What is dependency injection?

Supplying the dependencies an object requires when creating it.

Without Dependency Injection

```
class Car {
    private val frame: Frame = Frame()
    private val wheels: Wheels = Wheels()
    private val engine: Engine = RocketEngine()

    private fun startEngine() = engine.start()
}
```

With Dependency Injection

```
class Car(private val frame: Frame,
     private val wheels: Wheels,
     private val engine: Engine){

    private fun startEngine = engine.start()
}
```

Instantiation Example

Without

```
val car: Car = Car()
```

With

```
val car: Car =
    Car(Frame(),
    Engine(), Wheels())
```

Why Use Dependency Injection?

Class reusability

Easier to maintain

Easier to test

Cleaner architecture

What is Dagger2?

Dagger2 is a dependency injection library;
a fork of the original Dagger developed by Square.

It is open source and maintained by Google.

Why Use Dagger2?

Dagger allows us to easily scope dependencies; binding single instances to certain lifecycles of our application

When building our dependencies, we only need to construct them once with Dagger. Dagger also resolves large dependency graphs easily.

Unlike it’s predecessor and other dependency injection libraries, Dagger2 will generate all of its code at compile time

Constructor Injection With and Without Dagger

Without

```
fun buildCar(): Car =
     Car(SturdyFrame(),
     Wheels(),
     RocketEngine())
```

With

```
fun buildCar(): Car =
     DaggerAppComponent
     .builder()
     .build()
     .buildCar()
```

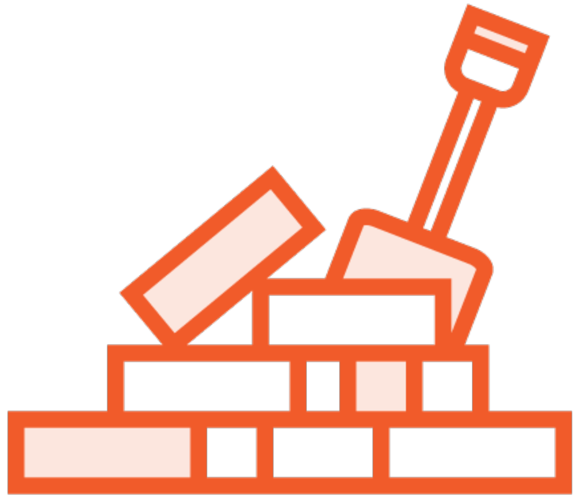
Field Injection Without Dagger

```
class SomeActivity : AppCompatActivity() {

    private val db: DbRepo = DbRepository.get()
    private val client: OkHttpClient = OkHttpClient
            .Builder()
            .cache(Cache(cacheDir, 5 * 1024 * 1024))
            .build()

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
    }
}
```

Field Injection With Dagger

```
class SomeActivity : AppCompatActivity() {

    @Inject lateinit var db: DbRepo
    @Inject lateinit var client: OkHttpClient

    override fun onCreate(savedInstanceState: Bundle?) {
        DaggerAppComponent
                .builder()
                .build()
                .injectActivity(this)
        super.onCreate(savedInstanceState)
    }
}
```

