WebSphere software

IBM®

WebSphere Process Server 6.0 –

1.0

1. WebSphere Process Server V6

WebSphere Process Server(WPS) V6   /
                      SOA(Service Oriented Architecture)   . WPS   SOA
                                                                                                    .
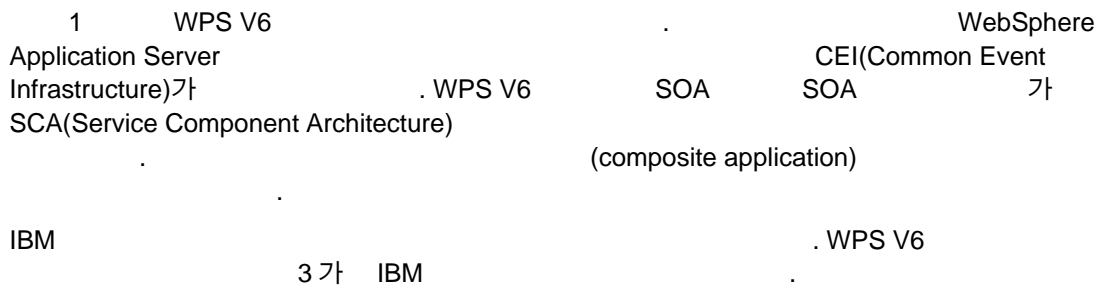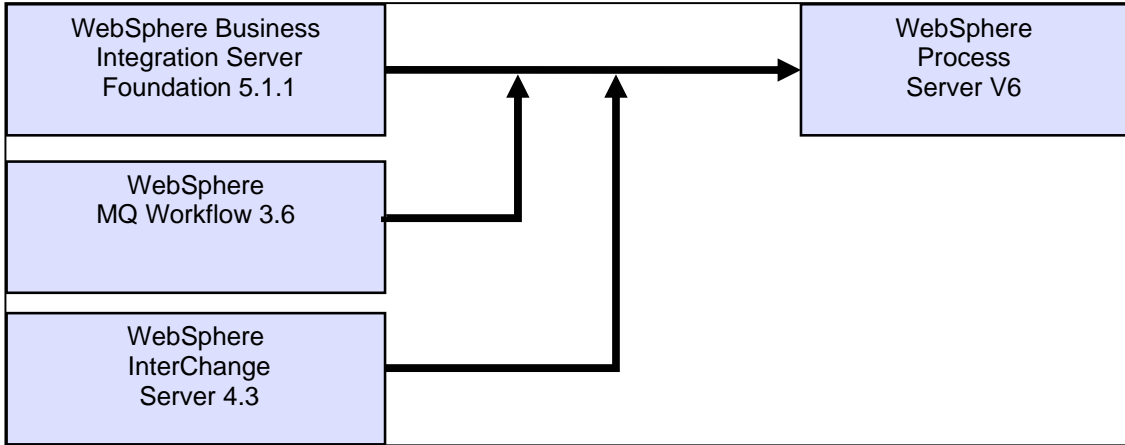
                                                                                    WPS
          (Human Task Manager)   .
                              ,   .
                        WPS   . WPS
          SOA
                .

SOA

SCA

J2EE

1 WebSphere Process Server

        1   WPS V6   .   WebSphere
Application Server   CEI(Common Event
Infrastructure)   . WPS V6   SOA   SOA   .
SCA(Service Component Architecture)
                          .   (composite application)
                        .

IBM   . WPS V6
                                3   IBM   .

WebSphere Business Integration Server Foundation 5.1.1		WebSphere Process Server V6
WebSphere MQ Workflow 3.6		
WebSphere InterChange Server 4.3		

2 3

2 , WPS WebSphere Business Integration Server Foundation V5.1.1
. WebSphere MQ Workflow WebSphere InterChange Server WPS
. 3 .

(WebSphere Application Server SOA) WPS V6
.

WPS V6 .

- SOA 2 SCA .
- ! .
  .

  i. , WPS V6 BPEL

  ii. (Human Task Manager)

  iii.

  iv.

  v.

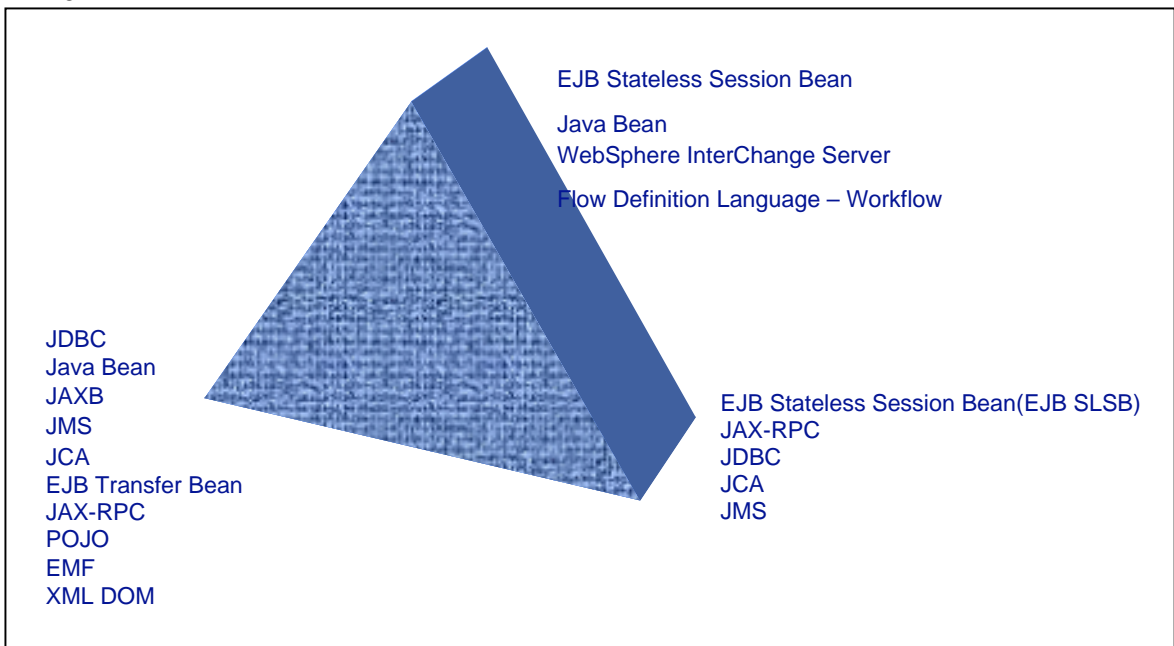- 4 WPS V6 WebSphere Integration
  Developer .

2. SOA

SOA   WebSphere Process Server(WPS)   . SOA
          SCA(Service Component Architecture)   . SCA
                                                                                    ,
                                                        .

SCA

J2EE   J2EE
                                    .   J2EE   3
                                                                              API
          .

      3

EJB Stateless Session Bean

Java Bean
WebSphere InterChange Server

Flow Definition Language – Workflow

JDBC
Java Bean
JAXB
JMS
JCA   EJB Stateless Session Bean(EJB SLSB)
EJB Transfer Bean   JAX-RPC
JAX-RPC   JDBC
POJO   JCA
EMF   JMS
XML DOM

J2EE   JDBC   , JMS
                    .   . J2EE   Session Bean
              JDBC   .   J2EE
BPEL   .

      SCA   .

      SCA   2   . WebSphere
                                                                    .   J2EE
                    J2EE   .

SCA

IT   ,   IT
. SCA
.   SCA
.   SCA
. IBM
SCA   .   IT
J2EE API   SCA
J2EE   .

SCA
.   , EIS
.

SCA   , EIS
.

SCA   QoS(quality of service)   .
(lower-common-denominator solution)
/   .

SCA

SOA   .   2   .

•
.
"   ","   "   "   "   .
"   "   .   ,
.
"   "   .   Java   CICS TP   IMS
.

•
.   .
,   "   "   ,
.   ,
/   .

SOA   XML   ,   IBM
. J2EE   WebSphere
Stateless Session Bean   Entity Bean
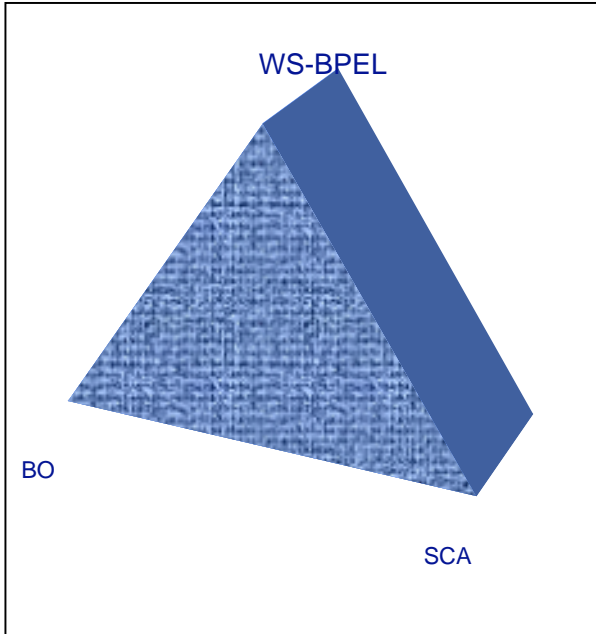.   Stateless Session Bean   ,
.
.

SDO   ,
.   ,   XML   XSD
.   ,   ,
XSD   XML   .

SCA   J2EE   API
.   ,

API 에 대한 전반적인 내용을 살펴본다.

그림 4 는 WPS V6 을 구성하는 핵심 개념을 보여준다.

그림 4 V6

SCA 는 구현 언어와 독립적으로 서비스를 호출하고 구현하는 모델을 제공한다. 서비스는 Java 나 J2EE(예를 들어 세션 빈) 혹은 각종 언어로 구현할 수 있으며, 서비스를 호출하는 클라이언트도 구현에 독립적이다. 따라서 서비스의 구현을 변경하여도 클라이언트에 영향을 주지 않는다. 이렇게 서비스의 호출과 구현을 분리함으로써 컴포넌트간의 느슨한 결합을 유지할 수 있다. 또한 J2EE 를 잘 모르는 개발자도 쉽게 서비스를 호출할 수 있다.

SCA

SCA 는 서비스를 조립하는 모델이다. 즉, SCA 를 이용하여 서비스를 조립하고 호출할 수 있다. WPS V6 에서는 다음과 같은 구현을 SCA 컴포넌트로 사용할 수 있다.

- Stateless EJB Session Bean
- Java 클래스
- 웹 서비스
- WPS 에서 제공하는 각종 컴포넌트
  - o 비즈니스 프로세스 (Business Process)
  - o 휴먼 태스크 (Human Task)
  - o 비즈니스 룰 (Business Rule)
  - o 비즈니스 상태 머신 (Business State Machine)
  - o 변환 (Transformation)

WebSphere Application Server, V6.0.1 . WPS
, . WebSphere
Application Server , .

WebSphere Process Server(WPS) WebSphere Application
Server(WAS) IBM .
WebSphere Process Portal WPS ,
SCA . WAS
WPS IBM .
WAS V6 WebSphere eXtended Deployment WPS . WPS
QoS(quality of service) . WPS z/OS
QoS .

CEI

CEI(Common Event Infrastructure) , , ,
, .

CEI IBM Autonomic Common Base Event /Situation Data
. IBM CEI
IBM .

CEI ( )3 .

- <u>CEI SDK</u>. , (descriptive) API
  . CEI SDK API ,
  .

- <u>CEI </u>. (:)
  CEI . CEI API CEI .

- <u>CEI </u>. CEI , .

WebSphere , CEI WAS J2EE
WAS
.

CEI ,
. WebSphere Monitor .

3.

WPS V6

5

(5) WPS , SOA

.

                                                                B2B(business-to-business)
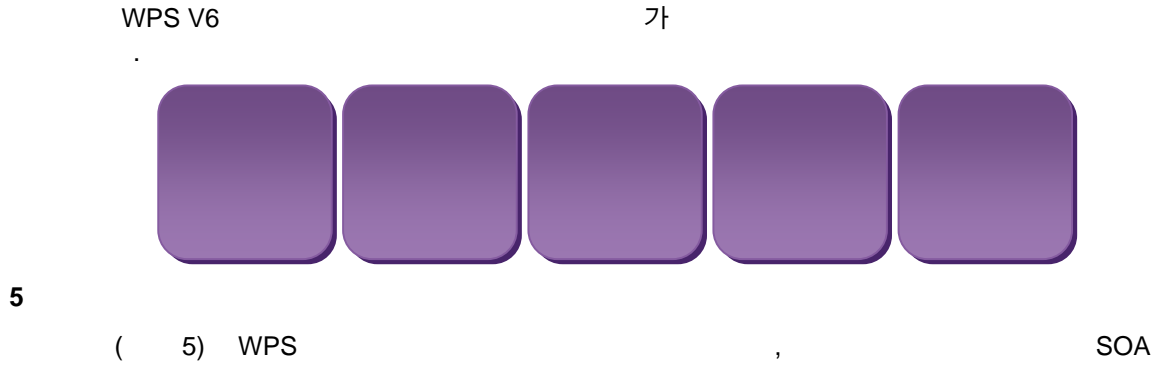
EAI(enterprise application integration)

.   .

