

Enterprise Integration with SAP & WSO2 ESB

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Road Map

- Introduction to SAP Adapter
- Introduction to SAP
- How does WSO2 ESB Help?
- SAP Adapter and operational modes
- SAP Integration and Linking

- SAP Integration with ESB
- Introduction to WSO2 ESB
- WSO2 SAP Adapter implementation
- SAP transport and configurations

- Sample Integration scenario/Demo





SAP

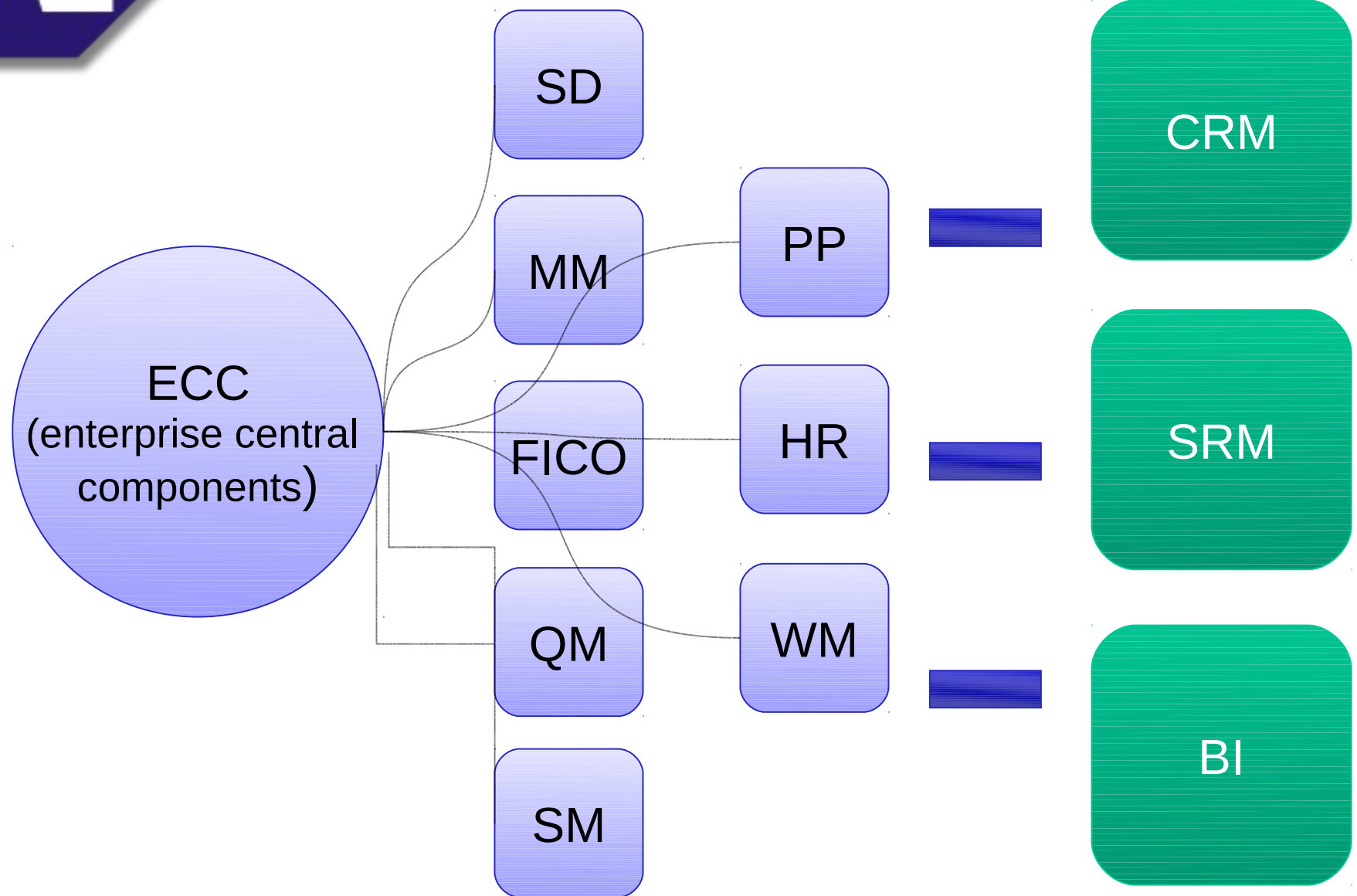
(Systems Applications and Products
for Data Processing)

- ▣ SAP Provides standards based ERP solutions for your enterprise
- ▣ Stable and Seamless integration with every SAP module and/or products





SAP



SAP Business Suites

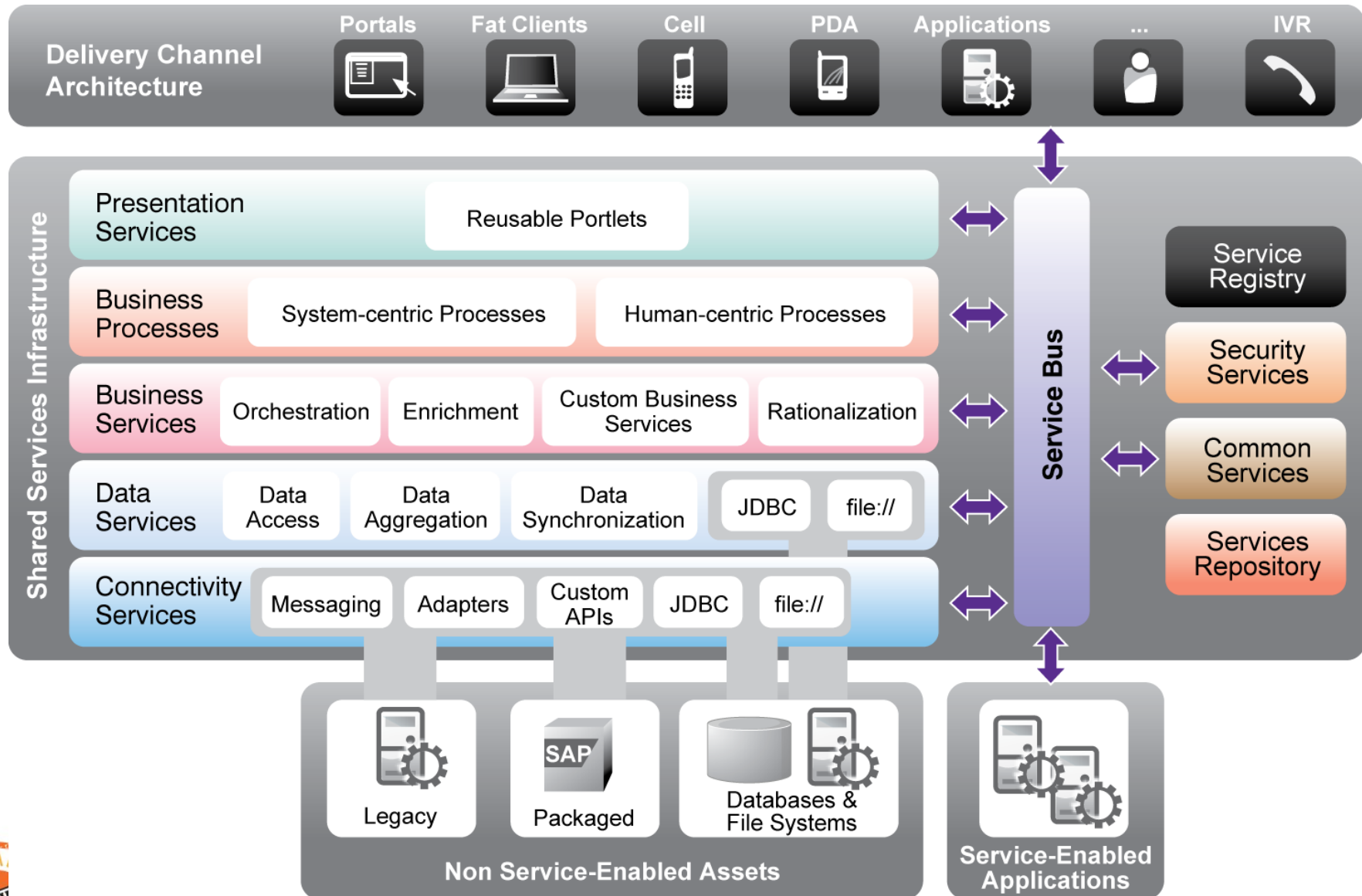


HOW Does WSO2 ESB Help ?

- ▣ Infrastructure to connect External systems (ie:-legacy) with SAP R/3
- ▣ Associate QoS services with SAP based systems (ie:-enable reliability, security)
- ▣ Associate advanced routing, mediation and work flows by interconnecting different systems
- ▣ Exposing host of SOA technologies



HOW Does WSO2 ESB Help ?

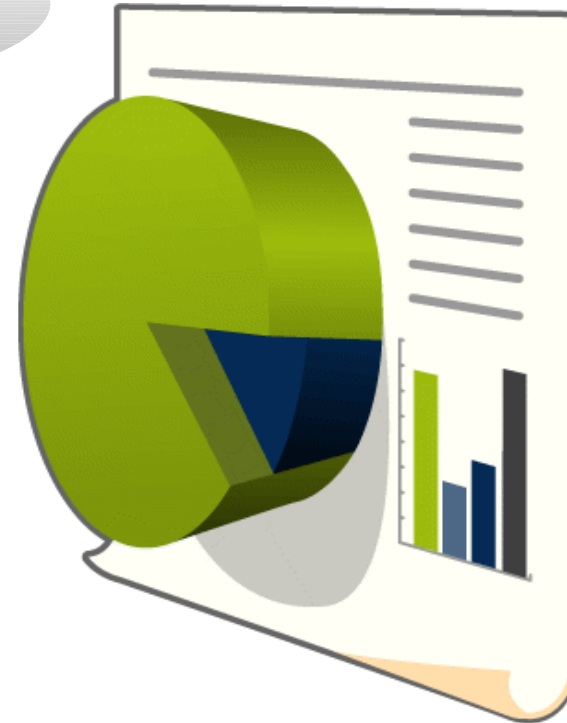


HOW Does WSO2 ESB Help ?



HOW Does WSO2 ESB Help ?

Next Big thing for 'Kwik E Mart'



HOW Does WSO2 ESB Help ?

I don't speak SAP!!!



