Android dependency injection framework

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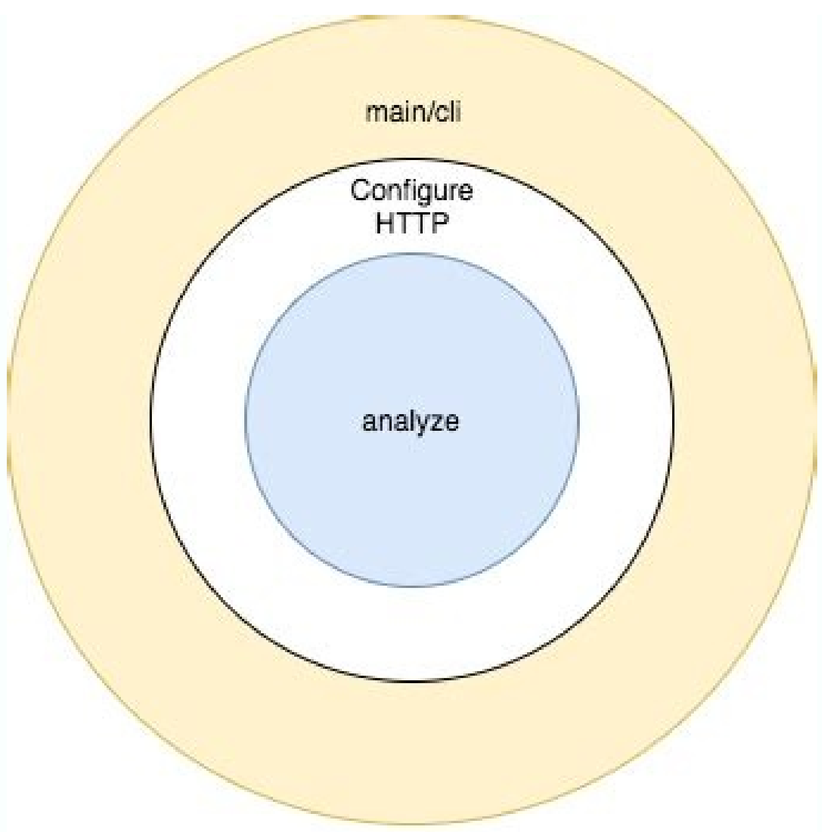

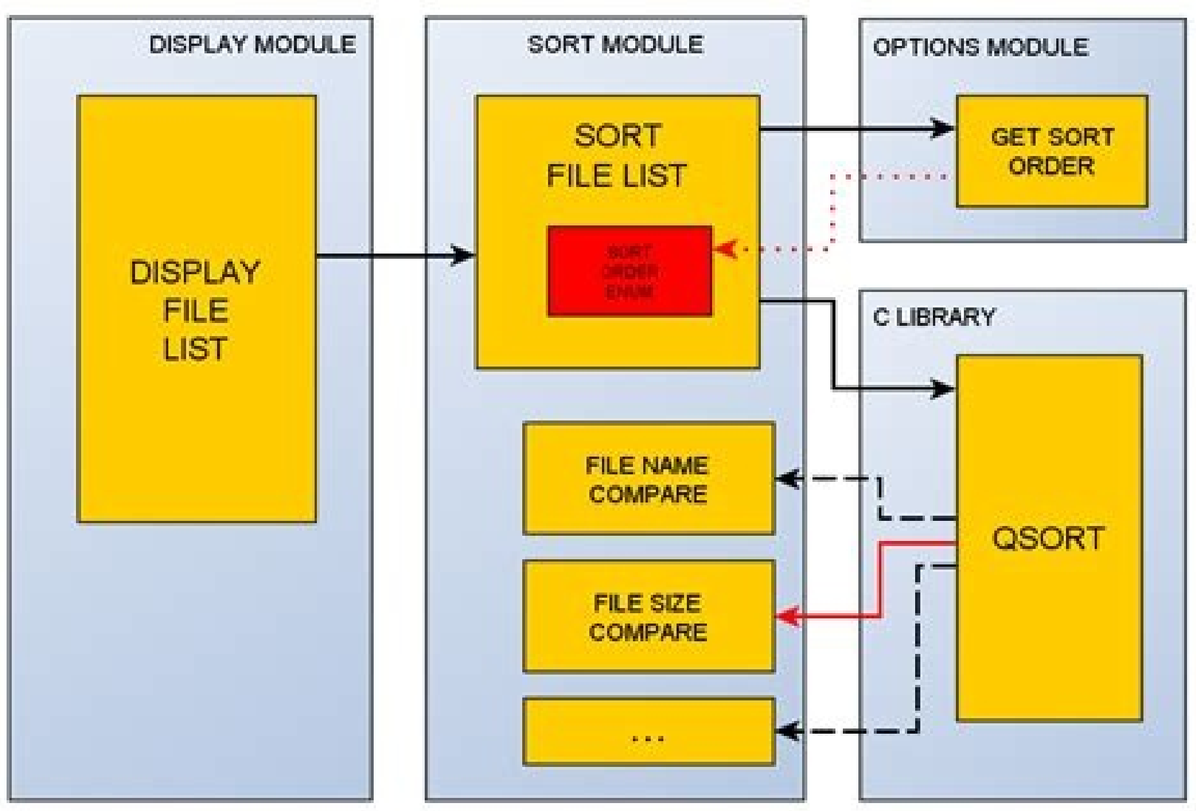

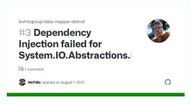

Why use dependency injection framework. Dependency injection in android example. Android dependency injection without framework. Why we use dependency injection in android. Android what is dependency injection. Best android dependency injection framework.