2   .

,

.

,   .

6   5   .
SCA   .

/   (   )   .

.

J2EE

6

,   ,   .
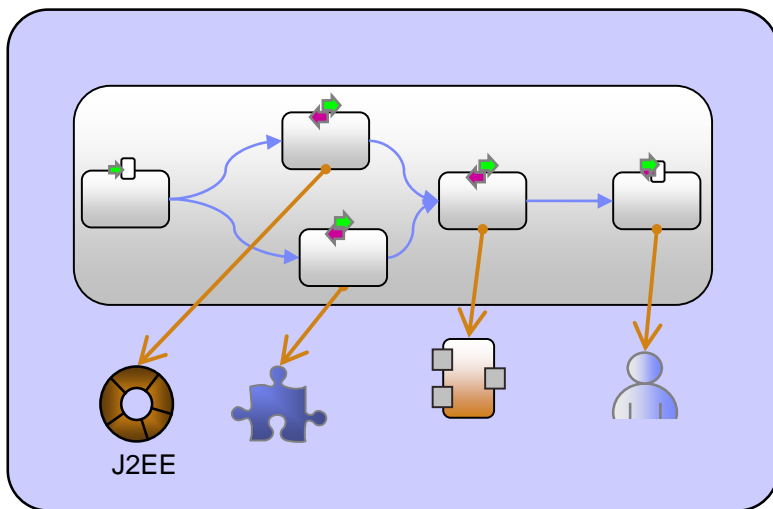
WS-BPEL 2.0

WS-BPEL

                                                                    .
                                                                    .
                                              . WS-BPEL 2.0
                                                                    .

                              ,   .
WS-BPEL

                                                        .

   WS-BPEL   .
       WS-BPEL   ,   /
                                                        .

WS-BPEL 2.0   XML   /
                  . BPEL4WS 1.1
                                        . WSDL 1.1, XML Schema 1.0   XPath 1.0. WSDL
   , XML Schema   WS-BPEL   . XPath
                          .   WSDL   . WS-BPEL
                                                        .   WS-BPEL 2.0
                          .

WS-BPEL 2.0   .

   •   (commit)   BPEL   (,
)

   •

   •   (:   )   XPath 1.0   -   ,
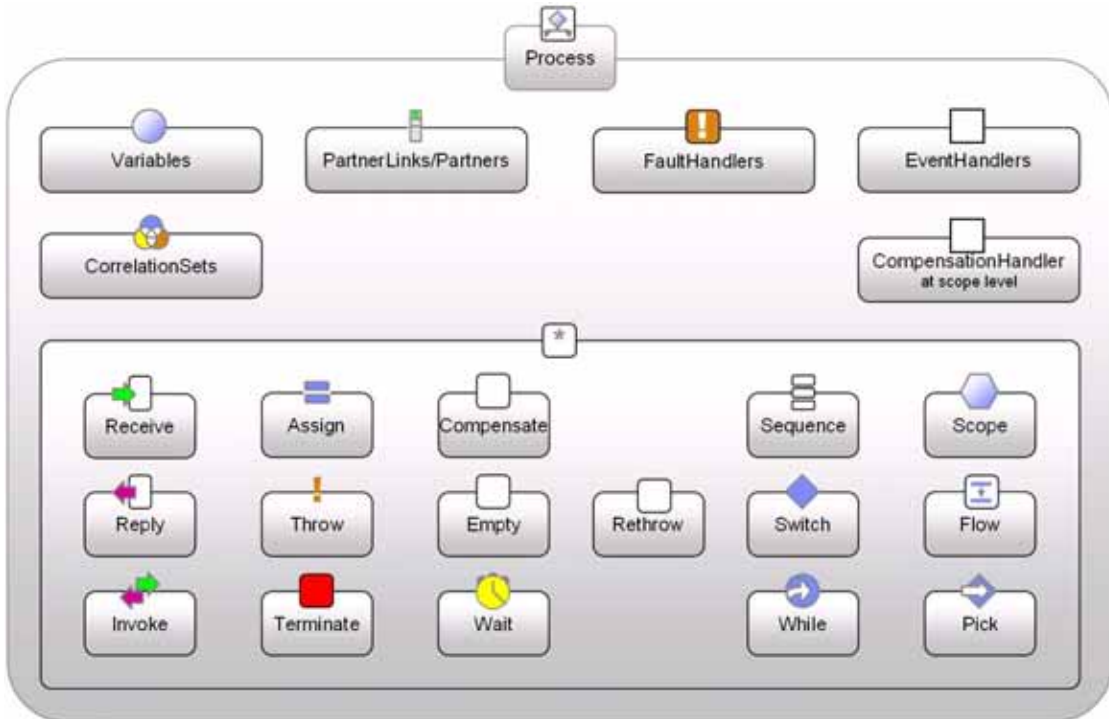
   •   -

   •   -

   •   assign

WPS V6   WS-BPEL 2.0(SCA   )   WBI   .

WPS V6   (
).

7 WPS V6 의 WS-BPEL 2.0

WPS 는 WBI Server Foundation Version 5.1 에서 사용되었던 프로세스 엔진을 기반으로 한다. WBISF V5.1 에서 지원되었던 모든 기능이 지원된다.

BPEL

BPEL 은 비즈니스 프로세스를 구현하기 위한 업계 표준 언어이며, 웹서비스와 상호작용을 통해 작업을 수행한다. 다음은 BPEL 의 주요 개념 및 특징이며, 이를 통해 비즈니스 프로세스를 모델링 할 수 있다.

BPEL 확장

WS-BPEL 표준을 기반으로, 필요에 따라 확장이 가능하다. WPS V6 에서는 표준 BPEL 을 확장하였으며, BPEL 을 확장하여 다양한 기능을 제공한다. 확장된 BPEL 을 사용하면 표준에서 제공하지 않는 기능을 구현할 수 있으며, 이식성 (예: 표준) 을 보장하기 위해 주의가 필요하다.

XPath 1.0 지원

WS-BPEL 2.0 과 마찬가지로 WPS V6 도 XPath 1.0 을 조건식 및 변수 표현에 사용한다 (예: Transition 조건). XPath 는 표준 언어이며 다양한 환경에서 (웹서비스 및 비즈니스 프로세스) 사용된다.

WPS V6 는 표준을 준수하며 확장 기능을 제공한다. 표준-준수 기능을 통해 이식성을 보장한다. 프로세스 종료를 위해 *processTerminate* 를 사용한다.

             ,   . *processTerminate*

- *Suspend, resume.*

- *Restart*:   .   ,

. WPS V6   WebSphere Business Integration Server Foundation V5.1, WebSphere ICS   WebSphere MQ Workflow

WebSphere Business Integration Server Foundation

WPS V6   WBISF   .   WBISF   WPS V6
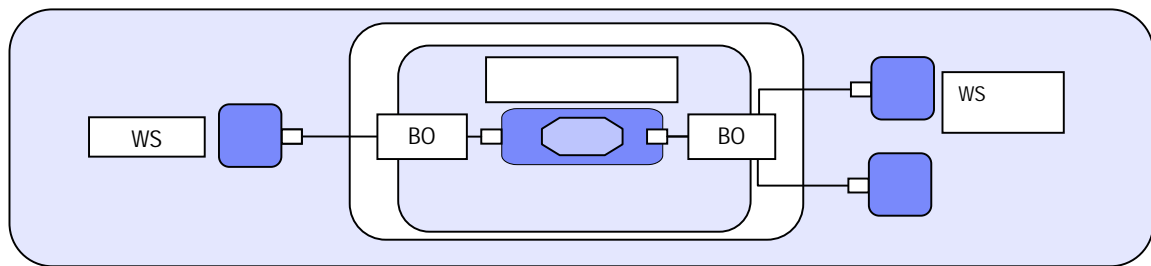
8 WebSphere Business Integration Server Foundation
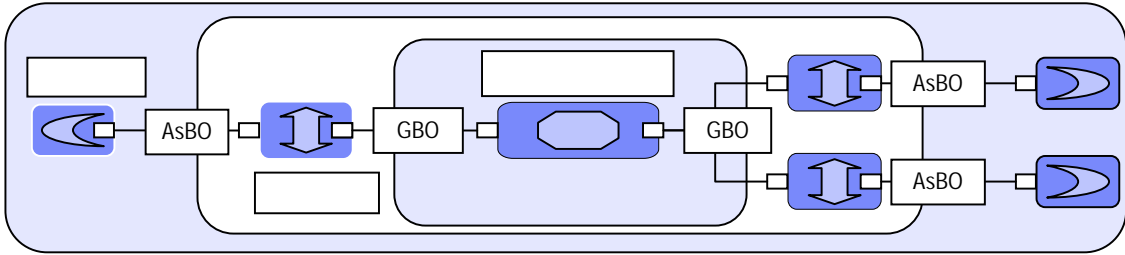
8   WPS V6   .

                      .   WS-BPEL V2   .   ,

WebSphere Interchange Server

WebSphere InterChange Server(WICS)   (   )   (   )   . WICS   ,   .   WPS V6 (Mediation)   .

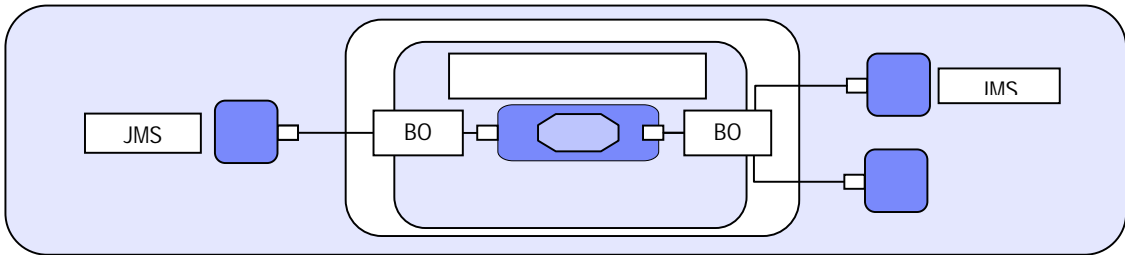**9 WebSphere InterChange Server**

9   WICS   .
       .   ASBO(Application Specific Business Object)   . (WICS
)WPS V6   ASBO   GBO(Generic Business Object)
           .   , GBO   BPEL
              .

       GBO   ASBO   .

WebSphere MQ Workflow

WebSphere MQ Workflow   MQ   .
         (11   ) WebSphere MQ Workflow   .
                    WPS V6   .

10 WebSphere MQ Workflow

10   JMS
              .   ,
              .   ,   JMS   .

                              WPS V6   .

                                                                                                            .

_____

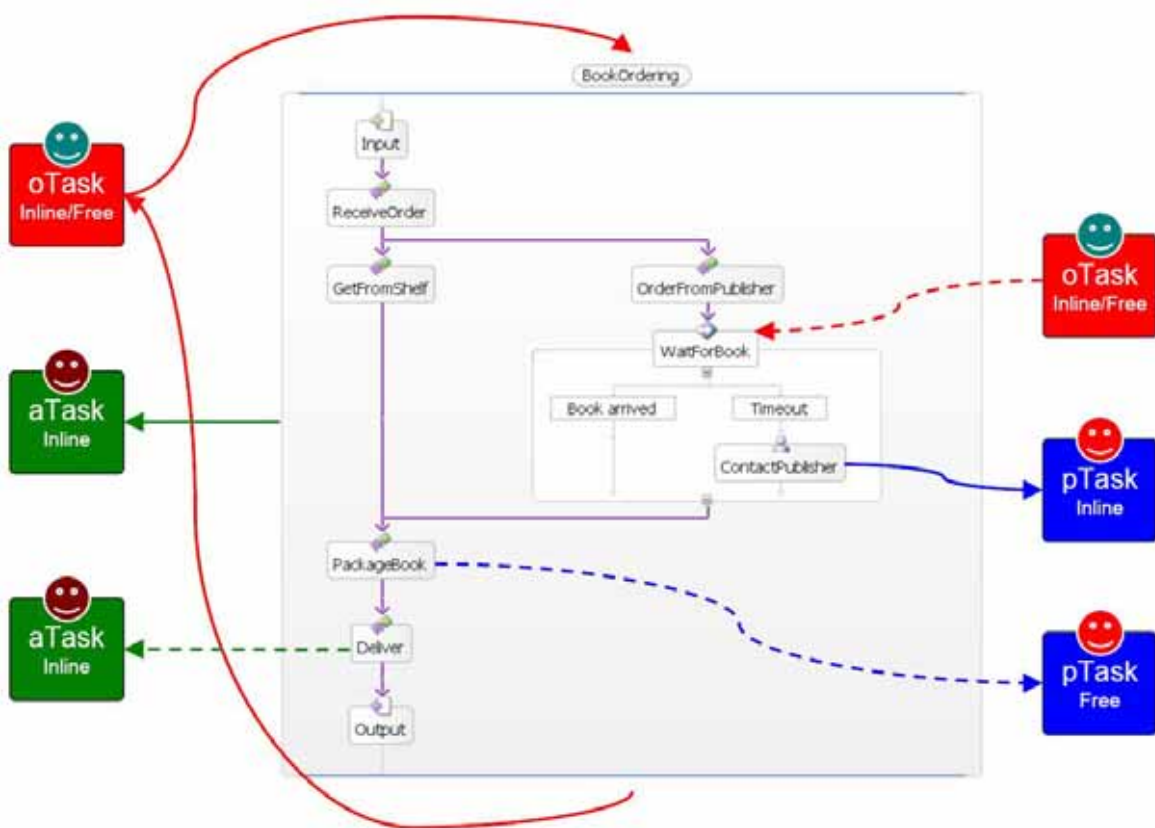   WPS V6   .

