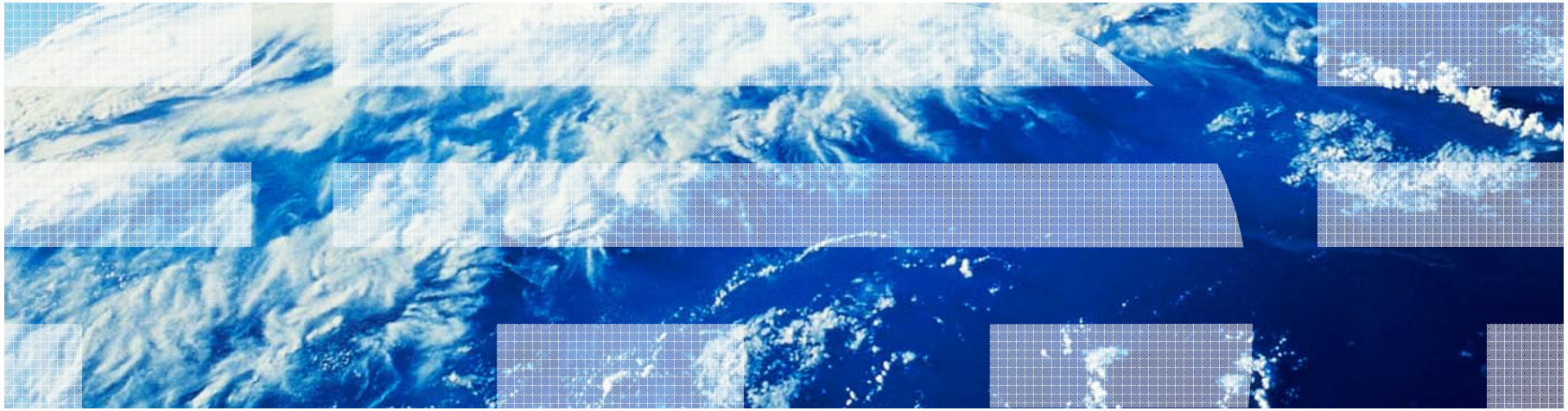
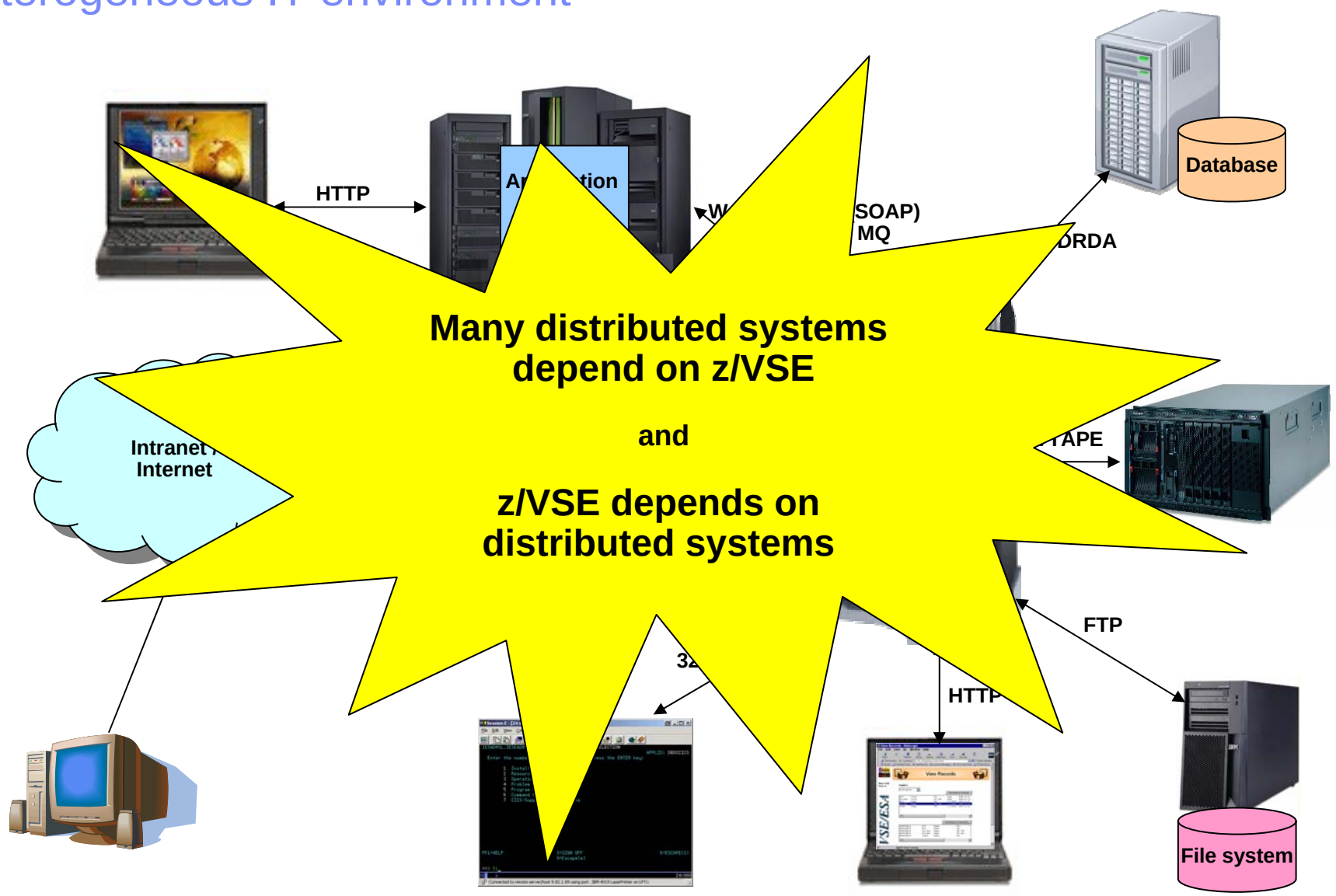
IS06 – z/VSE Connectors to trigger processes on distributed systems

