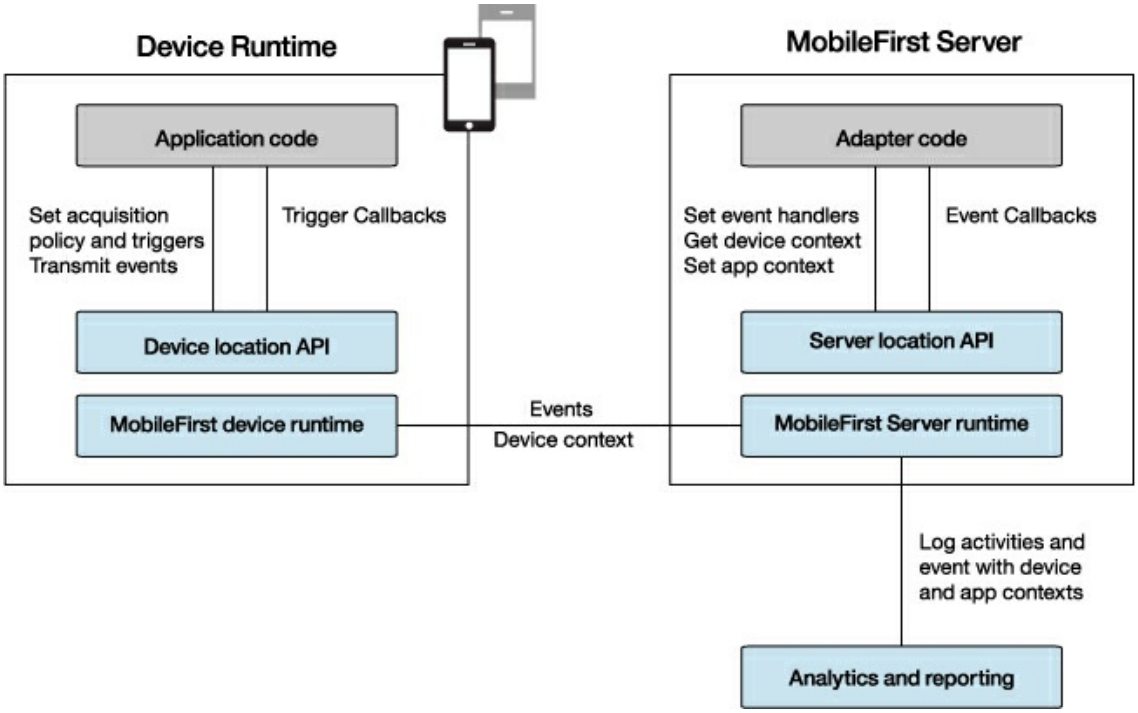
Location services in native Android applications

Architecture



The application code on the mobile device, in the form of an acquisition policy, controls the collection of data from device sensors.

The collected data is referred to as the device context.

When a change occurs in the device context, such as a change in the geolocation of the device or the fact that it entered a WiFi zone, triggers can be activated.

The triggers specify that an action occurs: either a callback function is called, or an event is sent to the server, based on the device context.

Events are created by triggers and application code, and include a snapshot of the device context at the time of their creation.

Events are buffered on the client and are transmitted to the server periodically.

The server might process the event later.

During the event transmission process, the device context is synchronized transparently to the server.

To handle the events, the server uses adapter application code.

This code sets up event handlers on the server. These handlers filter event data and pass matching events to a callback function.

The code also accesses the client device context (its location and WiFi network information) and sets an application context.

Server activities and received events are logged, together with the device and application contexts, for future reporting and analytics.

Acquisition policy

An acquisition policy defines how acquisition takes place.

```
WLAcquisitionPolicy policy = new WLAcquisitionPolicy();
```

Geo Acquisition policy

To enable geolocation, make sure to update your AndroidManifest.xml file to enable the following permissions:

```
<uses-permission android:name="com.google.android.c2dm.permission.ACCESS_COARSE_LOCATION"/>
<uses-permission android:name="com.google.android.c2dm.permission.ACCESS_FINE_LOCATION"/>
```

Then in your Java code:

```
policy.setGeoPolicy(WLGeoAcquisitionPolicy.getLiveTrackingProfile());
```

LiveTracking is a preset profile that uses the most accurate settings to track the device.
Additional configuration options include:

- `RoughTracking`
- `PowerSaving`
- Custom settings

> For more information, see the topic about setting an acquisition policy in the user documentation.

