

A11 – Make Your API Catalog Essential to Mobile App Developers and Business Partners with z/OS Connect

**Drive new business opportunities through naturally
RESTful APIs and JSON**

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Sharpen your competitive edge

2016 IMS Technical Symposium

March 7 – 10, 2016

Wiesbaden, Germany

www.ims-symposium.com

Agenda

1

Introduction to Swagger

2

REST and API enablement with z/OS Connect

3

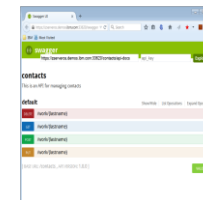
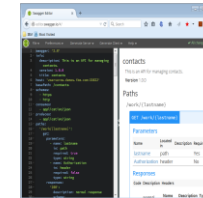
How to get z/OS Connect

Swagger-defined REST APIs

Introduction to Swagger and related tools



Swagger Specification and Tools (swagger.io)



Swagger Editor

An editor for designing Swagger specifications from scratch, using a simple YAML structure.

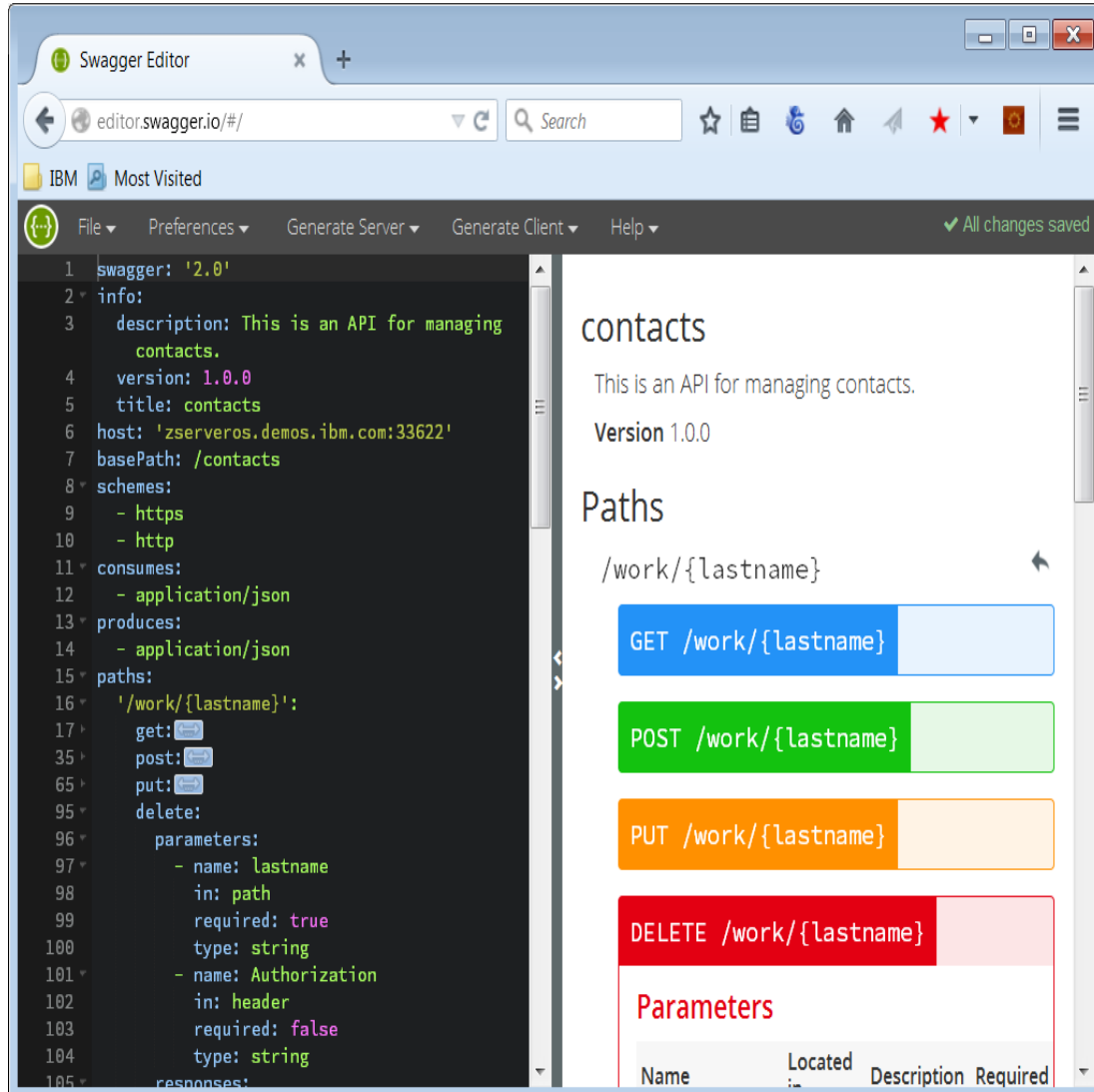
Swagger UI

Use a Swagger specification to drive your API documentation.

SDK Generators

Turn an API spec into client SDKs or server-side code with Swagger Codegen.

Swagger Editor – Develop an API Specification



Swagger Editor

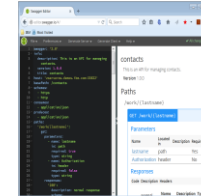
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Swagger Editor

editor.swagger.io/#/

IBM Most Visited

File Preferences Generate Server Generate Client Help

1 swagger: '2.0'
2 info:
3 description: This is an API for managing contacts.
4 version: 1.0.0
5 title: contacts
6 host: 'zserveros.demos.ibm.com:33622'
7 basePath: /contacts
8 schemes:
9 - https
10 - http
11 consumes:
12 - application/json
13 produces:
14 - application/json
15 paths:
16 '/work/{lastname}':
17 get:
35 post:
36 parameters:
37 - name: lastname
38 in: path
39 required: true
40 type: string
41 - name: firstname
42 in: query
43 required: true
44 type: string
45 - name: extension
46 in: query
47 required: true
48 type: string
49 - name: zipcode
50 in: query
51 required: true
52 type: string
53 - name: Authorization

The Swagger Editor can be used to browse and validate the design of an API.

contacts

This is an API for managing contacts.

Version 1.0.0

Paths

/work/{lastname}

GET /work/{lastname}

POST /work/{lastname}

Parameters

Name	Located in	Description	Required	Schema
lastname	path		Yes	⇌ string
firstname	query		Yes	⇌ string
extension	query		Yes	⇌ string
zipcode	query		Yes	⇌ string
Authorization	header		No	⇌ string

Responses

✓ All changes saved

Swagger Editor

editor.swagger.io/#/

IBM Most Visited

File Preferences Generate Server Generate Client Help

Import From URL

URL

☐ Use CORS proxy

☒ Valid URL

Cancel Import

Swagger for an API can be loaded directly from a server into the Swagger Editor

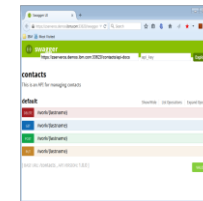
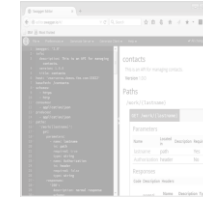
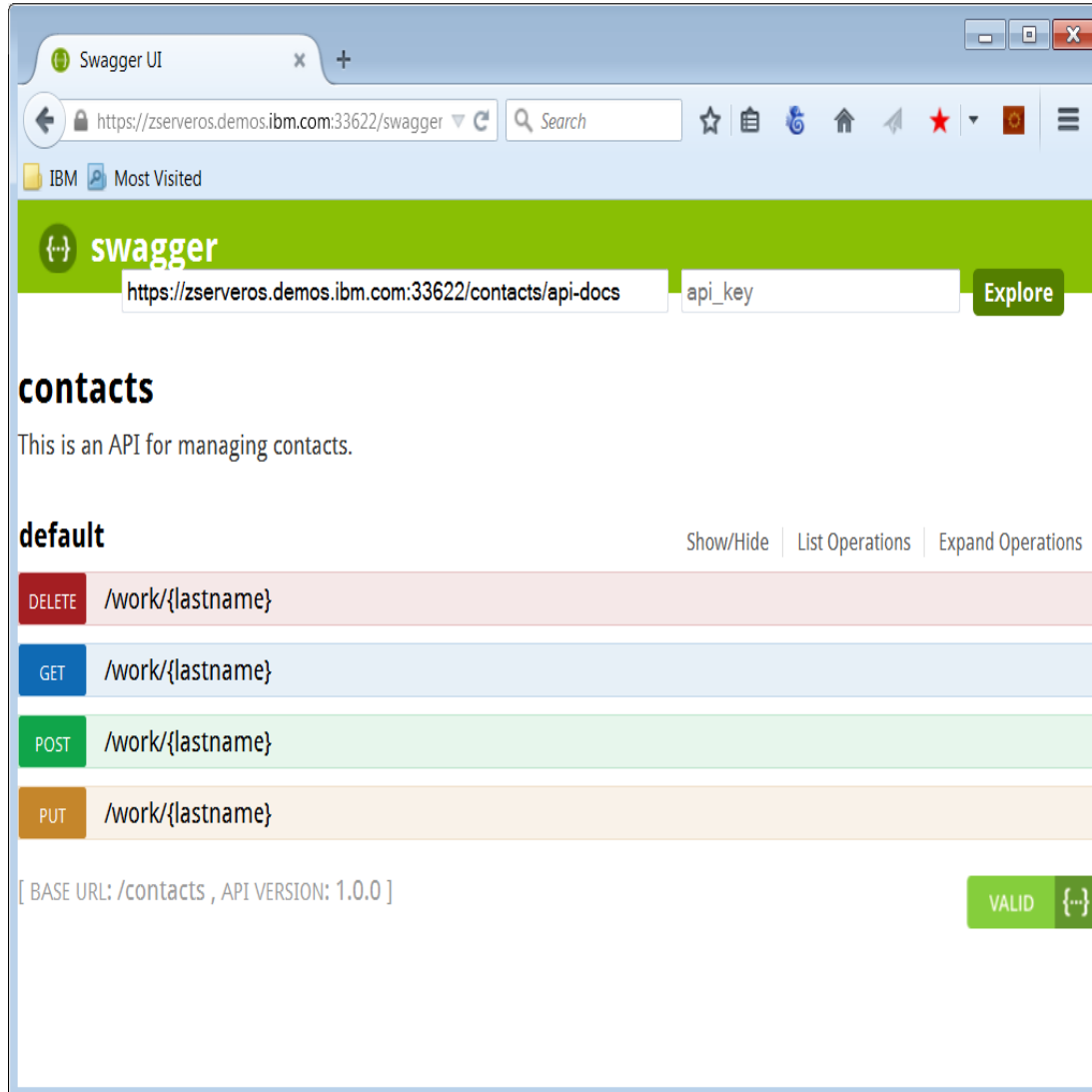
```
1 swagger: '2.0'
2 info:
3   description: This
4   version: 1.0.0
5   title: contacts
6 host: 'zserveros.demos.ibm.com:33622'
7 basePath: /contacts
8 schemes:
9   - https
10  - http
11 consumes:
12   - application/json
13 produces:
14   - application/json
15 paths:
16   '/work/{lastname}':
17     get:
18       parameters:
19         - name: lastname
20           in: path
21           required: true
22           type: string
23         - name: firstname
24           in: query
25           required: true
26           type: string
27         - name: extension
28           in: query
29           required: true
30           type: string
31         - name: zipcode
32           in: query
33           required: true
34           type: string
35     post:
36       parameters:
37         - name: Authorization
38           in: header
39           required: true
40           type: string
```

Parameters

Name	Located in	Description	Required	Schema
lastname	path		Yes	string
firstname	query		Yes	string
extension	query		Yes	string
zipcode	query		Yes	string
Authorization	header		No	string

Responses

Swagger UI – “Try out” an API



Swagger Editor

An editor for designing Swagger specifications from scratch, using a simple YAML structure.

Swagger UI

Use a Swagger specification to drive your API documentation.

SDK Generators


Turn an API spec into client SDKs or server-side code with Swagger Codegen.

Swagger UI

https://zserveros.demos.ibm.com:33622/swagger_ui/?url=/contacts/api-docs/

Search

IBM Most Visited

 **swagger**

https://zserveros.demos.ibm.com:33622/contacts/api-docs

Swagger for an API can be loaded directly from a server into Swagger UI

contacts

This is an API for managing contacts.

default

Show/Hide | List Operations | Expand Operations

DELETE

/work/{lastname}

GET

/work/{lastname}

POST

/work/{lastname}

PUT

/work/{lastname}

[BASE URL: /contacts , API VERSION: 1.0.0]

VALID

{...}

Swagger UI

https://zserveros.demos.ibm.com:33622/swagger_ui/?url=/contacts/api-docs#!/default/post_w

POST /work/{lastname}

Response Class (Status 200)

Model | Model Schema

```
{
  "OUTPUT_MSG": {
    "OUT_STATUS": "string"
  }
}
```

Response Content Type application/json

Parameters

Parameter	Value	Description	Parameter Type	Data Type
lastname	lastdemo3		path	string
firstname	firstdemo3		query	string
extension	3-5003		query	string
zipcode	95003		query	string
Authorization	Basic ZGRzMzcwNjpmZW4yZGVzdA==		header	string

Try it out!

Swagger UI can be used to unit test methods offered by the API.

Swagger Editor may also be used for unit testing, however it requires Node.js whereas Swagger UI does not.

Swagger UI

https://zserveros.demos.ibm.com:33622/swagger_ui/?url=/contacts/api-docs#!/default/post_w

```
curl -X POST --header "Content-Type: application/json" --header "Accept: application/json" --header "Authorization: Basic ZGRZl"
```

Request URL

https://zserveros.demos.ibm.com:33622/contacts/work/lastdemo3?firstname=firstdemo3&extension=3-5003&zipcode=95003

Response Body

```
{
  "OUTPUT_MSG": {
    "OUT_STATUS": "ENTRY WAS ADDED"
  }
}
```

The POST method did not require a request body, rather all of the input data is carried on the URI.

