

COPYGRID: Tracking Multi-Developer (and -Machine) Programs from Development to Production

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ABSTRACT

The Standard Economic Processing System (StEPS) is a batch and SAS/AF[®] system developed by the U.S. Census Bureau for processing data from its economic surveys. Several developers requiring edit access to its files of program code maintain it. Much of its program code is contained in a multitude of catalogs. Additionally, development and testing are done on one set of machines, while production programs are kept on another set of machines. This paper describes a system, COPYGRID, developed for tracking program code copying between machines for StEPS.

INTRODUCTION

StEPS is a generalized system developed by the economic directorate of the U.S. Census Bureau, to process data from its economic surveys. At present, it processes data from approximately 150 economic surveys. Several developers maintain its code, contained mainly in SAS[®] catalogs. COPYGRID is a tracking system developed by the StEPS development team, to monitor the process of copying program code between the development and test machines, and production machines. The COPYGRID module has developed into a complex system as StEPS itself, and its code tracking requirements, have evolved. This paper provides an overview of the system, potentially useful for organizations requiring such tracking of program code copies.

The StEPS development team consists of several developers who maintain the program code, as well as a testing section, which tests code prior to its copy from the development to the production machines. As the developer copies specific catalog entries between machines, he/she enters related information into COPYGRID. The testing section staff uses COPYGRID to keep track of the testing status and copy status. These status codes are used to determine where specific program code is in regard to the copy progression to the machines.

Recent enhancements to COPYGRID allow the user to query on a number of conditions related to the code being tracked and view summary charts by a number of variables related to StEPS itself, as well as the COPYGRID tracking module. Querying variables include the programmer, person testing the code, release status of the code, as well as a number of other conditions. Summary charts can be viewed by StEPS module, change request codes and release status, among other categories. Both the query and chart components of COPYGRID are described in more detail below.

COPYGRID MODULE

Query Copy ID Tab

Let's assume a developer has just created two new catalog entries, ABC.ABCD.FRAME, and ABC.ABCD.SCL, for inclusion in StEPS. The developer enters the corresponding information into COPYGRID. The testing section updates status codes for monitoring the test progress. When the testing is completed, this set of entries, along with the multitude of other programs

simultaneously being tested and copied between machines, are batched together into a release group of copy IDs. The COPYGRID module is also used as a tracking tool during the migration of the release.

For our example, the developer enters the copygrid module by clicking on the “Copygrid” image icon of the “Programmer Utilities” screen in StEPS. A pop-up menu, giving a choice of copy ID’s and Release ID’s, appears, as shown in Figure 1 below.



Figure 1

The developer creates a new copy ID for the given task by clicking on “1” in the above menu, which brings up the “Copy Grid” screen. This screen consists of two ‘tabs’, as shown in Figure 2 below. This section deals with the ‘Query Copy ID’ tab. The ‘Chart’ tab is discussed in the next section. By clicking on the “Default for Add” push button control towards the top left of the screen, the default copy ID for that day (and sequential copy ID) populates the text entry control for the copy ID number, as shown in Figure 2. Towards the bottom of this screen is a table viewer control, containing the COPYGRID data set mentioned above.

We need to continue creation of a new copy ID, by 1) Clicking the “Default of Add” pushbutton towards the upper left corner of the screen, as mentioned above; 2) Using the pull down menu, select “Edit”; 3) Select “Add copy grid”. The “Object Grid” screen is brought up, where the developer enters details about the individual catalog entries modified in the given programming task. This is shown in Figure 3 below, for the fictitious FRAME and SCL (ABC.ABCD) being created in this task.

Figure 2

Figure 3a

Figure 3a above shows the information we enter, to be included in the OBJ_GRID data set, such as the object name, ABC.ABCD, a catalog, as shown in Object Type, and entry types involved, SCL and FRAME. There are also a few other items, along with comments, which will be included in the observation for the OBJ_GRID data set.

Object Grid

Design Date: 20050114 | Module: OTHER | Reason: NEW | CCB#: 458 | SAS Version: 9.2

Development Comments: New Frame, sc1

Add/Update/Delete object:

Object Name: ABC.ABCD | Object Type: PROGRAM | Program: LAWRENCE ALTMAYER | Tax Effort Metric: N/A

Special Comment: | Special Processing: | Object Update: |

Buttons: Add/Update (F2), Reset, Delete (F4)

Completed testing for all objects: | All objects are updated: | Apply

Object Name	Object Type	SCL	Frame	Source	Program	Help	Other	Special Comment	Effort Metric	new
ABC.ABCD	CATALOG	Y	Y							Y

Total Record: | Total New Object: | Last Update: 30MAY05 09:07:24 | By: NGUYEN300

Figure 3b

Upon clicking on the “Update” push button on the upper right side of the screen, an observation is saved to the OBJ_GRID data set, as shown in Figure 3b. The table viewer on the bottom half of the screen shows the observation we are adding to the OBJ_GRID data set. It contains the name of the SAS object, ABC.ABCD we are creating. It also shows the object type, a catalog, as well as catalog entry types involved, a FRAME and SCL entry in this case. After we return to the “Copy Grid” screen, we exit that screen, and save the new observation there to the COPYGRID data set.

