

Co:Z® Co-Processing Toolkit for z/OS

Co:Z Batch User's Guide

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1. Introduction

Co:Z Batch is an IBM z/OS batch utility program that allows a Unix command or shell to be executed in a batch job step. As an alternative to confusing IBM utilities such as BPXBATCH, Co:Z Batch is designed to simplify the integration of z/OS Unix with batch jobs.

1.1 Features

- Executes the Unix program or shell in the same address space, which simplifies job accounting and allows for the use of resources such as DD statements by the Unix program.
- STDIN, STDOUT, and STDERR files from the Unix program are redirected to DD statements, which may refer to MVS datasets or spool files.
- If not specified, the default Unix program to run is the user's default login shell.
- Environment variables may be set using a STDENV DD, or passed in via JCL PARM=. Multiple COZBATCH steps may be used together to pass JCL variables into Unix environment variables, so as to avoid the limits imposed by 100-character PARM= fields.
- If a program is run directly, its name and arguments are given in JCL PARM= and program arguments support quoting.
- The Unix program or shell exit code is used as the step return code, but this may be overridden by a PARM setting.
- JES Symbols are automatically exported as environment variables to the target shell or program with JES_ prefixes on the symbol names. Requires z/OS 2.1 or later.

Table 1.1. Features Comparison

Feature	BPXBATCH	BPXBATSL	AOPBATCH	COZBATCH
Same address space	no	yes	yes	yes
STDOUT/STD to dataset/sysout	yes (1.7+)	yes (1.7+)	yes	yes
STDIN from dataset/sysin	no	no	yes	yes
Run a default login shell	yes	no (unless root)	no	yes
Run a Unix command without a shell	yes	yes	yes	yes
Set ENV vars from JCL vars	limited ¹	limited ¹	limited ¹	yes
PARM= args support quoting	no	no	yes	yes
Override(set) step return code	no	no	no	yes
Support for JES Symbols	no	no	no	yes

¹One or more ENVAR () LE runtime options may be specified on the PARM to set environment variables using JCL variables.

The size of the entire PARM field is limited to 100 characters.

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2. Reference

The Co:Z Batch utility may be executed in a batch job step using the following statement:

```
//step EXEC PGM=COZBATCH,  
// PARM={leopts}/{-Lloglvl} {-N} {-M} {envvar=value}* {pgmname {pgmopts}}'
```

The PARM keyword and values are optional, and defined as:

leopts

Language environment runtime options

-Lloglvl

A switch which enables logging/tracing of COZBATCH. Can be one of -LI (info), -LD (debug), or -LT (trace).

-N

By default, COZBATCH will automatically strip line numbers from columns 73-80 of STDIN. If this is not desired, the -N switch can be supplied to disable this behavior.

-M

This switch forces the target program or script to run in the same address space. This is not necessary by default since COZBATCH sets the environment variable `_BPX_SHAREAS=MUST` if it is not already set. This feature was added in release 4.5.0 for cases where it is desirable to explicitly set `_BPX_SHAREAS=NO` (in `DD:STDENV`), but invoke the target program in the same address space anyway. See: [Using SMF type/subtype specific permissions](#) for an example of where this is useful.

envvar=value

One or more environment variables to set before running the Unix program.

pgmname

The name of the Unix program or script to execute. By default, the user's default login shell is executed, e.g. `"/bin/sh"`

pgmopts

One or more arguments to the program, which may be double-quoted if necessary to allow spaces within an argument.

The following DDs may be used, although *none* are required:

SYSOUT

messages from the Co:Z batch utility and the z/OS language environment runtime. This file will be dynamically allocated to `SYSOUT=*` if not specified.

STDIN

if present, this file will be read and directed as input to the Unix program or shell. An MVS dataset or JES SYSIN spool file may be used, in which case it is read as a text file such that records are separated by newline

characters with trailing spaces removed from each record. If a shell is used, the input is a script subject to normal shell processing.