This is typical of REST APIs.

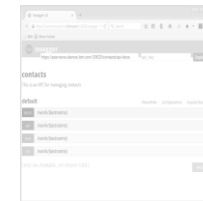
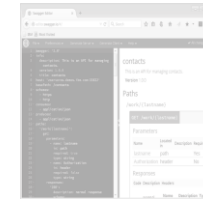
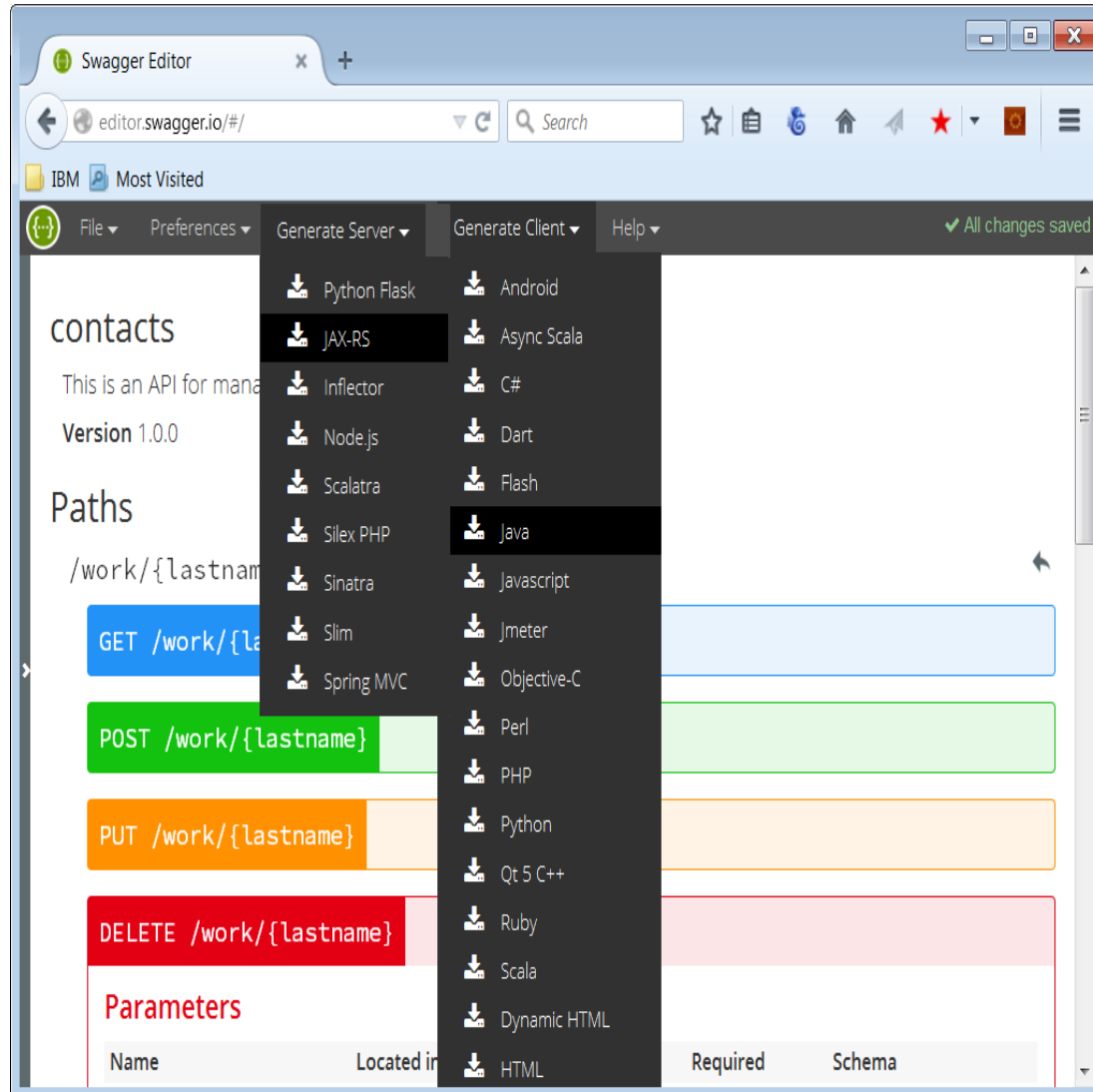
Response Code

200

Response Headers

```
{
  "x-powered-by": "Servlet/3.1",
  "x-segno": "0001",
  "content-type": "application/json",
  "content-language": "en-US",
  "content-length": "47",
  "date": "Tue, 02 Feb 2016 00:53:17 GMT"
}
```

SDK Generators – Integrate or Implement an API



Swagger Editor

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Swagger UI

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SDK Generators

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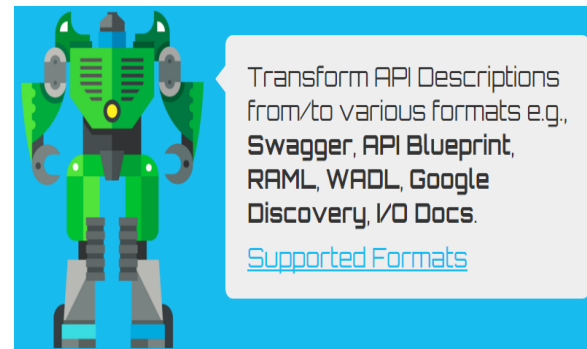
Choice of REST API Specifications

- While [Swagger](#) is the “most popular” specification, API developers may choose from other specifications to document REST APIs:

- [API Blueprint](#)
- [RAML](#)
- [Slate](#)
- [WADL](#)



- To address proliferation of specifications, tools such as [API Transformer](#) help by converting between specification types.
- Swagger’s SDK is a strong selling point.



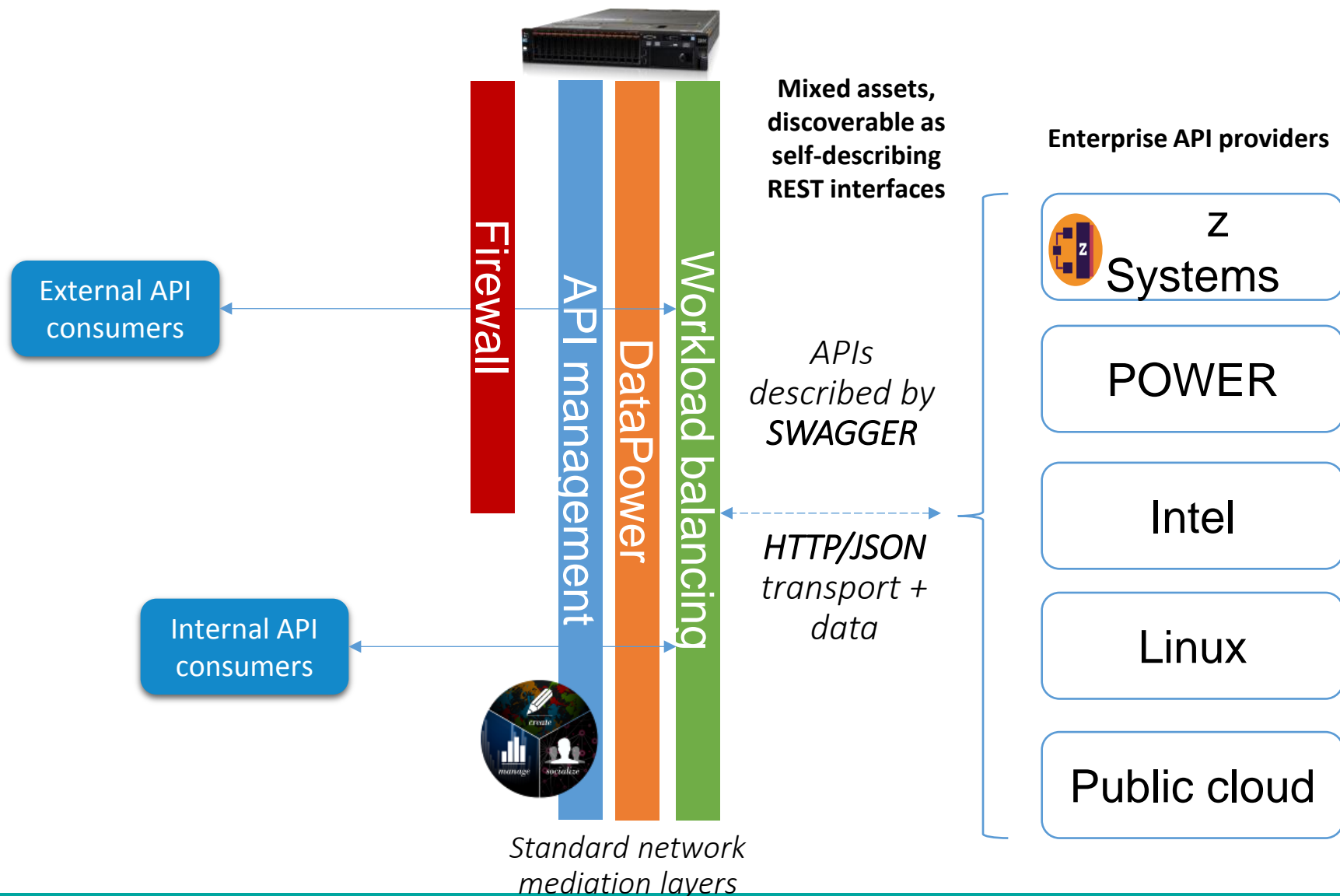
Introducing IBM z/OS Connect Enterprise Edition V2.0

Product key points and RESTful reminder



IBM z/OS Connect Enterprise Edition

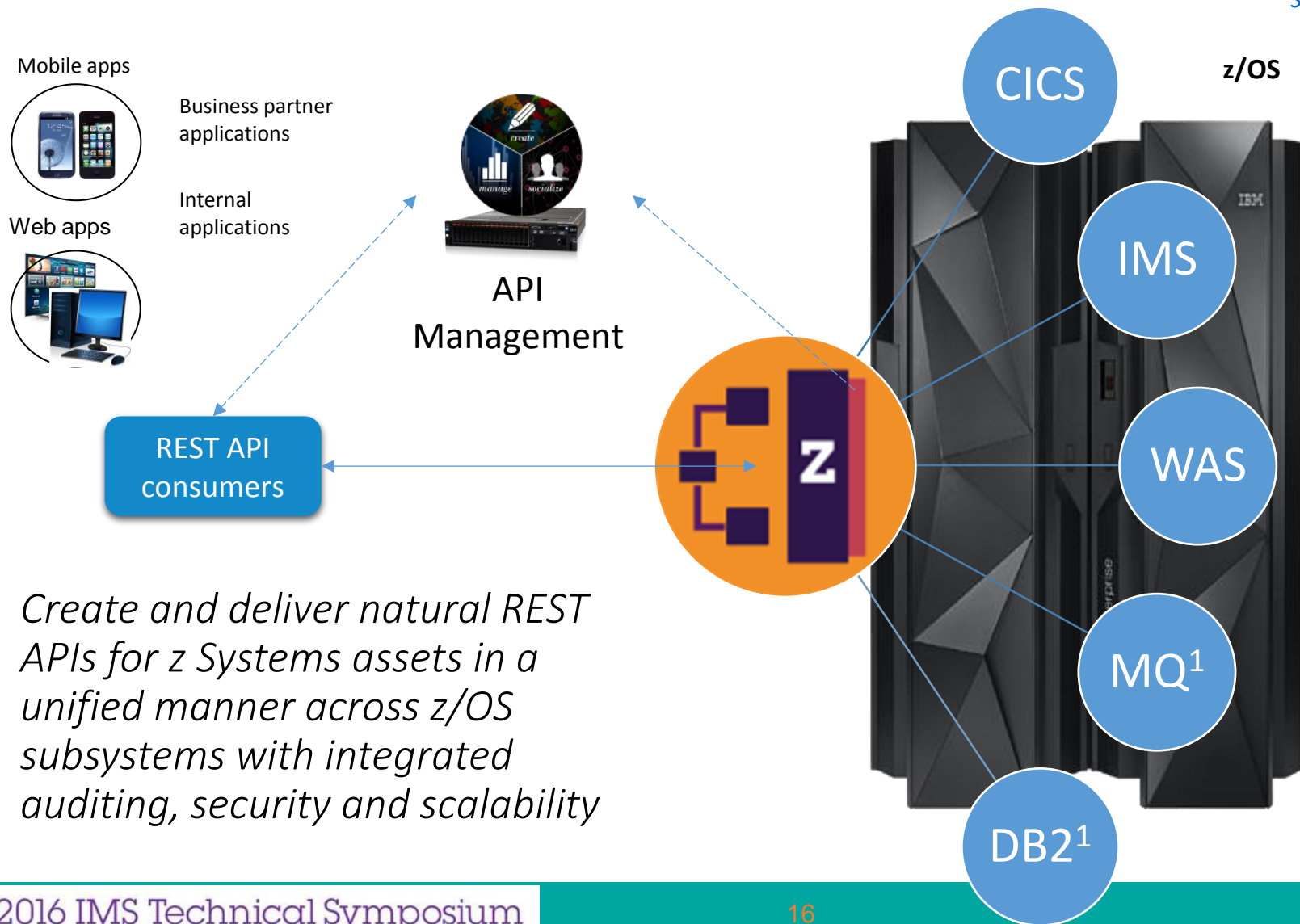
40,000ft Enterprise API ecosystem view



IBM z/OS Connect Enterprise Edition

10,000ft conceptual view

¹ see ENUS215-493
Statements of Direction



IBM z/OS Connect Enterprise Edition

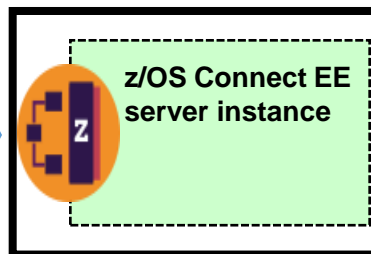
Two parts to every story

Runtime Server

- Includes service capabilities of V1.0
- Adds the ability to hosts APIs
- Integrates with multiple z subsystems
- Liberty + z/OS Connect = “instance”
- You may have multiple instances

