

Programmatically retrieve the health of a tenant's service in HMC

[Applies to](#)

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Overview

The monitoring and reporting platform in **Hosted Messaging and Collaboration** provides a new set of APIs for retrieving Exchange and SharePoint service availability state based on the product team's definitions of health model. The new APIs provide multi-tenancy health state of services. This article introduces details about how to retrieve the health information of a tenant's service in HMC.

Features of HMC Service Availability Monitoring and Reporting

HMC service availability monitoring and reporting contains two key parts, one is service monitoring and the other is availability reporting.

Service Monitoring

HMC monitors two kinds of service availability state: Exchange service and SharePoint service. HMC collects the availability state from System Center Operations Manager 2007 server. The availability state depends on the Exchange 2007 and Windows SharePoint Services 3.0 management packs for System Center Operations Manager 2007.

Exchange Service Availability

The health states of exchange service are determined by the health model defined in Microsoft® Exchange Server 2007 Management Pack for Operations Manager 2007. Exchange Management Pack runs Power Shell cmdlets to monitor the Exchange service state. In HMC, it focuses on the following three sub-functions' states:

Exchange MAPI Connectivity State

This represents the mailbox server connectivity state. It uses the **Test-MapiConnectivity** cmdlet to verify server functionality by logging on to the system mailbox.

Exchange Mail Flow State

This state is retrieved by using the **Test-Mailflow** cmdlet to verify whether mail can be successfully sent from and delivered to the system mailbox on a computer that has the Mailbox server role installed. It could

be the state of mail flow in a single mailbox server or between mailbox servers within a defined latency threshold.

Exchange OWA Connectivity State

This state is retrieved by using the **Test-OwaConnectivity** cmdlet to verify that Microsoft Office Outlook Web Access is running as expected. It contains the connectivity state for both internal and external Exchange 2007 Outlook Web Access URL.

SharePoint Service Availability

The health states of sharepoint service are determined by the health model defined in Microsoft® SharePoint Service 3.0 Management Pack for System Operations Manager 2007. SharePoint Services Management Pack monitors events placed in the Windows application event log generated by Windows SharePoint Services. The events indicate the outages or configuration problems of sharepoint services.

Top-level SharePoint Farm Availability

It includes the **Tracing**, **Timer** and **Search** services availability state. It also includes the **IIS Connectivity** and **SQL Server connectivity** state for each SharePoint front end server.

Availability Reporting

The Availability Reporting retrieves the availability data from Exchange 2007 MP and WSS 3.0 MP health monitors using System Center Operations Manager 2007 SDK. It will correlate the health states retrieved for each service with the tenants information which is retrieved from AD. The health states and tenants information get refreshed every 5 minutes.

Application Programming Interface

HMC Availability Reporting provides the health states and tenants information through a set of .Net APIs.

Get a Tenant's Service State

There are two kinds of APIs are provided, the first kind of APIs is used to retrieve a tenant's service availability state. It includes the following two APIs:

GetUserServiceState **GetOrgServiceState**

This kind of APIs expose the following data that can be consumed by an external application:

User or Org DN	Function Name	Server FQDN	Health State

Health State could have one of the three values: **Healthy**, **Warning** and **Error**. Each of the state is mapped to a state of health monitors defined in Exchange 2007 MP or WSS 3.0 MP

Get a List of Tenants

The other kind of APIs is used to retrieve the list of tenants for a specific service on a server. It includes the following two APIs:

GetUsersByServer **GetOrgsByServer**

Once you have retrieved a specific service state on a server by calling **GetUserServiceState** or **GetOrgServiceState** you can retrieve a list of the tenants who are using that service on that server by calling **GetUsersByServer** or **GetOrgsByServer**. This helps find out the impacted tenants when a service is not healthy.

Availability Monitoring and Reporting Architecture

The following schematic diagram shows the high level architecture of the availability monitoring and reporting services provided by HMC.

