

# Restart/Recovery Processing

Restart/recovery occurs if a cluster nucleus fails. Restart/recovery uses the Work data sets/files of all nuclei to recover the database. The Work data sets/files are dynamically allocated from the data set names recorded in the PPT. Adabas Parallel Services version supports offline and online recovery.

This chapter covers the following topics:

- Offline Recovery (Session Autorestart)
  - Online Recovery
  - Automatic Restart Management (ARM)
  - Archive Recovery
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## Offline Recovery (Session Autorestart)

- If a cluster nucleus session terminates abnormally, start one of the cluster nuclei to perform the autorestart.
- If a noncluster nucleus session terminates abnormally, restart the noncluster nucleus to perform the autorestart.

Offline recovery occurs if all active cluster nuclei in an Adabas Parallel Services cluster fail. Offline recovery relies only on information from the physical database and the Work data sets/files of each cluster nucleus. All information in the global cache and lock areas is lost.

The first cluster nucleus to restart repairs any physical inconsistencies in the database and backs out all incomplete commands and transactions. The restarted nucleus obtains recovery information from blocks in the common database and from the Work data sets/files of all the failed nuclei.

The restarting nucleus retrieves the Work data set/file names from the PPT block for each terminated nucleus and opens these data sets/files using dynamic allocation. From that point, normal recovery processing occurs:

- the breakpoint on each Work data set/file is found;
- backward and forward repair is performed; and
- autobackout is performed.

While reading through the Work data sets/files, the restarting nucleus on the fly merges the protection records by their timestamps into chronological sequence.

## Online Recovery

When one or more cluster nuclei have failed while one or more other nuclei in the same cluster remain active, online recovery processing is performed by collaboration of all surviving nuclei.

All surviving cluster nuclei quiesce their operations and reinitialize their working storage. Command processing is quiesced and the internal status variables, tables, and pools are repaired.

The peer nuclei compete for the recovery lock: when one of the nuclei obtains it, it invokes offline recovery processing. It repairs any physical inconsistencies in the database and backs out all incomplete command and transactions. Open transactions executed by the surviving nuclei are backed out as well. All information in the global lock and cache areas is discarded.

Once this recovery processing has completed, normal processing resumes.

Users are affected by online recovery as follows:

- users assigned to failed nuclei lose their commands, transactions, sequential processes, and search results. They may receive response codes 9, 21, 148, or 251, depending on the status of their session at the time of the failure.
- users assigned to surviving nuclei may or may not lose their commands/transactions, depending on whether they managed to complete them in the quiesce phase. They retain their sequential processes and search results, but they may experience an increased response time. Users that do lose their commands/transactions will subsequently receive response code 9 and might possibly get response code 21 as well.

## Automatic Restart Management (ARM)

Automatic restart management (ARM) is a z/OS facility that can be used to automatically restart a nucleus when it abends. Automatic restart is suppressed when the ABEND is intentional; for example, when it results from a parameter error.

ARM can be used for Adabas nuclei in both cluster and noncluster environments.

The ADARUN parameter ARMNAME (read *ADARUN Parameter Usage in Cluster Environments*) is used to identify the element in the ARM *policy* that is to be activated. Each element specifies when, where, and how often an automatic restart is to be attempted.

If an ARM policy has not been defined, the ARMNAME parameter has no effect.

## Archive Recovery

Archive recovery occurs if the container data sets of the database are damaged or restart recovery is not effective.

Archive recovery:

- restores the database; and
- regenerates the updates from the protection logs.

The protection logs to be regenerated are the output of the ADARES PLCOPY protection log copy and merge process that occurs in Adabas Parallel Services cluster environments. The restore/regenerate process is the same in both cluster and noncluster environments.