MX Pro

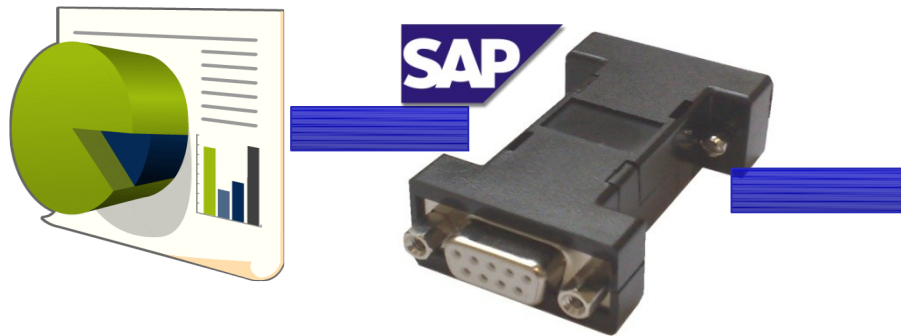
- ❑ MX Pro does NOT support SAP XI
- ❑ Incompatible messaging/protocols
- ❑ Legacy Systems

Finance
System

Inventory

HOW Does WSO2 ESB Help ?

*don't mind SAP...WSO2
SAP adapter will handle that
for me... :)*



- MX Pro pull out data from SAP
- publish data to SAP
- both Systems living in harmony

Finance
System

Inventory

Introducing WSO2 SAP Adapter...

- ▣ Interconnects SAP R/3 with external Systems with ESB SAP adapter in middle
 - Most external systems can't do RFC wrt R/3
 -
- ▣ External systems unable to understand R3 message types (ie:-idoc)
- ▣ Allow QoS features
 - ie:-reliability(ie:-message stores, dead-letter channels, queues,etc) , availability ,security

Introducing WSO2 SAP Adapter...

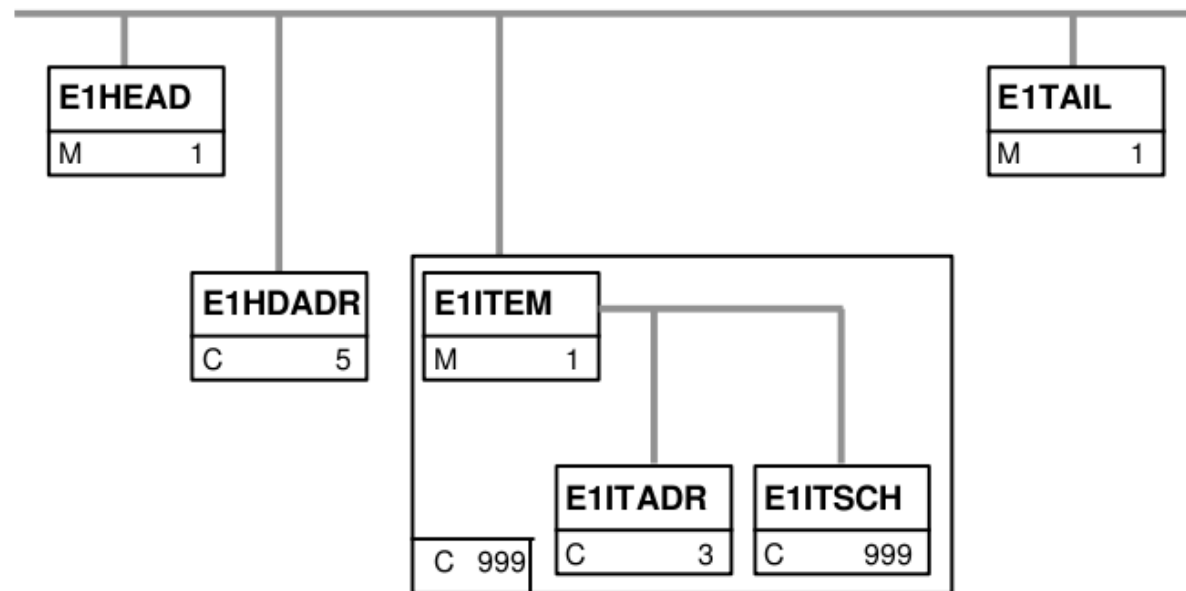
- Uses popular SAP Java Connector or SAP JCO library
- 2 modes of operation
 - IDOC (ALE)
 - BAPI RFC
- Utilize ESB/Axis2 transport framework

SAP Adapter in IDOC Mode

- IDOC (XML) messages for SAP data exchange
- Commonly refers to as ALE (Application Linking and Enabling)
- R/3 to R/3 – no problem
 - Inbuilt ALE interfaces
- R/3 to External Apps(vice versa) – SAP Adapter
 - ALE Message Handler
 - ALE Converter

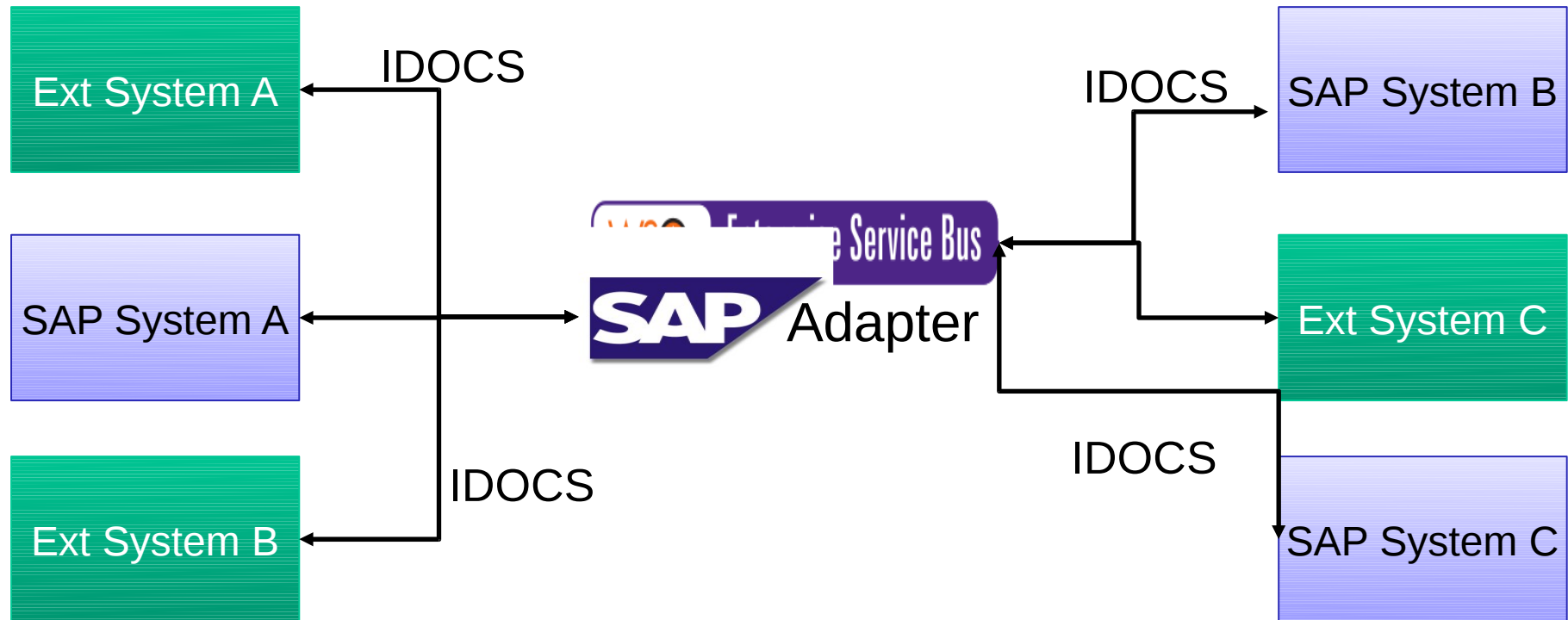
SAP Adapter in IDOC Mode...

- IDOC message structure
 - control segment (sender/receiver info)
 - data segment
 - status segment



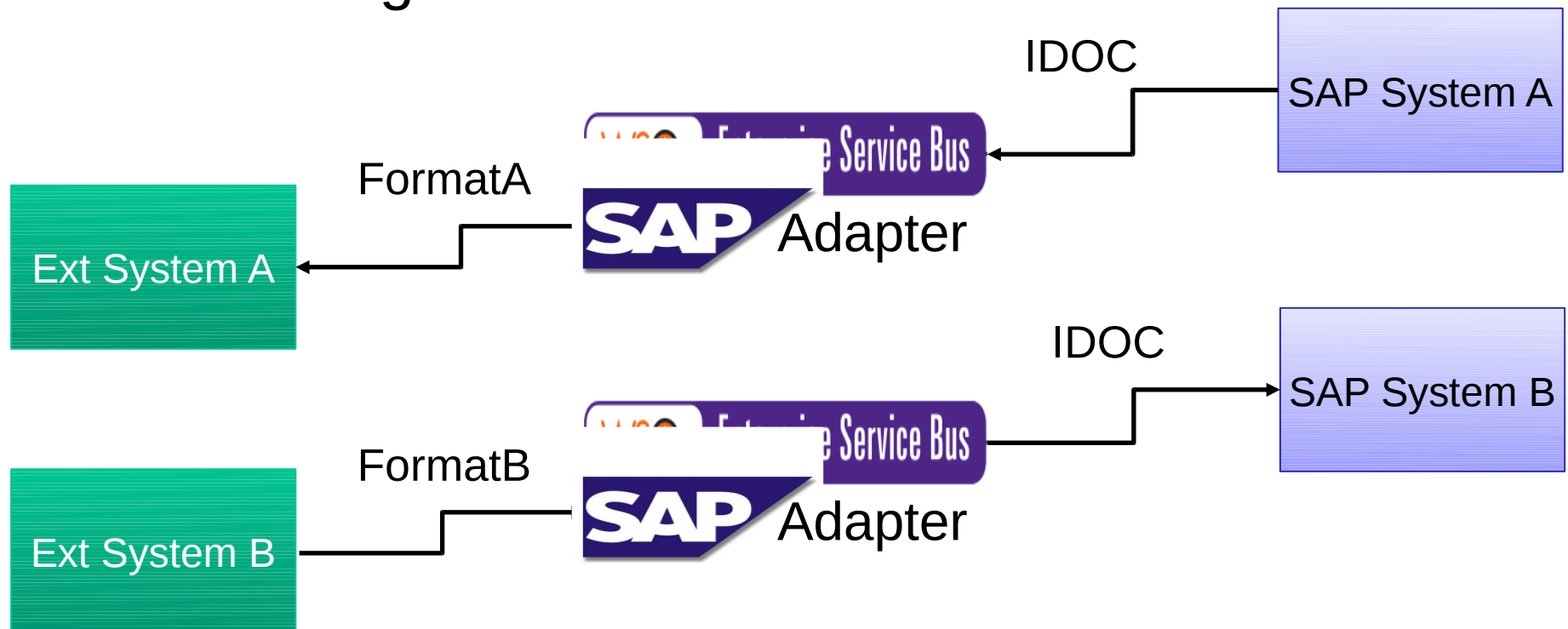
SAP Adapter in IDOC Mode...

