

**TSMCluster**<sup>®</sup>



First step into  
***Spectrum Cluster***

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# TSMCluster<sup>®</sup>

## Agenda

- Why is there a need for HA?
- Possible Solutions:
  - Db2 high availability
  - TSM node replication
- TSMCluster overview
- New webinterface
- Spectrum cluster

**YES:** *I'm still saying TSM instead of Spectrum Protect!*

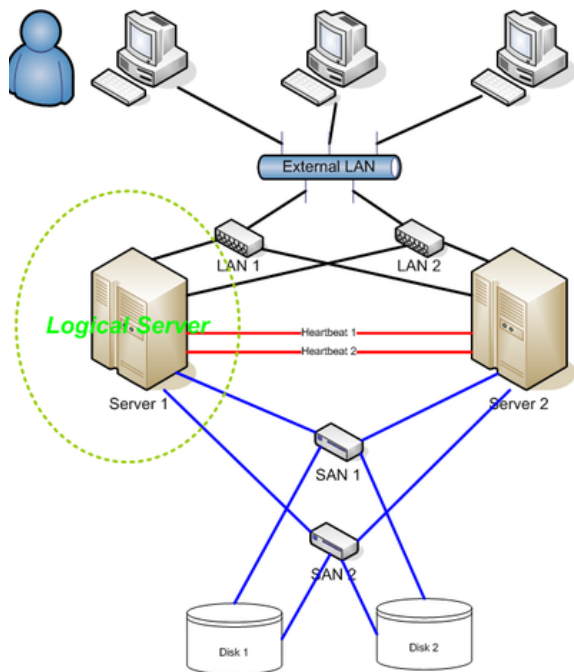
## Why is there a need for HA?

TSM service has to be available 24x7 !!!

Oracle/SAP/DB2/SQL archive logs

Windows Restores around the clock

National law's such as Basel-II, DS-VGO



And **you** have to handle things like...

Changes, Fixes, Updates

Hardware problems (failing host, adapter errors..)

LAN / SAN errors

Container / Tape inconsistencies

Driver errors

Human errors

Instable OS / applications

...

## Db2 high availability - HADR

HADR (**h**igh **a**vailability **d**isaster **r**ecovery) is a „log-shipping“ methodology to replicate a Db2 database from one Db2 system to another.

Some bad limitations:

- TSM as application runs on the same machine
  - When TSM “terminates”, Db2 components will not die
  - When Db2 crashes then TSM will not start on the other machine
- With TSM only one standby database is supported
- A large database has large buffer caches and warming up can take a long time
- Failover and Failback must be handled from an admin or scripts
- HADR is for database crashes/problems only

## TSM node replication

Node replication is a vaulting option for TSM.

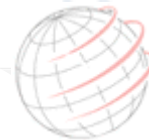
NOT a HA solution!!!

See

<https://www.youtube.com/watch?v=kmIr9Vf0Is4>

- TSM data (from all or selected nodes) and metadata can be replicated
- Source and target server platform can be totally different
- Data can be replicated to all kind of pool (object storage, cloud services ..)
- Node replication includes automatic failover (failback is not easy!!)
- It is „Vaulting only“

- **TSMCluster**® extends the standard TSM server and build a high availability solution for it
- There is no need for additional cluster software
- Supported operating systems: AIX & Linux (Redhat & SuSe)
- Supported TSM versions:  
all IBM supported releases
- TSMCluster is part of the IBM Value Advantage Plus program, IBM Global Solution Directory and an IBM certified solution.



