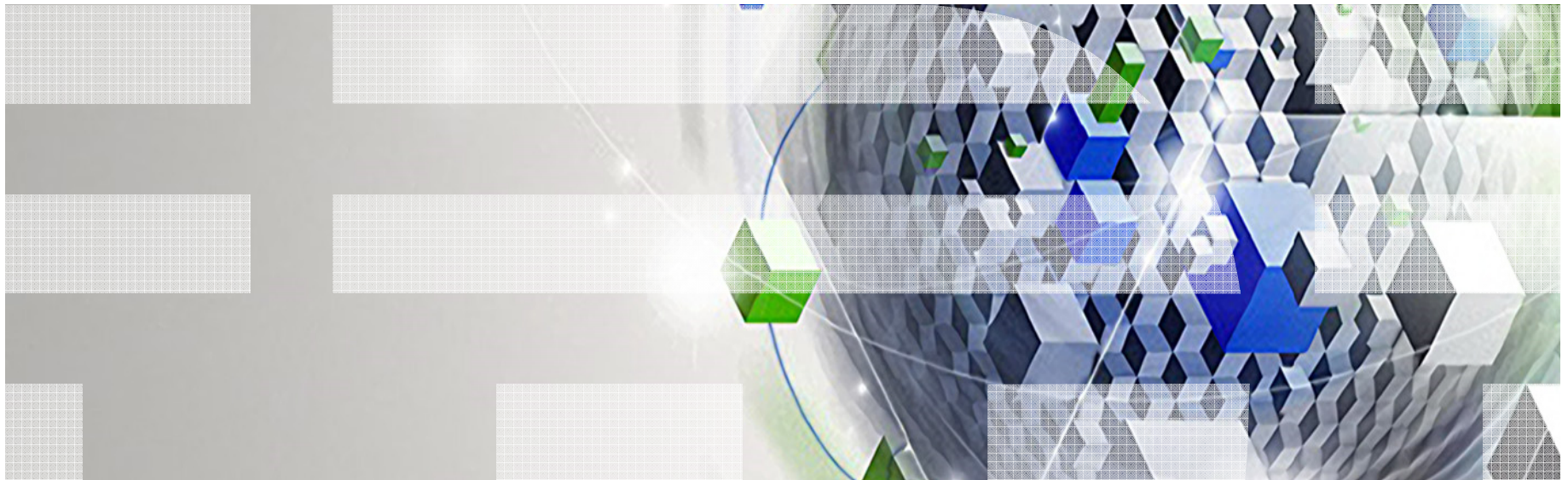


# z/VSE Connectors Introduction, Use Cases, and News



Ingo Franzki



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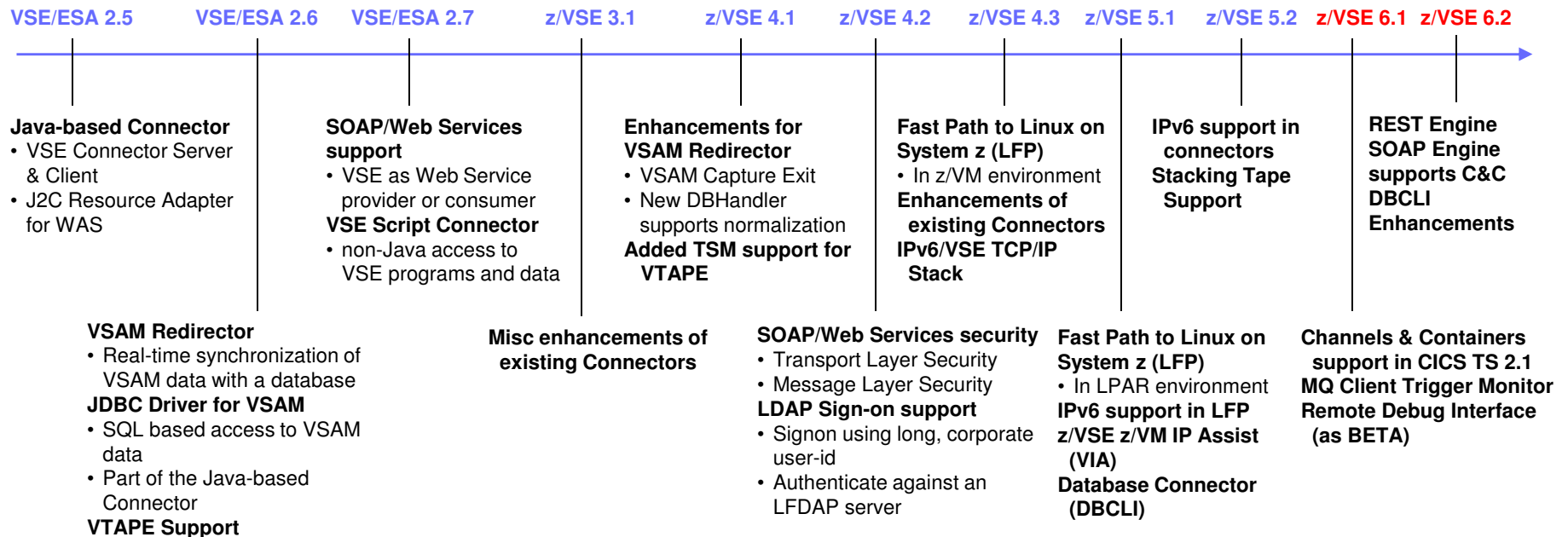
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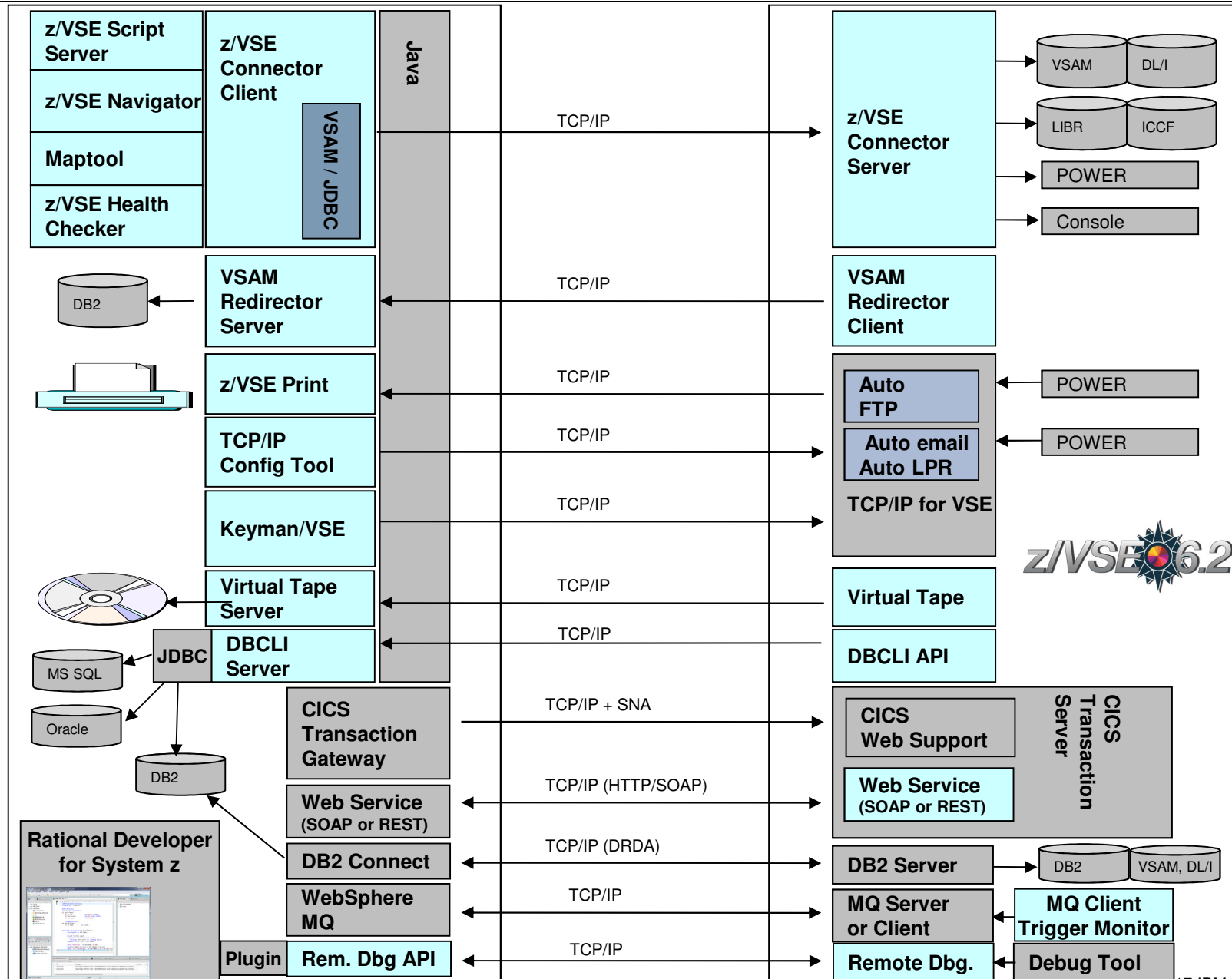
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- No other workload processing is authorized for execution on an SE.
- IBM offers SEs at a lower price than General Processors/Central Processors because customers are authorized to use SEs only to process certain types and/or amounts of workloads as specified by IBM in the AUT.

## z/VSE Connectors - Introduction

- The z/VSE Connectors started as a single function in VSE/ESA 2.5
- Since then, it evolved over time
- Its now more a technology than just a function
  - consisting of many different features and functions
  - supporting various connector solutions

Continuously supporting  
the z/VSE **PIE** Strategy  
Protect  
Integrate  
Extend





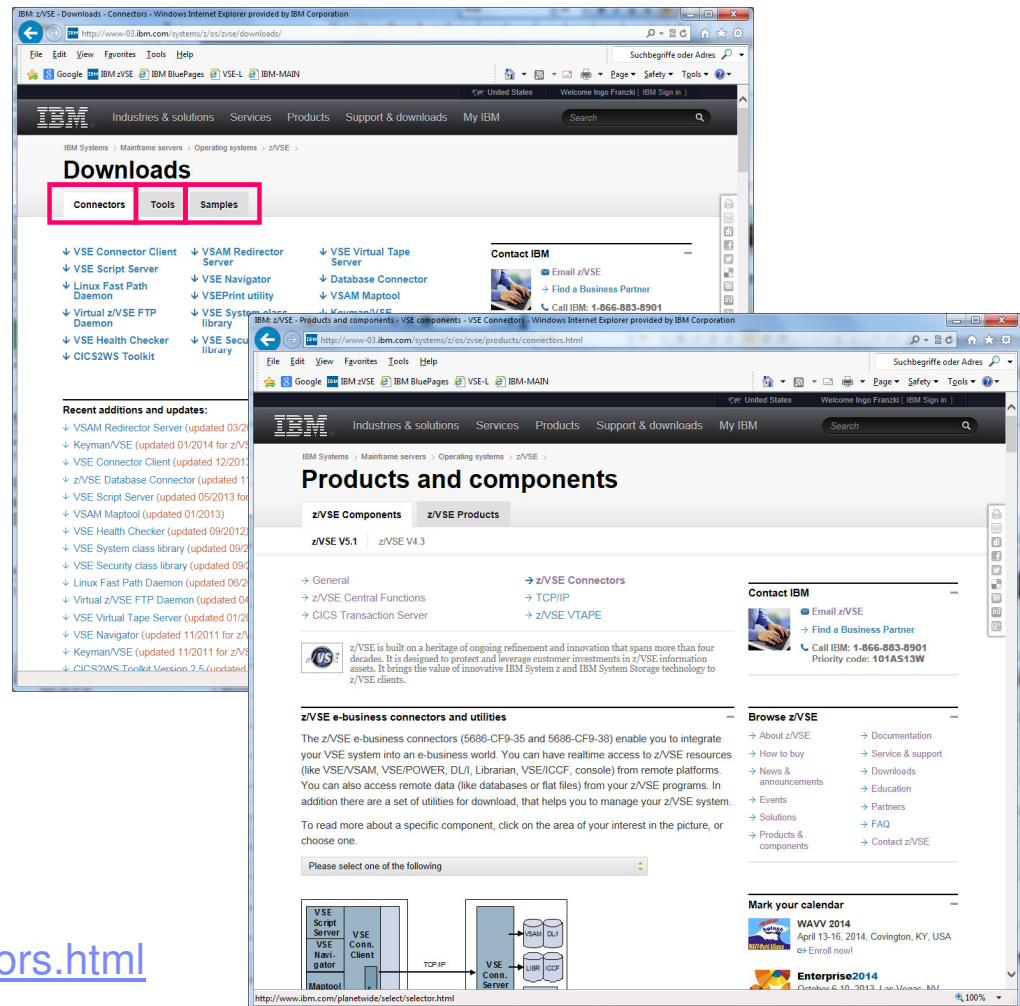
# z/VSE Connector & Tools - Downloads

- Connector components
    - Delivered as part of the z/VSE system as WBOOKs in PRD2.PROD
    - Also available on the z/VSE Homepage
- <http://ibm.com/zvse/downloads>