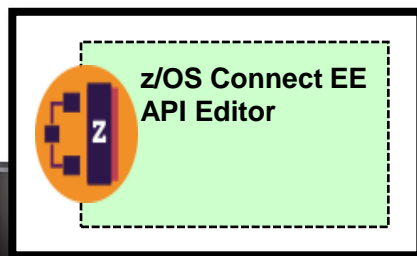
1

Liberty z/OS



*IBM 64-bit SDK for z/OS,
Java Technology Edition
V7.1.0 or V8.0.0*

z/OS Explorer Aqua V3.0



Windows, Linux or OS/X with

- IBM CICS Explorer V5.3
- IBM IMS Explorer for Development V3.2
- IBM Explorer for z/OS Aqua V3.0

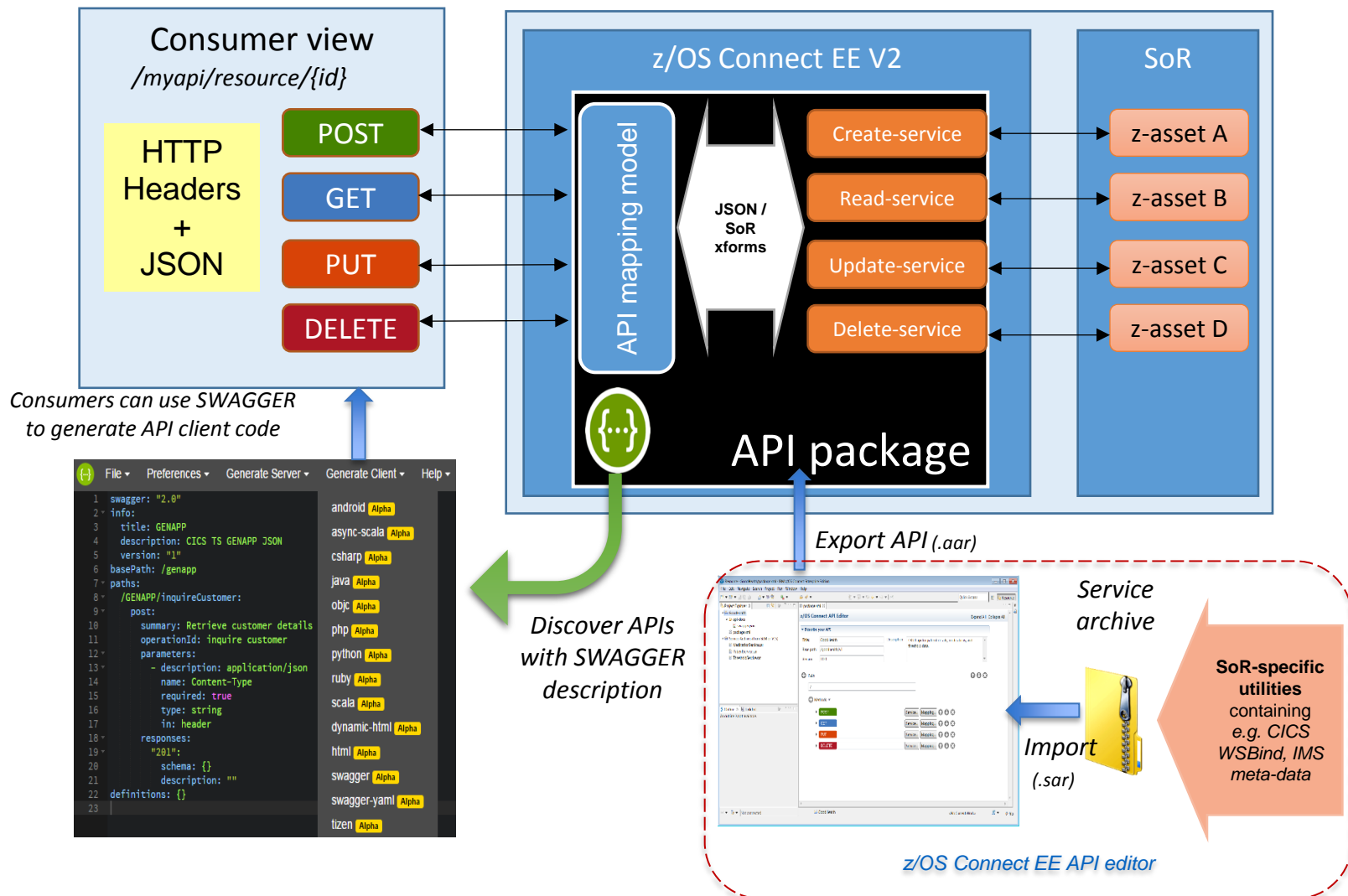
Tooling Platform

2

- Integrates with an Eclipse 4.4 environments
- Defines APIs and generates SWAGGER 2.0
- Compose API mapping models
- Deploy APIs to runtime server
- Export API archive for other tools to deploy

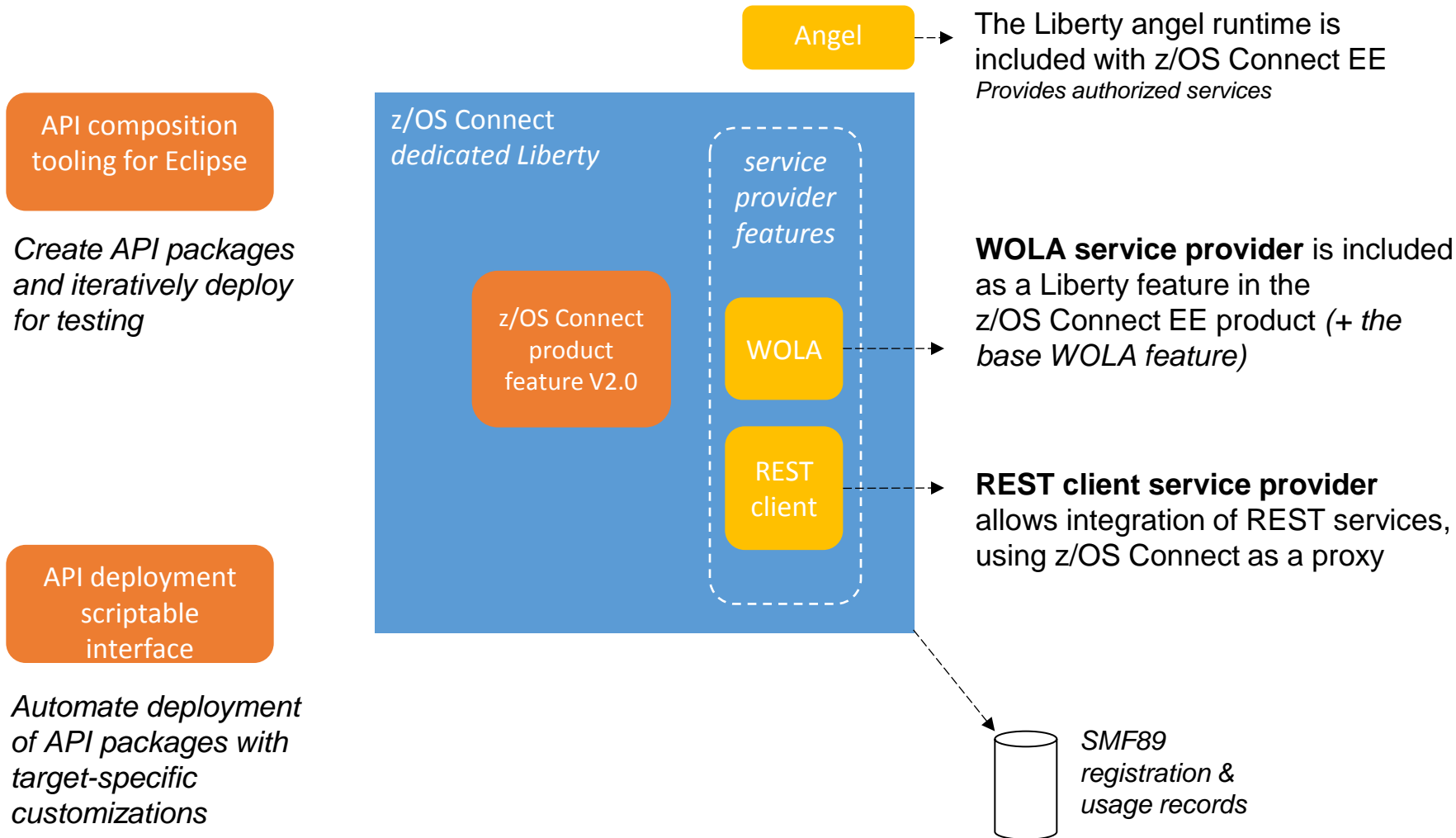
IBM z/OS Connect Enterprise Edition

API consumers, API packages, mapping and transformation, description, discovery and invocation!



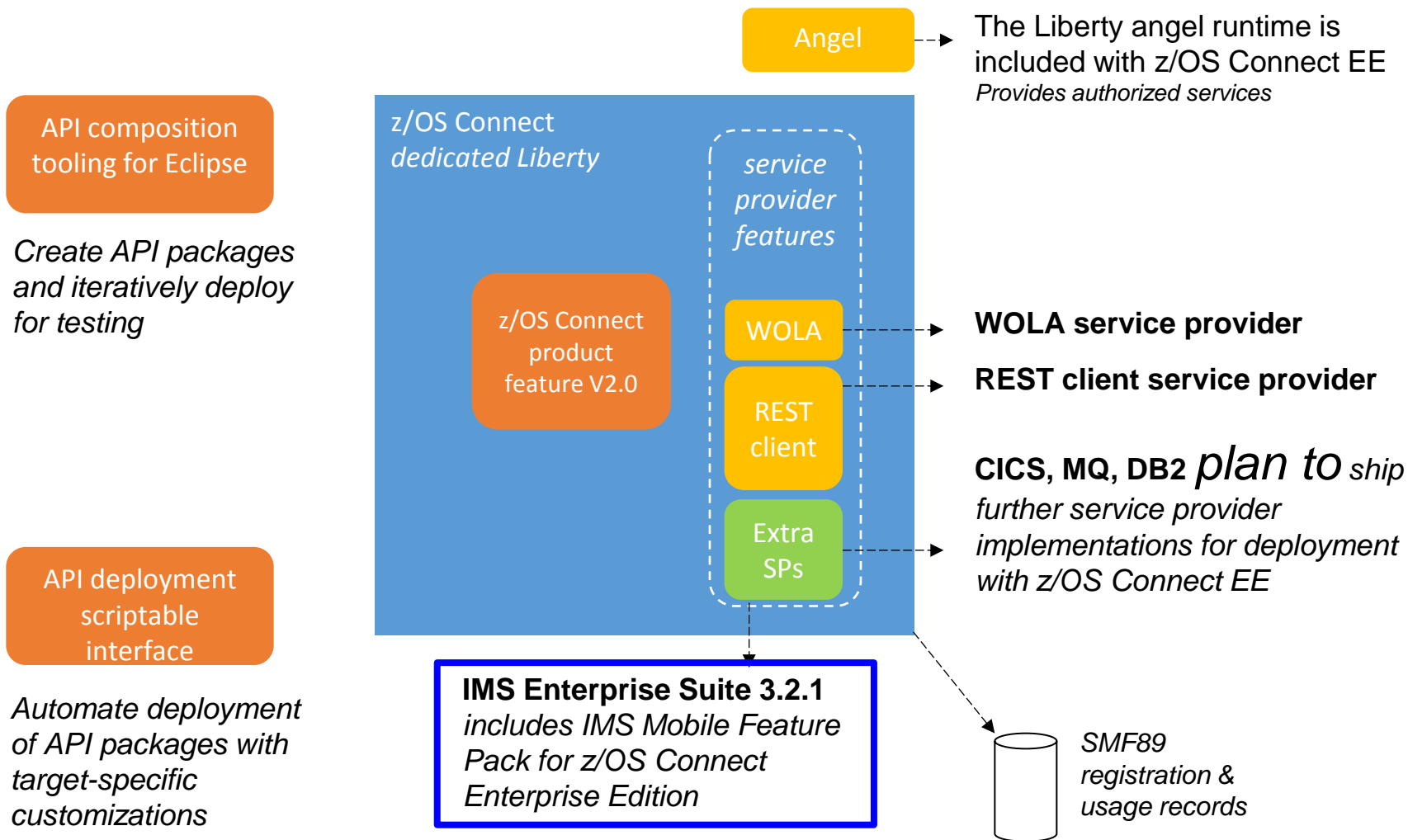
IBM z/OS Connect Enterprise Edition

Runtime component view – *what comes in the box*



IBM z/OS Connect Enterprise Edition

Runtime component view – *extending z/OS Connect EE*



IMS Mobile Feature Pack for z/OS Connect EE

- **Enable mobile and cloud clients to access IMS transactions as REST/JSON services**
 - Transform REST/JSON request to COBOL bytes and transform response back to JSON
 - No change to IMS applications
- **Tooling:**
 - IMS Explorer for Development to easily create RESTful services from existing IMS transactions
 - IBM zExplorer API Editor maps RESTful services as natural REST API
- **Runtime:**
 - Supports both z/OS Connect and z/OS Connect Enterprise Edition

Once published, services and APIs hosted by z/OS Connect EE can be discovered by mobile and cloud application developers

Develop a REST Service from an IMS Transaction with IMS Explorer for Development

- Select Input and Output messages in the navigation tree and import **selected fields**
- Specify a **service name** and **interaction properties**
- Specify **interface** by selecting or deselecting **check boxes** to add or remove fields from input and output messages. Default values can be provided

The screenshot displays the IMS Explorer for Development interface, which is used for developing REST services from IMS transactions. The main window shows the 'IMS Explorer Transaction Message Metadata Editor' for the transaction 'IVTNOXX'. The left pane shows the 'IMS Gateway Navigator' with a tree view of the transaction structure, including 'Input Messages', 'Output Messages', and 'Data Structures'. The right pane shows the 'IMS Explorer Transaction Message Metadata Editor' with a tree view of the transaction structure, including 'Input Messages', 'Output Messages', and 'Data Structures'. The 'Input Messages' section is expanded, showing 'IVTNOXX - INPUT' and 'IVTNOXX - OUTPUT'. The 'Output Messages' section is also expanded, showing 'IVTNOXX - OUTPUT'. The 'Data Structures' section is expanded, showing 'IN_LL', 'IN_ZZ', 'IN_TRANCODE', 'IN_COMMAND', 'IN_LAST_NAME', 'IN_FIRST_NAME', 'IN_EXTENSION', and 'IN_ZIP_CODE'. The 'Create an IMS Mobile Transaction Service' dialog box is open, showing the 'Service name' as 'IMPOTxx' and the 'Transaction code' as 'IVTNO'. The 'Interaction properties' section is also visible. The 'Create an IMS Mobile Transaction Service' dialog box is open, showing the 'Service name' as 'IMPOTxx' and the 'Transaction code' as 'IVTNO'. The 'Interaction properties' section is also visible. The 'Create an IMS Mobile Transaction Service' dialog box is open, showing the 'Service name' as 'IMPOTxx' and the 'Transaction code' as 'IVTNO'. The 'Interaction properties' section is also visible.

