



IDSS Immutable Data Storage System



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Power of Data & its consequences

As the power of data exponentiates - so does its responsibility

With great power comes great responsibility.

-an ancient adage, at least as old as the first century BC in the <u>allusion</u> of the <u>Sword of Damocles</u> popularized by Spider Man.

□ Following the explosion of Data, it became the new oil for the economy.

□ With this extra ordinary power – it started attracting

constructive forces like Big Data Analysis, ML & Al as well as destructive forces like Cyber Attacks, phishing, ransomeware

ZERO TRUST POLICY is the buzz word of the society recently.

Data Security & integrity have become basic requirement now than ever before.





Sorry state of Data security



Number of Complaints filed shows the sharp increase in data security related issues.

□ Financial industry , health care industry as well as other industries are increasingly experiencing the issue.



\$265 Billion by year 2031.







"WE COULDN'T HIRE THE CYBERSECURITY CANDIDATE YOU SENT US, HE WAS SAYING TOO MANY SCARY THINGS ABOUT OUR COMPUTERS,"











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Yours, Customer service officer



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Is "human factor" the biggest danger in cybersecurity? | Reveelium



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Coming to Immutable Storage



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Immutable Data Storage System Regulatory requirements

 NIST (National Institute of Standards and Technology) Special Publication 800-209 Security Guidelines for Storage Infrastructure Oct 2020 https://doi.org/10.6028/NIST.SP.800-209

 SEC & Financial Reform Act (FINRA) rules & regulations The Securities Exchange Act (SEA) Rule 17a-3 specifies the minimum requirements for broker-dealer records.
 CFTC 17 CFR 1.31





Immutable Data Storage System

NIST Special Publication 800-209

2.11.5 under Data Protection

Immutability involves the ability to lock data after it has been

created, thereby preventing it from alteration or deletion

□ 4.2.1 Data Backup and Recovery, and Archiving

DP-SS-R1: A data protection plan or policy should include Immutability & locking.

□ AL-SS-R5 –audit log retention and protection

requires the Archived log data should be protected from tampering

(e.g., using WORM or immutable storage.

□ 4.5 Preparation for Data Incident Response and Cyber Recovery:

IR-SS-R2 – Recovery assets immutability during incident management:

4.7 Isolation

Cyber-attack recovery –

requiring data copes that are hardened, locked, and kept in isolation.

IS-SS-R10 – Consider the use of immutable storage



Need for un-alterable data storage (WORM)

Critical data like credit card and Stock market transactions requires un-alterable storage.

In the case of all other data, un-alterable storage provides security against manipulation.
 Write Once Read Many Storage – provides this un-alterable data.
 Data once written cannot be altered, and it can be Read Many (Multiple) times.

□ US - Securities Exchange Act requires certain transactions to be stored in WORM with additional logging conditions. (expect many more to follow the suit)



SEC Rule 17a-4 & 17a-3 SEC Rule 17a-4 & FINRA Rules & Regulations Summary | 17a-4 LLC

The Securities Exchange Act (SEA) Rule 17a-3 specifies the minimum requirements for broker-dealer records, how long records and documents relating to a broker-dealer's business, and the format they may be kept.

SEC Rule 17a-4 is part of the US Securities Exchange Act of 1934 and outlines requirements for data retention, indexing, and accessibility for companies which deal in the trade or brokering of financial securities such as stocks, bonds, and futures. Records of certain transactions must be retained and indexed on indelible (WORM) media with immediate accessibility for a period of six months, and with non-immediate access for a period of at least two years. Duplicate records must also be kept within the same time frame at an off-site location.



SRMS – Coming up with solution - IDSS

1. SRMS solution - IDSS (Immutable Data Storage System) will provide

a storage system suitable for Current Zero Trust Environment with multiple layers of security where the data once committed/written will not be allowed to modify. Current Environment Sustainability Requirement by deploying energy efficient utilization of SSDs & HDDs.

2. SRMS aims to evolve our Immutable data storage service

To aid in implementing/ Transitioning to ZTA – Zero Trust Architecture, as part of their toolkit.

