<u>Tech Note 589</u> Common Application Server Redundancy Causes and Triggers

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Introduction

This *Tech Note* describes potential causes or triggers for a Wonderware Application Server Failover between redundant Application Engines. The SMC Log messages generated as a result of the failover are shown for each scenario.

Understanding the potential causes or triggers of a failover helps to answer the following questions. Answering these questions can result in better uptime and reduce negative impact to failovers in production environments.

- 1. How many times did a failover occur in my Galaxy?
- 2. What caused or triggered the Failover?

Application Versions

· Wonderware Application Server 3.0 SP2 and later

Key SMC Messages

Cause	Log Message
Engine goes into Standby mode.	Waiting for a redundancy status from the ObjectSyncMgr
Engine is manually failed over or undeployed.	< <i>EngineName</i> > is shutting down objects that are deployed to it.
	Logger Started.
Engine is rebooted or powered on.	 The Bootstrap service is starting The NmxSvc service is running.
	Note: Cross-reference the MS Event Viewer System Log for confirmation that the machine was rebooted.

In SMC: . ResolvelPAddr couldn't resolve IP [RMC Server IP Address]. It has a valid format but cannot be resolved. Engine cannot communicate to its redundant partner Engine . Platform [X] exceeded maximum heartbeats timeout of <configured timeout=""> ms. . The configured number of consecutive heartbeats have been missed by engine <x> over the secondary message channel from partner <platform [x]="" [y].="" engine=""> In SMC: . This process failed to send heartbeat and it exceeds maximum WatchdogFault This process will be restarted as a redundant engine. . This process failed to send heartbeat and it exceeds maximum WatchdogFault This process will be restarted as a redundant engine. . ManageRedundantProcess Process [Process ID] seems to be not responding. It has a status 12. It hasn't notified the process form for the secondary former secondary for the secondary former secondary for the secondar</platform></x></configured>		
In SMC: Engine does not respond to the ArchestrA Watchdog. It may be automatically restarted to recover the aaEngine.exe process, and started redundantly if it belongs to a . ManageRedundantProcess Process [Process ID] seems to be not responding. It has a status 12. It hasn't notified the	Engine cannot communicate to its redundant partner Engine	 In SMC: ResolveIPAddr couldn't resolve IP [RMC Server IP Address]. It has a valid format but cannot be resolved. Platform [X] exceeded maximum heartbeats timeout of <configured timeout=""> ms.</configured> The configured number of consecutive heartbeats have been missed by engine <<i>X</i>> over the secondary message channel from partner <platform [x]="" [y].="" engine=""></platform>
Engine does not respond to the ArchestrA Watchdog. It may be automatically restarted to recover the aaEngine.exe process, and started redundantly if it belongs to a • ManageRedundantProcess Process [Process ID] seems to be not responding. It has a status 12. It hasn't notified the		In SMC:
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Engine does not respond to the ArchestrA Watchdog. It may be automatically restarted to recover the aaEngine.exe process, and started redundantly if it belongs to a	 This process failed to send heartbeat and it exceeds maximum WatchdogFault This process will be restarted as a redundant engine. ManageRedundantProcess Process [Process ID] seems to be not responding. It has a status 12. It hasn't notified the

How Many Times Did a Failover Occur?

The best way to count the number of failovers takes some preparation since there is no default "Failover Counter."

You must create a script for each redundant Engine. Create the scripts in an object that writes a message to the SMC Log every time the **Redundancy.Identity** attribute of its hosting engine changes between the Primary and Backup states.

ex: 90000] ms to be considered responsive.

Click here to download a zipped file that contains

- \$FailoverObject.aaPKG object that contains a sample script.
- Object Viewer Watch file that lists common attributes used to monitor Redundant Engine Status.

Note: This script is a working example and will not meet your specific needs. It is included so you can customize it for your particular environment.

To use the object

• Derive a new object instance and place it under an area hosted by a redundant Engine in your plant model. The object will automatically capture redundant-related attributes, and dump them to the SMC log during a failover or deployment.

To use the watchlist file

- 1. Open the watch list file with Notepad.
- 2. Use the Find/Replace feature to rename **AppEngine_Test_001** to the actual name of an engine in your galaxy.
- 3. Save and close the file.

4. Open ObjectViewer and then open the new watch window by pointing to the updated watchlist file.

The final result should look similar to this screenshot. This assumes that you have a deployed instance of the **\$Failover** object called **FailoverObject_001**.

