

Integrating CICS Services with Service Flow Feature and WDz

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Session 4115A
CICS and Enterprise Transformation

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Objectives

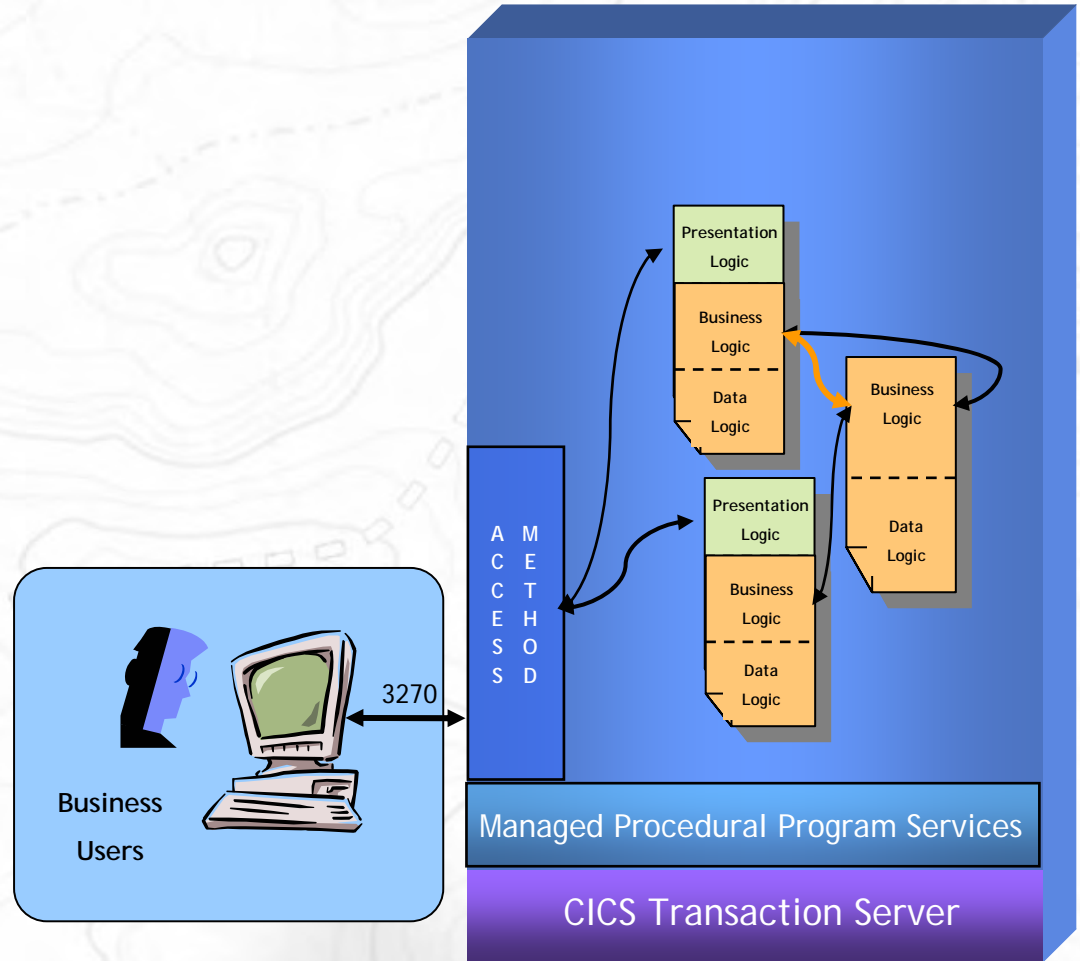
- Why Service Flows
- What is the Service Flow Feature
- What is a Service Flow
- Building a Service Flow
- Service Flow Runtime Environment

Why Service Flows?

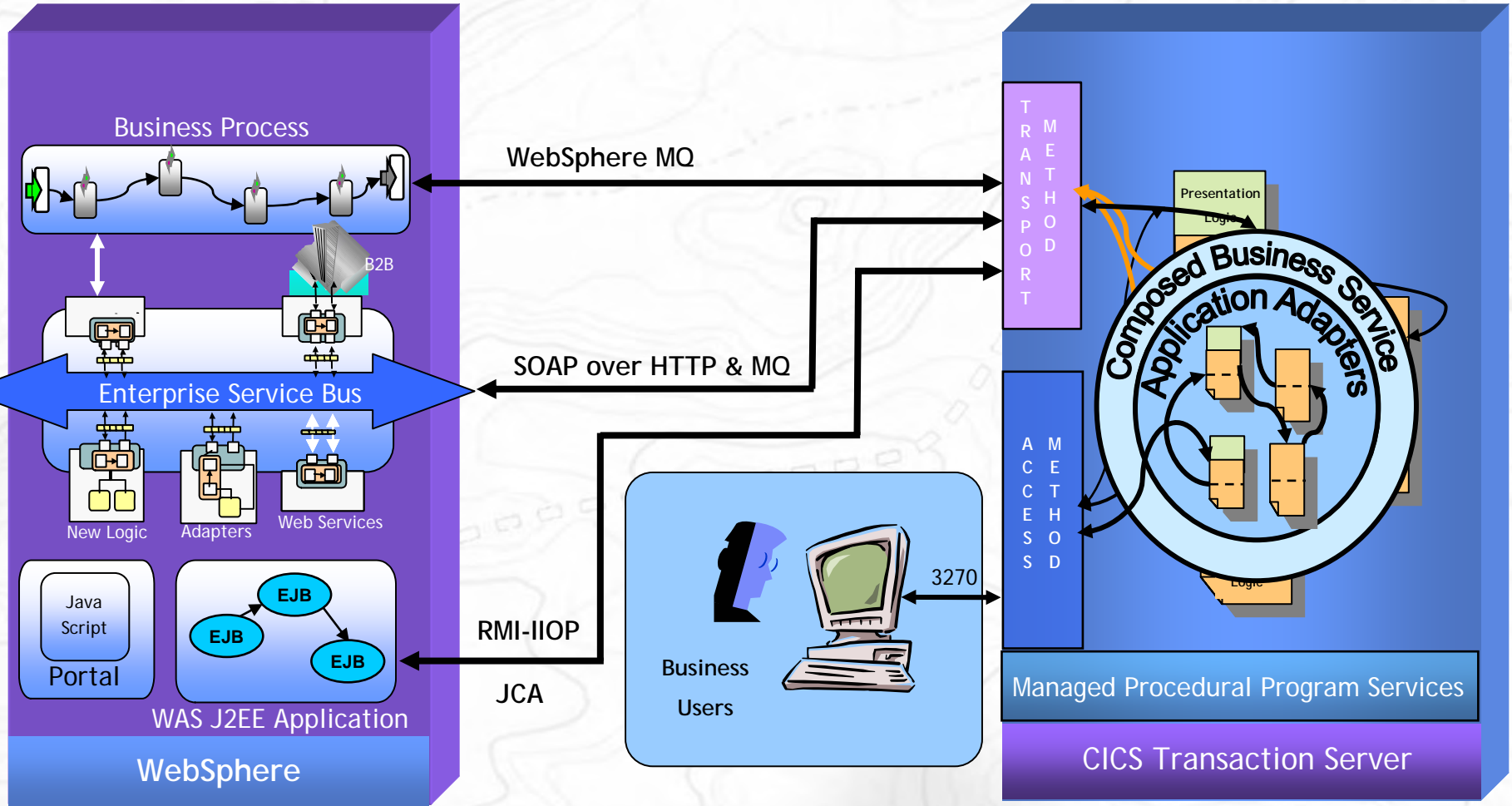
Transforming the Enterprise

- Many leading enterprises have chosen IBM Mainframes running CICS software to provide service functions
- The proven strengths of CICS running on IBM mainframes has, over time, led to a huge investment in CICS application code and skills
- To be agile in today's fast-moving marketplace, companies must embrace new technologies while leveraging these assets
- CICS maintains and adds value by enabling traditional, proven assets to be consumed as Web Services

CICS Application Access and Reuse



CICS Application Access and Reuse



Why a Service Flow Feature?

