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Tape Data Integrity and Fixity

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The Importance of Data Integrity

Current Data Protection Options Are Costly

Cost Often Outweighs Risk of Data Loss

1 error can be expected in
~1 EB written to enterprise tape*



How do I know
my data is safe?

OPTION 1: REPLICATE DATA

- › Doubles hardware costs

OPTION 2: PERIODICALLY READ BACK ALL THE DATA

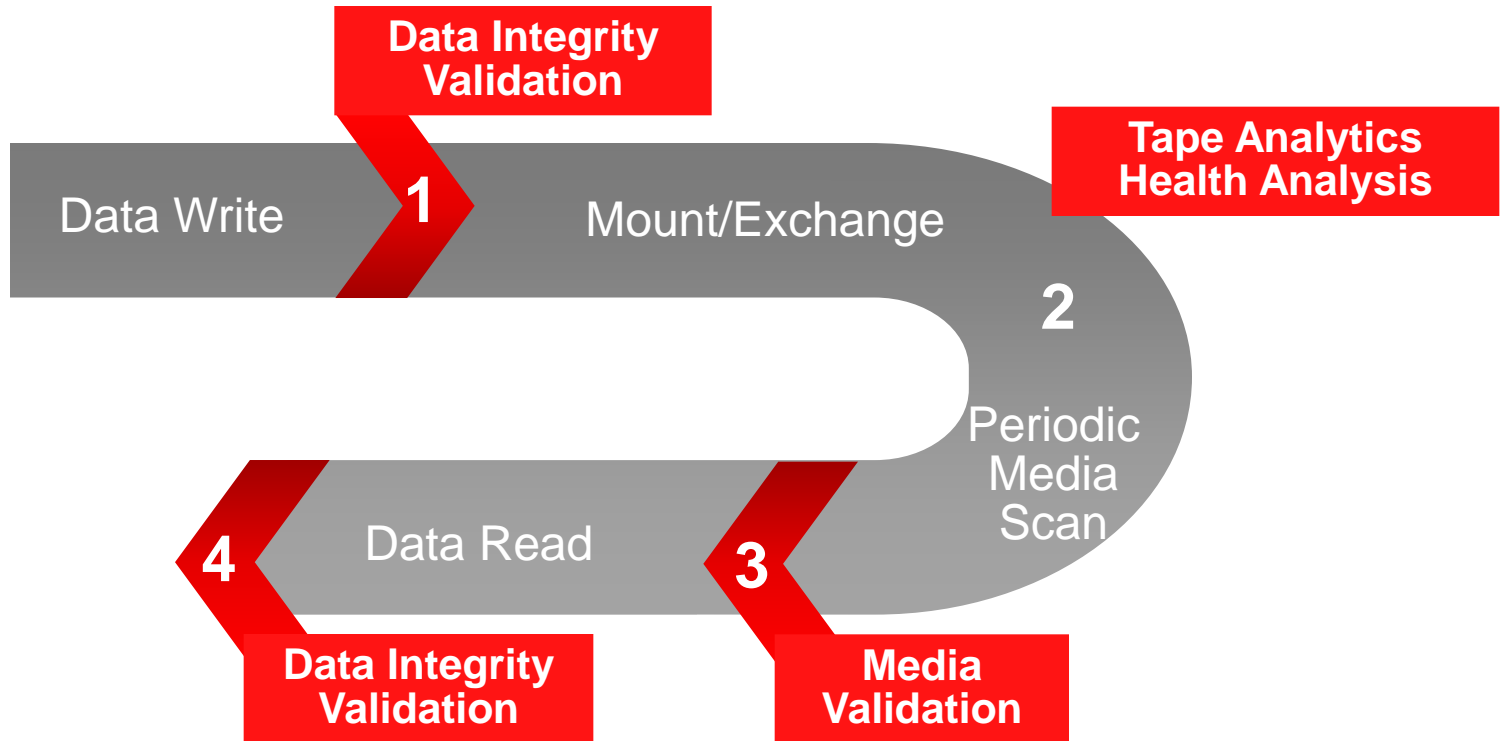
- › Adds stress to datacenter infrastructure,
increased hardware and people costs