The Two Building Blocks of Dagger2



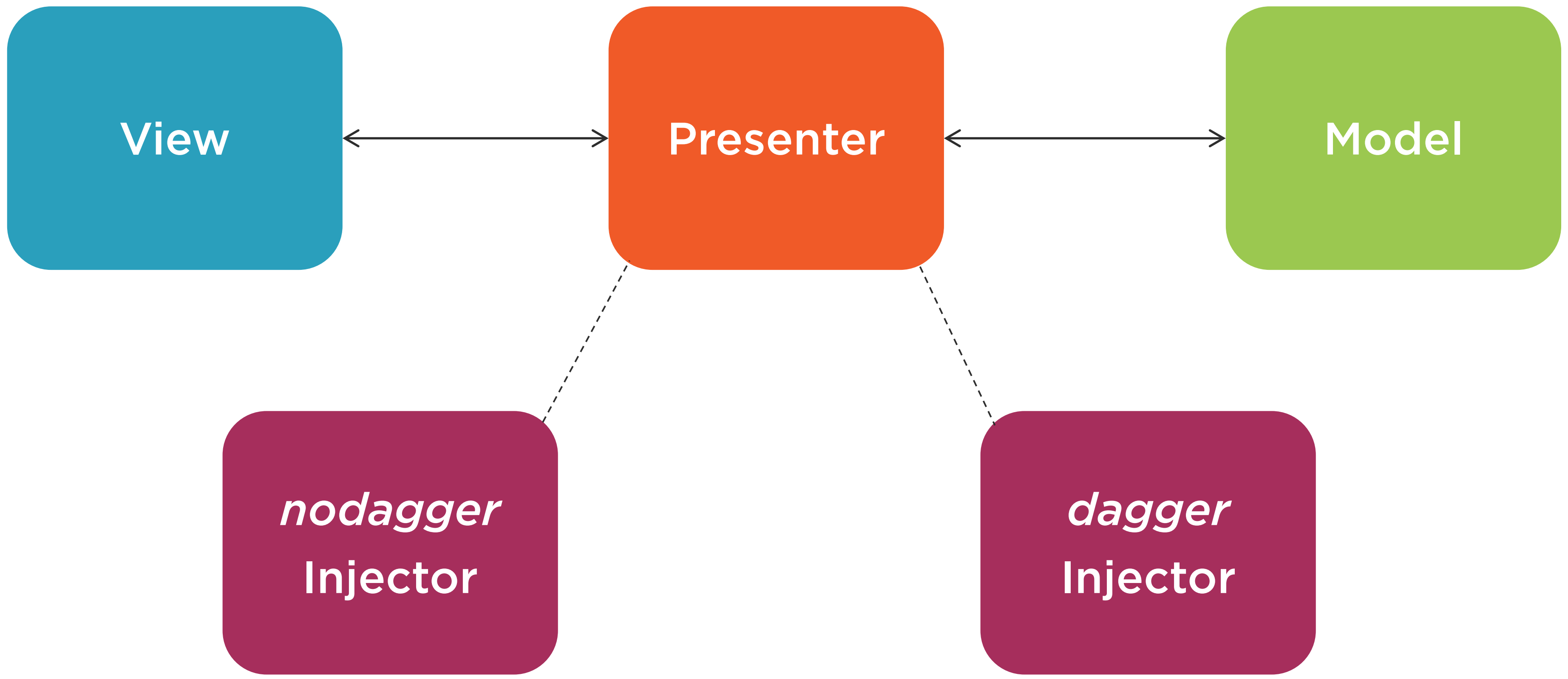
Modules

Responsible for building dependencies

Components

Responsible for holding our dependencies (modules)

