

ADVМ #11

Как я несколько дней искал ошибку в многопроцессном приложении

Даниил Попов
Ведущий инженер



Немного обо мне

- Ведущий инженер
Авито
- Работаю над
инфраструктурой
Android-проекта
- Занимаюсь Android
разработкой с 2012
года



Что имеем на входе?

- 1 Крэш приложения в случайный момент времени
- 2 Не воспроизводится локально
- 3 Ни строчки нашего кода в стэктрейсе



```
Fatal Exception: android.database.sqlite.SQLiteDatabaseLockedException: database is locked (code 5)
    at android.database.sqlite.SQLiteConnection.nativeExecute(SQLiteConnection.java)
    at android.database.sqlite.SQLiteConnection.execute(SQLiteConnection.java:553)
    at android.database.sqlite.SQLiteSession.beginTransactionUnchecked(SQLiteSession.java:323)
    at android.database.sqlite.SQLiteSession.beginTransaction(SQLiteSession.java:298)
    at android.database.sqlite.SQLiteDatabase.beginTransaction(SQLiteDatabase.java:505)
    at android.database.sqlite.SQLiteDatabase.beginTransaction(SQLiteDatabase.java:416)
    at androidx.sqlite.db.framework.FrameworkSQLiteDatabase.beginTransaction(FrameworkSQLiteDatabase.java:69)
    at androidx.room.RoomDatabase.beginTransaction(RoomDatabase.java:354)
    at androidx.work.impl.WorkerWrapper.runWorker(WorkerWrapper.java:135)
    at androidx.work.impl.WorkerWrapper.run(WorkerWrapper.java:127)
    at androidx.work.impl.utils.SerialExecutor$Task.run(SerialExecutor.java:91)
    at java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1113)
    at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:588)
    at java.lang.Thread.run(Thread.java:818)
```



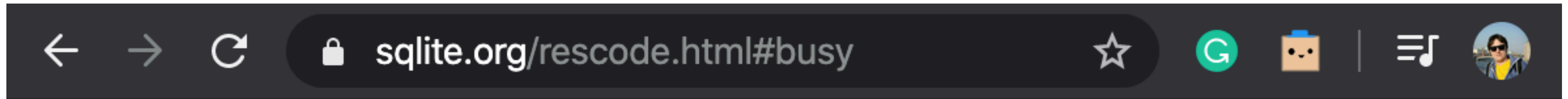

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    at android.database.sqlite.SQLiteDatabase.beginTransaction(SQLiteDatabase.java:505)
    at android.database.sqlite.SQLiteDatabase.beginTransaction(SQLiteDatabase.java:416)
    at androidx.sqlite.db.framework.FrameworkSQLiteDatabase.beginTransaction(FrameworkSQLiteDatabase.java:69)
    at androidx.room.RoomDatabase.beginTransaction(RoomDatabase.java:354)
    at androidx.work.impl.WorkerWrapper.runWorker(WorkerWrapper.java:135)
    at androidx.work.impl.WorkerWrapper.run(WorkerWrapper.java:127)
    at androidx.work.impl.utils.SerialExecutor$Task.run(SerialExecutor.java:91)
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Шаг 1

Понять, что именно происходит

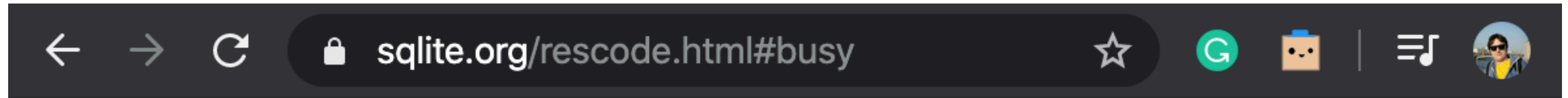




(5) SQLITE_BUSY

The SQLITE_BUSY result code indicates that the database file could not be written (or in some cases read) because of concurrent activity by some other [database connection](#), usually a database connection in a separate process.





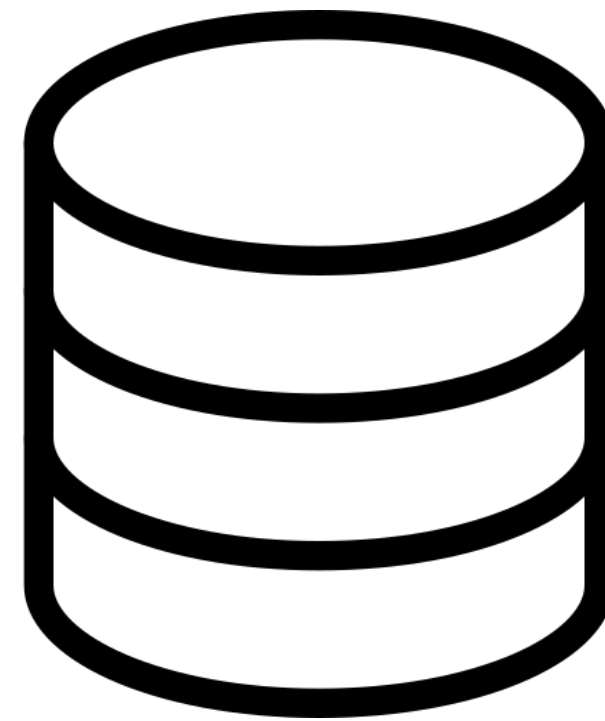
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SQLiteDatabase

SQLiteDatabase

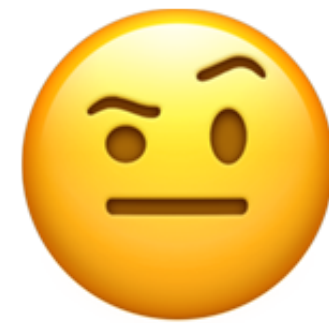


`some_db.sqlite`



Шаг 2

Понять, где происходит



```
Fatal Exception: android.database.sqlite.SQLiteDatabaseLockedException: database is locked (code 5)
    at android.database.sqlite.SQLiteConnection.nativeExecute(SQLiteConnection.java)
    at android.database.sqlite.SQLiteConnection.execute(SQLiteConnection.java:553)
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    at androidx.room.RoomDatabase.beginTransaction(RoomDatabase.java:354)
    at androidx.work.impl.WorkerWrapper.runWorker(WorkerWrapper.java:135)
    at androidx.work.impl.WorkerWrapper.run(WorkerWrapper.java:127)
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    at java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1113)
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```



Room



```
Fatal Exception: android.database.sqlite.SQLiteDatabaseLockedException: database is locked (code 5)
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    at android.database.sqlite.SQLiteSession.beginTransactionUnchecked(SQLiteSession.java:323)
    at android.database.sqlite.SQLiteSession.beginTransaction(SQLiteSession.java:298)
    at android.database.sqlite.SQLiteDatabase.beginTransaction(SQLiteDatabase.java:505)
    at android.database.sqlite.SQLiteDatabase.beginTransaction(SQLiteDatabase.java:416)
    at androidx.sqlite.db.framework.FrameworkSQLiteDatabase.beginTransaction(FrameworkSQLiteDatabase.java:69)
    at androidx.room.RoomDatabase.beginTransaction(RoomDatabase.java:354)
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    at androidx.work.impl.workerwrapper.RunWorker(RunWorker.java:127)
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```

