

z/VSE Connectors

Best practices and use cases

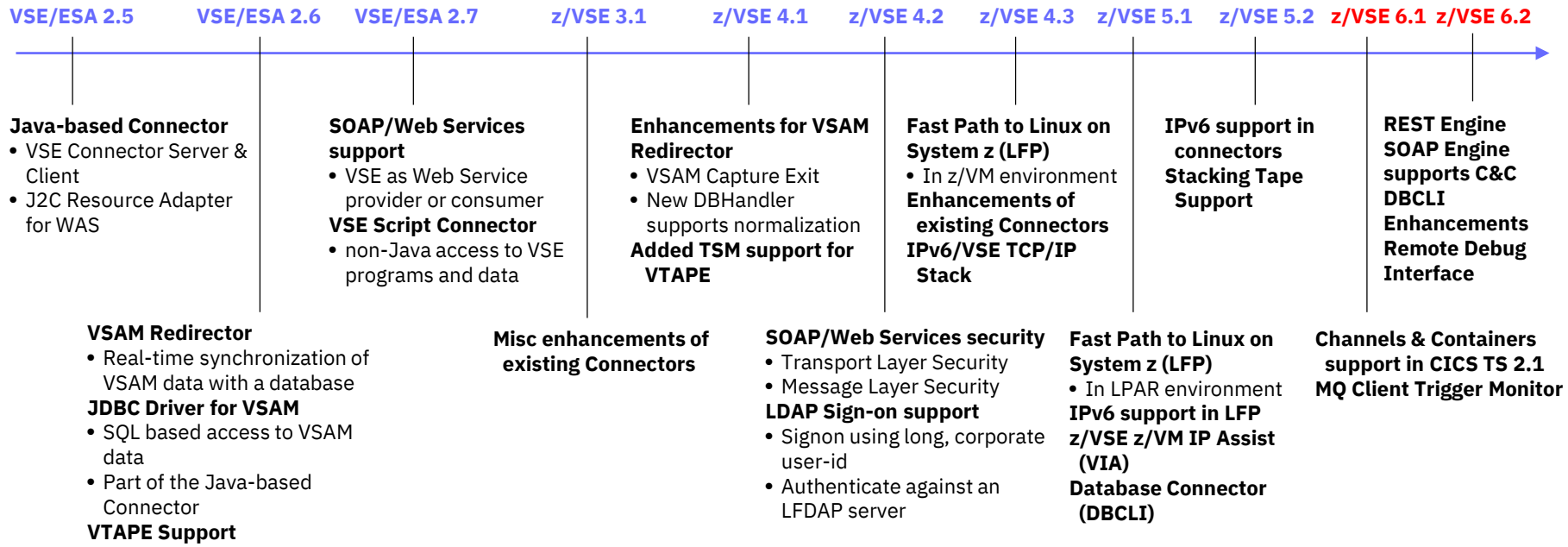
Ingo Franzki
ifranzki@de.ibm.com

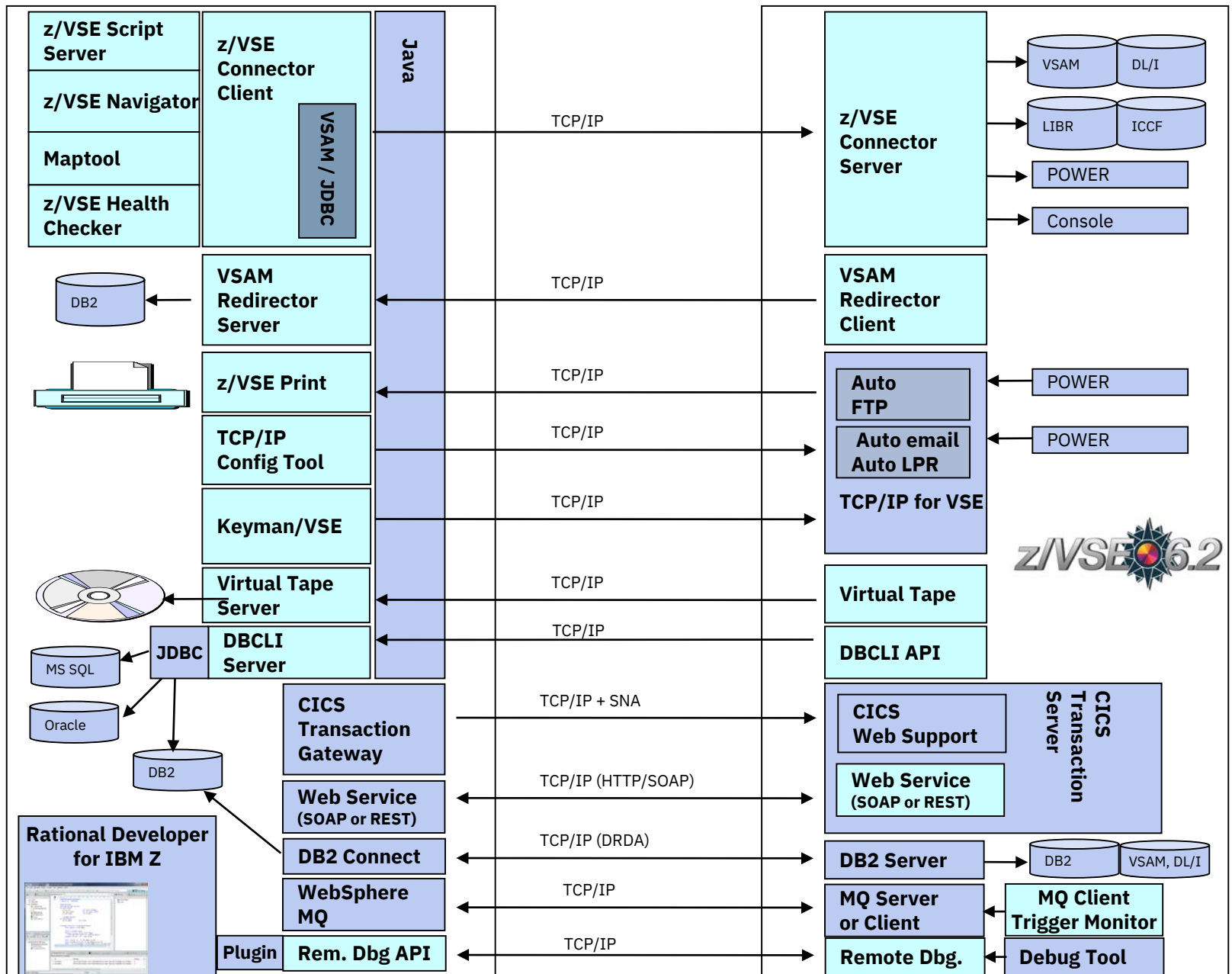


z/VSE Connectors - Introduction

- 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

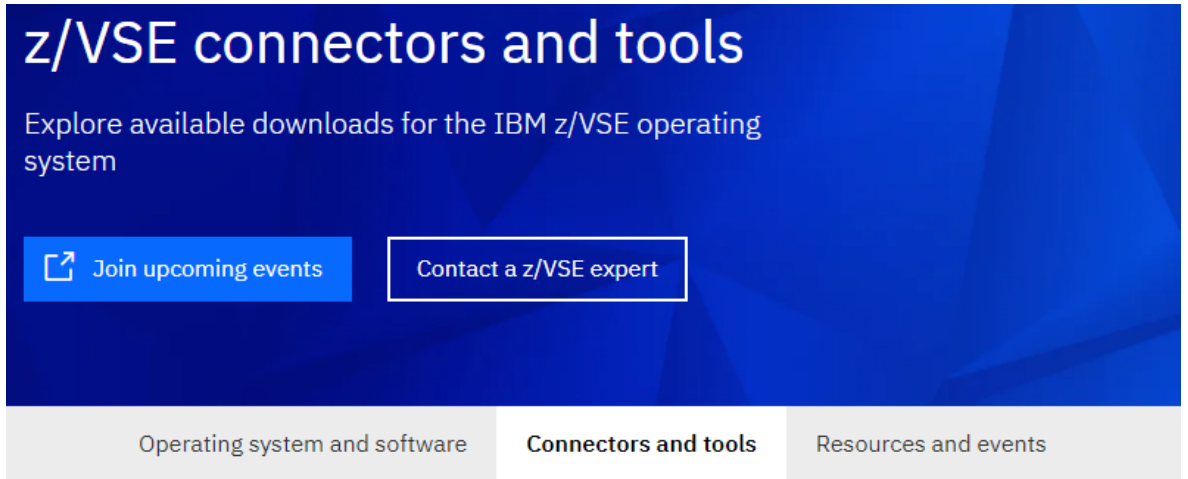
— Connector components

- Delivered as part of the z/VSE system as WBOOKs in PRD2.PROD
- Also available on the z/VSE Homepage
<https://www.ibm.com/it-infrastructure/z/zvse-downloads>

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

— Information about the Connector Components can be found here:

https://www.ibm.com/support/knowledgecenter/SSB27H_6.2.0/fa2ws_connection_possibilities_use.html



The screenshot shows the top section of a webpage. The main heading is "z/VSE connectors and tools" in white text on a dark blue background. Below the heading is a sub-heading: "Explore available downloads for the IBM z/VSE operating system". There are two buttons: a blue button with a white icon and text "Join upcoming events", and a white button with a blue border and text "Contact a z/VSE expert". At the bottom of the header is a navigation bar with three tabs: "Operating system and software", "Connectors and tools" (which is highlighted), and "Resources and events".

