



z/TPF V1.1

# TPF Users Group Fall 2008

## Title: Concepts of z/TPF SOAP Consumer Support

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- The following information is conceptual and subject to change.
- Certain support mentioned has not yet been delivered. This includes but is not limited to:
  - SOAP Consumer Support on z/TPF
    - Including TPF Toolkit enhancements
  - WebSphere MQ using SSL

## What is SOAP consumer support?

- Current TPF is capable of acting as a provider of Web Services
- Also known as *SOAP client* or *Web service consumer*
- Allow applications on z/TPF to call Web services on remote platforms (or they could be on the same platform)
  - There are no industry standard C/C++ SOAP consumer APIs

## SOAP consumer support on z/TPF – Overview of goals

- **Build upon the Web services infrastructure introduced on PUT 4:**
  - Deployment descriptors to define the characteristics of the consumer Web Service to the SOAP runtime
  - Provide multiple communication bindings to send Web Service requests
  - *Web service stubs* for building SOAP request messages
    - Analogous to Web service wrappers
  - ZWSAT command for management of consumer Web Services
  - Set of C/C++ API's to applications to call a Web Service
- **Development tooling in TPF Toolkit:**
  - Deployment descriptor creation wizard
  - Stub template creation wizard
  - Remote management of resources from RSE perspective
    - Deploy/Undeploy a Web Service

## SOAP consumer support on z/TPF - Deployment Descriptors

- A specialized XML document describing the attributes of the Web Service
  - Analogous to deployment descriptors for a provider Web Service
- The format is defined by an XML schema that is shipped with z/TPF

# SOAP consumer support on z/TPF - Deployment Descriptors

- **Elements**

- **ConsumerDeploymentDescriptor**

- The namespace universal resource identifier (URI) for each element that follows

- **Xsi:schemaLocation**

- Specifies the location of the schema that will be used to validate the deployment descriptor

- **ServiceURI**

- 1-512 character name/URI for the Web Service.
- This name will be used to by the application to call the Web Service

- **Stub**

- 4 character program name that is call to build the SOAP request message and process the SOAP response message
- Analogous to Web service wrappers

# SOAP consumer support on z/TPF - Deployment Descriptors

- **Elements Continued**

- **TransportChain**

- **HTTPTransport**

- Indicates that HTTP or HTTPS will be used to send the SOAP request message

- **MQTransport**

- Indicates that MQ or secure MQ will be used to send the SOAP request message

- **TPFTransport**

- **TPFLocal**

- Indicates that the provider of the Web Service is on the current z/TPF processor

- **TPFHost**

- Indicates the host name/IP address of the z/TPF processor that will provide the Web Service

- **UserTransport**

- Indicates that user information will be used to reach the Web Services

# SOAP consumer support on z/TPF - Deployment Descriptors

- **Elements Continued**

- **TransportAutoFailover**
  - Indicates whether the SOAP consumer support should automatically try the next transport in the chain if a transport specific error occurs
- **Operation**
  - 1-128 character name of a service method that is accessed through this Web Service
  - Multiple operations are allowed if the Web Service exposes multiple methods
- **ConsumerCodepage/ProviderCodepage**
  - Specifies message encoding on for the current z/TPF processor and the intended Web Service provider
- **Description**
  - 1-256 character string that provides a meaningful user description of the Web Service



# SOAP consumer support on z/TPF - Deployment Descriptors

- **Elements Continued**

- SOAPProcessing

- SOAPMessageHandlerChain/SOAPMessageHandler

- Indicates a list of message handlers to be called prior to sending the SOAP request messages
    - The same message handlers are called in the reverse order when a SOAP reply is received

- VerifySOAPHeaders

- Indicates if the SOAP runtime will verify the SOAP header blocks that might appear in a SOAP response message