Sample App Overview



Summary

Dependency Injection

- How it works
- Field vs Constructor injection

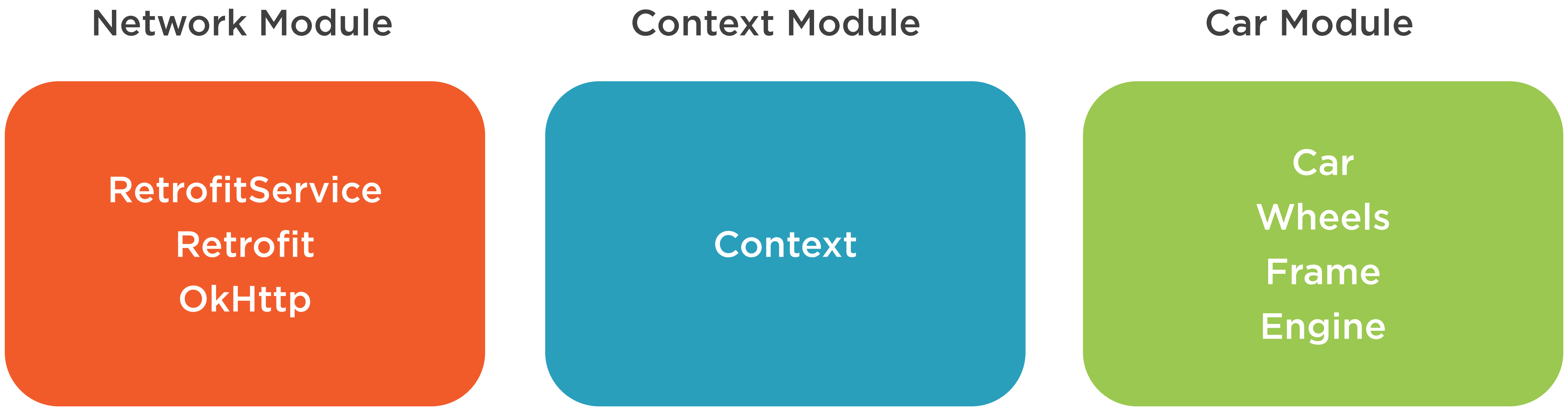
Dagger2

- Helps with DI

What is a module?

In simple terms, Modules in Dagger are responsible for *providing* objects which we want to inject. They contain methods which return said objects

Visualizing Modules



Visualizing Modules

Network Module

These dependencies can now be injected…

RetrofitService
Retrofit
OkHttp

…into other classes in our project.

Your First Module

```
class EngineModule {


}
```

Your First Module

```
@Module
class EngineModule {



}
```

Your First Module

```
@Module
class EngineModule {


      fun provideEngine(): Engine = Engine()
}
```

Your First Module

```
@Module
class EngineModule {

      @Provides
      fun provideEngine(): Engine = Engine()
}
```

A More Complex Module

```
@Module
class CarModule {

     @Provides
     fun provideEngine(): Engine = Engine()

     @Provides
     fun provideFrame(): Frame = Frame()

     @Provides
     fun provideWheels(): Wheels = Wheels()




   }
}
```

A More Complex Module

```
@Module
class CarModule {

      @Provides
      fun provideEngine(): Engine = Engine()

      @Provides
      fun provideFrame(): Frame = Frame()

      @Provides
      fun provideWheels(): Wheels = Wheels()

      @Provides
      fun provideCar(engine: Engine, wheels: Wheels, frame: Frame): Car{
        return Car(frame, wheels, engine)
    }
}
```

A *Lesser* Complex Module

```
@Module
class CarModule {

      @Provides
      fun provideCar(): Car{
        return Car(Frame(), Wheels(), Engine())
    }
}
```

Including Modules

```
@Module
class CarModule {

      @Provides
      fun provideFrame(): Frame = Frame()

      @Provides
      fun provideWheels(): Wheels = Wheels()

      @Provides
      fun provideCar(engine: Engine, wheels: Wheels, frame: Frame): Car{
        return Car(frame, wheels, engine)
    }
}
```

Including Modules

```
@Module(includes = [EngineModule::class])
class CarModule {

      @Provides
      fun provideFrame(): Frame = Frame()

      @Provides
      fun provideWheels(): Wheels = Wheels()

      @Provides
      fun provideCar(engine: Engine, wheels: Wheels, frame: Frame): Car{
        return Car(frame, wheels, engine)
    }
}
```

