Introduction to Lollipop

Overview

Android 5.0 (Lollipop) introduces a new design language, *Material Design*, and with it a supporting cast of new features to make apps easier and more intuitive to use. With Material Design, Android 5.0 not only gives Android phones a facelift; it also provides a new set of design rules for Android-based tablets, desktop computers, watches, and smart TVs. These design rules emphasize simplicity and minimalism while making use of familiar tactile attributes (such as realistic surface and edge cues) to help users quickly and intuitively understand the interface.

Material Theme is the embodiment of these UI design principles in Android. This article begins by covering Material Theme's supporting features:

- **Animations** – *Touch feedback* animations, *activity transition* animations, *view state transition* animations, and a *reveal effect*.
- **View shadows and elevation** – Views now have an `elevation` property; views with higher `elevation` values cast larger shadows on the background.
- **Color features** – *Drawable tinting* makes it possible for you to reuse image assets by changing their color, and *prominent color extraction* helps you dynamically theme your app based on colors in an image.

Many Material Theme features are already built into the Android 5.0 UI experience, while others must be explicitly added to apps. For example, some standard views (such as buttons) already include touch feedback animations, while apps must enable most view shadows.

In addition to the UI improvements brought about through Material Theme, Android 5.0 also includes several other new features that are covered in this article:

- **Enhanced notifications** – Notifications in Android 5.0 have been significantly updated with a new look, support for lockscreen notifications, and a new *Heads-up* notification presentation format.
- **New UI widgets** – The new `RecyclerView` widget makes it easier for apps to convey large data sets and complex information, and the new `CardView` widget provides a simplified card-like presentation format for displaying text and images.
- **New APIs** – Android 5.0 adds new APIs for multiple network support, improved Bluetooth connectivity, easier storage management, and more flexible control of multimedia players and camera devices. A new job scheduling feature is available to run tasks asynchronously at scheduled times. This feature helps to improve battery life by, for example, scheduling tasks to take place when the device is plugged in and

charging.

Requirements

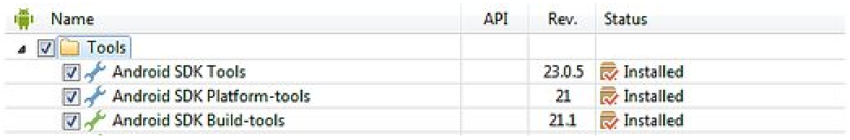
The following is required to use the new Android 5.0 features in Xamarin-based apps:

- **Xamarin.Android** – Xamarin.Android 4.20 or later must be installed and configured with either Visual Studio or Xamarin Studio. If you are using Xamarin Studio, version 5.5.4 or later is required.
- **Android SDK** – Android 5.0 (API 21) or later must be installed via the Android SDK Manager.
- **Java JDK 1.7** – Android 5.0 requires JDK 1.7 for compilation of applications; JDK 1.7 is available from Oracle.

Setting Up an Android 5.0 Project

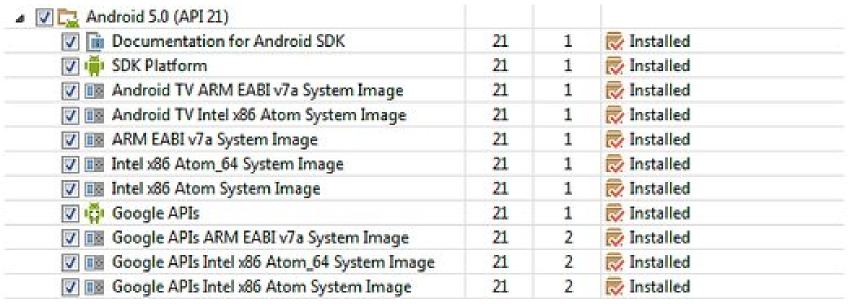
To create an Android 5.0 project, you must install the latest tools and SDK packages. Use the following steps to set up a Xamarin.Android project that targets Android 5.0:

1. Install Xamarin.Android tools and activate your Xamarin license. See Setup and Installation for more information about installing Xamarin.Android.
2. If you are using Xamarin Studio, install the latest Android 5.0 updates.
3. Start the Android SDK Manager (in Xamarin Studio, use Tools > Open Android SDK Manager…) and install Android SDK Tools 23.0.5 or later:



Name	API	Rev.	Status
☑ Tools			
☑ Android SDK Tools		23.0.5	Installed
☑ Android SDK Platform-tools		21	Installed
☑ Android SDK Build-tools		21.1	Installed

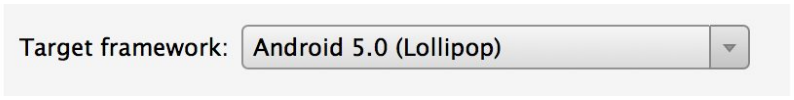
Also, install the latest Android 5.0 SDK packages (API 21 or later):



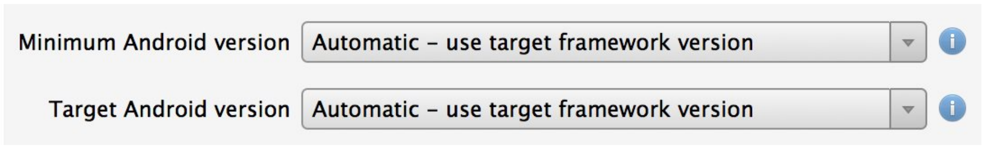
☑ Android 5.0 (API 21)			
☑ Documentation for Android SDK	21	1	Installed
☑ SDK Platform	21	1	Installed
☑ Android TV ARM EABI v7a System Image	21	1	Installed
☑ Android TV Intel x86 Atom System Image	21	1	Installed
☑ ARM EABI v7a System Image	21	1	Installed
☑ Intel x86 Atom_64 System Image	21	1	Installed
☑ Intel x86 Atom System Image	21	1	Installed
☑ Google APIs	21	1	Installed
☑ Google APIs ARM EABI v7a System Image	21	2	Installed
☑ Google APIs Intel x86 Atom_64 System Image	21	2	Installed
☑ Google APIs Intel x86 Atom System Image	21	2	Installed

For more information about using the Android SDK Manager, see SDK Manager.