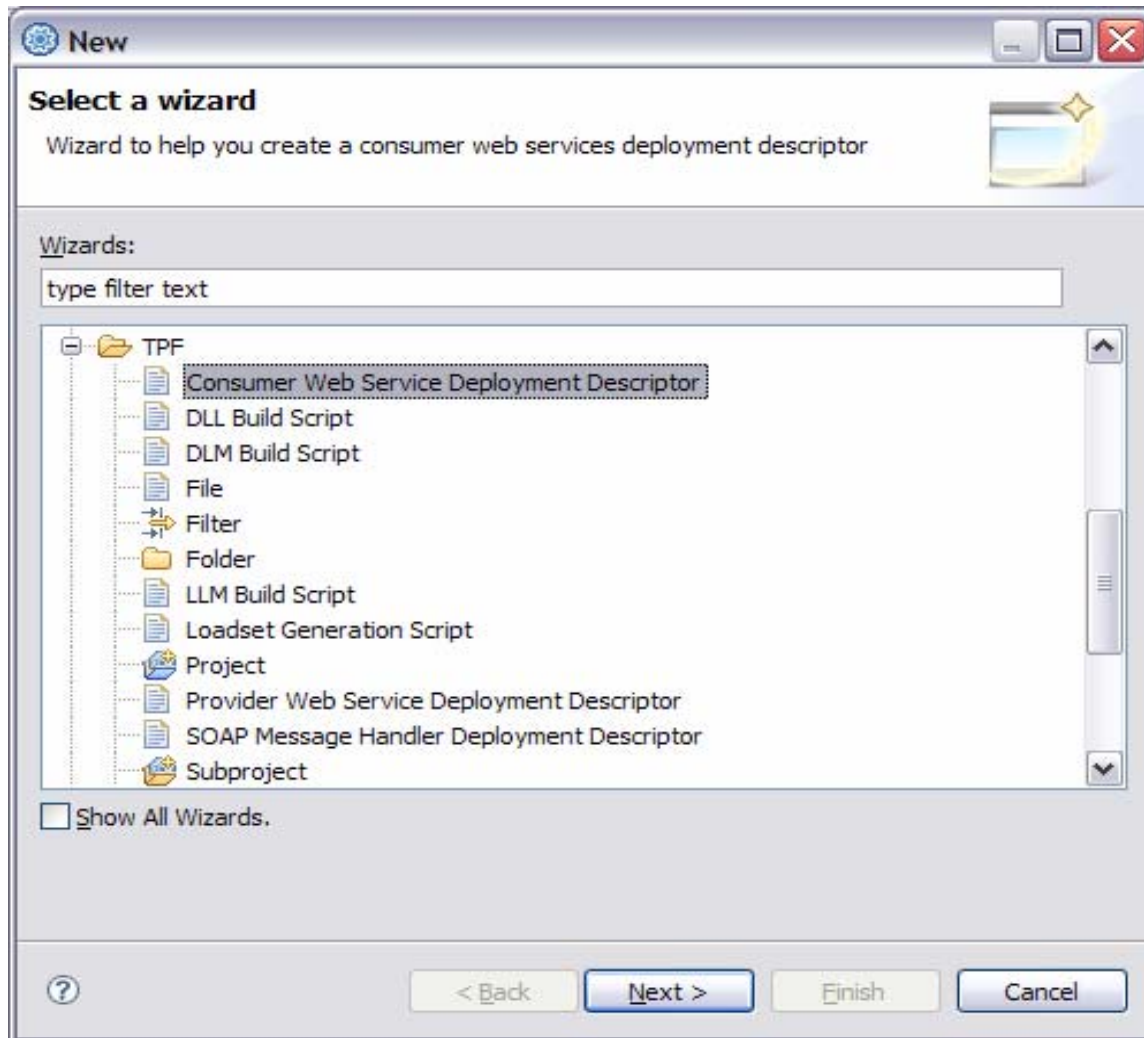
- SOAPVersion

- Indicates the expected format of a SOAP response message for the Web Service



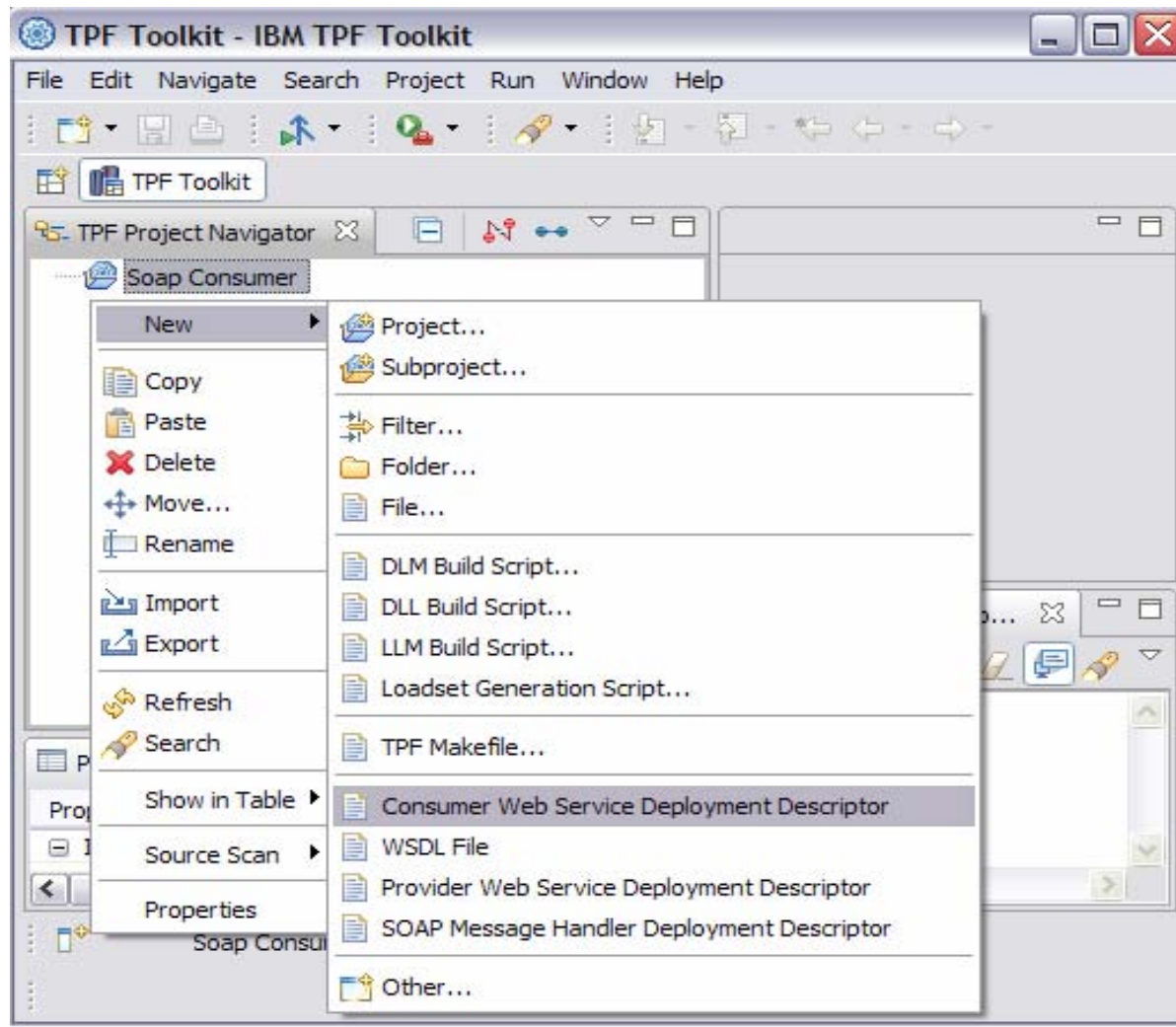
# SOAP consumer support on z/TPF – TPF Toolkit

