IBM Integration Bus

V9.0

Failed Event Management

Utility

Introduction

V1.0 January 2015

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Overview

Description

The IBM Integration Bus (IIB) v9.0 Failed Event Management Utility (FEMU) facilitates the capture and store for resubmission of event (or messages) that for whatever reason an IIB message flow cannot deliver. The failure may be due to a transient problem with the network or a failure to validate the data content of the message for example.

Based on a group identifier (an employee id for example) the FEMU will also manage events (or messages) that are related to the original failure by queuing those messages (in order) until some resubmission action is taken against the original failure.

This means by identifying how messages are grouped, related messages can be managed and kept in order by that group identifier even in the case of a failure, whilst messages with a different value for that group identifier continue to flow uninterrupted.

The IBM products, WebSphere Process Server and WebSphere Enterprise Service Bus had a component called the Failed Event Manager that provided this style of failure management.

Pre-requisites

IIB product

The original FEMU driver is based on IIB v9.0.0.2 + iFix for the IIB Resequence Node. This iFix will roll into the IIB v9.0 product as an apar in a future fixpack. The iFix adds capability to the Resequence node such that it can operate in Retry=failure mode. This mode causes the Resequence Node to catch 'downstream' exceptions and propagate them to its failure terminal rather than simply retrying.

Single threading

If maintaining order is critical the following must be single threaded:

1. Containing message – additional instances set to 0
2. Resequence node instances set to additional instance set to 0

Failed Event Management Utility Tooling

The utility is delivered as a set of subflow that wrapper one another. In this way, the FEMToolingWrapper (the highest level subflow) is independent from the FEMWrapper i.e. an alternative tooling to that supplied can be developed and the FEMToolingWrapper alone modified to support that alternative tooling.

The FEMToolingWrapper utility supplied has been developed for use with the IIB Record and Replay capability and it's Web GUI.

The FEMToolingWrapper sends an IIB monitoring event with:

- full data bitstream
- details about the nature of the exception
- details about the origin of exception IIBNode.IIBServer.[IIBApplication].IIB Message Flow

via the IIB monitoring infrastructure to the DataCapture (and then DataStore) configurable services which store the event (with its original payload) in the Record and Replay database.

The operator then selects and reviews these failed events and determines what action should be taken. Depending the required action the operator replays the event to a DataDestination configurable service (one per supported replay action)

Supported operator replay actions

1. ReplayOnly: Replay the original failed event directing it to is original out path and release all blocked events of the same GroupID to the original out path
2. RedirectFirstOnly: Redirect the original failed event to an alternative out path and release all blocked events of the same GroupID to the original out path
3. RedirectAll: Redirect the original failed event and all blocked events of the same GroupID to the alternative out path.
4. RedirectAllPermanent: Redirect the original failed event, all blocked events of the same GroupID and any new events of the same GroupID to the alternative out path
5. ClearRedirectAllPerm: Manually clear the RedirectAllPermanent for the GroupID - this function does not propagate the event to an out path.

FEM Tooling Wrapper subflow diagram
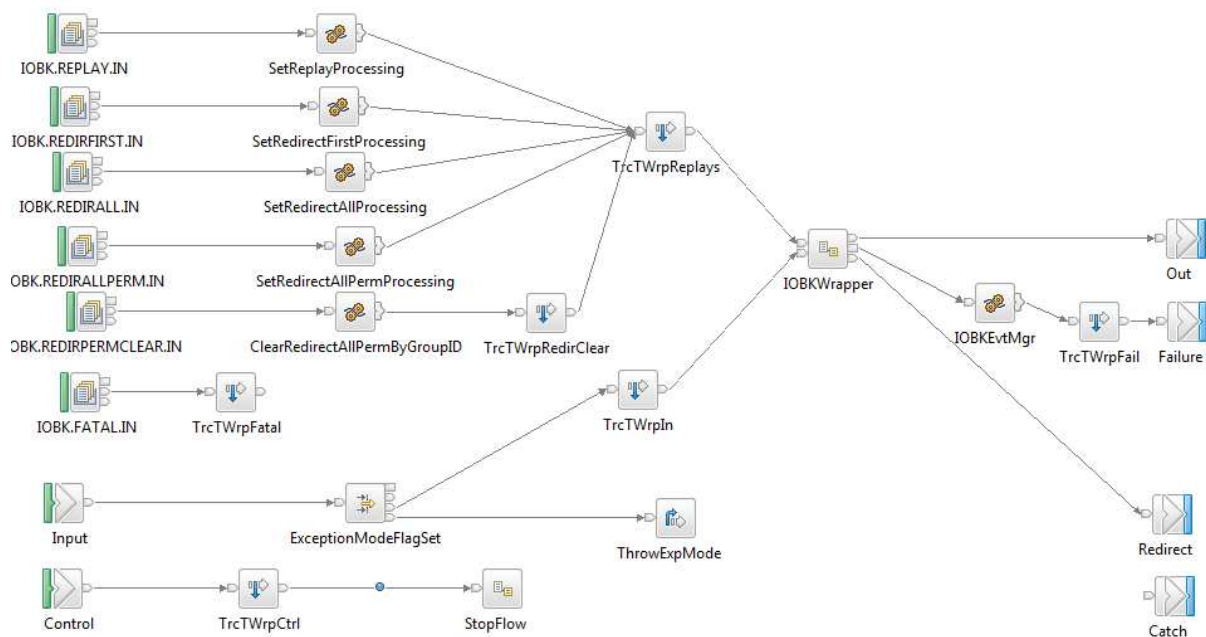
Fatal Errors