# ***TSM*Cluster<sup>®</sup>** Spectrum Cluster

Resource integration of Spectrum Control<sup>™</sup>

Control and failover of the Tivoli Operation Center (TOC)

Integration of TSLM (Tape system library manager)

Integration of Spectrum Scale<sup>™</sup> (GUI and resources)

Integration of Spectrum Protect<sup>™</sup> for Data Retention (SSAM)

# New webinterface

Based on IBM Websphere Liberty  
(known from TOC)

[https://cluster\\_ip:11090/tsmcl](https://cluster_ip:11090/tsmcl)  
(TLS 1.2 and TSM 8.1.2 ready)

Webinterface and TOC runs as a  
service (including failover)

All functions from the command  
line are included

All sensor data is visible

Webinterface runs on all supported  
platforms

The screenshot displays the TSMcluster web interface. The top navigation bar includes 'Cluster', 'Nodes', 'Instances', 'Sensors', and 'Apps'. The main content area is divided into two sections: a cluster overview and a log of events.

**Cluster Overview:**

- Cluster:** TSMcluster 6.1.0.0
- Nodes:** exaix61, exaix62, exaix63, exaix64
- Instances:**
  - exaix61: aix01, aix02
  - exaix63: aix03

**Log of Events:**

time	node	instance	app	message	details
12:38:13	exaix03	aix03	Resources	db2_aix03 - DB2 alive check OK for aix03	
12:38:13	exaix03	aix03	Resources	TSM - 'aix03': port 1903 OPEN on host 127.0.0.1	
12:38:12	exaix03	aix03	Resources	ip1_aix03 - status OK	
12:38:12	exaix03	aix03	Resources	ip1_aix03 - 192.168.178.163/255.255.255.0 set on en0	
12:38:12	exaix03	aix03	Resources	ip1_aix03 - 192.168.178.163/255.255.255.0 ping successful	
12:38:12	exaix03	aix03	NodeMgr	wrote spec file /opt/tsmcluster/var/specs/aix03.spec	
12:37:57	exaix03	Sensor.opscenter		oc_running - rc is 0, value is 'Server guiServer is not running.'	WARN
12:37:55	exaix02	Sensor.opscenter		oc_running - rc is 0, value is 'Server guiServer is not running.'	WARN
12:37:55	exaix04	Sensor.opscenter		oc_running - rc is 0, value is ''	WARN
12:37:52	exaix01	aix01	Utils	instance aix01 is sound	
12:37:47	exaix01	aix01	Resources	TSM - 'aix01': port 1901 OPEN on host 192.168.178.161	
12:37:47	exaix01	aix01	Resources	db2_aix01 - DB2 alive check OK for aix01	
12:37:46	exaix01	aix01	NodeMgr	wrote spec file /opt/tsmcluster/var/specs/aix01.spec	
12:37:46	exaix01	aix01	Resources	ip1_aix01 - status OK	
12:37:46	exaix01	aix01	Resources	ip1_aix01 - 192.168.178.161/255.255.255.0 set on en0	
12:37:46	exaix01	aix01	Resources	ip1_aix01 - 192.168.178.161/255.255.255.0 ping successful	
12:37:45	exaix01			keep-alive message (every 180 seconds)	
12:37:39	exaix01	aix02	Utils	instance aix02 is sound	
12:37:38	exaix03	aix03	Utils	instance aix03 is sound	
12:37:33	exaix01	aix02	Resources	TSM - 'aix02': port 1902 OPEN on host 127.0.0.1	
12:37:33	exaix01	aix02	Resources	db2_aix02 - DB2 alive check OK for aix02	
12:37:33	exaix01	aix02	NodeMgr	wrote spec file /opt/tsmcluster/var/specs/aix02.spec	
12:37:33	exaix01	aix02	Resources	ip1_aix02 - status OK	
12:37:33	exaix01	aix02	Resources	ip1_aix02 - 192.168.178.162/255.255.255.0 set on en0	
12:37:33	exaix01	aix02	Resources	ip1_aix02 - 192.168.178.162/255.255.255.0 ping successful	
12:37:33	exaix03	aix03	Resources	TSM - 'aix03': port 1903 OPEN on host 127.0.0.1	
12:37:32	exaix03	aix03	Resources	db2_aix03 - DB2 alive check OK for aix03	
12:37:32	exaix03	aix03	Resources	ip1_aix03 - status OK	

