C08/B16 – DevOps for z Systems APIs with deployment automation and continuous delivery

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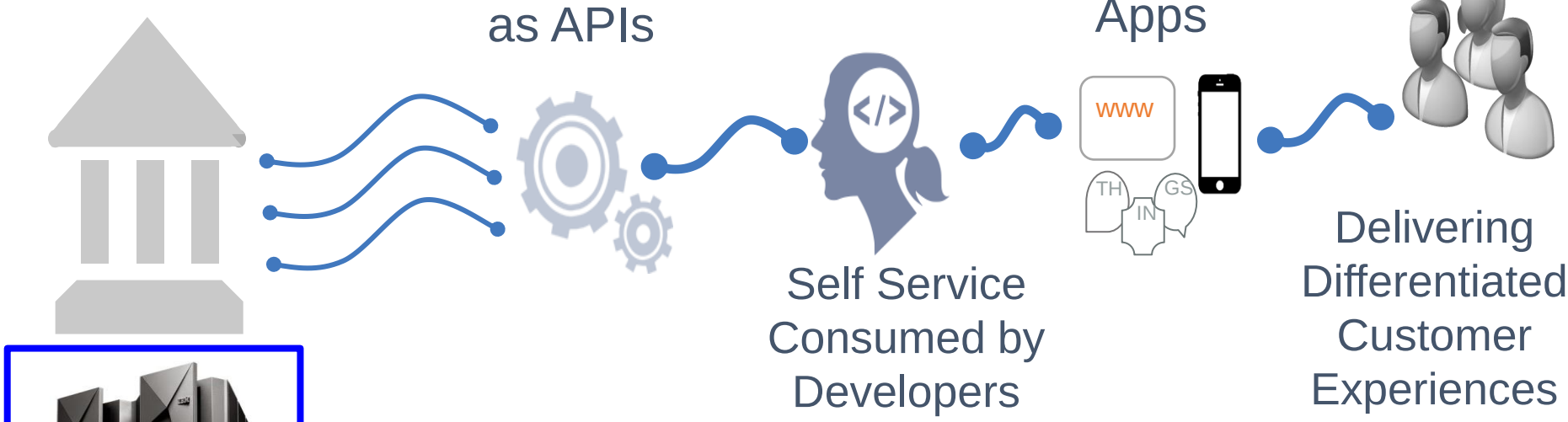
Unleash Enterprise Investments to Disrupt Competitors

Existing Enterprise IT Investments

Exposed as APIs

To Develop Innovative Apps



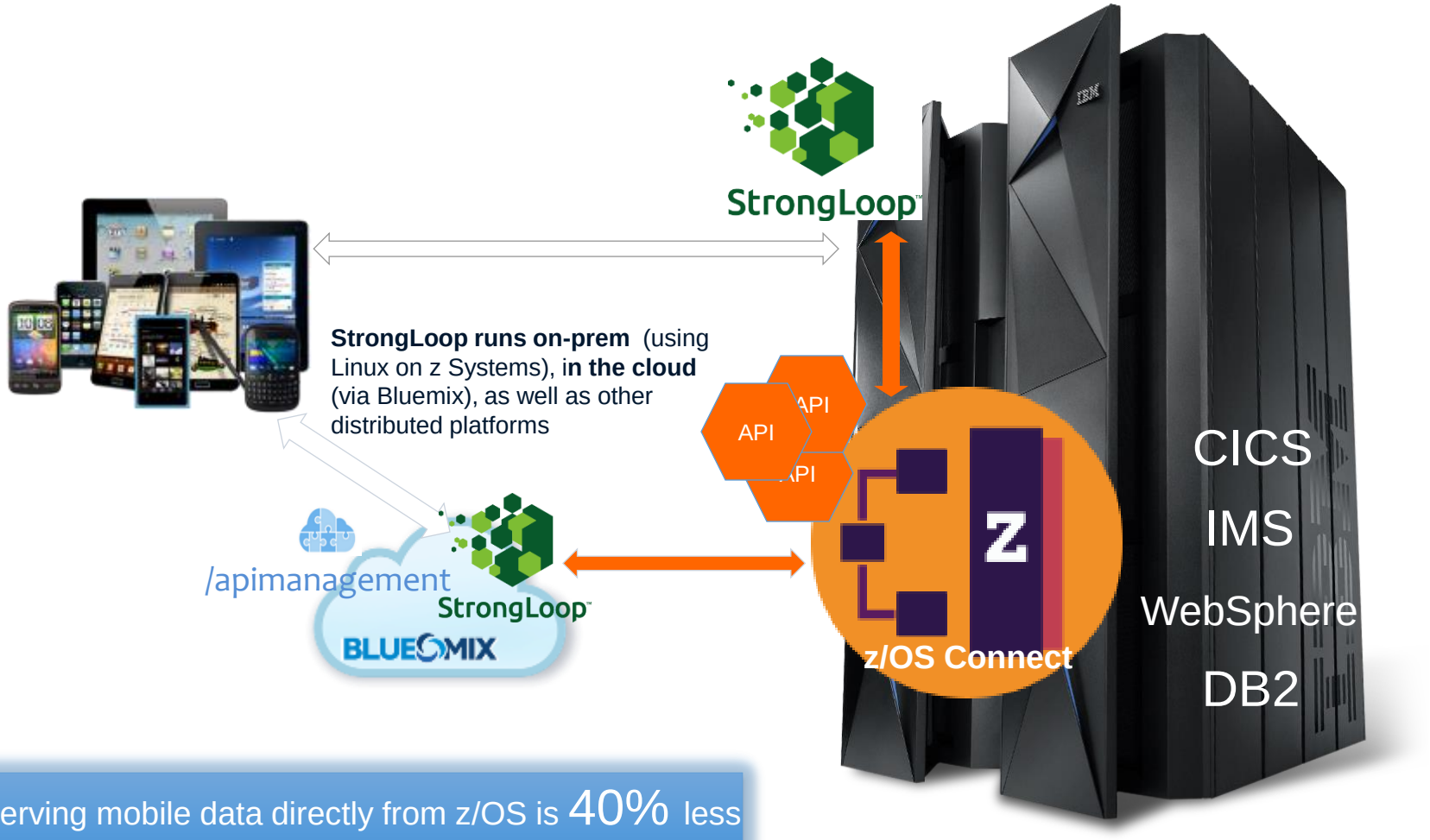
Self Service Consumed by Developers

Delivering Differentiated Customer Experiences

The API Economy

Where companies[Providers] expose their (internal) digital business assets or services in the form of (Web) APIs to third parties [consumers] with the goal of unlocking additional business value through creation of new assets

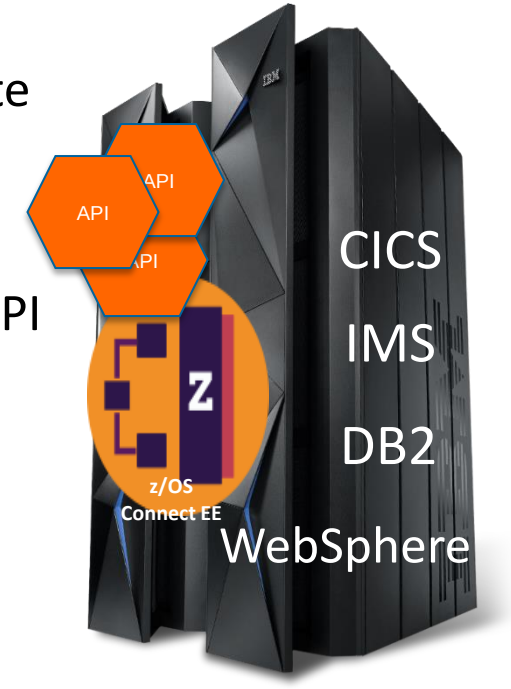
z/OS Connect provides optimized infrastructure to meet the demands of the API Economy



Serving mobile data directly from z/OS is 40% less expensive than exporting to a system of engagement

z/OS Connect Enterprise Edition

- Delivers RESTful APIs as a discoverable, first-class resource with Swagger 2.0 descriptions
  - Ready for consumption by today's enterprise application developers and integration with API management solutions
- Comprehensive tooling that enables API developers to create RESTful APIs from z/OS-based assets
- Supports standard JSON message format
- Integrated with IBM API Management for enterprise-class API management
  - Consumer registration, API security controls, and version control.



IMS Mobile Feature Pack for z/OS Connect EE

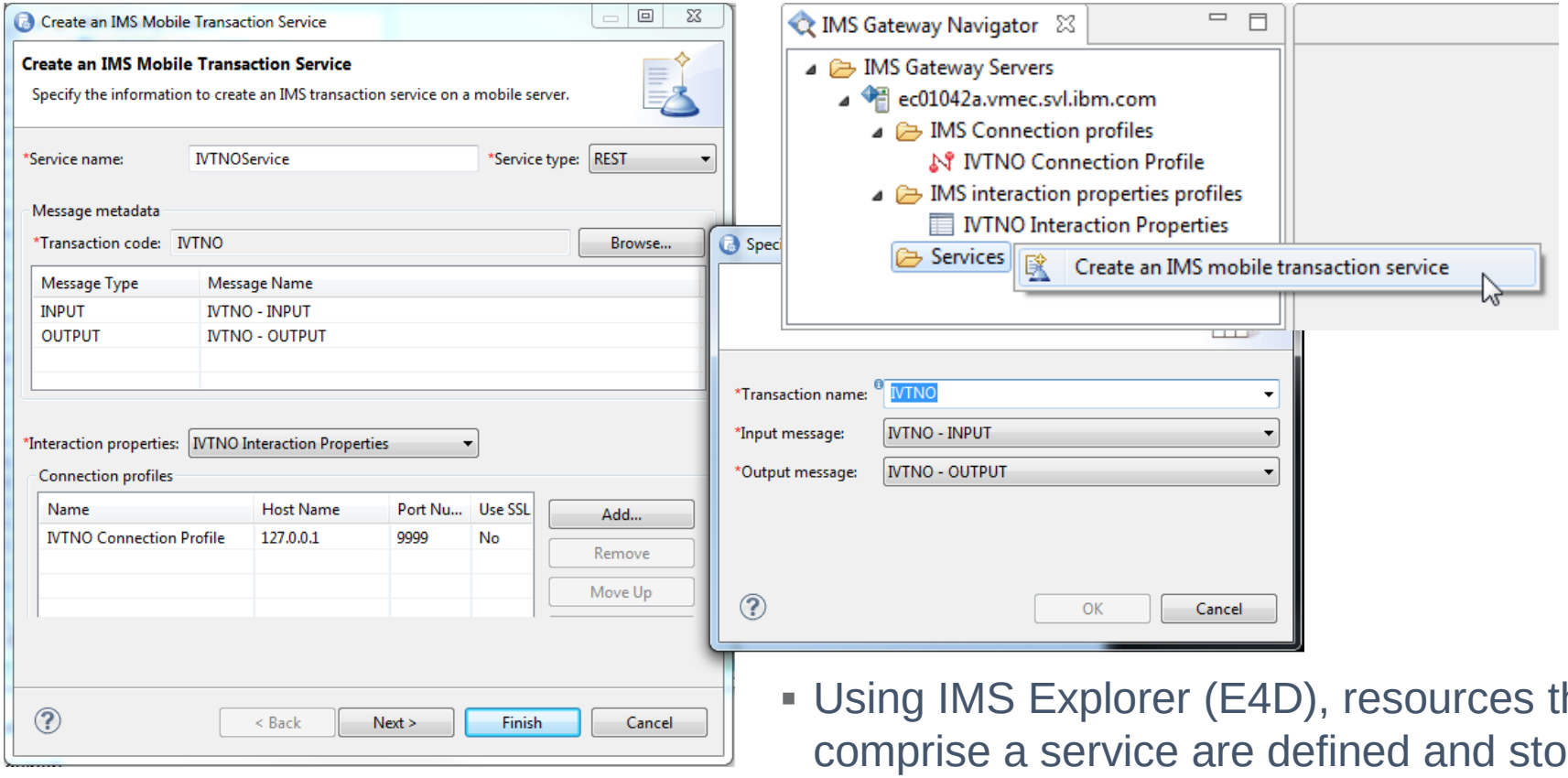
- **Enable mobile and cloud clients to access IMS transactions as REST/JSON services**
  - Transform REST/JSON request to COBOL bytes and transform response back to JSON
  - No change to IMS applications