Create an IMS Mobile Transaction Service

Specify the information to create an IMS transaction service.

*Service name: IMPOTxx

Message metadata

*Transaction code: IVTNO

Message Type: Message Name

*Interaction properties:

Connection profiles

Name	Host Name
IMSD2 (zservero...	zserveros.demos.ibm.com
Conn1	127.0.0.1
Conn2	127.0.0.1

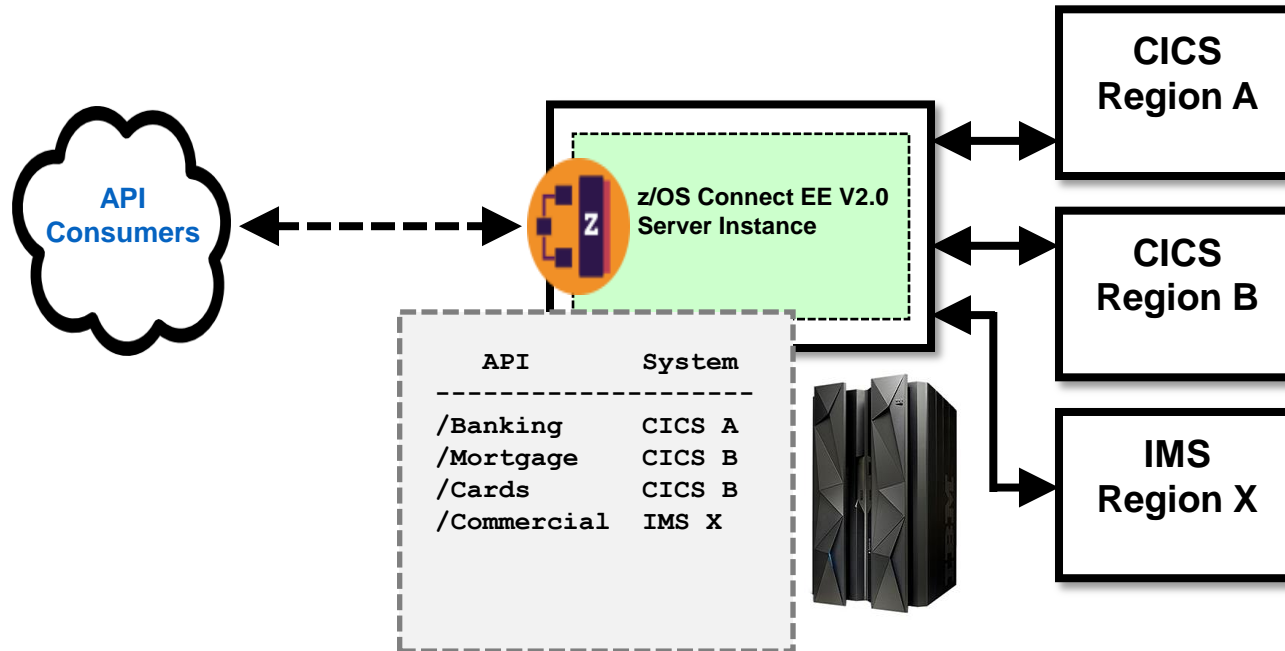
Create an IMS Mobile Transaction Service

Specify the fields to include in the input and output messages to define the IMS mobile transaction interface.

IMS Input and Output Messages

Input or Output Message	Include in Inte...	Default Field Value	Field Length	Data Type
Segment 1				
INPUT_MSG	<input checked="" type="checkbox"/>		59	STRUCT
IN_LL	<input type="checkbox"/>		2	SHORT
IN_ZZ	<input type="checkbox"/>		2	SHORT
IN_TRANCODE	<input checked="" type="checkbox"/>		10	CHAR
IN_COMMAND	<input checked="" type="checkbox"/>		8	CHAR
IN_LAST_NAME	<input checked="" type="checkbox"/>		10	CHAR
IN_FIRST_NAME	<input checked="" type="checkbox"/>		10	CHAR
IN_EXTENSION	<input checked="" type="checkbox"/>		10	CHAR
IN_ZIP_CODE	<input checked="" type="checkbox"/>		7	CHAR
IVTNO - OUTPUT				
Segment 1				
OUTPUT_AREA	<input checked="" type="checkbox"/>		93	STRUCT
OUT_LL	<input type="checkbox"/>		2	SHORT
OUT_ZZ	<input type="checkbox"/>		2	SHORT

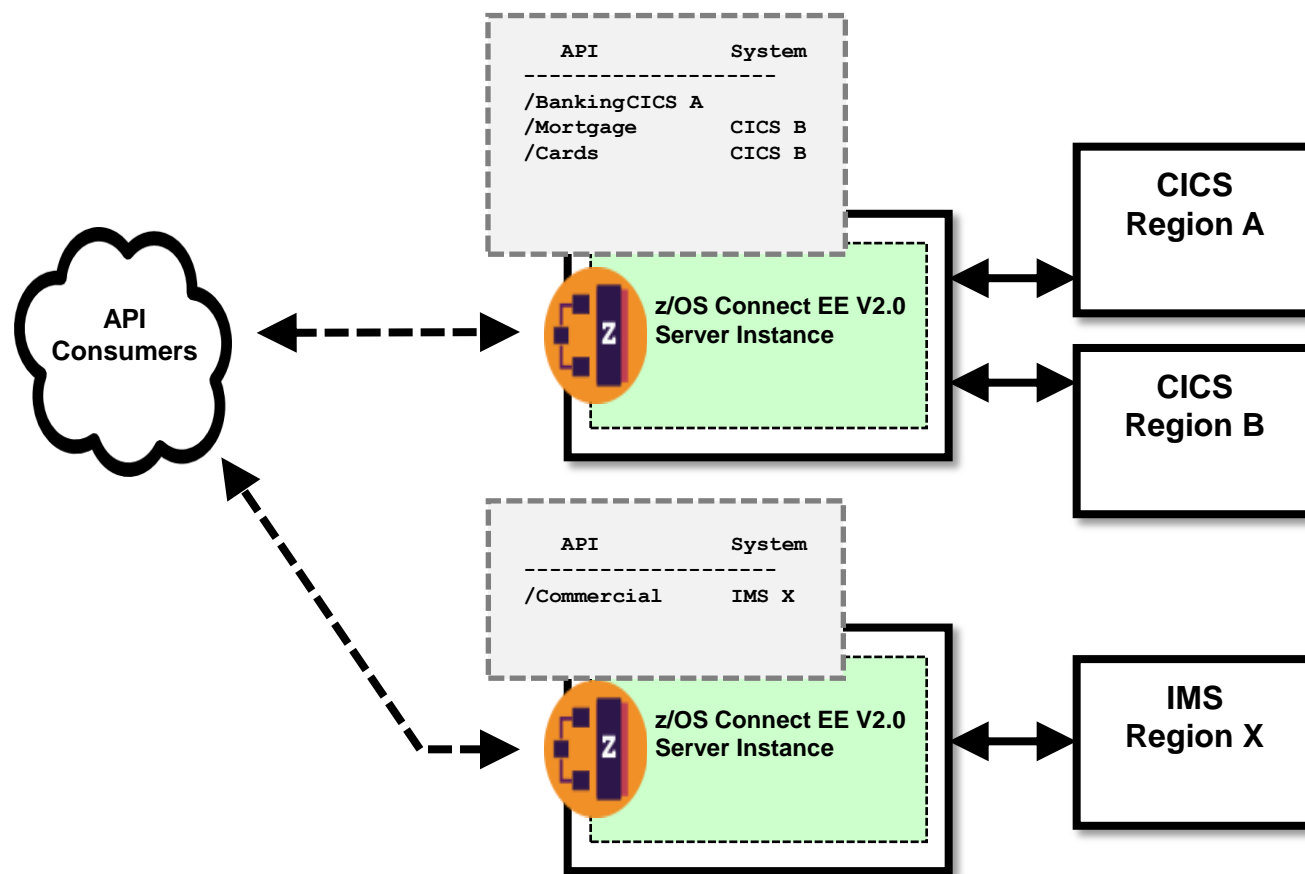
Example 1 - Multiple Backend Systems



z/OS Connect EE V2.0 becomes the REST API entry point to the LPAR for access to several backend systems where the data program resides

Duplicate the z/OS Connect EE V2.0 instance for greater availability and/or greater throughput

Example 2 - Multiple Lines of Business





There are times where the business requires operational separation and isolation. In that case, multiple instances of z/OS Connect EE V2.0 applies.


What's in a URI ?

JSON-RPC style services vs. a “naturally RESTful” API

A collection of individual services


POST /accounts/create +  (JSON with account create information)

POST /accounts/balance +  (JSON with account number)


POST /accounts/update +  (JSON with account number and deposit)

REST interface is very limited, **HTTP method is NOT significant.**
“Good enough” for some use-cases, but falls short the expectations of REST API consumers.

A naturally RESTful API

POST /accounts?name=Fred +  (JSON with Fred's information)

GET /accounts?number=1234

PUT /accounts?number=1234 +  (JSON with dollar amount of deposit)

DELETE /accounts?number=1234

HTTP verb conveys the *operation* against the resources; i.e., POST is for create, GET is for balance, etc.

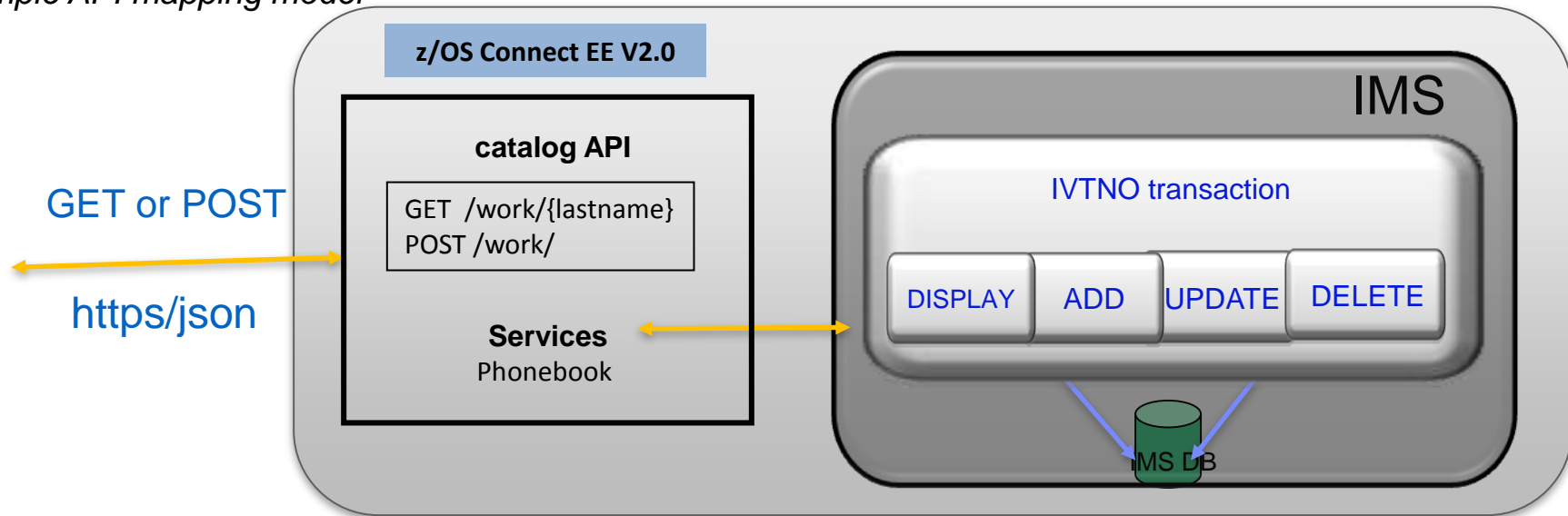
URI conveys the *resource* to be operated upon; i.e., Fred's account with number 1234

The HTTP body encoded in JSON carries the specific data resulting from the action (verb) against the resource (URI)

Aligned with API consumer expectations for REST APIs

Designing an API for the IMS Phonebook sample

A sample API mapping model



IMS Phonebook: sample API mapping model

API	HTTP verb	URL
Get Phone entry	GET	https://zosconnecthost:port/contacts/work/{lastname}
Add Phone entry	POST	https://zosconnecthost:port/contacts/work/{lastname}?firstName=DEMO1&extension=11111&zipcode=22222
Update Phone entry	PUT	https://zosconnecthost:port/contacts/work/{lastname}?firstName=&extension=11111&zipcode=22222
Delete Phone entry	DELETE	https://zosconnecthost:port/contacts/work/{lastname}

z/OS Connect EE API Editor

API composition



Eclipse Tools for Mainframe Development

Composite update site hosts compatible versions of Eclipse platforms & plugins

Plug-ins



Deployment Assistant



Performance Analyzer



Configuration Manager



Application Performance Analyzer



Debug Tools



Fault Analyzer



Rational Team Concert



Data Studio



Transaction Gateway



Interdependency Analyzer



File Manager



z/OS Connect EE Workstation Tooling



Release train delivering compatible versions of Eclipse platforms & plugins for IBM tooling on z/OS.

