

Management of Heterogeneous Data Centers Using Oracle Enterprise Manager Management Plug-ins

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Management of Heterogeneous Datacenters Using Oracle Enterprise Manager Management Plug-ins

GRID CONTROL DELIVERS A BREADTH OF MANAGEMENT PLUG-INS FOR COMPLETE MONITORING OF THE ORACLE GRID

- Centralize All Management Information in a Single Oracle Grid Console
- Apply Enterprise Manager Monitoring and Management Features to non-Oracle Components
- Correlate availability and performance problems across entire set of IT components
- Enhance service modeling and perform comprehensive root cause analysis
- Increase operational efficiencies

INTRODUCTION

While Oracle Enterprise Manager 10g Grid Control provides the most comprehensive management solution for Oracle products, it is clear that Oracle products and applications increasingly run in an environment that is heterogeneous in its composition. Customers have a wide variety of platforms, hardware, network, storage and software components delivering critical functionality to the Oracle Grid, and they look forward to a single tool to monitor and manage this environment. With Oracle Enterprise Manager 10g Grid Control, the focus is both on providing native support for a wide array of products, as well as on enabling partners and customers to easily build plug-ins for their components and applications.

COMPLETE, TOP-DOWN ORACLE MANAGEMENT THROUGH MANAGEMENT PLUG-INS

Enterprise Manager has dramatically broadened the reach of its management solution via feature-rich Management Plug-ins. Management Plug-ins enable customers to leverage their investment in Enterprise Manager to manage all the pieces of the application solution in a vendor neutral way. An extensive number of plug-ins for 3rd party databases, middleware, storage and network devices have been released and are available for download from the Oracle Technology Network website (OTN).

Industry-leading solution partners have been following Oracle's lead in developing plug-ins for their components, thereby enabling customers to consolidate all of the monitoring information in the Enterprise Manager Console. Additionally, customers can take advantage of the same mechanism used by Oracle and partners to easily extend Enterprise Manager to monitor components specific to their environments.

BENEFITS OF MANAGING HETEROGENEOUS DATACENTER WITH ENTERPRISE MANAGER

Oracle Enterprise Manager 10g Grid Control is best on Oracle, providing unparalleled monitoring and management for Oracle components. However, why would you want to monitor a datacenter composed of non-Oracle components by

Enterprise Manager if you are currently using other homegrown or vendor solutions to monitor them? What is the value add from extending Enterprise Manager by deploying plug-ins, as well as from developing custom plug-ins? There are three significant advantages to be realized.

Centralize All Management Information in a Single Console

Once a management plug-in for a particular software or hardware device is deployed into Enterprise Manager, that software or hardware component can appear in the Enterprise Manager console as *target* (A “target” is the Enterprise Manager term for components managed by Enterprise Manager, such as Oracle 10g database, Microsoft SQL Server etc). This concept can be extended to any software, hardware device or application in your enterprise thereby allowing Enterprise Manager to provide a consolidated view of the entire enterprise, enabling administrators to monitor and manage all of their components from a central place. This also streamlines correlation of availability and performance problems across entire set of IT components, by eliminating the need to manually compile critical information from many different tools. There is a significant efficiency benefit, as well as much lower operational risk that results from knowing even basic (availability, performance and configuration) information about everything in your environment.

Apply Enterprise Manager Monitoring and Management Features to non-Oracle Components

Management Plug-ins automatically inherit Enterprise Manager’s powerful monitoring and management features.

MANAGEMENT PLUG-IN TYPES FOR THE ENTIRE DATACENTER:

- System Monitoring Plug-in for Hosts
- System Monitoring Plug-in for Non-Oracle Databases
- System Monitoring Plug-in for Non-Oracle Middleware
- System Monitoring Plug-in for Network Devices
- System Monitoring Plug-in for Storage

