19

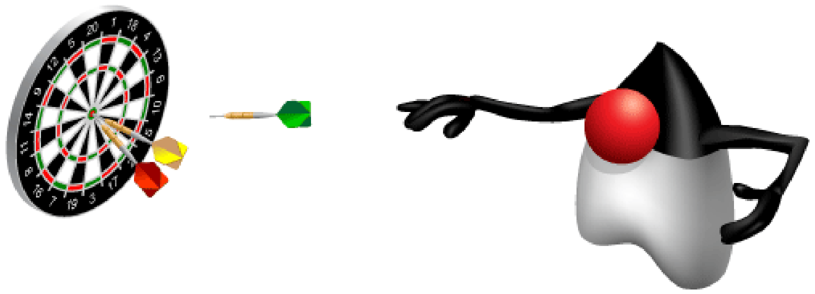
Localization

ORACLE

Objectives

After completing this lesson, you should be able to:

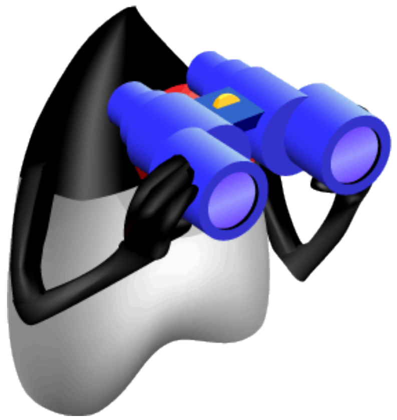
- Describe the advantages of localizing an application
- Define what a locale represents
- Read and set the locale by using the `Locale` object
- Create and read a `Properties` file
- Build a resource bundle for each locale
- Call a resource bundle from an application
- Change the locale for a resource bundle



Why Localize?

The decision to create a version of an application for international use often happens at the start of a development project.

- Region- and language-aware software
- Dates, numbers, and currencies formatted for specific countries
- Ability to plug in country-specific data without changing code

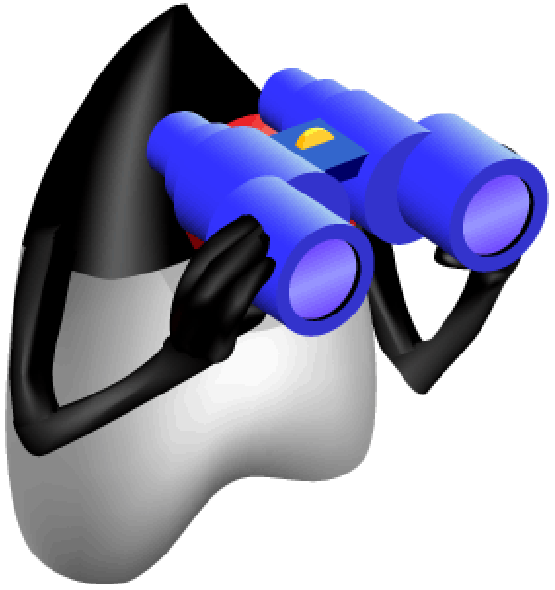


A Sample Application

Localize a sample application:

- Text-based user interface
- Localize menus
- Display currency and date localizations

```
=== Localization App ===
1. Set to English
2. Set to French
3. Set to Chinese
4. Set to Russian
5. Show me the date
6. Show me the money!
q. Enter q to quit
Enter a command:
```



`Locale`

A `Locale` specifies a particular language and country:

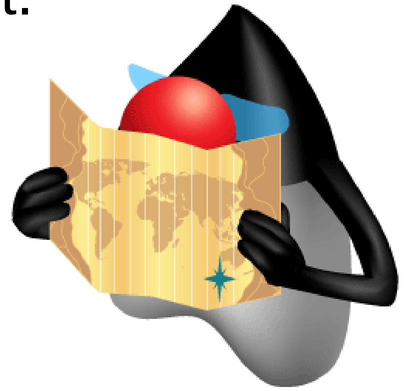
- Language
  - An alpha-2 or alpha-3 ISO 639 code
  - “en” for English, “es” for Spanish
  - Always uses lowercase
- Country
  - Uses the ISO 3166 alpha-2 country code or UN M.49 numeric area code
  - "US" for United States, "ES" for Spain
  - Always uses uppercase
- See the Java Tutorials for details of all standards used.

Properties

- The `java.util.Properties` class is used to load and save key-value pairs in Java.
- Can be stored in a simple text file:

```
hostName = www.example.com
userName = user
password = pass
```

- File name ends in `.properties`.
- File can be anywhere that compiler can find it.



