JBoss World 2006 LAS VEGAS

ADP Small Business Services

Ajax Adaptor For Hibernate

ADP Small Business Services

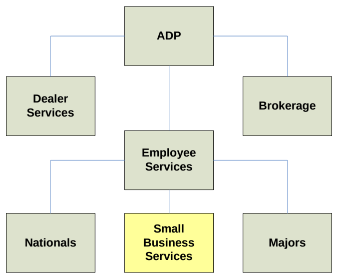
Summary

- ADP Small Business Services Profile
- Application Architecture & Business Drivers
- Ajax Adaptor for Hibernate Overview
- Adaptor Implementation in ADP SBS TeleNet
- Adaptor Architecture & Components
- Browser Side Components
- Roadmap

ADP SBS Profile

- ADP Generates 24 million paychecks in the US and 32 million worldwide.
- SBS is a Division of ADP's Employer Services.
- A Leading Provider of Outsourced Payroll and Human Resource Services.
- Provides Accurate and Convenient Payroll and Integrated Business Solutions for Small Businesses with fewer than 50 Employees as well as Accountants and Third Party Payroll Processors.
- Manages the Payrolls of more Clients than any other Division in ADP.

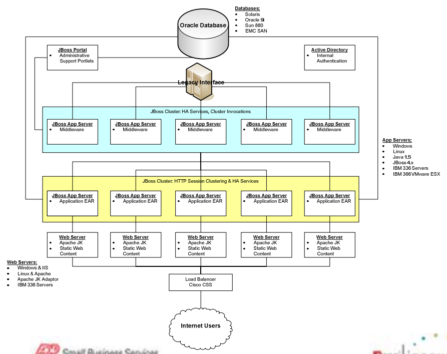
Where SBS is in ADP



JBoss Application Development Profile

- **Web Facing**
  - ✓ **EasyPayNet**: Web Hosted Payroll Solution
  - ✓ **Data Access Suite**: Web Hosted Financial Data Reporting
- **Internal**
  - ✓ **TeleNet**: Internal Web Based Customer Payroll Management
  - ✓ **FLT**: Tax Compliance Administration
  - ✓ **AOS**: Workers Compensation Administration
  - ✓ **Admin Portal**: Variety of Application Administrative Interfaces
  - ✓ **DataSync**: Custom Synchronous Middleware
  - ✓ **DSA:** iSeries Hosted Asynchronous Middleware

Typical Deployment Profile



How Did This Framework Evolve?

The TeleNet Product is a new intranet application that is used by our internal call center service representatives to take ADP client payrolls over the telephone.

Currently these associates are using an AS400 driven green screen application. This application has sustained our business for many years but it takes over a month to learn and become efficient with.

By leveraging an existing ADP internet payroll application this effort aimed to:

- Reduce the training time necessary to get new associates productive
- Give service the ability to use hired temps during year-end
- Reduce data entry errors which result in costly payroll reruns

BUT…
It cannot reduce productivity and throughput.

Small Business Services

TeleNet 1.5

The first iteration of TeleNet was delivered to beta late last year.

It began meeting the targeted goals right away.
- Temps were effectively used over last year end
- Reps reported training times of a few hours to be effective
- Errors were reduced

However tenured reps could not be as productive using the new application.

One tool called the Event Center was not ported to the web application during this 1.0 release due to the extensive middleware requirements….the workflow tool.

So in the next version we designed and built a new Event Center.

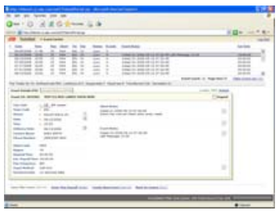
Small Business Services

The TeleNet Event Center

A Web-Based Tool for Managing Service Center Workload.

A single SBS call center is responsible for many thousands of Payroll Events* every day. The Event Center allows this work to be quickly distributed, executed accurately and monitored by hundreds of service associates.

Payroll Event:
A time-sensitive unit of data entry work that will result in a payroll being processed for an ADP client.