Extend z/VSE with connectors and tools

z/VSE enables clients to extend existing solutions with connectors and tools to access applications on Linux on IBM Z® – or any other platform – and to access z/VSE resources from other platforms. Learn more:

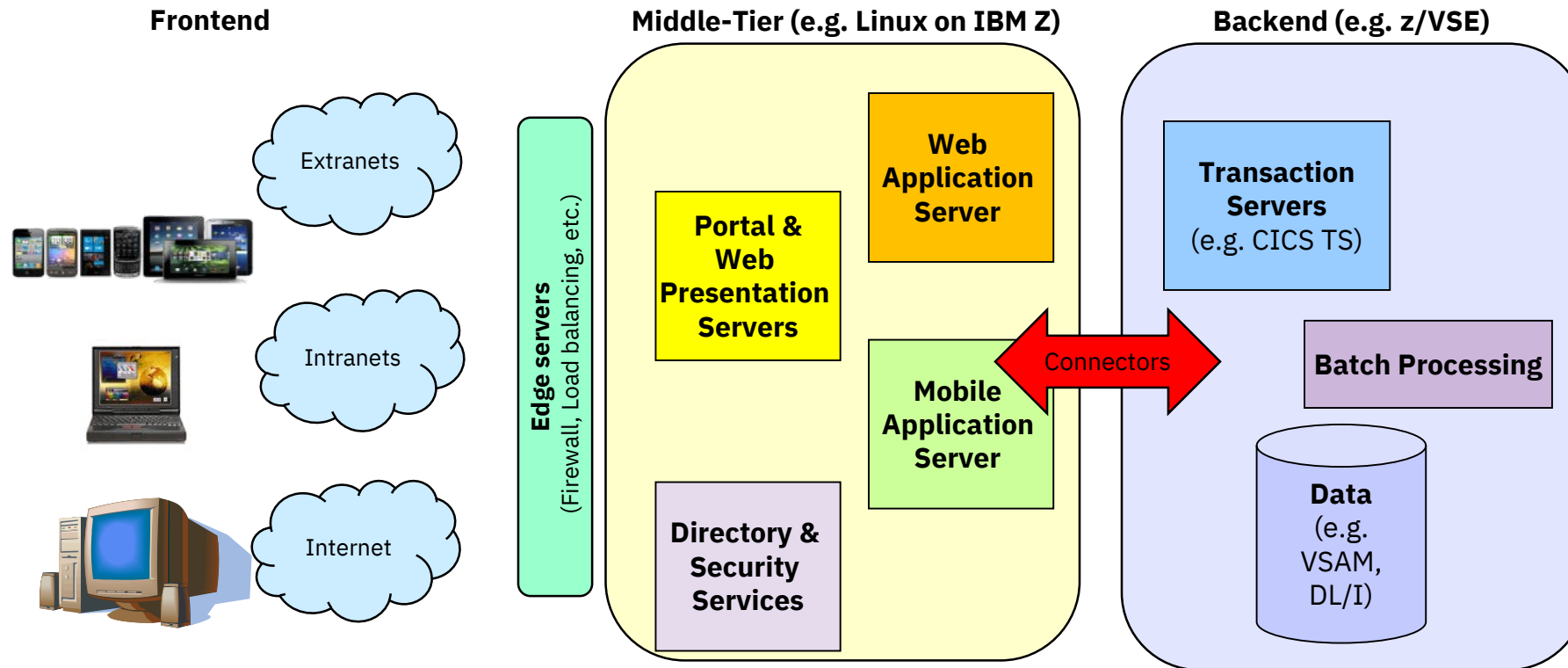
- [See what's new](#)
- [Download z/VSE connectors](#)
- [Download z/VSE tools](#)
- [Find popular resources](#)

What's new for z/VSE

- [VSE Navigator \(updated 01/2020 for z/VSE V6.2\)](#)
- [VSAM Redirector Server \(updated 10/2019 for APAR PH17722\)](#)
- [VSE Connector Client \(updated 03/2019 for APAR PH08671\)](#)
- [VSE Virtual Tape Server \(updated 02/2018 for APAR PI92815\)](#)

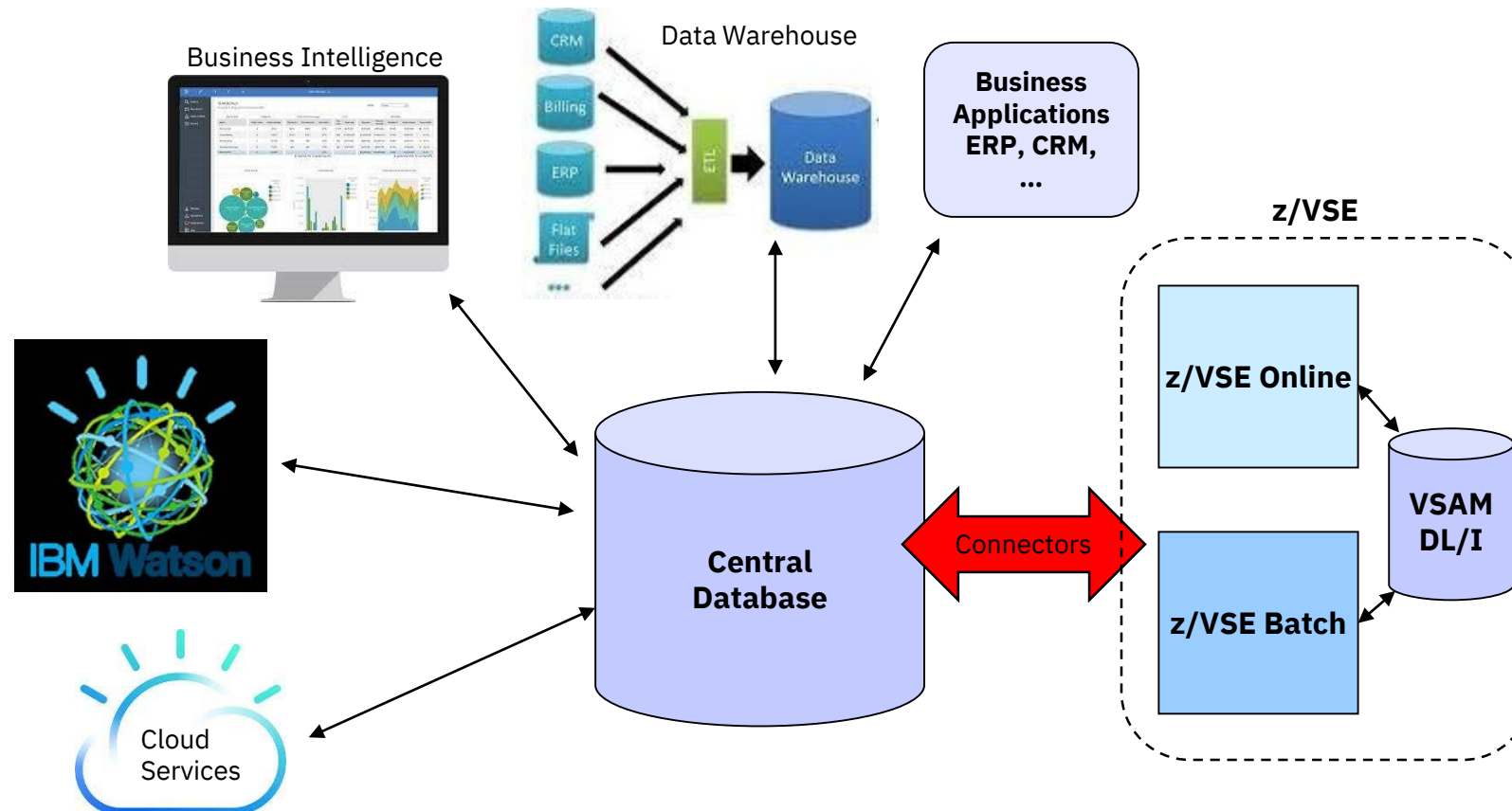
Scenario 1: Web- / Mobile-enabling of Applications

- Web-enable z/VSE Applications
- Mobile-enable z/VSE Applications
- Provide RESTful APIs for z/VSE Applications (microservices)
- Modernize User Interface for applications