4. Create a new Xamarin.Android project. If you are new to Android development with Xamarin, see Hello, Android to learn about creating Android projects. When you create an Android project, be sure to configure the version settings for Android 5.0. In Xamarin Studio, navigate to Project Options > Build > General and set Target framework to Android 5.0 (Lollipop) or later:


Target framework: Android 5.0 (Lollipop)

Under Project Options > Build > Android Application, set minimum and target Android version to Automatic - use target framework version:


Minimum Android version Automatic – use target framework version
Target Android version Automatic – use target framework version

5. Configure an emulator or an Android device to test your app. If you are using an emulator, see Configure the Emulator to learn how to configure an Android emulator for use with Xamarin Studio or Visual Studio. If you are using an Android device, see Setting Up the Preview SDK to learn how to update your device for Android 5.0. To configure your Android device for running and debugging Xamarin.Android applications, see Set Up Device for Development.

Note: If you are updating an existing Android project that was targeting the Android L Preview, you must update the Target Framework and Android version to the values described above.

Important Changes

Previously published Android apps could be affected by changes in Android 5.0. In particular, Android 5.0 uses a new runtime and a significantly changed notification format.

Android Runtime

Android 5.0 uses the new Android Runtime (ART) as the default runtime instead of Dalvik. ART implements several major new features:

- **Ahead-of-time (AOT) compilation** – AOT can improve app performance by compiling app code before the app is first launched. When an app is installed, ART generates a compiled app executable for the target device.

- **Improved garbage collection (GC)** – GC improvements in ART can also improve app performance. Garbage collection now uses one GC pause instead of two, and concurrent GC operations complete in a more timely fashion.

- **Improved app debugging** – ART provides more diagnostic detail to help in analyzing exceptions and crash reports.

Existing apps should work without change under ART—except for apps that exploit techniques unique to the previous Dalvik runtime, which may not work under ART. For more information about these changes, see Verifying App Behavior on the Android Runtime (ART).

Notification Changes

Notifications have changed significantly in Android 5.0:

- **Sounds and vibration are handled differently** – Notification sounds and vibrations are now handled by `Notification.Builder` instead of `Ringtone`, `MediaPlayer`, and `Vibrator`.

- **New color scheme** – In accordance with Material Theme, notifications are rendered with dark text over white or very light backgrounds. Also, alpha channels in notification icons may be modified by Android to coordinate with system color schemes.

- **Lockscreen notifications** – Notifications can now appear on the device lockscreen.

- **Heads-up** – High-priority notifications now appear in a small floating window (Heads-up notification) when the device is unlocked and the screen is turned on.

In most cases, porting existing app notification functionality to Android 5.0 requires the following steps:

1. Convert your code to use `Notification.Builder` (or `NotificationsCompat.Builder`) for creating notifications.

2. Verify that your existing notification assets are viewable in the new Material Theme color scheme.

3. Decide what visibility your notifications should have when they are presented on the lockscreen. If a notification is not public, what content should show up on the lockscreen?

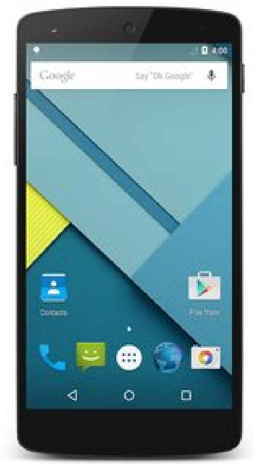
4. Set the category of your notifications so they are handled correctly in the new Android 5.0 *Do not disturb* mode.

If your notifications present transport controls, display media playback status, use `RemoteControlClient`, or call `ActivityManager.GetRecentTasks`, see Important Behavior Changes for more information about updating your notifications for Android 5.0.

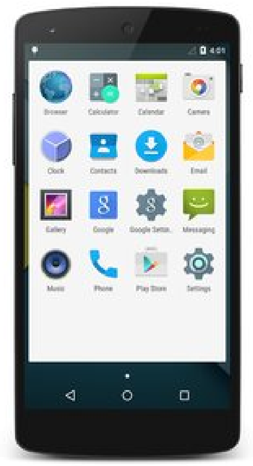
For information about creating notifications in Android, see Local Notifications. The Compatibility section of this article explains how to create notifications that are downward-compatible with earlier versions of Android.

Material Theme

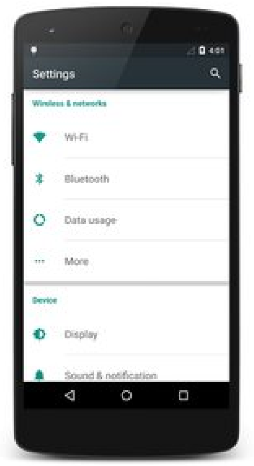
The new Android 5.0 Material Theme brings sweeping changes to the look and feel of the Android UI. Visual elements now use tactile surfaces that take on the bold graphics, typography, and bright colors of print-based design. Examples of Material Theme are depicted in the following screenshots:



Home Screen



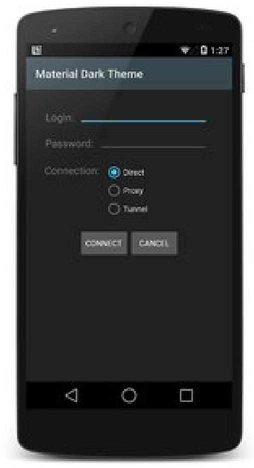
Apps Screen



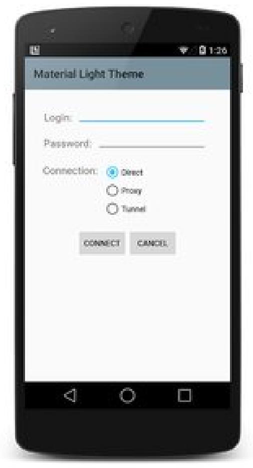
Settings Screen

Android 5.0 greets you with the home screen shown on the left. The center screenshot is the first screen of the app list, and the screenshot on the right is the Settings screen. Google's [Material Design]() specification explains the underlying design rules behind the new Material Theme concept.

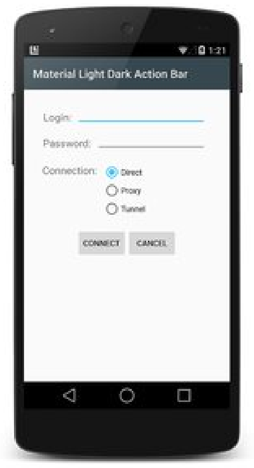
Material Theme includes three built-in flavors that you can use in your app: the `Theme.Material` dark theme (the default), the `Theme.Material.Light` theme, and the `Theme.Material.Light.DarkActionBar` theme:



Theme.Material



Theme.Material.Light



Theme.Material.Light.DarkActionBar

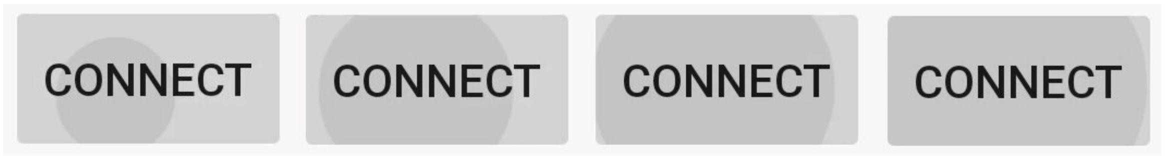
For more about using Material Theme features in Xamarin.Android apps, see Material Theme.

Animations

Android 5.0 provides touch feedback animations, activity transition animations, and view state transition animations to make app interfaces more intuitive to use. Also, Android 5.0 apps can use *reveal effect* animations to hide or reveal views. You can use *curved motion* settings to configure how quickly or slowly animations are rendered.

Touch Feedback Animations

Touch feedback animations provide users with visual feedback when a view has been touched. For example, buttons now display a ripple effect when they are touched—this is the default touch feedback animation in Android 5.0. Ripple animation is implemented by the new `RippleDrawable` class. The ripple effect can be configured to end at the bounds of the view or extend beyond the bounds of the view. For example, the following sequence of screenshots illustrates the ripple effect in a button during touch animation:



Initial touch contact with the button occurs in the first image on the left, while the remaining sequence (from left to right) illustrates how the ripple effect spreads out to the edge of the button. When the ripple animation ends, the view returns to its original appearance. The default ripple animation takes place in a fraction of a second, but the length of the animation can be customized for longer or shorter lengths of time.

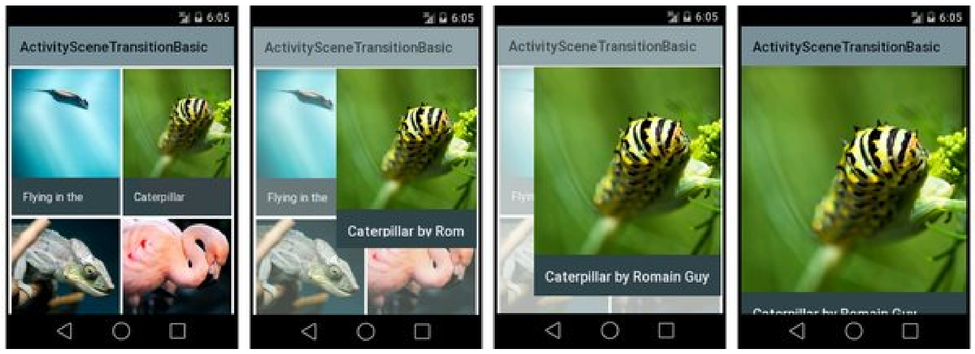
For more on touch feedback animations in Android 5.0, see Customize Touch Feedback.

Activity Transition Animations

Activity transition animations give users a sense of visual continuity when one activity transitions to another. Apps can specify three types of transition animations:

- ***Enter* transition** – For when an activity enters the scene.
- ***Exit* transition** – For when an activity exits the scene.
- ***Shared element* transition** – For when a view that is common to two activities changes as the first activity transitions to the next.

For example, the following sequence of screenshots illustrates a shared element transition:



A shared element (a photo of a caterpillar) is one of several views in the first activity; it enlarges to become the only view in the second activity as the first activity transitions to the second.

Enter Transition Animation Types

For enter transitions, Android 5.0 provides three types of animations:

- ***Explode* animation** – Enlarges a view from the center of the scene.
- ***Slide* animation** – Moves a view in from one of the edges of a scene.
- ***Fade* animation** – Fades a view into the scene.

Exit Transition Animation Types

For exit transitions, Android 5.0 provides three types of animations:

- ***Explode* animation** – Shrinks a view to the center of the scene.
- ***Slide* animation** – Moves a view out to one of the edges of a scene.
- ***Fade* animation** – Fades a view out of the scene.