- Adapter as a Message Handler
 - routing idoc's



SAP Adapter in IDOC Mode...

- Adapter as a ALE Message Converter
 - handling conversions/mappings
 - enabling transactions



SAP Adapter in BAPI/RFC Mode...

- ▣ BAPI → Business Application Programming Interface

- ▣ Communication standard to interconnect SAP based business application

- ▣ BAPI → RFC or Function module
 - Import parameters
 - Export parameters
 - Tables



SAP Adapter in BAPI/RFC Mode...

- Integrate/Interconnect
 - External/non-SAP Systems
 - R/3 Systems
 - Do complex work-flows



Detour : Introducing WSO2 ESB...

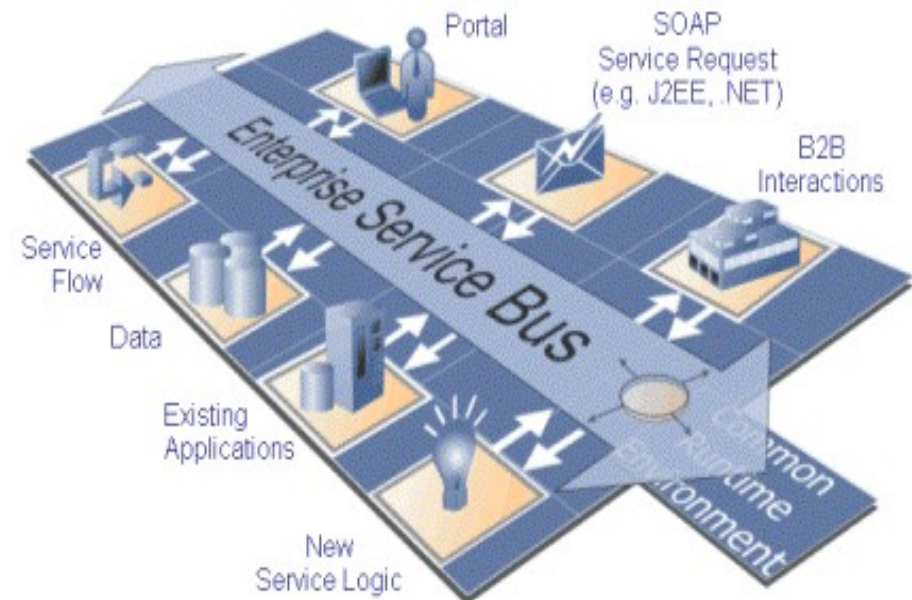
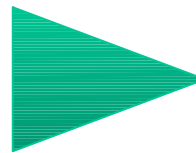
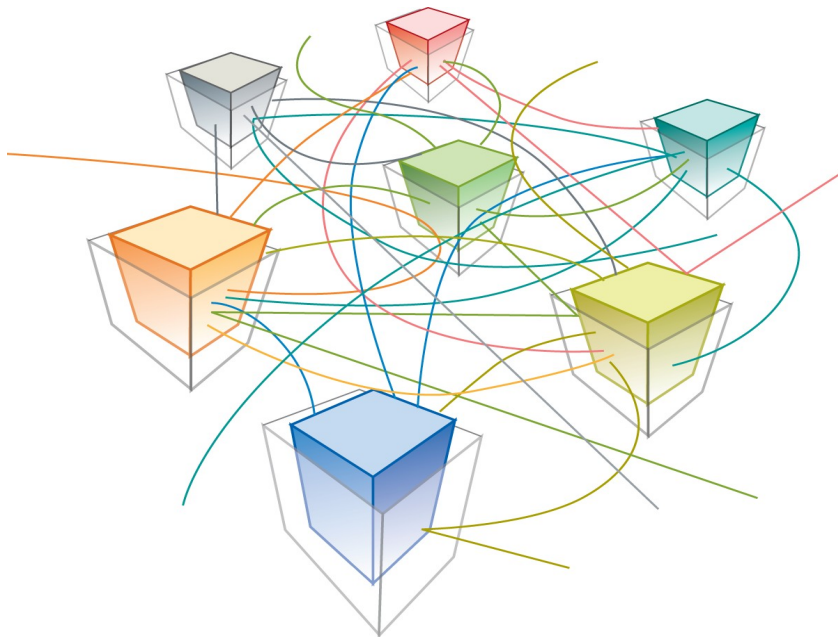
- Based on WSO2 Carbon (Modular Middleware) and Apache Synapse
- Designed to be asynchronous
 - Based on Synapse core with non blocking I/O
- Open source with commercial support
 - Apache Software License v2.0
- Rich collection of built-in features supporting any integration scenario or EIP
- Customizable by adding/removing features



SOA & ESB

ESB is considered the backbone
of a robust SOA

Integrates all the internal systems
as well as external systems
of the enterprise

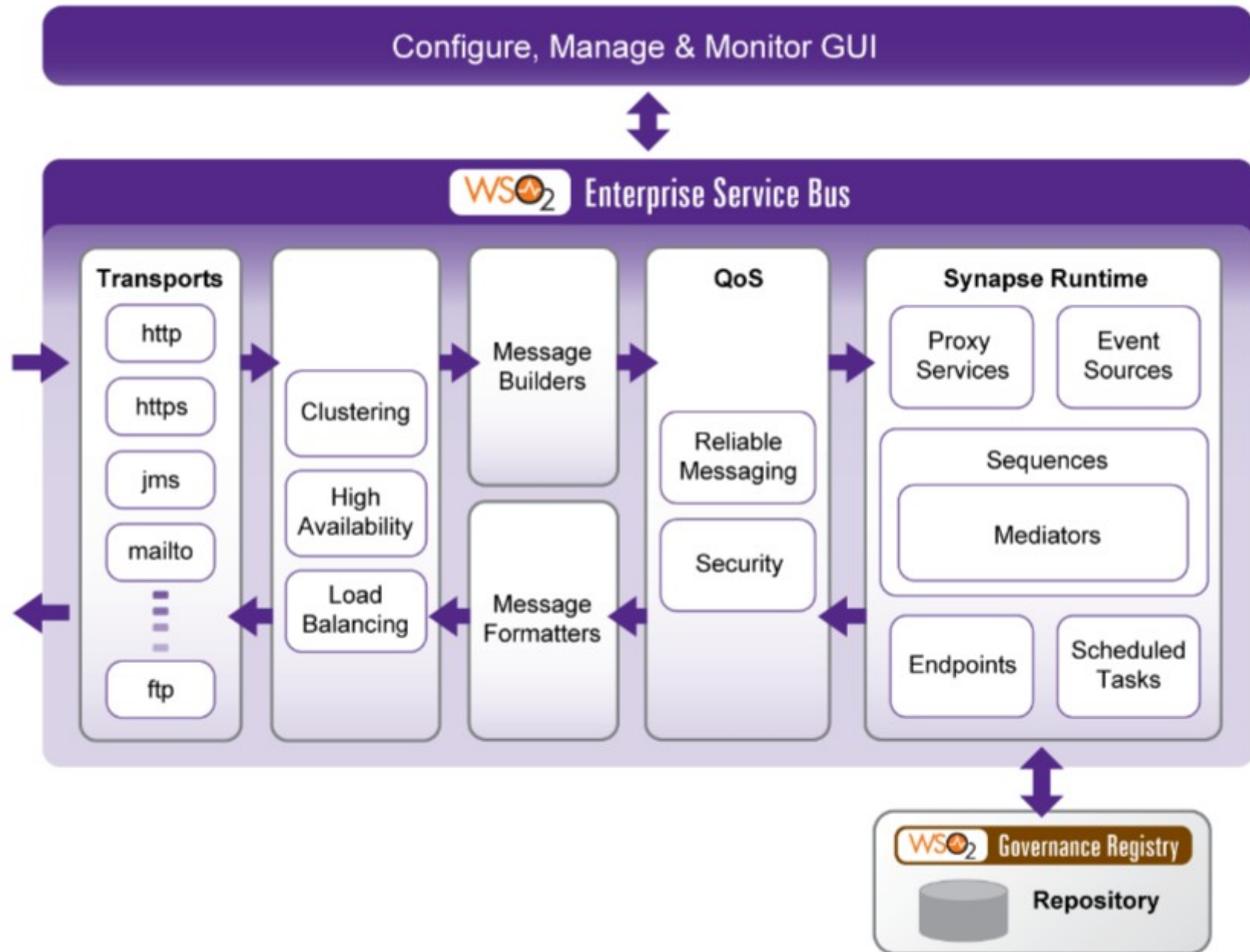


Key Features

- Message routing and transformation
- Load balancing and fail-over support
- Task scheduling
- Eventing support
- Supports different message formats/protocols
 - SOAP, POX, REST...
- QoS features
 - Security, Reliable Messaging, Throttling...
- ▣ Monitoring
 - Mediation stats, JMX Monitoring, BAM

