



# IBM Tivoli System Automation E2E Error Detection and Problem Analysis



**Transcript**



## IBM Tivoli System Automation for Multiplatforms and End-to-End Automation

Error detection and problem analysis  
April 2006

*"Life can be hard, but e2e is easy!"*



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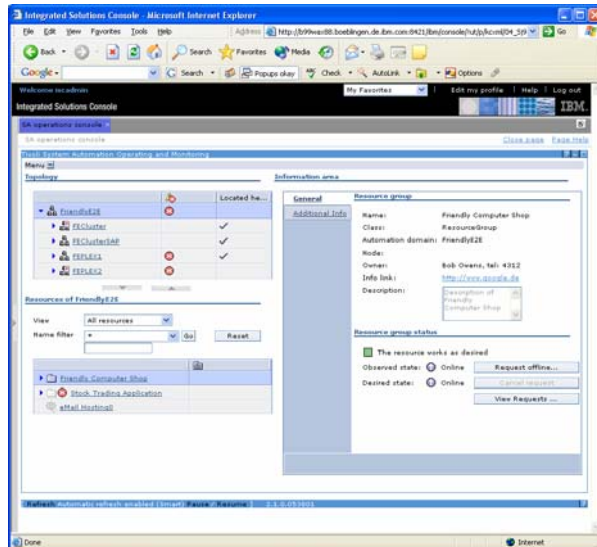
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Hello, my name is Joel Hermann, and I work in the IBM Development Center in Boeblingen, Germany, where we develop Tivoli System Automation. Two members of our development team, Isabell Schwertle and Wolfgang Schaeberle, want to show you some of the error detection and problem analysis capabilities that are available with Tivoli System Automation for Multiplatforms. They're going to jump right into a technical demonstration, so if you first want an overview to this solution and how it supports end-to-end automation in a heterogeneous IT landscape, then please refer to the first session we did in March. A pointer to it is at the end of this demo.

Our starting point today – and additional sessions that we have planned – is the Operations Console available with Tivoli Systems Automation for Multiplatforms.

## Operations Console – overview

- ③ One console to access **all** IBM Tivoli System Automation domains
- ↗ Same look and feel while controlling resources on different platforms
- ③ Comes with Tivoli System Automation for Multiplatforms V2 Base and End-to-End Automation
- ③ Web-based operations console
  - Based on WebSphere Portal Server (Integrated Solutions Console)
  - No need to install anything on the client
  - Can be accessed simply by using a Web browser
- ③ Designed to be easy to use and meet the needs of an SA operator



The Tivoli System Automation Operations Console is the “hub” for automated operations and monitoring of applications in a heterogeneous environment. Normally installed on a separate server, the console is Web-based and designed to provide easy and efficient support of an end-to-end landscape. It’s a great tool for controlling resources on different platforms and for recovering from problems that could occur. Wolfgang, Isabell, what do you want to demonstrate today?

**Wolfgang:** First we will look at a problem analysis scenario. We will see how an operator discovers problems that are reported by System Automation and how the SA operations console can be used to drill down to the root cause of the problem. We will see how to display relationships between automated resources and learn their meanings in an end-to-end automation scenario. Finally, we will learn how broken resources can be manually reset by the operator, so that System Automation will automate them again.

**Isabell:** So, will the operations console automatically refresh if an application signals a problem?

**W:** Yes, Isabell, as you can see, the operations console automatically displays errors and warnings when they are detected by System Automation:

The screenshot shows two main panels. The left panel, titled 'Topology', displays a tree view of resources under the 'FriendlyE2E' domain. Resources include FECluster, TMCC09, TMCLINX, TMCLINX2, FEClusterSAP, FEPLEX1, and FEPLEX2. FEPLEX1 and FEPLEX2 show error icons. Below this is a table titled 'Resources of FriendlyE2E' with columns for 'Resource name' and 'Compound state'. The table lists: Enterprise\_DB2 (OK), Backend\_AppServer (OK), Banking\_Application (Warning), DNS\_Server (OK), Frontend\_WebServer (OK), and IMS\_Connect (Error). The right panel, titled 'Information area', shows details for the 'Stock Trading Application' resource group. It includes fields for Name, Class, Automation domain, Node, Owner, Info link, and Description. Below this, the 'Resource group status' section shows an 'Error' state, with 'Observed state' as 'Offline' and 'Desired state' as 'Online'. Action buttons include 'Request offline...', 'Cancel request', and 'View Requests ...'.