**Legend:**

- ↑ instance starting
- ↓ instance terminating
- ⚙ instance maintenance
- node/instance ok
- node/instance failed
- instance stopped
- instance not available
- 🔒 cluster lock holder
- ⚙ instance takeover disabled
- 🔄 instance no spare node



# New webinterface – sensor data

Overview Resources **DB2**

**rlin01** started / activated

**DB**

Database: tsmdb1  
 Path: /rlin01/db/  
 Size: 1280.01 MB  
 LastBackup: 2017/05/12 11:36:57  
 LastBackupVolume: /rlin01/config/dbbackup/94581817.DBV (DBFILE)  
 LastReorg: 2017/09/18 10:54:25

1 Day ▾

DB2 Size last 24 hours

**LOG**

ActiveLogDir: /rlin01/actlog/NODE0000/LOGSTREAM0000/  
 ActiveLogSize: 2048 MB  
 First ActiveLogFile: S0000033.LOG  
 ArchLogDir: /rlin01/archlog/  
 ArchLogSize: 1196.52 MB

Overview **ClusterDB** Config License

## Cluster Database Information

current/initial CLH	exrlin02 / exrlin02
volume	clusterDB
path	/clusterDB/tsm-cluster-lock/log
current/max db size	599 MB / 512 MB Archiving..
current/max archive size	733 MB / 1024 MB
last backup time	2017/09/25 13:18:53