Small Business Services

Why the Ajax/Hibernate Adapter?

One of the primary goals of the Event Center tool was to provide users with the ability to target specific Payroll Events out of a pool of millions using any combination of an Event's 10-12 core attributes.

The flexibility of a raw SQL query engine was desired but without exposing the users to the complexities of SQL.

Hibernate was already providing caching for our data layer.

Ajax methodologies (**XMLHttp**) were already being used extensively to provide functionality to other parts of the application.

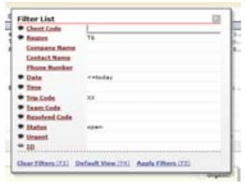
We simply connected the dots….

Small Business Services

A Simple Query

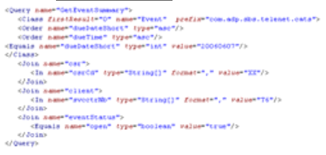
Use Case: Display My "To Do" List.
Return me all Events that are "open" that are scheduled for today
and assigned to me (XX) in my service center (T6).
Order them by date & time.

Query Builder UI



Region: T6
Date: <=today
Trip Code: XX
Status: open

Resulting Query XML

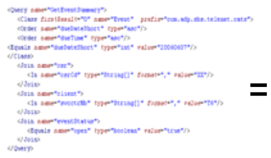


```
<Query name="GetEventSummary">
  <Class firstResult="0" name="Event"  prefix="com.adp.sbs.telenet.cats">
  <Order name="dueDateShort" type="asc"/>
  <Order name="dueTime" type="asc"/>
<Equals name="dueDateShort" type="int" value="20060607"/>
</Class>
  <Join name="csr">
    <In name="csrCd" type="String[]" format="," value="XX"/>
  </Join>
  <Join name="client">
    <In name="svcctrNb" type="String[]" format="," value="T6"/>
  </Join>
  <Join name="eventStatus">
    <Equals name="open" type="boolean" value="true"/>
  </Join>
</Query>
```

Small Business Services

HSQL Conversion

XML Query



```
<Query name="GetEventSummary">
  <Class firstResult="0" name="Event"  prefix="com.adp.sbs.telenet.cats">
  <Order name="dueDateShort" type="asc"/>
  <Order name="dueTime" type="asc"/>
<Equals name="dueDateShort" type="int" value="20060607"/>
</Class>
  <Join name="csr">
    <In name="csrCd" type="String[]" format="," value="XX"/>
  </Join>
  <Join name="client">
    <In name="svcctrNb" type="String[]" format="," value="T6"/>
  </Join>
  <Join name="eventStatus">
    <Equals name="open" type="boolean" value="true"/>
  </Join>
</Query>
```

