

EMC Ionix Storage Insight for Availability

Part of the Ionix Storage Resource Management Family

The Big Picture

- Dramatic reduction in downtime due to faster problem identification and resolution
- Automatically identify the impact of failures on related infrastructure elements including host devices, file systems, EMC PowerPath paths, logical volumes, and storage devices as well as Celerra data movers and client file shares
- When integrated with EMC Ionix IP Availability Manager, EMC Ionix Storage Insight for Availability correlates events, root-cause problems, and impacts across a heterogeneous FC SAN and IP network for a holistic view of the infrastructure
- Reduce time and cost of training people to use multiple tools supporting mixed heterogeneous environments

Automated root-cause and impact analysis of availability problems across the Fibre Channel SAN

EMC® IT management solutions help IT operations ensure the availability of critical IT services through visibility and control across the information infrastructure—including applications, servers, networks, and storage. These solutions, including EMC Ionix™ and EMC Ionix ControlCenter® families, also shift the burden of managing complexity from the users to the system by automating some of the most difficult, error-prone, and time-consuming tasks to ensure efficient delivery of IT services.

In today's complex IT environments with thousands of interrelated devices, a single outage can inundate storage administrators with floods of alarms and duplicate trouble tickets for the same problem. Manual diagnosis, silo management, and the inability to correlate events across storage, IP networks, and application domains leave administrators without a fast and accurate way to pinpoint root-cause problems before they impact business.

Leveraging EMC Ionix (formerly Smarts®) patented technologies, EMC Ionix Storage Insight for Availability (formerly EMC Smarts Storage Insight for Availability) isolates service-affecting Authentic Problems™ in a sea of sympathetic symptoms for dramatically faster mean-time-to-repair and maximum availability of storage infrastructure.

By intelligently correlating events across the FC storage infrastructure, Storage Insight for Availability pinpoints the following FC SAN hardware failures as root-cause problems:

- EMC Symmetrix® unit, disk, front-end director, and port link failures
- NetApp unit/filer, disk down; front-end port adapter, front-end port down, front-end director failures
- HDS unit and front-end adapter failures
- EMC CLARiiON® unit, disk, storage processor, and port link failures
- Fibre Channel SAN switch units and port links
- Host bus adapter cards and port links

In addition, extensive impact analysis identifies the impact of problems on associated infrastructure elements, including host devices, file systems, logical volumes, and storage devices as well as EMC Celerra® data movers and client file shares.

Automate root-cause analysis

As any storage manager can attest, fixing a problem is easy once it's diagnosed. The difficulty lies in locating the root cause among the myriad of events that appear on the management console. Storage Insight for Availability turns thousands of confusing events into a handful of meaningful problems, as illustrated in Figures 1 and 2.

This level of automation saves valuable time and resources across multiple groups and ensures that the right team gets to work on the right problem, right away.

Storage Insight for Availability also automatically identifies the impact of a failure on the associated elements in the SAN infrastructure. In the example shown in Figure 3, the down HBA card is impacting host devices, EMC PowerPath® paths, physical paths, and ports on switches.

Figure 1: A single outage can result in multiple symptoms.

Sev...	Ack...	Class	Name	Event	Source	Impact
!	No	FCSwitch	ASELAB_DS16B_239	Unreachable	IC-SIA	0
!	No	FCSwitch	ASELAB_DS32B_40	Unreachable	IC-SIA	0
!	No	FCSwitch	CSE_Br3250_cab7	Unreachable	IC-SIA	0
!	No	FCSwitch	ASELAB_DS16B_171	Unreachable	IC-SIA	0
!	Yes	FrontEndDirector	000190100439_FA-9D	OperationallyDown	IC-SIA	0
!	No	ServiceOffering	Production_Scheduling	Impacted	INCHARGE-...	0
!	No	PowerPathChildDevice	losbd206_c111d75	AccessImpacted	IC-SIA	0
!	No	PowerPathChildDevice	LOSBD202_c5t1d60	AccessImpacted	IC-SIA	0
!	No	HostPhysicalDevice	losbd205_\\PHYSICALDRIVE7	AccessImpacted	IC-SIA	0
!	No	HostFileSystem	losbd205_L:\	AccessImpacted	IC-SIA	0
!	No	HostPhysicalDevice	LOSBD202_\\PHYSICALDRIVE20	AccessImpacted	IC-SIA	0
!	No	PowerPathChildDevice	LOSBD202_c5t1d59	AccessImpacted	IC-SIA	0

Figure 2: Storage Insight for Availability automatically determines the root-cause problems to be an HBA card failure, switch failure, and Symmetrix front-end director failure.