WorkManager



Шаг 3

Попытаться нагуглить решение



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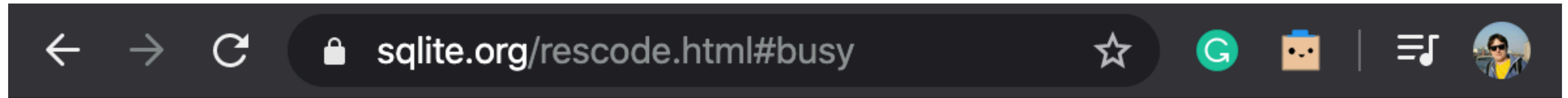
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Шаг 1

Понять, что именно происходит

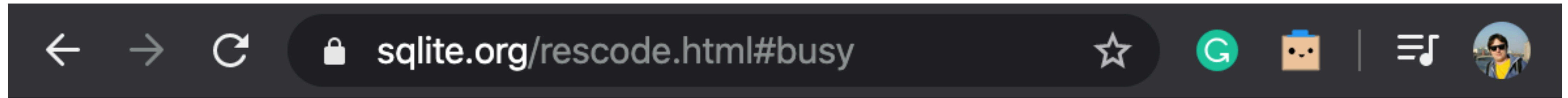




(5) SQLITE_BUSY

The SQLITE_BUSY result code indicates that the database file could not be written (or in some cases read) because of concurrent activity by some other database connection, usually a database connection in a separate process.





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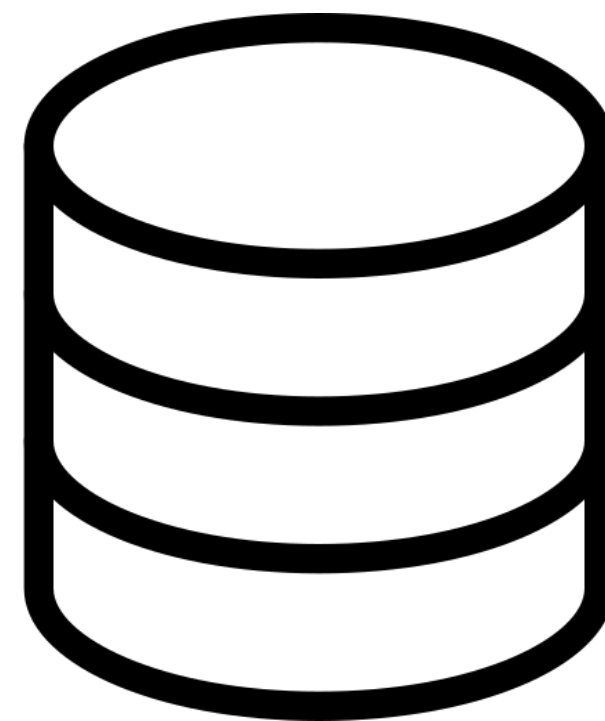