## Database Filesystem

ClusterDB ClusterDB Archives Free

# New webinterface - Log Viewer for TSMCluster, Db2 and TSM

TSMCluster Log DB2 Log TSM Log

node  =

instance  =

Filter  Limit 300  Refresh

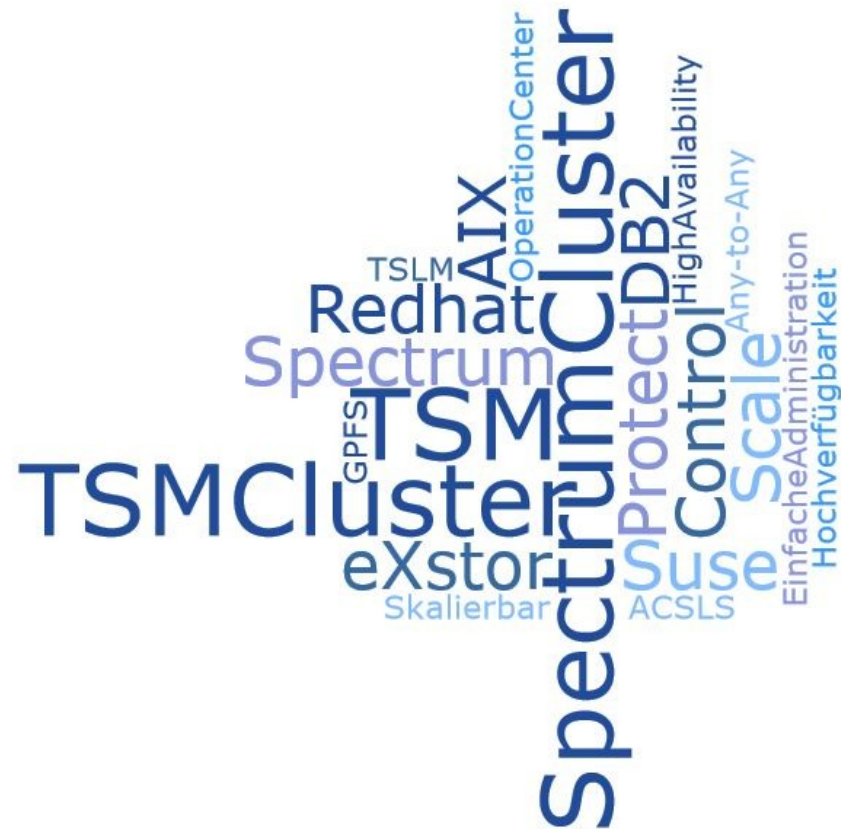
date	time	severity	node	instance	app	message
25.09.2017	16:00:36	2	exrlin01	rlin02	Resources	ip1_rlin02 - status OK
25.09.2017	16:00:37	2	exrlin01	rlin02	Resources	fs1_rlin02 - rlin02 available, mounted and ready
25.09.2017	16:00:37	2	exrlin01	rlin02	Resources	db2_rlin02 - DB2 alive check OK for rlin02
25.09.2017	16:00:37	2	exrlin01	rlin02	Resources	TSM - 'rlin02': port 1902 OPEN on host 127.0.0.1
25.09.2017	16:00:42	2	exrlin01	rlin02	Utils	instance rlin02 is sound
25.09.2017	16:01:16	2	exrlin01	rlin02	NodeMgr	wrote spec file /opt/tsmcluster/var/specs/rlin02.spec
25.09.2017	16:01:16	2	exrlin01	rlin02	Resources	ip1_rlin02 - 192.168.178.152/255.255.255.0 ping successful
25.09.2017	16:01:16	2	exrlin01	rlin02	Resources	ip1_rlin02 - 192.168.178.152/24 set on enp11s0f0
25.09.2017	16:01:16	2	exrlin01	rlin02	Resources	ip1_rlin02 - status OK
25.09.2017	16:01:17	2	exrlin01	rlin02	Resources	fs1_rlin02 - rlin02 available, mounted and ready
25.09.2017	16:01:17	2	exrlin01	rlin02	Resources	db2_rlin02 - DB2 alive check OK for rlin02
25.09.2017	16:01:17	2	exrlin01	rlin02	Resources	TSM - 'rlin02': port 1902 OPEN on host 127.0.0.1
25.09.2017	16:01:17	2	exrlin01	rlin02	Resources	instance rlin02 is sound
25.09.2017	16:01:22	2	exrlin01	rlin02	Utils	wrote spec file /opt/tsmcluster/var/specs/rlin02.spec
25.09.2017	16:01:56	2	exrlin01	rlin02	Resources	ip1_rlin02 - 192.168.178.152/255.255.255.0 ping successful
25.09.2017	16:01:56	2	exrlin01	rlin02	Resources	ip1_rlin02 - 192.168.178.152/24 set on enp11s0f0
25.09.2017	16:01:56	2	exrlin01	rlin02	Resources	ip1_rlin02 - status OK
25.09.2017	16:01:57	2	exrlin01	rlin02	Resources	fs1_rlin02 - rlin02 available, mounted and ready
25.09.2017	16:01:57	2	exrlin01	rlin02	Resources	db2_rlin02 - DB2 alive check OK for rlin02
25.09.2017	16:01:57	2	exrlin01	rlin02	Resources	TSM - 'rlin02': port 1902 OPEN on host 127.0.0.1
25.09.2017	16:02:02	2	exrlin01	rlin02	Utils	instance rlin02 is sound
25.09.2017	16:02:36	2	exrlin01	rlin02	NodeMgr	wrote spec file /opt/tsmcluster/var/specs/rlin02.spec
25.09.2017	16:02:36	2	exrlin01	rlin02	Resources	ip1_rlin02 - 192.168.178.152/255.255.255.0 ping successful
25.09.2017	16:02:36	2	exrlin01	rlin02	Resources	ip1_rlin02 - 192.168.178.152/24 set on enp11s0f0
25.09.2017	16:02:36	2	exrlin01	rlin02	Resources	ip1_rlin02 - status OK
25.09.2017	16:02:37	2	exrlin01	rlin02	Resources	fs1_rlin02 - rlin02 available, mounted and ready
25.09.2017	16:02:37	2	exrlin01	rlin02	Resources	db2_rlin02 - DB2 alive check OK for rlin02

