JavaFX

Events

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Event Driven Programming vs. Procedural Programming

Event-driven programming is a programming paradigm in which the flow of the program is determined by event such as user actions (mouse clicks, key presses), sensor outputs, or messages from other programs or threads.

Event-driven programming is the dominant paradigm used in graphical user interfaces and web applications.

Events

An **event** is an action or occurrence recognized by a program, often originating from the external environment, such as the user.

When an event occurs, such as the mouse click or button key press, an object is generated by the system.

The program must detect the generation of the event and respond to it.

Every GUI program has an **event loop** which watches for the generation of events.

The process of responding to an event is called **event handling**.

Button and ActionEvent

When a user clicks on a `Button`, an `ActionEvent` is generated.

To handle the `ActionEvent`, call the `setOnAction()` in the `Button` object.

```
button.setOnAction(e -> method())
```

The expression `e -> method()` is called a lambda expression.

The method on the right side of the lambda expression can be a built-in method or one that you provide.

See ButtonActionEventFirstExample.java

In-Class Problem

Write a JavaFX program with two buttons and a `Text` object. Clicking on one button should move the `Text` object to the left and clicking on the other button should move the `Text` object to the right.

To build the GUI:

Start with a BorderPane.
Insert an HBox in the bottom of the BorderPane.
Insert two Buttons in the HBox.
Insert a Pane in the center of the BorderPane.
Insert a Text object in the Pane.

TextField and ActionEvent

When presses the Enter key while in a `TextField`, an `ActionEvent` is generated.

To handle the `ActionEvent`, call the `setOnAction()` in the `TextField` object.

```
textField.setOnAction(e -> method())
```

See TextFieldActionEventFirstExample.java

In-Class Problem

Write a JavaFX program that converts miles to kilometers and vice versa. The GUI should have two `TextFields`, one for miles and one for kilometers. If you enter a value in the miles `TextField` and press the enter key, the corresponding kilometer value is displayed in the kilometers `TextField`. Likewise, if you enter a value in the kilometer `TextField` and press the Enter key, the corresponding mile value is displayed in the mile `TextField`.

In-Class Problem

Write a JavaFX program that lets the user enter a loan amount and loan period in number of years and displays the monthly and total payments for each interest rate starting from 5% to 8%, with an increment of 1/8. The user interface should include two `TextFields`, one for the loan amount, one for the number of years. The user interface should also contain a `Button`. When the user clicks the button, the results should be displayed in a `TextArea`. The next slide shows a sample run.

```
Loan Amount:  10000
Number of Years:  5

Interest Rate       Monthly Payment      Total Payment
 5.000%              $188.71              $11,322.74
 5.125%              $189.28              $11,357.13
 5.250%              $189.85              $11,391.59
 ...
 7.875%              $202.17              $12,129.97
 8.000%              $202.76              $12,165.83
```