Process #1

SQLiteDatabase

Process #2

SQLiteDatabase

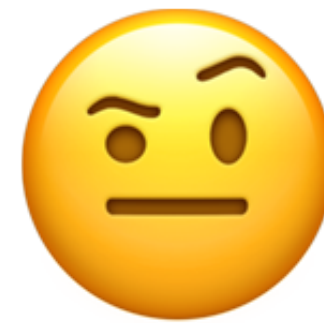


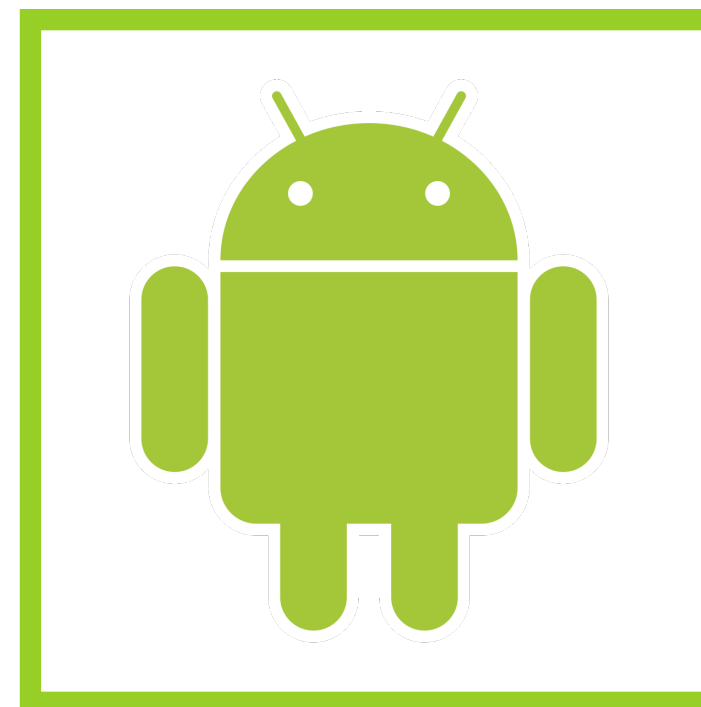
`some_db.sqlite`



Шаг 2

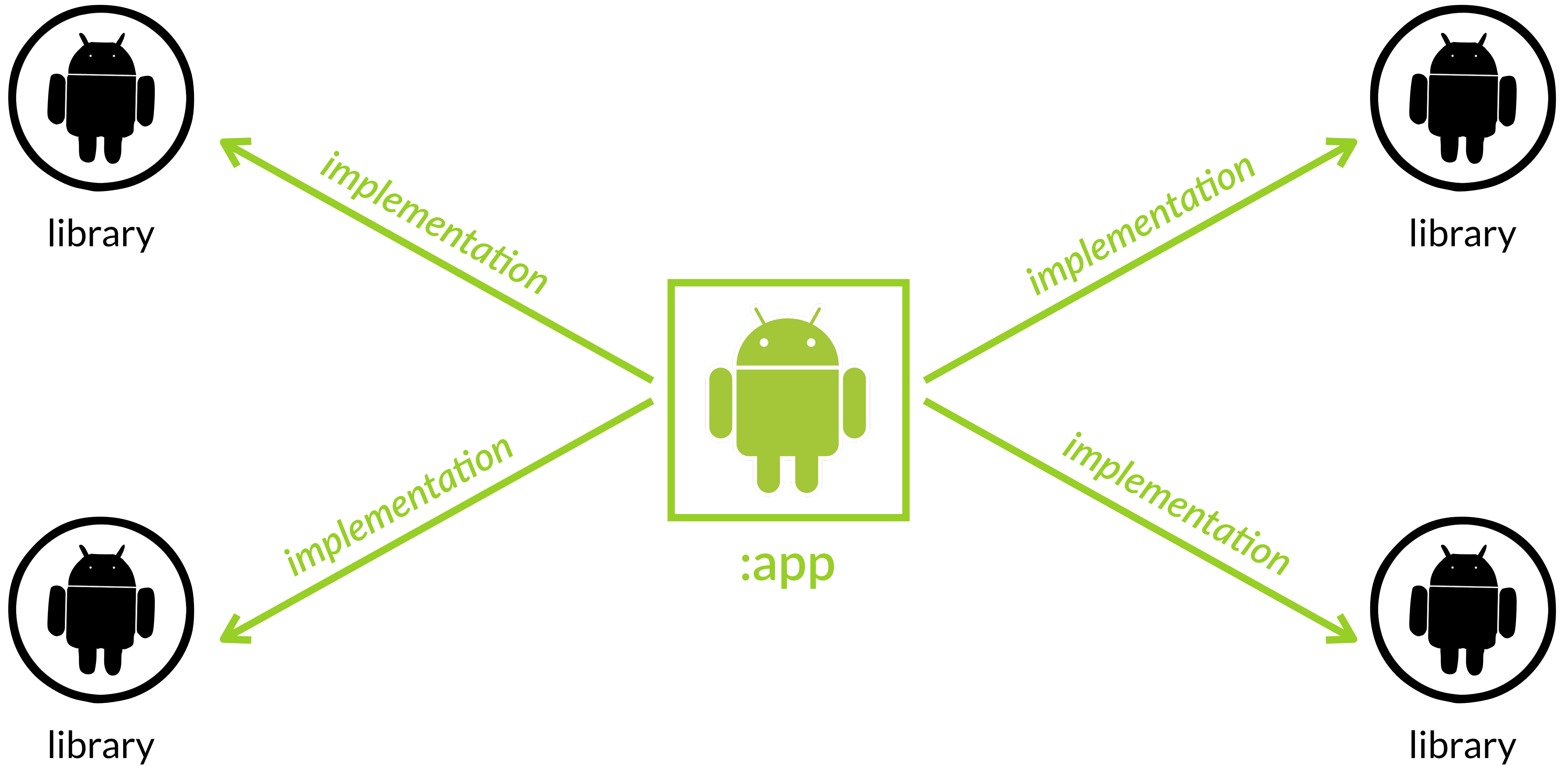
Понять, как происходит

