

# SIOS Protection Suite as DR for Stratus everRun

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## Overview

This document describes an implementation of SIOS Protection Suite as DR (Disaster Recovery) solution for a Stratus everRun FT/HA (Fault Tolerant / High Availability) environment.

## Usage

Some examples of usage could be:

- An off-site replica of the data and/or application is requested but the network environment does not qualify for an everRun Split-site integration.
- Availability protection of server-roles, which everRun is unaware of because these roles run inside the virtual machine. For instance an SQL server, DNS server, or a file share.
- Protection against total loss of communication with the everRun protected machine.

## Fictional request for this test

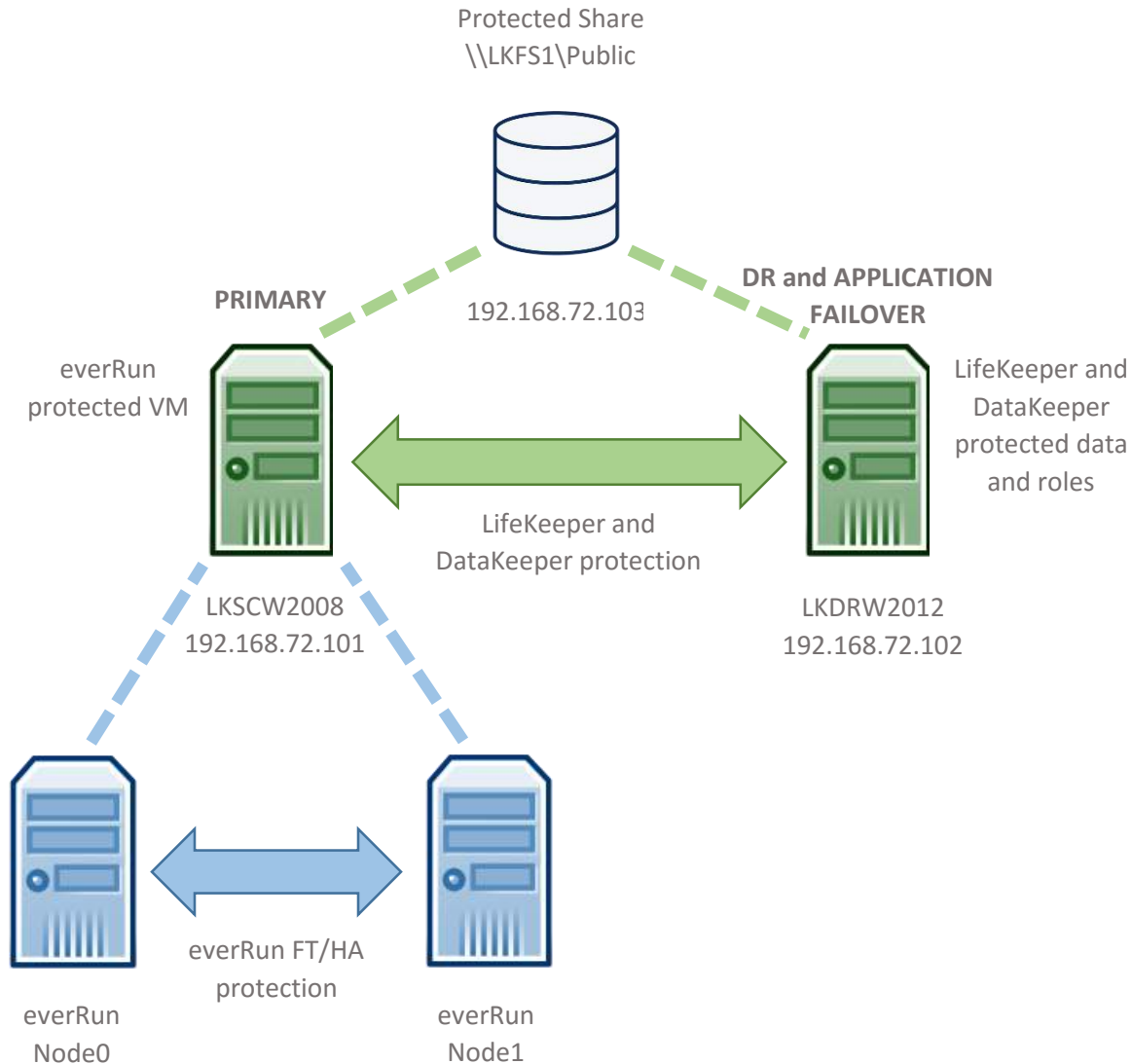
A fictional customer has asked us for a design in where a certain critical server is protected against hardware failures and available from a primary site as much as possible.

