Steps for configuring RAID volumes on various RAID cards
Creating & Managing the RAID volumes on Adaptec 2120S RAID card

1. Ensure that all the HDD's are connected properly in their respective slots (In case of HS).

2. In the POST ensure that the Adaptec 2120S RAID card is getting sensed.

3. Enter the ARC utility by pressing Ctrl+A when the Adaptec message appears in POST.

4. Once its is inside the Adaptec BIOS you will see a blue-background screen appears with the title Adaptec 2xx0S with different menu's

Use the "***Disk Utilities"*** menu item to examine the drives showing as available to the system. If any seem to be missing, power the system down and inspect the hardware connections.

5. RAID Controller " ***SCSI Select*** " Utility. Press < ENTER > once the desired Array Configuration Utility is highlighted by default.

Note: If more than one controller of the Adaptec SCSI RAID 2120S/2200S family is installed, the first screen will show the controllers present. Highlight the controller you wish to use and press < ENTER > to get to the screen in this step.

6. The " ***Array Configuration*** " Utility screen appears. Using the arrow keys, highlight " ***Initialize Drives*** ", then press < ENTER >.

Note: All drives being used in an array or volume must be initialized.

7. Using the arrow keys again, highlight the drives to be used for the RAID , press 'Insert key' when a desired drive is highlighted. Selected drives will be displayed in the box on the right side of the display. When the desired drives are on the right side, press < ENTER > to continue.

8. A red warning box appears. now Press Y, & then < ENTER > to continue(This is asking for a confirmation to destroy all the data on the drives). The system will initialize the selected drives, in a few seconds.

9. The Array Configuration Utility screen reappears. Using the arrow keys, highlight "***Create Array*** ", then press < ENTER >.

10. Using the arrow keys highlight the drives for the RAID , press Insert (Insert key) when a desired drive is highlighted. By selecting the drives the right hand frame lists the selected drives of volumes. press < ENTER > to continue.

11. On the next screen, most of the default entries will be used by pressing < ENTER > when they are highlighted. Make the following selections and entries:

Creating Array window appears Press < ENTER > to continue with the array configuration.

Note: The newly created array will be usable immediately, but will continue to build until finished in the background, impacting performance until it is done.

The array property line is displayed on Selection

Array Type :- Select RAID 5/RAID 1 etc, press < ENTER >

Array Label :- Type a suitable name in the space provided for identifying that array & press < ENTER >

Array Size :- Press < ENTER >for selecting the size of the volume & Press < ENTER > again to use the default value (The default values are based on the capacity & RAID volume created) the default drive granularity will be in GB.

Stripe Size :- Select appropriate (64KB will be the default)

Read Caching :- YES (with default values)

Write Caching :- YES (with default values)

Create RAID :- Press < ENTER > (Default value is Build/verify)

[Done] Press < ENTER > to complete.

12. Press Esc until the Exit Utility window appears. Highlight Yes, then press < ENTER >. The system will restart.

Rebuilding the RAID

1. Replace the HDD of the same make & model in the failed drive slot & reboot the server.

2. Enter the ARC utility by pressing Ctrl+A when the Adaptec message appears in POST

3. Once its is inside the Adaptec BIOS you will see a blue-background screen appears with the title Adaptec 2xx0S with different menu's

Use the "***Disk Utilities***" menu item to examine the New disk is getting sensed.

4. In RAID Controller " ***SCSI Select*** " Utility. Press < ENTER > once the desired Array Configuration Utility is highlighted by default.

Note: If more than one controller of the Adaptec SCSI RAID 2120S/2200S family is installed, the first screen will show the controllers present. Highlight the controller you wish to use and press < ENTER > to get to the screen in this step.

5. The " ***Array Configuration*** " Utility screen appears. Using the arrow keys, highlight " ***Initialize Drives*** ", then press < ENTER >.

6. Select the newly inserted disk (Identify using the SCSI ID for the disk) using the arrow keys again, highlight the new drive, press 'Insert key' when a desired drive is highlighted. Selected drives will be displayed in the box on the right side of the display. When the desired drives are on the right side, press < ENTER > to continue.

7. A red warning box appears. now Press Y, & then < ENTER > to continue(This is asking for a confirmation to destroy all the data on the drives). The system will initialize the selected drives, in a few seconds.

8. Now the rebuilding will start whose progress can be seen in the properties of the Array.

If a higher capacity disk is used as a replacement for failed array member then after initializing the new drive we have to make it as hotspare.
1. Initialize the new drive
2. In the "RAID array" press ctrl + y which will open the Hotspare creation menu.
3. Chose the new drive which is listed there & make it as hotspare which will start rebuilding your array(will use only the previous size of the failed array member & remaining space can be used for other array)

Creating RAID in Intel RAID (Intel SRCU31/SRCU42L)

Storage Console (StorCon) is the software tool used for creating host drives as well as administering the RAID subsystem. This procedure describes how to create a bootable host drive.

