Data Binding and Java™ Platform, Micro Edition (Java™ ME)

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Session Goal

Data binding and Java Platform, Micro Edition (Java ME platform)

Learn how easy is to develop interactive applications connected to local or remote data by using NetBeans™ Data Binding Micro Edition (ME) library.

Agenda

Introduction

Data Binding and Java ME Platform

NetBeans Data Binding ME Library

Binding to Data/Services

Binding UI Components

Tools Support

Summary and Q&A

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Introduction

Data binding

- “Data Binding” is a general mechanism to bind data to user interface elements
- Abstraction provides uniform access to various data sources
- Allows:
  - Separation of data/model and view/controller
  - Cleaner design
  - Faster application development
- Many data binding frameworks available for Java Platform, Enterprise Edition (Java EE) and Java Platform, Standard Edition (Java SE), but not for Java ME platform

Introduction

Expression Language

- A mechanism to easily navigate complex data structures
- Parsed and evaluated at runtime—expressions can be changed without recompiling application sources
- Originally appeared as a part of JavaServer Pages™ (JSP™) 2.0 specification (Java Specification Request (JSR) 154)
- Starting to appear in other frameworks—for example Beans Binding (JSR 295)

Introduction

Expression Language—The syntax

- Simple and rich syntax
  - Variables and properties access
  - Arrays and maps access
  - Function calls
  - Arithmetic and compare operations
- Supported types
  - Java platform primitive types
  - Number, BigInteger, …
  - String, Comparable, Object

Introduction

Expression Language—Samples

- Variable and properties access
  ```
  ${user.lastname + " " + user.firstname}
  ```
- Method calls
  ```
  ${sms:sendMessage(user.phoneNumber,"Hello")}
  ```
- Comparison
  ```
  ${user.age >= 21 ? "beer" : "soda" }
  ```
- Array and map access
  ```
  ${users[0 + 1].lastname}, ${users["nickname"].lastname}
  ```
- Dynamic evaluation
  ```
  a=#{5}, b=${a*a}, a=#{10} // eval(b) is 100
  ```
- Static evaluation
  ```
  a=#{5}, b=#{a*a}, a=#{10} // eval(b) is 25
  ```

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Data Binding and Java ME Platform

Dealing with Java ME platform

- Limited hardware resources
  - Limited size of memory available to application
  - Limited download size of the application package
  - Limited processing power
- No reflection or component model
- Necessity to work with existing UI components, but allow integration with other frameworks

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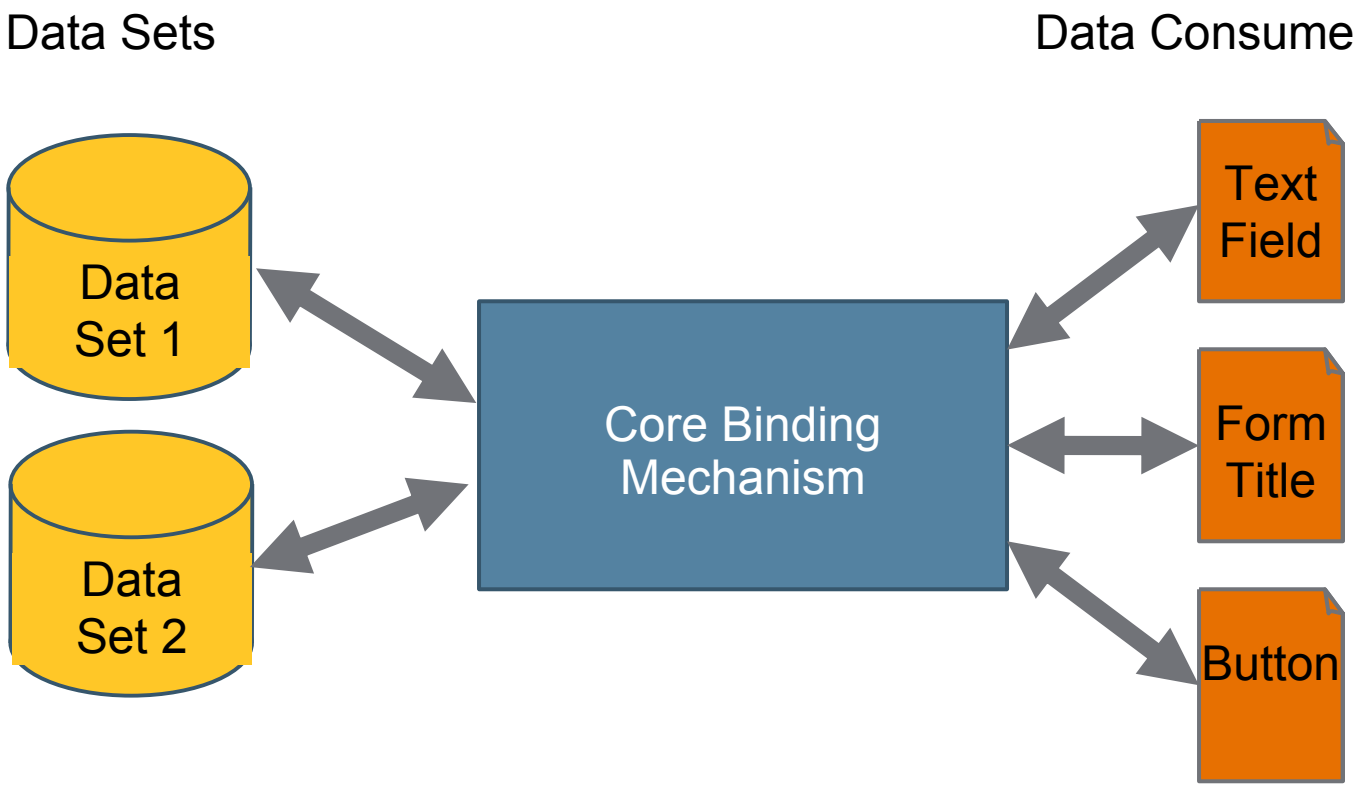
NetBeans Data Binding ME Library

