RAS A5x00 Hardware Configuration Guidelines

“Best” configurations with direct connected dual loop arrays are always the most fault tolerant and best performing configurations, but also the most expensive in terms of sbus slots for the additional host bus adapters required. This extra cost makes “best” configurations impractical for most environments.

Table 1: Best A5x00 Hardware Configurations

	Minimum hardware requirements
RAID 1+0* **RAID 0+1**	• array pairs - each array is mirrored to a separate array and loop pair • direct connect (no hubs or daisy chains) • separate host adapters (on separate system boards) • 2 loops per array (connected to separate host adapters) • separate power source for each array mirror disk
RAID 5	• 5 arrays - for 4+1 (4 data 1 parity) • direct connect (no hubs or daisy chains) • 5 host adapters (on separate system boards) • 2 loops per array • separate power source for each array RAID5 volume disk

*NOTE: RAID 1+0 configurations require SDS 4.x or SEVM 3.x

“Fully Redundant” RAS configurations can be built using hubs and daisy chains to put multiple arrays on the loop, but you must understand that the loop or loop pair to the arrays is a single point of failure. Data must be mirrored to a separate array on a separate loop or loop pair. If RAID5 is used each volume disk must be on a separate array on a separate loop.

Table 2: Fully Redundant A5x00 Hardware Configurations

	Minimum hardware requirements
RAID 1+0* **RAID 0+1**	• rack pairs - all rack arrays are mirrored to a separate rack and loop • hubs or daisy chains acceptable • separate host adapters (on separate system boards) • 1 or 2 loop/s per array (connected to separate host adapters) • separate power source for each rack
RAID 5	• 5 racks - for 4+1 (4 data 1 parity) • hubs or daisy chains acceptable • 5 host adapters (on separate system boards) • 1 or 2 loop/s per rack • separate power source for each rack

“NOT Redundant” configurations contain single points of failure, where one hardware error can cause loss of access to the array data.

Table 3: NOT redundant A5x00 Hardware Configurations

	Hardware configurations
RAID 1+0* **RAID 0+1**	• single array or loop • dual loop but to same array/s • single host adapter • single power source
RAID 5	• less that 1 array and loop per volume disk (4+1 with only 4 loops) • less that 1 loop per volume disk • less that 1 host adapter per volume disk • less that one power source for each volume disk

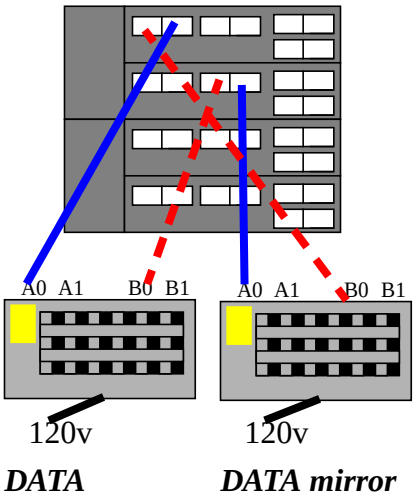
Configuration Examples

The following configuration examples depict an E4000 server with multiple connections to one or more A5x00 arrays. Solid connection lines represent connections to the array A loops, dotted connection lines represent connections to the array B loops.

Note the examples always show the A loops connected to the 0 (right) host adapter port and the B loops connected to the 1 (left) host adapter port. Although this is not a requirement its an excellent practice thats highly recommended.

Selected examples are only a few of the many choices for configuring A5x00 array subsystems. These examples are entended to aid in the understanding of the requirements and configurations listed in tables 1 through 3. For complete configuration information and additional examples reference the A5x00 configuration guide.

