



IBM IT Education Services

VSE Connectors Workshop

E02 | **Setup of VSAM Redirector**

VSE Technical Conference

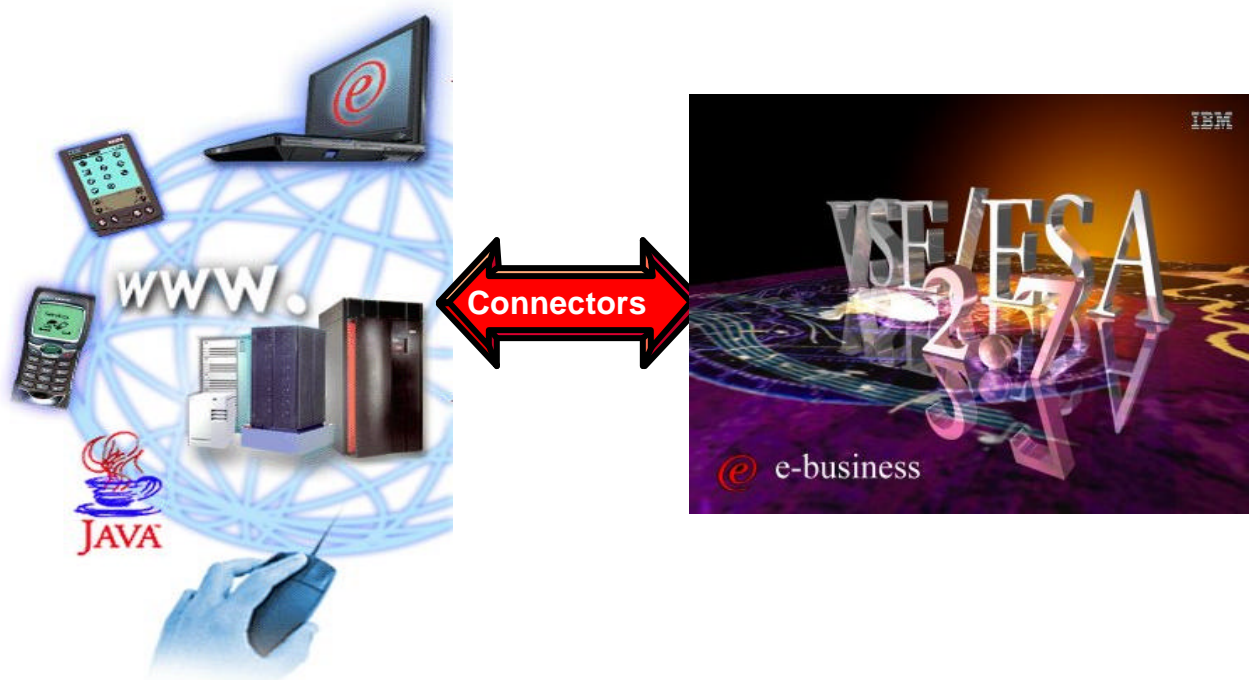
November 10 - 12, 2003 | Hilton, Las Vegas,
NV

© 2003 IBM
Corporation

VSE Connectors Workshop

Setup of VSAM Redirector

VSE Technical Conference 2003



Wilhelm Mild, Ingo Franzki
VSEESA@de.ibm.com

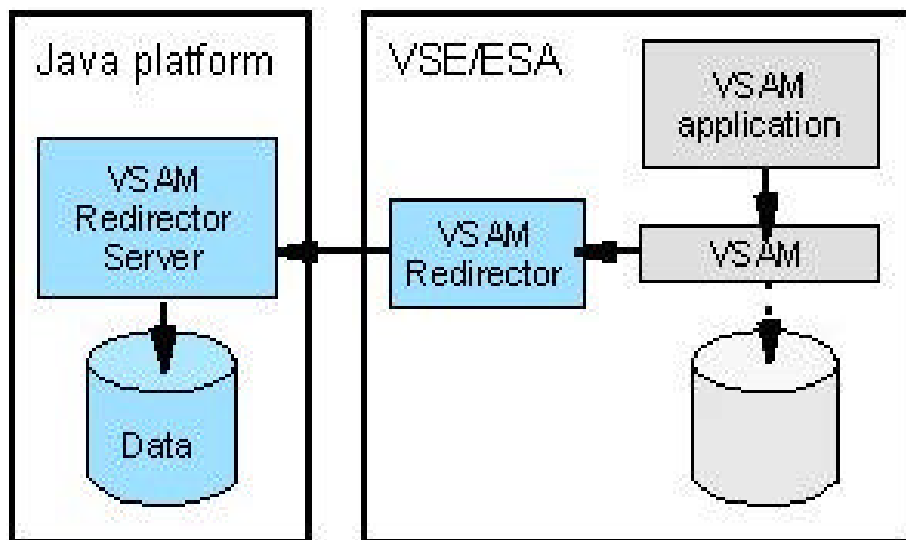
© Copyright IBM Corporation 2003

IBM @server. For the next generation of e-business.