AttributeReference	Value
AppEngine_Test_001.Engine.StartupReason	Starting_AfterDeploy
AppEngine_Test_001.Engine.StartingFromCheckpoint	false
· · · · · · · · · · · · · · · · · · ·	No Data
AppEngine_Test_001.Redundancy.FailoverOccurred	false
AppEngine_Test_001.Redundancy.FailoverOccurred.Condition	false
AppEngine_Test_001.Redundancy.FailoverOccurred.Desc	
	No Data
AppEngine_Test_001.Redundancy.PartnerStatus	Unknown
AppEngine_Test_001.Redundancy.PartnerPlatform	
AppEngine_Test_001.Redundancy.Identity	Primary
AppEngine_Test_001.Redundancy.Status	Active - Standby not Available
	No Data
AppEngine_Test_001.Redundancy.ForceFailoverCmd	false
FailoverObject_001.DebugLevel	0

Figure 1: Watchlist in Object Viewer

What Causes or Triggers a Failover?

A failover occurs when the Standby Engine in a redundant configuration can no longer communicate with the Active Engine of its redundant partner. It is important to note the significance of the wording in the above sentence. The **hearbeat** mechanism that is constantly monitored across the RMC Chanel is between **Application Server Engines** and not just the physical availability of the Server hardware.

For example, a redundant Platform server can be up and running, and even the network is running. The **Active** Redundant Engine is overloaded with Scan Overruns and does not respond in time to hearbeat requests from its redundant partner.

This condition triggers a failover condition and the Standby engine goes to Active.

Other variables could also effect this scenario, such as network communication issues or an unresponsive server due to faulty or starving resources (hard drive space, memory and CPU).

Failover Scenario Examples

The following scenarios include these elements:

- All scenarios start with the Active Partner.
- The Active Partner is **GR Platform** and the Standby Partner is **Remote Platform**.
- The GR Platform Server Name is: WWNESTEST (This is a Windows 2003 R2 SP2 OS)

Note: The Operating Systems used in this *Tech Note* are different from one another (Win2003 vs WinXP). This is for illustration purposes only. Best Practice dictates to always use the same OS between redundancy-enabled engines.

Logging the Manual Force Failover Set

On the GR Node, a manual force failover is initiated by setting the engine attribute [Engine_Name]. Redundancy.ForceFailoverCmd to TRUE.

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No:	Date	Time	Pr	Th	10	Component	Message	
294	3/26/2009	2:59:22 PM	700	2192	Mark	Log Viewer	Mark	
295	3/26/2009	3:01:21 PM	2880	2576	Info	AppEngine_Test_001.AppEnginePrimitive	AppEngine_Test_001 is shutting down objects that are deployed to it	
296	3/26/2009	3:01:21 PM	2880	2576	Info	AppEngine_Test_001.AppEnginePrimitive	AppEngine_Test_001 has shutdown all objects that are deployed to it	
297	3/26/2009	3:01:21 PM	2880	2576	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is finishing as an Active engine with status <2: Engine Swit	
298	3/26/2009	3:01:21 PM	2880	2576	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" has shutdown	
299	3/26/2009	3:01:22 PM	2880	2576	Info	AppEngine_Test_001.aaEngine	Exiting process "aaEngine"	
300	3/26/2009	3:01:22 PM	3120	1788	Info	aaEngine	Entering process "aaEngine" Version 2859.0143.0070.0000 Built on Jun 13 2008 18:15:13	
301	3/26/2009	3:01:22 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	aaEngine process is starting with the command line: " CheckpointPath=,ClsId={BE4A11B6-86C2-49C	
302	3/26/2009	3:01:22 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is starting	
303	3/26/2009	3:01:22 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	Redundant engine process will be restarted when going to standby mode.	
304	3/26/2009	3:01:22 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	Registering the Primary redundant engine "AppEngine_Test_001" id: 2 with the failover service. Part	
305	3/26/2009	3:01:22 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	Initializing the checkpointer	
306	3/26/2009	3:01:22 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	The checkpoint files will be initialized in folder "G:\Program Files\ArchestrA\Framework\Bin\CheckPoint	
307	3/26/2009	3:01:22 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	The checkpoint files have been successfully initialized.	
308	3/26/2009	3:01:24 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	Waiting for a redundancy status from the ObjectSyncMgr	
309	3/26/2009	3:01:28 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	Primary engine "AppEngine_Test_001" was assigned the redundancy status <2: Startup_SwitchingT	
310	3/26/2009	3:01:28 PM	3120	1788	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is starting as Primary Standby engine	
311	3/26/2009	3:02:51 PM	700	2192	Mark	Log Viewer	Mark	
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Fiau	 ire 2: N	lanual F	orce	Fail	ove	r: [ENGINE NAME].REDU	NDANCY.FORCEFAILOVERCMD IS SET TO TRUE	

The following graphic shows the Remote Backup Node as it becomes active.

