

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.

1.2 Trademarks

- Co:Z® is a trademark of Dovetailed Technologies LLC.
- z/OS® is a trademark of IBM Corporation.

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.

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.

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

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 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

The Co:Z Co-Processing Toolkit for z/OS, comprised of Co:Z Launcher, Co:Z Dataset Pipes, Co:Z SFTP, Co:Z Batch, Co:Z ssh-proxyc and Co:Z Target System Toolkit (in object code form only) is distributed under the Co:Z Community License Agreement (see below). *Note:* This community license is superseded for Co:Z Toolkit Enterprise License and Support customers. All components are distributed in binary form.

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Dovetailed Technologies, LLC
305 Willowpointe Drive
St. Charles, MO 63304

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