- 1. To implement CID based IPFS storage system for NFTs
- 2. To be a part of storage services for next generation solutions such as
 - ① WWW 3.0
 - ② Metaverse.





SRMS - Immutable Data Storage System

- Two Distinct system
 - with SSD (write once)
 - 8 * 4U modules with 60 slots per Module
 - Using 1TB SSDs/slots → 480TB
 - with HDD (write once)
 - 8 * 4U modules with 12 slots per Module
 - Using 18TB to 20 TB HDDs → 1728 TB to 1920 TB
- Write Once control
 - Immutable attribute deployed to protect the file from deletion/modification for a given period
 - SRMS archiving software will not allow overwriting.
 - Versioning is used for updated files with same name
 - When Same data to be archived again
 - stored as another copy based on user confirmation.
- Multi-layered Security to be incorporated
 - Overview in slide 9.



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SRMS – Cloud Operation of IDSS



torage Recovery Migration

DATA Protection – in SRMS Write Once Storage system

□ Multiple layers of data protection

- Fire wall to encompass the system
- Role based Access control
 - With dual factor authentication
- Customer data Encryption
 - @ transit using TLS1.2
 - @Rest using AES
- Soft lock to protect the storage elements
- Additional Hardware lock to protect the system integrity

This multilayer protection together with the immutable attribute -

protects the data From unauthorized access while it is in the system.

Overall – Immutability of the data stored together with the multi-layer protection makes it suitable for the Zero Trust environment.



Storage Recovery Migration Se

Power Consumption reduction

Projection Considering:

- IDSS for Archiving: for 30 PB of data

60% of data is archived

retrieval requirement is less than 5%

- using SRMS proprietary systems power consumption
- during idle times SRMS system is in OFF state no power consumption
- no environmental control needed.
- Comparing to competitive archiving solution:

| | Write once (HDD) | Write once (SSD) | |
|---------------------------------|---------------------|---------------------|----|
| For Archiving (60% of 30 PB) | 45% less | 63% less | |
| For storage &Retrieval /year | 81% less | 38% less | |
| Total | 60% less | 60% less | |
| | | | JГ |





SRMS Solution

Onsite Repair/wiping Solution



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The ORS and ODES System

Onsite Repair System (ORS)

- SRMS's first product family
- Networked On-Site Repair System (NORS)
 - Use SRMS VPN connection to perform Test, Wipe, and Repair
 - Repair certification by serial number

Onsite Data Erasure System (ODES)

- networked and non-networked
- Networked Onsite Data Erasure System (NODES)
 - Use SRMS VPN connection to perform data erasure onsite
- Non-Networked Onsite Data Erasure System (NNODES)
 - Stand-Alone, locally operating On-Site Data Erasure System



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The ORS system

- IP Patented Portfolio Design
- Customer defined specifications
 - HDD Test, Repair, and Data Erasure parameters
 - ⁻ SSD wiping and grading into A, B, C for re-use
 - Flexibility, supports multiple operating parameters per service
- Costs Reduced
- Data Security
 - Customer data never exposed
 - Fully encrypted: test results, failure data and analysis all secure
- Design Advantages
 - Supports all HDD device manufacturers and products
 - Supports SAS and SATA simultaneously (on same tester)
 - Designed for data center; easy to install, service and support







SRMS – HDD Repair & Wiping Services

• ORS

• On-site Repair System

• Performs

- HDD Testing
- HDD Repairing
- User data is never exposed
- Quality grading per SRMS proprietary method
 - Able to customize based on individual grading rules
- Summary reports will be from SRMS web application
- One Configuration:
 - NORS Networked ORS

• ODES

- On-site Data Erasure System
- Wiping as per NIST/ DoD standard Media clearing guideline
 - Able to customize based on user requirement
- Provides a sanitization certificate for every HDD wiped
 - Satisfying the challenge posed by increasing amount of governmental general data protection regulations
- Summary reports is generated from SRMS web application after synchronization
- Two Configurations
 - NODES Networked ODES
 - NNODES Non-Networked ODES



Networked (ORS and ODES) Global Deployment Schema



Data Storage Industry

Value Network of Distributors, Data Centers & ITAD/ Repair Centers



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Non-Networked (ODES) Deployment Schema





