Validation of Storage Devices with Serial advanced Technology Attachment (SATA)

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Abstract – This *paper highlights the significance of validation process for storage devices with SATA(Serial Advanced Technology Attachment) .This validation process aims at achieving an effective way of testing the essential functionality of Storage devices. Validation Of storage devices with SATA include many test cases .doing thorough design verification on testing will lead to improve Quality of Drives.* To validate the performance of SSD and HDD Crystal Disk Mark tool is used. It is a Benchmark testing using SATA connection.

*Key Words***:** SATA, HDD, SSD, NVME, ODD

1. INTRODUCTION

With development of microelectronics and software radio technology, the speed and accuracy of data acquisition system requirements is increasing. Traditional data storage system based on PCI bus, which shared by capture cards and storage disk array but it is less stable and lower bandwidth. Then PATA is evolved. It is interface to connect Hard Disk Drive(HDD),Solid State Drive(SSD) and Optical Disk Drive(ODD) in computer. But PATA not supports to hot pluggable and NCQ features. Then SATA technology replaced PATA. SATA is easy to integrate and having faster performance.SSD and HDD Storage devices are validated using SATA.SSD is basically comprised printed circuit board, memory controller, SDRAM cache, a set of NAND flash memory chips, interface controller and inter face connector such as SATA or IDE..

1.1 Background study

With improvement of the capabilities in computer data transmission and data processing, higher data transmission speed is needed in hard disk interfaces of computers . SATA (Serial Advanced Technology Attachment) is the interface having very fast transmission speed ability and better error correction [1] SATA protocol for data integrity verification. In [2], a scheme of using optical signals to transfer data from the host side to the storage device through SATA interface is mainly described, the idea mainly includes the conversion module between the data signal and the optical signal. Sending and receiving module for optical signal is also included. In [3], the realization of the SATA3.0 physical layer is mainly described based on the Rocket IO GTX (Gigabit Transceiver) in the Virtex-5 series FPGAs. The structure of

hardware platforms from different manufacturers independent to modular SATA controller on a platform are described in [4], the platform can achieve the maximum transmission speed close to the theoretical maximum. In contrast, more emphasis is put on the introduction of hardware platform in [5]. The method and device that enable a SATA host to access multiple SATA drives can be founded in [6], the most important part of the device is the mapping module between SATA logical drives and multiple SATA physical drives. The author mainly describes the process of using look-up table and fast memory technology to achieve high-efficiency 8B/10B encoding in [7]. The data storage control system in ARM and FPGA system is described in [8], using the SATA hard disk array to meet the high-capacity data.

2. About Crystal DiskMark

CrystalDiskMark is a software that allows to do benchmark of hard drive or solid state drive, the purpose of benchmarking is to check performance of HDD and SSD. In CrystalDiskMark first need to select drive in which the test should be perform and it perform number of tests on SSD and HDD to measure performance for reading and writing. And It will run Sequential read and write tests as well as random read and write tests.
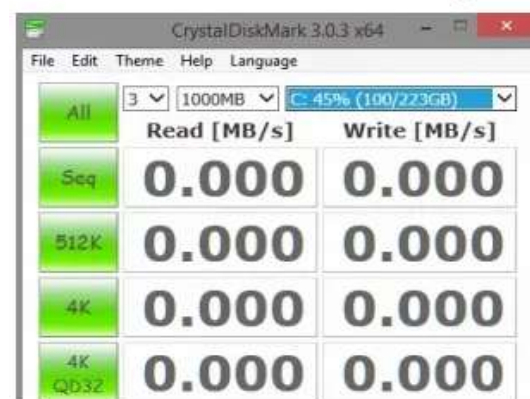

Fig 2.1 Crystal DiskMark

Above fig shows about Crystal disk mark benchmark testing. And Here we can see 5 green buttons on the left hand side. .All option indicates to run all the tests . The Sequential read and write tests are always gives highest results, but not represent real world performance. For example if you watching video on your PC ,easily you can read files because

all data located in one file but when we want to copy then it performs sequential read and writes . The CrystalDiskMark 4K tests are using 4KB file sizes which are more demanding on the CPU and storage than the sequential test Crystal diskmark.

Fig 2.2 comparision Between SSD and HDD using For testing , Samsung SSD 850 EVO (SSD) and Hitachi HDD is used. From the test we can observe SSD having more read write speed.

3. CONCLUSION

Crystal disk mark benchmark tool is used to know the performance of storage devices. After the benchmark testing we can conclude that SSD is more faster than HDD.

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