Highlights

- Automate checkpoint, backout, and re-start of IMS Batch Messaging Programs (BMPs) and IMS Batch DLI/DBB Batch programs

- Programmically identify the latest Check-point ID for batch program restarts

- Automatically drive Batch Backout for abnormally terminated batch programs

- Allow IMS BMPs to be restarted on any IMS system in an IMS Sysplex environment

- Optionally alert the user when too few checkpoints are created or when there is excessive checkpointing occurring

- Program Number: 5655-E14

IMS Program Restart Facility

Checkpoint, Backout and Restart IMS Batch jobs

IMS batch executions can be run as standalone IMS Batch DLI/DBB programs or under the control of the IMS control region as IMS Batch Messaging Programs (BMPs). At regular intervals, batch programs can issue Checkpoint (CHKP) calls to create points in time where they can be restarted in the event of a failure. When a checkpoint is created, IMS saves information, like designated work storage, database posi-tioning, key feedback areas and a Checkpoint ID, in the IMS log data set that can be used to restart the batch program safely. Sometimes, it is necessary to remove database changes that occurred after the Checkpoint was taken so that retained database locks can be freed and other applications can access the same database segments.

The *IMS Program Restart Facility* automates the Checkpoint, Re-start and Backout processing for IMS batch programs. It manages the Checkpoint ID selection process by identifying the correct log data set to use and programmically creating the restart job for execution. It also monitors the number of checkpoints created by the batch application to determine if there are too few or too many checkpoints created during a specified period of time. The *IMS Batch Backout Manager* product was integrated into *IMS Program Restart Facility V2.2*. This allows Batch Backout to be driven automatically when it is required to reestablish database integrity and free up retained locks which ultimately improves database availability and batch application restartability.

IMS Program Restart Facility

The *IMS Program Restart Facility* is one of the key components of the *IMS System Management Solution* as shown in Figure 1.

Figure 1: IMS System Management Solution Components

Figure 2: IMS Program Restart Facility Main Menu

The *IMS Program Restart Facility* automates the restarting of IMS Batch Message Processing (BMP) programs and IMS Batch DLI/DBB Batch programs. Users can avoid the manual and error prone process of identifying the last valid Checkpoint ID for the batch program and the associated log data sets to include in the restart job. The *IMS Program Restart Facility* determines everything that is required to restart a batch program and dynamically creates the restart job with the correct Checkpoint ID and IMS log data sets that were active at the time the batch program failed.

In the case where an IMS Batch DLI/DBB program abnormally terminates, the *IMS Program Restart Facility* determines if an IMS Batch Backout is required, and it will drive the backout as part of the termination process. In the case of a system outage, the *IMS Program Restart Facility* determines if an IMS Batch Backout is required during the subsequent job restart and it drives Batch Backout as part of the job restart process. The *IMS Program Restart Facility* main menu is shown in Figure 2.
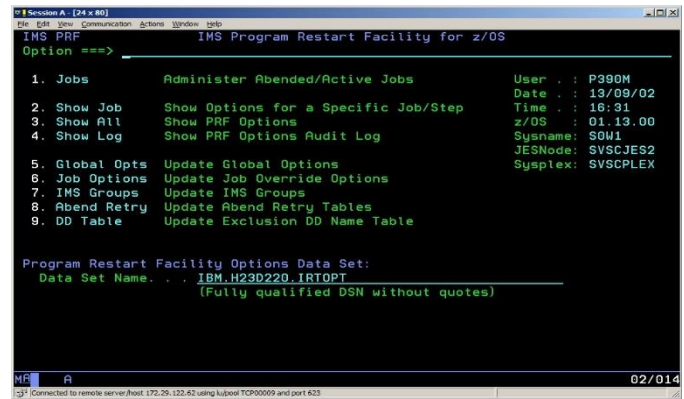
The *IMS Program Restart Facility* allows parameters to be defined up front for checkpoint, restart, and batch backout as shown in Figure 3.
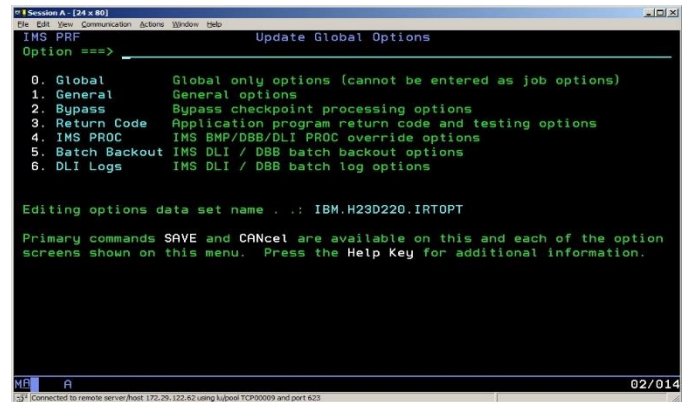