VSE/ESA 2.6/2.7

VSAM Redirector

The VSAM Redirector is a new VSE/ESA connector, introduced with VSE/ESA 2.6. The VSAM Redirector allows you to redirect all requests to a certain VSAM file into any other file system or database on any other (Java-enabled) platform. VSE/ESA is the client, while the server part runs on any other Java-enabled platform like Windows.



For example you could use the VSAM Redirector to synchronize a VSAM file with a DB2 database running on a Windows. By using the VSAM Redirector your existing VSAM programs doesn't require any revisions.

The VSAM Redirector makes use of a so called VSAM Data Access Exit (VDA). This exit intercepts all VSAM requests. The exit gets control at OPEN, CLOSE, and for all data requests (GET, PUT, INSERT,...).

A configuration table is used to define which VSAM files are being "redirected". The VSAM Redirector Client on VSE forwards all requests against a redirected file to the VSAM Redirector Server which then handles the request.

The VSAM Redirector Server is a Java application. It can run on any Java enabled platform.

Redirect VSAM requests to a HTML page on Windows - Overview

Initial state:

→ You have a VSAM file that contains data

(**FLIGHT.ORDERING.ORDERS**)

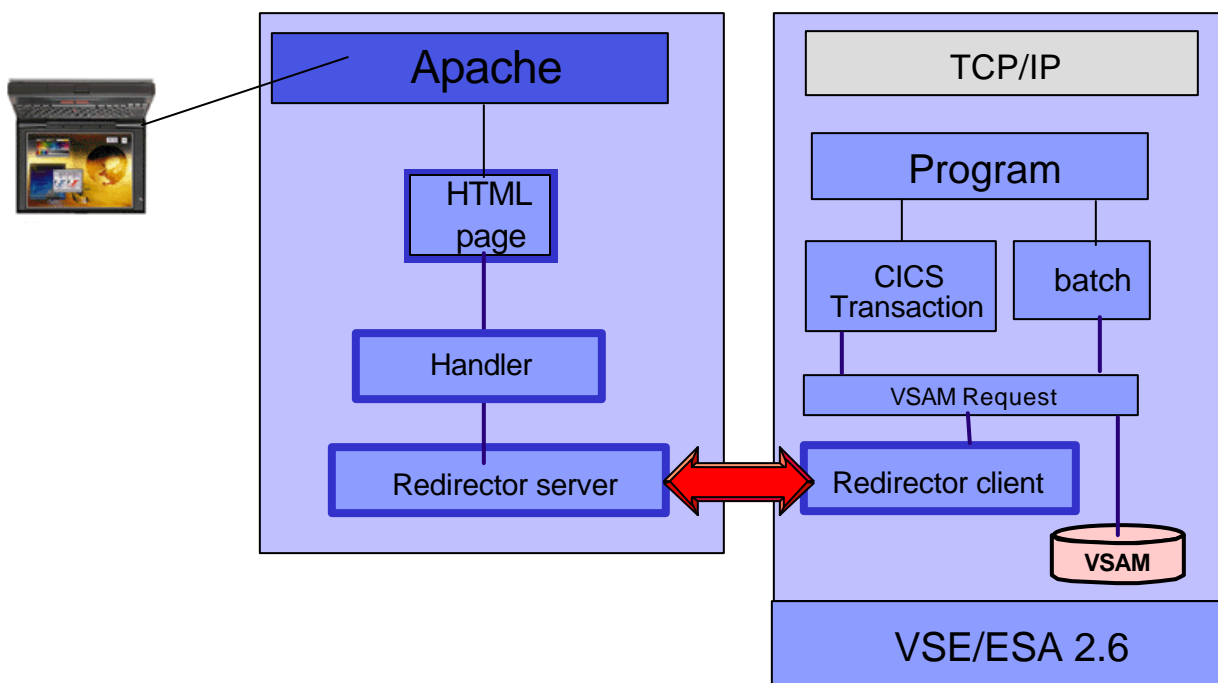
→ You have applications that work with that VSAM file
(i.e. batch applications, CICS Application, tools like Ditto)

Goal:

→ Redirect all VSAM INSERT requests to a HTML page on Windows

→ This operation can be done with existing applications (without changing/touching them)

NOTE: The VSAM Redirector Server does NOT require the VSE Connector Client on Windows



Chapter1: Steps for installation of VSAM Redirector server on Windows

STEP1.1: [Navigate to VSE Redirector Server home page](#)




Open the VSE Homepage with a web browser:

<http://www-1.ibm.com/servers/eserver/zseries/os/vse/>

Click on "[Service and Support](#)" on the left side and then on "[e-business connectors and utilities](#)".

The page you see contains the VSAM Redirector Server and some tools that can be downloaded for free.

Navigate to the **VSAM Redirector Server** which represents the remote component of the VSAM Redirector.