Amongst other roles, this machine also functions as a fileserver. To protect the shared data on this server against destructive disasters on the main site, the customer wants a continuous replica of all the data on a second site: I.e. a DR (Disaster Recovery) site.

Also, if possible, the customer would even like the shared data to be accessible if share access for some reason fails on the main server.

## Overall setup of proposal

See the diagram below.



In this concept, the main Windows server is a Windows 2008 machine named LKSCW2008, running as a virtual machine which is FT/HA(\*) protected by everRun (\* Both FT- and HA-protection could be used. Though all tests in this report are done while LKSCW2008 was HA-protected, because HA comes with an additional thought for LifeKeeper system failover recovery – see further down in this report).

Via SIOS Protection Suite, the fileserver LKSCW2008 is partnered with the DR file server: a Windows 2012 machine, named LKDRW2012. Only one of them (by default this is LKSW2008) is running a share \\LKFS1\Office.

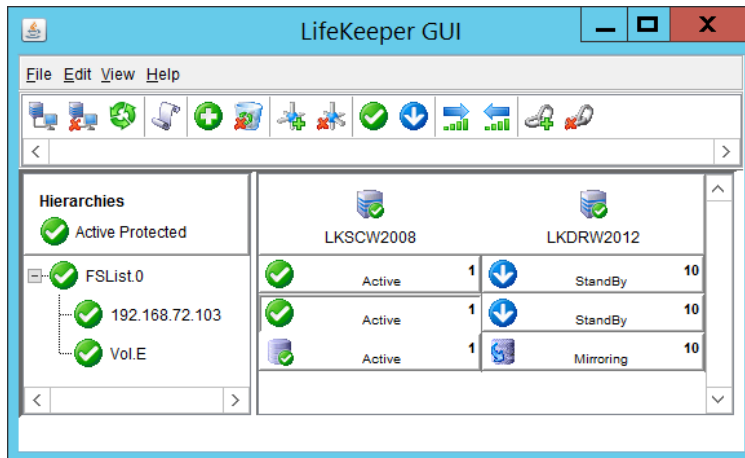
## Setup in Windows

Each Windows server:

- Has been given a fixed IP-address (192.168.72.101 and 192.168.72.102)
- Has a separate drive E: with a folder 'Office' which is shared as `\\<servername>\Office`.
- Has SIOS Protection Suite installed

## Setup in LifeKeeper

The following protected resources have been set up in LifeKeeper:

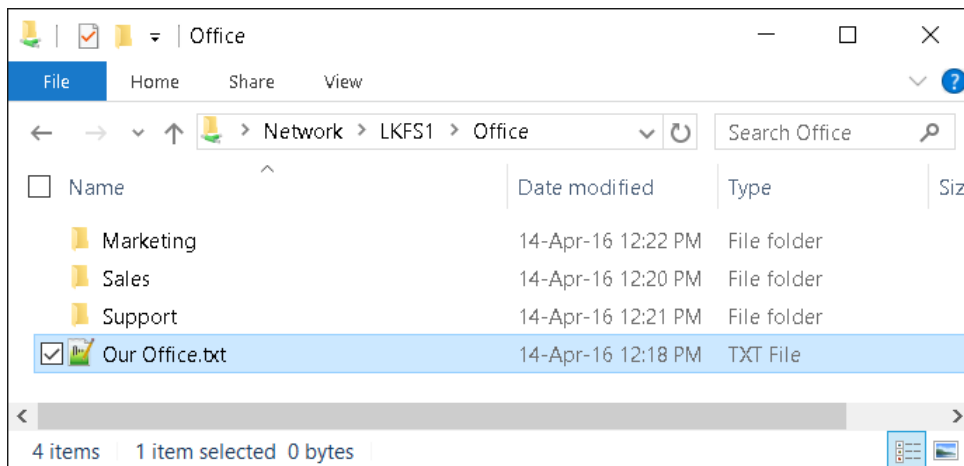


FSLIST.0 is a protected Share resource, which protects all shares on drive E:

Following from this, there is a dependency on a protected drive E:

A dependency on a protected virtual IP address 192.168.72.103 was included to make the share available from a single location. LifeKeeper automatically assigns this IP address to the machine which is leading. In the picture above, this is LKSCW2008 (the everRun protected VM).

