MVVM and RxJava – the perfect mix

Droidcon Berlin

Florina Muntenescu
@FMuntenescu

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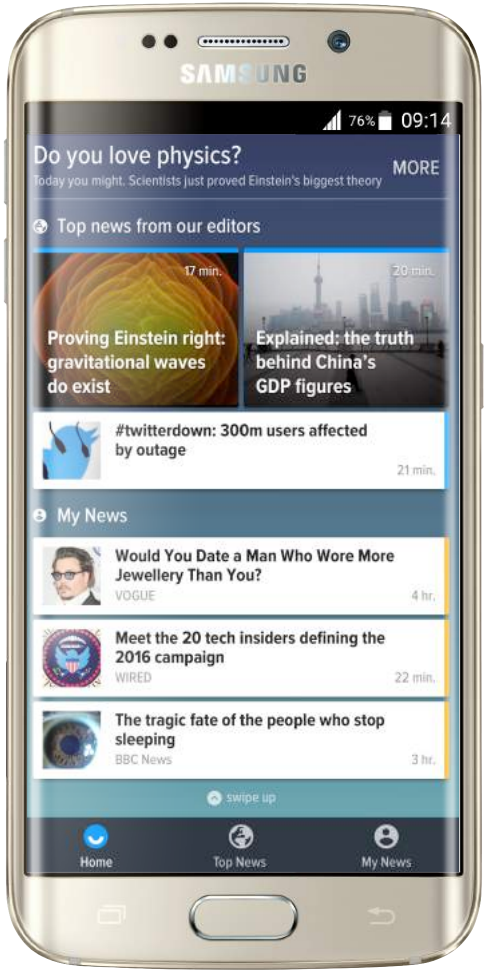
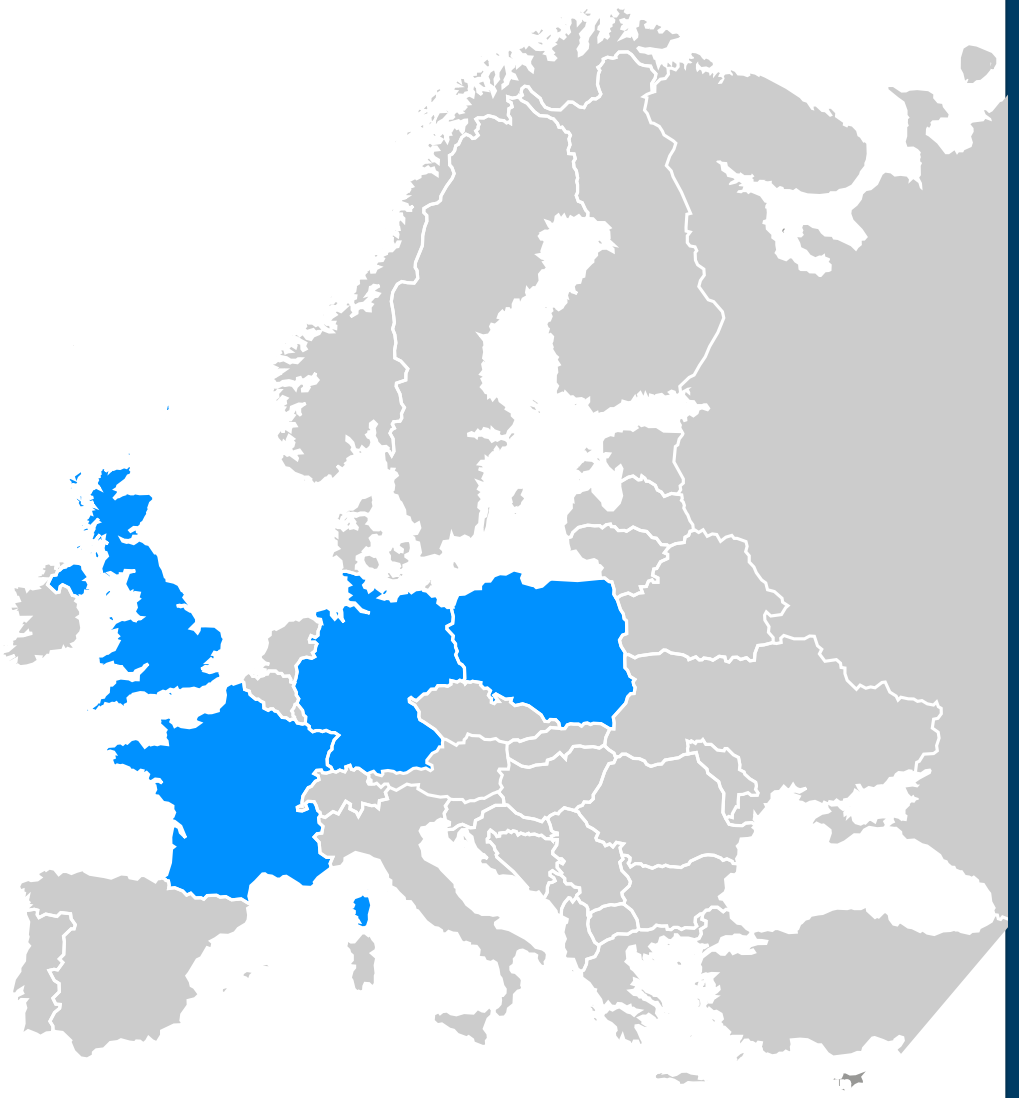
What and who upday is





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When did we decide to go the RxJava & MVVM way?