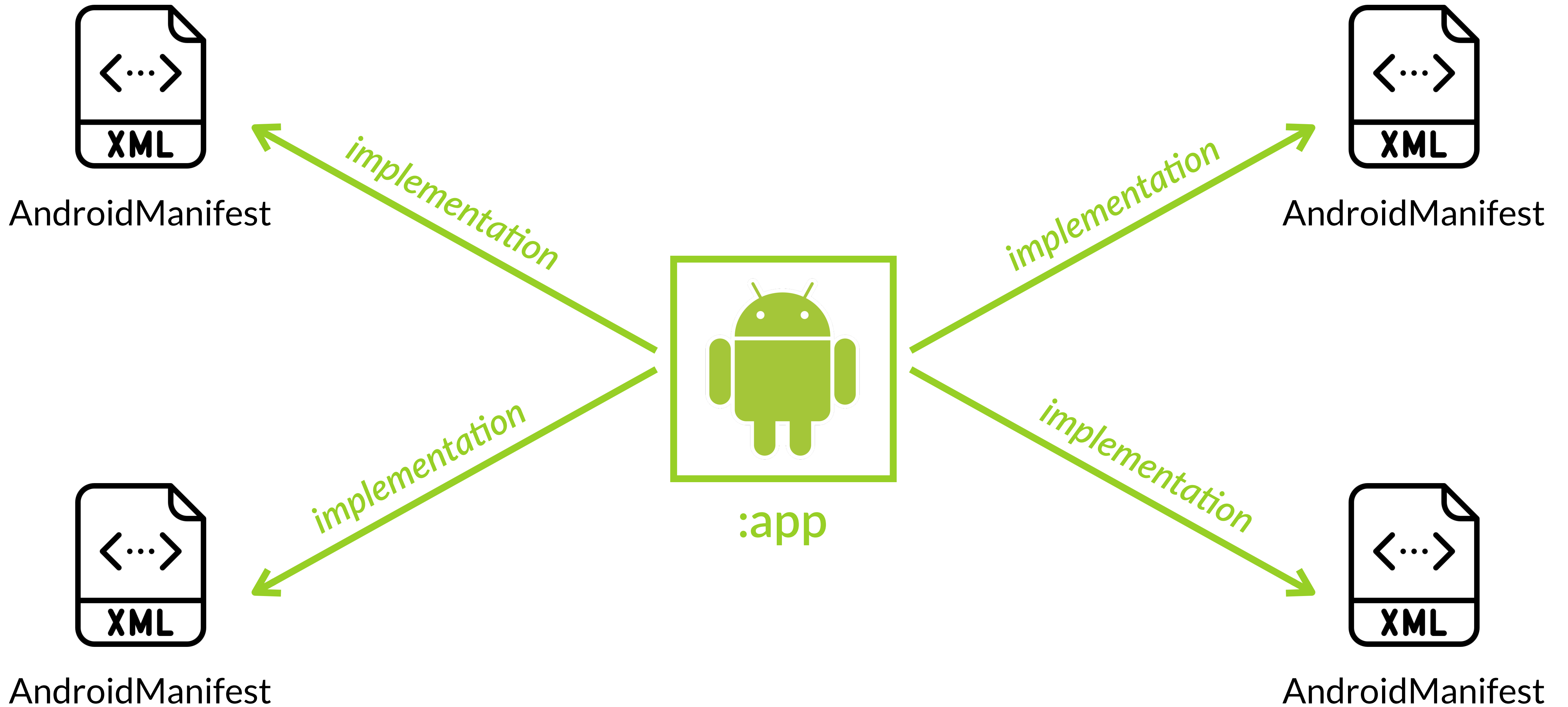


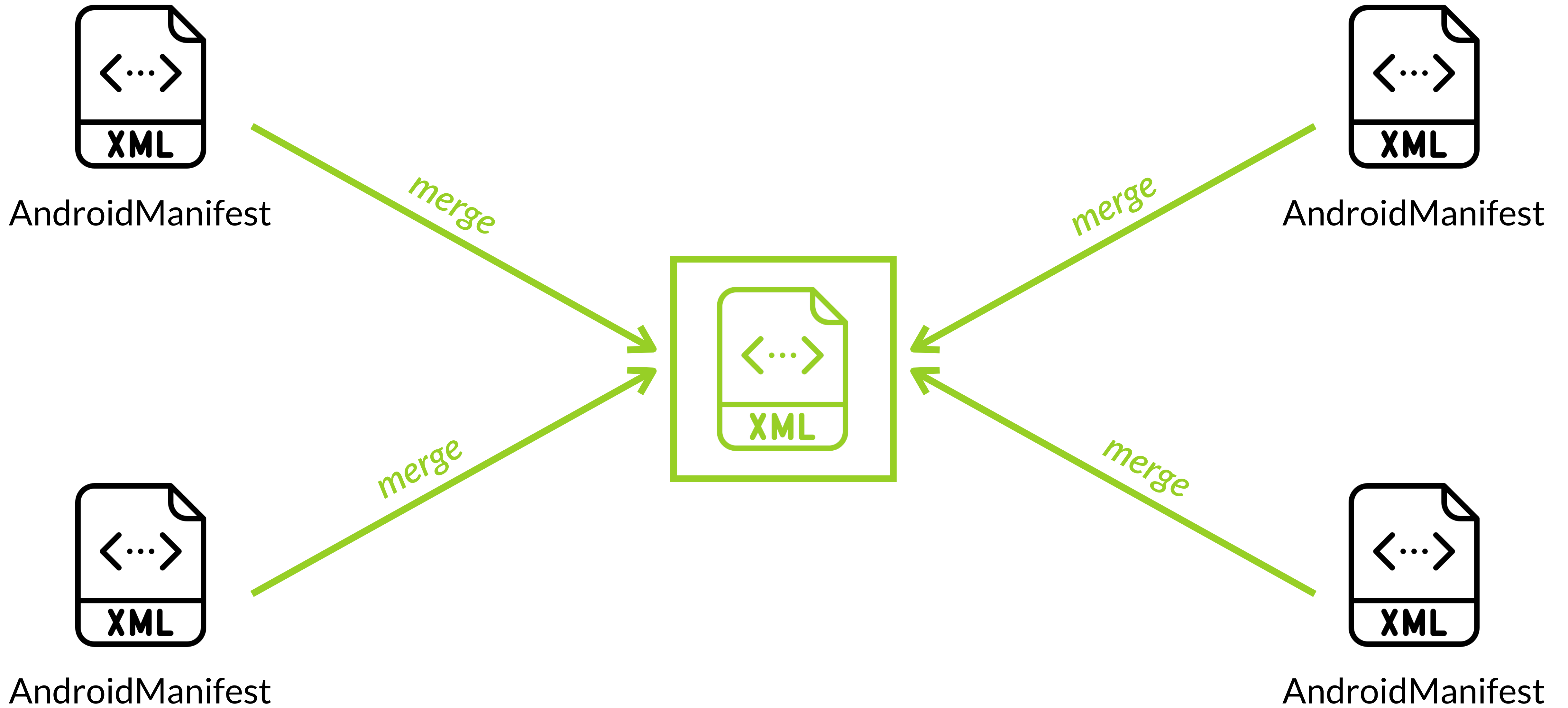


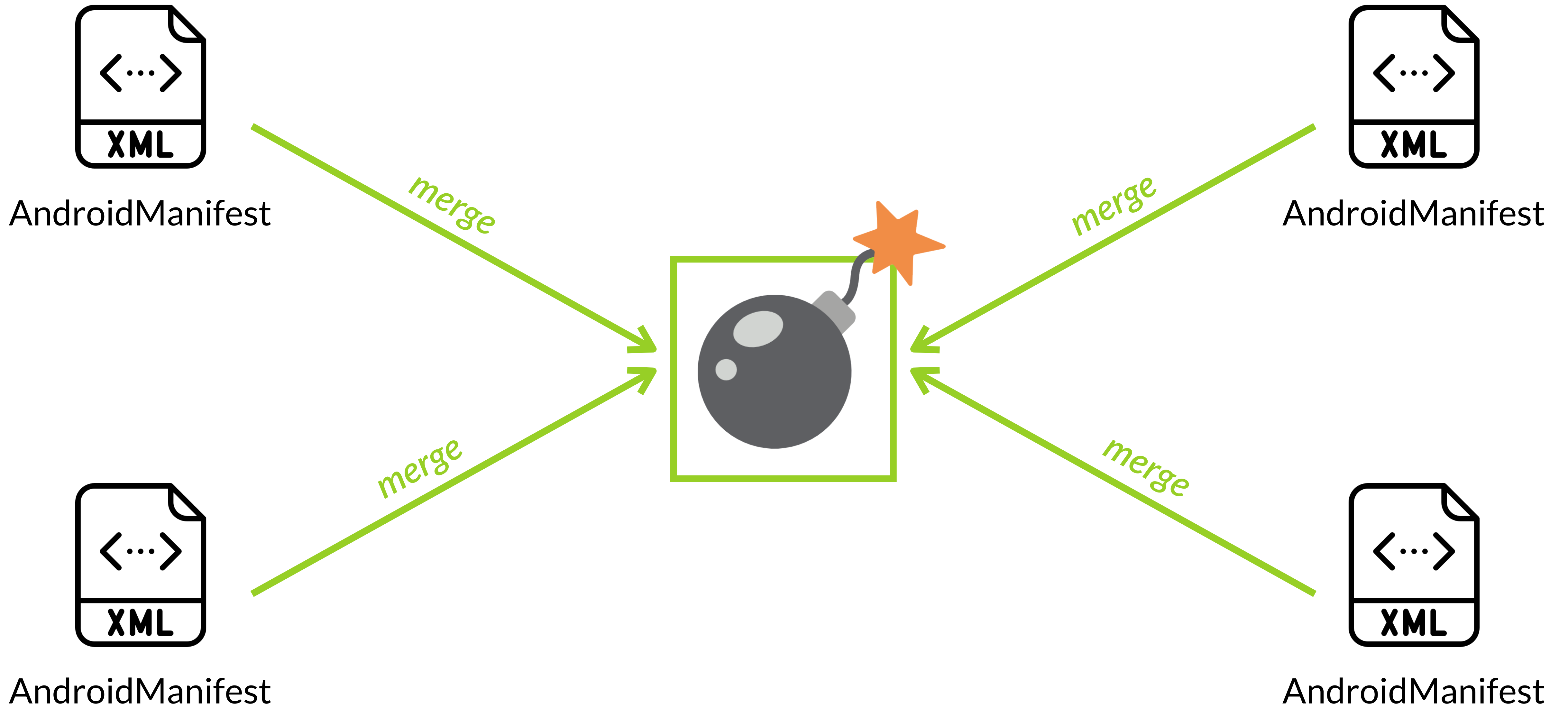
:app

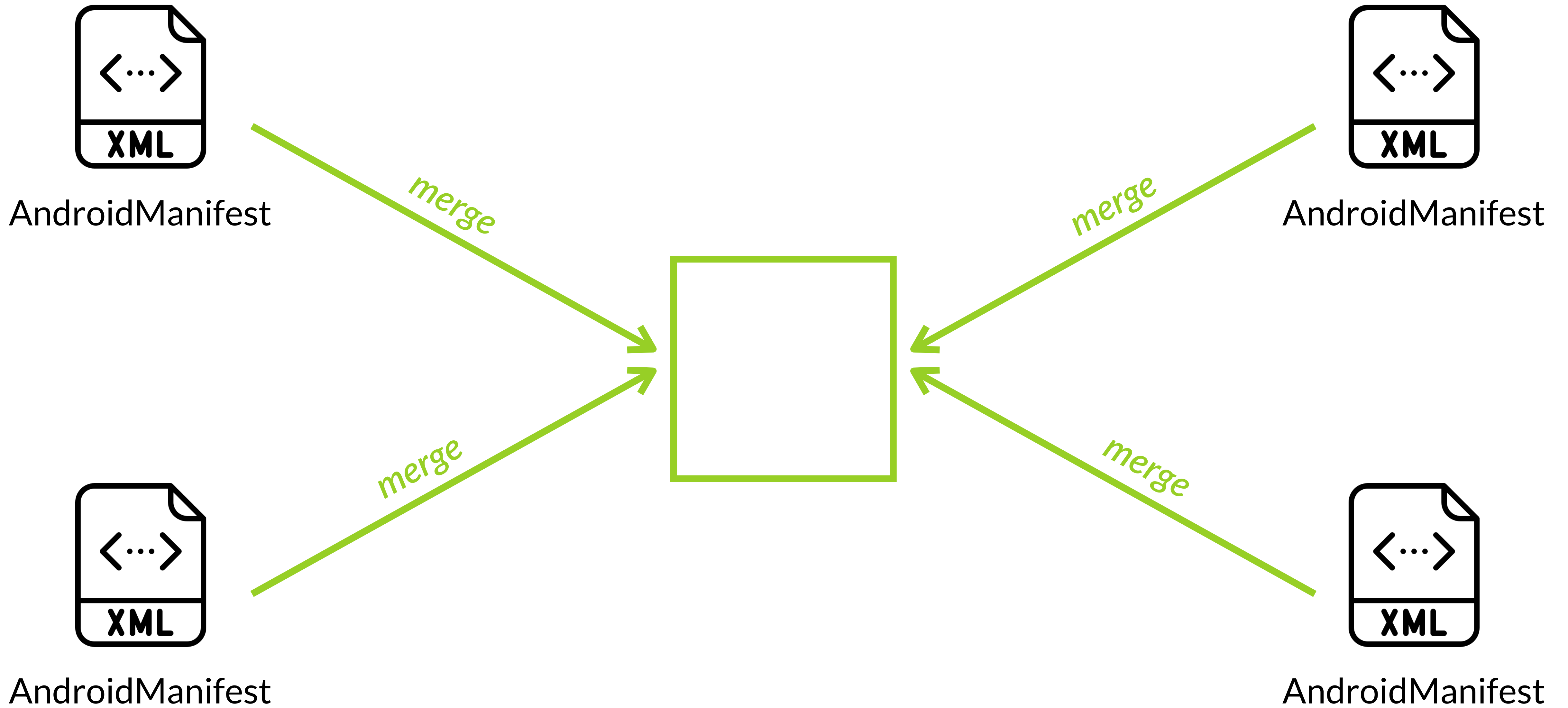













```
android:process=":ololo"
```



```
android:process=":ololo"
```