**I:** Ah, I see, there are a number of places where new errors and warnings have been reported. So, here in the domain topology I can see which domain hosts applications with problems. This is nice because it gives me a very high-level view of where problems exist.

And here, in the resource table, problems are visualized with additional icons next to each resource. In addition, the Compound state column gives textual information about the severity of each problem.

OK, so I see that the company’s “Stock Trading Application” is currently offline and signals an error. Let me have a look at the components of the “Stock Trading Application” to see which parts are affected.







**W:** OK, now you are looking at the components of the “Stock Trading Application” and you can see that both the “Banking Application” and the “IMS Connect” resources are currently offline with the “Banking Application” signaling a Warning and “IMS Connect” signalling an Error. The remaining components of the “Stock Trading Application” are still OK and up and running.

By the way, you can also use the “Compound state” column for sorting, so that all resources are sorted by problem severity, presenting the most severe problems at the top of the table. A click on the column header does the job:

## Resources of FriendlyE2E

View

Top > [Stock Trading Application](#)

Resource name	Compound state
 <a href="#">IMS Connect</a>	Error
 <a href="#">Banking Application</a>	Warning
 <a href="#">Enterprise DB2</a>	OK
 <a href="#">Backend AppServer</a>	OK
 <a href="#">DNS Server</a>	OK
 <a href="#">Frontend WebServer</a>	OK

To go back to the default sort order, you can sort by “Resource name” again.



**I:** I understand. This is in particular useful if there are a lot of resources displayed. Oh, and I can also limit the view to **only** show resources with errors and warnings using the View drop down box, right?

**W:** Yes, selecting the “Errors and warnings” view from the View drop down box will hide all resources that are OK:

## Resources of FriendlyE2E

View

Top > [Stock Trading Application](#)

Resource name	Compound state
 <a href="#">Banking Application</a>	Warning
 <a href="#">IMS Connect</a>	Error

**I:** OK, now I would like to understand why the “Banking Application” went offline. I mean, the two components “Banking Application” and “IMS Connect” which went offline are hosted by two different clusters. I bet, the warning that is shown for the “Banking Application” is related to the outage of “IMS Connect”. To find out more about this I select the “Banking Application” in the resource table.

Topology

		Located here
▼ FriendlyE2E	⚠	
▼ FECluster	⊗	
TMCC09		
TMCCLINX		
TMCCLINX2		
▶ FEClusterSAP		
▶ FEPLEX1	⊗	
▶ FEPLEX2	⊗	✓

Resources of FriendlyE2E

View:

Top > Stock Trading Application

Resource name	Compound state
Enterprise_DB2	OK
Backend AppServer	OK
⚠ Banking Application	Warning
DNS Server	OK
Frontend WebServer	OK
⊗ IMS Connect	Error

Information area

**General**

**Resource reference**

Name: Banking Application

Class: ResourceReference

Automation domain: FriendlyE2E

Owner: Bob Owens, tel: 4312

Info link: <http://www.google.de>

Description: Description of Banking Application

---

**Resource reference status**

⚠ Warning: The resource cannot be started because of unfulfilled dependencies

Observed state: Offline

Desired state: Online

---

**Referenced resource**

Name: BANKEAR/APL/SYS1

Automation domain: FEPLEX2

---

**Used by**

Banking Application is a member of the following resource groups

Resource	Class	Automation do...
⊗ Stock Trading Application	ResourceGroup	FriendlyE2E

**W:** Look, Isabell, the “Located here” column in the topology tree quickly shows the operator that the “Banking Application” is a component that is hosted by the z/OS Sysplex FEPLEX2 and the information area shows all details about the resource that you have selected.