Platforms

<https://developer.ibm.com/mainframe>

Rational Developer for System Z

CICS Explorer

z/OS Explorer

Eclipse

z/OS Connect EE API Editor

Model and create natural REST APIs based on z/OS Connect services

z/OS Connect Enterprise Edition



Overview of z/OS Connect EE Tooling (z/OS Connect EE API Editor)

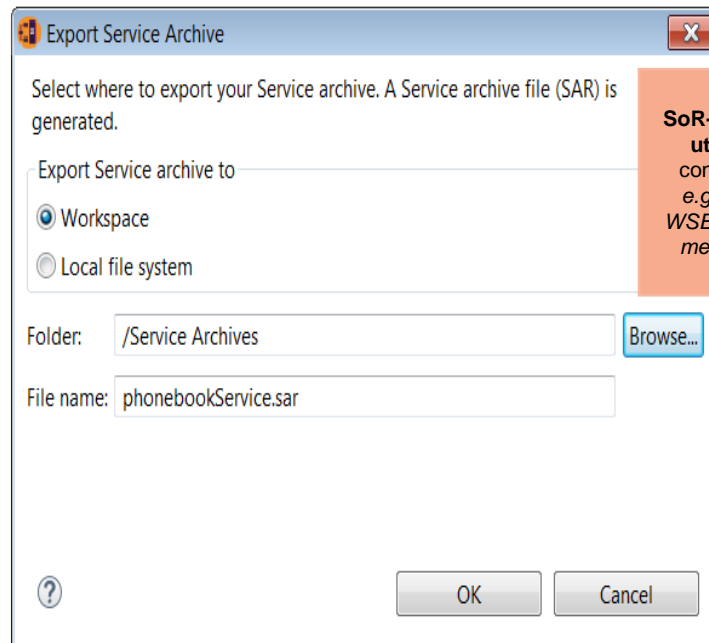
IBM® z/OS® Connect Enterprise Edition (z/OS Connect EE) provides a fast, secure, and reliable connector for clients to reach z/OS assets using Representational State Transfer (REST) calls. With z/OS Connect EE, you can define APIs in a standard format for use by cloud and web-based applications to reach virtually any z/OS assets, applications, and data. z/OS Connect EE manages the connection to the z/OS assets and any required data transformation, allowing you to consolidate multiple client connection pathways into a single common gateway to reach business assets on z/OS operating systems, including CICS®, IMS™, and classic batch environments.

The z/OS Connect EE API Editor is an Eclipse-based tool for modeling and creating APIs for your z/OS Connect EE services. In the editor, you can design and create your API by specifying your path parameters, query parameters, and header parameters, and defining how HTTP methods and the related parameters should be mapped to fields in the JavaScript Object Notation (JSON) schema of your service.

<https://developer.ibm.com/mainframe/products/zosconnect>

z/OS Connect EE API Editor

Composing an API from service archives

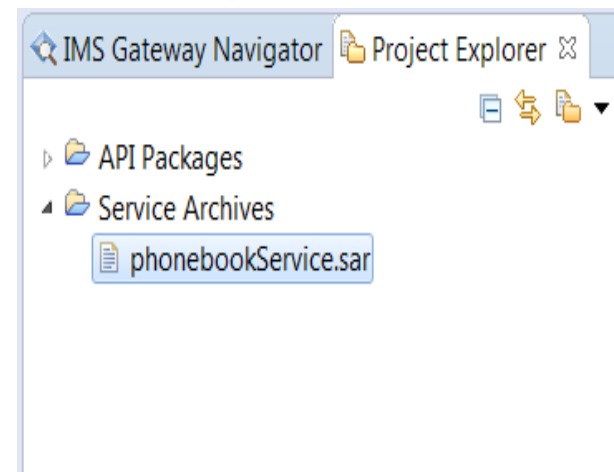


**SoR-specific
utilities**
containing
e.g. CICS
WSBind, IMS
meta-data

*Service
archive*



*Import SAR files to
z/OS Connect EE API Editor*



SoR-specific utilities for SAR generation

IMS Explorer for Development (shown)

- IMS Transaction data xforms

BAQJS2LS / BAQLS2JS utilities (supplied)

- CICS program data xforms

z/OS Connect EE API Editor

API composition: start with service archives

The screenshot displays the **z/OS Connect EE API Editor** interface. The main window shows the ***package.xml** file being edited. The **Describe your API** section includes fields for **Name** (contacts), **Base path** (/contacts), and **Version** (1.0.0). Below these, there is a **Path** section with a text box containing `/work/{lastname}?firstname&extension&zipcode`, and a **Methods** section with a dropdown menu. The **Methods** section lists four methods: **POST**, **GET**, **PUT**, and **DELETE**, each with a corresponding **Service...** button and a **Mapping...** button. A tooltip is visible over the **Service...** button for the **POST** method, stating: "Select a z/OS Connect EE service for the POST method".

Two dialog boxes are open. The **Select a z/OS Connect EE Service** dialog box is in the background, showing a list of service archives with **phonebookService** selected. The **Import z/OS Connect EE Services** dialog box is in the foreground, showing a list of service archives with **phonebookService.sar** selected. Both dialog boxes have **OK** and **Cancel** buttons.

z/OS Connect EE API Editor

Create the paths and methods supported by your REST API

The screenshot shows the 'z/OS Connect EE API Editor' window. At the top, there are tabs for 'package.xml', 'request', and 'response'. The main title bar says 'z/OS Connect EE API Editor'. Below this is a section titled 'Describe your API'. It contains three input fields: 'Name' with the value 'contacts', 'Base path' with the value '/contacts', and 'Version' with the value '1.0.0'. To the right of these fields is a 'Description' text area containing the text 'This is an API for managing contacts.'.

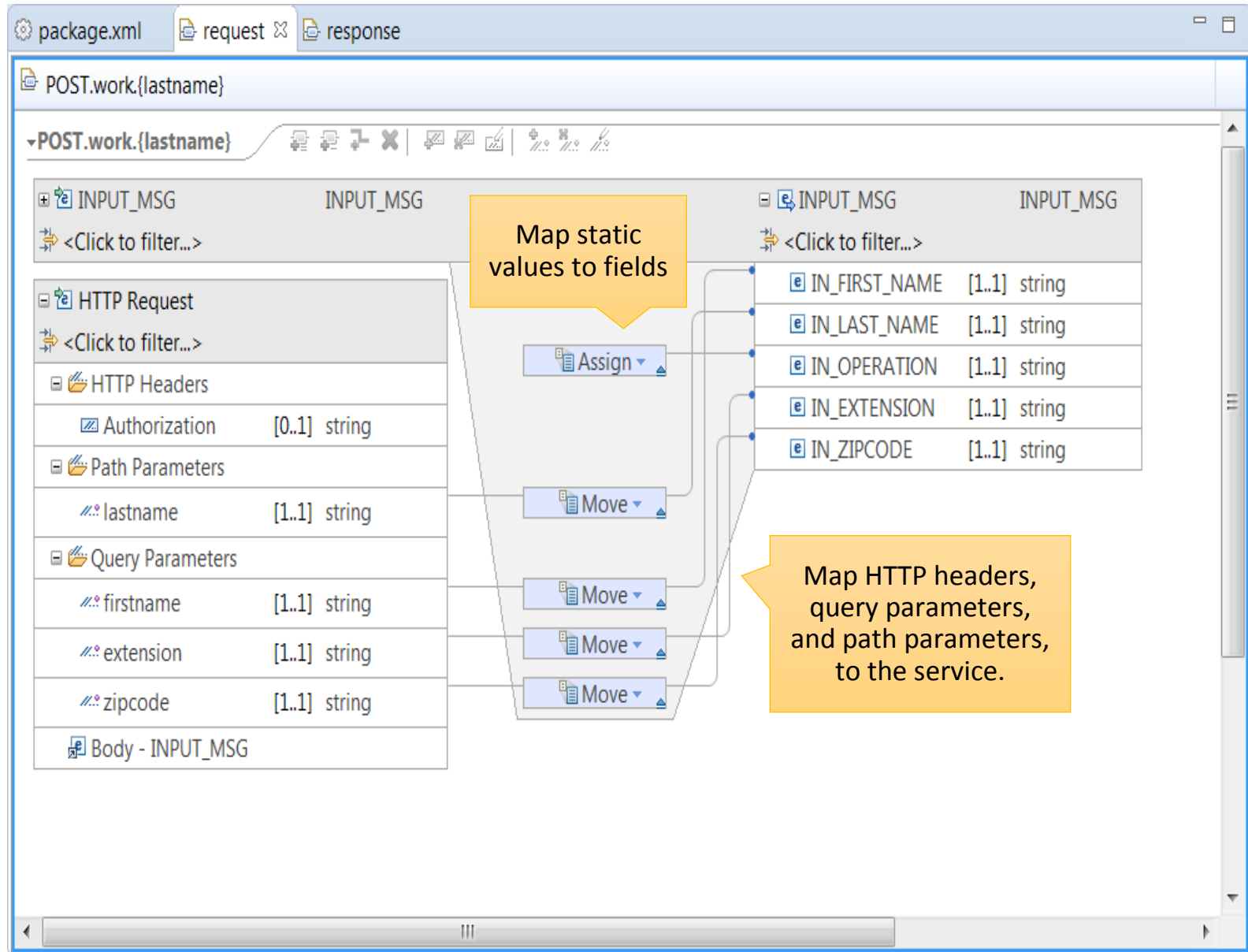
Below the 'Describe your API' section is a 'Path' section. It has a plus icon and the label 'Path'. To the right of the label are three icons: an up arrow, a down arrow, and a close 'X' icon. The path input field contains the text '/work/{lastname}?firstname&extension&zipcode'. Below the path field is a 'Methods' section. It has a plus icon and the label 'Methods'. Below this label is a table of methods.

Method	Service	Mapping	Up	Down	Close
POST	phonebookService	Service... Mapping...	↑	↓	×
GET	phonebookService	Service... Mapping...	↑	↓	×
PUT	phonebookService	Service... Mapping...	↑	↓	×
DELETE	phonebookService	Service... Mapping...	↑	↓	×

Two yellow callout boxes are present. The first callout box points to the 'Service...' button in the first row of the methods table and contains the text 'service to invoke for this path and method'. The second callout box points to the 'Mapping...' button in the first row of the methods table and contains the text 'unique mappings of the service for this path and method'.

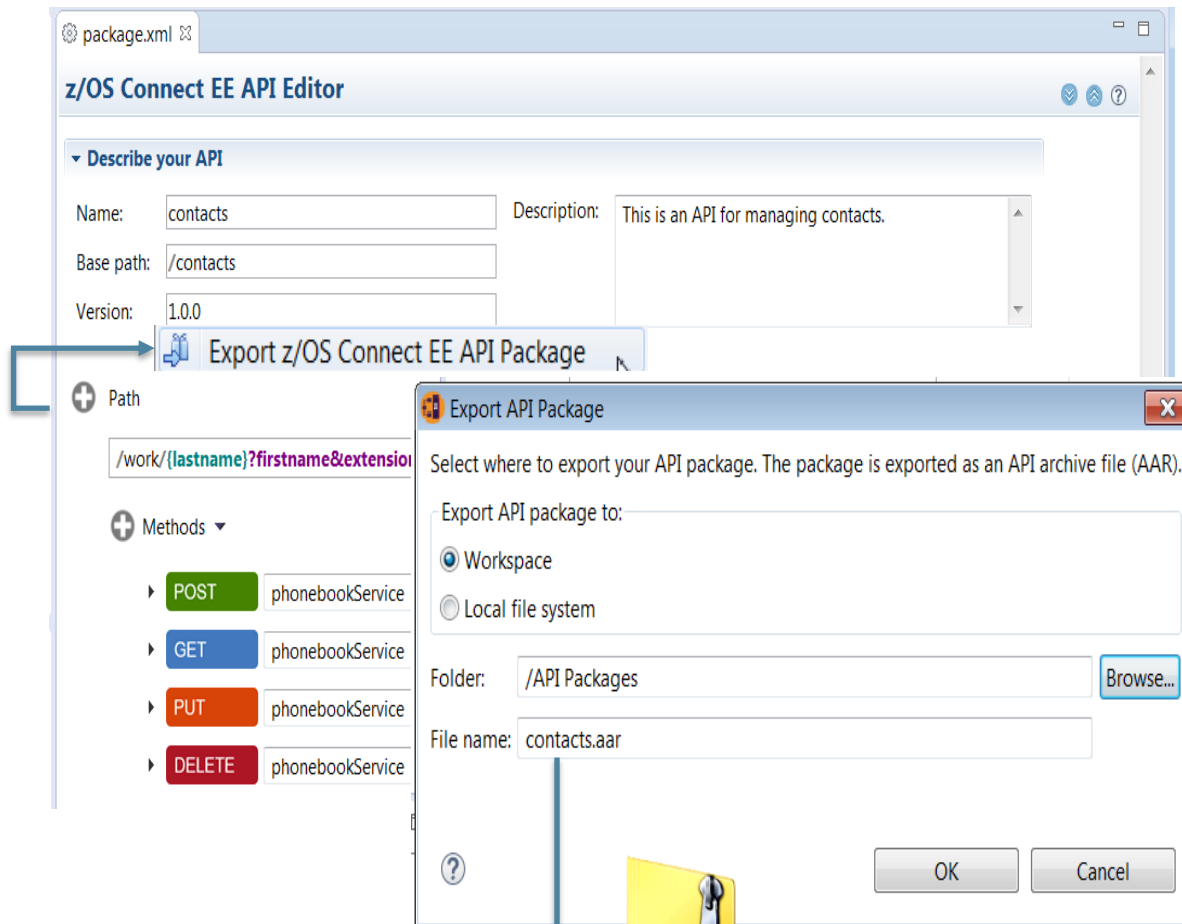
z/OS Connect EE API Editor

Create unique *RESTful* mappings of z/OS Connect services per path and method



z/OS Connect EE API Editor

API composition: export API package as API archive (AAR)



API archive includes
generated SWAGGER 2.0



Upload the **API archive** to zFS and deploy
using the **apideploy** command

z/OS Connect EE API Editor

API composition: Generated SWAGGER (shown in SWAGGER editor)

The screenshot displays the z/OS Connect EE API Editor interface. The left pane shows the Swagger JSON definition, and the right pane provides a visual overview of the API paths.

