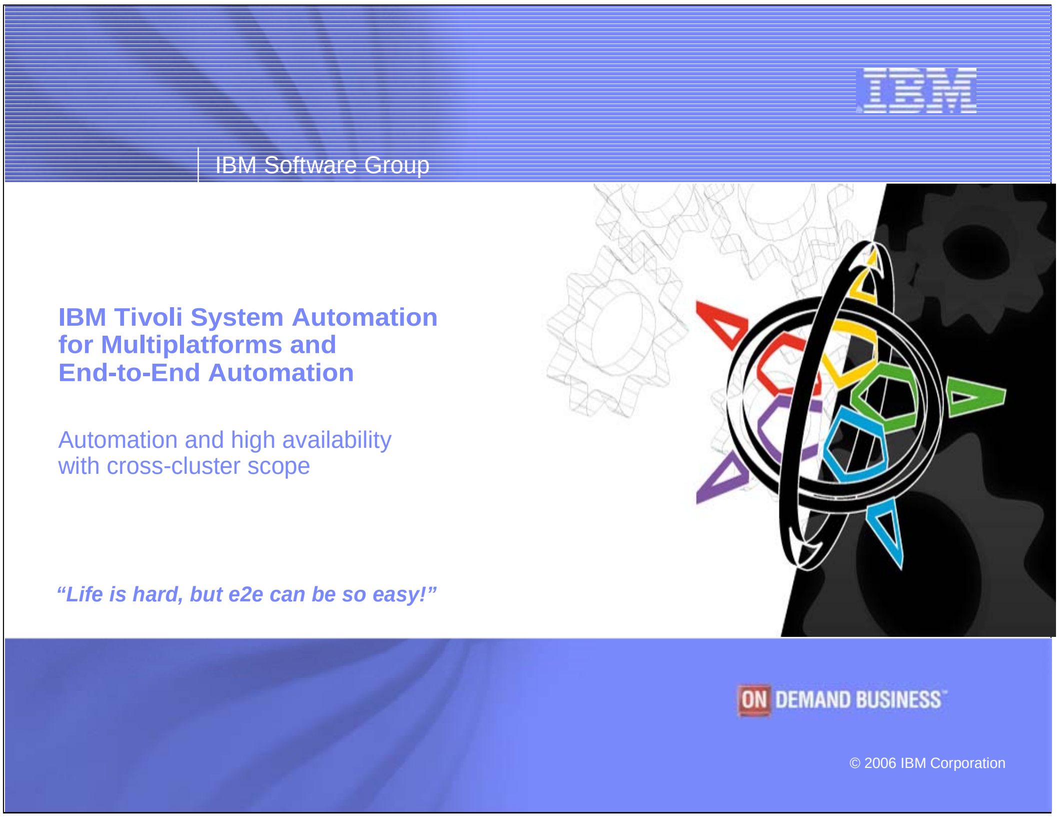
# IBM Tivoli System Automation for Multiplatforms and End-to-End Automation

## Transcript



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

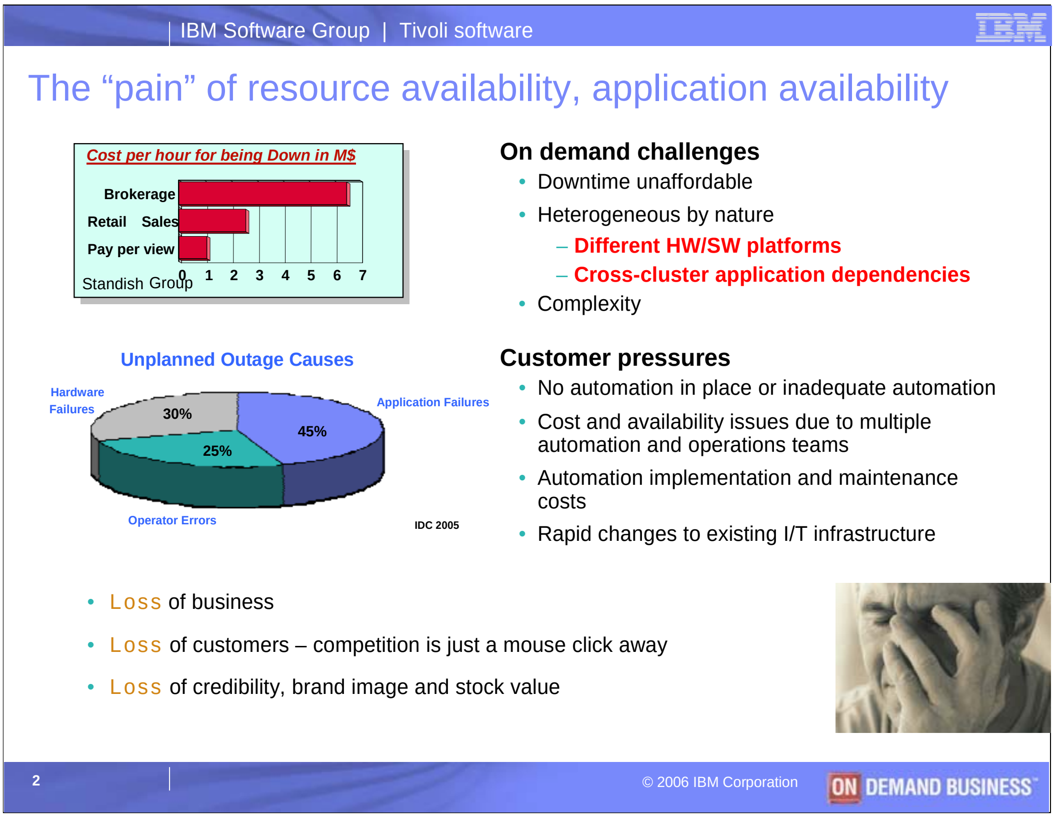
Automation and high availability
with cross-cluster scope

*“Life is hard, but e2e can be so easy!”*

Hello, my name is Joel Hermann and I work in the IBM Development Center in Boeblingen, Germany. I’m here today with Isabell Schwertle, a member of our development team for IBM Tivoli System Automation. We’d like to give you a very brief overview to this solution, which provides self-healing capabilities for business applications. It does this by detecting failing IT components and then repairing or working around those failures.

Through the Tivoli System Automation family of products, you can enjoy rock-solid high availability for applications and related resources that are on IBM mainframes, AIX clusters, and Linux clusters. **AND** you can do this end-to-end, in an IT landscape that has a mix of different platforms.

Please note that we’ll be doing additional sessions that go into more detail about some of the topics we’re covering today. At the end of this overview, we’ll show you where you can get them, plus other information. Let’s now get started by reviewing why system automation and resource availability are critical for your business.



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# The “pain” of resource availability, application availability

**On demand challenges**

- Downtime unaffordable
- Heterogeneous by nature
  - – **Different HW/SW platforms**
  - – **Cross-cluster application dependencies**
- Complexity

**Customer pressures**

- No automation in place or inadequate automation
- Cost and availability issues due to multiple automation and operations teams
- Automation implementation and maintenance costs
- Rapid changes to existing I/T infrastructure

- Loss of business
- Loss of customers – competition is just a mouse click away
- Loss of credibility, brand image and stock value

2

Businesses today simply can not afford to have their computing systems or even parts of systems down. Sure, you might be able to get by for a while, but any revenue or customers that you lose because of down time is simply too much.

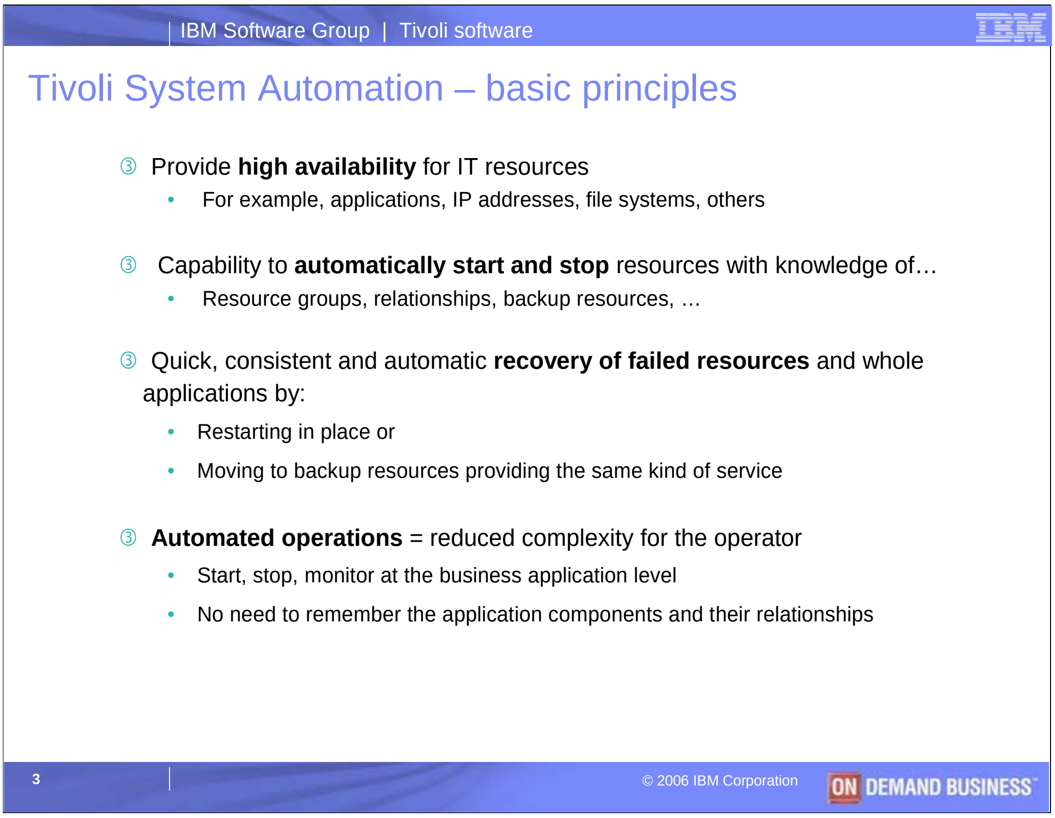
And avoiding down time isn’t getting any easier. Business processes and business requirements often mean adding complexity to your IT landscape. This can create problems with development and with maintenance and support.

That’s why looking for answers to system automation and high availability are not unique to IBM or IBM clients. It’s a common problem, and a number of solutions are on the market. Isabell and I might be biased, but we believe that Tivoli System Automation is the premier solution today and will remain so in the future. Through Tivoli System Automation:

•You can create the level of high availability that your business requires **AND**

•You can reach across platform and system boundaries through end-to-end automation, which can cover your entire IT landscape.

We’re very excited about the end-to-end capabilities available with Tivoli System Automation, but let’s take a few minutes to set the stage.



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## Tivoli System Automation – basic principles

- Provide **high availability** for IT resources
  - For example, applications, IP addresses, file systems, others
- Capability to **automatically start and stop** resources with knowledge of…
  - Resource groups, relationships, backup resources, …
- Quick, consistent and automatic **recovery of failed resources** and whole applications by:
  - Restarting in place or
  - Moving to backup resources providing the same kind of service
- **Automated operations** = reduced complexity for the operator
  - Start, stop, monitor at the business application level
  - No need to remember the application components and their relationships

3

ON DEMAND BUSINESS™

Tivoli System Automation‘s charter, its purpose, is to provide high availability by automating IT resources. This can be, for example, applications, IP addresses, file systems or other resources. Tivoli System Automation can manage your business applications, whether they run on a single system, are distributed within a cluster, or are spread across multiple clusters.

To be able to do this, Tivoli System Automation uses knowledge about:

•The components that make up an application,

•How these components are related (for example, one component must be started before another), and

•The desired operational state for an application

This kind of information is defined in an automation **policy**. A policy is the main input for the automation manager‘s decision engine, which is a very, very sophisticated knowledge- based system developed at IBM Böblingen.