OPTION 3: TRUST AND DO NOTHING

* 1 error in ~10 PB on LTO tape and 1 error in ~10 TB on disk

Integrity for the Life of Your Data

Continuous Archive Validation



5 Ways to Initiate Media Validation

Choose the Path that Best Meets Your Needs

Library Media Validation

Host Application

Simple > SLC (library controller)

Automated Policies >
StorageTek Tape Analytics 2.0

StorageTek Storage Archive
Manager (SAM) 5.3

Tivoli Storage Manager 6.3.3

Custom Application

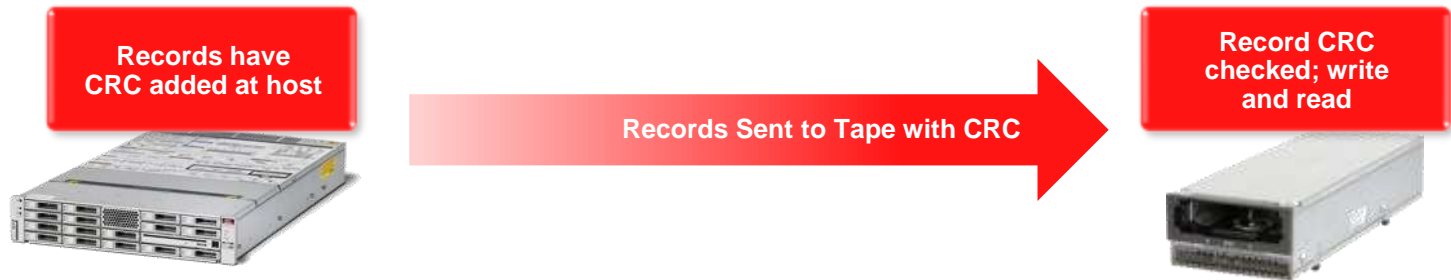
**StorageTek
T10000C
Tape Drive**

Archive End to End Data Integrity

StorageTek Data Integrity Validation

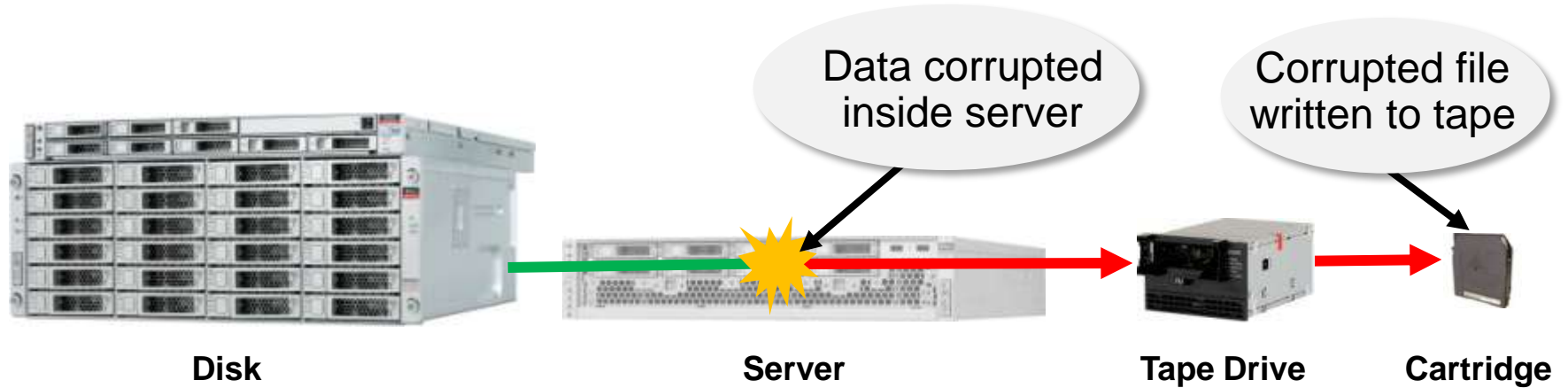
Only StorageTek T10000C` supports CRCs created in the server chip