- **Deployment descriptor creation wizard**



# SOAP consumer support on z/TPF – TPF Toolkit

- Deployment descriptor creation wizard



# SOAP consumer support on z/TPF – TPF Toolkit

- **Deployment descriptor creation wizard**

**Deployment Descriptor**  
Specify consumer web service details

URI: /Calculator

Stub: QZZ7

Description: This is a consumer calcultor service

Provider Code Page: UTF-8

Consumer Code Page: IBM-500

**SOAP Message Handlers**  
Specify the SOAP message handlers to invoke when a SOAP request is received:

Name	Required
logging	true
security	false
billing	true

Verify SOAP headers

Buttons: Add..., Edit..., Remove, Move Up, Move Down



# SOAP consumer support on z/TPF – TPF Toolkit

- **Deployment descriptor creation wizard**

**New Consumer Web Service Deployment Descriptor Wizard**

**Deployment Descriptor**  
Specify consumer web service details

**SOAP Versions**  
Specify the applicable SOAP versions:

Use system default SOAP version

Use specified SOAP versions

SOAP 1.1

SOAP 1.2

BP 1.1\_SSBP 1.0

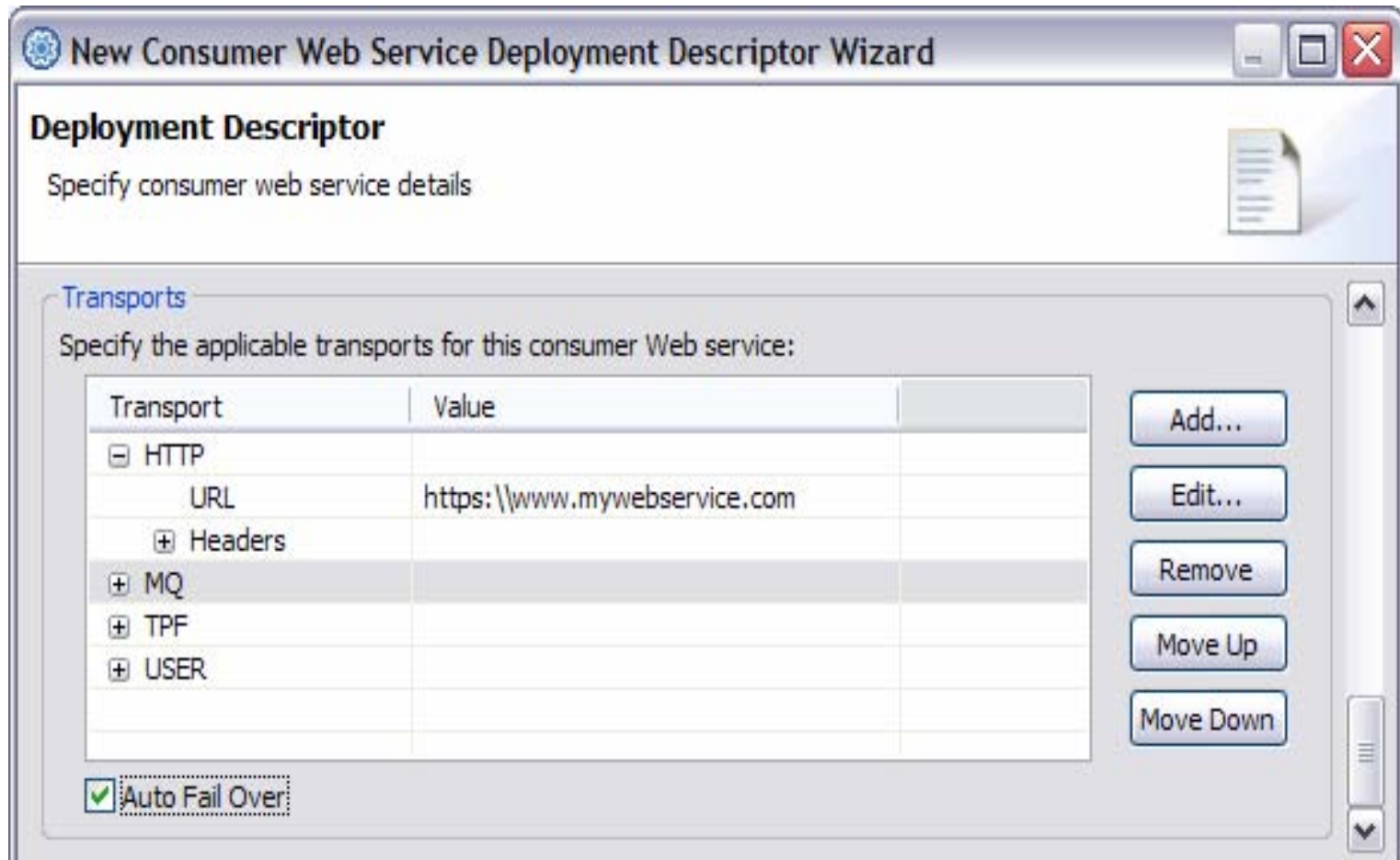
**Operations**  
Specify the name of service operations exposed in this web service:

add  
subtract  
multiple  
divide

Add  
Edit...  
Remove

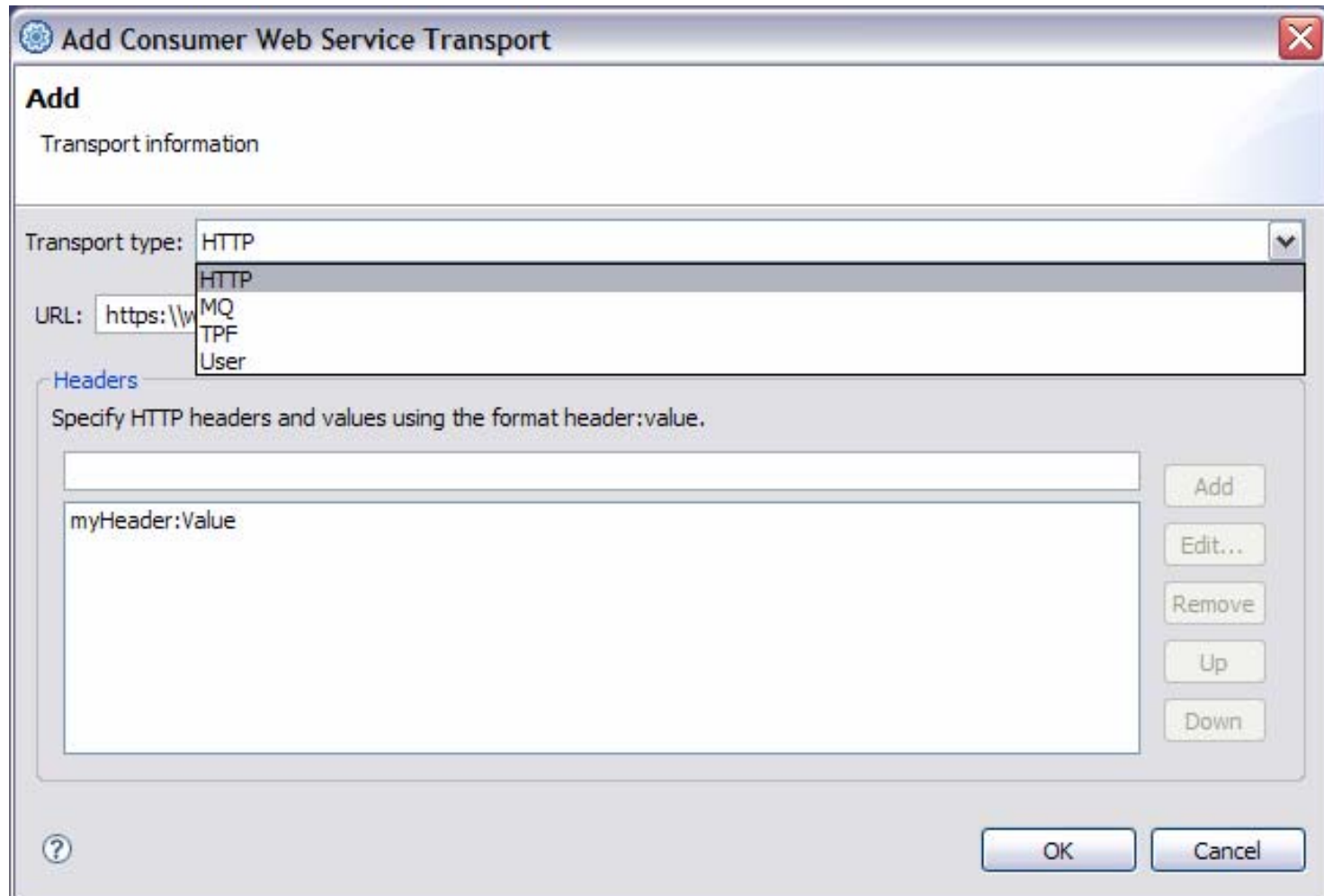
# SOAP consumer support on z/TPF – TPF Toolkit