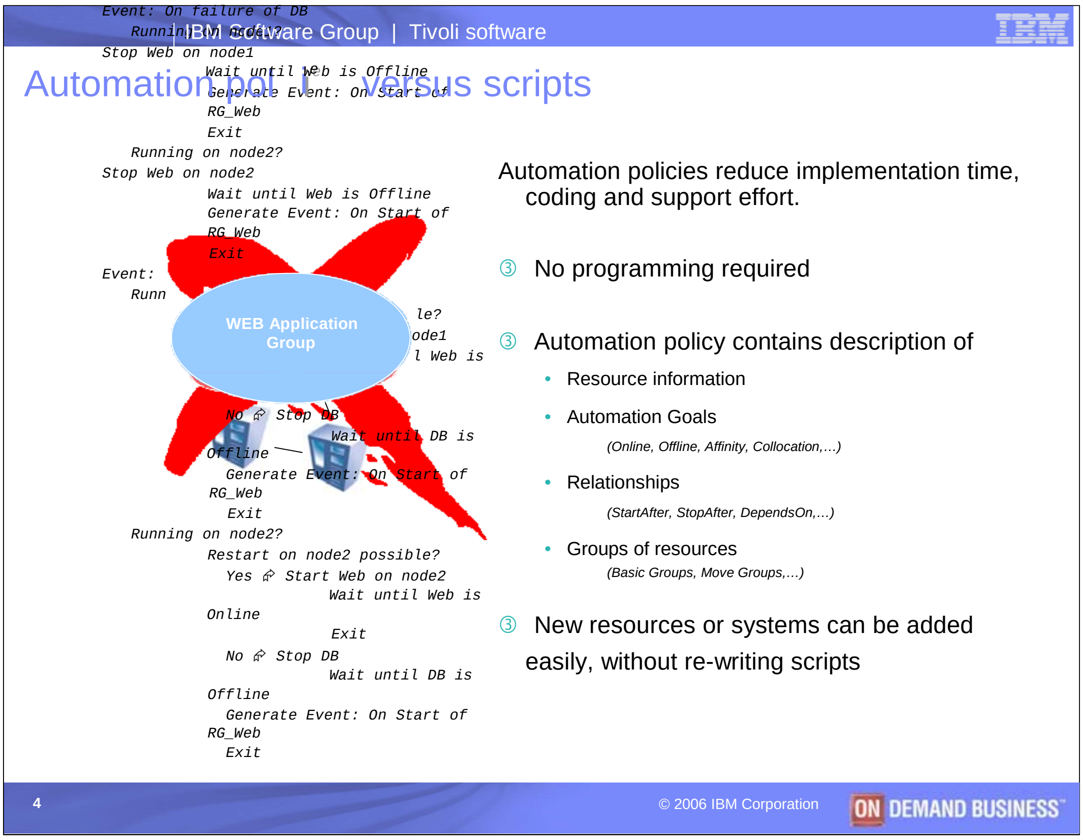
All automated resources are monitored to be able to detect outages very quickly. In case of a failure, Tivoli System Automation can recover:

•By restarting the application or components of an application in place, or if that is not possible,

•By moving an application to another system

Though these capabilities, Tivoli System Automation can help ease daily operations and reduce possible operator errors. That‘s because an operator doesn‘t need to remember the components that belong to an application, how they‘re related, or where they‘re located. The automation manager knows all of this because of the policy used.

Let‘s now see why policies are so cool.



## Automation pol   i   versus scripts

```
Event: On failure of DB
    Running on node1?
Stop Web on node1
              Wait until Web is Offline
              Generate Event: On Start of
              RG_Web
              Exit
    Running on node2?
Stop Web on node2
              Wait until Web is Offline
              Generate Event: On Start of
              RG_Web
              Exit
Event:
    Runn
                                le?
                               ode1
                                l Web is
                No  Stop DB
                              Wait until DB is
              Offline
                Generate Event: On Start of
              RG_Web
                Exit
    Running on node2?
              Restart on node2 possible?
                Yes  Start Web on node2
                              Wait until Web is
              Online
                              Exit
                No  Stop DB
                              Wait until DB is
              Offline
                Generate Event: On Start of
              RG_Web
                Exit
```

Automation policies reduce implementation time, coding and support effort.

- No programming required
- Automation policy contains description of
  - Resource information
  - Automation Goals
    *(Online, Offline, Affinity, Collocation,…)*
  - Relationships
    *(StartAfter, StopAfter, DependsOn,…)*
  - Groups of resources
    *(Basic Groups, Move Groups,…)*
- New resources or systems can be added easily, without re-writing scripts

If you've never had to write scripts that automate resources or applications, then count your blessings. And if you have written them, then you'll **really** love Tivoli System Automation policies.

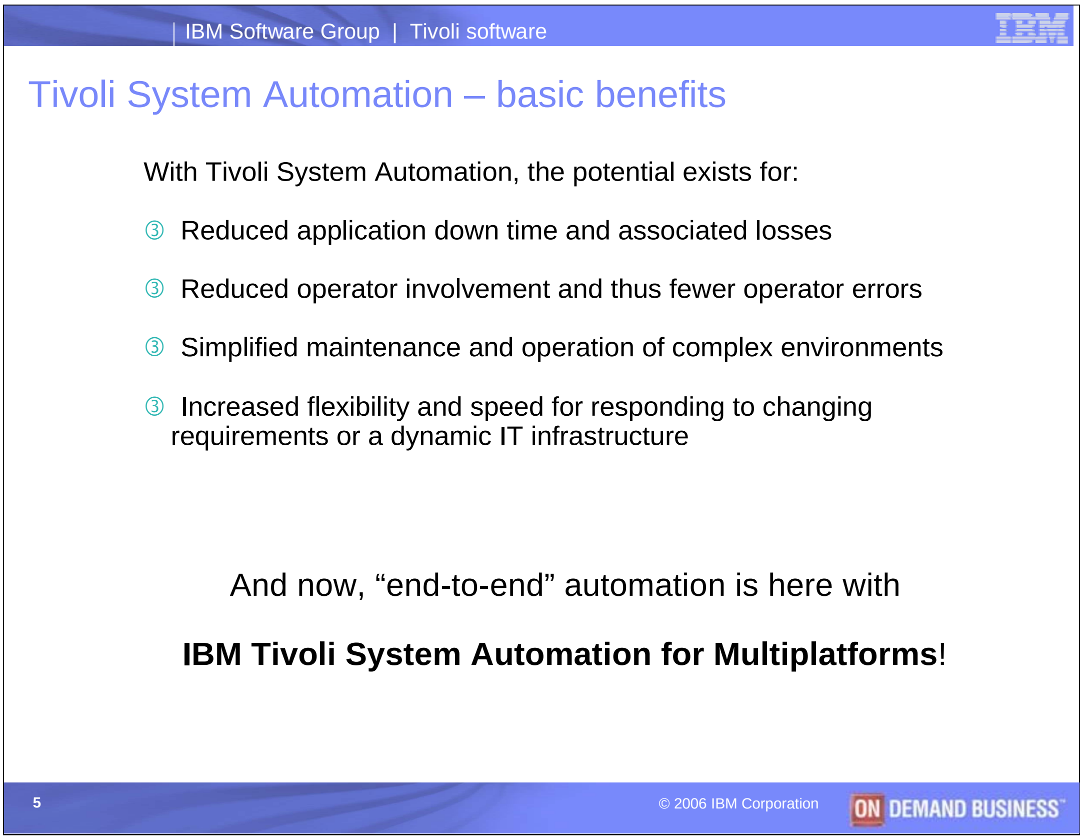
This animation shows a simplified pseudo script that tries to automate a Web application consisting of a Web server, a database, and a virtual IP address running in a three-tier cluster. The address and the database need to be started before the Web server.

In contrast, a TSA policy would use a simple **group** definition and so-called **DependsOn** relationships to replace such a lengthy – and often very complex – script. The DependsOn relationships would ensure that the address and the database are started before the Web server. It's that easy.

Policies thus contain resource information that decribes a resource's class and name, how to start, stop, and monitor it, and where it should run. These resources can be assigned to groups of similar resources, and relationships among resources and groups can be defined.

Unlike other automation products, **no** special programming skills or related education is required. And the best part is that resources or systems can be quickly added to or removed from policies and tested. Just try making changes to hand-coded scripts!

So what's the value of all this to you?



## Tivoli System Automation – basic benefits

With Tivoli System Automation, the potential exists for:

③ Reduced application down time and associated losses

③ Reduced operator involvement and thus fewer operator errors

③ Simplified maintenance and operation of complex environments

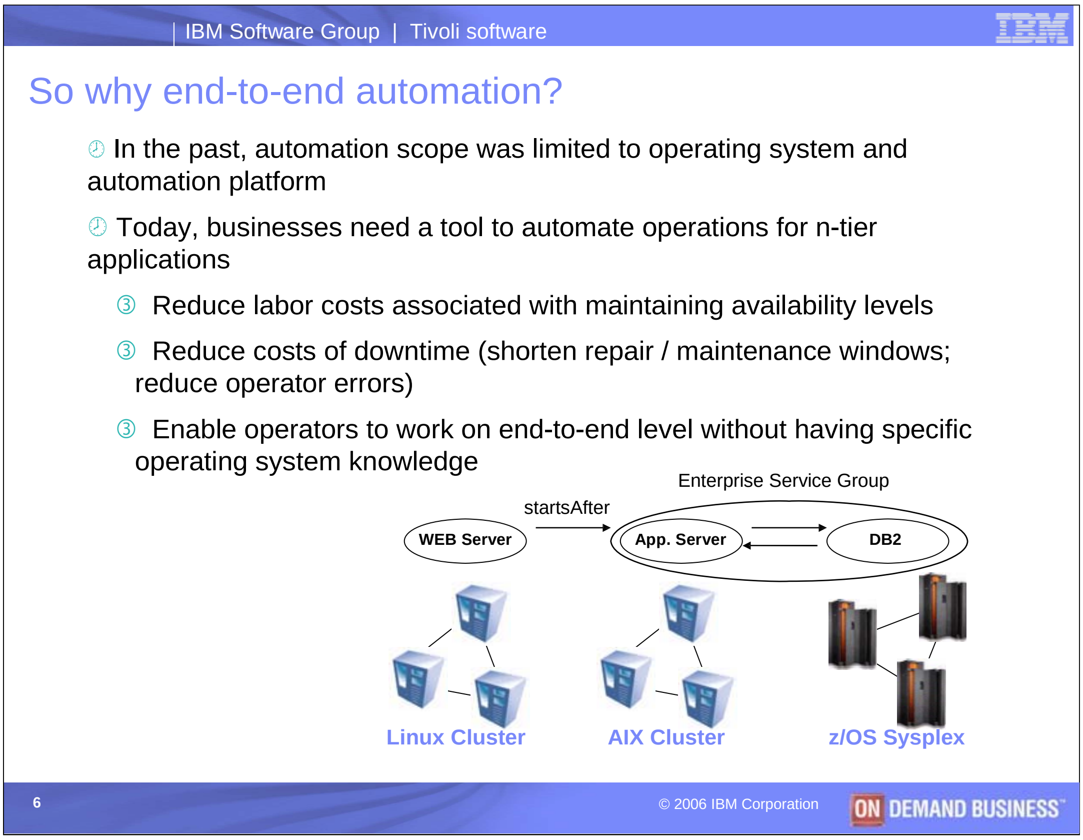
③ Increased flexibility and speed for responding to changing requirements or a dynamic IT infrastructure

And now, “end-to-end” automation is here with

**IBM Tivoli System Automation for Multiplatforms**!

Here we’ve listed some value “highlights” that Tivoli System Automation can offer companies of all shapes and sizes in today’s on demand business world. Each by itself is enough to warrant taking a closer look at Tivoli System Automation. Together, these values form a powerful argument for Tivoli System Automation as a means to help reduce a business’ Total Cost of Ownership for its IT infrastructure.

But that’s not all! Now Tivoli System Automation for Multiplatforms offers capabilities for end-to-end automation!



## So why end-to-end automation?

- In the past, automation scope was limited to operating system and automation platform
- Today, businesses need a tool to automate operations for n-tier applications
  - Reduce labor costs associated with maintaining availability levels
  - Reduce costs of downtime (shorten repair / maintenance windows; reduce operator errors)
  - Enable operators to work on end-to-end level without having specific operating system knowledge

Enterprise Service Group

startsAfter

WEB Server

App. Server

DB2

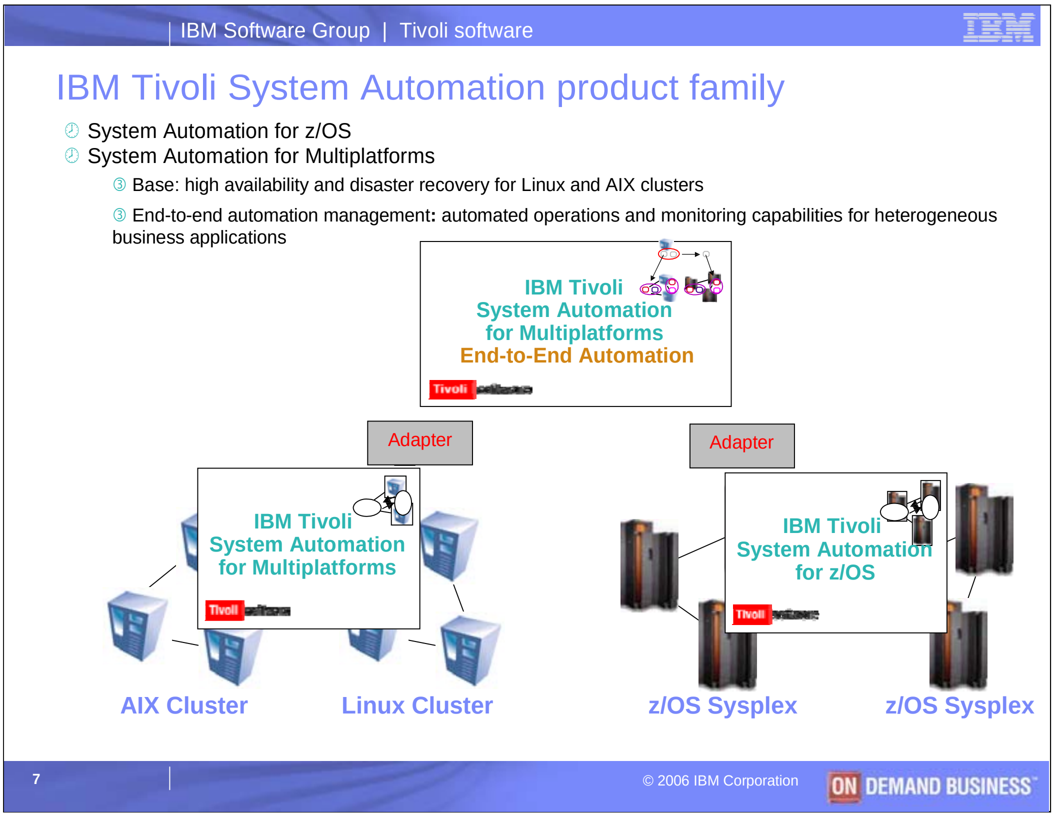
Linux Cluster

AIX Cluster

z/OS Sysplex

Up to now, we’ve really been talking about Tivoli System Automation’s past support for automation and high availability within a single system or a cluster of like (or “homogeneous”) systems. As great as that is, it still isn’t enough to meet the needs of businesses that have applications running in heterogeneous landscapes. And we’re not talking about something very exotic here.  For example, **any** business that has its SAP database on one hardware platform and its application servers on another has such a heterogeneous landscape.