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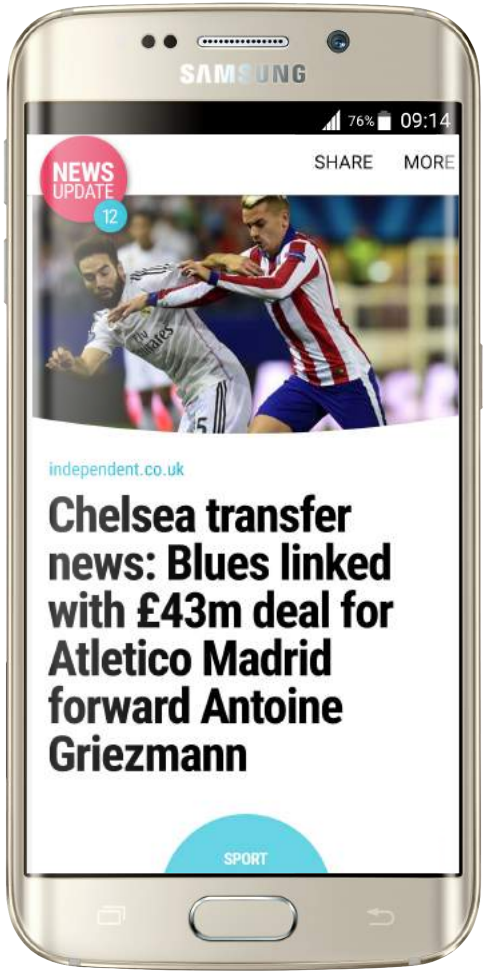
The old app



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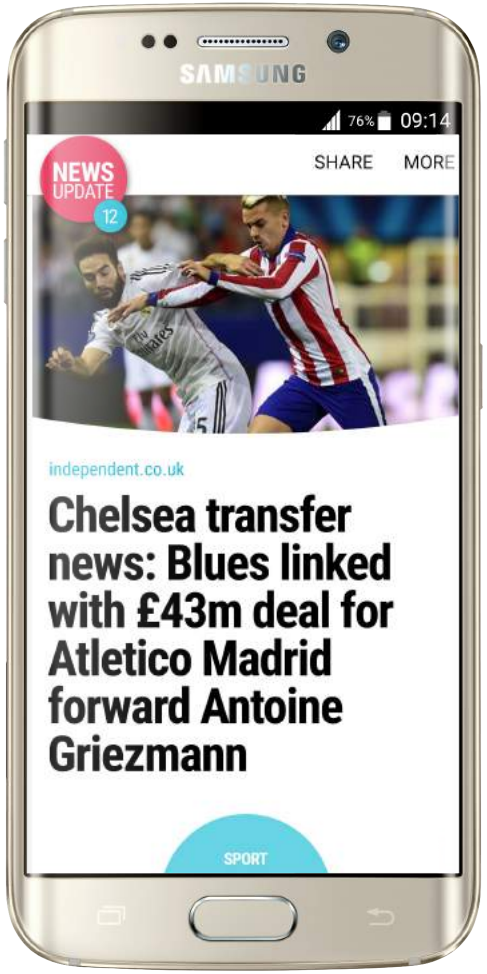
The old app

```
// TODO: Workaround for APP-124. Will be removed after refactoring.
if (mWtkSwipeLayout != null
    && mWtkSwipeLayout.getChildCount() > 1
    && isWtkEmptyVisible()
    && childCount == mWtkSwipeLayout.getMaxViewsCount()) {
    mWtkSwipeLayout.removeViewAt(1);
}
```

99 little bugs in the code.
99 little bugs in the code.
Take one down, patch it around.