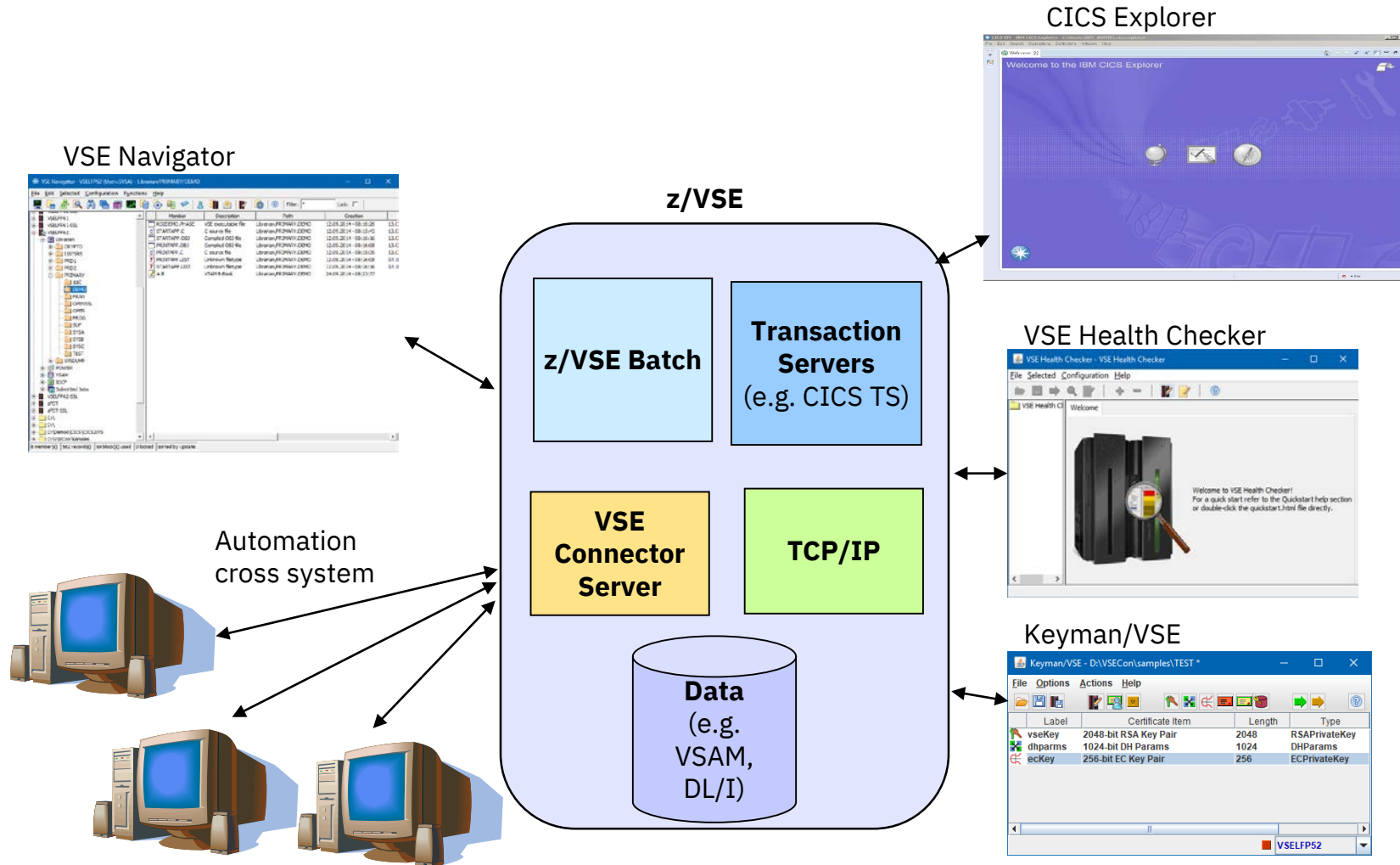
Scenario 2: Central Database

- Use a central database for all business related applications
- Allow z/VSE applications to work with central database
- Add analytics and business intelligence



Scenario 3: Modern z/VSE Administration, Operation, Automation

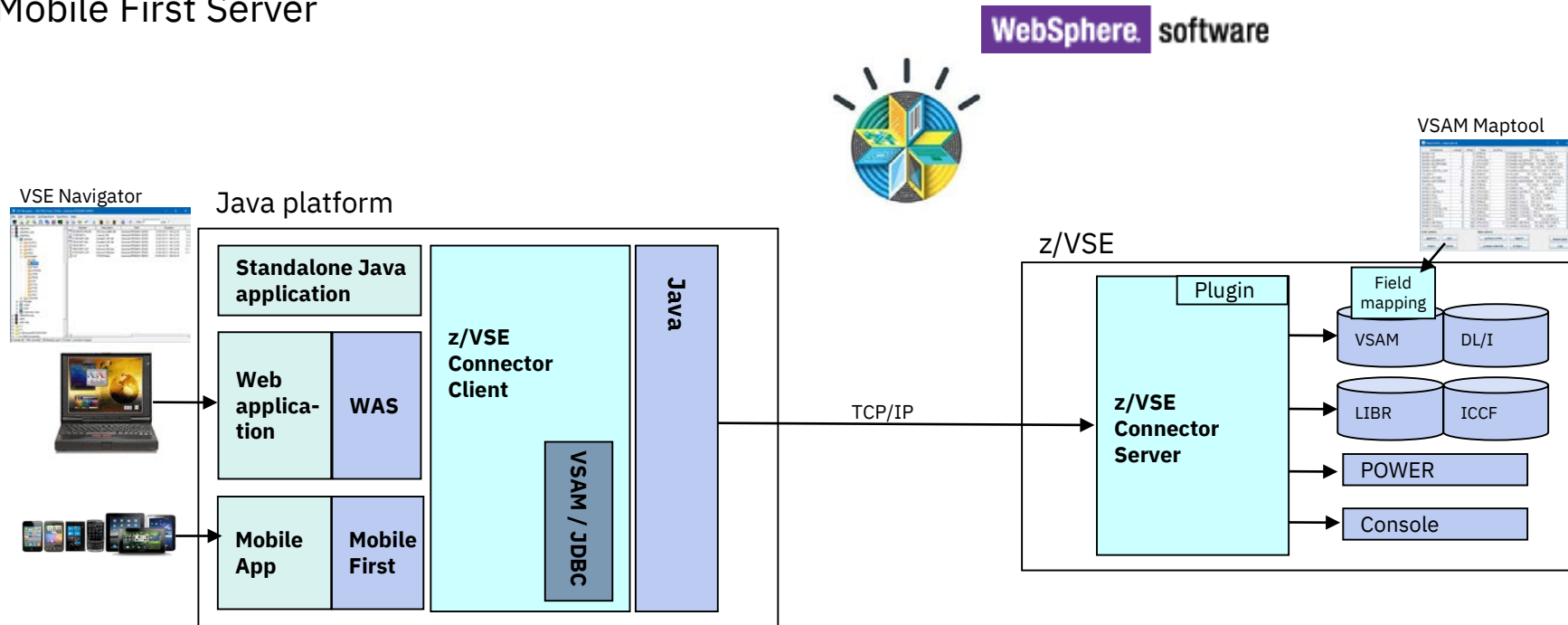
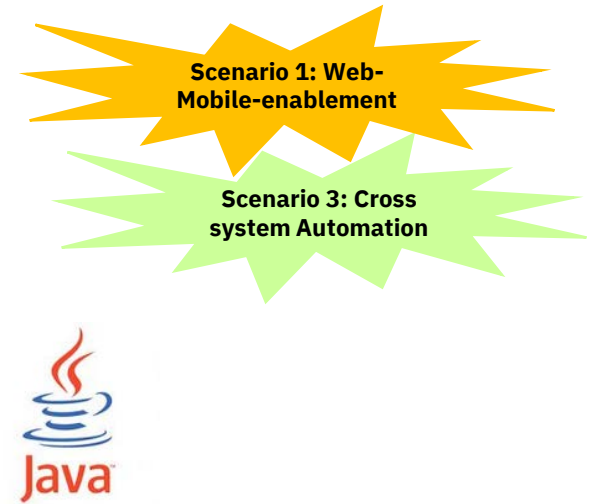
- Use graphical Tools for z/VSE administration
- Add cross-system automation