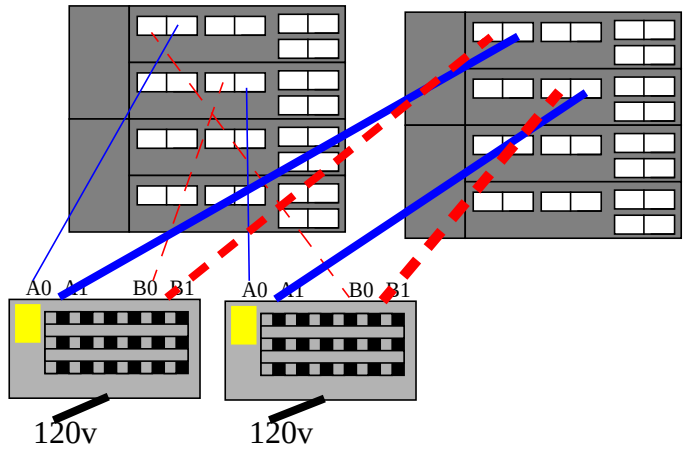
Best Mirrored Configurations



2 x X6731A - Sbus Host Adapter with 1 GBIC
2 x X6731A - GBIC
2 x X973A - 2 meter cable (X978A for 15 meter cable)

A5x00 table top arrays (includes 2 two meter cables)
2 x SG-XARY510A-45G(127G) - A5000
SG-XARY520A-63G(200G) - A5200
SG-XARY530A-91G(254G) - A5100

Note: A second host can be connected by cabling to the array's A1 and B1 ports. See example below.

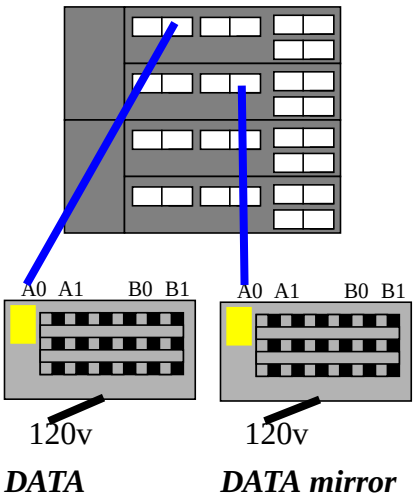


Options for second host:

2 x X6730A - Sbus Host Adapter
6 x X6731A - GBIC
4 x X973A - 2M cable (X978A for 15M)

Note: For hosts that use an array disk for booting you should configure one host to boot to loop A, the other host to boot to loop B. This will prevent data traffic or errors from one host effecting the other.

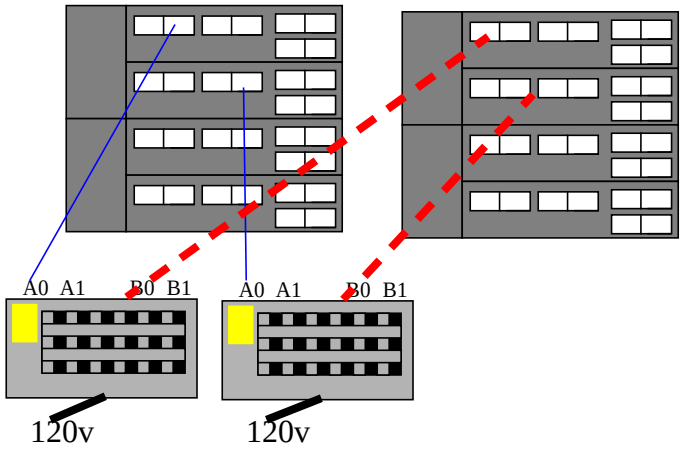
Fully Redundant Mirrored Configurations



2 x X6731A - Sbus Host Adapter with 1 GBIC
2 x X973A - 2 meter cable (X978A for 15 meter cable)

A5x00 table top arrays (includes 2 two meter cables)
2 x SG-XARY510A-45G(127G) - A5000
SG-XARY520A-63G(200G) - A5200
SG-XARY530A-91G(254G) - A5100

Note: A second host can be connected by cabling to the array's A1 and B1 ports. See example below.

