IBM CICS SOA Roadmap and V4.1 Highlights

Pradeep Gohil
CICS Software Engineer
gohilpr@uk.ibm.com

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Agenda

- Web Services in CICS TS V3
- CICS SOA Roadmap
- CICS TS V4.1 Highlights
- Questions

Web Services at a glance in Version 3

CICS TS V3.1

The runtime support in CTS 3.1 is for

- WSDL 1.1
- SOAP 1.1 and SOAP 1.2
- WS-I Basic Profile 1.1
- XML 1.0
- WS-I Simple SOAP Binding Profile 1.0
- WS-AT 1.0
- WS-Security 1.0

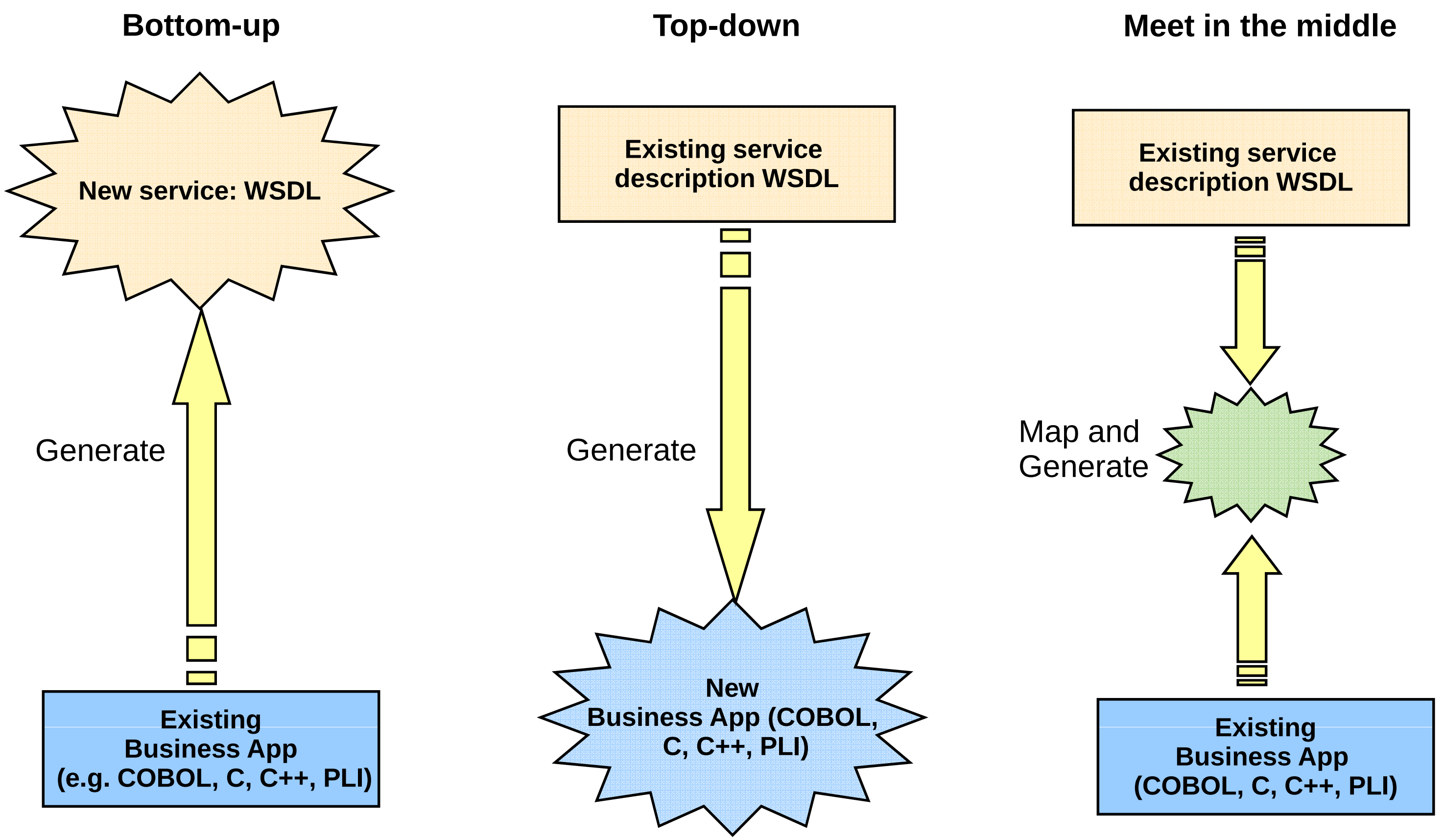
- Provides batch tooling to handle generation of data mappings
  - Schema into (and vice-versa)
    - C
    - Pl/I
    - Cobol

CICS TS V3.2

Support was added for

- WSDL 2.0
- MTOM/XOP
- WS-Trust
- Additional schema data mappings

Web Services Enablement Styles



Bottom-up

New service: WSDL

Generate

Existing
Business App
(e.g. COBOL, C, C++, PLI)

Top-down

Existing service
description WSDL

Generate

New
Business App (COBOL,
C, C++, PLI)

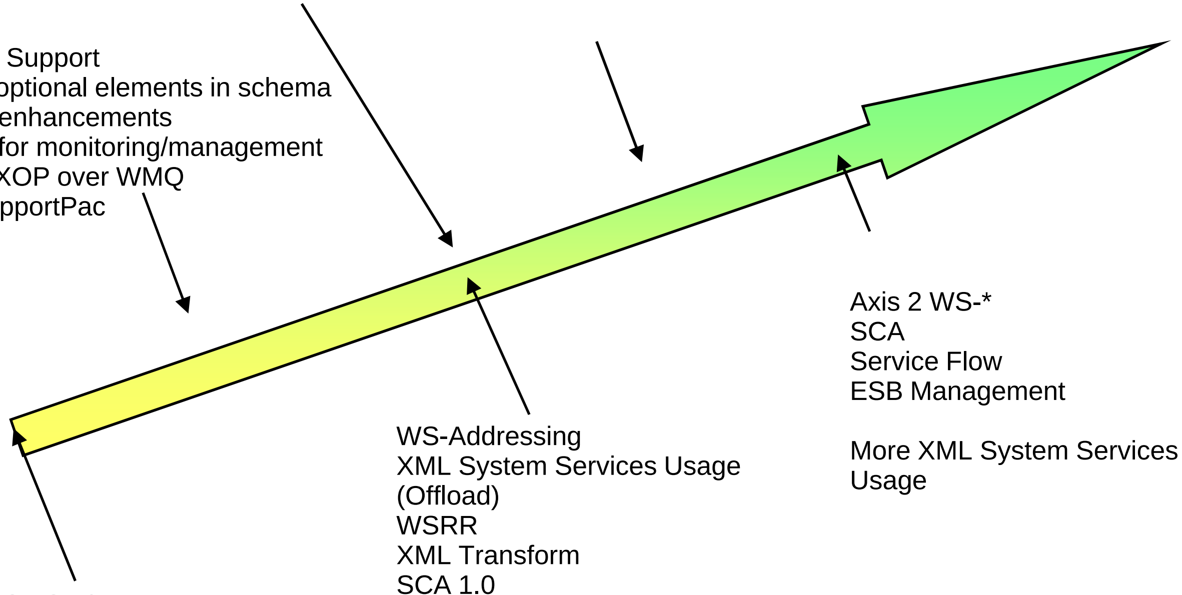
Meet in the middle

Existing service
description WSDL

Map and
Generate

Existing
Business App
(COBOL, C, C++, PLI)

CICS SOA Roadmap



CICS TS v3
SOAP 1.1 /1.2
WSDL 1.0/1.1

WS-Security 1.0
WS-AT 1.0
WS-Trust
MTOM/XOP

xsd:Any Support
inlining optional elements in schema
WS-AT enhancements
GLUEs for monitoring/management
MTOM/XOP over WMQ
PHP SupportPac

CICS TS 4.1

WS-Addressing
XML System Services Usage (Offload)
WSRR
XML Transform
SCA 1.0
ATOM Support

More Schema Data mapping

Axis2 exploitation

Axis 2 WS-*
SCA
Service Flow
ESB Management

More XML System Services Usage

Web Services Vision
CICS TS continues as a First-Class Web Services endpoint (Provider and Consumer).