Figure 3: IMS Program Restart Facility Options Menu

There are many options that can be set and together they allow the *IMS Program Restart Facility* to automatically drive the backout and restart processes as part of the application job step. With these options, there is literally no need to run a separate IMS Batch Backout job or modify the restart job's JCL following an abnormal termination. Figure 4 shows a sampling of the general options while Figure 5 shows the specific options for Batch Backout.
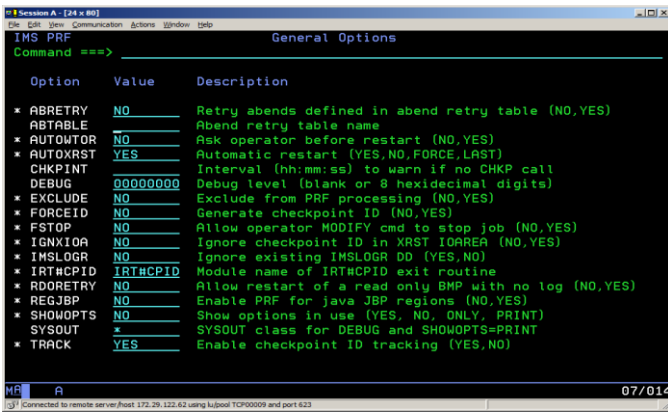
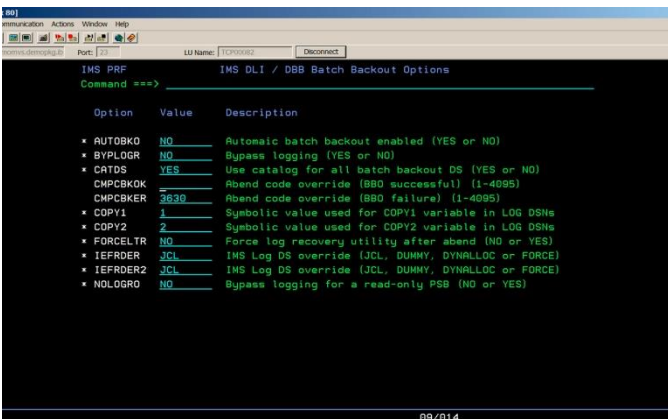Figure 4: IMS Program Restart Facility General Options

Figure 5: IMS Program Restart Facility Batch Backout Options

Creating IMS Checkpoints in Batch Programs

The *IMS Program Restart Facility* is invoked every time an IMS Batch Message Processing (BMP) program or IMS Batch DLI/DBB program issues a Checkpoint (CHKP) call. Like IMS, the *IMS Program Restart Facility* captures the Checkpoint ID, log data set information, working storage areas, key feedback areas for non-GSAM databases, and positioning information for GSAM databases. This information is stored in special data sets that are available to all standalone IMS Systems or all IMS Systems in an IMS Sysplex environment.

The *IMS Program Restart Facility* can optionally keep track of the time between checkpoints and if the time is too long, it can alert the user with a warning message. It can also optionally check if the batch application is creating too many checkpoints during a user-set period of time and bypass checkpoint processing to save excessive CPU and resource usage. These two checkpointing options are widely used by the IMS customers.

Driving IMS Batch Backout when needed

When an IMS Batch Message Processing (BMP) program or IMS Batch DLI/DBB program fails, it is often necessary to backout changes to the last valid Checkpoint ID. While the IMS Control Region automates the backout process for IMS BMPs, backing out IMS Batch DLI/DBB jobs is often an error-prone manual process.

For IMS Batch DLI/DBB programs, the *IMS Program Restart Facility* recognizes the need for backout during job abnormal termination and it takes control of the termination process. If the IMS Program Restart Facility determines that a backout is required, it ensures that the log data set is closed, and it drives the backout process before it allows the termination process to complete. This backs out partial database changes and frees up retained locks allowing other applications to access shared data quickly.

Restarting IMS Batch Programs

The *IMS Program Restart Facility* uses the special checkpoint data sets that were created when the original IMS BMP or IMS Batch DLI/DBB program was executed to determine the need for restarting the program. If the *IMS Program Restart Facility* determines that a restart is required, it automatically allocates the correct log data sets to the job and modifies the job execution parameters to allow the restart to be performed automatically.

In addition, the *IMS Program Restart Facility* allows the user to define certain IMS abnormal termination codes that when encountered allow IMS BMPs, and IMS Batch Read-Only DLI/DBB programs, to automatically restart without having to resubmit the jobs. There are also options to delay the restart of the program to allow administrators more time to affect the IMS system environment and there are options to retry the batch program multiple times.

Critical for IMS Database Availability

The *IMS Program Restart Facility* is a critical product for improving IMS database availability after batch program failures. For IMS Batch DLI/DBB programs requiring backout, the *IMS Program Restart Facility* closes the log data set and performs backout automatically as part of the abnormal termination process. This is important as it releases database locks and allows online processing to continue

for the affected databases. For both IMS BMPs and IMS Batch DLI/DBB programs, the *IMS Program Restart Facility* allows failed programs to restart much faster because it removes the error-prone JCL modification steps.

For more information

To learn more about the IBM IMS Tools product line, please contact your IBM representative or IBM Business Partner, or visit: ibm.com/software/data/db2imstools/products/ims-tools.html