The most valuable information for us right now is displayed in the status section. There we can see that the observed state is offline although the desired state is online and the summary information says: “The resource cannot be started because of unfulfilled dependencies”. To understand this unfulfilled dependency, we can have a look at the relationships to other resources by clicking on the “Relationships” tab:

## Information area

The screenshot displays the 'Forward relationships' section of a Tivoli System Automation interface. It shows two relationships between 'Banking Application' and 'IMS Connect'. The first relationship is 'starts after' and the second is 'forced down by'. Both relationships have a red 'X' icon next to the 'IMS Connect' target, indicating an error. The panel also includes a 'Backward relationships' section showing that 'IMS Connect' 'stops after' the 'Banking Application'.

Source	Relatio...	Target	Con...
Banking Application	starts after	IMS Connect	
Banking Application	forced down by	IMS Connect	

Source	Relati...	Target	Con...
IMS Connect	stops after	Banking Application	

I: Ah, here we go. This panel shows that two relationships to “IMS Connect” exist for the “Banking Application”.

The first one says that “Banking Application” starts after “IMS Connect”. This means that before the automation manager can start the “Banking Application”, “IMS Connect” must be started.

The second relationship says that “Banking Application” is forced down by “IMS Connect”. This means that if “IMS Connect” has a failure, the automation manager will stop the “Banking Application”. So, what has happened here under the covers?

**W:** As you can see, “IMS Connect” signals an Error. Due to the “forced down by” relationship, this resulted in a shutdown of the related “Banking Application”. This is ensured by Tivoli System Automation’s end-to- end automation manager.

Note that “IMS Connect” and “Banking Application” are hosted on two different clusters, so this is true cross-cluster automation.

The goal for the automation is to keep the “Banking Application” online. However, due to the “starts after” relationship to “IMS Connect”, the “Banking Application” will not be started again by the automation until “IMS Connect” is back online.

I: OK, now we understand why the “Banking Application” is offline and issued the warning that it cannot be started because of unfulfilled dependencies. Now, I want to go to the resource that actually has the error. By clicking on the link “IMS Connect” in the Relationships tab I will jump to the information page of that resource. So, with “IMS Connect” now being selected, I would first like to have a look at the status summary information on the resource’s General tab:

Topology

		Located here
▼ FriendlyE2E	⚠	
▶ FECluster	⊗	
▶ FEClusterSAP		
▶ FEPLEX1	⊗	✓
▶ FEPLEX2	⊗	

Resources of FriendlyE2E

View: All resources [Search...]

Top > Stock Trading Application

Resource name	Compound state
Enterprise DB2	OK
Backend AppServer	OK
Banking Application	Warning
DNS Server	OK
Frontend WebServer	OK
IMS Connect	Error

Information area

**General**

**Resource reference**

Name: IMS Connect

Class: ResourceReference

Automation domain: FriendlyE2E

Owner: Bob Owens, tel: 4312

Info link: <http://www.google.de>

Description: Description of IMS Connect

---

**Resource reference status**

⊗ Error: The referenced resource is in an error state

Observed state: Offline [Request offline...]

Desired state: Online [Cancel request]

[View Requests ...]

---

**Referenced resource**

Name: IMS CONNECT/APG

Automation domain: FEPLEX1

---

**Used by**

IMS Connect is a member of the following resource groups

Resource	Class	Automation ...
Stock Trading Application	ResourceGroup	FriendlyE2E

There, an error message is displayed which says, "The referenced resource is in an error state". What does this mean?

**W:** What we are currently looking at for "IMS Connect" is a so-called resource reference which is located in the end-to-end automation domain. The actual resource providing the "IMS Connect" service is located within a first-level cluster and is called referenced resource. The error message indicates that the actual problem has been reported for this referenced resource by the automation manager of the first level cluster.

We can use the hyperlink in the referenced resource section to drill down to the referenced resource which is located in sysplex FEPLEX1.