- Many ‘as-is’ tools are provided for download

- Information about the Connector Components can be found here:
 

<http://ibm.com/zvse/products/connectors.html>

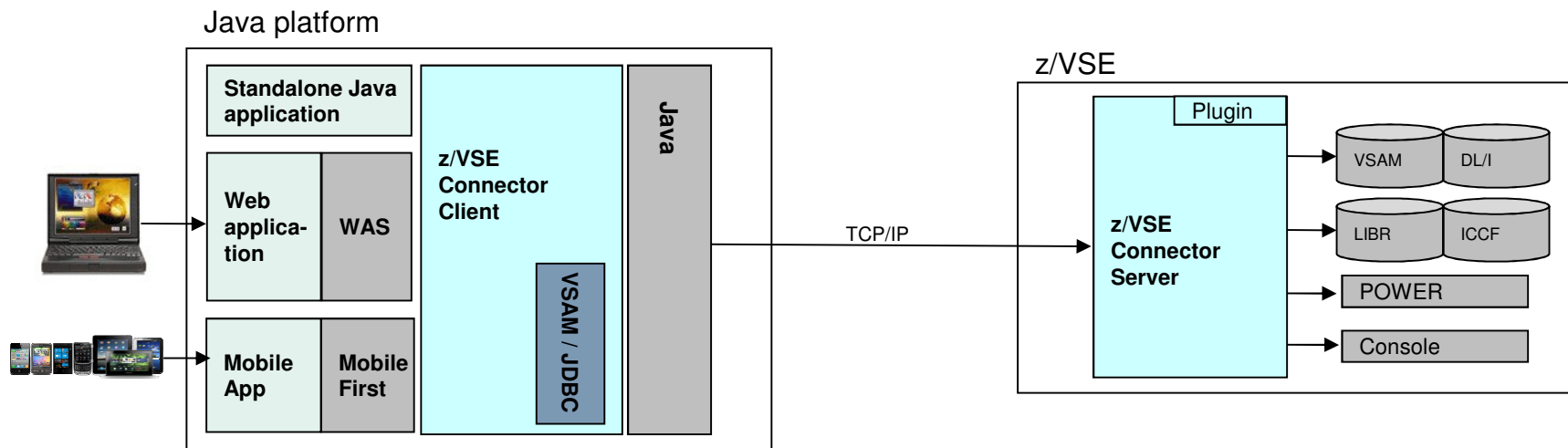


## Java-based Connector



WebSphere software

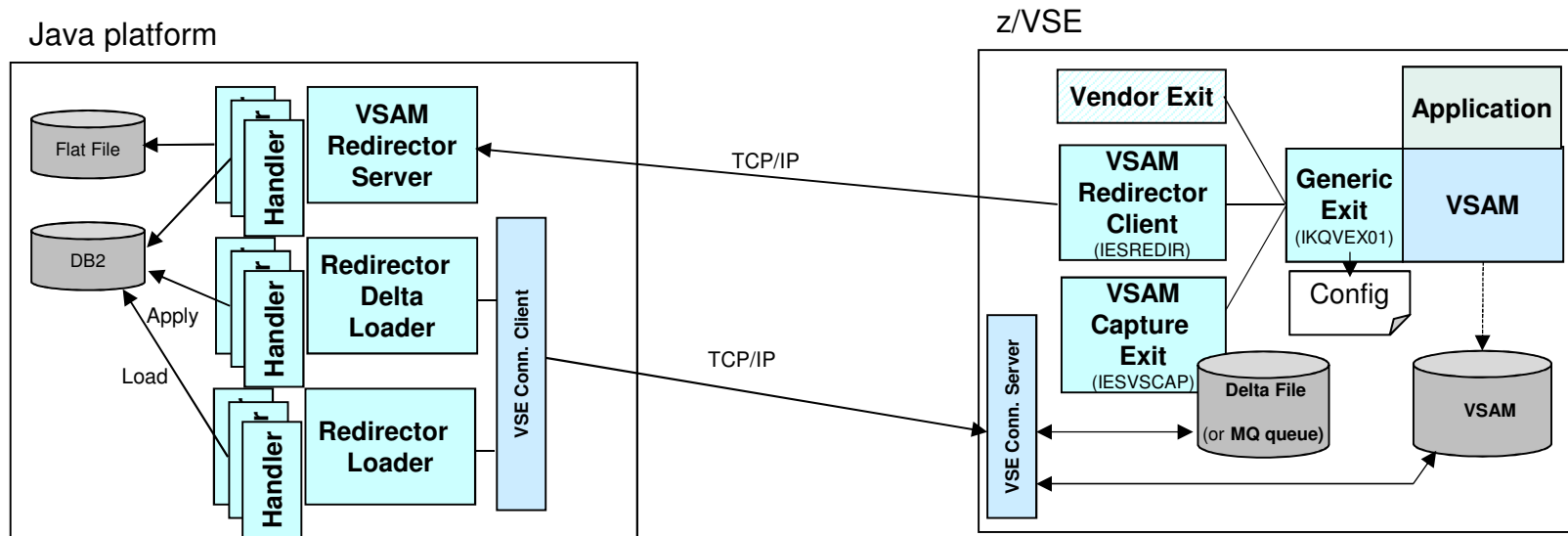
- **Remote access to z/VSE data and programs from a Java program**
  - Real time access to VSAM, DL/1, LIBR, POWER, Console, Jobs, ...
  - From standalone Java programs
    - ...or from web applications (servlets, JSPs, Mobile Apps etc.)
  - Deployable as J2C Resource Adapter or JDBC Data Source into J2EE web applications servers, such as:
    - WebSphere Application Server
    - IBM Mobile First Server
  - Extendable via Plugins



# VSAM Redirector



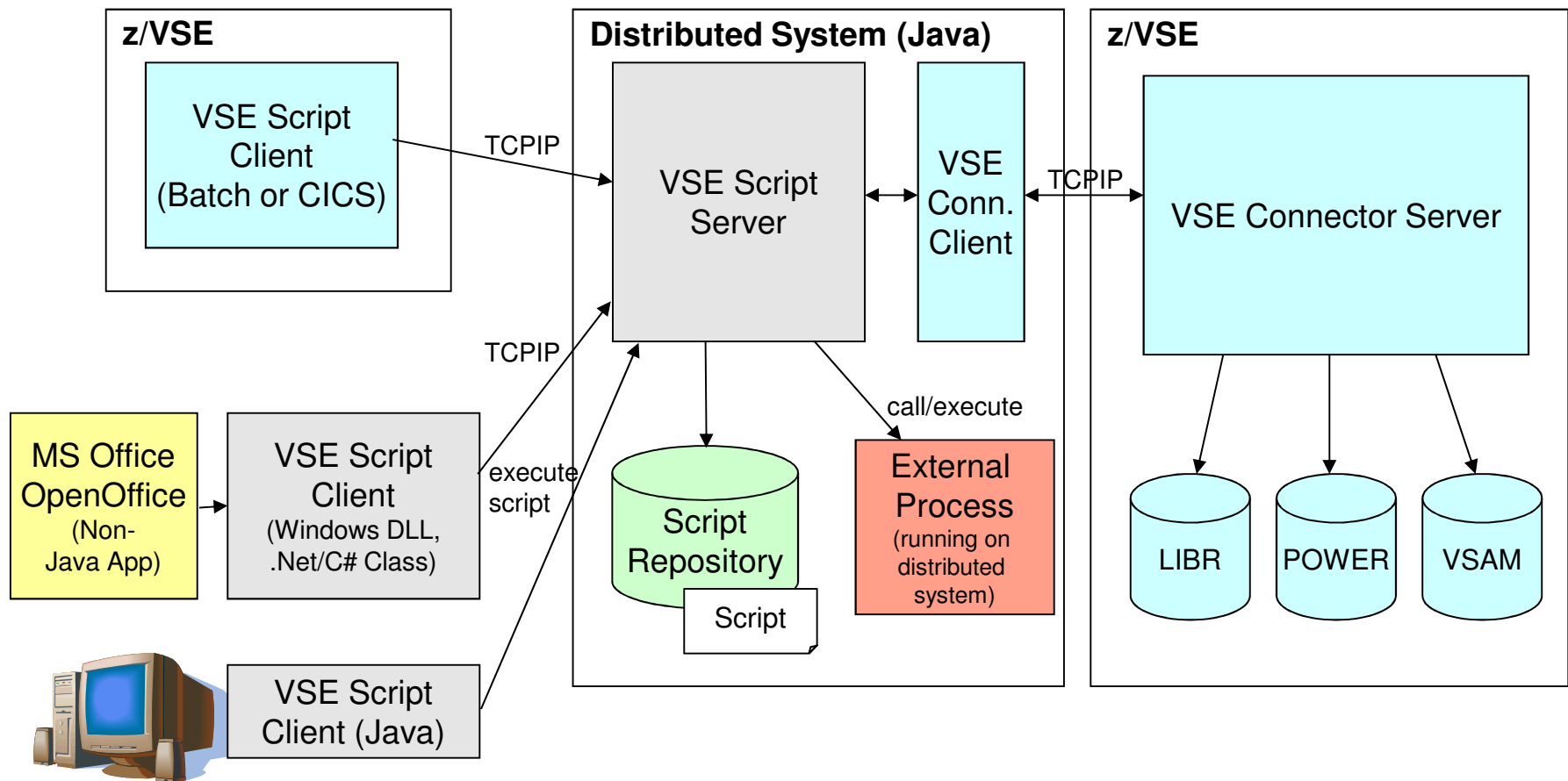
- **Synchronization of VSAM data with a database**
- **Real-time: VSAM Redirector Client/Server**
  - **OWNER=VSAM:**
    - any INSERT, UPDATE or DELETE request is immediately replicated into the database
    - Read requests go against the VSAM dataset on z/VSE
  - **OWNER=REDIRECTOR:**
    - All VSAM requests are sent to the database.
    - No access to the VSAM dataset anymore (except OPEN / CLOSE).
- **Near real-time: VSAM Capture Exit**
  - Data changes are collected in a delta file or MQ queue
  - Delta file is downloaded and applied to database from time to time





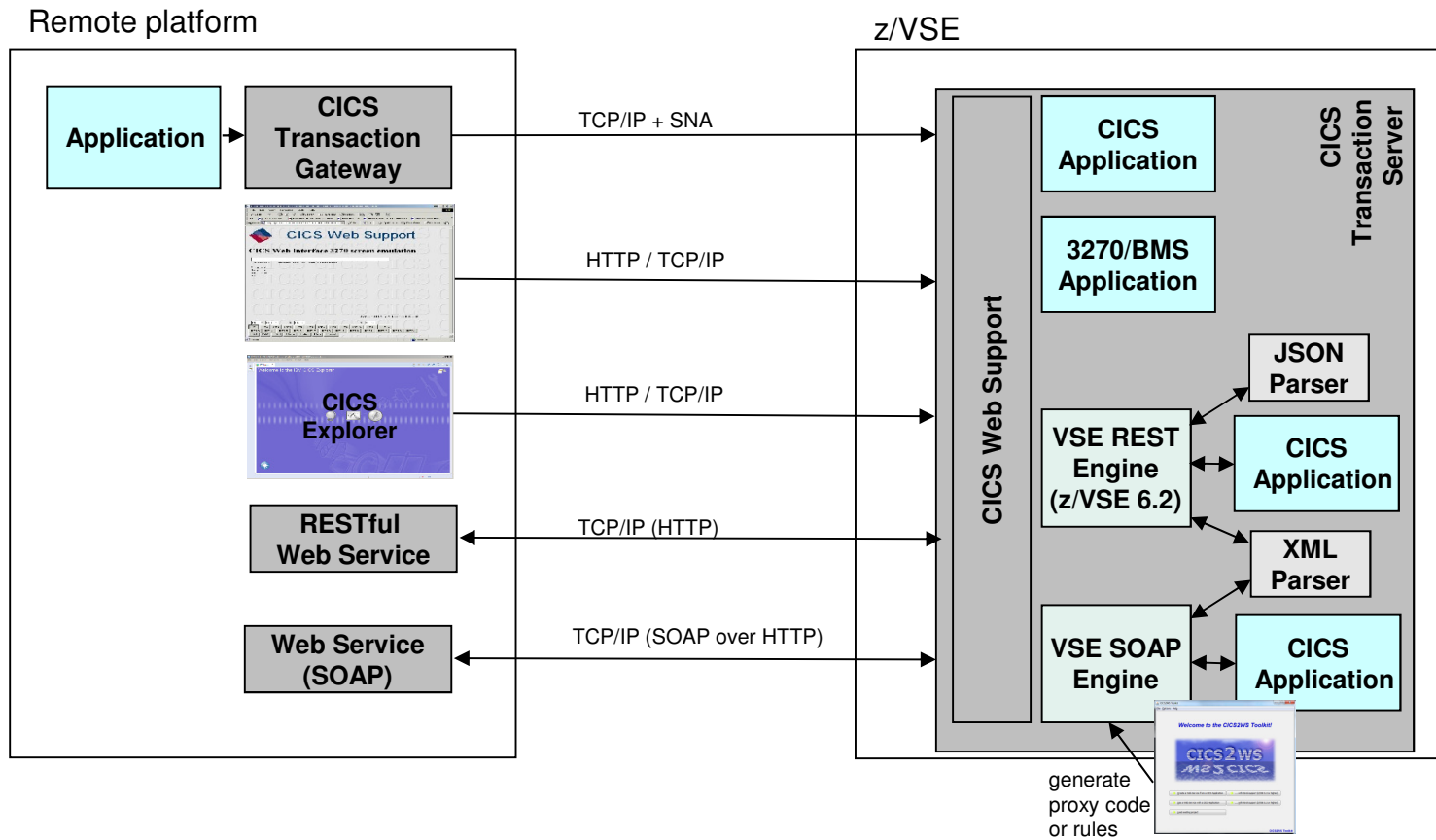
# z/VSE Script Connector

- **z/VSE Script Connector can be used to:**
  - Access z/VSE resources from distributed non-Java applications
  - Call/Execute processes on distributed systems from z/VSE applications or Jobs