Ingo Franzki
ifranzki@de.ibm.com

Karsten Graul
kgraul@de.ibm.com

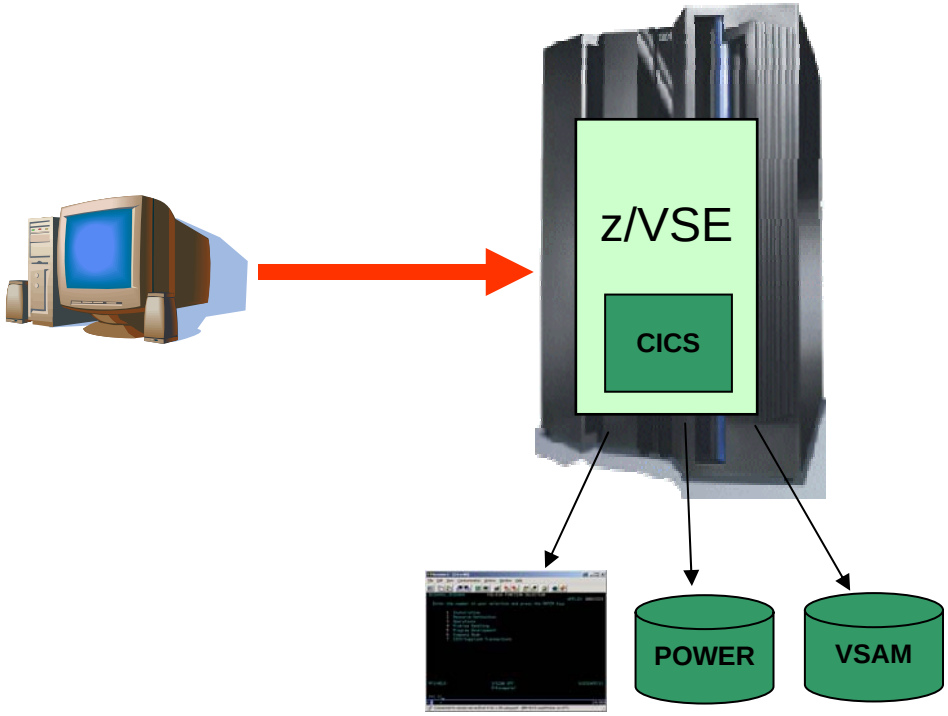


Heterogeneous IT environment



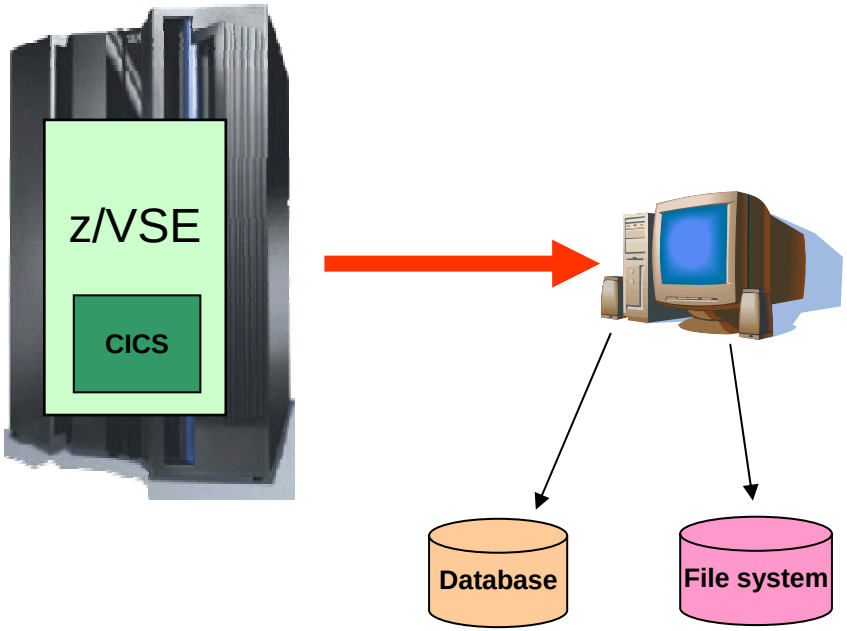
Distributed systems trigger actions on z/VSE

- **Submit a Job into z/VSE**
  - Using FTP into Reader
  - SubmitJob Java Program
  - ANT based automation
- **Issue Console commands**
  - IssueCommands Java Program
- **Trigger programs running on z/VSE**
  - Web Services (SOAP)
  - WebSphere MQ
  - CICS Transaction Gateway
- **Upload data to z/VSE for processing**
  - FTP into VSAM
  - Connectors



z/VSE triggers actions on distributed systems

- **Execute processes on distributed**
  - REXEC (Remote Exec)
  - VSE Script
- **Trigger programs running on distributed**
  - Web Services (SOAP)
  - WebSphere MQ
- **Send data for further processing**
  - FTP
  - Connectors
  - VSAM Redirector
  - VTAPE