The environment of choice for Web Services that interact with CICS assets.

CICS TS V4.1
SOA Highlights

- Web Services Highlights
- Resource Deployment / Life cycle – BUNDLE
- WEB 2.0 ATOM Support
- CICS PIPELINE Internal Transport
- SCA Support

Web Services Enhancements

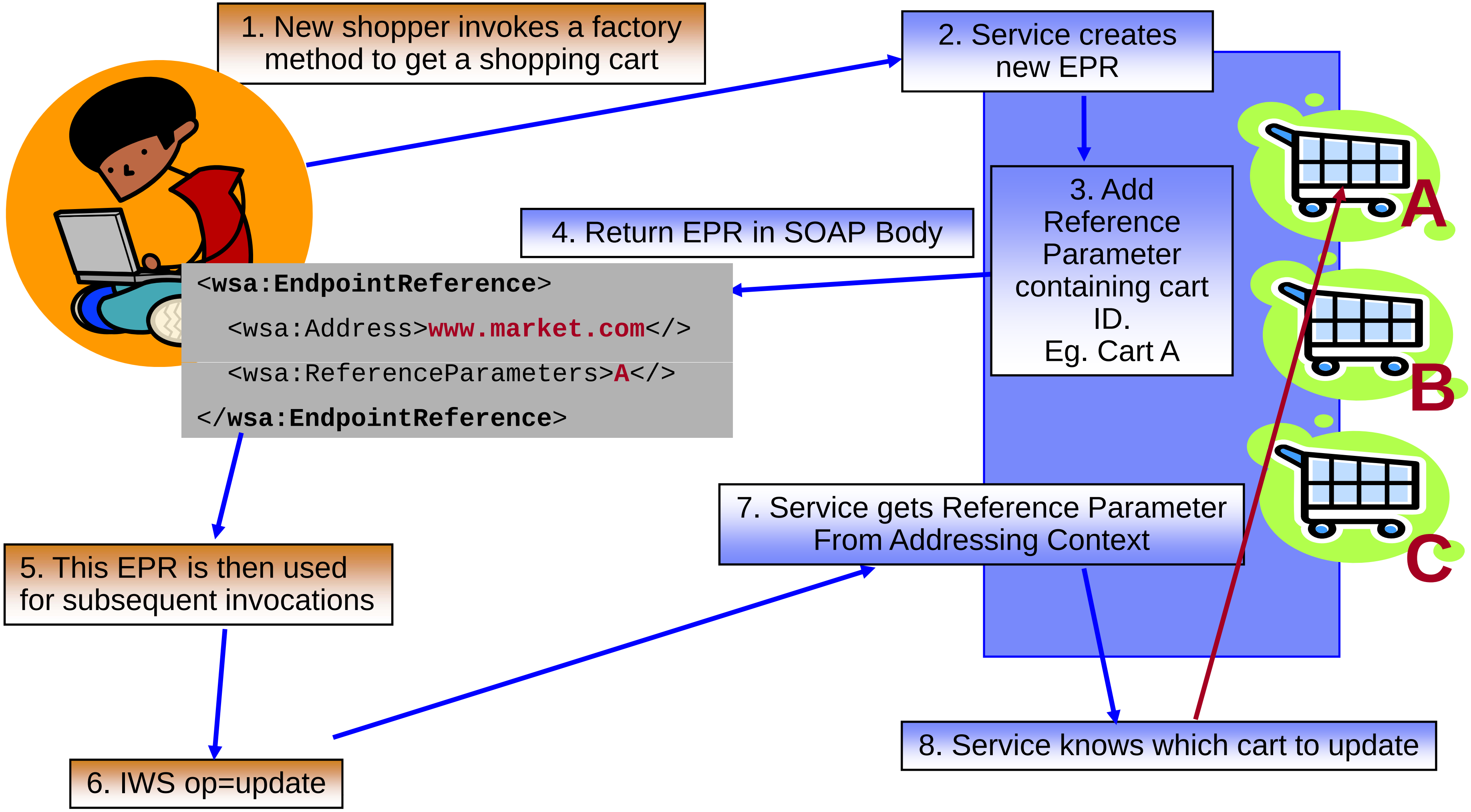
- Delivering WS-Addressing support
  - Improve SOA interoperation by adopting the most current standards
- Reducing TCO of web services solutions by offloading XML content processing
  - SOAP parsing to exploit XML System Services parser
  - XML Systems Services parser provides
    - Significant SOAP Message parsing improvements, resulting in overall Web Services improvement
- Web services Global User Exit points
- Integrating WSRR support with CICS Web Services assistants
- Providing generalized XML to language structure system mapping component and data mapping enhancements

WS-Addressing

WS-Addressing goals

- Defines transport-neutral mechanisms to address Web services and support message transmission through networks
  - Improves interop with other Web Services implementations such as .NET
  - XML elements to identify Endpoints: **EndpointReferences (EPRs)**
    - More than just a URI
    - Can have Reference Parameters and metadata
    - Allows for Psuedo-Conversational style web service requesters in CICS
  - WS-Addressing Message Addressing Properties (MAPs)
    - Standard placeholders in the SOAP header for WS-Addressing information
    - Plus reference parameters in target EPR

Example of a WS-Addressing Resource Access Pattern



1. New shopper invokes a factory method to get a shopping cart

2. Service creates new EPR

3. Add Reference Parameter containing cart ID. Eg. Cart A

4. Return EPR in SOAP Body

```
<wsa:EndpointReference>
  <wsa:Address>www.market.com</>
  <wsa:ReferenceParameters>A</>
</wsa:EndpointReference>
```

