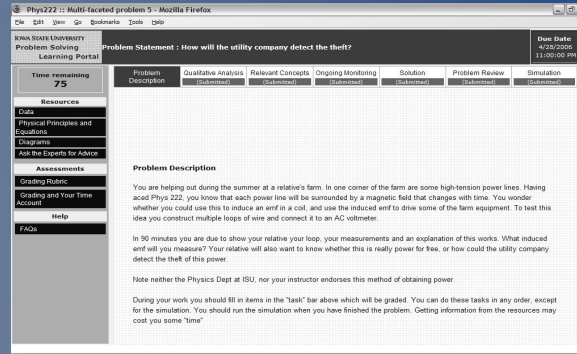


Presenting Real-World Problems in ThinkSpace

Dr. Pete Boysen
Iowa State University
May 25, 2011

The Problem



Diagnostic Pathfinder
Veterinary Medicine

Problem-solving
Learning Portal
Science/Engineering

MyCase
English/Technical Writing

Sustainable Solution?

Faculty View
(not mine!)



→ ThinkSpace

Definition

ThinkSpace is an instructional and collaborative learning tool designed to provide real-world problems and environments to students

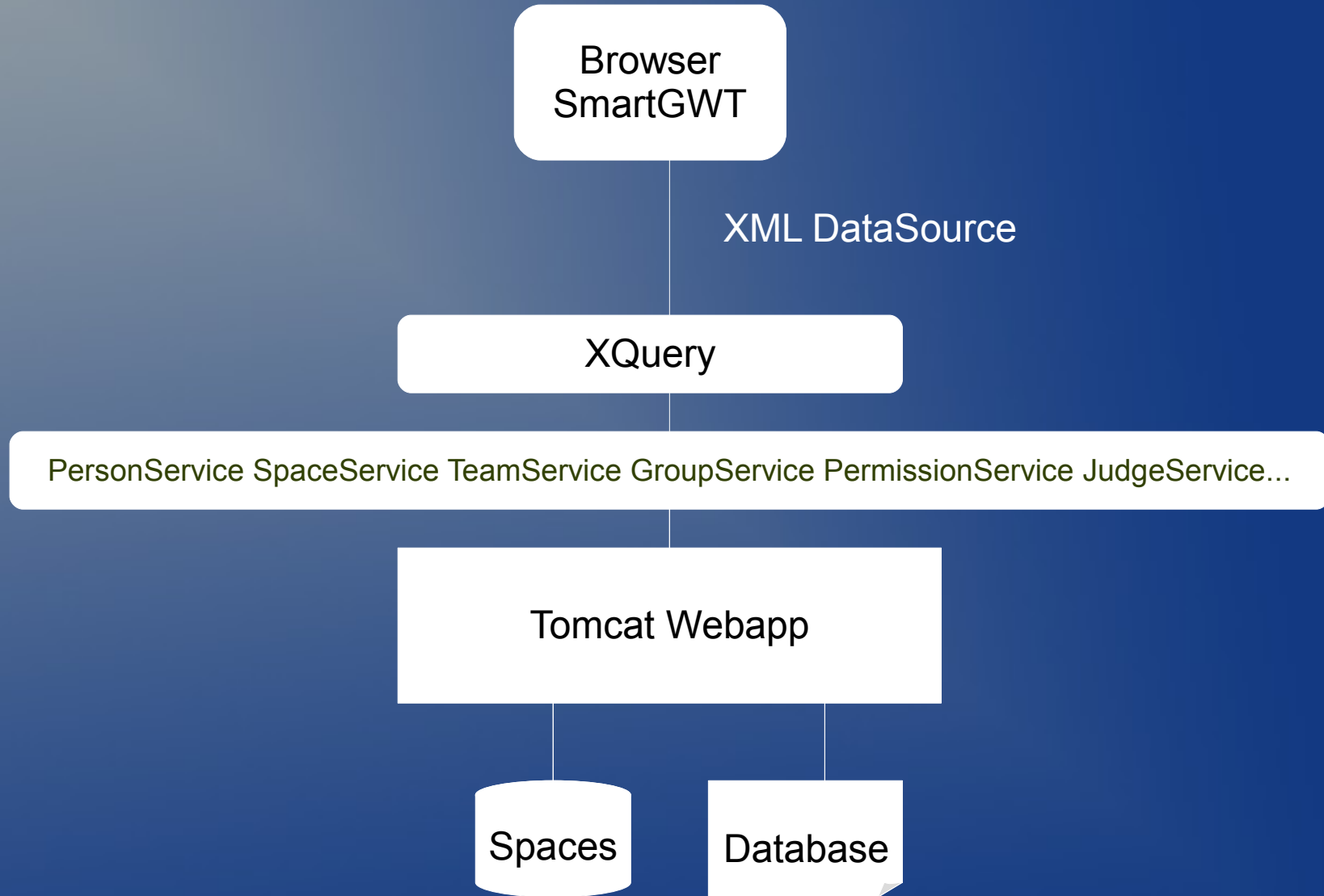
Characteristics

- Space – independent site for personal or group interaction
- Core Services – authentication, authorization etc.
- Enterprise integration – users, groups etc.
- Not an LMS – but a planned LTI integration
- Extensible – new space types can be created
- Full Ajax capabilities

Demo

Server

Architecture



Tomcat Webapp

- Spring/Hibernate/Maven
- Services - dependency injected

```
<bean id="GroupService" class="edu.iastate.its.thinkspace.core.groups.GroupService"
    factory-method="get">
    <property name="sources">
        <list>
            <ref bean="LocalGroupSourceImpl"/>
            <!-- ISU Registrar classes -->
            <ref bean="ClassSourceImpl"/>
        </list>
    </property>
</bean>
<bean id="PersonService" class="edu.iastate.its.thinkspace.core.people.PersonService"
    factory-method="get">
    <property name="sources">
        <list>
            <ref bean="LocalPersonSourceImpl"/>
            <ref bean="LdapPersonSourceImpl"/>
            <ref bean="GuestPersonSourceImpl"/>
        </list>
    </property>
</bean>
```

Server Datasources

- Converts non-XML data to XML format for access by XQuery

```
<beans xmlns="http://www.springframework.org/schema/beans"  
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```
    xsi:schemaLocation="http://www.springframework.org/schema/beans  
http://www.springframework.org/schema/beans/spring-beans-2.0.xsd">
```

```
<!-- main document sources -->
```

```
<bean id="auth" class="edu.iastate.its.thinkspace.core.source.AuthorizationSource" />  
<bean id="type" class="edu.iastate.its.thinkspace.core.source.ContentTypeSource" />  
<bean id="csf" class="edu.iastate.its.thinkspace.core.source.CSVSource" />  
