

Java Mainframe Tools - Zfile4aws

V1R4 BETA VERSION

USER GUIDE

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Introduction

Zfile4aws is a java mainframe tool used to send and retrieve z/OS sequential file from an AWS S3 cloud type.

Data source could be any sequential file type or format (RECFM=PS).

Zfile4aws support tape files like DFDSS backup and LBI type dataset (Large physical block size).

With Zfile4aws sequential data could be compressed, encrypted and segmented before it is shipped to the cloud.

In theory, there is no limit in dataset size that could be send to the cloud. Limits depends on your environment and/or your cloud service provider.

Zfile4aws is running in batch mode (JZOS) only.

HFS, ZFS and OMVS file types are also supported.

Environment requirements

- JAVA V8 31 bits is required.
- At least z/OS 2.2.
- IBM Crypto hardware is recommended but not required.
- IBM Compression feature is recommended but not required.
- IBM CPACF crypto enablement is required.
- ZIIP processors are also recommended but not required.
- Basic knowledge over modern z/OS function capability is a good starting point.
- Be familiar on how to run JAVA on Z/OS and JCL basic knowledge are also mandatory.
- Be familiar with AWS S3 cloud service and terms.
- JES2 Option SYSSYM=ALLOW is required in the job class definition.

Usage

There are four operations available to access data in the cloud with Zfile4aws.

The GET function is used to retrieve and download data from an S3 bucket.

The PUT function is used to upload and store data to an S3 bucket.

The LIST function is used to list objects information from an S3 bucket.

And the DELETE function used to delete cloud object(s) from an S3 bucket.

All configuration parameters required to run are specified in a single OMVS text file. This file is called Configuration File.

Before sending any z/OS dataset to cloud. Zfile4aws read and convert input data to an internal image format. This file image format support compression, encryption and segmentation. This internal image format is stored in a temporary work ZFS file. Internal image format is created by the PUT function.

User must predefine enough ZFS space to accommodate space requirement for his environment. This temporary ZFS space is called the Workspace.

Auto deletion of temporary file image format is controlled by the '-opt d' option parameter (explain later in this document).

Access to cloud objects is controlled by validating RACF access to the corresponding z/OS dataset name.

By example, suppose you want to create an object by using PUT function to store a z/OS dataset to a S3 bucket. Access to do so is permitted by validating if the current RACF userid have ALTER authority to the corresponding dataset name.

In the same idea, to retrieve an object by using the GET function. The current user must have a RACF READ authority to restore and retrieve a z/OS dataset image from an S3 bucket.

Configuration file

Parameters are specified as follow in a single OMVS text file.

FilePath: Indicate full path name to the ZFS Workspace.

FileCert: Indicate full path name of the java key ring to use for HTTPS request.

AwsAccKey: Indicate the AWS S3 access key to use.

AwsSecret: Indicate the AWS S3 secret key to use.

AwsRegion: Set the AWS region.

AwsBucket: Set the AWS S3 bucket name.

AwsHost: IP adr or end point name of the AWS S3 server.

AwsPort: Server IP port number.

Compress: Yes | No Used to Indicate if File image must be compressed.

Replace: Yes | No Used to replace any existing file or object by default.

ZosSegsize: nnnn Segment size in Megabytes. (1024 stand for 1 gig)

ZosKeyname: ICSF/ICRF key label to use to perform 3DES encryption.

ZosMaxblk: 1 | 2 | 3 Physical max blksize of input data source.

- 1 = 262144 bytes (LBI support 256k)
- 2 = 65535 64k
- 3 = 32760 32k (dasd device)

An Asterix (*) in Column1 stand for a comment line.

User must set OMVS config file security attributes as is own desired access HFS security policies.

Configuration file name must be specified by using the **-cfg** parameter when invoking a specific function.

Functions

GET | **GETR** is used to retrieve object from an AWS S3 bucket.

Parameters:

- cfg** Full file path name of the configuration file.
- fn** Full dsname or omvs file path name to download from cloud.
By using //dsname... form you specify a full z/OS dataset name.
- dd** DDNAME used to store retrieved data.

Use function GETR to execute a GET with 'replace' if you want to replace any existing file name on the local z/OS system.

PUT | **PUTR** is used to store object to an AWS S3 bucket.

Parameters:

- cfg** Full file path name of the configuration file.
- fn** Full dsname or omvs file path name to upload to cloud.
By using //dsname... form you specify a full z/OS dataset name.
- dd** DDNAME of source data.
- blk** Blocksize of the input source dataset.
This value overrides ZosMaxblk config parameter.

Use function PUTR to execute a PUT with 'replace' if you want to replace any existing cloud object.