- **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:**
  - Integrate with 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

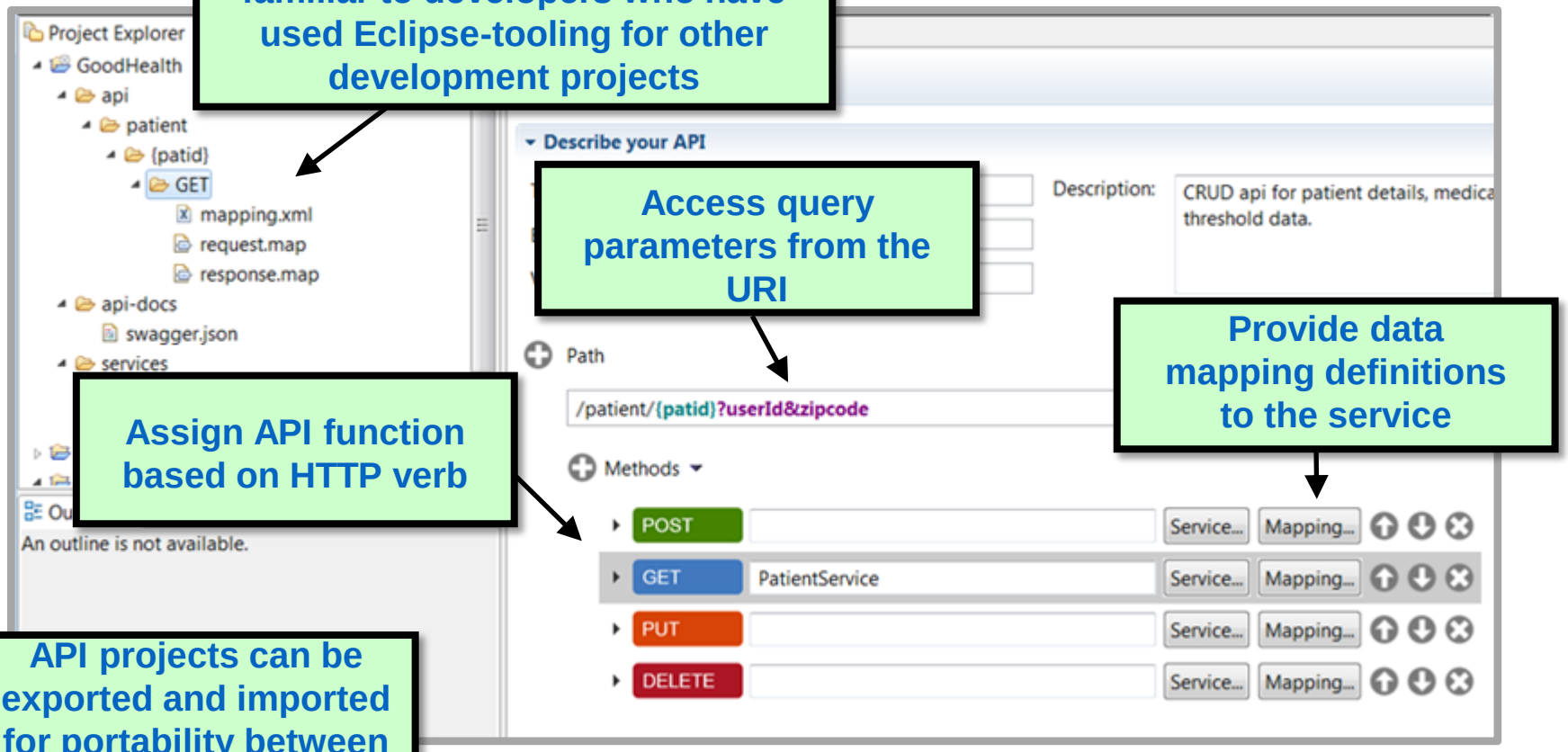
Enable IMS Transactions as REST Services



- Using IMS Explorer (E4D), resources that comprise a service are defined and stored seamlessly on the IMS Mobile Server

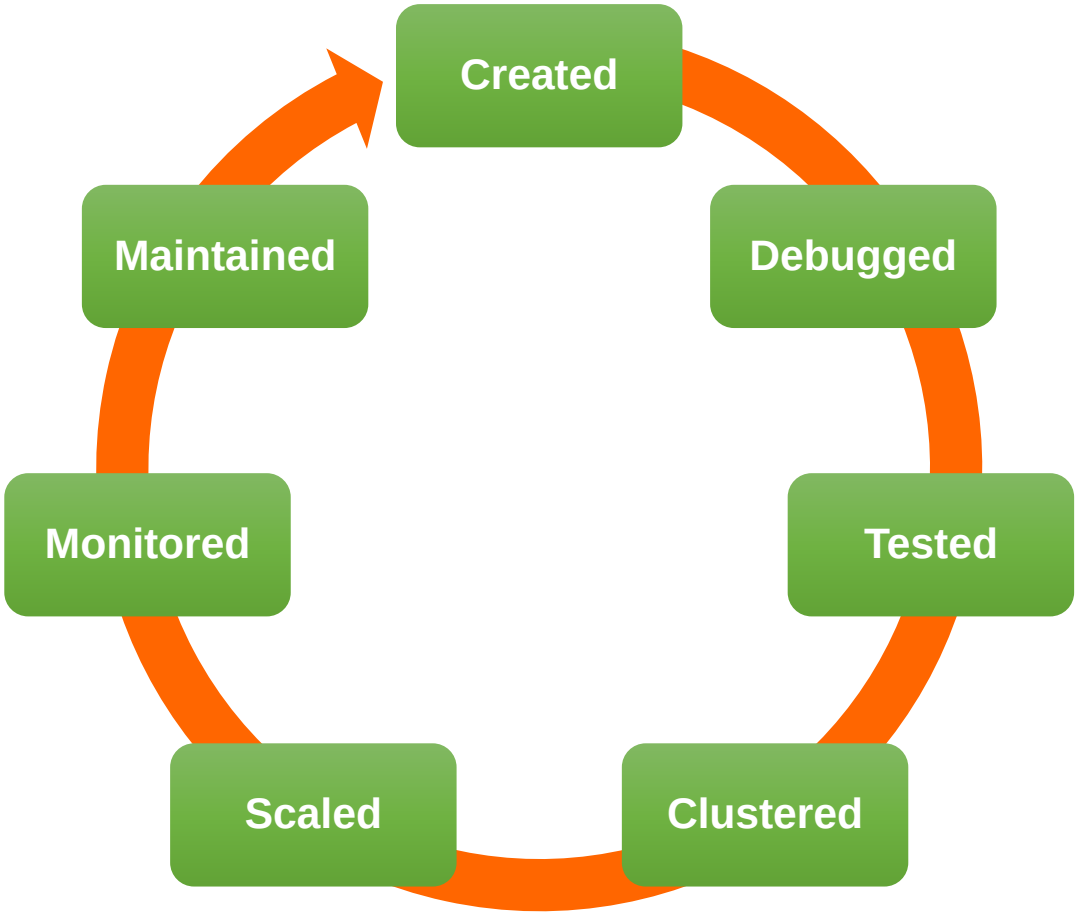
z/OS Connect EE API Editor

See Session A13 for API creation



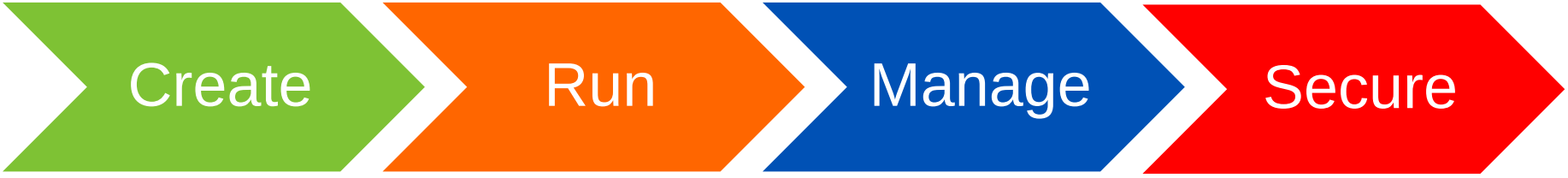
API definitions are created through the tool, which is consistent across backend systems (CICS, IMS, etc.)

APIs as Applications



API Connect: Simplified & Comprehensive API foundation

to jumpstart your entry into the API Economy



Unified experience across API Lifecycle; not a collection of piece parts.

- Connect API to data sources
- Develop & Compose API
- Generate API consumer SDK

- Build, debug, deploy, Node.js microservice apps
- Build, debug, deploy Java microservice apps
- Node.js & Java common management & scaling
- Stage to cloud or on-prem catalog

- API Discovery
- API Policy Management
- Publish to Developer Portal
- Self-service Developer Portal
- Subscription Management
- Social Collaboration
- Community Management
- API Monitoring & Analytics
- Lifecycle Mgmt & Governance

- API Policy Enforcement
- Security & Control
- Connectivity & Scale
- Traffic control & mediation
- Workload optimization
- Monitoring/Analytics Collection

See Session A09 for API Management

API Deployment and Promotion

Stan

Stan, a zOS Connect administrator, is asked to promote the latest update for the Hospital API from Bob's dev/test z/OS Connect systems, to the QA z/OS Connect systems.

It needs to be added into one or more z/OS Connect instances alongside other/existing APIs in the QA system for both regression and integration testing without interrupting unrelated APIs also under QA testing.

During the promotion process, Stan needs to apply some changes to configuration properties used by the API as the QA system access a different backend datastore.

Stan desires to use batch script for promoting APIs such that it can be automated and scheduled without user/manual intervention.

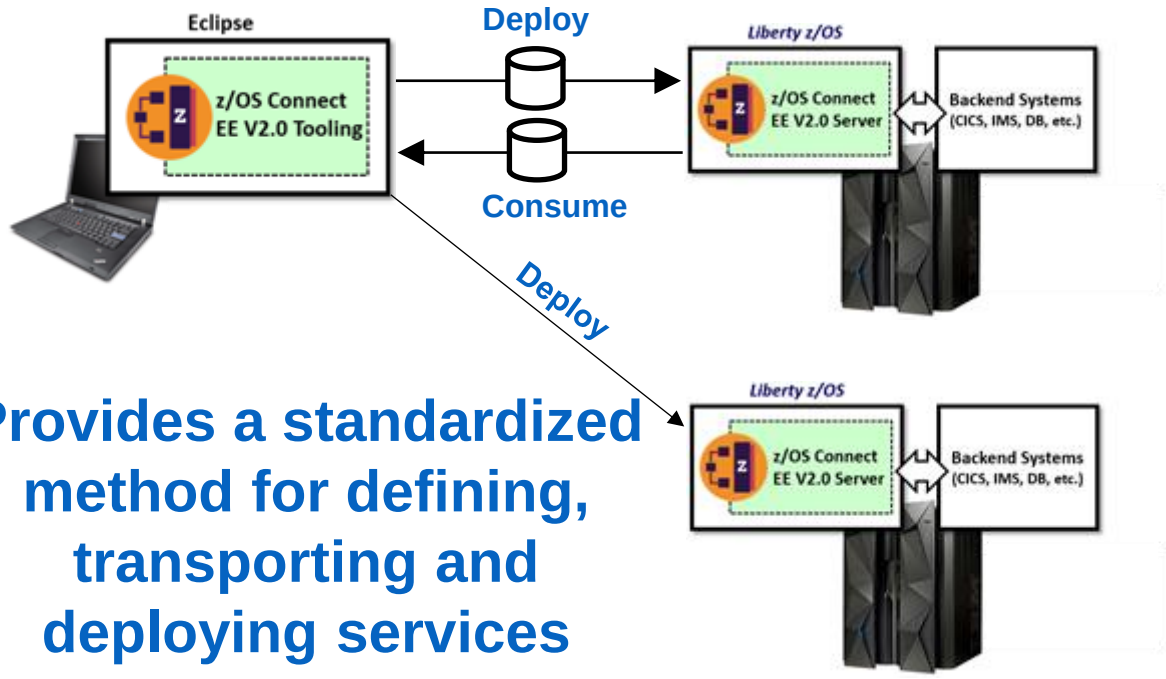
z/OS Connect EE API Deployment

- Use the API Deployment utility (apideploy) to deploy an API (AAR file).
- The API archive file (AAR) must reside on a file system that the apideploy utility can access.
- The user that runs the apideploy utility must have write permission to the /resources directory.
- The apideploy utility is a supplied z/OS UNIX command, so the deployer will need an OMVS shell to use the command.