Shared Element Transition Animation Types

Shared element transitions support multiple types of animations, such as:

- Changing the layout or clip bounds of a view.
- Changing the scale and rotation of a view.
- Changing the size and scale type for a view.

For more about activity transition animations in Android 5.0, see Customize Activity Transitions.

View State Transition Animations

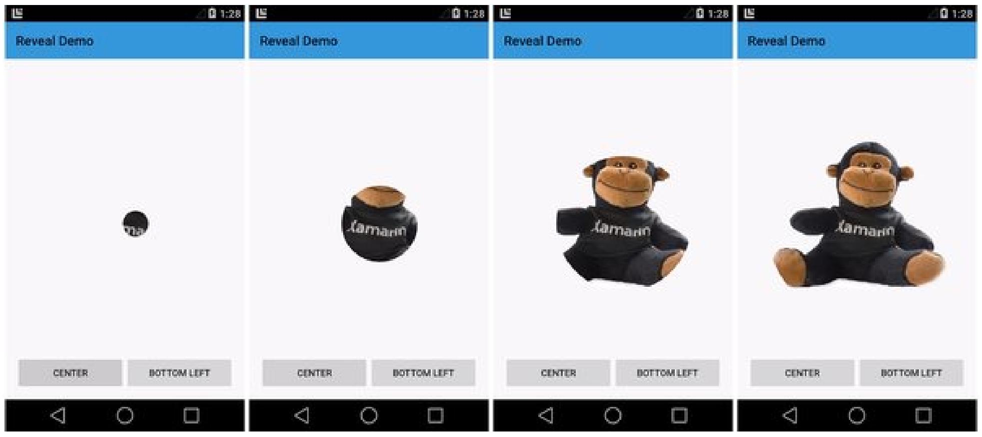
Android 5.0 makes it possible for animations to run when the state of a view changes. You can animate view state transitions by using one of the following techniques:

- Create drawables that animate state changes associated with a particular view. The new `AnimatedStateListDrawable` class lets you create drawables that display animations between view state changes.
- Define animation functionality that runs when the state of a view changes. The new `StateListAnimator` class lets you define an animator that runs when the state of a view changes.

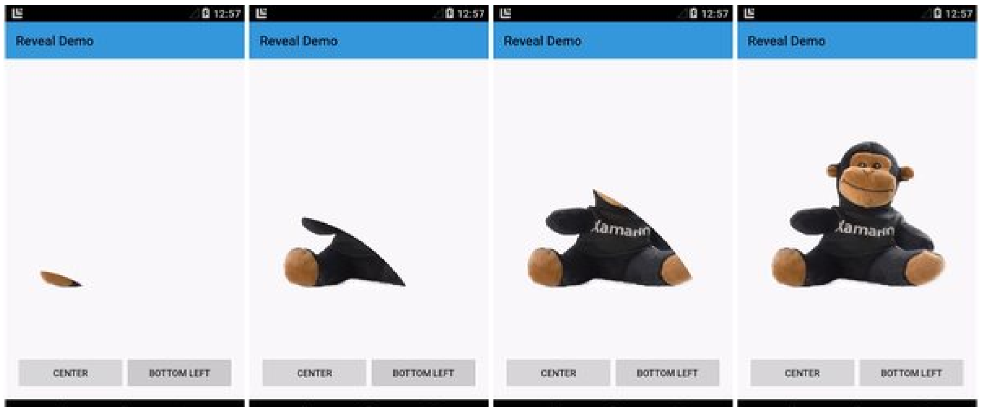
For more about view state transition animations in Android 5.0, see Animate View State Changes.

Reveal Effect

The *reveal effect* is a clipping circle that changes radius to reveal or hide a view. You can control this effect by setting the initial and final radius of the clipping circle. The following sequence of screenshots illustrates a reveal effect animation from the center of the screen:



The next sequence illustrates a reveal effect animation that takes place from the bottom left corner of the screen:



Reveal animations can be reversed; that is, the clipping circle can shrink to hide the view rather than enlarge to reveal the view.

For more information on the Android 5.0 reveal effect in, see Use the Reveal Effect.

Curved Motion

In addition to these animation features, Android 5.0 also provides new APIs that enable you to specify the time and motion curves of animations. Android 5.0 uses these curves to interpolate temporal and spatial movement during animations. Three curves are defined in Android 5.0:

- **Fast_out_linear_in** – Accelerates quickly and continues to accelerate until the end of the animation.
- **Fast_out_slow_in** – Accelerates quickly and slowly decelerates towards the end of the animation.
- **Linear_out_slow_in** – Begins with a peak velocity and slowly decelerates to the end of the animation.

You can use the new `PathInterpolator` class to specify how motion interpolation takes place. `PathInterpolator` is an interpolator that traverses animation paths according to specified control points and motion curves. For more information about how to specify curved motion settings in Android 5.0, see Use Curved Motion.

View Shadows & Elevation

In Android 5.0, you can specify the *elevation* of a view by setting a new `Z` property. A greater `Z` value causes the view to cast a larger shadow on the background, making the view appear to float higher above the background. You can set the initial elevation of a view by configuring its `elevation` attribute in the layout.

The following example illustrates the shadows cast by an empty `TextView` control when its elevation attribute is set to 2dp, 4dp, and 6dp, respectively:

View shadow settings can be static (as shown above) or they can be used in animations to make a view appear to temporarily rise above the view's background. You can use the `ViewPropertyAnimator` class to animate the elevation of a view. The elevation of a view is the sum of its layout `elevation` setting plus a `translationZ` property that you can set through a `ViewPropertyAnimator` method call.

For more about view shadows in Android 5.0, see Defining Shadows and Clipping Views.