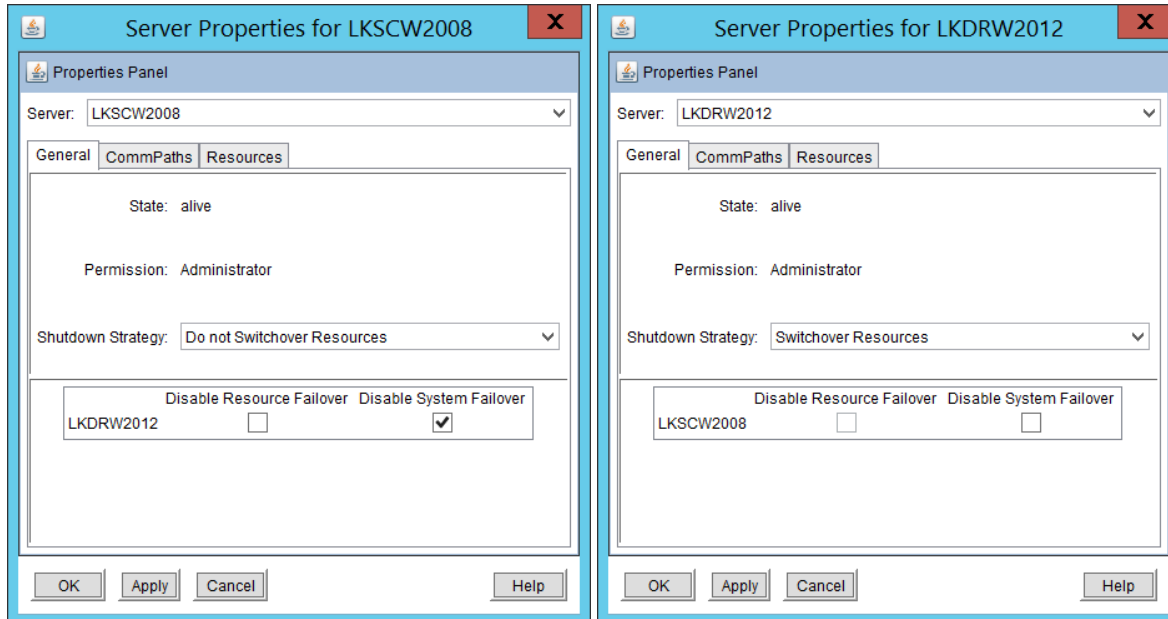
To make addressing more user friendly, an A-record was created in DNS, named 'LKFS1' which leads to 192.168.72.103.



So, for the user, this redundant share is available as `\\LKFS1\Office`

## LifeKeeper failover strategy

The protected hierarchy has been set up with the following policies



For the primary server LKSCW2008, the shutdown strategy has been kept to the LifeKeeper default to not automatically switchover resources on an orderly shutdown (or reboot). Because orderly shutdowns and reboots are expected to be done in maintenance windows on this customer site it is not needed and perhaps not even wanted at the time.

Also for LKSCW2008, automatic system failover has been disabled. This is a matter of choice, mostly dependent of whether the everRun protected machine is protected in FT or HA. Why?

Well, FT-protected machines are expected to keep on running if one of the everRun nodes fail. Therefore, if an FT-protected machine has unexpectedly gone down, it will probably have gone down for another reason and will probably not get back up again on its own. In such case LifeKeeper could do an automatic failover.

HA protected machines on the other hand will do a hard shutdown if the VM-running node crashes. At that point everRun HA protection will kick off the boot process for the VM on the surviving node, which is supposed to bring the VM back in production. However, if LifeKeeper is set to initiate an automatic failover on LKSCW2008 system failures as well, things might have unwanted outcomes; I.e. both everRun and LifeKeeper are starting a recovery procedure for the same incident.

Since the LifeKeeper failover machine LKDRW2012 is meant for DR only, LifeKeeper should probably back down while everRun is already handling an automatic recovery of the primary machine LKSCW2008.

Note that the time that LifeKeeper allows to pass before system failover kicks in can be lengthened in the communication path. But for every set time, do we know it is long enough? For all we know,

LKSCW2008 might be busy doing a disk recovery or handling Windows updates while it is booting. So we fictively suggested to disable it, thereby trusting on manual intervention of an administrator to bring the resources in service on the LKDRW2012 should this specific situation ever occur.

Because LKSCW2008 is the location where the share is preferred to be available from anyway, both the shutdown strategy and system failures response to perform an automatic switchover to the main system LKSCW2008 have been enabled for LKDRW2012.