=

HSQL

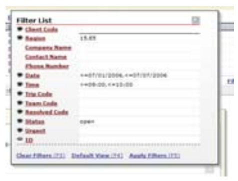
```
select * from ( select this_.EVENT_ID as EVENT1_4_, this_.CSR_ID as CSR2_7_4_,
this_.EVENT_STATUS_CD as EVENT3_7_4_, this_.ORG as ORG7_4_,
this_.CREATE_DATE as CREATE5_7_4_, this_.DELIVERY_DATE as DELIVERY6_7_4_,
this_.DUE_DATE as DUE7_7_4_, this_.DUE_DATE_SHORT as DUE8_7_4_,
this_.RESOLVED_DATE as RESOLVED9_7_4_, this_.EVENT_NOTE as
EVENT10_7_4_, this_.IS_URGENT as IS11_7_4_, this_.CONTACT_NAME as
CONTACT12_7_4_, this_.CONTACT_PHONE as CONTACT13_7_4_,
this_.CONTACT_EXTENSION as CONTACT14_7_4_, this_.PROJECTED_TIME as
PROJECTED15_7_4_, this_.ELAPSED_TIME as ELAPSED16_7_4_, this_.TEAM_ID as
TEAM17_7_4_, TO_CHAR(this_.DUE_DATE, 'HH24:MI') as formula0_4_, this_.rowid as
rowid_4_, csr1_.CSR_ID as CSR1_0_, csr1_.CSR_CD as CSR2_5_0_, csr1_.FNAME as
FNAME5_0_, csr1_.LNAME as LNAME5_0_, csr1_.SVCCTR_NB as SVCCTR5_5_0_,
eventstatu3_.EVENT_STATUS_CD as EVENT1_1_,
eventstatu3_.EVENT_STATUS_DESC as EVENT2_10_1_, eventstatu3_.OPEN as
OPEN10_1_, client2_.ORG as ORG2_, client2_.CLIENT_NB as CLIENT2_1_2_,
client2_.SVCCTR_NB as SVCCTR3_1_2_, client2_.DATA_ENTRY_METHOD_CD as
DATA4_1_2_, client2_.DIV_NB as DIV5_1_2_, client2_.CLIENT_NAME as
CLIENT6_1_2_, client2_.FREQUENCY_CD as FREQUENCY7_1_2_,
client2_.CLIENT_NOTE as CLIENT8_1_2_, client2_.rowid as rowid_2_,
dataentrym8_.DATA_ENTRY_METHOD_CD as DATA1_3_,
dataentrym8_.DATA_ENTRY_METHOD_DESC as DATA2_6_3_

from EVENT this_ inner join CSR csr1_ on this_.CSR_ID=csr1_.CSR_ID inner join
EVENT_STATUS eventstatu3_ on
this_.EVENT_STATUS_CD=eventstatu3_.EVENT_STATUS_CD inner join CLIENT
client2_ on this_.ORG=client2_.ORG left outer join DATA_ENTRY_METHOD
dataentrym8_ on
client2_.DATA_ENTRY_METHOD_CD=dataentrym8_.DATA_ENTRY_METHOD_CD

where (this_.DUE_DATE_SHORT<=?) and csr1_.CSR_CD in (?) and
client2_.SVCCTR_NB in (?) and eventstatu3_.OPEN=?

order by this_.DUE_DATE_SHORT asc, TO_CHAR(this_.DUE_DATE, 'HH24:MI') asc )
where rownum <= ?
```

Small Business Services

A More Complex Query

Use Case: Resource Planning
Return me all Events that are "open" that are for the week of July 1-7
between the hours of 9:00 and 10:00 AM in either service center 15 or E5.
Order my results by date.

Query Builder UI



Resulting Query XML

```
<Query name="GetEventSummary">
   <Class firstResult="0" maxSize="30" name="Event"
     prefix="com.adp.sbs.telenet.cats">
   <Order name="dueDateShort" type="asc"/>
   <And>
      <And>
      <GreaterThanOrEqual name="dueTime"
        type="String" value="09:00"/>
      <LessThanOrEqual name="dueTime"
        type="String" value="10:00"/>
    </And>
    <And>
      <GreaterThanOrEqual name="dueDateShort"
        type="int" value="20060701"/>
      <LessThanOrEqual name="dueDateShort"
        type="int" value="20060707"/>
    </And>
   </And>
   </Class>
   <Join name="client">
      <In name="svcctrNb" type="String[]"
        format="," value="15,E5"/>
   </Join>
   <Join name="eventStatus">
      <Equals name="open" type="boolean" value="true"/>
   </Join>
</Query>
```

The Query Results

An xml representation of the Hibernate POJOs are returned and parsed via Javascript into various user interface components.

