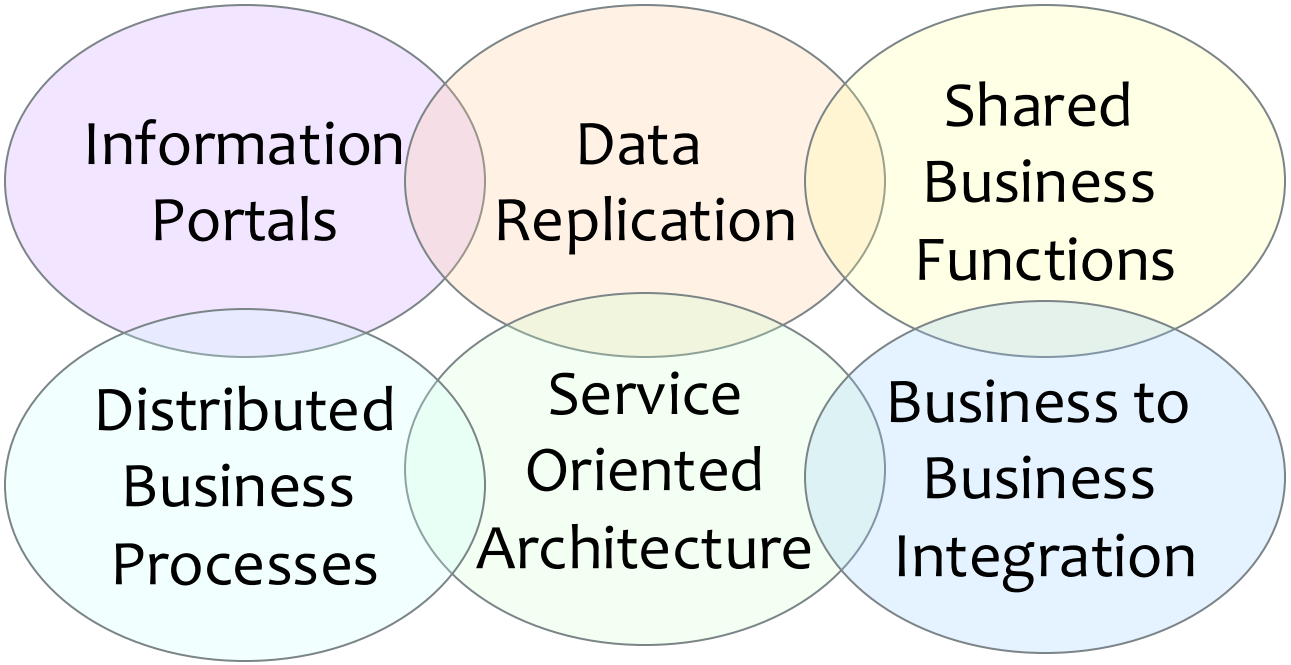
Information Builders

SOA Integration Patterns with Information Builders Technologies

Marc J. Greenberg
Vice President / Chief Architect
iWay Software

Common Integration Scenarios

How can I integrate multiple applications so that they work together and can exchange information?



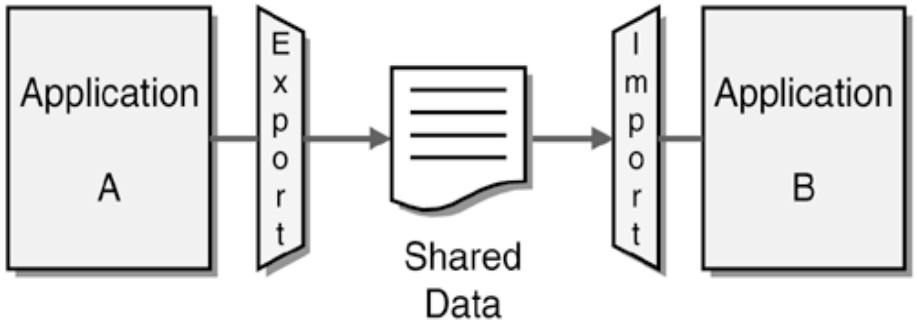
Four the Hard Way – Little Joe

Basic Integration Styles

Basic Integration Styles

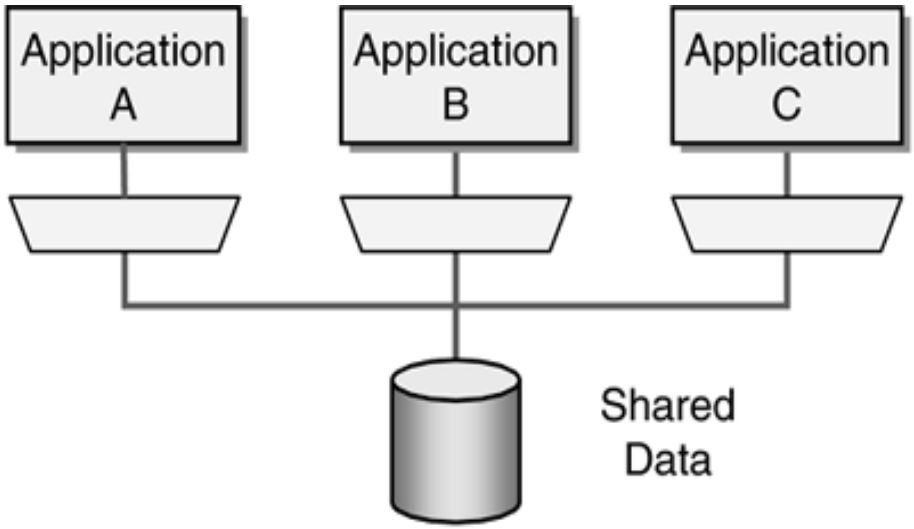
File Transfer

Applications share data by exchanging files. They use the export (producer) or import (consumer) patterns



Shared Database

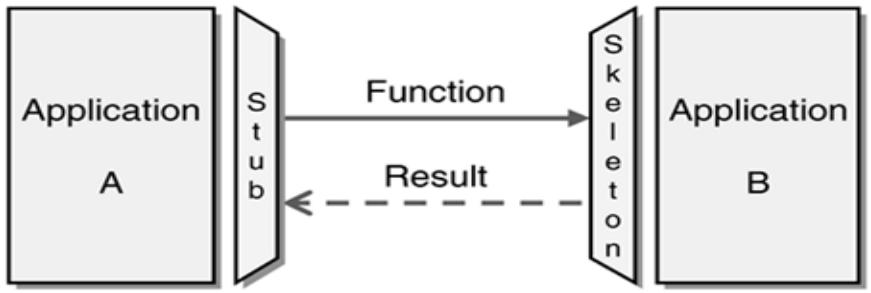
Applications store the data they wish to share in a common database.



Basic Integration Styles

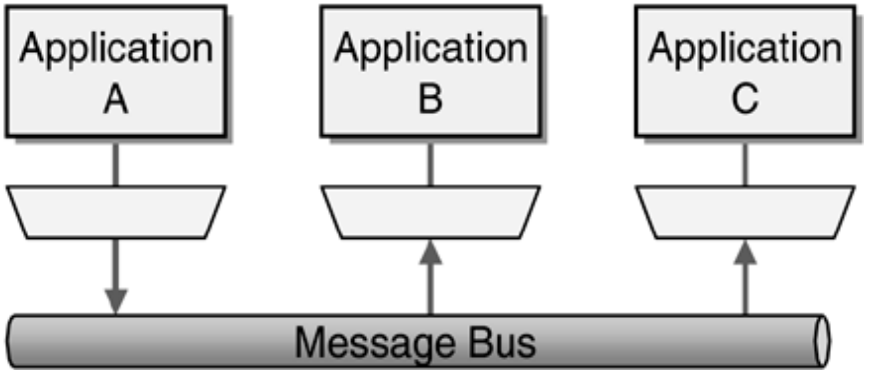
Remote Procedure

Applications share data by expose functionality that can be invoked remotely.



Message Passing

Applications share data by exchanging messages thru a common messaging system.



SOA, Working Definitions

- ***Service*** - is a entity that provides something of value.
  - Self-contained (objects), Well-defined (interfaces)
  - Independent of Consumer Context
  - Business Services (customer, order)
  - Technical Services (authentication)

- **Service-Oriented Architecture**
  - Style with distinguishing characteristics to produce desired effects.
  - Agility - the ability to gracefully adapt to changing business and environmental factors

SOA is Architecture

- An architecture is based on patterns and intent

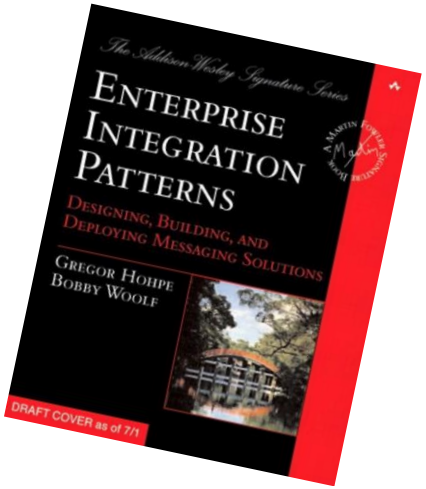



Characteristics of SOA

- Collaboration
- Stateless
- Loosely coupled
- Coarse-grained
- Reusable
- Interoperable
- Composable
- Autonomous
- Business focused
- Service contracts
- Document-orientated
- Monitored-managed

Integration Patterns

- What is an Integration Pattern?
  - "Mind-sized chunks of information"
  - Harvested, not invented
  - Higher levels of abstraction
  - Expresses the intent (why vs. how)

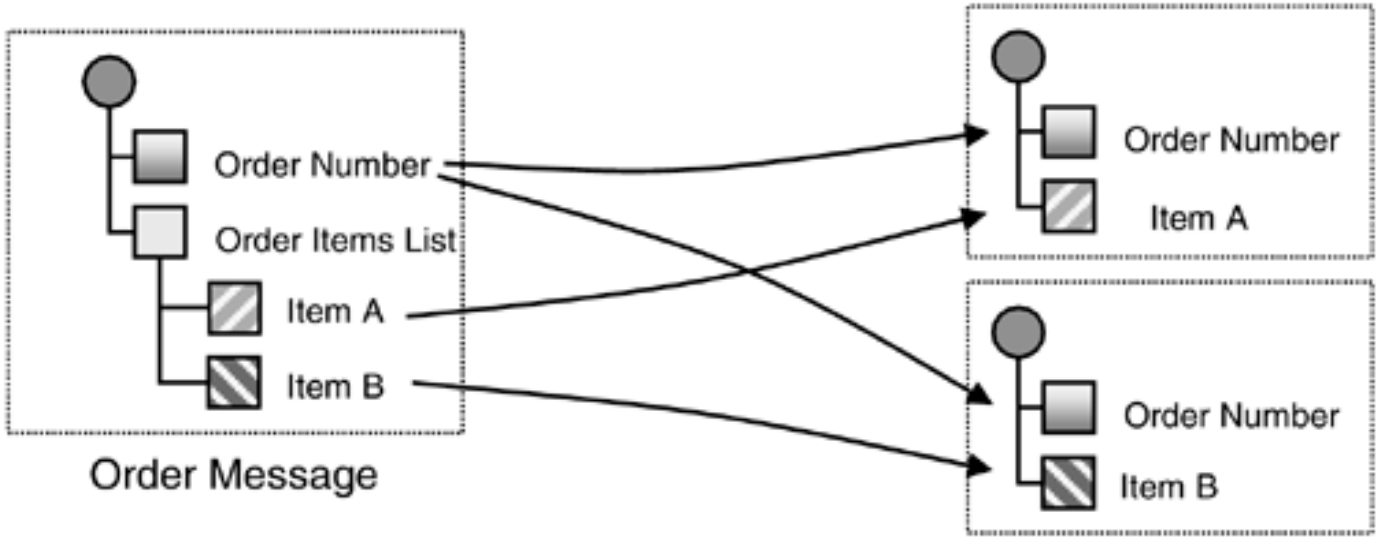


Integration Patterns By Category

- Message
- Channel
- Routing
- Transformation
- Consumer
- Management

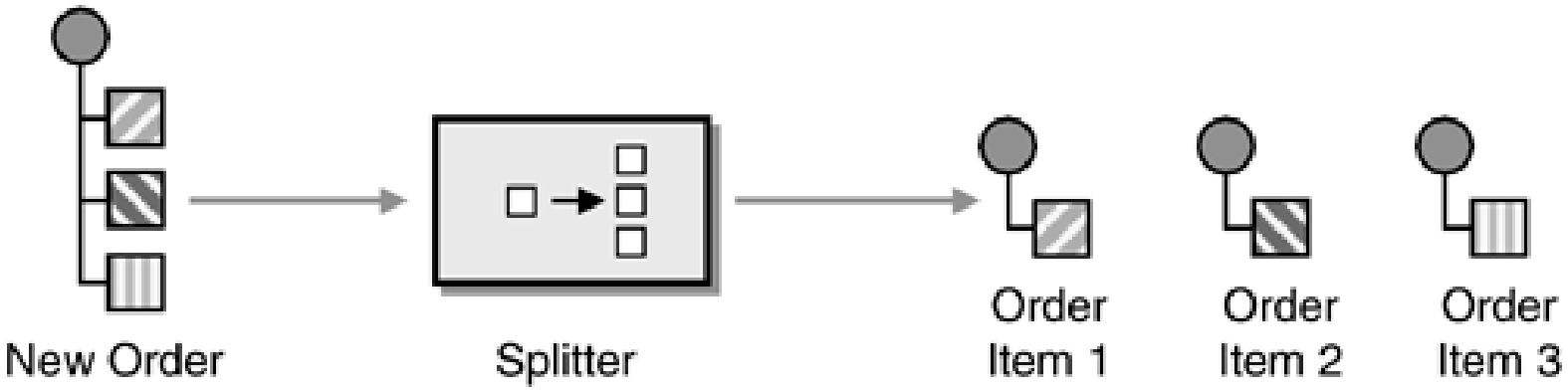
Patterns Exist to Solve Problems

How can we process a message if it contains multiple elements, each of which may have to be processed in a different way?