Color Features

Android 5.0 provides two new features for managing color in apps:

- *Drawable tinting* lets you alter the colors of image assets by changing a layout attribute.
- *Prominent color extraction* makes it possible for you to dynamically customize your app's color theme to coordinate with the color palette of a displayed image.

Drawable Tinting

Android 5.0 layouts recognize a new `tint` attribute that you can use to set the color of drawables without having to create multiple versions of these assets to display different colors. To use this feature, you define a bitmap as an alpha mask and use the `tint` attribute to define the color of the asset. This makes it possible for you to create assets once and color them in your layout to match your theme.

In the following example, a single image asset—a white logo with a transparent background—is used to create tint variations:

This logo is displayed above a blue circular background as shown in the following examples. The image on the left is how the logo appears without a `tint` setting. In the center image, the logo's `tint` attribute is set to a dark gray. In the image on the right, `tint` is set to a light gray:

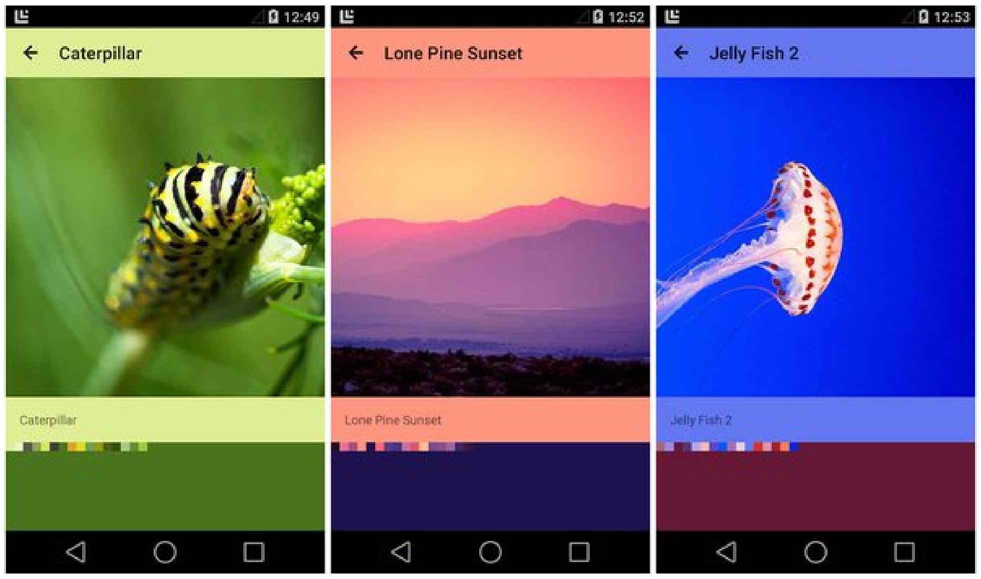
For more about drawable tinting in Android 5.0, see Drawable Tinting.

Prominent Color Extraction

The new Android 5.0 `Palette` class lets you extract colors from an image so that you can dynamically apply them to a custom color palette. The `Palette` class extracts six colors from an image and labels these colors according to their relative levels of color saturation and brightness:

- Vibrant
- Vibrant dark
- Vibrant light
- Muted
- Muted dark
- Muted light

For example, in the following screenshots, a photo viewing app extracts the prominent colors from the image on display and uses these colors to adapt the color scheme of the app to match the image:



In the above screenshots, the action bar is set to the extracted “vibrant light” color and the background is set to the extracted “vibrant dark” color. In each example above, a row of small color squares is included to illustrate the palette colors that were extracted from the image.

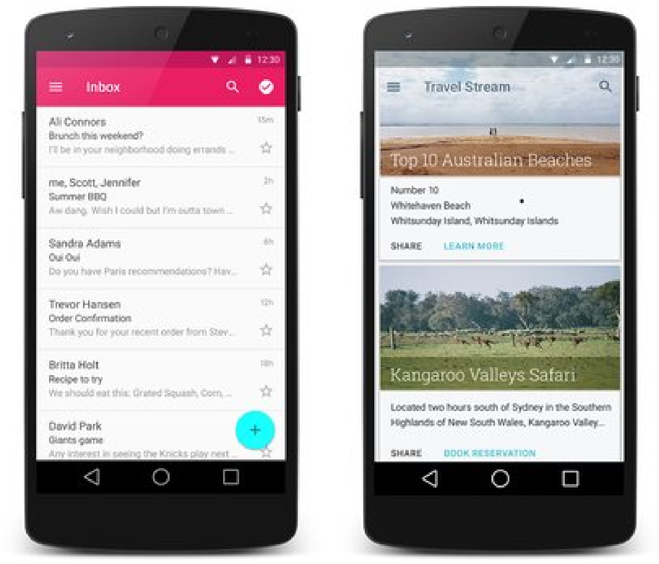
For more about color extraction in Android 5.0, see Extracting Prominent Colors from an Image.

New UI Widgets

Android 5.0 introduces two new UI widgets:

- `RecyclerView` – A view group that displays a list of scrollable items.
- `CardView` – A basic layout with rounded corners.

Both widgets include baked-in support for Material Theme features; for example, `RecyclerView` uses animations for adding and removing views, and `CardView` uses view shadows to make each card appear to float above the background. Examples of these new widgets are shown in the following screenshots:



Ali Connors 15m
Brunch this weekend?
I'll be in your neighborhood doing errands ...

me, Scott, Jennifer 2h
Summer BBQ
Aw dang. Wish I could but I'm outta town ...

Sandra Adams 6h
Oui Oui
Do you have Paris recommendations? Hav...

Trevor Hansen 12h
Order Confirmation
Thank you for your recent order from Stev...

