Mobile Application Development
Camera

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November 13, 2014

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Android Development

Developing camera module

Framework supports various cameras and camera features
Consider:

- Specify camera requirements in manifest
  - App only installable on device with camera?
- Still photo or video clip?
- Media available this app only or other?
  - Add to gallery?

Camera

Developer options

Two approaches available

- Use android camera API
  - Build customized app
- Use existing camera app
  - Use implicit intent
  - Similar to use of Maps app module in MyRent
  - Much simpler approach
  - But at a price

Camera

Building customized camera app (pre API 21)

Using deprecated **Camera API**
Superceded in API 21

- Detect & access camera
- Create preview class
- Build preview layout
- Setup and register listeners
- Capture and save files
- Release camera when done

```
/*interfaces*/
SurfaceHolder.Callback,
OnClickListener,
Camera.ShutterCallback,
Camera.PictureCallback
/*classes*/
Camera
SurfaceView
View
```

Camera

Building customized camera app (API 21)

package
android.hardware.camera2
Added in API 21

- Models camera as pipeline
- Input request to capture single frame
- Captures single image per request
- Outputs corresponding:
  - metadata packet
  - image buffers

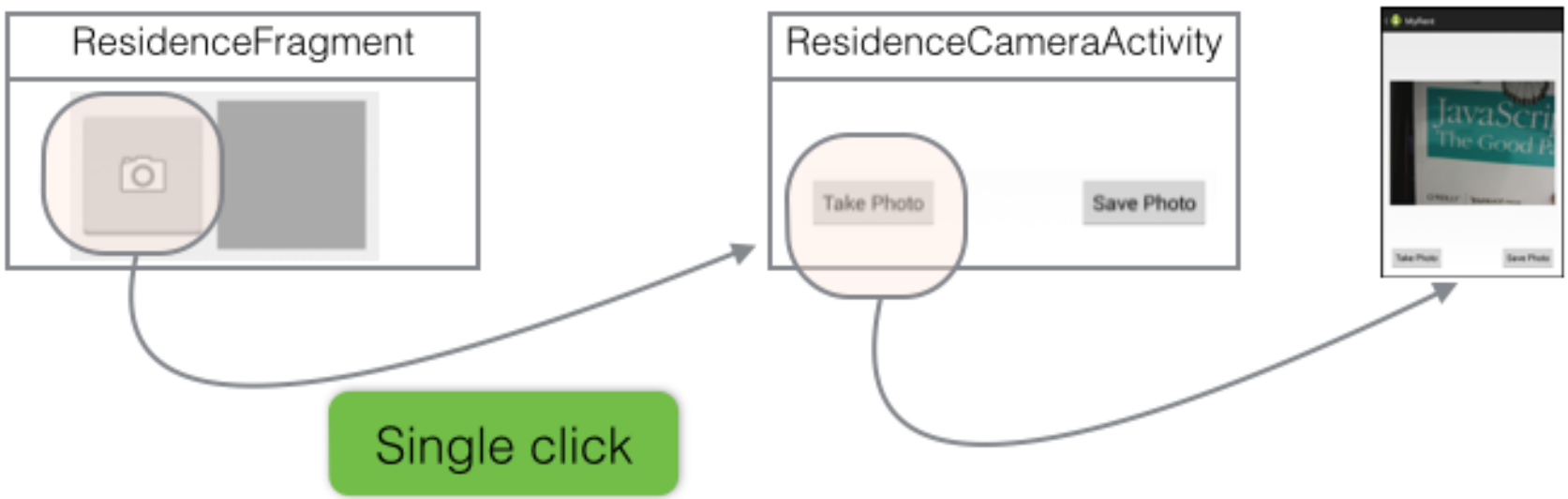
```
/** Example classes */
CameraCaptureSession
CameraCharacteristics
CameraDevice
CameraManager
CameraMetadata
CaptureFailure
CaptureRequest
CaptureResult
CameraAccessException
```

Camera

Using existing camera app

Use implicit intent

- Click camera button to start process
- Switches to new activity
- Take photo
- Save photo
- Returned to ResidenceFragment
- Image displayed as thumbnail