■ Transform the Enterprise

- Unlock critical IT assets and re-purpose them to participate in a service oriented architecture
- Opening access to existing fine-grained applications as coarse-grained business functions, while maintaining QoS
- Provide a layer of abstraction between service consumer and application implementation / user interface
- Foster SOA skills in traditional developers

■ Increase Productivity

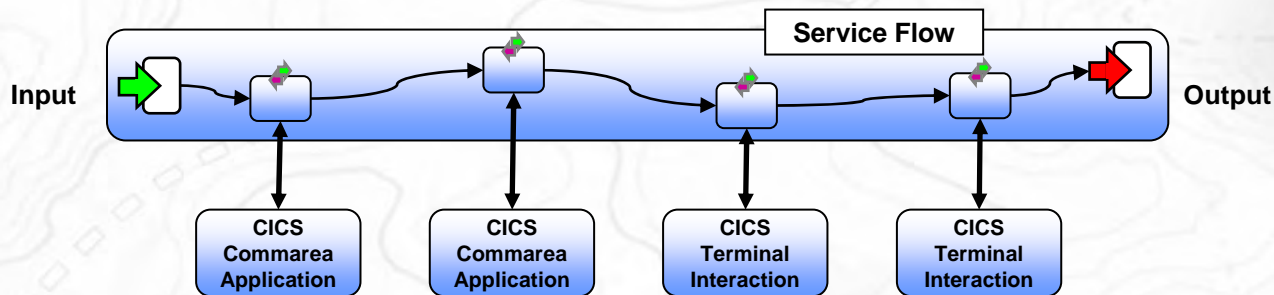
- Build libraries of annotated components representing current assets
- Rapidly assemble new applications from existing components using graphical tools
- Exploit existing developer skills and literacy

A topographic map with contour lines. A dashed line with small square markers follows a path across the map. A large white star is positioned on the right side of the map.

What is the Service Flow Feature?

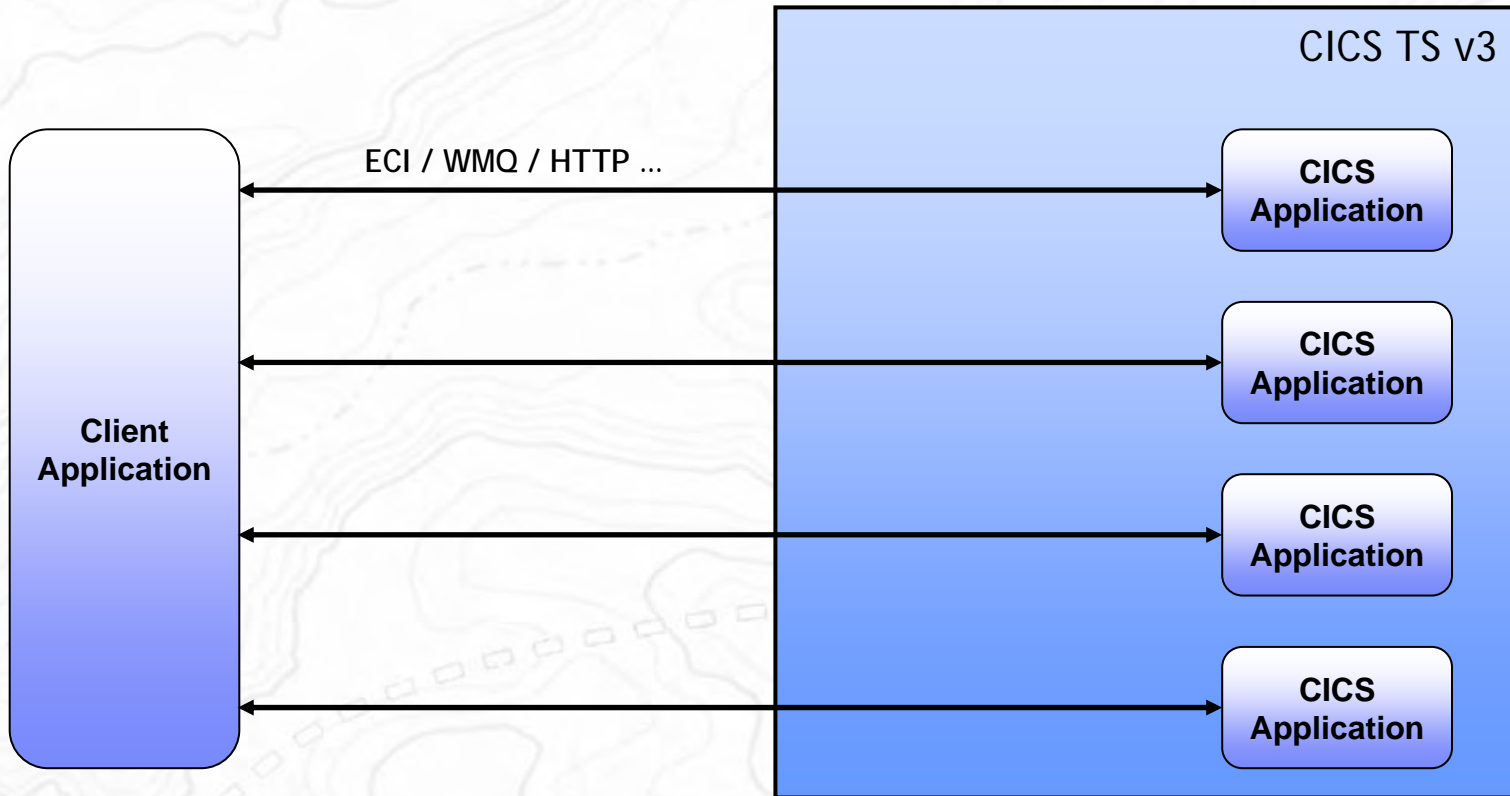
What is the Service Flow Feature?

- CICS Service Flow Feature provides capability to aggregate existing CICS applications into composed business services which may be integrated into an SOA environment
 - Aggregate multiple calls to CICS applications in one business level service call
 - Automate the interaction with 3270 terminal based applications and expose as a business level service