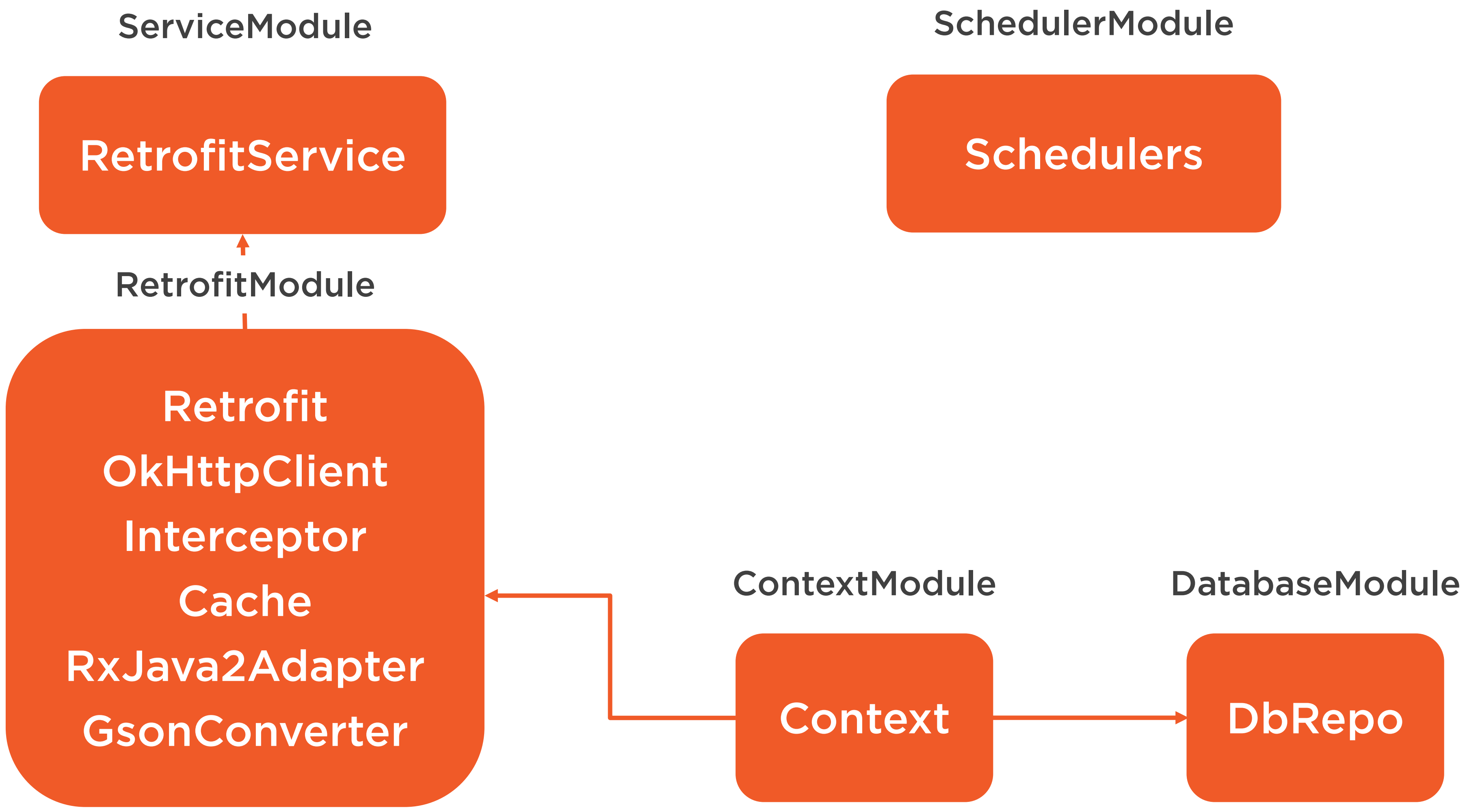
External Dependencies

```
@Module
class CacheModule {

      @Provides
      fun provideCache(context: Context): Cache =
            Cache(context.cacheDir, 5 * 5 * 1014)

}
```

External Dependencies

```
@Module
class ContextModule(val context: Context) {

      @Provides
      fun provideContext(): Context = context
}
```

Building Our Modules



Summary

Modules

- What they are
- How to create them
- Including modules in modules

What is a Component

A component is used for *holding* our modules. We include modules, which provide dependencies, inside a component. Doing this makes our dependencies accessible via our component.