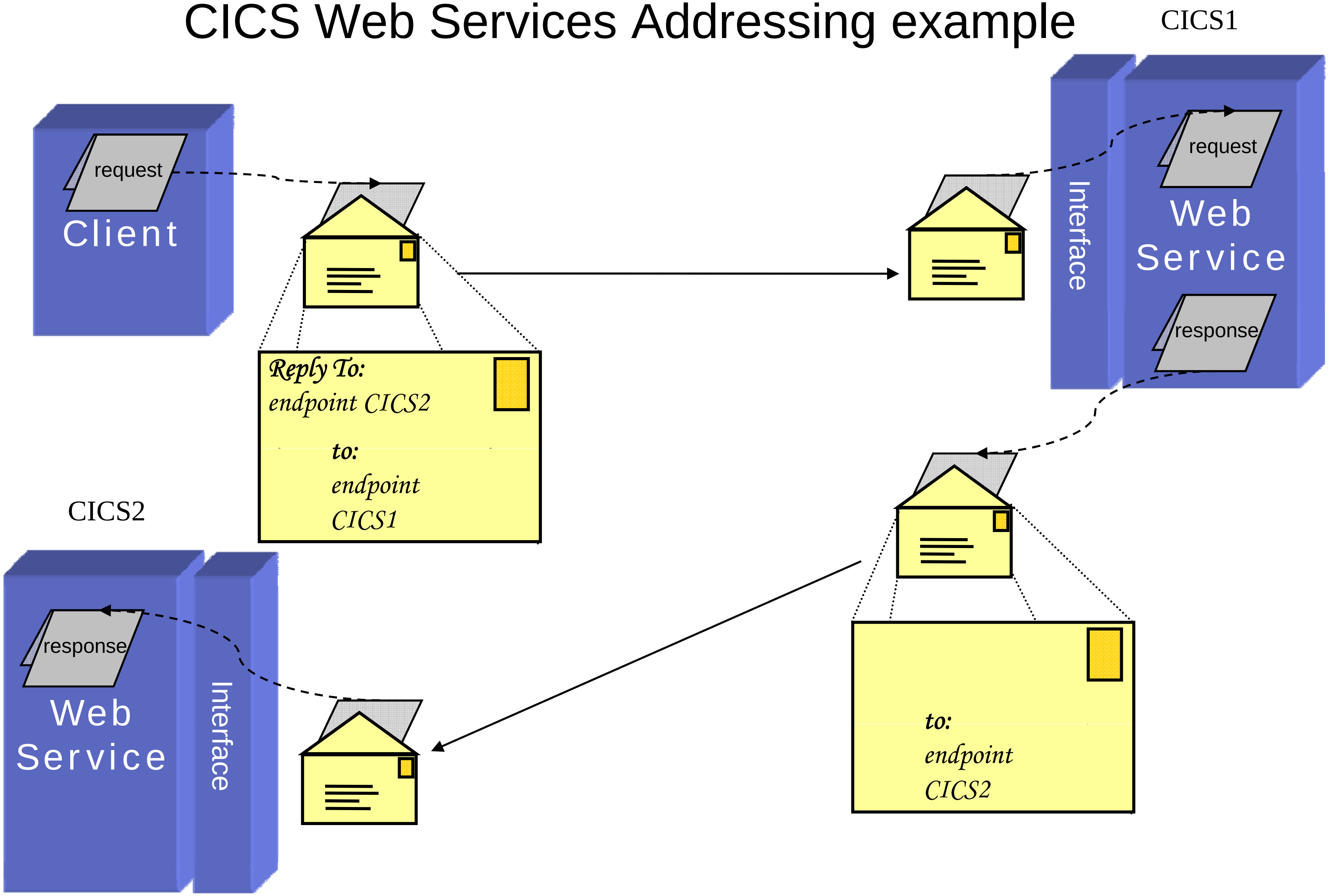
5. This EPR is then used for subsequent invocations

6. IWS op=update

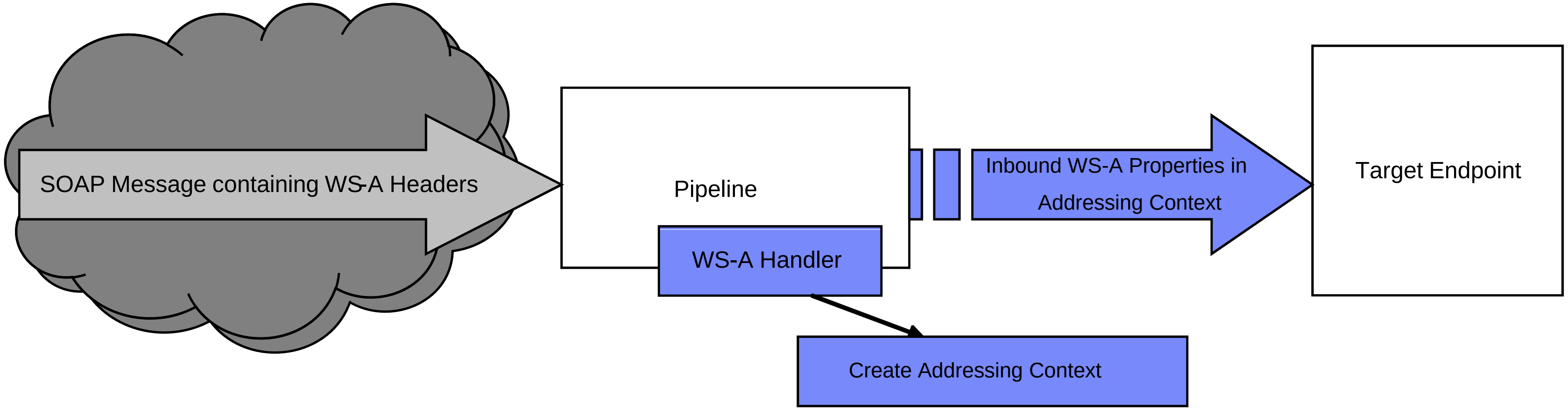
7. Service gets Reference Parameter From Addressing Context

8. Service knows which cart to update

CICS Web Services Addressing example


CICS1
Client
request
Reply To:
endpoint CICS2
to:
endpoint
CICS1
Interface
request
Web
Service
response
CICS2
response
Web
Service
Interface
to:
endpoint
CICS2

WS-Addressing in CICS


SOAP Message containing WS-A Headers

Pipeline

WS-A Handler

Create Addressing Context

Inbound WS-A Properties in Addressing Context

Target Endpoint

WS-Addressing in CICS

- Pipeline configuration
  - Configure Requester pipeline to use WS-Addressing handler giving specification version
  - Configure Provider pipeline to use WS-Addressing handler
- Requester
  - Requester application not aware requests are WS-Addressed
    - CICS handles the required addressing responses
  - Requester WS-A aware
    - Uses EXEC CICS API to set Message Addressing Properties (MAPs)
- Provider
  - Provider application not aware request/response is WS-Addressed
    - CICS handles the required addressing responses and routing
  - Provider WS-A aware
    - uses EXEC CICS API to interrogate Addressing Context (e.g. Fetch To EndPointReference (EPR) to extract Reference parameters)

WS-Addressing in CICS

- Requester
  - Requester optionally uses API to create an Addressing Context and modify/add MAPs
  - On INVOKE WEBSERVICE context MAPs converted to WS-A SOAP Headers
  - On return WS-A SOAP Headers converted to MAPs in Addressing Context
- Provider
  - Provider optionally uses API to interrogate Addressing Context and modify/add MAPs
  - On service return MAPs converted to WS-A SOAP Headers
  - ReplyTo or FaultTo EPR used for reply endpoint. An Anonymous address is the default. I.E. Reply back to requester.