Dagger is a fully static, compile-time dependency injection framework for Java, Kotlin, and Android. It is an adaptation of an earlier version created by Square and now maintained by Google. The latest Dagger release is: Dagger 2.44 Dagger aims to address many of the development and performance issues that have plagued reflection-based solutions. More details can be found in this talk (slides) by Gregory Kick. Where are the docs? User documentation Dagger API @ HEAD Where is the code? Have a question? As a software developer, we have come across a Dependency Injection term many times in our regular life. Regardless of which technology you are working on but you have to implement Dependency Injection in your project. It will help you to write a code that provides the following advantages.Reusability of codeEase of refactoringEase of testingMake your architecture loosely coupledSo let’s dig deep into Dependency Injection and understand how it gives so many benefits to the mobile app development company and entrepreneurs alike.First, we break the word Dependency Injection and try to understand the meaning of words.srcA dependency is an object which is to be used by a dependent i.e class.An injection is a technique that passes the dependency to dependent i.e Object to a class that wants to use it.So Dependency Injection is a technique that makes dependent i.e class independent of its dependencies. In this article, we are focusing on the Android Platform. Let’s take a real-time example and understand the whole concept.srcWe create a class named Car. In that, we need an object of Engine class and Steering class. Let’s first implement this scenario in a traditional way without using Dependency Injection.Without using dependency injectionThis code does not follow the principle of Dependency Injection because of the following reasons:Here Car class constructing its own Engine and Staring objects. This our code is tightly coupled. So if we want to change the Steering type from normal to power steering, you have to create two types of Car.Hard dependency on Steering and Engine makes testing more difficult, because of Car use the real instance of Engine and Steering, thus preventing you to do Unit Testing because of its use real object of Engine and Steering we can not modify objects for testing in different cases.Not an easy task to maintain this type of code because no subclasses or alternative implementations can be easily used.We have two approaches to solve this issue. In both methods we are trying to make our code loosely coupled. For that, we are removing the dependency of the Engine and Steering class from the Car class. To achieve this, let’s look into the following methods:In this, we are passing the dependencies by the constructor so our Car object does not depend upon Engine or Staring.With the use of the Constructor Injection dependency injection2. Field Injection (or Setter Injection)In Android, we have certain Android framework classes like activity or fragment which instantiated by the system, so constructor injection is not possible. So we are using Field Injection in which dependencies are instantiated after the class is created.With the use of the Field Injection dependency injectionWe can see this code is much more maintainable and loosely coupled. This is called dependency injection by hand, or manual dependency injection.But this small example. Real Car depends on many other classes like Sheets, Shape, Windows and many more. If we try to fit all this class dependancy manually than its more tedious work and you face the following problems.In the real world app, taking all the dependency and connecting them correctly is required lots of effort and a large amount of boilerplate code.If you want to create an object in the top layer, you have to provide all the dependency on their lower-level classes.In some cases, we are not able to construct dependencies before passing them into the target class which requires those dependencies. For Example if you are using lazy initializations than you need to manage custome containers, that maintain lifetimes of your dependencies in memory.To solve all these problems we have several libraries which can help us to solve all the above problems.This is available for java and kotlin both.2. KoinThis is a special design for Kotlin and supports only available for kotlin.In the next article, we are going deep in Dagger and Koin and make our hand dirty by implementing in our code. We will also find the pros and cons of both libraries.That’s all for this blog, we have understood what is dependency injection and why we need that and type of dependency injection. Thank you for giving your time.Happy Reading :) One of the primary advantages of Dagger 2 over most other dependency injection frameworks is that its strictly generated implementation (no reflection) means that it can be used in Android applications. However, there are still some considerations to be made when using Dagger within Android applications. Philosophy While code written for Android is Java source, it is often quite different in terms of style. Typically, such differences exist to accomodate the unique performance considerations of a mobile platform. But many of the patterns commonly applied to code intended for Android are contrary to those applied to other Java code. Even much of