127 little bugs in the code…

From the old to the new



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Crash course in RxJava

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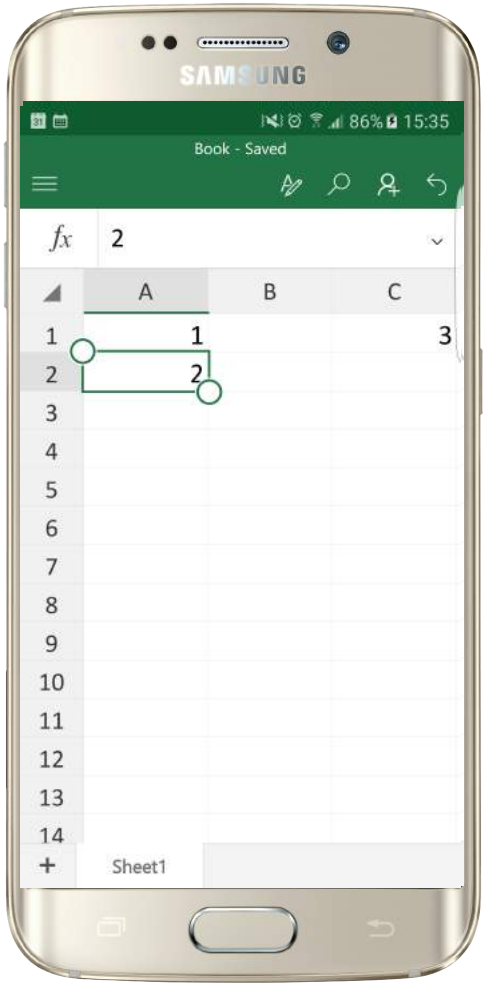
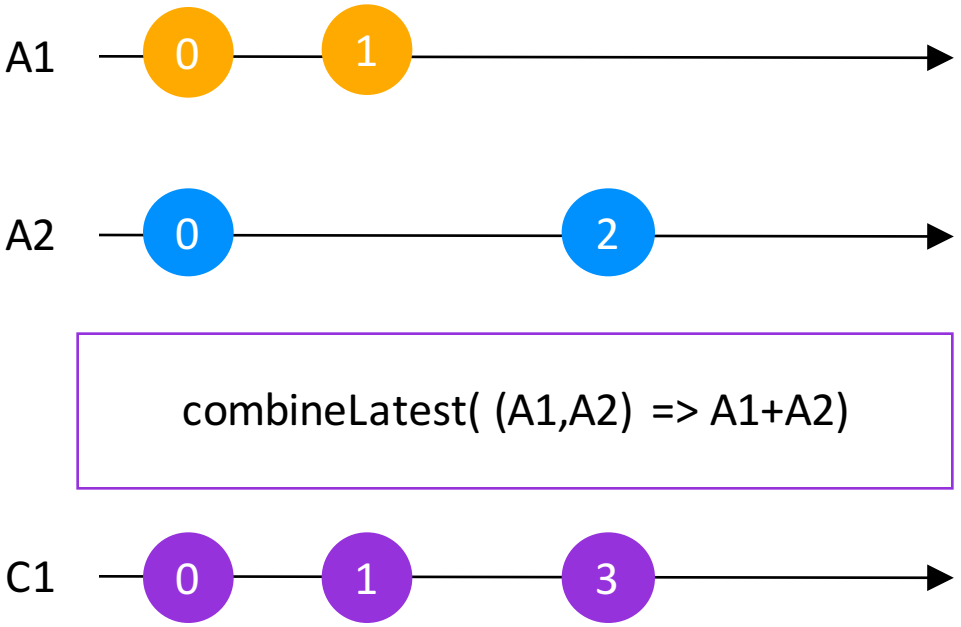
Sum it up!





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What is MVVM and how do you apply it?

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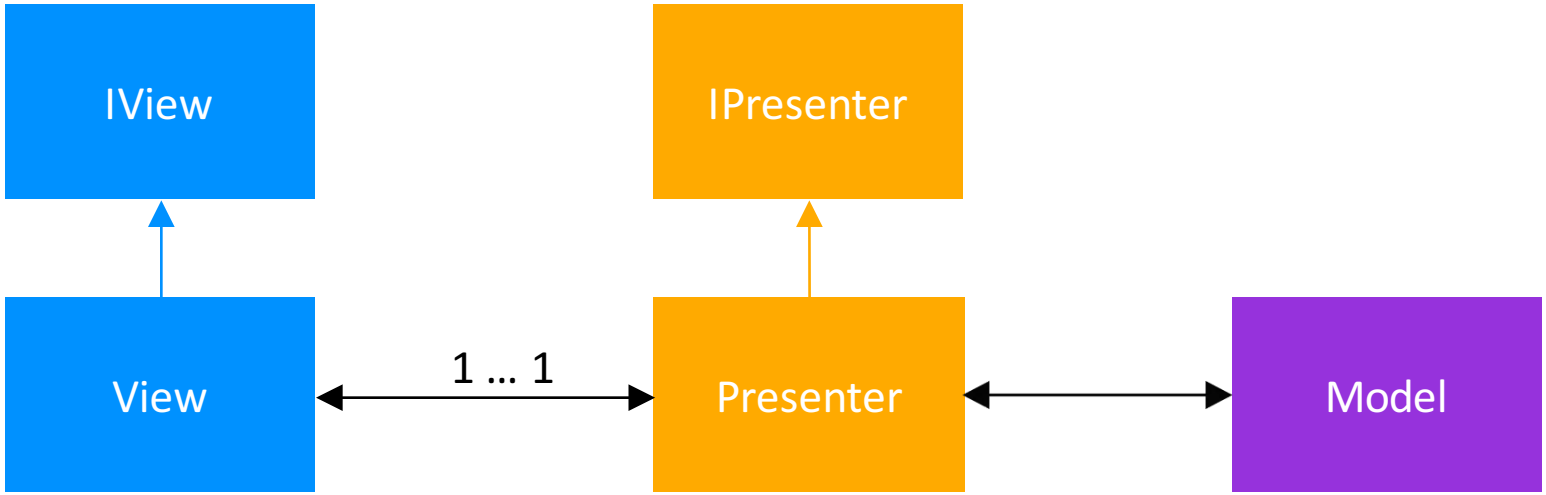
Model-View-Presenter