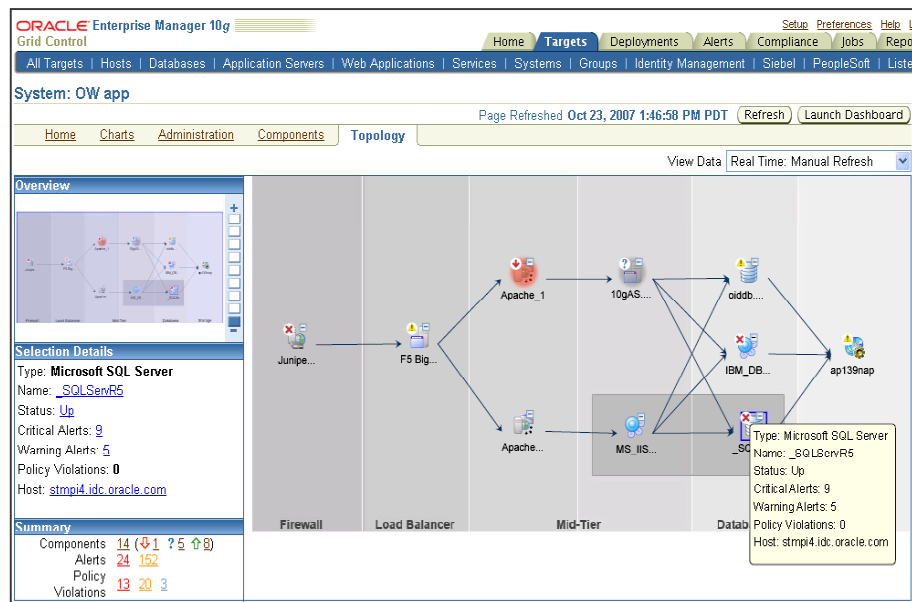


Figure 1. Shows the topology view of a heterogeneous system

These features include Alerts, Policies, Blackouts, Templates, Groups/Systems, Topology viewer, dashboard, Configuration Management and Enterprise Reporting. As seen in *Figure 1*, management plug-ins have helped model a heterogeneous ‘system’ within Enterprise Manager. This particular system is composed of the following components:

- *Network Devices:* Juniper Netscreen Firewall, F5 Big IP Load Balancer
- *Middleware:* Microsoft Internet Information Services (IIS) Server, Oracle 10g Application Server
- *Database:* Oracle Database, IBM DB2, Microsoft SQL Server
- *Storage:* NetApp Filer

The administrator monitoring these targets can not only monitor the health of individual targets but also take advantage of Enterprise Manager’s comprehensive monitoring capabilities for composite targets.

As another example, you can standardize the monitoring settings for a Management plug-in target such as Microsoft SQL Server by creating a ‘monitoring template’ and applying it to all SQL Servers in your environment to ensure consistent monitoring quality. You can also use Enterprise Manager’s configuration management features to track configuration changes, compare configurations between deployments, and enforce standards through policy management.

Perform Comprehensive Service Level Management across your entire datacenter

Complete data center management is key to performing Service Level Management

MANAGEMENT PLUG-IN DELIVERS:

- Out-of-box availability and performance monitoring
- Detailed configuration information collection and analysis
- Out-of-box reports for easier problem diagnosis, trend analysis and capacity planning.
- Advanced monitoring and event management features:
 - Blackouts
 - Corrective Actions
 - Notifications
 - Monitoring Templates
 - Dashboards

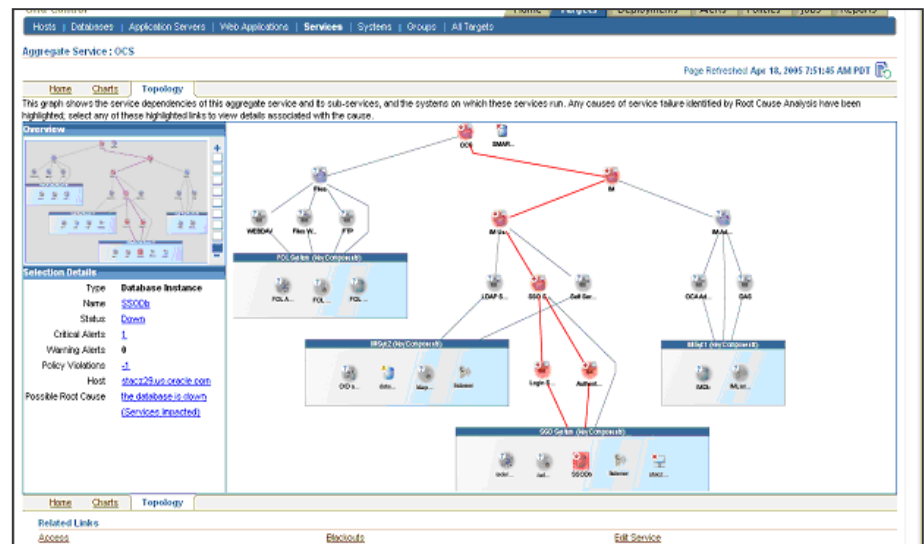


Figure 2: Shows topology of a service and root cause of service failure.