Swagger JSON Definition (Left Pane):

```
1 swagger: '2.0'
2 info:
3   description: This is an API for managing contacts.
4   version: 1.0.0
5   title: contacts
6   host: 'stplex4b.svl.ibm.com:13200'
7   basePath: /contacts
8   schemes:
9     - https
10    - http
11  consumes:
12    - application/json
13  produces:
14    - application/json
15  paths:
16    '/work/{lastname}':
17      get:
18        parameters:
19          - name: lastname
20            in: path
21            required: true
22            type: string
23          - name: Authorization
24            in: header
25            required: false
26            type: string
27        responses:
28          '200':
29            description: normal response
30            schema:
31              $ref: '#/definitions/phonebookService_GET_response_200'
32        headers:
33          X-SEGNO:
34            type: string
35      post:
36        parameters:
```

Visual Representation (Right Pane):

Paths

/work/{lastname}

GET /work/{lastname}

Parameters

Name	Located in	Description	Required	Schema
lastname	path		Yes	↔ string
Authorization	header		No	↔ string

Responses

Code	Description	Headers	Schema
200	normal response		↔ phonebookService_GET_response_200 { OUTPUT_MSG: { } }

Try this operation

POST /work/{lastname}

Parameters

Name	Located in	Description	Required	Schema
lastname	path		Yes	↔ string
firstname	query		Yes	↔ string

Managing your APIs

Secure, scale, manage, monitor, and socialize APIs



API Management

- **APIs hosted on a zEE server are not “managed”, therefore an API management (APIm) solution should be used.**
- **IBM APIm enhances zEE APIs with the following capabilities:**
 - Secure and scale
 - manage access to APIs by using API keys and secret keys.
 - Manage and monitor
 - extract API usage and analytics data to quickly react to new opportunities.
 - Administration portal
 - self-registration, quotas, key management and security policies.
 - Developer portal
 - engage application developers and foster use of published APIs.
 - customize with branding to advertise, market, socialize and sell APIs.

[Session B14 for more info...](#)

Demo

Create a Swagger-defined API using z/OS Connect



Security

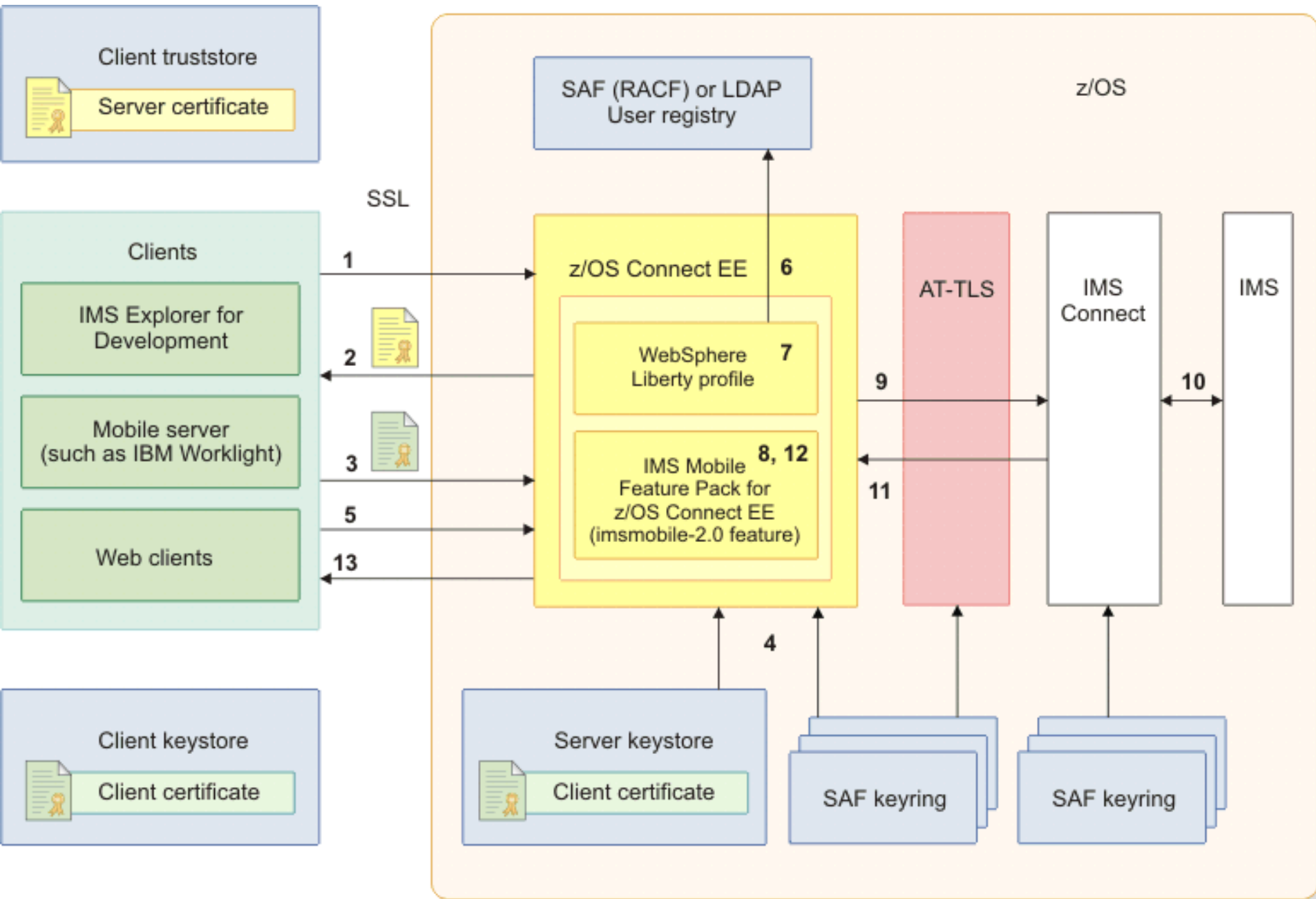


z/OS Connect / IMS Mobile Feature Pack security

- **End-to-end security flow can be divided into two layers:**
 - Security between REST client and z/OS Connect server
 - Security between IMS Mobile Feature Pack and backend IMS

- **Security can be discussed in three areas:**
 - Authentication/Encryption
 - Authorization
 - Identity Assertion

End-to-end Security flow



Authentication / Encryption

▪ **Between REST client and z/OS Connect server**

- HTTPS/SSL can be used to secure communication between REST client and z/OS Connect server. Default = SSL is on.
- If SSL is enabled, user can choose to use Client authentication (default) or Basic Authentication.
- User registry for authentication can be Basic, LDAP or SAF.

▪ **Between z/OS Connect(IMS Mobile) and IMS**

- AT-TLS can be used to secure communication between the z/OS Connect (IMS Mobile) server and IMS Connect.
- IMS Connect can authenticate the UserID/password if RACF=Y

Authorization

■ Authorization in z/OS Connect server

- Authorization take place at the z/OS Connect server to determine what kind of action is allowed to be performed on the REST service
- Three authorization levels:
 - Administrator = all actions
 - Operations = start, stop, getRequestSchema, getResponseSchema, getStatistics, etc
 - Invoke = invoke API
- Interceptors can be configured at the global or individual API level for authorization group control. It supports both LDAP and SAF.

■ Authorization in IMS

- Authorization take place in IMS to determine if the user is authorized to run the IMS transaction. (IMS OTMA authorization profile setup)

Identity Assertion

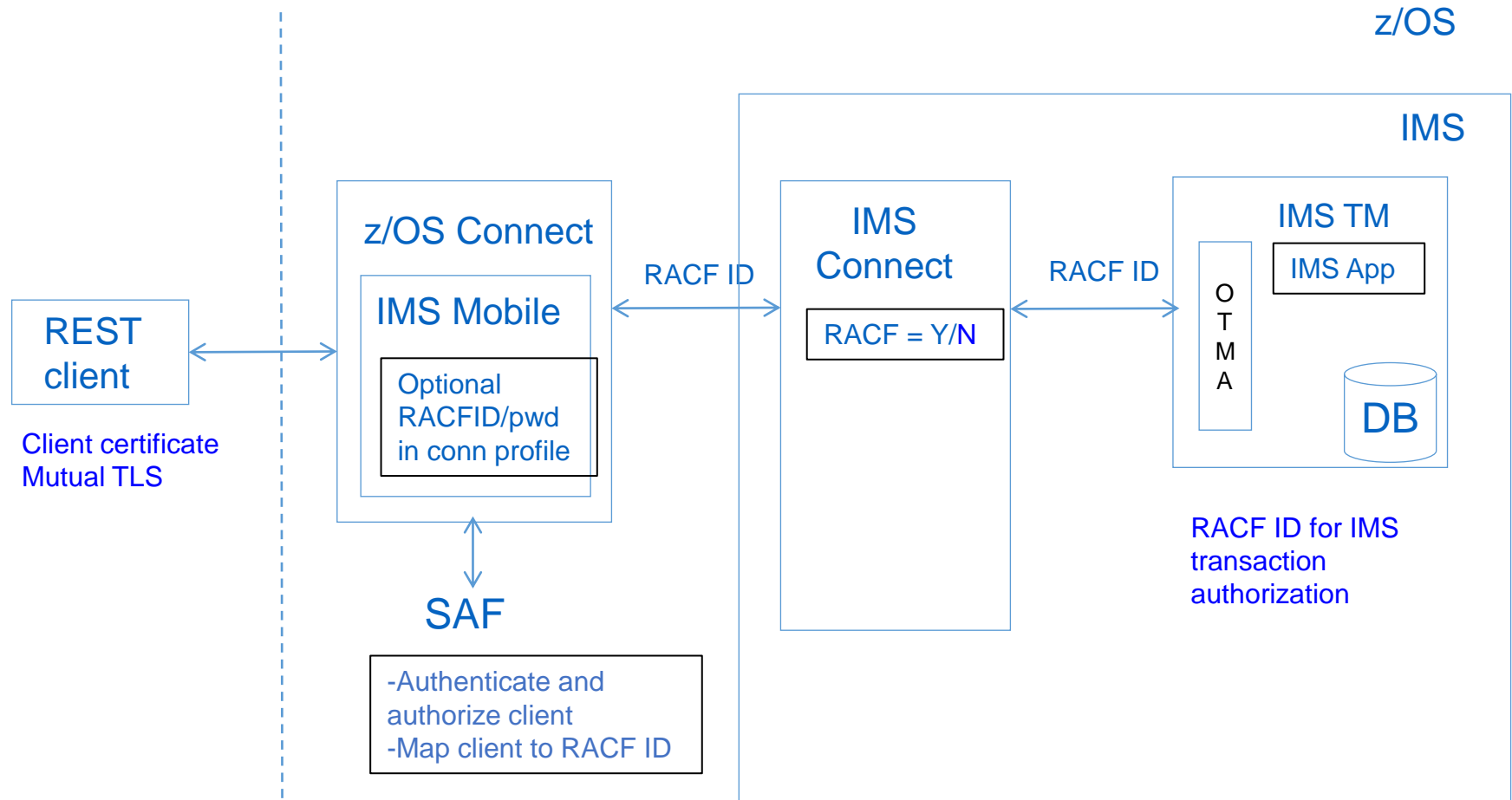
▪ User Identity in z/OS Connect server

- Once the client is authenticated/authorized by z/OS Connect, the user identity will be propagated to the IMS Mobile.
- The user identity could be the originating client ID or the mapped RACF ID.

▪ User Identity in IMS

- IMS Mobile can either take
 - the User ID passed along by z/OS Connect server (User ID only, no password) OR
 - the User ID and password specified in the IMS Connection profile and then pass along to IMS Connect/IMS.