Web services Mapping

and general data mapping services

Web services Mapping Enhancements – 1 of 2

- Support for new mappings of WSDL constructs to language structures
  - New mapping and runtime levels: 2.1 and 2.2
  - Extends CICS-supplied tooling to handle some relatively common WSDL structures that were not previously supported
- Mapping level 2.1
  - Support for
    - xsd:any, xsd:anyType
    - Inlining of optional elements
      - New DFHWS2LS parameter: INLINE_MAXOCCURS_LIMIT
    - Pass through the XML message unchanged (XML-ONLY option on DFHWS2LS) whilst retaining other benefits of CICS Web services support
      - Use of runtime validation
      - Use of EXEC CICS INVOKE WEBSERVICE
  - Available for CICS TS V3.2 via PTF

Web services Mapping Enhancements – 2 of 2

- Mapping Level 2.2
  - As 2.1 plus support for
    - ‘Fixed’ values for xsd:elements
      - Treat the ‘fixed’ element as if it had supplied a default value
      - Fixed values for attributes already supported
    - Enhanced support for xsd:choice
      - via improved mapping
    - Substitution groups
      - Based on the xsd:choice mapping
    - Abstract xsd:elements
      - Improved support by treating as the head of a substitution group
    - Abstract data types
      - Will be supported rather than merely ‘tolerated’
  - Much of this support also to be rolled back to CICS TS V3.2 via APAR

XML to language structure mapping services

- New API to convert between XML and application data
  - Map between XML and language structure
- TRANSFORM
  TRANSFORMTYPE(XMLTODATA ¦ DATATOXML)
- Command options depend on the direction of the transformation
  - XMLTODATA will require XMLTRANSFORM resource, providing metadata used for the transformation
  - XMLTRANSFORM resource installed via Bundle support

WebSphere Service Registry and Repository

CICS support for WSRR

- A Web service registry is the 3rd aspect of Web services
  - Requester, provider, registry
  - WSRR provides central repository for Web services and...
    - Query/search, user defined meta-data, lifecycle, version #, relationships, dynamic service selection and binding, governance, enforce policies, federation with other repositories (e.g. UDDI)
    - Institute best practices, encourages discovery and reuse of Web services
- CICS and WSRR
  - Publish WSDL representing CICS Web service providers
  - Retrieve WSDL representing Web services to be used by CICS requesters
  - Complements CICS Web services assistants, WSDL editors, etc.
  - Currently available as SupportPac CA1N for CICS TS V3

CICS support for WSRR in CICS TS 4.1

- Enhance function, documentation, and provide formal support by delivering WSRR support into base CICS
  - Use-case focus: Using CICS and WSRR
- Support new releases of WSRR
- Integrate SupportPac batch capabilities into the CICS Web services assistant
  - DFHLS2WS extension
    - Generate a WSDL file and WSBind file from copybooks and publish WSDL file to WSRR
  - DFHWS2LS extension
    - Extract a WSDL file from WSRR and generate copybooks and wsbind file

Bundle Resources

Why Bundles?

- Similar in concept to OSGI bundles for Java / Eclipse
- Provide a deployment and life cycle grouping for related application artefacts
  - Provides a single point of management and control
  - The artefacts can be from a number of resource spaces
- Allow such a grouping to express and police its dependencies on other
  - Can express functional or resource related dependencies
- Provide an extension point for Vendor or User artefacts to be deployed and managed alongside CICS Resources

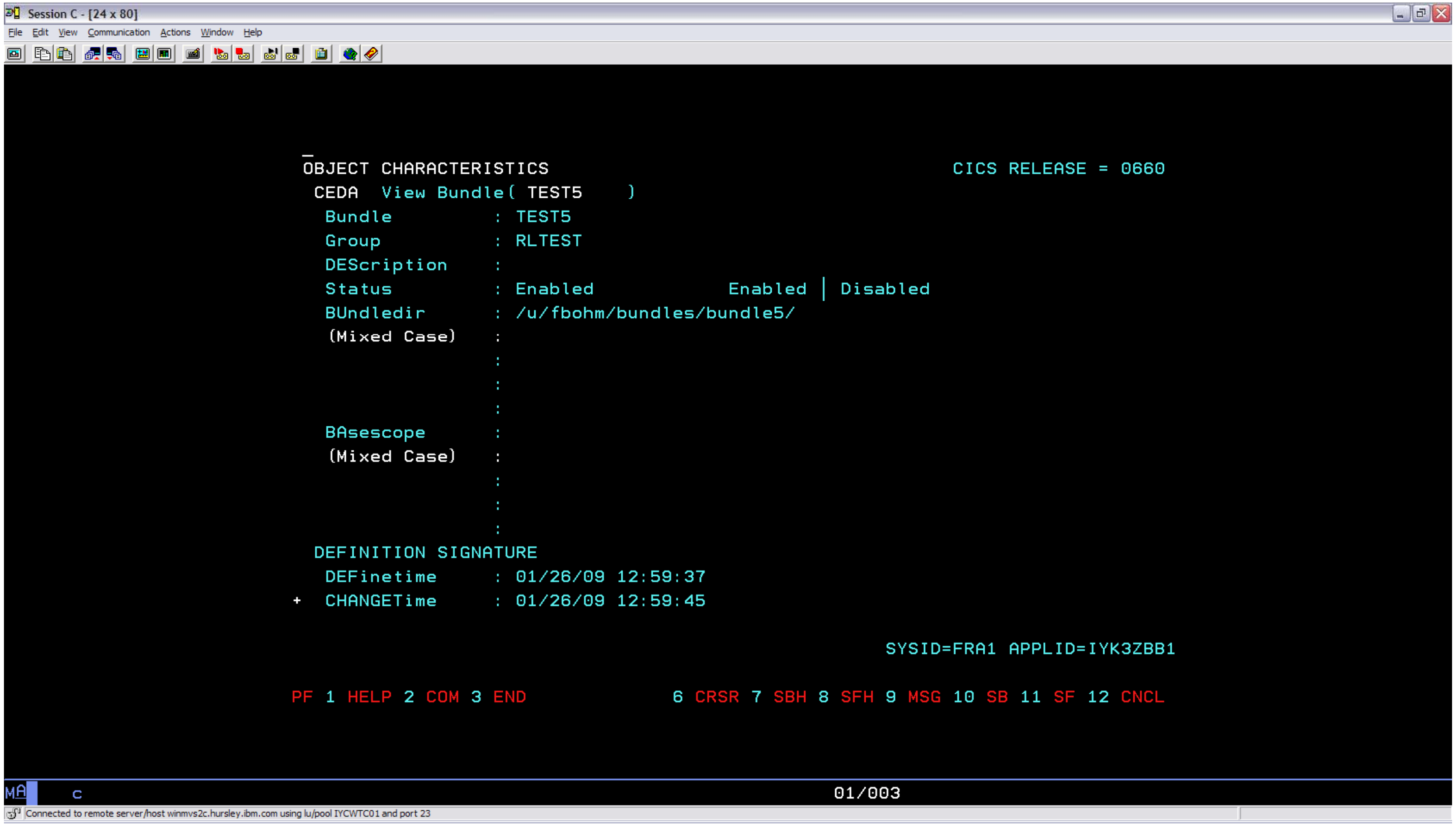
Extensible Resource Framework - BUNDLEs

- BUNDLE Resource
- Manifest File describes contents
  - Imports, exports , defines
- Defines
  - Event Binding
  - XSD Bindfile
  - SCA Composite which can create
    - URIMAP
    - WEB SERVICE
  - User extensible via Callback program

Defining Bundle Dependencies

- Imports
  - Things the application uses
    - Defined in other Bundles
    - Defined in the System
  - System imports
    - Program
    - File
    - Pipeline
    - Web Service
    - Transaction
    - TSQModel
    - ...