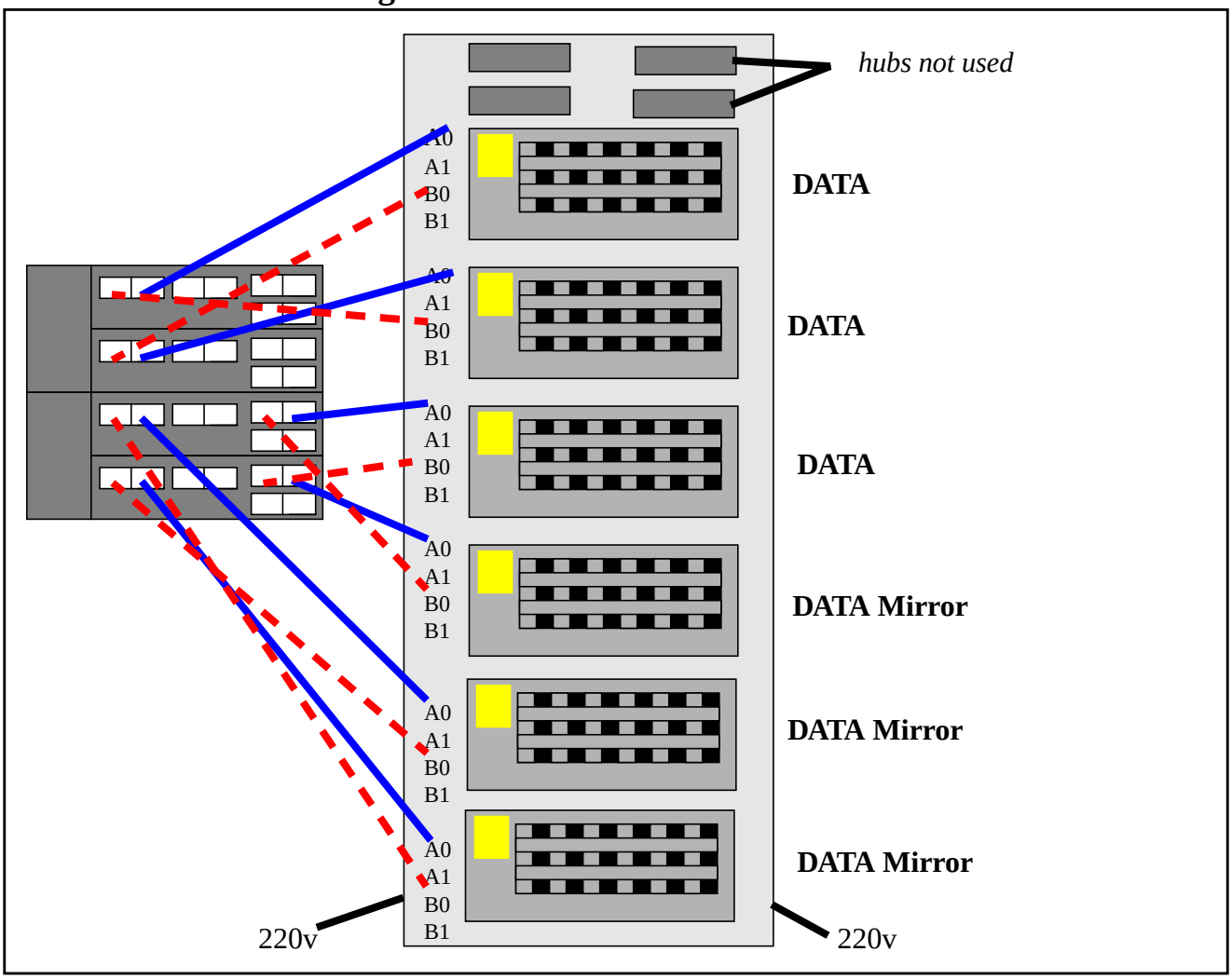


Options for second host:

2 x X6730A - Sbus Host Adapter w 1 GBIC
2 x X973A - 2M cable (X978A for 15M)

Note: The second host would connect to the B0 array ports. This gives better fault tolerance and performance as data traffic or errors on one host's loop will not effect the other host.