1. Power on the computer.

2. Press <Ctrl>+<g> when the Intel RAID BIOS message appears to load XROM StorCon.

3. Select the controller and press Enter.
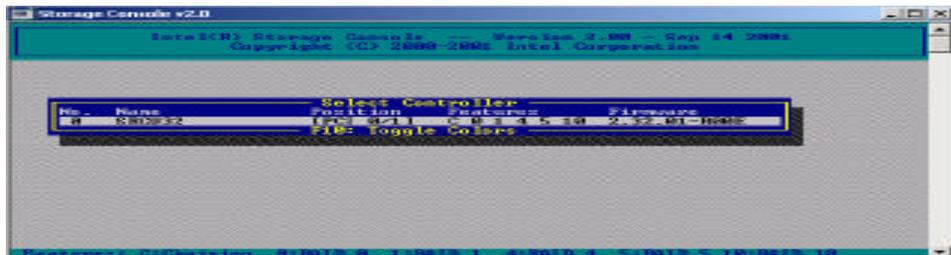
4. Select the menu option *Configure Host Drives* and press Enter as shown below.
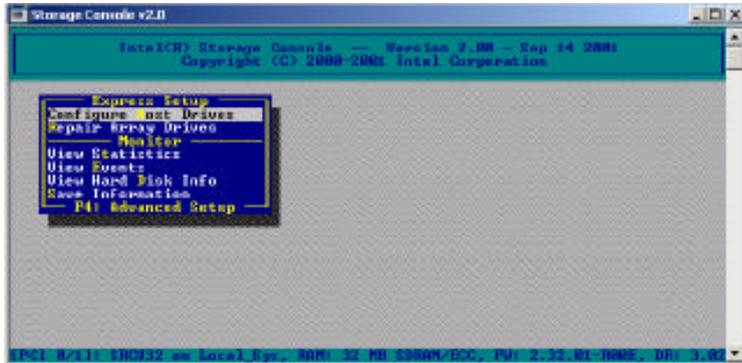
5. Select *Create new Host Drive* (as shown in below) and press Enter. StorCon displays a list of available hard disks
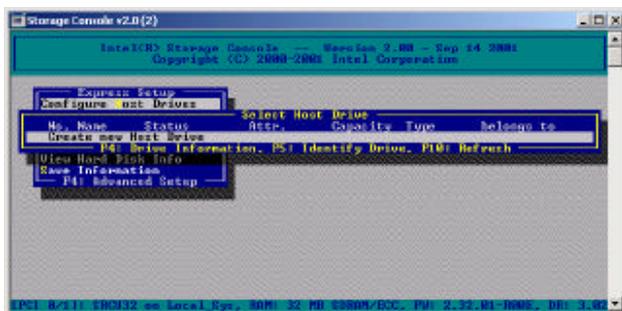
6. Use the arrow keys and the Space bar to select the number of hard disks for your RAID 5 array (minimum of three disks to a maximum of 15 disks per channel). In this RAID 5 example, four disks are selected. The selected hard disks become marked with an " * " as shown in below Press Enter to accept your selections.
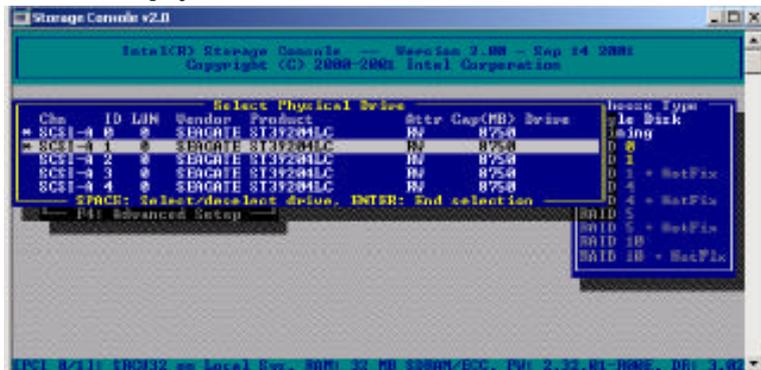
7. From the *Choose Type* menu, select *RAID 5* and press Enter. As shown in the next figure
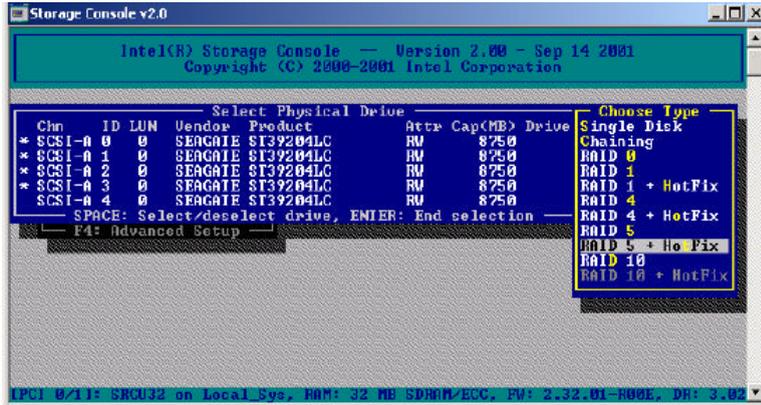
8. StorCon displays a warning that all data on the selected disks will be destroyed (as shown below in RED). Confirm your choice by pressing <y>.
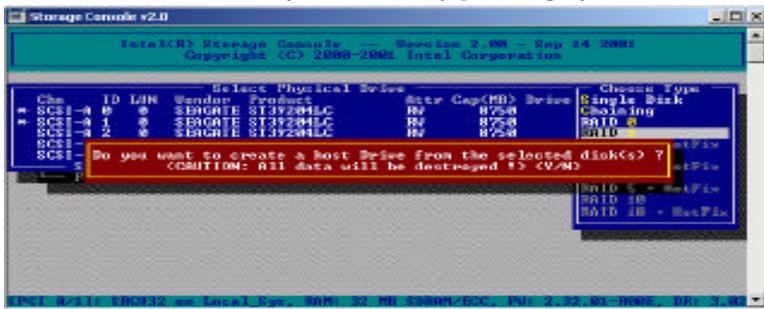
9. StorCon asks for the capacity to use for each drive (as shown below). Type in the physical drive capacity to be used from each RAID array member and press Enter.
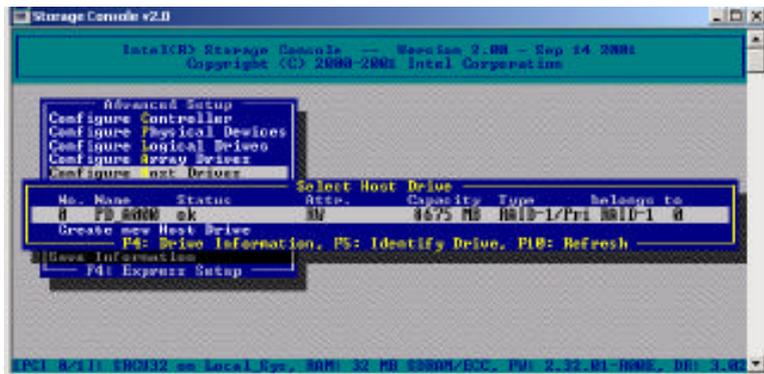
The new host drive is created as shown above.