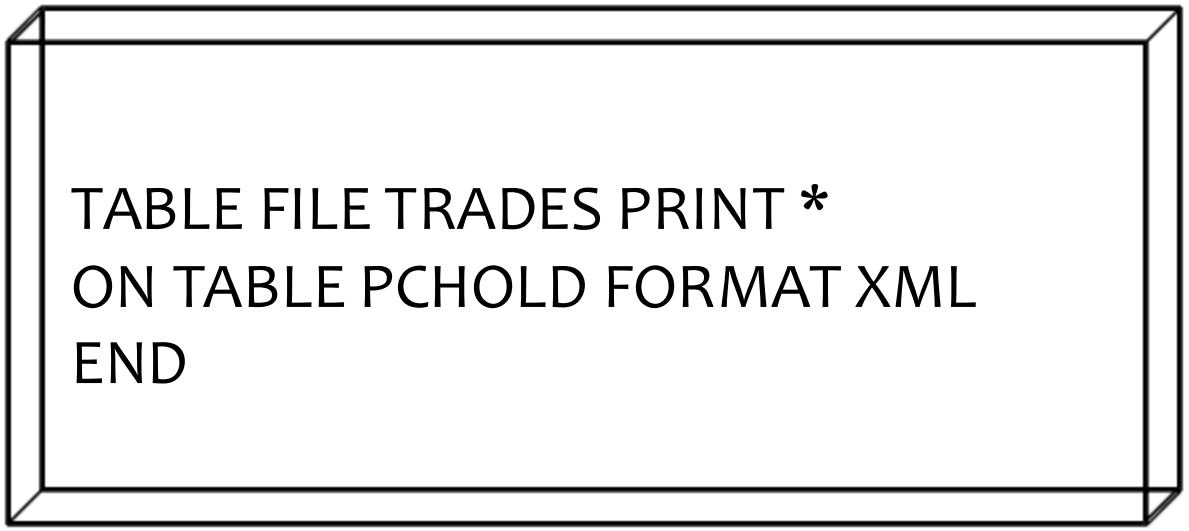


Patterns Exist to Solve Problems

How can we process a message if it contains multiple elements, each of which may have to be processed in a different way?



FOCUS To XML (Apply a Splitter)



FOCUS To XML (Apply a Splitter)

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        <col colnum="c1" fieldname="DATE_OF_TRADE" alias="DATE_OF_TRADE" datatype="date" width="10" focus_format="MDYY" description="Date of
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          <td colnum="c1" rawvalue="01021998">01021998</td>
          <td colnum="c2">AMERICAS</td>
          <td colnum="c3">CENTRAL AMERICA</td>
          <td colnum="c4">HONDURAS</td>
          <td colnum="c5">GOVT</td>
          <td colnum="c6">OVERNIGHT</td>
          <td colnum="c7">S</td>
          <td colnum="c8" rawvalue="331300">331300</td>
        </tr>
      - <tr linetype="data" linenum="2">
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          <td colnum="c1" rawvalue="01021998">01021998</td>
          <td colnum="c2">ASIA</td>
          <td colnum="c3">FAR EAST</td>
          <td colnum="c4">HONG KONG</td>
          <td colnum="c5">GOVT</td>
          <td colnum="c6">OVERNIGHT</td>
          <td colnum="c7">B</td>
          <td colnum="c8" rawvalue="214700">214700</td>
        </tr>
      </table>
    </report>
  </fxf>
```

FOCUS To XML (Apply a Splitter)

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      <COUNTRY>HONDURAS</COUNTRY>
      <HOLDER>GOVT</HOLDER>
      <TYPE>OVERNIGHT</TYPE>
      <BUY_SELL>S</BUY_SELL>
      <AMOUNT>331300</AMOUNT>
    </TRADE>
  </TRADES>
```

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
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  - <TRADE>
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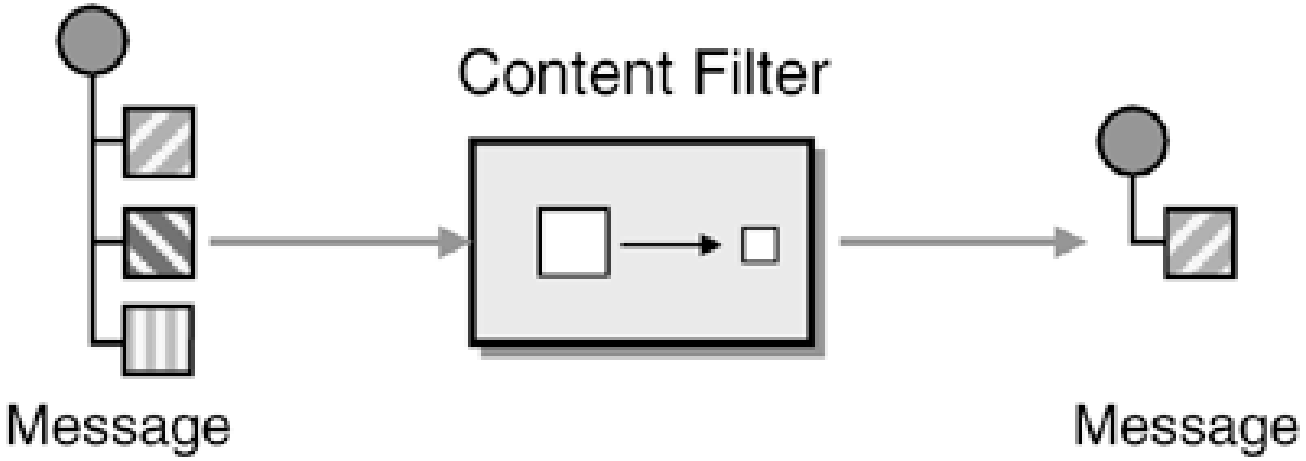
      <DATE_OF_TRADE>01021998</DATE_OF_TRADE>
      <CONTINENT>ASIA</CONTINENT>
      <REGION>FAR EAST</REGION>
      <COUNTRY>HONG KONG</COUNTRY>
      <HOLDER>GOVT</HOLDER>
      <TYPE>OVERNIGHT</TYPE>
      <BUY_SELL>B</BUY_SELL>
      <AMOUNT>214700</AMOUNT>
    </TRADE>
  </TRADES>
```

Patterns Exist to Solve Problems

- How do you simplify dealing with a large message when you are interested only in a few data items?



FOCUS To XML (Apply a Content Filter)

```
TABLE FILE TRADES

PRINT TRADER_ID
      DATE_OF_TRADE
      BUY_SELL
      AMOUNT

ON TABLE PCHOLD FORMAT XML
END
```

FOCUS To XML (Apply a Content Filter)

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
- <fxf version="1.0" data="hold">
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        <col colnum="c1" fieldname="DATE_OF_TRADE" alias="DATE_OF_TRADE" datatype="date" width="10" focus_format="MDY
          Trade" accept="" help_message="" title="Date of ,Trade" within="" property="" reference="" valign="right" />
        <col colnum="c2" fieldname="BUY_SELL" alias="BUY_SELL" datatype="char" width="1" focus_format="A1" description="Buy
          help_message="" title="Buy /,Sell" within="" property="" reference="" valign="left" />
        <col colnum="c3" fieldname="AMOUNT" alias="AMOUNT" datatype="float" width="21" focus_format="D16" description="Amo
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          <td colnum="c3" rawvalue="331300">331300</td>
        </tr>
      - <tr linetype="data" linenum="2">
          <td colnum="c0">02009</td>
          <td colnum="c1" rawvalue="01021998">01021998</td>
          <td colnum="c2">B</td>
          <td colnum="c3" rawvalue="214700">214700</td>
        </tr>
      </table>
    </report>
  </fxf>
```

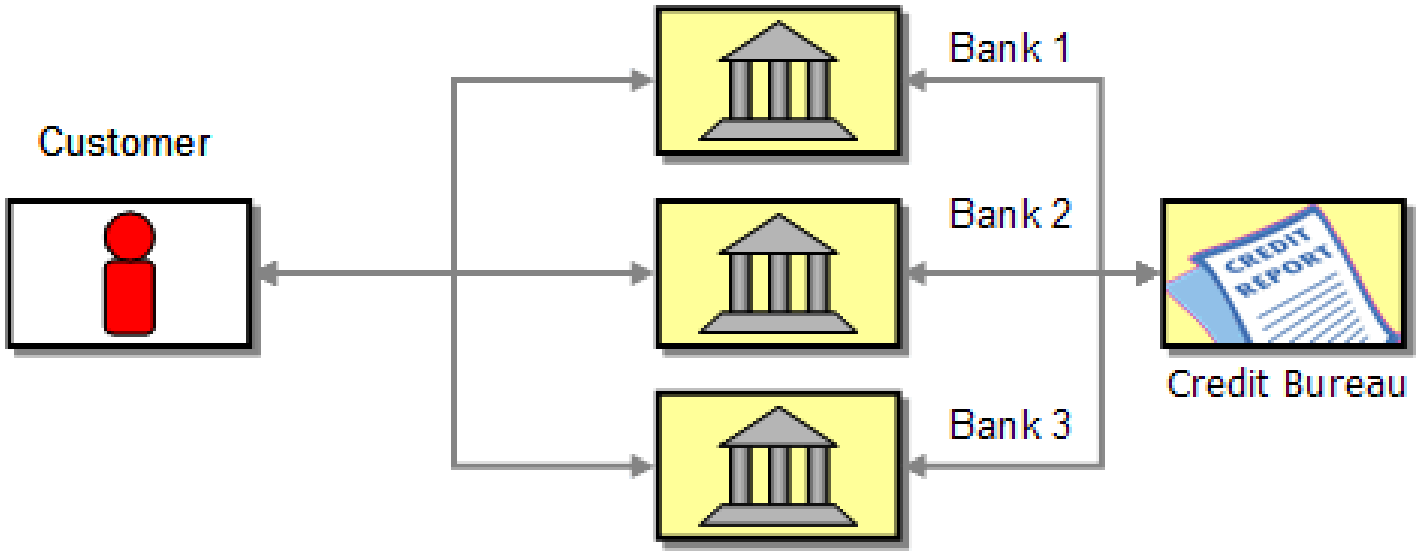
Introducing LoansForYou.Com

Don’t pursue happiness,
Create it!