BUNDLE Resource


Session C - [24 x 80]
File Edit View Communication Actions Window Help

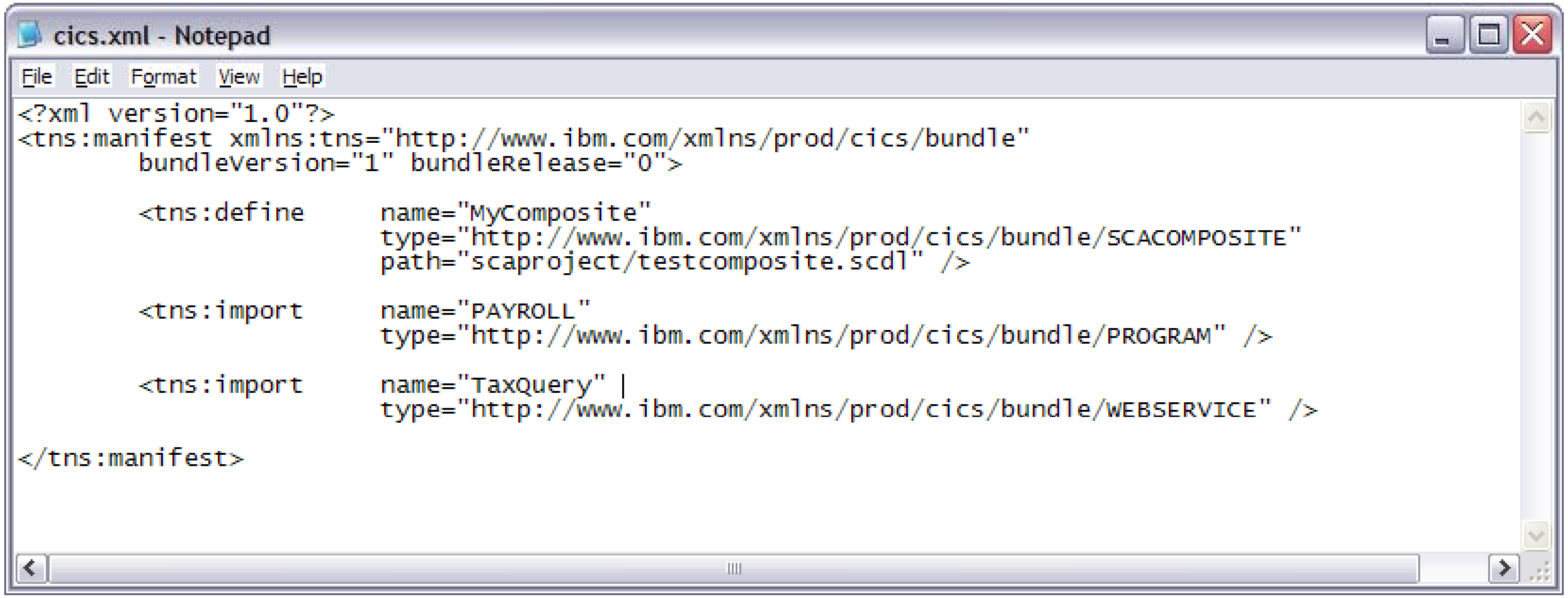
```
 OBJECT CHARACTERISTICS                                    CICS RELEASE = 0660
  CEDA  View Bundle( TEST5     )
   Bundle          : TEST5
   Group           : RLTEST
   DEScription     :
   Status          : Enabled            Enabled | Disabled
   BUndledir       : /u/fbohm/bundles/bundle5/
   (Mixed Case)    :
                   :
                   :
                   :
   BAsescope       :
   (Mixed Case)    :
                   :
                   :
                   :
  DEFINITION SIGNATURE
   DEFinetime      : 01/26/09 12:59:37
+  CHANGETime      : 01/26/09 12:59:45
                                                     SYSID=FRA1 APPLID=IYK3ZBB1

PF 1 HELP 2 COM 3 END               6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

```
MA     c                                                   01/003
```

Connected to remote server/host winmvs2c.hursley.ibm.com using lu/pool IYCWTC01 and port 23

Bundle Contents

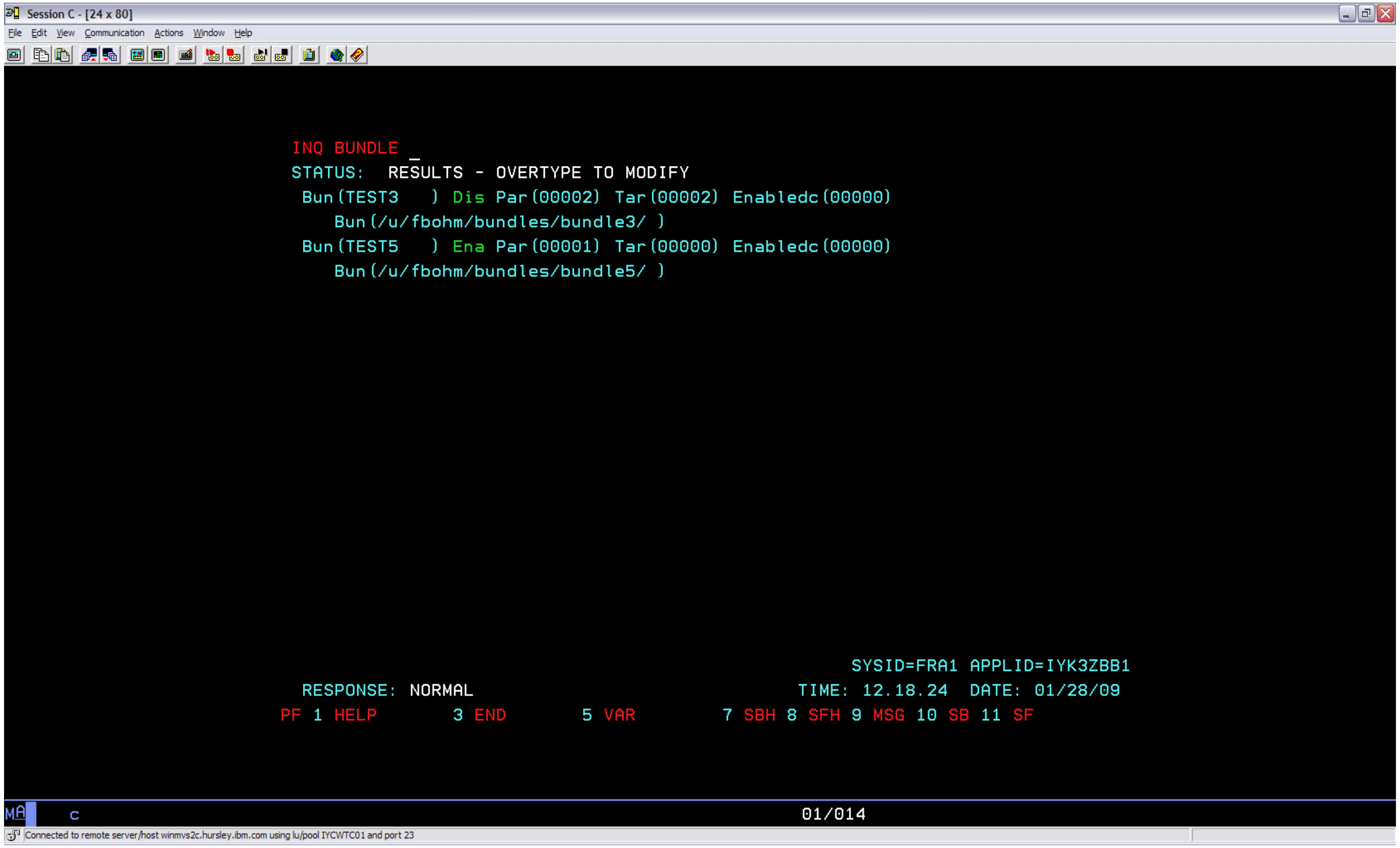
.../bundle5
/META-INF
　　cics.xml
/scaproject
　　testcomposite.scdl



cics.xml - Notepad
File Edit Format View Help

