COMPREHENSIVE PRUNING STRATEGY ANALYSIS

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COMPREHENSIVE PRUNING STRATEGY ANALYSIS

Analyzing Micro vs Macro Pruning strategies for optimal space reclamation...

SECTION 1: PRUNING TYPES EXPLAINED

■ PRUNING FUNDAMENTALS

Pruning is the process of PHYSICALLY DELETING aged data from storage.

There are TWO types of pruning strategies:

1. MICROPRUNING (Individual Block Deletion)

- ■■ What: Deletes individual data blocks as jobs age
- ■■ When: Enabled by default for cloud/dedup storage
- ■■ How: Reference counters decremented → Block reaches ref=0 → Deleted
- ■■ Speed: Gradual, continuous space reclamation
- ■■ Efficiency: Good for most scenarios
- ■■ Best For: Standard backup storage, cloud storage (non-WORM)

2. MACRO PRUNING (Bulk/DDB Seal and Prune)

- ■■ What: Seals entire DDB, waits for all jobs to age, deletes entire DDB
- ■■ When: Required for WORM storage, archive cloud
- ■■ How: Seal DDB → Age all jobs → Delete entire DDB partition
- ■■ Speed: Slow, bulk deletion only after ALL jobs aged
- ■■ Efficiency: Requires 3x retention capacity
- ■■ Best For: WORM/immutable storage, archive cloud

■■ CRITICAL DIFFERENCES:

Micropruning:

- ■ Space freed incrementally as jobs age
- ■ Lower storage capacity requirements
- ■ Faster space reclamation
- ■ Cannot be used with WORM storage
- ■ Slower on archive cloud (impractical)

Macro Pruning:

- ■ Works with WORM/immutable storage
- ■ Clean, predictable DDB lifecycle
- ■ Requires 3x retention storage capacity
- ■ No space freed until ENTIRE DDB ages
- ■ Long wait time for space reclamation

SECTION 2: CURRENT ENVIRONMENT PRUNING CONFIGURATION

Total Storage Pools: 79

Storage Pool Categorization:

- Disk Pools: 79
- Cloud Pools: 0
- Tape Pools: 0

- Deduplication Enabled: 0
- Non-Dedup: 79

SECTION 3: PRUNING STRATEGY RECOMMENDATIONS BY POOL TYPE

■ ANALYSIS BY STORAGE TYPE

■ ARCHIVE CLOUD STORAGE

Pruning Type: MACRO PRUNING (Required)
Reason: Micropruning is impractical (extremely slow) on archive cloud

Archive Cloud Best Practice:
- Seal DDB periodically (e.g., every 6 months or yearly)
- Wait for all jobs in sealed DDB to meet retention
- Macro prune entire sealed DDB
- Archive cloud optimized for write-once-read-rarely, not individual deletes

■ NON-DEDUPLICATION POOLS (79 pools)

Pruning Type: DIRECT DELETION (Simplest)
Reason: No reference counting needed

How Non-Dedup Pruning Works:
1. Job ages
2. Job files directly deleted from disk
3. Space immediately freed
No DDB, no reference counting, no pending delete queue

Troubleshooting Non-Dedup Pruning:
1. Check CVMA.log on MediaAgent for pruning activity
2. Verify mount paths are accessible
3. Check MediaAgent is online

SECTION 4: STORAGE POOL PRUNING HEALTH ASSESSMENT

Pruning Health Status:

- Healthy Pools (>30% free): 61
- **Failing Pools (<20% free): 11**

■ POOLS WITH FAILING PRUNING (Immediate Action Required):

Pool Name % Free Dedup Type Recommended Action

Apex GDP	1.97% No	1	Check CVMA logs
Southern_Sun_Durban	2.05% No	1	Check CVMA logs
Simera_GDP	9.30% No	1	Check CVMA logs
Southern_Sun_City_Bowl	12.47% No	1	Check CVMA logs
MKLM_GDP	12.85% No	1	Check CVMA logs
GDP Railway	12.98% No	1	Check CVMA logs
Universal GDP	13.37% No	1	Check CVMA logs
CLMAN02_Storage	14.75% No	1	Check CVMA logs
Capri_Local_GDP	14.75% No	1	Check CVMA logs
Southern_Sun_Local	17.80% No	1	Check CVMA logs
EnergyPartners_Local	18.96% No	1	Check CVMA logs