Loading and Using a Properties File

```java
public static void main(String[] args) {
  Properties myProps = new Properties();
  try {
    FileInputStream fis = new FileInputStream("ServerInfo.properties");
    myProps.load(fis);
  } catch (IOException e) {
    System.out.println("Error: " + e.getMessage());
  }

   // Print Values
   System.out.println("Server: " + myProps.getProperty("hostName"));
   System.out.println("User: " + myProps.getProperty("userName"));
   System.out.println("Password: " + myProps.getProperty("password"));
}
```

Loading Properties from the Command Line

- Property information can also be passed on the command line.
- Use the –D option to pass key-value pairs:

```
java –Dpropertyname=value –Dpropertyname=value myApp
```

- For example, pass one of the previous values:

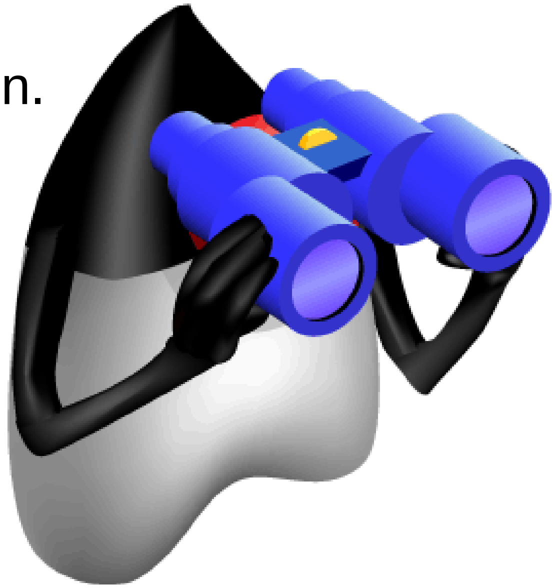
```
java –Dusername=user myApp
```

- Get the `Properties` data from the `System` object:

```
String userName = System.getProperty("username");
```

Resource Bundle

- The `ResourceBundle` class isolates locale-specific data:
  – Returns key/value pairs stored separately
  – Can be a class or a `.properties` file
- Steps to use:
  – Create bundle files for each locale.
  – Call a specific locale from your application.



Resource Bundle File

- Properties file contains a set of key-value pairs.
  - Each key identifies a specific application component.
  - Special file names use language and country codes.
- Default for sample application:
  - Menu converted into resource bundle

```
MessageBundle.properties
menu1 = Set to English
menu2 = Set to French
menu3 = Set to Chinese
menu4 = Set to Russian
menu5 = Show the Date
menu6 = Show me the money!
menuq = Enter q to quit
```

Sample Resource Bundle Files

Samples for French and Chinese

```
MessagesBundle_fr_FR.properties
menu1 = Régler à l'anglais
menu2 = Régler au français
menu3 = Réglez chinoise
menu4 = Définir pour la Russie
menu5 = Afficher la date
menu6 = Montrez-moi l'argent!
menuq = Saisissez q pour quitter
```

```
MessagesBundle_zh_CN.properties
menu1 = 设置为英语
menu2 = 设置为法语
menu3 = 设置为中文
menu4 = 设置到俄罗斯
menu5 = 显示日期
menu6 = 显示我的钱!
menuq = 输入q退出
```

Initializing the Sample Application

```
PrintWriter pw = new PrintWriter(System.out, true);
    // More init code here

    Locale usLocale = Locale.US;
    Locale frLocale = Locale.FRANCE;
    Locale zhLocale = new Locale("zh", "CN");
    Locale ruLocale = new Locale("ru", "RU");
    Locale currentLocale = Locale.getDefault();

    ResourceBundle messages = ResourceBundle.getBundle("MessagesBundle",
    currentLocale);

    // more init code here

    public static void main(String[] args){
        SampleApp ui = new SampleApp();
        ui.run();
    }
```

Sample Application: Main Loop

```
public void run(){
    String line = "";
    while (!(line.equals("q"))){
        this.printMenu();
        try { line = this.br.readLine(); }
        catch (Exception e){ e.printStackTrace(); }

        switch (line){
            case "1": setEnglish(); break;
            case "2": setFrench(); break;
            case "3": setChinese(); break;
            case "4": setRussian(); break;
            case "5": showDate(); break;
            case "6": showMoney(); break;
        }
    }
}
```

The `printMenu` Method

Instead of text, a resource bundle is used.