If **-dd** and **-fn** are both specified. DSN allocated by the DDNAME specified in the **-dd** parameter, override any DSN specified in the **-fn** parameter.

DELETE is used to remove object from an AWS S3 bucket.

Parameters:

- cfg** Full file path name of the configuration file.
- fn | -fp** Specific object name to delete or objects prefix name for deleting multiples objects.

To delete an object representing a z/OS dataset (dsn). Current RACF userid must have RACF ALTER authority to the corresponding dsn.

LIST is used to list object(s) from an AWS S3 bucket.

Parameters:

- cfg** Full file path name of the configuration file.
- fp** List all objects having name starting with this prefix name.
This parameter is optional.

The **-opt** parameter may be set for GET and PUT functions.

- opt v** Verbose option to get more messages with timestamp.
- opt d** Auto deletion of internal file image from the ZFS workspace.
- opt b** Bypass file image creation. Valid only for USS file type.

Examples

Example 1a – Configuration file to a MINIO server

```
Session B - [24 x 80]
File Edit View Communication Actions Window Help
Menu Utilities Compilers Help

BROWSE /Zfile4aws/conf/Example1a.txt Line 0000000001 Col 001 080
Command ==> Scroll ==> PAGE

* Workspace ZFS filepath
FilePath /cloud
* Java key store filepath
FileCert /u/user1/miniocerts.jks
AwsAccKey WFZS3YWCZRZESWS00HYUL
AwsSecret 6Ghk9BANWfDPE411rD63CgCJISfL4ZTChvRk4ICw
AwsRegion us-east-1
AwsBucket mainframetape01
AwsHost 192.168.2.44
AwsPort 9000
* Replace all existing file and/or cloud objects
Replace yes
* Compress data before to send
Compress yes
* 1 gig segment size (1024 meg)
ZosSegsize 1024
* 65535 as physical blksize
ZosMaxblk 2
* Encrypt data by using this icsf key label
ZosKeyname ICSF.TDES.KEY01

04/015
Connected to remote server/host 192.168.2.46 using port 3271
Type here to search -3°C Cloudy 11:59 AM 2023-01-09
```

Example 1b – Configuration file to a AWS server

```
Session B - [24 x 80]
File Edit View Communication Actions Window Help
Menu Utilities Compilers Help

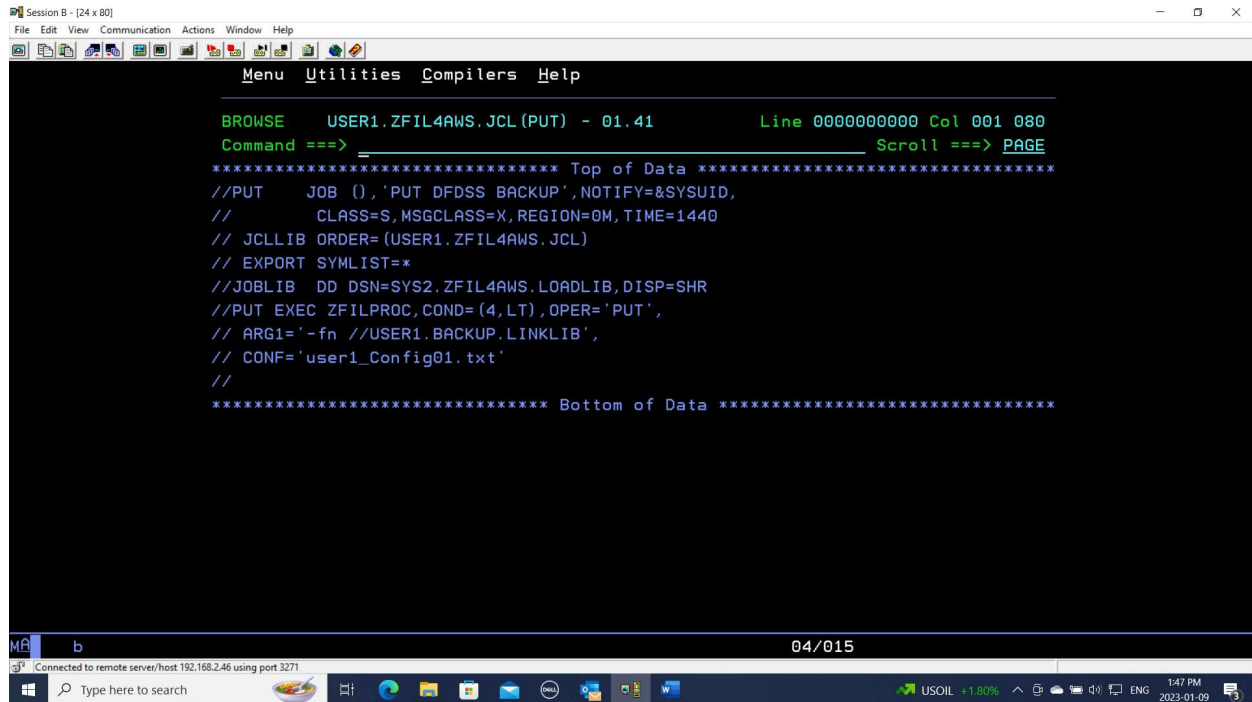
BROWSE /Zfile4aws/conf/Example1b.txt Line 0000000000 Col 001 080
Command ==> Scroll ==> PAGE

***** Top of Data *****
FilePath /cloud
FileCert /usr/lpp/java/J8.0/lib/security/cacerts
AwsAccKey BKJAX3W3VUXWES9SSTY1
AwsSecret uHhnMdt8a1zkok88Eyma0Tq5hoQ84mNG1CAUS/Z1
AwsRegion ca-central-1
AwsBucket bucketzosfiles01
AwsHost s3.ca-central-1.amazonaws.com
AwsPort 443
Compress yes
Replace no
ZosKeyname ICSF.TDES.KEY02
ZosSegsize 1000
ZosMaxblk 2
***** Bottom of Data *****

04/015
Connected to remote server/host 192.168.2.46 using port 3271
Type here to search -3°C Cloudy 12:12 PM 2023-01-09
```