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No:	Date	Time	Pr	Th	Lo	Component	Message		
96	3/26/2009	3:00:32 PM	1432	1436	Mark	Log Viewer	Mark		
97	3/26/2009	3:01:23 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is finishing as a Standby engine with status <3:	Engine Swi	
98	3/26/2009	3:01:23 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Backup engine "AppEngine_Test_001" was assigned the redundancy status <10: Standby	_Switching	
99	3/26/2009	3:01:23 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is starting as Backup Active engine		
100	3/26/2009	3:01:24 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Initializing Access Manager with platform id 2 and engine id 2.		
101	3/26/2009	3:01:24 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Creating and initializing the scheduler and security components		
102	3/26/2009	3:01:24 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Initializing the engine application object CLSID {BE4A11B6-86C2-49C6-883E-ABA501A68	BCC7}	
103	3/26/2009	3:01:24 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Initializing BRO with object name "AppEngine_Test_001" and object id 1.		
104	3/26/2009	3:01:24 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Registering the engine automation object with LMX object name "AppEngine_Test_001",	, object id	
105	3/26/2009	3:01:24 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Starting the engine automation object startup context: <3: Starting From Standby>, re	storing sca	
106	3/26/2009	3:01:24 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Restoring the engine automation object from the checkpoint file		
107	3/26/2009	3:01:24 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Starting up the engine automation object		
108	3/26/2009	3:01:25 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Setting "AppEngine_Test_001" onscan (checkpointed value)		
109	3/26/2009	3:01:25 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Notifying PlatformInfoServer the actual state of engine "AppEngine_Test_001" is onscan		
110	3/26/2009	3:01:25 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Starting hosted objects (set attribute "AppEngine_Test_001StartHostedObjects" = true)	
111	3/26/2009	3:01:25 PM	2096	2100	Info	AppEngine_Test_001.AppEnginePrimitive	AppEngine_Test_001 is starting up objects that have been deployed to it		
112	3/26/2009	3:01:26 PM	2096	2100	Info	AppEngine_Test_001.AppEnginePrimitive	AppEngine_Test_001 has finished starting 2 objects deployed to this appengine. 2 of thes	e objects h	
113	3/26/2009	3:01:26 PM	2096	2100	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" has been successfully initialized and is now runn	ning	
114	3/26/2009	3:02:50 PM	1432	1436	Mark	Log Viewer	Mark		
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Figure 3: REDUNDANT ENGINE ON REMOTE PLATFORM IS [...] "SUCCESSFULLY INITIALIZED AND IS NOW RUNNING."

Logging the Active Partner Crash/Power Cut/Communication Loss Failover

In this scenario, the following events occur:

- The GR Platform suddenly becomes unavailable either due to a power failure, network communication loss, or some kind of system crash.
- The Redundant Engine fails over to the Remote Platform.
- The GR Platform is restored and becomes available.