•
•
•

●

M2H(machine-to-human), H2M(human-to-machine)   H2H(human-to-human)   .

M2H   WBISF   ,   ("   ")
.

H2M

.   , BPEL   SOAP   , CICS
, Enterprise Bean
.

H2H   .   ,
.

"   "   . "   "
.
(*wiring)*
.   ,
, Enterprise Bean   CICS   .

/
. HTML API   BPEL
,
.   ,
.

11

．

．

．

．

M2H, H2H

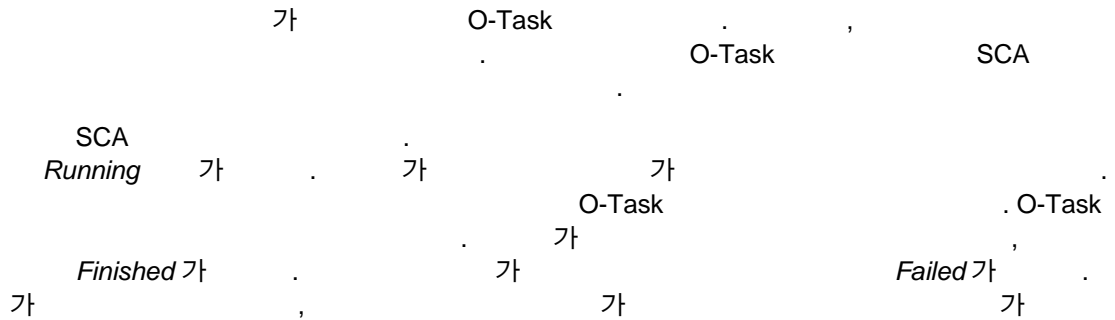．   ．

- O-Task(Originating Task)   ,
  ．   ．

- A-Task(Administrative Task)   ．

- P-Task(Participating Task)   ,
  ．

- ▪   H-Task(Human Task)   ．
  ．

- v5   Inline Task
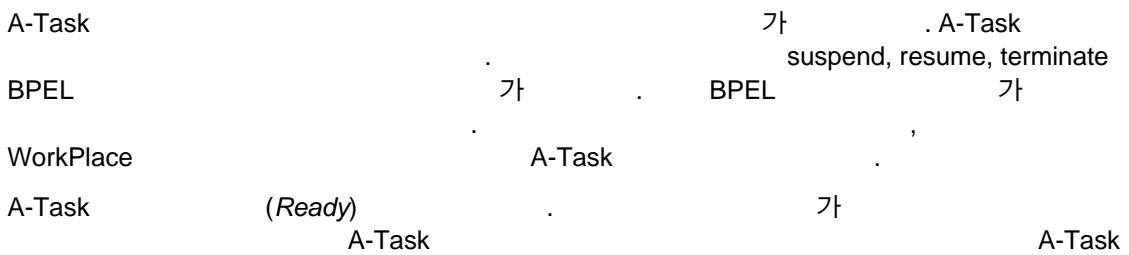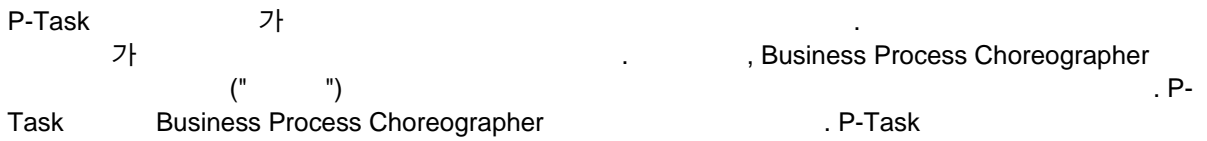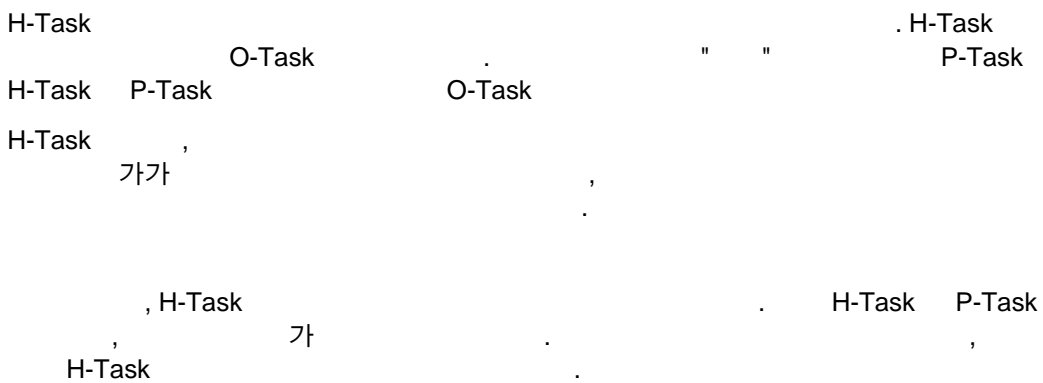   ．

  11
  ．   ．

O-Task(H2M)

O-Task   .   ,

.   O-Task   SCA

.

SCA   .
Running   .   .

O-Task   . O-Task

.   ,

Finished   .   *Failed*   .

,

.   .

A-Task

A-Task   . A-Task

.   suspend, resume, terminate

BPEL   .   BPEL

.   ,   ,

WorkPlace   A-Task   .

A-Task   (*Ready*)   .   .

A-Task   A-Task

.

P-Task

P-Task   .

.   , Business Process Choreographer

("   ")   . P-

Task   Business Process Choreographer   . P-Task

"   "

.

H-Task(H2H)

H-Task   . H-Task

O-Task   .   "   "   P-Task   .

H-Task   P-Task   O-Task   .

H-Task   ,   .

,

.

, H-Task   . H-Task   P-Task

,   .   ,

H-Task   .

.   .

IBM Websphere Integration Developer   (
12).

                                                                3   ,
                                            .

- •   :   /   (
          ,   ,   ?)

- •   :
          (IBM   ,   )

- •   :   .   '
                                    ?',   /   ,   .

12

                    .   13   .
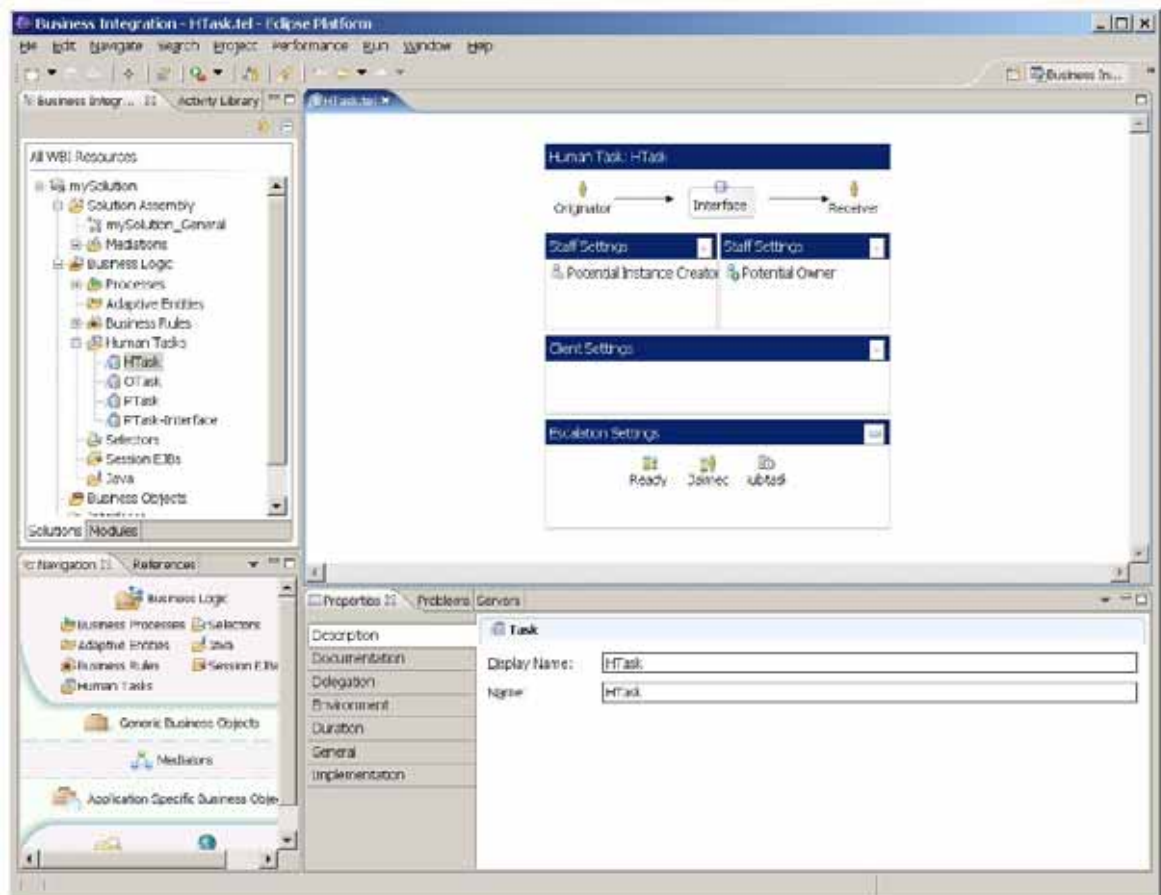
- • O-Task   ,
              .   .

- • A-Task   .

- • P-Task   ,   .