the advice in Effective Java is considered inappropriate for Android. In order to achieve the goals of both idiomatic and portable code, Dagger relies on ProGuard to post-process the compiled bytecode. This allows Dagger to emit source that looks and feels natural on both the server and Android, while using the different toolchains to produce bytecode that executes efficiently in both environments. Moreover, Dagger has an explicit goal to ensure that the Java source that it generates is consistently compatible with ProGuard optimizations. Of course, not all issues can be addressed in that manner, but it is the primary mechanism by which Android-specific compatibility will be provided. tl;dr Dagger assumes that users on Android will use R8 or ProGuard. Why Dagger on Android is hard One of the central difficulties of writing an Android application using Dagger is that many Android framework classes are instantiated by the OS itself, like Activity and Fragment, but Dagger works best if it can create all the injected objects. Instead, you have to perform members injection in a lifecycle method. This means many classes end up looking like: public class FrombulationActivity extends Activity { @Inject Frombulator frombulator; @Override public void onCreate(Bundle savedInstanceState) { super.onCreate(savedInstanceState); // DO THIS FIRST. Otherwise frombulator might be null! ((SomeApplicationBaseType) getContext().getApplicationContext()) .getApplicationComponent() .newActivityComponentBuilder() .activity(this) .build() .inject(this); // ... now you can write the exciting code } } This has a few problems: Copy-pasting code makes it hard to refactor later on. As more and more developers copy-paste that block, fewer will know what it actually does. More fundamentally, it requires the type requesting injection (FrombulationActivity) to know about its injector. Even if this is done through interfaces instead of concrete types, it breaks a core principle of dependency injection: a class shouldn’t know anything about how it is injected. dagger.android The classes in dagger.android offer one approach to simplify the above problems. This requires learning some extra APIs and concepts but gives you reduced boilerplate and injection in your Android classes at the right place in the lifecycle. Another approach is to just use the normal Dagger APIs and follow guides such as the one here. This may be simpler to understand but comes with the downside of having to write extra boilerplate manually. The Jetpack and Dagger teams are working together on a new initiative for Dagger on Android that hopes to be a large shift from the current status quo. While it is unfortunately not ready yet, this may be something to consider when choosing how to use Dagger in your Android projects today. Injecting Activity objects Install AndroidInjectionModule in your application component to ensure that all bindings necessary for these base types are available. Start off by writing a @Subcomponent that implements AndroidInjector, with a @Subcomponent.Factory that extends AndroidInjector.Factory: @Subcomponent(modules = ...) public interface YourActivitySubcomponent extends AndroidInjector { @Subcomponent.Factory public interface Factory extends AndroidInjector.Factory {} } After defining the subcomponent, add it to your component hierarchy by defining a module that binds the subcomponent factory and adding it to the component that injects your Application: @Module(subcomponents = YourActivitySubcomponent.class) abstract class YourActivityModule { @Binds @IntoMap @ClassKey(YourActivity.class) abstract AndroidInjector.Factory bindYourAndroidInjectorFactory(YourActivitySubcomponent.Factory factory); } @Component(modules = {..., YourActivityModule.class}) interface YourApplicationComponent { void inject(YourApplication application); } Pro-tip: If your subcomponent and its factory have no other methods or supertypes other than the ones mentioned in step #2, you can use @ContributesAndroidInjector to generate them for you. Instead of steps 2 and 3, add an abstract module method that returns your activity, annotate it with @ContributesAndroidInjector, and specify the modules you want to install into the subcomponent. If the subcomponent needs scopes, apply the scope annotations to the method as well. @ActivityScope @ContributesAndroidInjector(modules = { /* modules to install into the subcomponent */ }) abstract YourActivity contributeYourAndroidInjector(); Next, make your Application implement HasAndroidInjector and @Inject a DispatchingAndroidInjector to return from the androidInjector() method: public class YourApplication extends Application implements HasAndroidInjector { @Inject DispatchingAndroidInjector dispatchingAndroidInjector; @Override public void onCreate() { super.onCreate(); DaggerYourApplicationComponent.create() .inject(this); } @Override public AndroidInjector androidInjector() { return dispatchingAndroidInjector; } } Finally, in your Activity.onCreate() method, call AndroidInjection.inject(this) before calling super.onCreate();: public class YourActivity extends Activity { public void onCreate(Bundle savedInstanceState) { AndroidInjection.inject(this); super.onCreate(savedInstanceState); } } Congratulations! How did that work? AndroidInjection.inject() gets a DispatchingAndroidInjector from the Application and