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	Start Time:	3/26/2009 3	3:13:41	PM		End Time: 1/1/2101 8:59:59 AM				
No:	Date	Time	Pr	Th	Lo	Component	Message			
195	3/26/2009	3:25:18 PM	1432	1436	Mark	Log Viewer	Mark			
196	3/26/2009	3:25:28 PM	1832	4076	Info	aaBootstrap	The configured number of consecutive heartbeats have been missed by engine 2 ov	er the secondar	y	
197	3/26/2009	3:25:30 PM	1340	1612	Wa	NmxSvc	Platform 1 exceed maximum heartbeats timeout of 8000 ms.			
198	3/26/2009	3:25:31 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is finishing as a Standby engine with statu	is <3: Engine St	M	
199	3/26/2009	3:25:31 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Backup engine "AppEngine_Test_001" was assigned the redundancy status <10: St	andby_Switchin	g	
200	3/26/2009	3:25:31 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is starting as Backup Active engine			
201	3/26/2009	3:25:32 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Initializing Access Manager with platform id 2 and engine id 2.			
202	3/26/2009	3:25:33 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Creating and initializing the scheduler and security components			
203	3/26/2009	3:25:33 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Initializing the engine application object CLSID {BE4A11B6-86C2-49C6-883E-ABA5	01A6BCC7}		
204	3/26/2009	3:25:33 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Initializing BRO with object name "AppEngine_Test_001" and object id 1.			
205	3/26/2009	3:25:33 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Registering the engine automation object with LMX object name "AppEngine_Test,	_001", object id		
206	3/26/2009	3:25:33 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Starting the engine automation object startup context: <3: Starting From Standby	y>, restoring sc	a	
207	3/26/2009	3:25:33 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Restoring the engine automation object from the checkpoint file			
208	3/26/2009	3:25:33 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Starting up the engine automation object			
209	3/26/2009	3:25:34 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Setting "AppEngine_Test_001" onscan (checkpointed value)			
210	3/26/2009	3:25:34 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Notifying PlatformInfoServer the actual state of engine "AppEngine_Test_001" is on	scan		
211	3/26/2009	3:25:34 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Starting hosted objects (set attribute "AppEngine_Test_001StartHostedObjects" +	= true)		
212	3/26/2009	3:25:34 PM	2412	1380	Info	AppEngine_Test_001.AppEnginePrimitive	AppEngine_Test_001 is starting up objects that have been deployed to it		_	
213	3/26/2009	3:25:34 PM	2412	1380	Info	AppEngine_Test_001.AppEnginePrimitive	AppEngine_Test_001 has finished starting 2 objects deployed to this appengine. 2 of	f these objects	h	
214	3/26/2009	3:25:34 PM	2412	1380	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" has been successfully initialized and is not	v running		
215	3/26/2009	3:25:34 PM	2412	268	Info	AppEngine_Test_001.Checkpointer	CCheckpointer::PersistStateChanges - Last changes were not successfully persisted	to disk or failow	/	
216	3/26/2009	3:28:09 PM	1832	308	Wa	MessageChannel	WWNESTEST address was not resolved. Error = 10022			
217	3/26/2009	3:28:17 PM	1340	1324	Wa	MessageChannel	WWNESTEST address was not resolved. Error = 10022			
218	3/26/2009	3:29:25 PM	1432	1436	Mark	Log Viewer	Mark			
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Figure 4: Platform Detects That It can No Longer Communicate With Its Redundant Partner

Log messages show the restart from checkpoint:

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No:	Date	Time	Pr	Th	Lo	Component	Message	-
418	3/26/2009	3:27:34 PM	3836	3840	Mark	Log Viewer	Mark	п.
419	3/26/2009	3:32:50 PM	1124	1136	Info	aaLogger	Logger Started.	
420	3/26/2009	3:32:50 PM	1124	1136	Info	aaLogger	Logger Started.	
421	3/26/2009	3:32:51 PM	1216	1228	Info	aaGR	aaGR Started	
422	3/26/2009	3:32:51 PM	1232	1464	Info	aaUserValidator	SetAttributeThread started	
423	3/26/2009	3:32:51 PM	1232	1468	Info	aaUserValidator	OperationThread started	
424	3/26/2009	3:32:51 PM	1232	1256	Info	aaUserValidator	Service aaUserValidator started on WWNESTEST. Ver <2859.0017.0070.0001> Built on Jun 13 2008	
425	3/26/2009	3:32:56 PM	1216	1228	Info	aaGR	Published PackageServerNet on port 8090 (0x1f9a)	
426	3/26/2009	3:32:56 PM	1836	1920	Info	aaBootstrap	The Bootstrap service is starting	
427	3/26/2009	3:33:01 PM	1836	1920	Info	aaBootstrap	The Bootstrap service is running.	
428	3/26/2009	3:33:01 PM	1836	2164	Info	aaBootstrap	Starting the Bootstrap components	
429	3/26/2009	3:33:04 PM	1836	2432	Info	aaBootstrap	The Bootstrap Monitor started.	
430	3/26/2009	3:33:05 PM	1836	2440	Info	aaBootstrap	The Bootstrap Manager started.	
431	3/26/2009	3:33:08 PM	2708	2712	Info	aaEngine	Entering process "aaEngine" Version 2859.0143.0070.0000 Built on Jun 13 2008 18:15:13	
432	3/26/2009	3:33:08 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	aaEngine process is starting with the command line: "Deploy=False,Restart=False,ScanState=Last,	
433	3/26/2009	3:33:08 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Platform "WinPlatform_Test_001" is starting	
434	3/26/2009	3:33:08 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Setting startup timeout to 30000 ms	
435	3/26/2009	3:33:08 PM	1836	2164	Info	aaBootstrap	The Bootstrap of version <2859.380.0.> built on Aug 21 2007 (04:36:02)	
436	3/26/2009	3:33:09 PM	1172	1200	Info	aaGlobalDataCacheMonitorSvr	Service aaGlobalDataCacheMonitorSvr started. Version 2859.0124.0070.0000 Build on Jun 13 2008	
437	3/26/2009	3:33:10 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Initializing Access Manager with platform id 1 and engine id 1.	
438	3/26/2009	3:33:12 PM	2780	2792	Info	NmxSvc	The NmxSvc service is running	
439	3/26/2009	3:33:12 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Initializing the checkpointer	
440	3/26/2009	3:33:12 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	The checkpoint files will be initialized in folder "G:\Program Files\ArchestrA\Framework\Bin\CheckPoint	
441	3/26/2009	3:33:13 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	The checkpoint files have been successfully initialized.	
442	3/26/2009	3:33:13 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Creating and initializing security components	
443	3/26/2009	3:33:13 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Initializing the engine application object CLSID {BE4A11B6-86C2-49C6-883E-ABA501A6BCC7}	
444	3/26/2009	3:33:13 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Initializing BRO with object name "WinPlatform_Test_001" and object id 1.	
445	3/26/2009	3:33:13 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Registering the engine automation object with LMX object name "WinPlatform_Test_001", object id	
446	3/26/2009	3:33:13 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Starting the engine automation object startup context: <2: Starting From Checkpoint>, restoring	
447	3/26/2009	3:33:13 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Restoring the engine automation object from the checkpoint file	•
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Figure 6 (below) shows the additional logged messages in the SMC from the GR Platform after becoming available again:

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JП	Start Time:	12/31/1900	11:59:	59 PM		End Time: 12/31/2100 11:	59:59 PM	
No:	Date	Time	Pr	Th	Lo	Component	Message	
447	3/26/2009	3:33:13 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Restoring the engine automation object from the checkpoint file	
448	3/26/2009	3:33:15 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Starting up the engine automation object	
449	3/26/2009	3:33:15 PM	2708	2712	Info	NTPlatform	Platform identity - id: 1, name: "WinPlatform_Test_001", host: "WWNESTEST"	
450	3/26/2009	3:33:20 PM	1836	2932	Info	aaBootstrap	CFalloverManager::Initialize() Already Initialized	
451	3/26/2009	3:33:22 PM	2708	2712	Info	NTPlatform	Local engine list:	
452	3/26/2009	3:33:22 PM	2708	2712	Info	NTPlatform	Adding performance counters	
453	3/26/2009	3:33:22 PM	2708	2712	Info	NTPlatform	System info: Intel(R) Xeon(R) CPU E5420 @ 2.50GHz, Microsoft Windows Server 2003 Enterp	
454	3/26/2009	3:33:22 PM	2708	2712	Info	NTPlatform	Starting Global Data Distribution Service	
455	3/26/2009	3:33:24 PM	2708	2712	Info	NTPlatform	NMX message timeout set to 30000 ms	
456	3/26/2009	3:33:24 PM	2708	2712	Info	NTPlatform	Creating Store Forward directory "C:\Documents and Settings\All Users\Application Data\ArchestrA"	
457	3/26/2009	3:33:25 PM	2708	2712	Info	GlobalDataDistributionServiceR	Folder "G:\Program Files\ArchestrA\Framework\Bin\GalaxyData" has been successfully shared for Ar	
458	3/26/2009	3:33:25 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Setting "WinPlatform_Test_001" onscan (checkpointed value)	
459	3/26/2009	3:33:25 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Notifying BootstrapController the actual state of platform "WinPlatform_Test_001" is onscan	
460	3/26/2009	3:33:25 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Starting hosted objects (set attribute "WinPlatform_Test_001StartHostedObjects" = true)	
461	3/26/2009	3:33:25 PM	2708	2712	Info	WinPlatform_Test_001.aaEngine	Platform "WinPlatform_Test_001" has been successfully initialized and is now running	
462	3/26/2009	3:33:25 PM	2984	2988	Info	aaEngine	Entering process "aaEngine" Version 2859.0143.0070.0000 Built on Jun 13 2008 18:15:13	
463	3/26/2009	3:33:25 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	aaEngine process is starting with the command line: " CheckpointPath=,ClsId={BE4A11B6-86C2-49C	
464	3/26/2009	3:33:25 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is starting	
465	3/26/2009	3:33:25 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Redundant engine process will be restarted when going to standby mode.	
466	3/26/2009	3:33:25 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Registering the Primary redundant engine "AppEngine_Test_001" id: 2 with the failover service. Part	
467	3/26/2009	3:33:26 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Initializing the checkpointer	
468	3/26/2009	3:33:26 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	The checkpoint files will be initialized in folder "G:\Program Files\ArchestrA\Framework\Bin\CheckPoint	
469	3/26/2009	3:33:26 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	The checkpoint files have been successfully initialized.	
470	3/26/2009	3:33:28 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Waiting for a redundancy status from the ObjectSyncMgr	
471	3/26/2009	3:33:31 PM	1836	1920	Info	aaBootstrap	CFalloverStatusManager::CheckSubscription Found unacked remote subscriber over primary channel	
472	3/26/2009	3:33:31 PM	1836	1920	Info	aaBootstrap	CFalloverStatusManager::CheckSubscription Found unacked remote subscriber over secondary chan	
473	3/26/2009	3:33:31 PM	1836	1920	Info	aaBootstrap	CFalloverStatusManager::CheckSubscription Found unacked remote subscriber over secondary chan	
474	3/26/2009	3:33:31 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Primary engine "AppEngine_Test_001" was assigned the redundancy status <2: Startup_SwitchingT	
475	3/26/2009	3:33:31 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is starting as Primary Standby engine	
476	3/26/2009	3:34:42 PM	3508	3512	Mark	Log Viewer	Mark	-
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Figure 6: Continuation of Log File from Figure 5 (Above)

