Emerging Technologies: Mobile Development for Android Devices

Marshmallow Changes

Introduction

- Changes in the security model and in battery usage modes – doze mode.
- App permissions before
- App permissions after Marshmallow
- Battery usage
- Doze mode
- Doze restrictions
- App standby

Changes

- A number of changes have been made to the Android system that affect not only users but also developers.
- Among these changes are improvements to the security model aimed at giving users more control over permissions that their apps can access.
- Also aimed at reducing battery drain.
- These changes affect not only users but also developers.

App Permissions Before Marshmallow

- Pre-Marshmallow simple situation:
- Give the app all permissions it requires at install time or don’t install.
- However, some apps are necessary or very desirable so users would risk giving all necessary permissions when perhaps they shouldn’t.
- Invasive apps are tolerated because they do something useful/necessary.
- Not a good security model.
- Can also lead to permissions creep. Request a few at first, then more at each update once users are ‘hooked’.

App Permissions after Marshmallow

- After Marshmallow, users can grant or remove permissions from individual apps in the system menu.
- Users can restrict apps as necessary or as new information comes to light etc.
- For developers, a permission may be revoked and may have to be asked for again.
- Developers should be open and clear on why permissions are needed.
- Don’t request permissions that are not necessary or trivial.

App Permissions after Marshmallow

- Depending on the app, permissions may be obvious and need little explanation.
- A photo app needs permission to use the camera.
- A navigation app needs permission to use location sensors.
- In other cases, users might need to be informed why a permission is required.
- Access to location information or contacts may be sensitive and might rightly arouse user suspicion.

App Permissions after Marshmallow

- Due to the Marshmallow changes in the permissions model, the developer should always check that an app has a permission before trying to use it.
- A permission may have been revoked by the user so this check is imperative.
- Failure to do this results in an exception.
- Further information can be found at:

developer.android.com/training/permissions/requesting.html

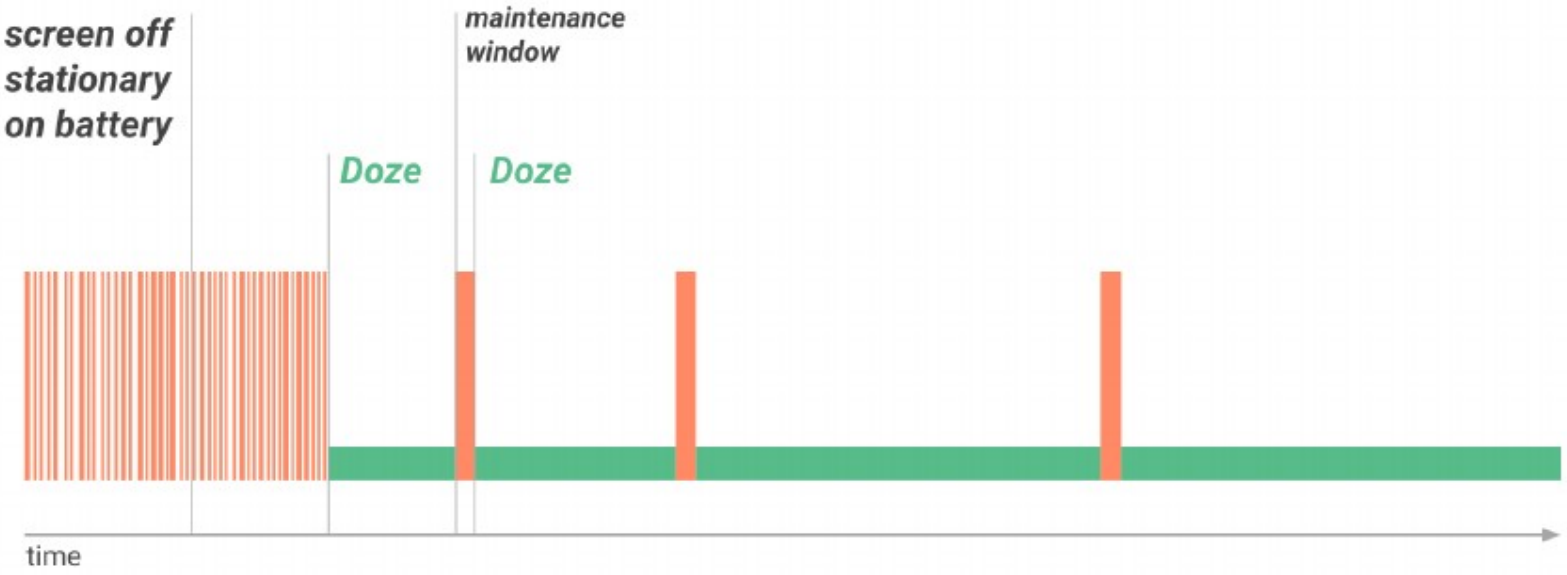
Battery Usage

- Features introduced to improve battery performance include:
- Doze mode
- App standby
- Always enabled and can not be switched off by the application or user.

Doze Mode

- Keeps track of whether the device is active and motionless.
- If the screen has been switched off and the device has not been used for a while, doze mode will modify the behaviour of apps that require network and CPU.
- Battery resources are conserved if Android can keep the device in the deep sleep state for as long as possible.

Doze Mode


screen off
stationary
on battery
maintenance
window
Doze
Doze
time

Doze Mode

- Doze mode is illustrated in the diagram.
- Orange representes periods of activity.
- Green represents periods of inactivity.
- On the left hand side, a user is actively using the device.
- There is a lot of network and processor activity.
- After a set period of inactivity, the device determines that it can enter doze mode.
- Network activity will be deferred and grouped until the next maintenance window is reached.

Doze Mode

- Doze mode is indicated by the green.
- Maintenance windows are indicated by the orange bars at regular intervals in doze mode.
- After a short maintenance period, the device re-enters doze mode again.
- Periods between maintenance windows are lengthened by further inactivity.
- Moving the device or switching on the screen causes the device to exit doze mode.

Doze Restrictions

- Doze mode restricts the following to try to conserve battery resources:
  - Network access is suspended.
  - Wake locks are ignored.
  - Alarmmanager alarms are deferred to the next window. Normal alarms are not affected.
  - Wi-fi scans are not carried out.
  - Sync adapters and job schedulers are not run.

Doze Restrictions

- App standby determines if an app is idle when the user is not actively using it.
- An app is on standby if:
  - The user has not explicitly launched it.
  - The app has no process in the foreground.
  - The app does not have any notification either on the lock screen or in the notification tray.

App Wakeup

- Apps are released from standby, ie. woken up when:
- A user interacts with the app.
- The device is plugged into a power supply.