API Archive (AAR) -- API Packaging

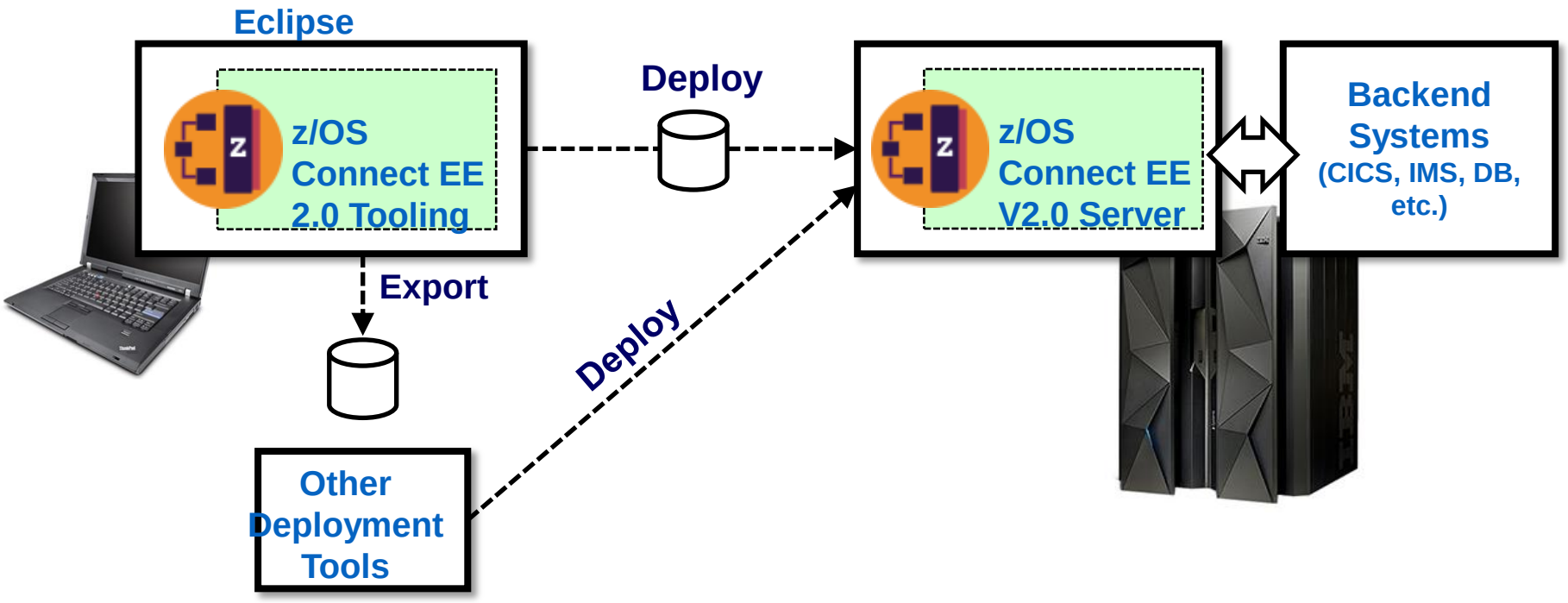
API Archive (AAR) File

- ZIP-format file
- Contains Swagger documentation of service
- Contains JSON schema and API information
- Produced by tooling
- Exportable to server runtime | Consumable by tooling



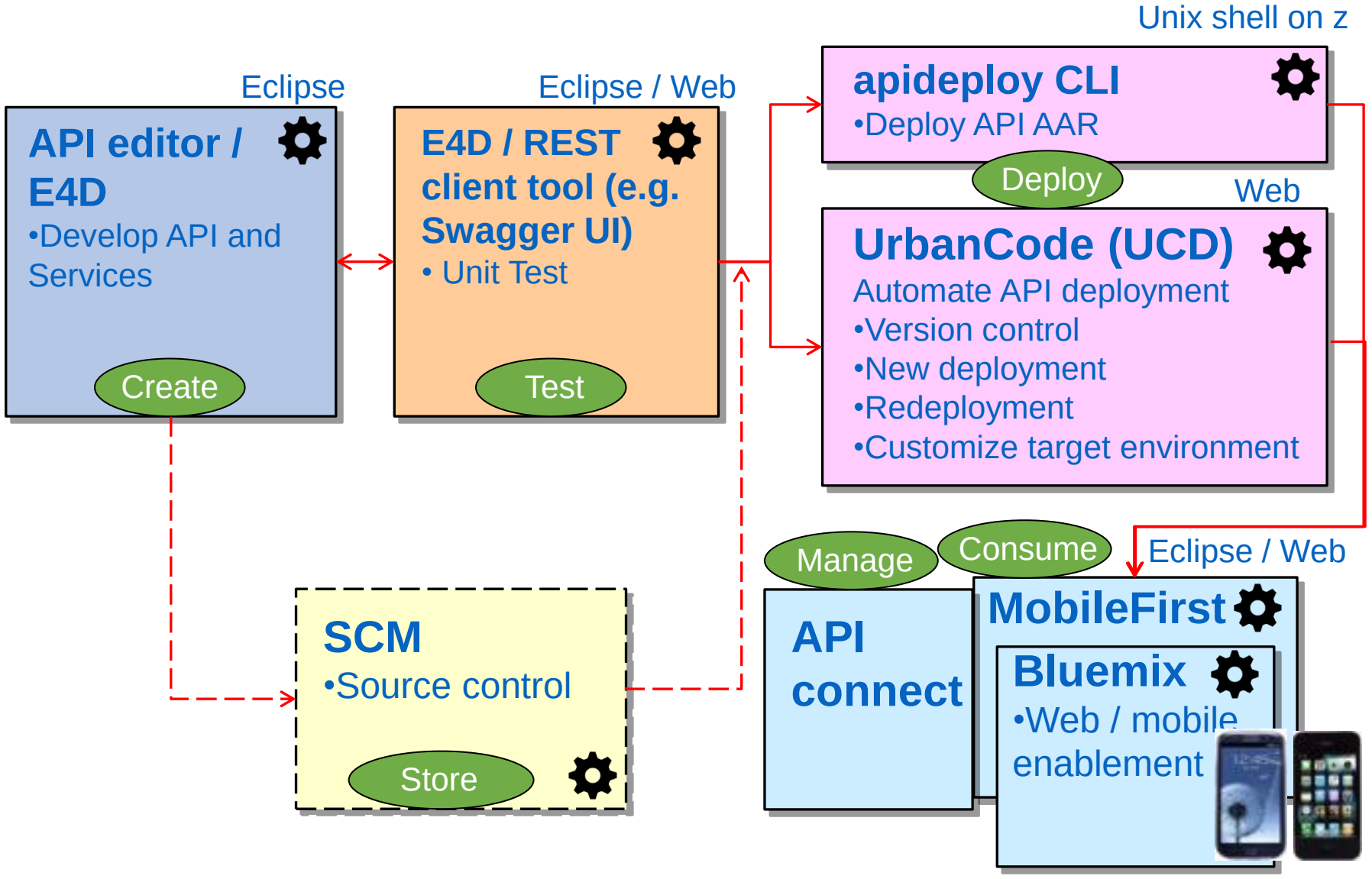
Provides a standardized method for defining, transporting and deploying services

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



API and Service Deployment

Service and API creation

1. Service developer connects to a z/OS Connect EE (DEV) server using IMS Explorer for Developer and creates an IMS service.
2. Service developer or administrator configure the environment properties in DEV server
3. Service developer tests the service in the DEV server.
4. Service developer checks in the service artifacts to a SCM (source control management system) when testing completes.
5. API developer imports the service into the API editor tooling and creates an API.
6. API developer deploys and tests the API and the service on the DEV server.
7. API developer checks in the tested API (AAR file) into SCM.

API and Service Deployment

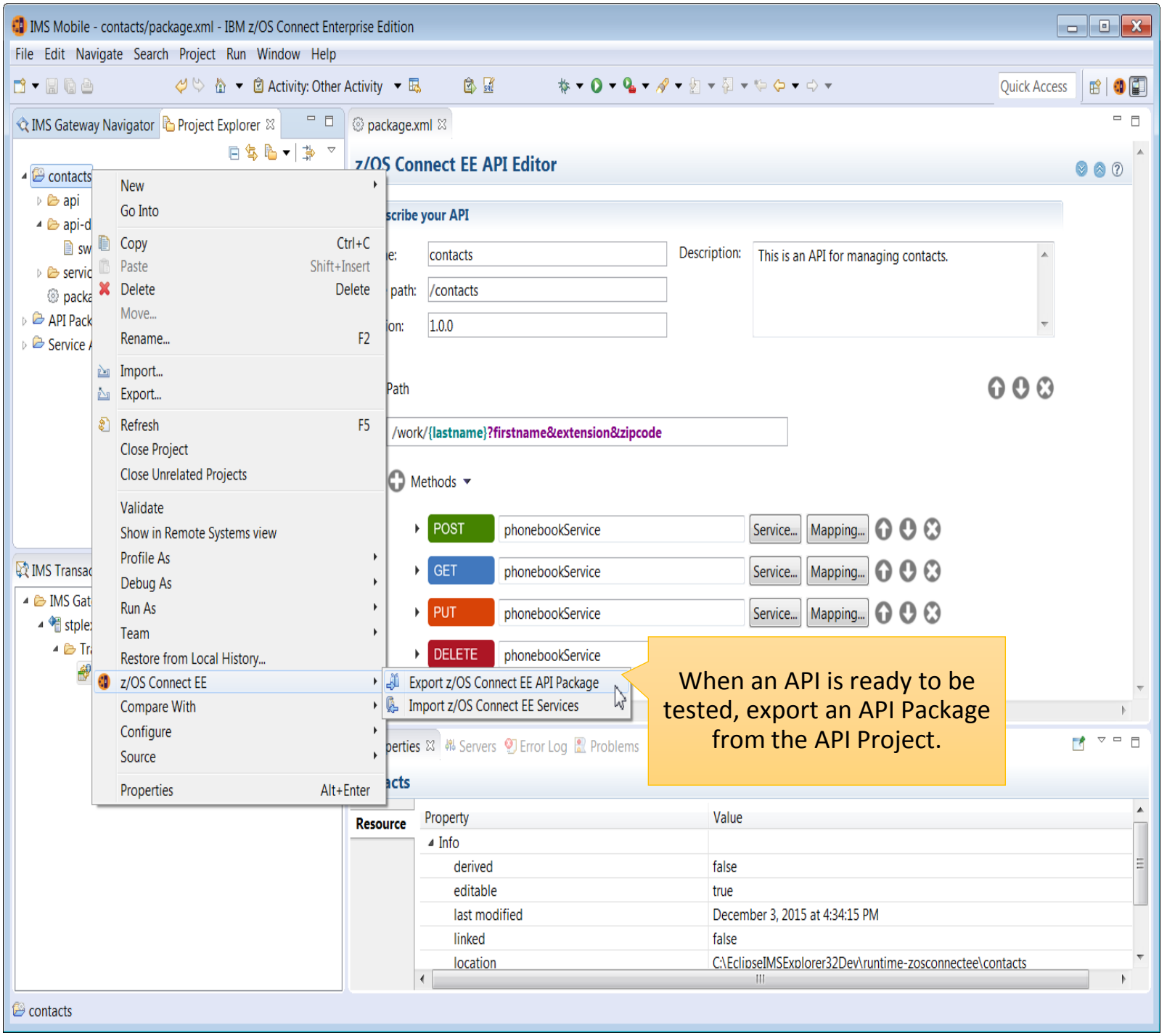
Create a new QA server by cloning a DEV server

7. Administrator checks out all the API and services artifacts from SCM.
8. Administrator creates environment properties for QA server using E4D. For example,
   - Change host name in Connection Profiles
   - Update IMS datastore name in Interaction Profiles
9. Administrator creates a new z/OS Connect EE QA server.
10. Administrator or an automated process/script (ftp and) to deploy each AAR file on z/OS Connect server
    - Deploy services referenced by APIs
    - Run apideploy command to deploy API aar files
    - Deploy each reference services based on Service Provider's
    - Update server.xml for interceptor, security and logging settings if needed.
11. Administrator starts the z/OS Connect EE QA server and ready to use.