And when you have that situation, then you need to think “globally”, cross-platform. You need to find ways to meet the challenge of maintaining and operating such applications. And even more than before, you need to find ways to keep them available!



## IBM Tivoli System Automation product family

- System Automation for z/OS
- System Automation for Multiplatforms
  - Base: high availability and disaster recovery for Linux and AIX clusters
  - End-to-end automation management**:** automated operations and monitoring capabilities for heterogeneous business applications

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

Adapter

Adapter

IBM Tivoli System Automation for Multiplatforms

IBM Tivoli System Automation for z/OS

AIX Cluster

Linux Cluster

z/OS Sysplex

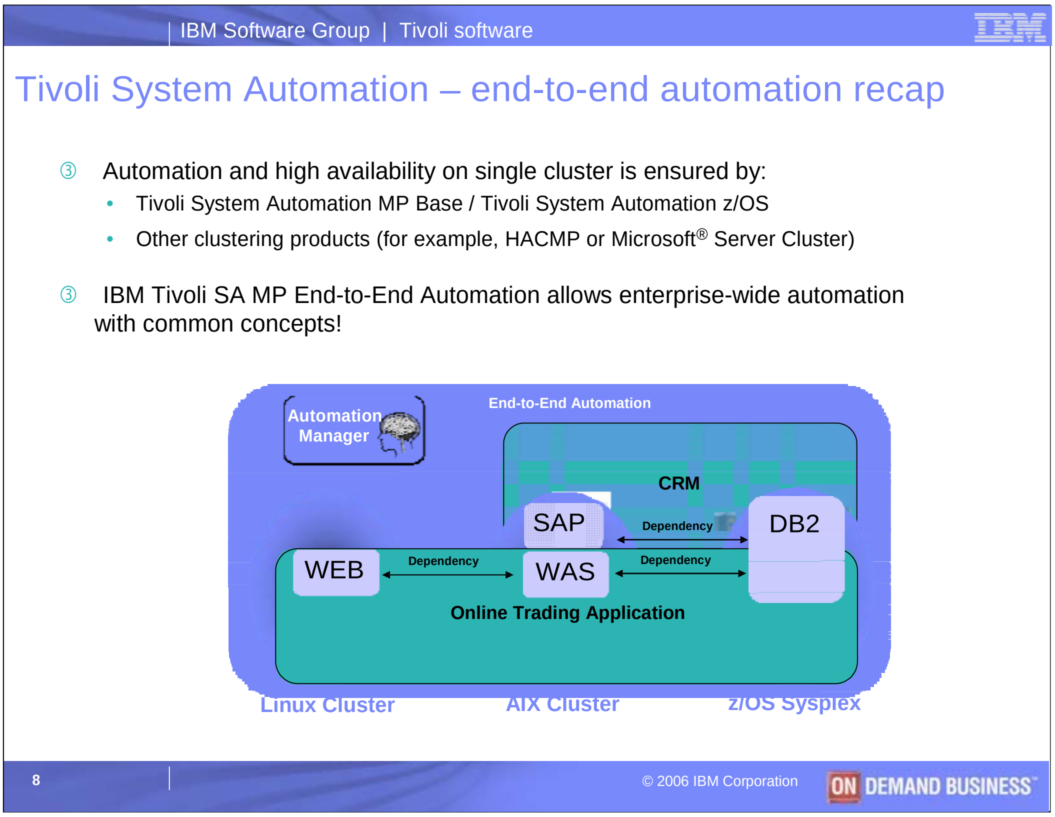
z/OS Sysplex

That’s why the Tivoli System Automation team stepped up to the challenge of “end-to-end” automation. Since September 2005, Tivoli System Automation for Multiplatforms also offers an end-to-end automation component that addresses the needs shown in the last chart. This component provides automated operations and monitoring for application resources located on **diverse** platforms. This includes managing their inter-dependencies.

Today, Tivoli System Automation for Multiplatforms provides end-to-end automation management capabilities for applications running under Linux, Linux on the mainframe, IBM AIX, and IBM z/OS. And support for other major platforms is under development.

Its important to note that the end-to-end automation feature does **not** replace other “first-level” automation products. Instead it builds on them and what‘s already in place. Communicaton between the end-to-end automation component and a first-level automation product is done through an adapter, as shown here.

So let’s review these ideas once more…………



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## Tivoli System Automation – end-to-end automation recap

③ Automation and high availability on single cluster is ensured by:

- Tivoli System Automation MP Base / Tivoli System Automation z/OS
- Other clustering products (for example, HACMP or Microsoft® Server Cluster)

③ IBM Tivoli SA MP End-to-End Automation allows enterprise-wide automation with common concepts!

8

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**X Fact #1**: Business applications are becoming more and more complex.

**X Fact #2**: More and more application workloads are being split across different platforms.

**X Fact #3**: Complex applications and complex application environments **X** create availability problems that can tax the skill of operations personnel.

**X** The Tivoli System Automation family and support for end-to-end automation help put an end to much of that pain. Now you can implement and take advantage of resource automation for multi-tiered applications in a heterogeneous environment. In turn, this can help you reduce costs associated with maintaining application availability or costs of down time caused by operator errors or maintenance windows.

The gateway to end-to-end automation is the Operations Console. Isabell, please show us how it works.

# Operations Console – overview

③ One console to access **all** IBM Tivoli System Automation domains

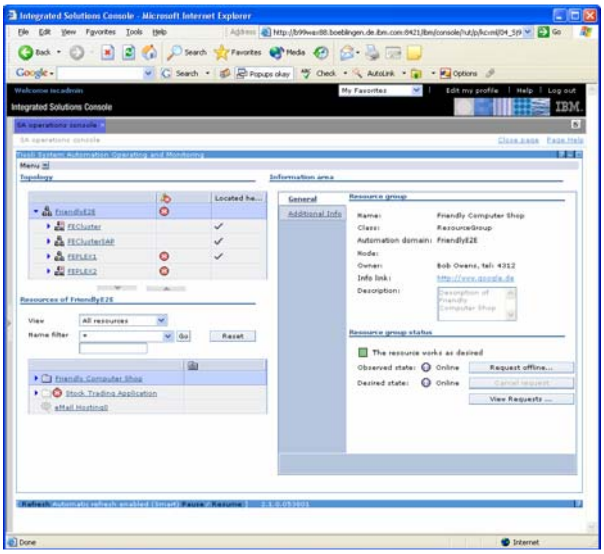
☞ Same look and feel while controlling resources on different platforms

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


Integrated Solutions Console - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://b99wax88.boeblingen.de.ibm.com:8421/ibm/console/?ut/p/kcxml/04_Sj9
Go
Back Search Favorites Media
Google Search Popups okay Check AutoLink Options
Welcome iscadmin
My Favorites
Edit my profile | Help | Log out
Integrated Solutions Console
IBM.
SA operations console
Close page Page Help
Tivoli System Automation Operating and Monitoring
Menu
Topology
Located he...
FriendlyE2E
FECluster
FEClusterSAP
FEPLEX1
FEPLEX2
Resources of FriendlyE2E
Information area
General
Additional Info
Resource group
Resource group status
Request offline...
Cancel request
View Requests ...
Refresh Automatic refresh enabled (Smart) Pause / Resume
Done
Internet

View: All resources

Name filter: *

Go Reset

Friendly Computer Shop

Stock Trading Application

eMail Hosting0

Name: Friendly Computer Shop

Class: ResourceGroup

Automation domain: FriendlyE2E

Node:

Owner: Bob Owens, tel: 4312

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

Description: Description of Friendly Computer Shop

🟩 The resource works as desired

Observed state: ○ Online

Desired state: ○ Online

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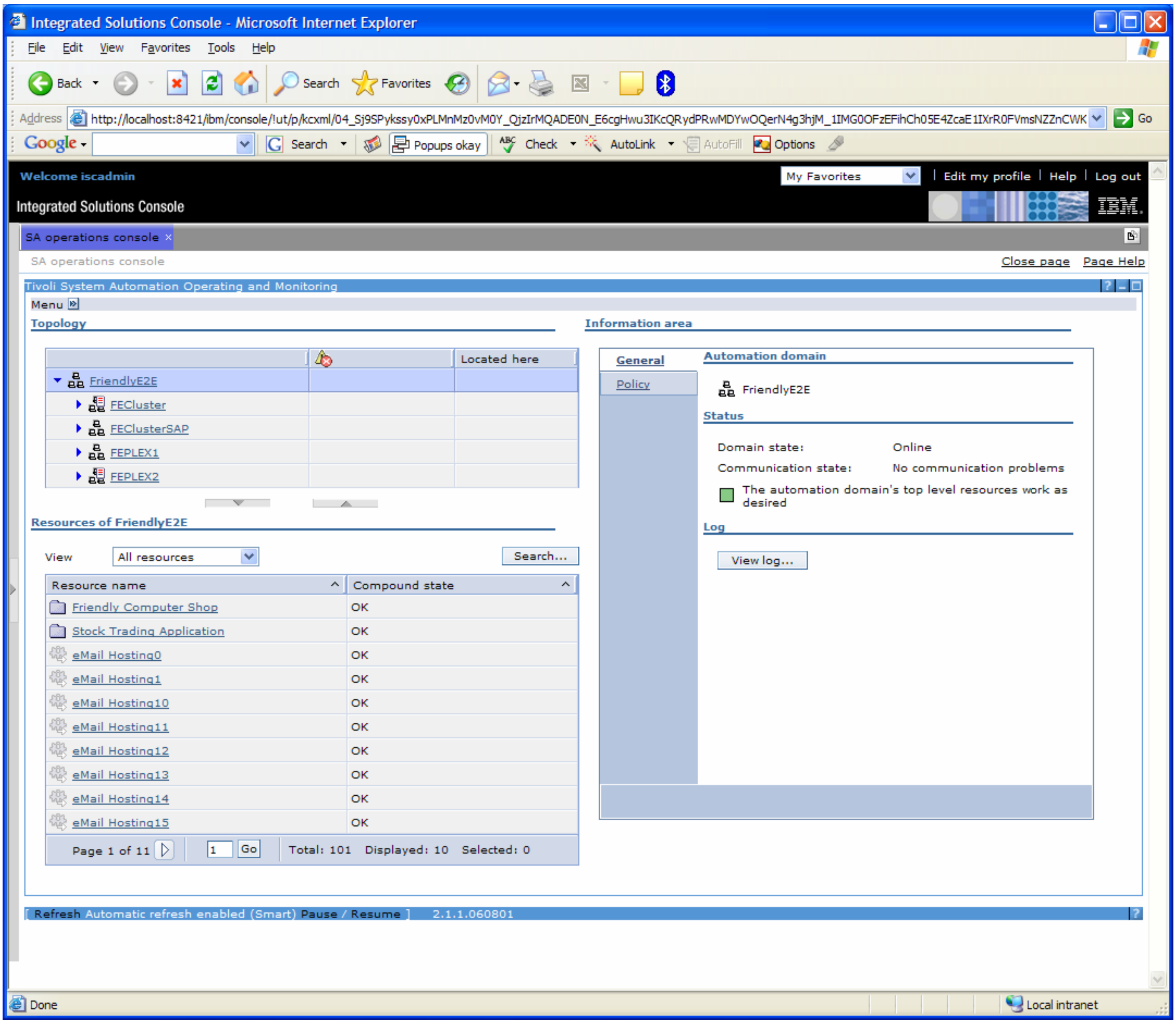
The Tivoli System Automation Operations Console is the "hub" for automated operations and monitoring of applications in a heterogeneous environment. Normally installed on a separate server, the console is Web-based and designed to provide easy and efficiently support of the end-to-end landscape.