- User creates a CRC (T10 ANSI standard) for each record
- StorageTek T10000C checks CRC as each record is received
- The CRC of each record is written to tape with that record
- When a record is read from tape the CRC is always checked
 - The SCSI Verify command can be used to check each record without transferring data to the application. (i.e. internally verified by the StorageTek T10000C)



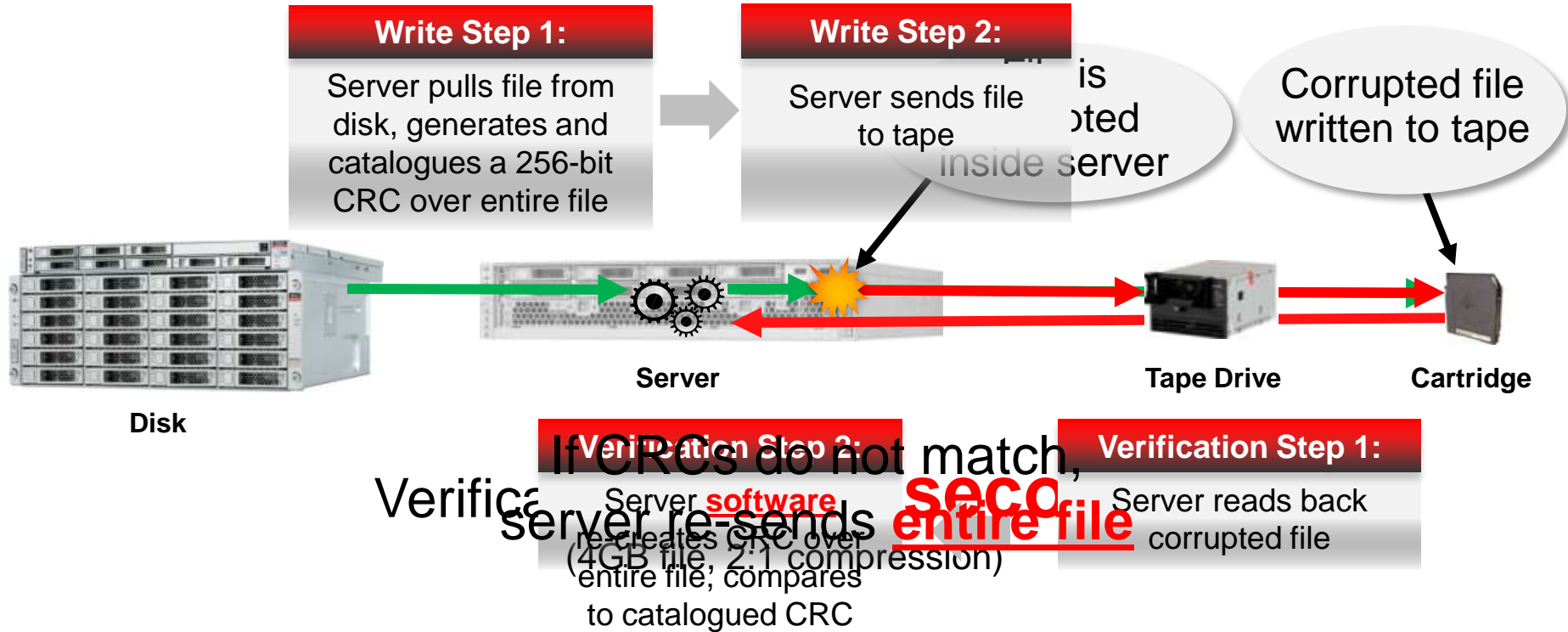
First, an Example...

