# Drag and Drop

With the Android drag/drop framework, you can allow your users to move data from one View to another View in the current layout using a graphical drag and drop gesture. The framework includes a drag event class, drag listeners, and helper methods and classes.

Although the framework is primarily designed for data movement, you can use it for other UI actions. For example, you could create an app that mixes colors when the user drags a color icon over another icon. The rest of this topic, however, describes the framework in terms of data movement.

Overview

A drag and drop operation starts when the user makes some gesture that you recognize as a signal to start dragging data. In response, your application tells the system that the drag is starting. The system calls back to your application to get a representation of the data being dragged. As the user's finger moves this representation (a "drag shadow") over the current layout, the system sends drag events to the drag event listener objects and drag event callback methods associated with the [View](file:///G:\Studio\SDK\docs\reference\android\view\View.html) objects in the layout. Once the user releases the drag shadow, the system ends the drag operation.

You create a drag event listener object ("listeners") from a class that implements [View.OnDragListener](file:///G:\Studio\SDK\docs\reference\android\view\View.OnDragListener.html). You set the drag event listener object for a View with the View object's[setOnDragListener()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#setOnDragListener(android.view.View.OnDragListener)) method. Each View object also has a[onDragEvent()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#onDragEvent(android.view.DragEvent)) callback method. Both of these are described in more detail in the section [The drag event listener and callback method](file:///G:\Studio\SDK\docs\guide\topics\ui\drag-drop.html#AboutDragListeners).

**Note**: For the sake of simplicity, the following sections refer to the routine that receives drag events as the "drag event listener", even though it may actually be a callback method.

When you start a drag, you include both the data you are moving and metadata describing this data as part of the call to the system. During the drag, the system sends drag events to the drag event listeners or callback methods of each View in the layout. The listeners or callback methods can use the metadata to decide if they want to accept the data when it is dropped. If the user drops the data over a View object, and that View object's listener or callback method has previously told the system that it wants to accept the drop, then the system sends the data to the listener or callback method in a drag event.

Your application tells the system to start a drag by calling the [startDrag()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#startDrag(android.content.ClipData, android.view.View.DragShadowBuilder, java.lang.Object, int)) method. This tells the system to start sending drag events. The method also sends the data that you are dragging.

You can call [startDrag()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#startDrag(android.content.ClipData, android.view.View.DragShadowBuilder, java.lang.Object, int)) for any attached View in the current layout. The system only uses the View object to get access to global settings in your layout.

Once your application calls [startDrag()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#startDrag(android.content.ClipData, android.view.View.DragShadowBuilder, java.lang.Object, int)), the rest of the process uses events that the system sends to the View objects in your current layout.

The drag/drop process

There are basically four steps or states in the drag and drop process:

*Started*

In response to the user's gesture to begin a drag, your application calls [startDrag()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#startDrag(android.content.ClipData, android.view.View.DragShadowBuilder, java.lang.Object, int)) to tell the system to start a drag. The arguments [startDrag()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#startDrag(android.content.ClipData, android.view.View.DragShadowBuilder, java.lang.Object, int)) provide the data to be dragged, metadata for this data, and a callback for drawing the drag shadow.

The system first responds by calling back to your application to get a drag shadow. It then displays the drag shadow on the device.

Next, the system sends a drag event with action type [ACTION\_DRAG\_STARTED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_STARTED) to the drag event listeners for all the View objects in the current layout. To continue to receive drag events, including a possible drop event, a drag event listener must return true. This registers the listener with the system. Only registered listeners continue to receive drag events. At this point, listeners can also change the appearance of their View object to show that the listener can accept a drop event.

If the drag event listener returns false, then it will not receive drag events for the current operation until the system sends a drag event with action type [ACTION\_DRAG\_ENDED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_ENDED). By sending false, the listener tells the system that it is not interested in the drag operation and does not want to accept the dragged data.

*Continuing*

The user continues the drag. As the drag shadow intersects the bounding box of a View object, the system sends one or more drag events to the View object's drag event listener (if it is registered to receive events). The listener may choose to alter its View object's appearance in response to the event. For example, if the event indicates that the drag shadow has entered the bounding box of the View (action type [ACTION\_DRAG\_ENTERED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_ENTERED)), the listener can react by highlighting its View.

*Dropped*

The user releases the drag shadow within the bounding box of a View that can accept the data. The system sends the View object's listener a drag event with action type [ACTION\_DROP](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DROP). The drag event contains the data that was passed to the system in the call to [startDrag()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#startDrag(android.content.ClipData, android.view.View.DragShadowBuilder, java.lang.Object, int)) that started the operation. The listener is expected to return boolean true to the system if code for accepting the drop succeeds.

Note that this step only occurs if the user drops the drag shadow within the bounding box of a View whose listener is registered to receive drag events. If the user releases the drag shadow in any other situation, no [ACTION\_DROP](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DROP) drag event is sent.

*Ended*

After the user releases the drag shadow, and after the system sends out (if necessary) a drag event with action type [ACTION\_DROP](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DROP), the system sends out a drag event with action type[ACTION\_DRAG\_ENDED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_ENDED) to indicate that the drag operation is over. This is done regardless of where the user released the drag shadow. The event is sent to every listener that is registered to receive drag events, even if the listener received the [ACTION\_DROP](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DROP) event.

Each of these four steps is described in more detail in the section [Designing a Drag and Drop Operation](file:///G:\Studio\SDK\docs\guide\topics\ui\drag-drop.html#DesignDragOperation).

The drag event listener and callback method

A View receives drag events with either a drag event listener that implements [View.OnDragListener](file:///G:\Studio\SDK\docs\reference\android\view\View.OnDragListener.html)or with its [onDragEvent(DragEvent)](file:///G:\Studio\SDK\docs\reference\android\view\View.html#onDragEvent(android.view.DragEvent)) callback method. When the system calls the method or listener, it passes to them a [DragEvent](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html) object.