By bringing all of your components into the Enterprise Manager environment, you can more fully benefit from the Service Level Management features offered in Enterprise Manager.. You will be able to enhance Service modeling by mapping

relationships between your applications and the complete set of infrastructure components that they rely on. This will enable you to see the complete topology of your Service, as well as to identify (or exclude) third-party components as root cause of service failure.

Visit the Enterprise Manager extensibility page:
<http://www.oracle.com/technology/products/oem/extensions/index.html>
 Browse through the list of management plug-ins available.

ONE-HOUR INTEGRATION: DEVELOPING AND DEPLOYING MANAGEMENT PLUG-INS

One of the primary features of Enterprise Manager is “One-hour integration”, accomplished by providing:

- A metadata-driven (XML-based) approach: You have to only provide a couple of XML files to incorporate infrastructure components and/or custom applications into your Grid Control environments.
- Automated Deployment: Enterprise Manager allows for automated deployment of Management Plug-ins from the Grid Control Console.

As a side effect of this easy integration process, you do not have to write any code in order to inherit the same user interface and rich monitoring features available for Oracle-supported components.

Developing Management Plug-ins

The diagram below illustrates the development cycle for creating custom Management Plug-ins.

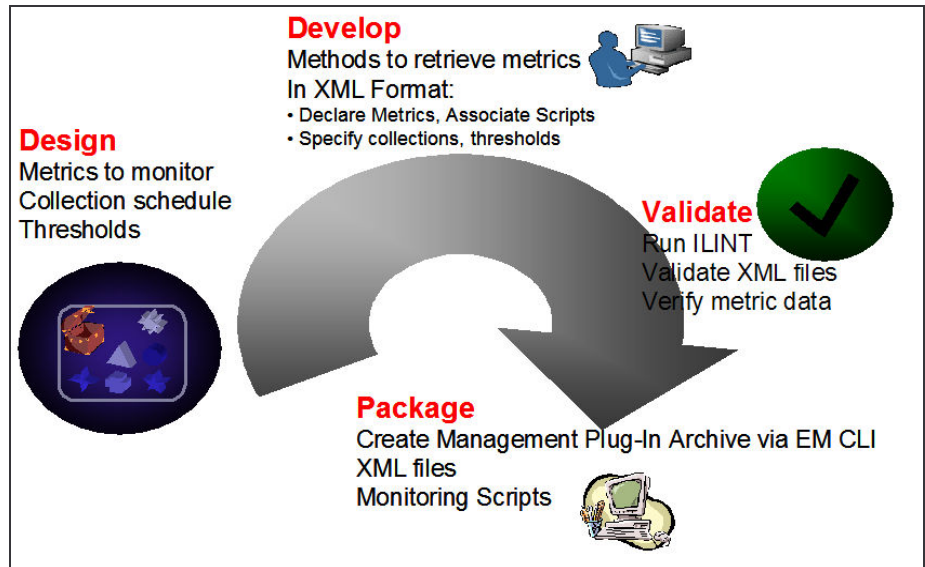


Figure 3. Management Plug-ins Development Cycle.

EASY 4 STEP PLUG-IN DEVELOPMENT:

- DESIGN
- DEVELOP
- VALIDATE
- PACKAGE
- Zero lines of code to write
- Metadata driven approach
- Tools for validation and packaging.

Design

Plug-in design is the first phase of the development process, and involves the following:

1. Identifying performance and configuration metrics that should be collected.
2. Determining how often each metric should be collected. Oracle recommends that collection frequency for any metric should not be less than once every five minutes.
3. Based on customer-specific operational practices, specifying default warning and/or critical thresholds on these metrics. Whenever a threshold is crossed, Enterprise Manager will generate an alert, informing administrators of potential problems.