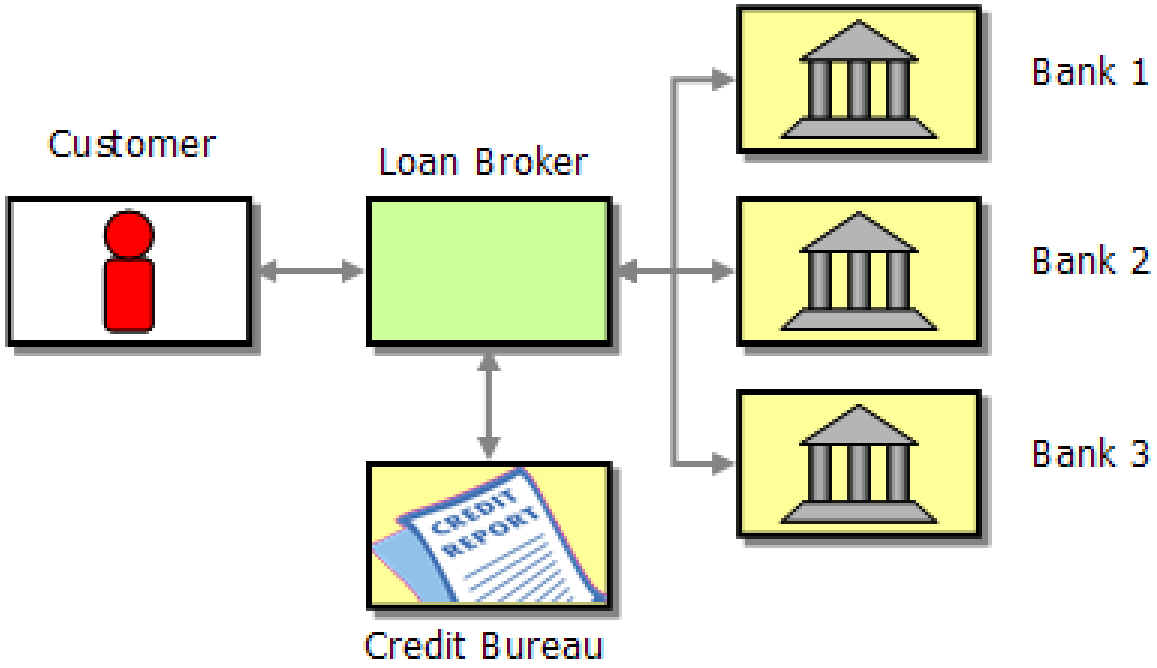
Loan Shark Free Zone

No Flesh Required

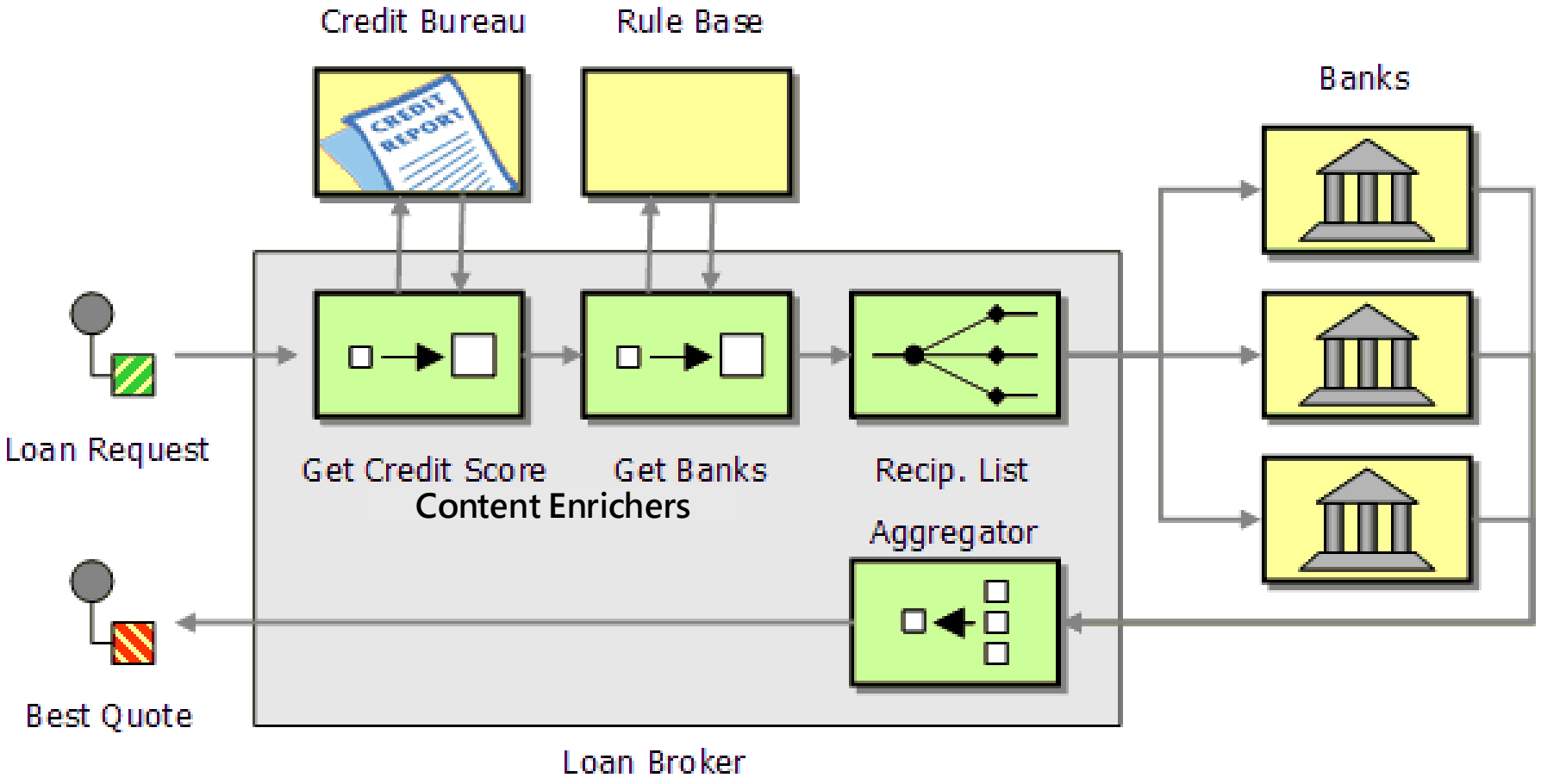
LoansForYou.Com



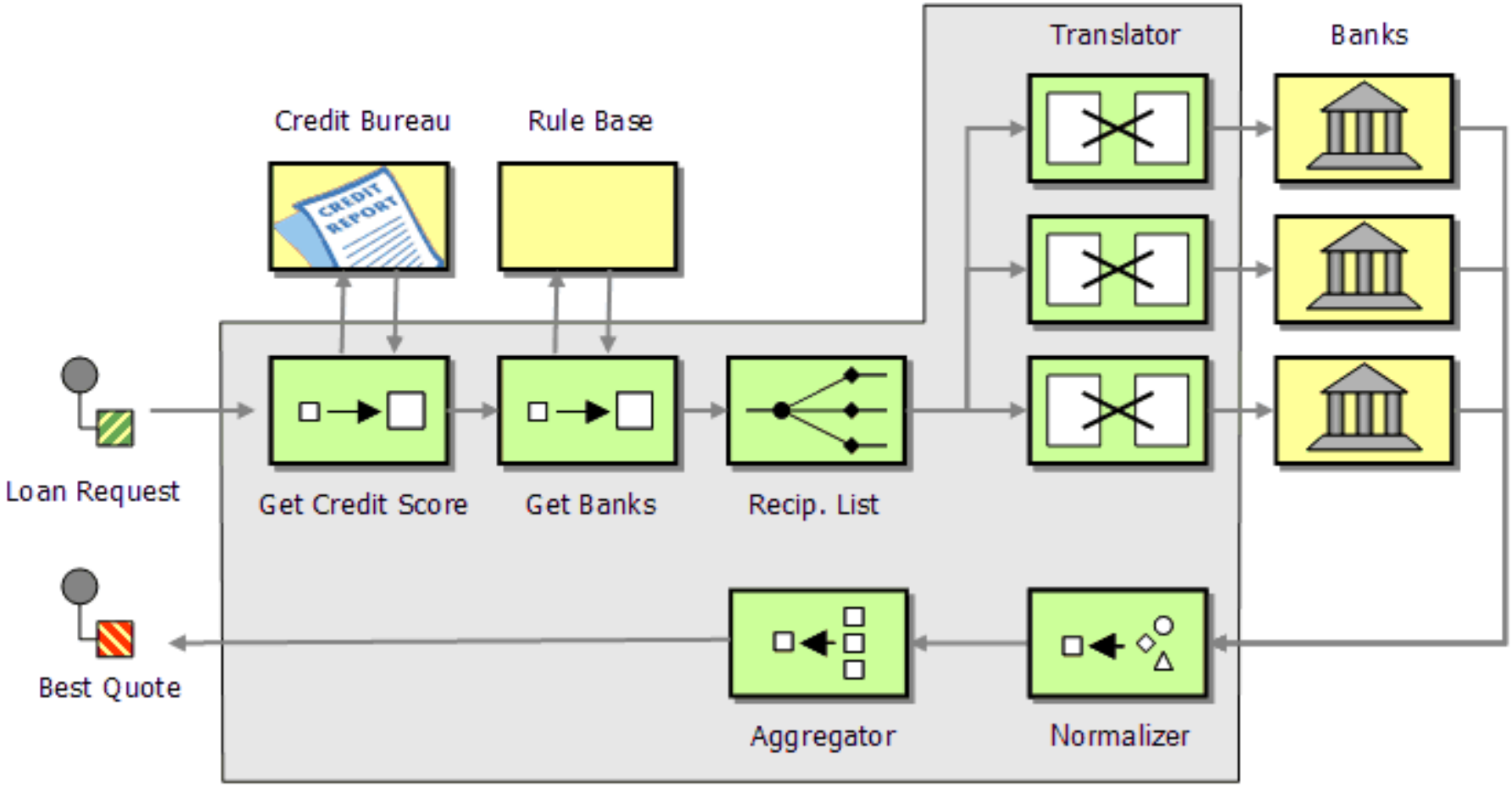
LoansForYou.Com



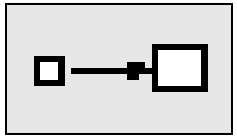
LoansForYou.Com



LoansForYou.Com

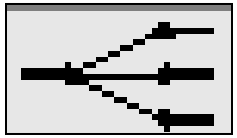


Summary of Patterns



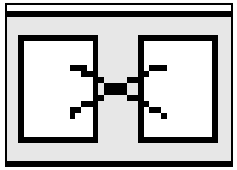
Content Enricher

How do we communicate with another system if the message originator does not have all the required data items available?



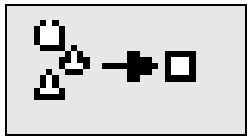
Recipient List

How do we route a message to a dynamic list of recipients?



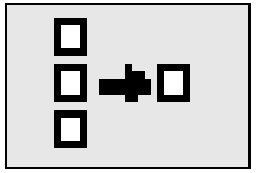
Message Translator

How can systems using different data formats communicate with each other using messaging?



Normalizer

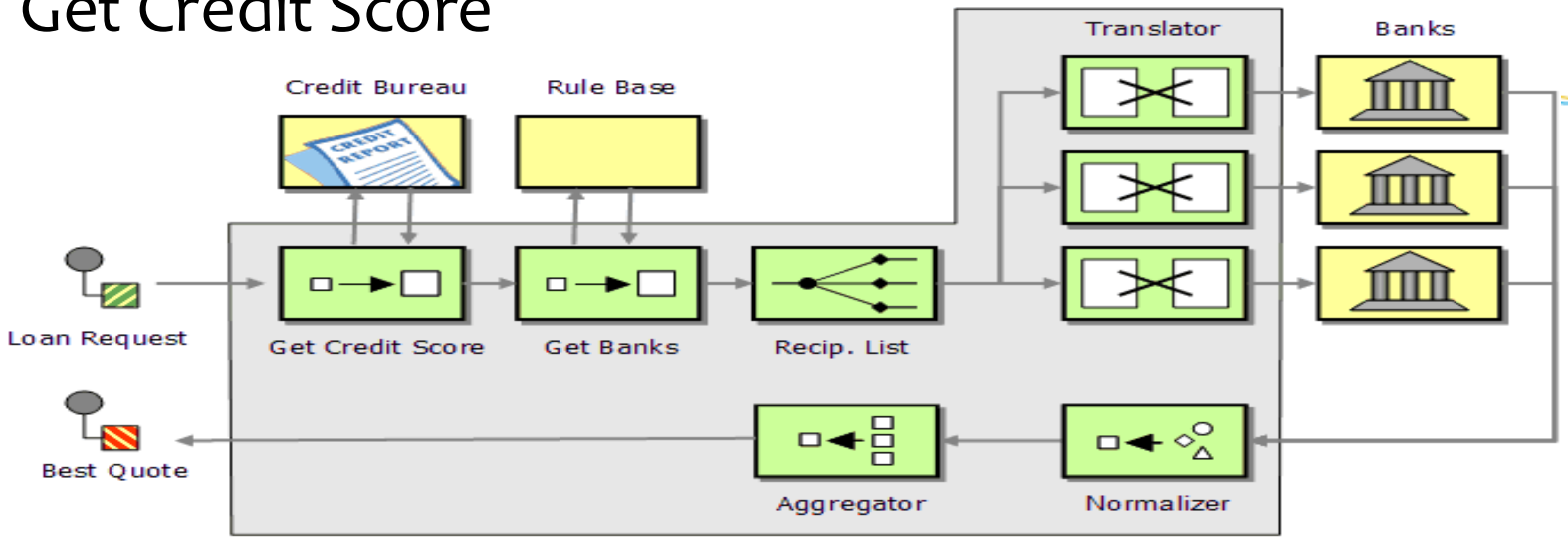
How do you process messages that are semantically equivalent but arrive in a different format?