If an error occurs in a message before the FEMToolingWrapper or the FEMU itself fails the control terminal on the FEMToolingWrapper can be driven by the containing message flow. This will direct the FEMStopFlow subflow to stop the containing message.

Use Cases

1. The FEMU can be used in IIB to provide similar functionality to the WPS/WESB failed event manager.
2. The FEMU can be used to maintain the order (or sequence) of messages by group ID even in the event of a failure without effecting messages with a different value for that group ID.
3. Maintain sequence or order when messages do not have a sequence number
4. Maintain sequence or order when messages cannot be assigned a sequence number because there is no definable start or end of sequence.

Using the Utility in a message flow

The FEMU delivers a set of IIB Libraries (containing subflows) that are imported into a Workspace and referenced by the IIB Application or IIB Message flow project in which you are working.

FEM Utility subflow referencing diagram
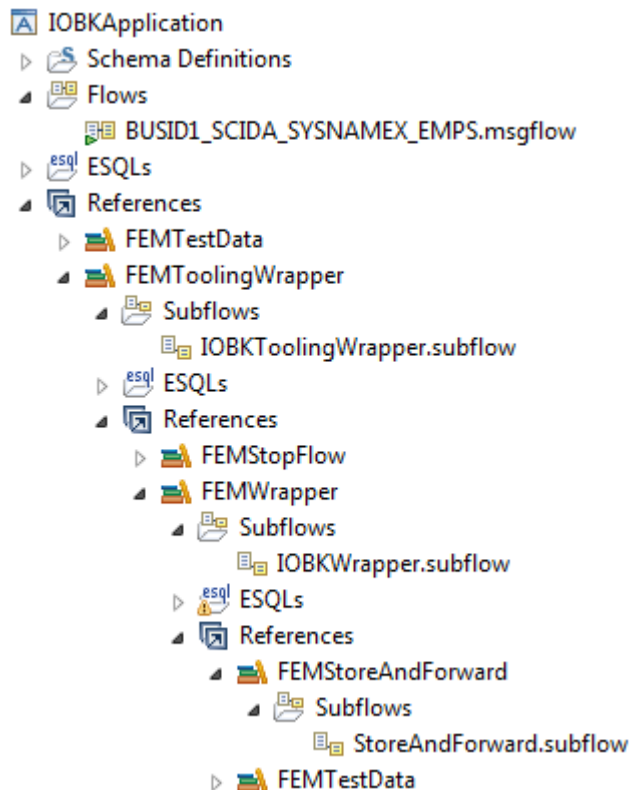
The FEMToolingWrapper subflow is included in a message flow and it references the other subflows.

Below is an example message flow, BUSID1_SCIDA_SYSNAMEX_EMPS showing how the ToolingWrapper is wire in. It is worth noting that there is a message flow naming convention in play here. Naming conventions are important mechanism that the example tooling supplied used to ensure that failed events are resubmitted to the correct message flow.

FEMU FEMToolingWrapper diagram

Wiring

The FEMU ToolingWrapper should be wired into the containing flow as early as possible to minimize the chance of a failure occurring before the FEMU capability is driven.