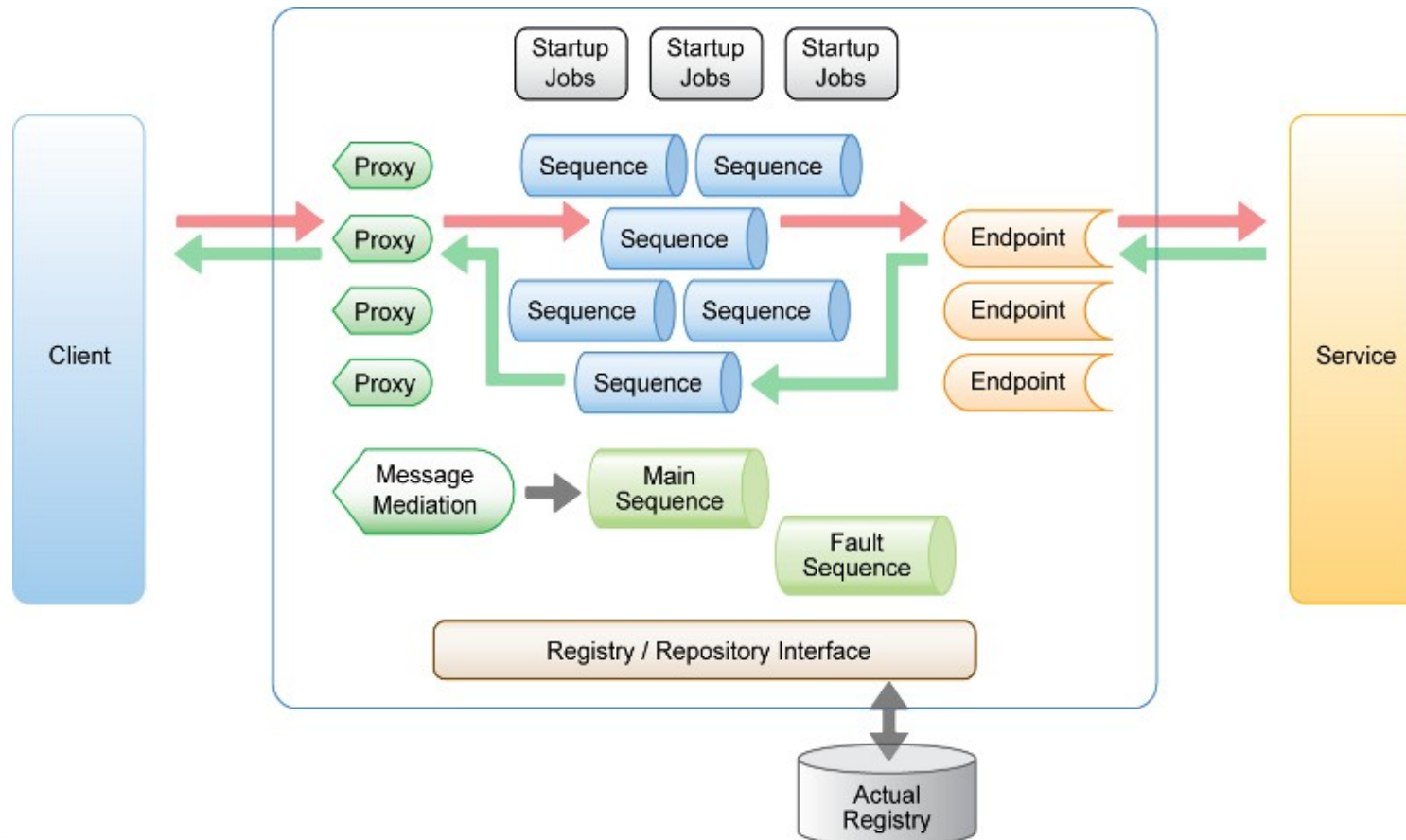


Component Architecture



ESB Runtime

- Message Mediation
- Proxy Services
- Scheduled Tasks



SAP Adapter Implementation

- ▣ Uses SAP JCO
 - SAP JCO for RFC
 - SAP JCO IDOC library
 - Server side + client side integration for SAP

- ▣ Uses Axis2 transport Framework
 - Plugged in with ESB
 - SAP transport for idoc + bapi

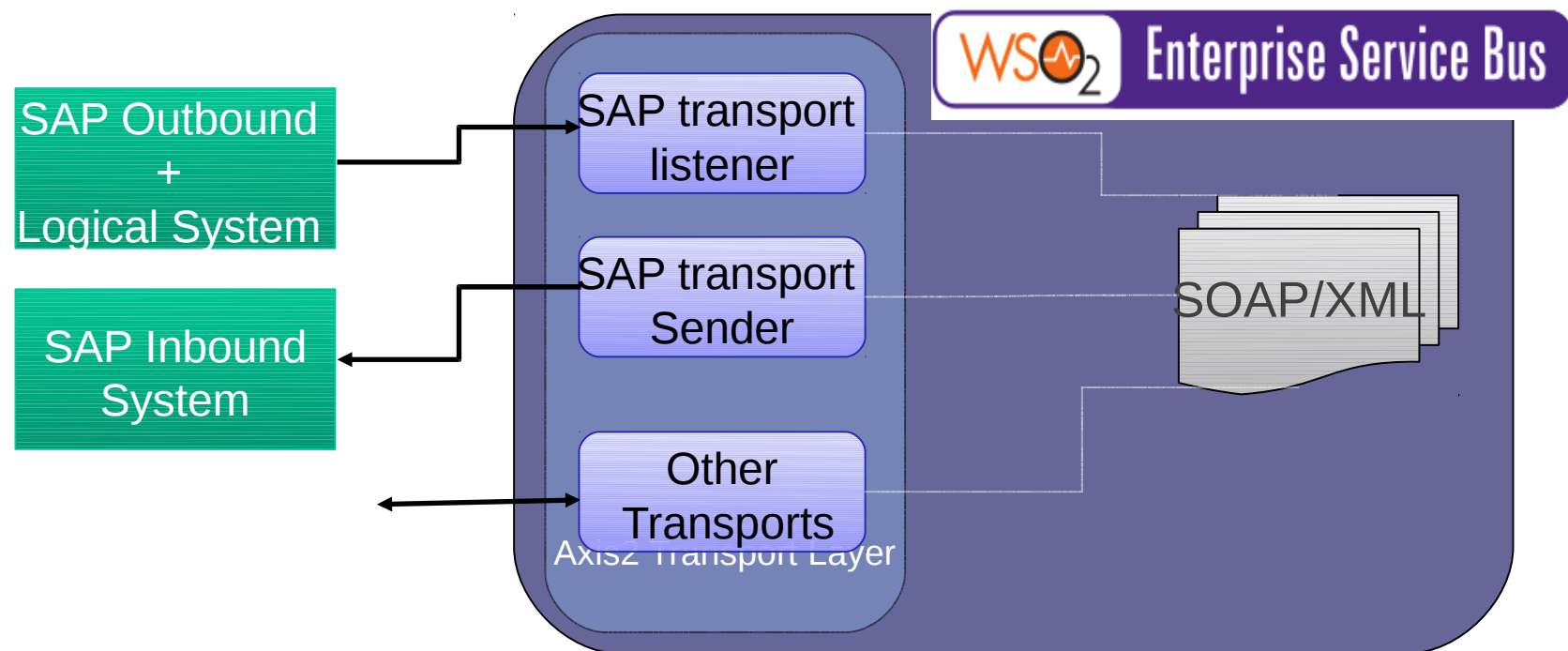


SAP Adapter Implementation..

- Transport Implementations for SAP Idoc + bapi

le:- idoc:/ , bapi:/

- Ability to manipulate SOAP/XML using ESB configuration language



SAP Adapter Implementation..

- ▣ IDOC transport
 - One-way Transport
 - Transport receiver → Acting as an IDOC server
 - SAP Adapter registers itself with SAP System at startup
 - Configurable ie:-program ID
 - Users should setup a logical system to send IDOC's over (ie:-SM59)



SAP Adapter Implementation..

- ▣ IDOC transport
 - Transport Sender → Connect to a SAP endpoint

- ▣ BAPI transport
 - In-Out transport
 - Connect to remote Bapi's published by SAP
 - Outgoing Message/XML should be formed to WSO2 SAP Adapter proprietary format



SAP Adapter Deployment

- ▣ Install WSO2 ESB + Axis2 configurations for SAP
- ▣ Install JCO
- ▣ Deploy Client/Server Configuration
 - Configuration parameters to connect to External SAP systems
 - Should be Located inside `$ESB_HOME/repository/conf/sap`
 - `.server` → server side SAP gateway config
 - `.dest` → client side config



SAP Adapter Deployment

▣ SAP server parameters - .server

gwhost → Gateway host

gwserv → Gateway service

progid → Program ID of the server

trace → You can enable or disable the RFC trace

params → Arbitrary parameters for RFC library

snc_myname → SNC name



SAP Adapter Deployment

▣ SAP client parameters - .dest

client → Client logon

user → User logon

passwd → Logon password

lang → Logon language

sysnr → R/3 system number

ashost → R/3 application server

▣ More info on WSO2 SAP adapter user guide



SAP Adapter Configuration - IDOC

▣ Transport Configuration

- defined inside axis2.xml

```
<transportSender name="idoc"  
class="org.wso2.carbon.transports.sap.SAPTransportSender"/>
```

```
<transportReceiver name="idoc"  
class="org.wso2.carbon.transports.sap.SAPTransportReceiver"/>
```

▣ Endpoint Configuration

```
<endpoint name="sap-idoc-endpoint">  
    <address uri="idoc:/JCOCLIENT01"/>  
</endpoint>
```



SAP Adapter Configuration - IDOC

Proxy Configuration

- defined inside synapse.xml or as a proxy config-file inside Dir proxy-services/
- configure SAP System parameters to port with ie:- transport.sap.serverName
- Enable Optional features
 - Enabling transactions (trfc)
 - Enabling Error Listeners (exception/errors)
 - Transport level configurations

- ie:-number of connections,etc



SAP Adapter Configuration - IDOC

```
<proxy name="sap-idoc-proxy" transports="idoc"/>
  //in,out,fault Sequence
  mediator +
  <parameter name="transport.sap.serverName">
    JCOSERVER01
  </parameter>
  // other parameters
  <parameter name="transport.sap.connections" ..... />
  <parameter name="transport.sap.customErrorListener" ../>
  <parameter
    name="transport.sap.customExceptionHandler"/>
  <parameter
    name="transport.sap.customTIDHandler" .../>
</proxy>
```



SAP Adapter Configuration - IDOC

Sample IDOC

```

<?xml version="1.0"?>
<WPDCUR01>
  <IDOC BEGIN="1">
    <EDI_DC40 SEGMENT="1">
      <TABNAM>EDI_DC40</TABNAM>
      <MANDT>400</MANDT>
      <DOCNUM>0000000000000072</DOCNUM>
      <DOCREL>701</DOCREL>
      <STATUS>30</STATUS>
      <DIRECT>1</DIRECT>
      <OUTMOD>2</OUTMOD>
      <IDOCTYP>WPDCUR01</IDOCTYP>
      <MESTYP>WPDCUR</MESTYP>
      <SNDPOR>SAPJMD</SNDPOR>
      <SNDPRT>LS</SNDPRT>
      <SNDPRN>JMDCLNT400</SNDPRN>
      <RCVPOR>WS02ISR</RCVPOR>
      <RCVPRT>KU</RCVPRT>
      <RCVPRN>SCAT</RCVPRN>
      <CREDAT>20100906</CREDAT>
      <CRETIM>170029</CRETIM>
      <SERIAL>20100906170029</SERIAL>
    </EDI_DC40>
    <E1WPC01 SEGMENT="1">
      <FILIALE>SCAT</FILIALE>
      <AENDKENNZ>MODI</AENDKENNZ>
      <AKTIVDATUM>20100906</AKTIVDATUM>
      <AENDDATUM>00000000</AENDDATUM>
      <WAEHRUNG>LKR</WAEHRUNG>
      <E1WPC02 SEGMENT="1">
        <ZWAEHRUNG>EUR</ZWAEHRUNG>
        <BEZEICH>European Euro</BEZEICH>
        <WSYMBOL>Euro</WSYMBOL>
      </E1WPC02>
    </E1WPC01>
  </IDOC>
</WPDCUR01>

```

SAP Adapter Configuration - BAPI

▣ Transport Configuration

- Note same class modules as idoc transport

```
<transportSender name="bapi"  
  class="org.wso2.carbon.transports.sap.SAPTransportSender"/>
```

```
<transportReceiver name="bapi"  
  class="org.wso2.carbon.transports.sap.SAPTransportListener"/>
```