Wifi Acquisition policy

To enable Wifi tracking, make sure to update your AndroidManifest.xml file to enable the following permissions:

```
<uses-permission android:name="android.permission.ACCESS_WIFI_STATE"/>
<uses-permission android:name="android.permission.CHANGE_WIFI_STATE"/>
```

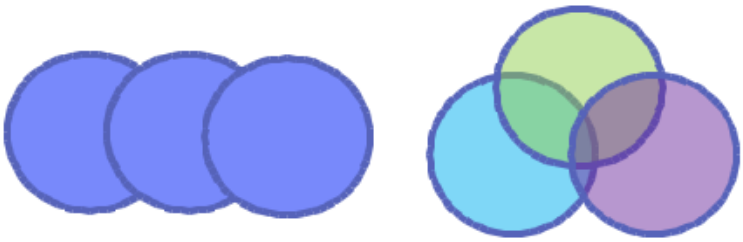
Then in your Java code:

```
policy.setWifiPolicy(new WLWifiAcquisitionPolicy()
   .setInterval(10000)
   .setAccessPointFilters(
      Arrays.asList(
         new WLWifiAccessPointFilter("Net1"),
         new WLWifiAccessPointFilter("Net2","*")
      )
   )
);
```

`interval` is the polling interval, in milliseconds. WiFi polling is performed at each interval.

`accessPointFilters` are access points of interest.
In the above example, the acquisition policy:

- Ignores everything except "Net1" and "Net2" – Helpful in dynamic environments, such as mobile hotspots.
- Considers all "Net1" access points as if they were one access point.
- Differentiates "Net2" access points by MAC address.



- Enterprise / Area-wide: unify by SSID (Net1)
- Indoors: differentiate by MAC address of access points (Net2)

> For more information, see the topic about setting an acquisition policy in the user documentation.

Triggers

You can set up triggers for

- Geo/Wifi fences (`Enter`, `Exit`, `Dwell Inside`, `Dwell Outside`)
- Movement (Geo: `PositionChange`, WiFi: `VisibleAccessPointsChange`)
- WiFi `Connect` / `Disconnect`

```
WLTriggersConfiguration triggers = new WLTriggersConfiguration();
triggers.getGeoTriggers().put(
   "trigger1",
   new WLGeoEnterTrigger()
   .setArea(new WLCircle(new WLCoordinate(40.68917,-74.04444),100))
   .setCallback(libertyAtLast)
   .setEvent(new JSONObject().put("bring","me").put("your","huddledMasses")
)
);
```

In the above example, `trigger1` is an **Enter** trigger which is activated when the device enters the defined circle (longitude, latitude, and radius).

When a trigger activates, it can call a callback function and/or create an event to be sent to the server.

> For more information, see the topic about triggers in the user documentation.

Start Acquisition

Use the `policy` and `triggers` defined above to start the acquisition.

```
WLLocationServicesConfiguration config = new WLLocationServicesConfiguration();
config.setPolicy(policy);
config.setTriggers(triggers);
WLClient.getInstance().getWLDevice().startAcquisition(config);
```

Events

Client Side

Events are generated by triggers (as explained above).

```
.setEvent(new JSONObject().put("bring","me").put("your","huddledMasses"))
```

Events can also be generated manually by calls to the API:

```
WLClient.getInstance().transmitEvent(event,immediate)
```

Where **event** is a `JSONObject` and **immediate** is a `boolean`.

Server side

In the adapter code, create event handlers by using:

```
WL.Server.createEventHandler(filter, handlerFunction);
```

Events that match the filter are passed to `handlerFunction`.
Filter examples:

- `{status: "platinum"}` – handle platinum members only
- `{hotel: { country: "USA" } }` – hotels in the USA
- `{}` – all events

Register the event handlers by using:

```
WL.Server.setEventHandlers([...]);
```

> For more information, see the topic about working with geofences and triggers in the user documentation.

Sample application

Click to download (http://public.dhe.ibm.com/software/products/en/MobileFirstPlatform/docs/v630/LocationServicesProject.zip) the Studio project.
Click to download (http://public.dhe.ibm.com/software/products/en/MobileFirstPlatform/docs/v630/LocationServicesNativeAndroidProject.zip) the Native project.

The LocationServices sample demonstrates:

- Acquiring an initial position
- Using a Geo profile
- Using Geo Triggers for DwellInside, Exit area, and PositionChange
- Transmitting event to the server on DwellInside and Exit area
- Ongoing acquisition