**Topology**

Resource	State	Located here
FriendlyE2E	⚠	
FECluster	⊗	
TMCC09		
TMCLINX		
TMCLINX2		
FEClusterSAP		
FEPLEX1	⊗	✓
FEPLEX2	⊗	

**Resources of FEPLEX1**

View:  Search...

Top > BUS\_CONTIN/APG > IMS\_CONNECT/APG

Resource name	Compound state
IMS_CONNECT/APL/SYS5	Fatal error
IMS_CONNECT/APL/SYS6	Fatal error
IMS_CONNECT/APL/SYS7	Fatal error

**Information area**

**General**

**Additional Info**

Name: IMS\_CONNECT/APG  
Class: MoveGroup  
Automation domain: FEPLEX1  
Owner: Bob Owens, tel: 4312  
Info link: <http://www.google.de>  
Description: Description of IMS\_CONNECT/APG

---

**Move group status**

⊗ Error

Observed state: Offline

Desired state: Online

---

**Used by**

IMS\_CONNECT/APG is a member of or is referenced by the following resources

Resource	Class	Automatio...
⊗ BUS_CONTIN/APG	ApplicationGroup	FEPLEX1
⊗ IMS Connect	ResourceReference	FriendlyE2E

We have now automatically and seamlessly navigated to the application group IMS\_CONNECT which is hosted by FEPLEX1 and which is automated by System Automation for z/OS. Note that FEPLEX1 is selected in the domain topology and the resource section now shows the resources hosted by FEPLEX1. The IMS\_CONNECT application group has been selected and is displayed in the information area.

**I:** So, I get the same presentation for my automated applications, independent of the underlying operating system or automation product and can navigate between the various domains or, as we have seen, from an end-to-end scope down to a first-level automation domain. This is really cool!

OK, I can see that IMS\_CONNECT is a Move Group controlled by System Automation for z/OS. It has been made highly available using three IMS Connect instances with each instance being located on a different system – SYS5, SYS6, and SYS7. System Automation ensures that only one instance is online at a time and if that one fails, it will failover to one of the stand-by instances on another system.

However, as it can be seen in the resource table, all IMS\_CONNECT instances show fatal errors. So, there was no instance left to failover to, right? So, this must be the reason why this error has been propagated up to the end-to-end level impacting the “Stock Trading Application”. What can I do next?

**W:** Well, let’s select the first instance – IMS\_CONNECT on SYS5

Topology

		Located here
▼ FriendlyE2E	⊗	
▼ FECluster	⊗	
TMCC09		
TMCCLINX		
TMCCLINX2		
▶ FEClusterSAP		
▶ FEPLEX1	⊗	✓
▶ FEPLEX2	⊗	

Resources of FEPLEX1

View:  Search...

Top > BUS\_CONTIN/APG > IMS\_CONNECT/APG

Resource name	Compound state
⊗ IMS_CONNECT/APL/SYS5	Fatal error
⊗ IMS_CONNECT/APL/SYS6	Fatal error
⊗ IMS_CONNECT/APL/SYS7	Fatal error

Information area

**General**

**Additional Info**

Name: IMS\_CONNECT/APL/SYS5

Class: Application

Automation domain: FEPLEX1

Node: SYS5

Owner: Bob Owens, tel: 4312

Info link: <http://www.google.de>

Description: Description of IMS\_CONNECT/APL/SYS5

---

**Resource status**

⊗ The resource has an unrecoverable problem

Observed state:  Offline

Desired state:  Offline

---

**Used by**

IMS\_CONNECT/APL/SYS5 is a member of the following resource groups

Resource	Class	Automatio...
⊗ IMS_CONNECT/APG	MoveGroup	FEPLEX1

The status section of the information area tells the operator that the resource has an unrecoverable problem. This means that the automation manager has tried several times to restart the application, but was not able to do so because of a permanent application failure. In such a case the operator needs to debug the problem at the source, looking for example through system logs or application logs. The operator can get assistance through the System Automation operations console by following the info link in the resource's information area. The info link can be provided by the customer for each resource and can point to resource specific operator instructions. In addition to the info link, owner information is presented for each resource, so that the operator immediately knows whom to contact.