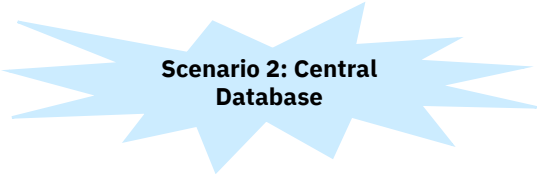
Java-based Connector

— Remote access to z/VSE data and programs from a Java program

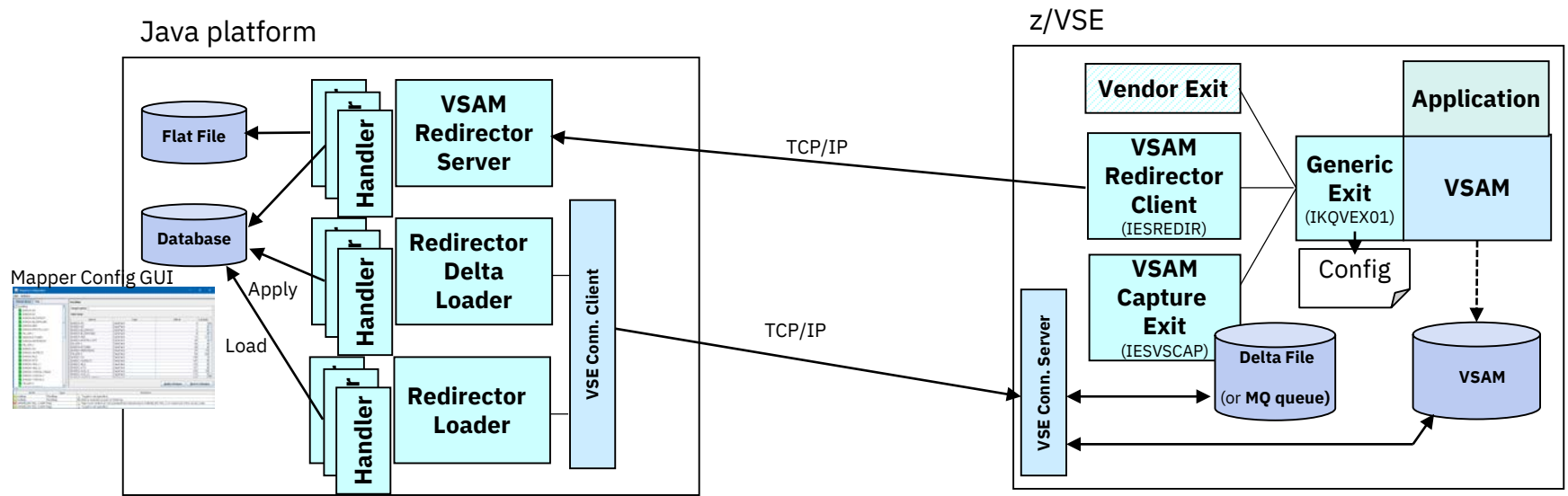
- Real time access to VSAM, DL/1, LIBR, POWER, Console, Jobs, ...
- From standalone Java programs
- From web/mobile applications (servlets, JSPs, Mobile Apps etc.)
- Deployable as J2C Resource Adapter or JDBC Data Source into J2EE web applications servers, such as:
 - WebSphere Application Server
 - IBM Mobile First Server



VSAM Redirector



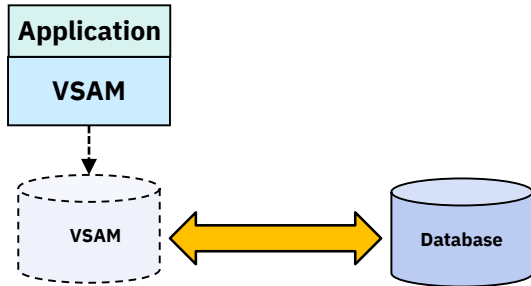
- **Synchronization of VSAM data with a database**
- **Real-time: VSAM Redirector Client/Server**
 - **Data synchronization (OWNER=VSAM):**
 - any INSERT, UPDATE or DELETE request is immediately replicated into the database
 - Read requests go against the VSAM dataset on z/VSE
 - **Data migration (OWNER=REDIRECTOR):**
 - 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



VSAM Redirector - modes of operation

Data Migration

- EXIT=IESREDIR, OWNER=REDIR

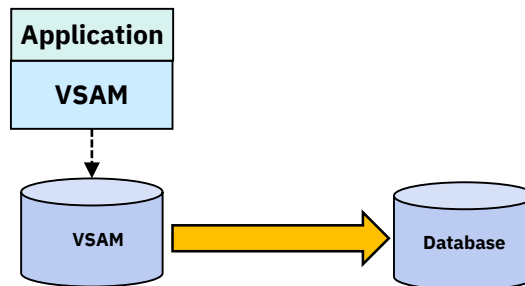


- Real time access to data in database
- All VSAM requests are redirected to the database

- High performance impact

Data Synchronization

- EXIT=IESREDIR, OWNER=VSAM

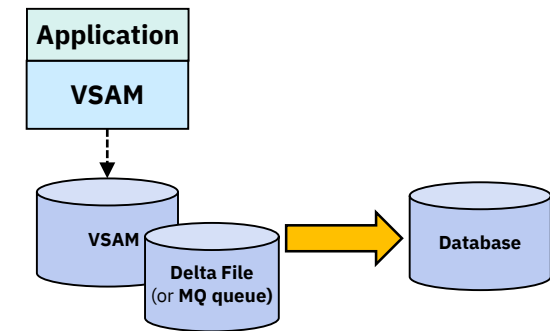


- Real time data replication (one way)
- Only updating VSAM requests (update, insert, delete) are redirected to database

- Medium performance impact

Capture & Apply

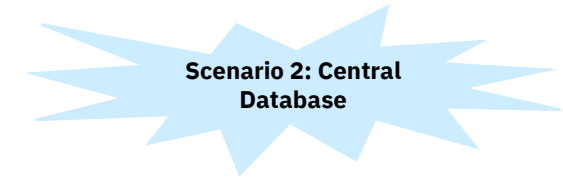
- EXIT=IESVSCAP



- Near real time data replication (every n minute, etc.)
- Changes to VSAM data are captured and collected, and then applied to the database asynchronously

- Low performance impact

z/VSE Database Call Level Interface (DBCLI)

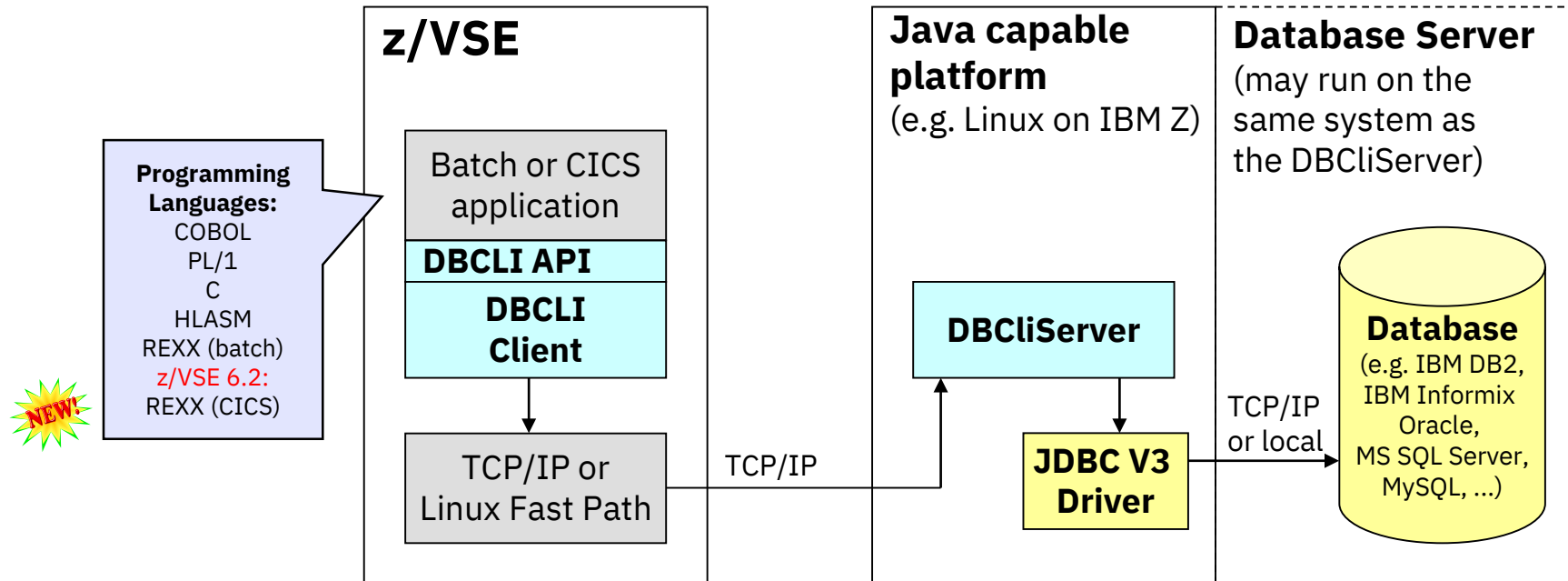


— Allows z/VSE applications to access a relational database on any suitable database server

- IBM DB2, IBM Informix, Oracle, MS SQL Server, MySQL, etc.