Visualizing a Component

Network Module

RetrofitService
Retrofit
OkHttp

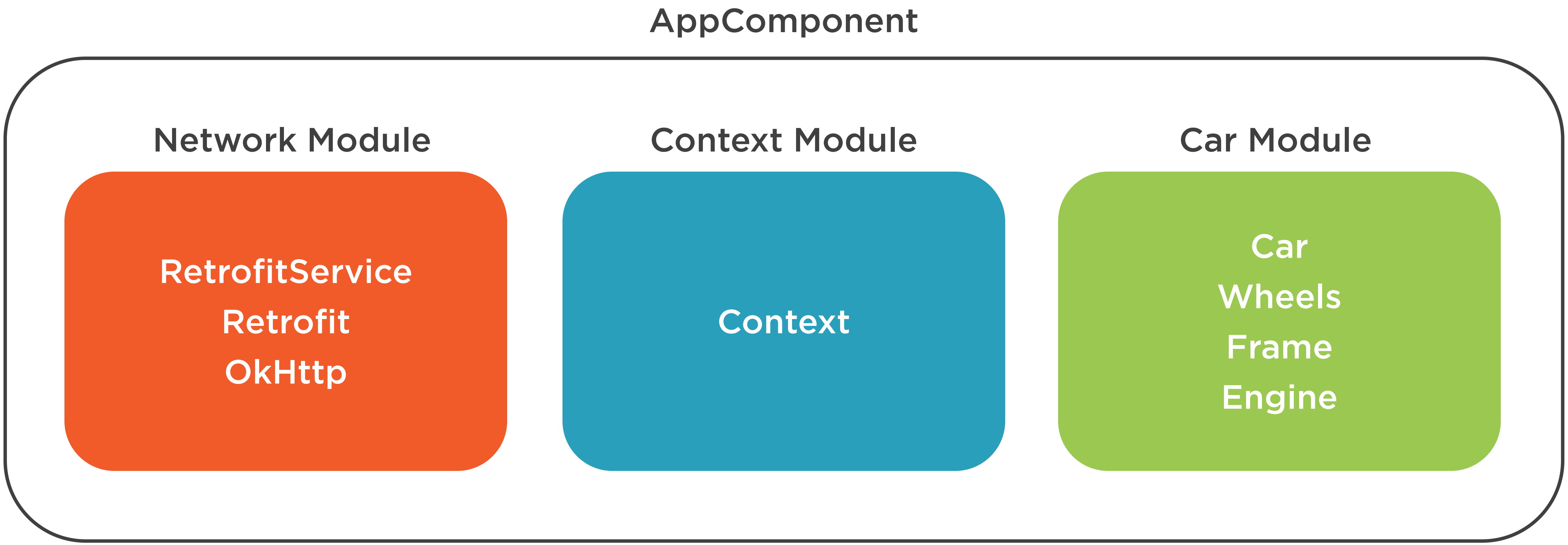
Context Module

Context

Car Module

Car
Wheels
Frame
Engine

Visualizing a Component



Building a Component

```
interface AppComponent {

}
```

Building a Component

```
@Component
interface AppComponent {


}
```

Building a Component

```
@Component(modules = [NetworkModule::class, ContextModule::class,
CarModule::class])
interface AppComponent {


}
```

Returning Single Dependencies

```
@Component(modules = [NetworkModule::class, ContextModule::class,
CarModule::class])
interface AppComponent {

      fun okHttpClient(): OkHttpClient

}
```

Returning Single Dependencies

```
@Component(modules = [NetworkModule::class, ContextModule::class,
CarModule::class])
interface AppComponent {

      fun okHttpClient(): OkHttpClient

      fun retrofitService(): RetrofitService

      fun car(): Car
}
```

Returning Single Dependencies

```
class SomeActivity : AppCompatActivity() {

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)

    }
}
```

Returning Single Dependencies

```
class SomeActivity : AppCompatActivity() {

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        val component = DaggerAppComponent
                .builder()
                .build()
    }
}
```

AppComponent in Action

```kotlin
class SomeActivity : AppCompatActivity() {

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        val component = DaggerAppComponent
                .builder()
                .build()

        val car = component.car()
        val retrofitService = component.retrofitService()
        val client = component.okHttpClient()
    }
}
```

AppComponent in Action

```
class SomeActivity : AppCompatActivity() {

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        val component = DaggerAppComponent
                .builder()
                .networkModule(NetworkModule())
                …
                .build()

        val car = component.car()
        val episodeService = component.episodeService()
        val client = component.okHttpClient()
    }
}
```