# CICS Connectivity

- CICS Web Support is the base of CICS connectivity



## SOAP / Web Services support

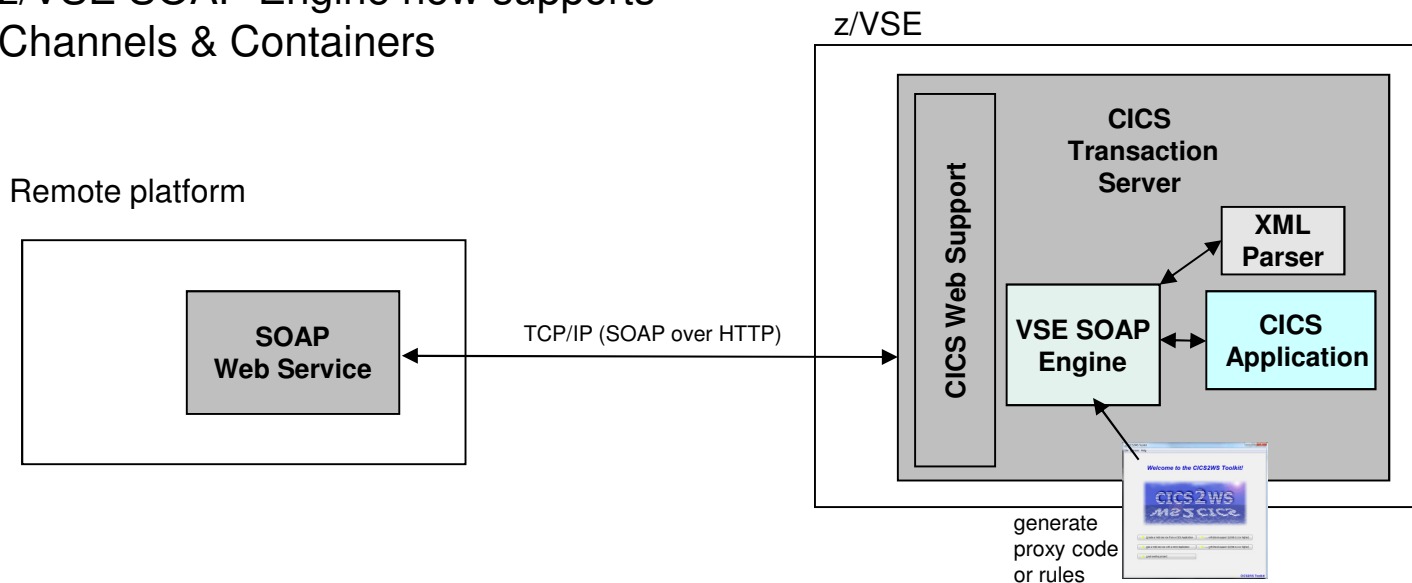
- **Web Service-enable z/VSE CICS applications**

- Provide existing CICS applications as Web Service to the outside world
  - z/VSE as the SOAP server
- Use/call external Web Services from within z/VSE CICS applications
  - z/VSE as the SOAP client
- CICS2WS Tool is used to generate proxy code or mapping rules

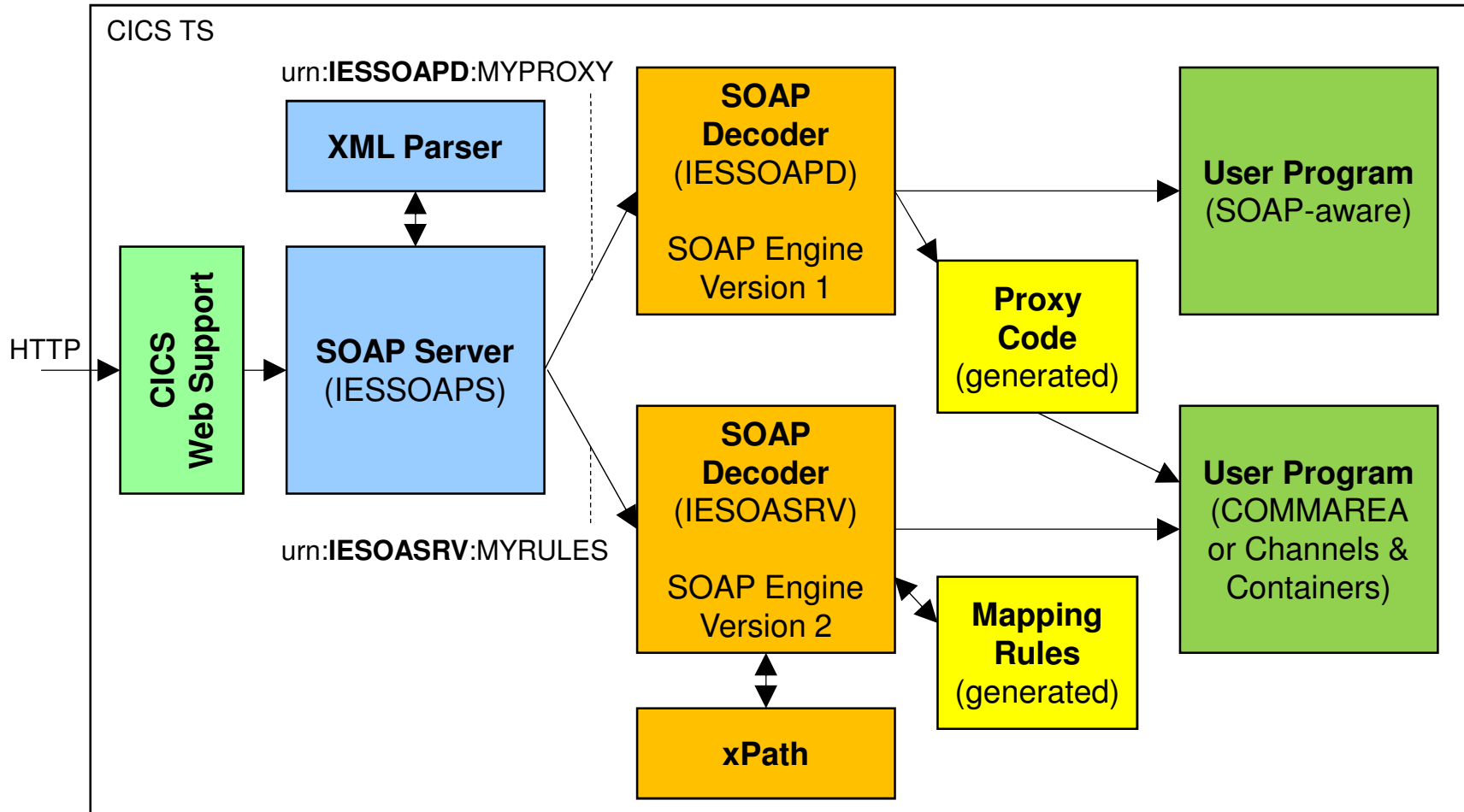
- **New with z/VSE 6.2:**



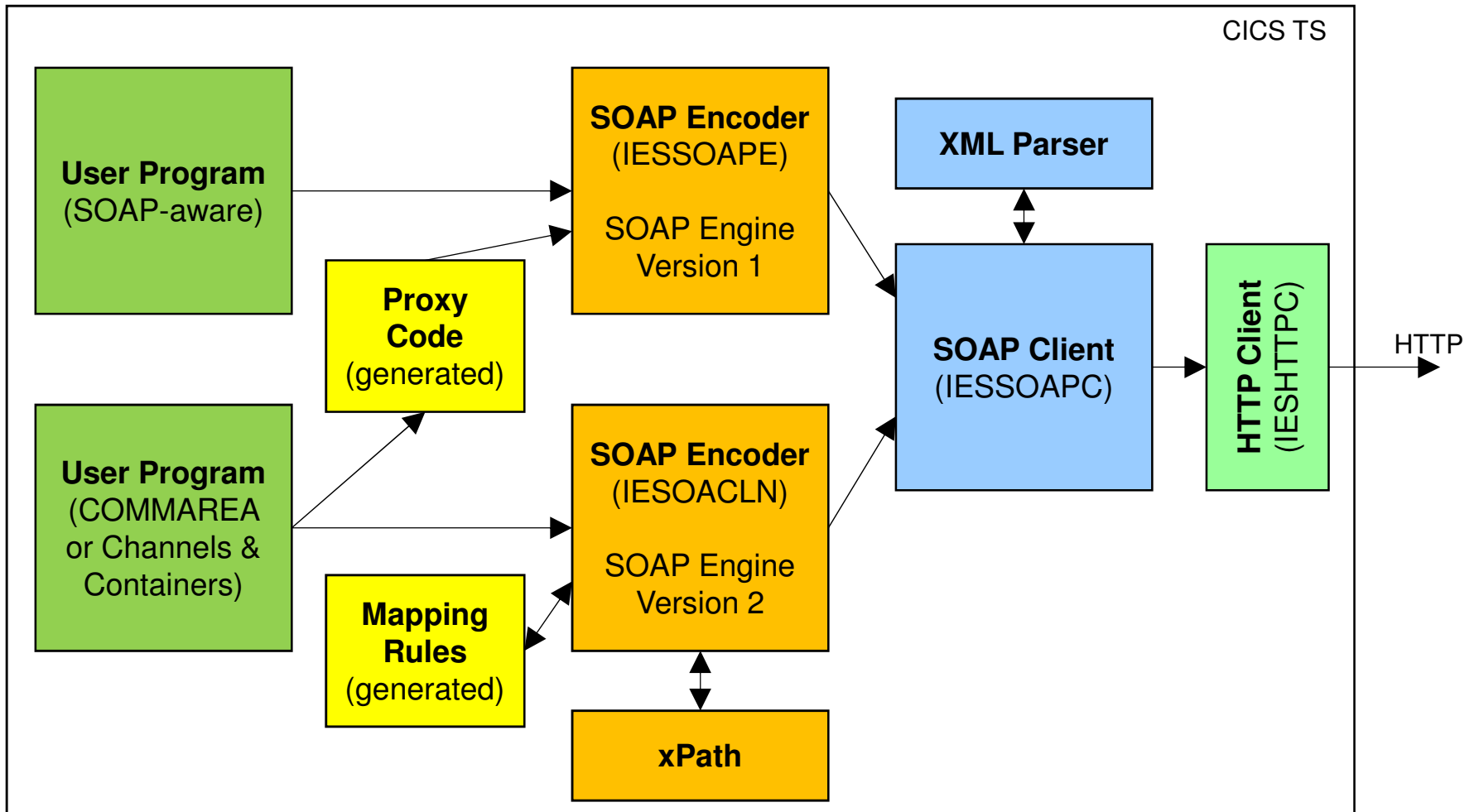
- z/VSE SOAP Engine now supports Channels & Containers