Develop

Developing a plug-in based on the requirements identified in the design phase involves:

1. For each metric, determining appropriate component-level API that exposes the metric.
2. Mapping a method used to retrieve a particular metric to a “Fetchlet” provided with the agent.
3. Defining two XML files (Target Type definition file, and Default Collections file) that the agent will use to monitor the new target type. This involves declaring appropriate metrics, metric collection methods, collection frequencies, and metric thresholds in the specified XML format.

Oracle Management Agent: Standards-based Extensible Architecture

In order to understand what it takes to develop a Management Plug-in, it is important to study the architecture of the Oracle Management Agent. Oracle Management Agents are deployed on each host, and are responsible for monitoring all components on that host. Out-of-box, the agent knows how to monitor default target types, such as the Oracle Database. In order to monitor a particular target type, the agent uses two XML files:

- *Target Type Metadata* File: specifies the metrics that should be monitored for this target type, and methods to retrieve those metrics.
- *Target Type Default Collections* File: specifies the default collection intervals and alert thresholds for each of the target metrics.

The agent uses “Fetchlets”(a parameterized data access mechanisms that take arguments for input and return formatted data) to collect data for the metrics specified in the *Target Type Metadata* file. “Fetchlets” for the following protocols are supported: SNMP (v.1), HTTP, JDBC, WBEM, OJMX/SOAP, OS Commands etc.

The agent uses the information in the *Target Type Default Collections* file to determine the metrics that need to be collected for each target and the corresponding collection frequency.

Validate

Successful integration of new target types with the Enterprise Manager framework relies on accurate XML. It is essential that Target Type Metadata file and Default Collections file are syntactically and structurally correct. It is also critical to simulate runtime data collection for a new target type, to ensure that proper data is collected, as well as that there are no adverse performance effects. Enterprise Manager supplies an integrator tool called ILINT that performs the following functions:

- Verifies that supplied metadata files conform to respective XML schemas.
- Verifies that metric collection frequency is not too short. ILINT will generate a warning, when collection interval is less than five minutes.
- Performs dynamic XML validation by executing all metrics defined for the new target and displaying viewable output.
- Assesses performance impact of the plug-in and flags potential areas of concern.

Package

Enterprise Manager Grid Control provides the capability to package all of the files associated with a Management Plug-in (metadata files, monitoring scripts, report files) into a Management Plug-in Archive (MPA) via EM CLI. MPA is a “.jar” file that contains one or more Management Plug-ins, and that facilitates easy import/export of plug-ins.

Consistent Look-and-Feel: Management Plug-in Home Pages

Each Enterprise Manager managed target has a ‘home page’ that provides a consolidated, at-a-glance view of its health. Management Plug-ins get this functionality out-of-box, inheriting rich user interface without any custom code.

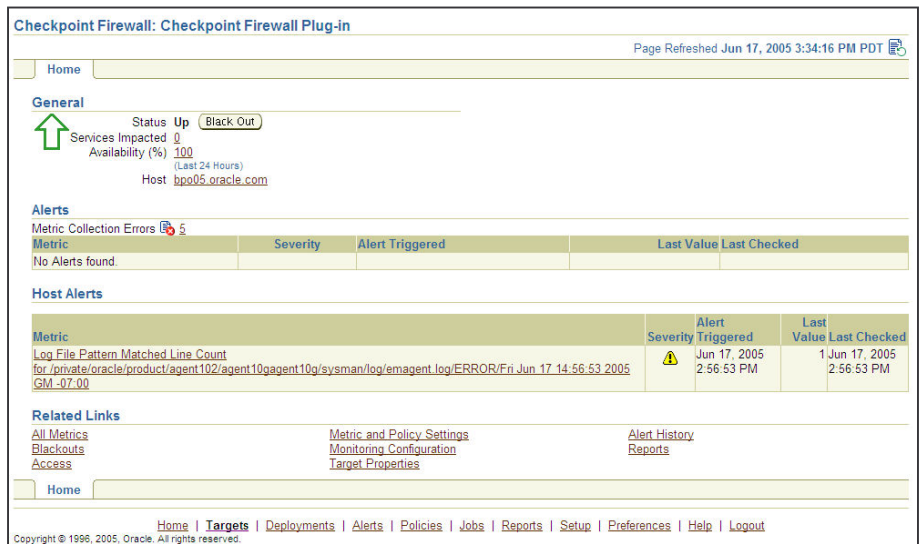


Figure 4: Shows default home page available to all plug-ins. (Check Point firewall is used as an example)

From the home page administrators can immediately review availability and alerts information, and drilldown for more details. Additionally, the plug-in home page provides access to configuration, monitoring and management information, such as Metric History, Alert History, Blackouts, Metric and Policy Settings.