## Covered scenarios

Using the design above, this setup is now protected against the following:

**Hardware component failure on the primary site.** If either a disk or network connection in one of the everRun nodes fails, everRun protection will allow the fileserver LKSCW2008 to continue to operate on the other (surviving) component of the redundant pair between the two everRun nodes.

**System failure on the primary site.** If one of the everRun nodes fails completely, the LKSCW2008 server can continue to operate (no downtime) if either its protection level is set to FT (Fault Tolerant) or if it was running on the surviving node at the time of the failure.

If the protection level of LKSCW2008 is HA, and if it was running on the node which failed, then LKSCW2008 will automatically be booted on the surviving node. In such case, the overall downtime of the share would be the time that LKSCW2008 needs to boot.

**Data- and system protection against disasters.** DataKeeper is maintaining a continuous replica of drive E: of LKSCW2008 on drive E: on LKDRW2012 on the 2<sup>nd</sup> site. Should a disaster occur which makes LKSCW2008 unavailable, and administrator can switch over the share-role to LKDRW2012 (demonstrated in test 1 below).

**Share availability protection against Windows failures.** LifeKeeper has been configured to perform a resource failover in the event of the resource becoming unavailable on LKSCW2008 (demonstrated in test 2 below).

## Test 1: Kill the everRun VM

Simulating a disaster, I did a hard-shutdown on the everRun VM LKSCW2008. LifeKeeper spotted the failure, but since System failover was disabled it did not perform any other actions. See the log entries below:

```
[04/18/2016 13:27:49] EventType: Information, Source: LifeKeeper, Category: LCM
Process: LCMLCDINT.EXE(2860) *INFO* (No. 960) LifeKeeper: communication to
LKSCW2008 by TCPIP:1500 FAILED
```

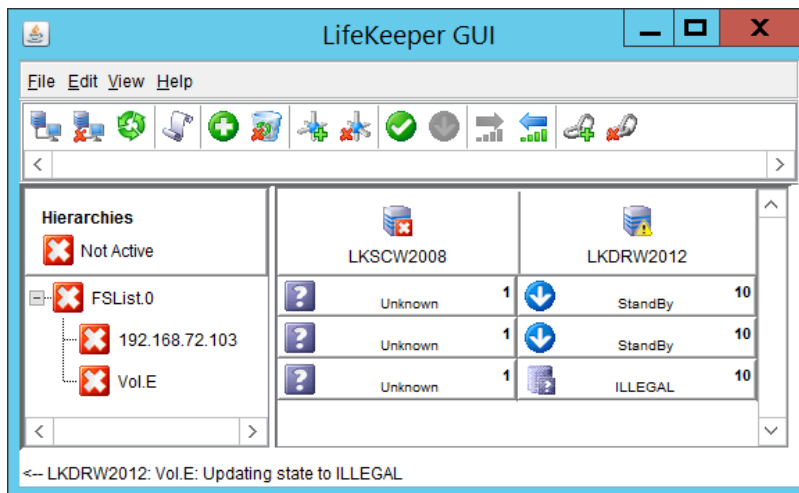
```
[04/18/2016 13:27:49] EventType: Information, Source: LifeKeeper, Category: LCM
Process: LCMLCDINT.EXE(2860) *INFO* (No. 968) COMM_DOWN event:
C:/LK/bin/sendevent -C lifekeeper -E comm_down -s1 -m LK:LCM -OC:/LK/out/LCM -
nLKSCW2008 -dTCPIP:1500
```

```
[04/18/2016 13:27:50] EventType: Error, Source: LifeKeeper, Category: General
```

```
Process: comm_down(2524) *ERROR* (No. 355) COMMUNICATIONS TO "LKSCW2008"
FAILED
```

```
[04/18/2016 13:28:25] EventType: Warning, Source: LifeKeeper, Category: General
Process: comm_down(3492) *WARNING* (No. 354) The Disable Automatic Failover
option was enabled for system "LKSCW2008". No restore operation will be
performed.
```

The LifeKeeper GUI now shows its current state. I.e. the primary machine in an unknown state and the failover machine standby.



At this point there are 2 options

- Bring the primary VM back online (fix the disaster)
- Manually failover resources to the DR site.

Bring the primary VM online.