# z/VSE as SOAP Server



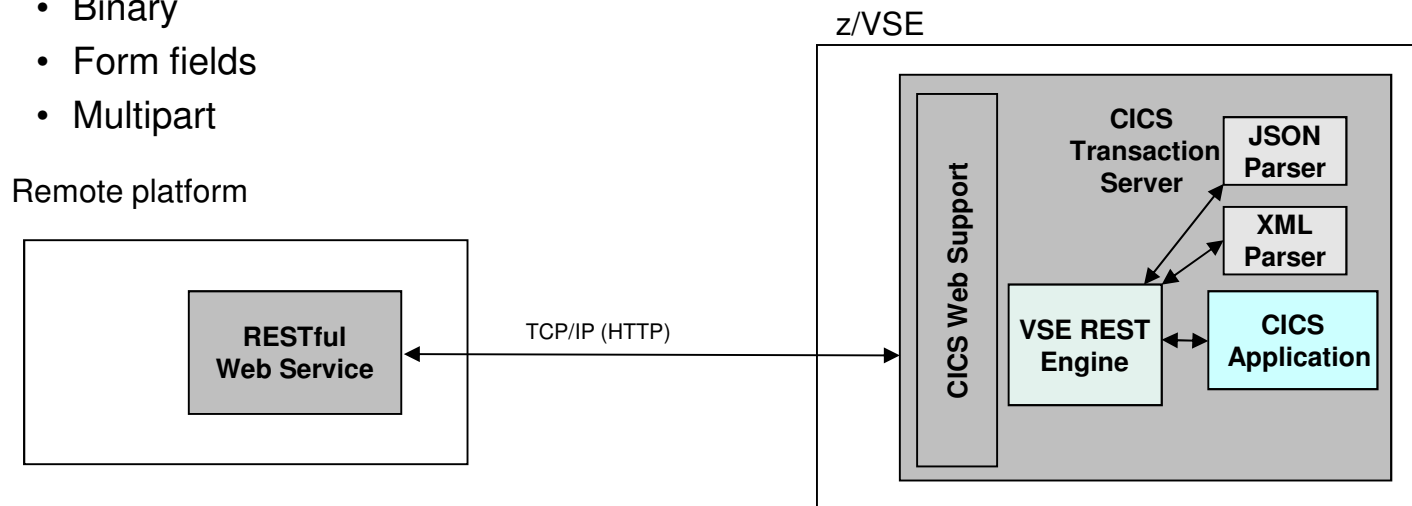
# z/VSE as SOAP Client



## z/VSE 6.2: RESTful Web Services support



- **Use REST (Representational State Transfer) with CICS applications**
  - Provide existing CICS applications as RESTful Web Service to the outside world
    - z/VSE as the REST server
  - Use/call external RESTful Web Services from within z/VSE CICS applications
    - z/VSE as the REST client
  - Payload can be:
    - JSON (JavaScript Object Notation)
    - XML
    - Plain text
    - Binary
    - Form fields
    - Multipart

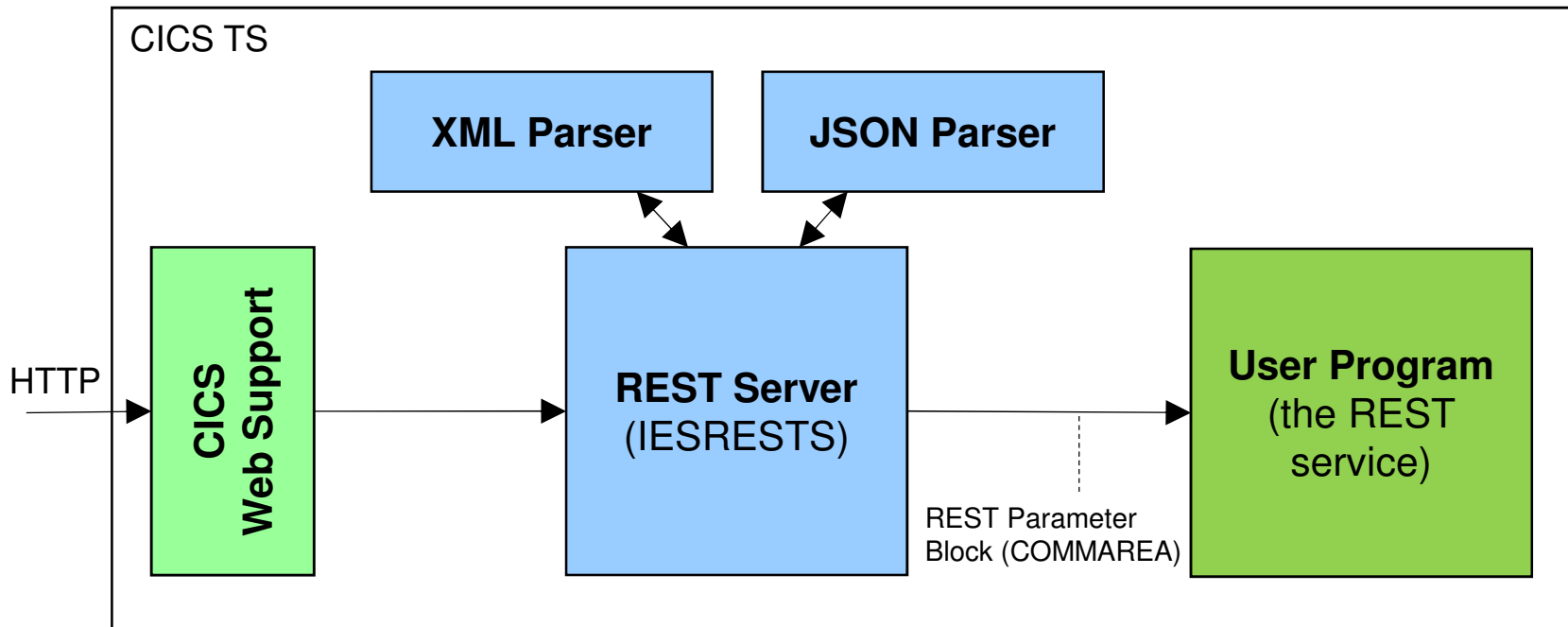


# What is REST (Representational State Transfer)?



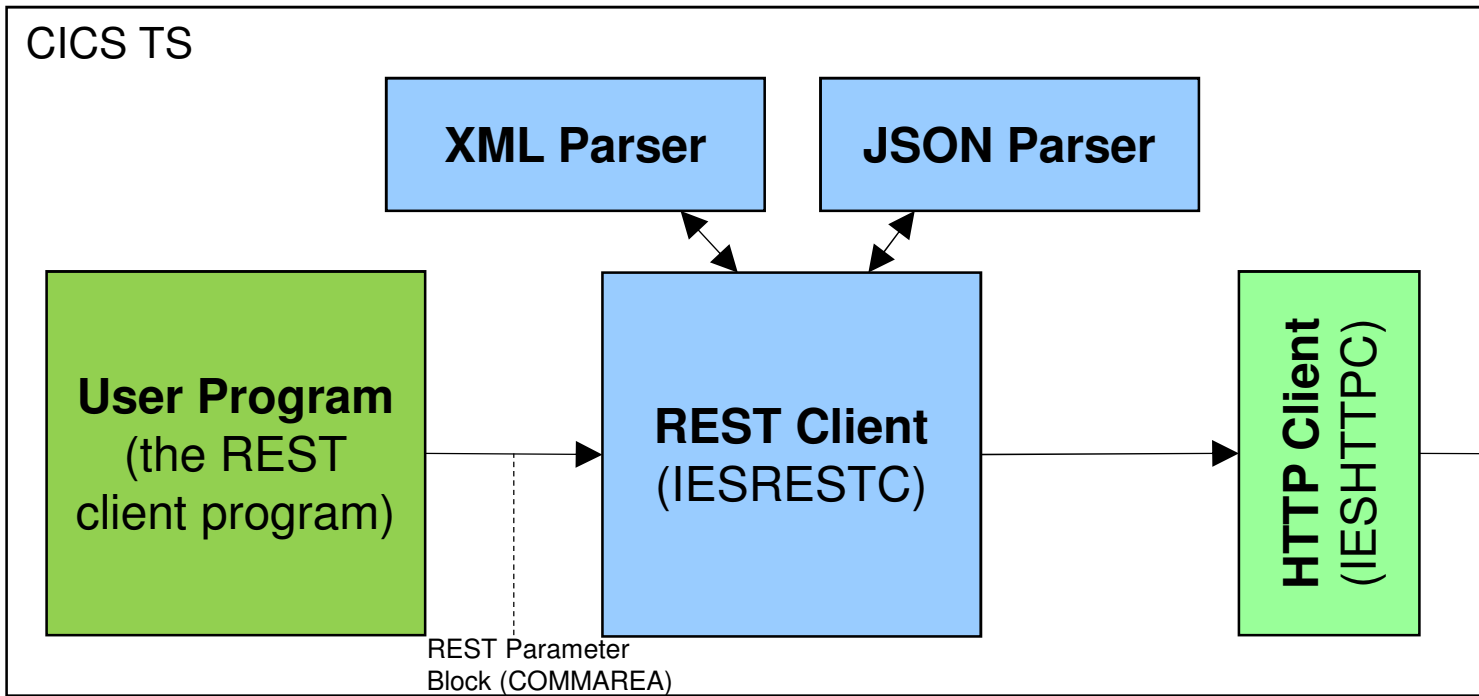
- Representational State Transfer (REST) is a **software architecture style consisting of guidelines and best practices** for creating web services
    - REST has gained widespread acceptance across the web as a **simpler alternative to SOAP** and WSDL-based web services
  - RESTful systems typically communicate over the Hypertext Transfer Protocol (**HTTP**) with the same HTTP verbs (GET, POST, PUT, DELETE, and so on) used by web browsers
  - The payload (message) transported by RESTful web services can be of various types (content types)
    - Commonly used is **JSON** as well as **XML**, but it can also be plain text, or even binary data
  - A RESTful web service typically operates on a certain '**object**' on a server
    - The object is typically addressed through the URI (part of the URL), for example **http://example.com/resource**
  - Actions on such resources are typically denoted by the HTTP request types:
    - **GET** would typically **read** the resource
    - **PUT** would typically **update/replace** the resource
    - **POST** would typically **create** the resource
    - **DELETE** would typically **delete** the resource
  - RESTful web services are typically **stateless**
    - Each request from any client contains all the information necessary to service the request
    - The session state is therefore held in the client
- As denoted by the term 'typically' in above descriptions, there is no hard requirement for any of the described properties