API and Service Deployment

Promote an API and service from DEV to QA

7. Administrator (API or Service deployer) checks out the new API and Service files from SCM.
8. Administrator updates the environment references in the Service configuration file
   - For example, change the connectionRef=ICON-DEV to ICON-QA where ICON-QA is an existing connection profile in the QA server
9. checks in the updated configuration files to the QA stream in SCM
10. Administrator or an automated DevOps process/script promotes the new service with the following steps:
    - (Ftp and) Run apideploy command to deploy API aar files
    - If referenced Service(s) does not exists in the target server, deploy Service based on Service Provider's process
    - Update environment configuration files if needed. For example, you may need to add a new interaction or connection profile instead of using an existing one.
11. The new API and Service is ready to use.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Quick Access
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Paste Shift+Insert
Delete Delete
Move...
Rename... F2
Import...
Export...
Refresh F5
Close Project
Close Unrelated Projects
Validate
Show in Remote Systems view
Profile As
Debug As
Run As
Team
Restore from Local History...
z/OS Connect EE
Compare With
Configure
Source
Properties Alt+Enter
Export z/OS Connect EE API Package
Import z/OS Connect EE Services
scribe your API
e: contacts
path: /contacts
on: 1.0.0
Description: This is an API for managing contacts.
Path
/work/{lastname}?firstname&extension&zipcode
Methods
POST phonebookService Service... Mapping...
GET phonebookService Service... Mapping...
PUT phonebookService Service... Mapping...
DELETE phonebookService
When an API is ready to be tested, export an API Package from the API Project.
Servers
Error Log
Problems
Resource
Property
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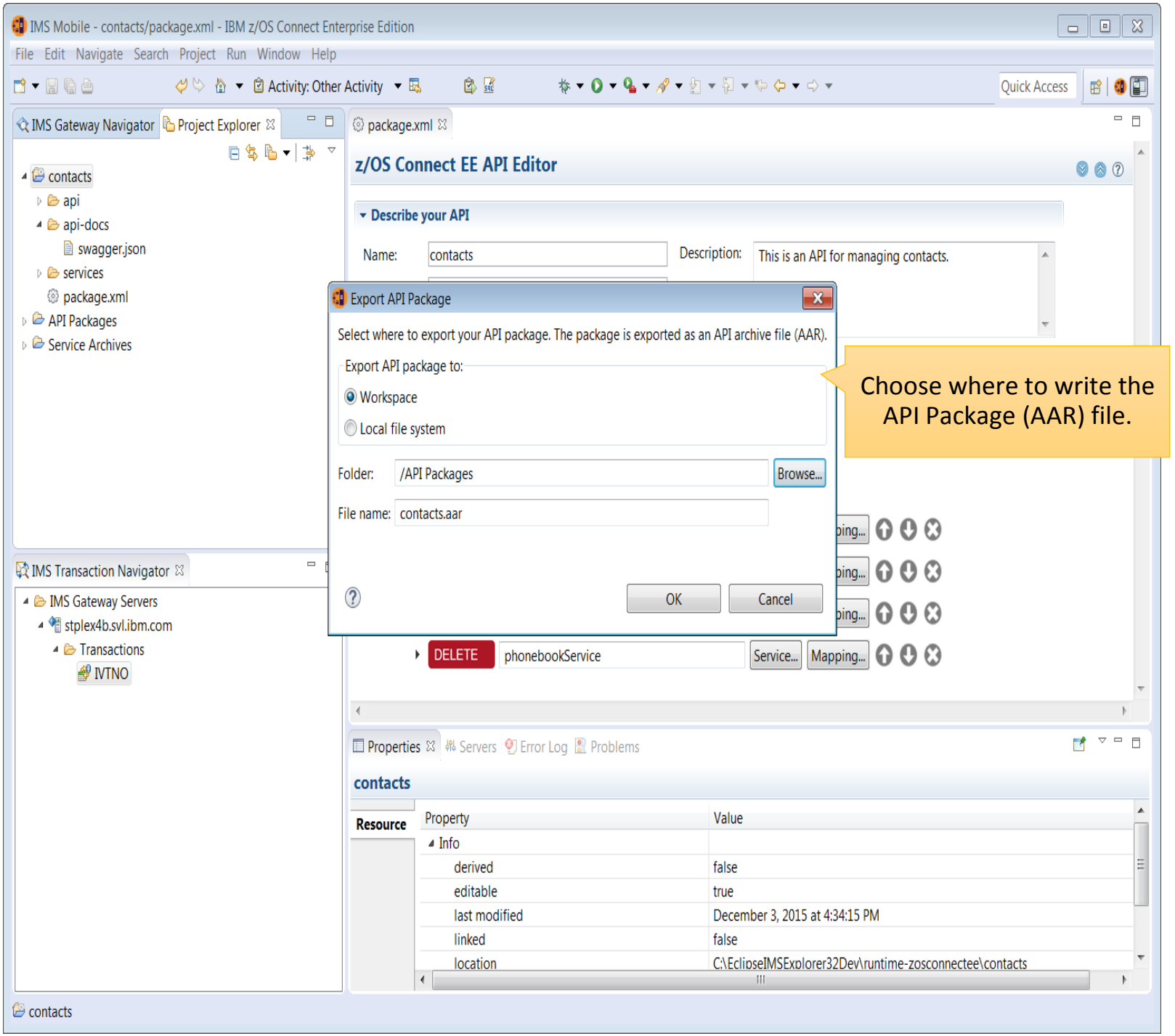
derived false
editable true
last modified December 3, 2015 at 4:34:15 PM
linked false
location C:\EclipseIMSExplorer32Dev\runtime-zosconnectee\contacts
contacts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api
api-docs
swagger.json
services
package.xml
API Packages
Service Archives
package.xml
z/OS Connect EE API Editor
Describe your API
Name:
contacts
Description:
This is an API for managing contacts.
Export API Package
Select where to export your API package. The package is exported as an API archive file (AAR).
Export API package to:
Workspace
Local file system
Folder:
/API Packages
Browse...
File name:
contacts.aar
OK
Cancel
Choose where to write the API Package (AAR) file.
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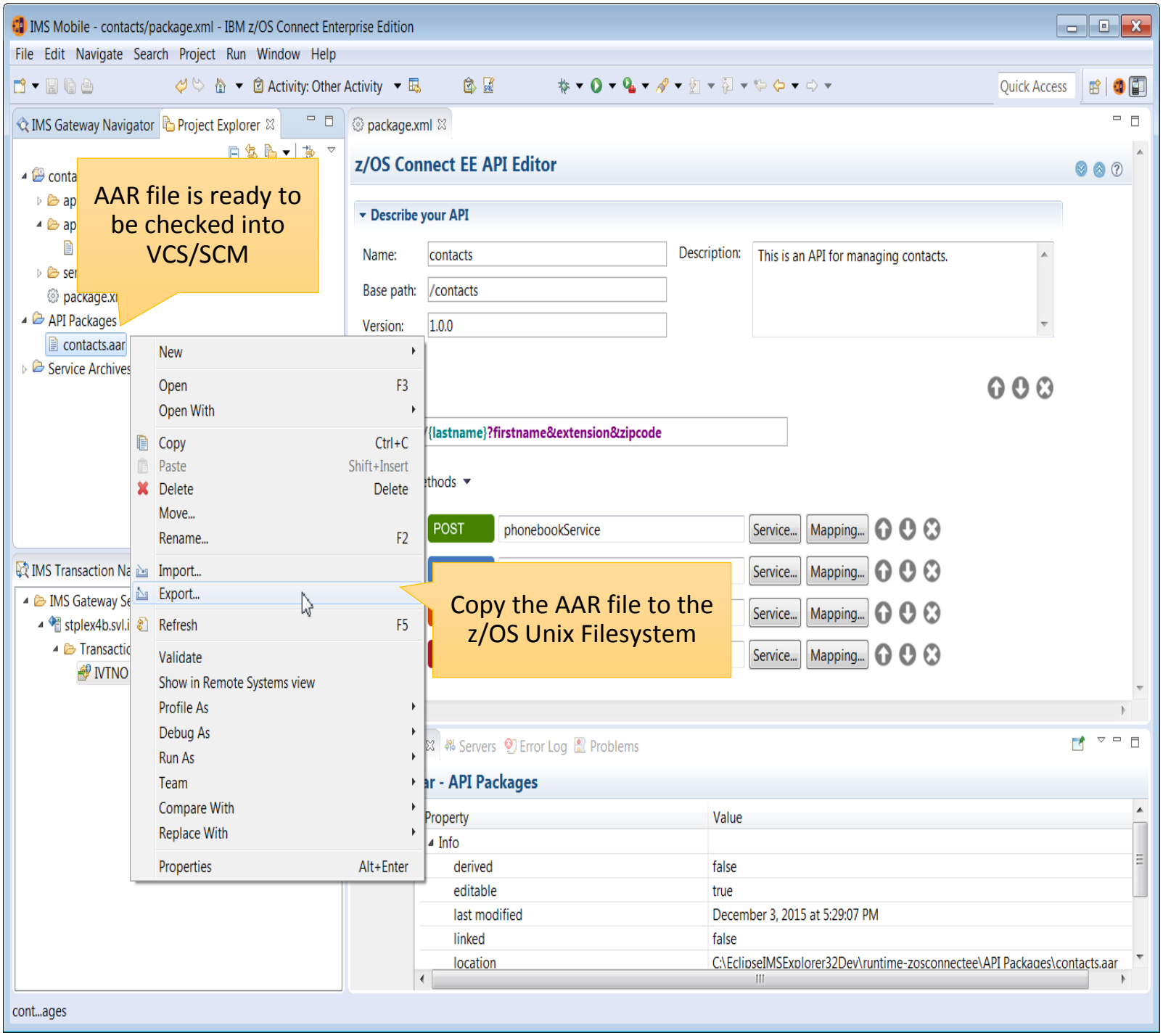
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Activity: Other Activity
Quick Access
IMS Gateway Navigator
Project Explorer
package.xml
z/OS Connect EE API Editor
Describe your API
Name: contacts
Base path: /contacts
Version: 1.0.0
Description: This is an API for managing contacts.