Aggregator

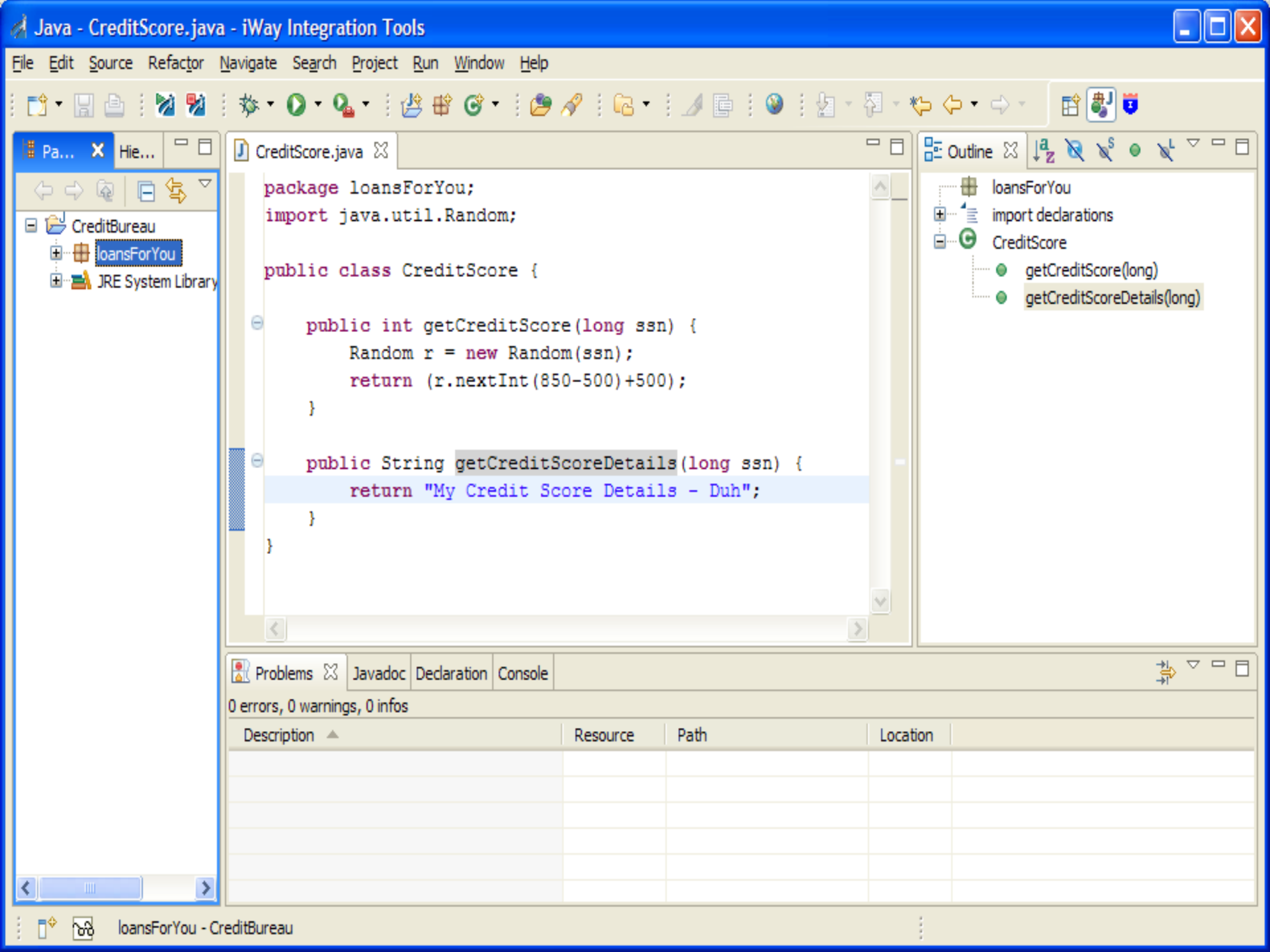
How do we combine the results of individual but related messages so that they can be processed as a whole

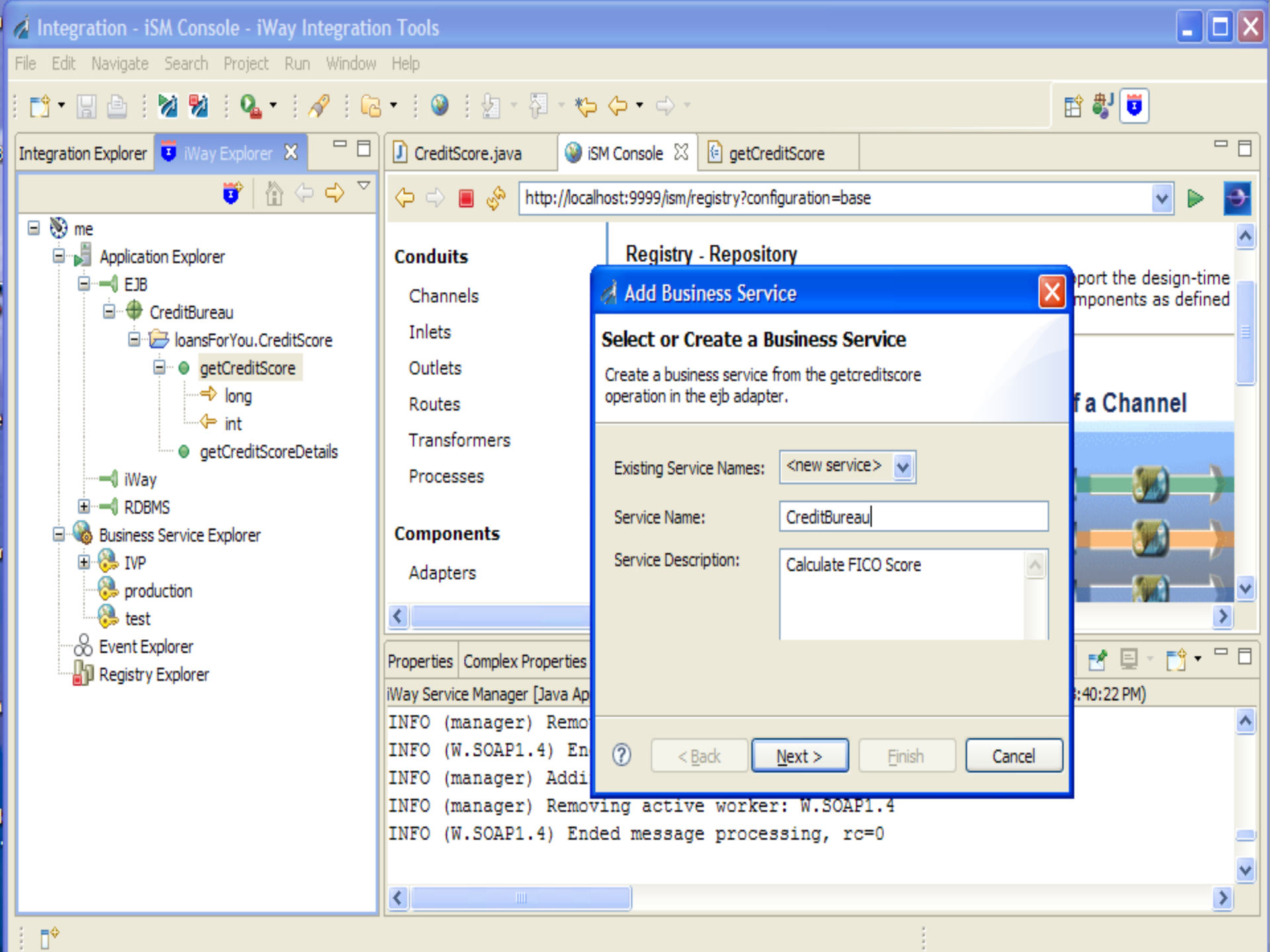
Get Credit Score

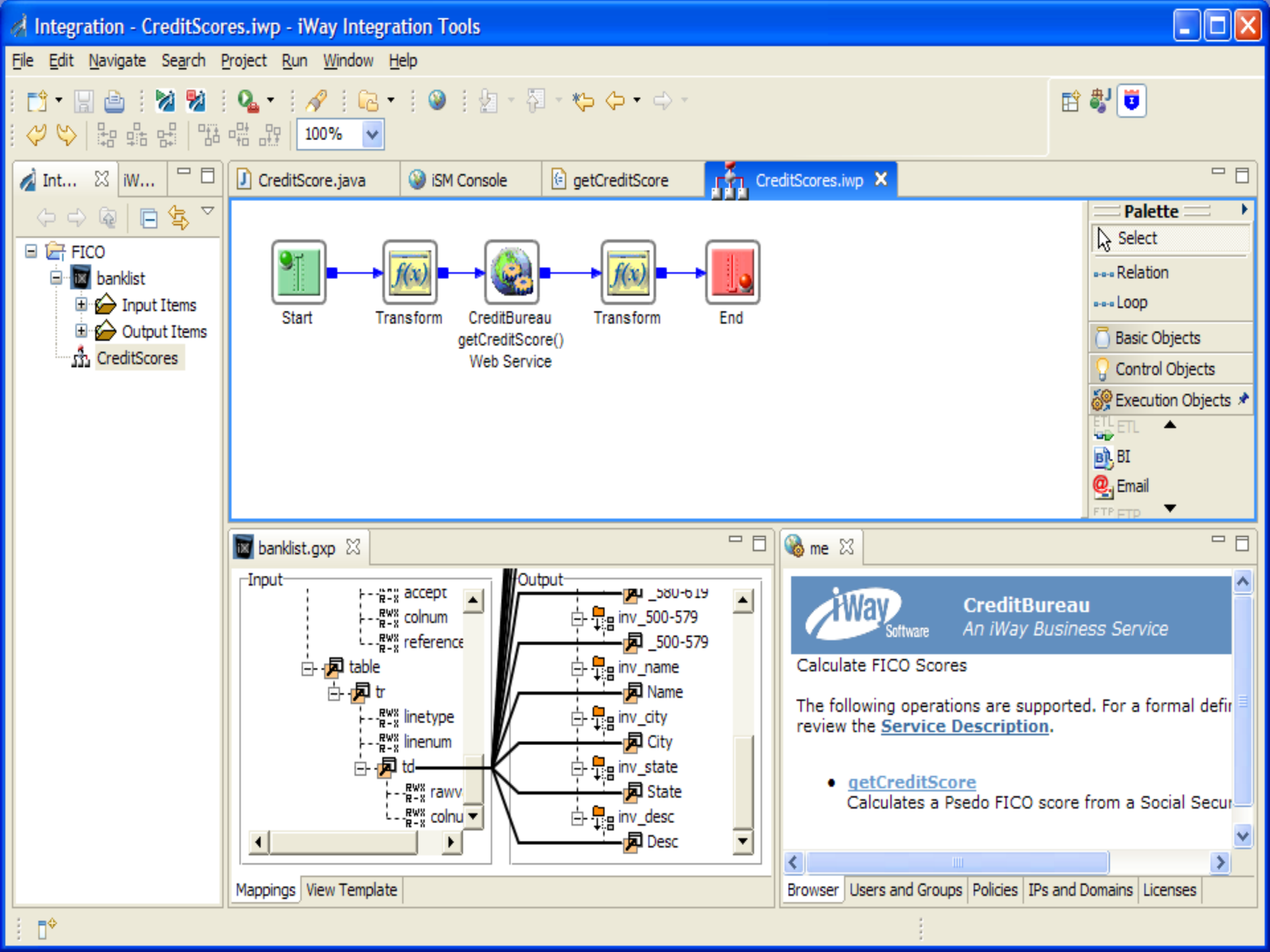


- Calls the CreditBureau service to obtain the applicants FICO score
  - getCreditScore(SSN)
  - getCreditScoreDetails(SSN)

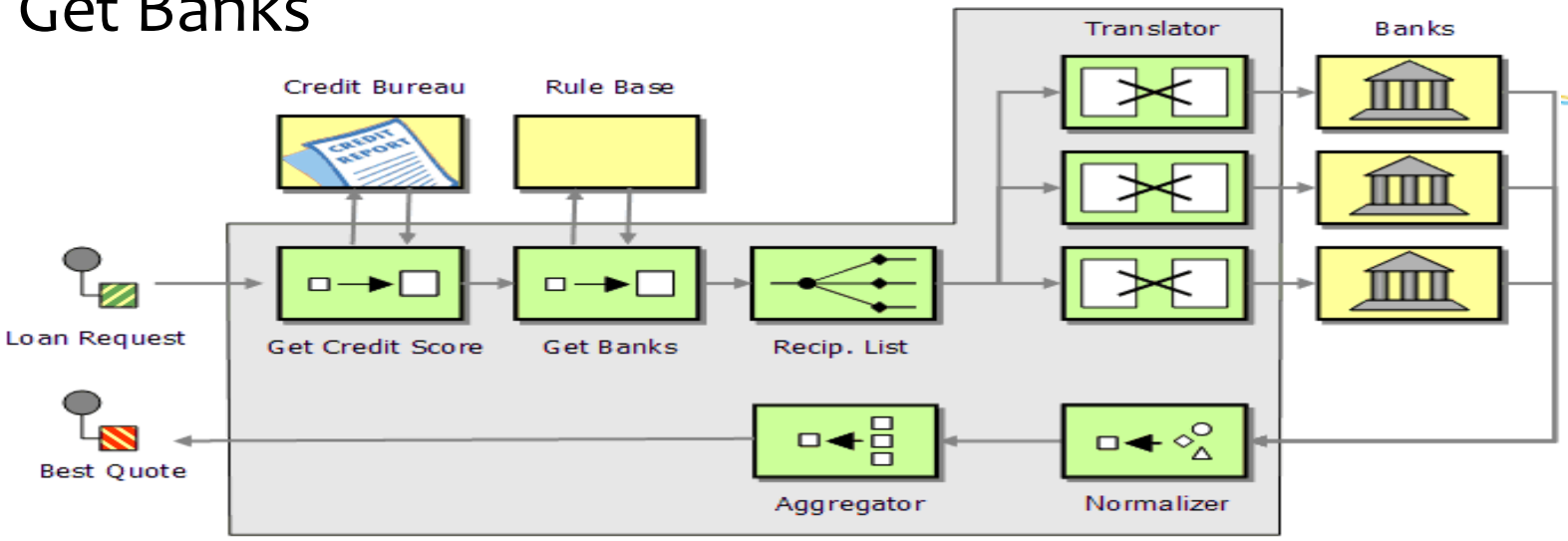
- FICO Score components:
  - 35% Your credit payment history
  - 30% Your outstanding debt load
  - 15% Your length of credit history
  - 10% Your mix of credit
  - 10% Your number of inquiries


Java - CreditScore.java - iWay Integration Tools
File Edit Source Refactor Navigate Search Project Run Window Help
Pa... Hie...
CreditBureau
loansForYou
JRE System Library
CreditScore.java
package loansForYou;
import java.util.Random;
public class CreditScore {
public int getCreditScore(long ssn) {
Random r = new Random(ssn);
return (r.nextInt(850-500)+500);
}
public String getCreditScoreDetails(long ssn) {
return "My Credit Score Details - Duh";
}
}
Outline
loansForYou
import declarations
CreditScore
getCreditScore(long)
getCreditScoreDetails(long)
Problems Javadoc Declaration Console
0 errors, 0 warnings, 0 infos
Description Resource Path Location
loansForYou - CreditBureau