VSAM Redirector Server	Updated: 06/2003
Use your existing applications (e.g. COBOL programs) without any changes, to work with data on any Java-enabled platform. Provides a Java-based server which communicates with the VSAM Redirector Client on VSE.	 
W-book: IESVSMRD.W in PRD1.BASE	
Platform: VSE/ESA 2.6 or later	
 Details and Download	

Click on:

[Details and Download](#)

The page explains the most important functions of the VSAM Redirector Server, which is the Java part of the VSAM Redirector function.

Steps for installation on a workstation

STEP1.2: Verification if Java environment installed

To install the VSAM Redirector a Java Virtual Machine must be installed on Windows.

- To just run Java programs, the JRE 1.3.x or later is needed (Java Runtime Environment),
- to develop/compile Java programs, JDK 1.3.x or later is needed (Java Developer Kit, which includes the JRE).

To verify if a Java Virtual Machine is installed, open a command prompt and hit command:

```
java -version
```

You should see something like:

```
Java version "1.3.1"  
Java(TM) 2 Runtime Environment, Standard Edition
```

If the messages above are shown go to STEP1.4.

STEP1.3: Install JDK if not on the system

If following message is shown:

'Java' is not recognized as an internal or external command, operable program or batch file.

- > your system has no Java virtual machine (Runtime Environment) installed.

To install a Java Virtual machine on the PC do:

On the same HTML page (*Service and Support -> VSE e-business Connectors*):

[VSAM Redirector Server -> Details and Download](#)

in section: **Installation** you will find a link where you can download the Java Developer Kit from IBM.

<http://www.ibm.com/developerworks/java/>

or you can download a SUN Version from <http://www.sun.com>

Install the downloaded JDK 1.3.x. or later and reboot the workstation.

Steps for installation on a workstation

STEP1.4: [Download VSE Redirector server Code](#)

With Java installed, navigate on [VSAM Redirector Server -> Details and Download](#) to:

Download latest Code via HTML

and click on: [redir270-pq74694.zip](#) (VSE 2.6 and 2.7). The file name may vary since it contains an APAR number. Please make sure you have applied the corresponding APAR on your VSE system.

The download process will be started. You will be prompted to specify where to save the code. *Save it in a place you remember later on.*

Download via FTP:

An alternative to the HTML download can be an FTP download if the code is on a FTP server.

For that issue commands:

```
ftp <ppp.xxx.yyy.zzz>  
cd </pub/directory>  
bin  
mget *.zip
```

After the code is *downloaded it must be unzipped.*

The ZIP file contains the following files:

install.class, install.bat, install.cmd, install.sh

Note: The VSAM Redirector server is also shipped and installed with the VSE base product in Library PRD1.BASE as member *iesvsmrd.w*. You can download it from there in binary format and rename it to *redir27.zip*. But the newest level will always be on the Internet.

Steps for installation on a workstation

STEP1.5: Install VSE Redirector Server

To install the VSAM Redirector server, open a Windows command line and change current directory to the one where *install.class* resides.

Type:

```
java install
```

or start the *install* program **install.bat**

This will guide you through the installation process of the VSAM Redirector Server.

The VSAM Redirector Server consists of:

- the VSAM Redirector Server code
- a detailed HTML documentation about the functions and possibilities
- two sample handlers, one for relational databases (i.e.DB2) and one for HTML
 - The HTML handler allows, to collect data inserted into a VSAM cluster, on a HTML page on Windows
 - The DB2 handler allows the synchronization of a VSAM cluster with a remote DB2 database
- documentation how to develop own handlers.

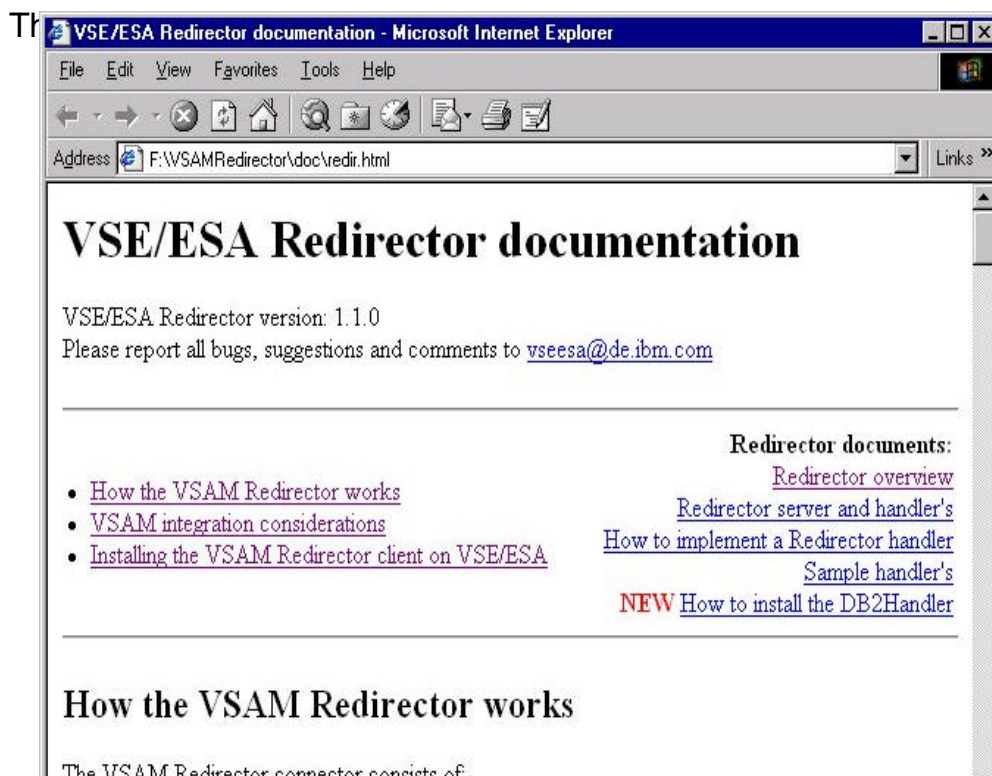
NOTE: The VSE Redirector Server does NOT require the VSE Connector Client