AAR file is ready to be checked into VCS/SCM
API Packages
contacts.aar
Service Archives
New
Open F3
Open With
Copy Ctrl+C
Paste Shift+Insert
Delete Delete
Move...
Rename... F2
Import...
Export...
Refresh F5
Validate
Show in Remote Systems view
Profile As
Debug As
Run As
Team
Compare With
Replace With
Properties Alt+Enter
Copy the AAR file to the z/OS Unix Filesystem
POST
phonebookService
Service...
Mapping...
IMS Transaction
IMS Gateway
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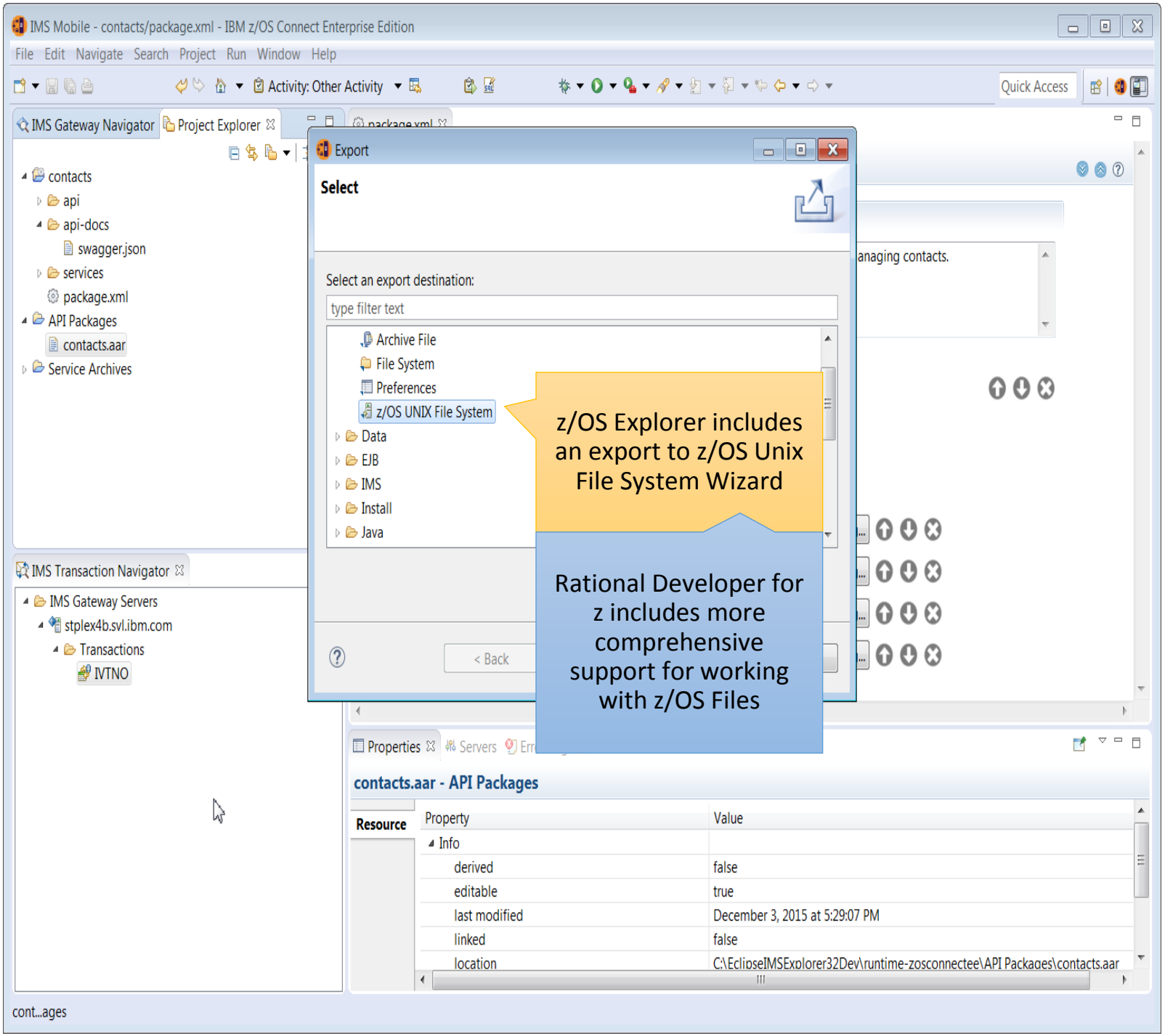
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Rational Developer for z includes more comprehensive support for working with z/OS Files
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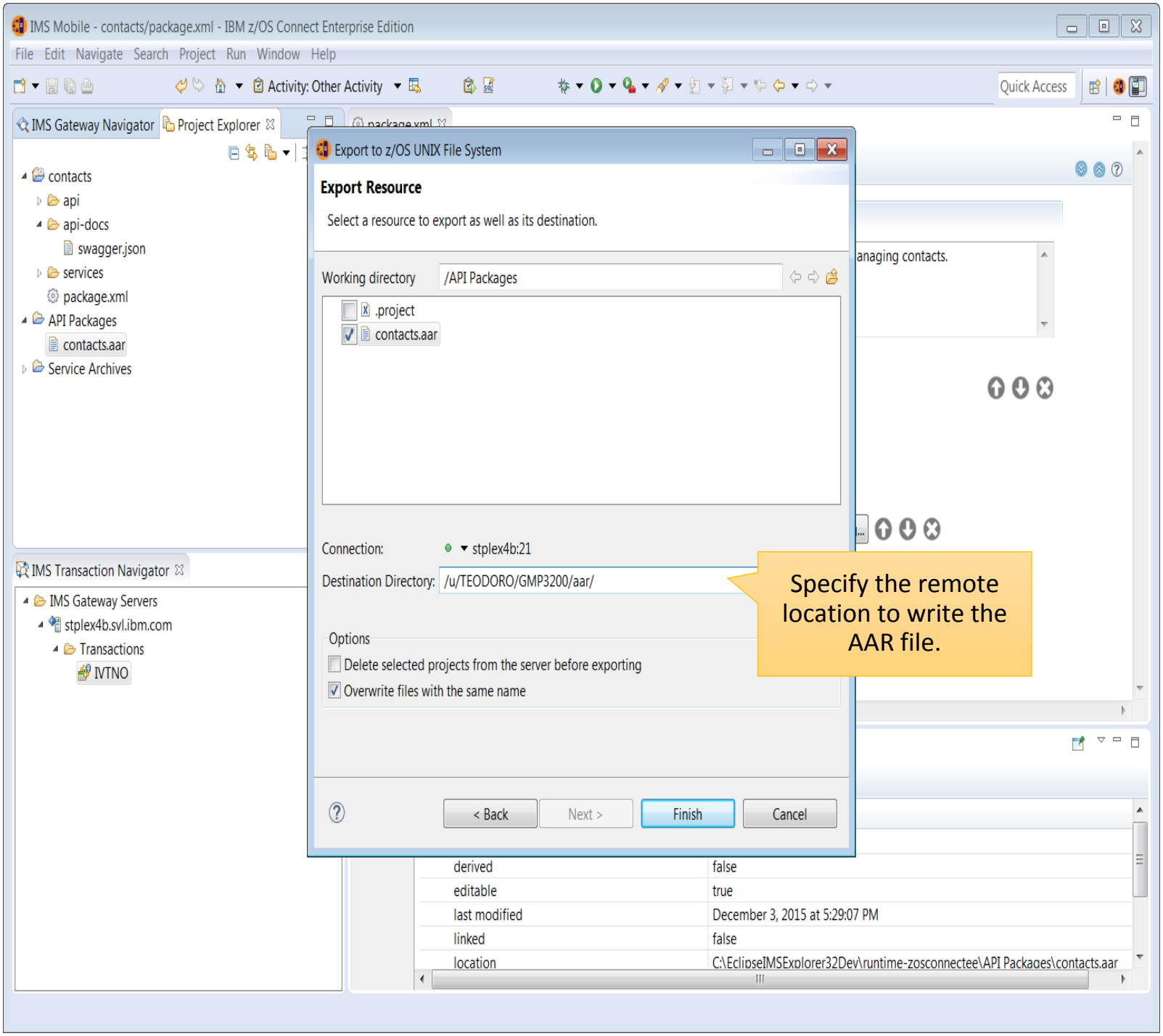
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Service Archives
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IMS Gateway Servers
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Export to z/OS UNIX File System
Export Resource
Select a resource to export as well as its destination.
Working directory
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Connection:
stplex4b:21
Destination Directory:
/u/TEODORO/GMP3200/aar/
Options
Delete selected projects from the server before exporting
Overwrite files with the same name
< Back
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Finish
Cancel
Specify the remote location to write the AAR file.
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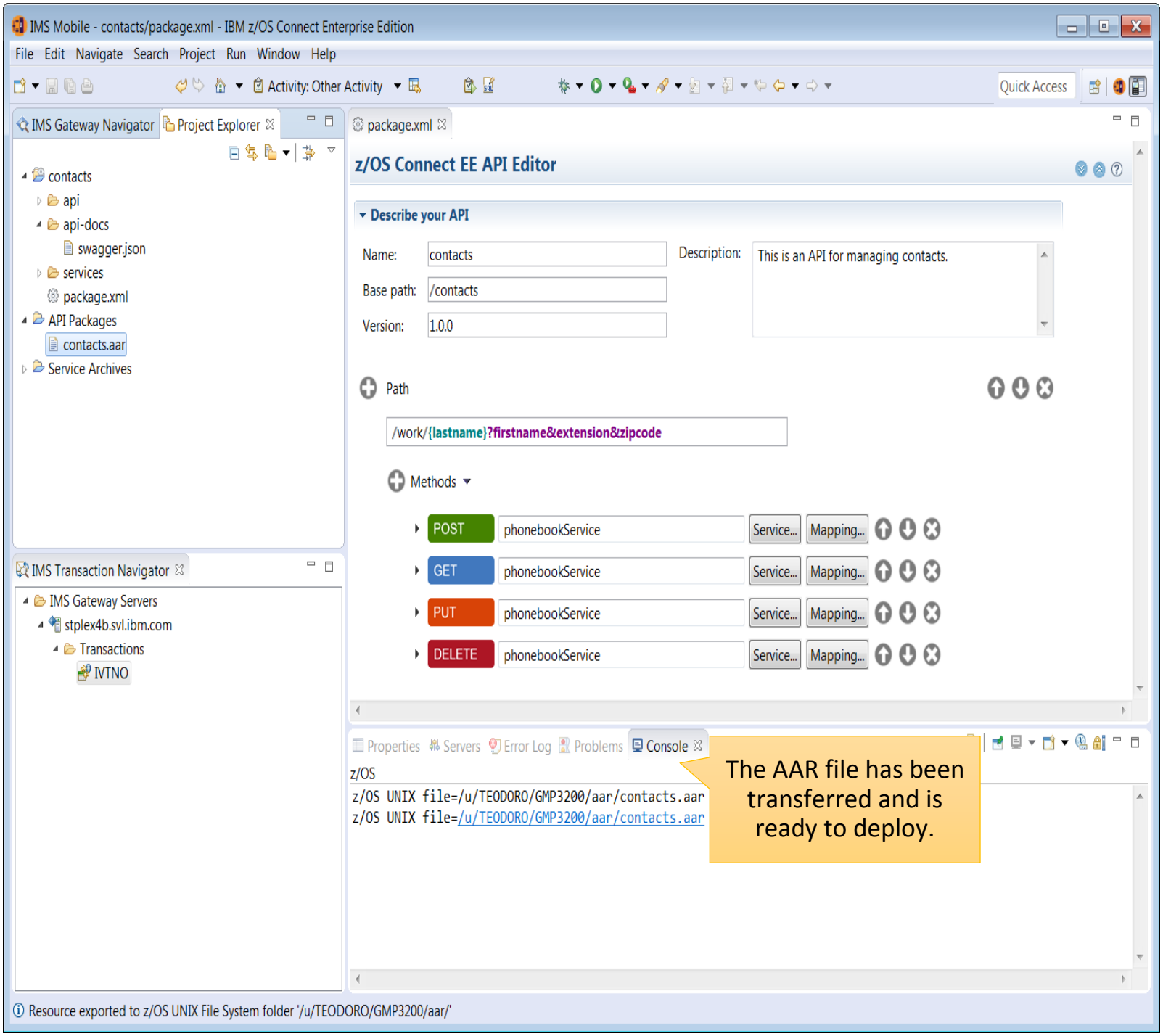
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Transactions
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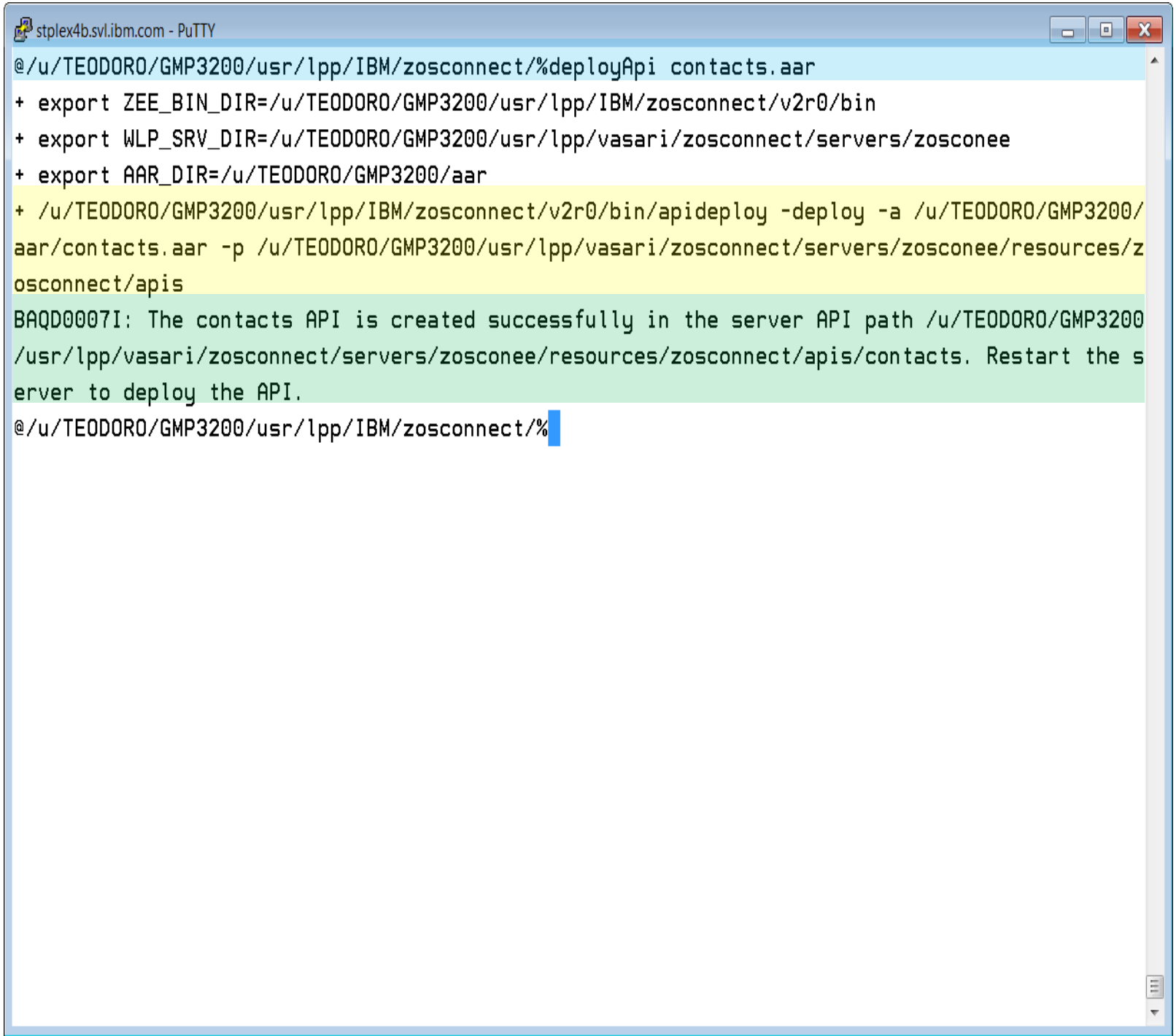
package.xml
z/OS Connect EE API Editor
Describe your API
Name: contacts
Description: This is an API for managing contacts.
Base path: /contacts
Version: 1.0.0
Path
/work/{lastname}?firstname&extension&zipcode
Methods
POST phonebookService Service... Mapping...
GET phonebookService Service... Mapping...
PUT phonebookService Service... Mapping...
DELETE phonebookService Service... Mapping...
Properties Servers Error Log Problems Console
z/OS
z/OS UNIX file=/u/TEODORO/GMP3200/aar/contacts.aar
z/OS UNIX file=/u/TEODORO/GMP3200/aar/contacts.aar
The AAR file has been transferred and is ready to deploy.
Resource exported to z/OS UNIX File System folder '/u/TEODORO/GMP3200/aar/'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+ export WLP_SRV_DIR=/u/TEODORO/GMP3200/usr/lpp/vasari/zosconnect/servers/zosconee
+ export AAR_DIR=/u/TEODORO/GMP3200/aar
+ /u/TEODORO/GMP3200/usr/lpp/IBM/zosconnect/v2r0/bin/apideploy -deploy -a /u/TEODORO/GMP3200/aar/contacts.aar -p /u/TEODORO/GMP3200/usr/lpp/vasari/zosconnect/servers/zosconee/resources/zosconnect/apis
BAQD0007I: The contacts API is created successfully in the server API path /u/TEODORO/GMP3200/usr/lpp/vasari/zosconnect/servers/zosconee/resources/zosconnect/apis/contacts. Restart the server to deploy the API.
@/u/TEODORO/GMP3200/usr/lpp/IBM/zosconnect/%