- H-Task   .   .
  , P-Task   ,
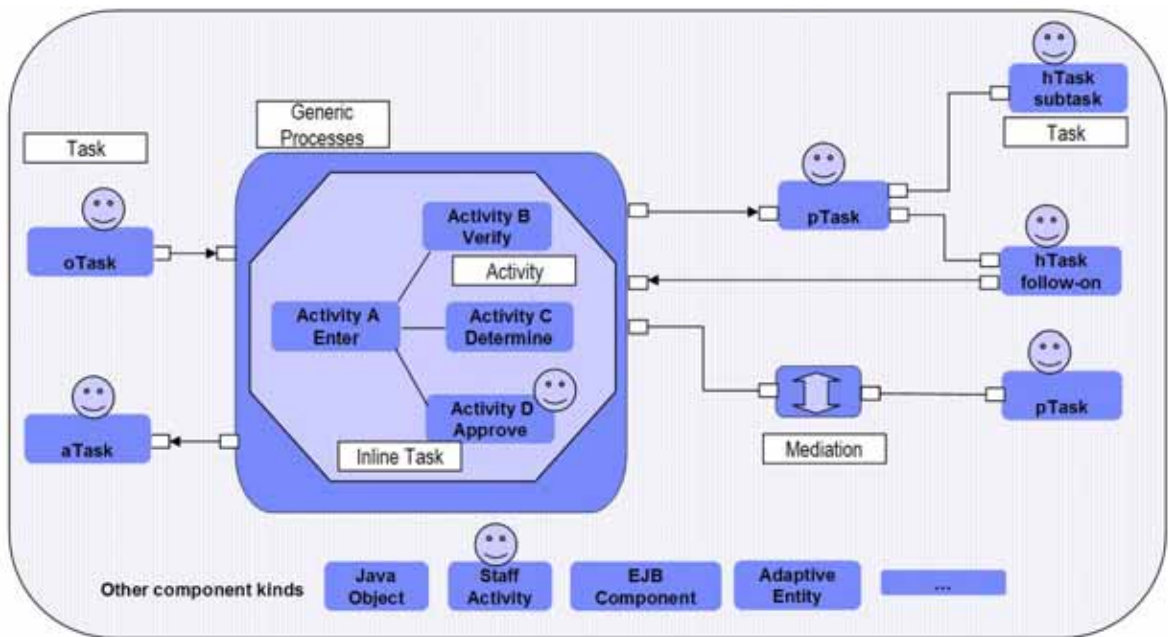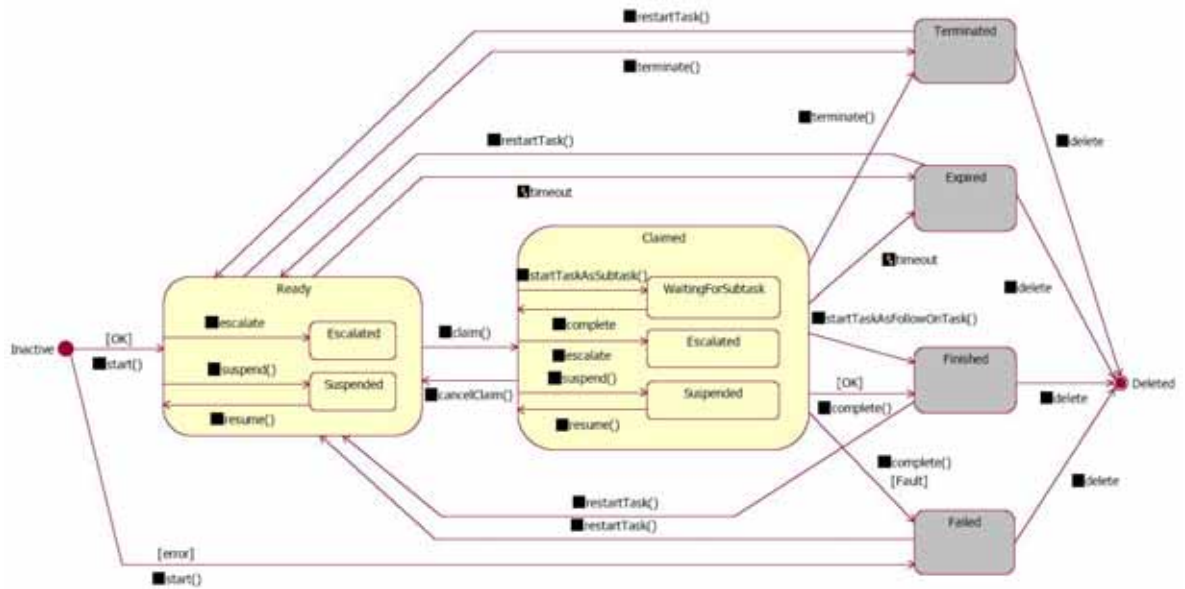   .

- v5   Inline Task
                                                                              .
  D   A   .

- •   .
                                    .

- •
                          .   ,   .

13

"   "   Ready, Claimed   WaitingForSubtask   .
              Ready   . Ready   (claim)   .
                                                      Claimed   .

              .   ,   Finished   .
                                  Failed   .   H-Task
                          ,   WaitingForSubtask
                                    .   Escalated   Suspended
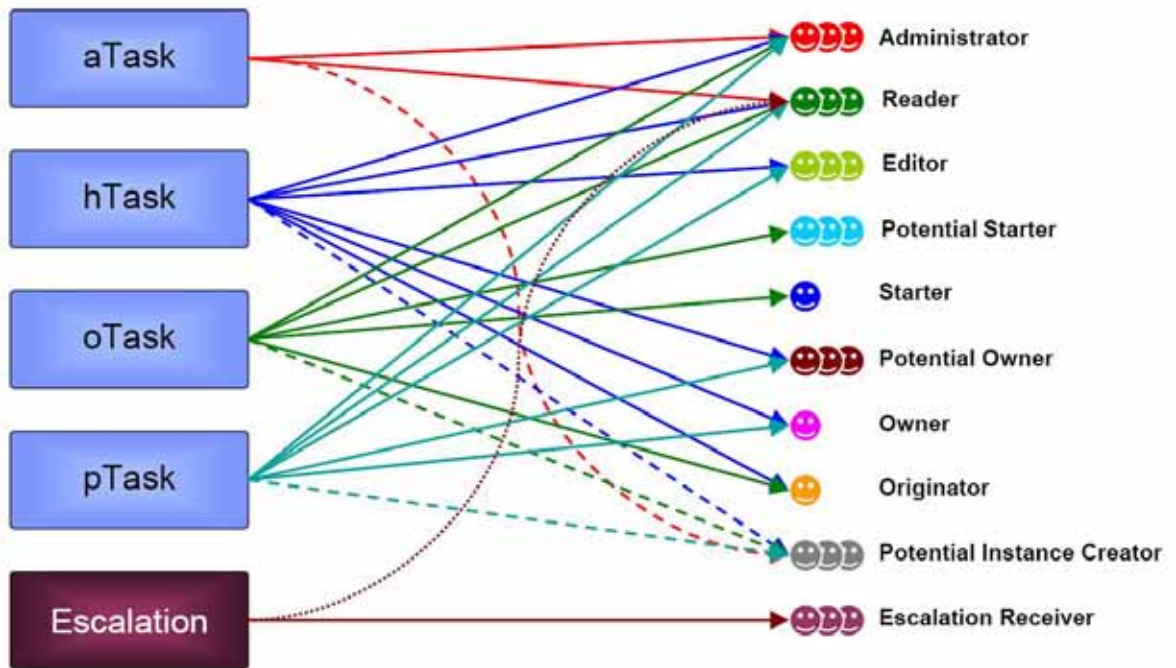   .   Escalated   .
        14   H-Task   P-Task   .

14 P-Task   H-Task

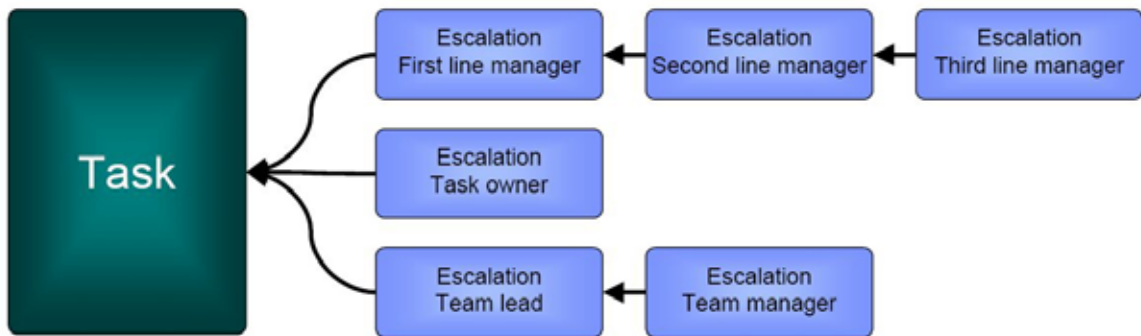(authorization)   WBISF V5.1

.

A- Task	
H- Task	
O- Task	
P- Task	

15   .

A- Task	
H- Task	
O- Task	
P- Task	

15

.

.

.

(surveillance   )   .

.

.

		1		

		2	3

16 .

	1		
		2	3

16

,   .

        1   .
   claimed   .
                                          .   1
           1   ,   .   2
                   ,   2
           .   3   ,   3
       .

                                              .

- .
setter .
(: displayName, description)
 .

- waiting . ,
 .

- surveillance atLeastExpectedState .
superfluous .
escalated , .
 . 2
 ,
 .

 , autoRepeatDuration
 . 0 .
 .

-
-
-
 ,
 .
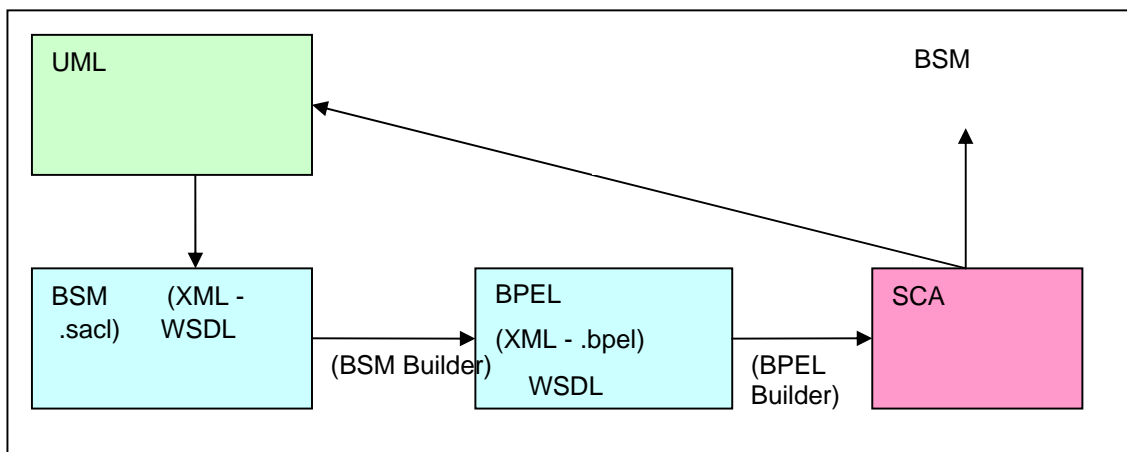 .
 .

increasePriority .
 .
 . ID
 .
 .

 . WBISF v5.x WebSphere MQ
Workflow .

- O-Task, A-Task, P-Task, H-Task Incline
- . BPEL ,
 .
- H2H H2M ad hoc
- ,
-
- ( )
- "claimed"
- " " . , ,

- CustomProperty   WebClient

WebSphere MQ Workflow   WBISF
          .   SCA
          .

                                                    ,   ' '
                    /   .   ,
                    .   ' '   (   )   ,
                              .
          '   .
    (   )   ,   .   ,

                              (,   ).
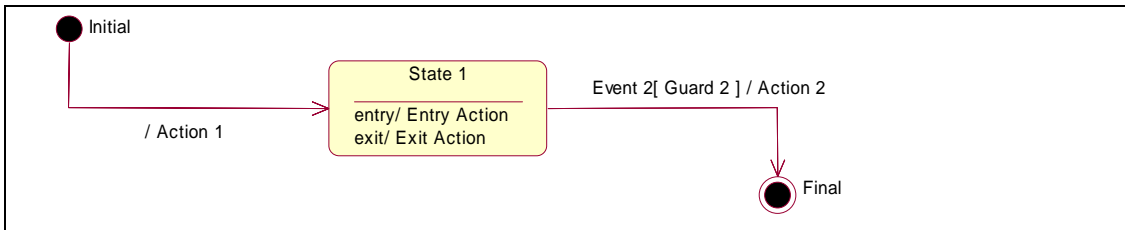   .
              stateful   BPEL   .
    (state machine)   . BSM(Business State Machine)
                              . BSM
          .   ,   BSM
                              .

    17   BSM   stateful   .
                              .   ,   BSM
          WSDL   UML   . BSM   XML   ,
              SACL(State Adaptive Choreography Language)   .   SACL
WSDL   .   SCA
          .   , UML
                                                        .

17 BSM

BSM   SCA   .   guard
              , BSM   .   BSM
                                                              .

              BSM   . BSM   GUI   ,   BSM
                                                      .   BSM
                                                                    .   ,
                                        .   .

              stateful   .

BSM   WPS   . BSM   UML 2.0
UML 2.0   . BSM   .
guard   .   /
                              .   UML   .

18   UML 2.0

BSM   .

SCA   :   (operation)
      (: state)   .

State: BPEL   BPEL
              .

Event: .   SCA
                    .

Guard: non-mutative Boolean   .   Java snippet
              SCA   .   .

Action: (guard   true   )
                    .   Java snippet   SCA   .
              .

State Exit Action: .
                                                              .   Java snippet   SCA
              .   .

State Entry Action: .
                                                              .   Java snippet   SCA
              .   .

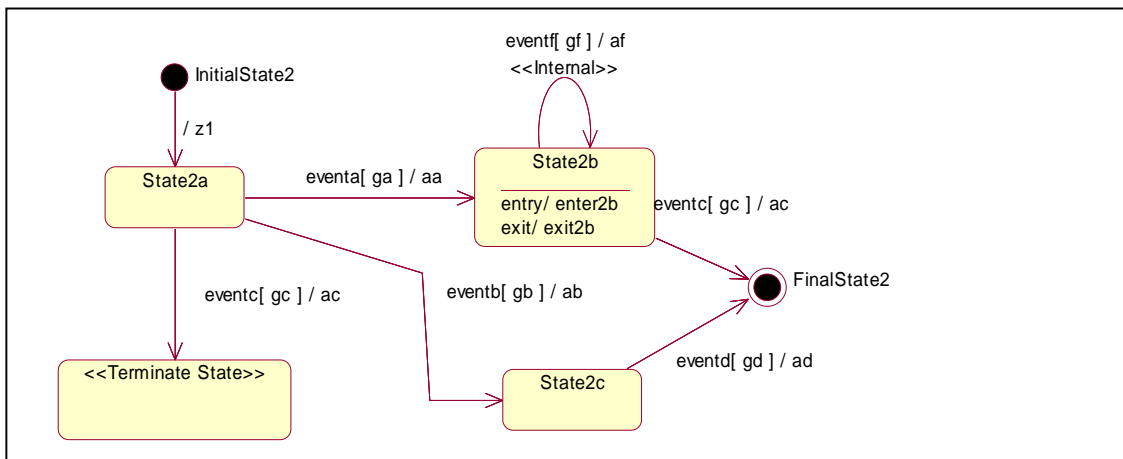guard, action, state exit action   state entry action   .
                          .   , UML   (2   ) **initial**   **State 1**
                          guard   (   ).