# z/VSE 6.2: z/VSE as a REST Server



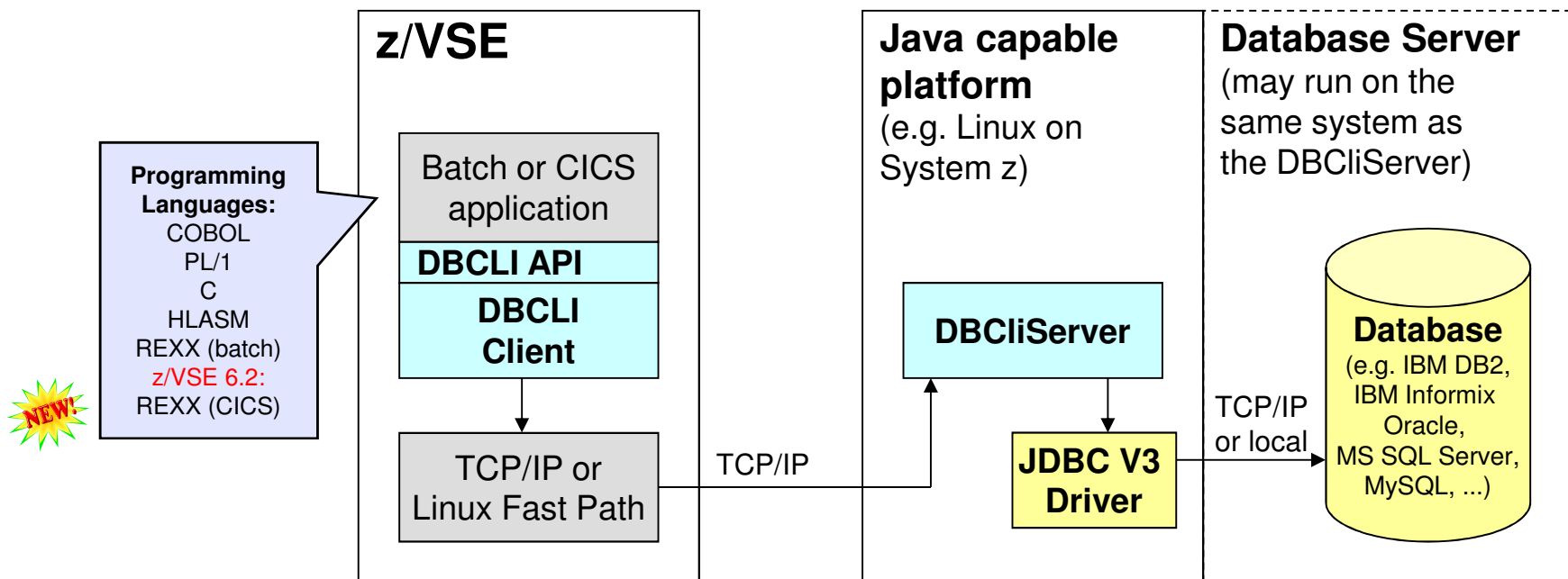


# z/VSE 6.2: z/VSE as a REST Client

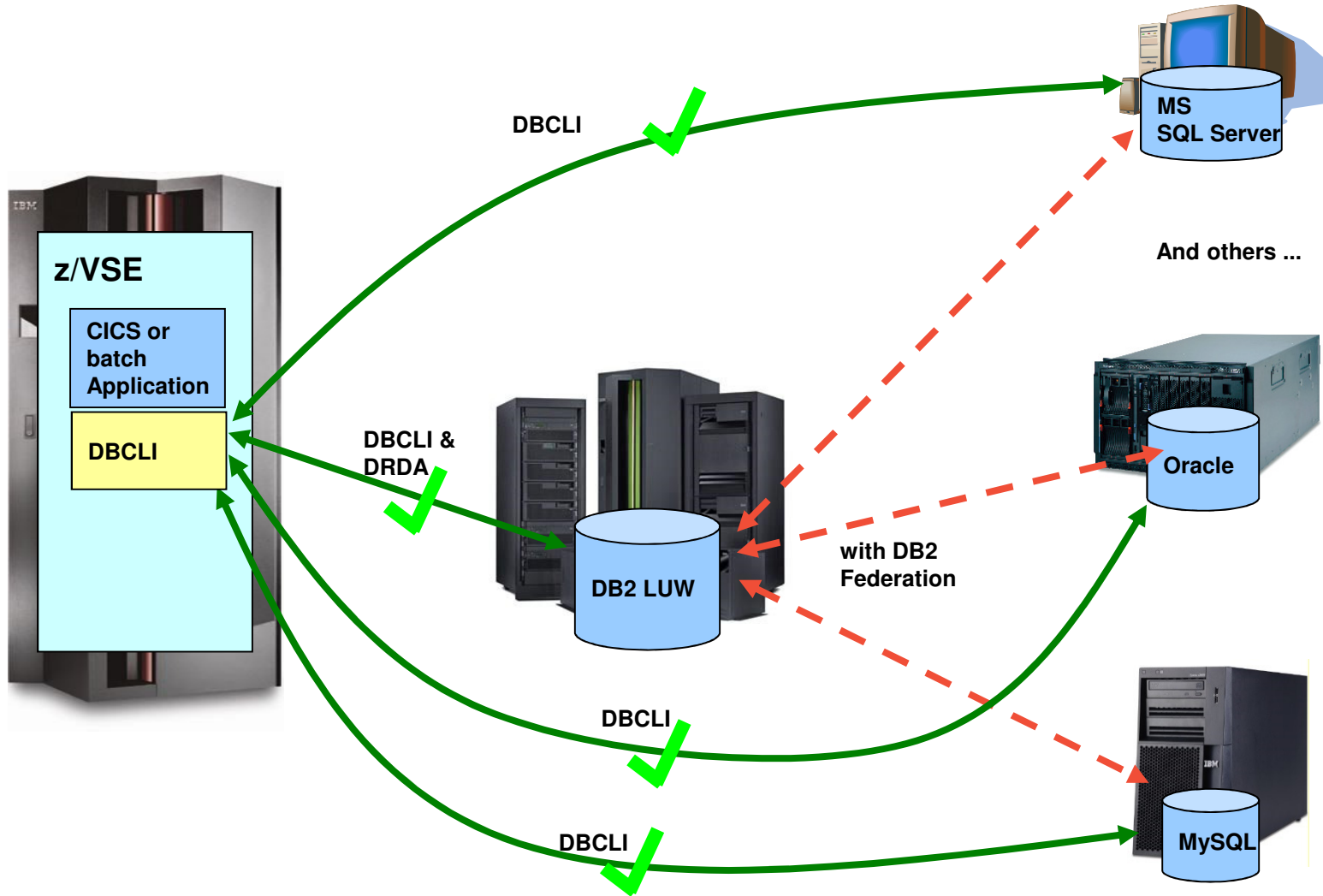


## z/VSE Database Call Level Interface (DBCLI)

- **Allows z/VSE applications to access a relational database on any suitable database server**
  - IBM DB2, IBM Informix, Oracle, MS SQL Server, MySQL, etc.
  - The database product must provide a JDBC driver that supports JDBC V3.0 or later
- **Utilize advanced database functions and use SQL statements provided by modern database products**



# z/VSE applications accessing Databases



# z/VSE 6.2: Interactive Query Tool for DBCLI



The screenshots illustrate the workflow of the z/VSE Database Connector. The first window shows the configuration for connecting to a remote server (boeocvse) using port 23. The second window shows the user entering the SQL statement `select * from employee`. The third window displays the output of the query as a table with 32 rows of employee data.

EMPNO	FIRSTNAME	MIDINIT	LASTNAME	WORKDEPT	PHONENO	HI
CHAR(6)	VARCHAR(12)	CHAR(1)	VARCHAR(15)	CHAR(3)	CHAR(4)	DA
000010	CHRISTINE	I	HAAS	A00	1234	01
000020	MICHAEL	L	THOMPSON	B01	3476	10
000030	SALLY	A	KWAN	C01	4738	04
000050	JOHN	B	GEYER	E01	6789	08
000060	IRVING	F	STERN	D11	6423	09
000070	EVA	D	PULASKI	D21	7831	09
000090	EILEEN	W	HENDERSON	E11	5498	08
000100	THEODORE	Q	SPENSER	E21	0972	06
000110	VINCENZO	G	LUCCHESSI	A00	3490	05
000120	SEAN		O'CONNELL	A00	2167	12
000130	DELORES	M	QUINTANA	C01	4578	07
000140	HEATHER	A	NICHOLLS	C01	1793	12
000150	BRUCE		ADAMSON	D11	4510	02
000160	ELIZABETH	R	PIANKA	D11	3782	10
000170	MASATOSHI	J	YOSHIMURA	D11	2890	09
000180	MARILYN	S	SCOUTTEN	D11	1682	07
000190	JAMES	H	WALKER	D11	2986	07
000200	DAVID		BROWN	D11	4501	03
000210	WILLIAM	T	JONES	D11	0942	04
000220	JENNIFER	K	LUTZ	D11	0672	08
000230	JAMES	J	JEFFERSON	D21	2094	11
000240	SALVATORE	M	MARINO	D21	3780	12
000250	DANIEL	S	SMITH	D21	0961	10
000260	SYBIL	P	JOHNSON	D21	8953	09
000270	MARIA	L	PEREZ	D21	9001	09
000280	ETHEL	R	SCHNEIDER	E11	8997	03
000290	JOHN	R	PARKER	E11	4502	05
000300	PHILIP	X	SMITH	E11	2095	06
000310	MAUDE	F	SETRIGHT	E11	3332	09
000320	RAMLAL	V	MEHTA	E21	9990	07
000330	WING		LEE	E21	2103	02
000340	JASON	R	GOUNOT	E21	5698	05

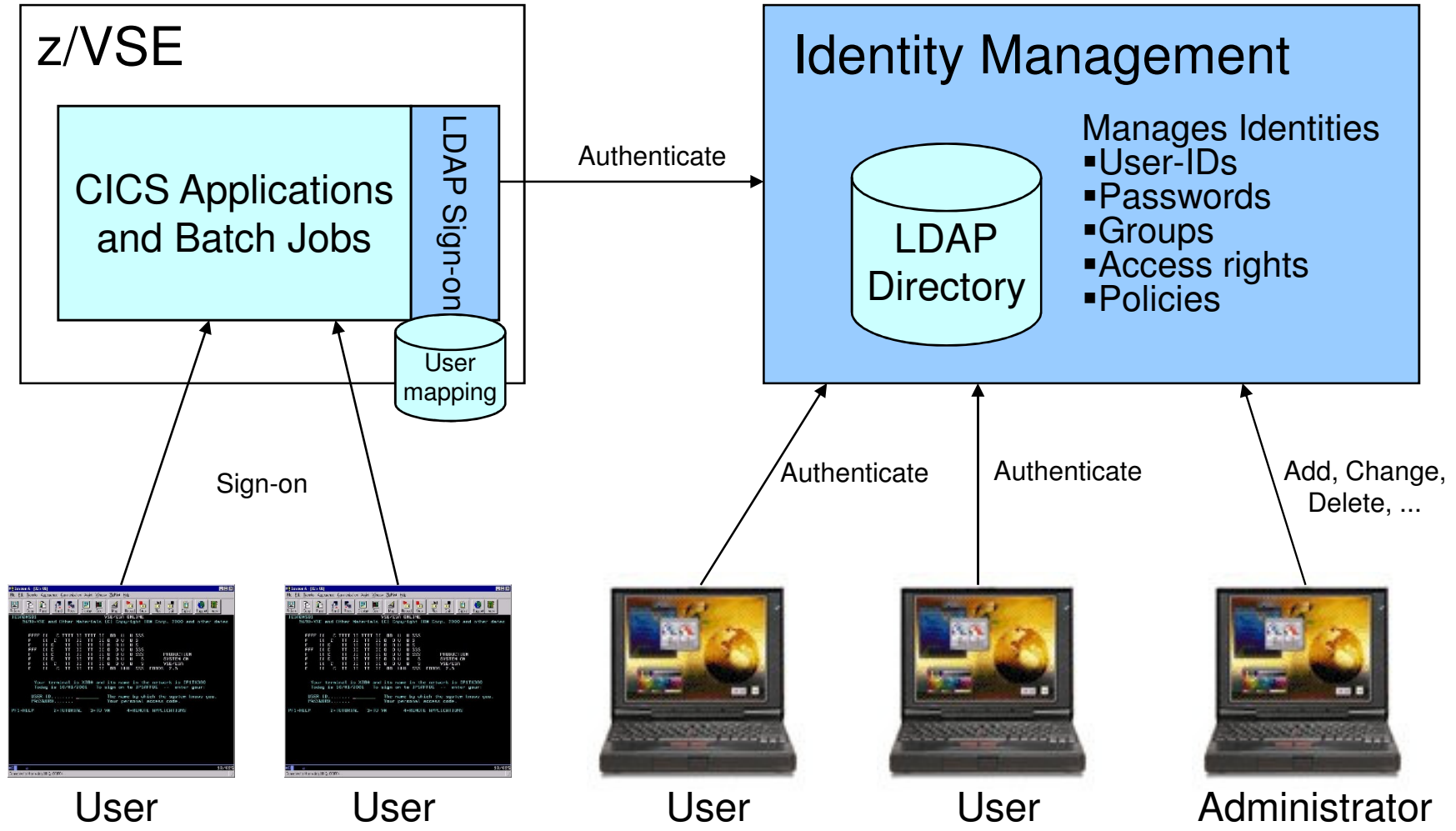
## z/VSE 6.2: Batch Query Tool for DBCLI



```
* $$ JOB JNM=RUNDBCLI,DISP=D,CLASS=4
* $$ LST DISP=D,CLASS=Q,PRI=3
// JOB RUNDBCLI
// LIBDEF *,SEARCH=(PRD2.CONFIG,PRD1.B
// EXEC IESDBCLB,PARM='SYMBOLS=YES ECH
CONNECT SERVER=my.database.server.com
        USER=db2user PASSWORD=password
SELECT EMPNO,FIRSTNME,LASTNAME,SALARY,
        FROM EMPLOYEE;
DISCONNECT;
/*
/&
```

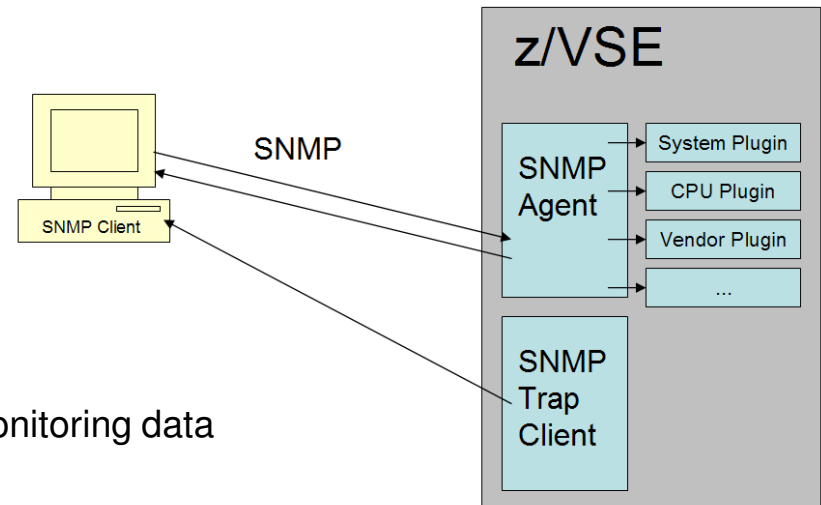
```
// JOB RUNDBCLI
// LIBDEF *,SEARCH=(PRD2.CONFIG,PRD1.BASE,PRD2.TCPIPC)
// EXEC IESDBCLB,PARM='SYMBOLS=YES ECHO=ON'
1S54I PHASE IESDBCLB IS TO BE FETCHED FROM PRD1.BASE
DBCLI BATCH QUERY TOOL
CONNECT SERVER= my.database.server.com DBNAME=SAMPLE
        USER=db2user PASSWORD=(PASSWORD SUPPRESSED);
INFO: CONNECTED TO SERVER 'my.database.server.com' DBNAME 'SAMPLE'.
INFO: DATABASE PRODUCT 'DB2/NT' VERSION 'SQL09075'
INFO: LAST RC=0
SELECT EMPNO,FIRSTNME,LASTNAME,SALARY,BONUS FROM EMPLOYEE;
INFO: STATEMENT HAS BEEN EXECUTED, IT PRODUCED THE FOLLOWING RESULT SET:
EMPNO    FIRSTNME    LASTNAME    SALARY    BONUS
CHAR(6)  VARCHAR(12) VARCHAR(15)  DECIMAL(9,2) DECIMAL(9,2)
-----
000010   CHRISTINE   HAAS        152750.00   1000.00
000020   MICHAEL     THOMPSON    94250.00    800.00
000030   SALLY       KWAN        98250.00    800.00
...
INFO: ROWCOUNT: 42
INFO: LAST RC=0
DISCONNECT;
INFO: DISCONNECT SUCCESSFULL.
INFO: LAST RC=0
1S55I LAST RETURN CODE WAS 0000
EOJ RUN          MAX.RETURN CODE=0000
```