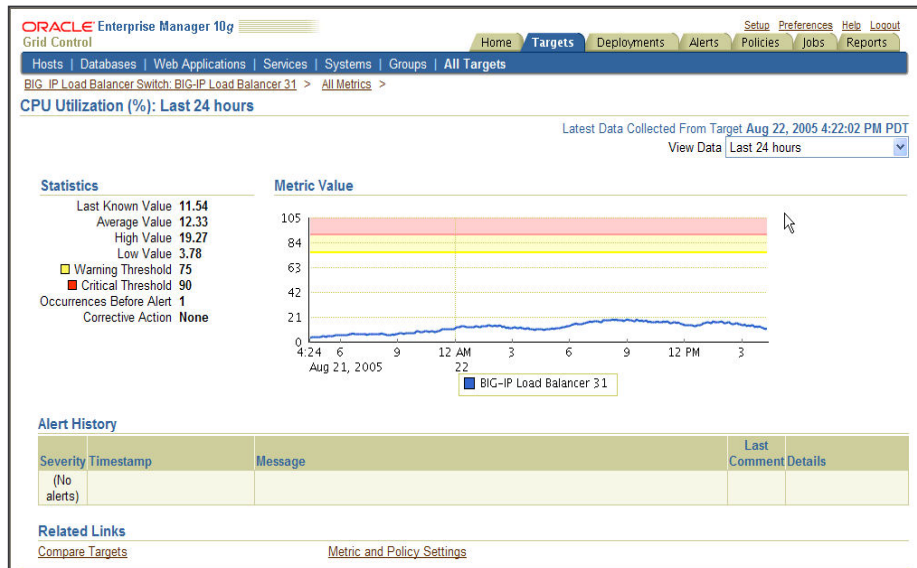


Figure 5. Shows Metric History for CPU Utilization of BIG-IP Server Load Balancer.

Enhancing Management Plug-in Pages with Custom Reports

A key component of Enterprise Manager Grid Control is Information Publisher – a powerful reporting framework that provides the following features:

- Ability to create custom reports against the Management Repository from the Console or via a well-documented PL/SQL API
- Ability to generate reports on a schedule, and share them with entire user community
- Out-of-box monitoring, configuration and service level reports.

Management Plug-in developers have the ability to enhance the plug-in homepage by developing management reports using the PL/SQL API to the Information Publisher. These reports can be packaged with the plug-in, and are available from the “Reports” sub-tab on the plug-in homepage.

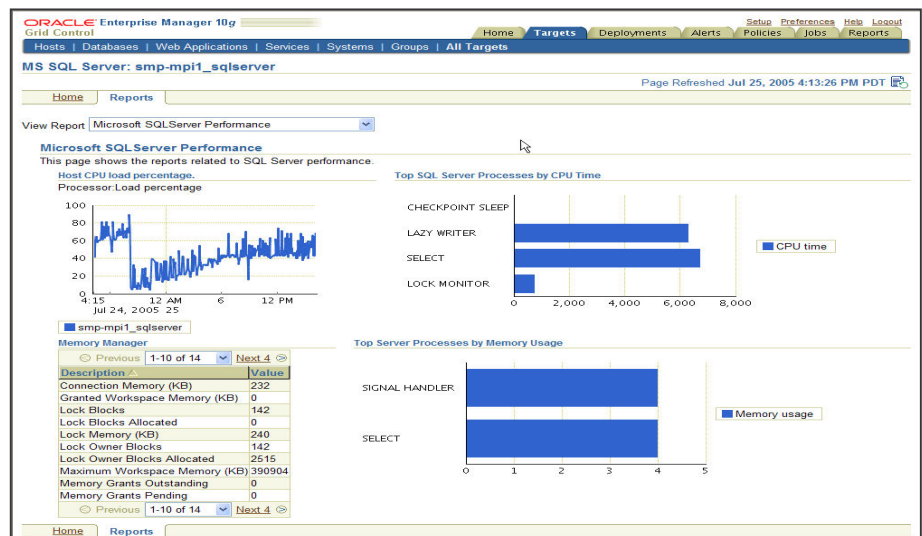


Figure 6. Shows a “Reports” sub-tab on the homepage for the SQL Server Plug-in.