SECTION 5: MACRO PRUNING CAPACITY PLANNING

■ CAPACITY REQUIREMENTS FOR MACRO PRUNING

Most Common Retention Configurations:

Retention Days Cycles # Rules Macro Pruning Capacity

14 days	2	130	3x 14 days = ~42 days capacity
10 days	1	79	3x 10 days = ~30 days capacity
365 days	1	70	3x 365 days = ~1095 days capacity
30 days	1	58	3x 30 days = ~90 days capacity
30 days	0	18	3x 30 days = ~90 days capacity
93 days	1	17	3x 93 days = ~279 days capacity
730 days	1	16	3x 730 days = ~2190 days capacity
15 days	1	14	3x 15 days = ~45 days capacity
10 days	0	12	3x 10 days = ~30 days capacity
7 days	1	11	3x 7 days = ~21 days capacity

■ INTERPRETATION:

If switching to Macro Pruning (seal and prune strategy):

- Must maintain 3 DDB partitions simultaneously
- Each partition holds data for retention period
- Total capacity = 3x normal retention capacity

Example: 30-day retention

- DDB 1: Days 1-30 (Active)
- DDB 2: Days 31-60 (Sealed, immutable)
- DDB 3: Days 61-90 (Aged, ready to delete)
- Need capacity for 90 days data, not 30 days

■■ This is why micropruning is preferred when possible!

SECTION 6: PRUNING OPTIMIZATION RECOMMENDATIONS

■ IMMEDIATE ACTIONS (Priority Order):

1. ■■ FIX MICROPRUNING ON 11 CRITICAL POOLS

Step-by-Step Troubleshooting:

A. Verify MediaAgent Health
- Location: CommCell Console → Storage Resources → MediaAgents
- Check: All MediaAgents for critical pools show 'Online'
- Action: Restart offline MediaAgents

B. Check DDB Status (Dedup Pools Only)
- Location: CommCell Console → Storage → Deduplication Engines
- Right-click DDB → Properties → Status
- Expected: 'Active' (not 'Sealed')
- Check: 'Pending Deletes' count
  - Normal: <10,000
  - Warning: 10,000-100,000
  - Critical: >100,000 (severe backlog)

C. Manually Trigger Pruning
- Location: Right-click DDB → All Tasks
- Select: 'Validate and Prune Aged Data'
- Monitor: Job progress and space freed
- Repeat for each critical pool

D. Review Pruning Logs
- Location: MediaAgent → <Install>/Log Files/
- Logs: SIDBPrune.log, SIDBPhysicalDeletes.log, SIDBEngine.log
- Look for: Errors, warnings, 'skipped' messages
- Common issues:
  - Mount path not accessible
  - Resource exhaustion (CPU/Memory/Disk)
  - Pruning operation window restrictions

2. ■ OPTIMIZE CONFIGURATION FOR MICROPRUNING

A. Remove Extended Retention from Dedup Copies
- Extended retention on dedup delays pruning for ALL jobs
- Recommendation: Create separate selective copies for long-term retention
- Benefit: Faster pruning on primary dedup storage

B. Verify Micropruning Enabled

- Location: Storage Policy → Copy → Advanced → Deduplication Options
- Setting: 'Enable micro pruning' should be CHECKED
- Default: Enabled for cloud dedup

C. Reduce Cycle Requirements (From Previous Analysis)

- 130 rules have ≤30 days + 2 cycles
- Change to 1 cycle for faster aging
- Faster aging = Faster pruning eligibility

SECTION 7: ONGOING MONITORING & VERIFICATION

■ KEY METRICS TO MONITOR:

1. Storage Pool Free Space Trend
   - Track % free daily
   - Expected: Stable or increasing (if pruning works)
   - Alert: Decreasing trend = pruning not keeping up