UrbanCode deploy

- IBM UrbanCode Deploy is a tool for automating application deployments through your environments.
- Facilitate rapid feedback and continuous delivery in agile development while providing the audit trails, versioning and approvals needed in production.

Customer's Release and Deploy challenges impact their entire business

CHALLENGES

Costly, error prone manual processes and efforts to deliver software across an enterprise

Slow deployment to development and test environments leave teams **waiting and unproductive**

Upgrade risk due to managing multiple application configurations and versions across servers

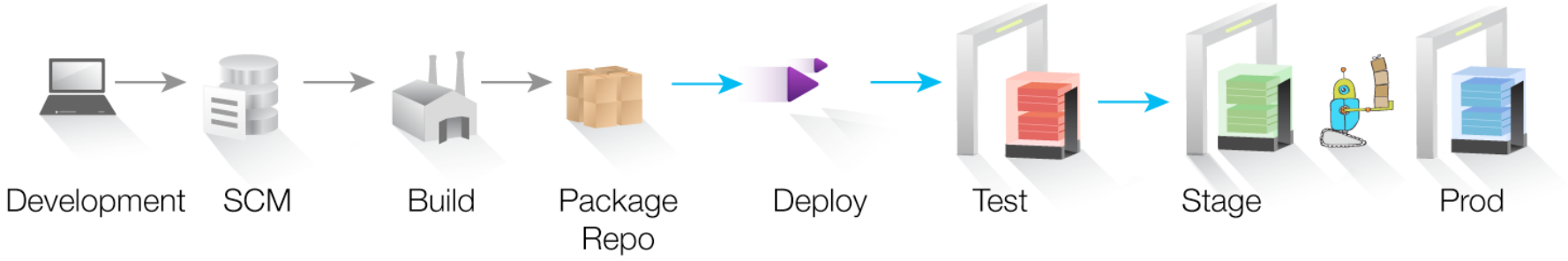
Knight Capital lost **$440 million in 45 minutes** due to a misconfigured release

New Zealand's biggest phone company, Telecom paid out **$2.7 million** to some **47,000 customers who were overcharged** after a software glitch

A bad software upgrade at RBS Bank left **millions unable to access money for 4 days**

UrbanCode for *Release* and *Deployment* automation

Enabling clients to more rapidly deliver mobile, cloud, big data and traditional applications with high quality and low risk



Drive down cost

Remove manual effort and wasted resource time with push button deployment processes

Speed time to market

Simple, graphical process designer, with built-in actions to quickly create deployment automation

Reduce risk

Robust configuration management, coordinated release processes, audits, and traceability

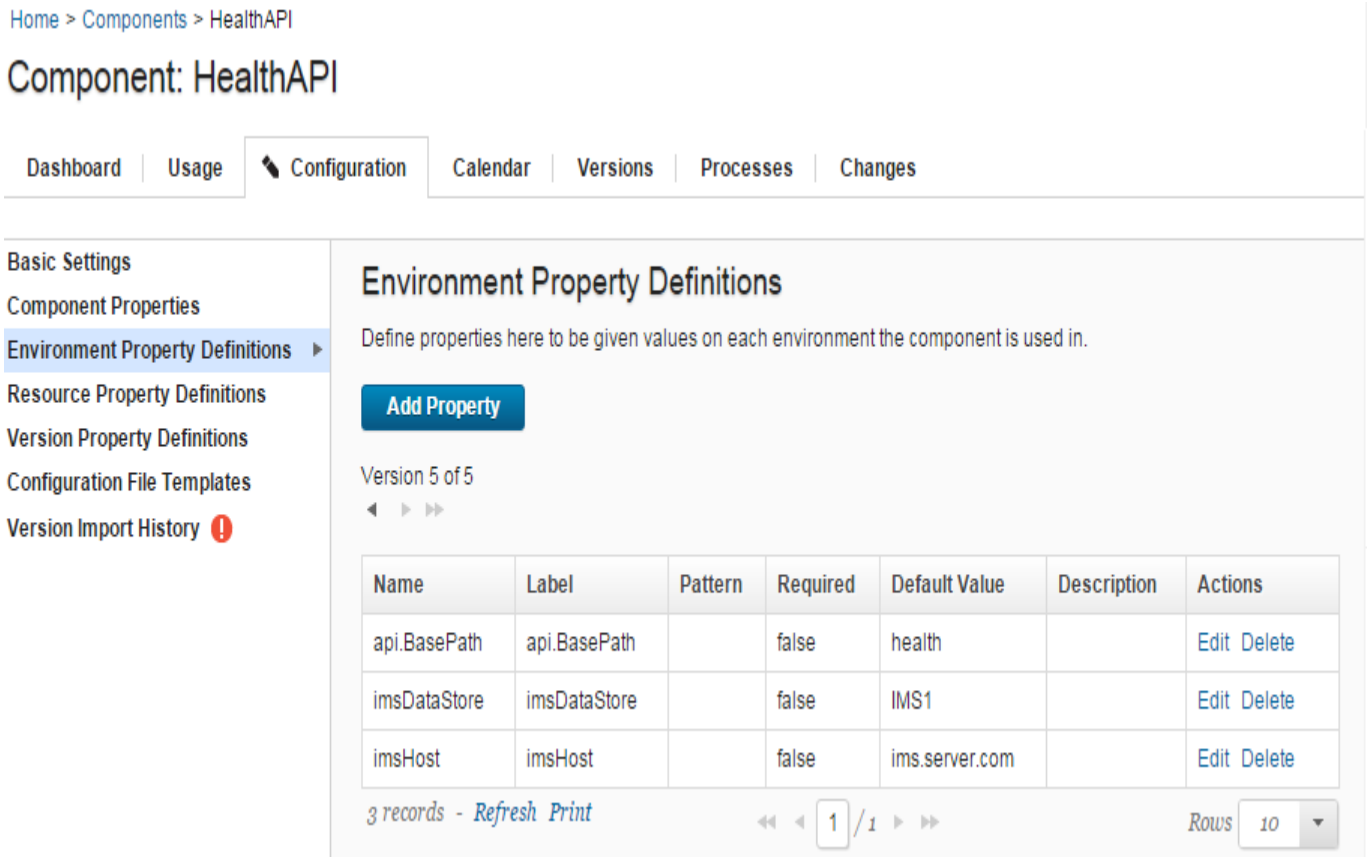
IBM UrbanCode Deploy automates the deployment of applications, databases and configurations into development, test and production environments, helping to drive down cost, speed time to market with reduced risk.