BSM   18   .   19   BSM
                                                          .

InitialState1

event9[g9] / a9

/ z0

State0

event2[g2] / a2

State1

entry/ entry1
exit/ exit1

event8[g8] / a8

FinalState1

event1[g1] / a1

event3[g3] / a3

<<Composite State>>
State2

eventx[gx] / ax

/ z2

State3

event after 12 seconds/ ^event5

State4

event5[g5] / a5

event6[g6] / a6

State5

event7[g7] / a7

FinalState3
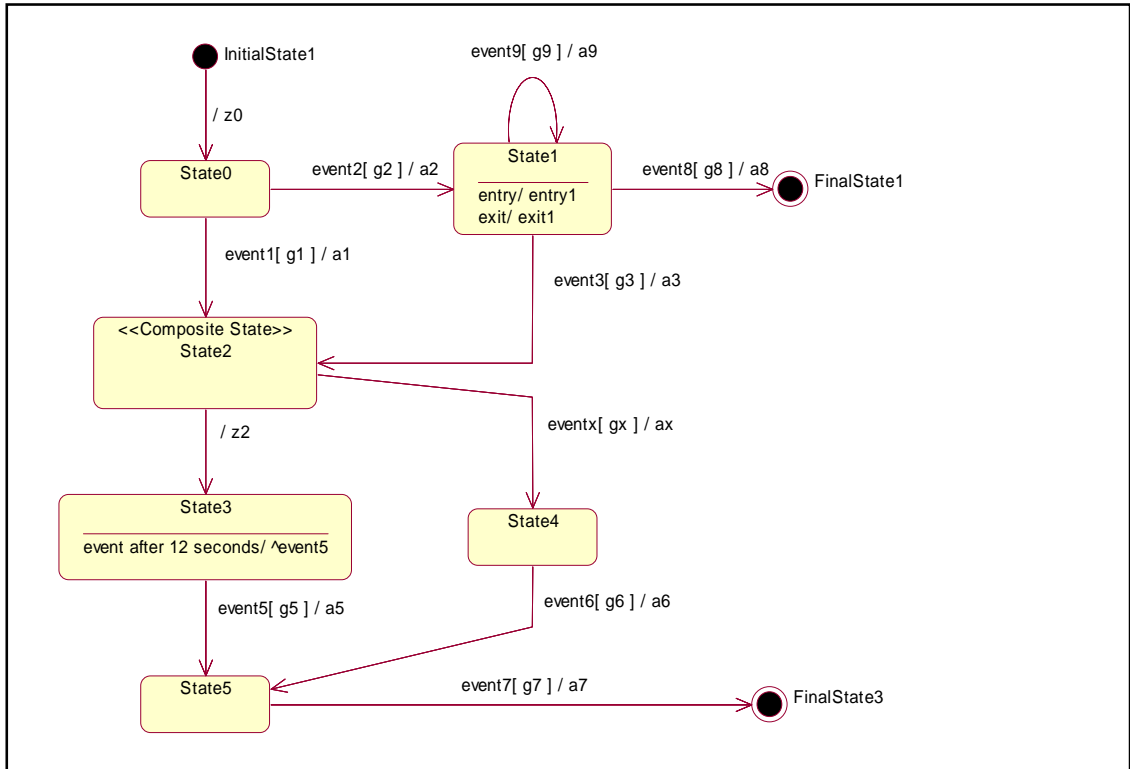
19

                              InitialState1(   )   ,   .
                                                                      .   (pseudo-
state)   (**State 0**).
              ,   guard   .
                              (3   z0).
      19   **State 0**   event1   event2   2   **State2**   **State1**
                . event2   , guard   g2   **State 0**
                              (   ).   a2   .   **State
1**   (entry1)   .

                                                              .   .

- event8   event3   **State 1**   exit1   .
- **State 1**   event9   .
                              /   (   )

/ . 3 . 4

.

1 guard, action state exit state entry .

. , a1 2

2 BPEL a1

SCA .

( )

. 3 . **State 3** 12 event5

. .

(: guard g5) .

State 2 .

. .

.

InitialState2

eventf[gf] / af
<<Internal>>

/ z1

State2b

State2a

eventa[ga] / aa

entry/ enter2b
exit/ exit2b

eventc[gc] / ac

FinalState2

eventc[gc] / ac

eventb[gb] / ab

<<Terminate State>>

State2c

eventd[gd] / ad

20 State 2

SACL . 20 **State2**

. event1 **State2** .

. (**InitialState2**)

(**State2a**).

.

- (terminate state) .

.

(final state) .

,

.

- (**FinalState2**) 3 **State2**

. (z2) , guard .

.

.　　　　　　　　(

)　　　　　,　　　　　　.

●

.　　3　　eventx　　**State 2**　　　　　　　　　.　**State 2**

(**State2a**, **State2b**, **State2c**) eventx　　　　　　guard　　gx　　　　　,

ax　　　**State4**　　　　.　　　　　　.

● UML 2　　　　　　(nested)　　　　　　　(enclosing)

.　　　　　　　eventx　　　　,　　3

eventx　　　　　　　　.

.　　　　　　　　　.

21　　　　　　　　　.

Created

Ready

purchase[needsApproval] / doApprovalAction

cancel

purchase[NotNeedsApproval] / doShipAction

InApproval

cancel/doCancelAction

approve / doShipAction

Cancelled

event Timer[Duration 1 Month]/ ^Timer

Shipped

orderReceived

Delivered

event Timer[Duration 2 Months]/ ^archi...

archive

archive

Archived
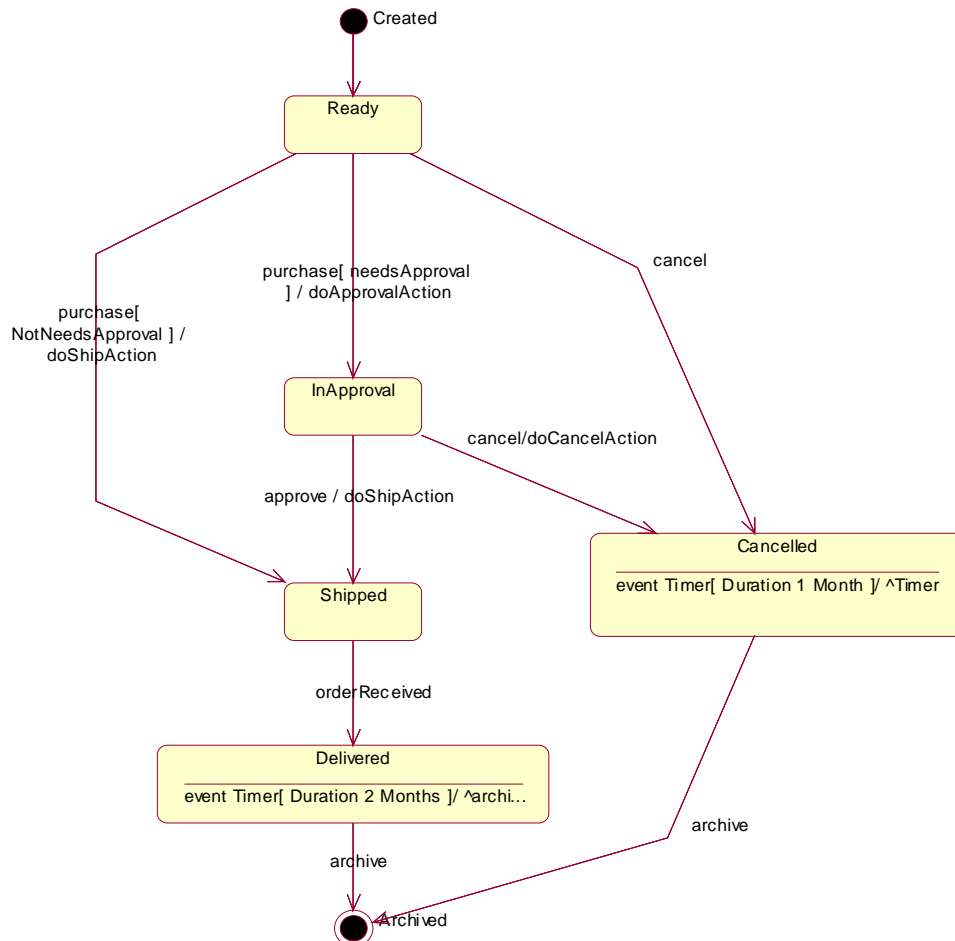
21

Created   .   .
,   Ready   .

Ready   purchase   cancel   2   . purchase   2
guard   , needsApproval   NotNeeds Approval   .   /   .

,   .   .
, guard   . needsApproval   ,
hApproval   .   NotNeedsApproval
Shipped   .

hApproval   cancel   approve   guard   . approve
Shipped   . Cancelled   (   )
. Cancelled   1
Timer   .

Shipped   orderReceived   Delivered   .   2
timer   ,   Archived   .

Archived   .   ,
.   .
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2   ,   (   ).

- If/then
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Eclipse
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,   .

SOA

SCA

WBI

(   )   ,   1..n

WBI   SCA   .

, Java   .   Java   .

                                    1..n

/

startDate	endDate	Business Rule ClassName	Business Rule XML	com.xyz.CalcDisc*.class
01/01/02	01/01/03	com.xyz.CalcDiscv1.class	calcDiscv1.ruleset	(params) {…}
01/01/03	01/01/04	com.xyz.CalcDiscv2.class	calcDiscv2.ruleset	
01/01/04	01/01/05	com.xyz.CalcDiscv3.class	calcDiscv3.dtable	

calcDiscount(a ,b)

startDate	endDate	Business Rule ClassName	Params/Sequence Data	com.xyz.CalcShip*.class
01/01/02	01/01/03	com.xyz.CalcShipv1.class	calcShipv1.dtable	(params) {…}
01/01/03	01/01/04	com.xyz.CalcShipv2.class	calcShipv2.dtable	
01/01/04	01/01/05	com.xyz.CalcShipv3.class	calcShipv3.dtable	fire (s ,t) {…}

calcShipping(s ,t)

'instances'

Java

22

/

/   , WBI

If/then

if/then   if/then   ,   'if'   , 'then'   .
                                                                                        . true
                            '   '   .   .
                                    .

 : (   )

> ***DiscountRulesetOkay*** *{*
>
> *discount = 0.0   // initialize return variable, essentially another rule*
>
> *If purchase.order >= 100.00 then discount = .05*
>
> *If purchase.order >= 500.00 then discount = .10*
>
> *If purchase.order >= 1000.00 then discount = .20*

            :

        = $50.00

 3   ,

      = 0

        e = $250.00

 3   , 1

      = .05

        = $750.00

 3   , 2

      = .10

        = $1000.00

 3   , 3

      = .20

If/then   .   ,
                        (,   ,   ,   )   if/then
4   .   if/then
          .   if/then
            .

                                                                        .
            .   /   ,
          .   ,   .   ,
                                    .   1   '   '   .
            .

: (   )

	Customer.type = Bronze	Customer.type = Silver	Customer.type = Gold	Customer.type = Platinum
purchase.order < 100.00	0	0	.05	.10
purchase.order >= 100.00 && < 500.00	0	.05	.10	.15
purchase.order >= 500.00 && < 1000.00	.05	.10	.15	.20
purchase.order >= 1000.00	.10	.15	.20	.25

:

= $50.00,   = Bronze

2   , 1

= 0

= $250.00,   = Platinum

6   , 1

= .15

= $750.00,   = Silver

5   , 1

= .10

= $1000.00,   = Gold

7   , 1

= .20

.   .

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'   '   .

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• (/   )

- (, , / /)
- if/then
- /
- (, WPT)

if/then .

UI

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IT
. IT
. IT
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SOA
. WPS V6 (Mediation Framework)
(Mediation Component) . WPS
V6 .
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SCA , .
- BO, BO
- BO, BO,

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(, , ,
, ,) (23).
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23

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(lookup) .