▣ Endpoint Configuration

```
<endpoint name="sap-bapi-endpoint">  
  <address uri="bapi:/JCOCLIENT01"/>  
</endpoint>
```



SAP Adapter Configuration - BAPI

Proxy Configuration

- Calls a remote Bapi in the in-sequence
- Manipulate response from the out-sequence

```

- <proxy name="BAPIProxy" transports="http" startOnLoad="true" trace="disable">
  - <target endpoint="sap_bapi_endpoint">
    - <inSequence>
      - <send>
        - <endpoint name="sap_bapi_endpoint">
          <address uri="bapi:/JCOCLIENT_BAPI"> </address>
        </endpoint>
      </send>
    </inSequence>
    - <outSequence>
      <!-- just log the response -->
      <log level="full"/>
      <send/>
    </outSequence>
  </target>
  <parameter name="transport.sap.serverName">MYSERVER</parameter>
</proxy>

```

SAP Adapter Configuration - BAPI

▣ BAPI Request

- Message format should include import/export/table parameters properly wrt the invoking BAPI interface
- BAPI function types should be known beforehand
- I.e:- `<import>` → represent inputs
- `<structure>` → array input
- `<field>` → basic simple type input



SAP Adapter Configuration - BAPI

- ▣ `<tables>` → represent input/output in a table data structure

```

<bapirc name="Z_BAPI_ACC_DOCUMENT_POST">
  <import>
    <structure name="DOCUMENTHEADER">
      <field name="BUS_ACT">RFBU</field>
      <field name="USERNAME">P9371444</field>
      <field name="HEADER_TXT">WS經由登録伝票テスト</field>
      <field name="COMP_CODE">Z000</field>
      <field name="DOC_DATE">2009-01-23</field>
      <field name="PSTNG_DATE">2009-01-23</field>
      <field name="DOC_TYPE">SA</field>
    </structure>
    <field name="COMPANYCODEID">P9375361</field>
  </import>

  <tables>
    <table name="ACCOUNTGL">
      <row id="0">
        <field name="ITEMNO_ACC">000000001</field>
        <field name="ITEMNO_ACC">000000002</field>
        <field name="GL_ACCOUNT">0000111110</field>
        <field name="ITEM_TEXT">テスト明細テキスト1WS</field>
      </row>
      <row id="1">
        <field name="ITEMNO_ACC">000000002</field>
        <field name="GL_ACCOUNT">0000111200</field>
        <field name="ITEM_TEXT">テスト明細テキスト2WS</field>
      </row>
    </table>
  </tables>

```

SAP Adapter Configuration - BAPI

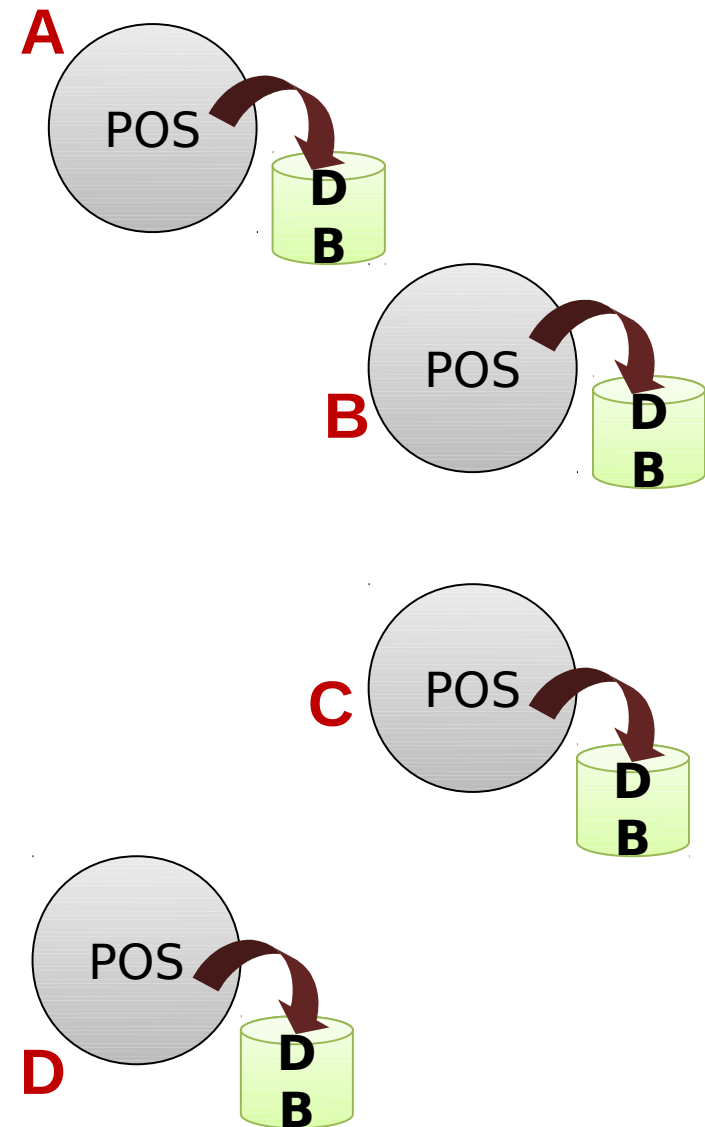
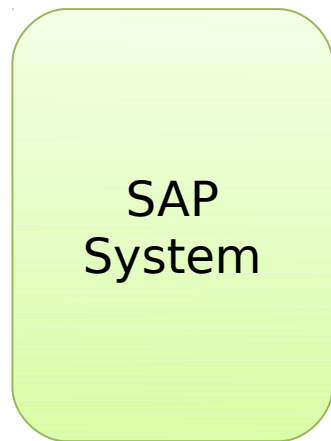
- Bapi response → <output> element

```

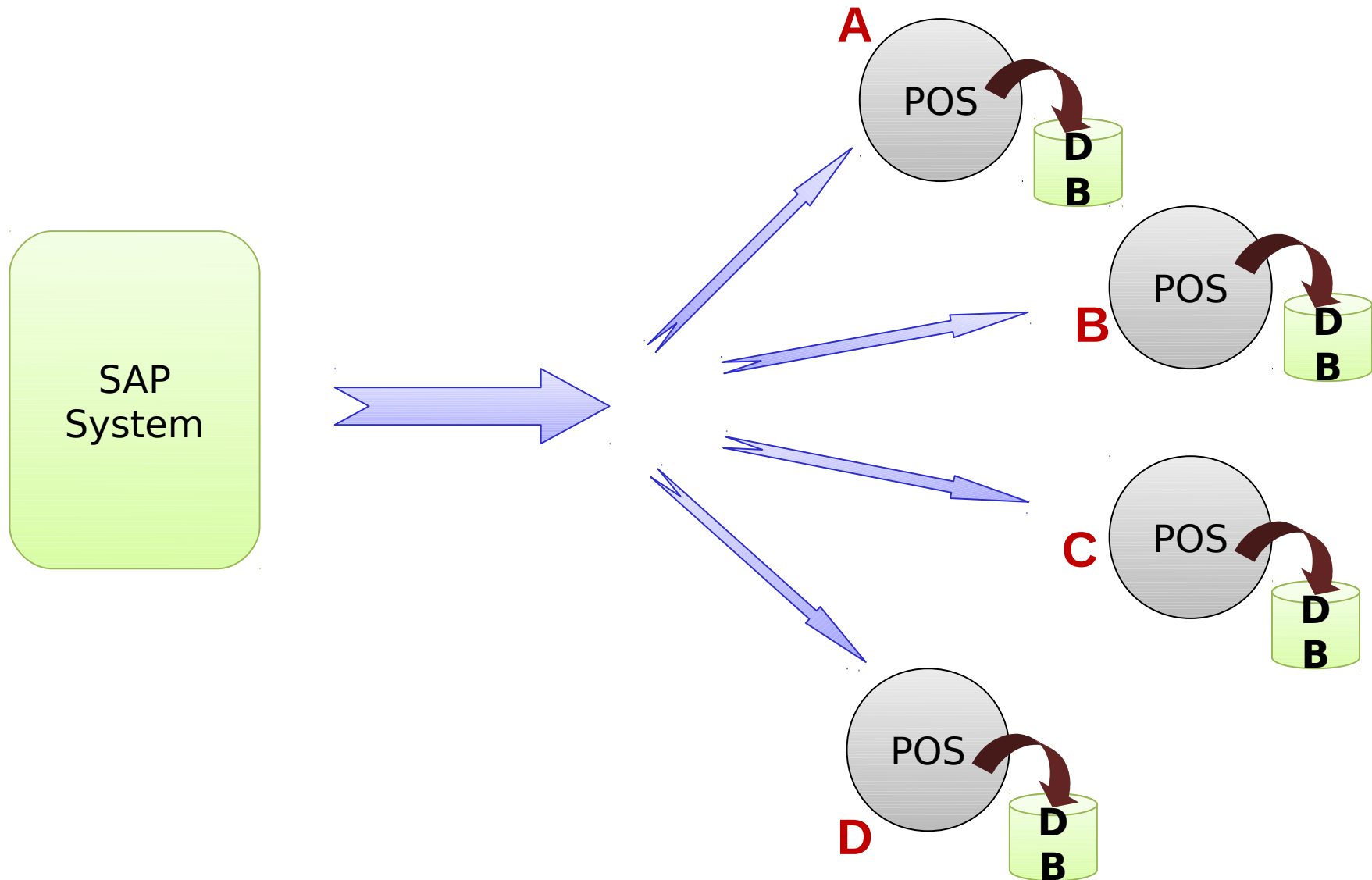
<BAPI_COMPANYCODE_GETDETAIL>
  <INPUT>
    <COMPANYCODEID>7600</COMPANYCODEID>
  </INPUT>
  <OUTPUT>
    <COMPANYCODE_ADDRESS>
      <ADDR_NO>0000022897</ADDR_NO>
      <FORMOFADDR>Company</FORMOFADDR>
      <NAME>Jaykay Marketing Services (Pvt) Limited</NAME>
      <NAME_2>(Company Number PV 33)</NAME_2>
      <NAME_3/>
      <NAME_4/>
      <C_O_NAME/>
      <CITY>Colombo 02</CITY>
      <DISTRICT/>
      <CITY_NO/>
      <POSTL_COD1/>
      <POSTL_COD2/>
      <POSTL_COD3/>
      <PO_BOX/>
      <PO_BOX_CIT/>
      <DELIV_DIS/>
      <STREET>Glennie Street</STREET>
      <STREET_NO/>
      <STR_ABBR/>
      <HOUSE_NO>NO. 125</HOUSE_NO>
      <STR_SUPPL1/>
      <STR_SUPPL2/>
      <LOCATION/>
      <BUILDING>125</BUILDING>
      <FLOOR/>
      <ROOM_NO/>
      <COUNTRY>LK</COUNTRY>
      <LANGU>E</LANGU>
      <REGION>001</REGION>
    </COMPANYCODE_ADDRESS>
  </OUTPUT>
</BAPI_COMPANYCODE_GETDETAIL>