```
<?xml version="1.0"?>
<tns:manifest xmlns:tns="http://www.ibm.com/xmlns/prod/cics/bundle"
        bundleVersion="1" bundleRelease="0">

        <tns:define     name="MyComposite"
                        type="http://www.ibm.com/xmlns/prod/cics/bundle/SCACOMPOSITE"
                        path="scaproject/testcomposite.scdl" />

        <tns:import     name="PAYROLL"
                        type="http://www.ibm.com/xmlns/prod/cics/bundle/PROGRAM" />

        <tns:import     name="TaxQuery" |
                        type="http://www.ibm.com/xmlns/prod/cics/bundle/WEBSERVICE" />

</tns:manifest>
```

Bundle Operations


Session C - [24 x 80]
File Edit View Communication Actions Window Help

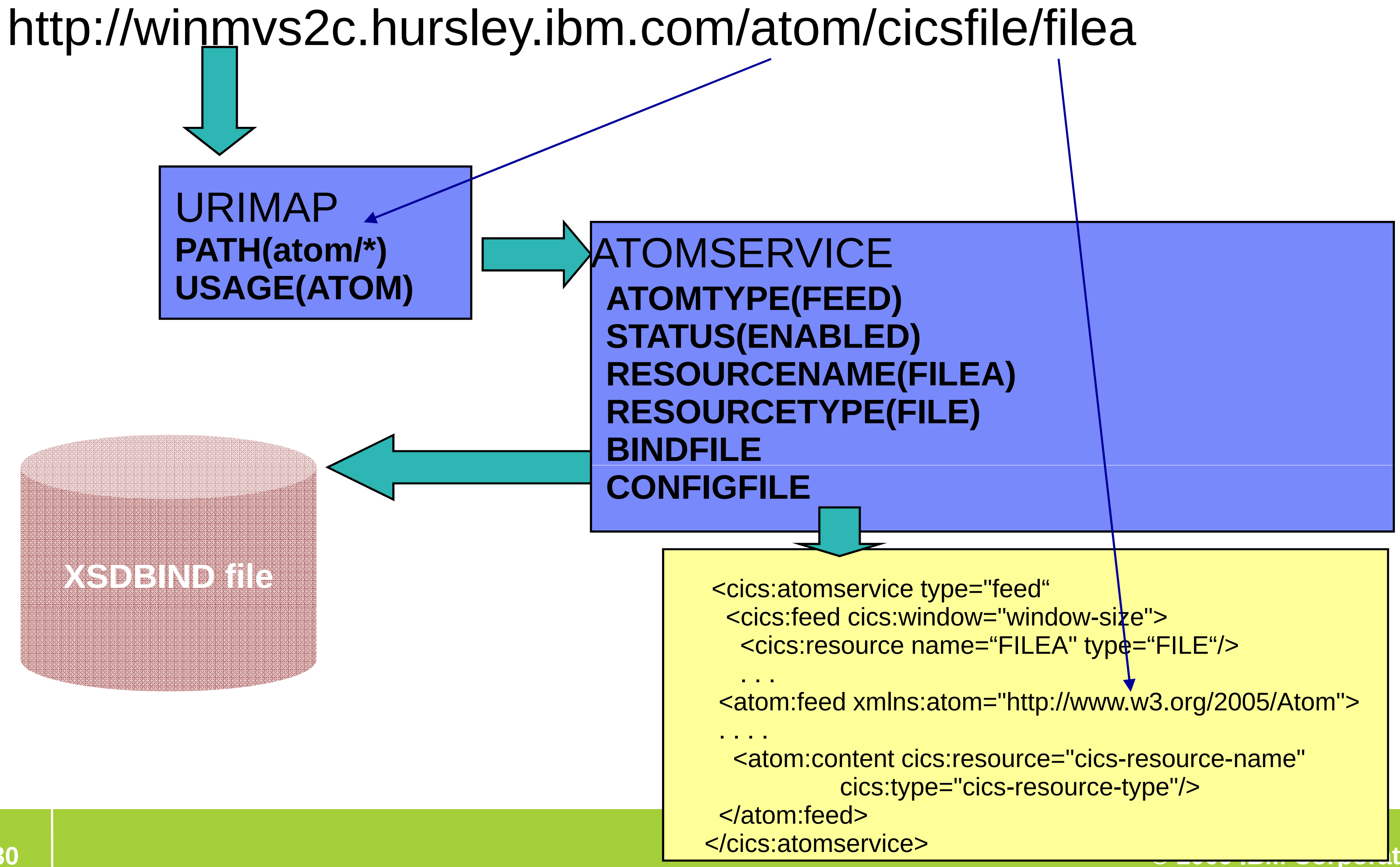
```
 INQ BUNDLE
 STATUS:  RESULTS - OVERTYPE TO MODIFY
  Bun(TEST3   ) Dis Par(00002) Tar(00002) Enabledc(00000)
     Bun(/u/fbohm/bundles/bundle3/ )
  Bun(TEST5   ) Ena Par(00001) Tar(00000) Enabledc(00000)
     Bun(/u/fbohm/bundles/bundle5/ )




















                                                     SYSID=FRA1 APPLID=IYK3ZBB1
  RESPONSE: NORMAL                              TIME:  12.18.24  DATE: 01/28/09
PF 1 HELP       3 END       5 VAR        7 SBH 8 SFH 9 MSG 10 SB 11 SF
```

```
MA      c                                                    01/014
```

Connected to remote server/host winmvs2c.hursley.ibm.com using lu/pool IYCWTC01 and port 23

CICS WEB 2.0 / ATOM Support

ATOM support in CICS TS 4.1



http://winmvs2c.hursley.ibm.com/atom/cicsfile/filea

URIMAP
PATH(atom/*)
USAGE(ATOM)

ATOMSERVICE
ATOMTYPE(FEED)
STATUS(ENABLED)
RESOURCENAME(FILEA)
RESOURCETYPE(FILE)
BINDFILE
CONFIGFILE

