

XRS+ z/OS Audit Data Collector (XRP)

Installation and Users Guide

Version 2.3.0

June 2016



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1. Introduction

Data Management is a vital activity in a modern data centre. The ever increasing amounts of data make it necessary to find easy solutions to manage the backup and recovery process in a z/OS environment. XRS for z/OS and XRS+ simplify the handling of these demands as part of the data management process.

New requirements have also resulted in an increased complexity. These requirements are not technically but rather legally orientated. New legislation (e.g. Sarbanes Oxley aka SOX and the upcoming 8th European Directive aka EuroSox) and the resulting compliance and audit rules now require that companies do business in a transparent and reproducible way, with rules for accounting and reporting.

These changes have had a dramatic knock-on effect as most business processes are handled by IT systems. One major part is data handling and reporting. Companies must now prove that everything possible has been done to secure and maintain data.

Up to now the motto of IT departments has been: "Just Do It!"

With the new regulation it will be: "Do it, Control it, Document it and Prove it!"

XRS+ also offers a powerful and comfortable method of collecting the system information required to analyse, report and monitor who did what with your corporate z/OS production data.

1.1. XRP

This document describes the installation and usage of the XRS+ z/OS Audit Data Collector (XRP). XRP extracts data from the IBM z/OS catalogs (using IDCAMS) and from the IBM z/OS "System Management Facility" (SMF).

Information pertaining to dataset and file access (e.g. creation, deletion, read, write, etc.) is extracted and formatted. The data can then be imported by XRS+ for analysis and reporting in a workstation environment.

XRP is "only" the data extraction tool for XRS+. Please consult the XRS+ documentation, for further information regarding the analysis functions. XRS+ is an optional product for the eXtended Recovery System for z/OS.

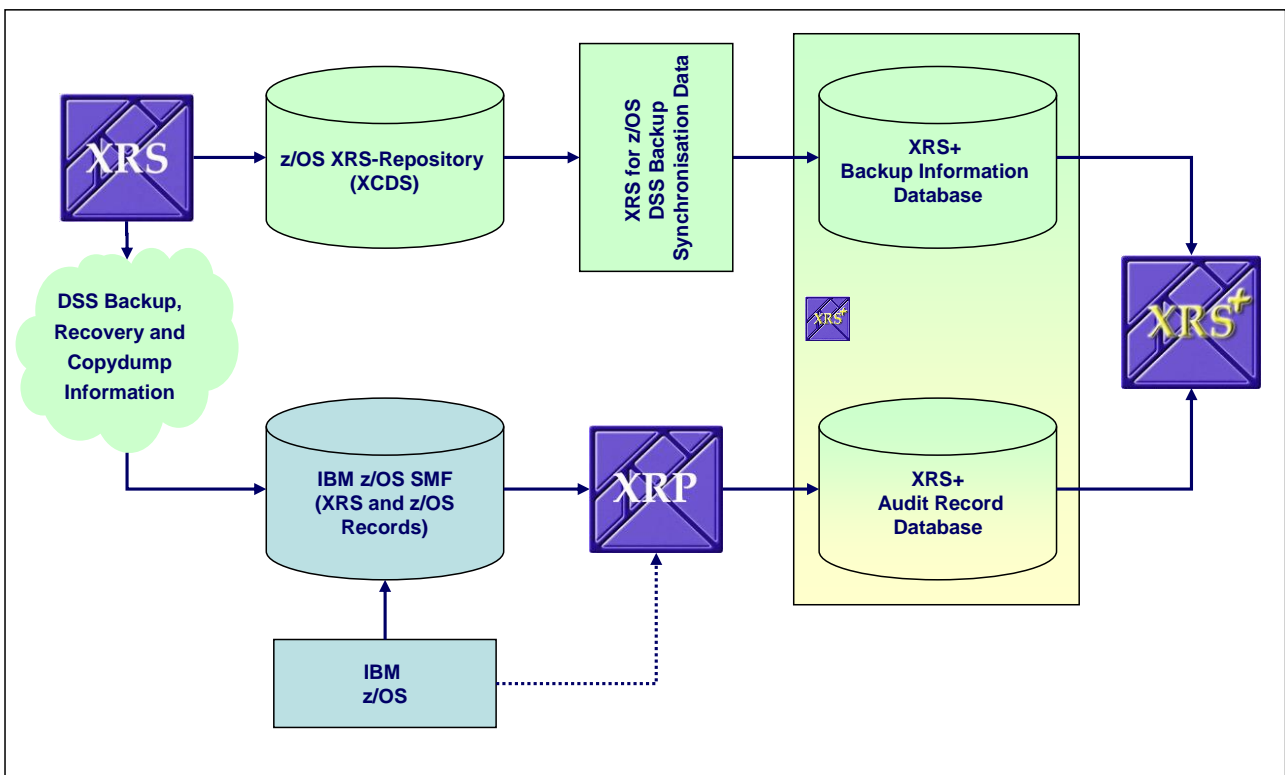
2. How does XRP work?