Sev...	Ack...	Owner	Class	Name	Event	Source	Impact
!	No		HostBusAdapter	losbd203_emulex-lp9002-1	Down	IC-SIA	78
!	No		FrontEndDirector	000190100439_FA-7B	Down	IC-SIA	74
!	Yes	admin	FCSwitch	ASELAB_DS16B_170	Unresponsive	IC-SIA	1
!	Yes	admin	FCSwitch	ASELAB_DS16B2_39	Unresponsive	IC-SIA	1
!	Yes	admin	FCSwitch	ASELAB_DS16B_239	Unresponsive	IC-SIA	1

Figure 3: Down HBA card impacts host devices, file systems PowerPath paths, physical paths, and ports on switches.

Notification : HostBusAdapter Down [100% 18 Apr 11:48:19]

Name : losbd203_emulex-lp9002-1

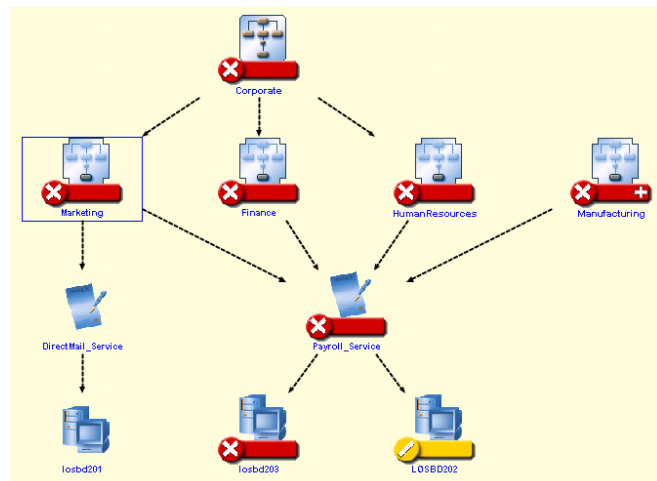
General | Audit Log | Impact | Codebook: IC-SIA

Class	Name	Event
HostPhysicalDevice	losbd203_\\PHYSICALDRIVE12	AccessImpacted
HostPhysicalDevice	losbd203_\\PHYSICALDRIVE20	AccessImpacted
HostPhysicalDevice	losbd203_\\PHYSICALDRIVE6	AccessImpacted
HostPhysicalDevice	losbd203_\\PHYSICALDRIVE20	Down
HostFileSystem	losbd203_H:\	AccessImpacted
HostFileSystem	losbd203_J:\	AccessImpacted
HostFileSystem	losbd203_G:\	AccessImpacted
HostFileSystem	losbd203_F:\	AccessImpacted
HostFileSystem	losbd203_E:\	AccessImpacted
HostFileSystem	losbd203_L:\	AccessImpacted
HostFileSystem	losbd203_K:\	AccessImpacted
HostFileSystem	losbd203_I:\	AccessImpacted
HostFileSystem	losbd203_M:\	AccessImpacted

Calculate business impact

Once you have identified root-cause problems, you need to quickly determine how these problems impact the business so you can prioritize corrective action. Integrating Storage Insight for Availability with EMC Ionix Business Impact Manager enables you to automatically calculate the impact of SAN infrastructure issues on business services. Figure 4 illustrates the impact of the three root-cause problems on services and their users.

Figure 4: Departments and services impacted by SAN infrastructure issues.



Correlate problems and impacts across storage and the network

One of the key differentiators of Ionix (formerly Smarts) technology is cross-domain correlation—the ability to identify root-cause problems and their impacts across technology domains to provide true end-to-end management of the IT environment. Storage Insight for Availability and IP Availability Manager are the only products that can correlate events, root-cause problems, and impacts across the heterogeneous FC SAN and IP network to provide a holistic view of the infrastructure. Cross-domain correlation gives you the option of using Storage Insight for Availability to automate root-cause analysis in your FC SAN infrastructure, or to add IP Availability Manager to gain exceptional insight into IT resource health and streamline processes across the data center and the network operations center.

By correlating root-cause problems and impacts across the FC SAN and IP infrastructure through the Celerra Gateway, Storage Insight for Availability identifies the impact FC SAN failures on Client File Shares as shown in figure 5.

Figure 5: Correlate SAN availability root-cause problems with impacts on Celerra file shares with Storage Insight for Availability and IP Availability Manager.

