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# N2O

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## Administrative Assistant Guide

This document is applicable to N2O and N2O/3GL. N2O/3GL is a separately priced, optional feature.

Comments pertaining to this document, N2O and N2O/3GL are encouraged. Please send any comments in writing to:

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### **Target Audience**

The person(s) responsible for controlling the site's change management policies. This includes enforcement of these policies. The audience is assumed to have at least one year experience with NATURAL administration and is knowledgeable of site standards for JCL and naming conventions. The audience must have knowledge of the site's NATURAL and ADABAS environment(s) (i.e. FUSER, FDIC, FNAT, and N2O files).

It may be necessary to refer to the N2O Administrator Manual for a more detailed description of the terms and processes described in this document.

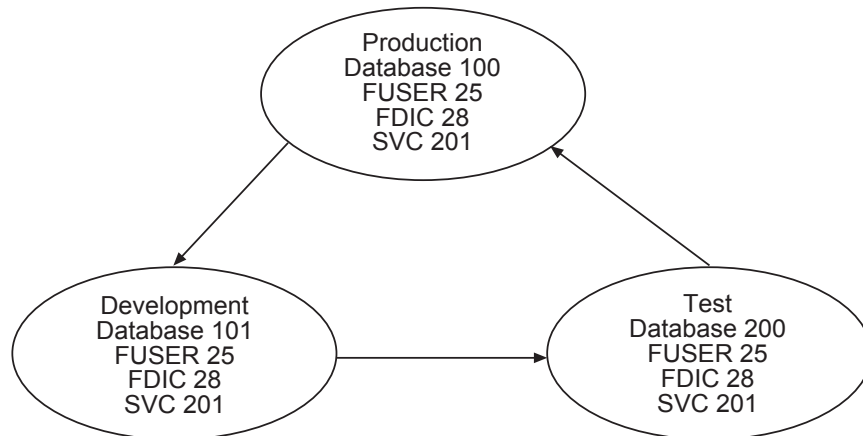
### **Getting Started**

N2O can be implemented using a site's current Application Life Cycle (ALC). Before defining any of the options in the Environment Sub-system, the N2O Administrator(s) should have a good idea of the ALC they wish to implement. It may be helpful to identify the existing ALC as a starting point. The steps below are recommended for determining the existing ALC and defining the ALC in N2O's Environment Subsystem.

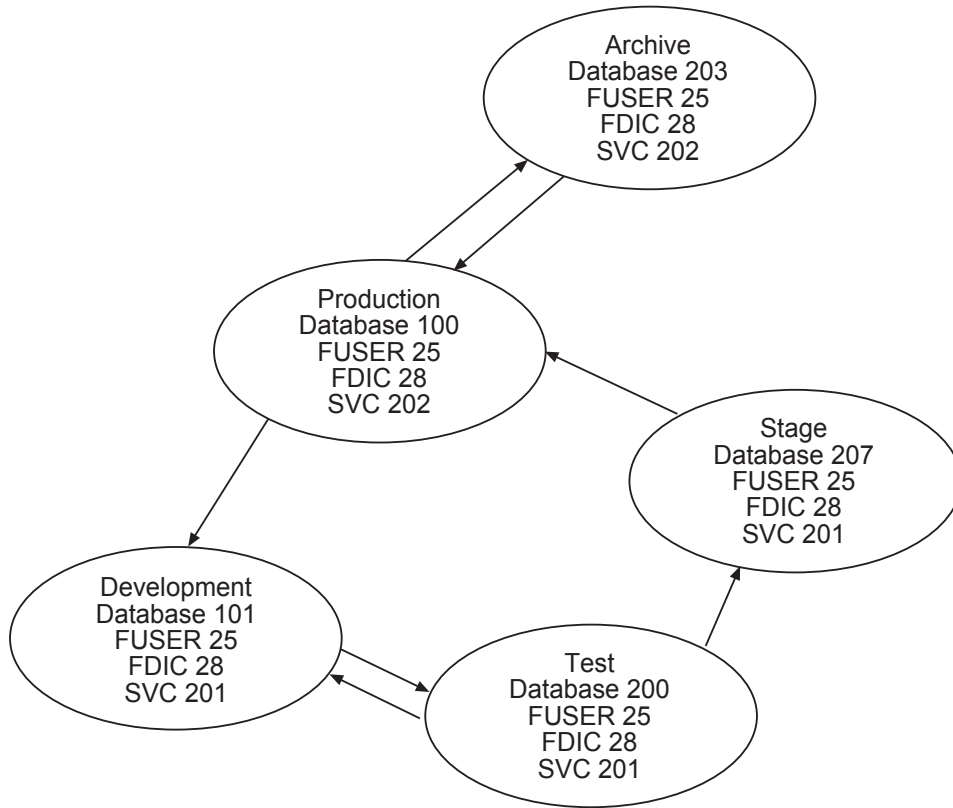
### **Initial Meeting With Application Development Managers**