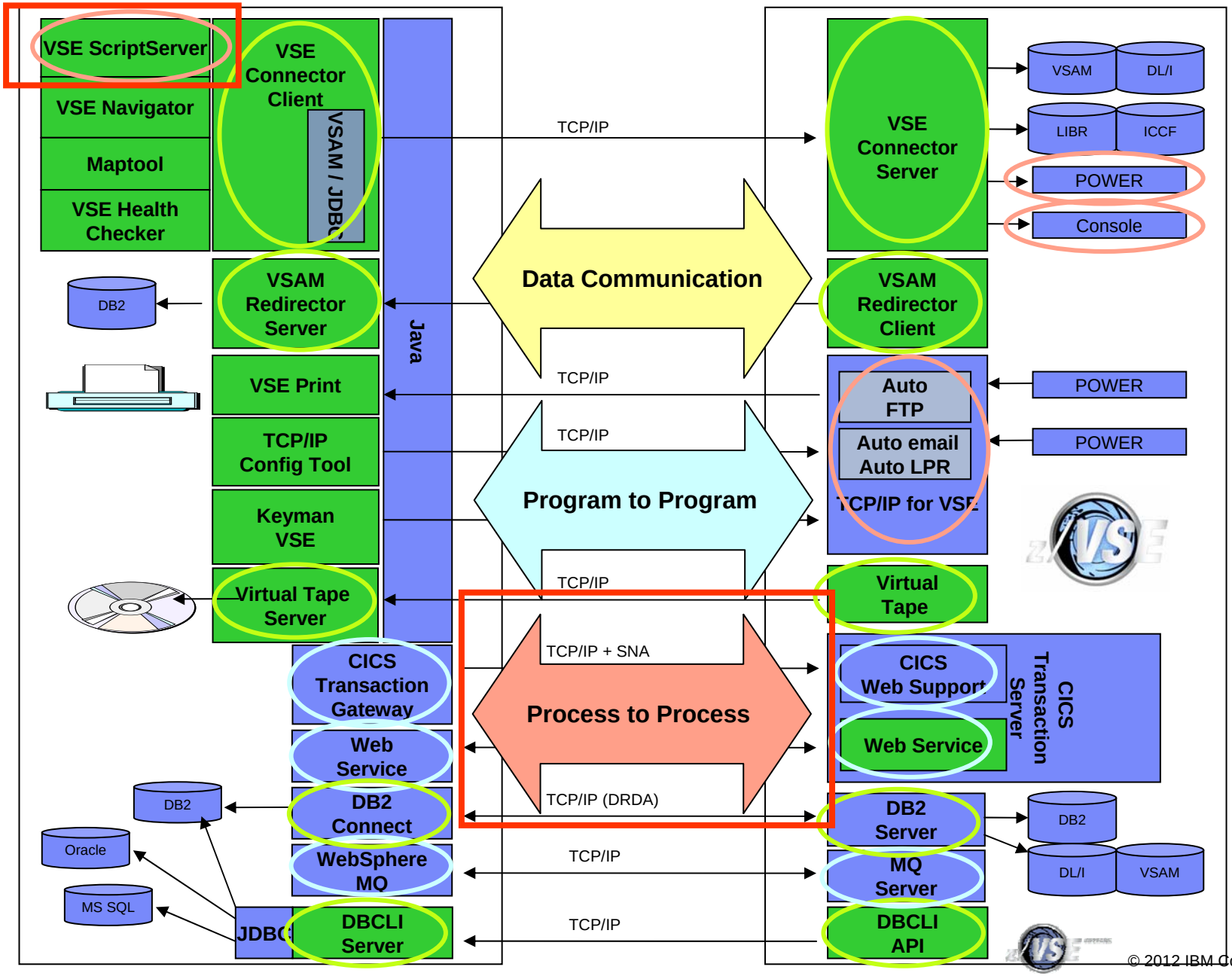


Different types of communication

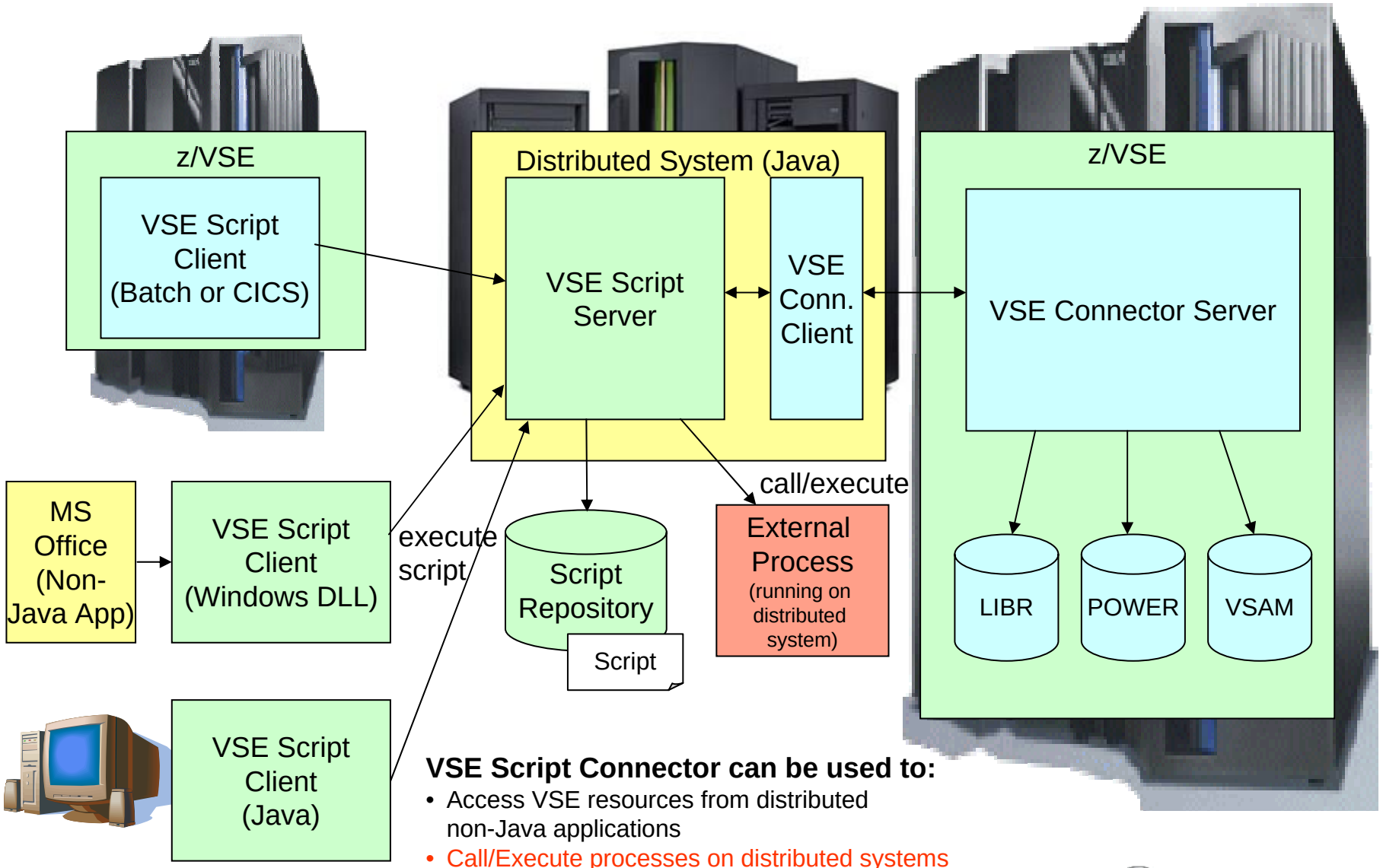
Data Communication
- Database, DRDA, DBCLI
- Connectors/Loaders
- FTP, VTAPE