XRP extracts dataset related information from your DCollect and SMF data. The extracted data must then be transferred to a server/workstation and loaded with the XRS+ Import Manager into a SQL database.

The XRS+ client may then be used to view and analyse the dataset information. These functions are in addition to the normal backup and recovery management features offered by XRS for z/OS and XRS+.

2.1. XRS / XRS+ Dataflow

The following diagram demonstrates the dataflow using from z/OS to and XRS+.



Graphic 1: XRS / XRS+ Dataflow

The XRS for z/OS Repository (XCDS) is synchronised with the XRS+ database using export files. The XRS+ Import Manager loads the exported data into the local SQL databases

Audit data is extracted using XRP. Data is then also transferred to the platform running XRS+ using export files. The XRS+ Import Manager loads the exported data into the local SQL databases.

3. XRP Installation

3.1. Software Prerequisites

The following IBM software is required:

- z/OS

All releases are supported.

The following **improvIT Software Innovations** software is also needed:

- eXtended Recovery System for z/OS (XRS) v480 or higher.
- eXtended Common Services (XCS) v280 or higher. XCS is the common runtime environment for all improvIT Software Innovations products. It does not need to be purchased separately.

3.2. Other Prerequisites

To utilise all XRS+ audit benefits, activate the collection of the following SMF record types in your IBM z/OS system:

Type	Function
14	A non-VSAM dataset is closed for input
15	A non-VSAM dataset is closed for output
18	A non-VSAM dataset is renamed
30	A JOB/STC/TSU starts
36	An ICF catalog is exported
42	A x37 abend is issued
59	MVS/BDT completes a file-to-file transmission
61	A DEFINE is issued
62	A VSAM cluster or component is opened
64	A VSAM cluster or component is closed or abends
65	An IDCAMS DELETE is issued
66	An IDCAMS ALTER is issued
80	A RACF security violation occurs
92	An OPENMVS file is closed
2xx	If you use the IBM tool DFSMSHsm, then turn on the SMF recording function (to collect "Function Statistics Records"). Insert the command "SETSYS SMF" into your DFSMSHsm init deck.
2yy	Activate the SMF recording for XRS for z/OS (in XRS\$\$OPT).

Table 1: Processed z/OS SMF Record Types

3.3. Runtime Datasets

XRP consists of one loadlib (SXRPLoad) and one samplib (SXRPSAMP) containing the installation JCL and the sample jobs.

XCS consists of two loadlibs (SXCSLOAD and SXCSAPF).

All files are delivered in TSO transmit format. To install XRP, just transfer the xmit files in binary mode to your host system (e.g. using FTP). The files must be extracted using the TSO Receive command. The target dataset names can be specified at this point. See the sample "\$XRP\$REC".

The following JCL shows a sample extract job:

```
//S1RECV EXEC PGM=IKJEFT01,DYNAMNBR=30
//SYSPRINT DD SYSOUT=*
//SYSTSPRT DD SYSOUT=*
//SYSTSIN DD *
  PROFILE NOPREFIX

  RECEIVE INDSN('?????????.XRP230.SXRPLoad.XMI')
           DSNAME('?????.XRP230.SXRPLoad')

  RECEIVE INDSN('?????????.XRP230.SXRPSAMP.XMI')
           DSNAME('?????.XRP230.SXRPSAMP')

  RECEIVE INDSN('?????????.XCS280.SXCSAPF.XMI')
           DSNAME('?????.XCS280.SXCSAPF')

  RECEIVE INDSN('?????????.XCS280.SXCSLOAD.XMI')
           DSNAME('?????.XCS280.SXCSLOAD')
/*
```

Listing 1: Extracting delivery datasets

It is recommended, that the XCS and XRP load libraries are defined in the Linklist concatenation. Alternatively the load libraries may be added to a Steplib concatenation.

