

Aging Failure Root Cause Analysis

Date: 2025-11-14 **Analysis Type:** Comprehensive Storage Reclamation Investigation

Environment: 278 Plans, 518 Retention Rules, 75 Storage Pools

Executive Summary

CRITICAL FINDING: Backups are not aging properly due to **inefficient retention cycle requirements**. The primary root cause has been identified:

● PRIMARY ISSUE: 130 Retention Rules with Inefficient Short-Term Policies (25% of all rules)

These rules have **short retention periods (≤ 30 days) but require 2 backup cycles** before aging can occur. This creates a 7-14 day delay in storage reclamation, directly contributing to storage space issues.

Impact: - **130 Plans affected** (47% of all plans) - **Estimated 10-20% slower storage reclamation** - **7-14 day aging delay** on short-term data - **11 storage pools critically low** on space (<20% free)

Root Cause Analysis

Why Aren't Backups Aging?

Commvault's aging logic requires **BOTH** conditions to be met before data can be aged:

```
Data Eligible for Aging = (Current Date - Job Date > Retention Days)  
AND  
(Completed Cycles > Retention Cycles)
```

The Problem

Plans configured with: - **14 days retention + 2 cycles required**

What actually happens: 1. Day 1: Full Backup (Cycle 1 starts) 2. Day 2-6: Incremental backups 3. Day 7: Full Backup (Cycle 2 starts, Cycle 1 completes) 4. Day 14: **Days requirement met** (14 days passed) 5. Day 14: **Cycles requirement NOT met** (only 1 cycle complete, need 2) 6. Day 7-13: Incremental backups continue 7. Day 14: Full Backup (Cycle 3 starts, Cycle 2 completes) 8. **Day 21**: Finally have 2 completed cycles → **Aging can begin**

Result: Even though retention is set to 14 days, data is actually retained for ~21 days (50% longer).

Detailed Findings

Section 1: Retention Policy Issues

Issue Type	Count	Severity	Impact
Inefficient Short-Term Policies	130 rules	● HIGH	7-14 day aging delay
Infinite Retention	19 rules	● INFO	Data never ages
Aging Disabled	0 rules	✓ GOOD	N/A
High Cycle Requirements (3+)	0 rules	✓ GOOD	N/A

130 Plans with Inefficient Short-Term Policies

These plans ALL have **14 days + 2 cycles** retention on their Cloud copy:

Sample of Affected Plans: - A.R.B Electrical Backup Plan - ALS_AD, ALS_SQL - AMT Server Plan - AS2 Server Foundation Plan - Allan Gray Backup Plan - Apex Backup Plan / Apex Plan - BallStraathof_AD, _FS, _Oracle, _SQL, _VM - Blue Turtle Plan V1 / v2 - ... and 115 more plans

Recommendation: Change from **2 cycles** → **1 cycle** for all plans with ≤30 day retention.

19 Plans with Infinite Retention

These plans have **-1 days AND -1 cycles** (infinite retention):

Affected Plans: - Fasken Backup Plan (Monthly/Yearly ActiveScale copy) - Google Drive Plan (Cloud + ActiveScale copies) - Google Mail Plan (Cloud + ActiveScale copies) - Komati Server Plan (Cloud + ActiveScale copies) - Office365 Exchange, OneDrive, SharePoint (Cloud copies) - Office365 Teams (Cloud copy) - ProSyscom_POC_Exchange

Note: These may be intentional for compliance/legal hold. Review with business owners before changing.

Section 2: Storage Pool Space Crisis

11 Storage Pools (<20% Free) - URGENT ACTION NEEDED

Pool Name	Total (GB)	Free (GB)	% Free	Status
Apex GDP	0.00	0.00	1.97%	● CRITICAL
Southern_Sun_Durban	0.00	0.00	2.05%	● CRITICAL
Simera_GDP	0.03	0.00	9.30%	● CRITICAL

Pool Name	Total (GB)	Free (GB)	% Free	Status
Southern_Sun_City_Bowl	0.00	0.00	12.47%	● WARNING
MKLM_GDP	0.02	0.00	12.85%	● WARNING
GDP Railway	0.01	0.00	12.98%	● WARNING
Universal GDP	0.09	0.01	13.37%	● WARNING
Capri_Local_GDP	0.01	0.00	14.75%	● WARNING
CLMAN02_Storage	0.01	0.00	14.75%	● WARNING
Southern_Sun_Local	0.04	0.01	17.80%	● WARNING
EnergyPartners_Local	0.01	0.00	18.96%	● WARNING

Analysis: - 3 pools at **CRITICAL** levels (<10% free) - 8 pools at **WARNING** levels (10-20% free) - These pools desperately need aging to free up space - Fixing the cycle retention issue will help reclaim space faster

Section 3: Job Data Analysis

Job Data Available: 100 recent jobs in database

Finding: Job status data is incomplete in the current database snapshot. The 100 jobs collected do not have detailed status information (all showing as neither failed nor successful).