Data is Corrupted Inside the Server and Unknowingly Written to Tape



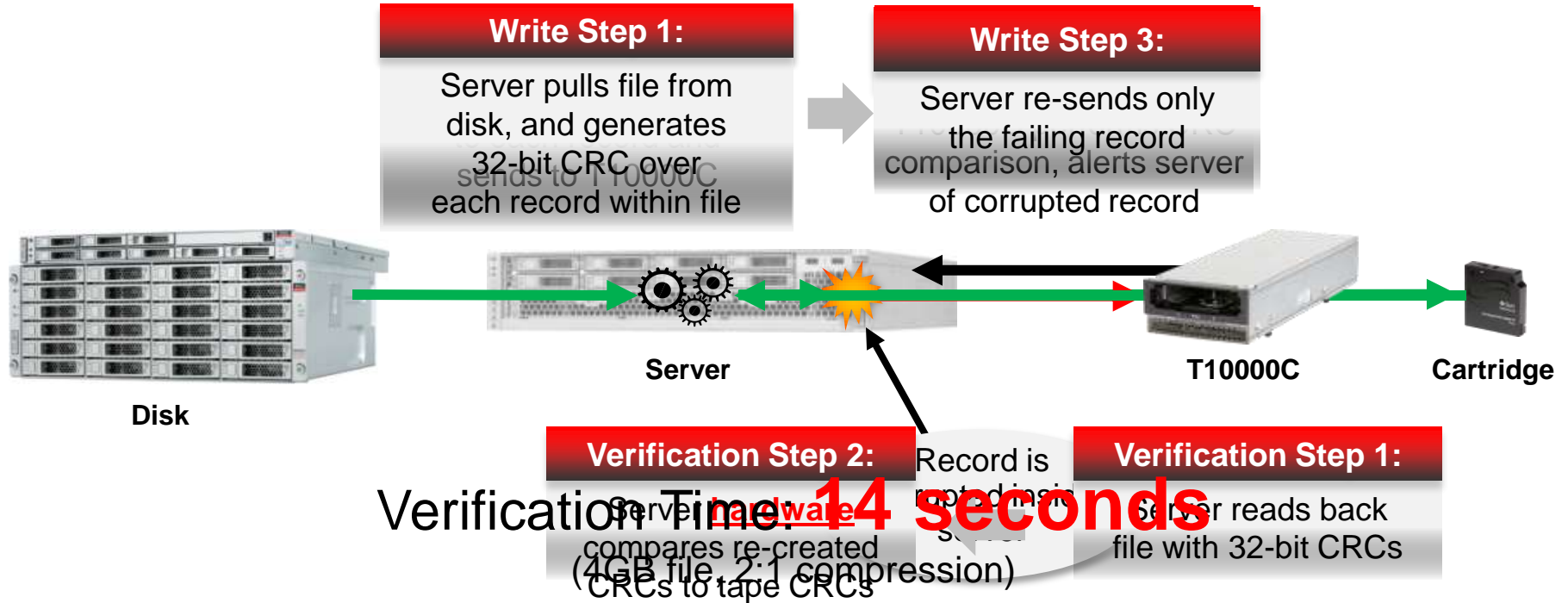
Conventional Data Validation

Inefficient Process Consumes Time and Server Resources



Data Validation with StorageTek T10000C

Discover Corrupted Records **Before** They Are Written to Tape



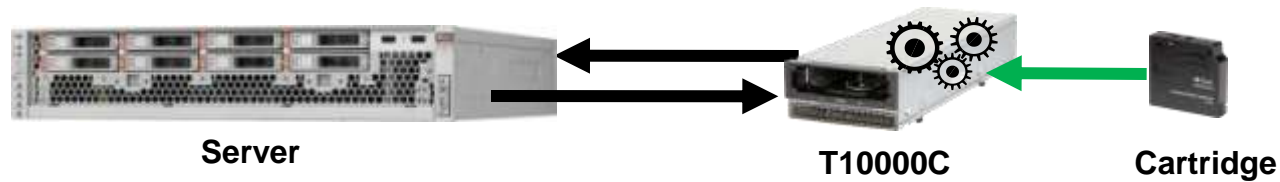
Media Validation

Periodic Archive Media Scans



SAM QFS + T10000C Means Fast, Secure Audits

Data is Quickly Verified Within T10000C, NOT an External Server



Step 1:
Verification Time: **9 seconds**
Server sends
SCSI file verify command
on tape to T10000C
to verify compressed CRCs