Service



```
android:process=":ololo"
```

Service

ContentProvider



```
android:process=":ololo"
```

Service

ContentProvider

BroadcastReceiver



```
android:process=":ololo"
```

Service

ContentProvider

BroadcastReceiver

Activity



1

```
<activity  
  android:name="com.google.android.play.core.missingsplits.PlayCoreMissingSplitsActivity"  
  android:process=":playcore_missing_splits_activity"/>
```

2

```
<activity  
  android:name="com.google.android.play.core.common.PlayCoreDialogWrapperActivity"  
  android:process=":playcore_dialog_wrapper_activity">
```

3

```
<service  
  android:name="com.yandex.metrika.MetricaService"  
  android:process=":Metrica" >
```

```
<service  
  android:name="com.yandex.metrika.ConfigurationService"  
  android:process=":Metrica" >
```

```
<service  
  android:name="com.yandex.metrika.ConfigurationJobService"  
  android:process=":Metrica" >
```



Шаг 3

Попытаться найти ошибку в коде





1 **Пытался найти проблему в Я.Метрике**



1 **Пытался найти проблему в Я.Метрике**






1. Попробовал найти проблему в Я.Метрике
2. Попробовал найти проблему в нашем коде





1. Попробовал найти проблему в Я.Метрике
2. Попробовал найти проблему в нашем коде



- 1  Пытался найти проблему в Я.Метрике
- 2  Пытался найти проблему в нашем коде
- 3 Пытался найти проблему в WorkManager

- 1 

Пытался найти проблему в Я.Метрике
- 2 

Пытался найти проблему в нашем коде
- 3 

Пытался найти проблему в WorkManager



- 1 Пытался найти проблему в Я.Метрике ✗
- 2 Пытался найти проблему в нашем коде ✗
- 3 Пытался найти проблему в WorkManager ✗
- 4 Пытался найти проблему в Room

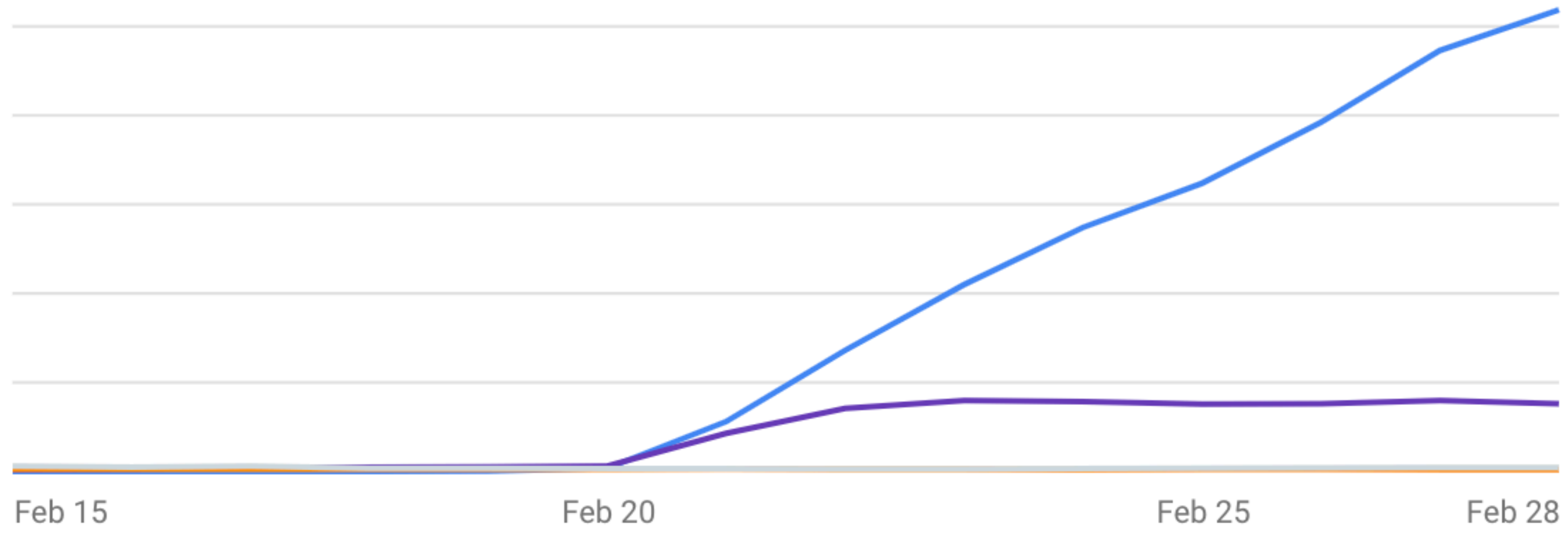
- 1 Пытался найти проблему в Я.Метрике ✗
- 2 Пытался найти проблему в нашем коде ✗
- 3 Пытался найти проблему в WorkManager ✗
- 4 Пытался найти проблему в Room ✗