Integrated Solutions Console - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://localhost:8421/ibm/console/!ut/p/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzIrMQADE0N_E6cgHwu3IKcQRydPRwMDYwOQerN4g3hjM_1IMG0OFzEFihCh05E4ZcaE1IXrR0FVmsNZZnCWK Go
Google Search Popups okay Check AutoLink AutoFill Options
Welcome iscadmin
My Favorites
Edit my profile | Help | Log out
Integrated Solutions Console
IBM.
SA operations console
Close page Page Help
Tivoli System Automation Operating and Monitoring
Menu
Topology
Information area
Done
Local intranet

| | | Located here |
|---|---|---|
| FriendlyE2E | | |
| FECluster | | |
| FEClusterSAP | | |
| FEPLEX1 | | |
| FEPLEX2 | | |

Resources of FriendlyE2E

View: All resources   Search...

| Resource name | Compound state |
|---|---|
| Friendly Computer Shop | OK |
| Stock Trading Application | OK |
| eMail Hosting0 | OK |
| eMail Hosting1 | OK |
| eMail Hosting10 | OK |
| eMail Hosting11 | OK |
| eMail Hosting12 | OK |
| eMail Hosting13 | OK |
| eMail Hosting14 | OK |
| eMail Hosting15 | OK |

Page 1 of 11   1 Go   Total: 101   Displayed: 10   Selected: 0

General | Policy

Automation domain

FriendlyE2E

Status

Domain state: Online

Communication state: No communication problems

🟩 The automation domain's top level resources work as desired

Log

View log...

[ Refresh Automatic refresh enabled (Smart) Pause / Resume ]   2.1.1.060801

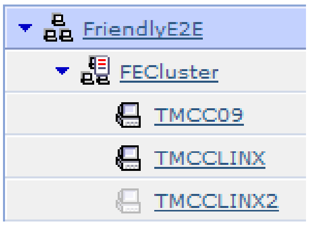
The Tivoli System Automation for Multiplatforms Operations Console is a web-based user interface that runs in the IBM Integrated Solutions Console. The Integrated Solutions Console, or short ISC, is a common framework for administrative console functions which is built on WebSphere Portal Server.

To access the Operations Console, all that is required on the client is a web browser. As the name says, the SA Operations Console, is the main console for the System Automation operator to perform daily operational tasks. For example, the operations console can be used to start or stop applications without the need to know their dependencies and without the need to have application- or operating system specific knowledge. Other typical operator tasks are: Monitoring the operational status of applications, diagnosing problems with automated applications, switching between configuration choices for applications, excluding nodes from automation for maintenance purposes, and more.

The SA operations console provides a common console to access all supported Tivoli System Automation domains. This means, the operator has a console with a common look and feel to access automated applications running on a z/OS Sysplex, AIX cluster or Linux cluster. In addition, the operations console displays an end-to-end automation domain for heterogeneous e-business applications spanning multiple clusters.

Now, let’s have a look at the layout of the main panel of the operations console:

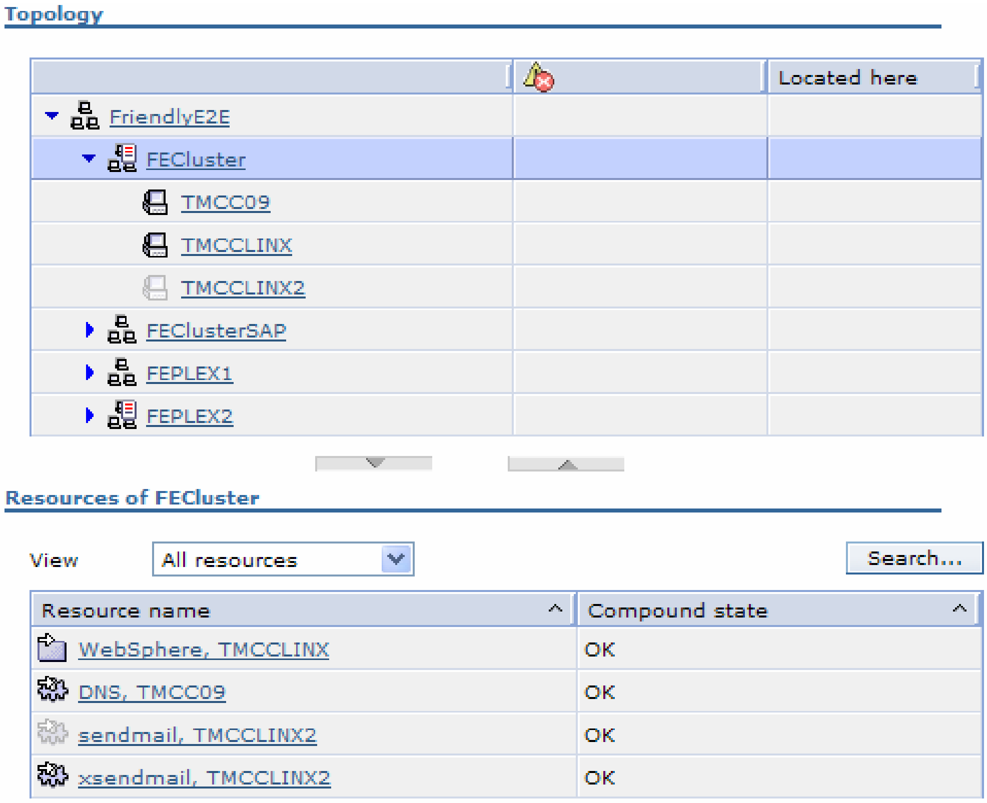
In the top left you can see the domain topology showing clusters and systems, including a logical end-to-end automation domain for cross-cluster e-business applications. This end-to-end automation domain is called “FriendlyE2E” in this example and is displayed as the root of the topology tree. Below this end-to-end automation domain you can see four so-called first level automation domains representing the real clusters. In this example we have two Linux Clusters and two z/OS Sysplexes. We can expand a cluster to see its systems, for example, if we expand FECluster, you can see that the cluster consists of three systems, where two are online and one is currently offline – as the greyed out icon shows.



- FriendlyE2E
  - FECluster
    - TMCC09
    - TMCCLINX
    - TMCCLINX2

The selection in the topology tree controls what is shown in the resource table below the domain topology. The resource table displays the automated resources for the currently selected domain or node. Currently the end-to-end automation domain FriendlyE2E is selected in the topology tree. Therefore the resource table displays the automated applications that have been defined for the end-to-end automation domain. In this example, there are two e-business applications “Friendly Computer Shop” and “Stock Trading Application” that consist of components running on multiple clusters and platforms.

Changing the selection in the topology tree, also changes the contents shown in the resource table. For example, if I select FECluster, the resource table shows the applications hosted within that cluster.



Topology

| | | Located here |
|---|---|---|
| FriendlyE2E | | |
| FECluster | | |
| TMCC09 | | |
| TMCCLINX | | |
| TMCCLINX2 | | |
| FEClusterSAP | | |
| FEPLEX1 | | |
| FEPLEX2 | | |

Resources of FECluster

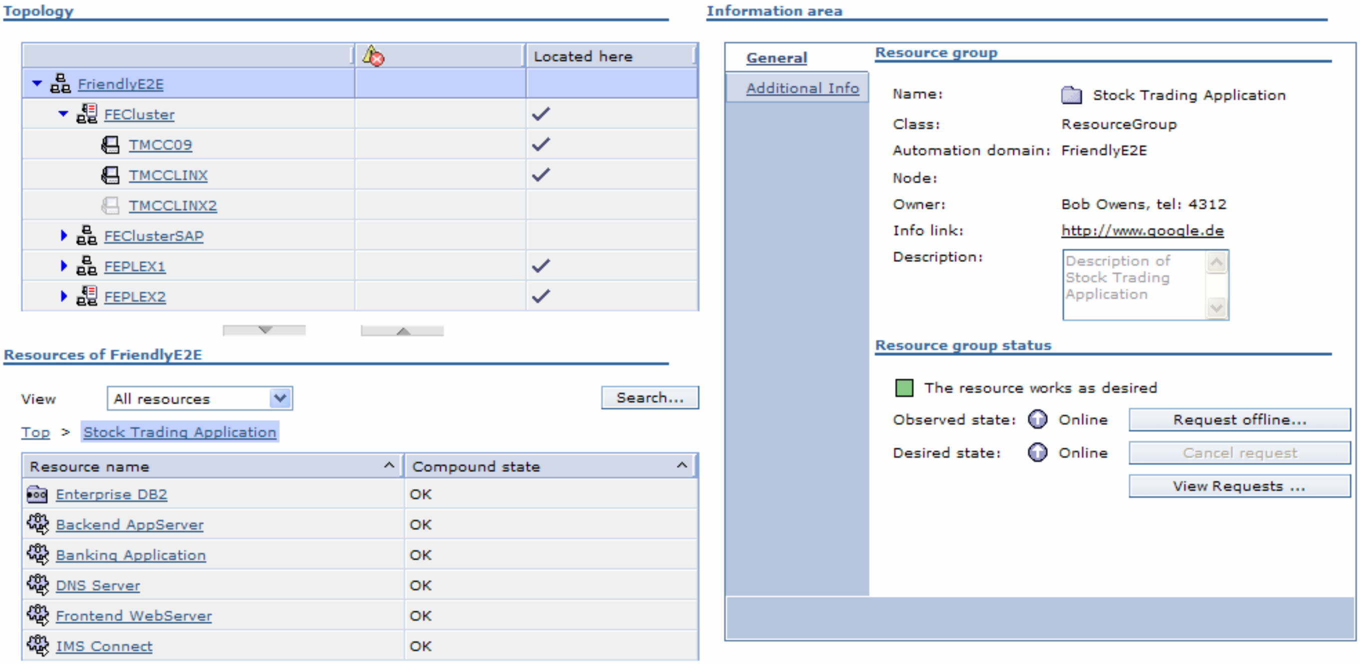
View: All resources

Search...

| Resource name | Compound state |
|---|---|
| WebSphere, TMCCLINX | OK |
| DNS, TMCC09 | OK |
| sendmail, TMCCLINX2 | OK |
| xsendmail, TMCCLINX2 | OK |

Again, notice that the icon immediately shows whether an application is online or offline.

Now, let's switch back to the end-to-end domain and have a closer look at the automated e-business applications. To get more information about a particular resource, an operator can select it in the resource table. As the icon shows, "Stock Trading Application" is a group that consists of several sub-components that make up the e-business application "Stock Trading Application". Let's select it:



Topology

| | | Located here |
|---|---|---|
| FriendlyE2E | | |
| FECluster | | ✓ |
| TMCC09 | | ✓ |
| TMCCLINX | | ✓ |
| TMCCLINX2 | | |
| 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

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

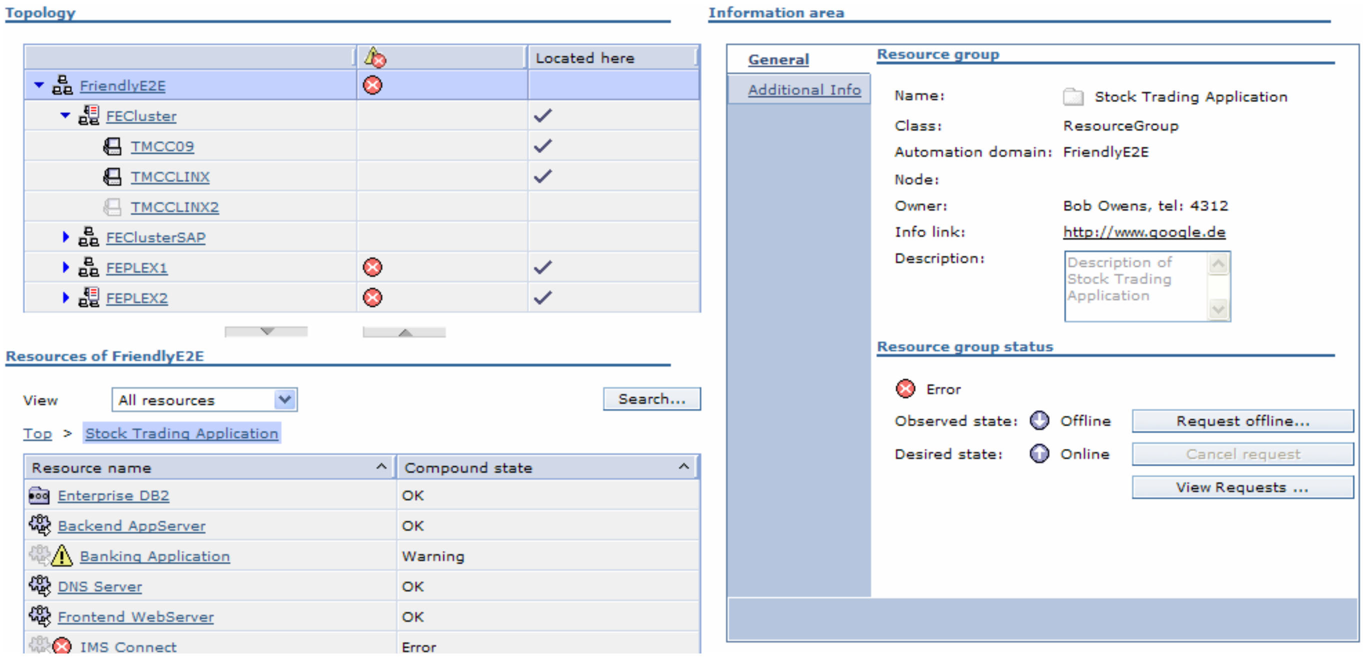
Note the following:

- The resource table now shows the sub-components belonging to the "Stock Trading Application"
- A bread-crumb trail above the resource table displays the current context
- In the Topology tree's "Located here" column you can see on which clusters and systems the components of the "Stock Trading Application" are distributed
- The information area shows more details about the currently selected "Stock Trading Application"

Let's have a look at the information area. The information area always shows detailed information about the current selection. For example, it shows the exact name and class, as well as owner information and provides a hyperlink that can take an operator to further operational information about this resource. Besides that, a very important part is the status section. The status section shows the currently observed state of the resource – online, which means that the "Stock Trading Application" is currently up and running – and the desired state, which is the automation goal that has been defined in the automation policy. Above these two states the status section shows summary information, also called a compound state, for the resource. Since the observed state matches the desired state, the summary says that the resource works as desired and a green icon is shown.