Model-View-ViewModel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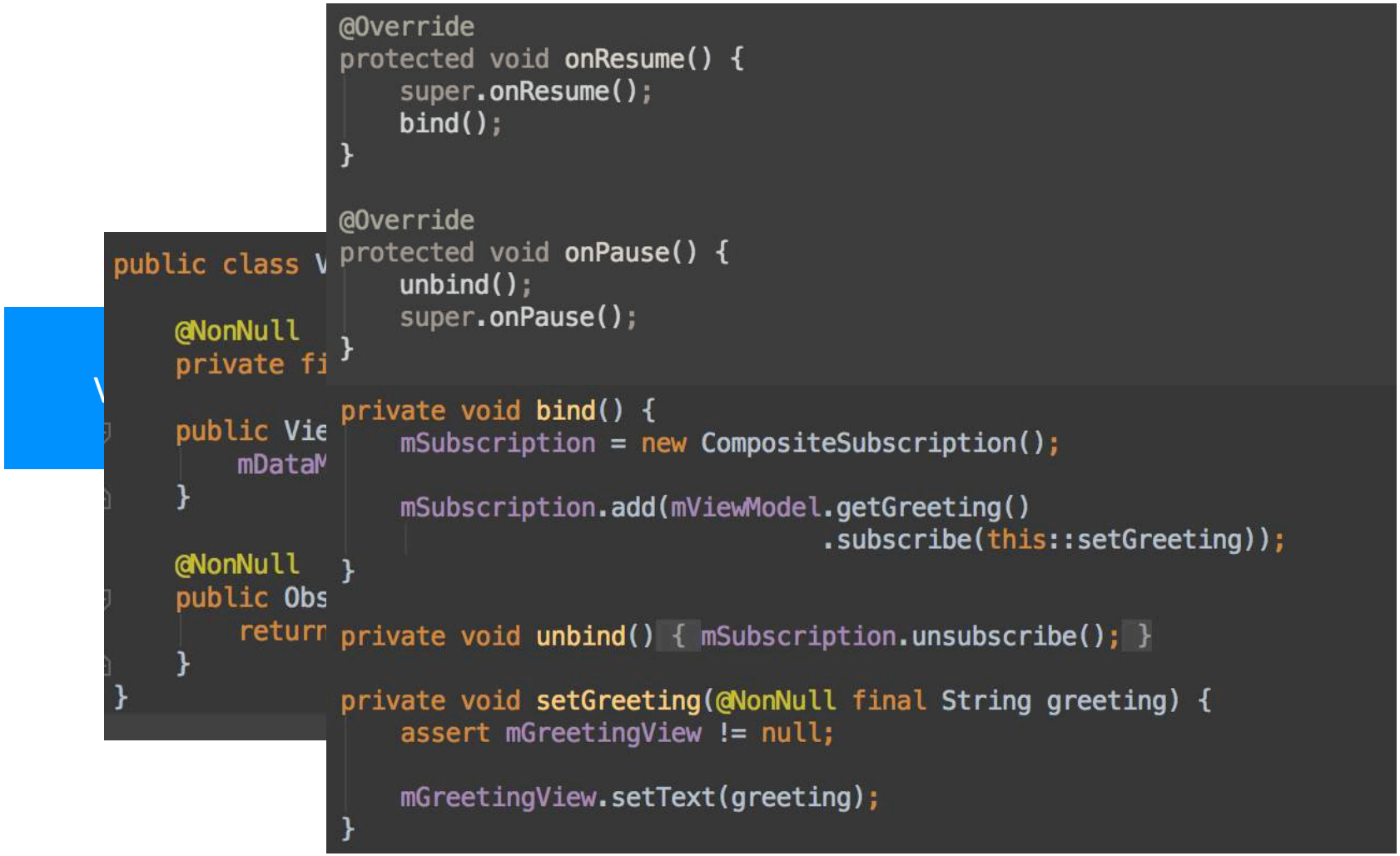
Hello, World!