Note: The target dataset for uploaded XMIT files should be pre-allocated and must have a logical record length of 80.

3.4. Licence Key

To use XRP you will need a licence key. This key is supplied by **improvIT Software Innovations**.

The key needs to be installed using the samplib member "ACTXRPLI". The sample job updates the licence information in the XRP loadlib.

3.5. XRP Core Options

XRP allows the customisation of variable/optional SMF user record types. The values are maintained using a simple assembler options module (see samplib “XRP\$\$OPT”). The resulting module is loaded and processed during runtime.

```

                                TITLE 'XRP DEFAULT OPTIONS MODULE'
XRP$$OPT CSECT
XRP$$OPT AMODE 31
XRP$$OPT RMODE 24
                                USING XRP$$OPT,12
XRP$NAME DC    CL8'XRPODFLT'      OPTIONS NAME
XRP$TXRS DC    X'00'              XRP XRS RECTYPE (TYPE ...)
XRP$THSM DC    X'00'              XRP HSM RECTYPE (TYPE ...)
                                DC    XL02'00'      -- FREE FOR FUTURE USE --
XRP$SELE DC    C'Y'              ALLOW DSN SELECTION (VIA SYSIN)
                                DC    XL03'00'      -- FREE FOR FUTURE USE --
                                END

```

Listing 2: XRP Core Options in XRP\$\$OPT

Some SMF record types are installation specific. If you do not want XRP to process one or both of these products (XRS for z/OS, IBM DFSMSHsm), then enter the record type value X'00'. Otherwise enter the value in hex.

Parameter	Description
XRP\$NAME	Specify a string to identify the used options during runtime
XRP\$TXRS	Specify the record type (in hex) for the user records that are written by the improvIT product XRS for z/OS. These records contain IBM DSS backup and recovery data
XRP\$THSM	Specify the record type (in hex) of the HSM Function Statistics Records (FSR)
XRP\$SELE	Allow dataset filtering to be used to select only relevant SMF input records. If you do not want to allow the selection of specific DCOLLECT or SMF records, then specify the value 'N' in the XRP\$SELE field.

Table 2: XRP Runtime Parameters

Warning: Do not change the specified field lengths!

4. Getting started with XRP

4.1. Running XRP

XRP consists of two batch job types, that either read SMF or DCollect data. In both cases XRP extracts all required dataset related records, processing the necessary fields and writing the information into an output file.

4.2. Processing DCollect Data

This job should be run directly after the XRP installation and then on a regular basis (e.g. once per month).

The first step collects information for all active datasets in your system, the second step for all inactive (migrated) datasets in your system. The third step calls XRP to process the results. This data can, for example, be used in XRS+ to establish whether datasets are correctly integrated in the backup management process.

The following JCL shows the required processing:

XRS+ z/OS Audit Data Collector (XRP)

```
/* *****  
/* GATHER DCollect INFORMATION FOR ALL A C T I V E DATASETS *  
/* *****  
//STEP01 EXEC PGM=IDCAMS  
//OUTDC DD DSN=????XRP999.DCOLLEC1,  
// DISP=(,CATLG,DELETE),  
// SPACE=(CYL,(10,10),RLSE),  
// DCB=(RECFM=VB,LRECL=644,BLKSIZE=0)  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *  
DCOLLECT -  
OUTFILE(OUTDC) -  
VOLUME(*)  
/*  
/* *****  
/* GATHER DCollect INFORMATION FOR ALL I N A C T I V E DATASETS *  
/* *****  
//STEP02 EXEC PGM=IDCAMS  
//MCDS DD DISP=SHR,DSN=????MCDS <----- YOUR HSM MCDS  
//OUTDC DD DSN=????XRP999.DCOLLEC2,  
// DISP=(,CATLG,DELETE),  
// SPACE=(CYL,(10,10),RLSE),  
// DCB=(RECFM=VB,LRECL=644,BLKSIZE=0)  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *  
DCOLLECT -  
OUTFILE(OUTDC) -  
MIGRATEDATA  
/*  
/* *****  
/* EXECUTE XRP (INPUT IDCAMS DCollect) *  
/* *****  
//STEP03 EXEC PGM=XRPLMAIN,PARM='IDC'  
//STEPLIB DD DISP=SHR,DSN=????XRP230.SXRPLOAD  
// DD DISP=SHR,DSN=????XCS280.SXCSAPF  
// DD DISP=SHR,DSN=????XCS280.SXCSLOAD  
// *  
//XRPDINPT DD DISP=OLD,DSN=????XRP999.DCOLLEC1  
// DD DISP=OLD,DSN=????XRP999.DCOLLEC2  
// *  
//XRPDEXPT DD DSN=????XRP214.XRPEXP1,  
// UNIT=SYSDA,DISP=(,CATLG,DELETE),  
// SPACE=(CYL,(50,50),RLSE)  
//SYSPRINT DD SYSOUT=*  
/* The selection of datasetnames is only allowed if enabled in XRP$$OPT module:  
//SYSIN DD *  
INC=SYS*  
INC=PROD*  
/*
```