Sev...	Ack...	Owner	Class	Name	Event	Source	Impact	Count	L
✖	No		FileServer	172.24.95.33 [Celerra Data Mo...	Down	INCHARGE...	1	1	17 Apr
✖	No		FrontEndDirector	000190100439_FA-9D	Down	IC-SIA	1	1	217 Apr

Sev...	Ack...	Owner	Class	Name	Event	Source	Impact	Count	L
⚠	No		MSFC	hop08-02m01-gw01.iss.emc....	DiscoveryError	INCHARGE-AM	0	1	17 Apr
⚠	No		Host	LOSBC027	DiscoveryError	INCHARGE-AM	0	1	17 Apr
⚠	No		FrontEndDirector	000190100439_FA-9D	Operationally...	IC-SIA	0	2	17 Apr
⚠	No		FileServer	172.24.95.33 [Celerra Data Mo...	Unresponsive	INCHARGE-AM	0	1	17 Apr

Storage Insight for Availability provides root-cause analysis for Network Appliance storage arrays. The product determines the root cause of Network Appliance storage array failures and reports impacts (see Figure 3) to file shares as available through EMC Ionix ControlCenter or the corresponding Network Appliance interface.

Figure 6. This screen displays a Notification Log when a disk failure has occurred on a Network Appliance device with hot spares enabled.

Sev...	Ack...	Owner	Class	Event	Name	Source	Impact	Count	Last notify	F
✖	No		NetAppPhysicalDisk	Down	D5C02	SIA-ANALYSIS	2	1	09 Jul 16:51:53	09 Jul
✖	No		NetAppPhysicalDisk	Down	D5C01	SIA-ANALYSIS	2	2	09 Jul 16:51:53	09 Jul
⚠	No		Host	Impacted	FCPH05B	SIA-ANALYSIS	0	2	09 Jul 16:51:53	09 Jul
⚠	No		HostPhysicalDevice	Impacted	HP001	SIA-ANALYSIS	0	2	09 Jul 16:51:53	09 Jul
⚠	No		Host	Impacted	IPHD01	SIA-ANALYSIS	0	2	09 Jul 16:51:53	09 Jul
⚠	No		NetAppLUN	DataRedundancyLost	LUN01	SIA-ANALYSIS	0	2	09 Jul 16:51:53	09 Jul
⚠	No		NetAppVolume	Degraded	VOL01	SIA-ANALYSIS	0	2	09 Jul 16:51:53	09 Jul
⚠	No		HostFileSystem	Impacted	HF001	SIA-ANALYSIS	0	2	09 Jul 16:51:53	09 Jul
⚠	No		Host	Impacted	LUN05T	SIA-ANALYSIS	0	2	09 Jul 16:51:53	09 Jul
⚠	No		NetAppPhysicalDisk	OperationallyDown	D5C02	SIA-ANALYSIS	0	1	09 Jul 16:51:48	09 Jul
⚠	No		NetAppPhysicalDisk	OperationallyDown	D5C01	SIA-ANALYSIS	0	2	09 Jul 16:51:48	09 Jul
⚠	No		Aggregate	Degraded	AGG01	SIA-ANALYSIS	0	2	09 Jul 16:51:48	09 Jul
⚠	No		DiskGroup	AtRisk	DG01	SIA-ANALYSIS	0	2	09 Jul 16:51:48	09 Jul

Rapid determination of whether the problem exists in the IP infrastructure or the FC SAN eliminates finger-pointing between the storage and network teams, and streamlines operations, processes, and communications to ensure that the right people are working on the right problem, right away. Productivity improves and the volume of trouble tickets decreases because multiple teams are no longer wasting valuable resources chasing the same problem.

Built on proven technology

Like all EMC Ionix products, Storage Insight for Availability leverages the patented EMC Ionix (formerly Smarts) Common Information Model™ and Codebook Correlation Technology™ to:

- Leverage alerts and topology from EMC Ionix ControlCenter
- Model your storage environment, including objects, relationships, and behaviors for systems, networks, applications, and services
- Automate root-cause and impact analysis using patented software algorithms in the context of the model

Together, these innovative technologies automate the most difficult tasks in storage and IT management, maximizing system availability while improving productivity of your expert storage system resources.

Value for your business

Storage Insight for Availability delivers these exceptional business and operational benefits:

Business benefits

- Faster problem identification and resolution dramatically reduces downtime, protecting revenue streams and preventing financial penalties due to missed service-level agreements.
- Higher levels of automation, including the automatic update of modeling and analysis as the environment changes, delivers exceptionally low cost of ownership and rapid return on investment.
- Knowing exactly what needs to be fixed in real time maximizes the availability of the FC SAN infrastructure that supports business-critical services and applications.

Operational benefits

- Take the correct action—right away and every time—with instant, accurate diagnosis of root-cause problems and impacts.
- Automated root-cause and impact analysis eliminates manual analysis and rules writing while reducing mean-time-to-repair.
- Cross-domain correlation streamlines operations, processes, and communication between the storage management and network teams.

About EMC

EMC Corporation is the world's leading developer and provider of information infrastructure technology and solutions that enable organizations of all sizes to transform the way they compete and create value from their information. Information about EMC's products and services can be found at www.EMC.com.



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