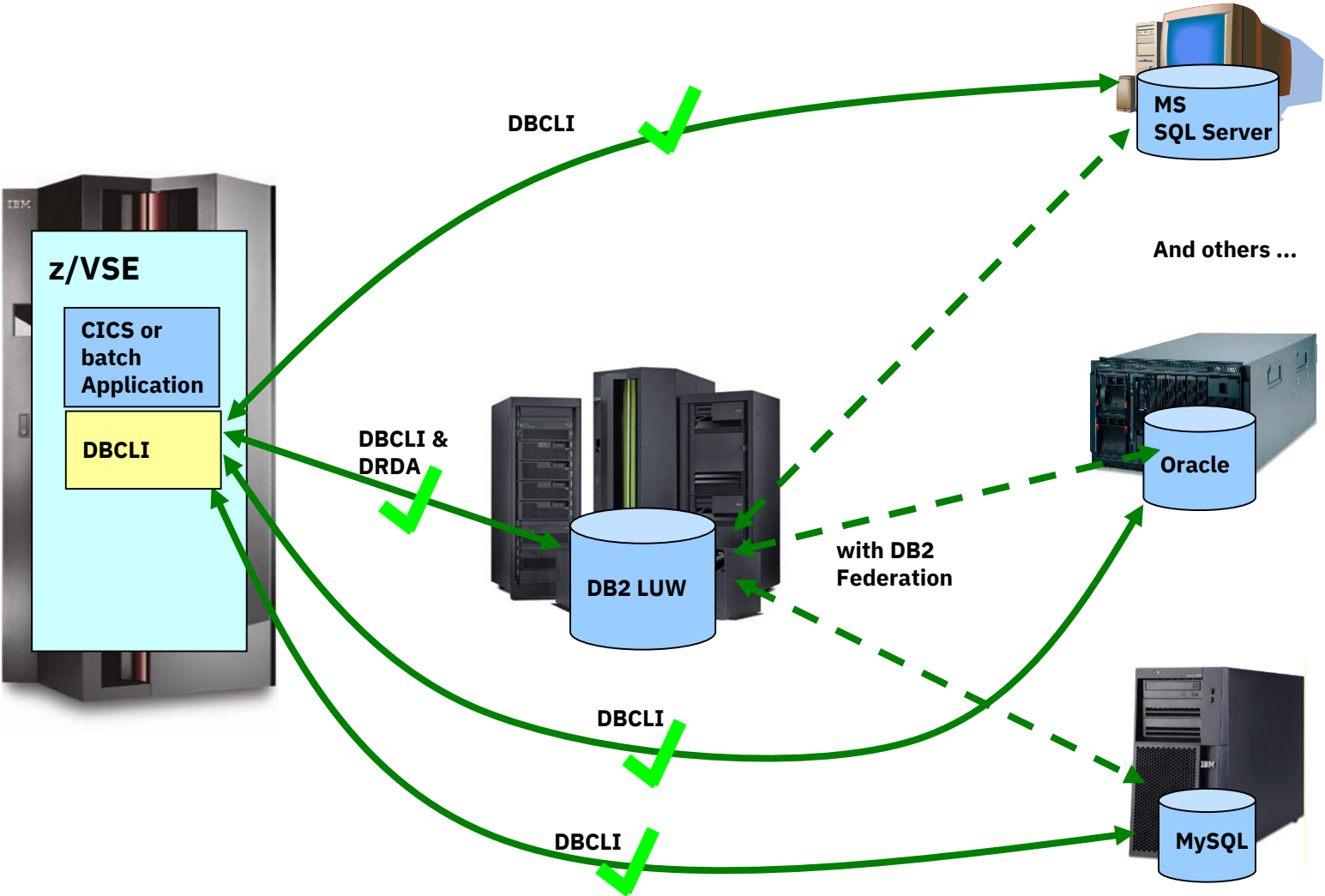
→The database product must provide a JDBC driver that supports JDBC V3.0 or later

— Utilize advanced database functions and use SQL statements provided by modern database products



z/VSE applications accessing Databases

Scenario 2: Central Database



z/VSE 6.2: Interactive Query Tool for DBCLI



z/VSE Database Connector - Interactive Terminal

APPLID: DBDCCICS

EZA settings (optional):
TCPName: _____ ADSName: _____

Connection information:
Server: vwinse06
Port: 16178
DBName: SAMPLE
User-ID: Administrat
Password: _____
SSL settings (optional):
SSLType: _____ (SSL3)
Keyring: _____
Keyname: _____
Ciphers: _____

DBName: SAMPLE
Product: DB2/NT
Version: SQL09075

SQL statement:
select * from employee

Stored procedure call (Y/N):
Y
For PF4 (TABLES) or PF5 (C
Table: %
You can use wild

Enter the required con
PF3: EX

MA B
Connected to remote server/host boeocvse u

z/VSE Database Connector - Interactive Terminal

APPLID: DBDCCICS

DBName: SAMPLE
Product: DB2/NT
Version: SQL09075

SQL statement:
select * from employee

EMPNO CHAR(6)	FIRSTNME VARCHAR(12)	MIDINIT CHAR(1)	LASTNAME VARCHAR(15)	WORKDEPT CHAR(3)	PHONENO CHAR(4)	HI 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	R	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	B	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

Displaying rows 1 to 32.
Use PF10/11 to scroll left/right, or PF7/8 to scroll backward/forward.
PF3: RETURN PF4: NEXT RESULT PF7: BACKW. PF8: FORW. PF10: LEFT PF11: RIGHT

MA B
Connected to remote server/host boeocvse using port 23

Print to Disk - Append 42/002

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.BASE,PRD2.TCPIPC)
// EXEC IESDBCLB,PARM='SYMBOLS=YES ECHO=ON'

CONNECT SERVER=my.database.server.com DBNAME=SAMPLE
        USER=db2user PASSWORD=password;

SELECT EMPNO,FIRSTNME,LASTNAME,SALARY,BONUS
        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:

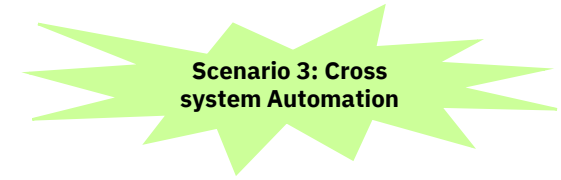
EMPNO   FIRSTNME   LASTNAME   SALARY   BONUS
CHAR(6) VARCHAR(12) VARCHAR(15) DECIMAL(9,2) DECIMAL(9,2)
-----
000010  CHRISTINE  HAAS       152750.00  1000.00
000020  MICHAEL    THOMPSON   94250.00   800.00
000030  SALLY      KWAN       98250.00   800.00
...