Integration - iSM Console - iWay Integration Tools
File Edit Navigate Search Project Run Window Help
Integration Explorer
iWay Explorer
me
Application Explorer
EJB
CreditBureau
loansForYou.CreditScore
getCreditScore
long
int
getCreditScoreDetails
iWay
RDBMS
Business Service Explorer
IVP
production
test
Event Explorer
Registry Explorer
CreditScore.java
iSM Console
getCreditScore
http://localhost:9999/ism/registry?configuration=base
Conduits
Channels
Inlets
Outlets
Routes
Transformers
Processes
Components
Adapters
Registry - Repository
port the design-time
mponents as defined
f a Channel
Add Business Service
Select or Create a Business Service
Create a business service from the getcreditscore operation in the ejb adapter.
Existing Service Names:
<new service>
Service Name:
CreditBureau
Service Description:
Calculate FICO Score
< Back
Next >
Finish
Cancel
Properties
Complex Properties
iWay Service Manager [Java Ap
:40:22 PM)
INFO (manager) Remo
INFO (W.SOAP1.4) En
INFO (manager) Addi
INFO (manager) Removing active worker: W.SOAP1.4
INFO (W.SOAP1.4) Ended message processing, rc=0


Integration - CreditScores.iwp - iWay Integration Tools
File Edit Navigate Search Project Run Window Help
100%
Int... iW...
FICO
banklist
Input Items
Output Items
CreditScores
CreditScore.java
iSM Console
getCreditScore
CreditScores.iwp
Start
Transform
CreditBureau
getCreditScore()
Web Service
Transform
End
Palette
Select
Relation
Loop
Basic Objects
Control Objects
Execution Objects
ETL
BI
Email
banklist.gxp
Input
accept
colnum
reference
table
tr
linetype
linenum
td
rawv
colnu
Output
inv_500-579
_500-579
inv_name
Name
inv_city
City
inv_state
State
inv_desc
Desc
Mappings
View Template
me
iWay Software
CreditBureau
An iWay Business Service
Calculate FICO Scores
The following operations are supported. For a formal defi
review the Service Description.
getCreditScore
Calculates a Psedo FICO score from a Social Secu
Browser
Users and Groups
Policies
IPs and Domains
Licenses

Get Banks



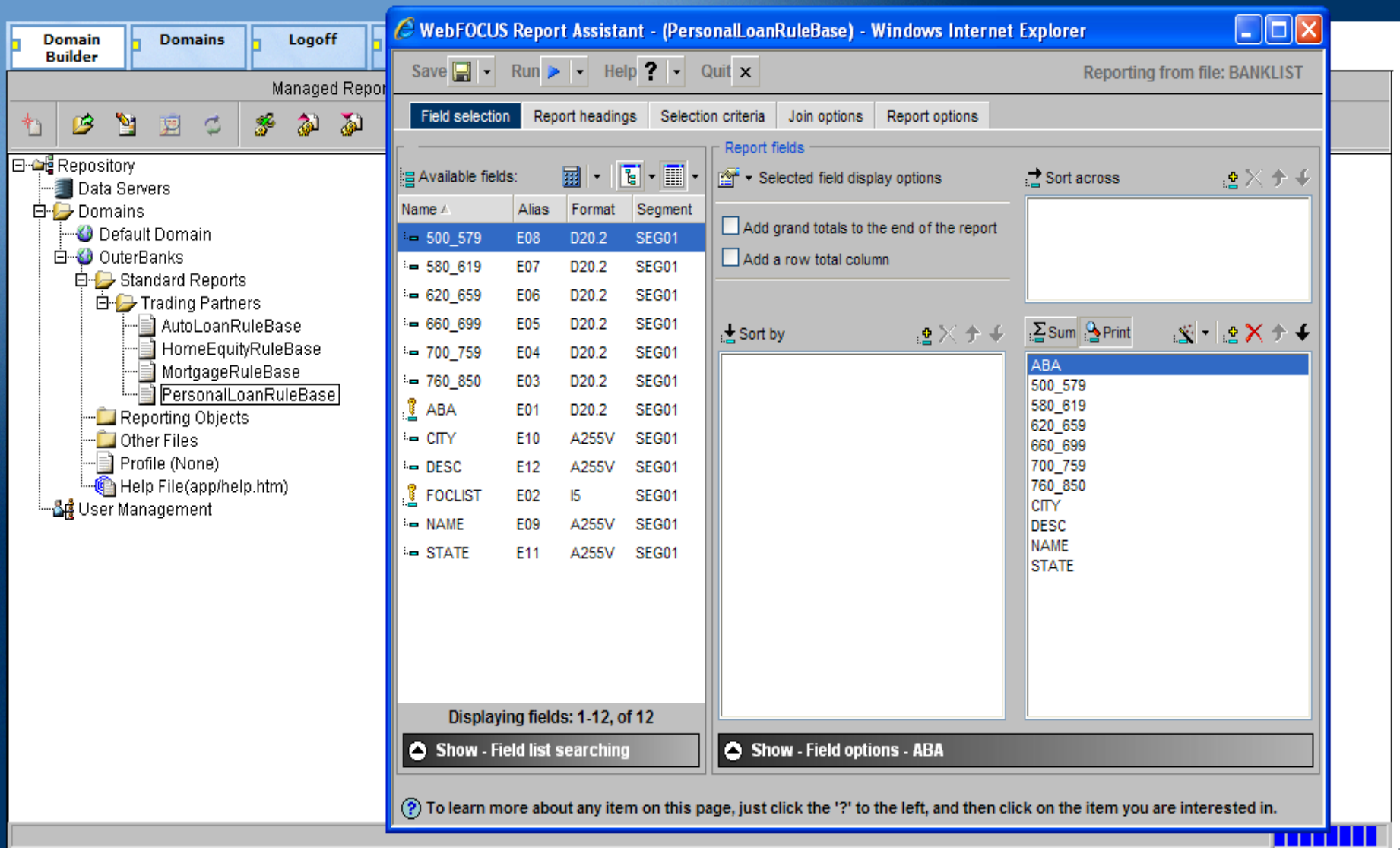
- Runs the OuterBanks service, generates a participant list
  - getBanks(FICO)
  - getBankDetails (ABA)

- Rules Base:

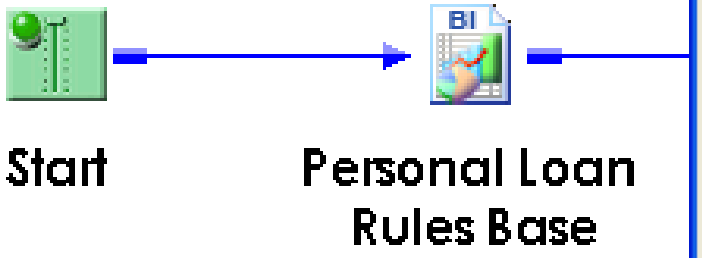
FICO	APR
760-850	5.860%
700-759	6.082%
660-699	6.366%
620-659	7.176%
580-619	8.820%
500-579	9.679%

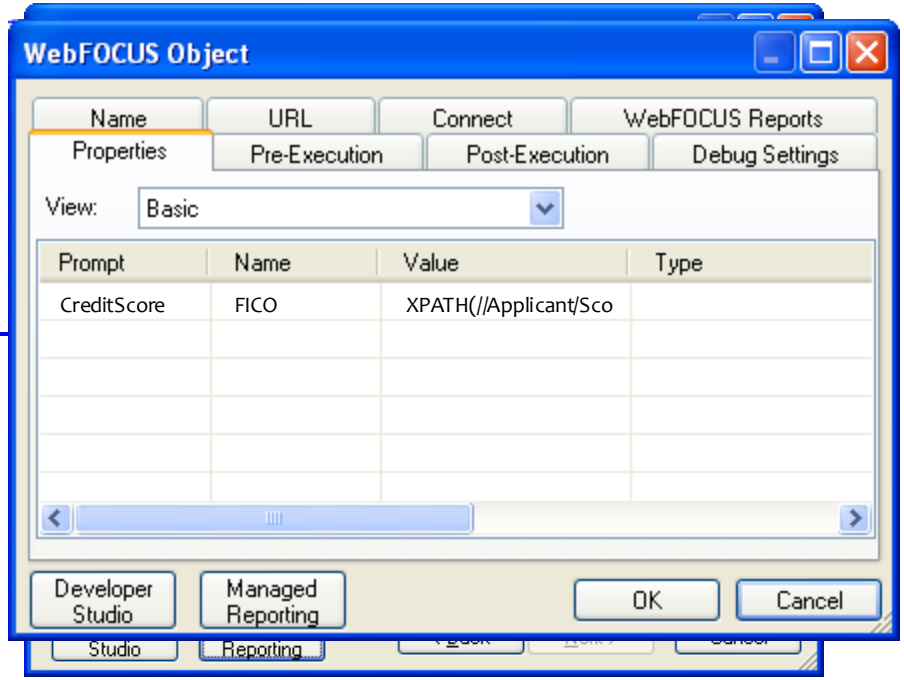
POWERED BY Information Builders

Managed Reporting

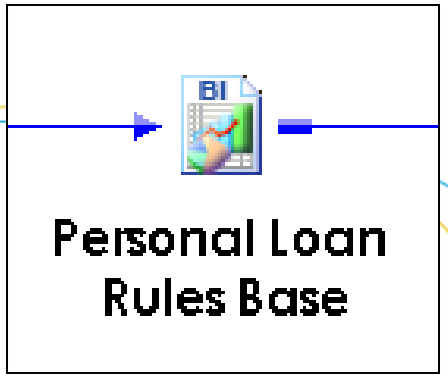


Get Banks


Start
Personal Loan
Rules Base


WebFOCUS Object
Name
URL
Connect
WebFOCUS Reports
Properties
Pre-Execution
Post-Execution
Debug Settings
View:
Basic
Prompt
Name
Value
Type
CreditScore
FICO
XPATH(//Applicant/Sco
Developer Studio
Managed Reporting
OK
Cancel