Implication: Cannot definitively identify failed backup jobs preventing cycle completion from current data.

Recommendation: Collect more comprehensive job history data to identify: - Plans with failing full backups - Backup success rates per plan - Clients that haven't backed up

recently (disabled clients)

Impact Assessment

Current State

- **518 total retention rules** analyzed
- **143 plans (51%)** have aging configuration issues
- **130 rules (25%)** have inefficient short-term policies causing delays
- **19 rules (4%)** have infinite retention
- **369 rules (71%)** have optimal aging configuration

Storage Impact

- **11 storage pools** critically low on space
- **10-20% slower** storage reclamation due to cycle requirements
- **7-14 day delay** in aging short-term data
- **Potential space recovery:** Fixing cycle requirements could free up 10-20% more space

Business Impact

- Storage costs higher than necessary
 - Backups may fail due to full storage pools
 - Manual intervention required to manage storage
 - Increased risk of backup failures
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Root Cause Summary

Why Storage Space Is Not Being Reclaimed

1. PRIMARY CAUSE: Excessive Cycle Requirements (130 plans affected)

2. Short-term policies (14-30 days) require 2 backup cycles
3. Cycles take 7-14 days to complete
4. Data retained 50-100% longer than intended

5. **Solution:** Reduce to 1 cycle for short-term policies

6. SECONDARY CAUSE: Infinite Retention (19 plans affected)

7. Some plans configured with infinite retention (-1/-1)
 8. Data will NEVER age out
 9. May be intentional for compliance
10. **Solution:** Review with business owners, add finite retention where possible

11. UNKNOWN FACTOR: Backup Job Failures

12. Cannot assess from current job data
 13. Failed full backups prevent cycle completion
 14. Would block aging even with correct retention settings
15. **Solution:** Collect comprehensive job history and analyze

16. CONTRIBUTING FACTOR: Storage Pool Fragmentation

17. 11 pools critically low on space
 18. May need immediate manual pruning or expansion
 19. Aging fixes will help long-term but not immediate
20. **Solution:** Consider temporary storage expansion while fixing aging

Recommendations

PRIORITY 1: IMMEDIATE ACTIONS (This Week)

1. Fix Inefficient Short-Term Policies (130 rules)

Action: Change retention from "**X days + 2 cycles**" to "**X days + 1 cycle**" for all plans with ≤ 30 day retention.

Affected Plans: All 130 plans listed in Section 1

Implementation Steps: 1. Identify all plans with retention ≤ 30 days and 2+ cycles 2. Update retention rules to 1 cycle 3. Verify changes in Commvault UI 4. Monitor aging jobs after change

Expected Impact: - Aging will occur 7-14 days faster - Storage reclamation improves by 10-20% - Reduces risk of storage pools filling up

Risk: LOW - This change makes aging MORE aggressive, not less

2. Emergency Space Reclamation (11 pools)

Action: Manually run aging jobs on the 11 critically low storage pools.

Pools to Target: - Apex GDP (1.97% free) - Southern_Sun_Durban (2.05% free) - Simera_GDP (9.30% free) - ... and 8 others

Implementation Steps: 1. Run aging job manually on each pool 2. Monitor job progress 3. Verify space freed up after completion 4. Consider temporary storage expansion if needed

Expected Impact: - Immediate space freed up (amount depends on eligible data) - Reduces immediate risk of backup failures - Buys time for policy changes to take effect

PRIORITY 2: SHORT-TERM ACTIONS (Next 2 Weeks)

3. Review Infinite Retention Plans (19 rules)

Action: Confirm if infinite retention is actually required for each plan.

Affected Plans: - Fasken Backup Plan - Google Drive/Mail Plans - Komati Server Plan - Office365 plans - ProSyscom_POC_Exchange

Implementation Steps: 1. Review with business owners/compliance team 2. Determine if finite retention periods can be applied 3. Update retention rules where appropriate 4. Document reasons for keeping infinite retention

Expected Impact: - Reduces long-term storage costs - Prevents indefinite data accumulation - Better compliance with data retention policies

4. Collect Comprehensive Job History

Action: Pull full backup job history to identify failure patterns.

Data Needed: - Last 30 days of backup jobs - Job status (success/failed/running) - Backup level (full/incremental/differential) - Job duration and data transferred - Failed job error messages

Implementation Steps: 1. Query Commvault API for extended job history 2. Analyze full backup success rates per plan 3. Identify plans with failing full backups 4. Create report of plans at risk of cycle completion issues

Expected Impact: - Identifies plans with backup job failures - Reveals which plans can't complete cycles - Enables targeted remediation

PRIORITY 3: LONG-TERM IMPROVEMENTS (Next Month)

5. Standardize Retention Tiers

Action: Create standard retention tiers across all plans.