IBM UrbanCode Release is an intelligent collaboration release management solution that replaces error-prone manual spreadsheets and streamlines release activities for application and infrastructure changes.

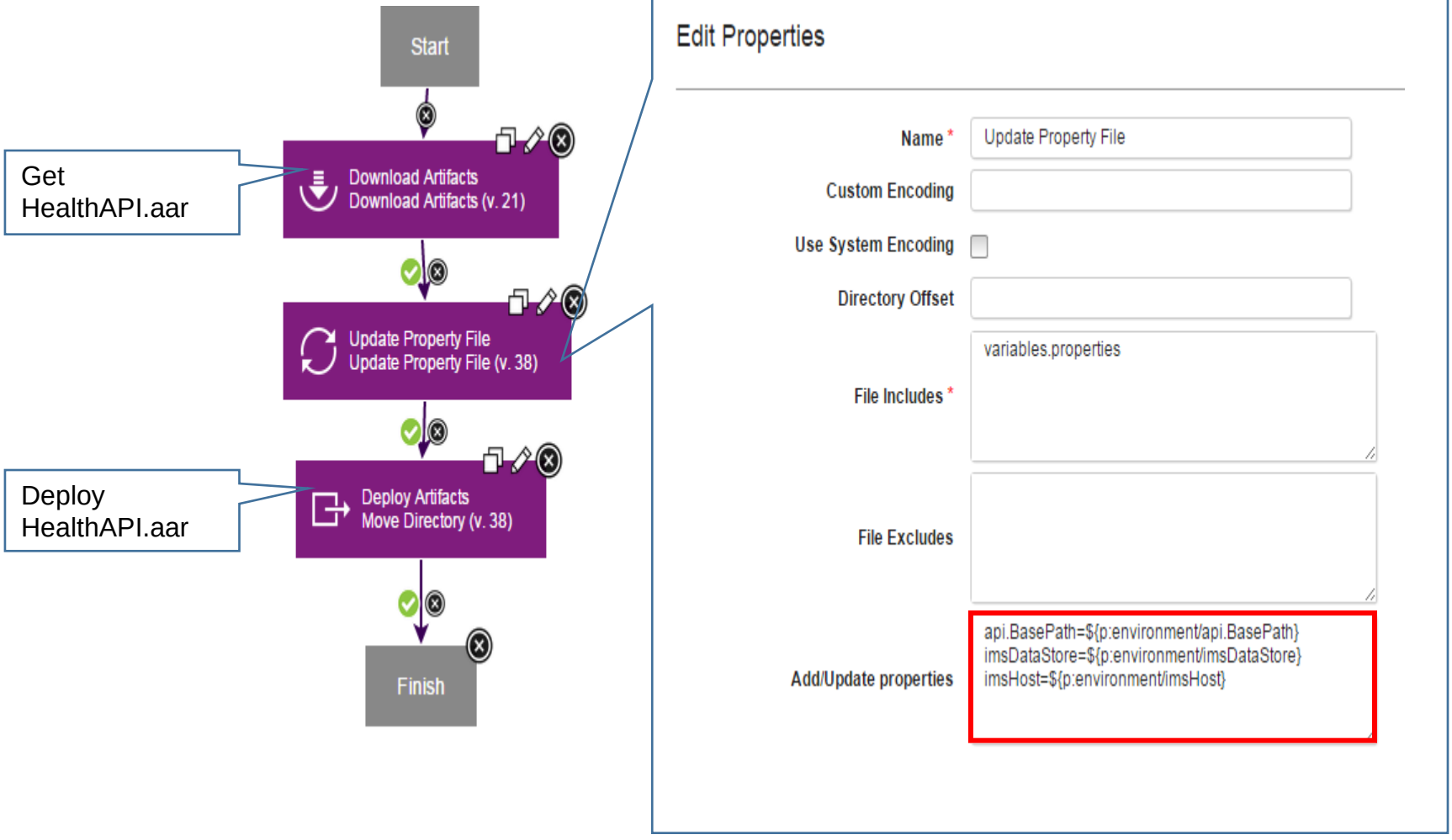
https://www.ibmdw.net/urbancode/

urban{code}
An IBM company

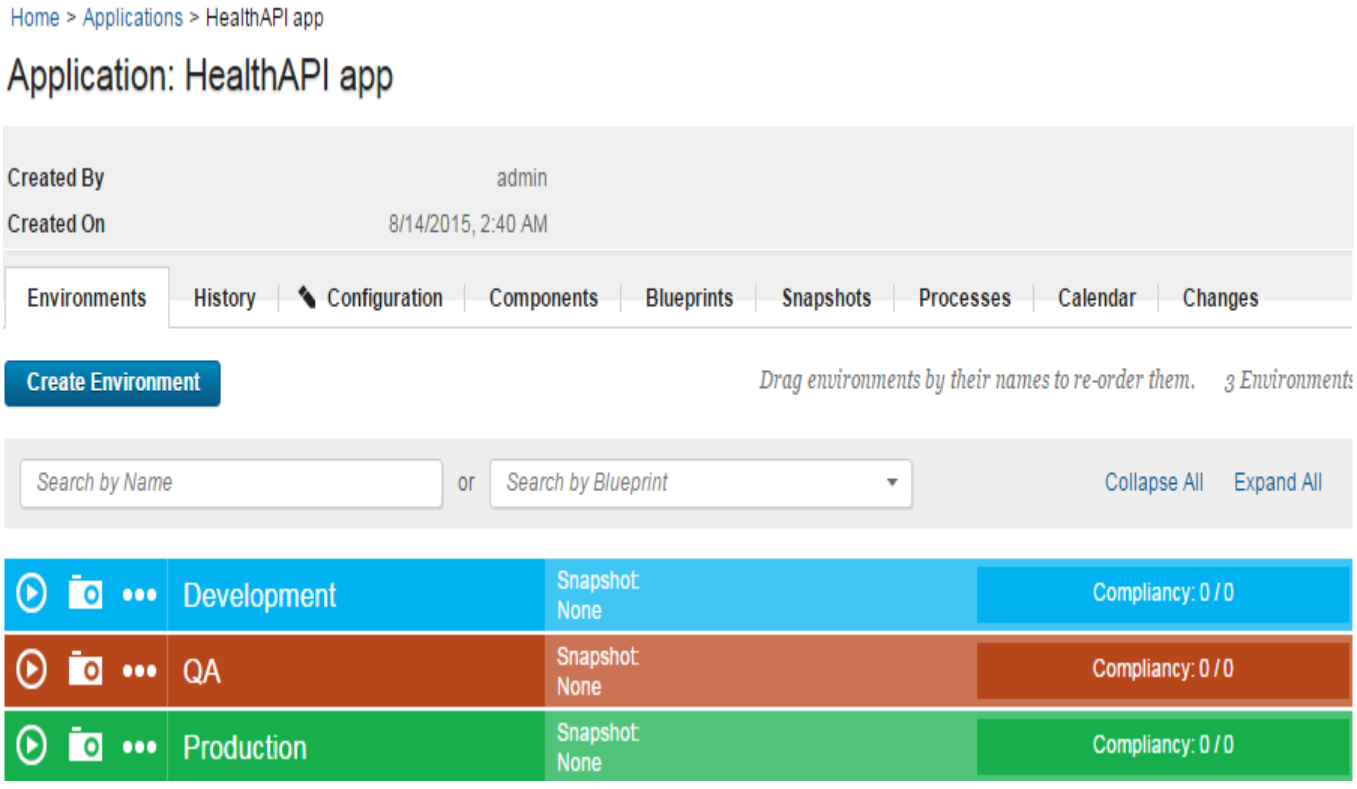
Smaple: Automate z/OS Connect API deployment with UrbanCode Deploy