# LDAP Sign-on Support



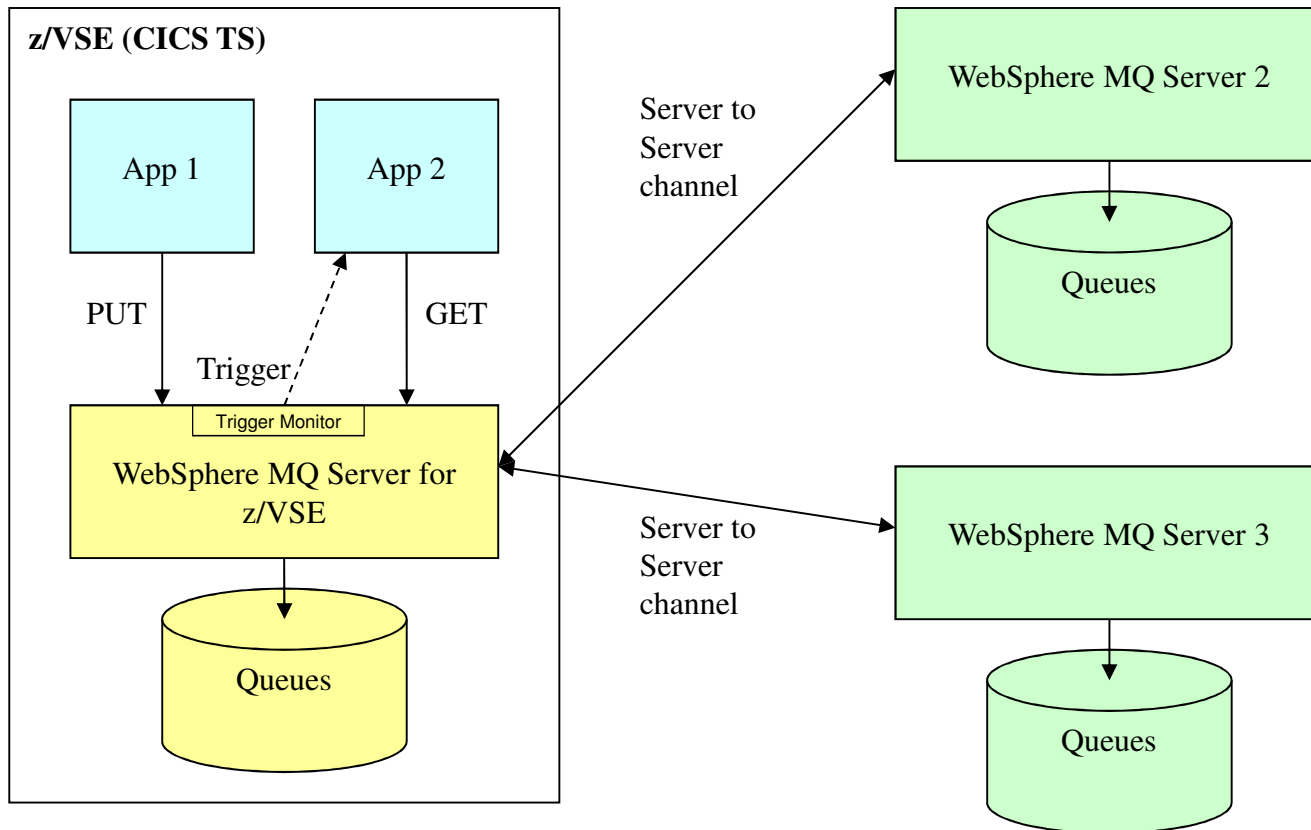
## z/VSE SNMP Monitoring Agent support

- **z/VSE Monitoring Agent enables customers to monitor z/VSE systems using standard monitoring interfaces (SNMP V1)**
  - Available since z/VSE V4.3
  - It also includes an open interface, which enables customers or vendors to use own programs (plugins) to collect additional data
  
- **Data collected by the IBM provided plugins contains**
  - Information about the environment (e.g. Processor, LPAR and z/VM information)
  - Number of partitions (static, dynamic, total, maximum)
  - Partition priorities
  - Number of CPUs (active, stopped, quiced)
  - Paging (page ins, page outs)
  - Performance counters overall and per CPU
  - CPU address and status
  - CPU time, NP time, spin time, allbound time
  - Number of SVCs and dispatcher cycles
  
- Plugin interface allows Vendors to provide additional monitoring data



# WebSphere MQ Server for z/VSE V3.0

**Withdrawn from service since September 30, 2015**



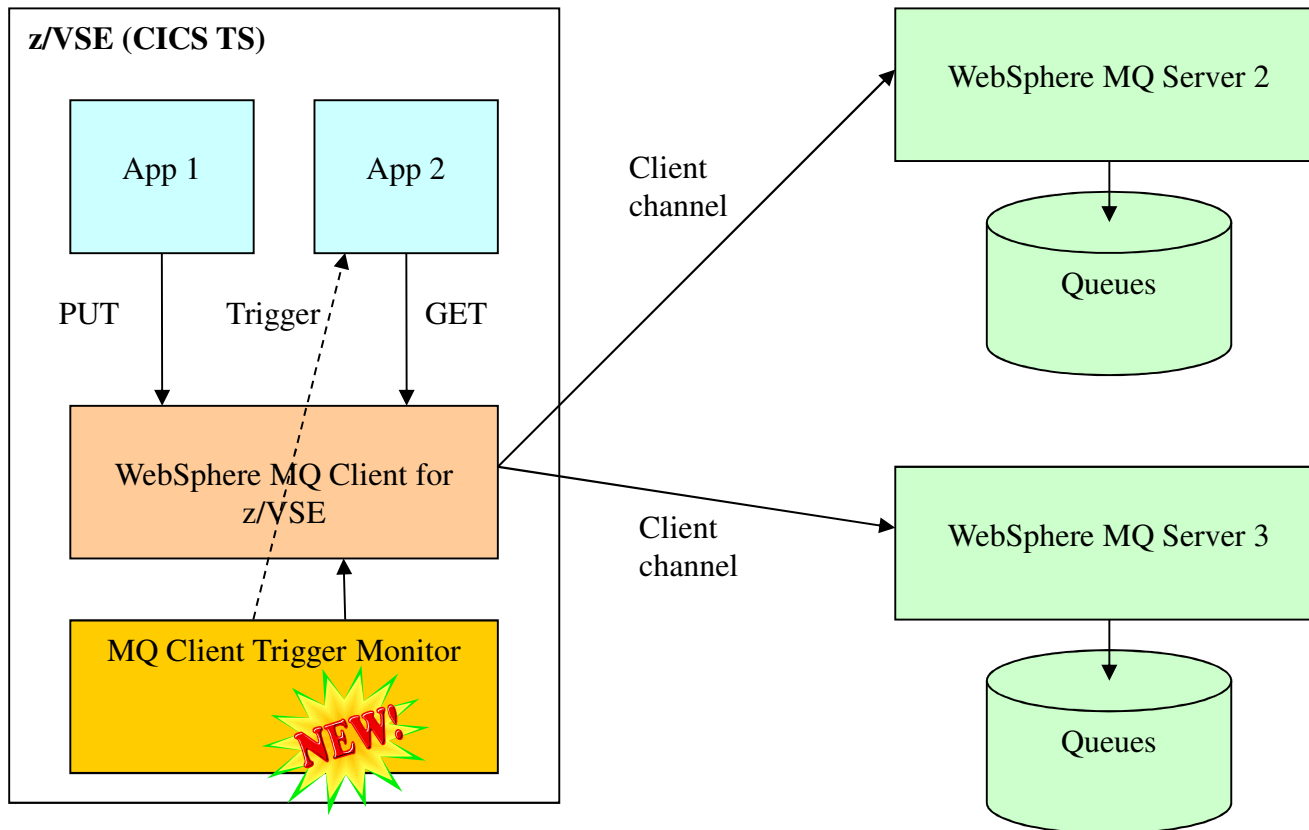
Note:

- z/VSE Applications don't have to be aware of MQ Server 2 and 3
- Decision which MQ Server Queue will host the messages is defined in channels between the MQ servers



# Replace the MQ Server on z/VSE with the MQ Client on VSE

## z/VSE applications work directly with the MQ Servers 2 and 3

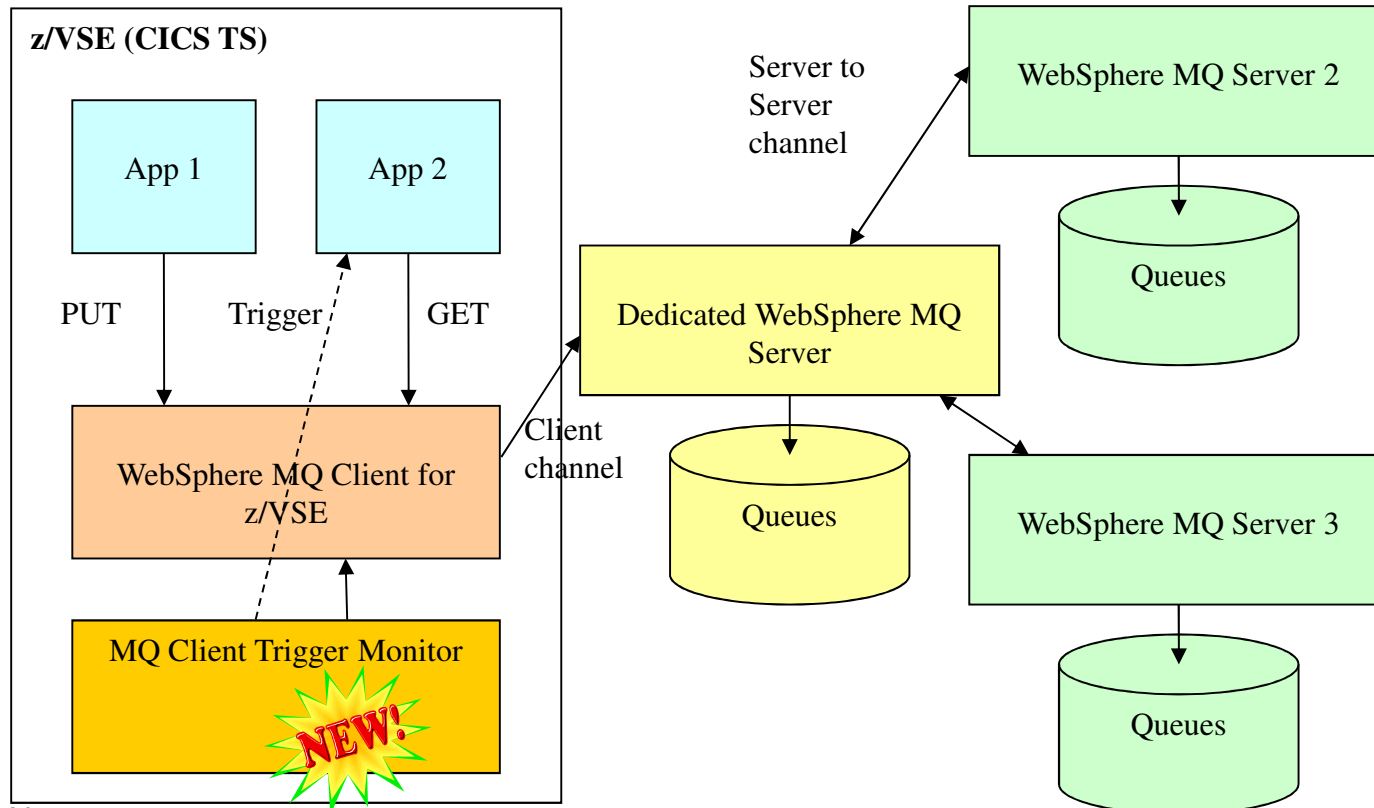


Note:

- z/VSE Applications have to be aware of MQ Server 2 and 3
- Decision which MQ Server Queue will host the messages has to be in the application

# Replace the MQ Server on z/VSE with the MQ Client on VSE

## Add a dedicated MQ Server (i.e. on Linux on System z)

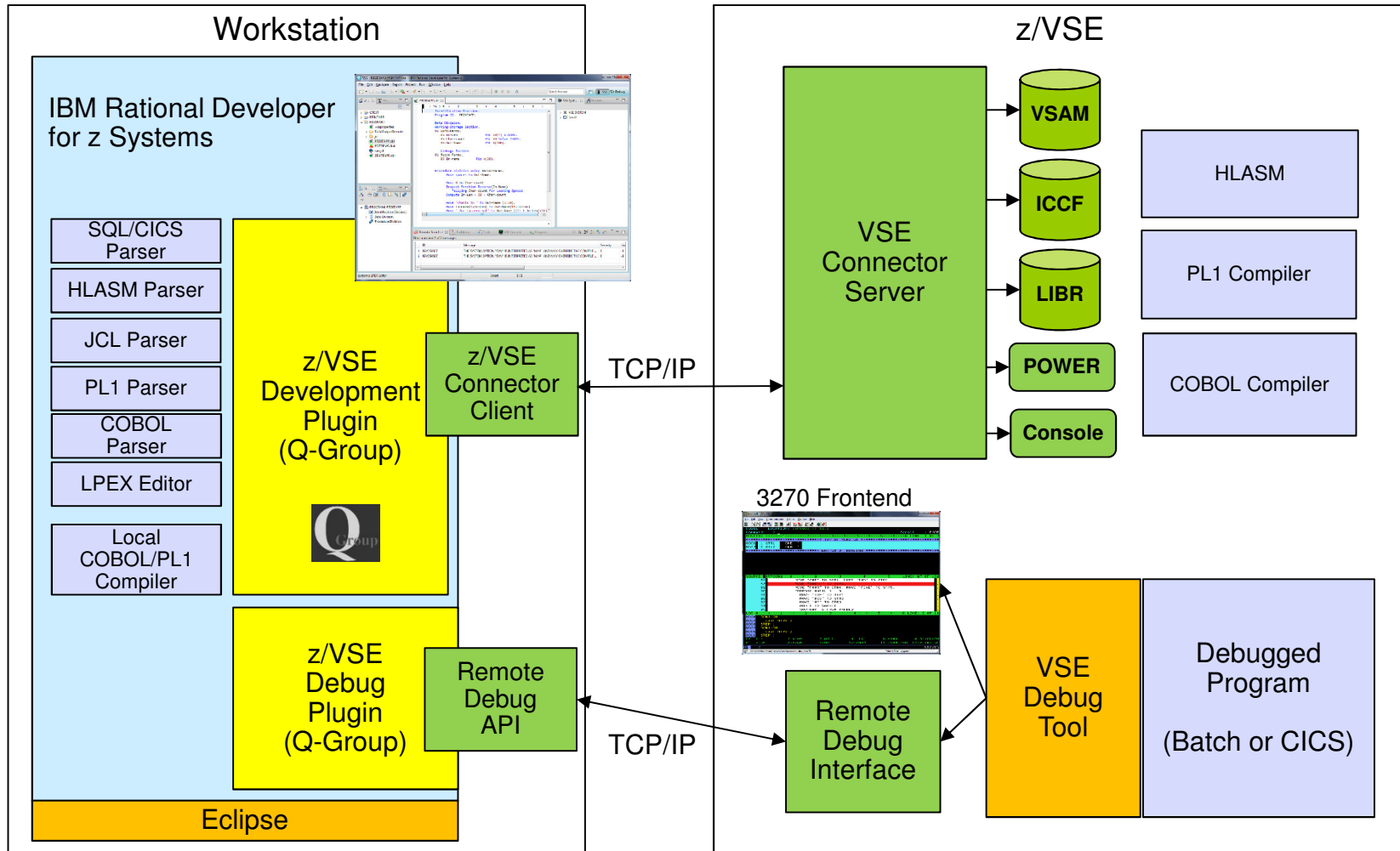


Note:

- z/VSE Applications are all working with the same MQ Server
- All definitions from z/VSE MQ Server can be replicated to the new dedicated MQ server
- z/VSE applications need to be aware of just one MQ server

# Rational Developer for z Systems (RDz)

*with z/VSE Development & Debug Plug-in for RDz – from QGroup*



VSE - RDZDEMO/PRINTAPP.cbl - IBM Rational Developer for System z

File Edit Source Refactor Navigate Search Project Run Window Help

Quick Access VSE Debug Java Java EE Database Development CVS Repository Exploring

z/OS Projects STARTAPP.cbl PRINTAPP.cbl VS... Re...

RDZDEMO

- .vseproperties
- BuildOutput
- BuildOutputRemote
- jcl
- PRINTAPP.cbl
- RDZDEMO.link
- run.jcl
- run.jcl.out
- rundebug.jcl
- STARTAPP.cbl

Project View allows grouping of program files

O... Pr...

PROGRAM: PRINTAPP

- Identification Division.
- Data Division.
  - Working-Storage Section
    - 01 Work-Parms.
  - Linkage Section.
    - 01 Recvd-Parms.
  - Procedure Division

Outline View shows structure of program

```

-----*A-1-B-----2-----3-----4-----5-----6-----7-----|-----
Identification Division.
Program-ID. PRINTAPP.

Data Division.
Working-Storage Section.
01 Work-Parms.
   05 In-Len          PIC S9(4) BINARY.
   05 Char-count     Pic 99 Value ZEROS.
   05 Out-Name       PIC X(100).

Linkage Section.
01 Recvd-Parms.
   05 In-name        Pic x(30).

Procedure Division using Recvd-Parms.
  Move spaces to Out-Name.

  Move 0 to Char-count
  Inspect Function Reverse(In-Name)
    Tallying Char-count For Leading Spaces
  Compute In-Len = 30 - Char-count

  Move 'Thanks to ' to Out-Name (1:10).
  Move In-name(1:In-Len) to Out-Name(11:In-Len)
  Move ' for succeeding!' to Out-Name ((11 + In-Len):16)

```

Editor with Syntax Highlighting

VSE SYSTEM

- zPDT
  - VSEDEMO
    - Librarian
      - PRD1
      - PRD2
      - PRIMARY
        - SSC
        - SUF
        - CNSL
        - DBDCCICS
        - FORSEC
        - FRAN
          - FFSTMA
          - GETQUC
          - PRINTA
          - STARTA
          - PRINTA
          - STARTA
          - PRINTA
          - STARTA
          - RDZDEM

Access to VSE's resources

Remote Error List Problems Tasks VSE Console Progress History

0 errors, 182 warnings, 0 others (Filter matched 100 of 182 items)

Description	Resource	Path	Location	Type
Warnings (100 of 182 items)				

VSE - RDZDEMO/PRINTAPP.cbl - IBM Rational Developer for System z

File Edit Source Refactor Navigate Search Project Run Window Help

Quick Access VSE Debug Java Java EE Database Development CVS Repository Exploring

z/OS Projects

- RDZDEMO
  - .vseproperties
  - BuildOutput
  - BuildOutputRemote
  - jcl
  - PRINTAPP.cbl
  - RDZDEMO.link
  - run.jcl
  - run.jcl.out
  - rundebug.jcl
  - STARTAPP.cbl

\*PRINTAPP.cbl

```

-----*A-1-B-+-----2-----3-----4-----5-----6-----7-----+-----
Identification Division.
Program-ID. PRINTAPP.

Data Division.
Working-Storage Section.
01 Work-Parms.
   05 In-Len          PIC S9(4) BINARY.
   05 Char-count     Pic 99 Value ZEROS.
   05 Out-Name       PIC X(100).

Linkage Section.
01 Recvd-Parms.
   05 In-name        Pic x(30).

Procedure Division using Recvd-Parms.
  Move spaces to Out-Name.
  Move 0 to Char-count3
  Inspect Function Reverse(In-Name)
  Tallying Char-count For Leading Spaces
  Compute In-Len = 30 - Char-count
  
```

Remote Compile shows error in source editor

Remote Error List

Problems Tasks VSE Console Progress History

Filter matched 2 of 2 messages

ID	Message	Sev...	Line	Location
i IGY04027	THE SYSTEM OPTION "SYM" IS INTERPRETED AS "MAP" AND MAY OVERRIDE THE COMPI...	0	-1	PRINTAPP
x IGYPS2121	"CHAR-COUNT3" WAS NOT DEFINED AS A DATA-NAME. THE STATEMENT WAS DISCAR...	2	19	PRINTAPP

Compiler Messages after Remote Compile

"CHAR-COUNT3" WAS NOT DEFINED AS A DATA-NAME. THE STATEMENT WAS DISCARDED.

VSE - IBM Rational Developer for System z

File Edit Source Refactor Navigate Search Project Run Window Help

Quick Access VSE Debug Java Java EE Database Development CVS Repository Exploring

z/OS Projects

- RDZDEMO
  - .vseproperties
  - BuildOutput
  - BuildOutputRemote
  - jcl
  - PRINTAPP.cbl
  - RDZDEMO.link
  - run.jcl
  - run.jcl.out
  - rundebug.jcl
  - STARTAPP.cbl

PRINTAPP.cbl

```

-----*A-1-B-+-----2-----3-----4-----5-----6-----7-----+-----
Identification Division.
Program-ID. PRINTAPP.

Data Division.
Working-Storage Section.
01 Work-Parms.
   05 In-Len          PIC S9(4) BINARY.
   05 Char-count      Pic 99 Value ZEROS.
   05 Out-Name        PIC X(100).

Linkage Section.
01 Recvd-Parms.
   05 In-name         Pic x(30).

Procedure Division using Recvd-Parms.
  Move spaces to Out-Name.

  Move 0 to Char-count
  Inspect Function Reverse(In-Name)
    Tallying Char-count For Leading Spaces
  Compute In-Len = 30 - Char-count
  
```

VSE SYSTEM

- zPDT
- VSEDEMO
  - Librarian
  - Power
  - VSAM
  - ICCF
  - Console
- Local

An outline is not available.

Remote Error List Problems Tasks VSE Console Progress History

VSEDEMO

```

AR 0015     PRV-64      OK
AR 0015     SYSTEM     1088K
AR 0015     AVAIL      61920K
AR 0015     TOTAL      270336K  <-----'
AR 0015 1140I  READY!
  
```

Access to VSE console

Command

VSE - .TmpVseRemote/HostEmuPro/VSEDEMO.hce - IBM Rational Developer for System z

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Quick Access VSE Debug Java Java EE Database Development CVS Repository Exploring

z/OS Projects PRINTAPP.cbl VSEDEMO.hce VS... Re...

RDZDEMO  
 .vseproperties  
 BuildOutput  
 BuildOutputRemote  
 jcl  
 PRINTAPP.cbl  
 RDZDEMO.link  
 run.jcl  
 run.jcl.out  
 rundebug.jcl  
 STARTAPP.cbl

Current host connection profile is: /.TmpVseRemote/HostEmuPro/VSEDEMO.hce

```

IESADMS01                z/VSE ONLINE
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                ++
                ++  VV  VV  SSSSS  EEEEEEE
                ++  VV  VV  SSSSSSS EEEEEEE
                ++  VV  VV  SS      EE
ZZZZZZ          ++  VV  VV  SSSSSS  EEEEEEE
ZZ              ++  VV  VV  SSSSSS  EEEEEEE
ZZ              ++  VV  VV  SS      EE
ZZZZZZ          ++  VVVV  SSSSSSS  EEEEEEE
ZZZZZZ          ++  VV    SSSSS    EEEEEEE

Your terminal is A000 and its name in the network is D3000001
Today is 01/16/2017 To sign on to DBDCCICS -- enter your:

USER-ID..... The name by which the system knows you.
PASSWORD..... Your personal access code.

PF1=HELP      2=TUTORIAL  3=TO VM      4=REMOTE APPLICATIONS
10=NEW PASSWORD
  
```

3270 Terminal Emulator included

Má a 18/025

Host Properties Host Connection

Remote Error List Problems Tasks VSE Console Progress History

Filter matched 0 of 0 messages

ID	Message	Sev...	Line	Location	Host Name	Date

VSE SYSTEM  
 zPDT  
 VSEDEMO  
 Librarian  
 Power  
 VSAM  
 ICCF  
 Console  
 Local

An outline is not available.

