CS 475/575

Audio

Content adapted from CS378 - Mobile Computing
http://www.cs.utexas.edu/~scottm/cs378/schedule.htm
Used with permission

Sound

- SoundPool – easy to use,great for short sounds, use for games (background sounds looping etc.). Hard limit on size of soundfile (~1Mb but this # will likely change)
- MediaPlayer - bit more complex, better suited for longer sounds streaming music and movies

SoundPool

- Android class for playing simple sounds

public **SoundPool** (int maxStreams, int streamType, int srcQuality) Since: API

Constructor. Constructs a SoundPool object with the following characteristics:

Parameters

maxStreams	the maximum number of simultaneous streams for this SoundPool object
streamType	the audio stream type as described in AudioManager For example, game applications will normally use `STREAM_MUSIC`.
srcQuality	the sample-rate converter quality. Currently has no effect. Use 0 for the default.

- (For API 21 and on use Soundpool.builder instead)

Using SoundPool

- Great for applications with a number of short sound samples
- maxStreams parameter sets maximum number of sounds that can be played at once via this SoundPool
- If max is exceeded, stream with lowest priority stopped
  - and then by age (oldest) with lowest priority

SoundPool play

public final int **play** (int soundID, float leftVolume, float rightVolume, int priority, int loop, float rate)

Parameters

soundID	a soundID returned by the load() function
leftVolume	left volume value (range = 0.0 to 1.0)
rightVolume	right volume value (range = 0.0 to 1.0)
priority	stream priority (0 = lowest priority)
loop	loop mode (0 = no loop, -1 = loop forever)
rate	playback rate (1.0 = normal playback, range 0.5 to 2.0)

Using SoundPool

- Looping of sounds:
  - 0 no looping
  - -1 loop forever
  - >0, play that many times
- frequency (speed) can be changed
  - range from 0.5 to 2.0
  - 0.5 twice as long to play
  - 2.0 half as long to play

SoundPool Example

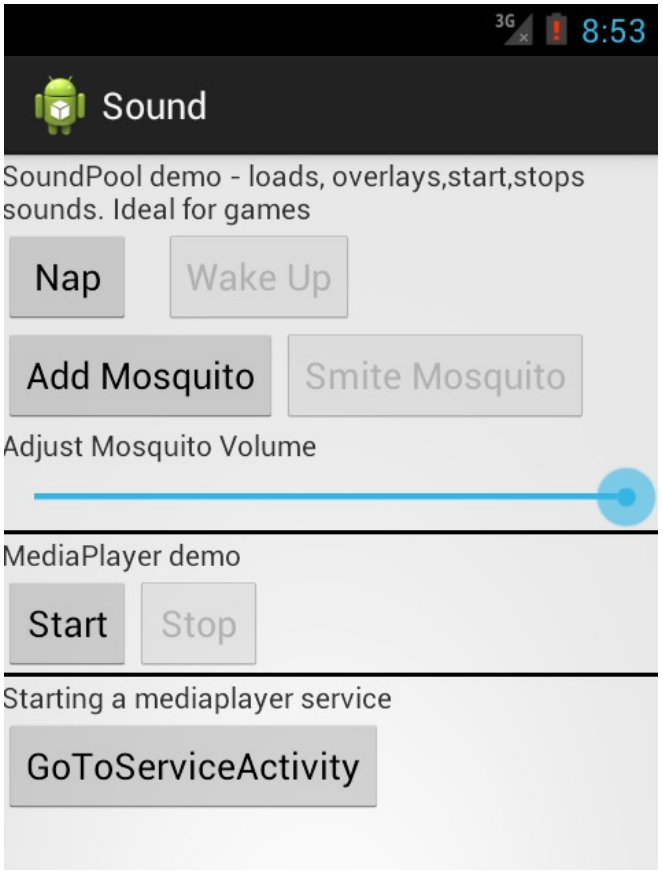
```
SoundPool sp = null;
int napStream = UNINITIALIZED;
//get soundpool object
sp = new SoundPool(MAX_STREAMS, AudioManager.STREAM_MUSIC, 0);

//load our sounds
trackNap = sp.load(this, R.raw.snore,0);
trackMosquito = sp.load(this, R.raw.mosquito,0);
trackSmite = sp.load(this, R.raw.flyswat,0);


private void doNap() {
    //create stream, the int returned is the value you use to clobber it
    if ( napStream == UNINITIALIZED){
        napStream = sp.play(trackNap, LEFTVOLUME, RIGHTVOLUME, PRIORITY,LOOPFOREVER , RATE);
        Log.d(TAG,"starting nap stream " + Integer.toString(napStream) );
    }
    setNapState();
}
public void doWakeup(View v){
    sp.stop(napStream);
    napStream = UNINITIALIZED;
    setNapState();
}
```