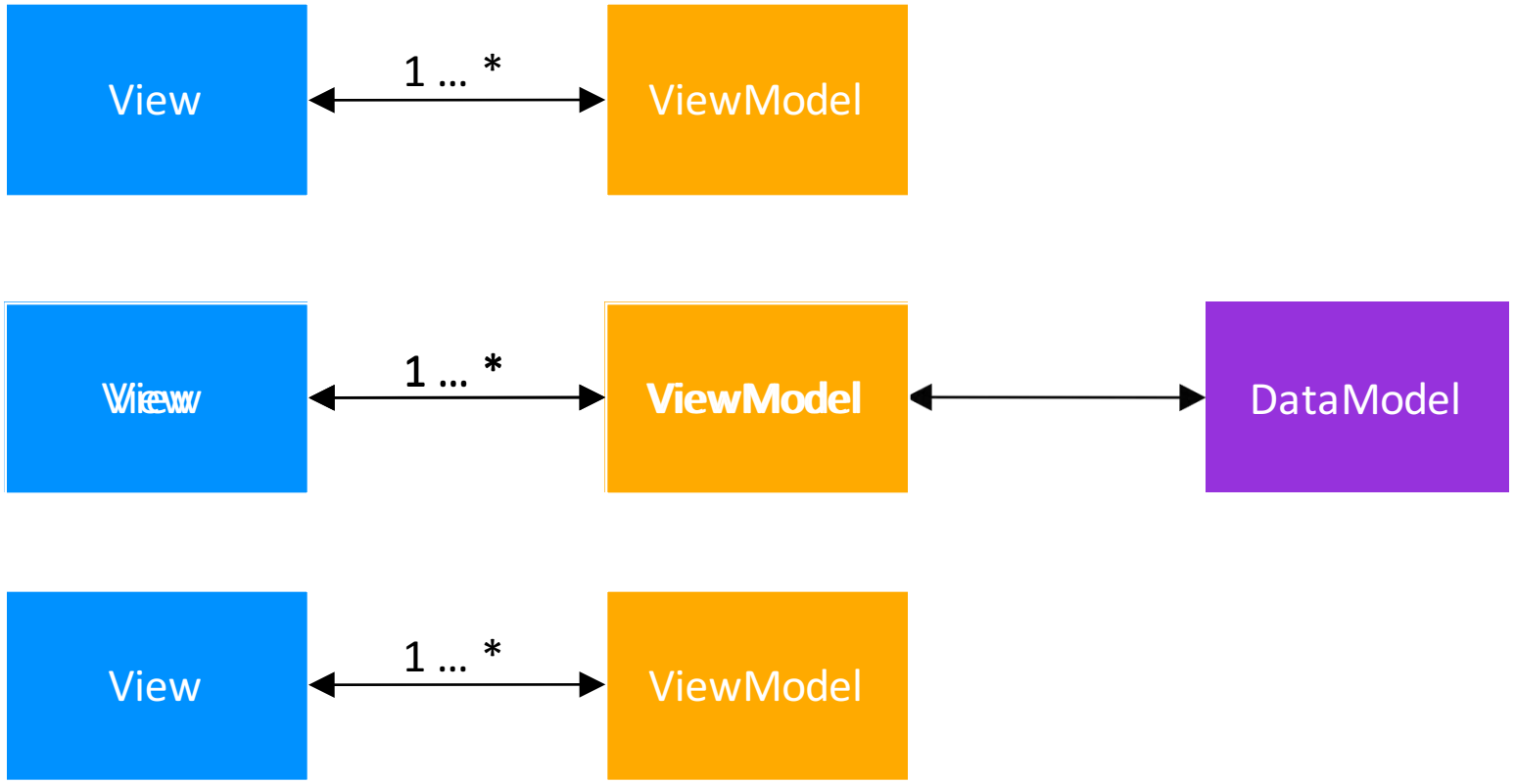
Model-View-ViewModel



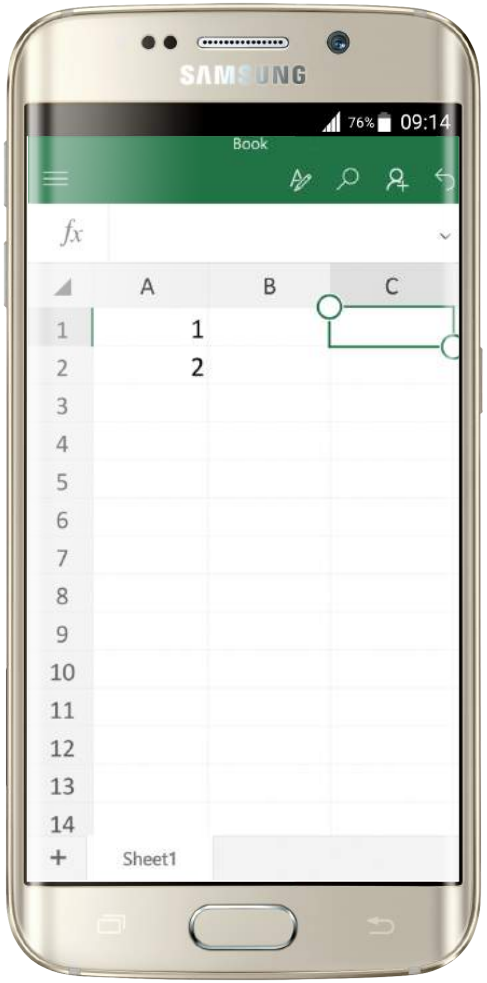
Testing

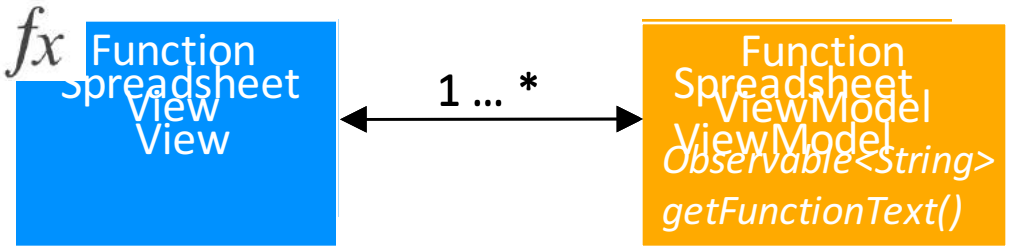
```
@Mock
private IDataModel mDataModel;

private ViewModel mViewModel;

@Before
public void setUp() throws Exception {
    MockitoAnnotations.initMocks(this);

    mViewModel = new ViewModel(mDataModel);
}

@Test
public void testGetGreeting_emitsCorrectGreeting() {
    String greeting = "Hello!";
    Mockito.when(mDataModel.getGreeting()).thenReturn(Observable.just(greeting));