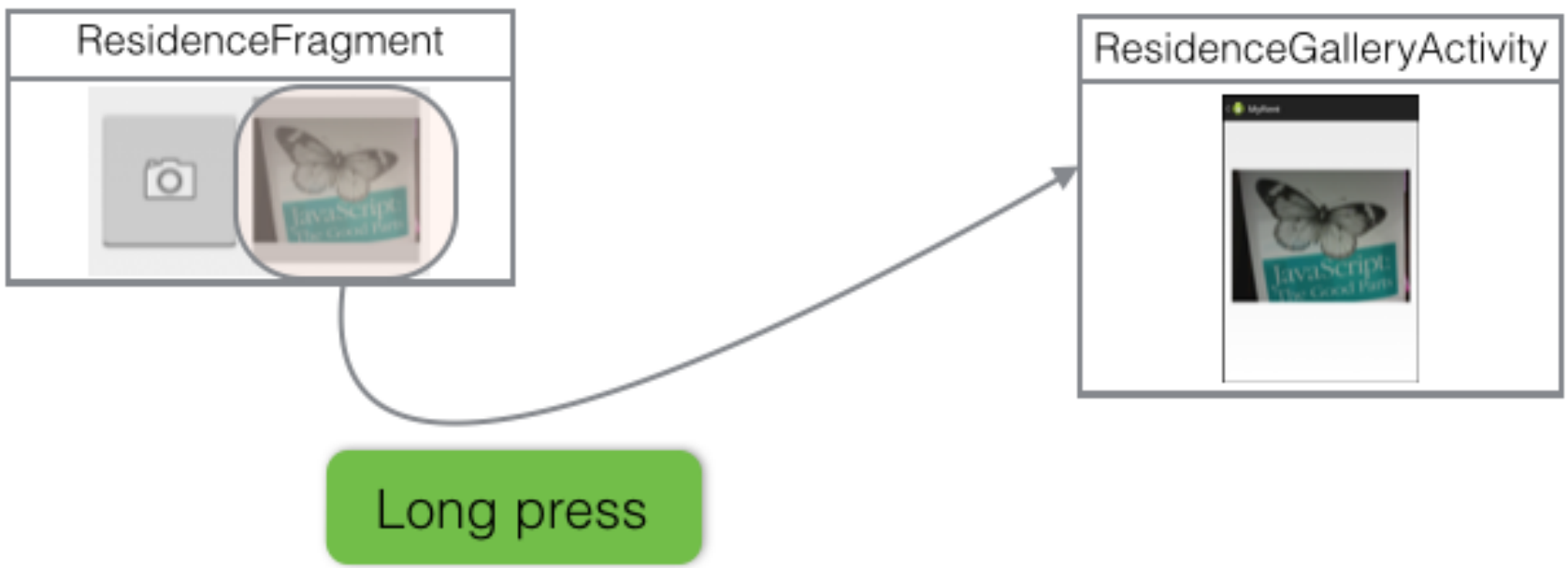


Camera

Using existing camera app

Display full-size photo

- Longpress thumbnail
- Switches to new activity
- Displays photo
- Use back or up button to return



Camera

Helpers

We begin with some helper methods

- Method to render photo . . .
- . . . that uses method to suitably scale image
  - *getScaledDrawable(Activity a, String path)*

```
/**
 * Render the photo on the ImageView
 */
public static void showPhoto(Activity activity, Residence res, ImageView photoView)
{
  String path = activity.getFileStreamPath(res.photo).getAbsolutePath();
  BitmapDrawable b = getScaledDrawable(activity, path);
  if (b != null)
    photoView.setImageDrawable(b);
}
```

```
photo= "da6676c8-2dd9-48b7-aaf9-40edfe84baf7.png" (id=831706398384)
```

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Model

We will add the photo filename to the model layer

- A String object to . . .
- . . . store the photo filename

```
public String  photo;

public Residence()
 {
    ...
   photo = "photo";
 }
```