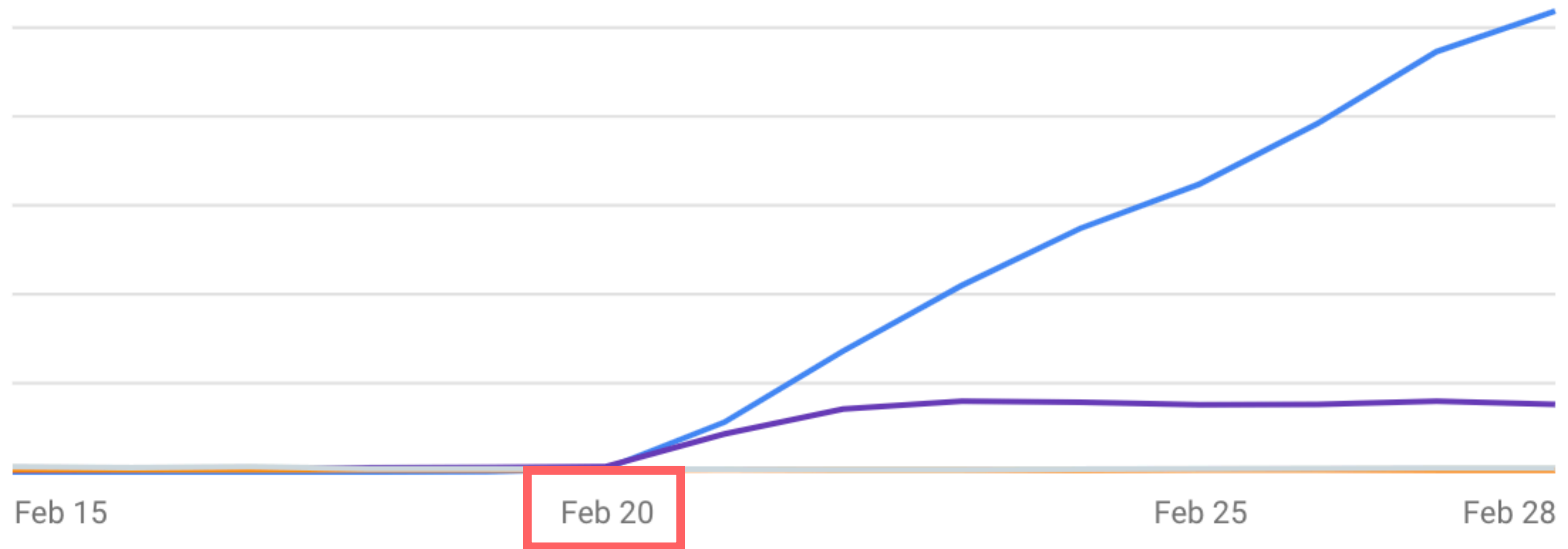


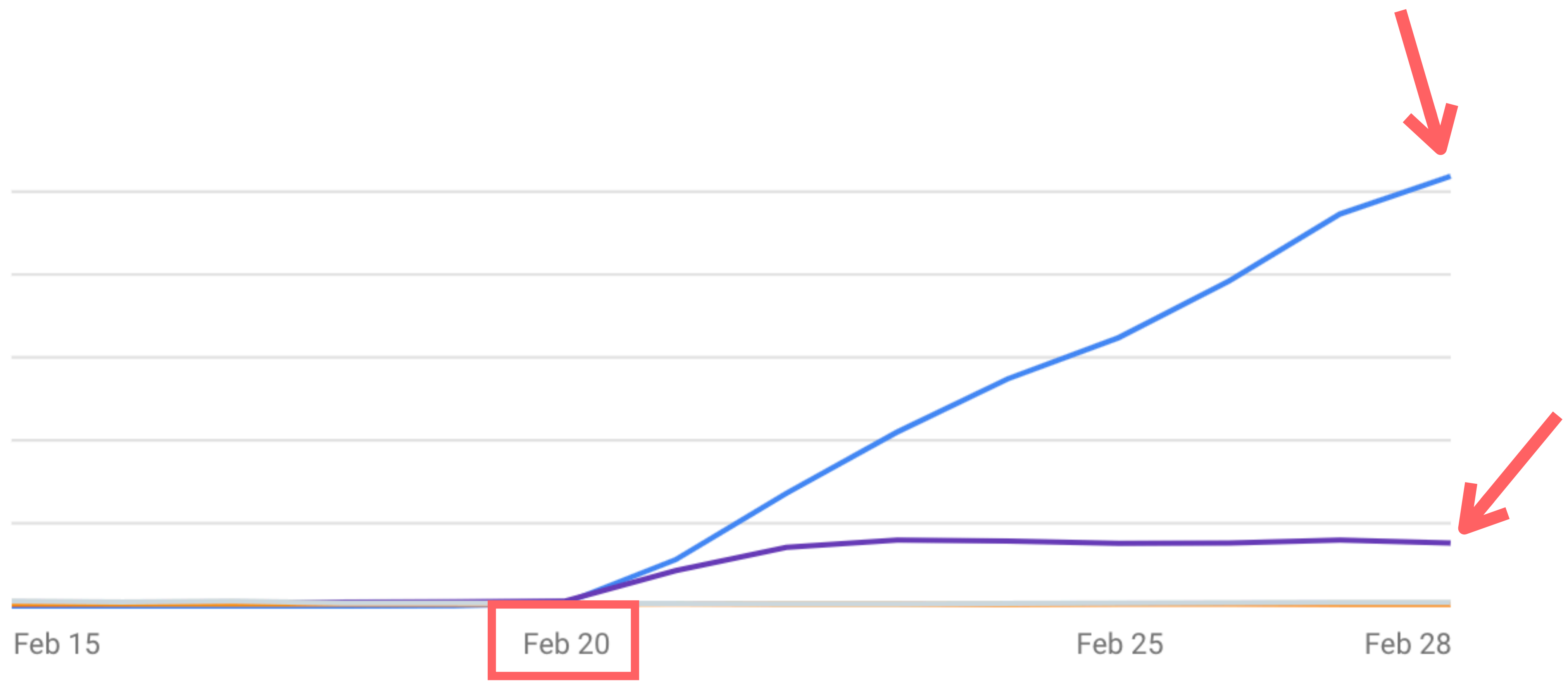
Шаг 4

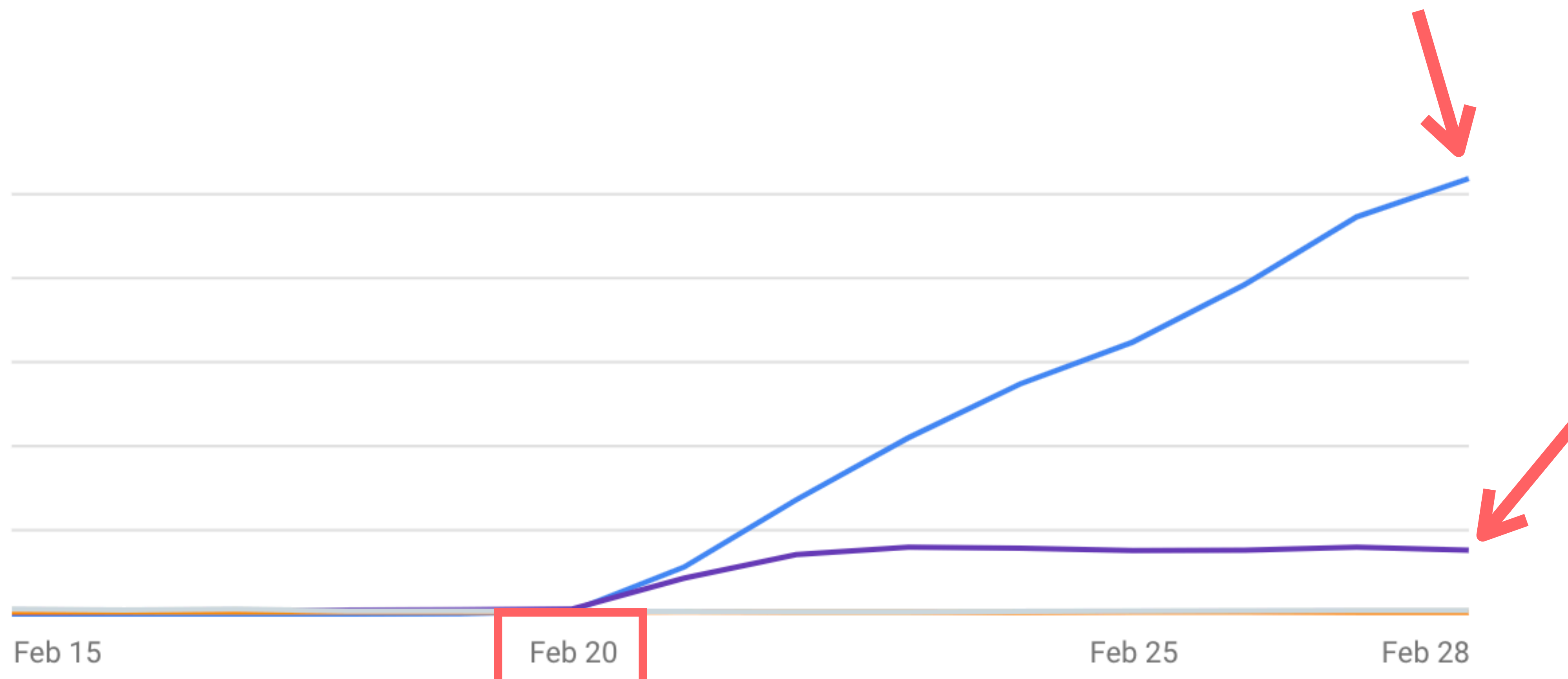
Попытаться понять, когда началось











Включили feature toggle



Шаг 5

Впасть в отчаяние

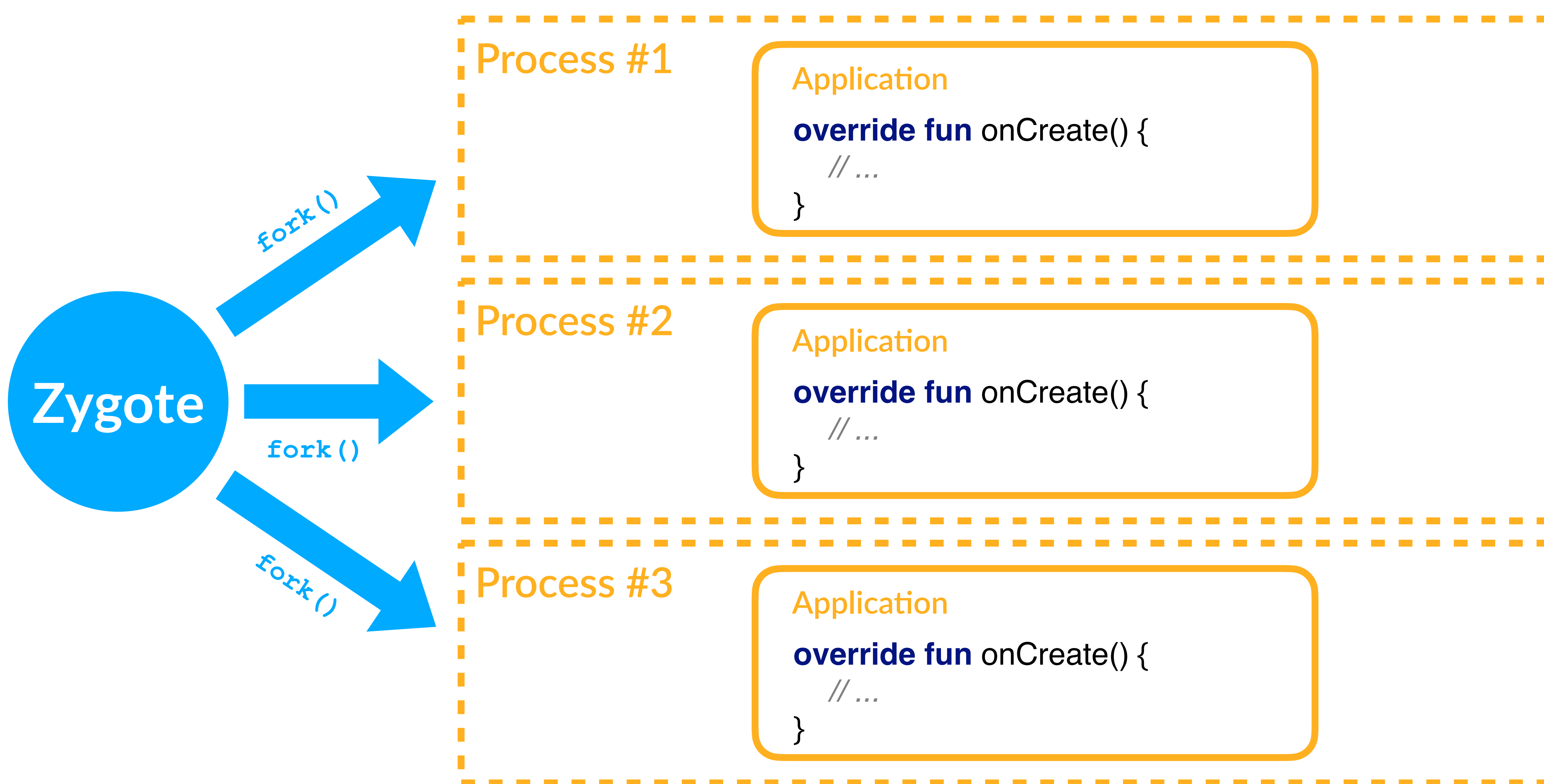


```
open class AvitoApp : BaseApp() {  
  
    @Inject lateinit var analytics: Analytics  
  
    override fun onCreate() {  
        super.onCreate()  
        // ...  