    TestSubscriber<String> testSubscriber = new TestSubscriber<>();

    mViewModel.getGreeting().subscribe(testSubscriber);

    testSubscriber.assertValue(greeting);
}
```

Model-View-ViewModel



What is MVVM and how do you apply it?





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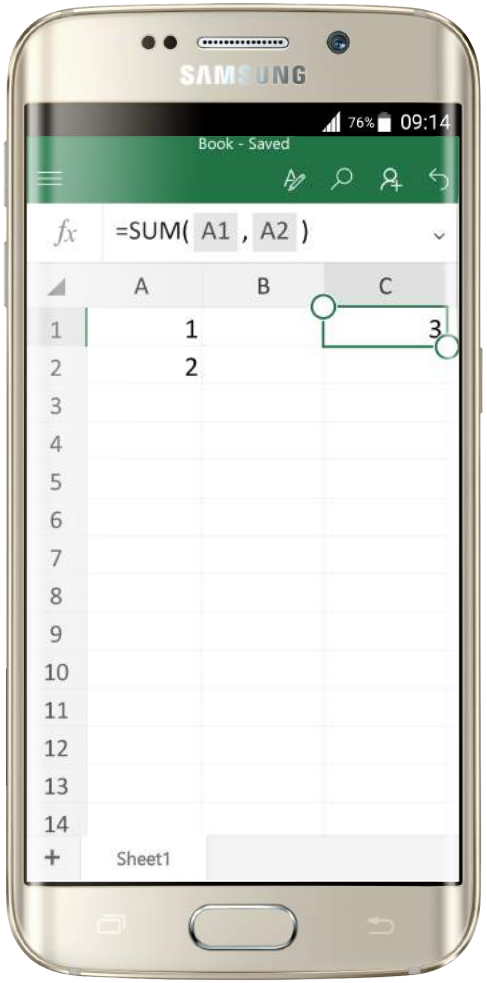
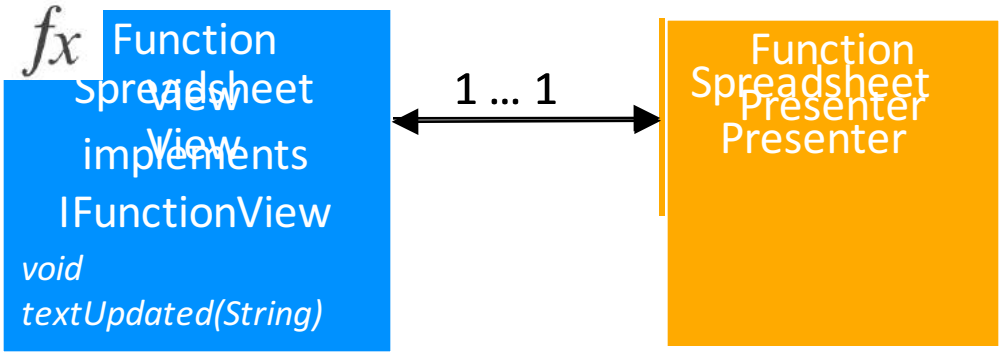
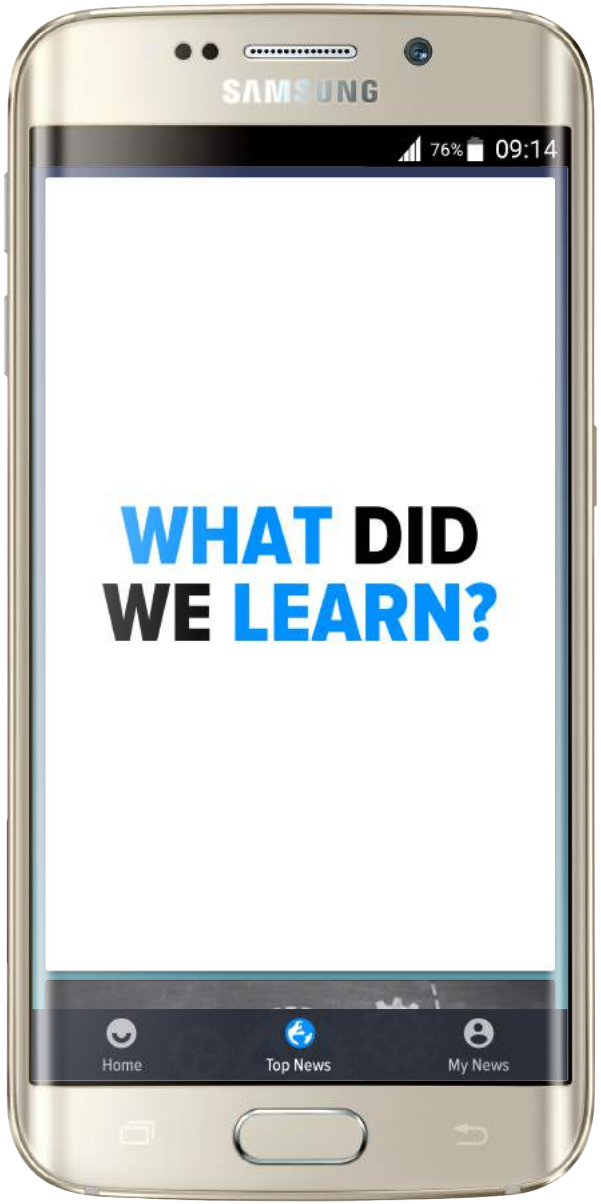
What is MVVM and how do you apply it?