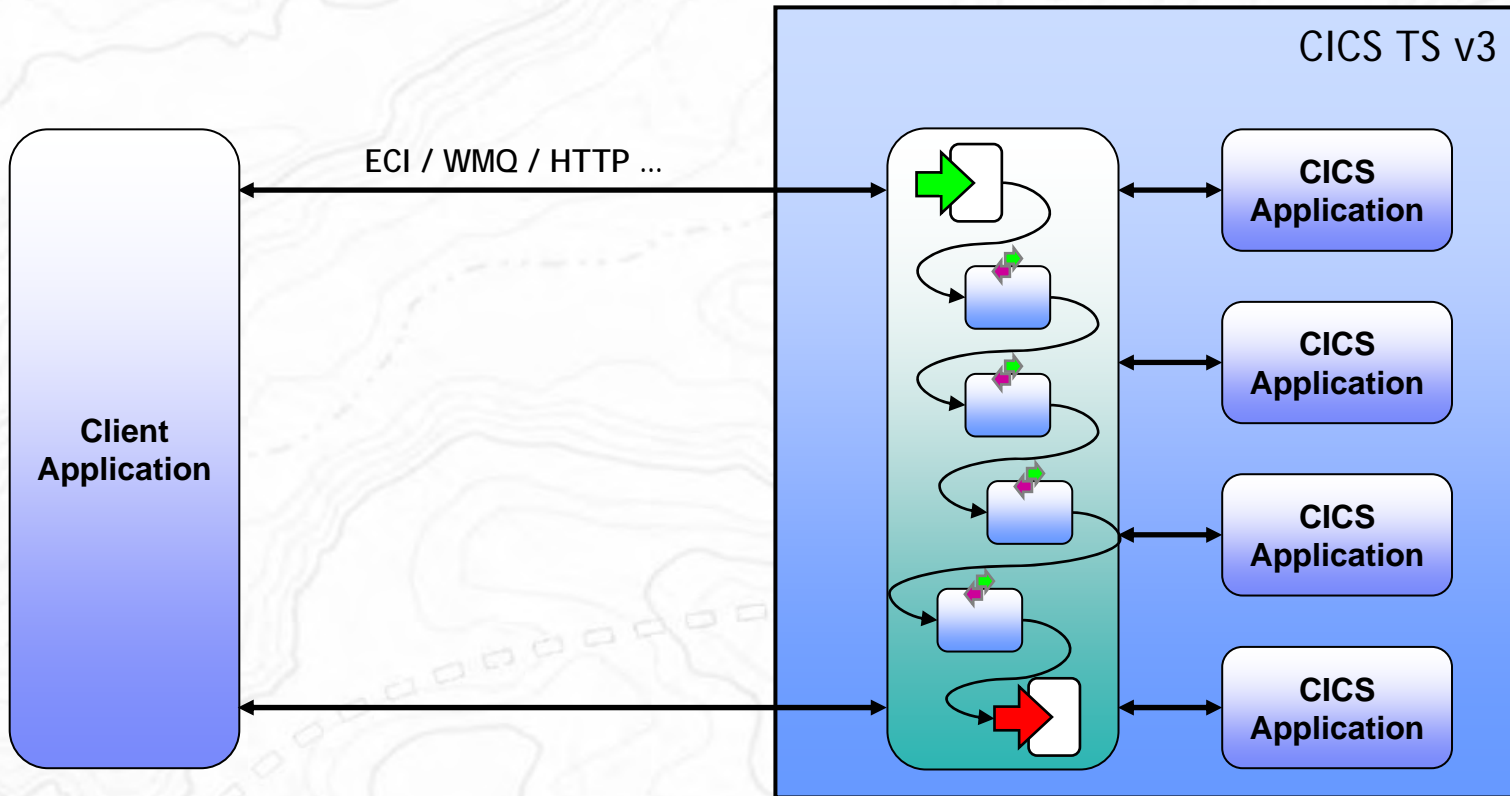
- The CICS Service Flow Feature is a no-charge, orderable feature for CICS TS v3.1

Traditional Access



- Multiple requests from client application
 - Expensive
 - Low potential for reuse

Aggregated Access

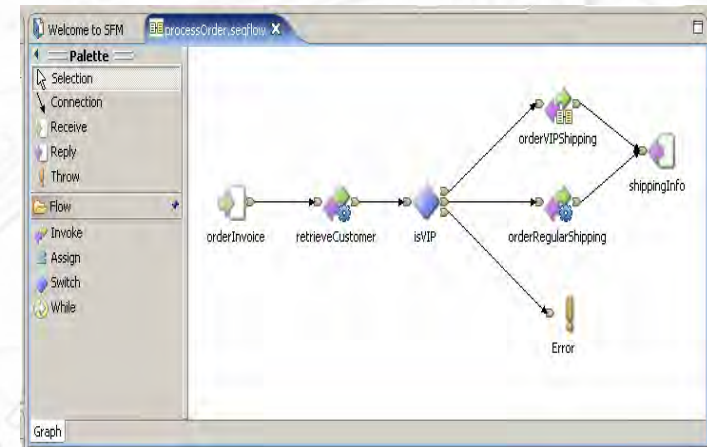


- Single request from client
 - Potentially reusable component
 - More efficient

Components of the Service Flow Feature

■ Tooling

- A graphical modeling integrated development environment
- WebSphere Developer for System z v7
 - Service Flow Modeler
 - XML Services for the Enterprise
 - Entitlement to 10 product licences



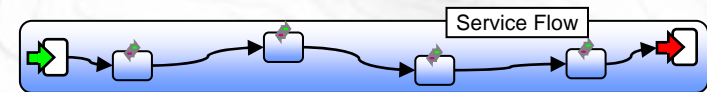
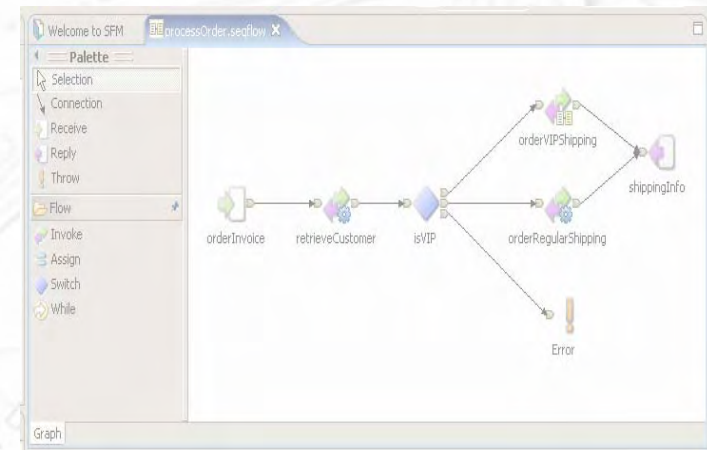
Components of the Service Flow Feature

■ Tooling

- A graphical modeling integrated development environment
- WebSphere Developer for System z v7
 - Service Flow Modeler
 - XML Services for the Enterprise
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■ Runtime

- CICS Service Flow Runtime
- Extends the CICS TS v3.1 environment.
- Offers adapters to invoke CICS commarea based programs and terminal-oriented transactions



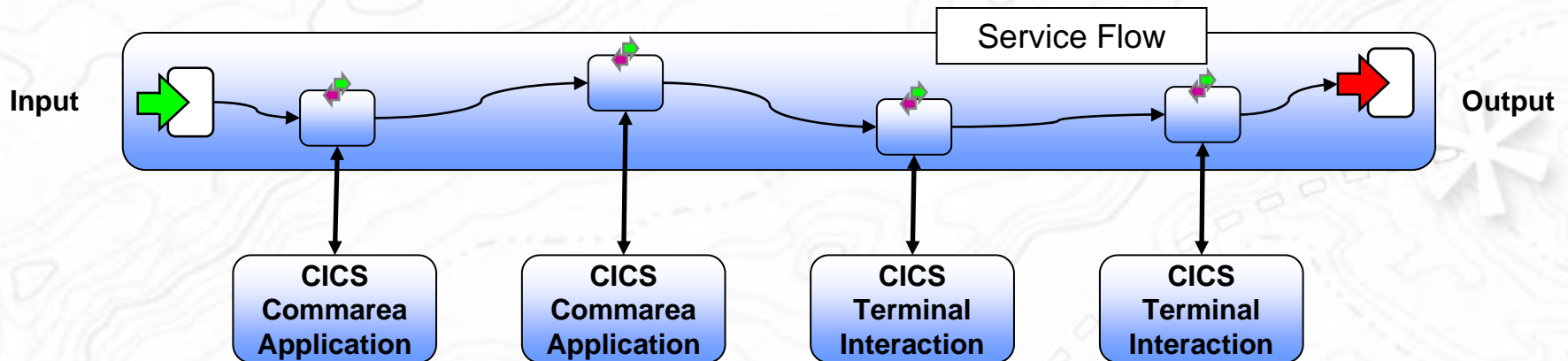
Capabilities - SFF and CICS Web Services

Feature	WSA	SFF
Supports bottom up style	●	●
Supports batch bottom up generation	●	
Supports meet in the middle style	●	●
Enables terminal applications		●
Enables commarea applications	●	●
Can drive multiple apps from one operation		●
Targets CICS runtime	●	●

A topographic map with contour lines. A dashed line path starts from the bottom left, moves right, then up, then right again, ending at a star-shaped marker on the right side. There are also some faint crosshair markers on the map.