Get Banks

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          accept="" help_message="" title="" within="" property="" reference="" valign="right" />
        <col colnum="c1" fieldname="FOCLIST" alias="E02" datatype="integer" width="5" focus_format="I5" description=""
          accept="" help_message="" title="" within="" property="" reference="" valign="right" />
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          accept="" help_message="" title="620-659" within="" property="" reference="" valign="right" />
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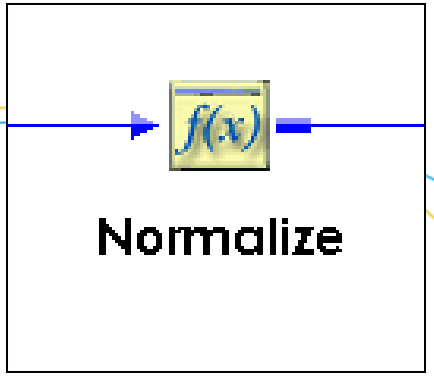
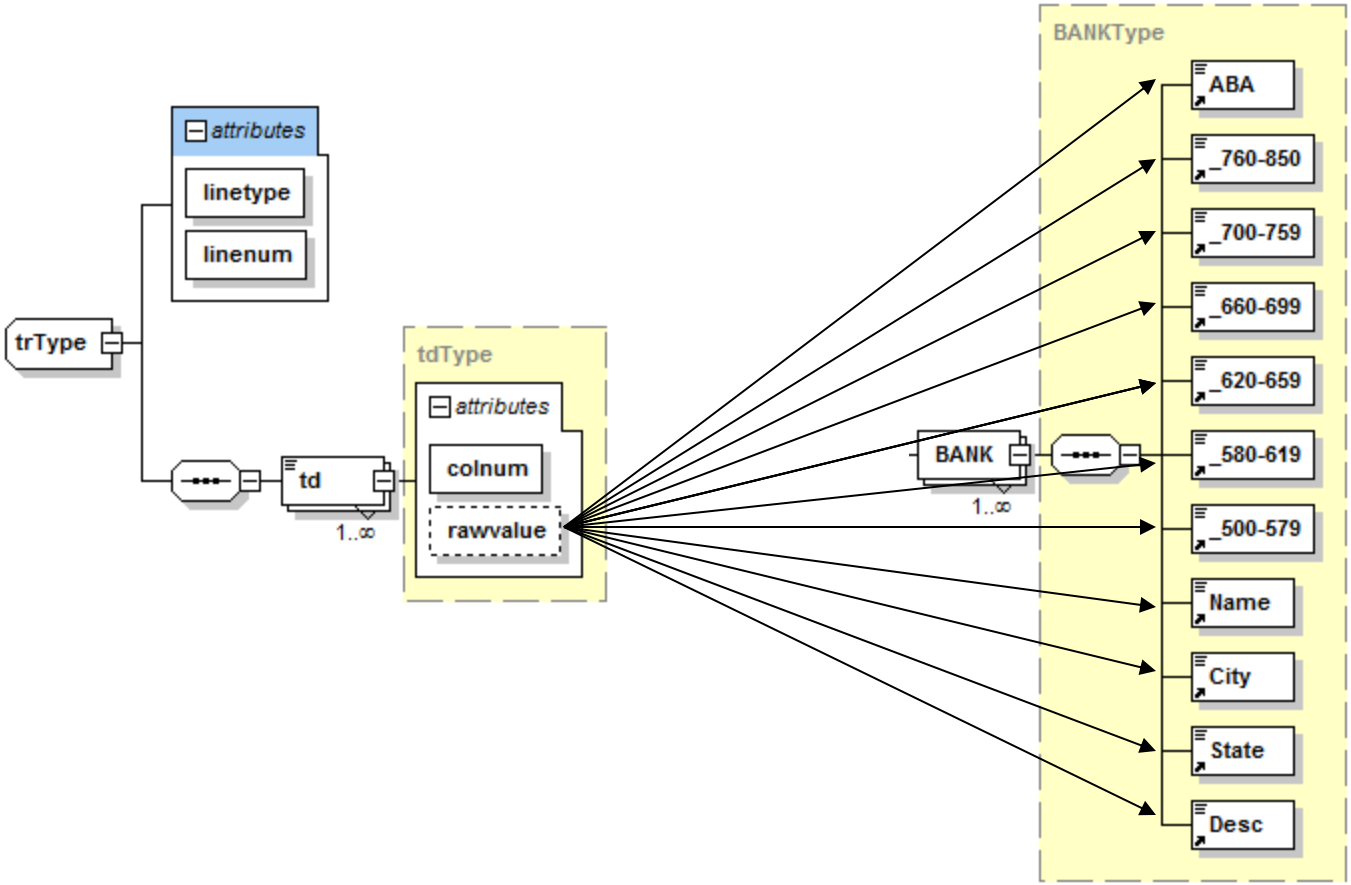
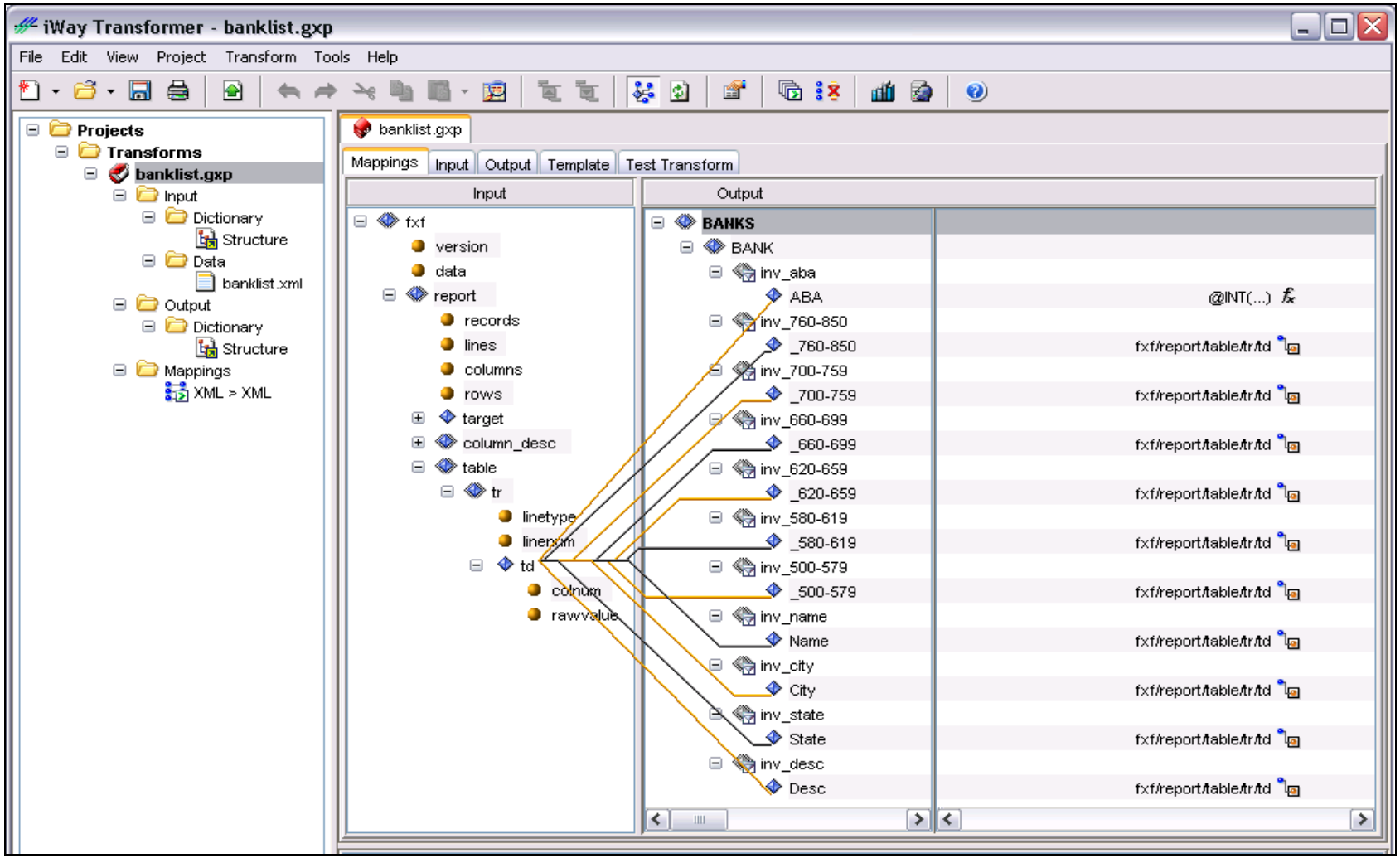
          accept="" help_message="" title="580-619" within="" property="" reference="" valign="right" />
        <col colnum="c7" fieldname="500_579" alias="E08" datatype="float" width="25" focus_format="D20.2" description=""
          accept="" help_message="" title="500-579" within="" property="" reference="" valign="right" />
        <col colnum="c8" fieldname="NAME" alias="E09" datatype="char" width="255" focus_format="A255V" description=""
          accept="" help_message="" title="" within="" property="" reference="" valign="left" />
        <col colnum="c9" fieldname="CITY" alias="E10" datatype="char" width="255" focus_format="A255V" description=""
          accept="" help_message="" title="" within="" property="" reference="" valign="left" />
        <col colnum="c10" fieldname="STATE" alias="E11" datatype="char" width="255" focus_format="A255V" description=""
          accept="" help_message="" title="" within="" property="" reference="" valign="left" />
        <col colnum="c11" fieldname="DESC" alias="E12" datatype="char" width="255" focus_format="A255V" description=""
          accept="" help_message="" title="" within="" property="" reference="" valign="left" />
      </column_desc>
    - <table>
      - <tr linetype="data" linenum="1">
          <td colnum="c0" rawvalue="1">1.00</td>
          <td colnum="c1" rawvalue="1">1</td>
          <td colnum="c2" rawvalue="5.86">5.86</td>
          <td colnum="c3" rawvalue="6.082">6.08</td>
          <td colnum="c4" rawvalue="6.366">6.37</td>
          <td colnum="c5" rawvalue="7.176">7.18</td>
          <td colnum="c6" rawvalue="8.82">8.82</td>
          <td colnum="c7" rawvalue="9.679">9.68</td>
          <td colnum="c8">Adams Bank & Trust</td>
          <td colnum="c9">Ogallala</td>
          <td colnum="c10">NE</td>
          <td colnum="c11">Family owned regional bank, serving Western Nebraska.</td>
        </tr>
```

Get Banks


f(x)
Normalize


attributes
linetype
linenum
trType
td
1..∞
tdType
attributes
colnum
rawvalue
BANK
1..∞
BANKType
ABA
_760-850
_700-759
_660-699
_620-659
_580-619
_500-579
Name
City
State
Desc

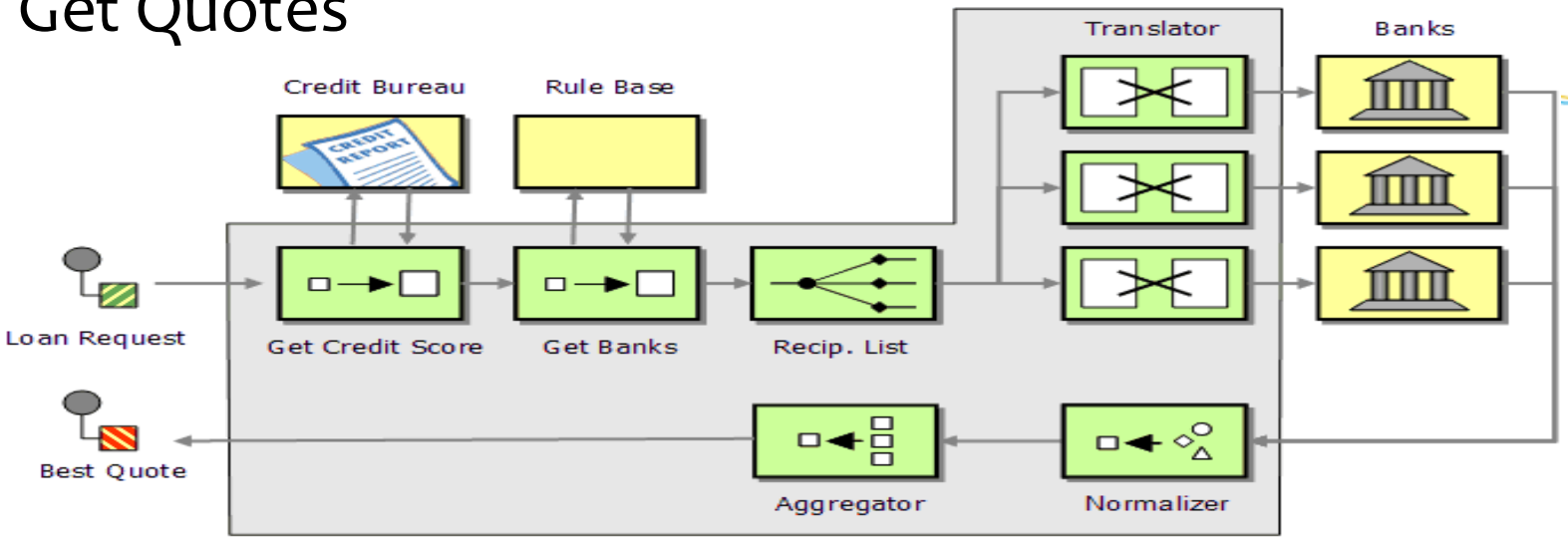
Get Banks


iWay Transformer - banklist.gxp
File Edit View Project Transform Tools Help
Projects
Transforms
banklist.gxp
Input
Dictionary
Structure
Data
banklist.xml
Output
Dictionary
Structure
Mappings
XML > XML
banklist.gxp
Mappings Input Output Template Test Transform
Input
fxf
version
data
report
records
lines
columns