```

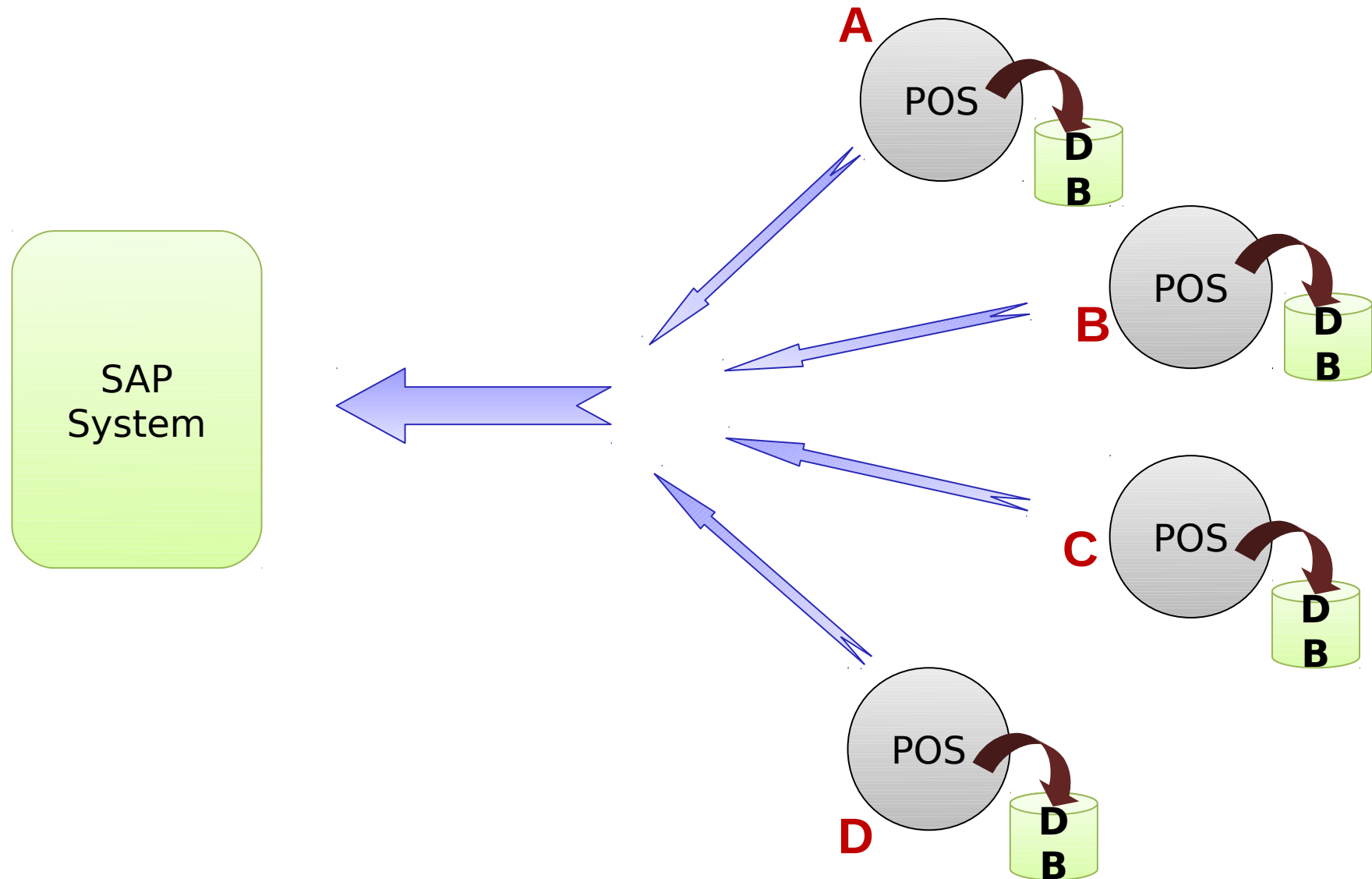
Application Scenario



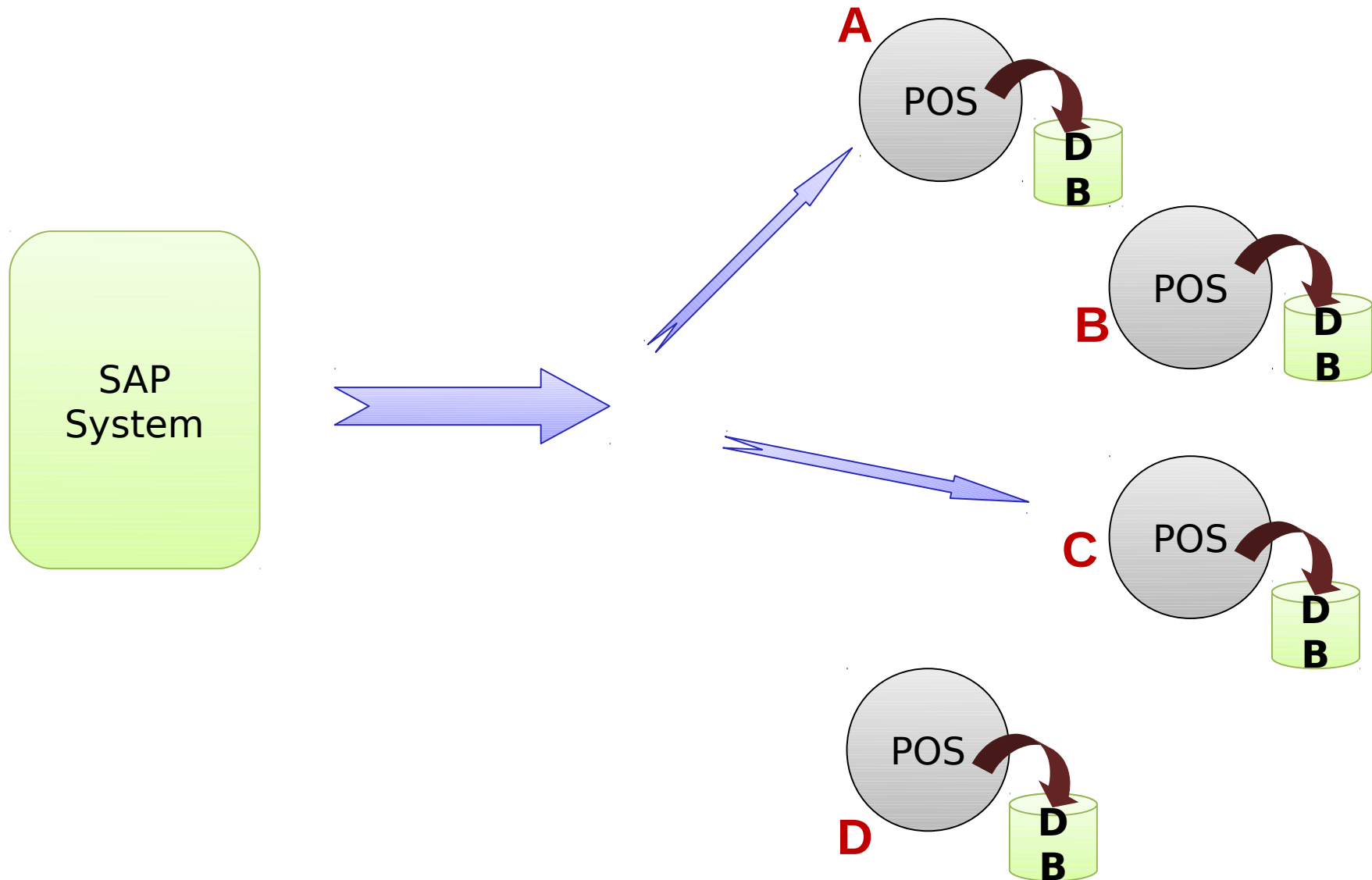
Application Scenario



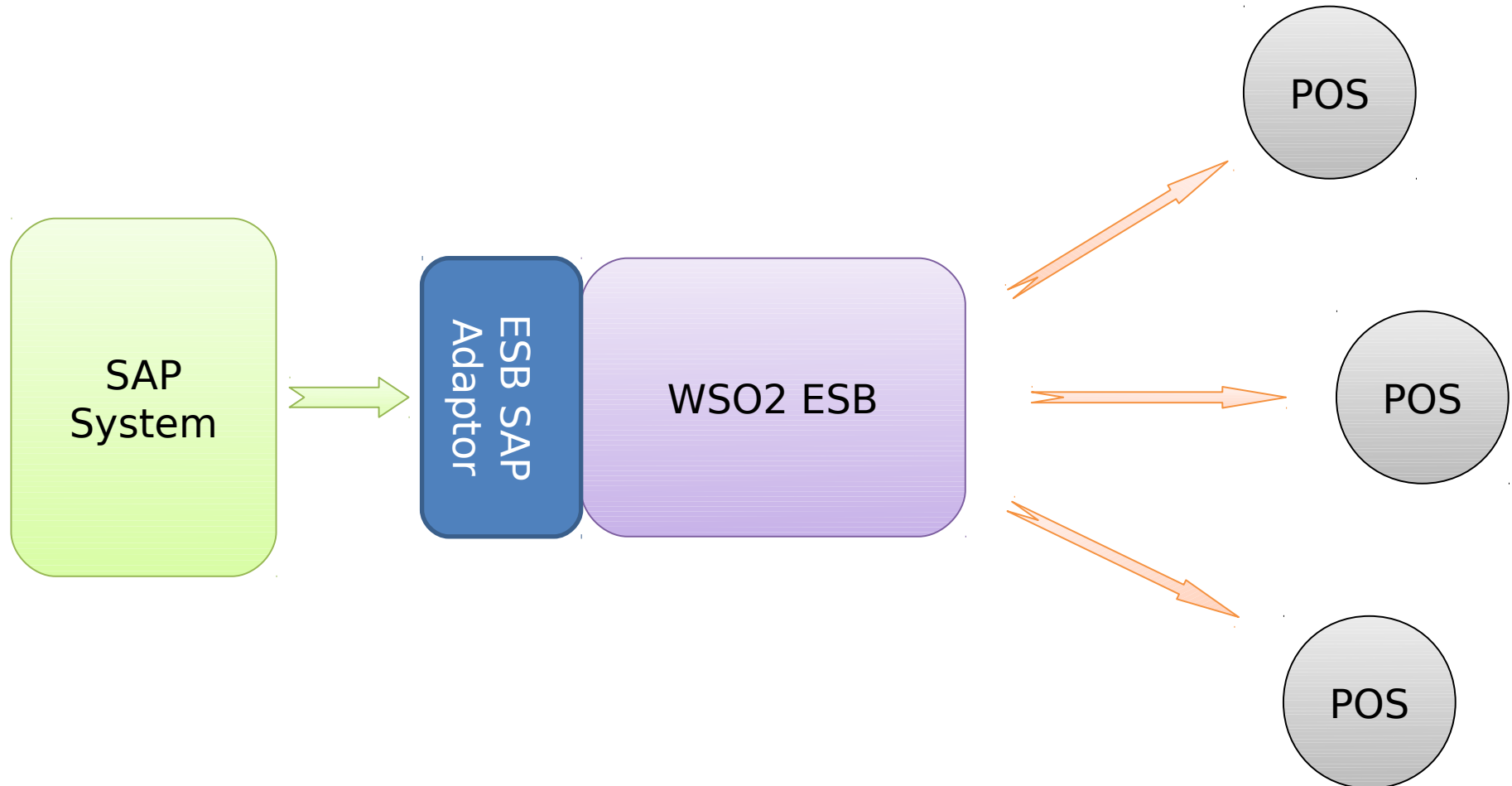
Application Scenario



Application Scenario



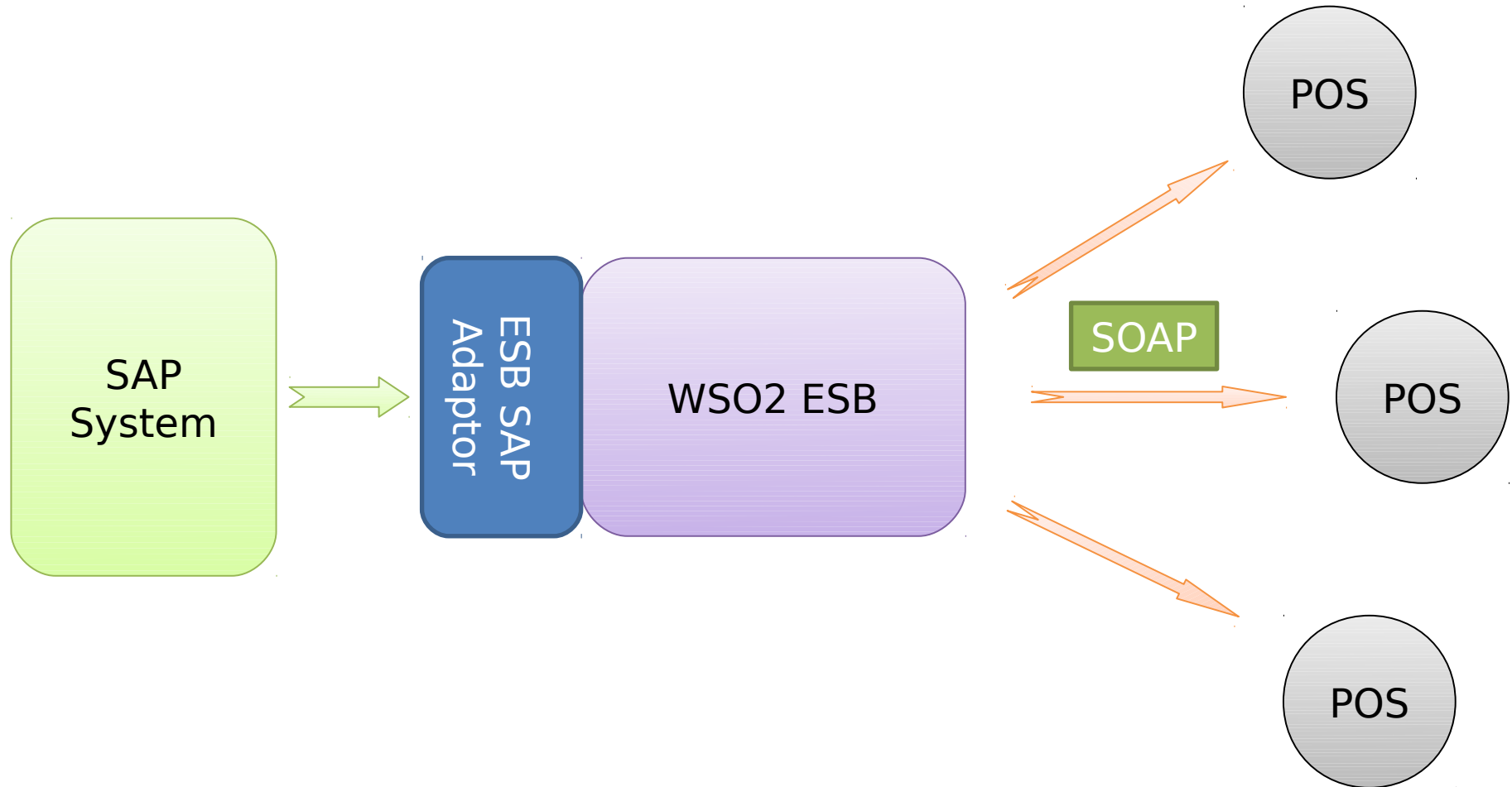
Application Scenario



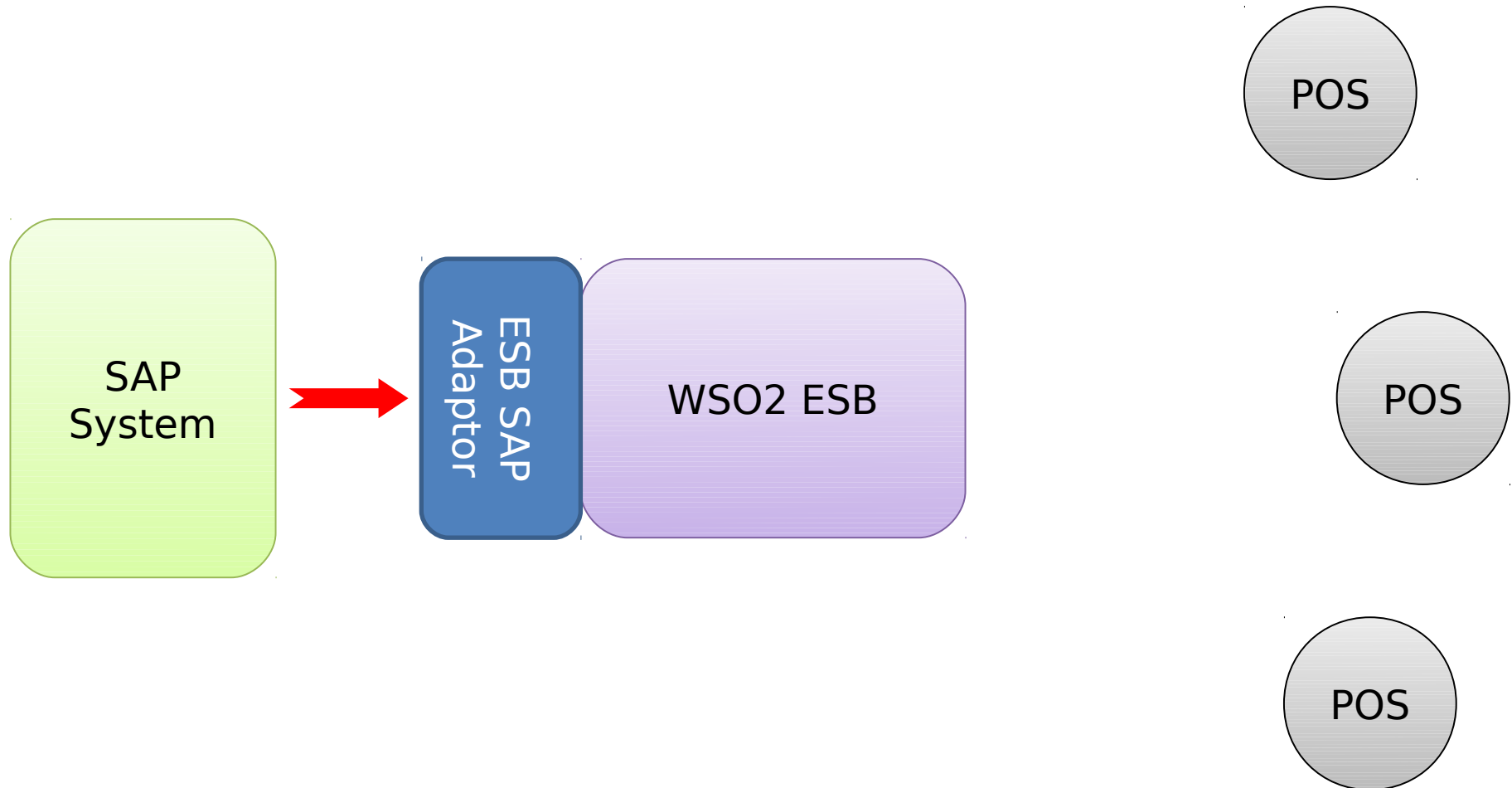
Application Scenario



Application Scenario



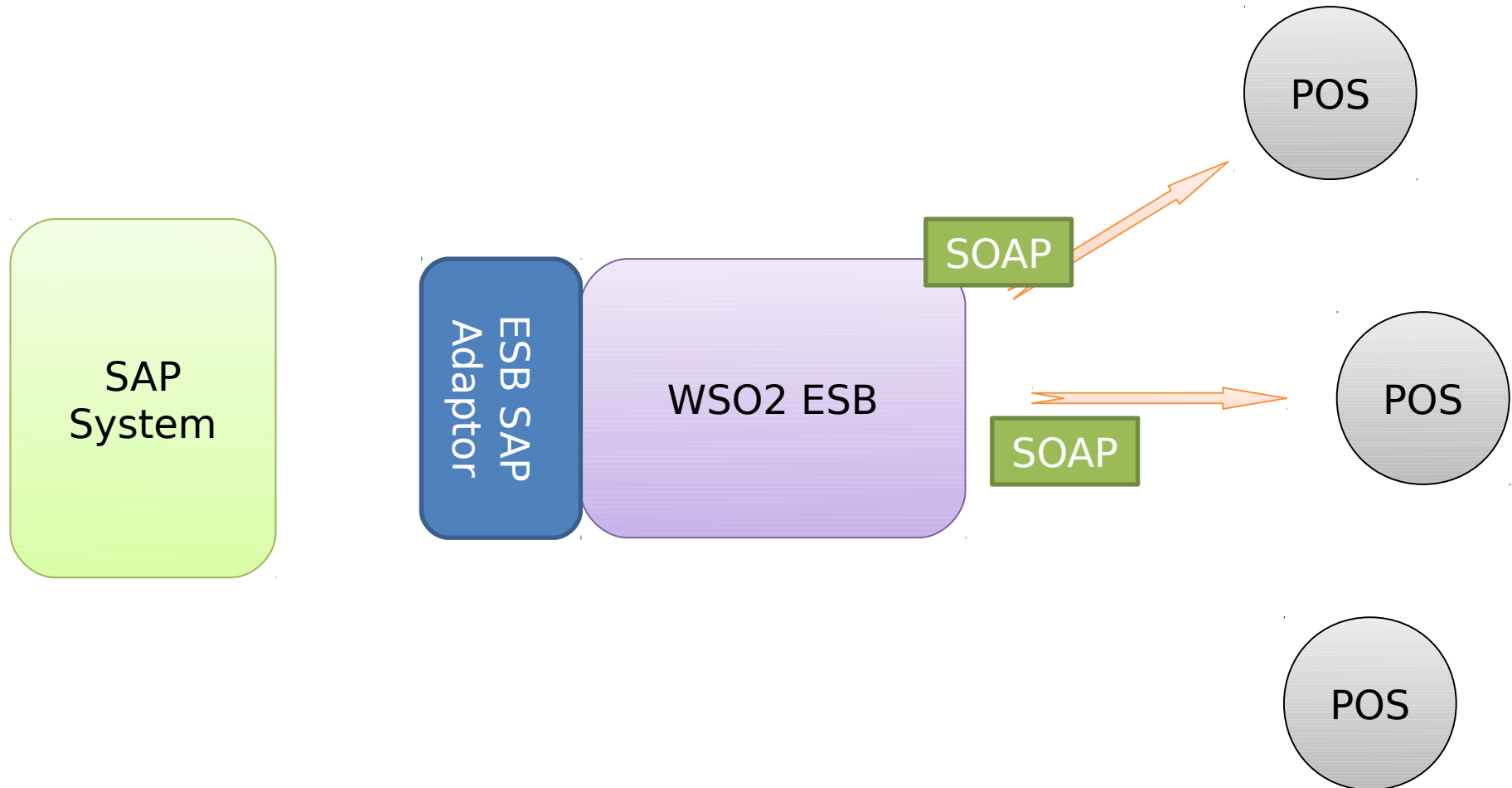
Application Scenario



Application Scenario



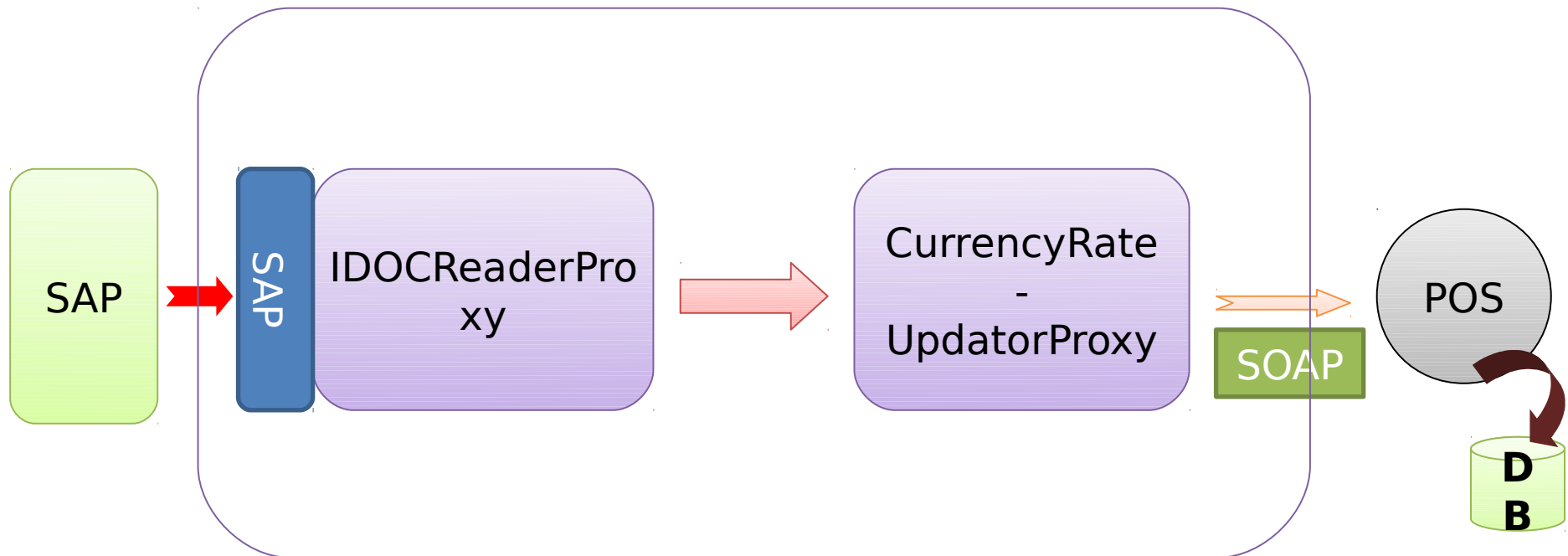
Application Scenario



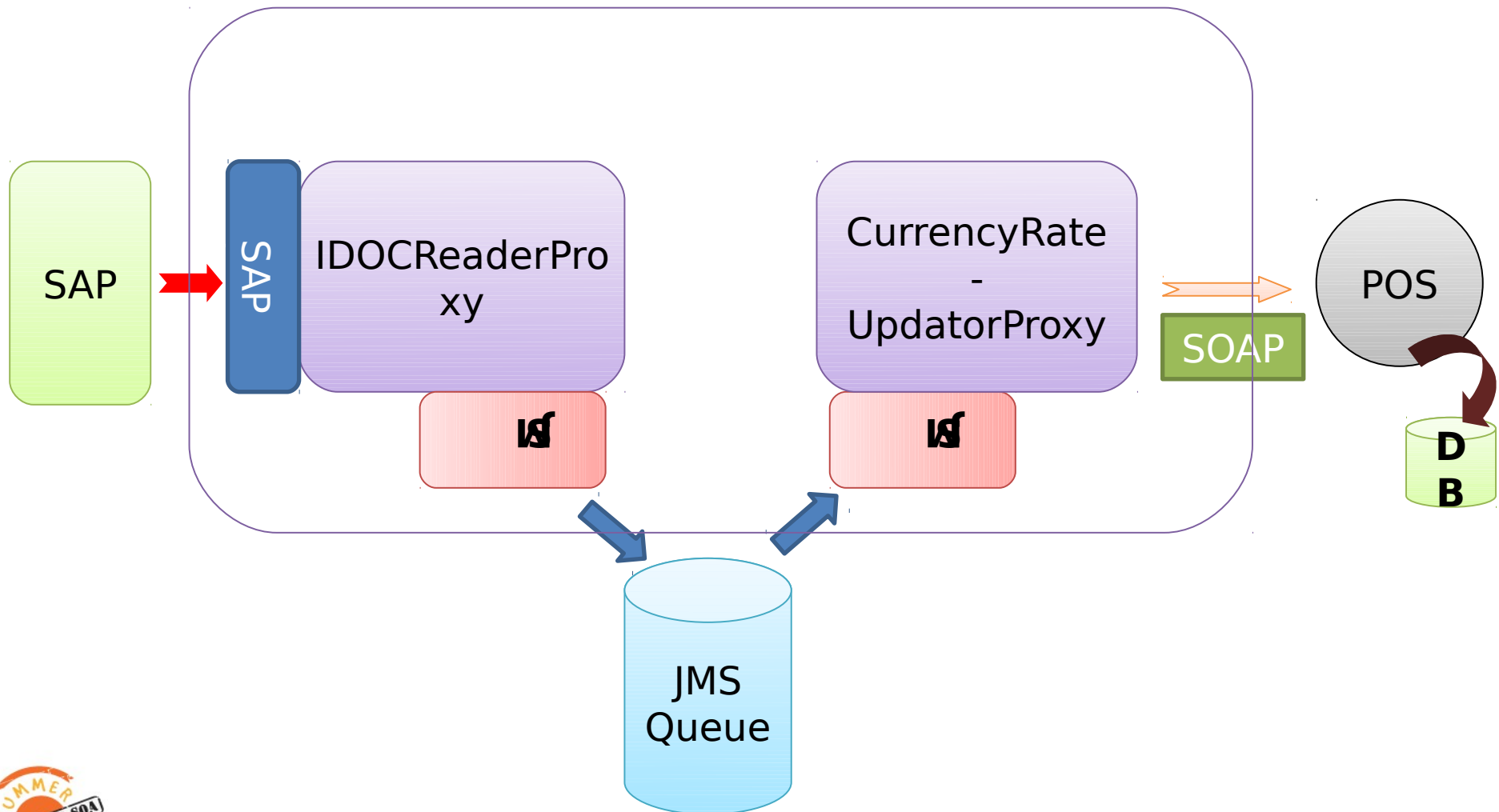
Application Scenario



Application Scenario



Application Scenario



Application Scenario

▣ IDOCReaderProxy Configuration

```
<proxy name="IDOCReaderProxy" transports="idoc" startOnLoad="true">
  <target>
    <inSequence>
      <log level="full"/>