Best Mirrored Rack Config



Note: Each adapter is on a separate sbus. Each mirrored pair uses separate adapters on separate system boards. Don't use the array hubs or power sequencer.

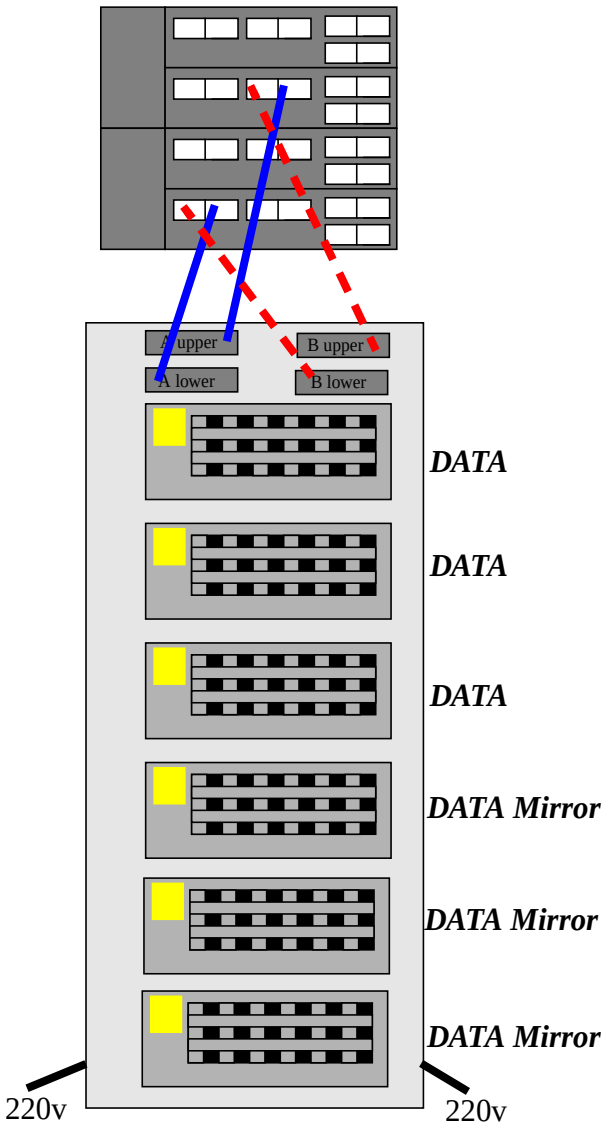
Although this is the best possible configuration for both fault tolerance and performance its not always practical due to the larger number of host adpters required.

6 x X6730A - Sbus Host Adapter with 1 GBIC
6 x X6731A - GBIC
8 x X973A - 2 meter cable (X978A for 15 meter cable)

SG-XARY523A-1200G - A5200 (comes with 4 15 meter cables)

Options for second host:
6 x X6730A - Sbus Host Adapter with 1 GBIC
18 x X6731A - GBIC
12 x X973A - 2 meter cable (X978A for 15 meter cable)

Fully Redundant Rack Configuration



Ordering example:

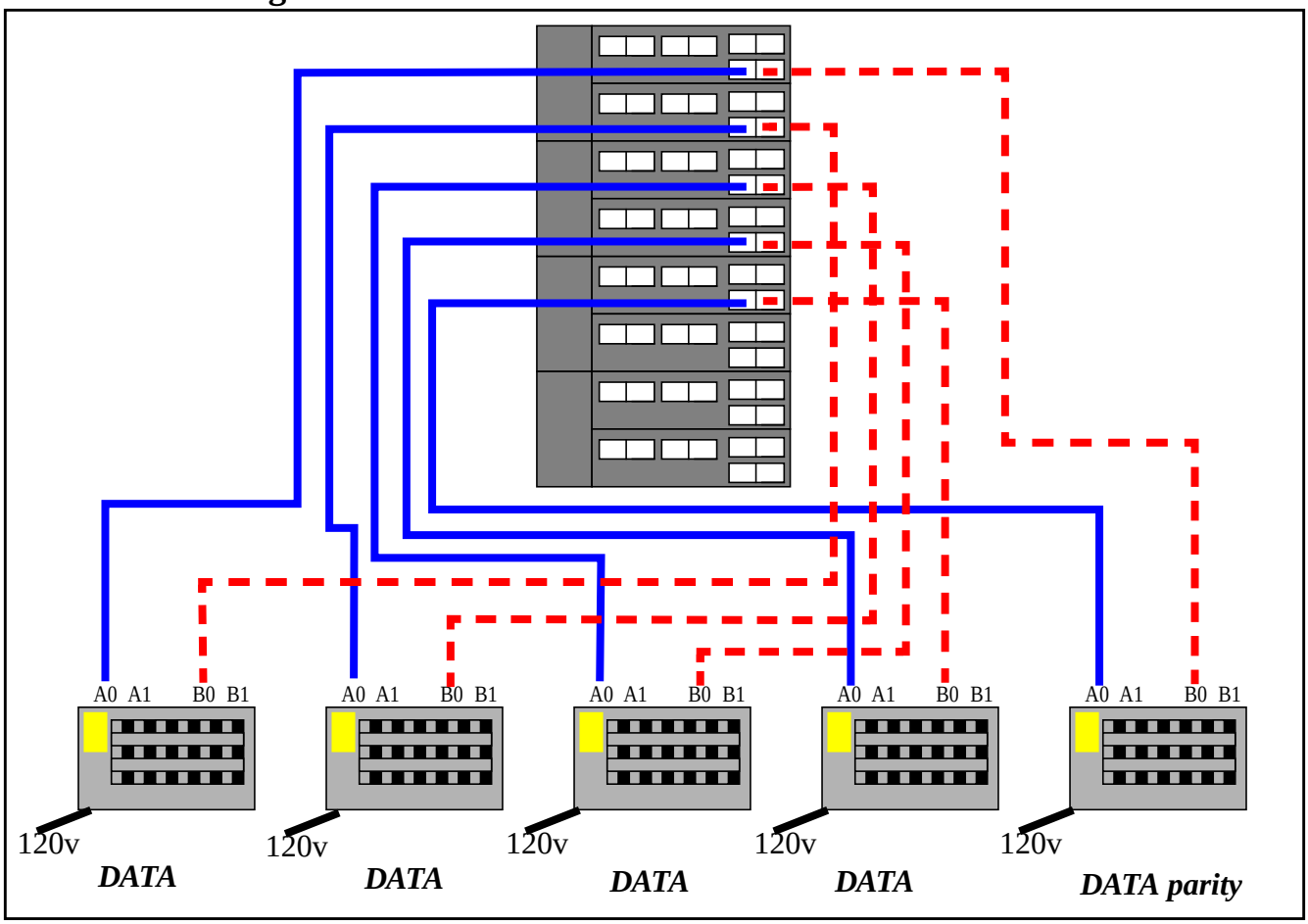
2 x X6730A - Sbus Host Adapter with 1 GBIC
2 x X6731A - GBIC

SG-XARY523A-1200G - A5200 (4 15 M cables)
2 x 3858A - US power cord (3859A for Inter)

Options for second host:
2 x X6730A - Sbus Host Adapter with 1 GBIC
6 x X6731A - GBIC
4 x X973A - 2 meter cable (X978A for 15 M cable)

This fully redundant mirrored rack configuration is much simpler to implement. The disadvantage over the Best direct connect rack example is that one failure can take out 3 array mirrors (such as a dual loop error caused by a failed mother board). After the failure is resolved the mirrors will require a fully resync which will take many hours. A similar failure for direct connect would only effect 2 arrays not 6.