Debug - VSEDebuggerTempFiles/vse2917040307456719476.cbl - IBM Rational Developer for System z

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Quick Access VSE Debug Java Java EE Database Development CVS Repository Exploring

Debug Servers

- VSE VSE Debug to VSEDEMO [Launch VSE Debugger]
  - VSE VM
    - Thread[1]
      - STARTAPP (line: 26)

Remote Debugger allows debugging of COBOL programs

Variables Breakpoints

Name	Value
PROGRAM-PASS-FIELDS	01 STARTAPP:>PROGRAM-PASS-FIELDS
TEMP-NAME	'
PROGRAM-OTHER-FIELDS	01 STARTAPP:>PROGRAM-OTHER-FIELDS
INPUT-NAME	'
CHAR-COUNT	00 <span style="color: red;">Display Variables</span>
PROGRAM-FLAGS	01 STARTAPP:>PROGRAM-FLAGS

vse2917040307456719476.cbl

Line 30 Column 1 Insert

```

000022      Initialize Program-pass-fields
000023      Program-other-fields
000024      Program-flags.
000025
000026      Perform until Loop-done
000027      Display ' '
000028      Display 'Enter a name or Q to quit:'
000029      Move Spaces to Input-name
000030      Accept Input-name
000031      IF Input-name = Spaces
000032      Move 'Q' to Input-name
000033      End-IF
000034
  
```

Step through in program source

Breakpoint

Outline

- CBL PROGRAM: StartApp
  - Identification Division.
  - Data Division.
    - Working-Storage Section.
      - 01 Program-pass-fields.
        - 05 Temp-name
      - 01 Program-other-fields.
        - 05 Input-name
        - 05 Char-count
      - 01 Program-flags.
        - 05 Loop-flag
    - Procedure Division.

Console Tasks Problems Executables

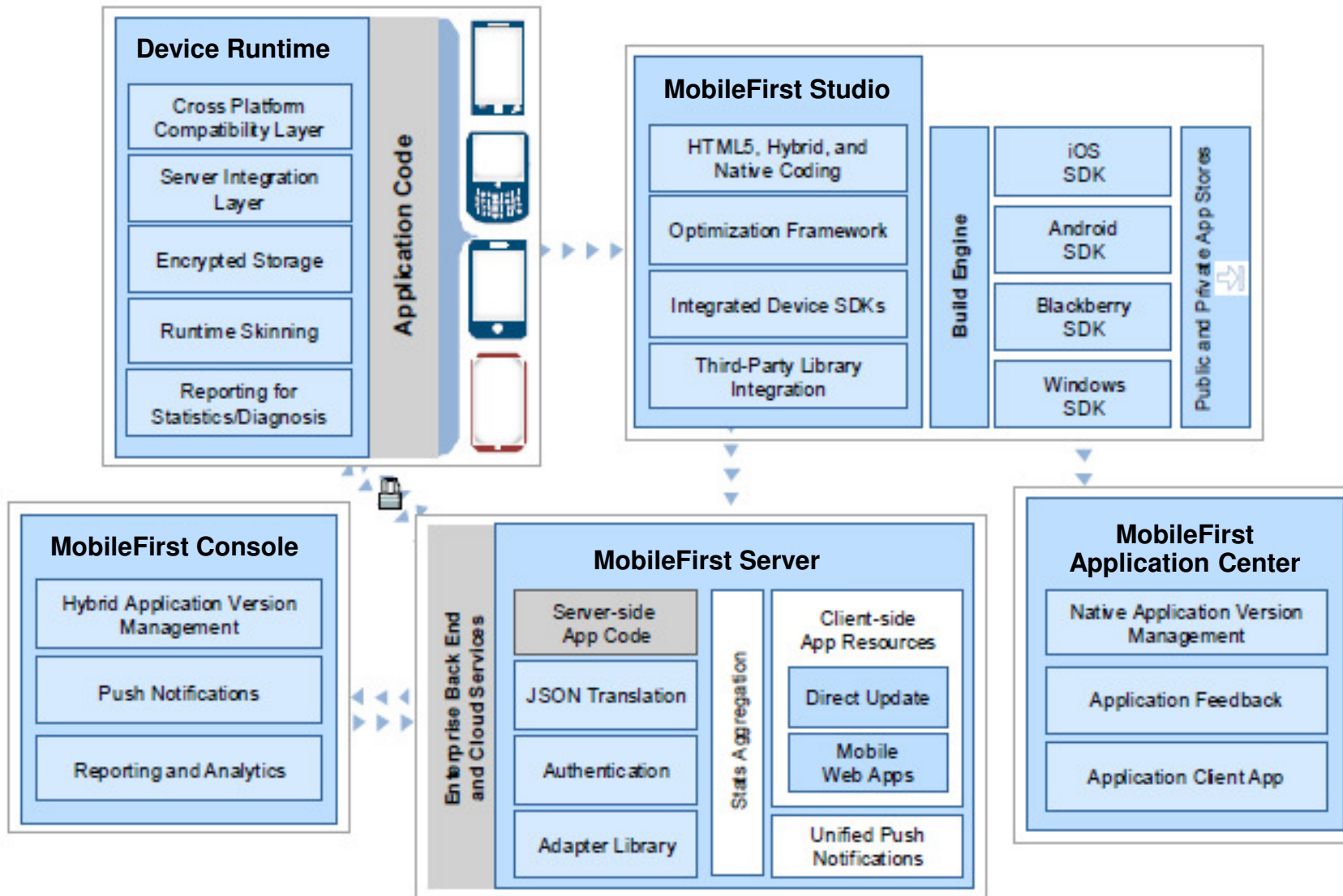
0 errors, 182 warnings, 0 others (Filter matched 100 of 182 items)

Description	Resource	Path	Location	Type
Warnings (100 of 182 items)				

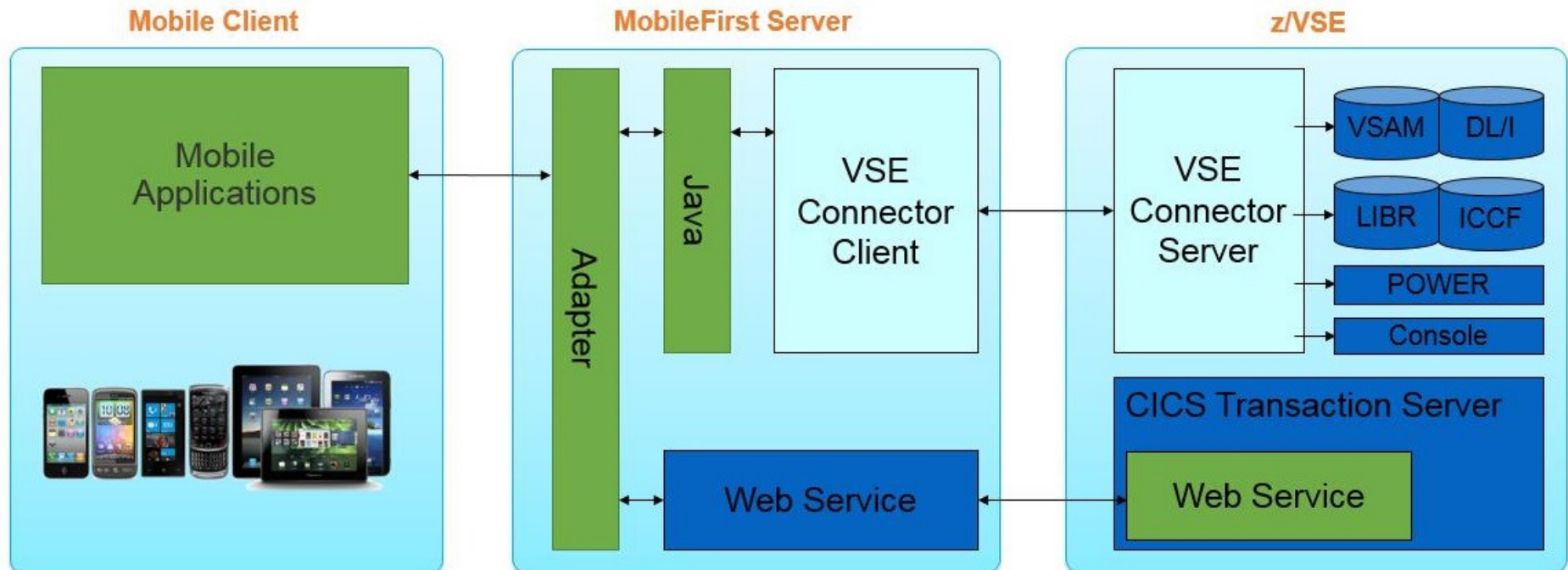
System z LPEX Editor Insert 30 : 1



# IBM MobileFirst Foundation

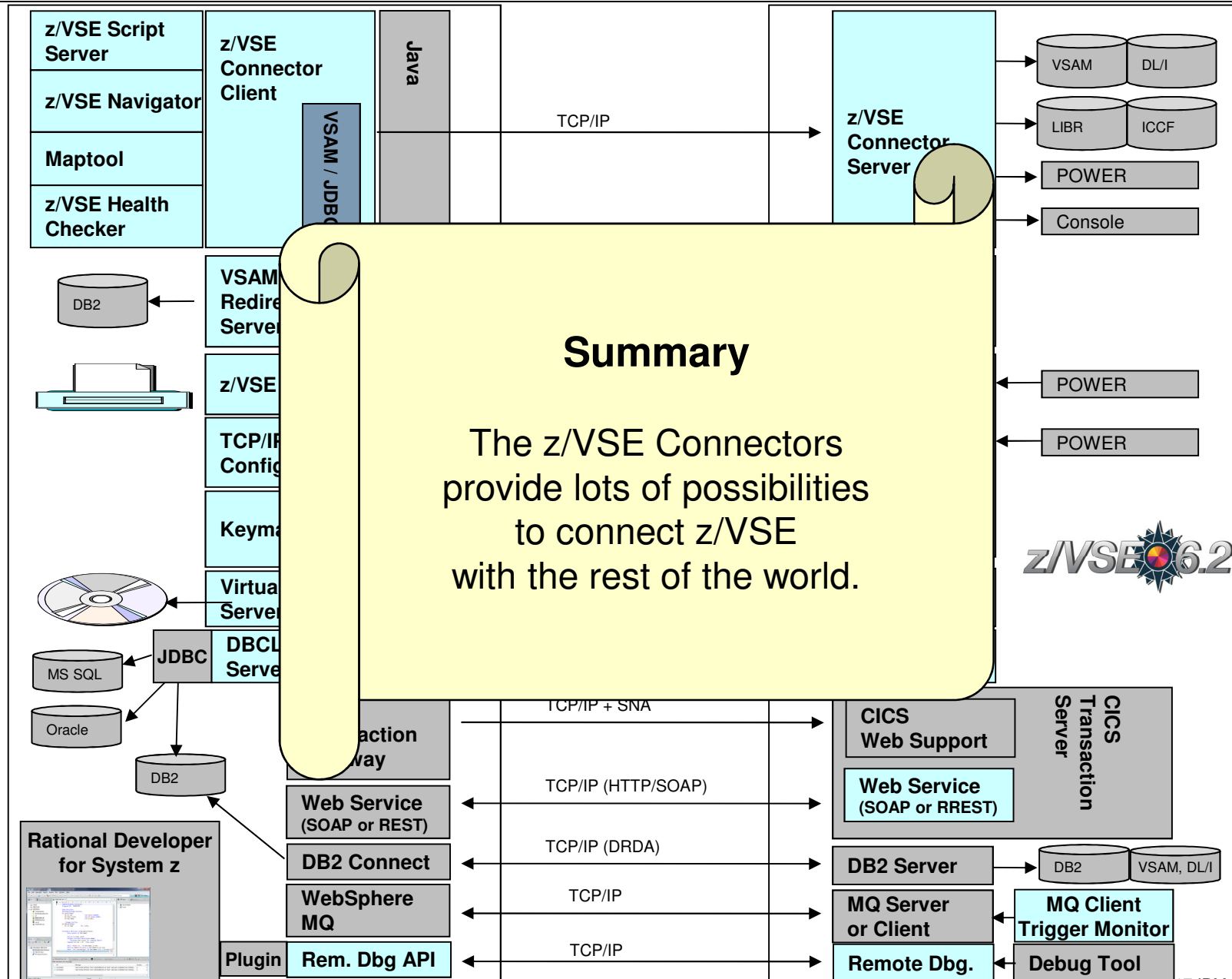


## z/VSE and IBM MobileFirst



To start mobile development with z/VSE, you need to have the following applications:

- The **IBM MobileFirst Platform Developer Edition**
- The **z/VSE Connector Client and Server**
- **Web Service** enabled CICS TS applications
- Whitepaper: <ftp://public.dhe.ibm.com/eserver/zseries/zos/vse/download/GettingStartedWithMobileDevelopmentForVSE.pdf>



## Questions ?



THANK YOU