End-to-End Security

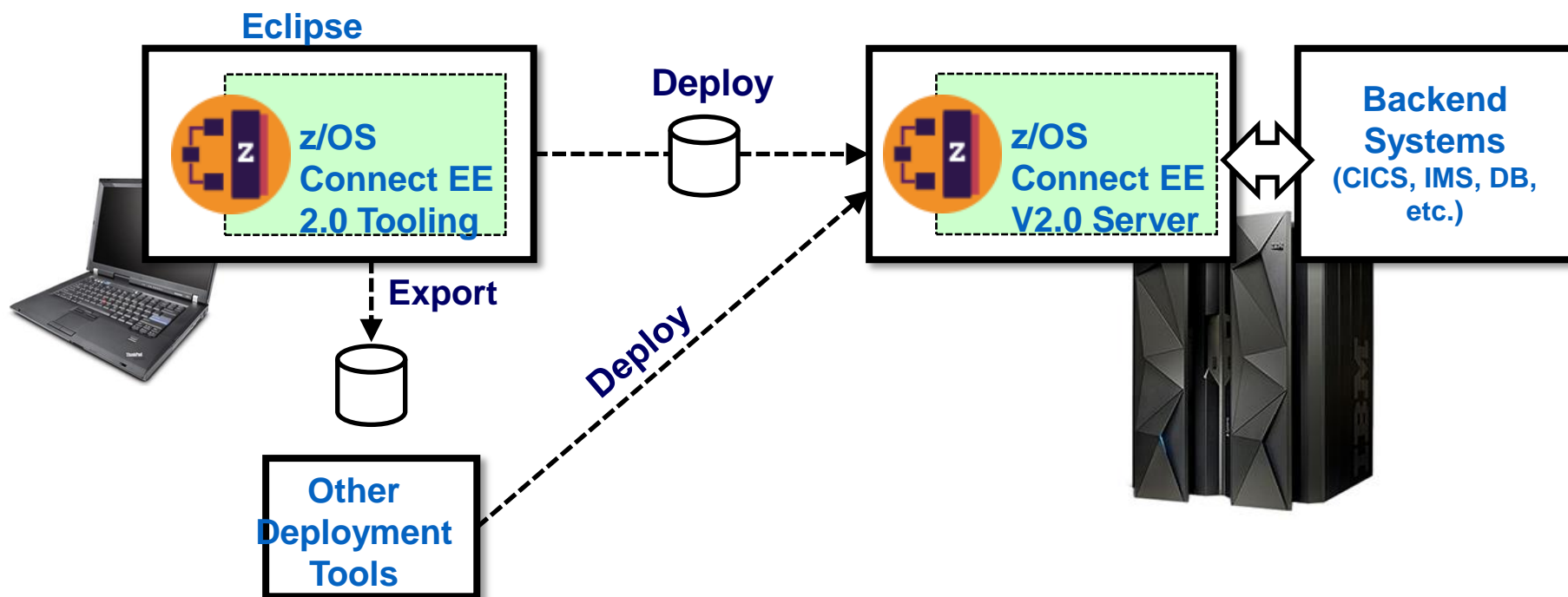


API Deployment and Promotion



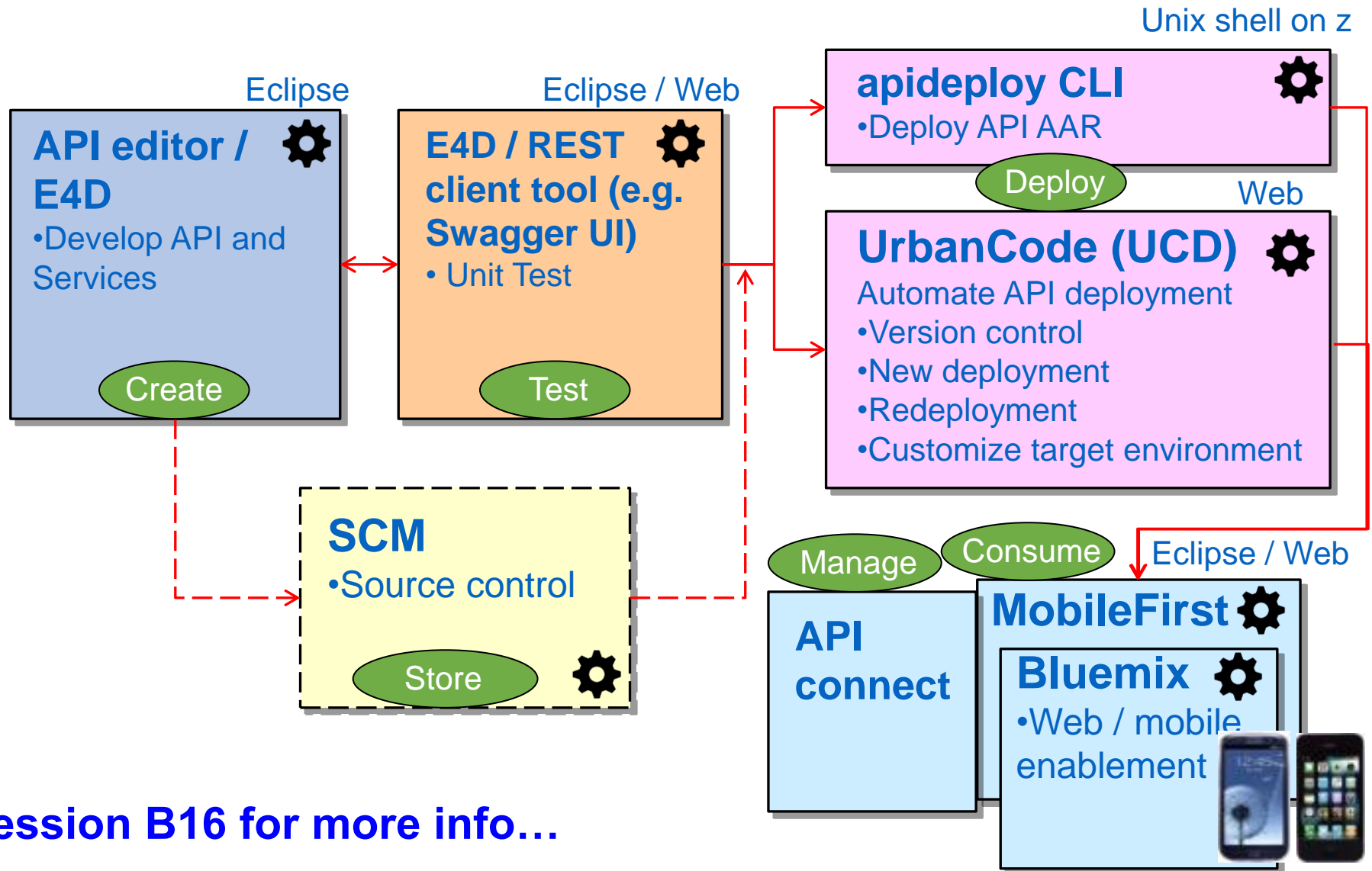


Deployable Artifact and Automated Tools



Because the service definitions have been encapsulated into a deployable unit, it becomes eligible for deployment by automated tools. This further enhances productivity.

End-to-end DevOps flow for z/OS Connect APIs and Services



Session B16 for more info...

z/OS Connect EE Pricing, Performance and Open Beta offering



What about pricing?

A new approach

z/OS Connect EE introduces an innovative new pricing model on z Systems.

“per instance” pricing metric

- Based upon the maximum number of active concurrent address spaces
- Tiered usage bands
 - provides increasing value as the size of an overall deployment rises; low cost of entry for small projects*
- Auditing is required through SMF89-2 records
 - hourly snapshots of the number of concurrent instances, reports created with utility IFAURP*

What about pricing?

Value Unit exhibit VUE037 (see announcement letter [ENUS215-493](#))

Number of Simultaneous Instances	VUs per Simultaneous Instance
1 to 4	1 VU per Simultaneous Instance
5 to 10	4 VUs + 0.6660 VUs per Simultaneous Instance > 4
11 to 20	8 VUs + 0.4000 VUs per Simultaneous Instance > 10
21 to 40	12 VUs + 0.2000 VUs per Simultaneous Instance > 20
41 to 100	16 VUs + 0.0660 VUs per Simultaneous Instance > 40
101 to 250	20 VUs + 0.0260 VUs per Simultaneous Instance > 100
251 to 500	24 VUs + 0.0160 VUs per Simultaneous Instance > 250
501 to 1000	28 VUs + 0.0080 VUs per Simultaneous Instance > 500
1001 to 3000	32 VUs + 0.0020 VUs per Simultaneous Instance > 1000
>3000	36 VUs + 0.0007 VUs per Simultaneous Instance > 3000

IFAURP usage reports

Maximum Concurrent Product Registrations – SMF 89 Type 2

```
//IFAURP EXEC PGM=IFAURP,REGION=0M,PARM='PRODUCT '  
//STEPLIB DD DSN=SYS1.SIFALIB,DISP=SHR
```

Measured Usage and S/390 Usage Pricing Charges

Page 2

IFAURP 4.1.2

Software Product Registration Report

14 DECEMBER

2015

----- Customer No: -----

----- Software Vendor: IBM CORP -----

ACME CICS COMPANY

CELL BLOCK A

HURSLEY, WINCHESTER

Contact/Phone: MR WANNABE / +44 1962 815000

----- Processor -----

Category	Type-Serial	Model	Begin-End Dates
Machine	2964-8E8C7	NE1	13Dec15 - 14Dec15
2964 CEC	2964-8E8C7	7A5	13Dec15 - 14Dec15

Maximum Concurrent Product Registrations

----- Product ----- 2015 2016

Name	Feature	Version	Number	L	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		Max MVS/ESA LPARs:			1	-	-	-	-	-	-	-	-	-	-	-	-
		Percent Missing Hours:			97	-	-	-	-	-	-	-	-	-	-	-	-
		#	13Dec15														
z/OS Connect	z/OS Connect	02.00.00	5655-CEE F		19#	-	-	-	-	-	-	-	-	-	-	-	-
		#	13Dec15														

Notes

- Data not collected for a full month.

N/A - Product registration counts are not available.

(01) - Not eligible for Measured Usage charges.

IFAURP usage reports

Maximum Concurrent Product Registrations – SMF 89 Type 2

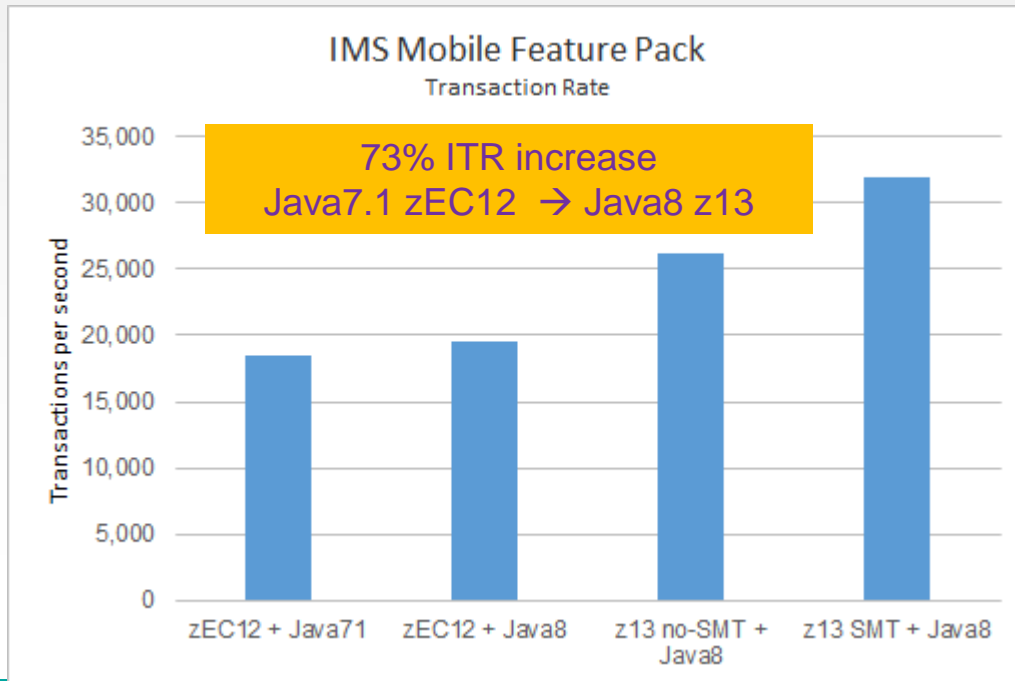
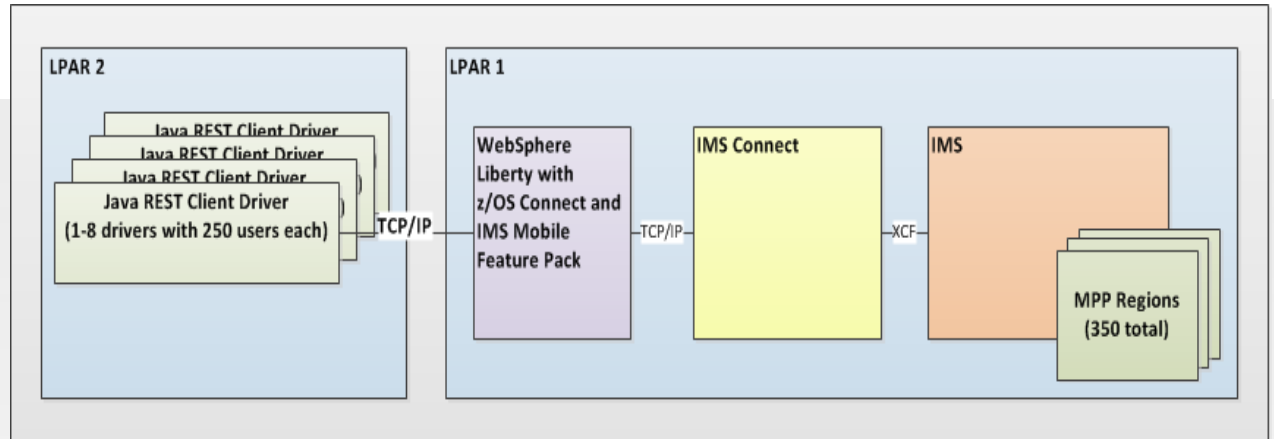
Measured Usage and S/390 Usage Pricing Charges
IFAURP 4.1.2 Software Product Registration Report Page 2 14 DECEMBER 2015

----- Product -----					2015
Name	Feature	Version	Number	L	Dec
Max MVS/ESA LPARs:					1
Percent Missing Hours:					97
# 13Dec15					
z/OS Connect	z/OS Connect	02.00.00	5655-CEE F		19#
# 13Dec15					

=====

- Data not collected for a full month.
N/A - Product registration counts are not available.
(01) - Not eligible for Measured Usage charges.

z/OS Connect with IMS (Mobile Feature Pack)



IMS Mobile Feature Pack **73%** aggregate improvement in throughput from z13 and IBM Java8

Get ahead of the game! *Register your interest today*

Preview potential capabilities plus the chance to give direct feedback

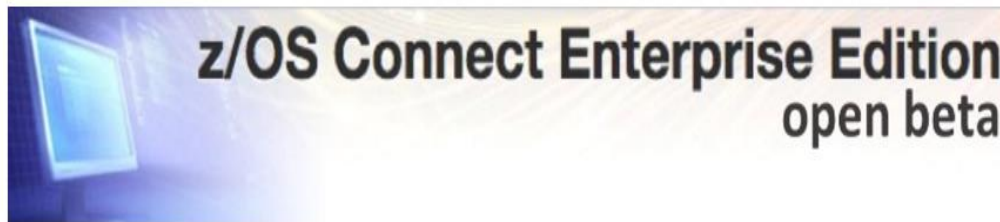
IBM z/OS Connect Enterprise Edition open beta

Downloadable files

Abstract

The z/OS Connect Enterprise Edition open beta offering is to be made available, unsupported by IBM, to enable you to evaluate its features at no charge, for a limited period.

