

# Jetpack Software Components

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## Foundation Components

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**Foundation Components** are a set of core system components for Android Applications which include Kotlin language support, Testing utilities, and backwards compatibility support.

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## AppCompat

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The **AppCompat** (Appcompat/appcompat) library contains key components for building Android Applications such as:

**App Bars** ([Compose View](#), [Android View](#))

**Navigation Drawers** ([Compose View](#), [Android View](#))

**Permissions** ([Requesting](#), [Declaring](#))

**Resources** ([Compose View](#), [Android View](#))

**Dialog Boxes** ([Compose View](#), [Android View](#)) **Share Actions** ([Simple Data](#), [ShareActionProvider](#))

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## Android KTX

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The **Android KTX** library contains **Extension functions**, **Extension properties**, **Lambdas**, **Named parameters**, **Parameter default values**, and **Coroutines** some of the modules include:

**Fragment KTX** ([Android Documentation](#))

**Lifecycle KTX** ([Android Documentation](#))

**Navigation KTX** ([Navigation KTX](#))

**Room KTX** ([Android Documentation](#))

**ViewModel KTX** ([Android Documentation](#))

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## Test

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The **Test** library includes:

**Espresso UI** for UI testing ([Android Documentation](#))

**AndroidJUnitRunner** for unit testing ([Android Documentation](#))

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## Multidex

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**Multidex** allows applications to be split across multiple *Dex* (executable) files which makes it possible to run larger applications (containing more than 65,536 methods) within the Android virtual machine (*Dalvik*) on devices running Android versions before Lollipop.

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## Architecture Components

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**Architecture Components** are libraries that make it easier for developers to deal with changes to data and lifecycles and local storage. They include tools for things like data binding, paging, navigation, and abstraction for local SQLite databases.

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## Room

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**Room** provides an abstraction layer for SQLite and is used for persisting local data. It gives developers compile-time verification of SQL queries, annotations that minimize boilerplate code, and database migration paths. It requires an, **Entity** (Model), **DAO** (Data Access Object/Service), and a **Database** (instance of a Room DB).

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## WorkManager

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**WorkManager** is an API for scheduling asynchronous tasks (single execution or repeatable) that will run even when the application is exits or if the device restarts when certain Work Constraints are met.

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## Lifecycle

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**Lifecycle** allows developers to create lifecycle-aware components such as Activities, Fragments, and ViewModels.

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## ViewModel

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**ViewModel** allows developers to store and manage UI-related data with actions scoped to component lifecycles and persists data through configuration changes. It also makes it easy to share data across Fragments and Composables.

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## LiveData

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**LiveData** is a lifecycle-aware data holder Class that implements the observable pattern which ensures that components observers are only updated when in an active lifecycle state.

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## Navigation

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**Navigation** contains a set of tools for implementing application navigation. It requires a **Navigation graph**, **NavHost**, and **NavController** and handles things like fragment transactions, standardized resources, and deep linking and provides a scope for ViewModels.

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## Paging

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**Paging** is a library which eases the loading, caching, and display of pages of information from large datasets from local and remote storage.

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## Data Binding

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**Data Binding** is a support library for binding UI components in layouts to application data sources in a declarative format.

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## Behavior Components

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**Behavior Components** are libraries that handle user interaction with an application through the UI. They include tools for things like notifications, downloading, permissions, sharing, and the Google assistant.

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## DownloadManager

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**DownloadManager** is a system service that handles long-running/large HTTP downloads in a background process.

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## Media & Playback

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**Media & Playback** represents a set of libraries for playing audio and video with support for backwards-compatibility which include:

**Media3** ([Android Documentation](#))

**Media2** ([Android Documentation](#))

**Media** ([Android Documentation](#))

**ExoPlayer** ([ExoPlayer Documentation](#))

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## Permissions

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**Permissions** are a set of systems used to grant applications permission to access restricted data and actions by either declaring permissions in the Android Manifest or by requesting them at runtime. Types of permissions include:

**Normal Permissions**, *Low Risk* ([Android Documentation](#))

**Signature Permissions**, *App Specific* ([Android Documentation](#))

**Runtime Permissions**, *High Risk* ([Android Documentation](#))

**Special Permissions**, *Platform/OEM Specific* ([Android Documentation](#))

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## Notifications

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**Notifications** libraries provide a way to use push notifications and assign special system actions to notifications like vibrations, sounds, and status bar icons.

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## Sharing

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**Sharing** provides a way to share data with other applications through Intent.

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## Slices

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**Slices** are UI templates that can display interactive content from an application inside other applications like Google Search and Google Assistant.

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## UI Components

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**UI Components** are a set of libraries which deal with UI and contain widgets, layouts, animations, palettes, and emojis, as well as support for driving mode, Android TV, and Wear OS.

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## Animation & Transition

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**Animation & Transition** provides a framework of APIs for animations, enter/exit transitions, physics, transformations, and keyframes.

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## Auto

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**Auto** provides an optimized experience for vehicle displays and drivers using either Android Auto or Android Automotive OS and supports apps categories such as media, messaging, navigation, parking, and charging.

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## Emoji

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**Emoji** (*EmojiCompat*) gives developers a library for backwards-compatibility support of Emojis by using a `CharSequence` and replaces Unicode sequences with an `EmojiSpan` if a device is running a version of Android that does not support the particular sequence.

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## Fragment

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**Fragment** is a support Class that allows for the separation of UI components for modularity and reusability within an Activity.

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## Layout

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**Layout** can either be defined as an XML resource file that contains ViewGroups and Views or as a Composable function which can accept child Composables as an argument.

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## Palette

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**Palette** is a support library that takes prominent colors from images (*Bitmap*) to aid in the creation and design of layout themes and custom colors.

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## TV

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**TV** provides a way for developers to create applications optimized for devices for large screens like TVs.

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## Wear

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**Wear** provides a set of libraries for creating Wear OS applications.