

Event Driven Systems and Modeling

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Topics

- Simple Event cycle
 - Source, target, activation, dispatch, listener, handler
 - Example: SimpleExample.java that comes JDK distribution.
- Custom events
- Event driven systems

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Types of Programs

- **Control-driven:** The order in the program code determines the sequence of events.
 - The actions are predetermined.
- **Event-driven:** The operation of the program depends on what you do with the controls presented (usually by the GUI)
 - Selecting menu items, pressing buttons, dialog interaction cause actions within the program.
 - Events in dynamic system/asynchronous systems.

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Events

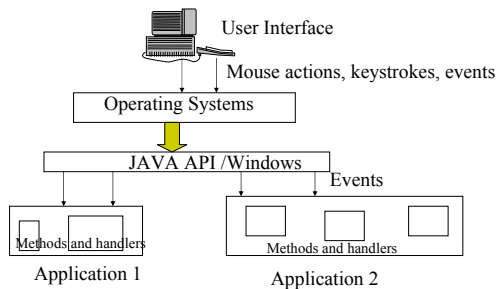
1. Actions such as clicking a button, moving a mouse, are recognized and identified by the operating systems(OS) or JVM.
2. For each action, OS/JVM determines which of the many currently running programs should receive the signal (of the action)
3. The signals that the application receives from the OS/JVM as result of the actions are called **events**.

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Event Generation



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Event Handlers

- An application responds to the events by executing particular code meant for each type of event.
- Not all events need to be handled by an application. For example, a drawing application may be interested in handling only mouse movements.
- As a designer of an event-driven application you will write classes/methods to handle the relevant events.

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Event Handling Process



- **Source** of an event is modeled as an object. Ex: button click's object is a button
- **Type** of the event: ActionEvent, WindowEvent, MouseEvent etc. Ex: An ActionEvent object is passed to the application that contains information about the action.
- **Target** of an event: Listener object of the event. Passing the event to a listener results in calling a particular method of the listener object.

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Event Handling



- Three ways:
 - Application/applet itself is a (mouse) listener, with an action performed method.
 - Event handling delegated to an object specially instantiated for this purpose.
 - Anonymous class/object to handle just one event.

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Designing Custom Events



- Three elements to generate and listen to events:
 - An event class
 - An event listener interface
 - An event generator

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Event class



- Java provides two super classes to define event class:
 - EventObject (for non-GUI events)
 - AWTEvent (typically for GUI controls)
- EventObject has at least one method getSource that returns an Object at which the event occurred.
- For your custom event class you extend this class and add other methods needed.

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Listener Interface



- The listener interface provides the contract between the listeners and the event generator.
- The contract provides the event generator with the method to call when it fires an event.
- When creating an event listener interface, you can add as many methods as you need.
- However, by convention, each method normally takes only one argument: the event.

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Event Generator



- An event generator tracks listeners, provides a mechanism to add and remove listeners, and, at the appropriate time, fires events to the listeners.
- When creating an event generator, make sure its registration mechanism is thread safe.
- Generator receives the stimulus and dispatches the events.
- Lets look at [Mr. Happy Object example](#).

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Event: Mood

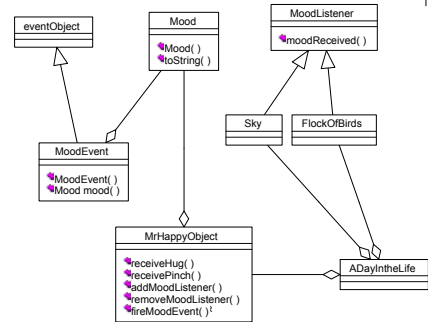
- Write the Mood class
- Write the MoodEvent class that extends EventObject
- Write MoodListener that has one method MoodReceived
- Mr.HappyObject will allow registration of listeners (add and remove listeners) and receive stimulus of pinch and hug and dispatch them appropriately.
- Listener classes (Sky and FlockOfBirds) implement MoodListener interface.
- These listeners are added to HappyObject by the application.
- They keep listening to HappyObject mood change and take appropriate action.

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UML diagram



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Summary

- Apply the concept studied to an event driven system.
- Design events, event object classes, listener interfaces, event generators-registrars and dispatchers.
- And an application connecting all these.

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