11. Exit StorCon by pressing <Esc> several times to escape out of the various menus and pressing <y> to quit.

Depending on the size of the host drive, the RAID 5 build process may take a considerable amount of time. You may exit out of StorCon without waiting for the build to complete. When leaving StorCon, a progress window informs you about the estimated completion time for the build process (as shown below).

Upon successful completion of the build process the RAID 5 disk array changes to *ready* status, for example, the data is fully redundant.
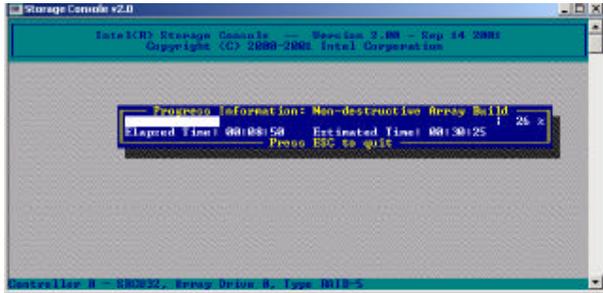
RAID Configuration steps on LSI Logic RAID cards (Elite 1600, Express 500, and Megaraid)

Starting MegaRAID Configuration Utility
When the host computer boots, hold the <Ctrl> key and press the <M >key when the following appears:

Host Adapter-1 Firmware Version *x.xx* DRAM Size 4 MB
0 Logical Drives found on the Host Adapter
0 Logical Drives handled by BIOS
Press <Ctrl><M> to run MegaRAID BIOS Configuration Utility

For each MegaRAID adapter in the host system, the firmware version, DRAM size, and the status of logical drives on that adapter is displayed. If you do not press <Ctrl> <M> within a few seconds of the prompt, the computer continues the normal boot procedure.

When you press <Ctrl> <M>, the following appears:
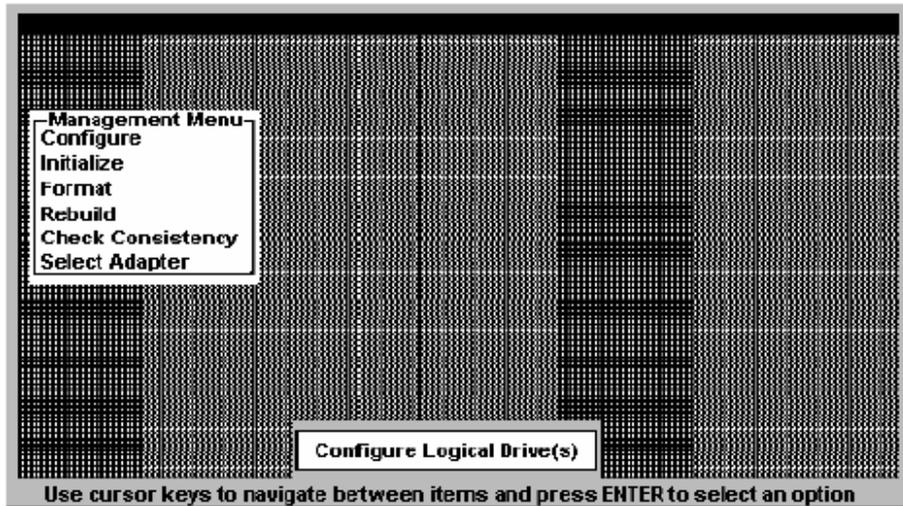
Configuration Utility Menu Options The Configuration Utility menu options:

5

Option	Description
Configure	Choose this option to configure physical arrays and logical drives.
Initialize	Choose this option to initialize one or more logical drives.
Objects	Choose this option to individually access controllers, logical drives, and physical drives.
Format	Choose this option to low-level format hard disk drives.
Rebuild	Choose this option to rebuild failed disk drives.
Check Consistency	Choose this option to verify that the redundancy data in logical drives using RAID level 1, 3, or 5 is correct.
Select Adapter	Choose this option to select a MegaRAID host adapter to work on. This menu item appears only if more than one MegaRAID host adapter is installed in the computer.

MegaRAID Configuration Utility Menu Tree
The following is an expansion of the menus in the MegaRAID Configuration Utility for boards that support Ultra 320 ,Ultra 160M, and 40 logical drives: Enterprise 1600, Elite 1600, and Express 500.

```
Configure ─────────── Easy Configuration
            ├──── New Configuration
            └──── View/Add Configuration
Initialize

Objects ──── Adapter ───────── Clear Configuration
         │              ├──── FlexRAID PowerFail
         │              ├──── Memory Type
         │              ├──── Fast Initialize
         │              ├──── Disk Spin Timings
         │              ├──── Chip Set Type
         │              ├──── Cache Flush
         │              ├──── Rebuild Rate
         │              ├──── Alarm Control
         │              ├──── Other Adapter Information
         │              ├──── Factory Defaults
         │              ├──── Disable BIOS\Enable BIOS
         │              ├──── Emulation
         │              ├──── Auto Rebuild
         │              ├──── Initiator ID = 7
         │              ├──── Cluster Mode
         │              ├──── Multiple PCI Delay Trans.
         │              └──── Force Boot
         │
         ├── Logical Drive ─────── Initialize
         │                   ├──── Check Consistency
         │                   └──── View/Update Parameters
         │
         ├── Physical Drive ───── Rebuild
         │                   ├──── Format
         │                   ├──── Make Online
         │                   ├──── Fail Drive
         │                   ├──── Make HotSpare
         │                   ├──── View Drive Information
         │                   ├──── Synchronous Negotiation
         │                   ├──── SCSI Command Q Tagging
         │                   └──── SCSI Channel
         │
         ├── SCSI Channel ─────── Termination State
         │                   ├──── Enable Auto Termination
         │                   └──── SCSI Transfer Rate
         │
         ├── Battery Information ───── Backup Module
         │                       ├──── Battery Pack
         │                       ├──── Temperature
         │                       ├──── Voltage
         │                       ├──── Fast Charge
         │                       └──── No of Cycles
         │
         └── Reset Battery Charge Counter ──── Yes
                                          └──── No
Format
Rebuild
Check Consistency
```

Creating the RAID volume :-

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Step	Action
1	Choose Configure from the MegaRAID Configuration Utility main menu.
2	Choose New Configuration from the Configure menu. An array selection window is displayed showing the devices connected to the current controller. Hot key information appears at the bottom of the screen. The hot key functions are: <F2> Display the manufacturer data and MegaRAID error count for the selected drive. <F3> Display the logical drives that have been configured. <F4> Designate the selected drive as a hot spare. <F10> Display the logical drive configuration screen.
3	Press the arrow keys to choose specific physical drives. Press the spacebar to associate the selected physical drive with the current array. The indicator for the selected drive changes from READY to ONLIN A[*array number*]-[*drive number*]. For example, ONLIN A2-3 means disk drive 3 in array 2. Add physical drives to the current array as desired. Try to use drives of the same capacity in a specific array. If you use drives with different capacities in an array, all the drives in the array are treated as though they have the capacity of the *smallest* drive in the array. The number of physical drives in a specific array determines the RAID levels that can be implemented with the array. RAID 0 requires one or more physical drives per array. RAID 1 requires 2 physical drives per array. RAID 3 requires at least three physical drives per array. RAID 5 requires at least three physical drives per array.
4	Press <Enter> when you are finished creating the current array. To continue defining arrays, repeat step 3. To begin logical drive configuration, go to step 5.

Step	Action
5	Press <F10> to configure logical drives. The logical drive configuration screen appears, as shown below: The window from the top of the screen shows the logical drive that is currently being configured as well as any existing logical drives. The column headings are: LD The logical drive number RAID The RAID level Size The logical drive size #Stripes The number of stripes (physical drives) in the associated physical array StrpSz The stripe size Drive-State The state of the logical drive
6	Set the RAID level for the logical drive. Highlight *RAID* and press <Enter>. A list of the available RAID levels for the current logical drive appears. Select a RAID level and press <Enter> to confirm. See the *MegaRAID Hardware Guide* for your board for an explanation of the RAID levels.
7	Set the spanning mode for the current logical drive. Highlight *Span* and press <Enter>. The choices are: CanSpan Array spanning is enabled for the current logical drive. The logical drive can occupy space in more than one array. NoSpan Array spanning is disabled for the current logical drive. The logical drive can occupy space in only one array. For two arrays to be spannable, they must have the same stripe width (they must contain the same number of physical drives) and must be consecutively numbered. For example, assuming Array 2 contains four disk drives, it can be spanned only with Array 1 and/or Array 3, and only if Arrays 1 and 3 also contain four disk drives. If the two criteria for spanning are met, MegaRAID automatically allows spanning. If the criteria are not met, the *Span* setting makes no difference for the current logical drive. Highlight a spanning option and press <Enter>.
8	Set the logical drive size. Move the cursor to *Size* and press <Enter>. By default, the logical drive size is set to all available space in the array(s) being associated with the current logical drive, accounting for the *Span* setting and for partially used array space. For example, if the previous logical drive used only a part of the space in an array, the current logical drive size is set to the remaining space by default.