You will probably want to use the listener in most cases. When you design UIs, you usually don't subclass View classes, but using the callback method forces you to do this in order to override the method. In comparison, you can implement one listener class and then use it with several different View objects. You can also implement it as an anonymous inline class. To set the listener for a View object, call [setOnDragListener()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#setOnDragListener(android.view.View.OnDragListener)).

You can have both a listener and a callback method for View object. If this occurs, the system first calls the listener. The system doesn't call the callback method unless the listener returns false.

The combination of the [onDragEvent(DragEvent)](file:///G:\Studio\SDK\docs\reference\android\view\View.html#onDragEvent(android.view.DragEvent)) method and [View.OnDragListener](file:///G:\Studio\SDK\docs\reference\android\view\View.OnDragListener.html) is analogous to the combination of the [onTouchEvent()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#onTouchEvent(android.view.MotionEvent)) and [View.OnTouchListener](file:///G:\Studio\SDK\docs\reference\android\view\View.OnTouchListener.html) used with touch events.

Drag events

The system sends out a drag event in the form of a [DragEvent](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html) object. The object contains an action type that tells the listener what is happening in the drag/drop process. The object contains other data, depending on the action type.

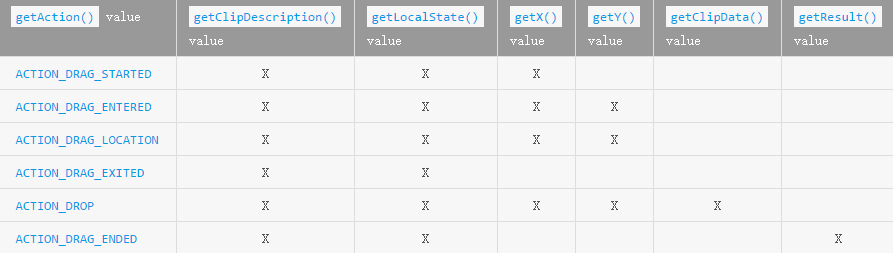
To get the action type, a listener calls [getAction()](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#getAction()). There are six possible values, defined by constants in the [DragEvent](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html) class. These are listed in [table 1](file:///G:\Studio\SDK\docs\guide\topics\ui\drag-drop.html#table1).

The [DragEvent](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html) object also contains the data that your application provided to the system in the call to [startDrag()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#startDrag(android.content.ClipData, android.view.View.DragShadowBuilder, java.lang.Object, int)). Some of the data is valid only for certain action types. The data that is valid for each action type is summarized in [table 2](file:///G:\Studio\SDK\docs\guide\topics\ui\drag-drop.html#table2). It is also described in detail with the event for which it is valid in the section [Designing a Drag and Drop Operation](file:///G:\Studio\SDK\docs\guide\topics\ui\drag-drop.html#DesignDragOperation).

**Table 1.** DragEvent action types

|  |  |
| --- | --- |
| getAction() value | Meaning |
| [ACTION\_DRAG\_STARTED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_STARTED) | A View object's drag event listener receives this event action type just after the application calls [startDrag()](file:///G:\Studio\SDK\docs\reference\android\view\View.html#startDrag(android.content.ClipData, android.view.View.DragShadowBuilder, java.lang.Object, int)) and gets a drag shadow. |
| [ACTION\_DRAG\_ENTERED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_ENTERED) | A View object's drag event listener receives this event action type when the drag shadow has just entered the bounding box of the View. This is the first event action type the listener receives when the drag shadow enters the bounding box. If the listener wants to continue receiving drag events for this operation, it must return boolean trueto the system. |
| [ACTION\_DRAG\_LOCATION](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_LOCATION) | A View object's drag event listener receives this event action type after it receives a [ACTION\_DRAG\_ENTERED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_ENTERED) event while the drag shadow is still within the bounding box of the View. |
| [ACTION\_DRAG\_EXITED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_EXITED) | A View object's drag event listener receives this event action type after it receives a [ACTION\_DRAG\_ENTERED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_ENTERED) and at least one[ACTION\_DRAG\_LOCATION](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_LOCATION) event, and after the user has moved the drag shadow outside the bounding box of the View. |
| [ACTION\_DROP](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DROP) | A View object's drag event listener receives this event action type when the user releases the drag shadow over the View object. This action type is only sent to a View object's listener if the listener returned boolean true in response to the [ACTION\_DRAG\_STARTED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_STARTED) drag event. This action type is not sent if the user releases the drag shadow on a View whose listener is not registered, or if the user releases the drag shadow on anything that is not part of the current layout.  The listener is expected to return boolean true if it successfully processes the drop. Otherwise, it should return false. |
| [ACTION\_DRAG\_ENDED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_ENDED) | A View object's drag event listener receives this event action type when the system is ending the drag operation. This action type is not necessarily preceded by an [ACTION\_DROP](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DROP) event. If the system sent a[ACTION\_DROP](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DROP), receiving the [ACTION\_DRAG\_ENDED](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DRAG_ENDED) action type does not imply that the drop operation succeeded. The listener must call[getResult()](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#getResult()) to get the value that was returned in response to[ACTION\_DROP](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DROP). If an [ACTION\_DROP](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#ACTION_DROP) event was not sent, then[getResult()](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#getResult()) returns false. |

**Table 2.** Valid DragEvent data by action type



The [getAction()](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#getAction()), [describeContents()](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#describeContents()), [writeToParcel()](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#writeToParcel(android.os.Parcel, int)), and [toString()](file:///G:\Studio\SDK\docs\reference\android\view\DragEvent.html#toString()) methods

always return valid data.