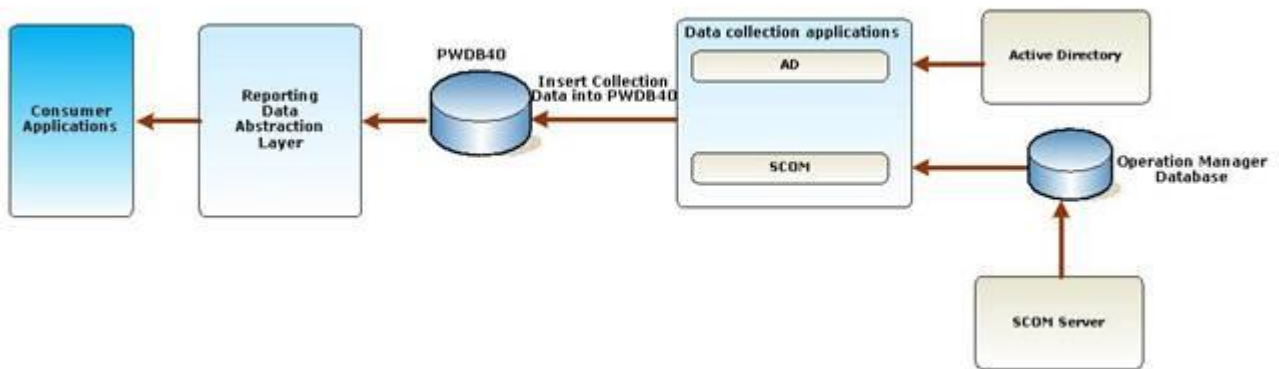


Figure 1 – HMC Availability Monitoring and Reporting Architecture

Reporting Data Abstraction Layer

RDAL is an abstraction concept that represents interfaces exposed by HMC for service state data query. It has many flavors for consumer application to consume multi-tenant enabled reporting data, such as .Net class library, web service, etc. In HMC, a set of .Net APIs for service health state query is provided.

PWDB40

Data warehouse that stores the tenant information and service availability information.

SCOM Operation Manager Database

Service availability information is stored in the System Center Operations Manager 2007 database.

Data Collection Applications

Data collection applications include AD collection tool and SCOM collection tool. Tenant information is retrieved from AD using the HMC AD collection tool. This will run periodically to retrieve newly provisioned tenants to correlate it with the physical servers hosting the related service. The service availability state is retrieved by the HMC SCOM collection tool which calls APIs provided in System Center Operations Manager 2007 SDK to get the data from System Center Operations Manager database.

How to Retrieve the Health of a Tenant's Service

Define the server roles that will be used in the following introduction.

Server	Role
EXCAS01.Fabrikam.Com	Exchange Client Access Server
EXMS02.Fabrikam.Com	Exchange Stand alone Mailbox Server
EXVS01.Fabrikam.Com	Exchange Clustered Mailbox Server
EXMBX01.Fabrikam.Com	Exchange Clustered Mailbox Server Node1
EXMBX02.Fabrikam.Com	Exchange Clustered Mailbox Server Node2
COLLAB01.Fabrikam.Com	SharePoint Front End Server

HMC provides a .Net assembly named **Microsoft.Provisioning.Monitoring.QueryClient.dll** to retrieve a tenant's service availability. There are four APIs exposed in this assembly:

«metaclass»HostedServiceMonitor
+Services : StringCollection
+GetUserServiceState(in serviceName : string, in userDN : string) : FunctionStateCollection
+GetOrgServiceState(in serviceName : string, in orgDN : string) : FunctionStateCollection
+GetUsersByServer(in serviceName : string, in serverName : string, in orgDN : string) : UserCollection
+GetOrgsByServer(in serviceName : string, in serverName : string, in orgDN : string) : StringCollection

Figure 2 – HMC Monitoring and Reporting Solution Interface

Retrieve Exchange Service Availability State

Retrieve Exchange Service Availability State for a User

Once a user is provisioned to consume exchange service, you can get the service state for that user through the API **GetUserServiceState** (Specify “Exchange” as the **serviceName**, the target user’s distinguished name as **userDN**).

The return result could contain one or more function states. For exchange service, the functions could be **OWA Connectivity**, **MAPI Connectivity** or **Mailflow**. Returning what kind of functions depends on what kind of functions the specified user is consuming.

For **OWA Connectivity**, only the user that is enabled with OWA feature could get the state of OWA Connectivity. HMC checks the value of AD object property **protocolSettings**, if the value does not contain “**OWA**” or contains “**OWA\$1**” then the user is enabled with OWA feature. HMC returns all the Exchange Client Access Servers’ OWA Connectivity states for the user that enabled with OWA feature.

For **MAPI Connectivity** and **Mailflow**, only the user that is created with mailbox could get the state of **MAPI Connectivity** and **Mailflow**. HMC checks the value of AD object property **msExchHomeServerName**, if the value is not empty then the user is using **MAPI** and **Mailflow**. When a user is created with a mailbox, HMC returns MAPI Connectivity and Mailflow states for the specific server on which the user’s mailbox is created.