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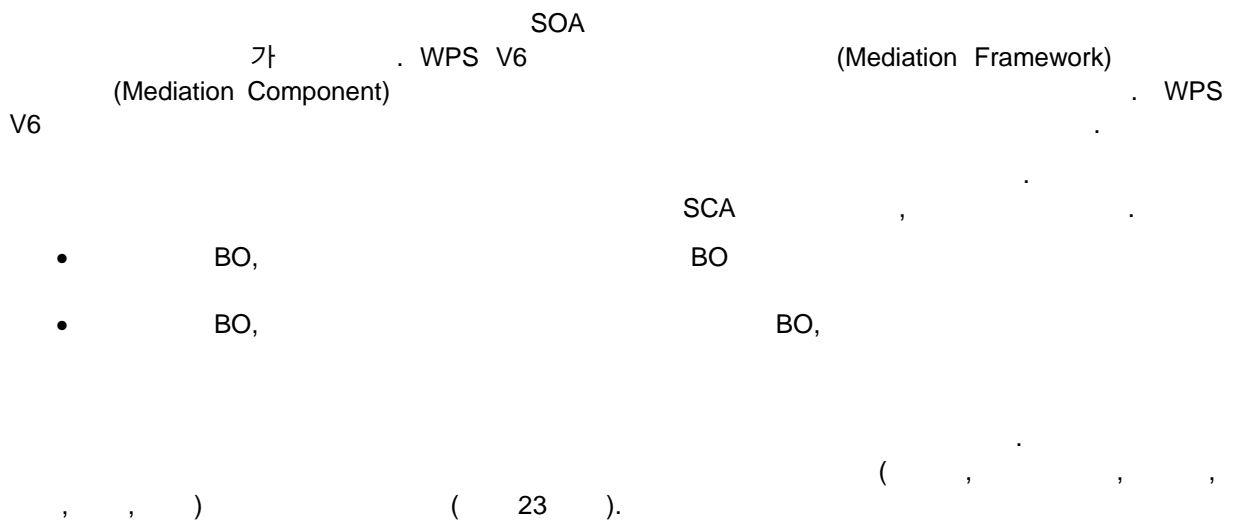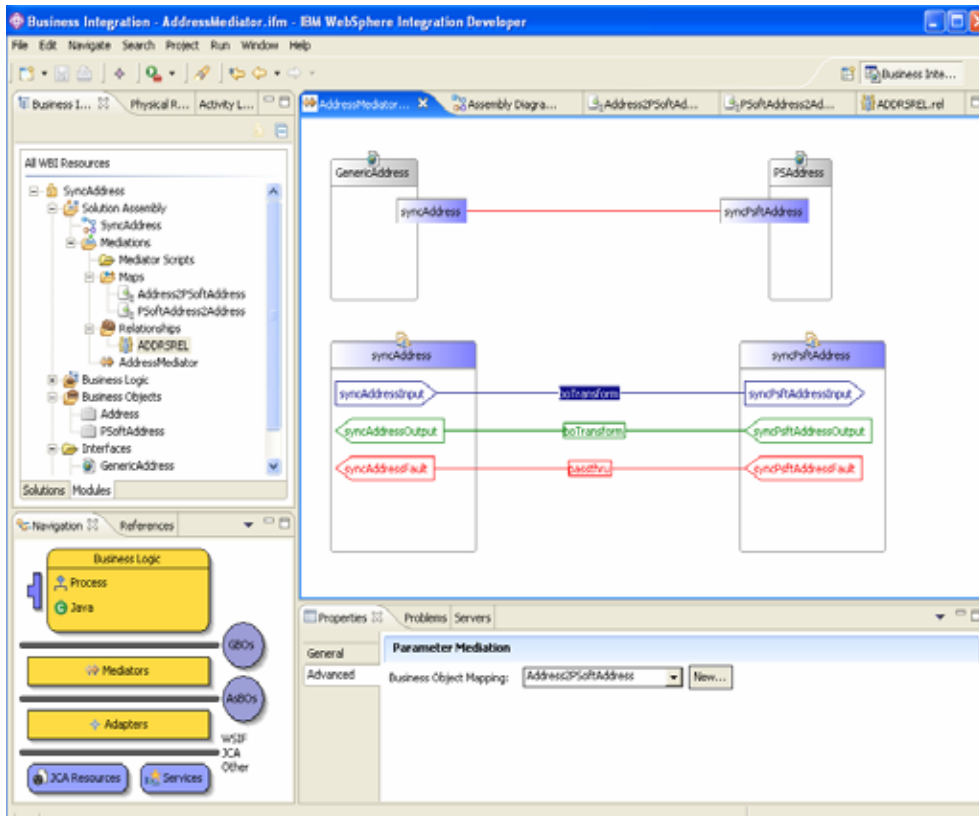
SCA

. 24 (cancelOrder)

(updateOrderStatus) .

(:

).

```
           ┌──────────┐          ┌──────────────────┐          ┌──────────┐
           │   A     ■├─────────►│                ■─┼─────────►│   B      │
           └──────────┘          │                  │          └──────────┘
                      ╲          │                  │       ╱
                       ╲         └──────────────────┘      ╱
                        ╲                                 ╱
           ┌─────────────▼───┐                ┌──────────▼──────────────────┐
           │ cancelOrder(Order│                │ updateOrderStatus(Order order, String│
           └──────────────────┘                └─────────────────────────────────┘
```

24

25   OrderManager   SAP   ,
                          .   SAP   ,   .

"   "   .

retrieve(Order)   ⊗   fetch(SAPOrder)

                                                        SAP '   '

                    ⬇ (green arrow)

retrieve(Order)   ⬍   fetch(SAPOrder)
                retrieve(Order) fetch(SAPOrder)
                                                        SAP '   '

25

:
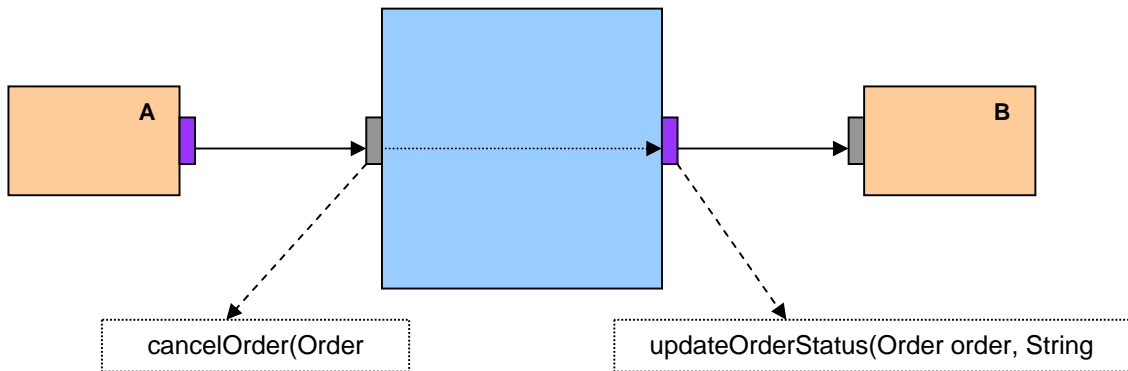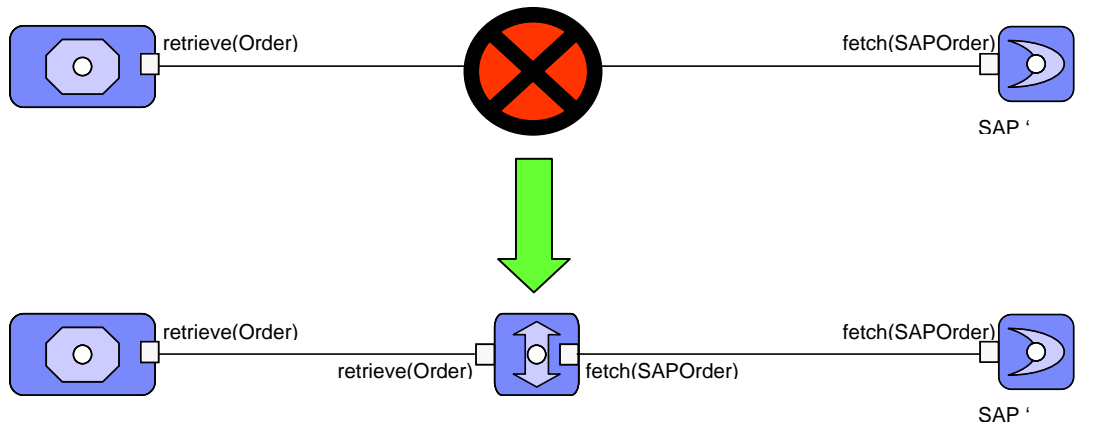
                                                    . WPS V6   ,
                    Move/Join/Extract/Assign   (
        Java   )   .
        .

                                                                                    '   '

        (31   ).
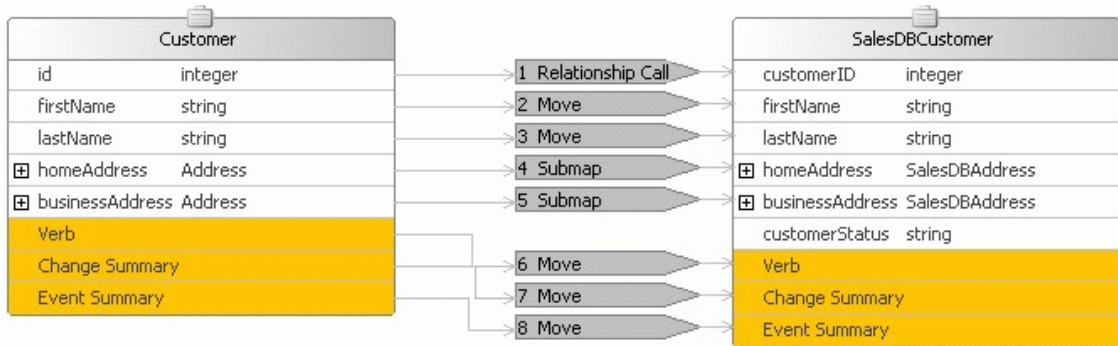
26

( )

ASBO(: SAPCustomer, SAPOrder) CRUD(Create, Read, Update, Delete)
EIS , GBO(: Customer, Order)
.
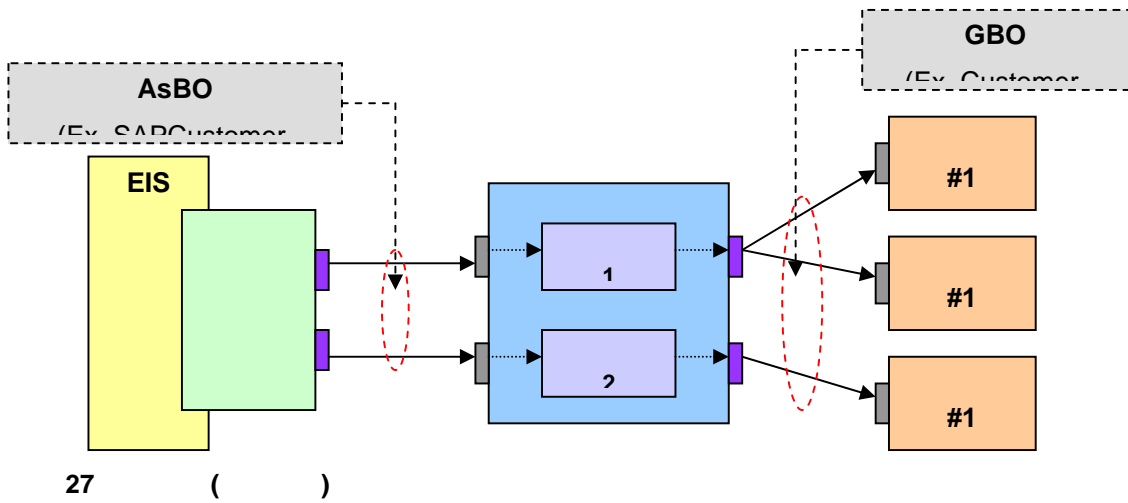
, /
. , ( )
( ). 27 .

27 ( )

( )

GBO(: Customer, Order) , ASBO(:
SAPCustomer, SAPOrder) EIS (: SAP) CRUD
.

, /
. 28 .

GBO
(Ex. Customer,

AsBO
(Ex. SAPCustomer,

EIS

#1

#2

#N

3

4

28

: ID

(:)

. WPS V6

.
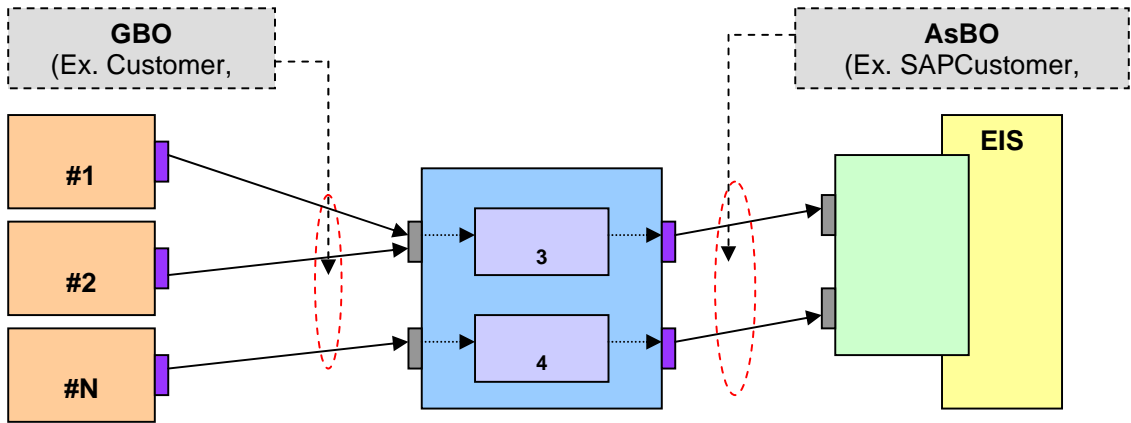
WPS .