rows
target
column_desc
table
tr
linetype
linenum
td
colnum
rawvalue
Output
BANKS
BANK
inv_aba
ABA
@INT(...)
inv_760-850
_760-850
inv_700-759
_700-759
inv_660-699
_660-699
inv_620-659
_620-659
inv_580-619
_580-619
inv_500-579
_500-579
inv_name
Name
inv_city
City
inv_state
State
inv_desc
Desc
fxf/report/table/tr/td

Get Banks

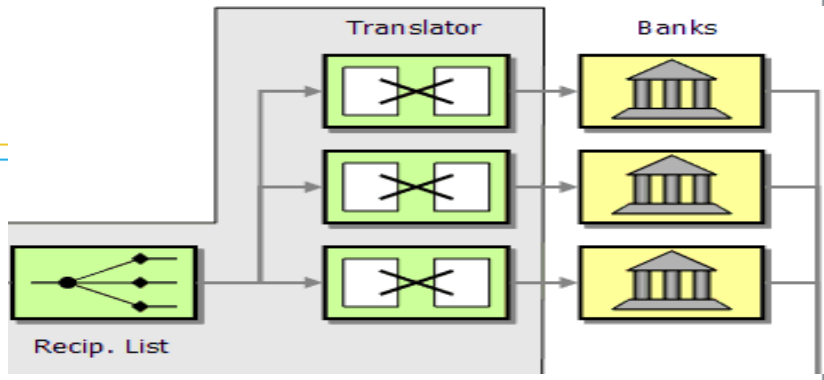
```
<?xml version="1.0" encoding="UTF-8" ?>
- <BANKS>
  - <BANK>
      <ABA>1</ABA>
      <_760-850>5.86</_760-850>
      <_700-759>6.08</_700-759>
      <_660-699>6.37</_660-699>
      <_620-659>7.18</_620-659>
      <_580-619>8.82</_580-619>
      <_500-579>9.68</_500-579>
      <Name>Adams Bank & Trust</Name>
      <City>Ogallala</City>
      <State>NE</State>
      <Desc>Family owned regional bank, serving Western Nebraska.</Desc>
    </BANK>
  - <BANK>
      <ABA>2</ABA>
      <_760-850>6.00</_760-850>
      <_700-759>6.00</_700-759>
      <_660-699>6.00</_660-699>
      <_620-659>6.00</_620-659>
      <_580-619>7.00</_580-619>
      <_500-579>8.00</_500-579>
```

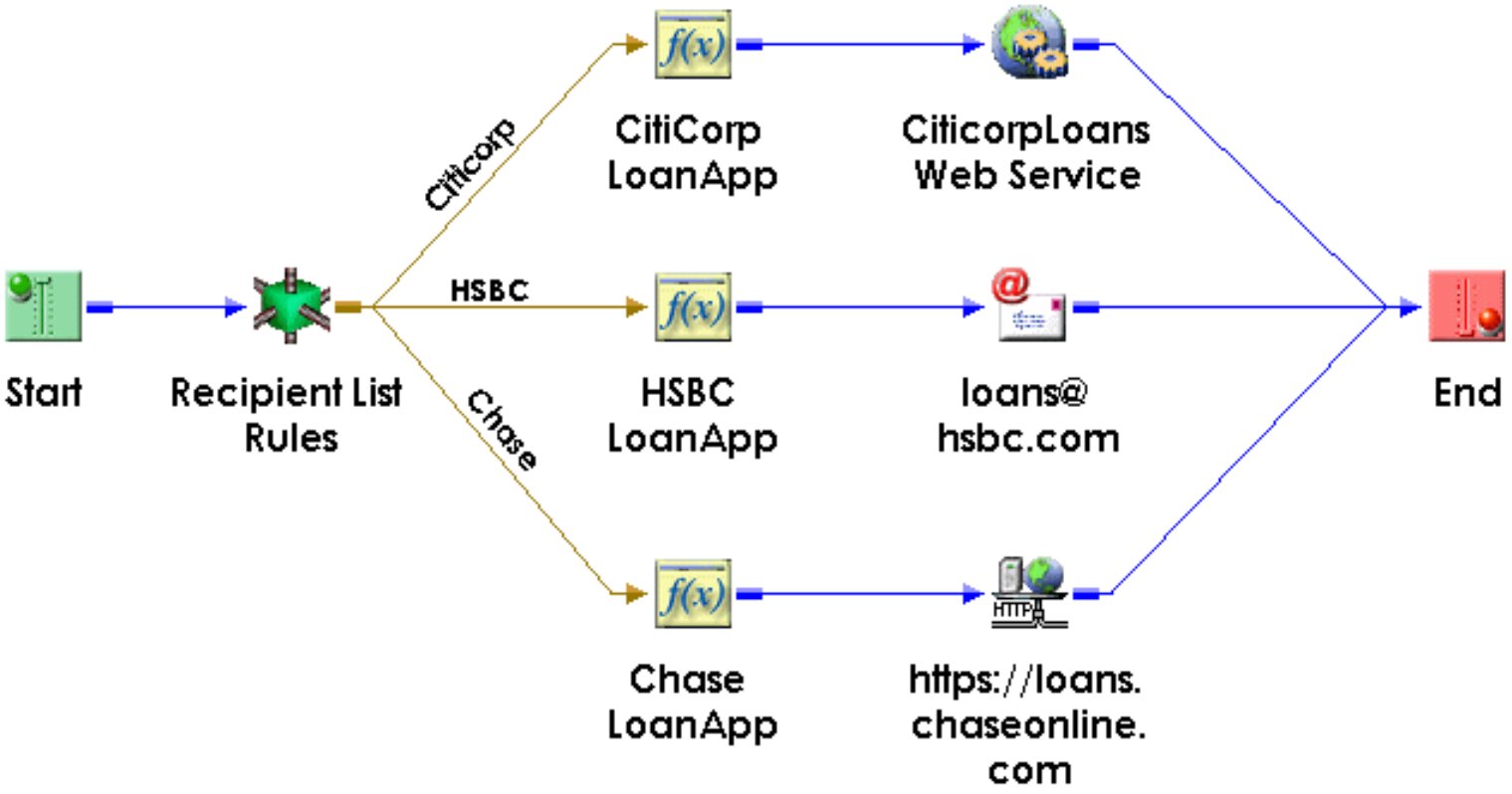
Get Quotes



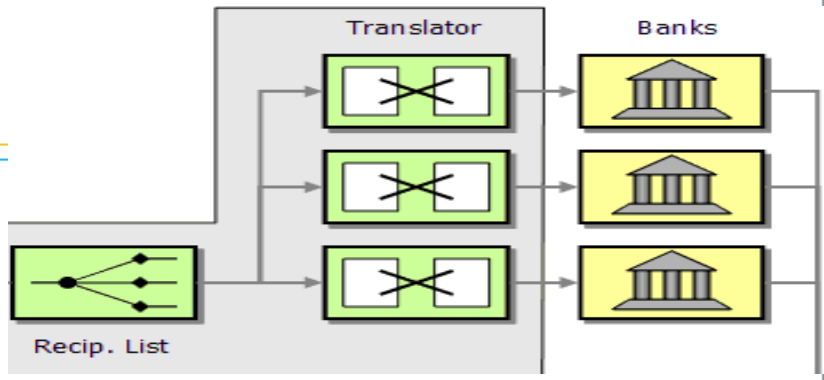
- For Each Trading Partner (Bank)
  - Recipient List Pattern
  - Lookup Contact Criteria (How to Speak)
  - Lookup Application Criteria (What to Say)

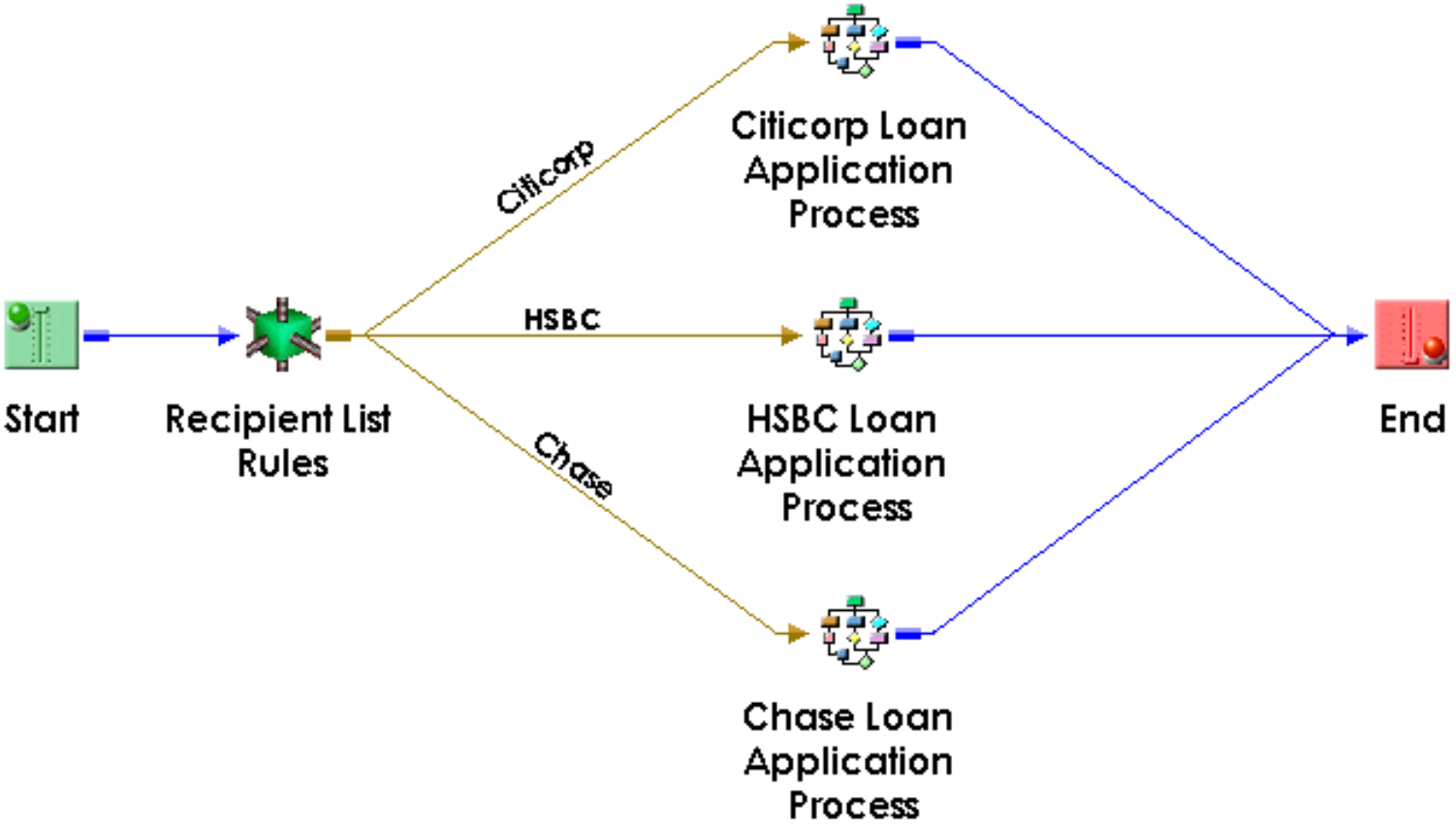
Get Quotes


Translator
Banks
Recip. List

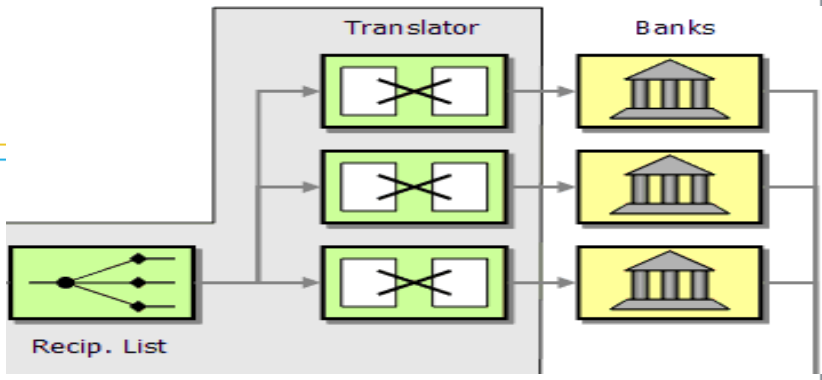

Citicorp
HSBC
Chase
CitiCorp LoanApp
CiticorpLoans Web Service
HSBC LoanApp
loans@ hsbc.com
Chase LoanApp
https://loans. chaseonline. com
Start
Recipient List Rules
End

Get Quotes


Translator
Banks
Recip. List


Citicorp
HSBC
Chase
Citicorp Loan Application Process
HSBC Loan Application Process
Chase Loan Application Process
Start
Recipient List Rules
End

Get Quotes


Translator
Banks
Recip. List


Loop On Selected Trading Partner
Start
ABA Iterator
Loan Application Process
End

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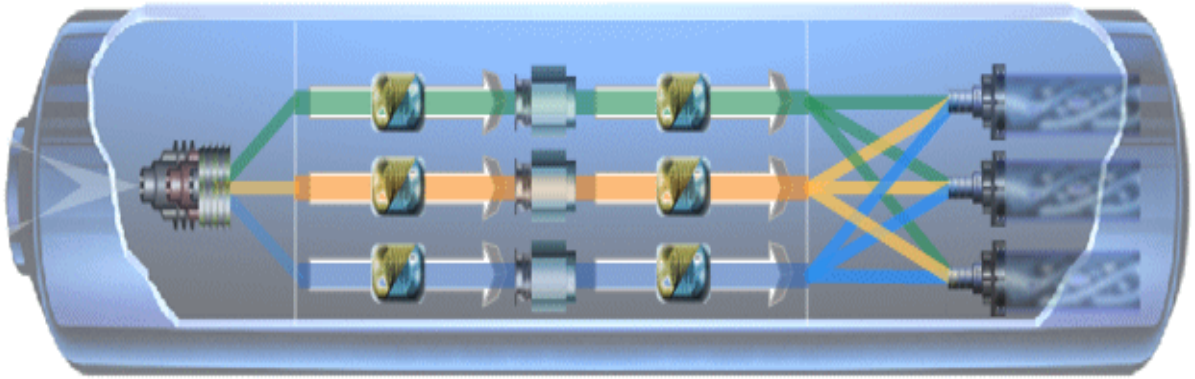
emitters

Registry - Repository

iWay Service Manager employs a registry/repository to support the design-time activities of the server. The illustration below provides a visual representation of the arangement of conduits and components as defined by a channel.

Anatomy of a Channel



iWay Service Manager defines a conduit as a container of components thru which messages flow. The ***channel conduit*** is used to deploy message flows from the design time repository to one or more runtime server instances. The unit of deployment is known as a channel archive (.car).

Channels contain references to Inlets, Routes and Outlets.

Conduits
Channels
Inlets
Outlets
Routes
Transformers
Processes

Components
Adapters
Decryptors
Ebix
Emitters
Encryptors
Listeners
Preemitters
Preparsers
Reviewers
Rules
Schemas
Services
Transforms

Variables
Parameters
Registers

Emitters

Emitters are protocol handlers, that drive the output of a channel to a configured endpoint. Listed below are references to the emitters that are defined in the registry.

Select emitter type

Type * Type of the new emitter

Select a type

- Select a type
- AQ
- AS1
- AS2
- EMAIL
- File
- FTP
- HTTP
- Internal
- JMSQ