Listing 3: XRP batch job (DCollect input)

4.3. Processing SMF Data

This job should be run after the SMF records have been dumped. This can be performed directly after the dump or as part of the daily SMF processing.

The following JCL shows the required processing:

```
//*****
//* EXECUTE XRP (INPUT SMF) *
//*****
//STEP01 EXEC PGM=XRPLMAIN, PARM='SMF'
//STEPLIB DD DISP=SHR, DSN=????.XRP230.SXRPLDAD
//        DD DISP=SHR, DSN=????.XCS280.SXCSAPF
//        DD DISP=SHR, DSN=????.XCS280.SXCSLOAD
//*
//XRPDINPT DD DISP=SHR, DSN=<YOUR SMF DATA>
//*
//XRPDEXPT DD DSN=????.XRP999.XRPEXP2,
//          UNIT=SYSDA, DISP=(,CATLG,DELETE),
//          SPACE=(CYL,(50,50),RLSE)
//SYSPRINT DD SYSOUT=*
//* The selection of datasetnames is only allowed if enabled in XRP$$OPT module:
//SYSIN DD *
INC=SYS*
INC=PROD*
/*
```

Listing 4: XRP SMF processing job

4.4. Data Selection / Filtering

Generally, only information relating to production datasets should be collected. Otherwise the amount of collected data can be extremely large. XRP permits input data to be filtered using INclude or EXclude statements. A maximum of 99 filter statements may be specified within one step. Each filter statement may contain one dataset name. Simple generic dataset names (containing one asterisk at the end of the string) may also be specified (see above sample jobs).

A mix of INclude and EXclude statements within one step is not allowed.

All records are collected if no filter statements are specified.

The used filter statements are displayed after processing in the XRP job log.

Note: INC/EXC statements are case sensitive and must start in column 1.

4.5. Processing Collected Data

The collected data must be transferred in binary mode to the workstation or server on which the XRS+ Import Manager is implemented. The XRS+ Import Manager can be externally triggered using a batch scheduler or can monitor specified directories for input files. The data may then be analysed/audited using the XRS+ GUI Client. Please consult the XRS+ documentation for further information.

The import runtime can vary according to the underlying hardware and implemented SQL database server. The amount of collected data can be very large, depending on the installation. If the XRS+ import execution times are too long, then one solution maybe to collect, transfer and load smaller amounts of data more than once per day.

4.6. XRP Return Codes

The following values are returned by program XRPLMAIN:

Return Code	Description
0	Processing successful
8	Invalid INC / EXC control statements entered
12	Required DD statement missing
16	Unexpected error
36	Licence error

Table 3: XRP return codes

5. Classification of XRP records

5.1. Record Categories

When XRP analyses DCollect or SMF data, the saved information is classified into three major categories (types):

Major Type	Description
INIT	Used for all DCollect records
ACCESS	These are all normal SMF records (record type less than 128)
BACKUP	These are the XRS and HSM records (SMF user records)

Table 4: SMF Record Type Audit Groups

Additionally every saved entry is also classified using a minor type.

5.2. SMF Record Associations

The following table shows the collected SMF record types and the corresponding XRP major and minor types. It is possible to select records in the XRS+ GUI using the major and/or minor types.