Camera

Model

Include the usual JSON to facilitate serialization

```
private static final String JSON_PHOTO = "photo" ;
public Residence(JSONObject json) throws JSONException
{
  ...
  photo = json.getString(JSON_PHOTO);
}
```

```
public JSONObject toJSON() throws JSONException
{
  ...
  json.put(JSON_PHOTO, photo);
  return json;
}
```

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Photo-taking process

Begins in ResidenceFragment

- Widgets and listener

```
private ImageView cameraButton;
private ImageView photoView;
```

```
private void addListeners(View v)
{
  ...
  cameraButton = (ImageView) v.findViewById(R.id.camera_button);
  ...
  cameraButton.setOnClickListener(this);
}
```

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Photo-taking process

Listener response to camera button press

- start activity
- expect photo filename in result

```
@Override
public void onClick(View v)
{
  switch (v.getId())
  {
    ...
  case R.id.camera_button:
    Intent ic = new Intent(getActivity(), ResidenceCameraActivity.class);
    startActivityForResult(ic, REQUEST_PHOTO);
    break;
  }
}
```

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Photo-taking process

On successful taking of photo

- photo filename returned
- update model with returned filename
- render photo as thumbnail

```
@Override
public void onActivityResult(int requestCode, int resultCode, Intent data)
{
    ...
  switch (requestCode)
  {
  ...
  case REQUEST_PHOTO:
    String filename = data.getStringExtra(ResidenceCameraActivity.EXTRA_PHOTO_FILENAME);
    if (filename != null) {
      residence.photo = filename;
      showPhoto(getActivity(), residence, photoView );
    }
    break;
  }
}
```

Camera

Display full-size photo

Set longpress listener

- ResidenceFragment implements *View.OnLongClickListener*

```
private void addListeners(View v)
{
  ...
  photoView = (ImageView) v.findViewById(R.id.myrent_imageView);
  ...
  photoView.setOnLongClickListener(this);
}
```

Camera

Display full-size photo

Respond to longpress

- Stores this Residence id in ResidenceGalleryActivity intent
- Switches to ResidenceGalleryActivity

```
@Override
public boolean onLongClick(View v)
{
  Intent i = new Intent(getActivity(), ResidenceGalleryActivity.class);
  i.putExtra(EXTRA_RESIDENCE_ID, residence.id);
  startActivity(i);
  return true;
}
```

Camera

ResidenceCameraActivity

- Activity layout comprises
  - placeholder for photo
  - button to take photo
  - button to save photo
- Save button disabled pending photo shoot
- Up button behaves same as back button
  - returns to calling activity

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ResidenceCameraActivity: Take photo

- Widgets and listeners

```
private Button    savePhoto;
private Button    takePhoto;

@Override
protected void onCreate(Bundle savedInstanceState)
{
  savePhoto = (Button)findViewById(R.id.savePhoto);
  takePhoto = (Button)findViewById(R.id.takePhoto);
  savePhoto.setEnabled(false);
  savePhoto.setOnClickListener(this);
  takePhoto.setOnClickListener(this);
}
```

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ResidenceCameraActivity: Take photo

- Program **Up** button to behave same as **Back** button

```
@Override
protected void onCreate(Bundle savedInstanceState)
{
    ...
    getActionBar().setDisplayHomeAsUpEnabled(true);

}
```

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ResidenceCameraActivity: Take photo

- Program **Up** button to behave same as **Back** button

```
@Override
public boolean onOptionsItemSelected(MenuItem item)
{
  switch (item.getItemId())
  {
  case android.R.id.home  : onBackPressed();
                            return true;
  default                 : return super.onOptionsItemSelected(item);
  }
}
```

Camera

ResidenceCameraActivity: Take photo

- Use the device camera to capture image

```
@Override
public void onClick(View v)
{
  switch(v.getId())
  {
    case R.id.takePhoto     : onTakePhotoClicked(v);
                              break;
  }
}

public void onTakePhotoClicked(View v)
{
  Intent cameraIntent = new Intent(android.provider.MediaStore.ACTION_IMAGE_CAPTURE);
  startActivityForResult(cameraIntent,CAMERA_RESULT);
  savePhoto.setEnabled(true);
}
```

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ResidenceCameraActivity: Take photo