```
<cics:atomservice type="feed“
  <cics:feed cics:window="window-size">
    <cics:resource name=“FILEA" type=“FILE“/>
    . . .
 <atom:feed xmlns:atom="http://www.w3.org/2005/Atom">
 . . . .
   <atom:content cics:resource="cics-resource-name"
                 cics:type="cics-resource-type"/>
 </atom:feed>
</cics:atomservice>
```

AtomService CONFIGFILE

- Specify the CICS resource attributes of the feed
- <cics:atomservice type=“typevalue”>
    - Root element for an Atom configuration file and the type of Atom document
        - feed, collection, service, category
- For feed documents: <cics:feed cics:window="window-size">
        - Specify the number of entries that CICS is to return in each feed document
    - <cics:resource> name="cics-resource-name" type="cics-resource-type“>
        - Specify name and type of CICS resource to be published
            - tsqueue, file
        - Or provide a program to create data from any source
            - DB2, custom data store etc.
    - <cics:fieldnames>
        - Identify the CICS resource field names that provide items of metadata

AtomService BINDFILE

- CICS Utility DFHLS2SC
  - Generates an XML schema and an XSD binding file from a language structure
  - XSD bind file will describe the record layout of the CICS resource used as a feed
  - Maps the contents of the TS queue or File record etc. onto the Atom protocol XML.

Systems Programmer Interface for Atom Feeds

- CREATE ATOMSERVICE
- DISCARD ATOMSERVICE
- INQUIRE ATOMSERVICE
- SET ATOMSERVICE
- INQUIRE URIMAP

- New CW2A Transaction ID
  - Alias transaction for Atom feeds

CICS Internal Transport

CICS PIPELINE Internal Transport

- PIPELINE Currently has two transport types based on URI
  - HTTP / HTTPS use HTTP Transport
  - WMQ / JMS use the WMQ Transport
- Adding a CICS Transport that uses internal services rather than the network for CICS <-> CICS service calls
  - New CICS URI Format
- A more flexible version of the local optimization that already exists for Web Services

CICS Transport URI format

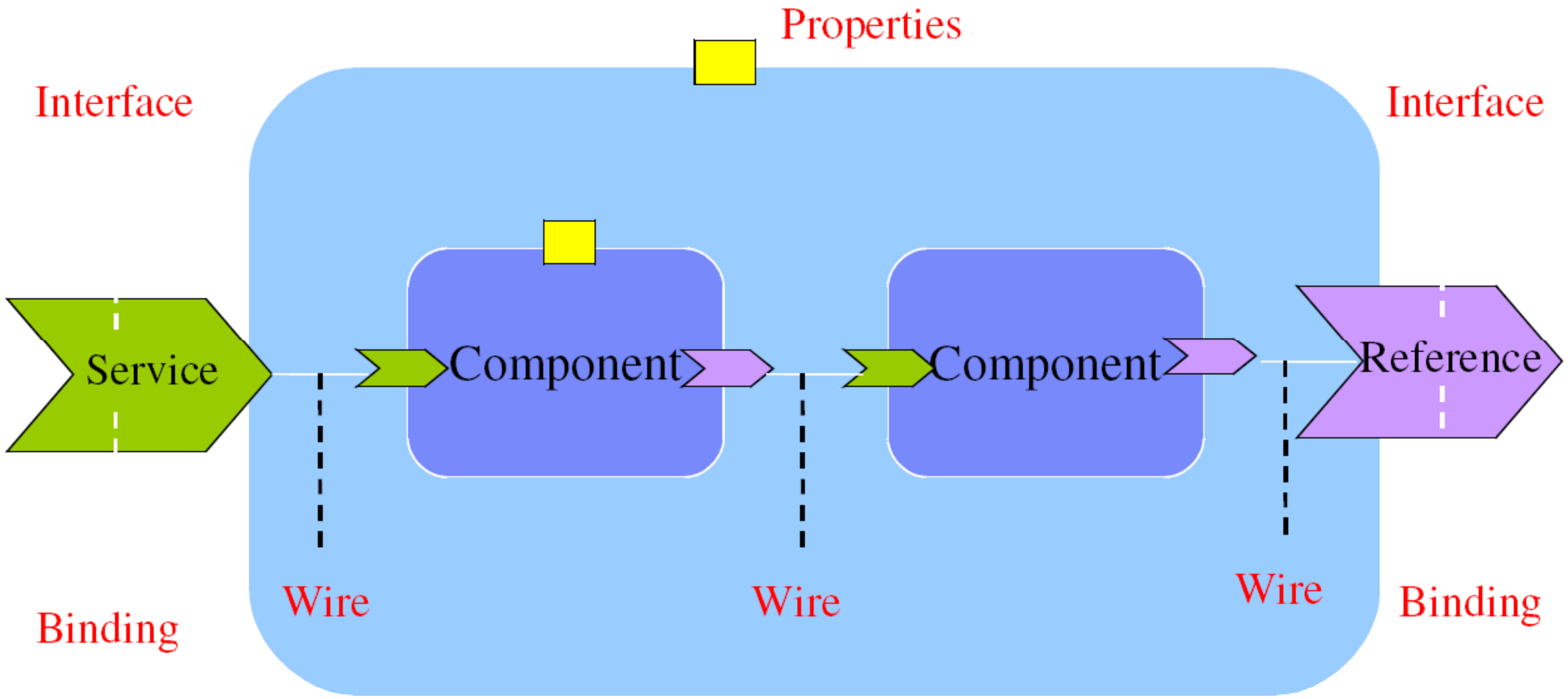
- Have the request target a program
  - cics://program/MYPROG
- Have the request target a Service (Provider pipeline)
  - cics://service/myservice?targetService=/myProviderApp/ServiceUri
- Have the request run a second Requester Pipeline
  - cics://pipeline/MYPIPE

Service Component Architecture

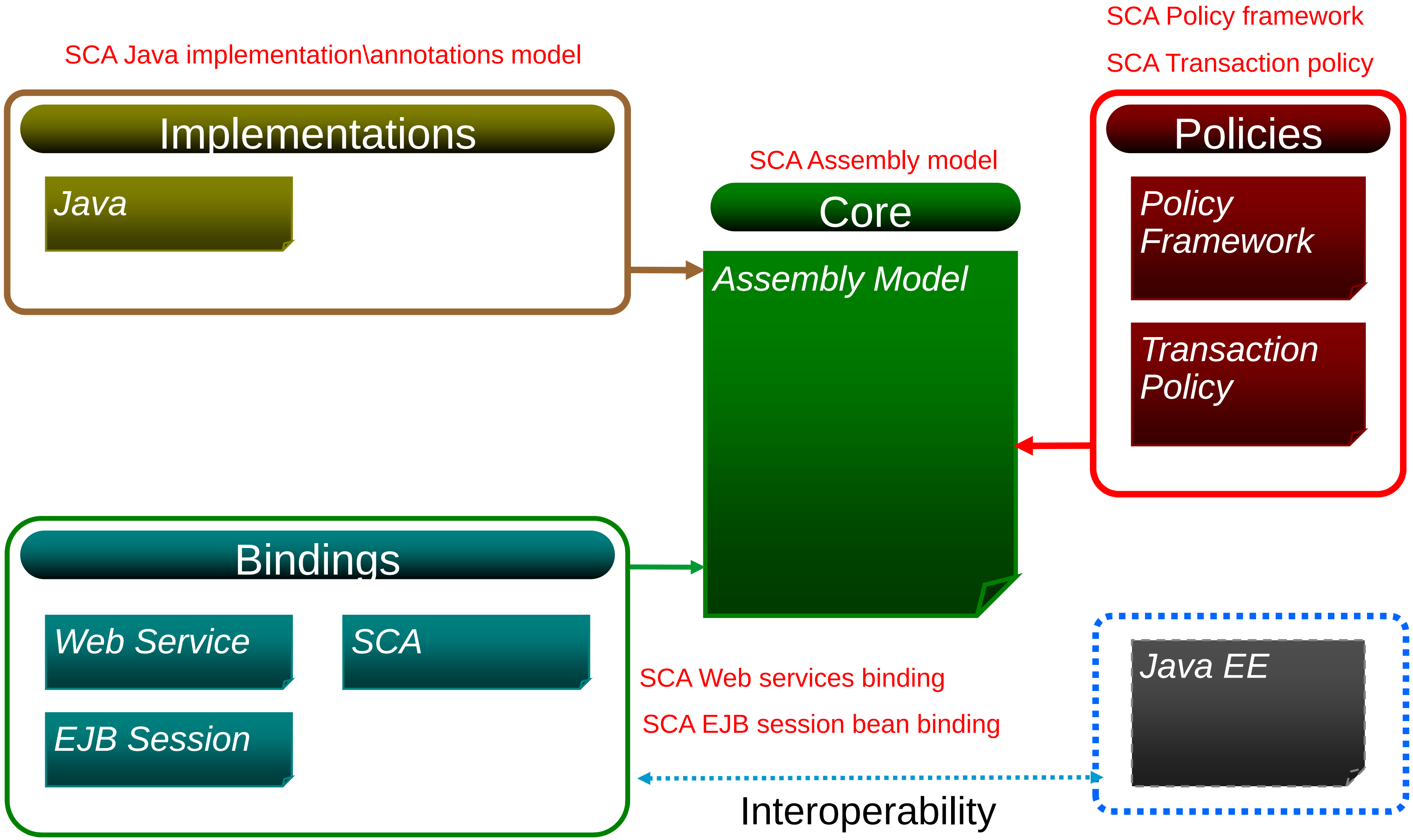
SCA: What it is