Depending on the actual problem, the operator can either fix the problem by himself, using for example the instructions behind the info link, or the operator opens a problem ticket and forwards the problem to some second level personnel. In this case you could contact Bob Owens who is the owner of "IMS\_CONNECT".

I: That's an excellent idea. Give me a couple of minutes. I'll talk to Bob and will be back soon.

OK, Bob was able to fix the problem with IMS Connect and it can be started again. With System Automation I don't need to care about a start-up sequence or any related resource that might be affected to get everything up and running again. All I have to do is to tell System Automation that the resource is operational again, so that System Automation will automate the resource again according to the automation policy. I will now do so using the Reset button that is available for resources that are in an unrecoverable error state. A click on the Reset button triggers System Automation for z/OS to bring IMS\_CONNECT online again on one of the available systems.

**Topology**

Resource	State	Located here
FriendlyE2E		
FECluster		
FEClusterSAP		
<b>FEPLEX1</b>		✓
FEPLEX2		

Resources of FEPLEX1

View: All resources

Top > BUS\_CONTIN/APG > IMS\_CONNECT/APG

Resource name	Compound state
IMS_CONNECT/APL/SYS5	OK
IMS_CONNECT/APL/SYS6	OK
IMS_CONNECT/APL/SYS7	OK

**Information area**

**General**

**Resource**

Name: IMS\_CONNECT/APL/SYS5  
Class: Application  
Automation domain: FEPLEX1  
Node: SYS5  
Owner: Bob Owens, tel: 4312  
Info link: <http://www.google.de>  
Description: Description of IMS\_CONNECT/APL/SYS5

**Resource status**

The resource works as desired

Observed state: Online   
Desired state: Online

**Used by**

IMS\_CONNECT/APL/SYS5 is a member of the following resource groups

Resource	Class	Automation ...
IMS_CONNECT/APG	MoveGroup	FEPLEX1

**W:** Right, as you can see, there are no more problems visible within the FEPLEX1 Sysplex and IMS\_CONNECT is now online on SYS5. Now let's go back to the "Stock Trading Application" in the end-to-end automation domain:

**Topology**

Resource	State	Located here
FriendlyE2E		
FECluster		✓
FEClusterSAP		
FEPLEX1		✓
FEPLEX2		✓

Resources of FriendlyE2E

View: All resources

Top > Stock Trading Application

Resource name	Compound state
Enterprise_DB2	OK
Backend_AppServer	OK
Banking_Application	OK
DNS_Server	OK
Frontend_WebServer	OK
IMS_Connect	OK

**Information area**

**General**

**Resource group**

Name: Stock Trading Application  
Class: ResourceGroup  
Automation domain: FriendlyE2E  
Node:  
Owner: Bob Owens, tel: 4312  
Info link: <http://www.google.de>  
Description: Description of Stock Trading Application

**Resource group status**

The resource works as desired

Observed state: Online   
Desired state: Online

As you can see, there are no more problems reported. So, let's switch back to the "All resources" view. Now you can see that the "Stock Trading Application" and both components that were offline previously, namely "IMS Connect" and "Banking Application", are all back online. Under the covers, the end-to-end automation manager was notified that IMS\_CONNECT has come back online. Therefore the end-to-end automation manager was now able to start the "Banking Application", which is located on the other Sysplex, because the "start after" relationship could now be satisfied.

**I:** Cool – This was an impressive scenario. We have seen, how to navigate between multiple heterogeneous clusters and how to drill down to the root cause of an application problem. I now know how to get detailed information about resources, how to view the defined automation relationships, and how true heterogeneous, cross-cluster automation can work without the need to remember relationships between application components. I was even able to navigate to a z/OS Sysplex and browse its automated resources although I have never been taught how to work with host systems.