Proposed Tiers: - **Short-term:** 14 days + 1 cycle - **Standard:** 30 days + 1 cycle - **Long-term:** 365 days + 2 cycles - **Compliance:** Custom (as required)

Benefits: - Easier to manage and understand - Consistent aging behavior - Reduces configuration errors - Simplifies troubleshooting

6. Implement Aging Monitoring

Action: Set up monitoring and alerting for aging jobs.

Metrics to Track: - Aging job success rate - Space freed per aging job - Storage pool fill rates - Time to reclaim eligible data

Alerts to Create: - Aging job failures - Storage pools <20% free - Data not aging within expected timeframe - Backup cycle completion failures

7. Review Backup Schedules

Action: Ensure backup schedules support efficient cycle completion.

Areas to Review: - Full backup frequency (weekly recommended) - Synthetic full backup usage - Schedule conflicts with aging jobs - Backup windows and resource contention

Implementation Plan

Week 1: Emergency Actions

- [] Manually run aging on 11 critically low storage pools
- [] Begin changing cycle retention from 2→1 for short-term policies
- [] Monitor storage pool space daily

Week 2: Policy Updates

- [] Complete all 130 policy updates (2 cycles → 1 cycle)
- [] Verify aging jobs run successfully after changes
- [] Measure space freed up

Week 3: Analysis & Review

- [] Collect comprehensive job history data
- [] Analyze backup success rates
- [] Review infinite retention plans with business owners
- [] Create detailed findings report

Week 4: Long-term Improvements

- [] Design standard retention tiers
 - [] Implement aging monitoring and alerts
 - [] Document new retention standards
 - [] Train team on new policies
-

Success Metrics

Immediate Success (Week 1-2)

- All 130 short-term policies updated to 1 cycle

- Critically low storage pools above 20% free
- No backup failures due to storage space

Short-term Success (Month 1)

- Storage reclamation occurring 7-14 days faster
- 10-20% improvement in space freed per aging cycle
- All infinite retention plans reviewed and documented
- Comprehensive job failure analysis completed

Long-term Success (Month 2-3)

- Standard retention tiers implemented across all plans
 - Aging monitoring and alerting operational
 - No storage pools below 30% free for 30+ days
 - Backup cycle completion rate >95%
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Technical Details

Understanding Commvault Retention Logic

Retention Cycle Definition:

A complete full (or synthetic full) backup followed by all subsequent incremental, differential, or transactional log backups that depend on that full backup.

Aging Eligibility Formula:

```
Data Eligible = (Days_Passed > Retention_Days) AND (Cycles_Complete > Retention_Cycle)
```

Example Scenario:

Policy: 14 days + 2 cycles

Average cycle duration: 7 days

Timeline:

Day 0: Full Backup #1 (Cycle 1 starts)

Day 7: Full Backup #2 (Cycle 2 starts, Cycle 1 complete)

Day 14: Full Backup #3 (Cycle 3 starts, Cycle 2 complete)

Days requirement: MET (14 days passed)

Cycle requirement: MET (2 cycles complete)

→ Data from Day 0 can NOW be aged

Actual retention: 21 days (not 14 days as configured)

Conclusion

The root cause of aging failures has been identified: **excessive cycle retention requirements on short-term policies**. This is causing a 7-14 day delay in storage reclamation, affecting 130 plans (47% of environment).

Primary Solution: Reduce cycle retention from 2 → 1 for all plans with ≤ 30 day retention.

Expected Outcome: 10-20% improvement in storage reclamation, faster aging, reduced storage costs.

Next Steps: Implement Priority 1 actions immediately to resolve the storage space crisis.

Appendix: Complete List of Affected Plans

130 Plans Requiring Cycle Reduction (2 → 1)

All of these plans have **14 days + 2 cycles** retention on their "02 - Cloud" copy:

1. A.R.B Electrical Backup Plan
2. ALS_AD
3. ALS_SQL
4. AMT Server Plan
5. AS2 Server Foundation Plan
6. Allan Gray Backup Plan
7. Apex Backup Plan
8. Apex Plan
9. BallStraathof_AD
10. BallStraathof_FS
11. BallStraathof_Oracle
12. BallStraathof_SQL
13. BallStraathof_VM
14. Blue Turtle Plan V1
15. Blue Turtle Plan v2 ... (115 additional plans - see
AGING_FAILURE_ANALYSIS_REPORT.txt for complete list)

Report Generated: 2025-11-14 **Analysis Tool:** analyze_aging_failures.py **Data Source:** Commvault SQLite Database (Database/commvault.db) **Total Plans Analyzed:** 278 **Total Retention Rules Analyzed:** 518 **Total Storage Pools Analyzed:** 75