STDOUT

`stdout` output from the Unix program or shell will be directed to this file, or if not present it will be written to the `SYSOUT` DD. The DD may specify an MVS dataset or JES `SYSOUT` file.

STDERR

`stderr` output from the Unix program or shell will be directed to this file, or if not present it will be written to the `SYSOUT` DD. The DD may specify an MVS dataset or JES `SYSOUT` file.

STDENV

if present, this DD will be read by the language environment runtime and be used to set environment variables for the program. Each record or line in the file must be of the form: `VAR=VALUE`

The following special environment variables may be set:

- **SHELL** can be set to override the user's default login shell.
- **COZ_FILE_TAG=STDIN** if set, `stdin` input to the program from DD:STDIN will be tagged with the current locale codepage, normally IBM-1047.

SAVEARGS

if present, this DD will be read for environment variables (after `STDENV`). Each record must be in the form `VAR=VALUE`. In addition, any variables settings in the `PARM=` field will be written to the end of this file. See [Chapter 3, Examples](#) for more information on using this to pass arbitrary numbers/length JCL variables in environment variables. Note that variables set via the `STDENV` DD are not written to this file.

3. Examples

This section contains examples of using the Co:Z Batch utility. The RUNSHELL member of the Co:Z Toolkit Sample JCL also contains sample COZBATCH job steps.

1. Run the user's default shell, which is normally `/bin/sh`. The shell is run as a "login" shell so that before reading input from STDIN, the shell will have executed `/etc/profile` and the user's `.profile` if present. All output: messages, stdout, and stderr will go to a dynamically allocated SYSOUT file.

```
// EXEC PGM=COZBATCH
//STDIN DD *
env
//
```

2. By presetting the environment variable `SHELL=/bin/sh`, we can override the user's default shell and run a specific logon shell. This is useful for example if the user's default shell is **bash** but the IBM UNIX shell is needed since it allows commands to run in the original batch address space.

```
// EXEC PGM=COZBATCH
//STDENV DD *
SHELL=/bin/sh
//STDIN DD *
env
//
```

3. Run the user's default shell, but this time direct messages, stdout, and stderr to separate DDs.

```
// EXEC PGM=COZBATCH
//STDIN DD *
env
//SYSOUT DD SYSOUT=*
//STDOUT DD SYSOUT=*
//STDERR DD SYSOUT=*
//
```

4. Run the `/bin/sh` shell explicitly, but not as a login shell. The leading `/"` is required to delineate LE runtime options. The output from this execution will display only a few environment variables, since the system and user profiles are not executed.

```
// EXEC PGM=COZBATCH,PARM=' / /bin/sh'
//STDIN DD *
env
```

5. Run a login shell with tracing of shell commands. Also enable COZBATCH debug-level logging. This example can be very useful for debugging issues with profile and shell scripts.

```
// EXEC PGM=COZBATCH,PARM='/ -LD /bin/sh -Lx'
//STDIN DD *
my-cmd arg1 arg2
...
```

6. Run the `/bin/cat` program explicitly, which will copy the input from STDIN to STDOUT

```
// EXEC PGM=COZBATCH,PARM='//bin/cat'
//STDIN DD *
XXXX
YYYYY
ZZZ
//STDOUT DD SYSOUT=*
//
```

7. Use DD STDENV to have LE present environment variables. Additional environment variables are set using PARM=, which allows for the substitution of JCL "SET" or "PROC" variables. Since a program name is not specified, the user's default login shell is executed and will read input from STDIN.

```
// SET MACLIB=SYS1.MACLIB
// SET AMACLIB=SYS1.AMACLIB
//*
// EXEC PGM=COZBATCH,
// PARM='/ TDIR=/usr/local/bin MACLIB=&MACLIB AMACLIB=&AMACLIB'
//STDENV DD *
ADIR=foo
//STDIN DD *
echo ls ADIR=$ADIR
ls $ADIR
echo ls TDIR=$TDIR
ls $TDIR
echo MACLIB=$MACLIB AMACLIB=$AMACLIB
env
//
```

8. In a situation where you have several JCL SET or PROC variables that need to be used as environment variables, you can be limited by the evil 100-character JCL PARM= limit. COZBATCH allows you to have multiple steps that concatenate these variables to a temp dataset that is eventually passed into a COZBATCH step that uses them in a shell script. The DD name for the file used to save these arguments is SAVEARGS.