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We made mistakes but we recovered!

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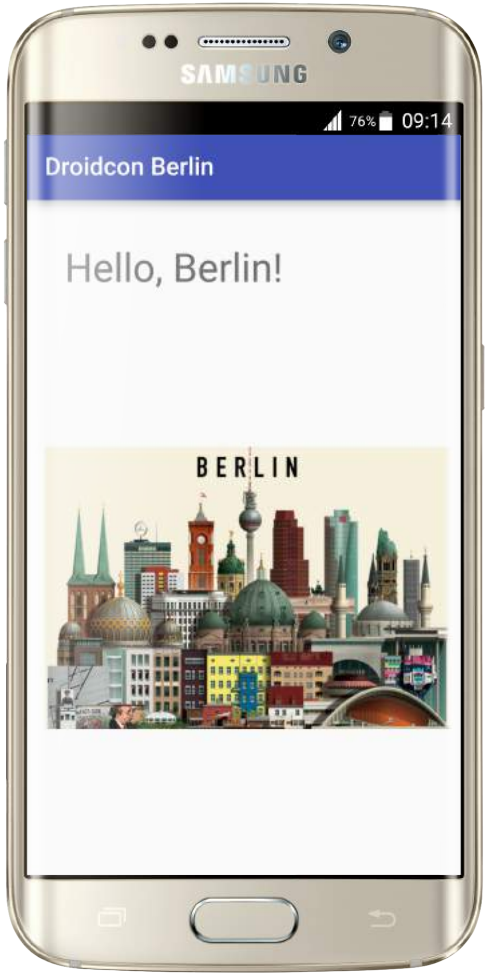
We made mistakes but we recovered!



View

```
private void setGreeting(@NonNull final String greeting) {
    assert mGreetingView != null;

    mGreetingView.setText(greeting);
}
```

View

```
private void setGreeting(@NonNull final String greeting) {
    assert mGreetingView != null;

    mGreetingView.setText(greeting);

    if(greeting.contains("Berlin")){
        setImage(R.drawable.berlin);
    }
}

private void setImage(@DrawableRes final int resId) {
    assert mImageView != null;

    mImageView.setImageResource(resId);
}
```

ViewModel

```
@NonNull
public Observable<String> getGreeting() {
    return mDataModel.getGreeting();
}

@NonNull
public Observable<Integer> getImage() {
    return mDataModel.getGreeting()
                     .filter(greeting -> greeting.contains(BERLIN))
                     .map(__ -> R.drawable.berlin);
}
```

Testing the ViewModel – positive case

```
@NonNull
public Observable<Integer> getImage() {
    return mDataModel.getGreeting()
                     .filter(greeting -> greeting.contains(BERLIN))
                     .map(__ -> R.drawable.berlin);
}
```

```
@Test
public void testGetImage_emits_WhenGreetingContainsBerlin() {
    String greeting = "Hello " + ViewModel.BERLIN;
    Mockito.when(mDataModel.getGreeting()).thenReturn(Observable.just(greeting));
    TestSubscriber<Integer> testSubscriber = new TestSubscriber<>();

    mViewModel.getImage().subscribe(testSubscriber);

    testSubscriber.assertValue(R.drawable.berlin);
}
```

Testing the ViewModel – negative case

```
@NonNull
public Observable<Integer> getImage() {
    return mDataModel.getGreeting()
                     .filter(greeting -> greeting.contains(BERLIN))
                     .map(__ -> R.drawable.berlin);
}
```

```
@Test
public void testGetImage_doesNotEmit_WhenGreetingDoesNotContainBerlin() {
    String greeting = "Hello, World!";
    Mockito.when(mDataModel.getGreeting()).thenReturn(Observable.just(greeting));
    TestSubscriber<Integer> testSubscriber = new TestSubscriber<>();

    mViewModel.getImage().subscribe(testSubscriber);

    testSubscriber.assertNoValues();
}
```