- **Deployment descriptor creation wizard**



# SOAP consumer support on z/TPF – TPF Toolkit

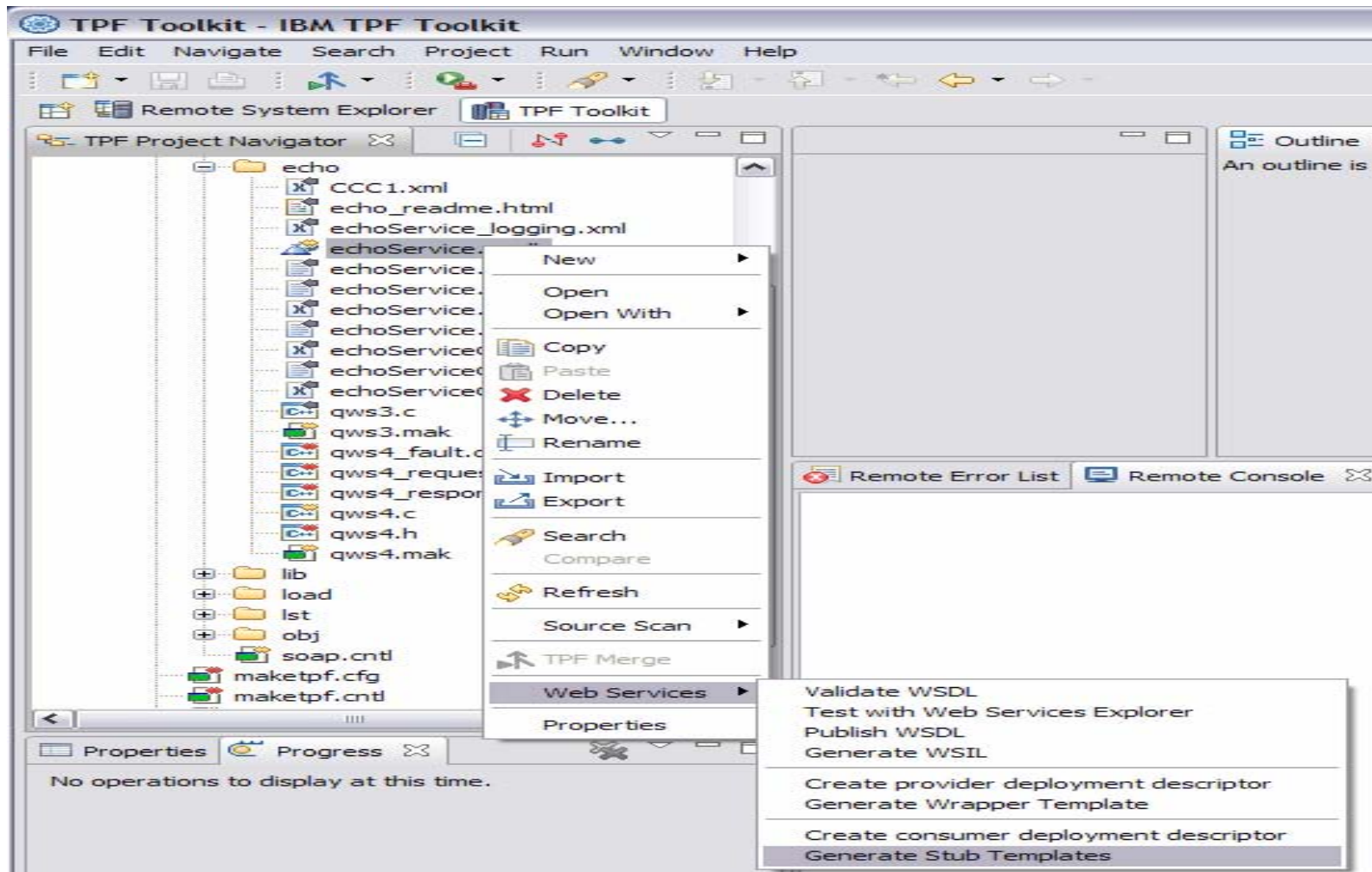
- **Deployment descriptor creation wizard**