Figure 7 (below) shows the GR Platform's MS Event Viewer System Application Log. Here we are highlighting the event that captured the system shutdown.

This event complements the Remote Platform's SMC Log messages indicating a communication loss with its redundant partner.

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Event Viewer (Local)	System 509 e	vent(s)				Date: 3/25/2003 Source: EventLog	
- Application	Type	Date	Time	Source	Cat	Time: 3:32:40 PM Category: None	F
Security	1 Information	3/26/2009	3:34:21 PM	Service Control Manager	Nor	Type: Error Event [D: 6008	Е
System	Information	3/26/2009	3:34:21 PM	Service Control Manager	Nor	User: N/A 🗈	Ц
	Information	3/26/2009	3:34:21 PM	Service Control Manager	Nor	Computer: WWNESTEST	Г
	Information	3/26/2009	3:34:21 PM	Service Control Manager	Nor	Description	E
	Information	3/26/2009	3:34:21 PM	Service Control Manager	Nor		E
	Warning	3/26/2009	3:34:14 PM	Kerberos	Nor	The previous system shutdown at 3:26:42 PM on 3/26/2009 was unexpected	L
	Warning	3/26/2009	3:33:05 PM	USER32	Nor	(L
	Information	3/26/2009	3:32:55 PM	IPSec	Nor	For more information, see Help and Support Center at	E
	Information	3/26/2009	3:32:28 PM	vmdebug	Nor	nttp://go.microsoft.com/twink/events.asp.	H
		3/26/2009	3:32:28 PM	IPSec	Nor	e	L
		3/26/2009	3:32:51 PM	AeLookupSvc	Nor	()	L
	Information	3/26/2009	3:32:40 PM	DCOM	Nor	«	L
	Information	3/26/2009	3:32:40 PM	eventlog	Nor	()	L
	Information	3/26/2009	3:32:40 PM	eventlog	Nor	n Daţa:	L
	Error	3/26/2009	3:32:40 PM	eventlog	Nor	0000: d9 07 03 00 04 00 la 00 Ù	L
	Information	3/26/2009	3:22:10 PM	Service Control Manager	Nor	0008: 0f 00 1a 00 2a 00 80 03*.D.	E
	Information	3/26/2009	3:22:09 PM	Service Control Manager	Nor	0010: d9 07 03 00 04 00 1a 00 U	H
	Information	3/26/2009	3:21:58 PM	Service Control Manager	Nor	r	H
	Information	3/26/2009	3:21:58 PM	Service Control Manager	Nor	OK Cancel Apply	E
	Warning	3/26/2009	3:21:55 PM	Kerberos	Nor		
	Warning	3/26/2009	3:20:45 PM	USER32	None	ne 1076 Administrator WWNESTEST	
	Information	3/26/2009	3:20:25 PM	Service Control Manager	None	ne 7036 N/A WWNESTEST	
	Information	3/26/2009	3:20:25 PM	Service Control Manager	None	ne 7035 SYSTEM WWNESTEST	
	Information	3/26/2009	3:20:25 PM	Service Control Manager	None	ne 7036 N/A WWNESTEST	
	Information	3/26/2009	3:20:25 PM	Service Control Manager	None	ne /USS SYSTEM WWWESTEST	
	Information	3/26/2009	3:20:25 PM	Service Control Manager	None	DE 7036 NUA WWWEDIEDI	-1
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Undeployed Hosting Engine

In this scenario, the GR Platform Hosts the Active Engine. It is undeployed and the failover is triggered.