AppComponent in Action

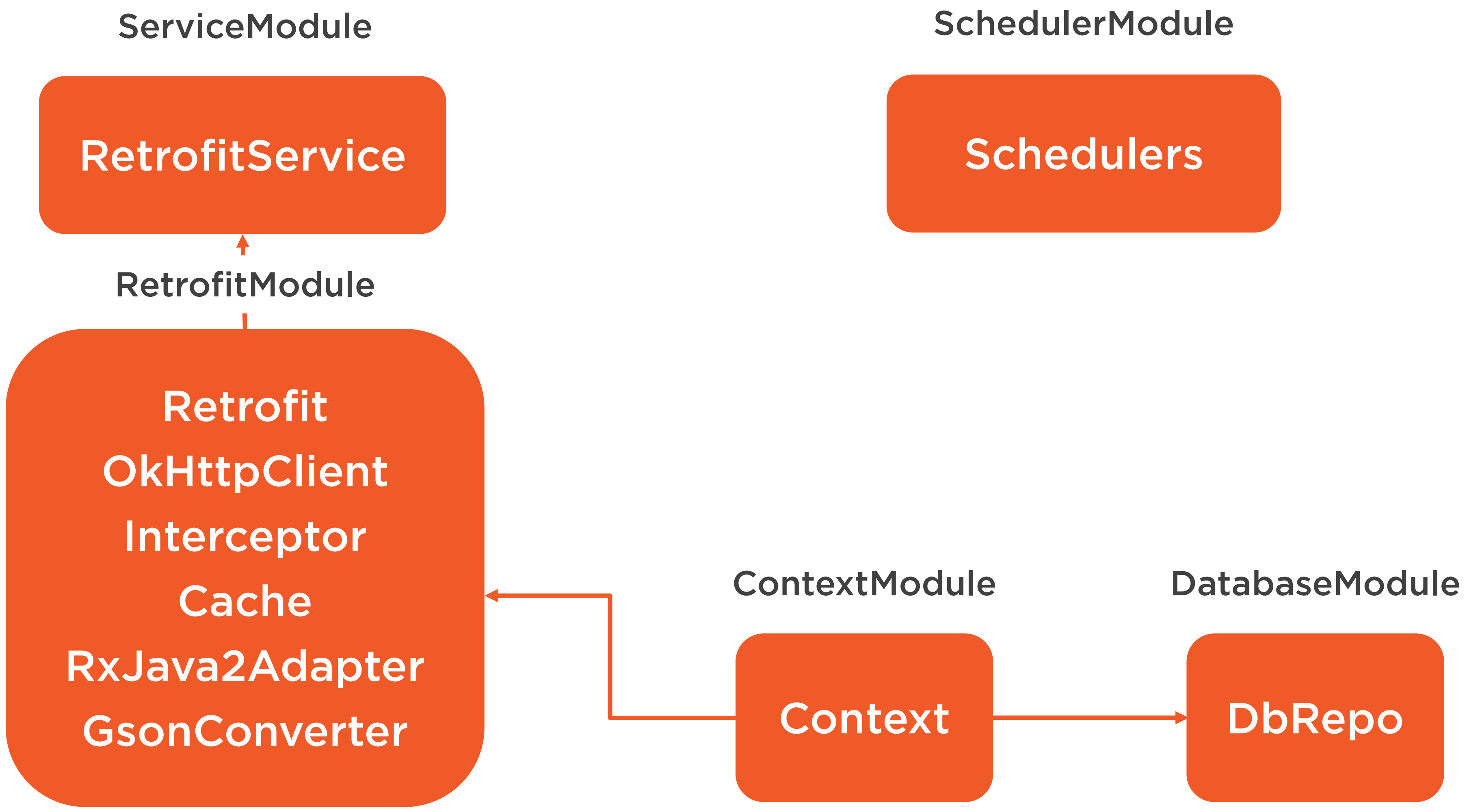
```kotlin
class SomeActivity : AppCompatActivity() {

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        val component = DaggerAppComponent
                .builder()
                .contextModule(ContextModule(context!!))
                .build()

        val car = component.car()
        val retrofitService = component.retrofitService()
        val client = component.okHttpClient()
    }
}
```