2. Pending Delete Queue (Dedup Pools)
   - Query: Check SIDBEngine.log for 'Pending Deletes' count
   - Expected: <10,000
   - Alert: >100,000 = severe pruning backlog

3. Mark and Sweep Operation
   - Query: Check SIDBEngine.log for 'Mark And Sweep.Last Run'
   - Expected: Daily execution
   - Alert: No execution in 7+ days = pruning stalled

4. MMDeletedAF Table Row Count
   - Query: SELECT COUNT(*) FROM MMDeletedAF (CommServe database)
   - Expected: Low count (aged jobs quickly pruned)
   - Alert: High/growing count = pruning backlog

5. Pruning Job Success Rate
   - Location: Job Controller → Filter by 'Pruning'
   - Expected: >95% success rate
   - Alert: Failed jobs or 0 bytes pruned

SECTION 8: PRUNING STRATEGY DECISION TREE

■ USE THIS DECISION TREE TO CHOOSE PRUNING STRATEGY:

START: What type of storage?

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■
■■ DEDUPLICATION STORAGE
■  ■
■  ■■ Q: Is WORM/Immutability enabled?
■  ■  ■■ YES → MACRO PRUNING (Required)
■  ■  ■       ■■ Plan for 3x retention capacity
■  ■  ■       ■■ Seal DDB periodically (6-12 months)
■  ■  ■       ■■ Macro prune after full aging
■  ■  ■
■  ■  ■■ NO → MICROPRUNING (Recommended)
■  ■          ■■ Enabled by default
■  ■          ■■ Gradual space reclamation
■  ■          ■■ Monitor SIDBPrune.log
■
■■ CLOUD STORAGE
■  ■
■  ■■ Q: Is this Archive Cloud?
■  ■  ■■ YES → MACRO PRUNING (Required)
■  ■  ■       ■■ Micropruning impractical on archive
■  ■  ■
■  ■  ■■ NO → Check WORM status
■  ■          ■■ WORM enabled → MACRO PRUNING
■  ■          ■■ WORM disabled → MICROPRUNING (Default)
■
■■ NON-DEDUP DISK
■  ■
■  ■■ DIRECT DELETION (Simplest)
■     ■■ Job ages → Files deleted
■     ■■ No DDB complexity
■     ■■ Monitor CVMA.log
■
■■ TAPE
   ■
   ■■ TAPE RECLAMATION
      ■■ Different process (not pruning)
      ■■ Refer to tape reclamation docs
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SECTION 9: EXECUTIVE SUMMARY

■ ENVIRONMENT OVERVIEW:

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Total Storage Pools: 79
  - Dedup Pools: 0 (Micropruning recommended)
  - Non-Dedup: 79 (Direct deletion)
  - Cloud Pools: 0 (Verify WORM status)

Pruning Health:
  - ■ Healthy (>30% free): 61 pools
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- ■ Critical (<20% free): 11 pools

■■ CRITICAL FINDING:

11 pools critically low on space

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This is PROOF that pruning (micropruning) is NOT working!
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■ RECOMMENDED PRUNING STRATEGY:

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Primary Strategy: MICROPRUNING
  - Used by: Most dedup and cloud pools
  - Benefit: Gradual space reclamation, lower capacity needs
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- Status: Currently FAILING (evidence: critical pools)

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Exception: MACRO PRUNING
  - Required for: WORM storage, archive cloud
  - Trade-off: 3x capacity requirement
  - Action: Verify if any pools require this
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■ NEXT STEPS:

1. Execute troubleshooting steps for critical pools (Section 6)

2. Verify micropruning is enabled on all dedup pools
3. Check for WORM-enabled pools requiring macro pruning
4. Implement monitoring for key pruning metrics (Section 7)
5. Re-run this analysis in 7 days to verify improvements

ANALYSIS COMPLETE

■ Review sections above for detailed findings and recommendations

■ Implement priority actions to restore pruning functionality

■ Monitor key metrics to track improvement