Now, let's have a look at a couple of scenarios showing how an operator can work with the System Automation operations console:

First we will look at a problem analysis scenario. The operations console automatically displays errors and warnings when they are detected by System Automation:



Topology

| | ⚠ | Located here |
|---|---|---|
| FriendlyE2E | ⊗ | |
| FECluster | | ✓ |
| TMCC09 | | ✓ |
| TMCCLINX | | ✓ |
| TMCCLINX2 | | |
| 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 — Additional Info

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

⊗ Error

| | | |
|---|---|---|
| Observed state: | Offline | Request offline... |
| Desired state: | Online | Cancel request |
| | | View Requests ... |

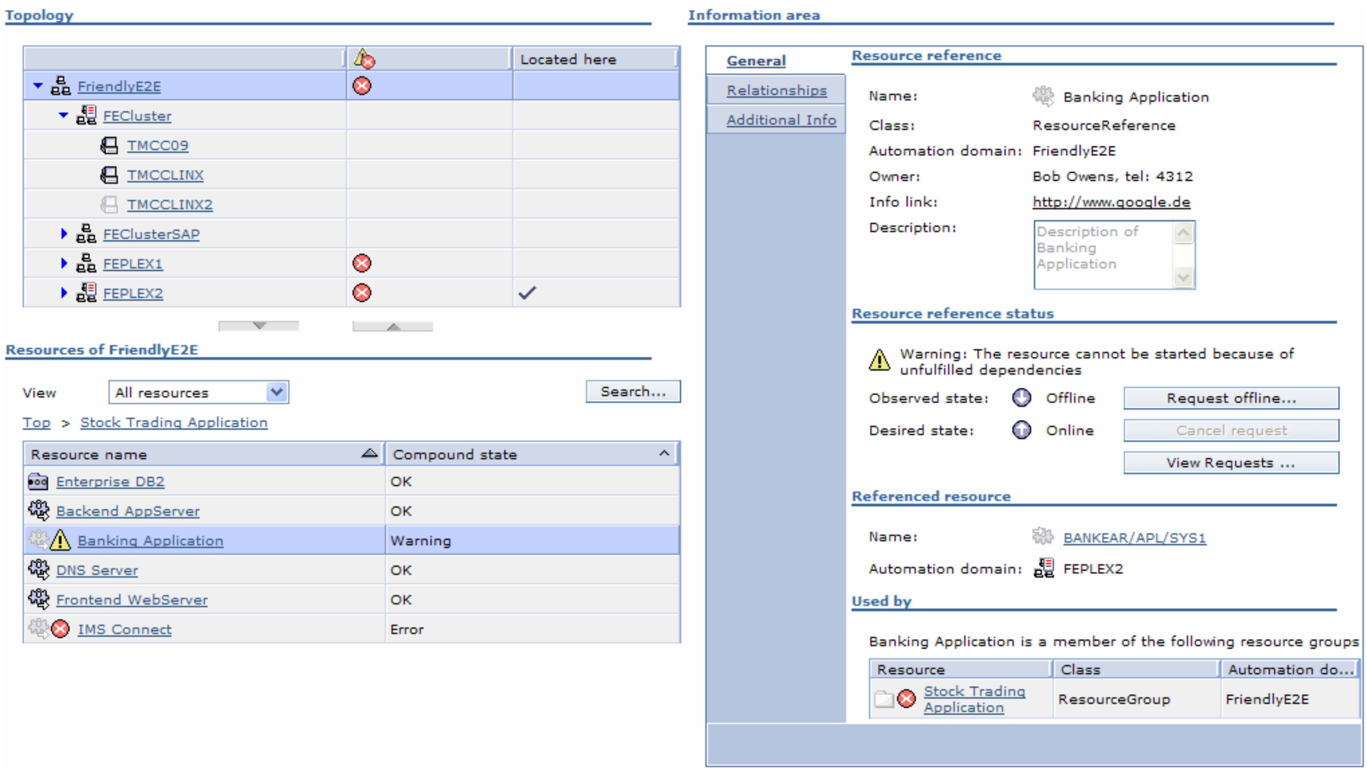
If the operation console is notified about state changes, it automatically triggers a refresh. As you can see there are a number of places where new errors and warnings have been reported:

In the domain topology you can see on a per domain basis which domain hosts applications with problems. This gives the operator already a very high-level view of where problems exist.

Then, of course, in the resource table you can see the problems using an additional icon next to each resource signaling a problem. Besides the icon, there is also the Compound state column, which gives textual information about the severity of the problem.

As you can see, the “Stock Trading Application” signals an error. If we look at its components we can see that both the “Banking Application” and the “IMS Connect” resources are currently offline with the “Banking Application” signalling a Warning and “IMS Connect” signalling an Error. The remaining components of the “Stock Trading Application” are still OK and up and running.

Now, let’s select the “Banking Application” to understand why it went offline.



Topology

| | ⚠ | Located here |
|---|---|---|
| ▼ FriendlyE2E | ⊗ | |
| ▼ FECluster | | |
| TMCC09 | | |
| TMCCLINX | | |
| TMCCLINX2 | | |
| ▶ 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 | Relationships | Additional Info

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  Request offline...
Desired state: Online  Cancel request
View Requests ...

Referenced resource

Name: BANKEAR/APL/SYS1
Automation domain: FEPLEX2

Used by

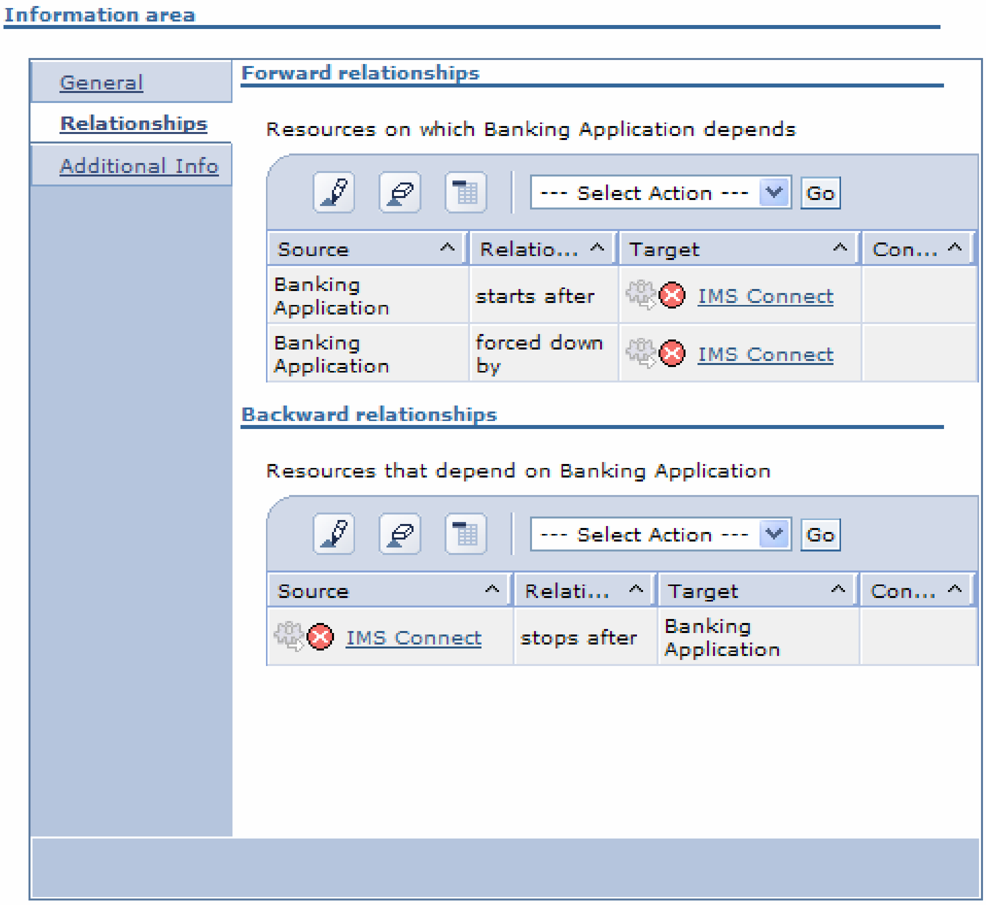
Banking Application is a member of the following resource groups

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

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.

The information area shows all details about the selected resource.

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:



Forward relationships

Resources on which Banking Application depends

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

Backward relationships

Resources that depend on Banking Application

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

Here you can see 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? 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”.

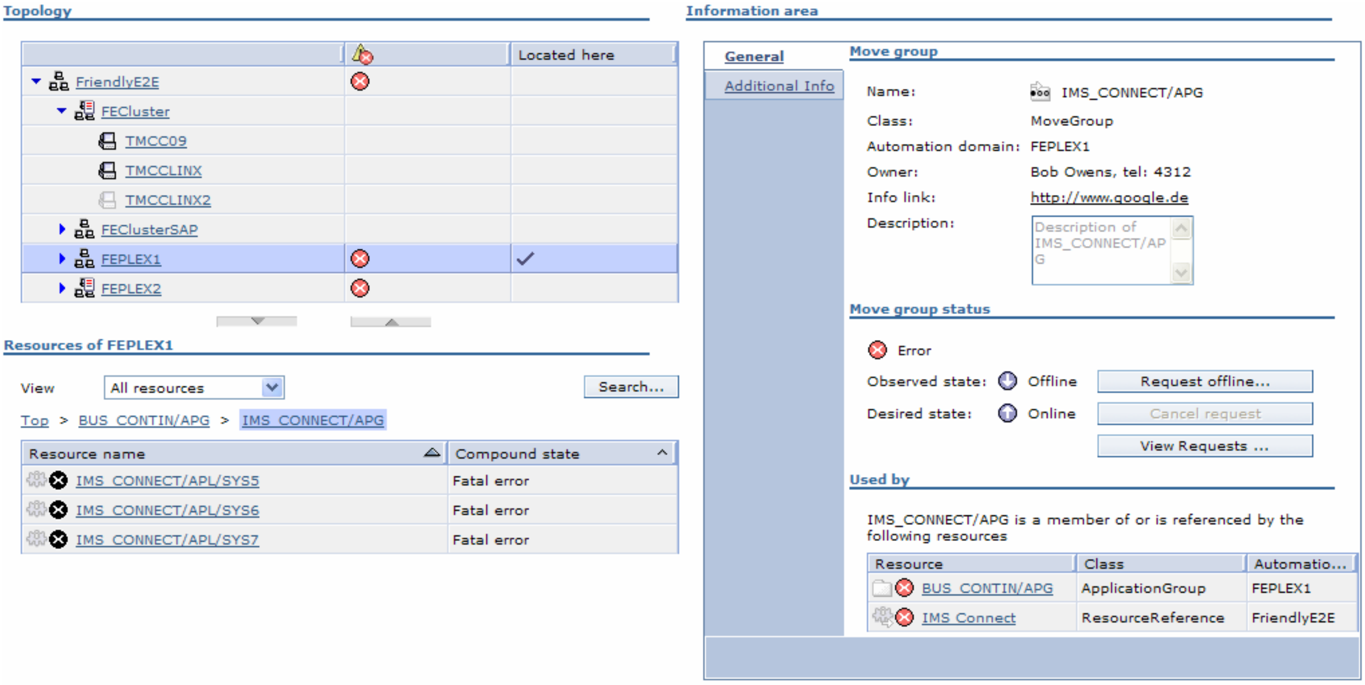
Note that “IMS Connect” and “Banking Application” are hosted on two different clusters, so this is true cross-cluster automation.

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. This is why the “Banking Application” issued the warning that it cannot be started because of unfulfilled dependencies.

Now, let’s go to the resource that actually has the error, “IMS Connect”. We can either use the link in the Relationships tab or select it in the resource table. Now “IMS Connect” is selected and we can switch back to the General page to view its detailed status information.

Again, we first look at the summary information in the status section. There it says, “The referenced resource is in an error state”. The actual resource providing the “IMS Connect” service is located within a first-level cluster and is called referenced resource.