Program to Program
- Web Services (SOAP)
- WebSphere MQ

Process to Process
- REXEC
- VSE Script



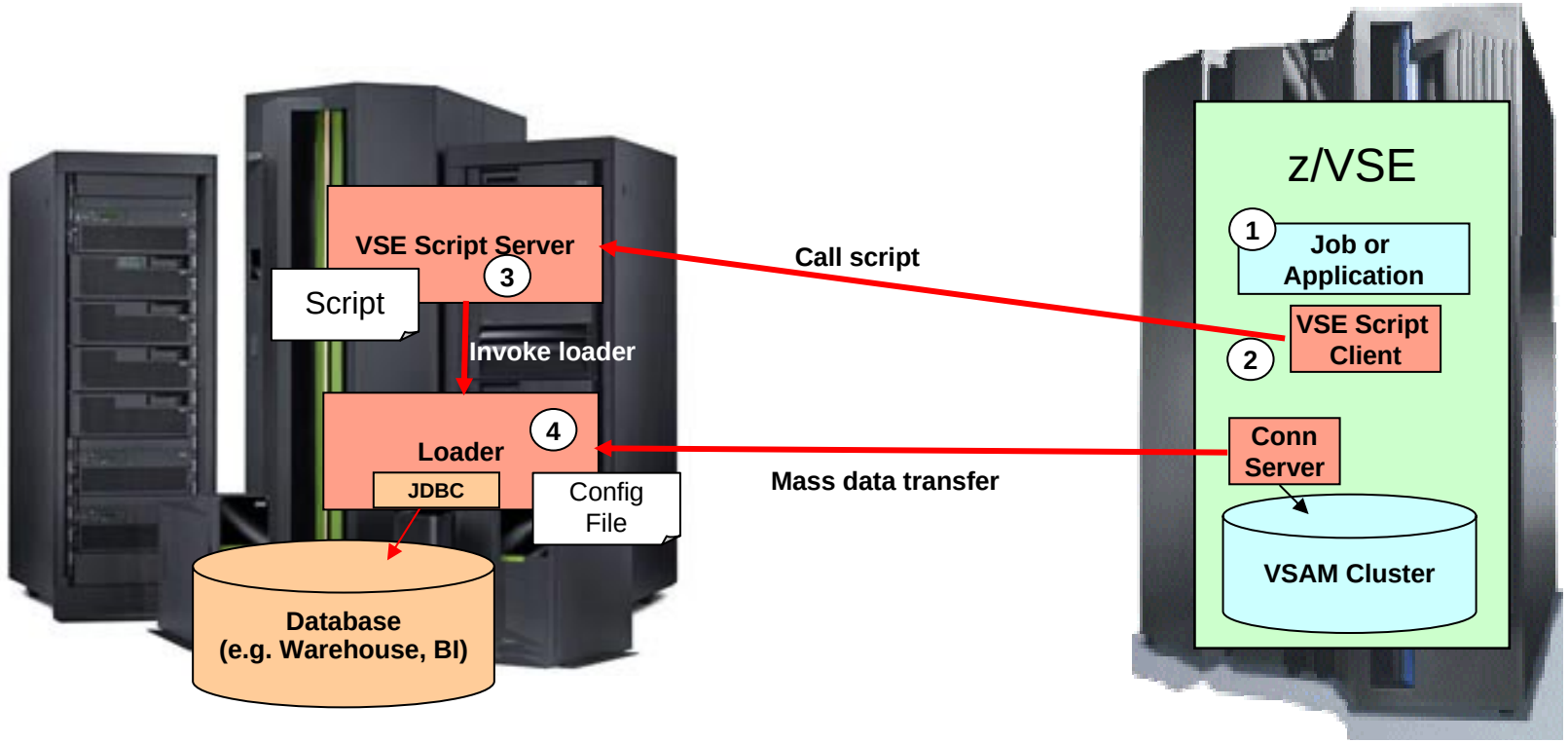
VSE Script Connector



VSE Script Connector can be used to:

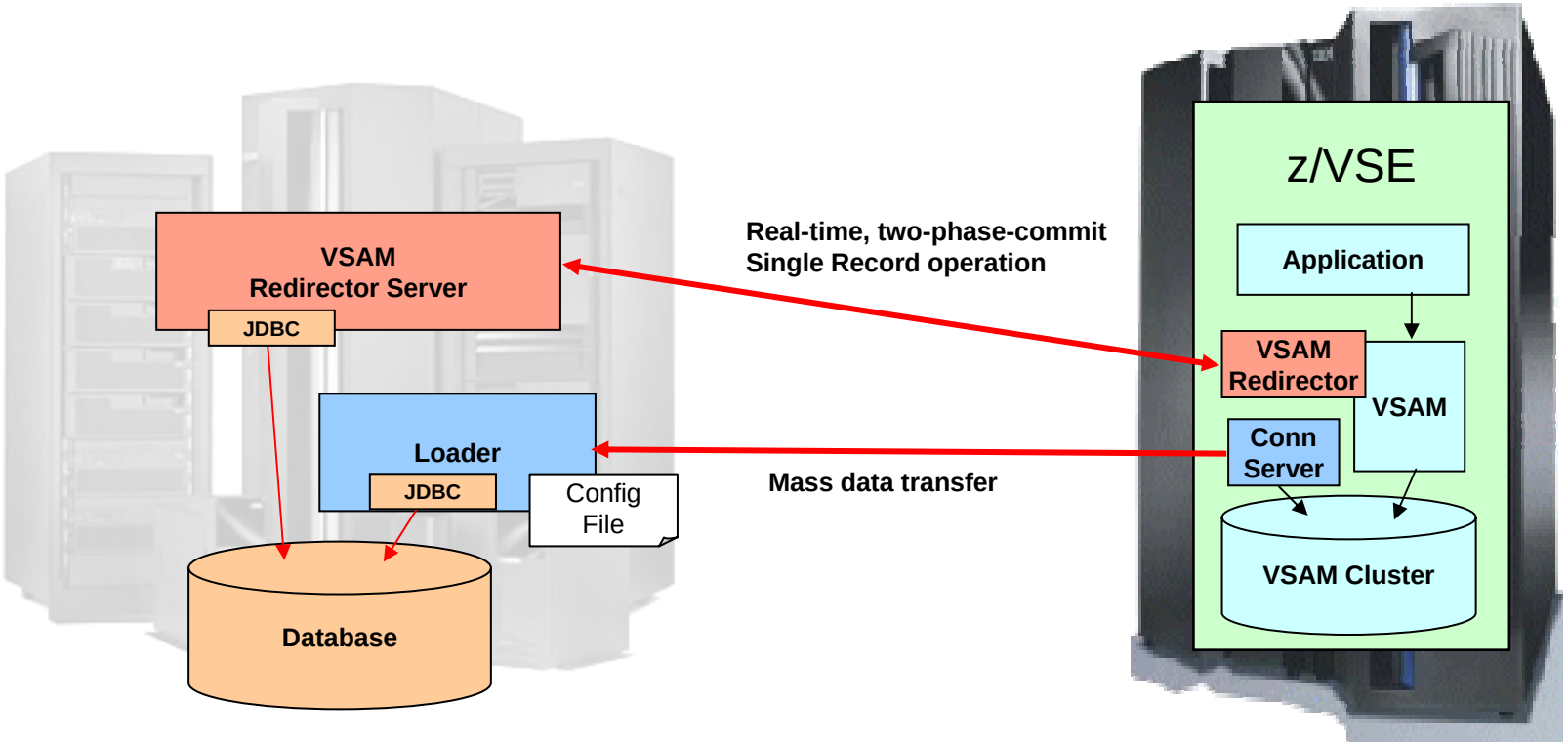
- Access VSE resources from distributed non-Java applications
- Call/Execute processes on distributed systems from z/VSE applications or Jobs

Example: Call VSAM Loader from a z/VSE Job using VSE Script



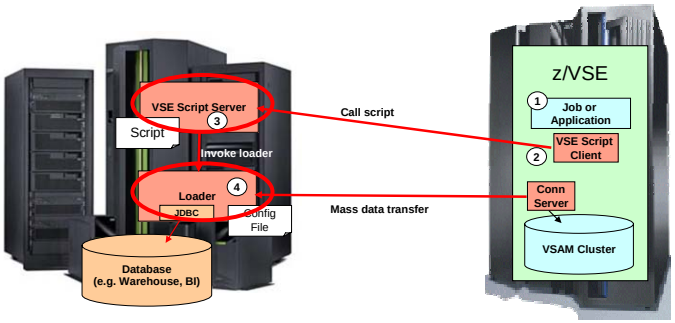
- Job or Application running on z/VSE
  - Uses VSE Script Client to call a script on distributed server
- Script invokes the VSAM Loader process
  - To load records from a VSAM Cluster into a Database
- z/VSE gets back all feedback and output from the script execution

VSAM Redirector and Loaders



- **Loaders can be used for**
  - Initial loading of a table
  - Resynchronization
  - Incremental loading with Delta Loader
- **VSAM Redirector**
  - Continuous real-time update
  - Capture changed records in a Delta File