Best RAID5 configuration



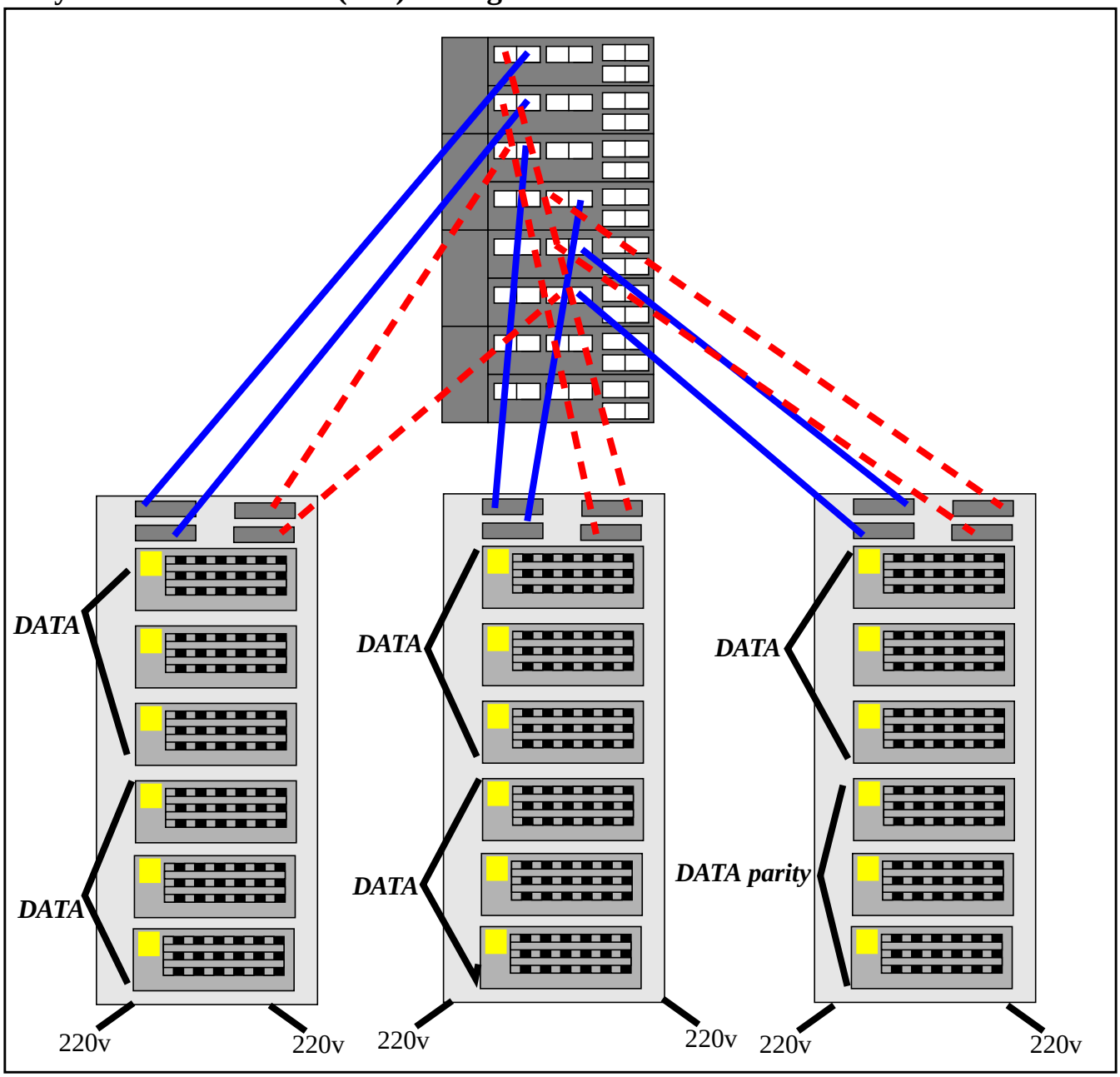
Note: The example above depicts RAID5 with 4 data disks and one parity disk (4+1). RAID5 actually stripes parity across all disks, but the example is used for simplicity. Also note that the server requires 5 system boards, one for each array. For very large installations the above configuration could be built using racks instead of table top arrays.