Massive wastage material

SRMS Data Wiping Service Framework



companies (產業廢棄物商) 委任者to deposit all HDD , those HDD still owned by you with potential liabilities

SRMS Proposed Process:



SRMS provides Data Wiping solutions with purchasing products agreement of HDD, meaning HDDs will be sold to SRMS and owned by SRMS without any liability to our customer

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ORS System - Reports

- Standard Online Reports
 - Ability to view ORS System report for all sites and specific equipment
 - Ability to review historical information
- Daily Reports
 - HDDs & SSDs processed by Serial Number

Monthly Reports

- Report by Interface (SATA and SAS)
- Report by HDD/SSD insertions and unable to Identify (Hard Failure)

Report Generation On-Demand

Custom reports are available upon request

| Site Daily | > Monito | e | Date | oort 🔻 | ₽ Maint | enance 👻 | ~ | | | | | | | | | |
|--------------|----------|-------------|--------------------|--------------|-------------------------|----------------------------|----------|---------------------|---|------------|-------------------|-------------------------------|-----------------|--------------|---------------------------|------------------|
| 10010 MTC-00 | E | ÷ | 201 | 18-05-0 | , | ● Pr | eview | 2 200 | wnload | | Report | 🔹 🎤 Maintenar | nce 🔻 | a , A | dministration | • |
| | | | | | Dai | іу керо | π | | Data : 2018-05-07 Print : 2018-06-20 | | | | | | | |
| | Tester | Pass (a) | Fail Te (b) (c= | sted a+b) | Recovered Capac (TB) | ity Recovery Ra (d=a/c) | ate | Out / In of Service | Tester Utilization | | Month | | _ | | | |
| | Rhino | 91 | 4 | 95 | 18 | 2.00 | 6% | 0 / 96 | 58.2% | ¢ | 2018-05 | | ٢ | Preview | / 📩 | Download |
| | Eagle | 79 | 17 | 96 | 15 | i8.00 🕚 8 | 32% | 96 / 96 | 62.2% | | | | | | | |
| | Total | 170 | 21 | 191 | 34 | 0.00 🕚 8 | 39% | 96 / 192 | 60.2% | | | | | | | |
| | Eagle | | Dess | P-11 | Tested | | | Decement Data | December 70mg | | | | | | | |
| | Repair | r Level | Pass (a) | (b) | (c=a+b) | (TB) | | (d=a/c) | (Hour/TB) | | | | | | | |
| | 0 | | 0 | 0 | 0 | 0 | .00 | 0 % | 0 | | | | _ | - | | |
| | 1 | | 0 | 0 | 0 | 0 | .00 | 0 % | 0 | | | Monthly | Rep | port | | |
| | 2 | | 79 | 17 | 96 | 158 | 00.00 | 82% | 10.61 | | | | | | | Month : 2018 |
| | 3 | | 0 | 0 | 0 | 0 | 00.00 | 0 % | 0 | _ | | | | | | · / mt . 2010-0 |
| | 5 | | 0 | 0 | 0 | | | 0 0% | | Fai (b) | Tested (c=a+b) | Recovered Capacity (TB)(d) | Recover (e=a | y Rate | Average Size (TB)(d/a) | Tester Utilizati |
| | u | | 0 | 0 | 0 | 0 | 00 | 0 0% | 0 | 3 | 192 | 316.00 | | 82% | 2.00 | 36 |
| | Total | | 79 | 17 | 96 | 158 | .00 | 82% | 10.61 | - 2 | 467 | 876.00 | | 94% | 2.00 | 15 |
| | | | | | | | | | Condor | | , | 180.00 | | 9494 | 2.00 | |
| | | | | | | | | | 001001 | | | 100.00 | - | | 2.00 | |

| Interface | Pass (a) | Fail (b) | Tested (c=a+b) | Recovered Capacity (TB)(d) | ecovered Capacity Recovery Rate (TB)(d) (e=a/c) | | Average Size (TB)(d/a) | Recovery Time (Hour/TB) | |
|-----------|-------------|-------------|-------------------|-------------------------------|--|-----|---------------------------|----------------------------|--|
| SATA | 686 | 62 | 748 | 1372.00 | ٩ | 92% | 2.00 | 9.19 | |
| Unknown | 0 | 7 | 7 | 0.00 | 0 | 0% | 0.00 | 0.00 | |
| Total | 686 | 69 | 755 | 1372.00 | • | 91% | 2.00 | 9.19 | |