WPS V6   ID   ,   .

,

(: TX = Texas, NC = North Carolina)

(Relationship Designer)   .   29
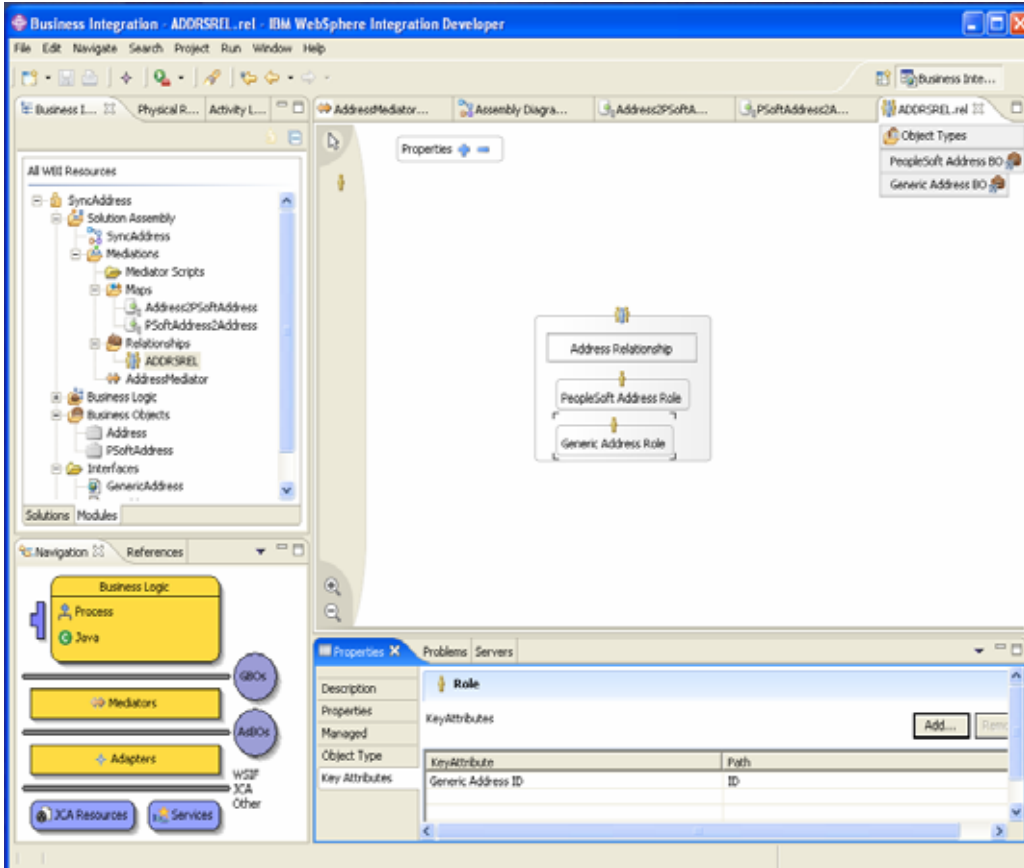
.

그림 29

. EIS에서는 Create 작업 (예: SAP에서 createCustomer)을 처리할 때 (그림 30)과 같이 WPS V6는 EIS의 ID(예: SAPCustomerID)와 ID(예: CustomerID)를 처리한다. EIS(예: Siebel)의 Customer를 처리할 때, 즉 CRUD 작업을 수행할 때이다.

그림 30

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WBI
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WBI   .   .

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             .
- •   Jservice
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                                           ,   (31   ).

31
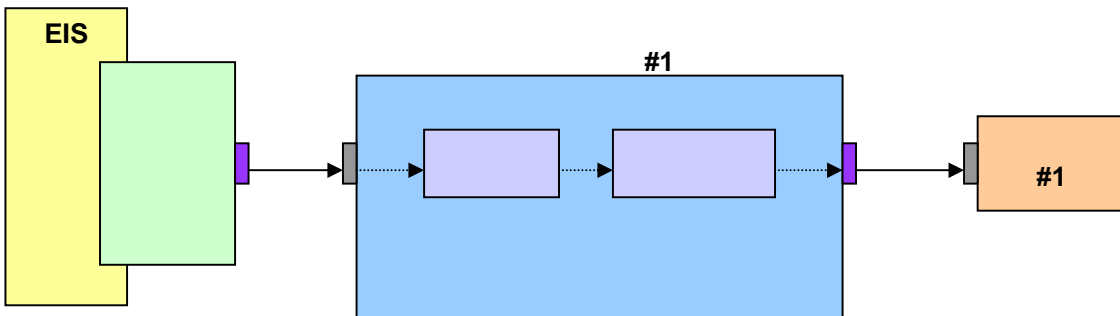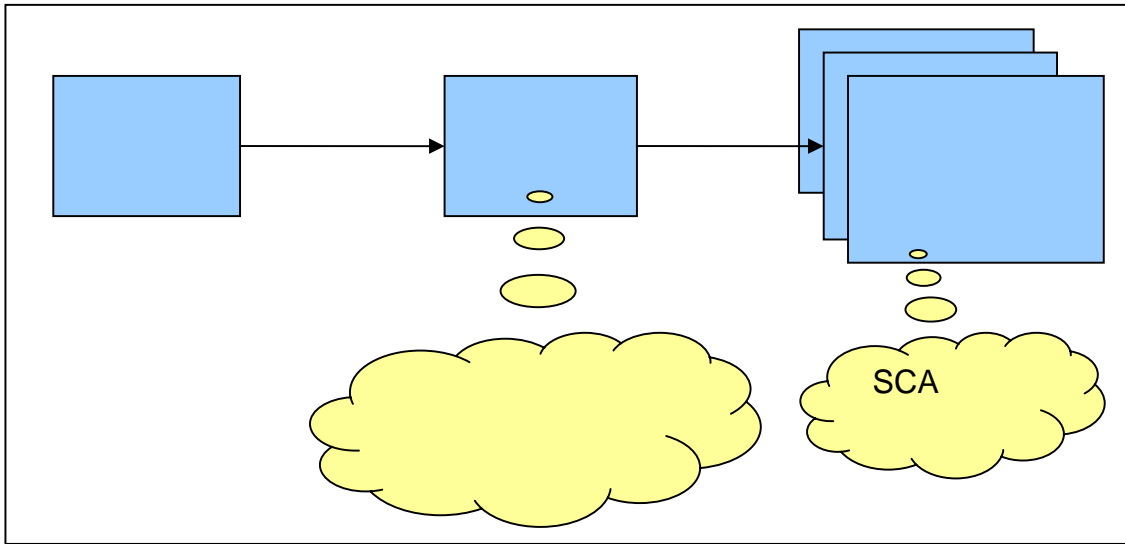
_____: . SCA
          .

_____: SCA   ,
                    .
          .

___: SCA   .
          .

32
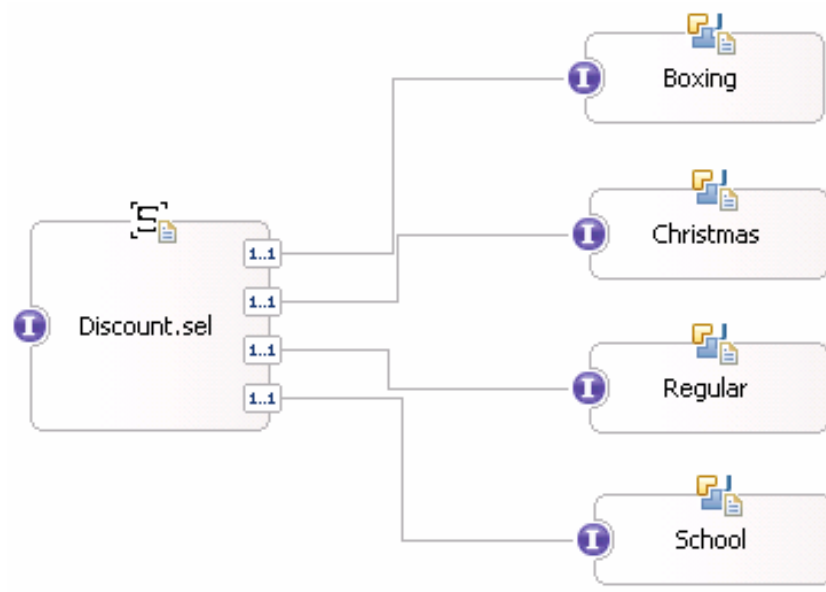
32   .   ,
Discount   SCA   .

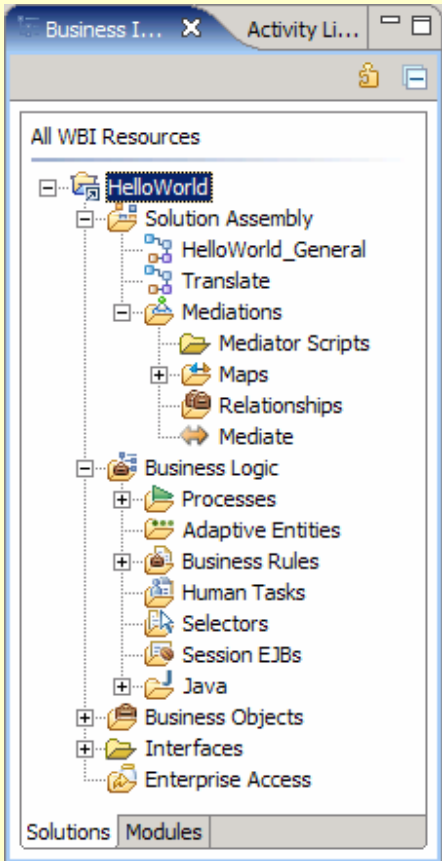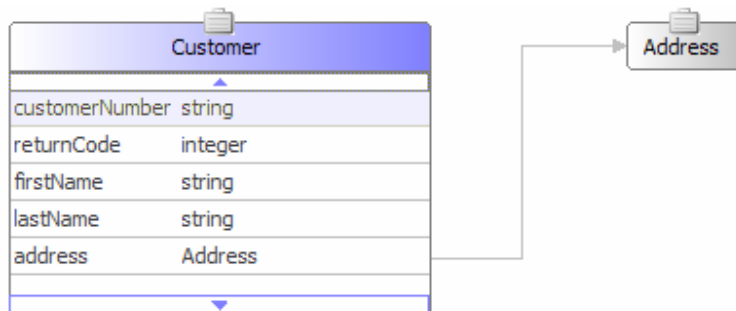   .

                                                                                         .

4. WebSphere Integration Developer

WebSphere Integration Developer v 6.0   WPS
                . Eclipse 3.0   , "   "   IDE   .   "
        "   Rational Application Developer v6.0   .

Integration Developer   .

                                                                                .

                                                                                    (top-down)

                (bottom-up)   .   /
                                                                                .
                                                                                                                    .
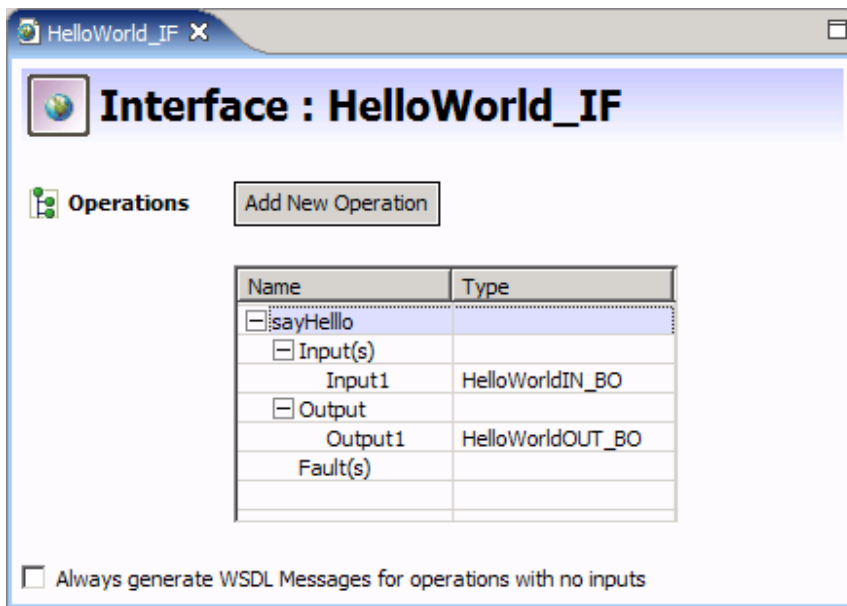
WebSphere Integration Developer   SCA   . Integration Developer
        SCA   .

