

Natural in Batch under VSE/ESA

This document contains special considerations that refer to Natural in batch under the operating systems VSE/ESA.

The following topics are covered:

- NATVSE - Natural VSE/ESA Batch Interface
- NTVSE Macro - Generation Parameters for Natural under VSE/ESA
- Natural Datasets Used under a VSE/ESA Batch Session
- NATVSE Print and Work File Support for VSE Library Members
- Debugging Facilities for Natural under VSE/ESA
- NATVSE Attention Interrupts

For considerations that refer to Natural in batch generally, see also:

- Adabas Datasets
- Sort Datasets
- Subtasking Session Support for Batch Environments

Natural in Batch Mode - Other Topics:

Natural in Batch Mode (all platforms) | Natural in Batch under OS/390 | Natural in Batch under CMS | Natural in Batch under BS2000/OSD

NATVSE - Natural VSE/ESA Batch Interface

The Natural VSE/ESA batch interface (NATVSE) consists of a number of service routines interfacing with the VSE/ESA operating system.

NATVSE is supplied as a source module and can be customized to meet your requirements; see also Installing Natural under VSE/ESA (described in the Natural Installation Guide for Mainframes), where you can set the generation parameters). You can either assemble and link it to the Natural nucleus or you can run it separately, connecting with a shared nucleus.

NATVSE must run below the 16 MB line. Multiple sessions can be started in parallel within one batch region; see Subtasking Session Support for Batch Environments.

NTVSE Macro - Generation Parameters for Natural under VSE/ESA

The NTVSE macro contains several generation parameters (to be set in the NATVSE copy book) to change the NATVSE internal defaults.

These parameters are:

NAME | DSECTS | CANCEL | RJEUSER | FILEID | FILMNGR | FILSCAN | BUFSIZE | LE370 | LIBRID

NAME - Name of Relocatable Module

NAME specifies the name of the relocatable module to be created by the given assembly. Possible values:

NAME=xxxxxx	xxxxxx = name of the relocatable module to be created. Maximum length: 8 characters.
NAME=NATVSE	This is the default value. NATVSE always terminates with RETURN or EOJ macros with a set return code (the same effect is achieved when you set the Session Abend Flag UPSI XXXXX1XX).

DSECTS - Listing of Operating System DSECTS

DSECTS specifies whether operating system DSECTS are to be listed. Possible values:

DSECTS=YES	Listing of operating system DSECTS takes place.
DSECTS=NO	This is the default value. Operating system DSECTS are not to be listed.

CANCEL - Session Termination

CANCEL specifies how the Natural VSE/ESA interface is to proceed at session termination. Possible values:

CANCEL=YES	This is the default value. The job is cancelled by CANCEL or JDUMP macros, unless either Natural terminated normally or the session was terminated by the Natural TERMINATE statement.
CANCEL=NO	NATVSE always terminates with RETURN or EOJ macros with a set return code (the same effect is achieved when you set the Session Abend Flag UPSI XXXXX1XX).

RJEUSER - User ID for Submission via XPCC Macro Requests

RJEUSER defines which user ID is to be set for submission via XPCC macro requests. Possible values:

RJEUSER=YES or RJEUSER=(YES,VSE)	This is the default value. The system variable *INIT-USER is used as the mandatory submission user ID.
RJEUSER=(YES,NAT)	The system variable *USER is used as the mandatory submission user ID.
RJEUSER=NO	The user ID "R000" is used.

FILEID - Check of Label Information

FILEID specifies a string of up to 8 characters which is checked against the start of a DLBL or TLBL file ID. If it matches, this label information is ignored. Possible values:

FILEID=xxxxxxxx	xxxxxxxx = any character string which must be enclosed in apostrophes if it contains special characters.
FILEID='IGNORE'	This is the default value.

This is particularly helpful when DLBL or TLBL statements for CMWKFnn* and/or CMPRTnn* are supplied in the (partition) standard labels, but should not be used.

If, for example, a // DLBL CMPRT01, '...' statement is found, it is not possible to direct a WRITE(1) output to a printer SPOOL. To do so, use the JCS statement // DLBL CMPRT01, 'IGNORE' and a suitable printer assignment of the relevant SYSnnn.