## Operations Console – a single point of control

- ③ Common, Web-based console
- ③ Can be used with multiple, heterogeneous clusters
- ③ Same presentation for all automated applications, regardless of underlying operating system or automation product
- ③ Detailed information available for each application resource
- ③ Console automatically refreshes if an application signals a problem
- ③ Icons show resources with problems; textual information indicates each problem's severity
- ③ Resources with problems can be filtered and sorted by severity
- ③ Hyperlinks can be used to drill down to specific causes of problems for faster resolution

### Tivoli SA for Multiplatforms – IBM's end-to-end high availability solution

*"Life can be hard, but e2e is easy!"*

Thanks very much, Isabell and Wolfgang. So to summarize: The Operations Console can be used to monitor and control the availability status of all automated resources. As shown today, it can serve as an operation and management team's gateway for error detection and problem analysis in a heterogeneous IT landscape.

The Operations Console provides these capabilities on a domain-spanning level. This means that an operator can monitor all automated resources in the enterprise environment from a single console. This has two major benefits:

- Operators who monitor and manage automated resources that are hosted by clusters of systems spanning different operating systems do **not** need to have specific knowledge about the particular operating systems.
- Different automation products may be used on different local clusters. Thanks to the Operations Console, however, an operator does **not** have to know the different automation concepts or learn how to work with their user interfaces.

User interfaces of first-level automation solutions still may be required for particular, highly specialized operations and for performing some product-specific monitoring and problem analysis tasks. But without the Operations Console, error detection and problem analysis in a heterogeneous environment would be much more difficult – **and much more costly.**

## Want more information?

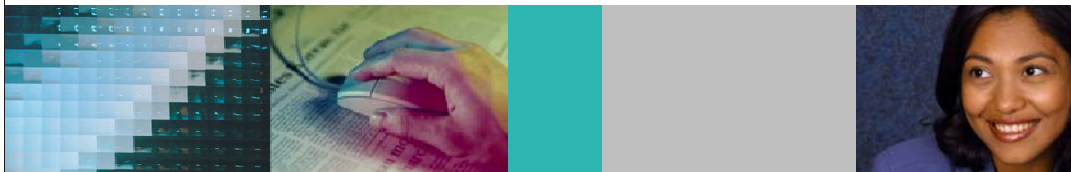
③ Tivoli System Automation for Multiplatforms home page:  
[ibm.com/software/tivoli/products/sys-auto-linux](http://ibm.com/software/tivoli/products/sys-auto-linux)

③ All sessions in this series:  
[ibm.com/??/?](http://ibm.com/???)

③ Data sheet:  
[ftp.software.ibm.com/software/tivoli/datasheets/ds-sys-auto-multiplatforms.pdf](http://ftp.software.ibm.com/software/tivoli/datasheets/ds-sys-auto-multiplatforms.pdf)

③ Sample policies:  
[ibm.com/software/tivoli/products/sys-auto-linux/downloads.html](http://ibm.com/software/tivoli/products/sys-auto-linux/downloads.html)

③ Reference library:  
[publib.boulder.ibm.com/tividd/td/IBMTivoliSystemAutomationforMultiplatforms2.1.html](http://publib.boulder.ibm.com/tividd/td/IBMTivoliSystemAutomationforMultiplatforms2.1.html)



For more information related to IBM Tivoli System Automation for Multiplatforms, please refer to the resources listed here. The second link is a pointer to all of the sessions in this series, including an introduction done in March 2006.

Thanks for your interest!

धन्यवाद  
Hindi

多謝  
Traditionelles Chinesisch

ขอบคุณ  
Thailändisch

Спасибо  
Russisch

Gracias  
Spanisch

شكراً  
Arabisch

Danke!

Obrigado  
Brasilianisch  
Portugiesisch

Grazie  
Italienisch

多谢  
Vereinfachtes Chinesisch

Thank You  
Englisch

Merci  
Französisch

நன்றி  
Tamilisch

ありがとうございました  
Japanisch

감사합니다  
Koreanisch