- A. Set-up a meeting with the Application Development Managers. The purpose of this meeting is to determine the following:
- Identify the current ALC. Creating a diagram may be helpful. Several sample diagrams are shown below.

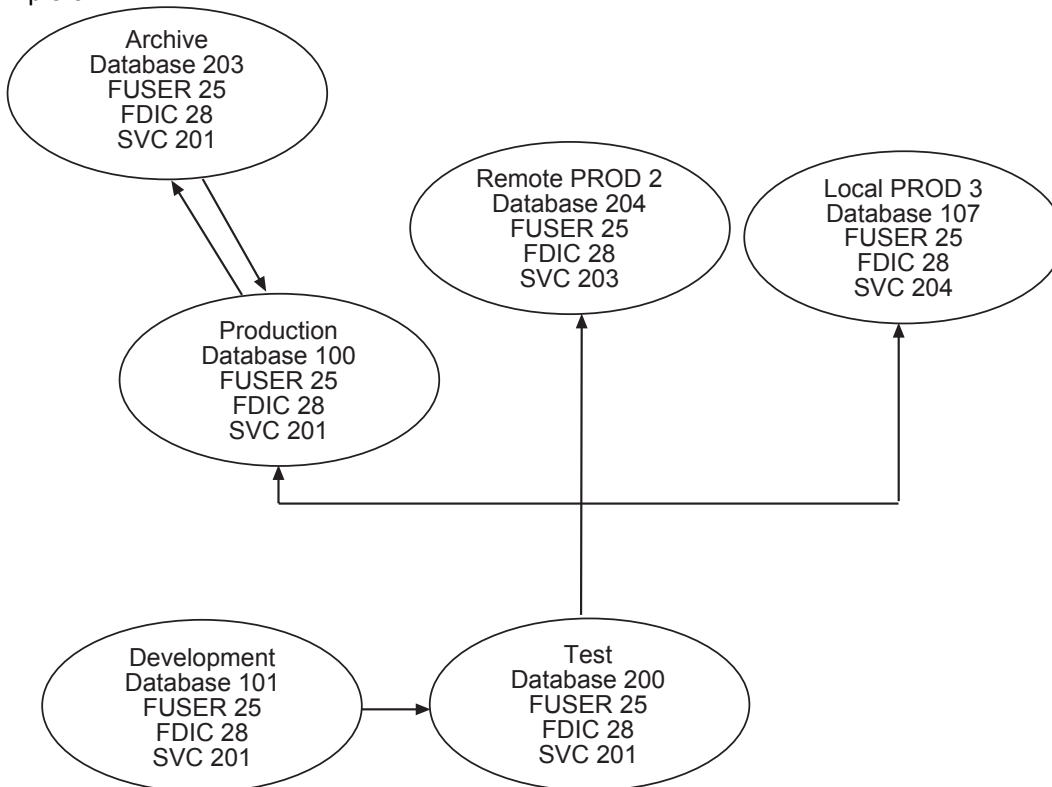
Example 1.



Example 2.



Example 3.