Type	Source	Audit Major Type	Audit Minor Type
n/a	Dataset information from a DCollect extract using XRP	INIT	INITIAL
14	A non-VSAM dataset is closed for input/output	ACCESS	READ/WRITE
15	A non-VSAM dataset is closed for input/output	ACCESS	READ/WRITE
18	A non-VSAM dataset is renamed	ACCESS	RENAME
30	A JOB/STC/TSU starts (only to get the userid)	n/a	n/a
36	An ICF catalog is exported	BACKUP	EXPORT
42	A x37 abend is issued	ACCESS	ABEND_x37
59	MVS/BDT completes a file-to-file transmission	ACCESS	FTP
61	A DEFINE is issued	ACCESS	DEFINE
62	A VSAM cluster or component is opened	ACCESS	OPEN
64	A VSAM cluster or component is closed or abends	ACCESS	CLOSE
65	An IDCAMS DELETE is issued	ACCESS	DELETE
66	An IDCAMS ALTER is issued	ACCESS	ALTER
80	A RACF security violation occurs	ACCESS	VIOLATION
92	An OPENMVS file is closed	ACCESS	CLOSE
2xx	If you use the IBM tool DFSMSHsm, then turn on the SMF recording function (to collect "Function Statistics Records"). Insert the command "SETSYS SMF" into your DFSMSHsm init deck.	BACKUP	Depends on the action (e.g. HBACKUP)
2yy	Activate the SMF recording for XRS for z/OS (in XRS\$\$OPT).	BACKUP	Depends on the action (e.g. DUMP, COPY)

Table 5: SMF Record Type Association

6. Viewing the XRP data in XRS+

The following sample screenshot shows how XRS+ displays the collected z/OS SMF and XRS for z/OS data. In this example, all entries for one dataset are shown.

The screenshot shows the XRS+ application window titled "XRS+ by improvIT Software Innovations GmbH". The main window displays "Potential Dataset Backup Flaws - nonVSAM" and "Audit" results. The "Audit results" tab is active, showing 72 audit results records and 1 selected record. A table lists the audit records with columns for Dataset Name, Action Date/Time, Action Type, Jobname, and User ID. The selected record is highlighted in blue.

Dataset Name	Action Date/Time	Action Type	Jobname	User ID
[-] CUST.XRS4710.POE1.E37TEST				
[-] 18.02.2010				
CUST.XRS4710.POE1.E37TEST	18.02.2010 10:05:23.70	ACCESS / DEFINE	CUST#20#	CUSTREN
CUST.XRS4710.POE1.E37TEST	18.02.2010 10:05:24.16	ACCESS / WRITE	CUST#20#	CUSTREN
CUST.XRS4710.POE1.E37TEST	18.02.2010 10:05:24.18	ACCESS / WRITE	CUST#20#	CUSTREN
[-] 23.02.2010				
CUST.XRS4710.POE1.E37TEST	23.02.2010 11:20:13.09	ACCESS / DEFINE	CUST#20#	CUSTREN
CUST.XRS4710.POE1.E37TEST	23.02.2010 11:20:13.83	ACCESS / WRITE	CUST#20#	CUSTREN
CUST.XRS4710.POE1.E37TEST	23.02.2010 11:20:13.85	ACCESS / WRITE	CUST#20#	CUSTREN
[-] 24.02.2010				
CUST.XRS4710.POE1.E37TEST	24.02.2010 13:55:14.64	ACCESS / DEFINE	CUST#20#	CUSTREN
CUST.XRS4710.POE1.E37TEST	24.02.2010 13:55:15.06	ACCESS / WRITE	CUST#20#	CUSTREN
CUST.XRS4710.POE1.E37TEST	24.02.2010 13:55:15.07	ACCESS / WRITE	CUST#20#	CUSTREN
[-] 25.02.2010				
CUST.XRS4710.POE1.E37TEST	25.02.2010 10:21:51.51	ACCESS / DEFINE	CUST#20#	CUSTREN
CUST.XRS4710.POE1.E37TEST	25.02.2010 10:21:51.94	ACCESS / WRITE	CUST#20#	CUSTREN
CUST.XRS4710.POE1.E37TEST	25.02.2010 10:21:51.96	ACCESS / WRITE	CUST#20#	CUSTREN
[-] 26.02.2010				
CUST.XRS4710.POE1.E37TEST	26.02.2010 07:31:44.11	ACCESS / DEFINE	CUST#20#	CUSTREN