        analytics.track(AppStartEvent())  
        // ...  
    }  
  
    // ...  
}
```



```
open class AvitoApp : BaseApp() {  
  
    @Inject lateinit var analytics: Analytics  
  
    override fun onCreate() {  
        super.onCreate()  
        //  
        analytics.track(AppStartEvent())  
        //  
    }  
  
    //  
}
```





analytics.track



analytics.track → android-job

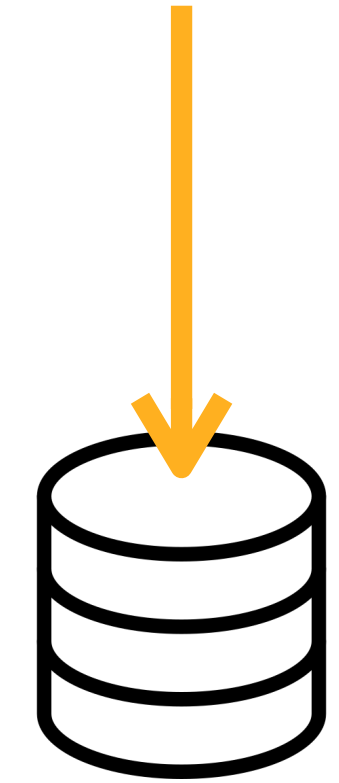
analytics.track → android-job → WorkManager