List For Selection

Details For Editing

```
<?xml version="1.0"?>
<Events rowCount="1" elapsedTime="15">
<event>
     <eventId>162350</eventId>
     <csr>
          <csrId>57</csrId>
          <csrCd>XX</csrCd>
          <firstName>Joseph</firstName>
          <lastName>Smith</lastName>
          <svcctrNb>T6</svcctrNb>
     </csr>
     <eventStatus>
          <eventStatusCd>A</eventStatusCd>
          <eventStatusDesc>Payroll Active</eventStatusDesc>
          <open>true</open>
     </eventStatus>
     <client>
          <org>886000004992</org>
          <clientNb>E26</clientNb>
          <svcctrNb>T6</svcctrNb>
          <dataEntryMethod>
               <dataEntryMethodCd>CO</dataEntryMethodCd>
               <dataEntryMethodDesc>Call-Out</dataEntryMethodDesc>
          </dataEntryMethod>
          <clientName>TEST CLIENT</clientName>
          <frequencyCd>OTM</frequencyCd>
          <clientNote>Client E26 Inited on 2006-03-29</clientNote>
     </client>
     <createDate>2001-11-21 12:37:17</createDate>
     <deliveryDate>2006-04-10 13:25:01</deliveryDate>
     <dueDate>2001-11-21 12:37:00</dueDate>
     <dueTime>12:37</dueTime>
     <dueDateShort>20011121</dueDateShort>
     <resolvedDate>0001-01-01 00:00:00</resolvedDate>
     <isUrgent>false</isUrgent>
     <contactName></contactName>
     <contactPhone>6095521199</contactPhone>
     <contactExtension>0</contactExtension>
     <projectedTime>00:03:00</projectedTime>
     <teamId>994</teamId>
</event>
</Events>
```

Result Set Paging

To control the performance implications of potentially huge result sets being returned to the client a paging syntax was added to the query interpreter.

By altering any query to include the attribute **rowCountOnly="true"** only a count of the result set will be returned.

<Class rowCountOnly="true"…

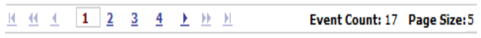
The results of this query:

**<Events rowCount="1"
elapsedTime="31">
<rowCount>17</rowCount>
</Events>**

This **rowCount** can now be use to weigh against performance requirements and properly controlled using the two paging attributes available to any query "**firstResult**' and "**maxSize**".

<Class firstResult="0" maxSize="30"….

From this we build a paging tool for navigating the results



Benefit: Simple Rapid Development

Once this framework is in place any POJO that is defined in Hibernate is accessible from javascript via an XMLHttp query.

Test Case: The Uninitiated Developer

The query syntax was then presented to a front-end web developer who was asked to use it to develop a required screen.

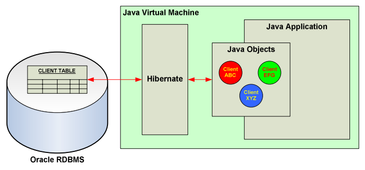
In a short amount of time this developer was able to complete development on the new screen which contained dynamic data from existing Hibernate POJOs.

One JSP file and one supporting JS file were created.

This was completed without requiring that the developer:
• write a single line of Java
• recompile or redeploy binary server code
• ask for any server-side developer support

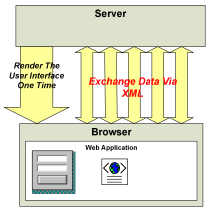
Ajax Adapter for Hibernate

- Brief Glossary of Components
  - ✓ Hibernate



Ajax Adapter for Hibernate

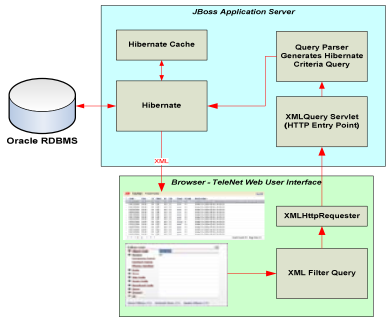
- Brief Glossary of Components
  - ✓ Ajax



Server Side Component

- The server component is basically:
  - ✓ A Servlet that receives HTTP/XML requests and returns the XML response.
  - ✓ A Stateless EJB that manages the invocation and packages the response.
  - ✓ A SAX Parser that dynamically converts the XML Query into a Hibernate Criteria Query.