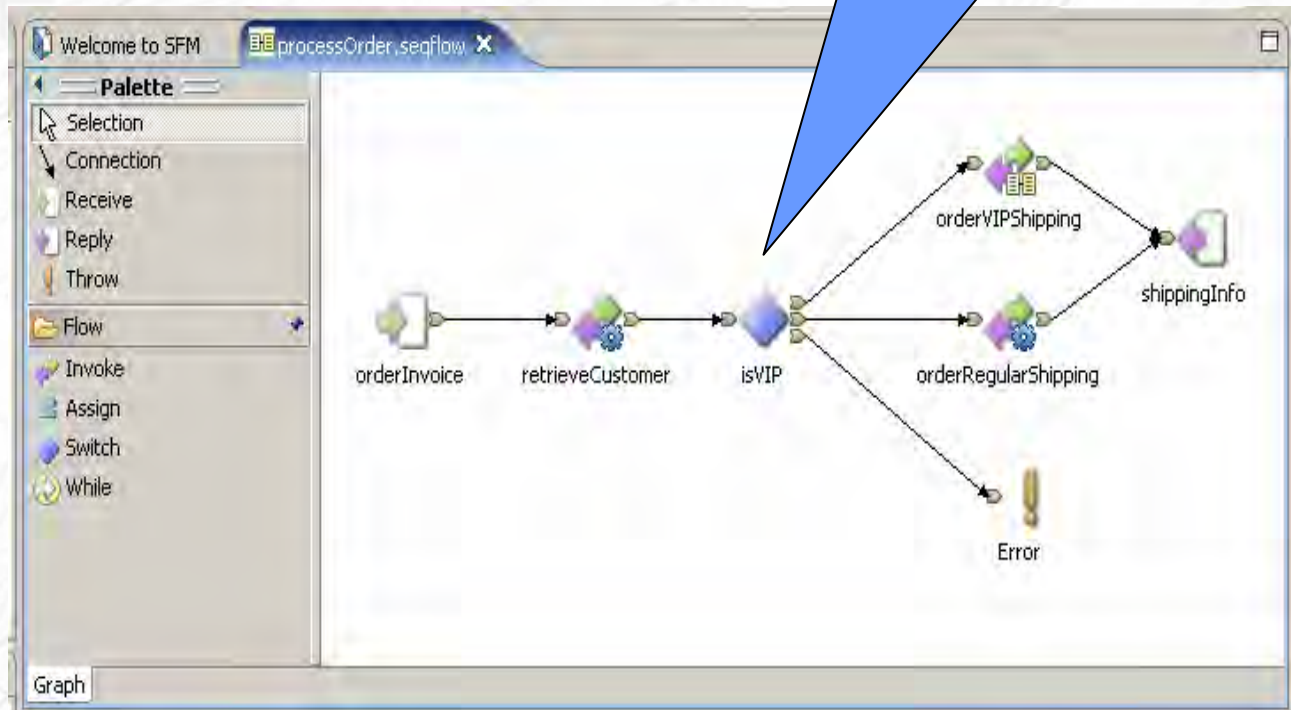
What is a Service Flow?

What is a Service Flow?













- A service flow is a non-interruptible micro-flow that is constructed from a collection of nodes that represent the invocation of CICS resources
- The flow describes the navigation of the nodes and allows data mapping between the nodes
- A single request may cause the execution of many CICS resources
- Allows for the development of coarse grained services from fine grained resources

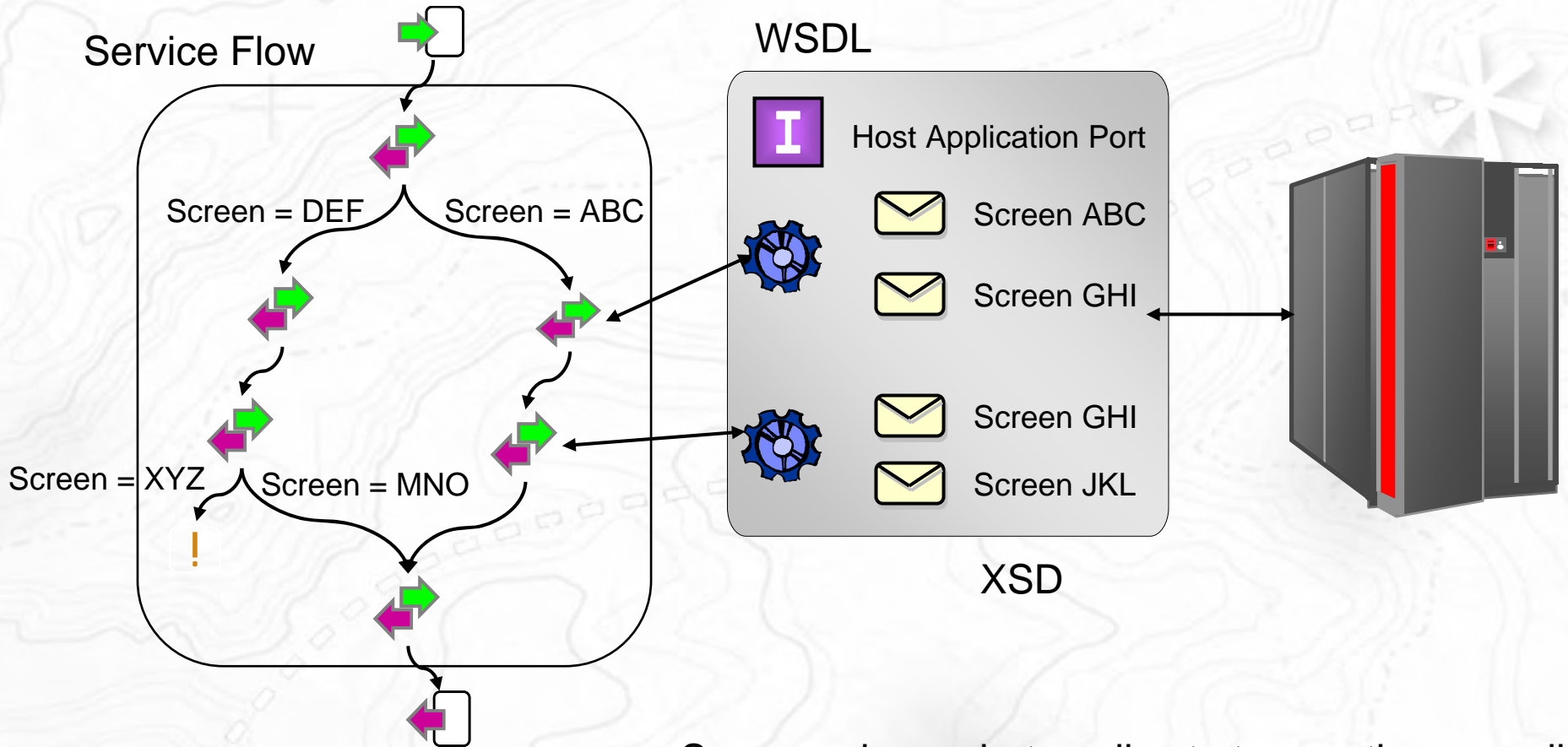
Model with SFM...