33   SCA

                                        .   /
                                                .
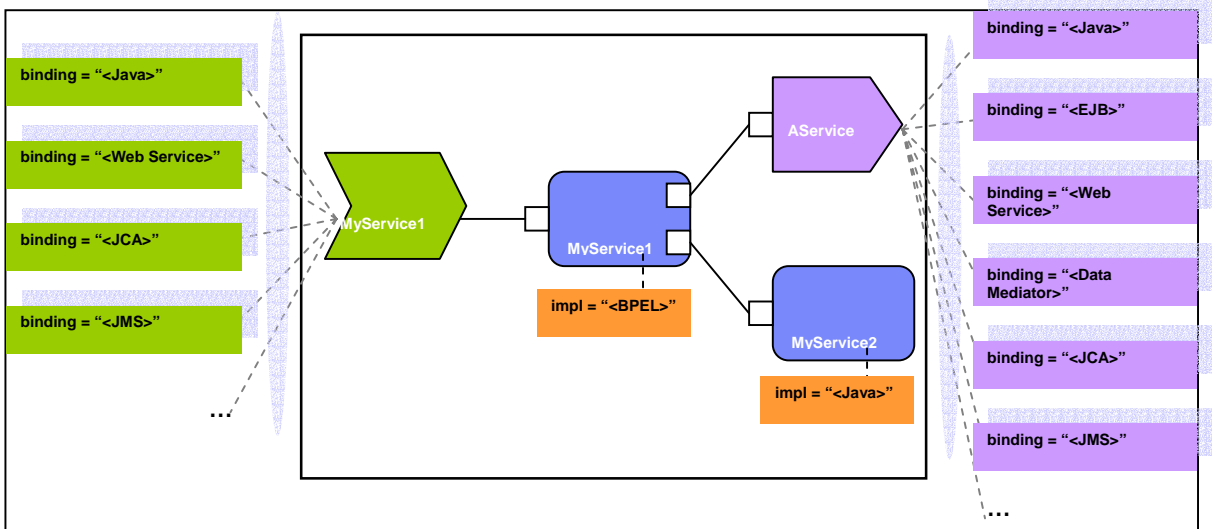
                                                                                            ,
WebSphere Business Integration Server   .

SCA . WDSL Java .

" "

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(Wire)

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(Service Qualifier)

QoS .

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(Service Implementation Type)

WebSphere Integration Developer

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BPEL , EIS , SCA

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/ . ,

. (: EJB, , EIS

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Integration Developer .

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Integration Developer .

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                    .   ,
                                        .

                                                            ,   .
                                              J2EE
        .   Rational Application Developer   WebSphere Integration
Developer   .

<hr>

WebSphere Integration Developer   SOA   .

                                                            .   WebSphere Integration
Developer   .   J2EE Connector Architecture
        .
        JMS   . WebSphere Integration Developer   SOAP
                    .   WSDL   .
        BPEL   .

                                                                                                                        .
                                                            ,   .
        WebSphere Integration Developer   .NET
                .   SCA   .

<hr>

WebSphere Integration Developer   ,   'meet-in-the-middle'
                                                            .   WebSphere
Integration Developer   .
                                                            ,   ,
                    .

Business Integration perspective

Business Integration perspective   .   34
                                                            ,   ,   .

34 WebSphere Integration Development

	Solution Assembly	. , , , .
	Business Logic	. Processes(BPEL), Business State Machines(Adaptive Entities), Business Rules, Human Tasks, Selectors, Session EJBs Java beans .
	Business Objects	.
	Interfaces	.
	Enterprise Access	JCA EIS (: Exports, Imports)

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35

, ASBO(*Application Specific Business Object*) .

GBO(*Generic Business Object*) .

GBO ASBO .

. ASBO GBO .

. BPEL , CICS

EIS COBOL .

(36).

Interface : HelloWorld_IF

Operations   Add New Operation

Name	Type
⊟ sayHelllo	
⊟ Input(s)	
Input1	HelloWorldIN_BO
⊟ Output	
Output1	HelloWorldOUT_BO
Fault(s)	

☐ Always generate WSDL Messages for operations with no inputs

36

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(37).

37

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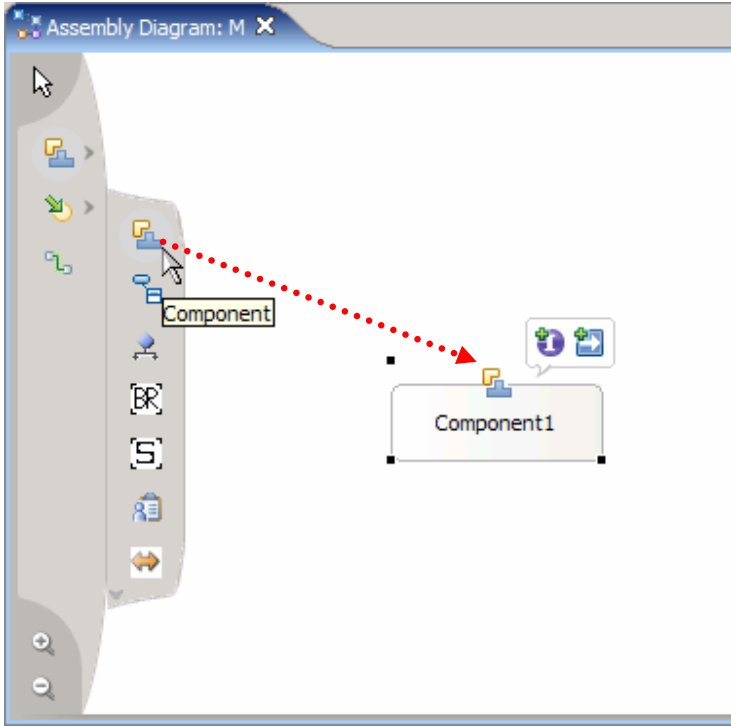
.   (
38)
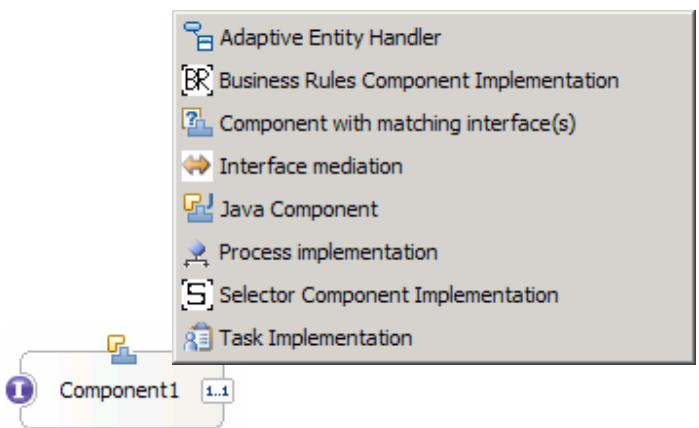
38

(39).
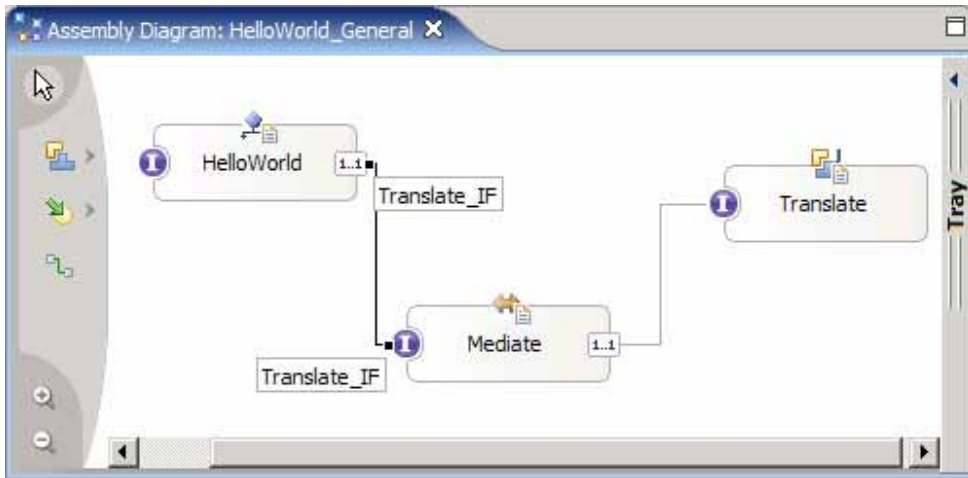
39

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EIS

EIS   .

(Enterprise Meta Data Discovery)   EIS

.   EIS

(40).

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43   .   ,
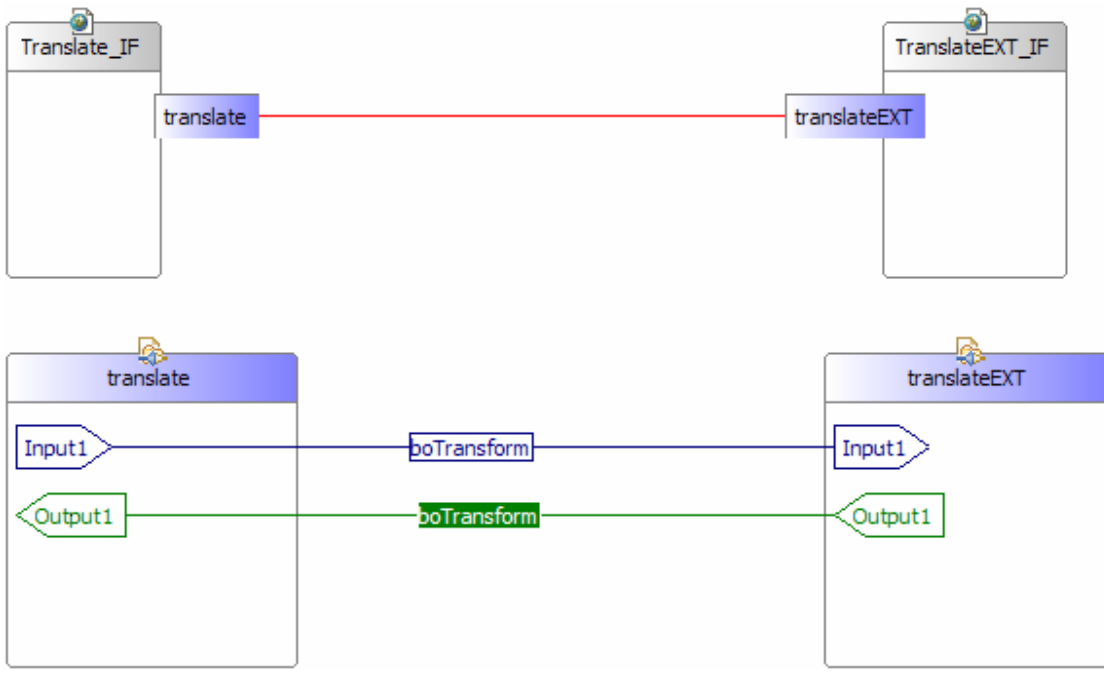   (   )   .
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43

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44

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,   BPEL   Java   )
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(47).

47

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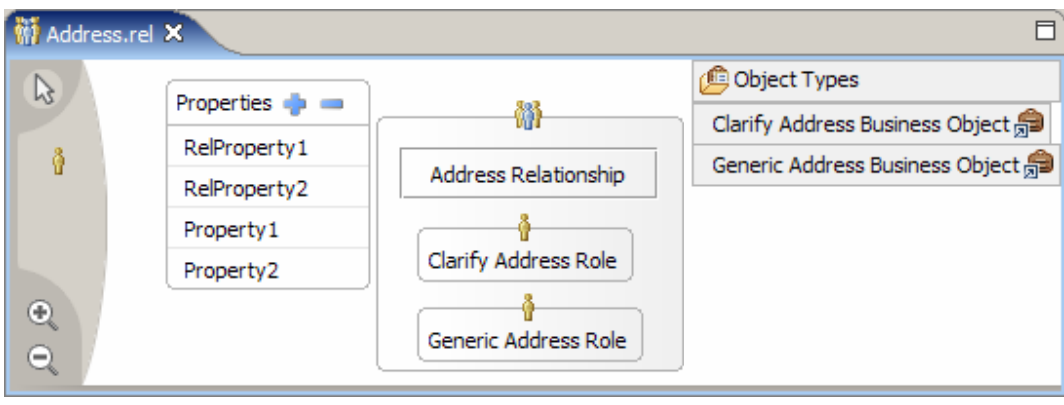.   .

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