- `messages` is a resource bundle.
- A key is used to retrieve each menu item.
- Language is selected based on the `Locale` setting.

```
    public void printMenu(){
        pw.println("=== Localization App ===");
        pw.println("1. " + messages.getString("menu1"));
        pw.println("2. " + messages.getString("menu2"));
        pw.println("3. " + messages.getString("menu3"));
        pw.println("4. " + messages.getString("menu4"));
        pw.println("5. " + messages.getString("menu5"));
        pw.println("6. " + messages.getString("menu6"));
        pw.println("q. " + messages.getString("menuq"));
        System.out.print(messages.getString("menucommand")+" ");
    }
```

Changing the `Locale`

To change the `Locale`:

- Set `currentLocale` to the desired language.
- Reload the bundle by using the current locale.

```
public void setFrench(){
    currentLocale = frLocale;
    messages = ResourceBundle.getBundle("MessagesBundle",
    currentLocale);
}
```

Sample Interface with French

After the French option is selected, the updated user interface looks like the following:

```
=== Localization App ===
1. Régler à l'anglais
2. Régler au français
3. Réglez chinoise
4. Définir pour la Russie
5. Afficher la date
6. Montrez-moi l'argent!
q. Saisissez q pour quitter
Entrez une commande:
```

Format Date and Currency

- Numbers can be localized and displayed in their local format.
- Special format classes include:
  - `java.time.format.DateTimeFormatter`
  - `java.text.NumberFormat`
- Create objects using `Locale`.

Displaying Currency

- Format currency:
  - Get a currency instance from `NumberFormat`.
  - Pass the `Double` to the `format` method.

- Sample currency output:

```
1 000 000 руб. ru_RU
1 000 000,00 € fr_FR
￥1,000,000.00 zh_CN
£1,000,000.00 en_GB
```

Formatting Currency with NumberFormat

```java
package com.example.format;

import java.text.NumberFormat;
import java.util.Locale;

public class NumberTest {

  public static void main(String[] args) {

    Locale loc = Locale.UK;
    NumberFormat nf = NumberFormat.getCurrencyInstance(loc);
    double money = 1_000_000.00d;

    System.out.println("Money: " + nf.format(money) + " in 
 Locale: " + loc);
  }
}
```

Displaying Dates

- Format a date:
  - Get a `DateTimeFormatter` object based on the `Locale`.
  - From the LocalDateTime variable, call the `format` method passing the formatter.

- Sample dates:

```
20 juil. 2011 fr_FR
20.07.2011 ru_RU
```

Displaying Dates with `DateTimeFormatter`

```java
import java.time.LocalDateTime;
import java.time.format.DateTimeFormatter;
import java.time.format.FormatStyle;
import java.util.Locale;

public class DateFormatTest {
  public static void main(String[] args) {

    LocalDateTime today = LocalDateTime.now();
    Locale loc = Locale.FRANCE;

    DateTimeFormatter df =
      DateTimeFormatter.ofLocalizedDate(FormatStyle.FULL)
        .withLocale(loc);
    System.out.println("Date: " + today.format(df)
        + " Locale: " + loc.toString());
  }
```

Format Styles

- `DateTimeFormatter` uses the `FormatStyle` enumeration to determine how the data is formatted.
- Enumeration values
  - SHORT: Is completely numeric, such as 12.13.52 or 3:30 pm
  - MEDIUM: Is longer, such as Jan 12, 1952
  - LONG: Is longer, such as January 12, 1952 or 3:30:32 pm
  - FULL: Is completely specified date or time, such as Tuesday, April 12, 1952 AD or 3:30:42 pm PST

Summary

In this lesson, you should have learned how to:

- Describe the advantages of localizing an application
- Define what a locale represents
- Read and set the locale by using the `Locale` object
- Create and read a `Properties` file
- Build a resource bundle for each locale
- Call a resource bundle from an application
- Change the locale for a resource bundle

Practice 19-1 Overview: Creating a Localized Date Application

This practice covers creating a localized application that displays dates in a variety of formats.

Quiz

Which bundle file represents a language of Spanish and a country code of US?

a. `MessagesBundle_ES_US.properties`

b. `MessagesBundle_es_es.properties`

c. `MessagesBundle_es_US.properties`

d. `MessagesBundle_ES_us.properties`

Quiz

Which date format constant provides the most detailed information?

a. `LONG`

b. `FULL`

c. `MAX`

d. `COMPLETE`