Components of a Service Flow

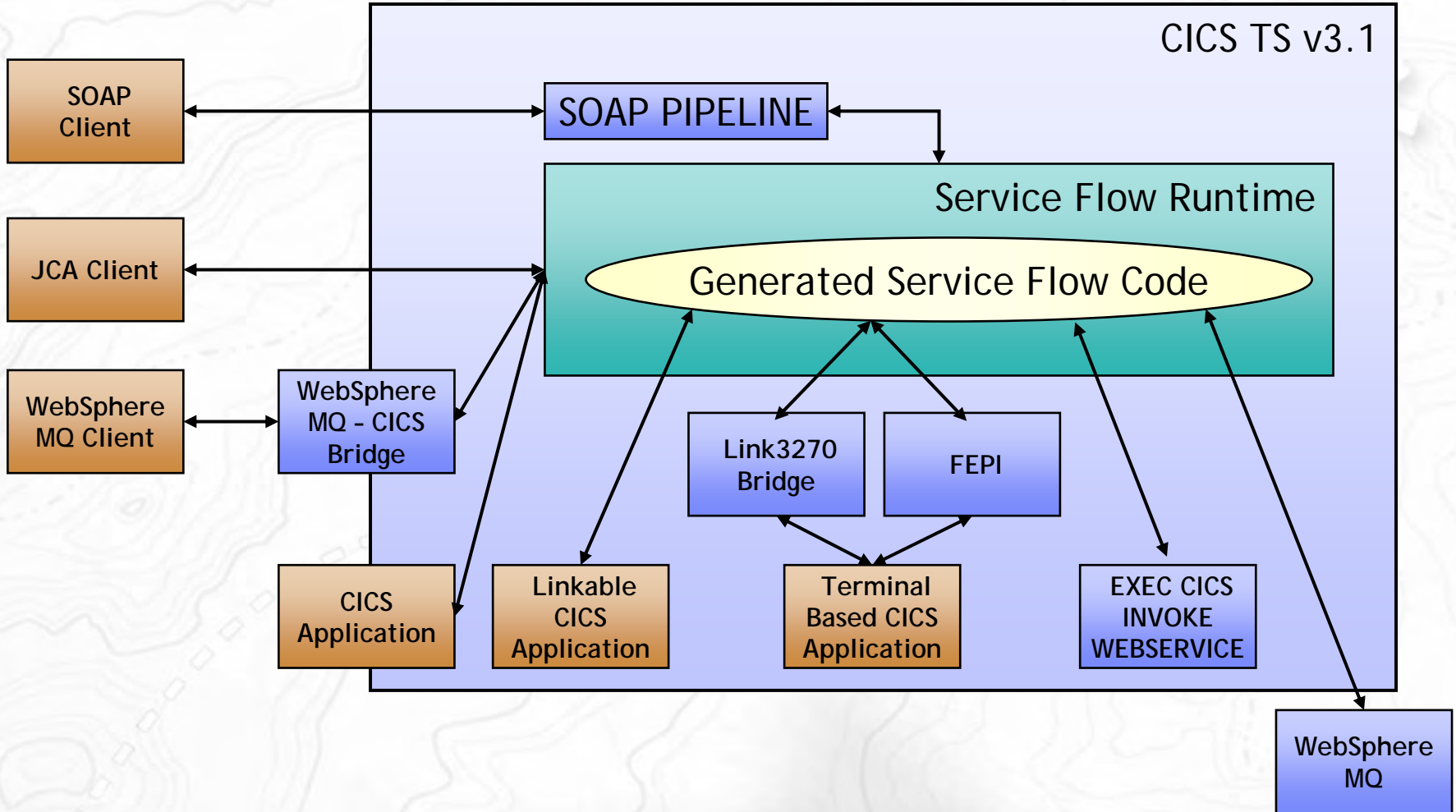
	Receive	Input node for flow
	Reply	Output node from flow
	Throw	Throw fault node
	Invoke	Generic invoke (target not yet defined)
	Invoke Operation	Invoke a non-terminal operation
	Invoke Terminal	Invoke a terminal screen operation
	Invoke Flow	Invoke a flow
	Assign	Map data between messages in the flow
	Switch	Flow control decision node
	While	Flow control loop node

Development Model



■ Screens shown, but applies to transaction as well

Deployment Model



A topographic map with contour lines. A dashed line path starts from the bottom left, moves right, then up, then right again, ending at a star-shaped marker on the right side. There are also some faint crosshair markers on the map.

Building a Service Flow

Using Service Flow Modeler

- Service Flow Project
 - Create, store and maintain required resources.
 - Interface Definitions, Terminal applications, Non-Terminal application
- Service Flow Model terminology
 - **Messages** - data structures
 - Screens, transaction inputs, transaction outputs, and web service messages
 - **Message mappings** - any transformation of data between messages
 - **Operations** - EIS interaction
 - Screen submission, transaction invocation, and sub-sequence flow invocation
 - **Flows** – composition of multiple operations and the message mapping
- Flow behavior is represented graphically
 - Data movement is done through Message Mappings

Development Tools

The image displays the IBM SFM (Service Flow Manager) development environment. It features several interconnected windows:

- Palette:** A sidebar on the left containing icons for Selection, Connection, Receive, Reply, Throw, Flow, and Invoke.
- Process Flow Diagram:** A central workspace showing a sequence of operations: `orderInvoice` → `retrieveCustomer` → `isVIP`. From `isVIP`, the flow branches into `orderVIPShipping` and `orderRegularShipping`, both of which lead to `shippingInfo`.
- Operations Editor:** A window on the left showing a tree view of operations under 'Ports' and 'Operation-receive'.
- getcust.mxsd:** A message structure editor showing a tree view of message elements. The `msg_DFHCMMAREA` structure is expanded, showing fields like `customerNumber`, `firstName`, `lastName`, `streetAddress`, `city`, `state`, `country`, `zipCode`, `phoneNumber`, `returnCode`, `numberOfStoc...`, `quantityOfShares`, and `storkSymbnk`.
- Source/Target Editor:** A window showing the mapping between source and target messages. The source is `msg_billing (billingInfo)` and the target is `msg_DFHCMMAREA (DFHCMMAREA)`. The mapping table is as follows:

Target	Source	Target value
<code>msg_DFHCMMAREA (DFHCMMAREA)</code>	<code>msg_billing (billingInfo)</code>	
<code>firstName</code>	<code>customerName</code>	<code>SUBSTRING(s_msg_billing.customerName ...</code>
<code>streetAddress</code>	<code>address1</code>	<code>s_msg_billing.address1</code>
<code>city</code>	<code>city</code>	<code>s_msg_billing.city</code>
<code>state</code>	<code>state</code>	<code>s_msg_billing.state</code>
<code>zipCode</code>	<code>zip</code>	<code>s_msg_billing.zip</code>

Specialized Terminal Tools

The screenshot displays the IBM IMPACT development environment. At the top, several windows are open, including 'accounts.seqflow' and 'processOrder.retrieveCustomer.seqmap'. A flowchart in the 'accounts.seqflow' window shows a 'variableAssignInput' action. The main terminal window displays the following account details:

```

ACCOUNTS          DETAILS OF ACCOUNT NUMBER 10001
SURNAME          : JONES          (10 CHRS)  TITLE       : MAST (4 CHRS OPTIONAL)
FIRST NAME       : JACOB          (12 CHRS)  MIDDLE INIT: J   (1 CHR  OPTIONAL)
TELEPHONE        : 1122223333    (10 DIGS)
ADDRESS LINE1   : 2 PARTRY CLOSE (24 CHRS)
ADDRESS LINE2   : CHANDLERS FORD (24 CHRS)
ADDRESS LINE3   : SA99 4SS       (24 CHRS OPTIONAL)

CARDS ISSUED    : 1              (1 TO 9)    CARD CODE   : 6   (1 CHR)
DATE ISSUED     : 02 02 99      (MM DD YY)  REASON CODE: L   (M,L,S,R)
APPROVED BY    : JJO            (3 CHRS)

UPTO 4 OTHERS WHO MAY CHARGE (EACH 32 CHRS OPTIONAL)
01: JERRY                                02:
03:

SPECIAL CODE1: CODE2: CODE3: (EACH 1 CHR OPTIONAL)
NO HISTORY AVAILABLE AT THIS TIME      CHARGE LIMIT 1000.00      STATUS N

NOTE:- DETAILS IN BRACKET'S SHOW MAXIMUM NO. CHARACTERS ALLOWED AND IF OPTIONAL
PRESS "CLEAR" OR "ENTER" TO RETURN TO THE MENU WHEN FINISHED
    
```

The 'Screen Operations Editor' window is also visible, showing a similar view of the account details with a 'Field522' highlighted. The 'Outline' window shows a tree structure for 'DetailsOfa_1' with 'Screen Interaction 0' containing 'Extract: Field337' and 'AID key: [clear]'. The 'Properties' window shows the following table:

Property	Value
Field	DetailsOfa_Ins:...
Name	Field337

The 'Properties' window also includes a 'Field Info' section with the following table:

Property	Value
Bidirectional	false
Contents	ACCOUN
Length	17
Name	Field2
Position	2
Protected	true

Mapping

The screenshot displays the IBM Impact tool's message mapping interface. It is divided into three main sections: Source, Target, and Overview.