- Determine what modifications (if any) should be applied to the ALC before defining it to N2O. There may be some options within N2O that would be beneficial to the programmers/developers. Answering the following questions for each migration path will assist in the setup of N2O.
  1. Are developers allowed to edit any Object or just the ones they are working on?
  2. Will there be more than one developer working on the same Object? If so, how many?
  3. Does the migration require authorization? If so, how many levels of authorization? Who will authorize? Should the developer be prevented from editing while the migration is waiting for authorization, or after the migration has been authorized?
  4. Which environments require an Archive Definition? Should Archive files be shared or separate for each Environment? How many versions of an Object should be kept on the Archive file? How many days should an Object be kept on the archive file?
  5. Which environment contains the protected version of the source code?
  6. New Objects are developed on what environment?
  7. Is the migration permitted to run online, batch, or both?
  8. What code is migrated: source, object, or both?
  9. Should N2O verify that the compiled code timestamp is greater than the source code timestamp? This will verify that the developer remembered to STOW or CAT the Object before allowing the migration to occur.
  10. Is PREDICT Cross Reference Data used? If so, will it be required or optional?
  11. Is the Object required to be documented in PREDICT?
  12. Should N2O compile Objects at the target (Autocompile)? If so, should they be CATaloged or STOWed?
  13. Should the migration create a copy of the Object on the target or should the Object be moved to the target (i.e. deleted from the source)?
  14. If Autocompile is performed and an error occurs, should N2O back out the migration? This feature requires the Target Environment to have an Archive defined to it.
  15. If the migration is a Move, should the delete of the Object from the source take place immediately or be delayed?
  16. If Autocompile is specified, should other affected Objects (based on PREDICT XREF data) on the target be re-compiled?
  17. When a migration is requested, should the developer be required to specify a tracking number? This can relate to a task defined in N2O project tracking or some other tracking number.

## **N2O Environment Subsystem Setup**

- B. Keeping the information from step A convenient, logon to the NATURAL Environment where N2O is installed and enter 'N2O'. This will take you to the N2O banner screen. Pressing Enter one more time will take you to N2O's Main Menu. All N2O setup is in the Environment Subsystem. Enter an 'E' on the main menu. Section III of the N2O Administrator's Manual will lead you through the proper order of the functions. The functions are also listed in order below, with the related questions from Step A detailed below the applicable function.

### **Install Parm**

*2. Will there be more than one developer working on the same Object? If so, how many?*

The answer to these questions determines the number of concurrent checkouts allowed for parallel development. This value should be entered in the CHECKOUT/CHECKIN field on the Install Parm screen. This value is applied to the entire installation.

*3. Does the migration require authorization? If so, how many levels of authorization? Who will authorize? Should the developer be prevented from editing while the migration is waiting for approval or after the migration has been authorized?*

If authorization is required and the developer should be prohibited from editing the Objects, the LOCKING field on the Install Parm screen must be modified. A value of "REQ" will prevent Objects contained in an Event from being modified once the event has been requested (but not yet authorized). A value of "AUTH" will prevent editing after the Event has been authorized.

### **Node Definition**

Define a node for every ADABAS SVC listed on the ALC diagram.

### **Archive Definition**

*4. Which environments require an Archive Definition? Should Archive files be shared or separate for each Environment? How many versions of an Object should be kept on the Archive file? How many days should an Object be kept on the archive file?*

Define the Archive Definitions as specified on the ALC diagram. Set the VERSIONS and/or the DAYS values. These values are evaluated together. If you specify 3 versions for 30 days, no version will be deleted until it is 30 days old, then the most recent 3 will be kept.

Note – nothing will be deleted from the Archive file until the Archive Purge is run. It is strongly suggested this be setup as a regularly scheduled job.

## Environment Definition

Define an Environment for each circle/environment in your ALC diagram.

*3. Does the migration require authorization? If so, how many levels of authorization? Who will authorize? Should the developer be prevented from editing while the migration is waiting for authorization, or after the migration has been authorized?*

Authorization must be set up on the Environment Definition and/or the Migration Profile. On the Environment Definition screen, the field AUTH REQUIRED can be set to "YES". When defining the Migration Profile, the field DELAY should be set to "AUTH". The field LEVELS OF AUTH is set to number of authorizations required.

It is possible to set up the Environment Definition with AUTH REQUIRED = "YES", and the Migration Profile with DELAY = "NONE". This will cause any Event that uses that Migration Profile to be marked as Override and executed without authorization. This can be used in conjunction with User-exit-1 to allow an emergency migration to occur. There are reports available to monitor any Events with an Override message.

*4. Which environments require an Archive Definition? Should Archive files be shared or separate for each Environment? How many versions of an Object should be kept on the Archive file? How many days should an Object be kept on the archive file?*

When defining the Environment Definitions, enter the Archive Definition name in the Archive field.