- Intent containing photo returned

```
@Override
protected void onActivityResult(int requestCode, int resultCode, Intent data)
{
  super.onActivityResult(requestCode, resultCode, data);
  switch (requestCode)
  {
    case ResidenceCameraActivity.CAMERA_RESULT  : processImage(data);
                                                  break;
  }
}
```

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ResidenceCameraActivity: Take photo

- Process returned image

```
private void processImage(Intent data)
{
  residencePhoto = (Bitmap) data.getExtras().get("data");
  if(residencePhoto == null)
  {
    Toast.makeText(this, "Photo shoot failed", Toast.LENGTH_SHORT).show();
  }
  residenceImage.setImageBitmap(residencePhoto);
}
```

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ResidenceCameraActivity: Take photo

- Declare static constants

```
private static  final int     CAMERA_RESULT = 5;
public static   final String  EXTRA_PHOTO_FILENAME = "org.wit.myrent.photo.filename";
```

Camera

ResidenceCameraActivity: Save photo

- Widgets and listener

```
@Override
protected void onCreate(Bundle savedInstanceState)
{
  ...
  savePhoto = (Button)findViewById(R.id.savePhoto);
  savePhoto.setEnabled(false);
  savePhoto.setOnClickListener(this);
}
```

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ResidenceCameraActivity: Save photo

- When photo taken then save button enabled

```
@Override
public void onClick(View v)
{
  switch(v.getId())
  {
    ...
  case R.id.savePhoto     : onPictureTaken(residencePhoto);
                            break;
  }
}
```

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ResidenceCameraActivity: Save photo

- Create random filename
- Use helper method to save photo
- Put filename in intent & **setResult** to return to calling activity

```
private void onPictureTaken(Bitmap data)
{
  String filename = UUID.randomUUID().toString() + ".png";
  if(writeBitmap(this, filename, data) == true) {
    Intent intent = new Intent();
    intent.putExtra(EXTRA_PHOTO_FILENAME, filename);
    setResult(Activity.RESULT_OK, intent);
  }
  else {
    setResult(Activity.RESULT_CANCELED);
  }
  finish();
}
```

Camera

ResidenceFragment

- Retrieve photo filename from intent
- Update the model
- Invoke helper *showPhoto* to render image as thumbnail

```
@Override
public void onActivityResult(int requestCode, int resultCode, Intent data)
{
  ...
  switch (requestCode)
  {
  ...
  case REQUEST_PHOTO:
    String filename = data.getStringExtra(ResidenceCameraActivity.EXTRA_PHOTO_FILENAME);
    if (filename != null) {
      residence.photo = filename;
      showPhoto(getActivity(), residence, photoView );
    }
    break;
  }
}
```

Camera

CameraHelper

- Recall that photo already saved to device
- Obtain absolute path
- Render bitmap (scaled using helper)

```
/**
 * Render the photo on the ImageView
 */
public static void showPhoto(Activity activity, Residence res, ImageView photoView)
{
  String path = activity.getFileStreamPath(res.photo).getAbsolutePath();
  BitmapDrawable b = getScaledDrawable(activity, path);
  if (b != null)
    photoView.setImageDrawable(b);
}
```

Camera

Gallery

- Longpress thumbnail in ResidenceFragment
- Switches to ResidenceGalleryActivity
  - ImageView widget declared: this to contain photo
  - Inflate xml layout: image placeholder
  - Invoke *showPicture* in *onCreate*

```
private ImageView photoView;

photoView = (ImageView) findViewById(R.id.residenceGalleryImage);

showPicture();
```

Camera

Gallery: Show picture

- Obtain Residence UUID from intent
- Use to get residence referrred to
- Invoke helper *showPhoto* to render image
- Return using Up or Back buttons

```
private void showPicture()
{
  UUID resId = (UUID)getIntent().getSerializableExtra(ResidenceFragment.EXTRA_RESIDENCE_ID);
  MyRentApp app = (MyRentApp) getApplication();
  Portfolio portfolio = app.portfolio;
  Residence residence = portfolio.getResidence(resId);
  showPhoto(this, residence,  photoView);
}
```