- Service Component Architecture.
- A concrete manifestation of an SOA way of thinking.
- Designed for building agile service oriented applications.
- A framework for implementing, assembling, composing and deploying services.
- Supports loose or tight coupling of coarse or fine grained services.
- Extends, exploits and complements existing technologies and standards.
- Language, Application Environment, Framework and Vendor neutral.
- Supports Java and Web Services, and more
- An extensible set of:
  - Protocol bindings (eg. SCA, WS, RMI, …)
  - Implementation languages (eg. Composite, Java, …)
  - Interface definitions (eg. WSDL, Java, …)
  - Pluggable Data bindings (eg. PoJo, JAXB, …)
  - Policies and Intents (eg. Integrity, Confidentiality).
- “Classic SCA” refers to Service Component Architecture as it is defined and built by IBM supported in a variety of WebSphere Family products starting with V6.
- “Open SCA” refers to Service Component Architecture as defined by the industry at both the OSOA collaboration

SCA Composite


Properties
Interface
Interface
Service
Component
Component
Reference
Binding
Wire
Wire
Wire
Binding

SCA v1.0 Specifications – Flexible & Extensible



SCA Policy framework

SCA Transaction policy

SCA Java implementation\annotations model

Implementations
Java

SCA Assembly model

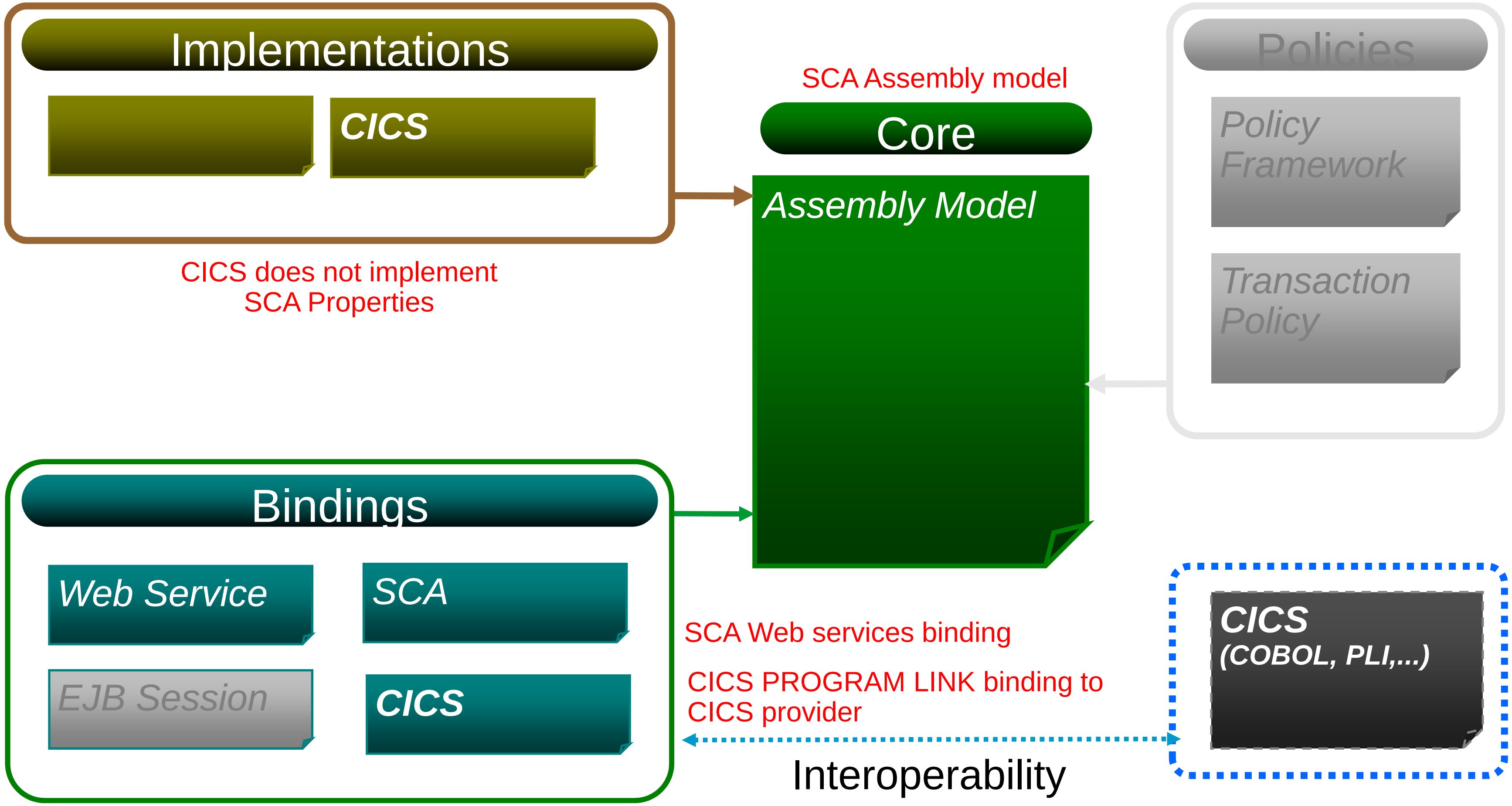
Core
Assembly Model
Policies
Policy Framework
Transaction Policy
Bindings
Web Service
SCA
EJB Session
Java EE

SCA Web services binding

SCA EJB session bean binding

Interoperability

CICS TS v4.1 Capabilites



CICS Service provider/consumer model
(Channel & Container with WS-Bind data-mapping,
EXEC CICS INVOKE SERVICE command)

SCA Policy framework

SCA Transaction policy

Implementations

- *CICS*

CICS does not implement
SCA Properties

SCA Assembly model

Core

- *Assembly Model*

Policies

- *Policy Framework*
- *Transaction Policy*

Bindings

- *Web Service*
- *SCA*
- *EJB Session*
- *CICS*

SCA Web services binding

CICS PROGRAM LINK binding to
CICS provider

CICS
(COBOL, PLI,...)

Interoperability

Summary

Web Services and SCA - Summary

- Web Services Highlights
  - WS-Addressing
  - XMLSS use
  - Data Mapping improvements
  - WSRR support
- Resource Deployment / Life cycle – BUNDLE
- WEB 2.0 / ATOM Support
- CICS PIPELINE Internal Transport
- SCA Support

Questions

- Thank you

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