'Fixed' the disaster by starting LKSCW2008 from the everRun console. As LKSCW2008 is starting, LifeKeeper reports are coming in:

```
[04/18/2016 15:08:47] EventType: Information, Source: LifeKeeper, Category: LCM
Process: LCMLCDINT.EXE(2860) *INFO* (No. 959) LifeKeeper: communication to
LKSCW2008 by TCPIP:1500 RESTORED
```

```
[04/18/2016 15:08:48] EventType: Information, Source: LifeKeeper, Category:
General
Process: comm_up(3508) *INFO* (No. 1278) COMMUNICATIONS TO "LKSCW2008"
RESTORED
```

```
[04/18/2016 15:08:52] EventType: Information, Source: LifeKeeper, Category:
General
Process: comm_up(856) *INFO* (No. 721) lkswitchback("LKSCW2008"): eligible
resources ()
```

```
[04/18/2016 15:08:52] EventType: Information, Source: LifeKeeper, Category:
General
```

Process: comm\_up(3288) \*INFO\* (No. 721) Automatic switchback aborted---no resources eligible for switchback

[04/18/2016 15:08:53] EventType: Information, Source: LifeKeeper, Category: General

Process: comm\_up(2584) \*INFO\* (No. 1203) LifeKeeper: RESOURCE PROTECTION ACTIVATED FOR LKSCW2008

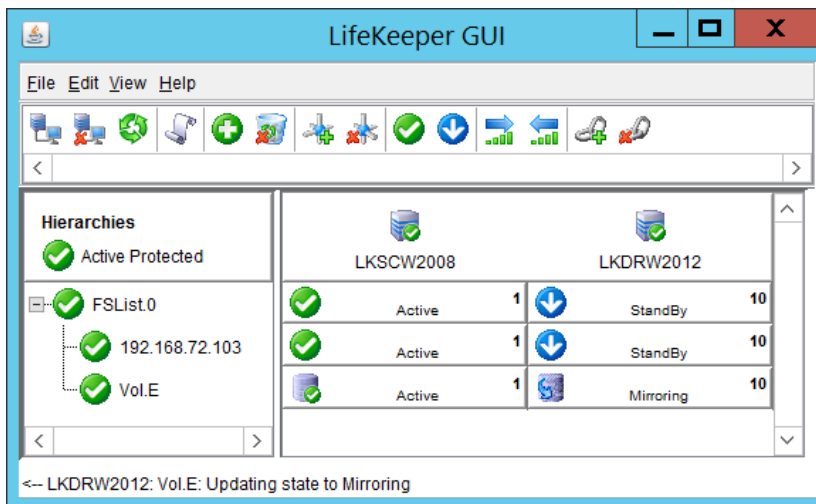
[04/18/2016 15:08:53] EventType: Information, Source: LifeKeeper, Category: General

Process: comm\_up(860) \*INFO\* (No. 1203) LifeKeeper: RESOURCE PROTECTION ACTIVATED FOR LKSCW2008

[04/18/2016 15:08:53] EventType: Information, Source: LifeKeeper, Category: General

Process: comm\_up(2944) \*INFO\* (No. 1288) LifeKeeper: COMM\_UP to machine LKSCW2008 done

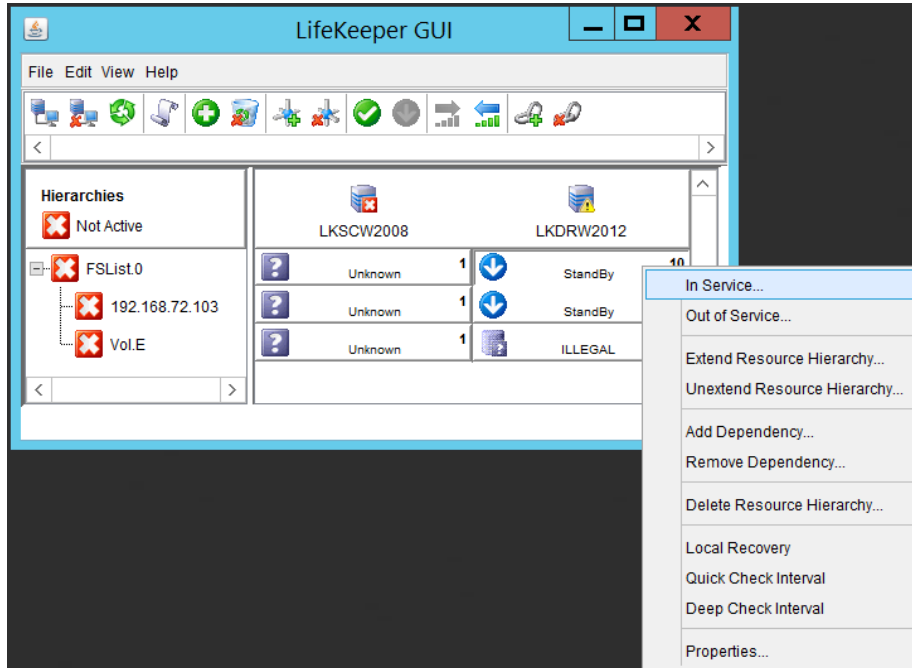
System back in mirrored state, the preferred VM still leading in operations.