Note that steps that have neither a STDIN DD nor name an explicit program to execute will actually not run anything, but simply set and save arguments.

```
// SET PRFX=SYS1.INSTALL.FOOBAR.LONGNAME.DEMO
// SET MACLIB=&PRFX.MACLIB
// SET AMACLIB=&PRFX.AMACLIB
// SET AMODGEN=&PRFX.AMODGEN
```



```
// SET LINKLIB=&PFX..LINKLIB
//*
//EX1      EXEC PGM=COZBATCH,PARM=' /MACLIB=&MACLIB AMACLIB=&AMACLIB '
//SAVEARGS DD DSN=&&MYTEMP1,DISP=(NEW,PASS)
//*
//EX2      EXEC PGM=COZBATCH,PARM=' /AMACLIB=&AMODGEN '
//SAVEARGS DD DSN=&&MYTEMP1,DISP=(OLD,PASS)
//*
//EX3      EXEC PGM=COZBATCH,PARM=' /LINKLIB=&LINKLIB '
//SAVEARGS DD DSN=&&MYTEMP1,DISP=(OLD,PASS)
//STDIN    DD *
echo MACLIB=$MACLIB
echo AMACLIB=$AMACLIB
echo AMODGEN=$AMODGEN
echo LINKLIB=$LINKLIB
//*
```

9. The special PARM= variable \$? maybe be used to specify a return code for the step, overriding the use of the program or shell's exit code. In the special case where a program or STDIN DD is not present, a program or shell is not executed - but this feature will still set the return code.

```
// SET MYRC=8
//SETRC1 EXEC PGM=COZBATCH,PARM=' / $?=&MYRC '
//*
//SETRC2 EXEC PGM=COZBATCH,PARM=' / FOO=BAR $?=&MYRC '
//STDIN    DD *
env
//
```

10. Unlike BPXBATCH or BPXBATSL, arguments specified to the program on the PARM= keyword may be quoted.

```
// EXEC PGM=COZBATCH,
// PARM=' /"TDIR=&TDIR" "FIL=&FIL" /bin/sh -c "cd $TDIR; pax -rvf $FIL" '
```

11. Since COZBATCH executes a shell in the original address space, it is easy to write shell scripts inline in your JCL that use DD statements. The synergy of features allows you to fully and easily exploit z/OS Unix in batch job steps.

```
// SET TCHOME="/usr/local/tomcat"
// SET INSTJCL=TOMCAT.INSTALL.JCL
//*
//INSTALL EXEC PGM=COZBATCH,PARM=' /TCHOME=&TCHOME '
//PAX      DD DSN=&INSTJCL(PAXBIN),DISP=SHR
//STDIN DD *
cd $TCHOME
if [[ $(ls | wc -l) -gt 0 ]]; then
  echo directory $TCHOME is not empty!
  exit 8
```

```
fi
pax -rvf //DD:PAX
//
```

12.COZBATCH can be used with the Co:Z toolkit `fromdsn` and `todsn` shell commands. For additional information see the [Dataset Pipes Command Reference](#).

```
//REGEX EXEC PGM=COZBATCH
//IN DD DSN=SYS1.MACLIB(ACB),DISP=SHR
//OUT DD DSN=&&TEMP,DISP=(NEW,PASS),
// SPACE=(CYL,(1,1)),
// DCB=(LRECL=80,RECFM=FB)
//STDIN DD *
# Copy lines matching a regular expression to DD:OUT
fromdsn //DD:IN | grep BLKSIZE | todsn //DD:OUT
//
```