TSMCluster Log DB2 Log TSM Log

rlin01

time	severity	name	message
15:08:24	W	ANR04051	Session 64686 ended for administrator EXSM (Linux x86-64). (SESSION: 64686)
15:08:24	E	ANR20171	Administrator EXSM issued command: QUERY STATUS (SESSION: 64686)
15:08:23	W	ANR04071	Session 64686 started for administrator EXSM (Linux x86-64) (Tcp/Ip localhost(52450)). (SESSION: 64686)
15:07:44	E	ANR04051	Session 64684 ended for administrator EXSM (Linux x86-64). (SESSION: 64684)
15:07:44	W	ANR20171	Administrator EXSM issued command: QUERY STATUS (SESSION: 64684)
15:07:43	E	ANR04071	Session 64684 started for administrator EXSM (Linux x86-64) (Tcp/Ip localhost(52422)). (SESSION: 64684)
15:07:43	W	ANR04051	Session 64682 ended for administrator EXSM (Linux x86-64). (SESSION: 64682)
15:07:43	E	ANR20171	Administrator EXSM issued command: QUERY ADMIN exsm F=d (SESSION: 64682)
15:07:43	W	ANR04071	Session 64682 started for administrator EXSM (Linux x86-64) (Tcp/Ip localhost(52410)). (SESSION: 64682)
15:07:43	E	ANR04051	Session 64681 ended for administrator EXSM (Linux x86-64). (SESSION: 64681)
15:07:43	W	ANR20171	Administrator EXSM issued command: QUERY STATUS (SESSION: 64681)
15:07:42	E	ANR04071	Session 64681 started for administrator EXSM (Linux x86-64) (Tcp/Ip localhost(52408)). (SESSION: 64681)
15:07:04	W	ANR04051	Session 64680 ended for administrator EXSM (Linux x86-64). (SESSION: 64680)
15:07:04	E	ANR20171	Administrator EXSM issued command: QUERY STATUS (SESSION: 64680)
15:07:03	W	ANR04071	Session 64680 started for administrator EXSM (Linux x86-64) (Tcp/Ip localhost(52390)). (SESSION: 64680)
15:06:24	E	ANR04051	Session 64678 ended for administrator EXSM (Linux x86-64). (SESSION: 64678)
15:06:24	W	ANR20171	Administrator EXSM issued command: QUERY STATUS (SESSION: 64678)
15:06:23	E	ANR04071	Session 64678 started for administrator EXSM (Linux x86-64) (Tcp/Ip localhost(52354)). (SESSION: 64678)
15:05:44	W	ANR04051	Session 64676 ended for administrator EXSM (Linux x86-64). (SESSION: 64676)
15:05:44	E	ANR20171	Administrator EXSM issued command: QUERY STATUS (SESSION: 64676)
15:05:43	W	ANR04071	Session 64676 started for administrator EXSM (Linux x86-64) (Tcp/Ip localhost(52326)). (SESSION: 64676)
15:05:04	E	ANR04051	Session 64674 ended for administrator EXSM (Linux x86-64). (SESSION: 64674)
15:05:04	W	ANR20171	Administrator EXSM issued command: QUERY STATUS (SESSION: 64674)
15:05:03	E	ANR04071	Session 64674 started for administrator EXSM (Linux x86-64) (Tcp/Ip localhost(52298)). (SESSION: 64674)
15:04:24	W	ANR04051	Session 64672 ended for administrator EXSM (Linux x86-64). (SESSION: 64672)
15:04:24	E	ANR20171	Administrator EXSM issued command: QUERY STATUS (SESSION: 64672)
15:04:23	W	ANR04071	Session 64672 started for administrator EXSM (Linux x86-64) (Tcp/Ip localhost(52262)). (SESSION: 64672)
15:03:44	E	ANR04051	Session 64670 ended for administrator EXSM (Linux x86-64). (SESSION: 64670)
15:03:44	W	ANR20171	Administrator EXSM issued command: QUERY STATUS (SESSION: 64670)

Visit us at booth 15.



**TSMCluster®**

Thank You!!

[info@tsmcluster.com](mailto:info@tsmcluster.com)

Bruno Friess

[bf@exstor.de](mailto:bf@exstor.de)

+49-170-6326924