FILMNGR - Management of Print or Work File in Natural

FILMNGR specifies how a print or a work file is to be managed in Natural. Possible values:

FILMNGR=YES	This is the default value. The fact that there is label information for a print or a work file and the fact that LABEL=OFF/ON is specified for an unlabelled work file indicates to Natural that this file is available. In particular, this is relevant if the Natural print and work files are to be managed by a file management system.
FILMNGR=NO	The logical unit number of the Natural print or work file must be assigned to the appropriate device type.

FILSCAN - Scanning of Print or Work Files

FILSCAN specifies whether print or work files are to be scanned. Possible values:

FILSCAN=YES	This is the default value. The Natural interface for VSE/ESA scans the VSE/ESA label area for all Natural print and work files for which no specific file access method has been defined via Natural session parameters, as this may cause overhead.
FILSCAN=NO	Access to all Natural print and work files must be specified explicitly via session parameters in order to be "available". This concentrates all file access efforts on the defined files.

BUFSIZE - Size of Natural I/O Buffer

BUFSIZE specifies the size of the Natural I/O buffer which is used for all input and output operations.

BUFSIZE=nnnn	nnnn specifies the size of the Natural I/O buffer in bytes. Minimum value: 8192 (KB).
BUFSIZE=8192	This is the default value.

LE370 - Use of IBM Language Environment

LE370 specifies whether Natural is to run in the IBM Language Environment. Possible values:

LE370=YES	The IBM Language Environment runtime environment is initialized on the initialization of the Natural session. You must specify YES if IBM Language Environment subroutine programs (dynamic or static) are to be called via Natural.
LE370=NO	This is the default value. The IBM Language Environment runtime environment is not initialized on the initialization of the Natural session.

LIBRID - Check of DLBL File ID Information

LIBRID specifies a string of up to 8 characters which is checked against the start of a DLBL file ID. If it matches, the remaining portion of that file ID is scanned for information specifying a library member in a VSE library or library chain. Possible values:

LIBRID=xxxxxxx	xxxxxxx = any character string of 8 characters length; must be enclosed in quotes if it contains any special characters.
LIBRID='LIBR:'	This is the default value.

Natural Datasets Used under a VSE/ESA Batch Session

The following datasets are required if certain functions are used during a Natural VSE/ESA batch session:

CMEDIT	Software AG Editor Work File
CMHCOPY	Hardcopy Print Output
CMOBJIN	Input for Natural INPUT Statements
CMPLOG	Dynamic Profile Parameter Report Output
CMPRINT	Primary Report Output
CMPRMIN	Dynamic Profile Parameter Input
CMPRT <i>nn</i>	Additional Reports 01-31
CMSYNIN	Primary Command Input
CMTRACE	External Trace Output
CMWKF <i>nn</i>	Work Files 01-32

These datasets are described below.

CMEDIT - Software AG Editor Work File

The Software AG Editor work file VSAM dataset is required if a local or global Software AG editor buffer pool is to be used.

If not defined in the JCL, the name of the Editor work file specified by subparameter DSNAME of profile parameter EDBP or parameter macro NTEDBP is used by Natural to do the dynamic allocation for the Editor work file.

Alternatively, profile parameter EDPSIZE can be used to run with an auxiliary editor buffer pool, which doesn't require an editor work file. For more information about the installation of the Software AG editor, please refer to Installing the Software AG Editor (in the Natural Installation for Mainframes documentation).

CMHCOPY - Optional Report Output for Hardcopy

The default name of the hardcopy print output dataset is CMHCOPY. It can be changed by one of the following:

- the subparameter DEST of profile parameter PRINT for Print File 0,
- the profile parameter HCDEST, which is an equivalent of PRINT=((0) , DEST= . . .) ,
- the setting of the system variable *HARDCOPY during the session,
- the terminal command %H during the session.

The subparameters of the profile parameter PRINT for Print File 0 can be used to change the default values for the hardcopy dataset. The default dataset name CMHCOPY implies CLOSE=FIN for the hardcopy print dataset, that is, after the dataset has been opened for output, any subsequent change of the hardcopy print output dataset name will not be honored. If a different name is defined at open time, the hardcopy dataset will be closed according to subparameter CLOSE of profile parameter PRINT for Print File 0.

By default, the CMHCOPY file is assigned to SYSLST and is processed via the macro DTFPR.