Download Description



IBM z/OS Connect Enterprise Edition (EE) extends the value of applications that run on z/OS by allowing efficient and scalable APIs for contemporary mobile and cloud applications to be easily created.

ibm.biz/zosconnectopenbeta

Summary



IBM z/OS Connect Enterprise Edition

Product summary review

ibm.biz/zosconnect20_announce

IBM z/OS Connect Enterprise Edition (EE) V2.0 is the latest evolution of z/OS Connect! z/OS Connect EE V2.0 is a priced offering, orderable via Shopz as PID **5655-CEE**.

z/OS Connect EE V2.0 includes

A dedicated Liberty profile for z/OS

- *GA release includes Liberty V8.5.5.7*

New Eclipse-based tooling for API composition with SWAGGER

- *Delivered through IBM Explorer for z/OS V3.0 Aqua*

The WOLA service provider for access to CICS and BATCH

- *Including the WOLA Liberty feature*

Utilities to generate service archives for use with CICS programs

- *Creates JSON schemas as input for API composition*

The REST client for access to “3rd party” REST services

- *e.g. JAX-RS applications hosted on WAS for z/OS*

Available now!



IBM IMS Enterprise Suite V3.2.1

Delivers day-one support for z/OS Connect EE V2.0

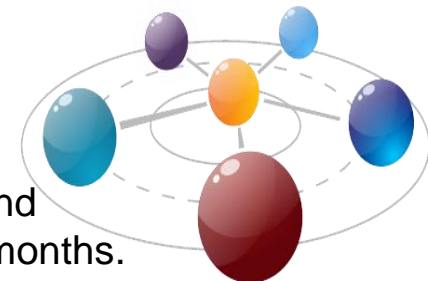
- IBM IMS Enterprise Suite V3.2.1 is the latest release of components that support open integration technologies to enable new application development and extend access to IMS transactions and data.

- IMS Enterprise Suite V3.2.1 includes
 - IMS Mobile Feature Pack for z/OS Connect Enterprise Edition
 - The IMS mobile feature (service provider) for z/OS Connect EE, enabling integration of IMS Transactions with z/OS Connect EE

 - IMS Explorer for Development
 - Support for generating service archives for use with IMS transactions

Statements of general direction

ENUS215-493, December 1st, 2015



IBM intends to deliver IBM z/OS Connect Enterprise Edition (EE) components and technologies through **continuous delivery of new features** in the coming months.

IBM intends that a future release of IBM **CICS Transaction Server** for z/OS (CICS TS) will provide support for z/OS Connect EE to enable it to execute **embedded within CICS TS**. (zCEE V2.0 APAR PI56615 / CICS TS V5.2 PI54207 / CICS TS V5.3 PI54208)

IBM intends that a future release of IBM **MQ** for z/OS will provide support for **both** z/OS Connect and z/OS Connect EE.

IBM intends to update IBM **System Automation** for z/OS V3.5.0 to deliver a new sample policy to allow automated operations and restart of z/OS Connect and z/OS Connect EE.

IBM intends that a future release of IBM **IMS Enterprise Suite** will provide support for z/OS Connect EE. (*Delivered ! IMS ES V3.2.1*)

IBM intends to offer IBM **DB2** for z/OS Version 11, or later, with support for the external interface delivered in z/OS Connect EE V2.0, and DB2 RESTful API support that is fully integrated into the DB2 for z/OS Distributed Data Facility.

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IBM z/OS Connect EE

Further information



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z/OS Connect EE Knowledge Center

The screenshot shows the IBM Knowledge Center interface. At the top, the IBM logo is on the left, and 'Sign In' is on the right. Below the logo is the text 'IBM Knowledge Center'. A search bar with a magnifying glass icon and the word 'Search' is in the center, with a 'Save Search' dropdown to its right. Below the search bar, the search filters are displayed: 'Search Filters: IBM z/OS Connect Enterprise Edition' (with a blue 'x' icon), 'Auto-select' (with a checked checkbox), 'Clear All', and 'Add Products...'. On the left side, there is a navigation menu with a 'Table of Contents' header. Below it, there are links: 'Back to all products', 'IBM z/OS Connect Enterprise Edition', and 'IBM z/OS Connect Enterprise Edition 2.0.0'. Under 'IBM z/OS Connect Enterprise Edition 2.0.0', there is a 'Welcome' section followed by a list of topics: 'What is IBM z/OS Connect Enterprise Edition?', 'Installation information', 'Configuring', 'Designing RESTful APIs', 'Designing and building APIs in z/OS Connect', 'Deploying APIs', 'Developing client applications', and 'Extending z/OS Connect EE'. On the right side, the main content area is titled 'z/OS Connect Enterprise Edition V2.0'. Below the title, there is a paragraph: 'z/OS® Connect Enterprise Edition V2.0 extends the communication of z/OS subsystems to support current mobile and cloud applications.' Below this paragraph, there is a 'Learn more' section with links: 'Product overview', 'Product Legal Notices', 'Product information' (with a document icon), and 'Data sheet' (with a document icon). Below the 'Learn more' section, there is a 'Find support' section with links: 'Troubleshooting', 'dwAnswers' (with a document icon), and 'IBM Support Portal' (with a document icon). At the top right of the main content area, there are icons for 'Share', 'Add to Collection', and a thumbs up/down icon.

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 - Welcome
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 - Designing and building APIs in z/OS Connect
 - Deploying APIs
 - Developing client applications
 - Extending z/OS Connect EE

z/OS Connect Enterprise Edition V2.0

z/OS® Connect Enterprise Edition V2.0 extends the communication of z/OS subsystems to support current mobile and cloud applications.

Learn more

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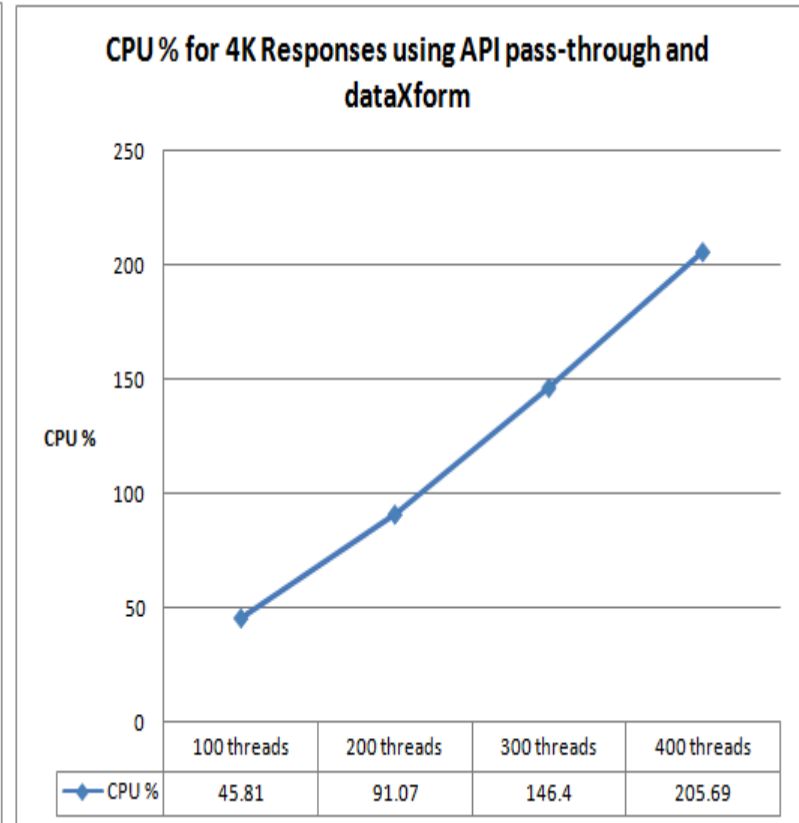
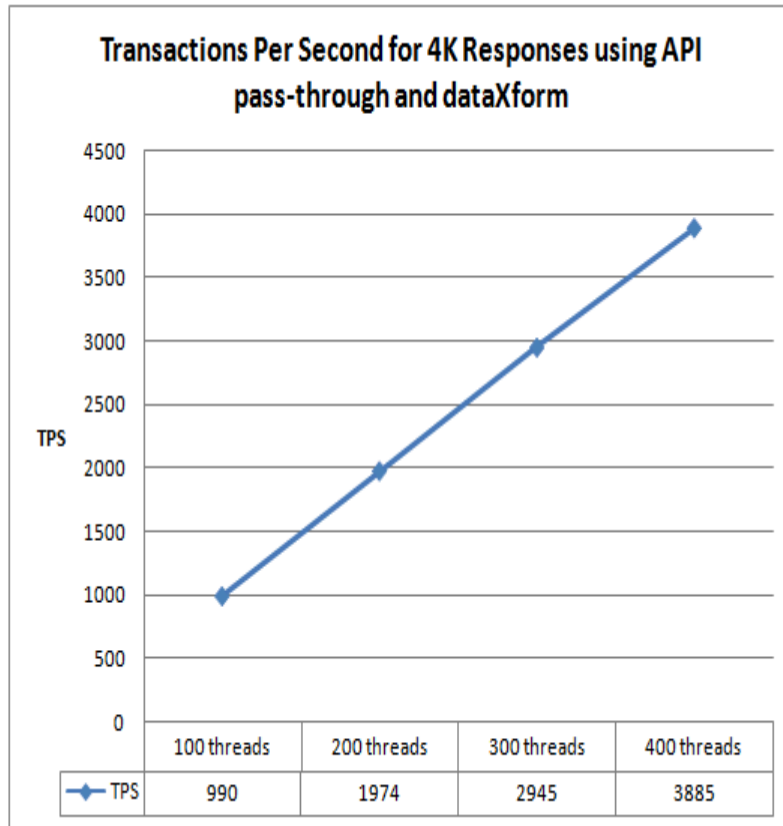
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z/OS Connect EE V2.0 Performance

SupportPac CP02: IBM z/OS Connect Enterprise Edition Performance Reports

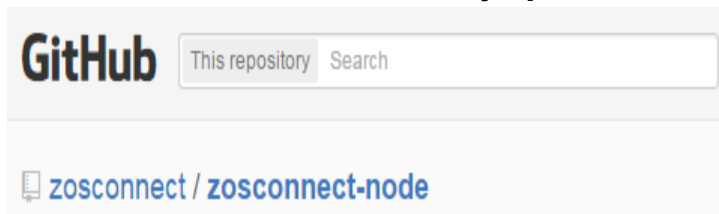


Lab-based performance summaries for z/OS Connect EE V2.0, with regular updates aligned with the product continuous delivery lifecycle

z/OS Connect support for node.js developers

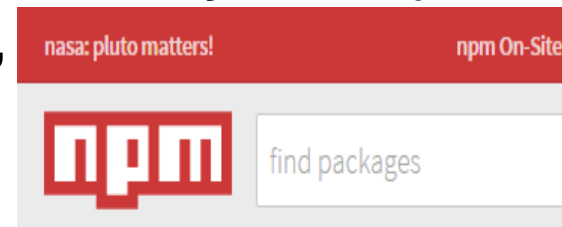
Introducing the **z/OS Connect for node.js** project. Want to contribute to it's evolution? *It's happening in the open...*

JavaScript programmers eat and breathe JSON & REST; node.js is now the de-facto runtime framework used on the server. **Today**, node.js is available on many platforms,



A wrapper service for z/OS® Connect, enabling node applications to discover and access IBM z Systems resources that are service-enabled by z/OS® Connect.

github.com/zosconnect/zosconnect-node



zosconnect-node public

Node zosconnect

build passing Codecov 100% dependencies up to date

npm install zosconnect-node

www.npmjs.com/package/zosconnect-node

IBM z Systems Integration Guide for the Mobile and API Economy

Richard Gamblin

Rob Jones

Nigel Williams



Abstract

Today, organizations engage with customers, business partners, and employees who are increasingly using mobile technology as their primary general-purpose computing platform. They have an opportunity to fully embrace this new mobile technology for many types of transactions, including everything from exchanging information to exchanging goods and services, from employee self-service to customer service. This mobile engagement allows organizations to build new insight into the behavior of their customers to better anticipate customer needs and gain a competitive advantage by offering new services.

By extending existing enterprise applications onto a mobile platform you can capitalize on existing investments without the need to develop completely new solutions to support mobile services. Because nearly 70% of all enterprise transactions touch a mainframe, IBM z Systems™ has an important role in enabling existing and new mainframes to be easily consumed by mobile applications, for example, through REST APIs. These same APIs can be consumed through other channels and applications, both on-premises and in the cloud.



Profile

Last Update
01 December 2015

Rating: ★★★★★
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- Nigel Williams

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