Source: msg_PLACEORDERREQUEST (tns:PLACEORDERREQUEST)

- ca_userid
- ca_charge_dept
- ca_item_ref_number
- ca_quantity_req

Target: msg_CAPLACEORDER (tns1:CAPLACEORDER)

- ca_request_id
- ca_return_code
- ca_response_message
- ca_order_request
 - ca_userid
 - ca_charge_dept
 - ca_item_ref_number
 - ca_quantity_req

Overview Table:

Target	Source	Target value
msg_CAPLACEORDER (tns1:CAPLAC...)	msg_PLACEORDERREQUEST (tns:PLAC...)	
ca_order_request		
ca_userid	ca_userid	s_msg_PLACEORDERREQUEST.ca_userid

Mapping Editor

Compose Mapping Expression

Use source or target fields and functions to create value for target

Mapping: ca_userid --> ca_userid
Value of target field: t_msg_CAPLACEORDER.ca_order_request.ca_userid

s_msg_PLACEORDERREQUEST.ca_userid

Apply Condition

s_msg_PLACEORDERREQUEST.ca_userid IS NOT NULL

Source fields » String Functions

OK Apply Cancel

The background of the slide is a light gray topographic map with contour lines. A dashed line, composed of small squares, winds across the map from the bottom left towards the top right. A white star-shaped marker is positioned on the right side of the map, near the top of the dashed line. There are also some faint crosshair markers on the map.

Service Flow Runtime Environment

Deploy Service Flow to Runtime

Service Flow Modeler

WebSphere Developer for System z

Generate

Deployment JCL

Generated Service Flow

Deploy

Service Flow Runtime

Generated Service Flow Code

EIS Applications

CICS TS v3.1

Generation & Deployment

- **Creates Artefacts for deployment**
 - Artefacts created depends on options chosen
 - In addition to the CICS Business Service artefacts, you can create CICS Web services artefacts
- **CICS Service Flow artefacts**
 - 1 or more generated CICS Cobol programs
 - JCL files
 - RDO Definitions
 - Property File Update
 - Compilation JCL for the programs.
- **Deployment**
 - Transfer artefacts to Host
 - Submit JCL to Deploy artefacts
 - Perform PIPELINE scan to deploy Web services

Generated Files

■ COBOL Source

```
...  
...  
PROCEDURE DIVISION.  
COPY DFHMAL22.  
  
MACGEN MOVE DFHCLEAR TO SNA-INITIAL-AID-BYTE.  
MACGEN MOVE 'EGUI' TO SNA-CICSMACRO-SCREEN.  
MACGEN MOVE DFHENTER TO SNA-AID-BYTE.  
MACGEN MOVE +5 TO NSC-CHILD-TYPE.  
  
MACGEN MOVE 1 TO TRANSLATE-MAP-TO-HOST.  
MACGEN MOVE 'Y' TO SEND-PFKEY-FIRST.  
  
PERFORM 4000-SEND-RECEIVE-RTN  
THRU 4000-SEND-RECEIVE-EXIT.  
  
MOVE SNA-VECTOR-DATA TO MAP-BUFFER.  
  
MACGEN  
MACGEN IF SNA-3270-MAP-NAME = 'EXMENU' AND  
MACGEN SNA-3270-MAPSET-NAME = 'DFH0XS1'  
MACGEN MOVE 'EXMENU' TO CSC-RESULT-NAME  
MACGEN MOVE LENGTH OF EXMENU  
MACGEN TO WS-COC-LENGTH  
MACGEN ELSE  
MACGEN MOVE 'UNKNOWN' TO CSC-RESULT-NAME  
MACGEN MOVE 24000 TO WS-COC-LENGTH.  
...  
...
```

Generated Files

- COBOL Source
- Compilation JCL

```
M //SFFUSERC JOB (SFFUSER),'SFFUSER',
M // CLASS=A,MSGCLASS=H,NOTIFY=SFFUSER
M
M /**
M // JCLLIB ORDER=(SFFUSER.SFF.SCIZSAMP)
M /**
M /** CURRENTLY SET FOR: ORDERITE
M /**
M //COMPILE EXEC DFHMAXCP,
M // COPY1='SFFUSER.USER.COPYLIB',
M // COPY2='SFFUSER.DEMO.SCIZMAC',
M // COPY3='CTS310.CICS640.SDFHCOB',
M // LINK2='SFFUSER.DEMO.SCIZLOAD',
M // OBJLIB='SFFUSER.DEMO.SCIZLOAD',
M // PROGRAM='ORDERITE',
M // LINK='SFFUSER.CICS.LOADLIB',
M // SOURCE='SFFUSER.USER.SRCLIB(ORDERITE)'
M //LINKSTEP.SYSIN DD *
M INCLUDE OBJLIB(DFHMAF)
M /*
M // DD *
M NAME ORDERITE(R)
M /*
M //
M /******* TRAILER: DFHMAXCJ *****
```

Generated Files

- COBOL Source
- Compilation JCL
- CICS RDO Definitions

```
//SFFUSERC JOB (SFFUSER), 'SFFUSER',  
//SFFUSERC JOB (SFFUSER), 'SFFUSER',  
// CLASS=A,MSGCLASS=X,NOTIFY=SFFUSER  
//***** RDO RESOURCE DEFINITIONS  
//*****  
//DEFINE EXEC PGM=DFHCSDUP,REGION=1024K,PARM='CSD(READWRITE)'  
//STEPLIB DD DSN=CTS310.CICS640.SDFHLOAD,DISP=SHR  
// DD DSN=CTS310.CICS640.SDFHAUTH,DISP=SHR  
// DD DSN=CEE.SCEERUN,DISP=SHR  
//* following line changed by APAR PK17446  
//DFHCSD DD DSN=SFFUSER.CICSIPL.RAPO.CSD,DISP=SHR  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *  
***** DFHMAXRP *****  
...  
*****  
DEFINE PROGRAM(ORDERITE) GROUP(CICSSFRG)  
DESCRIPTION(''  
LANGUAGE(LE370) RELOAD(NO) RESIDENT(NO) USAGE(NORMAL)  
USELPACOPY(NO) STATUS(ENABLED) CEDF(NO) DATALOCATION(ANY)  
EXECKEY(USER) CONCURRENCY(QUASIRENT) DYNAMIC(NO)  
EXECUTIONSET(FULLAPI) JVM(NO)  
***** TRAILER: DFHMAXRP *****  
***** DFHMAXRT *****  
...  
...
```


Generated Files

- COBOL Source
- Compilation JCL
- CICS RDO Definitions
- Properties File Update

```
//SFFUSERC JOB (SFFUSER), 'SFFUSER',  
//SFFUSERC JOB (CHRISB), 'CHRISB',  
// CLASS=A,MSGCLASS=H,NOTIFY=CHRISB  
//*****  
//* RUN DFHMAMUP (CICS SFR PROPERTIES FILE UPDATE PROGRAM)  
//*  
//*****  
//MAMUP EXEC PGM=DFHMAMUP  
//STEPLIB DD DSN='CHRISB.DEMO.SCIZLOAD',DISP=SHR  
//*****  
//* THE OUTPUT WILL GO TO SYSPRINT  
//*****  
//SYSPRINT DD SYSOUT=*  
//SYSOUT DD SYSOUT=*  
//DFHMAMPF DD DSN='CHRISB.DEMO.DFHMAMPF',DISP=SHR  
//SYSIN DD *  
*  
MODE=SAFE  
TYPE=5  
NAME=ORDERITE  
PARM01=  
PARM02=  
PARM03=300  
PARM04=4200000  
PARM05=1  
*  
PARM06=  
PARM07=Y  
*  
PARM08=0  
*  
PARMXX  
*  
TYPE=R  
*  
NAME=ITEMREQ  
*  
...
```

Generate Runtime Code

Generate run time code

Generation Properties - File selection

Select a generation properties file and a location for the generated code.