If appropriate label information is supplied for the file name CMHCOPY, the print output may also be routed to disk or tape by using the VSE/ESA macro DTFSD or DTFMT respectively, with RECFORM=FIXUNB,BLKSIZE=133.

When routed to a VSE library, the record format is fix, the record length is 80 and the default member type is PRINT.

CMOBJIN - Input for Natural INPUT Statements

CMOBJIN is used for data intended to be read by Natural INPUT statements. This type of data can alternatively be placed in the CMSYNIN input stream immediately following the relevant source program or the relevant RUN or EXEC command.

When the setting for the profile parameter OBJIN is "N", Natural reads input from CMSYNIN. When OBJIN is set to "Y", Natural reads input from CMOBJIN.

When OBJIN is set to "R", Natural determines which option has been selected for a particular session depending upon the presence or absence of a CMOBJIN label information.

By default, the CMOBJIN input file is assigned to SYSIPT. By using the READER profile parameter, it can be assigned to SYSRDR.

Alternatively, a sequential disk or labeled tape file may be used rather than a real/logical (POWER) reader file. In that case, you must supply appropriate label information for file name CMOBJIN.

Supported file formats are:

```
DTFSD/DTFMT: RECFORM=FIXUNB,RECSIZE=81
DTFSD/DTFMT: RECFORM=FIXUNB/FIXBLK,RECSIZE=80
LIBR:        RECFORM=FIX,RECSIZE=80 , default member type CARD
```

You must supply appropriate label information; for assignment, you have to use file names CMSYNIN and /or CMOBJIN.

CMPLOG - Optional Report Output for Dynamic Parameters

If profile parameter PLOG=ON is set and dataset CMPLOG is available, the evaluated dynamic profile parameters are written to this dataset during session initialization. If dataset CMPLOG is not available, the evaluated dynamic profile parameters are written to CMPRINT.

By default, the CMPLOG file is assigned to SYSLST and is processed with the macro DTFPR.

If appropriate label information is supplied for the file name CMPLOG, the print output may also be routed to disk or tape by using the VSE/ESA macros DTFSD or DTFMT respectively, with RECFORM=FIXUNB,BLKSIZE=133.

When routed to a VSE library, the record format is fix, the record length is 80 and the default member type is PRINT.

CMPRINT - Primary Report Output

CMPRINT is used for the primary output report resulting from DISPLAY, PRINT and WRITE statements in a Natural program.

By default, the CMPRINT file is assigned to SYSLST and is processed via the macro DTFPR.

If appropriate label information is supplied for the file name CMPRINT, the print output may also be routed to disk or tape by using the VSE/ESA macro DTFSD or DTFMT respectively, with RECFORM=FIXUNB,BLKSIZE=133.

When routed to a VSE library, the record format is fix, the record length is 80 and the default file type is PRINT.

CMPRMIN - Dynamic Parameter Dataset

CMPRMIN can be used as a dynamic parameter dataset to overcome the length restriction for the character string in the job control PARM keyword of the EXEC statement.

All input records from CMPRMIN are concatenated into one parameter string. Only the first 72 positions of each CMPRMIN record are significant. Trailing blanks at the end of each record are truncated; no commas are inserted.

Additional dynamic parameters from the job-control PARM keyword can be supplied. They are concatenated after the parameters from CMPRMIN, which means that the PARM character string can be used to overwrite dynamic parameters specified in the CMPRMIN dataset.

CMPRMIN is a sequential disk or a labelled tape dataset. Supported file formats are:

```
DTFSD/DTFMT: RECFORM=FIXUNB,RECSIZE=81
DTFSD/DTFMT: RECFORM=FIXUNB/FIXBLK,RECSIZE=80LIBR:          RECFORM=FIX,RECSIZE=80 , default member type CARD
```

CMPR T_{nn} - Additional Reports

CMPR T_{nn} is used for each additional report referenced by any Natural program compiled or executed during the session. " nn " must be a two-digit decimal number in the range 01-31 corresponding to the report number used in a DISPLAY, PRINT or WRITE statement.