Step	Action
9	Open the Advanced menu to set the remaining options.

```
┌─Logical Drive 2─┐  ┌──Advanced──────────┐
│ RAID = 5        │  │ StripeSize = 8KB    │
│ Size = 8190MB   │  │ Write Policy = WRTHRU│
│ Advanced Menu   │  │ Read Policy = READAHEAD│
│ Accept          │  │ Cache Policy = CachedIO│
│ Span = NO       │  └────────────────────┘
└─────────────────┘
```

Stripe size This parameter specifies the size of the segments written to each disk in a RAID 1, 3, 5, 10, 30 or 50 logical drive. You can set the stripe size to 2 KB, 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB. A larger stripe size produces higher read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random read requests more often, select a small stripe size. The default stripe size is 64 MB.

Write Policy This option sets the caching method to write-back or write-through.

In *Write-back caching*, the controller sends a data transfer completion signal to the host when the controller cache has received all the data in a transaction.
In *Write-through caching*, the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. This is the default setting.
Write-through caching has a data security advantage over write-back caching, whereas write-back caching has a performance advantage over write-through caching. *You should not use write-back for any logical drive that is to be used as a Novell NetWare volume.*
Read-ahead This option enables the SCSI read-ahead feature for the logical drive. You can set this parameter to *Normal, Read-ahead,* or *Adaptive.*

Normal specifies that the controller does not use read-ahead for the current logical drive. This is the default setting.
Read-ahead specifies that the controller uses read-ahead for the current logical drive.
Adaptive specifies that the controller begins using read-ahead if the two most recent disk accesses occurred in sequential sectors. If all read requests are random, the algorithm reverts to Normal, however, all requests are still evaluated for possible sequential operation.
Cache Policy This parameter applies to reads on a specific logical drive. It does not affect the Read ahead cache.

Cached I/O specifies that all reads are buffered in cache memory.
Direct I/O specifies that reads are not buffered in cache memory. This is the default setting.
Direct I/O does not override the cache policy settings. Data is transferred to cache and the host concurrently. If the same data block is read again, it comes from cache memory.
Press <Esc> to exit the Advanced Menu.

| 10 | After you define the current logical drive, choose *Accept* and press <Enter>. If space remains in the arrays, the next logical drive to be configured appears. Repeat steps 6 to 9 to configure another logical drive. If the array space has been used, a list of the existing logical drives appears. Press any key to continue and respond to the Save prompt. |

Rebuilding Failed Disk Drives

If a disk drive fails in an array that is configured as a RAID 1, 3, or 5 logical drive, you can recover the lost data by rebuilding the drive.

Rebuild Types The rebuild types are:

Type	Description
Automatic Rebuild	If you have configured hot spares, MegaRAID automatically tries to use them to rebuild failed disks. Display the Objects/Physical Drive screen while a rebuild is in progress. The drive indicator for the hot spare disk drive has changed to REBLD A[*array number*]-[*drive number*], indicating the disk drive being replaced by the hot spare.
Manual Rebuild	Manual rebuild is necessary if no hot spares with enough capacity to rebuild the failed drives are available. Select the MegaRAID Configuration Utility main menu Rebuild option or the Rebuild option on the Objects/Physical Drive menu.

Manual Rebuild – Rebuilding an Individual Drive

| Step	Action
1	Choose the Objects option from the MegaRAID Configuration Utility main menu. Choose Physical Drive from the Objects menu. A device selection window is displayed showing the devices connected to the current controller.
2	Press the arrow keys to select the physical drive to be rebuilt and press <Enter>. The following action menu appears: Channel 1, Target 1 Rebuild Format Make Online Fail Drive Make HotSpare View Drive Information Synchronous Negotiation SCSI-2 Command Tagging
3	Choose the Rebuild option from the action menu and respond to the confirmation prompt. Rebuilding can take some time, depending on the drive capacity.
4	When rebuild completes, press any key to display the previous menu.
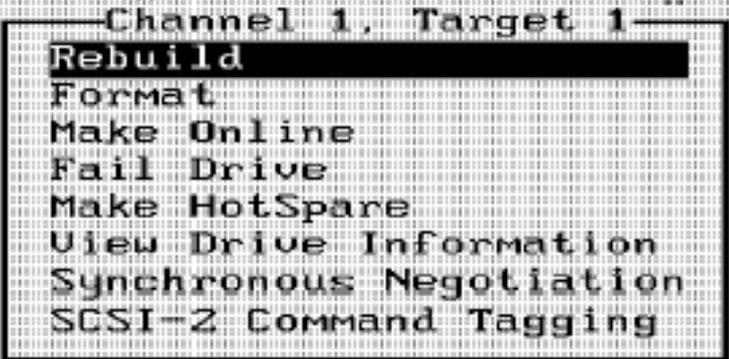
RAID on Adaptec 2010/2015 card

This section describes how to use SMOR to create arrays and multilevel RAIDs, delete arrays, assign hot spare drives, and rebuild an array.