      <property name="OUT_ONLY" value="true"/>
      <send>
        <endpoint>
          <address uri="jms:/IDOCHolderQueue?transport.jms.Des
        </endpoint>
      </send>
    </inSequence>
  </target>
  <parameter .....>...</parameter>
</proxy>
```



Application Scenario

▣ CurrencyRateUpdaterProxy Configuration

```
<proxy name="CurrencyRateUpdaterProxy" transports="jms" startOnLoad="true">
  <target>
    <inSequence>
      <xslt key="currency_idoc_transform"/>
      <log level="full"/>
      <property name="OUT_ONLY" value="true"/>
      <send>
        <endpoint>
          <address uri="http://127.0.0.1:9773/services/posds"/>
        </endpoint>
      </send>
    </inSequence>
  </target>
  <parameter ...>...</parameter>
</proxy>
```



Application Scenario

▣ The XSLT Transformation

```

<localEntry key="currency_idoc_transform">
  <xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/T..."
    <xsl:output method="xml" omit-xml-declaration="yes" indent="yes"/>
    <xsl:template match="/">
      <xsl:apply-templates select="//E1WPC02"/>
    </xsl:template>
    <xsl:template match="E1WPC02">
      <ds:AddCurrency xmlns:ds="http://ws.wso2.org/dataservice">
        <ds:CurrencyCode>
          <xsl:value-of select="//WSYMBOL"/>
        </ds:CurrencyCode>
        <ds:Name>
          <xsl:value-of select="//BEZEICH"/>
        </ds:Name>
        <ds:Symbol>
          <xsl:value-of select="//ZWAEHRUNG"/>
        </ds:Symbol>
        <ds:Rate>
          <xsl:value-of select="//KURS"/>
        </ds:Rate>
      </ds:AddCurrency>
    </xsl:template>
  </localEntry>

```

.....



Q&A



Thank You