## Manually failover resources

In this fictional choice it was not expected that the disaster can be fixed easily, so I brought the DR site into service in LifeKeeper.



The LifeKeeper progress window showed the following output:

```
LifeKeeper: Put resource "FSLIST.0" in-service at:
    Wed Apr 20 13:38:11 WEDT 2016
Process: perform_action.exe(2296)
*INFO* (No. 348) LRACI 1 attempting remote remove of resource "192.168.72.103"
on machine "LKSCW2008"

Process: perform_action.exe(2296)
*ERROR* (No. 349) remove unnecessary since lost communication with machine
"LKSCW2008"

Process: IPAPP(3424)
*INFO* (No. 6001) Restore IP Address 192.168.72.103 End: Successful
Process: perform_action.exe(2296)
*INFO* (No. 348) LRACI 1 attempting remote remove of resource "Vol.E" on
machine "LKSCW2008"

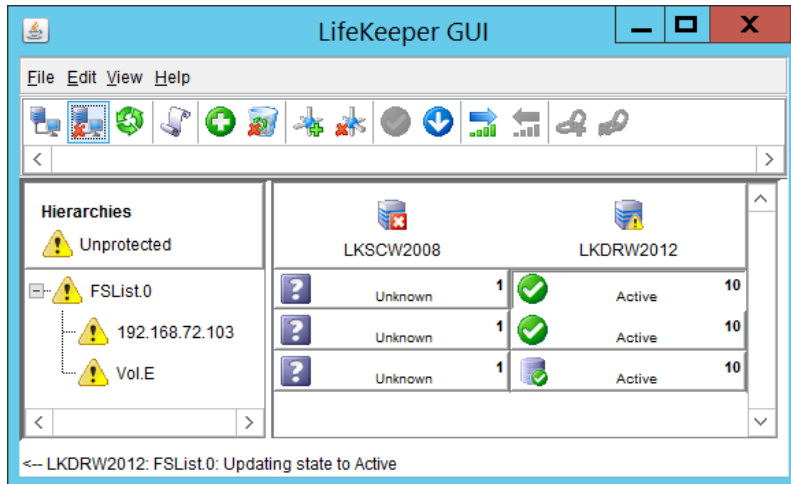
Process: perform_action.exe(2296)
*ERROR* (No. 349) remove unnecessary since lost communication with machine
"LKSCW2008"

    Status = 0
volume E on LKDRW2012 marked for LifeKeeper protection
Process: perform_action.exe(2296)
*INFO* (No. 348) LRACI 1 attempting remote remove of resource "FSLIST.0" on
machine "LKSCW2008"
```

```
Process: perform_action.exe (2296)
*ERROR* (No. 349) remove unnecessary since lost communication with machine
"LKSCW2008"
```

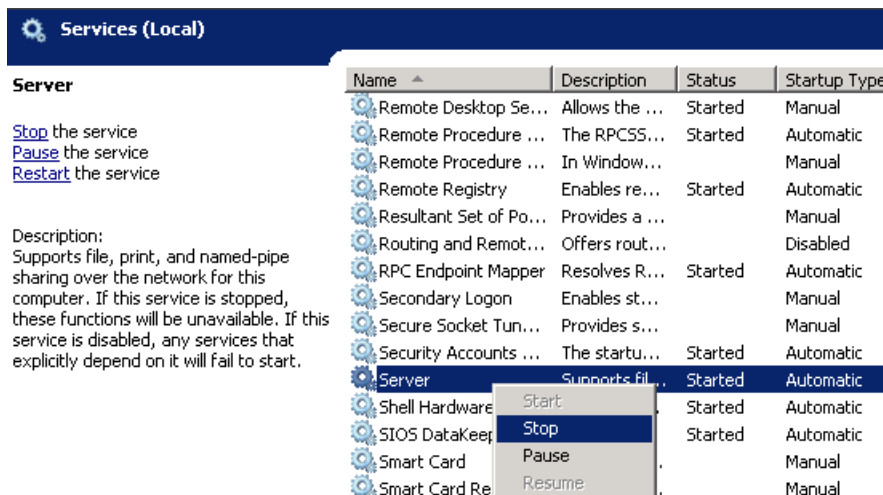
```
LifeKeeper: Put "FSList.0" in-service successful at:
Wed Apr 20 13:38:48 WEDT 2016
```

Resources now showed active on the DR site, LKDRW2012:



## Test 2: Disable resources on LKSCW2008

The main resource for this protected system is a share. To simulate a failed resource we stopped the 'Server' service on LKSCW2008, which disables all sharing for this machine.