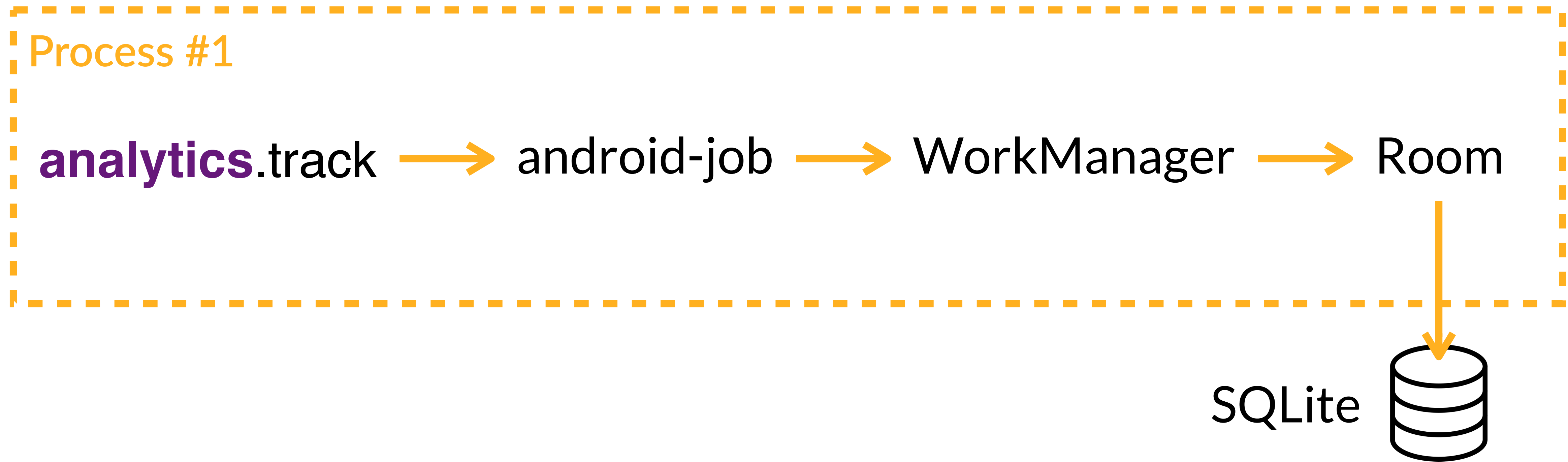


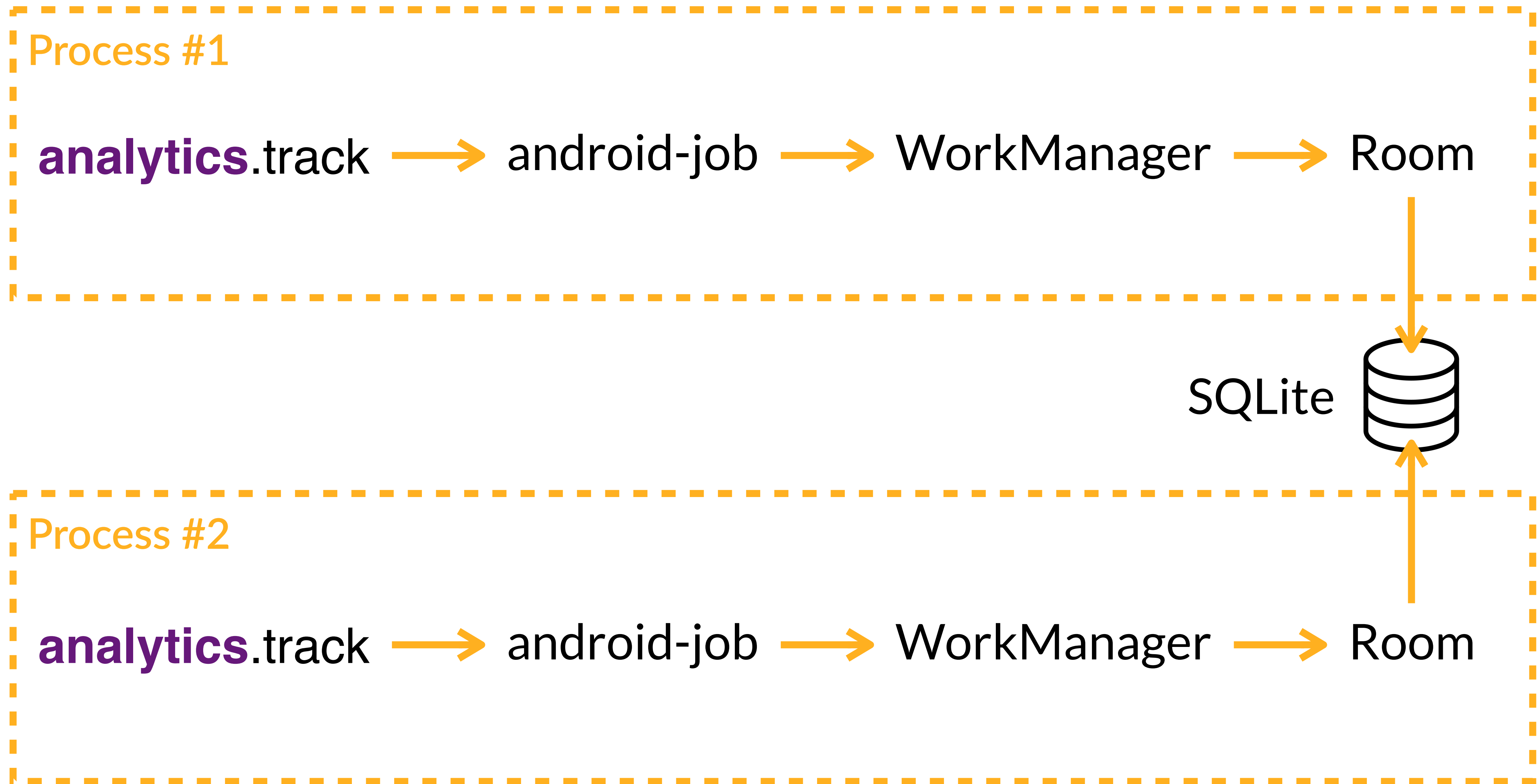
analytics.track → android-job → WorkManager → Room

analytics.track → android-job → WorkManager → Room

SQLite







Шаг 6

Сделать надёжный фикс



```
fun Application.runIfPrimaryProcess(block: () -> Unit) {  
    if (isPrimaryProcess) {  
        block()  
    }  
}
```

```
val Application.isPrimaryProcess: Boolean  
    get() = currentProcessFullName == packageName
```

```
val Application.currentProcessFullName: String?  
    get() {  
        val myPid = Process.myPid()  
        val am = getSystemService(Context.ACTIVITY_SERVICE) as ActivityManager?  
        return am?.runningAppProcesses?.find { myPid == it.pid }?.processName  
    }
```




```
fun Application.runIfPrimaryProcess(block: () -> Unit) {  
    if (isPrimaryProcess) {  
        block()  
    }  
}
```

val Application.*isPrimaryProcess*: Boolean
get() = *currentProcessFullName* == *packageName*

val Application.*currentProcessFullName*: String?
get() {
 val myPid = Process.myPid()
 val am = getSystemService(Context.*ACTIVITY_SERVICE*) **as** ActivityManager?
 return am?.*runningAppProcesses*?.*find* { myPid == **it**.pid }?.**processName**
}



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```
    get() {
```

```
        val myPid = Process.myPid()
```

```
        val am = getSystemService(Context.ACTIVITY_SERVICE) as ActivityManager?
```

```
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```

```
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```

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```

```
override fun onCreate() {  
    super.onCreate()  
    runIfPrimaryProcess {  
        // do initialization here  
    }  
}
```




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```

1

Код — документация

```
override fun onCreate() {  
    super.onCreate()  
    runIfPrimaryProcess {  
        // do initialization here  
    }  
}
```

1

Код — документация

2

Явно выражает намерение

```
override fun onCreate() {  
    super.onCreate()  
    runIfPrimaryProcess {  
        // do initialization here  
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```

1

Код — документация

2

Явно выражает намерение

3

Нельзя забыть про процессы





Primaree

<https://github.com/int02h/primaree>

Спасибо

dalporov@avito.ru

<http://t.me/int02h>

<https://twitter.com/int02h>

Попов Даниил
Ведущий инженер