Messages logged on the GR PLATFORM:

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JΠ	Start Time: 12/31/1900 11:59:59 PM End Time: 12/31/2100 11:59:59 PM End Time: 12/31/2100 11:59:59 PM								
No:	Date	Time	Pr	Th	Lo	Component	Message		
495	3/26/2009	3:43:56 PM	3508	3512	Mark	Log Viewer	Testing Redundancy with Hosting Platform Undeploy		
496	3/26/2009	3:44:08 PM	304	312	Info	aaIDE	IDE Started		
497	3/26/2009	3:44:08 PM	304	312	Info	WWPackageManager	Wonderware SSC - Version 7,0,100,1 (3 : 1.1) (2 : 4.1) (3 : 5.0.97)		
498	3/26/2009	3:44:13 PM	1216	428	Info	WWPackageServer	Wonderware SSC - Version 7,0,100,1 (3 : 1.1) (2 : 4.1) (3 : 5.0.97)		
499	3/26/2009	3:44:37 PM	3508	3512	Mark	Log Viewer	Begin Test		
500	3/26/2009	3:44:59 PM	1216	2768	Info	WWPackageServer	Undeploy Operation Mode is Multi Threaded. Starting undeploying 3 objects.		
501	3/26/2009	3:44:59 PM	1216	2768	Info	WWPackageServer	Performing Undeploy operation, Mode : Multi Threaded, MaxThreadPoolSize = 1, Queuing NumberOf		
502	3/26/2009	3:44:59 PM	1216	2856	Info	ApplicationCategory	Setting 1 object(s) offscan on engine (id:2) platform (id:1)		
503	3/26/2009	3:45:01 PM	1216	2856	Info	ApplicationCategory	Setting 1 object(s) offscan on engine (id:2) platform (id:1)		
504	3/26/2009	3:45:05 PM	1216	2856	Info	ApplicationCategory	[1] Undeploying 1 objects from engine "AppEngine_Test_001" (id:2) on platform "WinPlatform_Test		
505	3/26/2009	3:45:08 PM	1216	2856	Info	ApplicationCategory	[1] Undeploying 1 objects from engine "AppEngine_Test_001" (id:2) on platform "WinPlatform_Test		
506	3/26/2009	3:45:10 PM	1216	2856	Info	EngineCategory	Undeploying engine "AppEngine_Test_001" (id:2) from platform "WinPlatform_Test_001" (id:1) on no		
507	3/26/2009	3:45:10 PM	2984	2988	Info	AppEngine_Test_001.AppEngi	AppEngine_Test_001 is shutting down objects that are deployed to it		
508	3/26/2009	3:45:10 PM	2984	2988	Info	AppEngine_Test_001.AppEngi	AppEngine_Test_001 has shutdown all objects that are deployed to it		
509	3/26/2009	3:45:10 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is finishing as an Active engine with status <1: Engine Shu		
510	3/26/2009	3:45:10 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" has shutdown		
511	3/26/2009	3:45:10 PM	2984	2988	Info	AppEngine_Test_001.aaEngine	Exiting process "aaEngine"		
512	3/26/2009	3:45:11 PM	1216	2768	Info	WWPackageServer	Finished undeploying 3 objects.		
513	3/26/2009	3:45:37 PM	3508	3512	Mark	Log Viewer	Test Completed		
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Figure 8: GR Platform Log Messages

On the remote Platform, its platform was undeployed. This was the hosting primary engine of the redundant pair.

The messages look like the following graphic.