Britta Holt 18h
Recipe to try
We should eat this: Grated Squash, Corn, ...

David Park
Giants game
Any interest in seeing the Knicks play next ...

Top 10 Australian Beaches
Number 10
Whitehaven Beach
Whitsunday Island, Whitsunday Islands

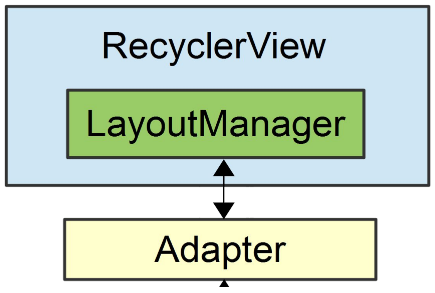
Kangaroo Valleys Safari
Located two hours south of Sydney in the Southern Highlands of New South Wales, Kangaroo Valley...

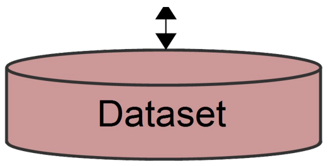
The screenshot on the left is an example of `RecyclerView` as used in an email app, and the screenshot on the right is an example of `CardView` as used in a travel reservation app.

RecyclerView

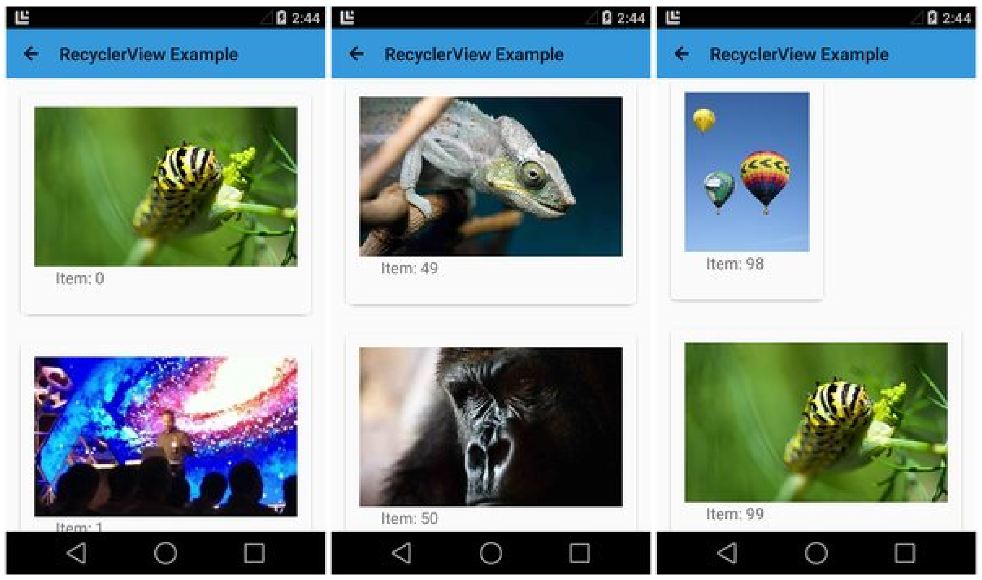
`RecyclerView` is similar to `ListView,` but it is better suited for large sets of views or lists with elements that change dynamically. Like `ListView,` you specify an adapter to access the underlying data set. However, unlike `ListView,` you use a *layout manager* to position items within `RecyclerView`. The layout manager also takes care of view recycling; it manages the reuse of item views that are no longer visible to the user.

When you use a `RecyclerView` widget, you must specify a `LayoutManager` and an adapter. As shown in this figure, `LayoutManager` is the intermediary between the adapter and the `RecyclerView`:

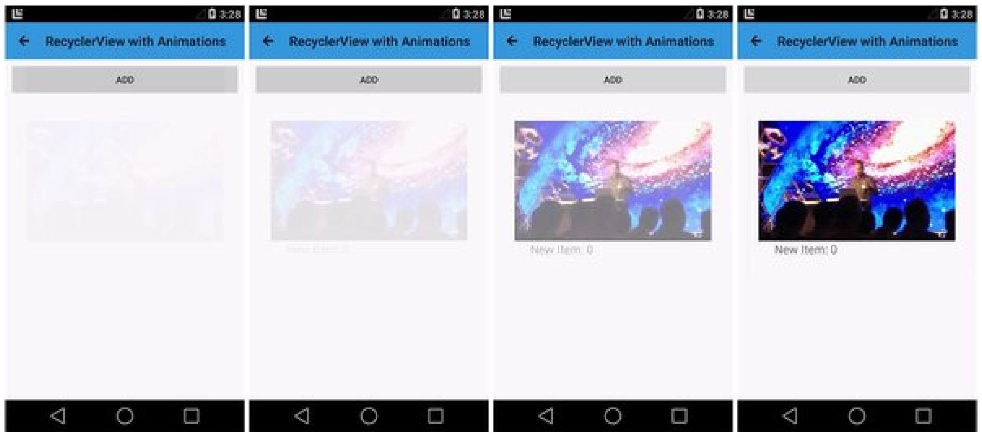




The following screenshots illustrate a `RecyclerView` that contains 100 items (each item consists of an `ImageView` and a `TextView`):