The data retrieved from **GetUserServiceState** could be serialized into XML format:

```
<FunctionStates>
  <Function>
    <DisplayName>OWA Connectivity</DisplayName>
    <Servers>
      <Server>
        <FQDN>EXCAS01.Fabrikam.Com </FQDN>
        <HealthState>Success</HealthState>
      </Server>
    </Servers>
  </Function>

  <Function>
    <DisplayName>MAPI Connectivity</DisplayName>
    <Servers>
      <Server>
        <FQDN>EXMS02.Fabrikam.Com</FQDN>
        <HealthState>Error</HealthState>
      </Server>
    </Servers>
  </Function>

  <Function>
    <DisplayName>Mailflow</DisplayName>
    <Servers>
      <Server>
        <FQDN>EXMS02.Fabrikam.Com</FQDN>
        <HealthState>Warning</HealthState>
      </Server>
    </Servers>
  </Function>
</FunctionStates>
```

Retrieve Exchange Service Availability State for an Organization

Once an organization is subscribed to exchange server, HMC can get the service state for that organization by calling **GetOrgServiceState** interface (Specify "Exchange" as the **servcieName**, the target organization's distinguished name as **orgDN**).

The format of the return data is the same as **GetUserServiceState**. Please refer to it [here](#).

The return data could contain one or more function states. For exchange service, the functions could be **OWA Connectivity**, **MAPI Connectivity** or **Mailflow**. The returned function states are the union of all its users' function states.

Retrieve Clustered Exchange Mailbox Server Availability State

For Exchange service, one special scenario is monitoring clustered mailbox server state. Assuming that you have two or more exchange mailbox servers behind a clustered mailbox server:

EXMBX01.Fabrikam.Com

EXMBX02.Fabrikam.Com

These two nodes are configured to be a clustered mailbox server:

EXVS01.Fabrikam.Com

The return data of **GetUserServiceState** or **GetOrgServiceState** serialized into XML format is like:

(Please note that the returned server is the virtual clustered mailbox server rather than any of the cluster server nodes)

```
<FunctionStates>
<Function>
  <DisplayName>MAPI Connectivity</DisplayName>
  <Servers>
    <Server>
      <FQDN>EXVS01.Fabrikam.Com</FQDN>
      <HealthState>Success</HealthState>
    </Server>
  </Servers>
</Function>
```

```
<Function>
  <DisplayName>Mailflow</DisplayName>
  <Servers>
    <Server>
      <FQDN> EXVS01.Fabrikam.Com </FQDN>
      <HealthState> Success </HealthState>
    </Server>
  </Servers>
</Function>
</FunctionStates>
```

You can also view the monitor state from System Center Operations Manager 2007 management console:

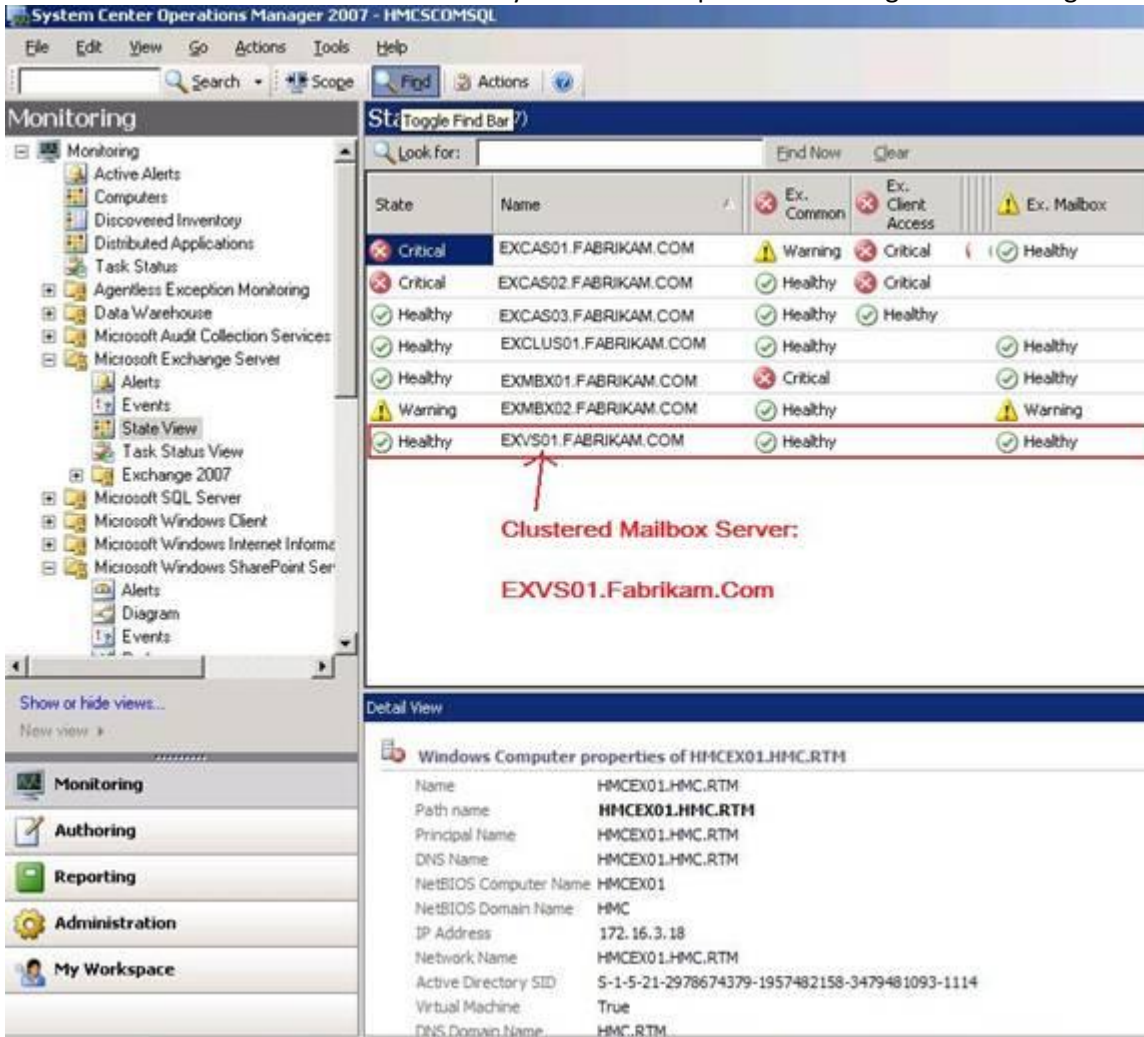


Figure 3 – Clustered Mailbox Server state in System Center Operations Manager 2007

Retrieve SharePoint Service Availability State

In order to monitor the SharePoint front end servers, first you need to populate the **GroupServerMapping** information to PWDB40 database.

One sample **GroupServerMapping** table:

(Note: If there is only a single front end server in the farm then only a single mapping record is needed)

GroupID	ServerFqdn
http://WSSFE:8080	wssfe01.fabrikam.com
http://WSSFE:8080	wssfe02.fabrikam.com

The **GroupServerMapping** is used to find out the mapping between tenant and server. The logic is:

1. Retrieves the target SPCA server from the tenant’s SharePoint service pointer from AD. It happens at the time of collection of the data (default every 5 minutes).
2. Get the target front end server from **GroupServerMapping** table according to the SPCA retrieved from SharePoint service pointer.

After a customer site is provisioned for an organization, we can get the service states for the organization or a user of that organization by calling **GetUserServiceState** or **GetOrgServiceState** interface (Specify “SharePoint” as the serviceName).

The **WSS Availability** function for each SharePoint front end server is returned. If the org provisions its customer sites on multiple front end servers, then multiple servers' states are returned.

A typical return data serialized into XML format is like:

```
<FunctionStates>
  <Function>
    <DisplayName>WSS Availability</DisplayName>
    <Servers>
      <Server>
        <FQDN>WSSFE01.Fabrikam.Com</FQDN>
        <HealthState>Success</HealthState>
      </Server>
      <Server>
        <FQDN>WSSFE02.Fabrikam.Com</FQDN>
        <HealthState>Success</HealthState>
      </Server>
    </Servers>
  </Function>
</FunctionStates>
```

How to Retrieve the List of Tenants for a Specific Service on a Server

HMC provides two APIs **GetUserServiceState** and **GetOrgServiceState** to help find out the list of tenants for a specific service on a server.

Retrieve the List of Users

You can call **GetUsersByServer** to return the list of users (by specifying a **serviceName**, a **server FQDN** and its parent organization's DN).

The result lists all the users that are under the specified organization and are using the specified service on that server.

