STORAGE ADMINISTRATION

A Practical Mainframe Storage Operations Workbook

DASD fundamentals • SMS concepts • Dataset availability • Capacity and incident response

Estimated time: 45–60 minutes | Audience: z/OS storage administrators, system programmers and operations teams

What you will learn

Understand the storage administrator's role in z/OS environments, distinguish key storage concepts, investigate dataset and volume availability symptoms, and plan safe storage changes using evidence, approvals and recovery controls.

1. Mainframe storage: the operating model

Mainframe storage administration supports reliable access to data sets and volumes used by z/OS, subsystems and applications. Responsibilities commonly include DASD capacity, dataset placement, SMS policy, backup/recovery coordination, performance monitoring and operational controls.

Concept	Purpose and operational relevance
DASD volumes	Persistent disk volumes that host data sets. Monitor availability, capacity, health and allocation conditions.
Data sets	Named storage objects used by applications, system components and utilities. Attributes and organisation affect allocation and access.
SMS	System Managed Storage policies automate dataset placement and related storage behaviour.
Storage groups	Logical groupings of volumes used in SMS-managed storage allocation.
Storage classes	Policies that express availability, performance and other storage service requirements.
Management classes	Policies governing lifecycle actions such as backup, migration and retention, as configured at the site.
Data classes	Policies that can supply dataset allocation attributes and defaults.

Core principle

Understand the policy and dependency chain before changing an allocation or storage definition. An allocation failure may result from naming rules, SMS constructs, volume capacity, permissions, dataset attributes or an unavailable dependency.

2. Daily storage health checks

Check	Questions and evidence
Volume capacity	Are free space, utilisation and growth trends within site thresholds?
Dataset allocation	Are allocation failures increasing? Check requested attributes, space units, extents and eligible volumes.
SMS policy	Are storage, data and management class assignments consistent with workload requirements?
Availability	Are required volumes online and accessible to the relevant systems and applications?
Backup and recovery	Are scheduled backup, migration and restore processes completing? Are exceptions tracked?
Performance	Do I/O response-time trends or workload changes indicate a storage bottleneck?

Use organisation-defined thresholds. Do not infer a storage problem from one metric without correlating workload, dataset and system evidence.

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3. Troubleshooting playbook

Symptom	Investigation path	Avoid
Dataset allocation fails	Check dataset name, requested attributes, SMS class assignment, eligible storage groups, volume free space and security.	Repeated attempts without correcting the cause.
Volume appears unavailable	Confirm scope and system visibility; review operator messages, device status, path and storage subsystem alerts.	Changing device or volume state without coordinated incident control.
Capacity threshold reached	Identify high-growth datasets, workload changes, utilisation and planned capacity; coordinate expansion or cleanup.	Deleting data without owner approval, retention review and recovery checks.
Slow I/O complaints	Correlate response-time metrics with workload, affected volumes, paths and recent changes; engage storage and system teams.	Changing placement or cache settings based on one sample.
SMS assignment unexpected	Review ACS routine outcomes, class definitions, naming patterns and recent policy changes.	Editing production ACS routines without testing and rollback.

4. Scenario: dataset allocation failure

Situation: A production batch job fails while allocating a new dataset. The job ran successfully last week. Other jobs in the same application environment appear unaffected. Operations reports that the target storage group is close to its capacity threshold.

Investigation sequence

Step	Action and evidence to collect
1. Establish scope	Capture job name, dataset name, timestamp, allocation request and exact system messages.
2. Validate attributes	Review requested dataset organisation, space, volume, SMS classes and recent application changes.
3. Trace policy	Determine which ACS routines and SMS constructs assigned the dataset; confirm expected storage group.
4. Check capacity	Review eligible volumes, free space, thresholds and whether allocation constraints prevent placement.
5. Check access	Confirm security permissions and dataset naming/ownership requirements.
6. Plan remediation	Coordinate with storage, application and operations owners; correct capacity or policy through change control.
7. Validate	Rerun only when approved; verify dataset placement, job completion and capacity headroom.

Decision prompts

- Did the dataset attributes or naming pattern change?
- Was the expected SMS class assigned?
- Is the storage group eligible and does it have allocatable capacity?
- Could security or an allocation constraint explain the failure?

5. Controlled storage change checklist

Control	Evidence required
Scope	Affected datasets, volumes, systems, applications and business impact documented.
Baseline	Current SMS definitions, capacity, placement and relevant metrics captured.
Technical review	Policy impact, naming patterns, dependencies and release-specific documentation reviewed.
Testing	Change validated in a representative non-production environment where possible.
Recovery	Rollback steps, restore implications and responsible owners documented.
Approval	Storage, application, operations and service owners approve and are informed.
Post-change	Allocation, placement, capacity and workload behaviour validated and recorded.

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6. Storage incident worksheet

Field	Record
System / environment	_____
Dataset / volume / storage group	_____
Time and scope of incident	_____
Exact messages and evidence	_____
Requested dataset attributes	_____
SMS classes / policy outcome	_____
Capacity and access checks	_____
Likely cause and alternatives	_____
Action, approval and owner	_____
Validation and closure evidence	_____

7. Knowledge check

1. Which SMS construct is commonly used to group volumes for allocation? **A.** Storage group **B.** Job class **C.** Load module **D.** Transaction ID

2. A dataset allocation fails. What should be reviewed first? **A.** Only application source **B.** Allocation messages, requested attributes, SMS assignment and eligible volume capacity **C.** Delete old datasets **D.** Restart z/OS

3. What is a key role of a management class? **A.** Define COBOL syntax **B.** Govern lifecycle actions such as backup or migration as configured **C.** Route network traffic **D.** Compile JCL

4. Why review high-growth datasets before cleanup? **A.** Skip owner checks **B.** Confirm ownership, retention and recovery requirements **C.** Maximise deletion speed **D.** Bypass approvals

5. What should follow a storage policy change? **A.** No checks **B.** Validate allocation, placement, capacity and workload behaviour **C.** Delete baseline **D.** Disable monitoring

Answer key: 1-A, 2-B, 3-B, 4-B, 5-B

Key takeaway

Reliable storage administration requires understanding dataset attributes, SMS policy, volume capacity and workload dependencies. Diagnose using evidence, protect data lifecycle requirements, and validate every approved change.

Further learning: Consult IBM documentation for DFSMS and the z/OS release installed at your site. Review SMS constructs, ACS routines, dataset allocation, space management, backup/recovery and storage operations. Validate commands and procedures against local standards and approved runbooks.

Ez-Learn course resource: Storage Administration | Use alongside the official curriculum, instructor guidance and approved lab environment.

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