Verify installation of VSAM Redirector Server

STEP1.6: Verify Redirector server Documentation

To verify that the VSAM Redirector Server is installed properly,
open the HTML Documentation

(For Windows: **START -> Programs -> VSAM Redirector -> Online Help**)



STEP1.7: Start VSE Redirector server

To start the VSAM Redirector Server, execute:

run.bat in the <redirector> directory or

use **START -> Programs -> VSAM Redirector -> Start Server**)

• Commands for Redirector server:

status - shows the status of the server

stop x / all - stop client with number 'x' (show in status) or stop all clients

quit - stop all clients and exit server

IBM @server. For the next generation of e-business.

Redirect a VSAM requests to a HTML page

STEP1.8: Redirector Server -> Handler

To be able to work with VSAM data on another platform (ASCII), the most important component is the **Handler**.

The handler is responsible for data manipulation and conversion. Therefore it must know the structure (mapping) of the VSAM record.

The handler used in the workshop is the **HtmlHandler.class** stored in directory: <redir>\com\ibm\vse\htmlhandler

The handler needs a map to split the record into fields. This map does not need to be defined on the VSE system, but you can reuse a already defined map.

A map for a VSAM cluster can be defined with the **Maptool**, **VSE Navigator** or **IDCAMS RECMAP** utility.

We work with the VSAM Cluster **FLIGHT.ORDERING.ORDERES**

The **ORDERES_MAP** is already defined.

In the used HTML handler <redir>com\ibm\vse\htmlhandler\HtmlHandler.java the mapping is hard coded.

The Record Layout of the **ORDERES** Cluster is defined as follows:

Offset	Length	Type	Key	Field Name	Description
0	20	STRING	no	FIRST_NAME	First Name
20	20	STRING	no	LAST_NAME	Last Name
40	4	UNSIGNED	no	FLIGHT_NUMBER	Flight Number
44	4	UNSIGNED	no	SEATS	Seats
48	1	BINARY	no	NON_SMOKE	Smoker 0=no

The Record length is 49 Bytes

The Record Layout is reflected in the Map **ORDERES_MAP**

Chapter2: VSE Settings to redirect a VSAM cluster

STEP2.1: Configuration for Redirector Client on VSE/ESA

To redirect requests for the:

- VSAM cluster: **FLIGHT.ORDERING.ORDERS.TEAMxx**
- in VSAM catalog: **VSESP.USER.CATALOG**

We have to setup the Configuration phase (**IESRDCFG.PHASE**).

In this phase we have to define which VSAM cluster should be redirected to which remote location, and eventually filter which requests.

For that a skeleton in ICCF Library 59 is shipped, called **SKRDCFG**

It was copied to your primary library.

The definitions for the redirected file were extracted into member **RDCFGxx** where xx is your team ID

This was done to be able to build at the end one phase with the settings from all attendees.

Edit skeleton RDCFGxx:

Change the sample entry in the configuration as shown below.

Enter **CASE M** in the command line to switch to mixed case mode before editing.

```
IESRDENT CATALOG='VSESP.USER.CATALOG' , X
        CLUSTER='FLIGHT.ORDERING.ORDERS.TEAMxx' , X
        EXIT='IESREDIR' , X
        OWNER=VSAM, X
        IP='<ip-addr>' , X
        HANDLER='com.ibm.vse.htmlhandler.HtmlHandler' , X
        OPTIONS=''
```

The most important parameter is **OWNER**:

OWNER=VSAM means the READ requests will be done from the VSAM cluster and the INSERTS will be done to VSAM and to the remote site specified in IP.

That means a synchronization takes place.

OWNER=REDIRECTOR means all requests are redirected to the remote site.

VSE Settings to redirect a VSAM cluster

In your skeleton **SKRDCFG** consider:

- let the job load IESRDCFG into the SVA (Step 2)
- let the job copy IESVEX01 to IKQVEX01 in PRD2.CONFIG (Step 3)
- let the job load IKQVEX01 into the SVA (Step 4)
- do NOT let the job load IESRDANC into the SVA, because it has already be done (Step 5)
- let the job execute IESRDLDA to register the new configuration (Step 6)
- **submit SKRDCFG** and check for RC=0000 (this is only to test for errors)

If the **RC=0** tell the instructor and he'll activate your definitions.