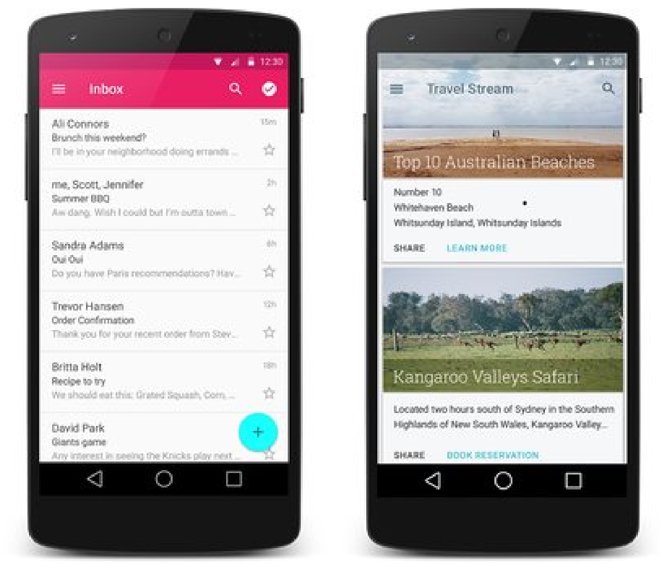
`RecyclerView` handles this large data set with ease—scrolling from the beginning of the list to end of the list in this sample app takes only a few seconds. `RecyclerView` also supports animations; in fact, animations for adding and removing items are enabled by default. When an item is added to a `RecyclerView`, it fades in as shown in this sequence of screenshots:



For more about `RecyclerView`, see RecyclerView.

CardView

`CardView` is a simple view that simulates a floating card with rounded corners. Because `CardView` has built-in view shadows, it provides an easy way for you to add visual depth to your app. The following screenshots show three text-oriented examples of `CardView`:

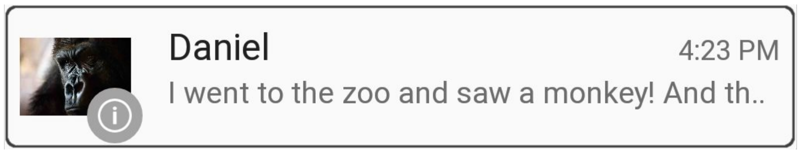

Inbox
Ali Connors
Brunch this weekend?
I'll be in your neighborhood doing errands ...
me, Scott, Jennifer
Summer BBQ
Aw dang. Wish I could but I'm outta town ...
Sandra Adams
Oui Oui
Do you have Paris recommendations? Hav...
Trevor Hansen
Order Confirmation
Thank you for your recent order from Stev...
Britta Holt
Recipe to try
We should eat this: Grated Squash, Corn, ...
David Park
Giants game
Any interest in seeing the Knicks play next ...
Travel Stream
Top 10 Australian Beaches
Number 10
Whitehaven Beach
Whitsunday Island, Whitsunday Islands
SHARE
LEARN MORE
Kangaroo Valleys Safari
Located two hours south of Sydney in the Southern Highlands of New South Wales, Kangaroo Valley...
SHARE
BOOK RESERVATION

Each of the cards in the above example contains a `TextView`; the background color is set via the `cardBackgroundColor` attribute.

For more about `CardView`, see CardView.

Enhanced Notifications

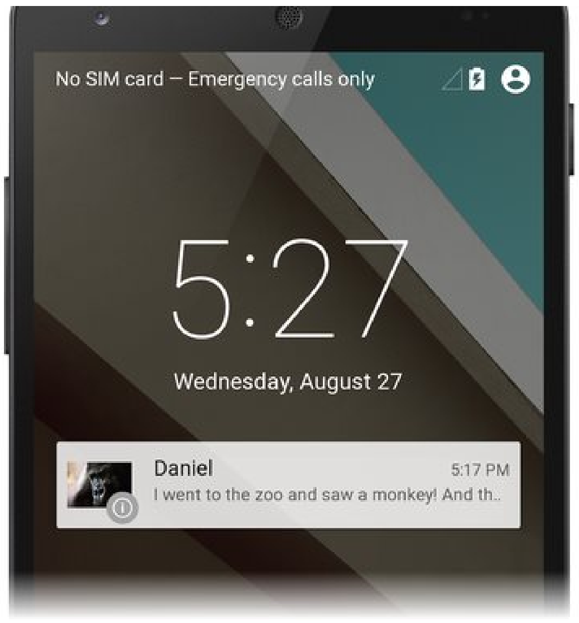
The notification system in Android 5.0 has been significantly updated with a new visual format and new features. Notifications have a new look in Android 5.0. For example, notifications in Android 5.0 now use dark text over a light background:



Daniel 4:23 PM
I went to the zoo and saw a monkey! And th..

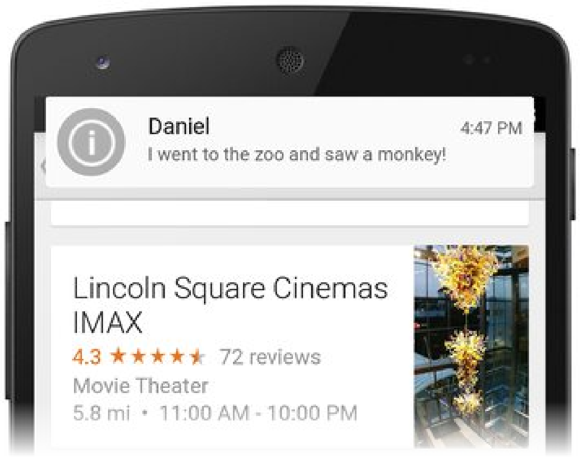
When a large icon is displayed in a notification (as shown in the above example), Android 5.0 presents the small icon as a badge over the large icon.

In Android 5.0, notifications can also appear on the device lockscreen. For example, here is an example screenshot of a lockscreen with a single notification:


No SIM card — Emergency calls only
5:27
Wednesday, August 27
Daniel
5:17 PM
I went to the zoo and saw a monkey! And th..

Users can double-tap a notification on the lockscreen to unlock the device and jump to the app that originated that notification, or swipe to dismiss the notification. Notifications have a new *visibility* setting that determines how much content can be displayed on the lockscreen. Users can choose whether to allow sensitive content to be shown in lockscreen notifications.