Summary

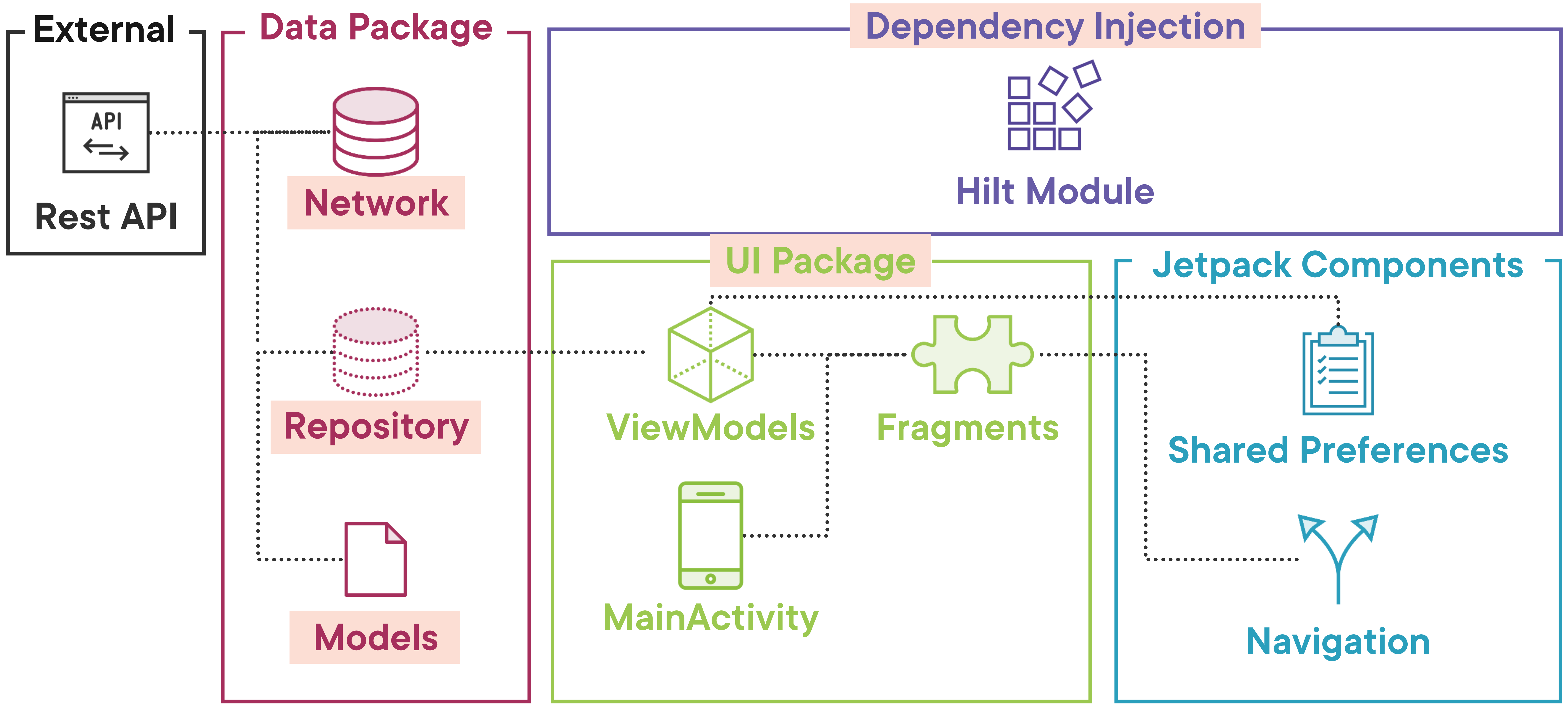
Components

- How to include modules
- Function definitions
- Building and supplying modules
- Retrieve dependencies

Building Our App’s Component



App Structure


External
API
Rest API
Data Package
Network
Repository
Models
Dependency Injection
Hilt Module
UI Package
ViewModels
Fragments
MainActivity
Jetpack Components
Shared Preferences
Navigation