Instead of CMPR T_{nn} , another file name may be used by setting the DEST subparameter of profile parameter PRINT to an appropriate value, for example:

```
PRINT=( ( nn) , . . . ,DEST=PRNTFIL)
```

When supplying label information with file name CMPR T_{nn} , the print output can be written to a disk or tape. Natural treats this print file like an unblocked fixed-length work file. When "printing" to disk or tape, the same logic as for work files applies (see below).

When mapped to a VSE library member, the record format is fix, the record length is 80 and the default file type for these files is PRINT.

CMSYNIN - Primary Input

CMSYNIN is used for the primary input file that contains Natural commands, Natural source programs, and (optionally) data to be read by INPUT statements during the execution of Natural programs.

By default, the CMSYNIN input file is assigned to SYSRDR. By using the READER profile parameter, it may be assigned to SYSIPT.

Alternatively, a sequential disk or labeled tape file may be used rather than a real/logical (POWER) reader file. In that case, you must supply appropriate label information for file name SMSYNIN. Supported file formats are:

```
DTFSD/DTFMT: RECFORM=FIXUNB,RECSIZE=81
DTFSD/DTFMT: RECFORM=FIXUNB/FIXBLK,RECSIZE=80
LIBR:          RECFORM=FIX,RECSIZE=80 , default member type CARD
```

CMTRACE - Optional Report Output for Natural Tracing

If profile parameter ETRACE=ON is set or the equivalent terminal command %TRE+ was issued, any Natural trace output during the session is written to the CMTRACE dataset. To define the Natural components that are to be traced, the profile parameter TRACE is required.

By default, the CMTRACE file is assigned to SYSLST and is processed via the macro DTFPR.

If appropriate label information is supplied for the file name CMTRACE, the print output may also be routed to disk or tape by using the VSE/ESA macro DTFSD or DTFMT respectively, with RECFORM=FIXUNB,BLKSIZE=133.

When routed to a VSE library, the record format is fix, the record length is 80 and the default member type is PRINT.

CMWKF nn - Work Files 01-32

CMWKF nn is used for each Natural work file referenced by any Natural program compiled or executed during the session. " nn " must be a two-digit decimal number in the range 01 - 32 corresponding to the number used in a READ WORK FILE or WRITE WORK FILE statement.

Instead of CMWKF nn , another file name may be used by setting the DEST subparameter of profile parameter WORK to an appropriate value.

If the Natural VSE/ESA generation parameter FILMNGR=YES is specified and there is label information for a work file - or if "NO" or "NOTM" is specified for the LABEL subparameter of parameter WORK for an unlabeled work file - Natural knows the file is available. Otherwise, the Natural work-file logical-unit number must be assigned to the correct device type.

When mapped to a VSE library member, the record format is fix, the record length is 80 and the default member type for these files is WORK.

If a Natural printer or work file is assigned "IGN", all I/O requests for these files are treated as dummy and no Natural error is generated. However, if there is no assignment or the printer/work file is assigned "UA", any attempt to use this file is treated as an error.

NATVSE Print and Work File Support for VSE Library Members

NATVSE supports access to VSE library members for input and/or output for all Natural datasets. When a VSE library member is accessed, only "card image format" is supported, that is, a record length of 80 bytes.

The access to a VSE library member is triggered via the file ID of an associated DLBL statement. A special string (see LIBRID in NATVSE Generation Parameters) at the start of the file ID field in the DLBL statement signals that the Natural dataset actually is a VSE library member which is specified in the remainder of the file ID field.

The following specifications are possible:

C= <i>chain</i>	Specifies a library concatenation chain defined in JCL.
S= <i>library.sublib</i>	Specifies a specific sublibrary in a specific library.
M= <i>mbrname.mbrtype</i>	Specifies a library member name and its type.

The following rules apply:

- All these possible specifications are optional.
- Each parameter may be specified only once.
- The parameters are separated by one or more commas or blanks.
- Chain (C=) and sublibrary (S=) specifications are optional, but mutually exclusive when specified.
- If neither a chain (C=) nor a sublibrary (S=) is specified, a default of C=SOURCE is taken.
- If a library member (M=) is not specified, a default of M=*filename.type* is taken, where *filename* is the file name of the DLBL statement and

type indicates the Natural file class, namely **WORK** for Natural work files, **PRINT** for Natural print files and **CARD** for the Natural input files **CMPRMIN**, **CMSYNIN** and **CMOBJIN** (the relevant default member type for every Natural dataset is mentioned below).