Services – Data Erasure With Certification

- **Standard configuration:** ٠
 - DoD / NIST800-88-r1 standard •

Based wiping

- Flexibility
 - Easily configured to fit Customer requirements ٠
- WEB based configuration allows changing erase functions within minutes (for NORS)

 - Basic Erase, No Verify Basic Erase with Verify Meets Government Standard Erase i.e. DoD 5220.22-M
 - **Client customization**
- Wipes all HDD manufacturer products •
 - SATA I, II, III and SAS devices all on same tester
- **Certification by individual HDD serial number** ٠

| TIFICATE OF HDD SA | NITIZATION | | | | | | |
|--|--|--|--|--|--|--|--|
| HDD INFORMATIO | N | | | | | | |
| Vendor: SEAGATE Model: ST2000NM0011 Capacity: 2000 G | | | | | | | |
| DGW9 | | | | | | | |
| 5000C5003CCEAFBC | | | | | | | |
| DDR123456789 | | | | | | | |
| SANITIZATION INFORM | ATION | | | | | | |
| | HDD INFORMATION HDD INFORMATION Model: ST2000NM0011 DGW9 5000C5003CCEAFBC DDR123456789 SANITIZATION INFORM | | | | | | |

| Reference Number: DDR123456789 | | | | | |
|------------------------------------|-----------------------|--|--|--|--|
| SANITIZ | ATION INFORMATION | | | | |
| Method Type: NIST Clear | Date: 09-Jun-18 21:39 | | | | |
| Method Used: Overwrite | Key: AH93C012 | | | | |
| Method Details: 1 Pass Overwrite | | | | | |
| Equipment Used: CSST ORS Version : | 3.15.504.2469 | | | | |
| Verification Method: | | | | | |
| Post Sanitization Classification: | | | | | |
| Notes: | | | | | |
| OPERA | TOR INFORMATION | | | | |
| Name: Title: | | | | | |
| Group: | Location: | | | | |
| Signature: | | | | | |
| Website: | Phone: | | | | |
| VALIDA | TION INFORMATION | | | | |
| Name: | Date: | | | | |
| Organization: | Location: | | | | |
| | | | | | |

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CERTIFICATE OF HDD SANITIZATION

| | HDC | D INFO | RMATION | | | | | |
|---|------------------|--------|---------------|------------------|--|--|--|--|
| /endor: WDC | Model: WD25 | 00AVV | S-61L2B0 | Capacity: 250 GB | | | | |
| Serial Number: WD-W | VCAV11447734 | | | | | | | |
| Norld Wide Name: 5 | 0014EE1AC90B1 | 3E | _ | | | | | |
| Reference Number: | | | | | | | | |
| | SANITIZA | ATION | INFORMATION | | | | | |
| Method Type: NIST Clear Date: 27-Jun-18 02:08 | | | | | | | | |
| Method Used: Overw | rite | | Key: ASTLUWIN | ZFWU9UWQ | | | | |
| Method Details: 3 Pass Overwrite | | | | | | | | |
| Equipment Used: CS | ST ORS Version 3 | 19.508 | 2729 | | | | | |
| /erification Method: | | | | | | | | |
| Post Sanitization Clas | sification: | | | | | | | |
| Notes: | _ | | | | | | | |
| | OPERA | TOR IN | FORMATION | | | | | |
| ame: Title: | | | | | | | | |
| Group: | roup: Location: | | | | | | | |
| Signature: | $\overline{}$ | | | | | | | |
| Website: | | Phone: | Phone: | | | | | |
| | VALIDA | TION I | NFORMATION | | | | | |
| Name: | | | Date: | | | | | |
| Organization: Location: | | | | | | | | |
| | | | DMC | | | | | |





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Thank You



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