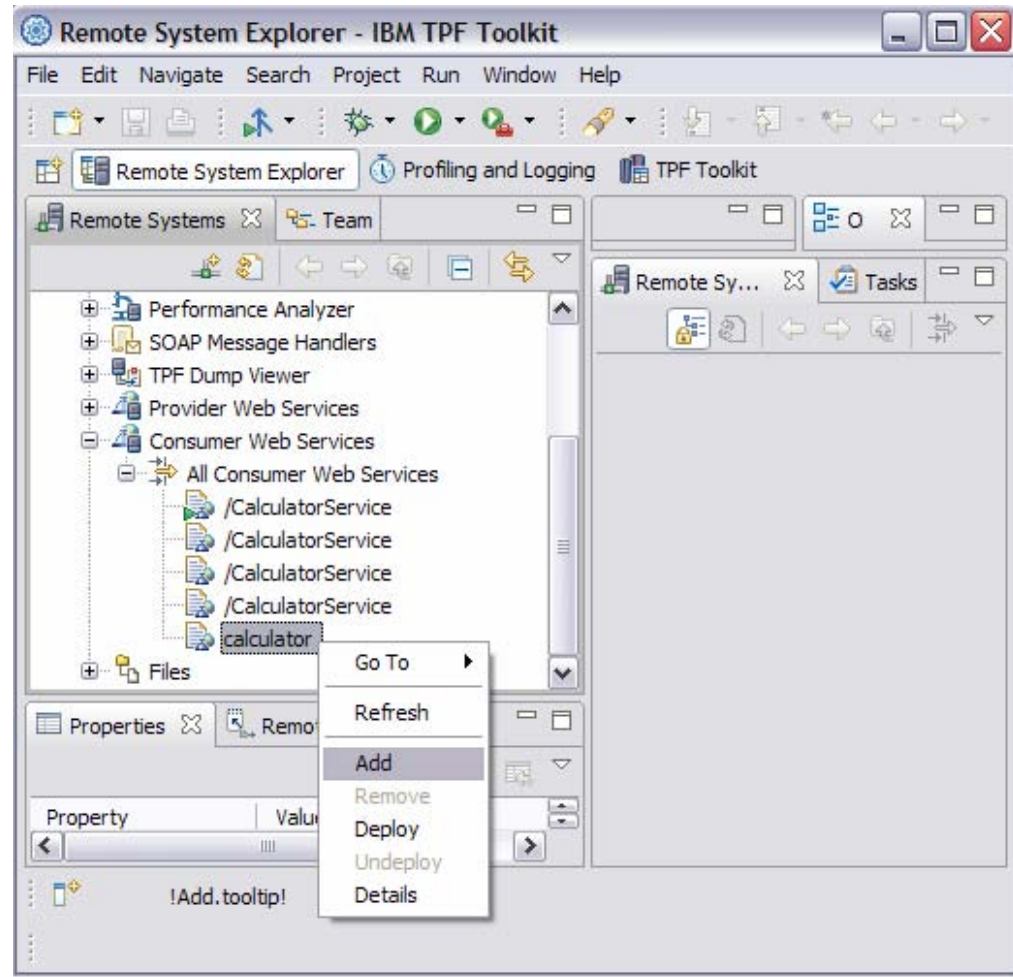
# SOAP consumer support on z/TPF – TPF Toolkit

- **Stub template creation wizard**



# SOAP consumer support on z/TPF – TPF Toolkit

- Remote management of Web Service resources from RSE perspective
  - Add
  - Deploy
  - Undeploy
  - Remove



# SOAP consumer support on z/TPF - Transports

- **HTTP Transport**

- Ability to send and receive SOAP messages using HTTP
- Added security by using HTTP over SSL (HTTPS)
- Supports the uses of HTTP headers
- Conforms to industry standard for SOAP using HTTP
- \*\* When used asynchronously, the invoking ECB will be blocked until the response is received by the z/TPF system

# SOAP consumer support on z/TPF - Transports

- **MQ Transport**

- Ability to send and receive SOAP messages using WebSphere MQ
- Added security by using MQ over SSL
  - \*\* To use SSL, the corresponding channel definitions must have already been defined as such.
  - \*\* There is no mechanism in SOAP consumer support to specify that SOAP messages should be sent across a secure WebSphere MQ
- Conforms to new industry standard for SOAP using MQ
  - [Insert link to white paper](#)
- \*\* All necessary WebSphere MQ resources must have already been defined and properly configured on the z/TPF system before deploying a consumer Web service resource.

