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Designing Storage Architectures for Digital Collections

Panel 2

Tape Vendors – future

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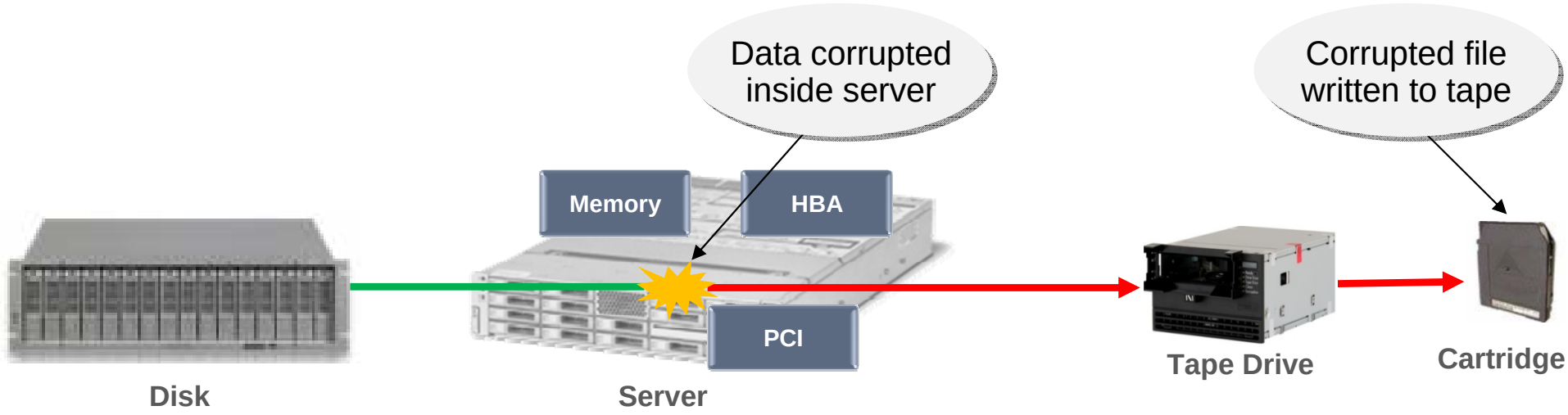
Emerging Tape Technologies

- Data Integrity Validation (DIV)
- Higher Capacity Tape
  - 5TB today
- LTFS (Linear Tape File System)

Why is End-to-End Data Protection Necessary?

Corrupted Data From the Server Can Be Written to Tape



Conventional Data Protection

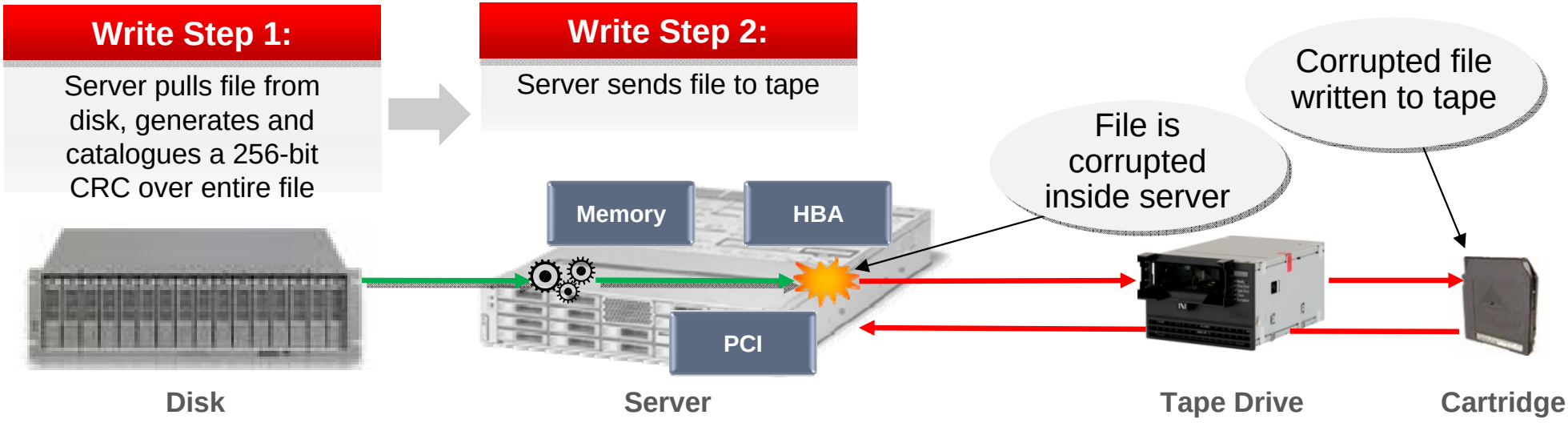
Conventional Checksum Verification Requires Entire File to Be Re-sent