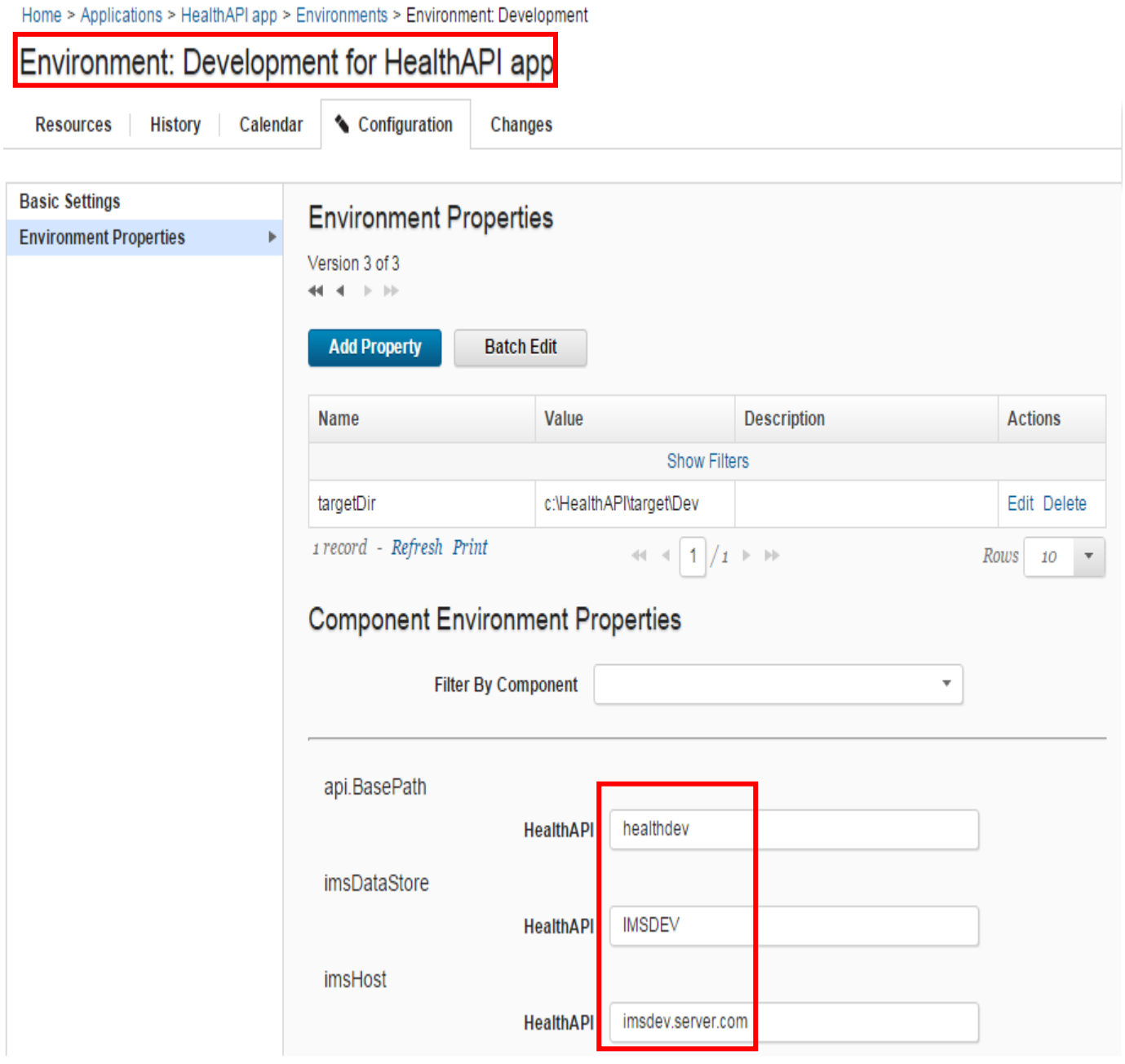


Sample: Deployment process



Sample: Environments




Home > Applications > HealthAPI app > Environments > Environment: Development
Environment: Development for HealthAPI app
Resources
History
Calendar
Configuration
Changes
Basic Settings
Environment Properties
Environment Properties
Version 3 of 3
Add Property
Batch Edit
Name
Value
Description
Actions
Show Filters
targetDir
c:\HealthAPI\target\Dev
Edit Delete
1 record - Refresh Print
1 / 1
Rows 10
Component Environment Properties
Filter By Component
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HealthAPI
healthdev
imsDataStore
HealthAPI
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imsHost
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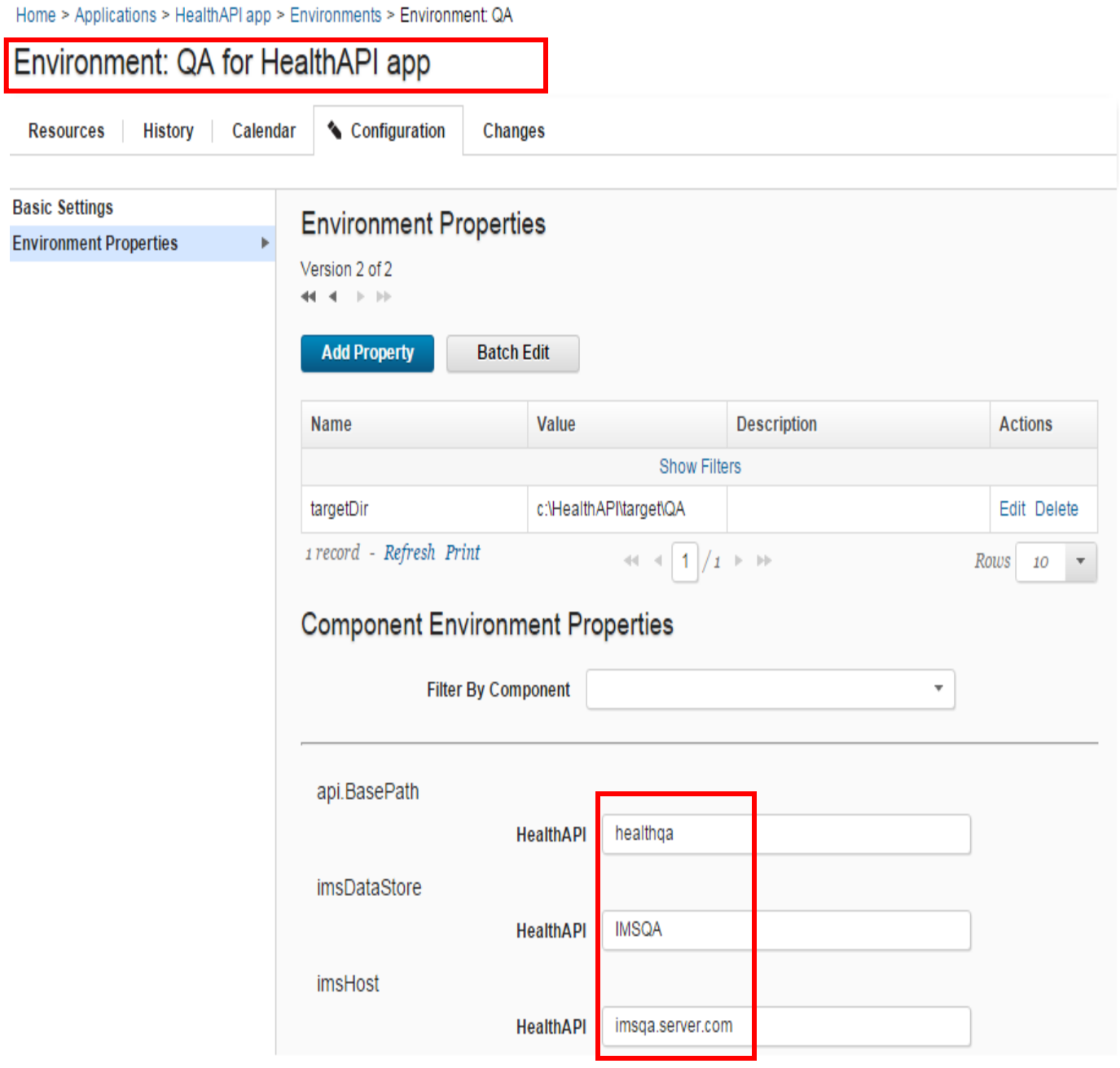
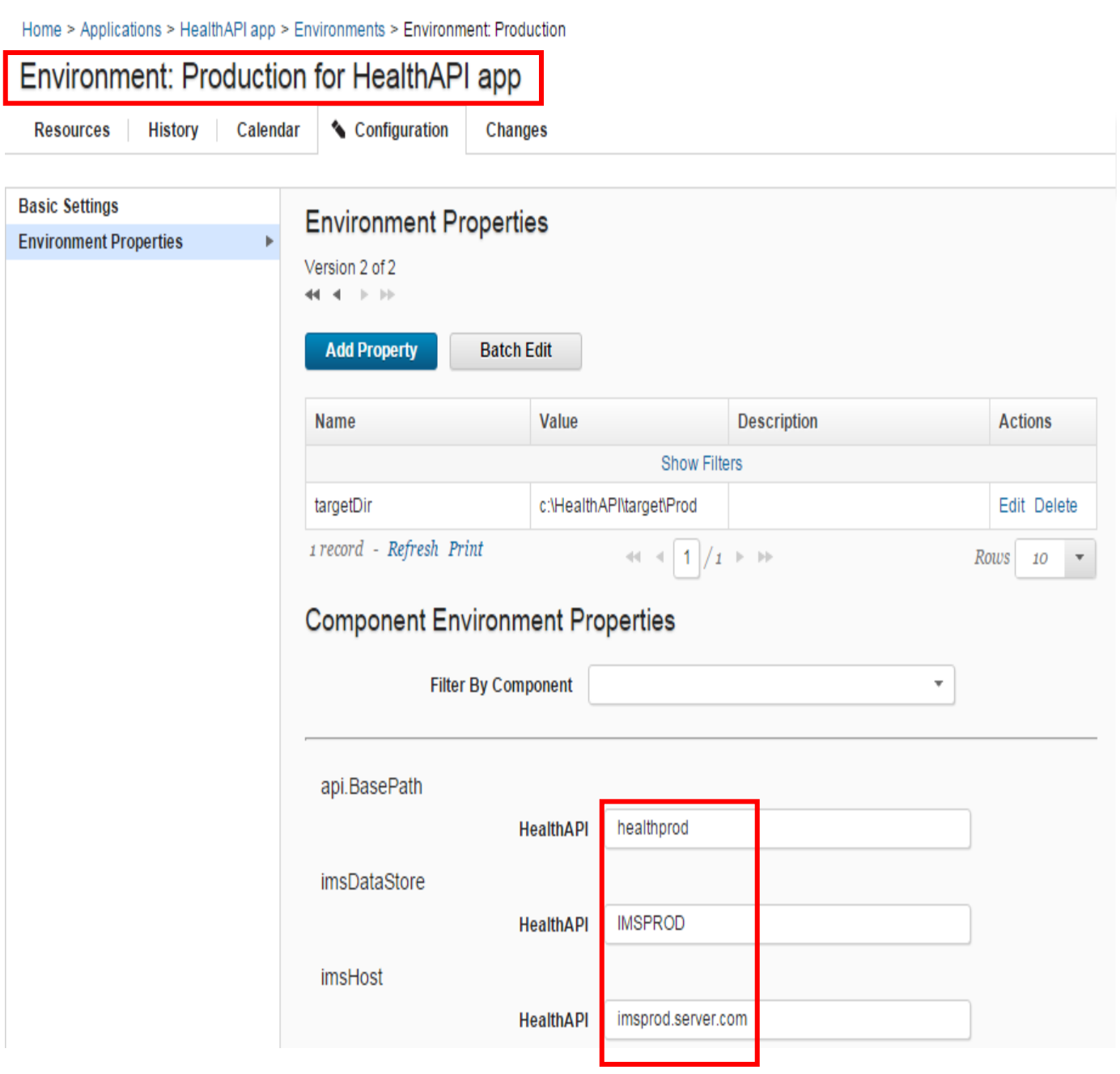
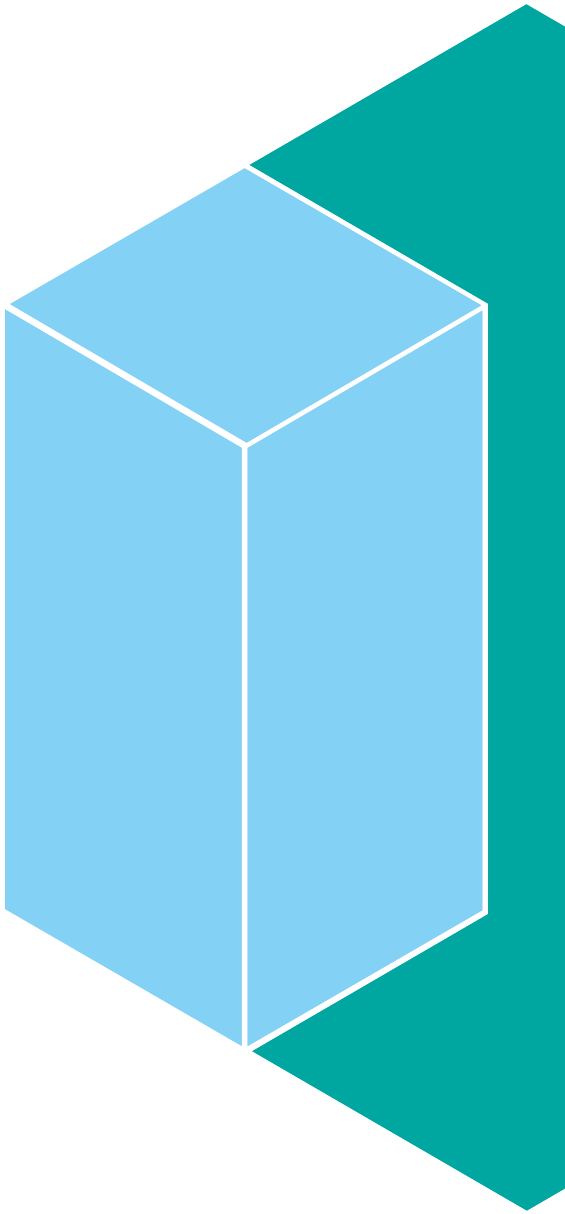

Home > Applications > HealthAPI app > Environments > Environment: QA
Environment: QA for HealthAPI app
Resources
History
Calendar
Configuration
Changes
Basic Settings
Environment Properties
Environment Properties
Version 2 of 2
Add Property
Batch Edit
Name
Value
Description
Actions
Show Filters
targetDir
c:\HealthAPI\target\QA
Edit Delete
1 record - Refresh Print
1 / 1
Rows 10
Component Environment Properties
Filter By Component
api.BasePath
HealthAPI
healthqa
imsDataStore
HealthAPI
IMSQA
imsHost
HealthAPI
imsqa.server.com


Home > Applications > HealthAPI app > Environments > Environment: Production
Environment: Production for HealthAPI app
Resources
History
Calendar
Configuration
Changes
Basic Settings
Environment Properties
Environment Properties
Version 2 of 2
Add Property
Batch Edit
Name
Value
Description
Actions
Show Filters
targetDir
c:\HealthAPI\target\Prod
Edit Delete
1 record - Refresh Print
1 / 1
Rows 10
Component Environment Properties
Filter By Component
api.BasePath
HealthAPI
healthprod
imsDataStore
HealthAPI
IMSPROD
imsHost
HealthAPI
imsprod.server.com

Feedback Questions

- Do you have a DevOps process (or use a DevOps product) for your mainframe assets? Do you have a DevOps process for your Web application today? If so, can you describe your DevOps process that you may use for deploying z/OS Connect services and APIs?
- Do you envision to store your environment configuration information in Source Control Management (SCM) system? Or just application artifacts?
- Do you use Websphere Liberty AdminCenter today?

Thank You!



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