and selects an appropriate action by looking up the action in the action catalog database, where action-related information and binding information are stored.

If the appropriate action is a dashboard alert, the Adaptive Action Manager extracts the data needed for the creation of the alert-notification record from the received situation event and inserts this record in the WebSphere Business Monitor Runtime database. The record is collected by the Alerts view in a dashboard.

Schema Generator

The Schema Generator is the WebSphere Business Monitor component that generates scripts used by other components.

The schema generator component uses the business measures model, which is created by the Business Measures editor (BME), and generates the scripts that are required to:

- Create the tables for the state, runtime, and historical databases of WebSphere Business Monitor
- Describe the mappings from state to runtime and from runtime to historical databases for the database replication service
- Produce Cube Views metadata that is used for dimensional analysis

External components

Some external components enhance the operation of WebSphere Business Monitor.

Business Measures editor

The Business Measures editor is a component of WebSphere Business Modeler. You use it to monitor a process instance by creating a business measures model. In the model, you define what should be monitored: process instances, key performance indicators (KPIs), metrics, and business situations. You can also use the Business Measures editor to produce monitoring information through events, relationships, and maps.

To create the monitoring process, WebSphere Business Monitor depends on the business measures models. In each model, you define the measuring points, event filters, measurements, correlations, and the sources of business data. When the model is complete, it is exported from the WebSphere Business Modeler, which is then imported to WebSphere Business Monitor. The WebSphere Business Monitor recognizes the model to be monitored and the measurements to be captured from incoming events.

The Business Measures editor creates a business measures model. In the business measures model, you define metrics and KPIs, create situation events, and specify when the situation events are sent to trigger specific actions. For each process model, you define the business measures model that is exported for import to WebSphere Business Monitor. To calculate the KPIs and metrics, the Observation Manager requires the business measures model definitions as well as the incoming events.

DB2 Alphablox and DB2 Cube Views

The DB2 Alphablox technology provides custom Web-based analytic applications for relational databases, relational cubes in DB2, and multidimensional databases.

DB2 Alphablox provides a set of analytic components and supporting services to facilitate rapid assembling of analytic applications. These components, known as "Blox" (as in "building blocks") include interactive graphs, charts, and reports.

The DB2 Alphablox platform provides access and interaction with data in multidimensional and relational databases and creates structured reports sourced from relational databases. Users can choose from a wide variety of charts to display data, and they can interact with different levels of data (for example, filter, drill down) to display the exact view of the data they want.

DB2 Cube Views is an add-on feature of DB2 Universal Database™ (UDB) that accelerates the performance of DB2 UDB in Online Analytical Processing (OLAP) of data. DB2 Cube Views streamline the deployment and management of OLAP solutions and improve the performance of OLAP tools and applications. With DB2 Cube Views, you can describe the dimensional structure of your relational tables and create OLAP constructs.

The Historical Database has a multidimensional structure that can be described in DB2 Cube Views. DB2 Alphablox provides the technology to use this description to create enhanced multidimensional analysis for the dashboard views.

DB2 Replicator

DB2 Universal Database version 8.2 provides different solutions that you can use to replicate data from and to relational databases. Committed source changes are staged in relational tables before being replicated to target systems.

SQL replication captures changes to sources and uses staging tables to store committed transactional data. The changes are then read from the staging tables and replicated to corresponding target tables. With staging tables, data can be captured and staged once for delivery to multiple targets, in different formats, and at different delivery intervals.

You can replicate continuously, at intervals, or for one time only. Replicating continuously can be useful if your applications need data in near-real-time, such as applications for making airline reservations. Replicating at intervals can be useful for replicating large batches of data during off-peak hours.

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