- MQ
- MQJMS
- MSMQ
- Passthru
- Print
- Sonic
- TCP
- Tibrv

<< Back Next >>

Conduits
Channels
Inlets
Outlets
Routes
Transformers
Processes

Components
Adapters
Decryptors
Ebix
Emitters
Encryptors
Listeners
Preemitters
Preparsers
Reviewers
Rules
Schemas
Services
Transforms

Variables
Parameters
Registers

Routes

A route is used to define the path a particular message takes thru a channel. A Route is defined as a sequence of: a transformer, followed by a process, followed by another transformer, followed by zero or more outlets.

Route Definitions

Filter By Name Where Name Equals

Name	View	References	Description
autoLoan			Gather Automotive Quotes
homeEquityLoan			Gather Home Equity Loan Quotes
personalLoan			Gather Personal Loan Quotes

Add Delete Rename Copy

Conduits
Channels
Inlets
Outlets
Routes
Transformers
Processes

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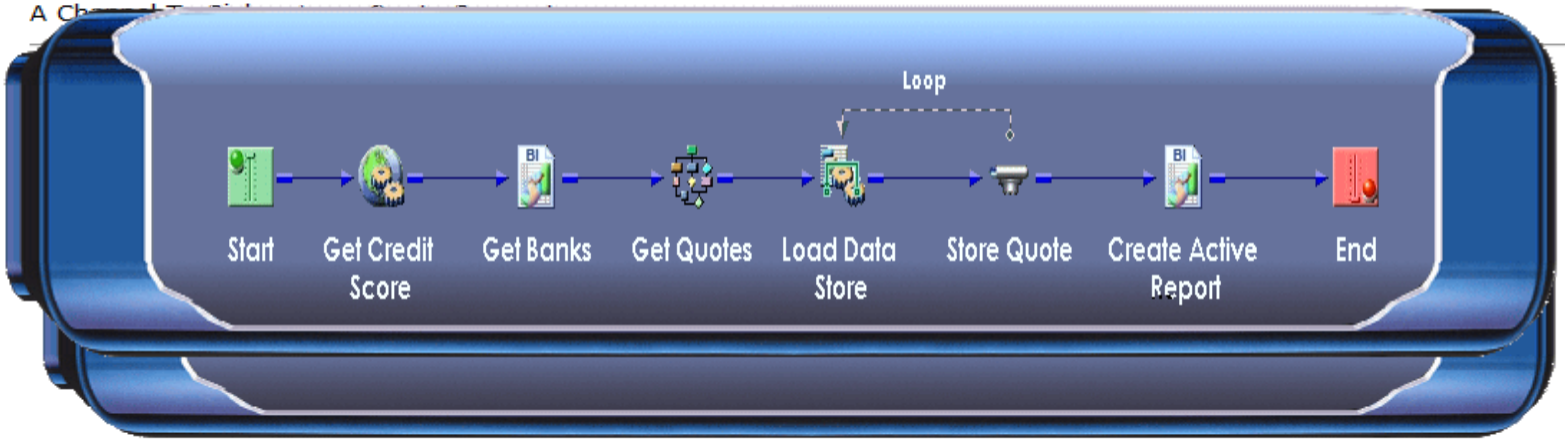
Decryptors
Ebix
Emitters
Encryptors
Listeners
Preemitters
Preparsers
Reviewers
Rules
Schemas
Services
Transforms

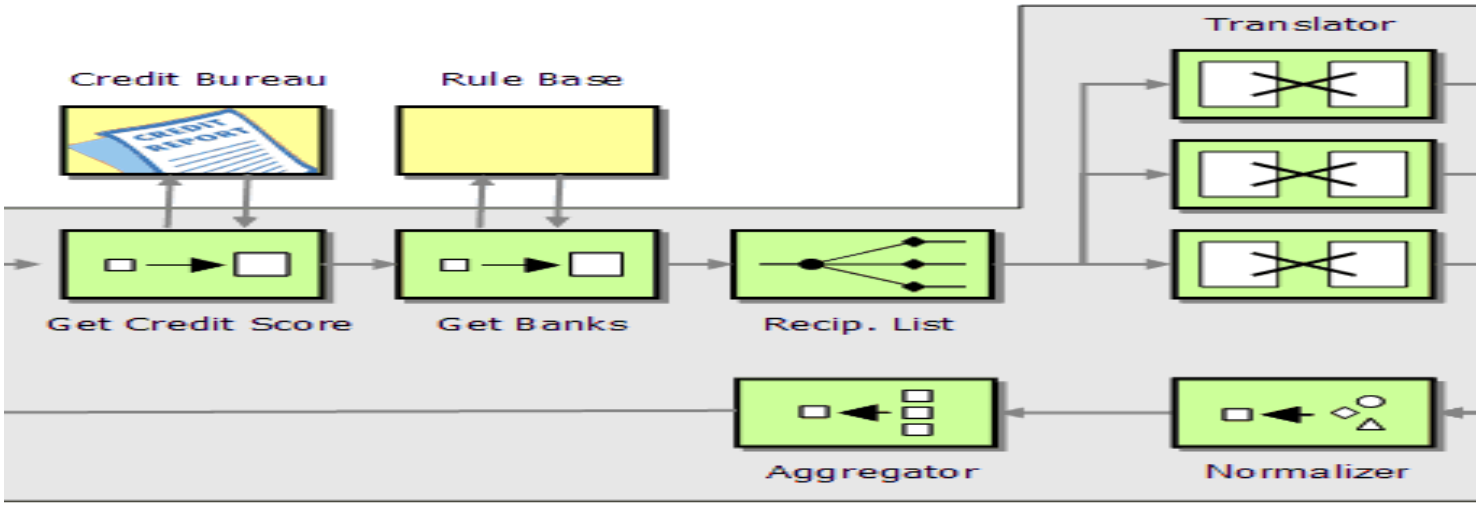
Variables
Parameters
Registers

Channels / LoanRequest

A Ch...



<< Back | Build LoanRequest



LoansForYou.Com

HTML Document

12 of 12 records (100%), Page 1 of 1

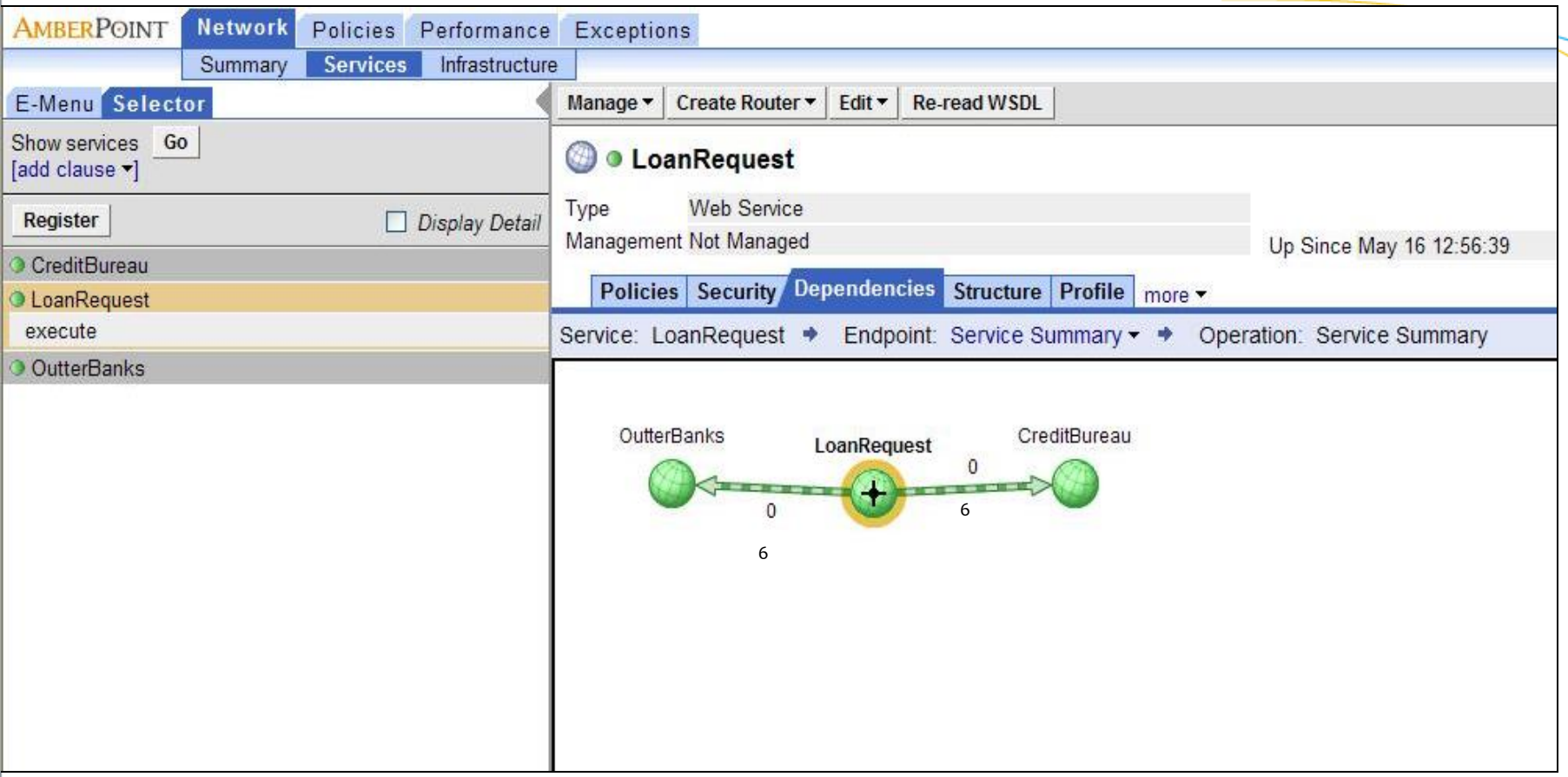
APR (Annual Percentage Rate) Quote Summary

Prepared for John Smith on 05/18/07 by LoansForYou.com

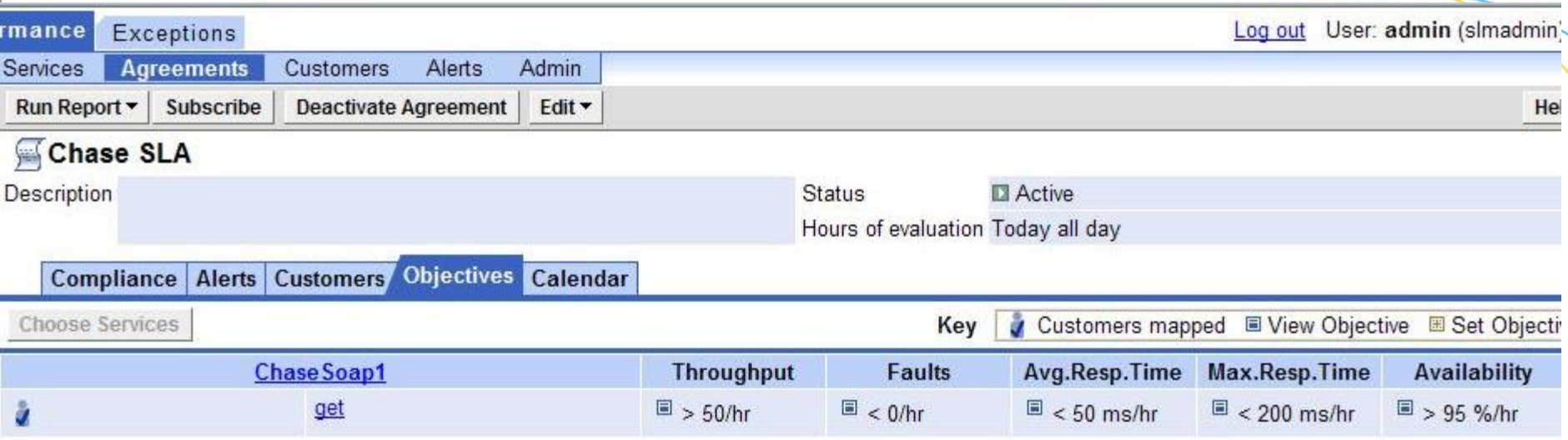
Bank	Term (Years)	State	City	FICO: 700-759	Your Credit Score: 680	FICO: 620-659
American Savings Bank	5	NY	New York	6.019	6.212	6.547
	10	NY	New York	6.121	6.366	6.787
	15	NY	New York	6.232	6.457	6.948
Citibank	5	NY	New York	5.801	6.011	6.575
	10	NY	New York	5.921	6.211	6.828
	15	NY	New York	5.999	6.899	7.095
HSBC	5	NY	New York	5.677	5.733	5.798
	10	NY	New York	5.721	5.798	5.803
	15	NY	New York	5.802	5.912	6.012
J. P. Morgan Chase	5	NY	New York	5.518	5.732	6.757
	10	NY	New York	5.977	5.841	7.017
	15	NY	New York	6.018	6.123	7.125

POWERED BY Information Builders

Monitored - Managed



Monitored - Managed



Monitored - Managed

Target group: **Default**

Performance measure	Target
Throughput	> 50 /min
Fault	< 0 /min
Avg. Resp. Time	< 50 ms
Max. Resp. Time	< 200 ms
Availability	> 90 %

Monitored - Managed

References

- *Enterprise Integration Patterns* (Addison-Wesley)
  http://www.enterpriseintegrationpatterns.com/eaipatterns.html

  The book provides a consistent vocabulary and visual notation framework to describe large-scale integration solutions across many technologies. It also explores in detail the advantages and limitations of asynchronous messaging architectures.

- Microsoft - patterns & practices Developer Center
  http://msdn2.microsoft.com/en-us/practices/default.aspx

  Microsoft patterns & practices are Microsoft's recommendations for how to design, develop, deploy, and operate architecturally sound applications for the Microsoft application platform.

- IBM – Pattern Solutions
  http://www-128.ibm.com/developerworks/rational/products/patternsolutions/

  Web site contains patterns that are already built and freely available for use as well as information about how to build your own custom patterns.

Questions ?