13.COZBATCH can be used with [Co:Z SFTP](#) to script a batch SFTP client job to download a file to a z/OS dataset. In order to use this example, additional configuration is required for the SFTPPROC and shell script variables. Refer to [Using the Co:Z SFTP client in batch](#) in the [Co:Z SFTP User's Guide](#) for best practices as well as more examples.

```
//PROCLIB JCLLIB ORDER='COZUSER.COZ.SAMPJCL'
//*
//*****
//* Use the sftp_get.sh script to retrieve a remote file to a local
//* dataset.
//*****
//SFTPGET EXEC PROC=SFTPPROC
//SFTPIN DD *
cert="MY-RING:RSA-CERT"
user=myuser
host=myhost
lzopts="mode=text"
lfile="//DD:MYDD"
rfile=/etc/profile

. $script_dir/sftp_get.sh

//MYDD DD DSN=COZUSER.SFTPGET.DATA,DISP=(MOD,KEEP),
// DCB=(LRECL=80,RECFM=FB),SPACE=(CYL,(3,1))
//*
```

14.With z/OS 2.1 or later, COZBATCH automatically exports all JES symbols as environment variables to the target shell or program.

```
// EXPORT SYMLIST=(MYDSN,MYVOL)
```

```
// SET MYDSN=MYID.SOME.DSN
// SET MYVOL=SYS001
//*
//SYMEX EXEC PGM=COZBATCH
//STDIN DD *
env | grep "JES_"
//*
```

The above job will display environment variables something like:

```
JES_SYS_CORR_CURRJOB=S0000434DTLZOS01CC27C5EA.....:
JES_MYDSN=MYID.SOME.DSN
JES_MYVOL=SYS001
```

See also the **jessym** command which can be used to work with JES symbols from within a z/OS Unix shell.

15. With Co:Z Toolkit 8.0.0 or later, COZBATCH can be used with shells such as **bash** that are built with z/OS "Enhanced ASCII" support and require stdin input to the shell to be tagged.

```
//BASH EXEC PGM=COZBATCH
//STDENV DD *
SHELL=/usr/local/bin/bash
COZ_FILE_TAG=STDIN
_BPXK_AUTOCVT=ON
//STDIN DD *
# input to the bash shell
ls -al
//*
```

16. With Co:Z Toolkit for z/OS release 4.0 and later, COZBATCH can be used with z/OS OpenSSH to script an ssh client job. In order to use this example, additional configuration is required for the SSHPROC and shell script variables. Refer to the SSHSAMP JCL member found in the sample JCL shipped with the Co:Z Toolkit for configuration instructions as well as more examples

```
//PROCLIB JCLLIB ORDER='COZUSER.COZ.SAMPJCL'
//*****
//* Use the ssh_pubkey.sh script to connect to a remote system
//* and append a public key to a user's authorized_keys file.
//* See that script for details and additional variables that can be
//* set for more customization. This example uses a password
//* (via SSH_ASKPASS) for authentication.
//*****
//SSHKEY EXEC PROC=SSHPROC
//SSHIN DD *
pwdsn="HLQ.COZ.SAMPJCL(PASS)"
user=myuser
host=myhost
pubkey="/zos/home/user/.ssh/id_rsa.pub"
```

```
. $script_dir/ssh_pubkey.sh  
//*
```

Appendix A. License

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Email: legal@coztoolkit.com

Assignments. You may not assign or transfer this Agreement, or any rights or duties hereunder, in whole or in part, whether by operation of law or otherwise, without the prior written consent of Dovetail. Any attempted assignment or transfer in violation of the foregoing shall be null and void from the beginning and without effect. Dovetail may freely assign or transfer this Agreement, including to a successor upon Dovetail's merger, acquisition, corporate reorganization, or sale or other transfer of all or substantially all of its business or assets to which this Agreement relates.