INFO: ROWCOUNT: 42
INFO: LAST RC=0

DISCONNECT;
INFO: DISCONNECT SUCCESSFULL.
INFO: LAST RC=0

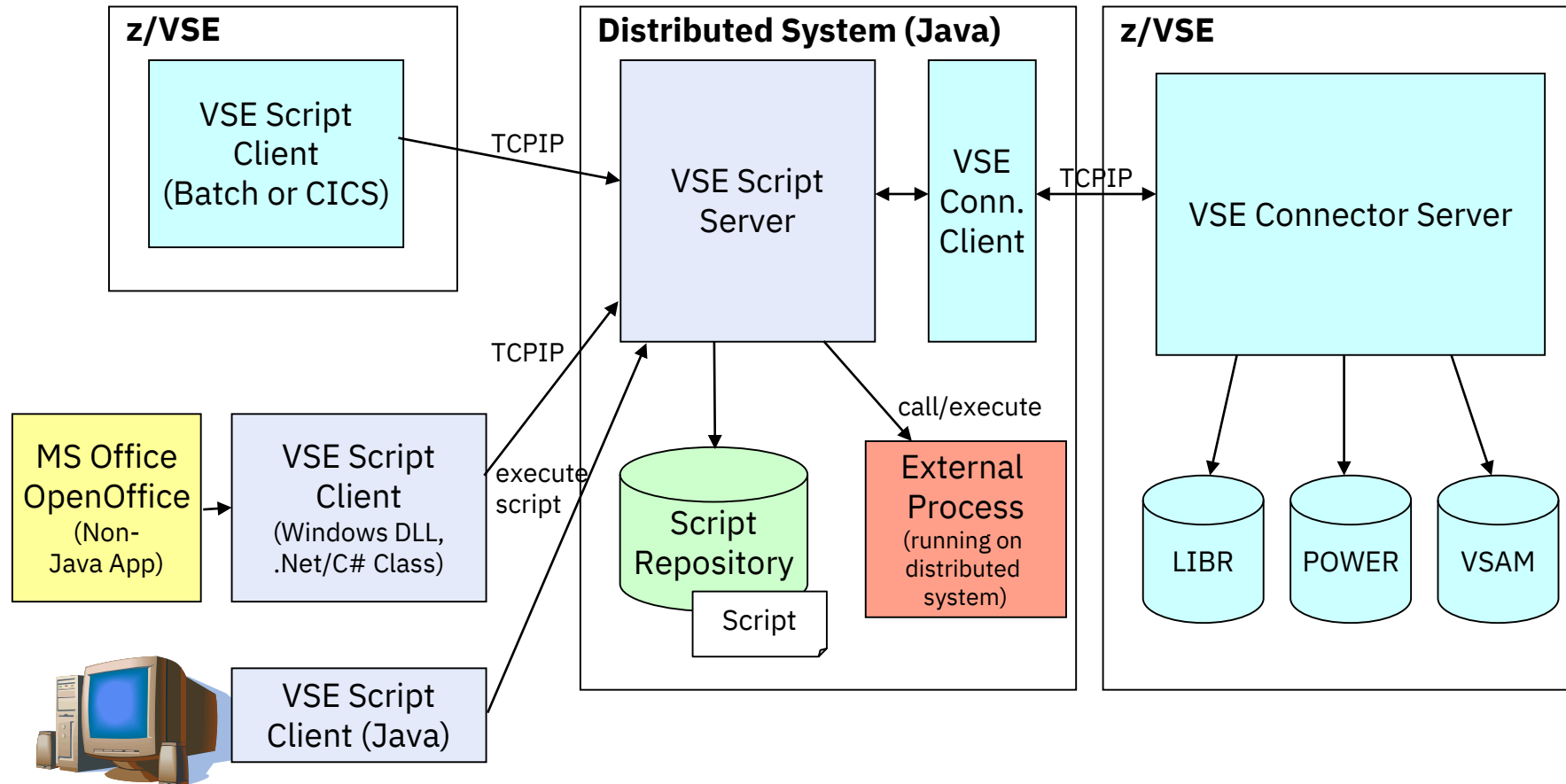
1S55I LAST RETURN CODE WAS 0000
EOJ RUN          MAX.RETURN CODE=0000
```

z/VSE Script Connector



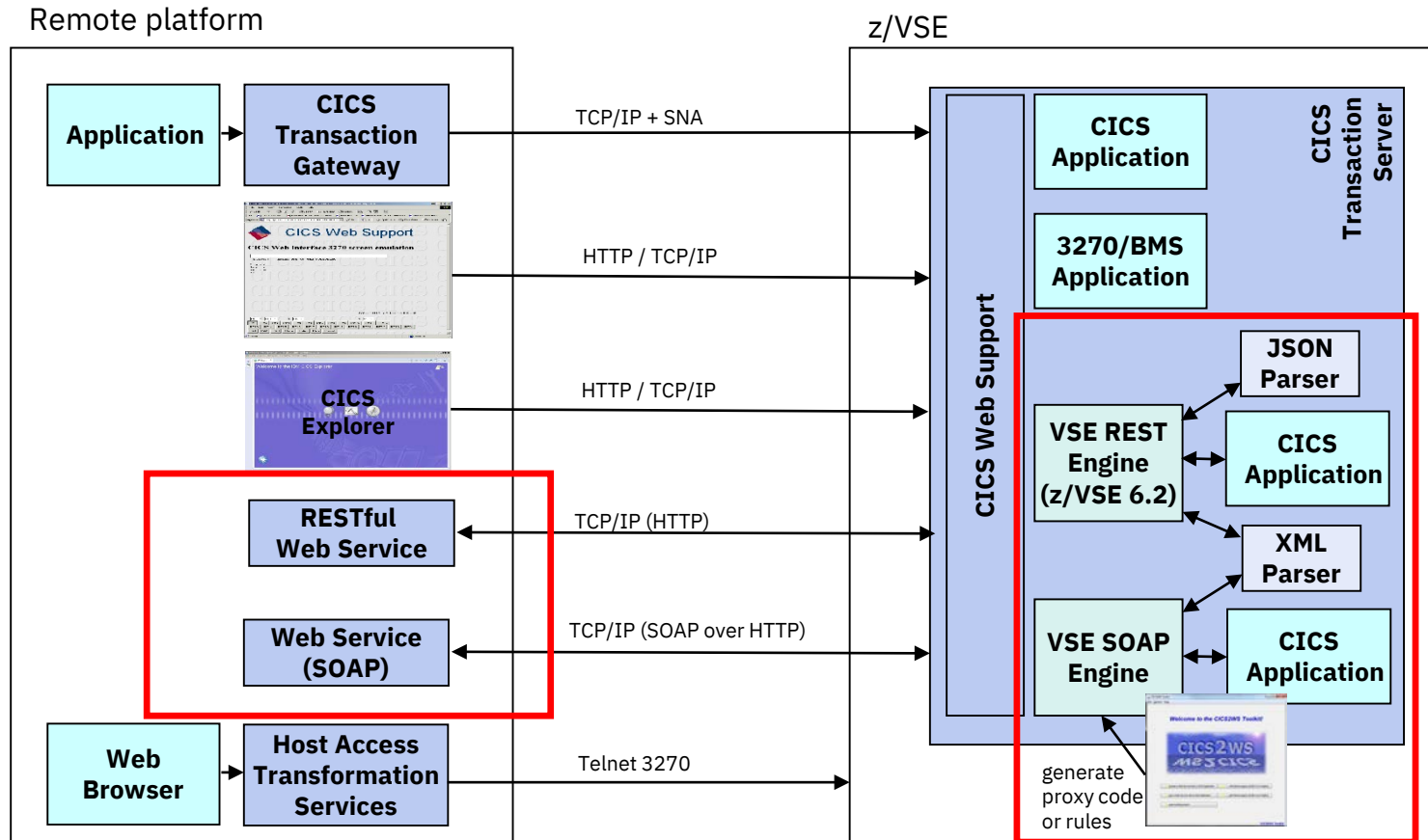
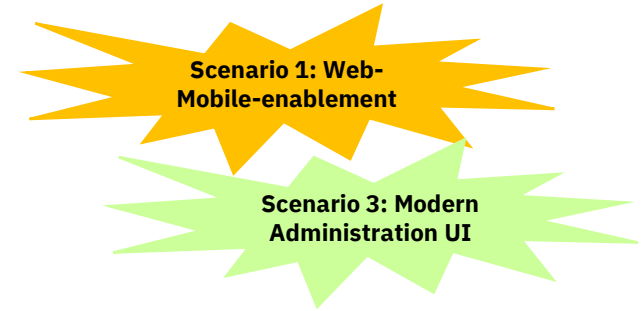
— **z/VSE Script Connector can be used to:**

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



CICS Connectivity

— CICS Web Support is the base of CICS connectivity



SOAP / Web Services support

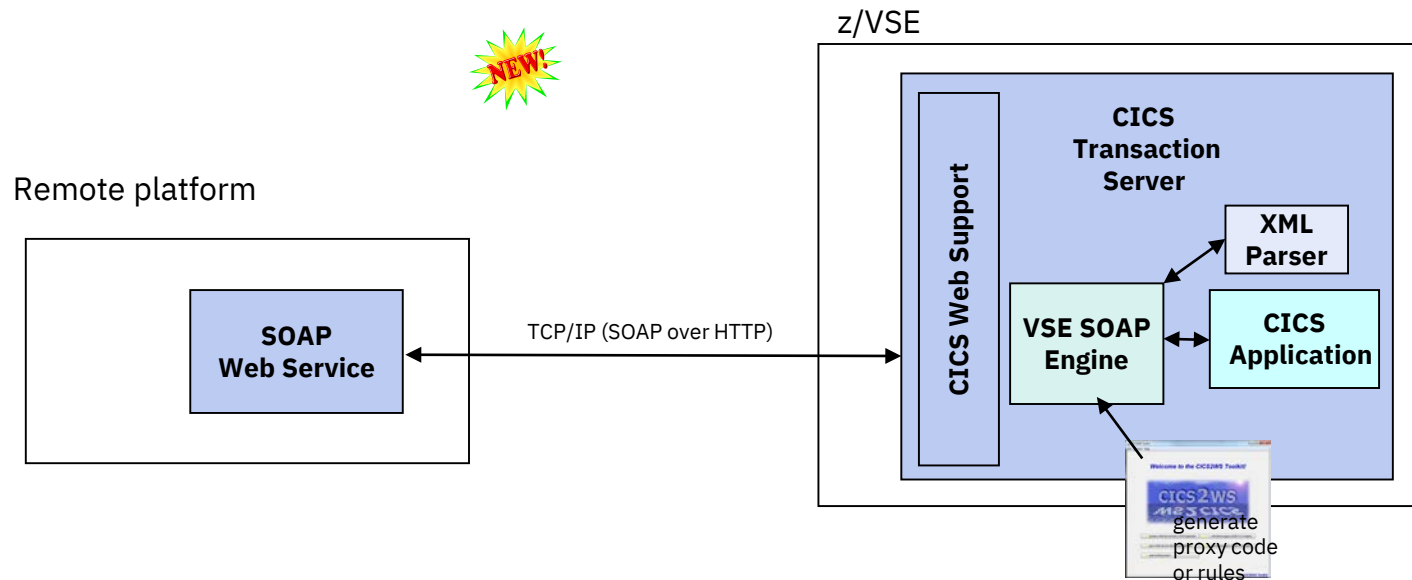


— Web Service-enable z/VSE CICS TS applications

- 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

— z/VSE 6.2:

- z/VSE SOAP Engine now supports Channels & Containers

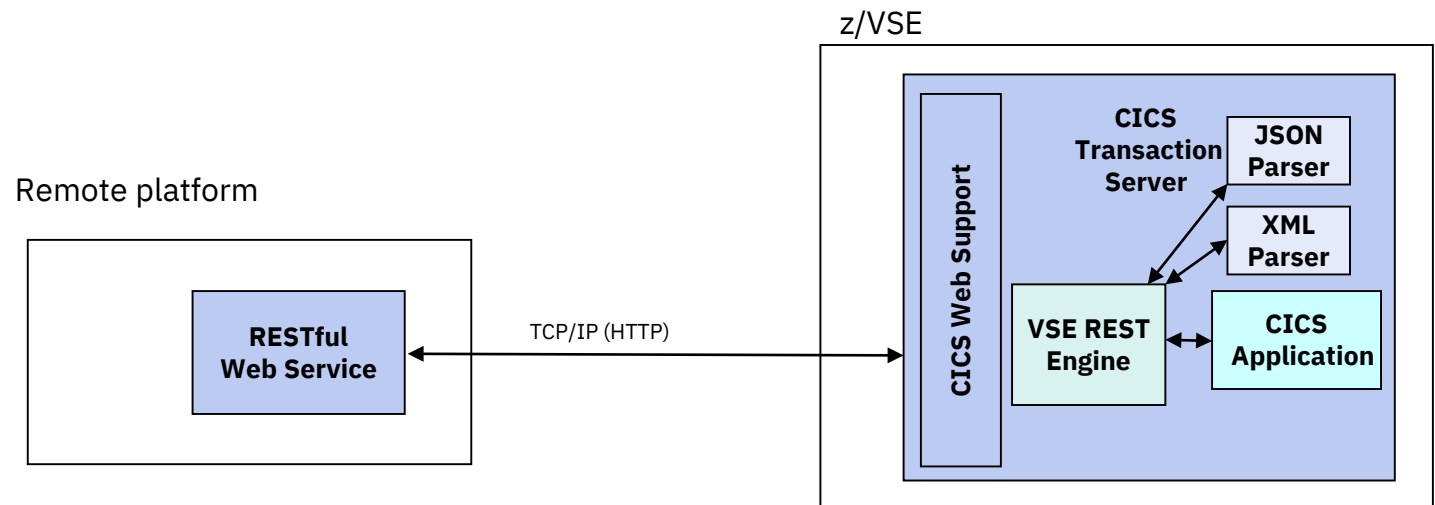


z/VSE 6.2: RESTful Web Services support

Scenario 1: Web-Mobile-enablement

— 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
 - Provide an easy to use RESTful API to services for z/VSE services
- Use/call external RESTful Web Services from within z/VSE CICS applications