File name:

Deployment target

Deploy to remote target location

Job Control information

Job Control user ID:

Job Control account:

Deployment libraries HLQ:

Create resource definitions JCL

Create compile JCL

Code Deployment

```
...  
PROCEDURE DIVISION.  
  COPY DFHMAL22.  
  
MACGEN  MOVE DFHCLEAR TO SNA-INITIAL-AID-BYTE.  
MACGEN  MOVE 'EGUI' TO SNA-CICSMACRO-SCREEN.  
MACGEN  MOVE DFHENTER TO SNA-AID-BYTE.  
MACGEN  MOVE +5 TO NSC-CHILD-TYPE.  
  
MACGEN  MOVE 1 TO TRANSLATE-MAP-TO-HOST.  
MACGEN  MOVE 'Y' TO SEND-PFKEY-FIRST ...  
...  
...
```

WebSphere Developer
for System z

CICS SFR Runtime

zSeries

Code Deployment

WebSphere Developer
 for System z

```

...
PROCEDURE DIVISION
    COPY DFHMA22.

MACGEN  MOVE DFHCLEAR TO SNA-INITIAL-AID-BYTE.
MACGEN  MOVE 'EGUI' TO SNA-CICSMACRO-SCREEN.
MACGEN  MOVE DFHENTER TO SNA-AID-BYTE.
MACGEN  MOVE +5 TO NSC-CHILD-TYPE.

MACGEN  MOVE 1 TO TRANSLATE-MAP-TO-HOST.
MACGEN  MOVE 'Y' TO SEND-PFKEY-FIRST ...
...
    
```