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



| | ⚠ | Located here |
|---|---|---|
| FriendlyE2E | ⊗ | |
| FECluster | | |
| TMCC09 | | |
| TMCCLINX | | |
| TMCCLINX2 | | |
| FEClusterSAP | | |
| FEPLEX1 | ⊗ | ✓ |
| FEPLEX2 | ⊗ | |

Resources of FEPLEX1

View: All resources

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 |

Move group

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

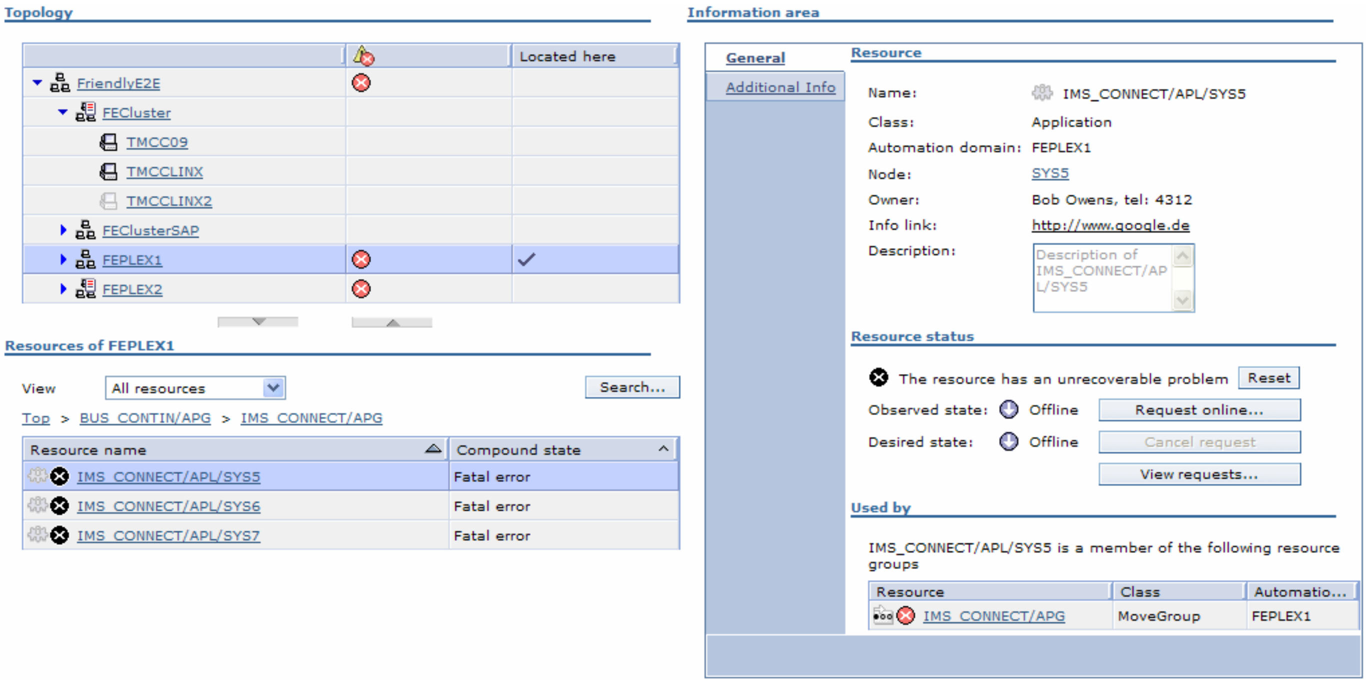
IMS_CONNECT/APG is a member of or is referenced by the following resources

| 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. The operator gets the same presentation for his automated applications, independent of the underlying operating system or automation product and can seamlessly navigate between the various domains or, as we have seen, from an end-to-end scope down to a first-level automation domain.

IMS_CONNECT has been made highly available using three IMS Connect instances, where each instance is 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 you can see in the resource table, all IMS_CONNECT instances show fatal errors. So, there was no instance left to failover to. This is the reason why this error has propagated up to the end-to-end level impacting the “Stock Trading Application”. Let’s select the first instance – IMS_CONNECT on SYS5



|  |  | Located here |
|---|---|---|
| FriendlyE2E | ⊗ |  |
| FECluster |  |  |
| TMCC09 |  |  |
| TMCCLINX |  |  |
| TMCCLINX2 |  |  |
| FEClusterSAP |  |  |
| FEPLEX1 | ⊗ | ✓ |
| FEPLEX2 | ⊗ |  |

View: All resources

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 |

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

The resource has an unrecoverable problem
Observed state: Offline
Desired state: Offline

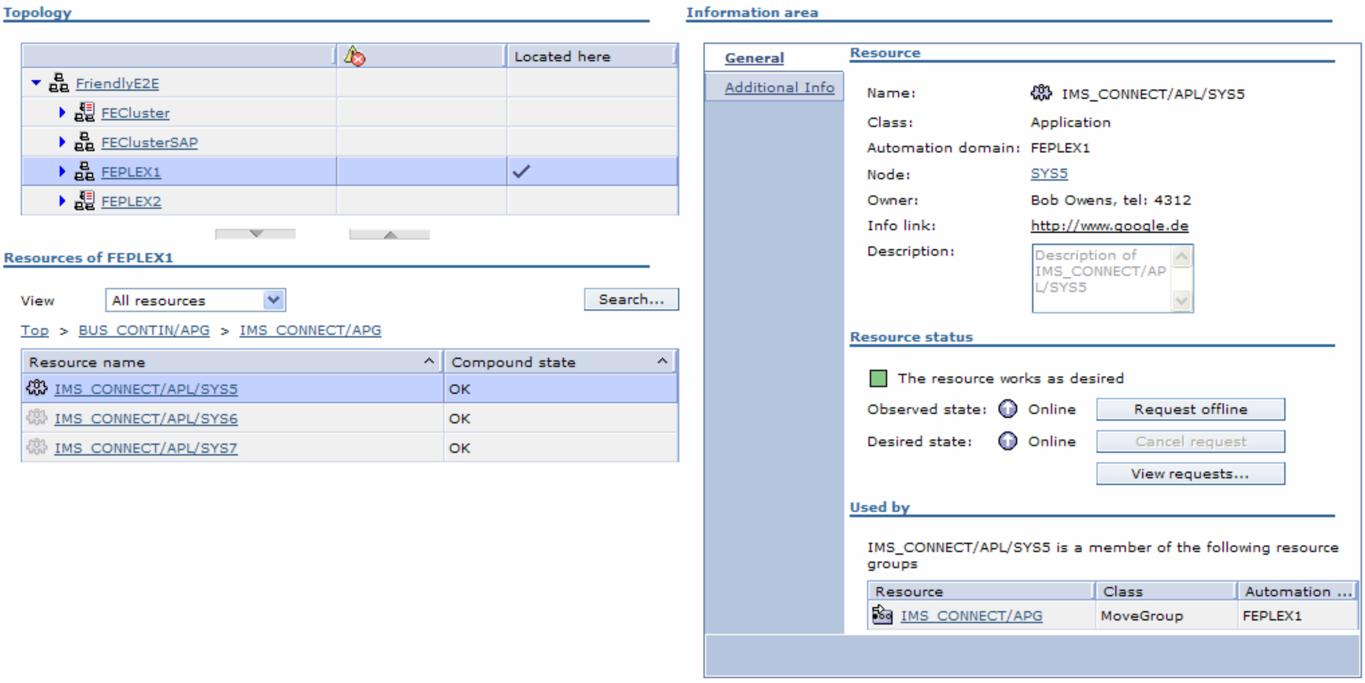
IMS_CONNECT/APL/SYS5 is a member of the following resource groups

| 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 operator instructions that contain information on how to debug typical problems with this application, tasks how to fix common problems, what the service level agreements are, who the primary contacts are for problems with this application, and any other information that the customer's administrator wants to provide for this resource. 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.

When the actual problem with IMS_CONNECT has been fixed at the source, the operator needs to tell System Automation that the resource is operational again, so that System Automation will automate the resource again according to the automation policy. The operator can 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**

| | | Located here |
|---|---|---|
| ▾ FriendlyE2E | | |
| ▸ FECluster | | |
| ▸ FEClusterSAP | | |
| ▸ FEPLEX1 | | ✓ |
| ▸ FEPLEX2 | | |

**Resources of FEPLEX1**

View: All resources | Search...

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 | Additional Info

**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 | Request offline

Desired state: Online | Cancel request

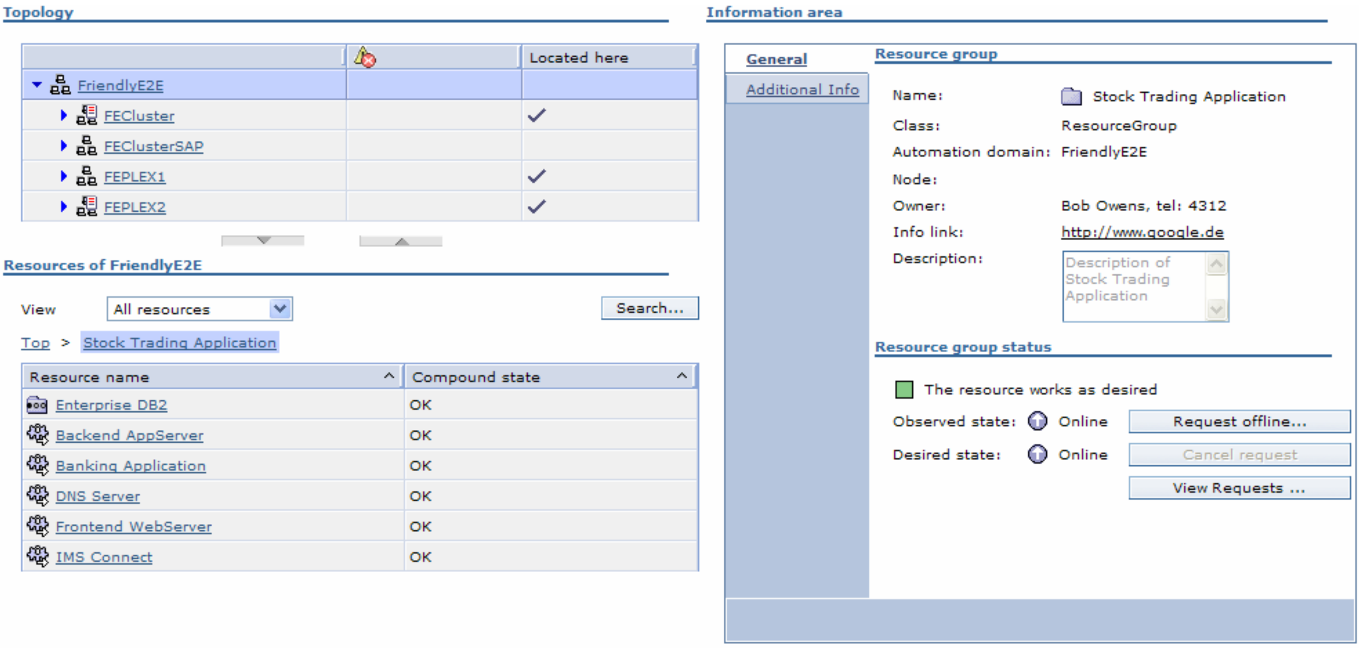
View requests...

**Used by**

IMS_CONNECT/APL/SYS5 is a member of the following resource groups

| Resource | Class | Automation ... |
|---|---|---|
| IMS_CONNECT/APG | MoveGroup | FEPLEX1 |

As you can see, there are no more problems visible within the FEPLEX1 sysplex and IMS_CONNECT is online on SYS5. Now let’s have a look at the “Stock Trading Application” in the end-to-end automation domain:



**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 | OK |
| DNS Server | OK |
| Frontend WebServer | OK |
| IMS Connect | OK |

**Information area**

General | Additional Info

**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 | Request offline...

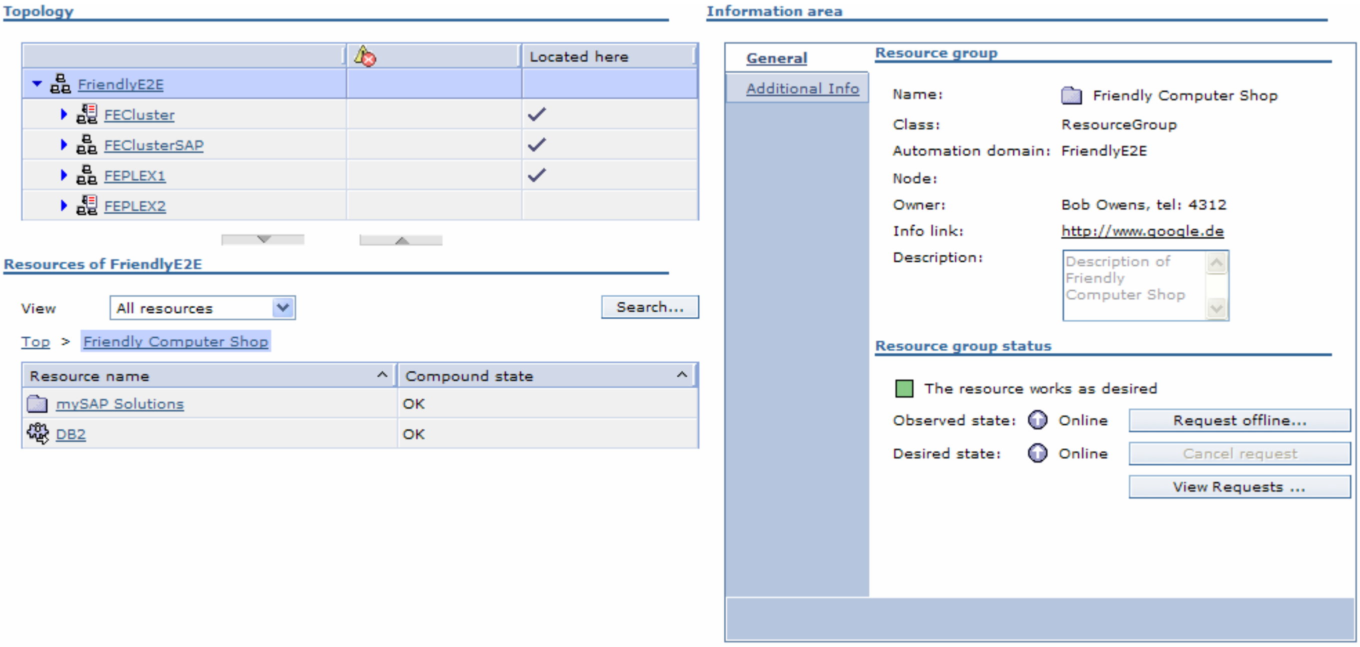
Desired state: Online | Cancel request

View Requests ...