# SOAP consumer support on z/TPF - Transports

- **TPF Transport**

- TPF to TPF Transport
  - Send SOAP requests to a different z/TPF processor
    - Processor specified by host name or IP address
- Local Transport
  - Send SOAP request to the same z/TPF processor
  - Uses a single ECB
- Performance gains
  - Bypass building a full XML document
  - Ability to include binary data in XML handle and XML document

# SOAP consumer support on z/TPF - Transports

- **User Transport**

- Enters the 4 character program specified in the deployment descriptor for the Web Service
- Allows you to use your own communications protocol for sending and receiving SOAP requests and responses
  - SOAP using FTP
  - SOAP using z/TPF File system
  - SOAP using z/TPF Mail Support
- Ability to pass a user define string to the transport
  - String is specified in the deploy descriptor for the Web Service



## SOAP consumer support on z/TPF - Stub

- 4 character program defined in the deployment descriptor for the Web Service
- Logically sits between the z/TPF application and a Web service provider
- Applications do not require knowledge of XML
  - Arranges application parameters into an XML format
  - Extracts parameters from SOAP responses to return to the application
- Ability to send request message directly and bypass the remainder of the SOAP consumer support
  - Useful when invoking a restful Web Service

## SOAP consumer support on z/TPF – Message Handlers

- SOAP message handlers provide a single, reusable interface for extending one or more consumer Web services
  - Standard SOAP features:
    - WS-Security
    - WS-Addressing
    - WS-\*
  - User-specific functionality:
    - Logging
    - Billing
- SOAP message handlers perform operations that involve SOAP Headers
  - The SOAP specifications allow for a great deal of extensibility by using the “Header” section of SOAP message



## SOAP consumer support on z/TPF – Message Handlers

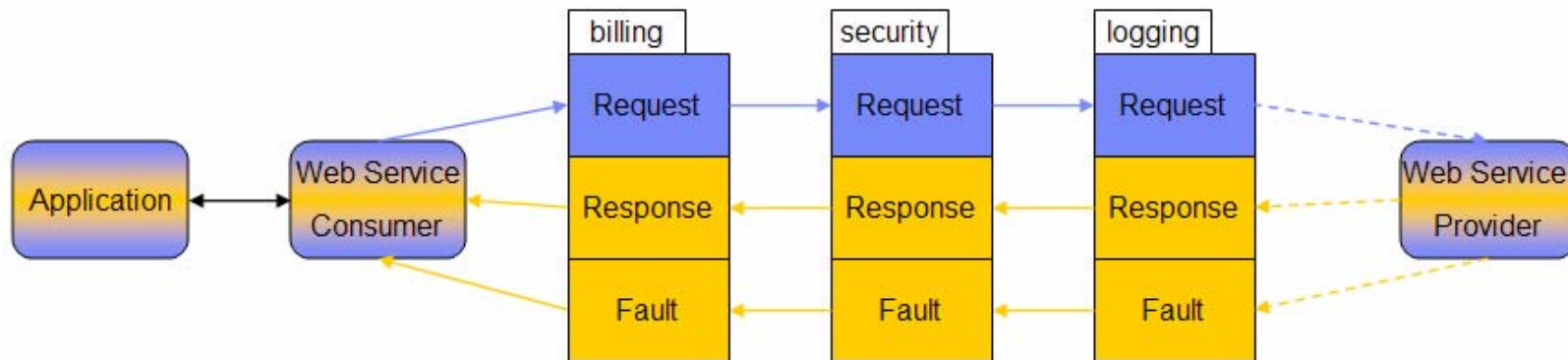
- Consumer and provider Web Services can share SOAP message handlers
- Creating SOAP message handlers for use on z/TPF requires 2 artifacts:
  - *SOAP message handler deployment descriptor*: defines the runtime characteristics of the SOAP message handler
  - *SOAP message handler program*: performs necessary processing using the outbound SOAP request and the inbound SOAP response
- Each consumer Web service that requires a SOAP message handler to be called must include the message handler's name in the SOAPMessageHandlerChain element of its own deployment descriptor

## SOAP consumer support on z/TPF – Message Handlers

- SOAP message handlers are invoked by the z/TPF SOAP consumer support in each of the following situations:
  - **SOAP request**
    - Called in the order they are listed in the Web Service's SOAP message handler chain after calling the Web Service stub (if needed)
  - **SOAP response**
    - Called in the reverse order they are listed in the Web Service's SOAP message handler chain before calling the Web Service Stub
  - **SOAP fault**
    - Called in the reverse order they are listed in the Web Service's SOAP message handler chain
- SOAP message handlers are not called when the application builds its own XML document

## SOAP consumer support on z/TPF – Message Handlers

- Flow of the SOAP message handler chain



## SOAP consumer support on z/TPF – API's

- **tpf\_soapInitHandle()**
- **Initialize the SOAP consumer handle**
  - The SOAP consumer handle is used to pass information about the Web Service
  - The Web Service is denoted by the service URI specified in the deployment descriptor
  - Sets default transport and transport specific values for the Web Service
  - User exit is provided

# SOAP consumer support on z/TPF – API's

- **tpf\_soapGetOpts()**
- **Retrieve information about the Web Service**
  - Transport information
    - Details for a specific transport
    - Details for the active transport
    - Number of transports
  - Details about most recent error
  - Last request and response XML handle
  - List of operations provided by the Web Service
  - Message encoding settings
  - Transport error recovery (TransportAutoFailover) setting

# SOAP consumer support on z/TPF – API's

- **tpf\_soapSetOpts()**
- **Alter information about the Web Service**
  - Transport information
    - Set active transport
    - Change details for the active transport
    - Change details for a specific transport
  - Save a meaningful error code
  - Store the request XML handle
  - Change message encoding settings
  - Change transport error recovery (TransportAutoFailover) setting