Note – nothing will be deleted from the Archive file until the Archive Purge is run. It is strongly suggested this be setup as a regularly scheduled job.

*5. Which environment contains the protected version of the source code?*

The Environment Definition containing the master version of the code should have a value of "YES" in the BASE ENV field. This is the Environment that the majority of the ALC will begin and end with. An Object is migrated out of this environment for development (CHECKOUT), and migrated into this environment when completed (CHECKIN).

## Migration Profile

The arrows on the ALC diagram represent Migration Profiles.

*3. Does the migration require authorization? If so, how many levels of authorization? Who will authorize? Should the developer be prevented from editing while the migration is waiting for authorization, or after the migration has been authorized?*

Authorization must be set up on the Environment Definition and/or the Migration Profile. On the Environment Definition screen, the field AUTH REQUIRED can be set to "YES". When defining the Migration Profile, the field DELAY should be set to "AUTH". The field LEVELS OF AUTH is set to number of authorizations required.

It is possible to set up the Environment Definition with AUTH REQUIRED = "YES", and the Migration Profile with DELAY = "NONE". This will cause any Event that uses that Migration Profile to be marked as Override and executed without authorization. This can be used in conjunction with User-exit-1 to allow an emergency migration to occur. There are reports available to monitor any Events with an Override message.

Authorization requires that the DELAY field on the Migration Profile be set to "AUTH". The LEVELS OF AUTH must also be specified. A pop-up screen will appear after pressing Enter. This screen is where you define who will authorize and in what order the authorizations will occur. An '\*' indicates that any user, that has the Migration Profile specified in an Approval Profile, may authorize the migration as long as it is not their own Event. A specific user-id limits authorization to that id. A group id (defined on the User Definition screen) may be specified to note that anyone assigned to that group may authorize the migration. To permit someone to authorize their own migrations, the APPROVAL STATUS field on the user definition screen must be set to "YES".

*7. Is the migration permitted to run online, batch, or both?*

This option is defined on the Migration Profile using the field MODE. It can be set to "ONLINE", "BATCH", or "BOTH". Specifying "BOTH" will cause N2O to present a pop-up selection window when an Event is executed to allow the user to choose online or batch.

*8. What code is migrated: source, object, or both?*

This option is defined on the Migration Profile using the field TYPE. It can be set to "SOURCE", "OBJECT", or "BOTH".

*9. Should N2O verify that the compiled code timestamp is greater than the source code timestamp? This will verify that the developer remembered to STOW or CAT the Object before allowing the migration to occur.*

This option is defined on the Migration Profile using the field VERIFY OBJECT. It can be set to "YES" or "NO".

*10. Is PREDICT Cross Reference Data used? If so, will it be required or optional?*

This option is defined on the Migration Profile using the field MIGRATE XREF. It can be set to "Y" (XREF must exist and will be migrated), "S" (IF XREF exists it will be migrated), or "N" (don't verify or migrate XREF Data).

*11. Is the Object required to be documented in PREDICT?*

This option is defined on the Migration Profile using the field PROGRAM DOC. It can be set to "YES" (PREDICT program documentation must exist) or "NO" (PREDICT program documentation will not be verified).

*12. Should N2O compile Objects at the target (Autocompile)? If so, should they be CATaloged or STOWed?*

This option is defined on the Migration Profile using the field AUTOCOMPILE. It can be set to "CAT", "STOW", or "NO".

In order to use Autocompile, it must be installed. This is described in Section II.5 Autocompile requirements.

For on-line Autocompile on the same FUSER to occur after a migration takes place, you must modify and activate the sample code supplied in User-exit-4 (N2OUE04N).

When migrating across FUSERS, the Autocompile will only occur automatically using a Batch Migration. An on-line migration requires the user to logon to the Target Environment and run N2OCATI. This will present the user with a selection of libraries pending Autocompile. The user may select the Autocompile to be executed.

*13. Should the migration create a copy of the Object on the target or should the Object be moved to the target (i.e. deleted from the source)?*

This option is defined on the Migration Profile using the field MIGRATION METHOD. It can be set to "COPY", "MOVE", or "BOTH". Specifying "BOTH" will cause N2O to present a pop-up selection window when an Event is executed to allow the user to choose "MOVE" or "COPY".