The containing message flow's input node should have its out terminal wired to the ToolingWrapper's input terminal.

The containing message flows's catch terminal should be wired to the ToolingWrapper's control terminal if you require that exceptions thrown back to the containing message flow be treated as FATAL and result in the message flow being stopped.

Failed Event Management Utility Wrapper

The FEMWrapper utilizes an MQRFH2 header in order to manage the state of messages flowing through the message flow.

The MQRFH2 header is inserted at the head of the data payload. It is recognized by the IIB message flow, but once leaving the message flow it "appears as data". In this way it is able to survive the "round trip" through the FEMU Tooling. In the supplied example that is the IIB Record and Replay facility.

The MQRFH2 header contains state information that is required to be maintained

- Through the tooling round trip
- From the upstream side (thread) of the StoreAndForward subflow to the downstream side of the StoreAndForward (separate thread).

The MQRFH2 header holds the following for a message

- Sequence number
- Sequence group ID
- Control Message status (Y/N)
- Replay action

The FEMWrapper wrappers the StoreAndForward subflow and manages how replayed messages and their related (blocked) messages are processed.

FEMU FEMWrapper diagram
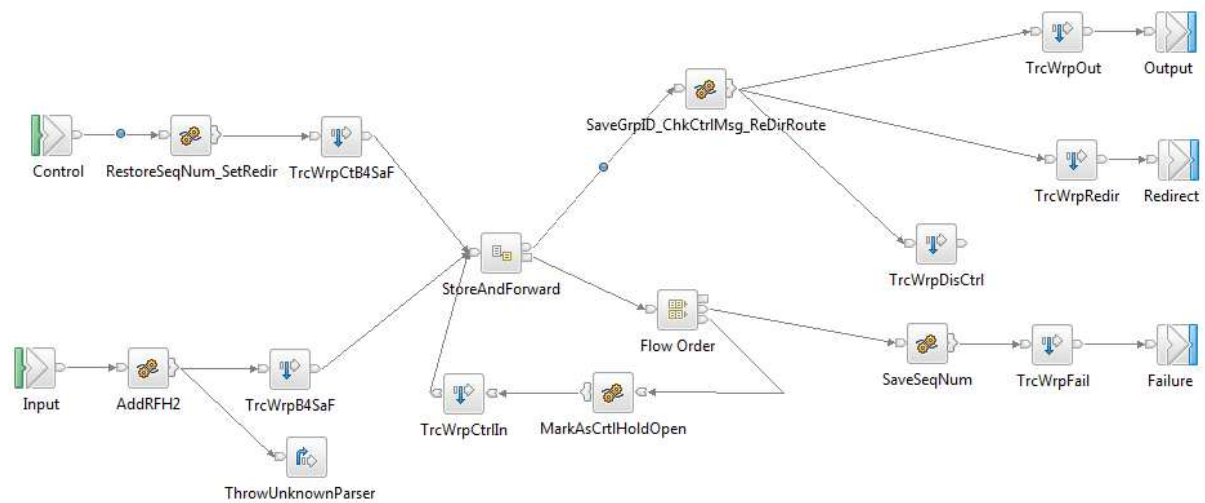
Failed Event Management Utility StoreAndForward

This subflow provides a store and forward capability based on the group ID of a message by wrappering the updated IIB Resequence Node. When the FEMU wrapper feeds a control message back into the Resequence node based on a failed event message the Resequence node will "block", queue up related messages by group ID, in order on its MQ system queues.

When an original failed event message is replayed into the Resequence node it will release the related messages in order for processing by the FEMU wrapper.

FEMU StoreAndForward diagram
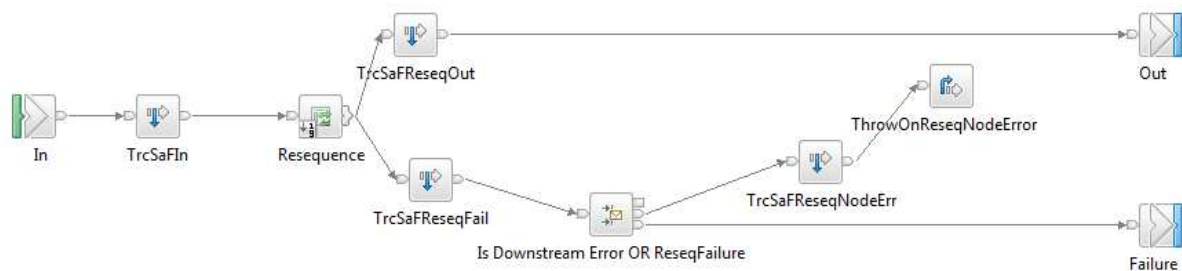
The Resequence node is configured as follows