# SOAP consumer support on z/TPF – API's

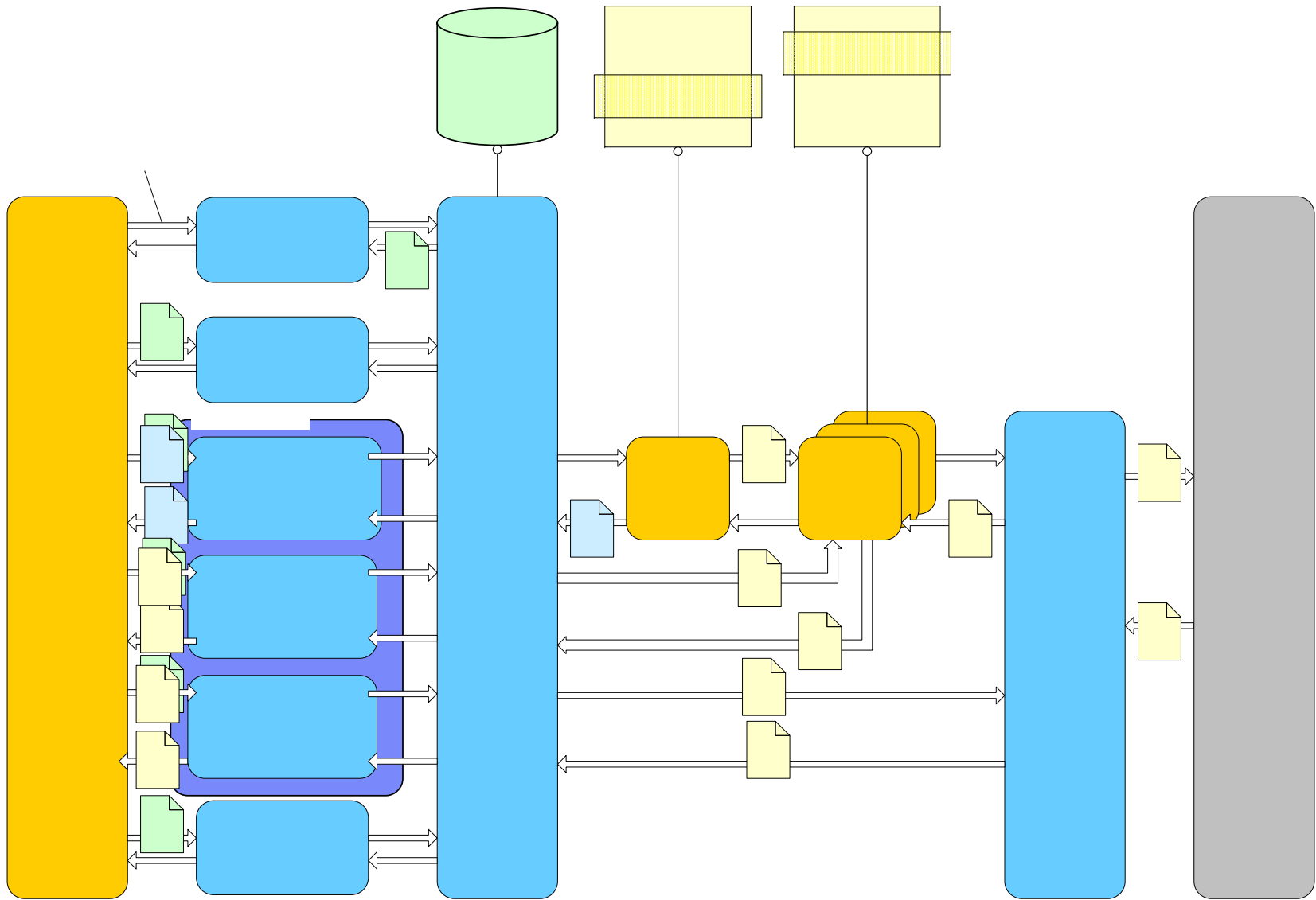
- **tpf\_soapInvokeService()**
- **Invoke the Web Service**
  - Multiple data formats
    - XML document
    - XML handle
    - Parameter list
  - Multiple message exchange patterns
    - Synchronous
    - Asynchronous
      - \*Not permitted with local TPF transport
      - \*HTTP transport is blocking until reply is received
    - One-way
  - Operation being requested for the Web Service
  - Specify a timeout value for response to be received
  - Specify a 4 character program that will later gain control for asynchronous calls
  - User data to pass to the ECB that will gain control for asynchronous calls
  - Pointer to response for synchronous calls

## SOAP consumer support on z/TPF – API's

- **tpf\_soapEnd()**
- **Terminate a SOAP consumer handle**
  - Release associated storage
  - Terminate associated XML handles
  - User exit is provided
    - Useful if additional cleanup is required as a result of user transports



# SOAP consumer support on z/TPF – Application Flow



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