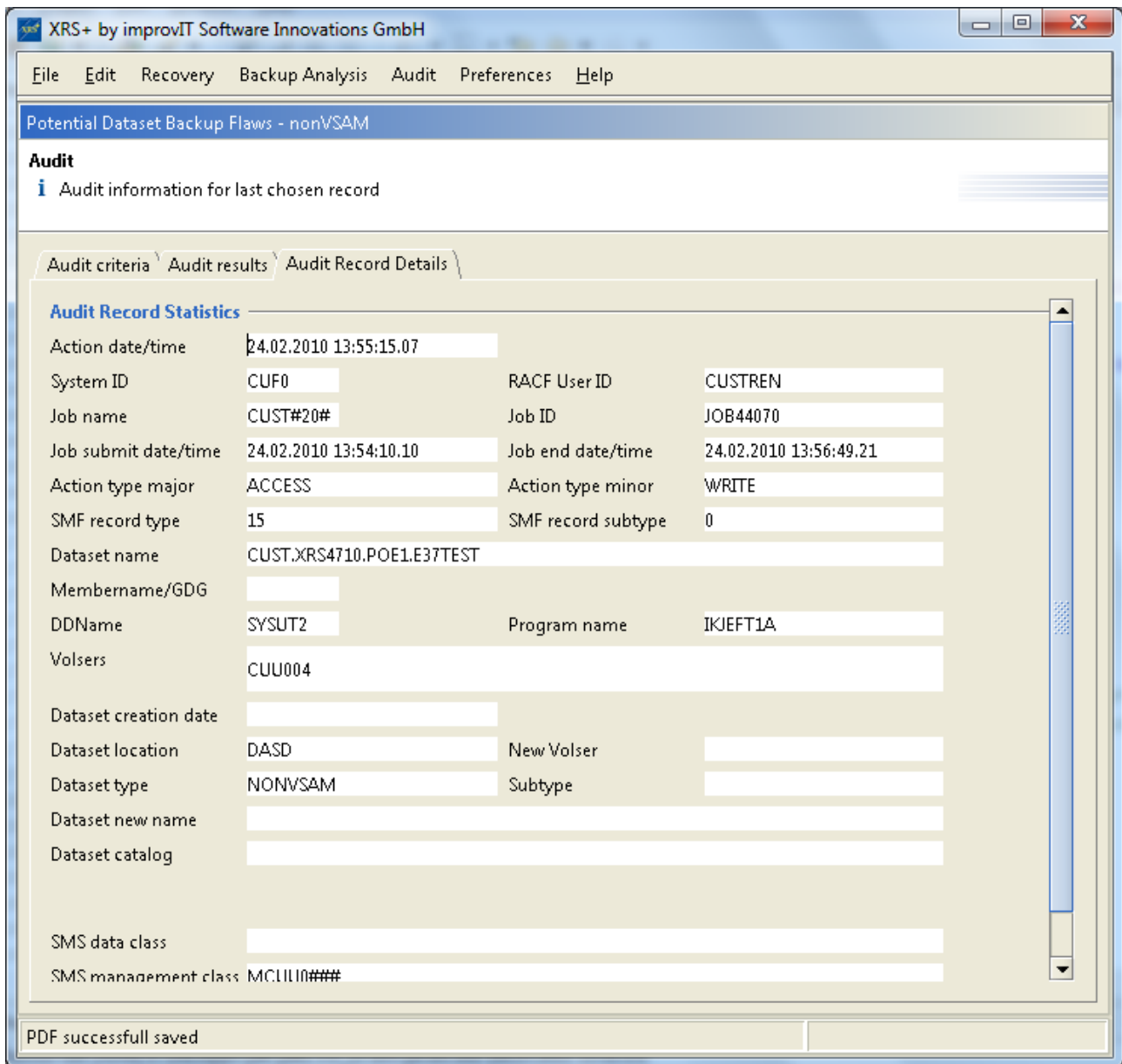
Buttons at the bottom: Print List, Save List..., Select all, Deselect, Collapse all.

Status bar: PDF successfull saved

Graphic 2: XRS+ Audit Result List

XRS+ z/OS Audit Data Collector (XRP)

The following screenshot shows all available details for one action. In this case a backup information record is displayed.



Graphic 3: XRS+ Action Details

The same data can also be used to recover datasets and perform various analysis functions. Please consult the XRS+ Users Guide for detailed information.

7. XRP Release Information

7.1. New in XRP Version 2.3

- Internal optimization.

7.2. New in XRP Version 2.2

- XRP Initial records can now contain information about migrated datasets.

7.3. New in XRP Version 2.1

- Support for dataset selection via SYSIN (INC/EXC).

7.4. New in XRP Version 2.0

- Support for XRS and HSM SMF records.
- Binary export data processing.
- Support for XRS+ file type recognition.

7.5. Migrating to XRP Version 2.3

There are no specific migration issues. XRS+ v2.3 must be used to process data created by XRP v2.3.

XRS for z/OS v480 (or higher) must also be implemented.

8. Contact

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