As you can see, there are no more problems reported and both components that were offline previously, namely “IMS Connect” and “Banking Application”, are both 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.

In this scenario you have seen, how an operator can seamlessly navigate between multiple heterogeneous clusters, how you can drill down to the root of an application problem, 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 for the operator to remember relationships between application components or the need to have platform specific knowledge.

Let's have a look at another scenario, where an operator will shutdown an application component, which is distributed across multiple clusters, for maintenance purposes. A click on "Top" will show all top-level e- business applications available in the FriendlyE2E domain again. Now, let's look at the "Friendly Computer Shop" application group:



Topology

| | | Located here |
|---|---|---|
| FriendlyE2E | | |
| FECluster | | ✓ |
| FEClusterSAP | | ✓ |
| FEPLEX1 | | ✓ |
| FEPLEX2 | | |

Resources of FriendlyE2E

View: All resources
Top > Friendly Computer Shop

| Resource name | Compound state |
|---|---|
| mySAP Solutions | OK |
| DB2 | OK |

Information area

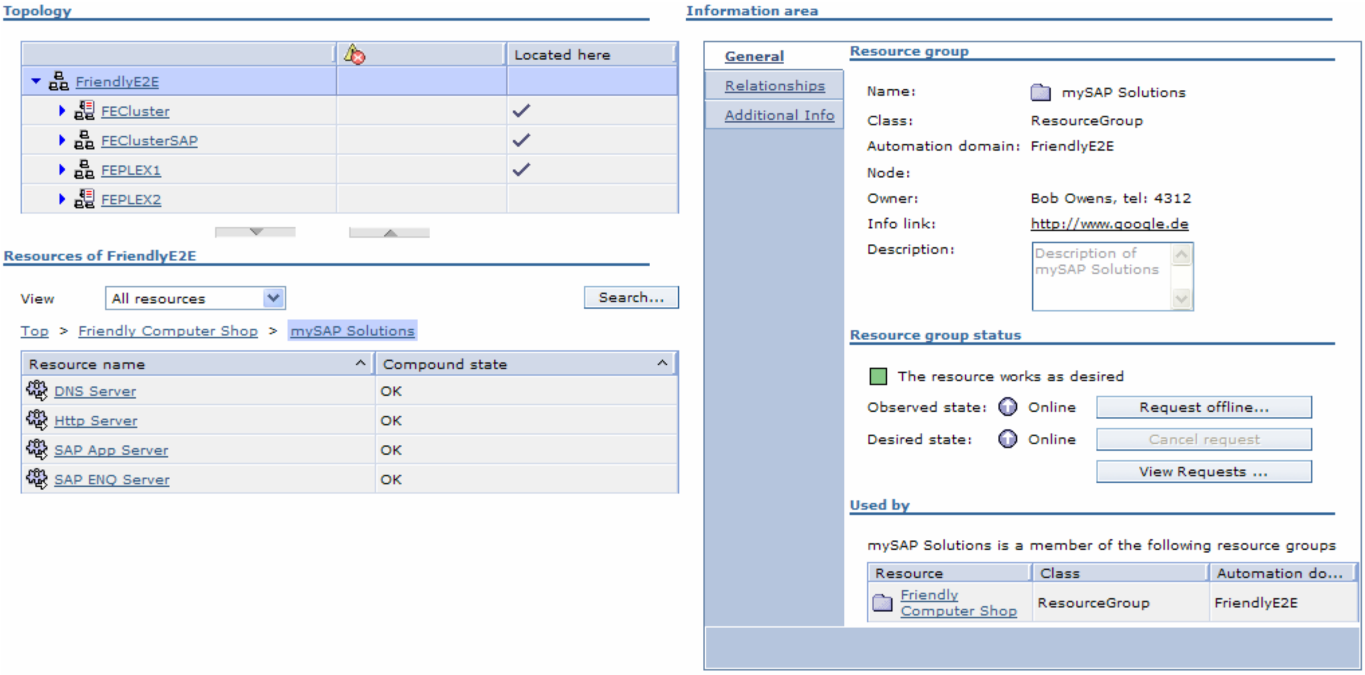
Resource group

Name: Friendly Computer Shop
Class: ResourceGroup
Automation domain: FriendlyE2E
Node:
Owner: Bob Owens, tel: 4312
Info link: http://www.google.de
Description: Description of Friendly Computer Shop

Resource group status

🟩 The resource works as desired
Observed state: Online
Desired state: Online

The "Friendly Computer Shop" is an online shopping application based on SAP. As you can see, it consists of two components, "mySAP Solutions", which itself is a group consisting of sub-components, and a DB2 database. In the "Located here" column you can see that the "Friendly Computer Shop" is a heterogeneous e- business application which is distributed across three clusters. Now, let's assume that we need to apply service to the database component of "Friendly Computer Shop". During this service period, the "SAP Solution" should be shut down. Therefore, the operator selects "mySAP Solutions":



**Topology**

| | | Located here |
|---|---|---|
| FriendlyE2E | | |
| FECluster | | ✓ |
| FEClusterSAP | | ✓ |
| FEPLEX1 | | ✓ |
| FEPLEX2 | | |

**Resources of FriendlyE2E**

View: All resources

Top > Friendly Computer Shop > mySAP Solutions

| Resource name | Compound state |
|---|---|
| DNS Server | OK |
| Http Server | OK |
| SAP App Server | OK |
| SAP ENQ Server | OK |

**Information area**

**Resource group**

Name: mySAP Solutions
Class: ResourceGroup
Automation domain: FriendlyE2E
Node:
Owner: Bob Owens, tel: 4312
Info link: http://www.google.de
Description: Description of mySAP Solutions

**Resource group status**

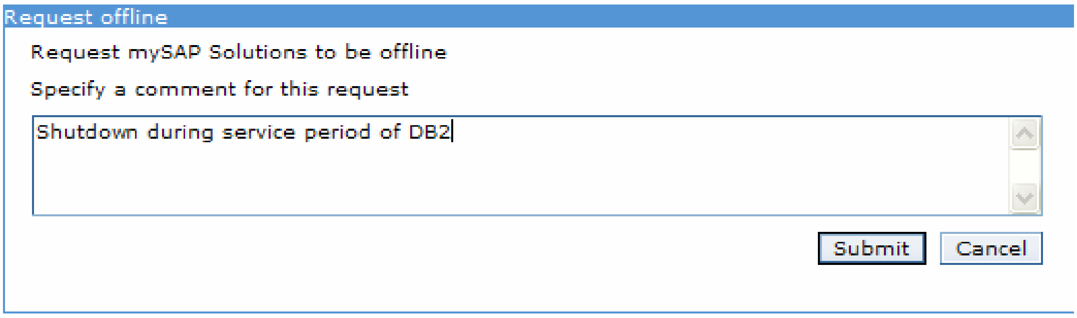
🟩 The resource works as desired
Observed state: Online
Desired state: Online

**Used by**

mySAP Solutions is a member of the following resource groups

| Resource | Class | Automation do... |
|---|---|---|
| Friendly Computer Shop | ResourceGroup | FriendlyE2E |

The resource table now shows the components belonging to “mySAP Solutions”, which are distributed across three different clusters, and the information area shows its details. In the status section you can see that “mySAP Solutions” is currently online. There you can also find the “Request offline” button, which can be used to stop “mySAP Solutions”. The operator now clicks on “Request offline”. A new panel appears that can be used to enter a comment, telling other users why “mySAP Solutions” is shut down:



Request offline

Request mySAP Solutions to be offline

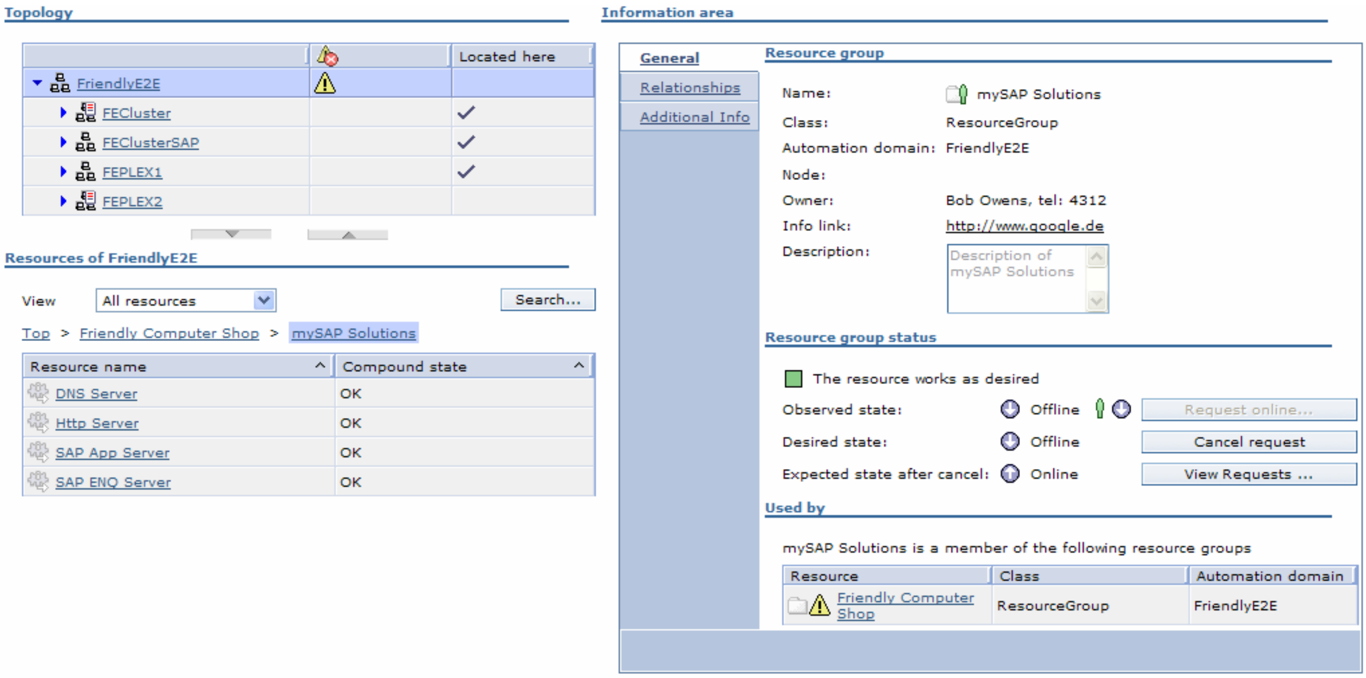
Specify a comment for this request

Shutdown during service period of DB2

After a comment has been entered, press Submit to tell the automation manager to initiate a shutdown of “mySAP Solutions” and all its sub-components.

A message appears that confirms that the request has been submitted successfully. Now the automation manager will shut down all components belonging to “mySAP Solutions”, which are distributed across multiple clusters, in the correct order. The operator does not need to know the relationships between the application components and how exactly the individual components are stopped – the automation handles all this.