STEP2.2: Access the VSAM file with Ditto

Make sure the Redirector server is started on your Windows (STEP1.7)

Use **Ditto (2) Edit or update data -> (1) Edit VSAM data**

Enter the VSAM cluster name: **FLIGHT.ORDERING.ORDER.STEAMxx**

Enter the catalog name: **VSESP.USER.CATALOG**

Monitor the Redirector server console on Windows and press **<ENTER>**

You must see the connection messages.

On VSE:

1. You should see the preloaded records from VSAM file (if OWNER=VSAM)
2. Make sure Ditto works in **CHAR** mode (upper right corner)
3. **Insert** in the first **40 (0-39)** characters of the record (first name, last name)
4. Change the mode Ditto works in **HEX** (upper right corner)
5. Now from position **39** you can key in the numeric fields (two times 4 byte numbers and a binary field that can be 00 or 01 – as the map describes them in *STEP1.8*)
6. Add as much records as you want
7. At the command line hit **save** or press **PF3**
8. The Redirector Console on Windows should show a message that the **output.html** page was created.
9. Open the HTML page in <redir> directory (*output.html*)

You should see your inserted records only.

Change the OWNER to REDIRECTOR and you'll see each time you open in Ditto the cluster, it's empty – because it will nor read from VSAM anymore.

Chapter3: Redirect a VSAM file to HTML

STEP3.1: Change Handler to read VSAM record as string

Exit Ditto on VSE and stop the Redirector server on Windows using command **quit**.

The handler on Windows should be changed to be able to use string fields only.

The handler is stored in `<redir>\com\ibm\vse\htmlhandler` as **HtmlHandler.java**

Edit the file and make following changes:

1. Change the HTML header tag to create an HTML page that will refresh itself all 5 seconds.

```
<html><head><title>VSE/ESA Redirector sample</title>  
    <meta http-equiv=refresh content=5></head>
```

2. Change the lines in the source as below to read a string of 49 char.

- Define all fields as String:

String firstname, lastname, flightnumber, seats, smoker;

- Make the changes below in the source code (it's in the last 3-rd)

```
    firstname = requestInfo.getString(0, 20);  
    lastname  = requestInfo.getString(20, 20);  
    flightnumber = requestInfo.getString(40, 4);  
    seats = requestInfo.getString(44, 4);  
    smoker = requestInfo.getString(48, 1);  
    // smoktmp = requestInfo.getString(48, 1);  
    // if(smoktmp.length > 0)  
    //     if( smoktmp[0] == 0 )  
    //         smoker = false;  
    //     else  
    //         smoker = true;  
    ....  htmloutput.newLine();  
         htmloutput.flush();
```

Save the changed file.

To be able to compile it we have to update the CLASSPATH temporary.

```
set CLASSPATH=VsamRedir.jar;.;%CLASSPATH%
```

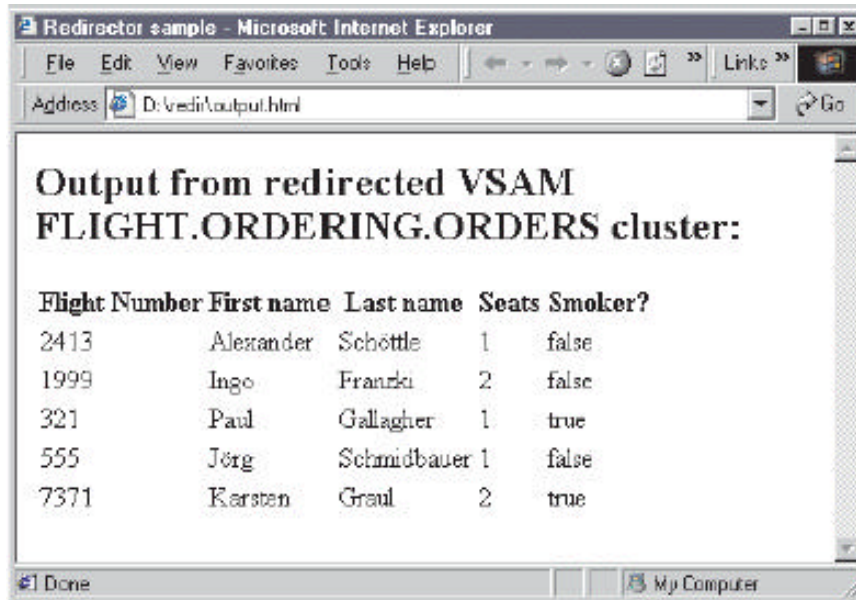
In `<redir>` type:

```
javac com\ibm\vse\htmlhandler\HtmlHandler.java
```

3. Test the changed handler.

Restart the Redirector server on Windows. In `<redir>` type: **run.bat**

Use Ditto again, in **CHAR** mode (right upper corner) add some records with 49 characters each. Now the **output.html** should refresh itself each 5 seconds and show the inserted records.