Example 2 – PUT job (Upload z/OS file to a cloud bucket)

JCL used to upload tape file 'USER1.BACKUP.LINKLIB':

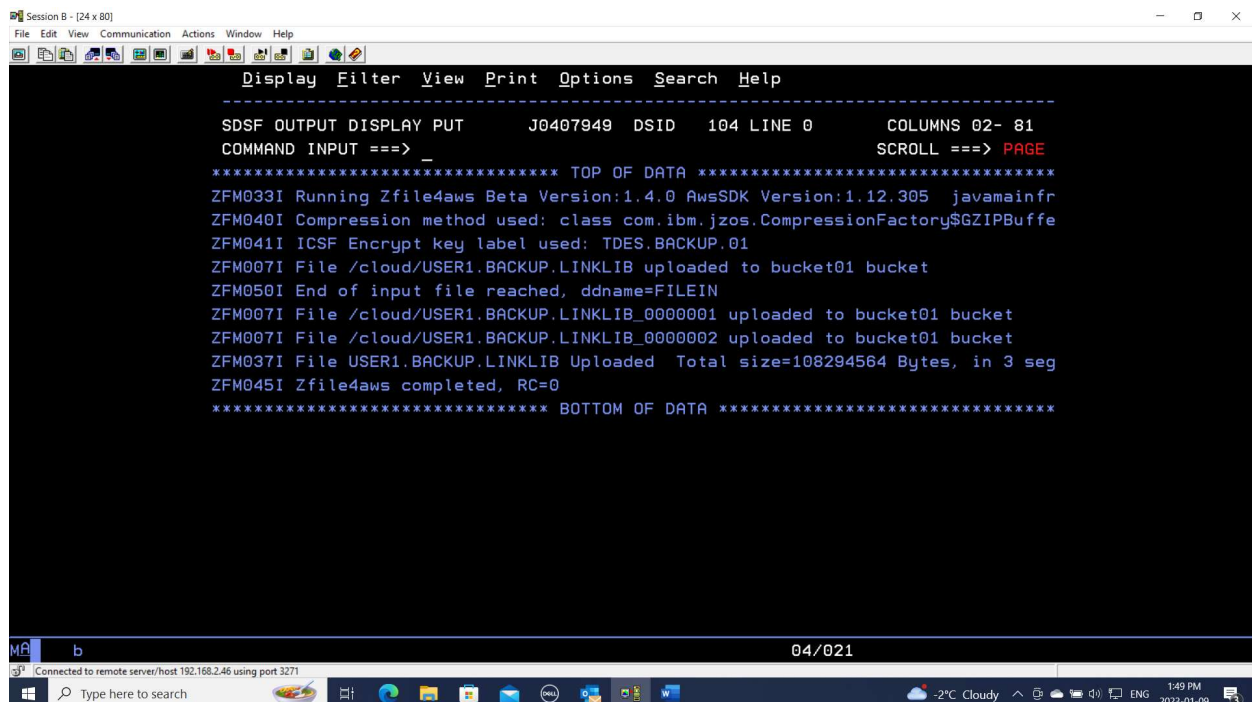


The screenshot shows a z/OS JCL editor window titled 'Session B - [24 x 80]'. The menu bar includes 'File', 'Edit', 'View', 'Communication', 'Actions', 'Window', and 'Help'. The main display area shows the JCL for a PUT job. The command is 'BROWSE USER1.ZFIL4AWS.JCL (PUT) - 01.41'. The JCL text is as follows:

```
***** Top of Data *****
//PUT JOB (), 'PUT DFDSS BACKUP', NOTIFY=&SYSUID,
// CLASS=S, MSGCLASS=X, REGION=0M, TIME=1440
// JCLLIB ORDER=(USER1.ZFIL4AWS.JCL)
// EXPORT SYMLIST=*
//JOB LIB DD DSN=SYS2.ZFIL4AWS.LOADLIB, DISP=SHR
//PUT EXEC ZFILPROC, COND=(4,LT), OPER='PUT',
// ARG1='-fn //USER1.BACKUP.LINKLIB',
// CONF='user1_Config01.txt'
//
***** Bottom of Data *****
```

The status bar at the bottom shows '04/015' and 'Connected to remote server/host 192.168.2.46 using port 3271'.

JOB output result:



The screenshot shows a z/OS JCL editor window titled 'Session B - [24 x 80]'. The menu bar includes 'File', 'Edit', 'View', 'Communication', 'Actions', 'Window', and 'Help'. The main display area shows the output of a PUT job. The command is 'BROWSE USER1.ZFIL4AWS.JCL (PUT) - 01.41'. The output text is as follows:

```
***** TOP OF DATA *****
ZFM033I Running Zfile4aws Beta Version:1.4.0 AwsSDK Version:1.12.305 javamainfr