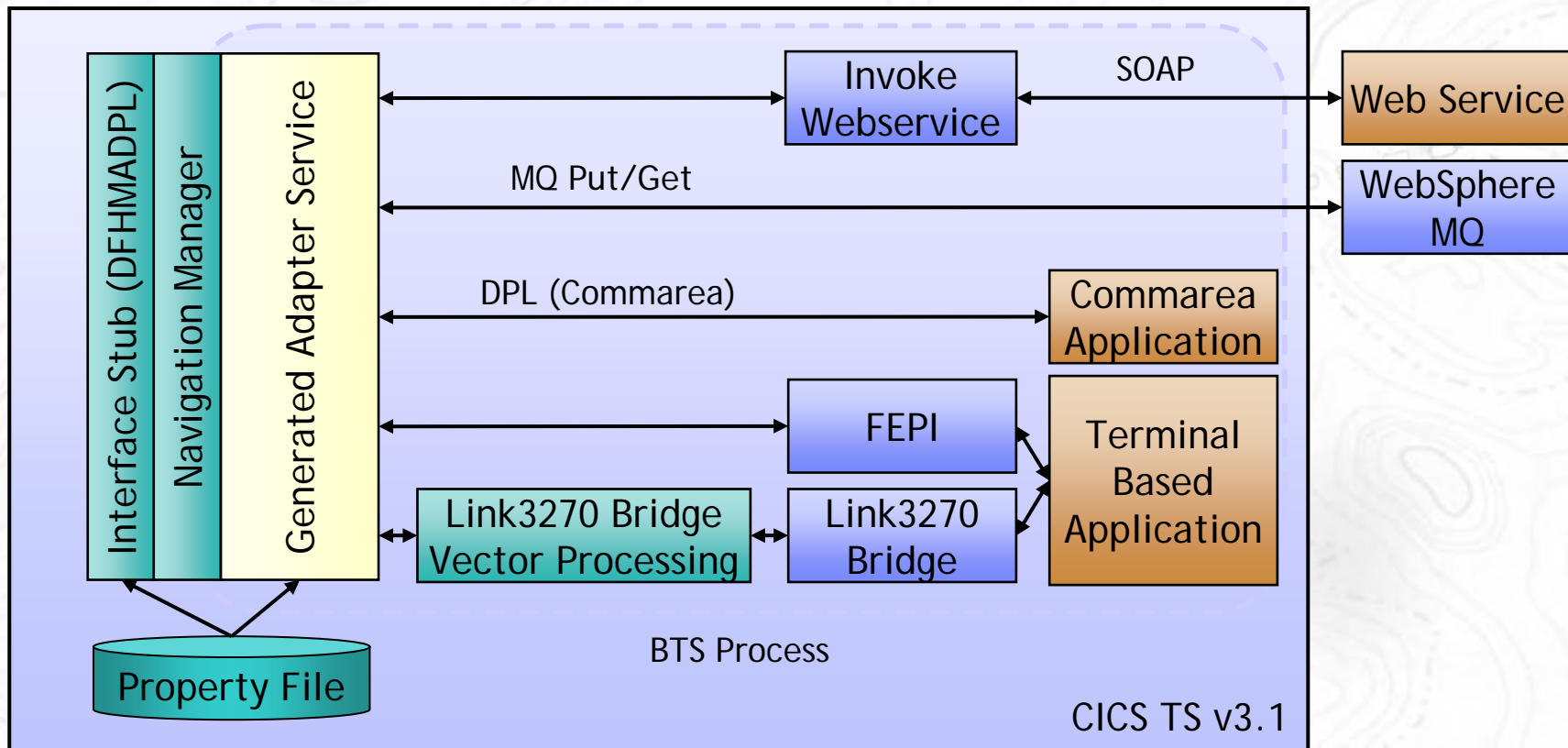
DFHMA***

SFR . SCIZLOAD

CICS SFR Runtime

zSeries

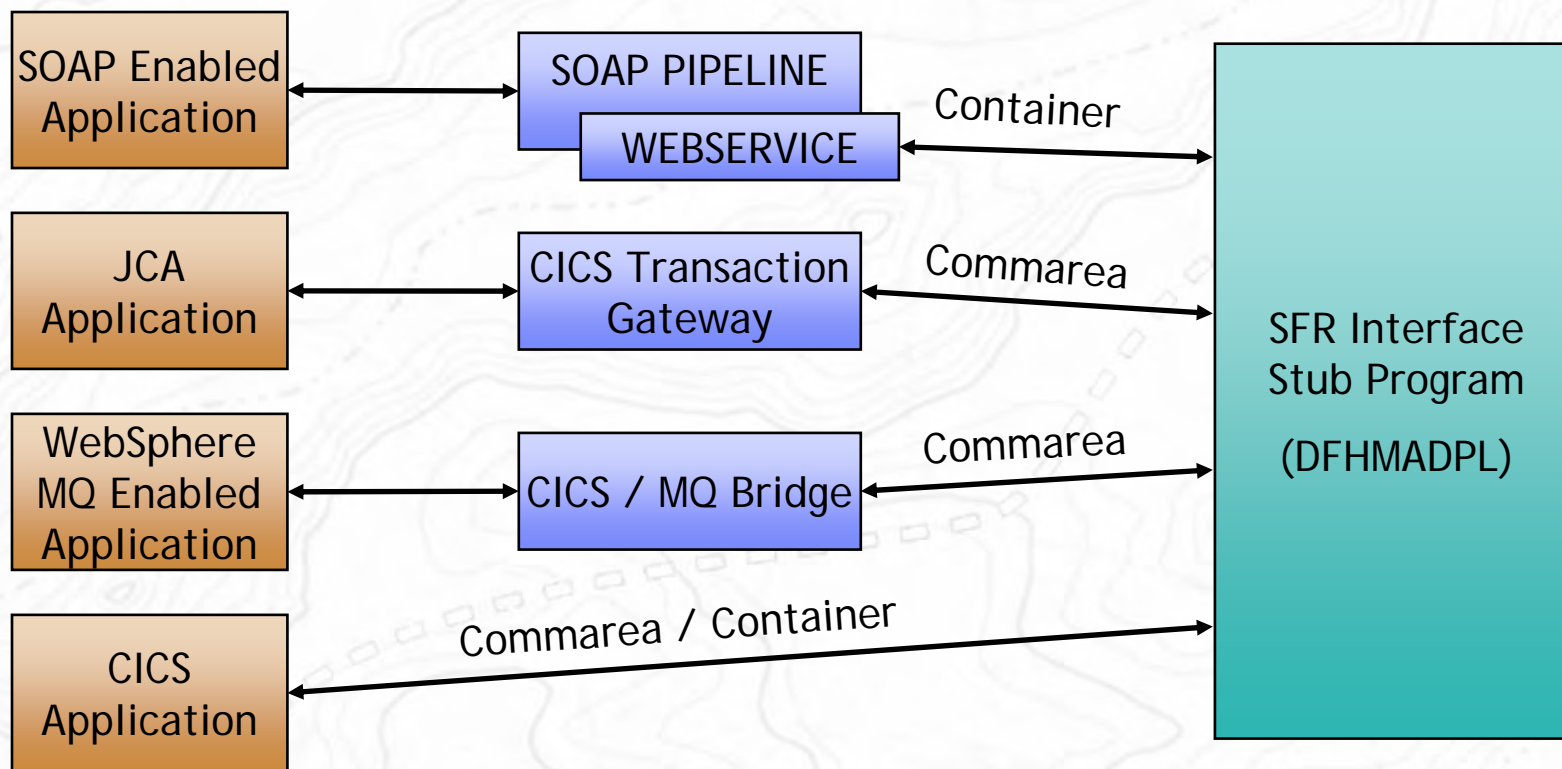
Runtime Architecture



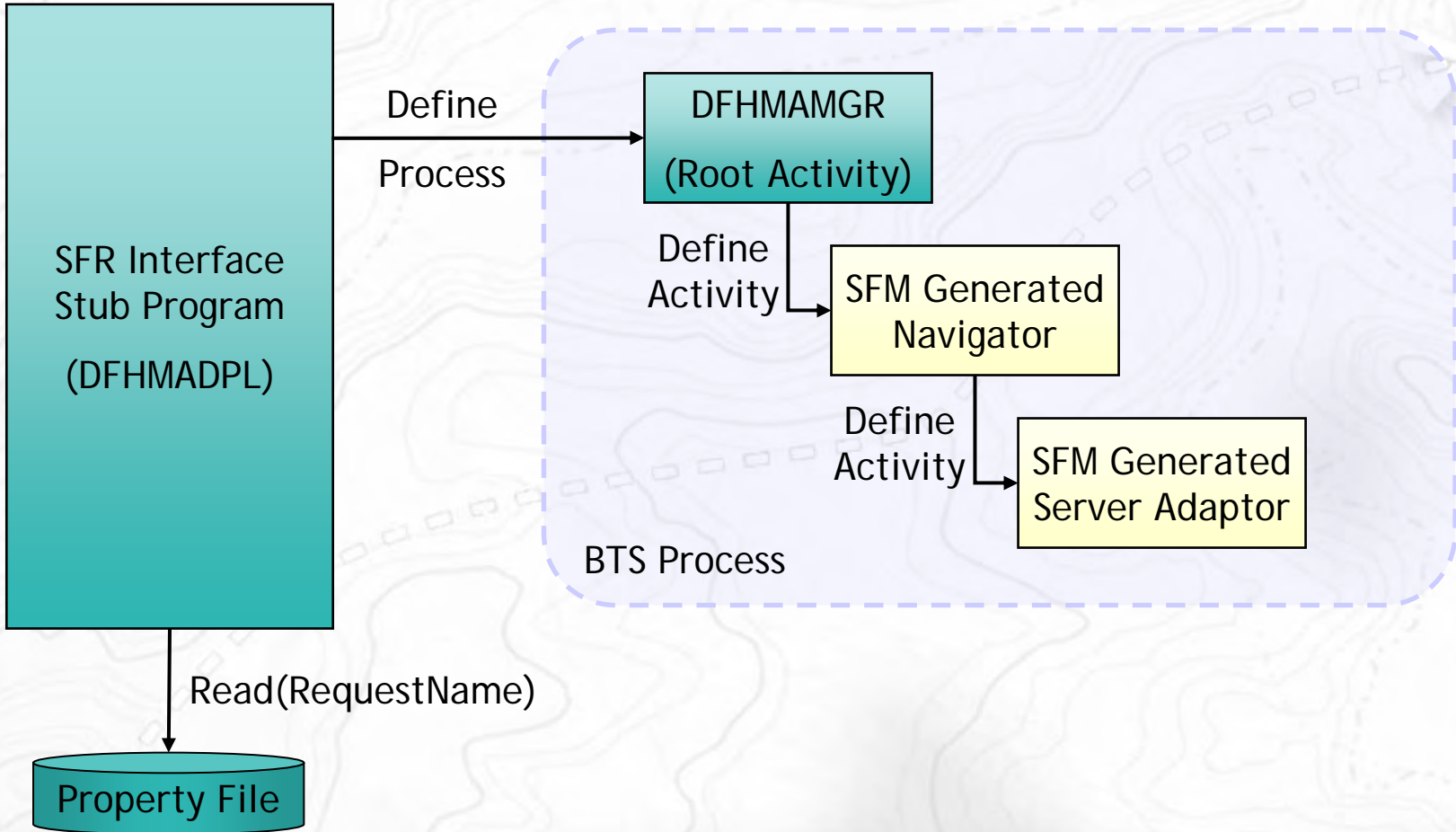
Invoking a CICS Service Flow

- Flow Invoked through module DFHMADPL
- Message passed from Service Requestor to CICS SFR
 - Commarea interface
 - Channel interface (recommended)
- Container Interface
 - Input
 - DFHMAC-REQUESTV1 - Request Name - PIC X(8)
 - DFHMAC-USERDATA - Optional User Data
 - Output
 - DFHMAC-USERDATA - Optionally returned
 - DFHMAC-ERROR - Returned only on error

Invoking a CICS Service Flow



Running a CICS Service Flow



Managing a Deployed Flow

- BTS ProcessType defined for each flow
 - ProcessType name matches flow request name
- When using channel interface to SFR flows can be managed with ProcessType resource
 - Install
 - Discard
 - Enable
 - Disable
- Access to installed flow only when corresponding ProcessType is installed and enabled

Summary

- The CICS Service Flow Feature is a no-charge, orderable feature for CICS TS v3.1
 - WebSphere Developer for System z (10 restricted licences)
 - CICS TS v3.1 Runtime component
- CICS Service Flow Feature provides the capability to aggregate existing CICS applications into composed business services
 - Aggregate multiple calls to CICS applications into one business level service call
 - Automate the interaction with 3270 terminal based applications and expose as a business level service

Questions and Answers