Server Side Component


JBoss Application Server
Hibernate Cache
Query Parser Generates Hibernate Criteria Query
Hibernate
XMLQuery Servlet (HTTP Entry Point)
Oracle RDBMS
XML
Browser - TeleNet Web User Interface
XMLHttpRequester
XML Filter Query

Server Side Component

- Stateless Session Bean (QueryService)
  - ✓ Invoked using either:
    - `public String submitXMLQueryforXML(String xml)` for single request.
    - `public String submitXMLQueryforXML(String[] xml)` for batching multiple requests.
  - ✓ Will also optionally report session factory statistics.
  - ✓ Wraps and decorates the XML returned from the Hibernate **EntityMode.DOM4J**.
    - Creates Consolidated XML Document
    - Adds RowCount Attribute
    - Adds Elapsed Time

Server Side Component

- SAX Parser (XMLQueryBuilder)
  - ✓ Implements SAX Event Based Parsing To Generate Hibernate Criteria Query.
  - ✓ Maintains context sensitive stacks tracking sub criteria, projections, nested expressions and junctions.
  - ✓ As logical elements in the XML start, we push the according stack. When the element closes, we pop the stack.

Server Side Component

XML Query

```
<Query name="GetEventSummary">
   <Class firstResult="0" maxSize="30" name="Event"
     prefix="com.adp.sbs.telenet.cats">
   <Order name="dueDateShort" type="asc"/>
   <And>
      <And>
      <GreaterThanOrEqual name="dueTime"
        type="String" value="09:00"/>
      <LessThanOrEqual name="dueTime"
        type="String" value="10:00"/>
    </And>
    <And>
      <GreaterThanOrEqual name="dueDateShort"
        type="int" value="20060701"/>
      <LessThanOrEqual name="dueDateShort"
        type="int" value="20060707"/>
    </And>
   </And>
   </Class>
   <Join name="client">
      <In name="svcctrNb" type="String[]"
        format="," value="15,E5"/>
   </Join>
   <Join name="eventStatus">
      <Equals name="open" type="boolean" value="true"/>
   </Join>
</Query>
```

Criteria Query

```
Session dom4JSession =
        session.getSession(EntityMode.DOM4J);
dom4JSession.createCriteria(Event.class)
        .addOrder(Order.asc("dueDateShort"))
        .add(Restrictions.conjunction())
        .add(Restrictions.conjunction())
        .add(Restrictions.ge("dueTime", "09:00"))
        .add(Restrictions.le("dueTime", "10:00"))
        .add(Restrictions.conjunction())
        .add(Restrictions.ge("dueDateShort", "20060701"))
        .add(Restrictions.le("dueDateShort", "20060707"))
        .createCriteria("client")
        .add(Restrictions.in("svcctrNb",
                          new String[]{"15", "E5"}))
        .createCriteria("eventStatus")
        .add(Restrictions.eq("open", Boolean.TRUE));
```

XML Query Tester

JSP Allows Interactive Query Testing

XML Query Tester

- Reports Hibernate Statistics
  - ✓ Query Cache
  - ✓ Entity Operation Counts
  - ✓ Cache Hits
  - ✓ Cache Population
  - ✓ Transaction Counts
  - ✓ Etc.

Small Business Services

Roadmap

- In Progress
  - ✓ Enhanced XMLHttp Wrapper
  - ✓ Event Based Ajax Browser Components; Automated XML Data Binding.
  - ✓ Criteria Query & XML Caching.
  - ✓ Oracle Hint Interceptor
  - ✓ Performance Logging By Query Name
    - Elapsed Time & Row Counts
    - JDK 1.5 Stats (CPU, Waits, Blocks)

Small Business Services

Roadmap

- Next Steps
  - ✓ Implementation of Updates (Tentative?)
  - ✓ Conversational Transactions
  - ✓ Meta Data Enhancement & Streamlining
    - Implicit Projections
    - Summary Data
  - ✓ Native SQL Extensions
  - ✓ Implicit Reference Data Macros
  - ✓ Enhanced Security
  - ✓ Invoker Independence

Small Business Services

Thanks !

- Q&A

Small Business Services