ZFM040I Compression method used: class com.ibm.jzos.CompressionFactory$GZIPBuffe
ZFM041I ICSF Encrypt key label used: TDES.BACKUP.01
ZFM007I File /cloud/USER1.BACKUP.LINKLIB uploaded to bucket01 bucket
ZFM050I End of input file reached, ddname=FILEIN
ZFM007I File /cloud/USER1.BACKUP.LINKLIB_0000001 uploaded to bucket01 bucket
ZFM007I File /cloud/USER1.BACKUP.LINKLIB_0000002 uploaded to bucket01 bucket
ZFM037I File USER1.BACKUP.LINKLIB Uploaded Total size=108294564 Bytes, in 3 seg
ZFM045I Zfile4aws completed, RC=0
***** BOTTOM OF DATA *****
```

The status bar at the bottom shows '04/021' and 'Connected to remote server/host 192.168.2.46 using port 3271'.

Example 3 – LIST job (List cloud objects)

JCL used to list objects USER1.BACKUP.**

```
Session B - [24 x 80]
File Edit View Communication Actions Window Help

Menu Utilities Compilers Help

BROWSE USER1.ZFIL4AWS.JCL (LIST) - 01.02 Line 0000000000 Col 001 080
Command ==> Scroll ==> PAGE

***** Top of Data *****
//LIST JOB (), 'LIST OBJECT', NOTIFY=&SYSUID,
// CLASS=S, MSGCLASS=X, REGION=0M, TIME=1440 TYPRUN=SCAN
// *
// * List all cloud objects with name starting by USER1.BACKUP
// *
// JCLLIB ORDER=(USER1.ZFIL4AWS.JCL)
// EXPORT SYMLIST=*
// EXEC ZFILPROC, OPER='list', ARG1='-fp USER1.BACKUP',
// CONF='user1_Config01.txt'
//
***** Bottom of Data *****

MA b 04/015
Connected to remote server/host 192.168.2.46 using port 3271
Type here to search
```