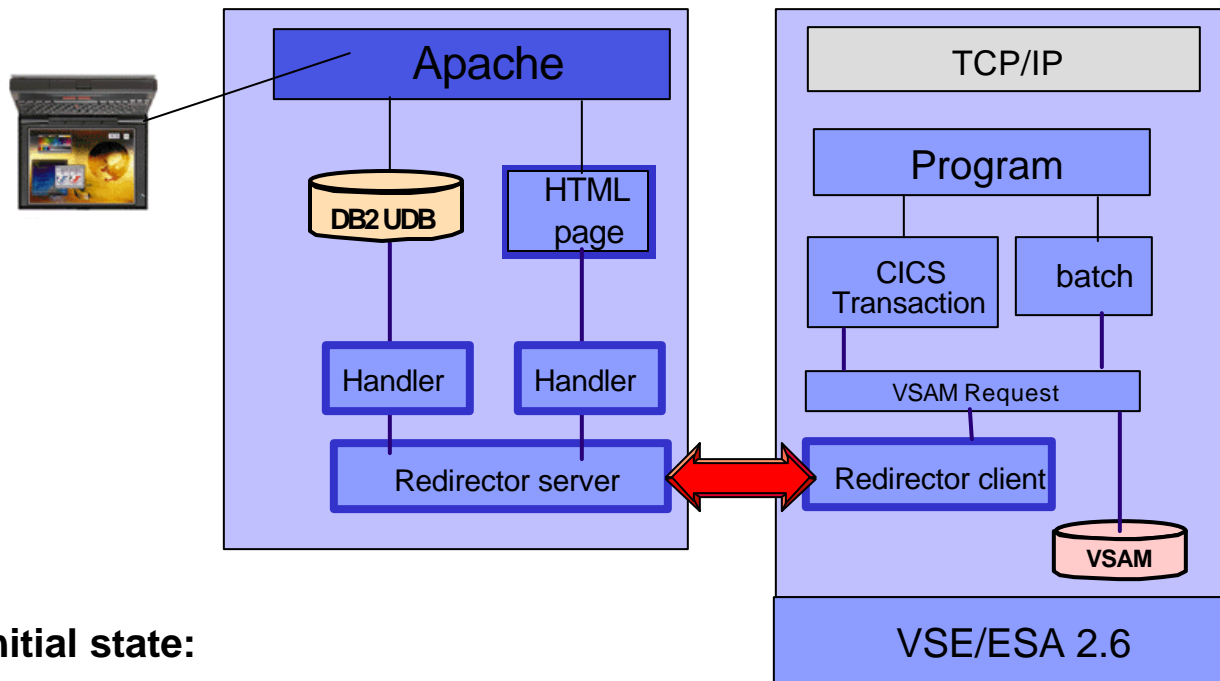


Summary

Major Steps to install VSAM Redirector Server on a Java Platform

- ✓ install Java Runtime Environment (JRE) or
- ✓ Java Developer Kit (JDK)
 - ✓ free download from SUN or IBM
 - ✓ version 1.3.x or later
 - <http://www.ibm.com/developerworks/java/>
- ✓ download VSAM Redirector Server
 - <http://www-1.ibm.com/servers/eserver/zseries/os/vse/support/vseconn/redirect.html>
- ✓ install VSAM Redirector Server
 - ✓ at a Windows command enter: `java install`
- ✓ Configure the VSAM clusters to be redirected on the VSE side using skeleton SKRDCFG from ICCF lib 59.

Chapter4: Redirect VSAM requests to a DB2 database on Windows



Initial state:

- You have a VSAM file that contains data (i.e. FFSTORES.DEMO.CLUSTER)
- You have applications that work with that VSAM file (i.e. FFST CICS Application)

Goal:

- Redirect all VSAM requests to DB2 UDB on Windows
- Access the data with existing applications (without changing them)

NOTE: The VSAM Redirector Server does NOT require the VSE Connector Client on Windows

STEP4.1: Define a map

To move the data into a database, you must know the format of the records.

Therefore you must do a mapping containing all fields including their offset in the record, length and type.

- Start the VSE Navigator, connect to the VSAM host, and navigate to the VSAM cluster [FFSTORES.DEMO.CLUSTER](#).
- Right click the Cluster, choose "[Create map definition](#)". Enter a name for the map, e.g. "[MAP](#)"
- Right click on the map, choose "[Change map definition](#)":

Redirect a VSAM file to DB2

Mapping of FFSTORES.DEMO.CLUSTER:

Field name	Type	Length	Offset
STOREID	STRING	0	6
STORENAME	STRING	6	25
LOCSTREET	STRING	31	25
LOCCITY	STRING	56	25
LOCZIP	STRING	81	10
LOCCOUNTRY	STRING	91	25
LOCREP	STRING	116	20
STOREN1	UNSIGNED	136	4
STOREN2	UNSIGNED	140	4
LDATE	STRING	144	10
WEBPIC1	STRING	154	20
WEBPIC2	STRING	174	20
ACODE	STRING	194	10

To verify the mapping, use the VSE Navigator to display the VSAM data. Right click on the map, choose "[Display VSAM Data](#)". On the "Display Filter" dialog box, press "OK" to display all records (no filter).