A useful feature of the Query Copy ID Tab of the Copy Grid screen is, as the name indicates, the ability to query the COPYGRID data set on many of its variables. For example, if a StEPS tester wants a listing of all his/her assigned Copy IDs, the TESTER variable in COPYGRID can be queried on. If a developer would like such a listing, the PRGCODER variable can be queried on. Figure 4 below shows the result of a query on the Copy IDs for the developer ID for the author of this paper.

Copy Grid

Enter Copy ID: 20050131-01 | Default for Add

Copy Grid WHERE: | CHART

Additional Conditions:

Module: OTHER | Programmer: LAWRENCE ALTMAYER | Associated Group Project: |

Reason: NEW | SEPS Tester: ALTMAYER | Survey Parameter: |

Release Status: | CR#: | Object: |

Type of Change: | Release ID: |

Status of copied: | Object Type: |

Buttons: Query, Reset

Copy Identifier	CHK	Revised	Original	Module Name	SEPS Tester	Type	Reason for Copy	Programmer	Comment
1 20050131-01 458				OTHER	ALTMAYER	M	NEW	ALTMAYER	new frame, sc1
2 20040304-01				OTHER	ALTMAYER	M	ENHANCE	ALTMAYER	Added capability to provide detail printout
3 20040213-02	RA	A		REVIEW/COR	ALTMAYER	M	FIX	ALTMAYER	Fixed code for survey spec variable SCOPE, so when v
4 20040122-02	BP	P		OTHER	ALTMAYER	M	OTHER	ALTMAYER	check negative to allow users to enter several subsequent
5 20031217-03	RA	A		OTHER	ALTMAYER	M	FIX	ALTMAYER	Fixed printing capability for derived and adjusted item de
6 20031209-01	BP	P		OTHER	ALTMAYER	M	FIX	ALTMAYER	Fix to allow printing of control dictionary variables
7 20031209-02	BP	P		SNAP	ALTMAYER	M	FIX	ALTMAYER	Fixed sc1 code, to allow for printing of sample imputation c
8 20031113-01	BP	P		OTHER	ALTMAYER	M	FIX	ALTMAYER	Fixed program survey stat frame, sc1 to take out 7:00 p
9 20030829-01	BP	P		REVIEW/COR	ALTMAYER	M	ENHANCE	ALTMAYER	Remove right click pop-up menu capability from data tabl

Total: 9 | Last Update: 23MAY05 10:28:27

Figure 4

Chart Tab

Another recent enhancement to the COPY GRID screen is the Chart Tab. This tab allows the user to view graphic representations of a variety of COPYGRID variable breakdowns. Breakdowns include StEPS module, and reason for copy, among a few other types of breakdowns. Figure 5 below shows the chart for reason for copy, as indicated by the REASON variable on the COPYGRID data set.

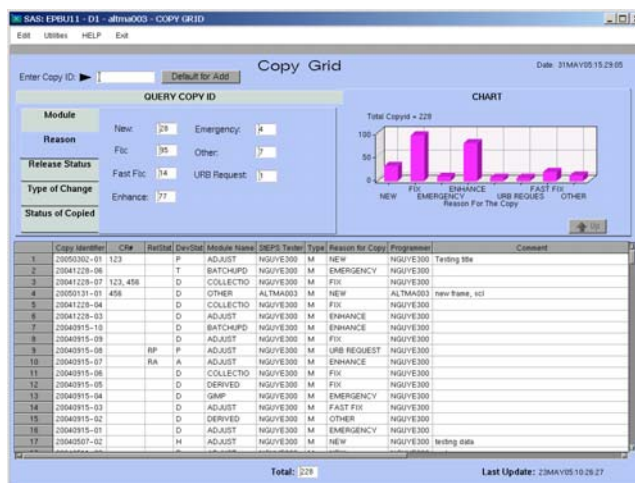


Figure 5

RELEASES

The COPYGRID module is based on two record keeping concepts: the copy ID and the release ID. In general, the developer uses one copy ID to summarize all catalog entries updated in a given programming task. This is usually limited to one catalog, though more than one might be involved on occasion. All copy ID records are contained in a COPYGRID data set, which contains summary information about the task itself. An object grid (OBJ_GRID) data set, with at least one (and potentially several) SAS objects, relates each copy ID to the catalog entries involved in the task.

