CMSC436: Programming Handheld Systems
Alarms
Today’s Topics

Alarms
AlarmManager APIs
Alarm Types
Example Application
Alarms

Mechanism for sending Intents at some point in the future

Allows one application to make code execute, even when that application is no longer running
Alarms

Once registered, Alarms remain active even if the device is asleep.
Can configure Alarms to wake a sleeping device.
Alarms are canceled on device shutdown/restart.
Alarm Examples

MMS - Retry Scheduler
Settings - Bluetooth Discoverable timeout
Phone - User Info Cache
AlarmManager

You create and manage Alarms by interacting with the AlarmManager

Get a reference to the AlarmManager by calling the Context class’

getSystemService(Context.ALARM_SERVICE)
Creating Alarms

// One-shot Alarm with inexact timing. If there is already an alarm
// scheduled for the same IntentSender, that previous alarm will first
// be canceled

open fun set(type: Int, triggerAtMillis: Long,
        operation: PendingIntent!): Unit
Creating Alarms

// One-shot Alarm with exact timing
open fun setExact(type: Int, triggerAtMillis: Long, operation: PendingIntent!): Unit
Creating Alarms

// Repeating alarm with inexact timing

open fun setRepeating(type: Int, triggerAtMillis: Long,
                        intervalMillis: Long, operation: PendingIntent!): Unit
Alarm Types

Two degrees of configurability

How to interpret time

What to do if the device is sleeping when the Alarm fires
Interpreting Time

Realtime - relative to system clock
Elapsed - relative to time since last boot up
Sleeping Devices

When Alarm fires and device is asleep, can either

- Wake up device now & deliver Intent
- Wait to deliver Intent until device wakes up
Alarm Type Constants

RTC_WAKEUP
RTC
ELAPSED_REALTIME
ELAPSED_REALTIME_WAKEUP
PendingIntent

A description of an Intent and a target action to perform with it

Can be handed to other applications so that they can perform actions on your behalf at a later time

Key concern - proxy applications shouldn’t perform operations that originating application can’t
PendingIntent

static fun getActivity(context: Context!, requestCode: Int,
        intent: Intent!, flags: Int): PendingIntent!

static fun getBroadcast(context: Context!, requestCode: Int,
        intent: Intent!, flags: Int): PendingIntent!

static fun getService(context: Context!, requestCode: Int,
        intent: Intent, flags: Int): PendingIntent!
AlarmCreate

Set Single Alarm
Set Repeating Alarm
Cancel Repeating Alarm

AlarmCreate

Set Single Alarm
Set Repeating Alarm
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Set Single Alarm
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A Kind Reminder
Get back to studying!
public override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.main)

    // Get the AlarmManager Service
    mAlarmManager =
        getSystemService(Context.ALARM_SERVICE) as AlarmManager

    // Create an Intent to broadcast to the AlarmNotificationReceiver
    val mNotificationReceiverIntent = Intent(this@AlarmCreateActivity,
        AlarmNotificationReceiver::class.java)

    // Create an PendingIntent that holds the NotificationReceiverIntent
    mNotificationReceiverPendingIntent = PendingIntent.getBroadcast(
        this@AlarmCreateActivity, 0, mNotificationReceiverIntent, 0)
// Create an Intent to broadcast to the AlarmLoggerReceiver
val mLoggerReceiverIntent = Intent(this@AlarmCreateActivity,
    AlarmLoggerReceiver::class.java)

// Create PendingIntent that holds the mLoggerReceiverPendingIntent
mLoggerReceiverPendingIntent = PendingIntent.getBroadcast(
    this@AlarmCreateActivity, 0, mLoggerReceiverIntent, 0)
fun onClickCancelRepAlarmButton(v: View) {

    // Cancel all alarms using mNotificationReceiverPendingIntent
    mAlarmManager.cancel(mNotificationReceiverPendingIntent)

    // Cancel all alarms using mLoggerReceiverPendingIntent
    mAlarmManager.cancel(mLoggerReceiverPendingIntent)

    // Show Toast message
    Toast.makeText(applicationContext, "Repeating Alarms Cancelled",
                    Toast.LENGTH_LONG).show()
}

class AlarmLoggerReceiver : BroadcastReceiver() {
    companion object {
        private const val TAG = "AlarmLoggerReceiver"
    }

    override fun onReceive(context: Context, intent: Intent) {
        // Log receipt of the Intent with timestamp
        Log.i(TAG, context.getString(R.string.logging_at_string) +
              DateFormat.getDateTimeInstance().format(Date()))
    }
}
fun onClickSetSingleAlarmButton(v: View) {

    // Set single alarm
    mAlarmManager.set(AlarmManager.RTC_WAKEUP,
        System.currentTimeMillis(), mNotificationReceiverPendingIntent)

    // Set single alarm to fire shortly after previous alarm
    mAlarmManager.set(AlarmManager.RTC_WAKEUP,
        System.currentTimeMillis() + JITTER, mLoggerReceiverPendingIntent)

    // Show Toast message
    Toast.makeText(applicationContext, "Single Alarm Set",
        Toast.LENGTH_LONG).show()
}
AlarmCreateActivity.kt

fun onClickSetRepAlarmButton(v: View) {

    // Set repeating alarm
    mAlarmManager.setRepeating(AlarmManager.ELAPSED_REALTIME,
        SystemClock.elapsedRealtime(), REPEAT_INTERVAL,
        mNotificationReceiverPendingIntent)

    // Set repeating alarm to fire shortly after previous alarm
    mAlarmManager.setRepeating(AlarmManager.ELAPSED_REALTIME,
        SystemClock.elapsedRealtime() + JITTER, REPEAT_INTERVAL,
        mLoggerReceiverPendingIntent)

    // Show Toast message
    Toast.makeText(applicationContext, "Repeating Alarm Set",
        Toast.LENGTH_LONG).show()
Next Time

Threads, Messages and Handlers
Example Applications

AlarmCreate