Resequence node configuration
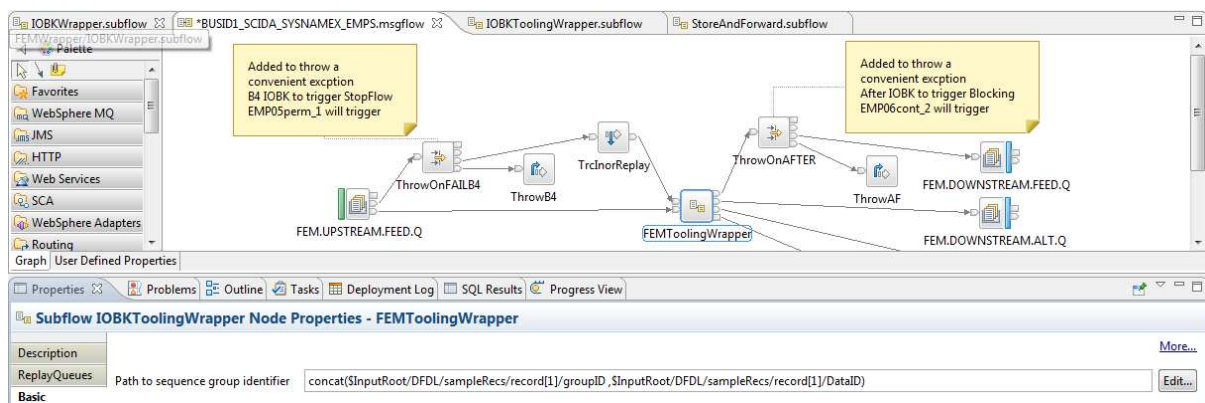
Relating messages by Group ID

The group ID that relates messages is ultimately consumed by the Resequence node via its "Path to sequence group identifier" property. This property is promoted through the nested subflows to the top level containing message flow where is it set up the developer


In this example the group ID is a combination of two fields from the message data.