Release IDs are used to "batch" copy IDs for copying between machines, and are contained in a REL_GRID data set, which contains summary information about the copy event. In a methodology similar to that for OBJ_GRID and COPYGRID, each release ID has a record in a release exception (REL_EXPT) data set for the one or more copy IDs in the release shown in the REL_GRID data set. Several developers, including many people outside the development team itself, do StEPS maintenance. Release IDs help to monitor the copying of catalog entries between the two test, and several production machines used in StEPS. Typically, each copy ID has two releases to reach the production environments. However, there is no limit on how many releases a copy ID may have; thus, a given copy ID can be found in several release IDs. StEPS procedure requires the closure of the copy ID when released to production. The above four data sets, COPYGRID, OBJ_GRID, REL_GRID and REL_EXPT provide electronic documentation of programming tasks completed.

In our example, our copy ID for our new FRAME and SCL is 20050131-01. In our case, the release ID has only this copy ID. The release ID is generated in the following format:

MMMCCCC-##

where

MMM is the three-character month (e.g., JAN, FEB...),

CCCC is the four digit year (e.g., 2005), and

is a number generated sequentially for the release IDs during the current month.

Our release ID is JAN2005-01. One component of a release ID is the release status. Most releases go through a standard testing process, although some are needed immediately in production. This latter type of release is known as an “emergency” release. These types of releases are indicated by codes in the RELSTAT variable on the COPYGRID data set described above.

The screen to create release IDs is accessed by clicking on the second choice in the pop-up menu in Figure 1 above. In Figure 6 below, we show the information which must be entered to create the JAN2005-01 release ID. First, we must have privilege to update the REL_GRID data set with the current release ID. In StEPS, there is only a group of people in our testing section having privilege to do this. Second, the information which must be entered in the screen to create the release ID is:

- 1) Release ID, shown in the upper left corner;
- 2) Schedule Release Date, shown just below the Release ID;
- 3) Selected IDs (copy IDs), shown in the right-hand list box in the Query Release box on the right-hand side of the screen. (At least one copy ID is required.)

Release Identifier	Scheduled Release Date	Actual Release Date	Release Stage	Release Comment
1. JAN2005-01	20050131		S	
2. SEP2004-25	20040922		S	
3. SEP2004-28	20040922		S	
4. SEP2004-27	20040922		S	
5. SEP2004-29	20040922	20041029	S	
6. SEP2004-24	20040922	20041002	S	
7. SEP2004-23	20040922		S	
8. SEP2004-22	20040922		S	
9. SEP2004-21	20040922		S	
10. SEP2004-20	20040922		S	
11. SEP2004-19	20040922		S	
12. SEP2004-18	20040922		S	
13. SEP2004-17	20040922		S	

Figure 6

This screen is used to create a detail listing of the code objects related to a release ID. The pop-up menus at the top left side of the screen in Figure 6 illustrate the selection of print utilities. Note that several listing options are available. All detail listings have various filters of the object data. However, the summary only details one line for each copy ID and provides information for all the related objects.

One person in our area staff copies the catalogs between the machines, using the Detail Listing and a SAS/CONNECT® program. This listing is shown in Figure 7 below. It is created using a merge of the OBJ_GRID and REL_EXPT data sets mentioned above. A sample SAS/CONNECT program to copy catalog entries between machines is shown in Figure 8.

As can be seen from the above screens, much additional information is provided, including programmer involved, release status (e.g., regular, accelerated), and scheduled and actual release date. All of the information provided is beyond the scope of this paper, but details on it are available upon request.

CONCLUSION

COPYGRID, a tracking system developed by the StEPS development team to monitor copying of program code between the development and production machines, has evolved as details of monitoring needed have developed. It is designed as a SAS/AF based system. It uses release IDs and copy IDs as developed for StEPS, to enable testers to query data set observation summaries of program code changes during the copy process. A recently added enhancement also provides graphic representations of several breakdowns of variable related to StEPS and the copy process. COPYGRID also provides listings to facilitate the actual program copies between machines, which use SAS/CONNECT.

REFERENCE

Tasky, D., et al. (1999). "Get In Step With StEPS: Standard Economic Processing System," *Proceedings of the Twelfth Annual NorthEast SAS Users Group Conference*, 167-175.

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Release #: JAN2005-01 Release Report Date: 31JAN05

Copyid	Object Name	Object Type	SCL	Frame	Source	PMenu	Help	Other	DUP	Excpt	Release Status
20050131-01	ABC.ABCD	CATALOG	Y	Y							

Figure 7

```

*** This program assumes that you already set the "programs" libname
***;
*** to the right version of StEPS on the local machine ***;

options comamid=tcp;
filename rlink '/steps/sas-connect/epbu10-v4.scr';

*** Machines ***;
signon epbu10;

rsubmit;

libname programs;
libname programs "&programs" server=&stpserve;

proc upload incat=programs.abc outcat=programs.abc status=no;
select abcd /entrytype=frame;
select abcd /entrytype=scl;
run;

endrsubmit;

signoff;

```

Figure 8