- An asterisk specified for any sub-parameter of the library member specification signals the default to be taken; hence a specification of **M=*.*** has the same effect as omitting this parameter.
- Omitting the member type subparameter also means the default to be taken.

Example:

```
// LIBDEF PROC,SEARCH=(...)
// LIBDEF SOURCE,SEARCH=(...)
// DLBL CMWKF01,'LIBR:M=FILE1.TEST S=SAGLIB.USRLIB'
// DLBL CMWKF02,'LIBR: S=SAGLIB.USRLIB'           -> M=CMWKF02.WORK
// DLBL CMWKF03,'LIBR: M=TEST C=PROC'             -> M=TEST.WORK
// DLBL CMPRT04,'LIBR:M=* .LISTING,S=SAGLIB.USRLIB' -> M=CMWKF01.LISTING
// DLBL CMPRT05,'LIBR:'                           -> M=CMWKF05.PRINT,C=SOURCE
// DLBL CMPRT06,'LIBR:M=WORK'                       -> M=WORK.PRINT,C=SOURCE
// DLBL CMWKF07,'LIBR: M=*.DATA'                   -> M=CMWKF07.DATA,C=SOURCE
// DLBL CMPRMIN,'LIBR:M=*. *'                       -> M=CMPRMIN.CARD,C=SOURCE
```

Notes:

1. When a chain is specified or defaulted for an output file, the output is written into the first sublibrary specified in the chain.
2. If a member with the same name and type already exists in a target sublibrary of a Natural output file, this member is replaced unconditionally.
3. The file ID field of a DLBL statement is just 44 characters in length, which is not enough to specify all (sub)parameters in their full length. Therefore it is recommended to take advantage of the defaults. Regarding the member name, there is also the option to specify the file name via the **DEST** subparameter of the Natural **PRINT** or **WORK** profile parameter.

Debugging Facilities for Natural under VSE/ESA

The Natural VSE/ESA batch interface contains some debugging facilities which can help you to track down problems.

These facilities are controlled by the UPSI settings in the JCL.

Additionally, the UPSI settings may also be specified as a Natural session parameter (**UPSI=1XXXXXXXX**, for example). This is useful if UPSI settings in JCL have produced side effects in the sense that they have a different meaning for other programs such as for front-end Natural or for programs called by Natural.

There may be the following UPSI settings:

- UPSI 1XXXXXXXX - Dump Flag
- UPSI X1XXXXXXXX - Trace Flag
- UPSI XXX1XXXXX - Storage Freeze Flag
- UPSI XXXXX1XX - Session Abend Flag
- UPSI XXXXXX1X - Abend Exit Flag
- UPSI XXXXXXXX1 - Formatted Dump-Only Flag

These settings are listed below. In addition, a sample job is given to show you how to obtain documentation for debugging.

UPSI 1XXXXXXXX - Dump Flag

When Natural encounters a problem, the corresponding job usually cancels without a dump, unless an abend actually occurred. When this UPSI flag is set, a dump is always created at the end of the job when an error occurs, that is, when the Natural session termination message is other than NAT9995.

UPSI X1XXXXXXXX - Trace Flag

When this flag is set, snapshots are taken of the register save area at some strategic points in Natural.

Note: Depending on the product sample output, setting this flag can lead to large output.

On entry of all NATVSE service routines, the name of this routine and the general registers 0 to 15 (GRG) are displayed.

Note: You can identify the caller from Register 14.

On exit of all NATVSE service routines, the name of this routine, the current general registers (GRG) and Registers 0 to 15 of the currently assigned save area (CSA) are displayed.

Notes:

- The contents of the CSA are returned to the caller of the service routine, except the Register 15 return code which is taken from the general registers.
- The contents of the HSA are returned to the caller, which means that this save area contains the return code in Register 15 if a return code was set at all.

Whenever the GRG registers are set, the debugging trace program tries to determine the name of the calling routine and the offset of the call from the beginning of the routine.

The `SYSnnn` number for the debugging trace print output is `SYS040`, as long as this `SYSnnn` number is assigned to a printer device; otherwise `SYSLST` is used. This is of particular interest if debugging trace output and other Natural print output are to be separated; to do so, assign `SYS040` appropriately and supply a `POWER * $$ LST` statement for this logical print unit.