When you query the users for **Exchange** service on an exchange client access server, it returns the users that are enabled with OWA feature. (Please refer to [here](#) for how to determine a user is enabled with OWA feature)

When you query the users for **Exchange** service on an exchange mailbox server, it returns the users that are created with a mailbox on that mailbox server. (Please refer to [here](#) for how to determine a user is created with a mailbox)

When you query the users for **SharePoint** service on a SharePoint front end server, it returns the users whose parent organization has been provisioned a customer site on that front end server. (Please refer to [here](#) for how to get mapping information between the tenant and the front end servers)

The data serialized into XML format is like:

```
<Users>
  <User>
    <UserDN>
      CN=Kima, OU=Alpineskihouse, OU=ConsolidatedMessenger, OU=Hosting, DC=Fabrikam,DC=Com
    </UserDN>
    <OrgDN>
      OU=Alpineskihouse, OU=ConsolidatedMessenger, OU=Hosting, DC=Fabrikam, DC=Com
    </OrgDN>
  </User>
  ...
  ...
</Users>
```

Retrieve the List of Organizations

You can call **GetOrgsByServer** to return the list of organizations by specifying a **serviceName**, a **serverName** and its parent organization's DN.

It returns all the organizations that are under the specified parent organization and have users using the specified service on that server.

The data retrieved from **GetOrgsByServer** could be serialized into XML format like:

```
<Orgs>  
  <Org>  
    OU=Alpineskihouse, OU=ConsolidatedMessenger, OU=Hosting, DC=Fabrikam, DC=Com  
  </Org>  
  ...  
  ...  
</Orgs>
```

Troubleshooting Tips

Exchange clustered mailbox server health state fails to show up on OpsMgr 2007 SP1

When you are using Exchange 2007 converted management pack to monitor Exchange servers, you may have noticed that the cluster node could not show up in the OpsMgr monitoring console.

SYMPTOMS

1. Exchange cluster node does not show up in the OpsMgr monitoring console
2. The following event appears in the agent's event log rather frequently

Event Type: Warning
Event Source: Health Service Modules
Event Category: None
Event ID: 10720
Date: 3/11/2008
Time: 9:06:45 PM
User: N/A
Computer: EXMBX01

Description:

The Backwards Compatibility mapper module was not able to start because discovery has not fully completed for this Health Service. This is a transient issue, the affected rule(s) will be unloaded and the Health Service will restart them when initialization is complete.

One or more workflows were affected by this.

Workflow name: System.Mom.BackwardCompatibility.ServiceStateMonitoring

Instance name: EXVS01.fabrikam.com

Instance ID: {7E669FE2-B4F9-00CB-1E1D-99B07E791F91}

Management group: SCOM01

CAUSE

OpsMgr backward compatibility feature requires some properties (such as **DNSName**) for an instance of **Microsoft.Windows.Computer**. For a virtual cluster node, it is an instance of **Microsoft.Windows.Cluster.VirtualServer** which inherited from **Microsoft.Windows.Computer**. SCOM sees a virtual cluster node as a **Computer**. When the discovery rule attempts to get the property **DNSName** for a virtual cluster node, unfortunately, SCOM doesn't set that property for the instance of **Microsoft.Windows.Cluster.VirtualServer**, the discovery rule will fail to discover the virtual cluster node.

RESOLUTION

Open OperationsManager database and execute the following query:

```
use OperationsManager
select NetbiosComputerName, DNSName from OperationsManager.dbo.MT_Computer
where DNSName is NULL
```

Following is the query result:

NetbiosComputerName	DNSName
EXCLUS01	NULL
EXVS01	NULL

You can see that there is no value for **DNSName** property for the virtual cluster nodes. The resolution is to set the **DNSName** by executing the following command:

```
update OperationsManager.dbo.MT_Computer set DNSName =
'<MyClusterDNSName>'
where NetbiosComputerName='<MyClusterNetBiosName>'
```

Executing the command and the property is now populated:

NetbiosComputerName	DNSName
EXCLUS01	EXCLUS01.FABRIKAM.COM
EXVS01	EXVS01.FABRIKAM.COM

Note: To see if this workaround works you need to wait for some time (may be half an hour) for discovery rule to re-discover your virtual cluster nodes.

Limitations

Currently, we only provide a .Net assembly to query the service availability state. We may provide some other ways to access the availability state in future, for example: SQL Server Reporting Service, web service. For SharePoint service, we provide server level availability state, the site collection level state is not provided. The SharePoint service availability state only shows the state of the servers in the farm instead of the site collections.

Office Communication Service availability is not provided in current HMC Monitoring and Reporting Solution.

We don't do any authentication in current APIs. Customers have to handle all authentications for permission checking in their code before accessing our APIs.

APPLIES TO

Microsoft Solution for Hosted Messaging and Collaboration version 4.5

Terminology

Name	Description
PWDB40	Performance warehouse database
MP	Management Pack used for System Center Operations Manager 2007
FQDN	Full Qualified Domain Name
DN	Distinguished Name
SCOM/ OpsMgr	System Center Operations Manager
SPCA	SharePoint Central Administration
cmdlet	An operation command used in Windows Power Shell