IBM Servers and Storage Demos
i5/OS Switch Disk Storage Architecture - IASPs and Cross Site Mirroring

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Welcome to part 3 of Switch Disk Basics. In the first part we reviewed the fundamental storage architecture that led to the development of Switch Disk Technology. In the second part, we reviewed switchable disks, which is based on independent auxiliary storage pools and provides a way for customers to have a more resilient system within a single data center, by providing a way to manage a shrinking backup window. In the third part we are going to review an additional way to manage the replication of data.

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In a switch disk cluster, although we have a very nice way to manage a shrinking maintenance window, we only have one copy of the data. Customers have told us that they wanted an alternate way to manage the ability to replicate data from a switch disk cluster.

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In Version 5 Release 3 of i5/OS, we introduced something called 'cross site mirroring'. You will sometimes see this abbreviated in documentation as XSM. Cross site mirroring is a way for i5/OS to mirror the data that resides in a switchable IASP to another IASP. So let's take a look.

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What we are doing here is setting up a third node in the cluster. The third node is the one in the lower right part of the picture. It's called System C and it is yellow. It is in a different location than systems A and B, which are generally partitions within a single server or two servers connected to each other using a high-speed link, in the same data center. The third system, System C, has its own disk - its own independent auxiliary storage pool. We connect System C to the data center using whatever communication fabric is available. We then define two IASP's - one in the data center and a second one that is connected to System C. We define those as being mirrored. The second IASP is a mirrored copy of the first. It's varied on, but it's not active. By that we mean the system knows that a switch disk cluster is there, but i5/OS does not allow users or applications to actually access the disk. Only the switch disk IASP in the data center can be accessed.

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As we run an application in the data center and make changes to data, data pages are written out of memory and those pages get simultaneously sent down to the switch disk cluster and to the cross site mirrored version. As new pages are written out of memory and onto disk, the system handles the mirroring of these two objects.

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One of the aspects that customers really like about this solution is that once the cross site mirrored environment is set up, and you define what data is placed in that IASP, you can stop worrying about replication, because i5/OS will handle the mirroring of the data from one copy to the next.

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The mirroring can be done in two different ways. If you look in the System i Information Center, you will see that i5/OS offers two options for synchronizing the data. The first one is called 'synchronous' - that means the data must reach the disk in the second IASP before the system sends a message back to the primary server indicating the transaction is complete. i5/OS also has an option called asynchronous, and probably this is more accurately called 'nearsynchronous'. In this environment the data only has to reach memory on System C before i5/OS will send a message back indicating transaction complete. You'll notice, though, that in either environment i5/OS will send a message back to the primary server saying transaction complete". Because of this transaction complete message being sent back, we do not generally recommend that System C should be more than 20-50 km away from the primary data center.

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So this is more of a metro mirroring type of solution, as opposed to an asynchronous geographically dispersed solution. In the future we may have a truly asynchronous option, but for now we are recommending 20-50 km away.

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The other part of cross site mirror technology - In Version 5 Release 3 of i5/OS, cross site mirroring technology was deployed and if the two locations lost communication or cross site mirroring was suspended for any reason, i5/OS would need to do a full re-synch of that IASP before continuing with operations. That means if you have a terabyte of disk we would have to fully re-synch a terabyte of data if you lost the connection or you suspended cross site mirroring for any reason.

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In Version 5 Release 4 we offer something called 'source side tracking'. What source side tracking allows is, you can be running your application on System A and you can suspend cross site mirroring. What happens is i5/OS will track all the changes made to the data on System A during the suspended time, and when you resume cross site mirroring, i5/OS will only send the changed data to System C, re-synchronizing that way. In V6R1 i5/OS has added 'target side tracking'. Target side tracking allows you to suspend cross site mirroring, make changes to the data on System C, and then resume cross site mirroring. i5/OS does bi-directional change data refresh. When target side tracking is active the user can suspend cross site mirroring in order to, for example, save the data to a tape on System C, then resume cross site mirroring when the backup has completed.

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So as you can see this is very critical technology, in terms of the availability solutions customers will have available to them.

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