After some time all components of “mySAP Solutions” are successfully stopped by the automation. The icons in the resource table show that all components are offline. In the information area for “mySAP Solutions” you can see an icon showing that an offline request has been submitted by an operator against this resource ( ):



Topology

| | | Located here |
|---|---|---|
| FriendlyE2E | ⚠ | |
| FECluster | | ✓ |
| FEClusterSAP | | ✓ |
| FEPLEX1 | | ✓ |
| FEPLEX2 | | |

Resources of FriendlyE2E

View: All resources

Top > Friendly Computer Shop > mySAP Solutions

| Resource name | Compound state |
|---|---|
| DNS Server | OK |
| Http Server | OK |
| SAP App Server | OK |
| SAP ENQ Server | OK |

Information area

Resource group

Name: mySAP Solutions

Class: ResourceGroup

Automation domain: FriendlyE2E

Node:

Owner: Bob Owens, tel: 4312

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

Description: Description of mySAP Solutions

Resource group status

🟩 The resource works as desired

Observed state: Offline

Desired state: Offline

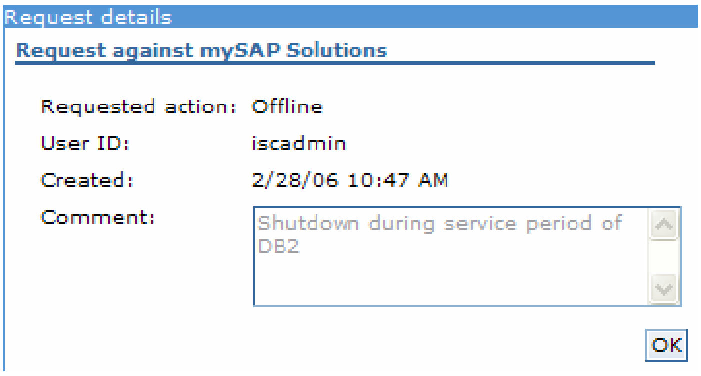
Expected state after cancel: Online

Used by

mySAP Solutions is a member of the following resource groups

| Resource | Class | Automation domain |
|---|---|---|
| ⚠ Friendly Computer Shop | ResourceGroup | FriendlyE2E |

Moving the mouse cursor over this icon provides a flyover help that displays the user id that has submitted this request. You can click on this icon to get even more details about the submitted request:



Request details

Request against mySAP Solutions

Requested action: Offline

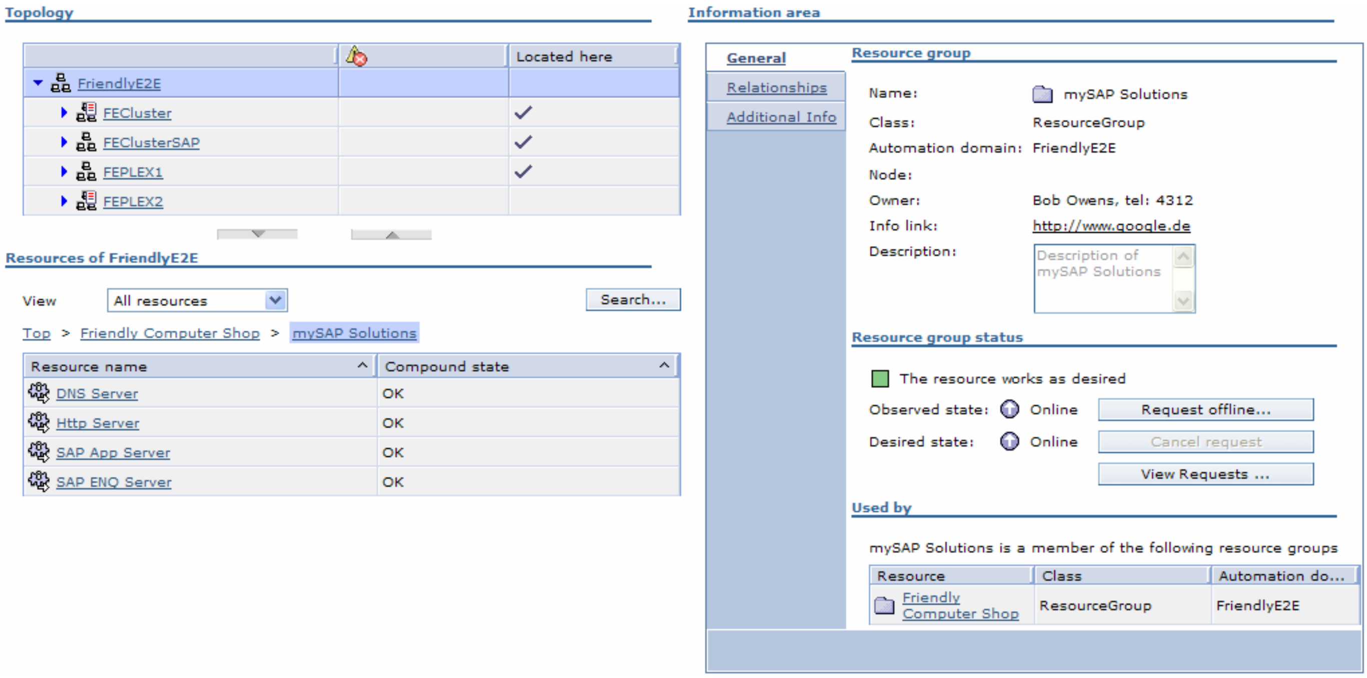
User ID: iscadmin

Created: 2/28/06 10:47 AM

Comment: Shutdown during service period of DB2

Here you can see the type of request, the user that submitted it, the date when it was submitted and in particular it shows the comment that has been entered, when the request was submitted.

As long as the offline request stays on “mySAP Solutions”, the automation will keep the SAP application including its sub-components offline. Once the service period is over, all the operator has to do is to cancel the offline request using the “Cancel request” button. This has the result that the automation manager will start up all components belonging to “mySAP Solutions” again, because this is the desired state that has been defined in the automation policy. Again, the operator does not need to know about a start-up sequence, specific start procedures, the location of the sub-components, or any other relationship between them. This is all handled by automation and the results will be automatically displayed in the operations console:



Topology

| | | Located here |
|---|---|---|
| FriendlyE2E | | |
| FECluster | | ✓ |
| FEClusterSAP | | ✓ |
| FEPLEX1 | | ✓ |
| FEPLEX2 | | |

Resources of FriendlyE2E

View: All resources

Top > Friendly Computer Shop > mySAP Solutions

| Resource name | Compound state |
|---|---|
| DNS Server | OK |
| Http Server | OK |
| SAP App Server | OK |
| SAP ENQ Server | OK |

Information area

Resource group

Name: mySAP Solutions
Class: ResourceGroup
Automation domain: FriendlyE2E
Node:
Owner: Bob Owens, tel: 4312
Info link: http://www.google.de
Description: Description of mySAP Solutions

Resource group status

🟩 The resource works as desired

Observed state: Online
Desired state: Online

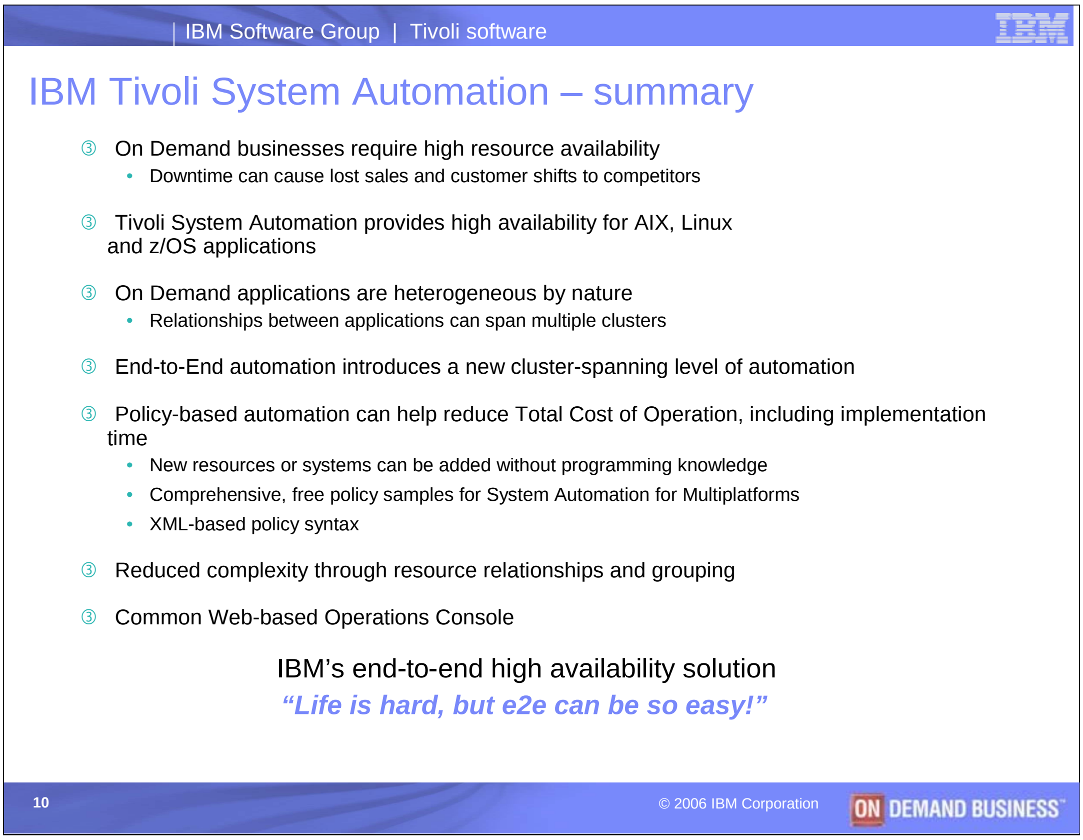
Used by

mySAP Solutions is a member of the following resource groups

| Resource | Class | Automation do... |
|---|---|---|
| Friendly Computer Shop | ResourceGroup | FriendlyE2E |

Using two typical operator scenarios you hopefully got an impression how to work with the System Automation operations console.

You have only seen a subset of all available functions. For example, you can also use the SA operations console to exclude whole systems from automation. This will move all workload away from that system. You can switch between application configuration choices defines in a so called choice group. You can activate and de-activate automation policies. You can search for resources by name or do a domain wide search for all resources with operator requests, and you can view automation logs to get a history of actions performed by the automation or to look for errors.



## IBM Tivoli System Automation – summary

- On Demand businesses require high resource availability
  - Downtime can cause lost sales and customer shifts to competitors
- Tivoli System Automation provides high availability for AIX, Linux and z/OS applications
- On Demand applications are heterogeneous by nature
  - Relationships between applications can span multiple clusters
- End-to-End automation introduces a new cluster-spanning level of automation
- Policy-based automation can help reduce Total Cost of Operation, including implementation time
  - New resources or systems can be added without programming knowledge
  - Comprehensive, free policy samples for System Automation for Multiplatforms
  - XML-based policy syntax
- Reduced complexity through resource relationships and grouping
- Common Web-based Operations Console

IBM’s end-to-end high availability solution

***“Life is hard, but e2e can be so easy!”***

Thanks very much, Isabell.

So to summarize: On demand businesses require high availability, and IBM Tivoli System Automation addresses pain points like:

•Application availability,

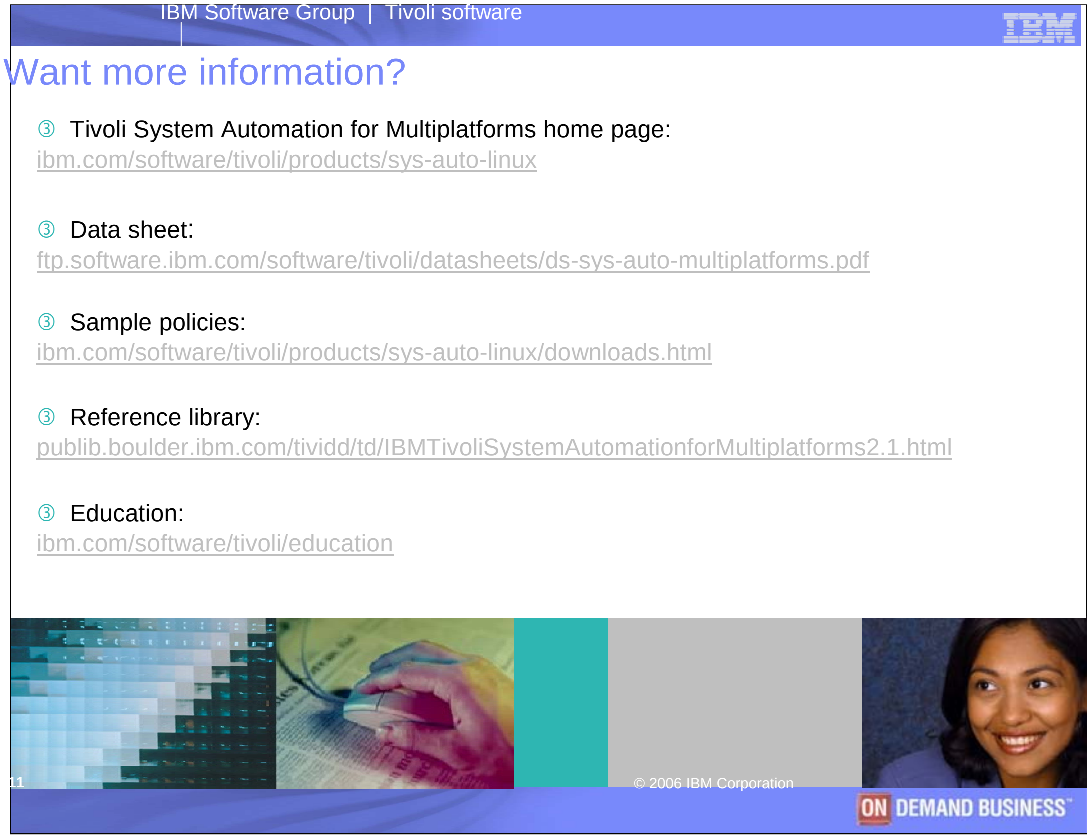
•Complexity and operations costs

•Automation implementation and maintenance costs

•Education requirements related to automation

•Rapid changes to an IT landscape

IBM Tivoli System Automation overcomes these problems through policy-based automation that supports grouping of resources and relationships. And it can do this in environments where applications run on diverse platforms. All of this is meant to help you to remain competitive, to be flexible and responsive, and to operate in a cost effective manner.


ON DEMAND BUSINESS

IBM Software Group | Tivoli software

# Want more information?

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

③ Data sheet:
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

③ Reference library:
publib.boulder.ibm.com/tividd/td/IBMTivoliSystemAutomationforMultiplatforms2.1.html

③ Education:
ibm.com/software/tivoli/education

11

For more information related to IBM Tivoli System Automation for Multiplatforms, please refer to the resources listed here. And as we’ve said, we’ll be offering you more in-depth sessions in the future.

Thanks for your interest!