Write Step 1:

Server pulls file from disk, generates and catalogues a 256-bit CRC over entire file

Write Step 2:

Server sends file to tape



Verification Step 2:

Server **software** re-creates CRC over entire file, compares to catalogued CRC

CRCs do not match, server re-sends **entire file**

MINIMUM Verification Time: **25 seconds**

(4GB file, 2:1 compression)

Verification Step 1:

Server reads back corrupted file with no CRC

Data Protection with DIV

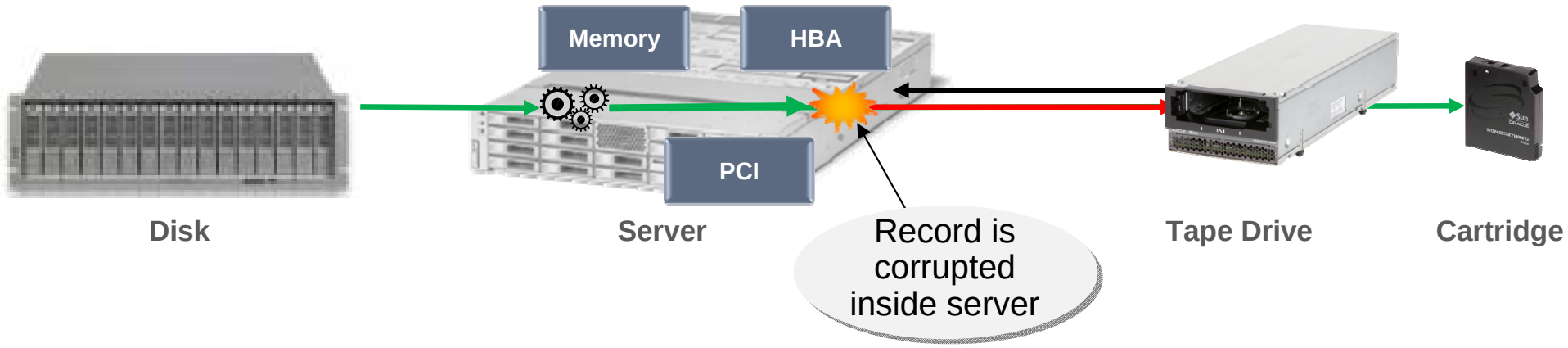
Discover Corrupted Records Before They Are Written to Tape

Write Step 1:
Server pulls file from disk, and generates 32-bit CRC over each record

Write Step 2:
Server appends CRC to each record and sends to tape drive

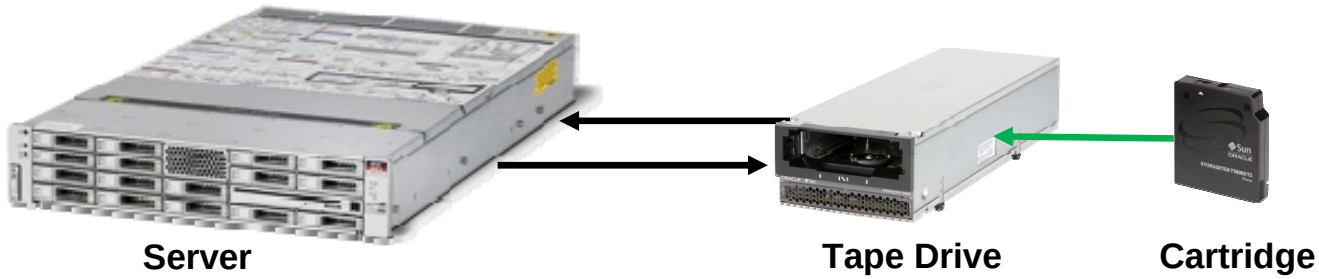
StorageTek Data Integrity Validation
Tape drive performs CRC comparison, alerts server of corrupted record

Write Step 3:
Server re-sends only the failing record



Fast Verification with SCSI Verify and DIV

SCSI Verify Checks Cartridge CRCs 2.5x Faster



Step 1:	Step 2:	Step 3:	Step 4:
Server sends SCSI Verify command to tape drive	Tape drive reads record(s) and re-creates CRCs	Tape drive compares CRCs on tape to re-created CRCs	Tape drive sends SCSI Verify status to server

MAXIMUM Time Required:
9 seconds

(4GB file, 2:1 compression)

Hardware and Software

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