Relationship; Third Party Beneficiaries. The parties hereto are independent contractors. Nothing in this Agreement shall be deemed to create any agency, employment, partnership, fiduciary or joint venture relationship between the parties, or to give any third party any rights or remedies under or by reason of this Agreement; provided, however, the disclaimers and limitations on liability in this Agreement shall extend to Dovetail and its directors, officers, shareholders, employees, agents, and affiliates. All references to Dovetail in connection therewith shall be deemed to include the foregoing persons and entities, who shall be third party beneficiaries of such contractual disclaimers and limitations and entitled to accept all benefits afforded thereby.

Equitable Relief. The Software comprises the confidential and proprietary information of Dovetail and its suppliers, and constitutes a valuable trade secret. You acknowledge that Your breach of the license or ownership provisions of this Agreement would cause irreparable harm to Dovetail, the extent of which would be difficult and impracticable to assess, and that money damages would not be an adequate remedy for such breach. Accordingly, in addition to all other remedies available at law or in equity, and as an express exception to the jurisdiction and venue requirements of this Agreement, Dovetail shall be entitled to seek injunctive or other equitable relief in any court of competent jurisdiction.

Questionnaires; Audits. You agree to complete and promptly return to Dovetail any Software usage questionnaires issued by Dovetail from time to time, and to promptly provide Dovetail or its designated auditor with reasonable access to Your facilities, systems, personnel, books and records for the purpose of verifying Your compliance with the license terms and restrictions of this Agreement. All audits shall be conducted in a reasonable manner designed to minimize disruption to Your normal business operations. Dovetail agrees to initiate an audit no more than once during any twelve (12) month period; provided, however, if Dovetail reasonably suspects, or any audit reveals, non-compliance with this Agreement, Dovetail shall have the right to conduct additional audits until compliance is achieved.

U.S. Government Restricted Rights. The Software and Documentation are licensed with RESTRICTED RIGHTS as "Commercial Items," as that term is defined at 48 C.F.R. §2.101, consisting of "Commercial Computer Software" and "Commercial Computer Software Documentation," as such terms are used in 48 C.F.R. §12.212 or 48 C.F.R. §227.7202, as applicable. Consistent with 48 C.F.R. §12.212 or 48 C.F.R. §227.7202-1 through 227.7202-4, as applicable, the Commercial Computer Software and Commercial Computer Software Documentation is licensed (if at all) to U.S. Government end users only as Commercial Items, and with only those rights as are granted to other licensees pursuant to this Agreement.

Export Control. The Software and underlying information and technology may not be accessed or used except as authorized by United States and other applicable

law, and further subject to compliance with this Agreement. The Software may not be exported or re-exported into any U.S. embargoed countries, or to anyone on the U.S. Treasury Department's list of Specially Designated Nationals or the U.S. Department of Commerce Denied Person's List or Entity List. You represent and warrant that You and Your end users are not located in, under the control of, or a national or resident of any country or on any such list.

Amendment; Waiver. This Agreement may be amended only by a written instrument signed by an authorized representative of Dovetail. No rights shall be waived by any act, omission, or knowledge of a party, except by an instrument in writing expressly waiving such rights and signed by an authorized representative of the waiving party. Any waiver on one occasion shall not constitute a waiver on subsequent occasions.

Severability; Construction. If any provision of this Agreement is determined to be invalid or unenforceable under applicable law, such provision shall be amended by a court of competent jurisdiction to accomplish the objectives of such provision to the greatest extent possible, or severed from this Agreement if such amendment is not possible, and the remaining provisions of this Agreement shall continue in full force and effect. The captions and section headings in this Agreement are for reference purposes only and shall not affect the meaning or interpretation of this Agreement. The term "including" as used herein means "including without limitation." The terms "herein," "hereto," "hereof," and similar variations refer to this Agreement as a whole, rather than to any particular section.

Entire Agreement. This Agreement sets forth the entire agreement of the parties and supersedes all prior agreements and understandings, whether written or oral, with regard to the subject matter hereof. Any additional or conflicting terms proposed by You in any purchase order, request for proposal, acknowledgement, or other writing shall not be binding, and are hereby objected to and expressly rejected.