Step by step: Prepare the environment



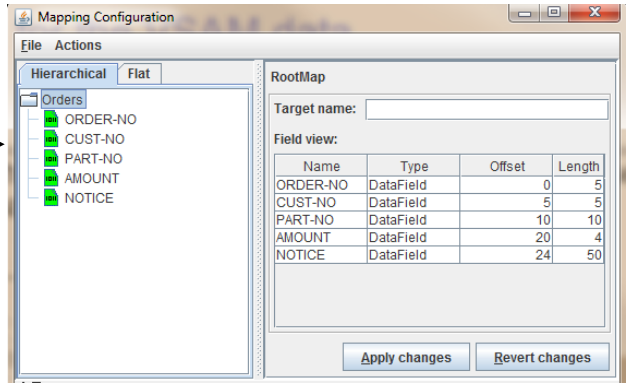
- **Install involved components**
  - VSE Connector Server and Batch/CICS VSE Script Clients are part of the z/VSE base installation
  - Download and install the VSE Connector Client, VSE Script Server and the VSAM Redirector Server/Loader on the Java system
    - Tip: change the offered target directory name and remove the blanks, this avoids the need to escape the directory name later
  - All downloads are available on the z/VSE homepage
    - http://www.ibm.com/systems/z/os/zvse/downloads/
  - The VSE Script Server must be started and keep running
- **Make sure that the z/VSE host can connect via TCP/IP to the Java system**
- **Check that the JDBC driver for your database system is installed on the Java system**
  - Usually the JDBC driver is part of the database system installation
  - If not, a web search will reveal an official download location
  - The JDBC driver JAR file must be referenced in the CLASSPATH
- **Know the JDBC URL that points to the target database on the database system**
  - Details and examples can be found in the VSAM Redirector documentation

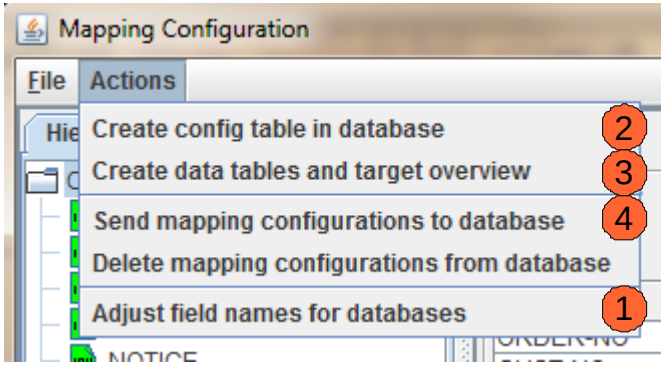
Step by step: Create a mapping for the VSAM data

We are going to use the new VSAM Redirector DBHandler, so we can use the MapperConfigGui to create a data mapping for the fields in the VSAM cluster

```
01  ORDERS.
  03  ORDER-NO   PIC 9(9) COMP-3.
  03  CUST-NO    PIC 9(9) COMP-3.
  03  PART-NO    PIC X(10).
  03  AMOUNT     PIC 9(9) COMP.
  03  NOTICE     PIC X(50).
```

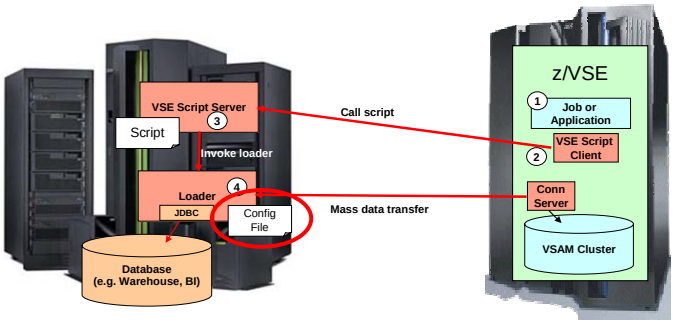
Import





1) Change all field names to be SQL compliant
2) Create a database table to store mapping configurations (use the table name ORDERS_CONFIG)
3) Create all data tables (the map has the name ORDERS, so the database table will also have this name)
4) Store the mapping configuration in the config table (use the configuration name ORDERS)

Step by step: Prepare a VSAM Redirector Loader configuration



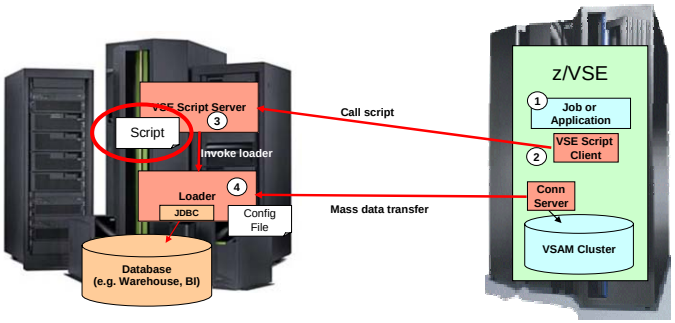
- Edit a new file in a data directory and name it load_orders.cfg
- The Loader will connect to the VSE Connector Server running on the z/VSE host, specify:
  - z/VSE host name and user/password of a z/VSE user-ID
  - Name of the VSAM catalog and cluster that is to be loaded
- For each VSAM record the Loader invokes a VSAM Redirector handler, specify:
  - The handler to use, DBHandler in our case
  - The handler specific configuration in 1 single line (this is the same kind of configuration you would define when you redirect a VSAM Cluster)
  - In the OPTIONS we define that we want to connect to the ORDERSDB database system, use the ORDERS_CONFIG configuration table and the configuration named ORDERS that we created with the MapperConfigGui

load_orders.cfg

```
VSEHOST = vsehost.domain.com
VSEUSER = FRED
VSEPASSWORD = the9ties
LDAPSIGNON = NO
VSAMCATALOG = VSESP.USER.CATALOG
VSAMCLUSTER = MY.ORDERS.CLUSTER

HANDLER = com.ibm.vse.dbhandler.DBHandler
OPTIONS = "dburl=jdbc:db2:ORDERSDB;configtable=ORDERS_CONFIG;
           configname=ORDERS;dbuser=dbuser;dbpassword=db4data"
```