JOB output result:

```
Session B - [24 x 80]
Display Filter View Print Options Search Help

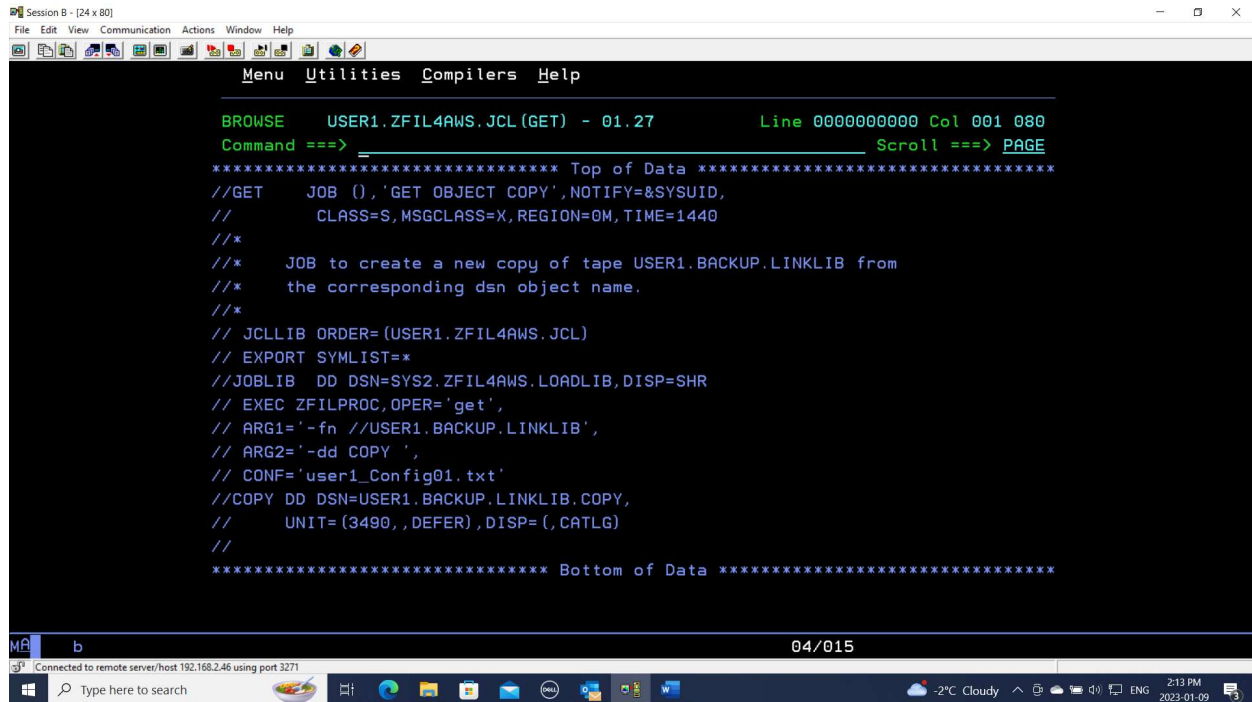
SDSF OUTPUT DISPLAY LIST J0407950 DSID 104 LINE 0 COLUMNS 02- 81
COMMAND INPUT ==> SCROLL ==> PAGE

***** TOP OF DATA *****
ZFM033I Running Zfile4aws Beta Version:1.4.0 AwsSDK Version:1.12.305 javamainfr
- USER1.BACKUP.LINKLIB (size = 50 MB) Mon Jan 09 12:28:44 EST 2023
- USER1.BACKUP.LINKLIB_0000001 (size = 50 MB) Mon Jan 09 12:35:38 EST 2023
- USER1.BACKUP.LINKLIB_0000002 (size = 3 MB) Mon Jan 09 12:36:00 EST 2023
ZFM045I Zfile4aws completed, RC=0
***** BOTTOM OF DATA *****

MA b 04/021
Connected to remote server/host 192.168.2.46 using port 3271
Type here to search
```

Example 4 – GET job (download or restore cloud objects to z/OS ds)