<bean id="ls" class="edu.iastate.its.thinkspace.core.source.FileListSource" />  
<bean id="file" class="edu.iastate.its.thinkspace.core.source.FileSource" />  
<bean id="groups" class="edu.iastate.its.thinkspace.core.source.GroupSource" />  
<bean id="ldap" class="edu.iastate.its.thinkspace.core.source.LDAPSource" />  
<bean id="map" class="edu.iastate.its.thinkspace.core.source.MapSource" />  
<bean id="members" class="edu.iastate.its.thinkspace.core.source.MemberListSource" />
```

```
...
```

Space Concepts

- All space content is stored in a directory a space directory including XML and uploaded files
- Each space has a type (e.g. UserSpace, ProblemSpace) which defines how it is allocated on disk, which HTML/Javascript to use, roles and permissions

Space Context

```
<bean id="UserSpace"
class="edu.iastate.its.thinkspace.core.SpaceContext">
  <property name="name" value="UserSpace"/>
  <property name="view"
value="/thinkspace/gwt/UserSpace.html"/>
  <property name="fileSystemClassName" value="$
{cms.filesystem}"/>
  <property name="root" value="{cms.home}"/>
  <property name="structure" value="single"/>
  <property name="deleteFiles" value="true"/>
  <property name="mainModel"><ref
bean="userspace"/></property>
  <property name="subModels">
    <list>
      <ref bean="authorization"/>
    </list>
  </property>
```

Space Model

```
<bean id="problemspace" class="edu.iastate.its.thinkspace.core.SpaceModel">
  <property name="modelName" value="ProblemSpace"/>
  <property
name="debug"><value>parameters,documents,xqueries</value></property>
  <property name="path"><value></value></property>
  <property name="authorization">
    <bean
class="edu.iastate.its.thinkspace.core.permissions.Authorization">
      <property name="roles">
        <list>
          <bean
class="edu.iastate.its.thinkspace.core.permissions.Role">
            <property name="name" value="student"/>
            <property name="activities">
              <list>
                <value>viewGradebook</value>
                <value>takeAssignments</value>
              </list>
            </property>
          </bean>
        </list>
      </property>
    </bean>
  </property>
</bean>
```