Step by step: Prepare a VSE Script script to invoke the VSAM Redirector Loader



- Edit a new file in the scripts sub-directory that is located within the VSE Script installation directory and name it call_runloader.scr
- The script will be invoked by the z/VSE VSE Script client and will receive one parameter:
  - The path to the Redirector Loader configuration file load_orders.cfg
- The script will start the runloader.sh shell script to run the Redirector Loader
- When the Loader indicates an error then a non-zero return code is signaled to the z/VSE VSE Script client
  - This value will also be the JCL return code of the client

call_runloader.scr

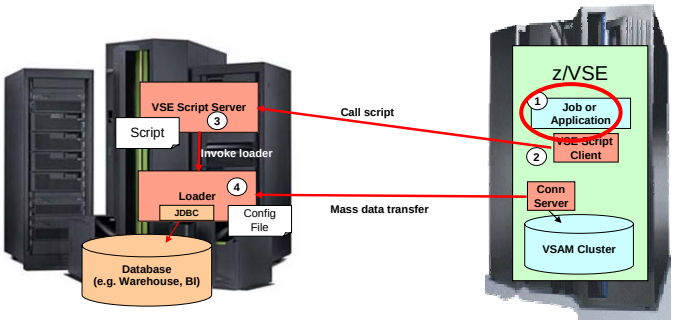
```
// Script: call_runloader.scr
int rc;

// Ensure that a configuration was specified
// Note: the ARGV array variable contains all parameters from caller
arraySize(&ARGV, &rc);
if (rc == 0) do;
  println("Error: No loader configuration was specified.");
  exit(8);
endif;

// Call the command and wait for completition
string outLines;
call("/opt/IBM/VSEVSAMRedirectorServer/runloader.sh", &ARGV, &outLines, &rc);

if (rc != 0) do;
  string errorMsg;
  getlasterrormsg(&errorMsg);
  println("Ready, rc=", rc, "  err=", errorMsg);
  exit(rc);
endif;
```

Step by step: Create a z/VSE job that executes the VSE Script Batch Client



- This sample job just invokes the Loader
  - In practice this invocation would take place for after a previous job step that filled the VSAM cluster with data
- The job's SYSIPT input contains:
  - The IP or hostname of the VSE Script Server to which a connection is to be made (in the first line)
  - The name of the script that is to be invoked (in the second line)
  - The parameter to be passed to the script (in the third line)

```
* $$ JOB JNM=RUNLOAD,DISP=D,CLASS=A
// JOB RUNLOAD  INVOKE RUNLOADER
// LIBDEF *,SEARCH=(PRD1.BASE,PRD2.SCEEBASE,PRD2.DBASE)
// EXEC IESSCBAT,PARM='CODEPAGE=Cp1047 SHOWERROR=yes'
10.0.0.1
call_runloader.src
/home/loader/load_orders.cfg
/&
* $$ EOJ
```

Step by step: Launch it!

- Submit the job and see the records flying from the VSAM cluster into the database ...

```
-- Redirector Loader (build 029) --
<snip>
Oct 13, 2012 9:33:11 AM - [RedirLoader] *** Initializing ***
Oct 13, 2012 9:33:11 AM - [RedirLoader] Connect to VSE host...
Oct 13, 2012 9:33:11 AM - [RedirLoader] ... connected to VSE host.
Oct 13, 2012 9:33:11 AM - [RedirLoader] Init cluster ...
Oct 13, 2012 9:33:12 AM - [RedirLoader] ... cluster initialized.
Oct 13, 2012 9:33:12 AM - [RedirLoader] Init handler ...
Oct 13, 2012 9:33:12 AM - [RedirLoader] ... handler initialized.
Oct 13, 2012 9:33:12 AM - [RedirLoader] Using 1 insert thread(s).
Oct 13, 2012 9:33:12 AM - [RedirLoader] *** Starting load process ***
Oct 13, 2012 9:33:15 AM - [RedirLoader] ************************************
Oct 13, 2012 9:33:15 AM - [RedirLoader] *** VSEConnector transfer finished ***
Oct 13, 2012 9:33:15 AM - [RedirLoader] ************************************
Oct 13, 2012 9:33:15 AM - [RedirLoader] Waiting for threads to finish...
Oct 13, 2012 9:33:15 AM - [RedirLoader] *** InserterThread 1 finished ***
Oct 13, 2012 9:33:15 AM - [RedirLoader] All threads finished.
Oct 13, 2012 9:33:15 AM - [RedirLoader] Closing Cluster.
Oct 13, 2012 9:33:15 AM - [RedirLoader]
Oct 13, 2012 9:33:15 AM - [RedirLoader] ----------------------------------------
Oct 13, 2012 9:33:15 AM - [RedirLoader] Load process finished.
Oct 13, 2012 9:33:15 AM - [RedirLoader]
Oct 13, 2012 9:33:15 AM - [RedirLoader] Inserted records:  1,501
Oct 13, 2012 9:33:15 AM - [RedirLoader]
Oct 13, 2012 9:33:15 AM - [RedirLoader] Duplicate records: 0
Oct 13, 2012 9:33:15 AM - [RedirLoader] Other errors:      0
Oct 13, 2012 9:33:15 AM - [RedirLoader]
Oct 13, 2012 9:33:15 AM - [RedirLoader] Overall duration:  3 seconds
Oct 13, 2012 9:33:15 AM - [RedirLoader] Overall speed:     459 records/second
Oct 13, 2012 9:33:15 AM - [RedirLoader]
Oct 13, 2012 9:33:15 AM - [RedirLoader] Transfer duration: 1 seconds
Oct 13, 2012 9:33:15 AM - [RedirLoader] Transfer speed:    1,977 records/second
Oct 13, 2012 9:33:15 AM - [RedirLoader] ----------------------------------------
```