Naming conventions

The FEMU subflows are deployed into a message flow and the capability has per message flow scope. Therefore, in replaying any failed event messages the operator must target the correct message flow. The failed event includes detail of its origin IIBNode -> IIBServer -> optional IIB Application -> IIB Message Flow.
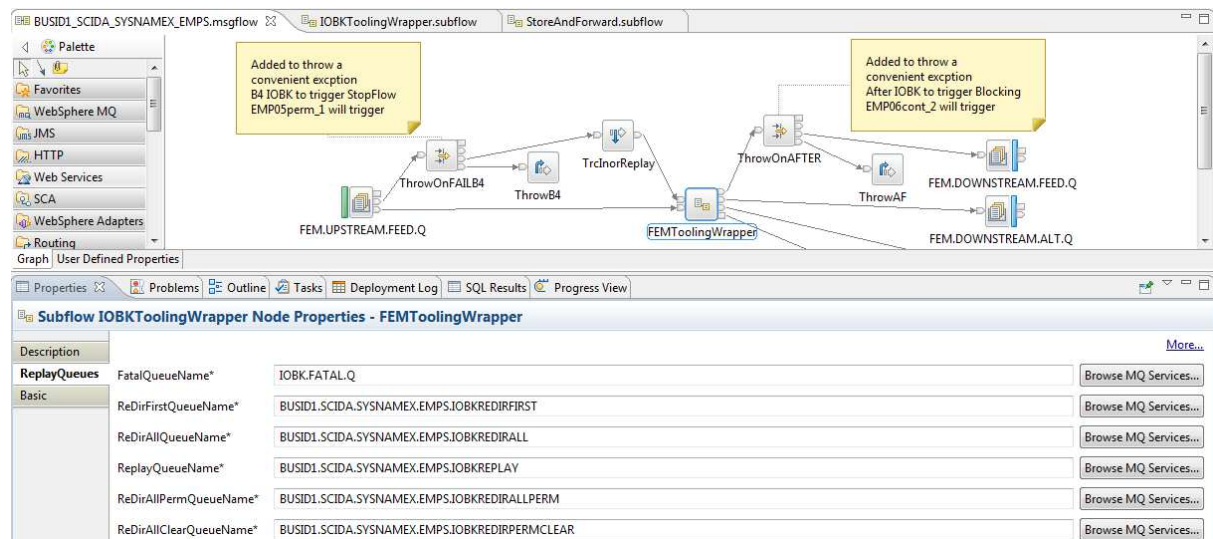
Example: IB9NODE.FEMRNR.IOBKApplication.BUSID1_SC1DA_SYSNAMEX_EMPS
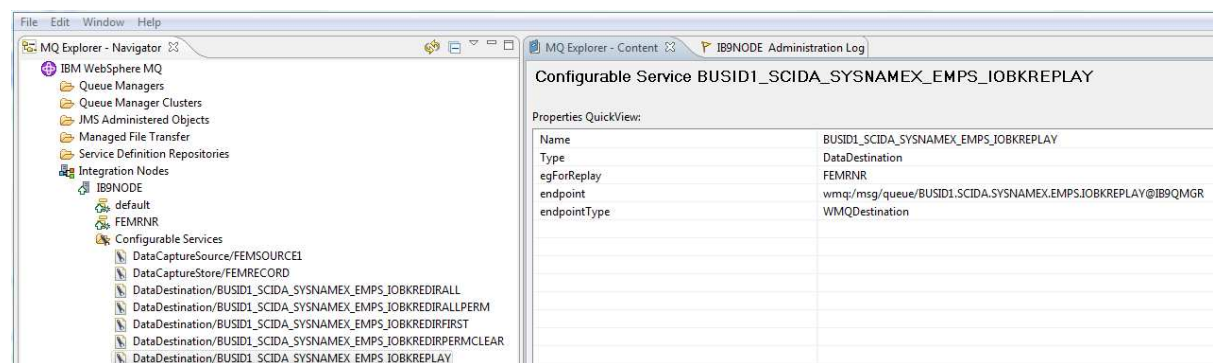
Containing Message flow
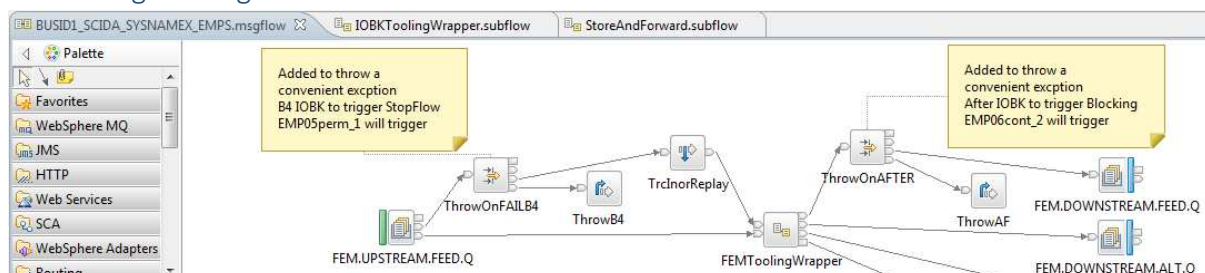
Replay MQ Queues

The replay queues reused the message flow naming convention.

DataDestination configurable services for replay

The DataDestinations reuse the message flow naming convention and hence identify the correct replay queues.

FEMU Subflow functional details

All IIB developed collateral has been documented in the Short and Long Description fields and PDFs have been generated to describe how each subflow works.

Setup scripts and test data

Setup scripts for MQ and IIB resources have been provided for example purposes.

Example test flows containing FEMU and test data to drive the examples have been supplied

Directory Structure for running tests

The test files for running tests against the FEM Utility rely on the following directory structure.

The IIB file I/O nodes in the test harness application and all trace nodes in all flows rely on this directory structure.

The key directories are c:\temp\FEM\infiles, outfiles, TestDataFiles and traces

Computer ▸ SYSTEM (C:) ▸ temp ▸ FEM ▸

Include in library ▼   Share with ▼   Burn

Name

📁 infiles
📁 outfiles
📁 Scripts
📁 TestDataFiles
📁 TestDataSingleMsgs
📁 tools
📁 traces