The Importance of Tape Complex Monitoring

Dashboard

Media

Health by Media Type



Library Media Cells



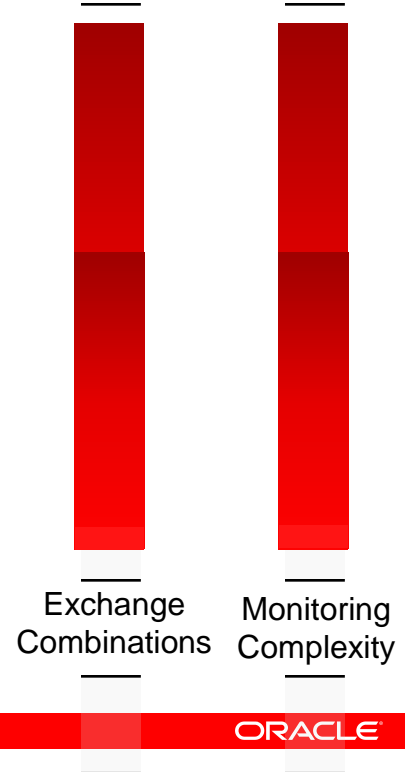
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Tape Management Challenges

Drive & Media Exchange Combinations Add Complexity



10 Drives of Drive Type 1 of Type 1 Cartridge



StorageTek Tape Analytics

Proactively Manage the Entire Tape Storage System from a Single Interface

- ✓ **Simplify Tape Management**

Monitors your drives and media so you can focus your resources elsewhere

- ✓ **Leverage Intelligent Analytics**

Provides proactive health indicators that can be trusted, using Oracle's proprietary algorithms

- ✓ **Worry Free Deployment**

Collects performance data via the library without entering your live data path

- ✓ **Grow with Peace of Mind**

Scales easily and monitors globally dispersed libraries from a single interface



Flexible Hardware Support		
Tape Drives	Libraries	Deployment
StorageTek T10000A,B,C StorageTek LTO3,4,5,6	StorageTek SL8500 StorageTek SL3000 StorageTek SL500 StorageTek SL150	Oracle Linux Downloadable Software

Automated Health Monitoring

Tape Analytics Monitors Every Tape Exchange, Simplifying Management



StorageTek Tape Analytics

Monitoring Every Exchange in the Archive

Tape Analytics Analyzes Over 150 Exchange Health Attributes



ORACLE StorageTek Tape Analytics

Media - Overview

Details for Media A0B1C835 **Monitored since 2012-06-**

Media Details	Most Recent Exchange
Volume Serial Number :	Last Exchange Start :
Media Type :	Exchange Elapsed Time :
Media Health Indicator :	Exchange Mount Time :
WORM/VolSafe Media :	Recording Technique :
Media Manufacturer Serial Number :	Media Exchange Status :
Media Manufacturer :	Exchange Drive Cleaning Required :
Media Warranty Indicator :	Mount R/W MB/Sec :
STA Start Tracking :	Media Load Limit Alert :
STA Stop Tracking :	Data Compression Ratio :
	Cart Memory Failure :

Media DATA Activity	Additional Exchange Info
Media Dismounts :	Media MB Capacity :
Dismounts with Errors :	Media MB Avail Pre :
MB Read :	Nearing Media Life Alert :
MB Write :	IBM Media Efficiency :
MB R/W :	HP Media Status :
MB Sent :	Media Length in Meters :
MB Received :	Media Manufacturer Date :
Avg Mount Read MB/Sec :	Media Auxiliary Memory Capacity :
Avg Mount Write MB/Sec :	Media Directory Corrupt :
Avg Mount R/W MB/Sec :	

Introducing StorageTek Library Media Validation

StorageTek
SL8500 or SL3000

+

StorageTek
Tape Analytics

+

StorageTek
T10000C



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Library Media Validation

3 Easy Steps

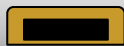
Flexible Drive Selection

Select any drive in library to perform validations



TAPE DRIVES

Drive Pool



Flexible Media Selection

Select any cartridge in library to verify



MEDIA

Media Queue



Flexible Verify Selection

Select type of media verify to perform

Basic Verify

Standard Verify

Complete Verify

Complete Verify Plus

MEDIA VERIFY OPTIONS

Designed for Simplicity, Security, and Speed

Simplicity

- The MOST initiation options:
 - Initiate with Tape Analytics, library, and other applications
- Keep validation inside the T10000C
 - No extra fibre
 - No extra servers
 - No key management