JCL used to get object copy of USER1.BACKUP.LINKLIB

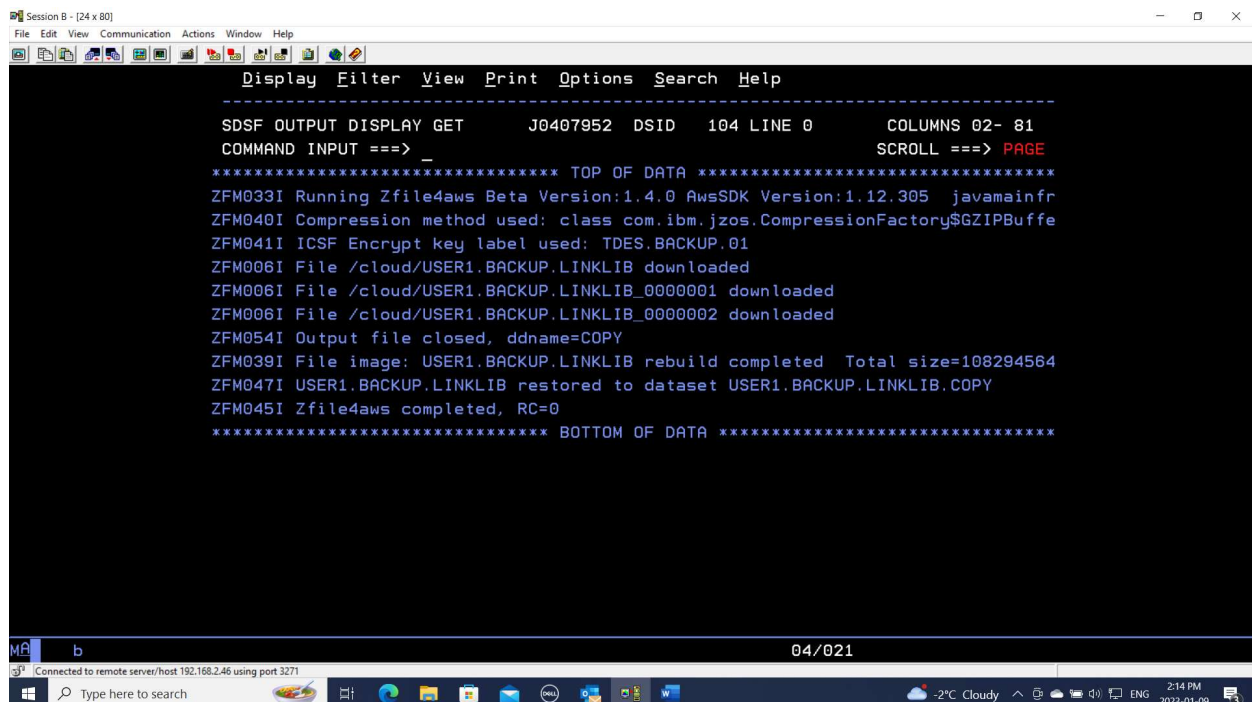


The screenshot shows a z/OS JCL editor window titled "Session B - [24 x 80]". The menu bar includes File, Edit, View, Communication, Actions, Window, and Help. The toolbar contains various icons for file operations. The main text area displays the following JCL code:

```
BROWSE      USER1.ZFIL4AWS.JCL(GET) - 01.27      Line 0000000000 Col 001 080
Command ==> _____ Scroll ==> PAGE
***** Top of Data *****
//GET      JOB (), 'GET OBJECT COPY', NOTIFY=&SYSUID,
//          CLASS=S, MSGCLASS=X, REGION=0M, TIME=1440
//*
//*      JOB to create a new copy of tape USER1.BACKUP.LINKLIB from
//*      the corresponding dsn object name.
//*
// JCLLIB ORDER=(USER1.ZFIL4AWS.JCL)
// EXPORT SYMLIST=*
//JOBLIB DD DSN=SYS2.ZFIL4AWS.LOADLIB, DISP=SHR
// EXEC ZFILPROC, OPER='get',
// ARG1='-fn //USER1.BACKUP.LINKLIB',
// ARG2='-dd COPY ',
// CONF='user1_Config01.txt'
//COPY DD DSN=USER1.BACKUP.LINKLIB.COPY,
//       UNIT=(3490,, DEFER), DISP=(,CATLG)
//
***** Bottom of Data *****
```

The status bar at the bottom shows "04/015" and "Connected to remote server/host 192.168.2.46 using port 3271". The Windows taskbar at the bottom shows the date and time as 2:13 PM on 2023-01-09.

JOB output result:



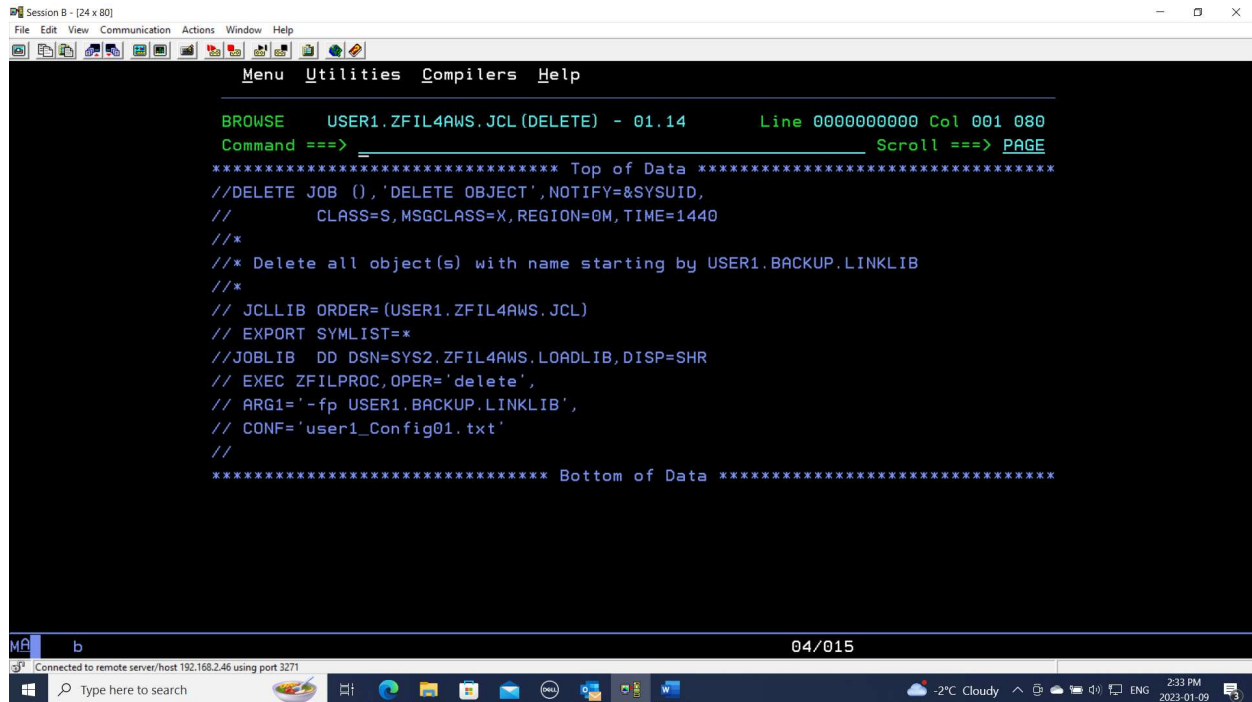
The screenshot shows a z/OS JCL editor window titled "Session B - [24 x 80]". The menu bar includes File, Edit, View, Communication, Actions, Window, and Help. The toolbar contains various icons for file operations. The main text area displays the following output:

```
Display Filter View Print Options Search Help
-----
SDSF OUTPUT DISPLAY GET      J0407952 DSID   104 LINE 0      COLUMNS 02- 81
COMMAND INPUT ==> _____ SCROLL ==> PAGE
***** TOP OF DATA *****
ZFM033I Running Zfile4aws Beta Version:1.4.0 AwsSDK Version:1.12.305 javamainfr
ZFM040I Compression method used: class com.ibm.jzos.CompressionFactory$GZIPBuffe
ZFM041I ICSF Encrypt key label used: TDES.BACKUP.01
ZFM006I File /cloud/USER1.BACKUP.LINKLIB downloaded
ZFM006I File /cloud/USER1.BACKUP.LINKLIB_0000001 downloaded
ZFM006I File /cloud/USER1.BACKUP.LINKLIB_0000002 downloaded
ZFM054I Output file closed, ddname=COPY
ZFM039I File image: USER1.BACKUP.LINKLIB rebuild completed Total size=108294564
ZFM047I USER1.BACKUP.LINKLIB restored to dataset USER1.BACKUP.LINKLIB.COPY
ZFM045I Zfile4aws completed, RC=0
***** BOTTOM OF DATA *****
```

The status bar at the bottom shows "04/021" and "Connected to remote server/host 192.168.2.46 using port 3271". The Windows taskbar at the bottom shows the date and time as 2:14 PM on 2023-01-09.

Example 5 – DELETE job (delete object(s) from cloud bucket)