Creating an Array

To create an array, follow these steps:
1 Select **RAID > Create**. The RAID Type window appears as shown in figure below

11
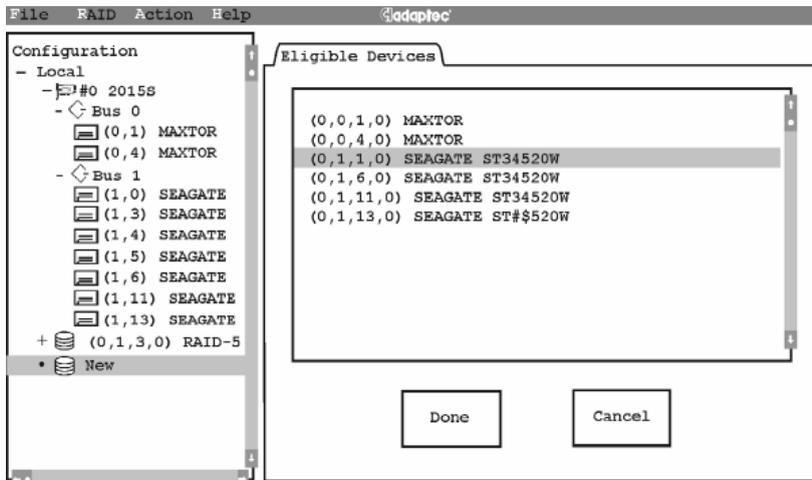
2 When the RAID Type window appears, select the RAID level you want to use. The default stripe size is selected automatically; however you can select a different stripe size value by highlighting the fie ld and using the up and down arrow keys to change the stripe size.

Note: Although you can change the stripe size, Adaptec recommends using the default value, which has been selected for optimum performance based on the type of disk array you chose to create.

a When you are ready to proceed, select **Ok**.

b The Eligible Devices tab appears, as shown in figure
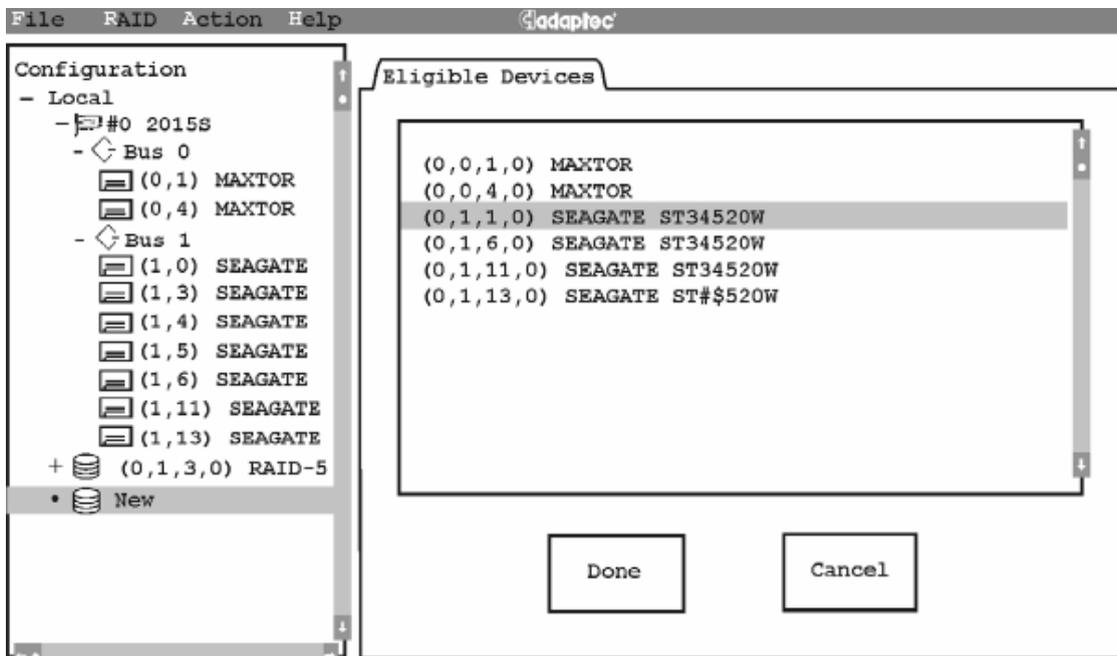
The list of eligible devices can be either individual hard drives or previously created array groups. Array groups appear in the list when you select RAID 0 and eligible array groups exist.

```
RAIDtype:
( ) RAID-0  (No fault tolerance)
( ) RAID-1  (Fault tolerance, Higher performance)
(•) RAID-5  (Fault tolerance, Higher capacity)        [ Ok ]

Stripe size:    64KB    [ Default ]                    [ Cancel ]
```
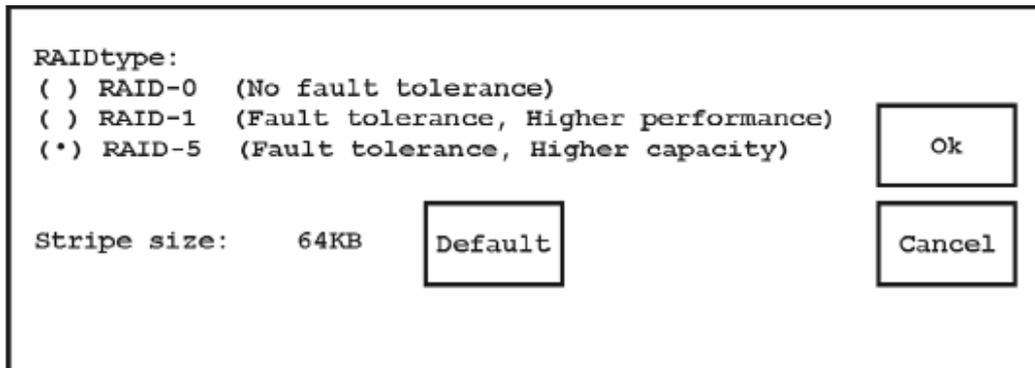
3 Select the devices you want to include in the array:

a To add devices to the array, highlight the device and press the **Spacebar**. A check mark appears next to the device to indicate that it has been selected. You might need to scroll the display down to view all eligible devices.

b To remove a previously selected device from the array, highlight the device and press the **Spacebar**.

4 When you are finished selecting drives for the new array, select **Done**.

5 If you are creating a RAID 1 array, the RAID 1 Build Option window appears, as shown in figure

```
RAID 1 Build Option:

( ) Copy from (1,2,0,0) to (1,0,12,0)    [ Ok ]

(●) Copy from (1,0,12,0) to (1,2,0,0)    [ Cancel ]
```
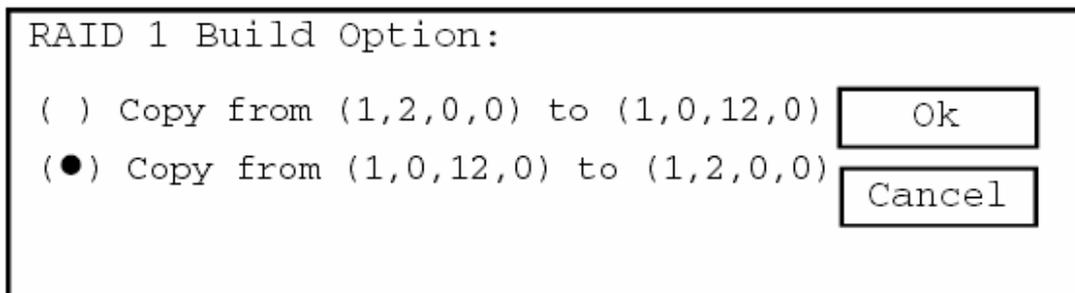
RAID 1 arrays are built by copying the existing data from one device to the other.
Select the direction for the copy, then select **Ok**.

6 Select **File > Set System Config** to start the build process. The build process begins for the array you created. If you created multiple arrays, they are built serially in the order they were defined. Alternatively, you can exit SMOR. Upon exiting, you are prompted to save the configuration changes. If you save, the build process begins for any arrays you defined.

For large redundant arrays, the build process can take several hours to complete. You can exit SMOR and perform other activities on the system while the build continues. An array being built can be accessed during the build process.

If you exit SMOR and you want to monitor the progress of the build operation, you can use the Storage Manager Array Group

Creating a Multilevel RAID

Creating a multilevel RAID (RAID 10 or 50) is similar to creating a normal RAID 1 or RAID 5 array group. To create a RAID10 or RAID 50 multilevel RAID, follow these steps:

1 Create and build your array groups as described in as mentioned earlier. *Do not* initiate the build process on any arrays that you intend to use in a multilevel RAID.

2 After you have created your initial array groups, select **RAID > Create** again.

3 Select **RAID 0** for the RAID type and click **Ok**.

4 Select two or more arrays of the same type from the list of eligible devices, then click **Done**.

Note: You cannot combine arrays that use different RAID levels.

5 Select **File > Set System Config** to begin the build process for the multilevel RAID.

The Tree View displays the multilevel RAID LSU as (*x,x,x,x*) FW RAID-0 with the array groups listed where drives would normally be listed. Selecting an array group component branches to the hard drives for that array group. The LSU address is the lowest address of the array logical addresses that comprise the multilevel RAID.

Hot Spares

Hot spares automatically replace failed drives in protected arrays and are not accessible by the operating system for other use. Any hard drive not assigned to an array or in use by the operating system can be designated as a hot spare, as long as the spare drive is at least as large as the other drives in the array.

To assign a drive as a hot spare, follow these steps:

1 Highlight the drive you want to use in the left pane.

2 Select **Action > Make Hotspare**.

The selected hot spare is reassigned as a normal hard drive accessible by the operating system.