UPSI XXX1XXXX - Storage Freeze Flag

On normal or abnormal session termination, Natural, by default, releases all its resources including storage. Despite the setting of UPSI 1, a dump may be useless, because all relevant storage has already been released during Natural termination. When this flag is set, no GETVIS storage acquired earlier is ever released within this job; this applies to all external subroutine programs called by Natural including the Natural nucleus (if not linked to NATVSE) and RCA=ON subproducts.



This flag should be handled carefully, because more partition GETVIS storage is used, but jobs may still cancel due to failed GETVIS requests if the operating system storage requests cannot be satisfied.

UPSI XXXXX1XX - Session Abend Flag

By default, a Natural session is cancelled if crucial errors have occurred (NAT9nnn termination messages except NAT9995 and NAT9987). When this flag is set, Natural does *not* cancel, but terminates "normally" just passing the Natural return code to the job control.

UPSI XXXXXX1X - Abend Exit Flag

This flag may be helpful in the case of recurrent abends.

In batch mode, Natural usually has a check abend exit for active programs (STXIT PC) to recover from program checks (NAT095*n* error messages). When DU=ON is specified, this exit creates a snap dump and passes control to Natural for a clean session termination.

When this flag is set, the Natural session runs without any abend exit for active programs, which means that all program checks are handled directly by the operating system.

If this flag is set, the dump flag, the storage freeze flag, the session abend flag and the formatted dump-only flag are ignored.

UPSI XXXXXX1 - Formatted Dump-Only Flag

With DU=ON, the NATVSE abend exit routine creates a snap dump of the Natural session when a program check abend occurs (and the UPSI XXXXXX1X flag is not set).

- The failed instruction, the program check code (SOC*n*), the general registers, the currently active routine, the offset of the failed instruction within this routine and the absolute (PSW) address are displayed together with Registers 0 to 15 of the currently assigned save area (CSA).
- In addition, the non-reentrant Natural VSE/ESA driver, all areas GETMAINED by Natural and all Natural programs in the buffer pool are dumped.
- Then control is passed to Natural for a clean session termination.
- Finally the job terminates via a VSE JDUMP macro resulting in a dump containing the whole partition.

Since in many cases the dynamic Natural session areas are relevant for debugging only, the dump of the static session areas can be suppressed by setting this UPSI flag.

Obtaining Documentation for Debugging

If a problem has to be analyzed, any information which might be relevant is important, in particular, the executed JCS and the corresponding console log.

The following sample job is intended to show you how to obtain comprehensive documentation:

```

// JOB sampljob
// OPTION LOG,PARTDUMP to see JCL on printer
/* Library Definitions: labels and LIBDEFs
...
/* ADARUN Parameter Input Definition
// ASSGN SYS000,SYSRDR
/* Natural Work File Definitions
// DLBL CMWKFnn,'...',... disk work file
// EXTENT SYSnnn,volser,,,nn,mm
// ASSGN SYSnnn,DISK,VOL=volser,SHR
// TLBL CMWKFnn,'...',... labelled tape work file
// ASSGN SYSnnn,uu assignment to tape unit
/* Natural Print File Definitions
// ASSGN SYSnnn,uu assignment to print UR unit
// DLBL CMPRTnn,'...',... print file on disk
// EXTENT SYSnnn,volser,,,nn,mm
// ASSGN SYSnnn,DISK,VOL=volser,SHR
// TLBL CMPRTnn,'...',... print file on labelled tape
// ASSGN SYSnnn,uu assignment to tape unit
/* Debugging Options
// ASSGN SYS040,SYSLST debugging trace unit
// UPSI 1xxx00xx flags as discussed above
// EXEC Natural,SIZE=...
... dynamic parameters
/* end of dynamic parameters
... ADARUN parameters
/* end of ADARUN parameters
... Natural input
/* end of Natural input
// EXEC LISTLOG print console messages
/& end of job

```

NATVSE Attention Interrupts

The Natural VSE/ESA batch interface (NATVSE) supports attention interrupts via the console command `MSG xx`, where `xx` is the VSE partition ID a console operator can force on a NAT1016 attention interrupt event.

This special functionality is controlled by the Natural profile parameter `ATTN`.