 - z/VSE as the REST client
 - Use external RESTful APIs within z/VSE applications
- 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



What is REST (Representational State Transfer)?

— 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)
 - <http://host:port/resource-uri>

— 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

— Additional parameters can be supplied via the URL query string

- <http://host:port/resource-uri?query-string>

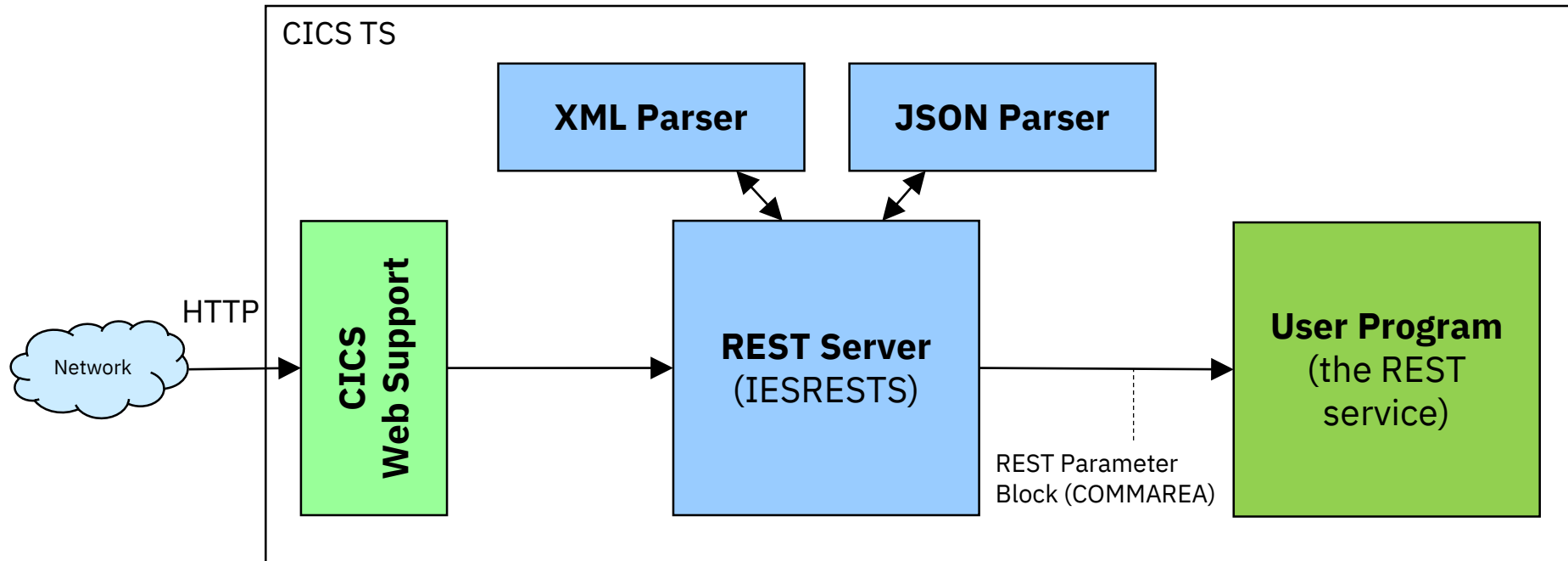


What is REST (Representational State Transfer)?

- 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
 - RESTful web services may use **HTTP specific features**
 - **HTTP headers** – to transport additional attributes
 - **Cookies** – to manage state information between requests
- As denoted by the term 'typically' in above descriptions, there is no hard requirement for any of the described properties



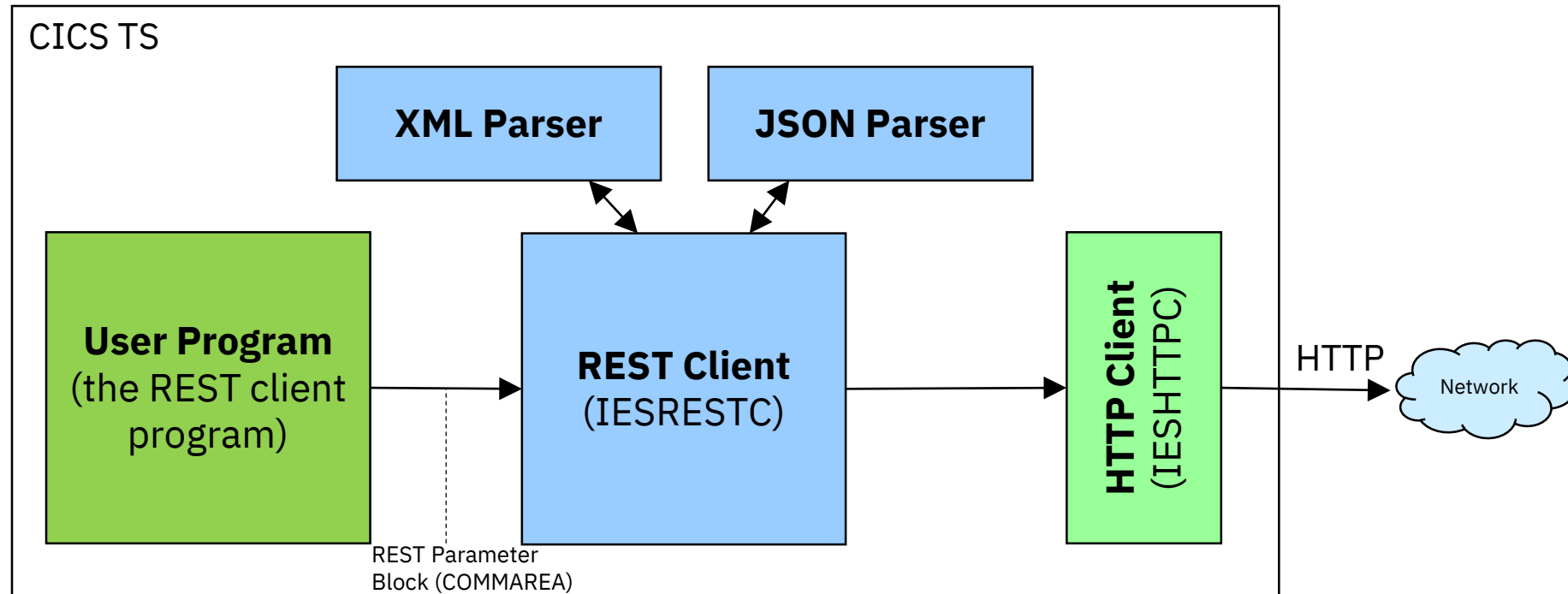
z/VSE 6.2: z/VSE as a REST Server



Description of the REST Parameter Block:

https://www.ibm.com/support/knowledgecenter/SSB27H_6.2.0/fa2ws_how_rest_control_blocks_are_used.html

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

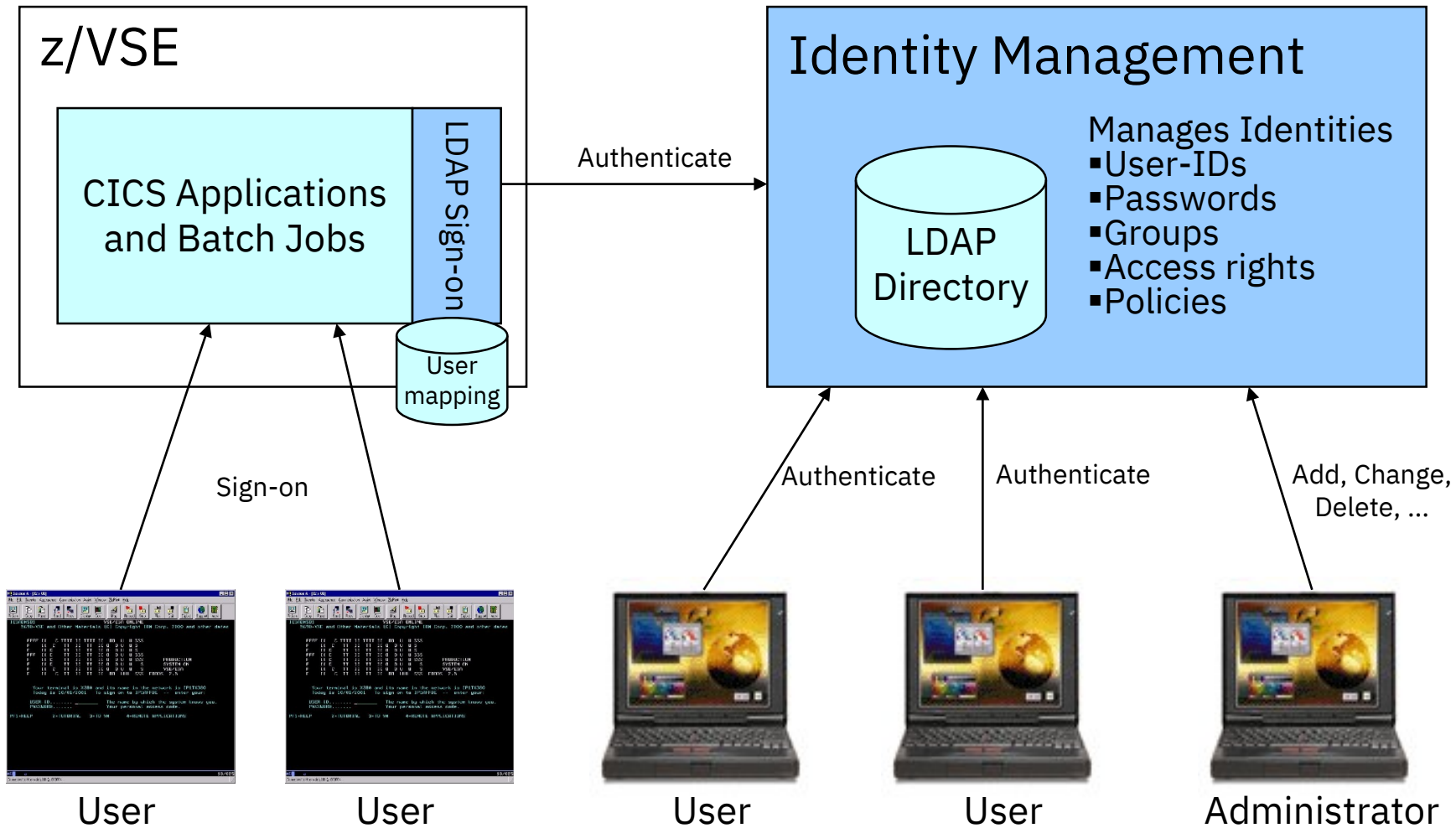


Description of the REST Parameter Block:

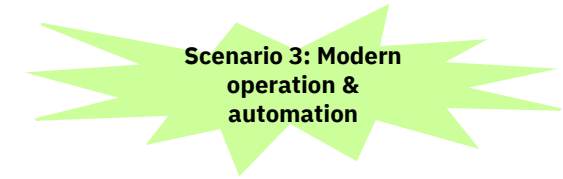
https://www.ibm.com/support/knowledgecenter/SSB27H_6.2.0/fa2ws_how_rest_control_blocks_are_used.html

LDAP Sign-on Support

Scenario 3: Modern security solutions



z/VSE SNMP Monitoring Agent support



— z/VSE Monitoring Agent enables customers to monitor z/VSE systems using standard monitoring interfaces (SNMP V1)

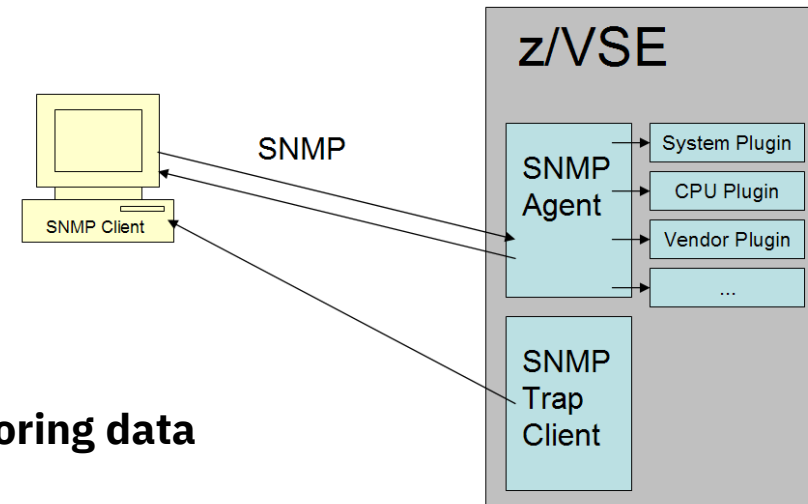
- Available since z/VSE V4.3
- It also includes an open interface, which enables customers or vendors to use own programs (plugins) to collect additional data

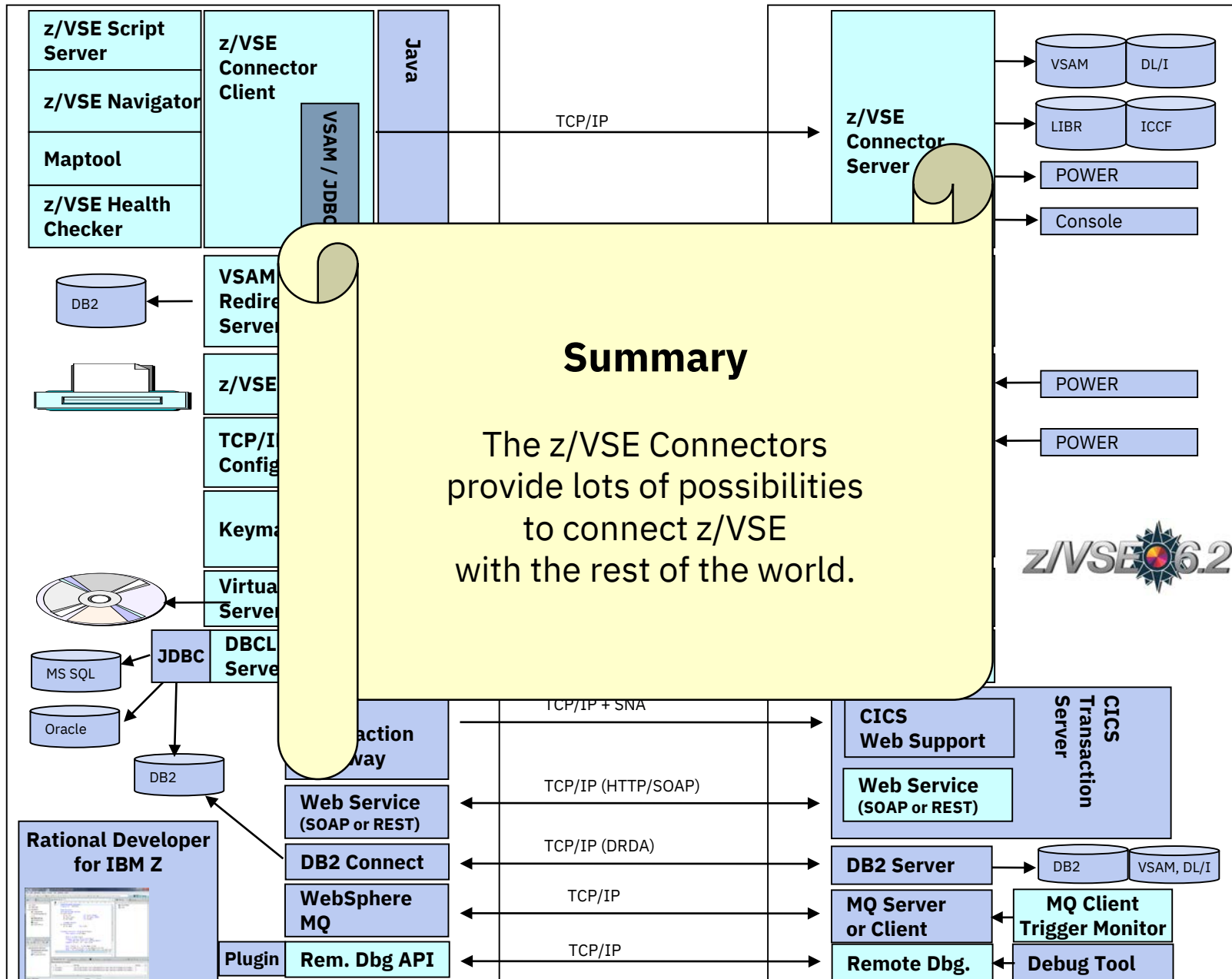
— Data collected by the IBM provided plugins contains

- 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

- Velocity Software: zVPS





Questions?



THANK YOU

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