Simple Sound Demo App

- audio files local to app placed in res/raw
- CAUTION
  - large sound files difficult to install on emulator:
  - better success with dev phones / actual devices

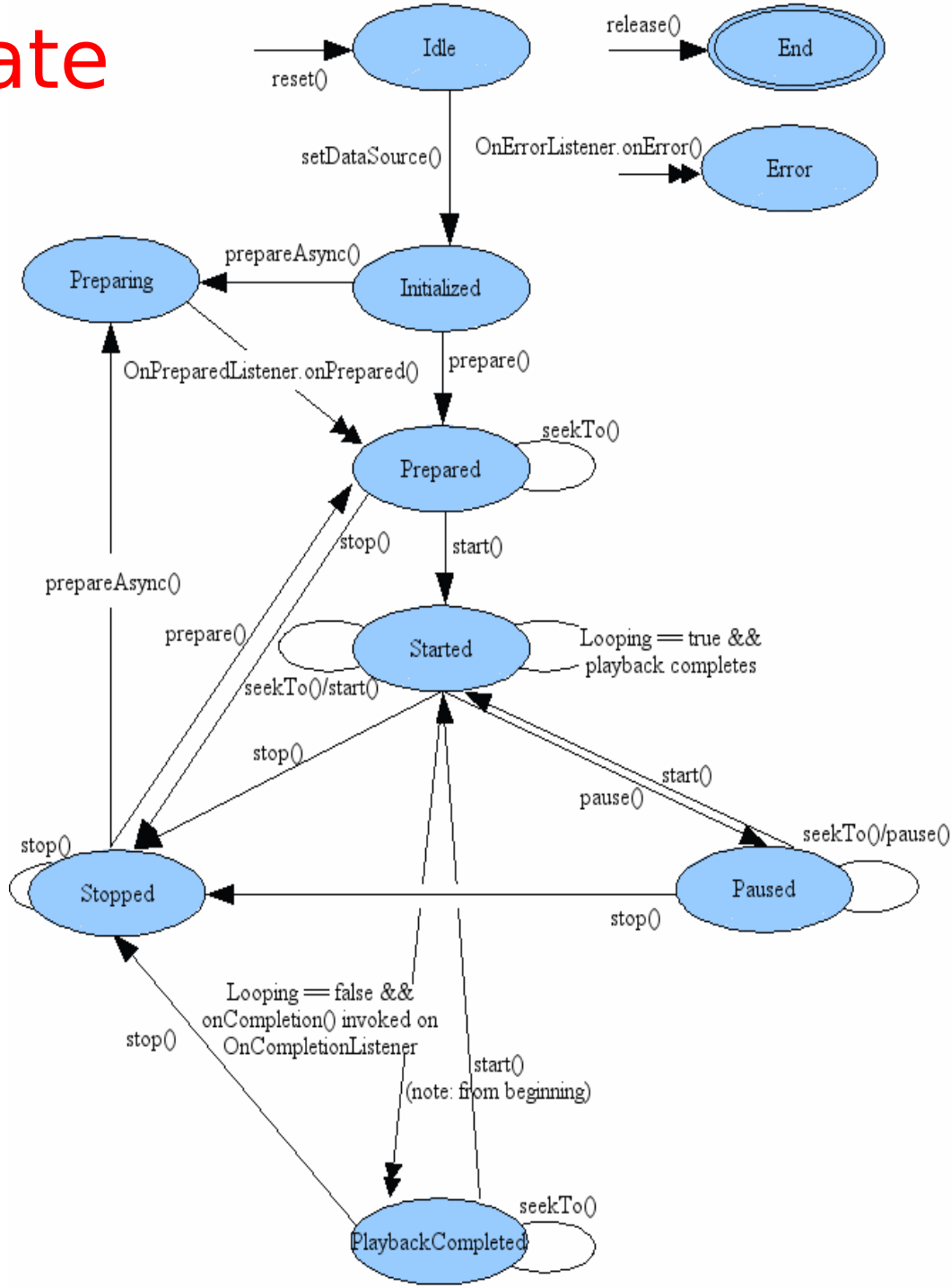


Android Audio

- Use the MediaPlayer class
- Common Audio Formats supported:
  - MP3, MIDI (.mid and others), Vorbis (.ogg), WAVE (.wav) and others
- Sources of audio
  - local resources (part of app)
  - internal URIs (Content Provider for other audio available)
  - External URLs (streaming)