passes your activity to inject(Activity). The DispatchingAndroidInjector looks up the AndroidInjector.Factory for your activity’s class (which is YourActivitySubcomponent.Factory), creates the AndroidInjector (which is YourActivitySubcomponent), and passes your activity to inject(YourActivity). Injecting Fragment objects Injecting a Fragment is just as simple as injecting an Activity. Define your subcomponent in the same way. Instead of injecting in onCreate() as is done for Activity types, inject Fragments to in onAttach(). Unlike the modules defined for Activitys, you have a choice of where to install modules for Fragments. You can make your Fragment component a subcomponent of another Fragment component, an Activity component, or the Application component — it all depends on which other bindings your Fragment requires. After deciding on the component location, make the corresponding type implement HasAndroidInjector (if it doesn’t already). For example, if your Fragment needs bindings from YourActivitySubcomponent, your code will look something like this: public class YourActivity extends Activity implements HasAndroidInjector { @Inject DispatchingAndroidInjector androidInjector; @Override public void onCreate(Bundle savedInstanceState) { AndroidInjection.inject(this); super.onCreate(savedInstanceState); // ... } @Override public AndroidInjector androidInjector() { return androidInjector; } } public class YourFragment extends Fragment { @Inject SomeDependency someDep; @Override public void onAttach(Activity activity) { AndroidInjection.inject(this); super.onAttach(activity); // ... } } @Subcomponent(modules = ...) public interface YourFragmentSubcomponent extends AndroidInjector { @Subcomponent.Factory public interface Factory extends AndroidInjector.Factory {} } @Module(subcomponents = YourFragmentSubcomponent.class) abstract class YourFragmentModule { @Binds @IntoMap @ClassKey(YourFragment.class) abstract AndroidInjector.Factory bindYourFragmentInjectorFactory(YourFragmentSubcomponent.Factory factory); } @Subcomponent(modules = { YourFragmentModule.class, ... } public interface YourActivityOrYourApplicationComponent { ... } Base Framework Types Because DispatchingAndroidInjector looks up the appropriate AndroidInjector.Factory by the class at runtime, a base class can implement HasAndroidInjector as well as call AndroidInjection.inject(). All each subclass needs to do is bind a corresponding @Subcomponent. Dagger provides a few base types that do this, such as DaggerActivity and DaggerFragment, if you don’t have a complicated class hierarchy. Dagger also provides a DaggerApplication for the same purpose — all you need to do is to extend it and override the applicationInjector() method to return the component that should inject the Application. The following types are also included: Note: DaggerBroadcastReceiver should only be used when the BroadcastReceiver is registered in the AndroidManifest.xml. When the BroadcastReceiver is created in your own code, prefer constructor injection instead. Support libraries For users of the Android support library, parallel types exist in the dagger.android.support package. TODO(ronshapiro): we should begin to split this up by androidx packages How do I get it? Add the following to your build.gradle: dependencies { implementation 'com.google.dagger:dagger-android:2.x' implementation 'com.google.dagger:dagger-android-support:2.x' // if you use the support libraries annotationProcessor 'com.google.dagger:dagger-android-processor:2.x' annotationProcessor 'com.google.dagger:dagger-compiler:2.x' } When to inject Constructor injection is preferred whenever possible because javac will ensure that no field is referenced before it has been set, which helps avoid NullPointerExceptions. When members injection is required (as discussed above), prefer to inject as early as possible. For this reason, DaggerActivity calls AndroidInjection.inject() immediately in onCreate(), before calling super.onCreate(), and DaggerFragment does the same in onAttach(), which also prevents inconsistencies if the Fragment is reattached. It is crucial to call AndroidInjection.inject() before super.onCreate() in an Activity, since the call to super attaches Fragments from the previous activity instance during configuration change, which in turn injects the Fragments. In order for the Fragment injection to succeed, the Activity must already be injected. For users of ErrorProne, it is a compiler error to call AndroidInjection.inject() after super.onCreate(). FAQ Scoping AndroidInjector.Factory AndroidInjector.Factory is intended to be a stateless interface so that implementors don’t have to worry about managing state related to the object which will be injected. When DispatchingAndroidInjector requests a AndroidInjector.Factory, it does so through a Provider so that it doesn’t explicitly retain any instances of the factory. Because some implementations may retain an instance of the Activity/Fragment/etc that is being injected, it is a compile-time error to apply a scope to the methods which provide them. If you are positive that your AndroidInjector.Factory does not retain an instance to the injected object, you may suppress this error by applying @SuppressWarnings("dagger.android.ScopedInjectorFactory") to your module method.

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