5 x X6730A - Sbus Host Adapter with 1 GBIC
5 x X6731A - GBIC
5 x X973A - 2 meter cable (X978A for 15 meter cable)

5 x SG-XARY510A-45G(127G) - A5000
SG-XARY520A-63G(200G) - A5200
SG-XARY530A-91G(254G) - A5100

Options for second host:
5 x X6730A - Sbus Host Adapter with 1 GBIC
15 x X6731A - GBIC
10 x X973A - 2 meter cable (X978A for 15 meter cable)

Fully Redundant RAID5 (5+1) Configuration

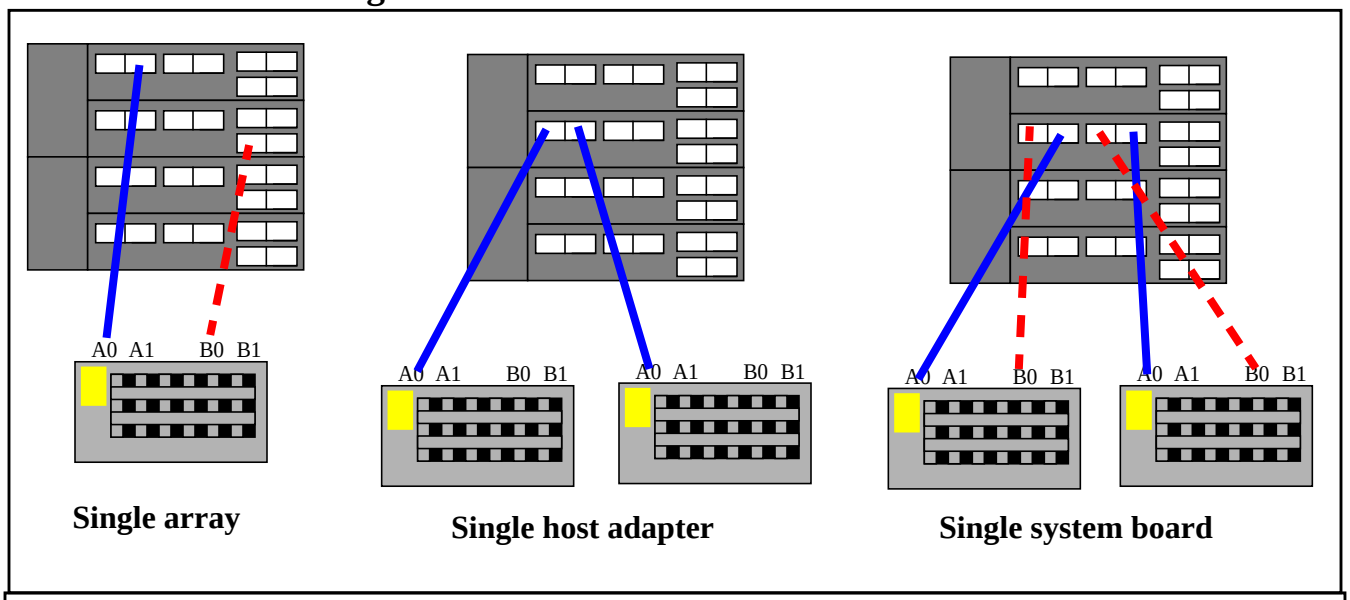


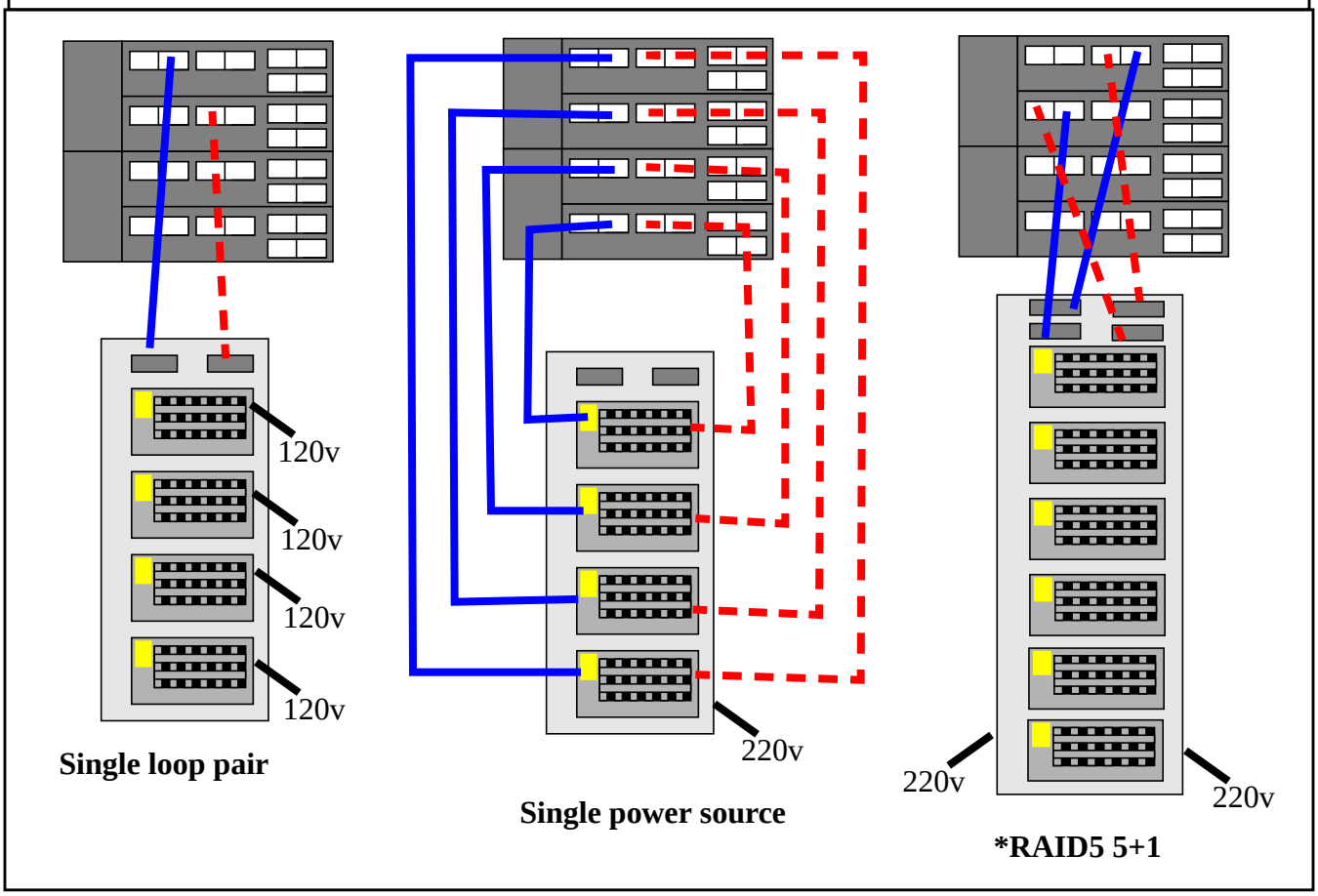
This example shows use of both the A and B loops, this is not a requirement for full redundancy, but is highly recommended as the slight extra cost yields greater fault tolerance and performance.

6 x X6730A - Sbus Host Adapter with 1 GBIC
6 x X6731A - GBIC

3 x SG-XARY523A-1200G - A5200 (comes with 4 15 meter cables)
SG-XARY533A-1528G - A5100
SG-XARY513A-764G - A5000
6 x 3858A - US power cord (3859A for International)

NOT Redundant Configurations





* For this RAID5 example, although this would be an excellent mirror config, you would need two more racks (6 redundant array groups) to implement a fully redundant RAID5 5+1 configuration.