**6-2 Matrix Assignment: RAID Levels**

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|  | **Raid 0** | **Raid 1** | | **Raid 5** | **Raid 10** |
| **Benefits** | Provides very fast access by spreading data over across all member disks | * High performance for large requests due to parallel I/O operations across multiple drives (Tenenbaum & Bos, 2022). * Simple implementation (Tenenbaum & Bos, 2022). | | * A significant advantage is   the fast and  consistent read speed  (Techtarget.com, n.d.).   * This RAID design   also provides.  low-cost data redundancy  and fault tolerance  (Techtarget.com, n.d.). | * Strong fault tolerance with mirroring and striping. * Improved read/write speeds for various applications. * Easy disk replacement, minimizing downtime. * Better than mirroring (RAID 1) due to striping. * Can handle multiple drive failures if not in the same mirrored pair. |
| **Drawbacks** | If one disk fails, al l data is lost because each block represents the ONLY copy of the data | * No data redundancy, making it unsuitable for applications where data reliability is crucial (Tenenbaum & Bos, 2022). * Limited fault tolerance: A drive failure leads to complete data loss since there is no redundancy (Tenenbaum & Bos, 2022). | | * Longer rebuild times, that could result in data loss (Techtarget.com, n.d.). * If another disk fails during rebuild, then the user loses the data forever (Techtarget.com, n.d.). | * Requires more disks, leading to higher storage costs. * RAID controller impacts performance and fault tolerance. * 50% usable capacity due to mirroring. |
| **Business Impact** | Businesses that need the fastest access with no redundancy will benefit; however, businesses sensitive to data loss should avoid RAID 0 | * **Positive**: Data redundancy, better read performance, easy recovery. * **Challenges**: Higher cost due to mirroring, reduced usable capacity, possible impact on write-heavy tasks. | * **Positive**: Data redundancy, cost-efficient, good read performance, more usable capacity than mirroring (RAID 1). * **Challenges**: Lower write performance, rebuild time impact, controller load, risk during rebuilds. | | * **Reliability**: Enhanced data protection. * **Performance**: Optimal for high-speed applications. * **Cost-Benefit**: Evaluate higher disk costs vs. data protection and performance. * **Recovery**: Simplified drive replacement minimizes downtime. |

**References:**

Tanenbaum, A. S., & Bos, H. (2022). Modern Operating Systems (5th ed.). Pearson Education (US). https://mbsdirect.vitalsource.com/books/9780137618941

What is RAID 5? | Definition from TechTarget. (n.d). Retrieved 11 August 2023, from https://www.techtarget.com/searchstorage/definition/RAID-5-redundant-array-of-independent-disks?Offer=abt\_pubpro\_AI-Insider