LifeKeeper spotted the failed resource and automatically initiated a resource failover.

See log entries below.

```
[04/20/2016 14:16:41] EventType: Information, Source: LifeKeeper, Category:
General
Process: recoverfail.exe(2908) *INFO* (No. 1681) Recoverfail.exe program
invoked by system LKSCW2008 for resource FSList.0.

[04/20/2016 14:16:42] EventType: Information, Source: LifeKeeper, Category:
General
Process: IPAPP(3192) *INFO* (No. 6013) Restore IP Address 192.168.72.103 Start

[04/20/2016 14:16:45] EventType: Information, Source: LifeKeeper, Category:
General
Process: IPAPP(2512) *INFO* (No. 6001) Restore IP Address 192.168.72.103 End:
Successful

[04/20/2016 14:16:46] EventType: Information, Source: LifeKeeper, Category:
General
Process: restore.ksh(140) *INFO* (No. 12043) LifeKeeper: RESTORE VOLUME E:
START.

[04/20/2016 14:16:53] EventType: Information, Source: LifeKeeper, Category:
General
Process: restore.ksh(3664) *INFO* (No. 12044) LifeKeeper: RESTORE VOLUME E:
SUCCEDED.

[04/20/2016 14:16:54] EventType: Information, Source: LifeKeeper, Category:
General
Process: restore.ksh(684) *INFO* (No. 13203) RESTORE FILE SHARE LIST RESOURCE
INSTANCE "FileShareList1" START.

[04/20/2016 14:16:54] EventType: Error, Source: LifeKeeper, Category:
Process: no_name(1964) *ERROR* (No. 13290) Update operation for share "E$"
located at "E:\" has failed; error 87, parmerr=0, error message = The parameter
is incorrect.
    Note that all authorized users must be domain user accounts.

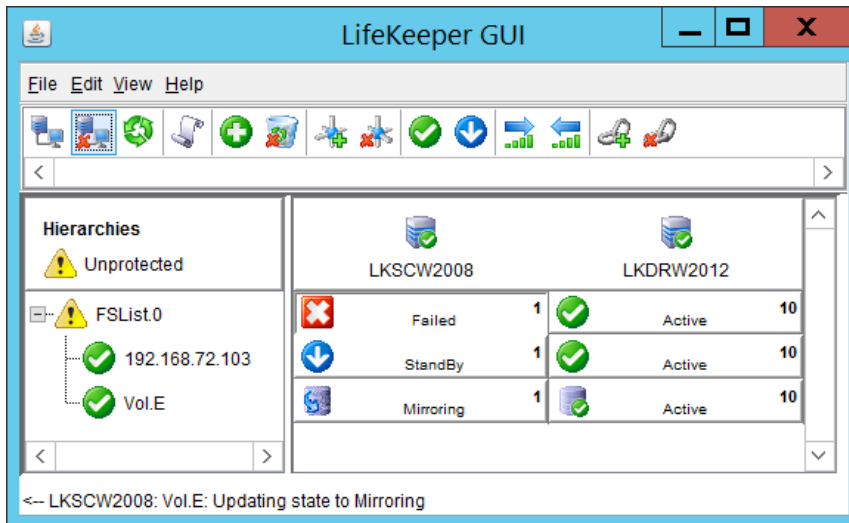
[04/20/2016 14:16:56] EventType: Information, Source: LifeKeeper, Category:
General
Process: restore.ksh(820) *INFO* (No. 13204) LifeKeeper: RESTORE FILE SHARE
LIST RESOURCE INSTANCE "FileShareList1" END.

[04/20/2016 14:16:58] EventType: Information, Source: LifeKeeper, Category:
General
Process: LKRESMON.EXE(2680) *INFO* (No. 1600) Created child thread for
monitoring resource Vol.E.

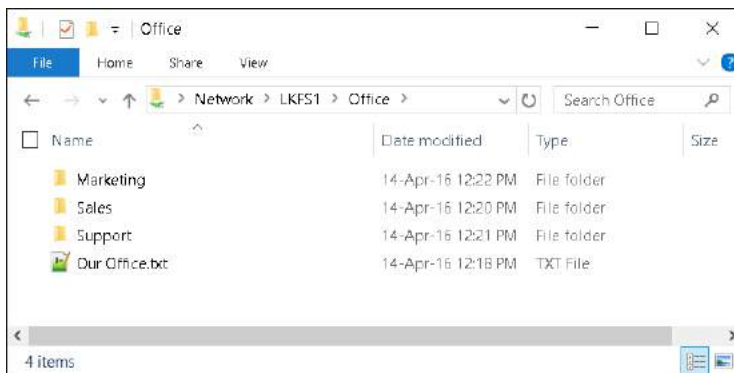
[04/20/2016 14:16:58] EventType: Information, Source: LifeKeeper, Category:
General
Process: LKRESMON.EXE(2680) *INFO* (No. 1600) Created child thread for
monitoring resource 192.168.72.103.
```

```
[04/20/2016 14:16:58] EventType: Information, Source: LifeKeeper, Category:
General
Process: LKRESMON.EXE(2680) *INFO* (No. 1600) Created child thread for
monitoring resource FSList.0.
```