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File Action View Help

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	Start Time:	3/26/2009	3:13:41	PM		End Time: 1/1/2101 8:59:59 AM	
No:	Date	Time	Pr	Th	Lo	Component	Message
238	3/26/2009	3:41:38 PM	1432	1436	Mark	Log Viewer	Testing Redundancy with Hosting Platform Undeploy
239	3/26/2009	3:42:47 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is finishing as a Standby engine with status <3: Engine Swi
240	3/26/2009	3:42:47 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Backup engine "AppEngine_Test_001" was assigned the redundancy status <10: Standby_Switching
241	3/26/2009	3:42:47 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" is starting as Backup Active engine
242	3/26/2009	3:42:47 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Initializing Access Manager with platform id 2 and engine id 2.
243	3/26/2009	3:42:48 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Creating and initializing the scheduler and security components
244	3/26/2009	3:42:48 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Initializing the engine application object CLSID {BE4A11B6-86C2-49C6-883E-ABA501A6BCC7}
245	3/26/2009	3:42:48 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Initializing BRO with object name "AppEngine_Test_001" and object id 1.
246	3/26/2009	3:42:48 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Registering the engine automation object with LMX object name "AppEngine_Test_001", object id
247	3/26/2009	3:42:48 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Starting the engine automation object startup context: <3: Starting From Standby>, restoring sca
248	3/26/2009	3:42:48 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Restoring the engine automation object from the checkpoint file
249	3/26/2009	3:42:48 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Starting up the engine automation object
250	3/26/2009	3:42:49 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Setting "AppEngine_Test_001" onscan (checkpointed value)
251	3/26/2009	3:42:49 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Notifying PlatformInfoServer the actual state of engine "AppEngine_Test_001" is onscan
252	3/26/2009	3:42:49 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Starting hosted objects (set attribute "AppEngine_Test_001StartHostedObjects" = true)
253	3/26/2009	3:42:49 PM	3036	3356	Info	AppEngine_Test_001.AppEnginePrimitive	AppEngine_Test_001 is starting up objects that have been deployed to it
254	3/26/2009	3:42:49 PM	3036	3356	Info	AppEngine_Test_001.AppEnginePrimitive	AppEngine_Test_001 has finished starting 0 objects deployed to this appengine. 0 of these objects h
255	3/26/2009	3:42:49 PM	3036	3356	Info	AppEngine_Test_001.aaEngine	Redundant engine "AppEngine_Test_001" has been successfully initialized and is now running
256	3/26/2009	3:43:02 PM	1432	1436	Mark	Log Viewer	Test Completed
-							
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Figu	ire 9· R	emote F	Platfo	orm	/Ho	stina Engine I og View from	n the SMC

9: Remote Platform/ Hosting Engine Log view from the

Prebuilt InTouch® ArchestrA Graphics for Redundancy

A predefined ArchestrA Graphic for Engine Redundancy Statistics is provided with the standard install of Application Server 3.0.

The graphic is called **AppEngineRedundancyDisplay** and is available from the Graphic Toolbox in the IDE.

In the IDE, from the Graphic Toolbox, navigate to **ArchestrA Symbol Library > Displays**.

Figure 9 (below) shows the graphic when implemented in Runtime.

AppEngine_Test_001			
WinPlatform_Test_001 Primary Force Failover Standby - Ready			
			6
Active AppEngine (Identity)	Backup		
AppEngine Scan State	OnScan	Scans	tateCmd
AppEngine Scan Period	1000	ms	
AppEngine CPU Usage	2		
AppEngine Startup Reason	Starting_FromStandby		
Active Heartbeat Period	1000	ms	
Active Consec Heartbeats Missed Max	5		
Standby Heartbeat Period	1000	ms	
Standby Consec Heartbeats Missed	0	Max	5
Standby Total Heartbeats Missed	0		
Checkpoint Deltas Sent to Standby	0		
Buffered Checkpoint Deltas	0	Max	0
Checkpoints Out of Sync	0		
Alarm State Changes Sent to Standby	0		
Buffered Alarm State Changes	0	Max	0
Alarm State Changes Out of Sync	0		
Forced Failover Timeout	90000	ms	
Standby Activate Timeout	15000	ms	
Partner Connect Timeout	15000	ms	

Figure 10: Redundancy Object in Runtime

To place the graphic in a template or derived instance of an engine:

- 1. From the **Graphics** tab of AppEngine editor, add a new Local Graphic.
- 2. Open the graphic and click the **EMBED GRAPHIC** button.
- 3. Browse to this symbol under the Graphic Toolbox tree view and select it.
- 4. Once it is on your graphic editor as an embedded symbol, you are done.
- 5. Save the symbol and close. *Do not* convert the embedded symbol to a group.

Note: The Graphic Toolbox contains several other ArchestrA symbols that show useful information about Engines and Platforms.



Figure 11: Diagnostic Symbols in Graphic Toolbox

References

For more information on implementing & optimizing redundancy-enabled engines, please refer to the following TechNotes:

- Tech Note 368 Network Setup for AppEngine Redundancy
- Tech Note 401 Fine-Tuning AppEngine Redundancy Settings
- Tech Note 478 Industrial Application Server Platform Deployment Checklist

Tech Note 554 Rebuilding/Replacing a Redundant AppObject Server Node

S. Kermani

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