Security

- Data stays secure within the tape drive
 - No need to move the data to an external server
- Cartridges stay secure within the library

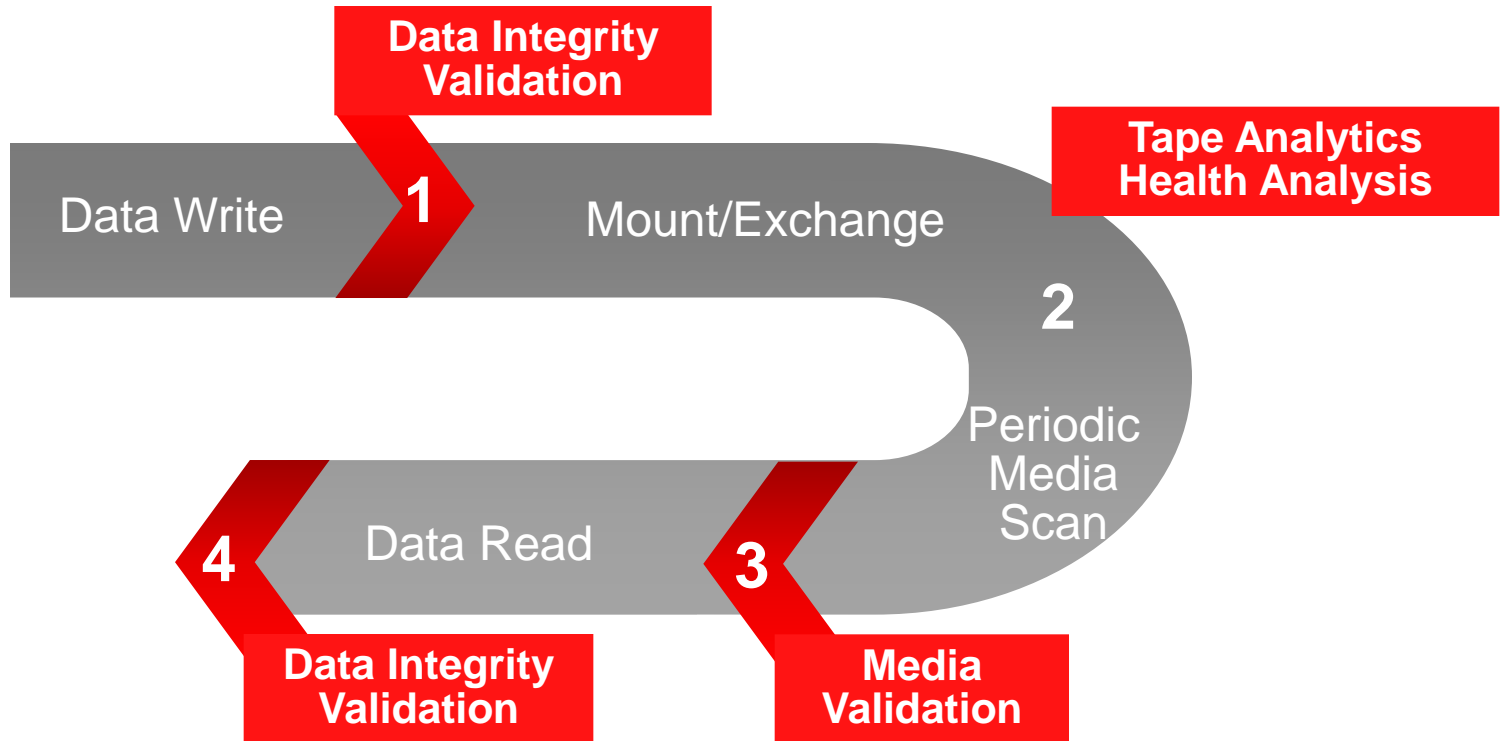


Speed

- T10000C offers the FASTEST data validation speeds
- No keys required to run scans
- No speed limit with compressed data

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Continuous Archive Validation



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