The LifeKeeper GUI now showed its current state. I.e. the primary machine LKSCW2008 in a failed state and the DR failover machine LKDRW2012 running all the resources.

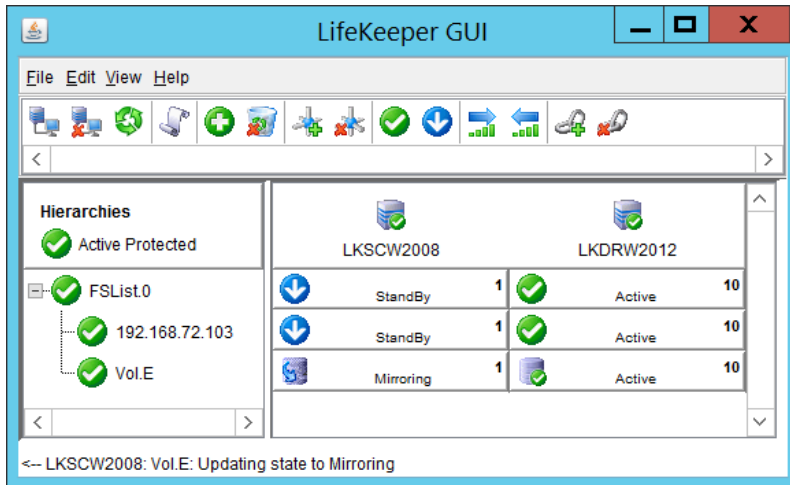


And the <\\LKFS1\Office> share was, of course, available.

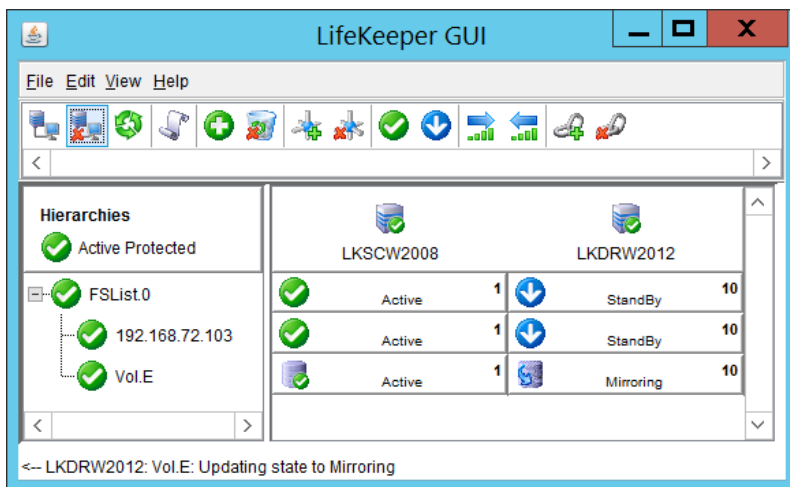


### Switchback resources after recovery

So I recovered the problem on LKSCW2008 by restarting the virtual machine.



LifeKeeper noticed the resource becoming available again.



And we brought LKSCW2008 back in service, which restored all back to normal.

### Conclusion

It requires some additional thought on strategies, but everRun and LifeKeeper seem to be able to coexist very nicely. From the perspective of everRun, implementing LifeKeeper as a DR site even introduces a new level of protection in application failover. From the perspective of LifeKeeper, adding an everRun layer introduces no-downtime hardware redundancy.

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20-Apr-2016