*14. If autocompile is performed and an error occurs, should N2O back out the migration? This feature requires the Target Environment to have an Archive defined to it.*

This option is defined on the Migration Profile using the field AUTO REC. It can be set to "Y" or "N".

*15. If the migration is a Move, should the delete of the Object from the source take place immediately or be delayed?*

If the delete of the *Object* should take place immediately, leave the DEFERRED TIME field on the Migration Profile set to 0. For batch events make sure to include the N2ODELT step.

If the delete it is to be delayed (a Deferred Move Event), set the DEFERRED TIME field to the number of hours it is to be delayed. Please note that no delete will occur until a job is submitted to Process Deferred Move Events or the online process is executed. Online, this option is listed under the Migration Utilities. In batch, a regularly scheduled job should be setup to process all eligible Deferred Move Events.

*16. If Autocompile is specified, should other affected Objects (based on PREDICT XREF data) on the target be re-compiled?*

This option is defined on the Migration Profile using the field XREF TARGET.

If the *Object* type being migrated is specified in the value of this field, PREDICT Cross-Reference information will be used to determine all NATURAL *Objects* affected by the migrated *Object(s)*. These *Objects* and the *Objects* being migrated will be Autocompiled in the Target Environment.

## **Master Event**

A Master Event is a template event that developers will use to create a migration request. Some sites use a different Master Event for each Migration Profile, other sites group Migration Profiles that can use a single Master Event. To limit a Master Event for certain Migration Profiles or other site-specific requirements, add code to N2O's User-exit-1 (N2OUE01N).

*6. New Objects are developed on which environment?*

The Environments where new Objects are created in may need to have an Extract Event defined to them. An Extract Event allows developers to copy a production module without causing a checkout. A developer would use the Extract Event to copy a base Object into development, then rename it to the new name, and manually checkout the new Object. The Extract and Rename can be completed at the same time. A new option of the Extract Event is to rename the module at the target. To define an Extract Event, set the EXTRACT EVENT field on the Master Event to "YES".

*17. When a migration is requested, should the developer be required to specify a tracking number? This can relate to a task defined to N2O project tracking or some other tracking number.*

If you are going to use N2O Project Tracking, you can require that all Events be related to a Project Task Group and task number. Set the PROJECT TRACKING field on the Master Event to "Y". When utilizing this feature, you can modify and activate the sample code in N2O user-exit-15 (N2OUE15N) to automatically select Objects that have been linked to the task in Project Tracking.

If you have an external Project Management package, the CHANGE CNTL field can be used to associate An Event with the number assigned by that package. Set the CHANGE CNTL field on the Master Event to "N".

## Security

### Approval Profile

*3. Does the migration require authorization? If so, how many levels of authorization? Who will authorize? Should the developer be prevented from editing while the migration is waiting for authorization, or after the migration has been authorized?*

Approval Profiles define the Migration Profiles that a user may use to migrate objects. A user is able to request an Event for a Migration Profile that requires authorization. The Event will not run until it is authorized by someone who has the specified Migration Profile in an Approval Profile assigned to their user-id. Many sites define a Developer Approval Profile that contains the Development Migration Profiles, and an Administrative Approval Profile that contains the Migration Profiles back to Production.

### Function Profile

The Function Profile defines what N2O menu functions a user has access to. Typically, developers are not permitted any update (Add, Change, Delete) functions in the Environment Subsystem. They are also not permitted to access the Maintenance Toolbox, Utility Toolbox, and Administrative utility functions.

### PREDICT Profile

#### User Definition

Users are defined with up to 40 Approval Profiles, Function Profiles, and Predict Profiles. This allows one user to be a developer for one application and an authorizer for another application.

## C. Autocompile Installation.

*12. Should N2O compile Objects at the target (Autocompile)? If so, should they be CATaloged or STOWed?*

In order to use Autocompile, it must be installed. This is described in Section II.5 Autocompile requirements.

For on-line Autocompile on the same FUSER to occur after a migration takes place, you must modify and activate the sample code supplied in User-exit-4 (N2OUE04N).

When migrating across FUSERS, the Autocompile will only occur automatically using a Batch Migration. An on-line migration requires the user to logon to the Target Environment and run N2OCATI. This will present the user with a selection of libraries pending Autocompile. The user may select the Autocompile to be executed.

