**Disk configuration**

In providing for fault tolerance in the AWARE application some consideration should be given to the configuration of the disks. This consideration should involve the following items:

* The impact of any potential data loss
* The performance of the system when and while a disk fails
* The amount of storage space required
* The budget afforded the disk configuration

While there is no ideal disk configuration for every installation since the answers to the above 4 items may differ, we can only offer a guideline for the different raid configurations while strongly recommending against using Raid Level 0 which offers no protection from a disk failure.

Summary of the different types of Raid Levels:

* **Raid Level 0:** Striping, minimum of 2 disks. Data is striped across all disks in the disk group. Fast writes, fast reads. Not fault tolerant at all, losing a single disk breaks the group and the information cannot be salvaged. The total amount of usable space is size of disk \* number of disks in array. ***This configuration should never be used in a production environment***
* **Raid Level 1:** Mirroring, minimum of 2 disks, all information is mirrored to each other disk in the set. write operations are N per group (this means if you have 2 disks in a mirrored pair, 1 physical write will cause a total of 2 physical write (1 per disk as the information is mirrored)). Group can lose N-1 disks and still function without data loss. Read speeds can be increased possibly by N. Total usable space is the size of a single drive in the array as the entire array is mirrored. ***This configuration works well in most installations to minimally address the above 4 considerations***.
* **Raid Level 0+1:** This Raid Level is based on the combination of striping (Raid Level 0) and mirroring (Raid Level 1) techniques. Raid Level 0+1 inherits Raid Level 0 performance and Raid 1 fault tolerance. ***This configuration works well in most installations to minimally address the above 4 considerations***.
* **Raid Level 5:** Striping with parity, minimum of 3 disks needed. This configuration offers a good balance between usable storage, fault tolerance and performance. Data is written across all but one disk which is used to hold the checksum. Raid Level 5 can tolerate a single disk failure which is considered then to be in degraded mode. The array then can be rebuilt in most instances by taking out the bad drive and putting a good one in its' place. The array will be rebuilt but will have a sever performance hit while running in degraded and while rebuilding the array as the data must be recovered from the checksum calculations. Offers good read speeds (n-1) but suffers from slower write speeds. Raid Level 5 is the most common configuration in use and provides a good base for expanding.
* **Raid Level 5E:** Based on Raid Level 5 with the only difference being there is an integrated spare disk which affords a rebuild of the failed array immediately in the event of a disk failure.
* **Raid Level 10:** Raid 10 is actually the same as Raid Level 1 + Raid Level 0 in that it utilizes a mirrored array of stripes, minimum of 4 disks. It is considered the most performant raid type that most devices support (other than raid 0 which is not fault tolerant). Data is mirrored in one set and stripped across the first and second set. This offers both the benefit of mirroring and striping for reads speeds and striping for write speeds. At most a single disk can be lost from each mirrored set of stripes, which under certain circumstances could actually be multiple disk failures. While this offers generally the best protection and performance, its weakness is usable drive space which would be the size of a single drive \* number of drives / 2. So, for example, if you wanted to run 100 GB of raid 10 you would need at minimum 4 drives of 50 GB which would give you 50 \* 4 / 2 = 100 GB. Raid 10 works very well for transaction logs which have high sequential writes and reads.

**Data Storage**

It is recommended that the data storage space be configured to a minimum 60 gigabytes. This will facilitate the storage of 20 million alerts within the SQL database and transaction logging, application files and web applications.