STO...	STORENAME	LOCSTREET	
000001	Frechdax	Elbeplatz 2	Boeblingen
000002	Cafe Keese	Reeperbahn 15	Hamburg
000003	Hotel Sacher	Hauptstr. 15	Wien
000004	Cafe Frech	Postplatz 3	Boeblingen
000005	Cafe Frech Filiale 1	Seestrasse 2	Boeblingen
000006	Cafe Frech Filiale 2	Schoenaicherstrasse	Boeblingen
000007	Cafe Frech Filiale 3	Blumenstrasse	Boeblingen

STEP4.2: [Export the mapping to a XML File](#)

The VSAM Redirector "Create DB2 Tables" tool reads the mapping from a XML file.

Right click on the map and choose "[Export map to XML](#)". Enter a filename (e.g. `ffstores.xml`). You will need this file in the next step.

Redirect a VSAM file to DB2

STEP4.3: Create the tables in the database

To continue with the next steps

- you must have installed a database management system (i.e. DB2).
- you must have a JDBC Driver for it (i.e. db2java.zip in <db2>\java\).
- you must be able to connect to the database (userid/password)

Make sure the JDBC driver is in the CLASSPATH. You may have to edit the **create.bat/create.cmd/create.sh** batch files as well as the **run.bat/run.cmd/run.sh** batch files and add the JDBC Driver Archive to the classpath:

```
set CLASSPATH=. ;xerces.jar ;<db2>\java\db2java.zip ;
                                %CLASSPATH%
```

Also the path must setup to contain the DB2 libraries.

Start the "Create DB2 Tables" utility (**create.bat/create.sh** or [START - Programs - VSAM Redirector - Create DB2 Tables](#)).

The tool prompts you for the following:

- XML Filename:** enter the name of the XML File you exported in the last step (i.e. [ffstores.xml](#))
- DB url:** enter a JDBC URL for your database, i.e. [jdbc:db2:sample](#)
- DB user:** enter a user id you use for accessing the database
- DB password:** enter the users password
- DB table name:** Enter the name of the data table, i.e. [FFSTORES](#). This table will later contain the VSAM data.
- Map table name:** Enter the name of the table that contains the mapping information, i.e. [FFSTORES_MAP](#). You can use the same map table for several clusters.
- Map name:** Enter the name of the map, i.e. [FFSTORES](#). This name is independent from the map defined with the VSE Navigator.
- DB system:** Enter [1 for DB/2](#), 2 for Oracle.
- The tool now imports the XML file and tries to connect to the database.
- Next, the map info table is created ([FFSTORES_MAP](#)). Enter "Yes" to continue.
- Then, the data table is created ([FFSTORES](#)). Enter "Yes" to continue.
- Cluster Type:** Enter 1 ([KSDS without AIX](#)).
- Primary key field:** Enter the name of the key field: [STOREID](#). Press enter to create the table and indexes.

Redirect a VSAM file to DB2

Before we can work with the data in the database, we have to load the data from VSAM into the database. To do this we define a second cluster, redirect this cluster and copy (repro) the original cluster into the redirected one.

STEP4.4: Define cluster `FFSTORES.REPRO.CLUSTER` with the same attributes as `FFSTORES.DEMO.CLUSTER`:

- KSDS
- Max/Avg. record length: 210
- Key Position: 0, Keylength: 6

STEP4.5: Configure the Redirector for `FFSTORES.REPRO.CLUSTER`:

Copy skeleton `SKRDCFG` from `ICCF Library 59` to your primary library. Edit/add a entry to the configuration table. Enter **CASE M** in the command line to switch to mixed case mode before editing.

```
IESRDENT CATALOG='VSESP.USER.CATALOG' , X
          CLUSTER='FFSTORES.REPRO.CLUSTER' , X
          EXIT='IESREDIR' , X
          OWNER=REDIRECTOR , X
          IP='<ip-addr>' , X
          HANDLER='com.ibm.vse.db2handler.DB2Handler' , X
          OPTIONS='dburl=jdbc:db2:<db>;dbuser=<userid> X
                  matable=FFSTORES_MAP;map=FFSTORES; X
                  dbpassword=<password>;dbtable=FFSTORES'
```

- let the job load `IESRDCFG` into the SVA (Step 2)
- let the job copy `IESVEX01` to `IKQVEX01` in `PRD2.CONFIG` (Step 3)
- let the job load `IKQVEX01` into the SVA (Step 4)
- let the job load `IESRDANC` into the SVA, if not already done (Step 5)
- let the job execute `IESRD LDA` to register the new configuration (Step 6)
- submit and check for `RC=0000`

Redirect a VSAM file to DB2

STEP4.6: Copy FFSTORES.DEMO.CLUSTER into FFSTORES.REPRO.CLUSTER:

Use the IDCAMS REPRO function to copy the contents of FFSTORES.DEMO.CLUSTER into the redirected FFSTORES.REPRO.CLUSTER:

```
* $$ JOB JNM=REPRO,CLASS=A,DISP=L
// JOB REPRO COPY FILE
// DLBL COPYIN,'FFSTORES.DEMO.CLUSTER',,VSAM,CAT=VSESPUC
// DLBL COPYOUT,'FFSTORES.REPRO.CLUSTER',,VSAM,CAT=VSESPUC
// EXEC IDCAMS,SIZE=AUTO
  REPRO INFILE (COPYIN) -
        OUTFILE (COPYOUT) -
        NOREUSE
/*
/&
* $$ EOJ
```

During the copy process, the VSAM Redirector Client will get control (at open time of FFSTORES.REPRO.CLUSTER) and will connect to the VSAM Redirector Server. In case this fails, a VSAM open error message will be displayed.

To verify the data in the DB/2 table, issue the following SQL statement, or use the DB/2 Control Center:

SELECT * FROM FFSTORES

UNIQRBAC...	STOREID	STORENA...	LOCSTREET	LOCCITY	LOCZIP	LOCCOUN...	LOCREP	STOREI
0	000001	Frechdax ...	Elbeplatz 2...	Boeblinge...	71032	Germany ...	Hiller	31
1	000002	Cafe Kees...	Reeperbah...	Hamburg ...	20000	Germany ...	Domina ...	31
2	000003	Hotel Sach...	Hauptstr. 1...	Wien ...	11111	Austria ...	Arnold S ...	31
3	000004	Cafe Frech...	Postplatz 3...	Boeblinge...	71032	Germany ...	Hiller	31
4	000005	Cafe Frech...	Seestrass...	Boeblinge...	71032	Germany ...	Hiller	31
5	000006	Cafe Frech...	Schoenaic...	Boeblinge...	71032	Germany ...	Hiller	31
6	000007	Cafe Frech...	Blumenstr...	Boeblinge...	71034	Germany ...	Hiller	31
7	000008	Cafe Frech...	Dahlienstr...	Boeblinge...	71034	Germany ...	Hiller	31
8	000009	Cafe Frech...	Rosenstra...	Boeblinge...	71034	Germany ...	Hiller	31
9	000010	Cafe Muell...	Marienplatz...	Munich ...	0000080000	Germany ...	Hiller	31
10	000011	McDonalds...	Main Street...	Melbourne ...	20000	Australia ...	Hiller	31
11	000012	Cafe Howa...	Harbor Ro...	Sydney ...	10000	Australia ...	Hiller	31
12	000013	McDonlad...	Main Street...	Perth ...	30000	Australia ...	Hiller	31

Redirect a VSAM file to DB2

STEP4.7: Configure the Redirector for FFSTORES.DEMO.CLUSTER:

Edit skeleton SKRDCFG:

Change the previously created entry in the configuration table.

Enter **case m** in the command line to switch to mixed case mode before editing. Change FFSTORES.REPRO.CLUSTER to FFSTORES.DEMO.CLUSTER

```
IESRDENT CATALOG='VSESP.USER.CATALOG' , X
        CLUSTER='FFSTORES.DEMO.CLUSTER' , X
        EXIT='IESREDIR' , X
        OWNER=REDIRECTOR, X
        IP='<ip-addr>' , X
        HANDLER='com.ibm.vse.db2handler.DB2Handler' , X
        OPTIONS='dburl=jdbc:db2:<db>;dbuser=<userid>; X
                mactable=FFSTORES_MAP;map=FFSTORES; X
                dbpassword=<password>;dbtable=FFSTORES'
```

- let the job load IESRDCFG into the SVA (Step 2)
- let the job copy IESVEX01 to IKQVEX01 in PRD2.CONFIG (Step 3)
- let the job load IKQVEX01 into the SVA (Step 4)
- do NOT let the job load IESRDANC into the SVA, because it has already be done (Step 5)
- let the job execute IESRD LDA to register the new configuration (Step 6)
- submit and check for RC=0000

STEP4.8: Finished.

You may have to reopen the VSAM file in CICS, since the VSAM Redirector configuration becomes active at open time.

You can now work with your VSAM applications which will fully transparently access DB2 data and think they are working with VSAM data .

Additional Information

- **VSE/ESA Home Page**

<http://www.ibm.com/servers/eserver/zseries/os/vse/>

- **e-business Connectors User's Guide**

SC33-6719

<http://www-1.ibm.com/servers/eserver/zseries/os/vse/pdf/ieswue21.pdf>

- **e-business connectors tools**

- <http://www.ibm.com/servers/eserver/zseries/os/vse/ebus/home.html>



- **e-business Connectivity for VSE/ESA**

SG24-5950

- **e-business Solutions for VSE/ESA**

SG24-5662

- **Servlet and JSP Programming**

SG24-5755

- **Linux Web Hosting with WebSphere,
DB2, and Domino**

SG24-6007

VSEESA@de.ibm.com



IBM @server. For the next generation of e-business.