Overview

- Data binding framework for Java ME platform
  - Supports CLDC, might be used for CDC and Java SE platform
- Open source project
  - Hosted on http://databindingme.dev.java.net/
- Uses Expression Language-like syntax as the binding “glue”
- Focuses on simplicity
  - Only a single line of code necessary to do the bind
- Provides API for creating data part
- Provides API and implementation for UI part

NetBeans Data Binding ME Library

Block scheme



NetBeans Data Binding ME Library

The architecture

- Three logic blocks
- Core Binding Mechanism
  - **Expression Language parser**
  - Binding and updating support mechanisms
- Data sets
  - APIs to be implemented by boundable data, e.g., PIM
- Data consumers
  - APIs to be implemented by consumers, e.g., LCDUI bindings

NetBeans Data Binding ME Library

Examples

```
// register data set
DataSet ds = new MyRemoteDatabaseDS("db.netbeans.org",
                                    "username", "password");
DataBinder.registerDataSet(ds ,"database");

// one-time value access
String username =
(String)DataBinder.readValue("database.username");

// create consumer
StringItem item = new StringItem("Username", null);

// bind the data set with consumer
DataBinder.bind("database.users[index].name",
new StringItemBindingProvider(), item,
StringItemBidningProvider.FEATURE_TEXT);
```

NetBeans Data Binding ME Library

Delivering changes in data sets to consumers

- Framework supports automatic listening on changes in data sets
  - No extra code required
  - EL defines a place in data structure (not just the value)
  - DataBinder listens on changes of data sets
  - DataBinder notifies DataBindingProvider
  - DataBindingProvider updates the consumer
- Two-way bindings
  - Consumer can push data back to data set e.g., updating an input value from TextField in connected data set

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Data Binding in Action

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Binding to Data/Services

What makes data a data source

- Data or services can be either local or remote
- Implementation needs to implement interface `org.netbeans.microedition.databinding.DataSet`
- Important methods are:
  - `getValue(name)`
  - `setValue(name,value)`
- When a value is changed, call: `DataBinder.fireDataSetChanged(dataSet, dataItemName)`
- For hierarchical data use DataSet as a value
- For indexable data use IndexableDataSet

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Binding to Local and Remote Data

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Extensible API for data consumers

- Data consumer API is extensible
- Framework provides implementation for LCDUI
- Can be extended to other UI frameworks
- Can be extended even to non-UI frameworks

Binding UI Components

Example—Providing bindings to SVG graphics

- SVG graphics is a XML-based vector graphics format
- DOM APIs can be used to manipulate the content
- Changes to the document automatically appear on the screen
- Data binding is done using element IDs
- Any attribute/text node can be bound to data set

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Binding to SVG Graphics

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Beyond the NetBeans Data Binding ME Library

- NetBeans Mobility Pack includes the library
- End-to-end tools can be used to automatically generate source code for data sets
- Support for web services using JSR 172
- Support for any remote data using Mobile Web Client

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Connecting to a Remote Service Using NetBeans Mobility Pack

Future Plans

- Extend the library to offer implementations of data set providers for various local services, e.g., PIM or RMS
- Visual support for using data bindings in Mobility Pack's Visual Mobile Designer

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Summary

- NetBeans Data Binding ME Library provides a generic data binding facility to Java ME platform
- Data binding can be used to connect to both local and remote data and services
- Data binding can be used with LCDUI as well as other frameworks
- NetBeans Mobility Pack comes with tools support for generating data binding-enabled code

For More Information

- Links
  - http://databindingme.dev.java.net
  - http://mobility.netbeans.org
  - http://www.netbeans.org
- Other 2007 JavaOne^{SM} Conference Sessions
  - TS-9452—Visual Development and Deployment of Advanced Mobile Applications
  - TS-5628—Developing Flashy Mobile Applications, Using SVG and JSR 226
- Look for us in tools area and mobility area of the Sun booth

Q&A

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