MediaPlayer State Diagram

- Single arrows are synchronous transitions
- Double arrows are asynchronous transitions
- Delicate!! See
- http://developer.android.com/reference/android/media/MediaPlayer.html#StateDiagram



Playing Local Audio

- To play audio local to the app
- use the MediaPlayer.create convenience method
  - when complete MediaPlayer in the **prepared** state
- Then just start MediaPlayer

playSound method

```
private void playSound(int songID) {
    MediaPlayer mediaPlayer = MediaPlayer.create(this, songID);
    mediaPlayer.start();
    // no need to call prepare(); create() does that for you
}
```

- okay for *short* sounds
- downsides:
  - plays to completion
  - multiple sounds play at same time (desirable in some cases)
  - audio continues to play when app paused

Changing Behavior
Starting and Stopping

- Add instance variable for MediaPlayer
- Have start and stop methods

```
private void startMP() {
    mp = MediaPlayer.create(this,R.raw.mosquito);
    mp.start();
    mp.setOnCompletionListener(this);
    setMediaPlayerButtonState(false);
}
  private void stopMP(MediaPlayer mp) {
    if (mp != null){
        mp.stop();
        mp.release();
        mp = null;
    }
    setMediaPlayerButtonState(true);
}
```

in ActivitySound class

Cleaning Up

- Current version does not end well
- Audio continues to play if back button pressed and even if home button pressed!
- Activity Life Cycle - onPause we should stop MediaPlayer and release

```
@Override
protected void onPause() {
    super.onPause();
    if (mp!= null)
        onStop(null);
}
```

```
public void onStop(View v) {
    if (mp != null) {
        mp.stop();
        mp.release();
        mp = null;
    }
```

Saving State

- Resume music where we left off if paused or activity destroyed due to orientation change

```
@Override
protected void onSaveInstanceState(Bundle outState) {
    super.onSaveInstanceState(outState);

    stopPlayer();
}

@Override
protected void onPause() {
    super.onPause();

    stopPlayer();
}
```

Saving MediaPlayer State

- Not a lot of data so used the SharedPreferences

```
private void stopPlayer() {
    if(player != null) {
        if(player.isPlaying()) {
            SharedPreferences mPrefs
                    = getSharedPreferences("sound_demo", MODE_PRIVATE);
            SharedPreferences.Editor ed = mPrefs.edit();
            ed.putInt("songID", currentSongID);
            ed.putInt("audioLocation", player.getCurrentPosition());
            ed.commit();
        }
        player.stop();
        player.release();
        player = null;
    }
}
```

Restarting Audio

- In onCreate check if audio was interrupted recreate player with same songid and move to correct position
- Can write data to shared preferences or bundle (onSaveInstanceState) and pull out in onCreate

Playing Audio from Phone

- If audio is on device / system, but not local to app use a URI
- Obtain URIs of Music via a Content resolver

Playing Audio from Remote URL

- Straightforward given the URL
- Currently works on Physical Device (not emulator)
- See 14_Sound project

Completion of Audio

- If action required when audio done playing, implement the MediaPlayer.onCompletionListener interface
-

```
MediaPlayer.OnCompletionListener done
        = new MediaPlayer.OnCompletionListener() {

    @Override
    public void onCompletion(MediaPlayer mp) {
        // take necessary action on completion
    }
};
```

- Or could make activity the listener

SoundPool or MediaPlayer

- Soundpool
  - Short clips (~10s) that are loaded fast
  - Loaded up font when soundpool created
  - Multiple streams can play at same time
  - Good for game sound effects (gun fire, explosions etc)
- MediaPlayer
  - Longer audio tracks (also streamed)
  - Loaded in chunks, decoding is on-the-fly.
  - One audio stream per player, (can have multiple players though)
  - Good for a music player or podcast app
-

From https://coderanch.com/t/741964/MediaPlayer-long-clips-resource-intensive

References

- SeekBar http://webtutsdepot.com/2011/12/03/android-sdk-tutorial-seekbar-example/
- http://www.vogella.com/articles/AndroidMedia/article.html