Step by step: Avoid common pitfalls

- Correct older versions of runloader.sh / runloader.bat
  - The runloader shell script in the Redirector installation directory must contain a statement that changes into the directory where the shell script is located
  - Older versions miss this line and the line must be added
  - Linux:

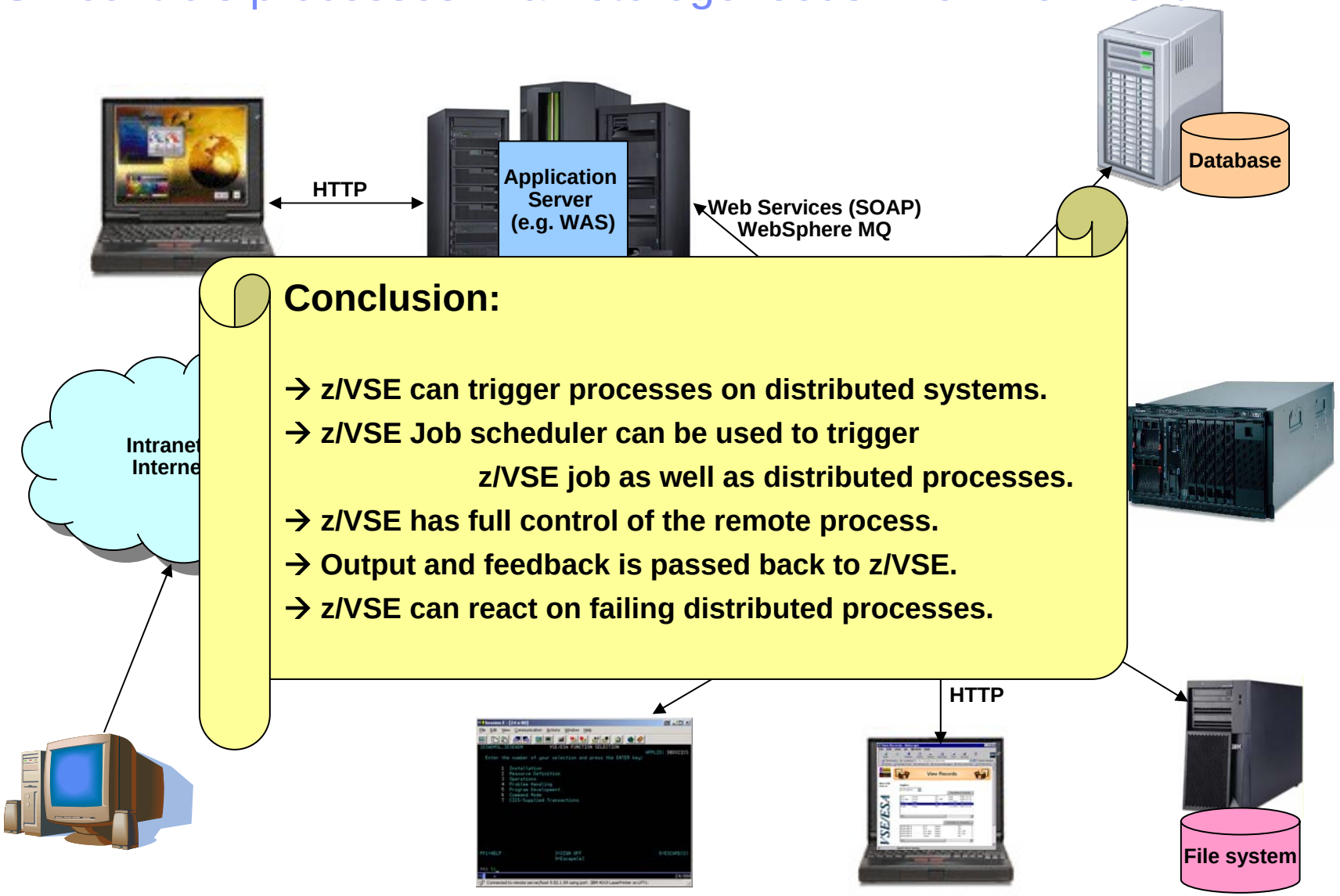
```
#! /bin/sh
# ----------------------------------------------------
# Startup file for RedirLoader
# ----------------------------------------------------
cd `dirname $0`
if [ -e "$JAVA_HOME/bin/java" ]; then
<snip>
```

  - Windows:

```
Rem ----------------------------------------------------
Rem Startup file for RedirLoader
Rem ----------------------------------------------------
@ECHO OFF
SETLOCAL
cd %~dp0
SET JAVA_EXEC=java.exe
<snip>
```

- The z/VSE host can't connect to the VSEScript Server?
  - Check the firewall settings!
- The Redirector Loader shows error messages about missing JAR files?
  - Check that the VSECON environment variable is set and points to the VSE Connector Client directory!

z/VSE controls processes in a heterogeneous IT environment



Conclusion:

- → z/VSE can trigger processes on distributed systems.
- → z/VSE Job scheduler can be used to trigger z/VSE job as well as distributed processes.
- → z/VSE has full control of the remote process.
- → Output and feedback is passed back to z/VSE.
- → z/VSE can react on failing distributed processes.

Questions ?