Space File Organization

- XML files are cached in memory while in use
- XQuery updates in-memory copy and writes to disk.
- All space data including content, user files and data are stored in the space directory
- Archive(zip)/Restore(unzip) operations are independent of space type
- Schema upgrades of XML files use XSLT
- Version checks are made when entering space

Xquery Processing

- SmartGWT datasources send CRUD operations with arguments
- Arguments are converted to an \$args XML document for use by XQuery
- Server datasources are accessed as XML documents
- XQuery compiled when first used
- XQuery retrieves data via services and returns XML response

XQuery Example

```
declare variable $upd external;
declare variable $args external;
declare variable $file :=
concat('/space/'$args/args/pid/./profile.xml');
if ($_operationType = "fetch") then (
  <response>
    <status>0</status>
    <data>
      {doc($file)/profile}
      {doc("WEB-INF/models/UserSpace/apps.xml")/apps}
      {SpaceService:getUserContext($spaceService,$state)/context}
    </data>
  </response>
) else if ($_operationType = "update") then (
  let $status := ''
  let $apps :=
Transform:getDocumentFromString($args/args/appsList/./apps
  let $pf := ProfileService:updateProfile($profileService,$state,$args)
  let $doc := QueryUpdate:replace($upd,$file,'/profile/apps',$apps)
  let $profile := QueryUpdate:update($upd,$file,'/profile',$args)
  return
    <response>
      {$doc/response/*}
    </response>
```


Client

Google Web Toolkit

- Compiles Java to Javascript – one file for each browser
- Removes most browser dependencies
- Plugin for Eclipse
- Java interface for Javascript functions
- Development mode for UI design

SmartGWT

- “Smart GWT is a GWT-based framework that allows you to not only utilize its comprehensive widget library for your application U”
- Showcase has 300+ examples with source
<http://www.smartclient.com/smartgwt/showcase/#main>
- Open source UI and open forum

Data Model

Datasources define data model:

```
public class Space extends Record {
    public static SpaceDS getDataSource() {
        SpaceDS spaceDS = new SpaceDS(spaceId,xq);
        DataSourceTextField id = new
DataSourceTextField(Field.id.toString(), "ID", 5, true);
        id.setPrimaryKey(true);
        id.setHidden(true);
        DataSourceTextField title = new
DataSourceTextField(Field.title.toString(), "Space", 20, true);
        DataSourceEnumField type = new
DataSourceEnumField(Field.type.toString(), "Type", 20, true);
        type.setValueXPath("context");
        DataSourceTextField view = new
DataSourceTextField(Field.view.toString(), "View", 20, true);
        spaceDS.setFields(id,version,title...);
        spaceDS.setXmlRecordXPath("//space");
        return spaceDS;
    }
}
```

Connecting Datasource

Connecting to a datasource:

```
spaceDS = Space.getDataSource(userId, "space.xq");  
spaceGrid = new ListGrid();  
spaceGrid.setLeaveScrollbarGap(false);  
spaceGrid.setModalEditing(true);  
spaceGrid.setDataSource(spaceDS);  
spaceGrid.setAutoFetchData(true);
```

Space	Type	Owner Name
<u>advert</u>	ProblemSpace	Admin User
<u>geol</u>	ProblemSpace	Admin User
<u>CI280A</u>	ProblemSpace	Admin User
<u>faidley</u>	ProblemSpace	Admin User
<u>aaims</u>	ProblemSpace	Admin User
<u>test</u>	ProblemSpace	Admin User
<u>studentspace</u>	ProblemSpace	Default Student

Space Development

- Layout Widgets
- Create datasource with XQuery endpoint
- Connect widget to datasource
- Build XQuery file and put in model directory
- Most development does not require extensive knowledge of server Java

Conclusion

ThinkSpace provides an extensible environment and services to support a wide variety of highly interactive web-based applications

Questions?

pboysen@iastate.edu

Wiki: <http://pws2.ait.iastate.edu/wiki/x/PAAY>