Android 5.0 introduces a new high-priority notification presentation format called *Heads-up*. Heads-up notifications slide down from the top of the screen for a few seconds and then retreat back to the notification shade at the top of the screen. Heads-up notifications make it possible for the system UI to put important information in front of the user without disrupting the currently running activity. The following example illustrates a simple Heads-up notification that displays on top of an app:


Daniel
4:47 PM
I went to the zoo and saw a monkey!
Lincoln Square Cinemas IMAX
4.3 ★★★★★ 72 reviews
Movie Theater
5.8 mi • 11:00 AM - 10:00 PM

Heads-up notifications are typically used for the following events:

- A new next message

- An incoming phone call
- Low battery indication
- An alarm

Android 5.0 displays a notification in Heads-up format only when it has a high or max priority setting.

In Android 5.0, you can provide notification metadata to help Android sort and display notifications more intelligently. Android 5.0 organizes notifications according to priority, visibility, and category. Notification categories are used to filter which notifications can be presented when the device is in *Do not disturb* mode.

For detailed information about creating and launching notifications with the latest Android 5.0 features, see Local Notifications.

New APIs

In addition to the new look-and-feel features described above, Android 5.0 adds new APIs that extend the capabilities of existing multimedia, storage, and wireless/connectivity functionality. Also, Android 5.0 includes new APIs that provide support for a new job scheduler feature.

Camera

Android 5.0 provides several new APIs for enhanced camera capabilities. The new `Android.Hardware.Camera2` namespace includes functionality for accessing individual camera devices connected to an Android device. Also, `Android.Hardware.Camera2` models each camera device as a pipeline: it accepts a capture request, captures the image, and then outputs the result. This approach makes it possible for apps to queue multiple capture requests to a camera device.

The following APIs make these new features possible:

- `CameraManager.GetCameraIdList` – Helps you to programmatically access camera devices; you use `CameraManager.OpenCamera` to connect to a specific camera device.
- `CameraCaptureSession` – Captures or streams images from the camera device. You implement a `CameraCaptureSession.CaptureListener` interface to handle new image capture events.
- `CaptureRequest` – Defines capture parameters.
- `CaptureResult` – Provides the results of an image capture operation.

For more about the new camera APIs in Android 5.0, see Media.

Audio Playback

Android 5.0 updates the `AudioTrack` class for better audio playback:

- `ENCODING_PCM_FLOAT` – Configures `AudioTrack` to accept audio data in floating-point format for better dynamic range, greater headroom, and higher quality (thanks to increased precision). Also, floating-point format helps to avoid audio clipping.
- `ByteBuffer` – You can now supply audio data to `AudioTrack` as a byte array.
- `WRITE_NON_BLOCKING` – This option simplifies buffering and multithreading for some apps.

For more about `AudioTrack` improvements in Android 5.0, see Media.

Media Playback Control

Android 5.0 introduces the new `Android.Media.MediaController` class, which replaces `RemoteControlClient`. `Android.Media.MediaController` provides simplified transport control APIs and offers thread-safe control of playback outside of the UI context. The following new APIs handle transport control:

- `Android.Media.Session.MediaSession` – A media control session that handles multiple controllers. You call `MediaSession.GetSessionToken` to request a token that your app uses to interact with the session.
- `MediaController.TransportControls` – Handles transport commands such as Play, Stop, and Skip.

Also, you can use the new `Android.App.Notification.MediaStyle` class to associate a media session with rich notification content (such as extracting and showing album art).

For more about the new media playback control features in Android 5.0, see Media.

Storage

Android 5.0 updates the Storage Access Framework to make it easier for applications to work with directories and documents:

- To select a directory subtree, you can build and send an `Android.Intent.Action.OPEN_DOCUMENT_TREE` intent. This intent causes the system to display all provider instances that support subtree selection; the user then browses and selects a directory.
- To create and manage new documents or directories anywhere under a subtree, you use the new `CreateDocument`, `RenameDocument`, and `DeleteDocument` methods of `DocumentsContract`.

- To get paths to media directories on all shared storage devices, you call the new `Android.Content.Context.GetExternalMediaDirs` method.

For more about new storage APIs in Android 5.0, see Storage.

Wireless & Connectivity

Android 5.0 adds the following API enhancements for wireless and connectivity:

- New *multi-network* APIs that make it possible for apps to find and select networks with specific capabilities before making a connection.
- Bluetooth broadcasting functionality that enables an Android 5.0 device to act as a low-energy Bluetooth peripheral.
- NFC enhancements that make it easier to use near-field communications functionality for sharing data with other devices.

For more about the new wireless and connectivity APIs in Android 5.0, see Wireless and Connectivity.

Job Scheduling

Android 5.0 introduces a new `JobScheduler` API that can help users minimize battery drain by scheduling certain tasks to run only when the device is plugged in and charging. This job scheduler feature can also be used for scheduling a task to run when conditions are more suitable to that task, such as downloading a large file when the device is connected over a Wi-Fi network instead of a metered network.

For more about the new job scheduling APIs in Android 5.0, see Scheduling Jobs.

Summary

This article provided an overview of important new features in Android 5.0 for Xamarin.Android app developers:

- Material Theme
- Animations
- View shadows and elevation
- Color features, such as drawable tinting and prominent color extraction
- The new `RecyclerView` and `CardView` widgets
- Notification enhancements

- New APIs for camera, audio playback, media control, storage, wireless/connectivity, and job scheduling

If you are new to Xamarin Android development, read Setup and Installation to help you get started with Xamarin.Android. Hello, Android is an excellent introduction for learning how to create Android projects.