JCL used to delete objects USER1.BACKUP.LINKLIB.**



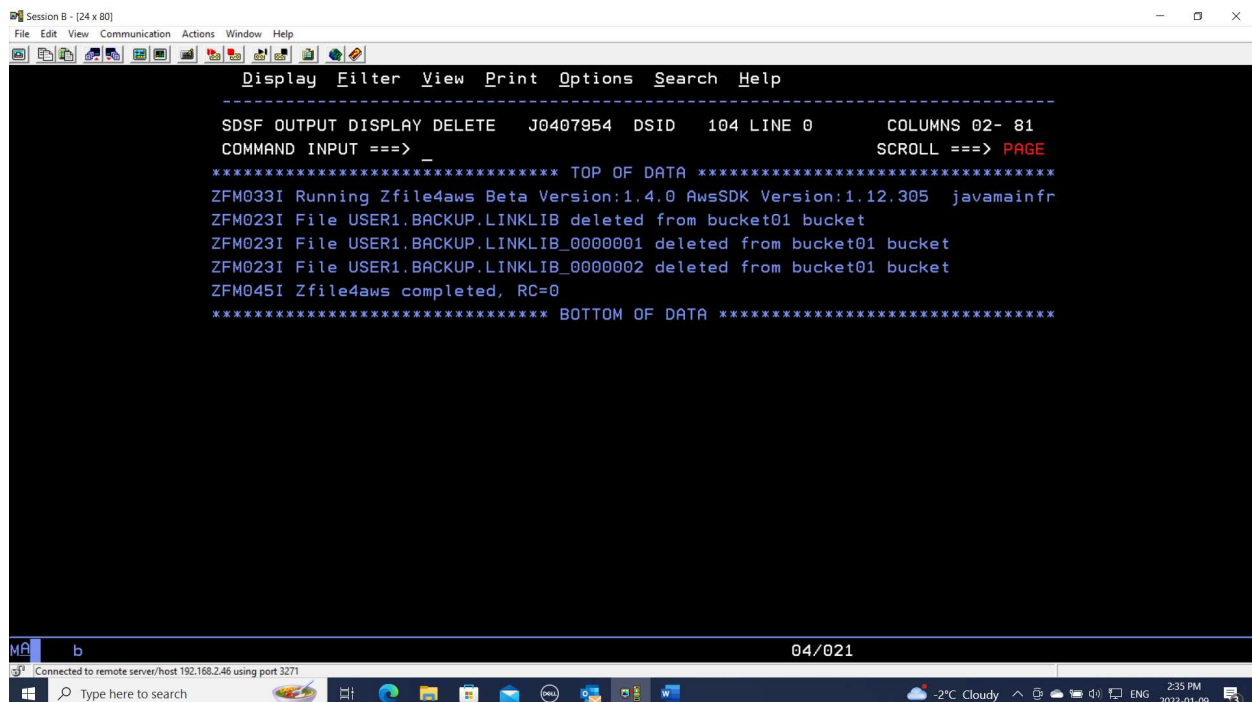
The screenshot shows a terminal window titled 'Session B - [24 x 80]' with a menu bar (File, Edit, View, Communication, Actions, Window, Help) and a toolbar. The main area displays JCL code for a job named 'USER1.ZFIL4AWS.JCL (DELETE)'. The code includes comments and JCL statements for deleting objects from a cloud bucket. The status bar at the bottom shows '04/015'.

```
Menu Utilities Compilers Help

BROWSE      USER1.ZFIL4AWS.JCL (DELETE)  - 01.14      Line 0000000000 Col 001 080
Command ==> _ Scroll ==> PAGE
***** Top of Data *****
//DELETE JOB (), 'DELETE OBJECT', NOTIFY=&SYSUID,
//      CLASS=S, MSGCLASS=X, REGION=0M, TIME=1440
//*
/* Delete all object(s) with name starting by USER1.BACKUP.LINKLIB
/*
// JCLLIB ORDER=(USER1.ZFIL4AWS.JCL)
// EXPORT SYMLIST=*
//JOB LIB DD DSN=SYS2.ZFIL4AWS.LOADLIB, DISP=SHR
// EXEC ZFILPROC, OPER='delete',
// ARG1='-fp USER1.BACKUP.LINKLIB',
// CONF='user1_Config01.txt'
//
***** Bottom of Data *****

MA b 04/015
Connected to remote server/host 192.168.2.46 using port 3271
Type here to search
```

JOB output result:



The screenshot shows the output of the JCL job in a terminal window titled 'Session B - [24 x 80]'. The output displays the job's execution details, including the command input, the top of data, and the bottom of data. The status bar at the bottom shows '04/021'.

```
Display Filter View Print Options Search Help

SDSF OUTPUT DISPLAY DELETE J0407954 DSID 104 LINE 0 COLUMNS 02- 81
COMMAND INPUT ==> _ SCROLL ==> PAGE
***** TOP OF DATA *****
ZFM033I Running Zfile4aws Beta Version:1.4.0 AwsSDK Version:1.12.305 javamainfr
ZFM023I File USER1.BACKUP.LINKLIB deleted from bucket01 bucket
ZFM023I File USER1.BACKUP.LINKLIB_0000001 deleted from bucket01 bucket
ZFM023I File USER1.BACKUP.LINKLIB_0000002 deleted from bucket01 bucket
ZFM045I Zfile4aws completed, RC=0
***** BOTTOM OF DATA *****

MA b 04/021
Connected to remote server/host 192.168.2.46 using port 3271
Type here to search
```

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Or download it from Github: [javamainframetools/Zfile4aws_V1R4_Beta](https://github.com/javamainframetools/Zfile4aws_V1R4_Beta)

Email should be answered with an attached zip file. Unzip it on your workstation and see installation instruction in the /doc subdirectory.

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Glossary of terms

JAVA

Java® is a widely used object-oriented programming language and software platform that runs on billions of devices, including notebook computers, mobile devices, gaming consoles, medical devices and many others. The rules and syntax of Java are based on the C and C++ languages.

Z/OS

z/OS®, a widely used mainframe operating system, is designed to offer a stable, secure, and continuously available environment for applications running on the mainframe. z/OS today is the result of decades of technological advancement.

JES2

A z/os subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system.

JCL

Job Control Language is required to run job process in batch mode on z/OS.

JZOS

Utility required to run JAVA standalone application in batch mode.

AWS S3

Amazon Simple Storage Service (Amazon S3) is an object storage service offering industry-leading scalability, data availability, security, and performance. Customers of all sizes and industries can store and protect any amount of data for virtually any use case, such as data lakes, cloud-native applications, and mobile apps.