Rebuilding a Failed Array

To replace a failed drive in an array that is not protected by an automatic hot spare, follow these steps:

1 Remove and replace the failed drive according the procedures in your hardware documentation.

2 When the failed drive has been replaced, select **RAID > Rebuild Array** to start the rebuild process.

The status of the array changes to *Rebuilding* (view the Information tab for that array). When the rebuild is complete, the array status changes to *Optimal*.

Note: Supported SAF-TE or SES enabled enclosures automatically detect the replacement of a failed drive and the controller will initiate a rebuild as soon as the new drive is online.

Current RAID cards with their Specifications

RAID Cards	Single Channel		Dual Channel		Zero Channel	
	Intel (Bonita) for 64 MB requirement; U160	Adaptec 2120S with 64 MB ,BBU,.U320	Elt1600 (AMI)	LSI Megaraid 320 -2	2000S (Adaptec)	Adaptec 2010S
Channels	1	1	2	2	0	0
External Interface	U160	U320	U160	U320	-	-
PCI Bus width 2.2 comp.	64/33	64/66	64/66	64/66	64/66	64/66
PCI Std	2.2	2.2	2.2	2.2	2.2	2.2
Support Hot Plug	Yes	No	No	Yes	No	No
Processor	i960rn	Intel 80302	i960rn	Intel 80303	7930W	7930W
Speed (MHz)	100	66	100	100	-	-
SDRAM Cache With ECC	64 MB dimm	64MB onbrd	64 MB dimm	128 MB	48 MB onbrd	48 MB onbrd
Max. Cache Supported	128	None	64	128	48	48
BBU Support	No	Yes	Yes	Yes	No	No
Conn. (Int.)	1*68p	1*68p	2*68p	2*68p	0	0
Conn. (Ext)	1*68p vhdci	1*68p vhdci	2*68p vhdci	2*68p vhdci	0	0
Dev. support	15	15	30	30	15/30	15/30
Form Factor	Half	LP	Half	Half	LP	LP
Capacty exp.	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	No	No	Yes	Yes	No	No

RAID levels supported by different RAID cards

RAID Cards	Intel (Bonita) for 64 MB requirement; U160	Adaptec 2120S with 64 MB ,BBU,.U320	Elt1600 (AMI)	LSI Megaraid 320 -2	2000S (Adaptec)	Adaptec 2010S
RAID 0	Yes	Yes	Yes	Yes	Yes	Yes
RAID 1	Yes	Yes	Yes	Yes	Yes	Yes
RAID 3	-		Yes		-	
RAID 5	Yes	Yes	Yes	Yes	Yes	Yes
RAID 10	Yes	Yes	Yes	Yes	Yes	Yes
RAID 30	-		Yes		-	
RAID 50	-	Yes	Yes		Yes	Yes
RAID 0+1	-		-		-	
JBOD	Yes	Yes	-		Yes	Yes

Current OS supportability matrix for various RAID cards (as on 30/10/03)

RAID Cards	Single Channel		Dual Channel		Zero Channel	
	Bonita (Intel)	2120S (Adaptec)	Elt1600 (AMI)	U320-2 (LSI)	2000S (Adaptec)	2010S Adaptec)
Win NT4.0 S+SP6a	-	Yes	Yes	Yes	Yes	Yes
Win2K S/AS/.NET	Yes	Yes	Yes	Yes	Yes	Yes
NW4.2	Yes	-	Yes		-	No
NW5.0	Yes	-	-		-	No
NW5.1	Yes	Yes	Yes	Yes	Yes	No
NW6.0	Yes	Yes	Yes	Yes	Yes	No
OSR 5.0.5	No	No	Yes	No	Yes	No
OSR 5.0.6	Yes	-	Yes	No	Yes	No
UW7.1.1	Yes	Yes	Yes	No	Yes	No
OU 8.0	Yes	Yes	Yes	No	Yes	No
RHL 6.2 SBE2	-	-	-		-	No
RHL 7.1	Yes	No	-		Yes	No
RHL 7.2	Yes	-	-	-	-	No
RHL 7.3	Yes	Yes	Yes	Yes	Yes	Yes

Manageability comparison of various RAID cards

Manageability Comparison:						
Mgmt S/w	RAID Storage Console	Adaptec Storage Manager	Power console Plus	Power console Plus	Storage Mgr. Pro / Storage Mgr.	Storage Mgr. Pro / Storage Mgr.
PopUp (local)	No	Yes	No	No	No	No
PopUp (remt)	No	No	No	No	No	No
Audble Alarm	No	Yes	Yes	Yes	No	No
E-mail Alert	Yes	Yes	No	No	Yes	Yes
Pager Alert	No	No	No	No	Yes	Yes
Appl. launch	Yes	No	No	No	No	No
Rbld. rate adj.	No	No	Yes	Yes	Yes	Yes
Faild->online	No	No	Yes	Yes	No	No
Event log	Yes	Yes	Yes		Yes	Yes
Perf. monitor	Yes	No	Yes	Yes	No	No
SMART supp	No	Yes	Yes	Yes	Yes	Yes

Happy Reading……