## D. N2OEDIT Installation.

*1. Are developers allowed to edit any Object or just the ones they are working on?*

If they can only edit the Objects they are working on, N2OEDIT will need to be installed. This will prevent anyone from editing an Object unless they have it checked-out. N2OEDIT installation is described in section II.6 of the N2O Administrator's manual. If this feature is to be enforced for specific libraries only, modify N2OEDITU before following the installation steps for N2OEDIT.

**Installing N2OEDIT immediately places all Objects under N2O's locking control.** Make sure to place code in N2OEDITU that enforces which Libraries or Users N2OEDIT checking should be performed on BEFORE installing N2OEDIT.

- E. **N2OUSERJE Installation.**  
N2O user-exit N2OUSERJE must be installed to properly submit any batch job using N2O's on-line screens. This process is described in Section V.3.3 of the N2O Administrator's Manual.
- F. When N2O is installed, there is a sample NATURAL library named N2OBATCH installed. This library contains template JCL for all Batch activities within N2O. It is recommended that you copy the appropriate version of the JCL (MVS, BS, VSE, or VM) into another library and customize it for your site standards. Refer to Appendix C for a list of variables that can be placed in the JCL. N2O will substitute the correct values before submitting the job to the internal reader. Make sure that the library name on the Install Parm's screen is the same as the library you copied all of the JCL into. This library should also be listed on the Migration Profiles under the JCL Library name (if you are going to perform Batch Migrations).
- G. **Catalog Capture.**  
After modifying the sample Catalog Capture JCL, run the Catalog Capture on every BASE, Remote, and 3GL Environment. This job will read the NATURAL FUSER or 3GL Objects and create Master Records on the N2O-MIGRATION file for each Object.
- H. **N2O is now ready to use!**  
You can begin using it now or continue with setting up the Archive and Event Purge jobs.
- I. **Archive Purge.**  
The Archive Purge job should be set up as a regularly scheduled job. This will ensure that the N2O-ARCHIVE file does not run out of space. The purge process applies the values supplied on the Archive Definition and purges any eligible Objects.
- J. **Event Purge.**  
The Event Purge should be set up as a regularly scheduled job, to be executed after the Archive Purge has completed. This will ensure that the N2O-MIGRATION file does not run out of space. The purge process applies the values supplied on the Master Event and purges any eligible Events. An Event that still has Objects on the Archive file will not be purged.
- K. **3GL Migration JCL.**  
3GL migrations must be batch migrations. This is documented in Section V.5.2 3GL Migration JCL. The following provides a more detailed explanation of the 3GL Batch Migration process.
- N2O accomplishes a 3GL migration by submitting 2 separate batch jobs.
- The first job uses the JCL that is contained in a member called N2O3GL. A sample member is supplied in the N2OBATCH library. This member in the JCL library must be called N2O3GL. This job contains 2 steps:
- The first step runs N2OSELT. This program reads the JCL from the member specified in the Migration Profile (3GL JCL LIB and 3GL JCL PGM values). It writes this JCL to a work file, replacing any generic variables with the N2O replacement values.
- The second step sends the JCL (work file 2 from first step) to the internal reader. This submits the second batch job that is required to perform a 3GL migration.
- The second job executes the JCL that is named in the Migration Profile (3GL JCL PGM). The samples are in N2OBATCH named PDSMIGR (PDS migrations), LIBRMIGR (LIBRARIAN Migrations), PANVMIGR (PANVALET migrations), ENDVMIGR (ENDEVOR migrations).

If the JCL template contains &INCLUDE ARCHIVE statement and archiving is specified for the Target Environment, it will be replaced by the member named on the migration profile in the 3GL JCL ARCH field. If the JCL template contains &INCLUDE COMPILE, N2O will check User-exit-11 for the name of the compile JCL template. The &INCLUDE COMPILE will be replaced by the member name specified in the user-exit. If the JCL contains any &U variables (user replacement variables), N2O will replace them with the values the users enter in exit 11.

All of the various 3GL products have sample JCL in the N2OBATCH library and are discussed in the manual. It is mandatory that the Acknowledgement step of each migration takes place whether the migration succeeds or fails. This step updates the N2O files with the information about the migration. It is the only way to keep N2O updated on the status of 3GL members.

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