Automated Deployment

Enterprise Manager makes plug-in deployment easy. Plug-ins can be deployed to any number of agents simultaneously, and all operations are performed from the Enterprise Manager Console.

Refer to the Extensibility Guide:

http://download.oracle.com/docs/cd/B16240_01/doc/em.102/b40007.pdf
for step-by-step instructions on building plug-ins for Enterprise Manager

Management Plug-ins Page: Manage Plug-In Deployments

Enterprise Manager super administrators have the ability to manage plug-in deployments from the Management Plug-ins page. This page provides information about all of the management plug-ins available, and agents to which these plug-ins have been deployed. Additionally, administrators have the ability to deploy/un-deploy plug-ins, delete plug-ins, and import new plug-ins into the Grid Control Console.

The screenshot displays the Oracle Enterprise Manager 10g interface. The top navigation bar includes links for Home, Targets, Deployments, Alerts, Policies, Jobs, and Reports. The main content area is titled "Management Plug-ins" and contains a search bar, a table of plug-ins, and a "Related Links" section. The table lists a plug-in named "MyDatabase_NN 2.0" with a version of "0" and a description "Sample DB Monitoring Plug-in Requires access to a target Oracle DB V7+". The footer contains copyright information for Oracle Corporation and its affiliates.

Select	Name	Version	Deployed Agents	Description	Deployment Requirements	Deploy	Undeploy
<input type="checkbox"/>	MyDatabase_NN 2.0	0		Sample DB Monitoring Plug-in	Requires access to a target Oracle DB V7+		

Figure 7. Shows Management Plug-ins page in the Grid Control Console.

Management Plug-ins can be deployed simultaneously to any number of agents, without causing any downtime to production environments. Enterprise Manager will automatically copy appropriate metadata files and monitoring scripts to the selected agents, without any additional administrator effort. Upon deployment, EM has the ability to monitor targets of the new type.

Management Plug-in Discovery

Once a plug-in is deployed the agent already knows how to monitor the plug-in target type. All that is left to do is instructing the agent to start monitoring one or more instances of the plug-in type by, first, discovering targets from the agent home page, by specifying a small set of target properties, such as SID and username for a database. Plug-in targets will then be discovered and monitoring begins.

ENTERPRISE MANAGER PARTNER PROGRAM

There are a few, well-documented steps to follow in order to become an Enterprise Manager Partner. First, all Oracle partners are required to be members of the Oracle Partner Network (OPN), which paves the way for promotional benefits and developer software licenses. Once OPN membership has been secured, a modest amount of documentation (e.g., a simple collateral packet) and an expressed interest in developing Enterprise Manager solutions are all that's needed to get started. Partners who choose to develop Plug-ins for Enterprise Manager must submit a more comprehensive collateral packet, with business and technical components. Development partners will gain access to tools that help them develop and test successful operation of their Plug-in. These results must be submitted at the time the Plug-in is to be published. All partner information is regularly compiled for cataloging and solution promotion.

Want to integrate your product with Enterprise Manager 10g Grid Control?
Check Out:

<http://www.oracle.com/partners/home/pf/global/emgc/unauth/index.html>

CONCLUSION

With the latest releases of Grid Control, Oracle continues to make investment in two significant areas to enable Oracle customers to manage a wide array of components in their heterogeneous data center:

1. Discussed in this paper: Extending the scope of Grid Control's management capabilities via native management extensions, and partner- and custom plug-ins. This means developing and delivering supported plug-ins for hardware, software, and network and storage devices.
2. More fully described in a separate Oracle whitepaper: Solutions for integrating Enterprise Manager with non-Oracle management products through Oracle Enterprise Manager Management Connectors to allow customers to leverage existing infrastructure investments without losing the unique value they gain from Enterprise Manager Grid Control.

The objective of Oracle Enterprise Manager 10g Grid Control extensibility is, simply put, to perfect the management of the complete enterprise. This means providing the highest quality of service and lowest total cost of ownership for Oracle customers performing Top-Down Application Management.



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