View

```
private void bind() {
    mSubscription = new CompositeSubscription();

    mSubscription.add(mViewModel.getGreeting()
                                .subscribeOn(Schedulers.computation())
                                .observeOn(AndroidSchedulers.mainThread())
                                .subscribe(this::setGreeting));

    mSubscription.add(mViewModel.getImage()
                                .subscribeOn(Schedulers.computation())
                                .observeOn(AndroidSchedulers.mainThread())
                                .subscribe(this::setImage));
}

private void setGreeting(@NonNull final String greeting) {
    assert mGreetingView != null;

    mGreetingView.setText(greeting);
}

private void setImage(@DrawableRes final int resId) {
    assert mImageView != null;

    mImageView.setImageResource(resId);
}
```

What about Views that don’t have have lifecycle events?

```java
@Override
protected void onResume() {
    super.onResume();
    bind();
}

@Override
protected void onPause() {
    unbind();
    super.onPause();
}
```

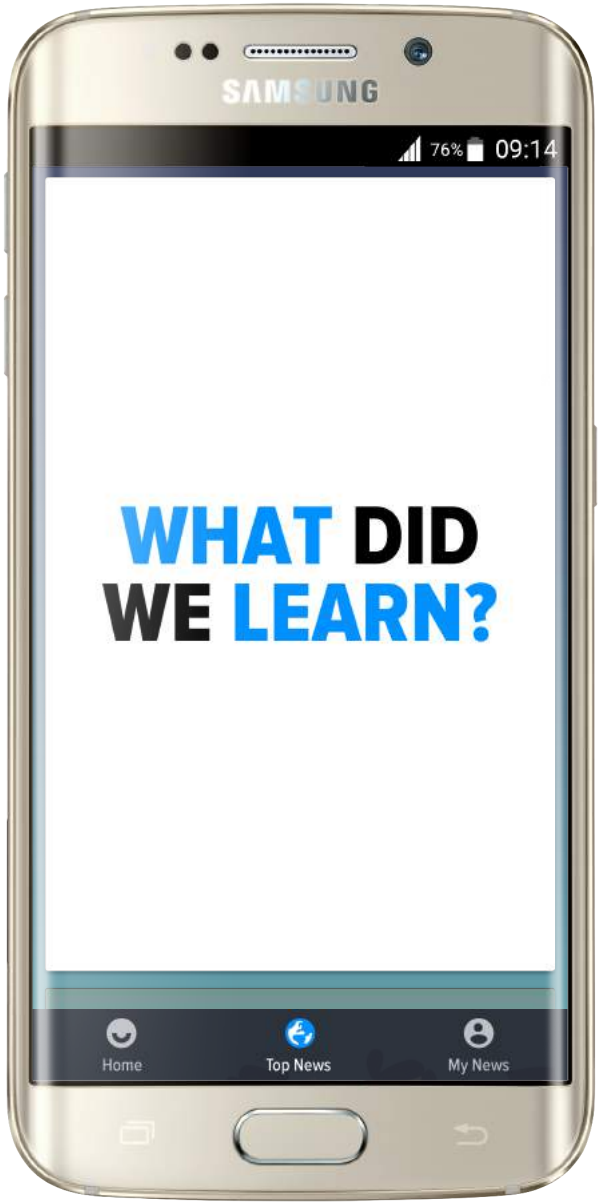
```java
private void bind() {
    mSubscription = new CompositeSubscription();

    mSubscription.add(mViewModel.getGreeting()
                                .subscribe(this::setGreeting));
}

private void unbind() { mSubscription.unsubscribe(); }

private void setGreeting(@NonNull final String greeting) {
    assert mGreetingView != null;

    mGreetingView.setText(greeting);
}
```

Views and subscriptions

```
public class MyView extends LinearLayout {

    @NonNull
    private CompositeSubscription mSubscription;

    @NonNull
    private ViewModel mViewModel;

    @Nullable
    private TextView mGreetingView;

    public MyView(@NonNull final Context context,
                  @NonNull final ViewModel viewModel) {
        super(context);
        mSubscription = new CompositeSubscription();
        mViewModel = viewModel;

        View.inflate(context, R.layout.view_layout, this);
        mGreetingView = (TextView) findViewById(R.id.greeting);

        bind();
    }

    private void bind() {
        mSubscription.add(mViewModel.getGreeting()
                                    .subscribe(this::setGreeting));
    }

    private void setGreeting(@NonNull final String greeting) {
        assert mGreetingView != null;

        mGreetingView.setText(greeting);
    }
```

Views and subscriptions

```
private void unbind() { mSubscription.clear(); }

@Override
protected void onDetachedFromWindow() {
    unbind();
    super.onDetachedFromWindow();
}
```



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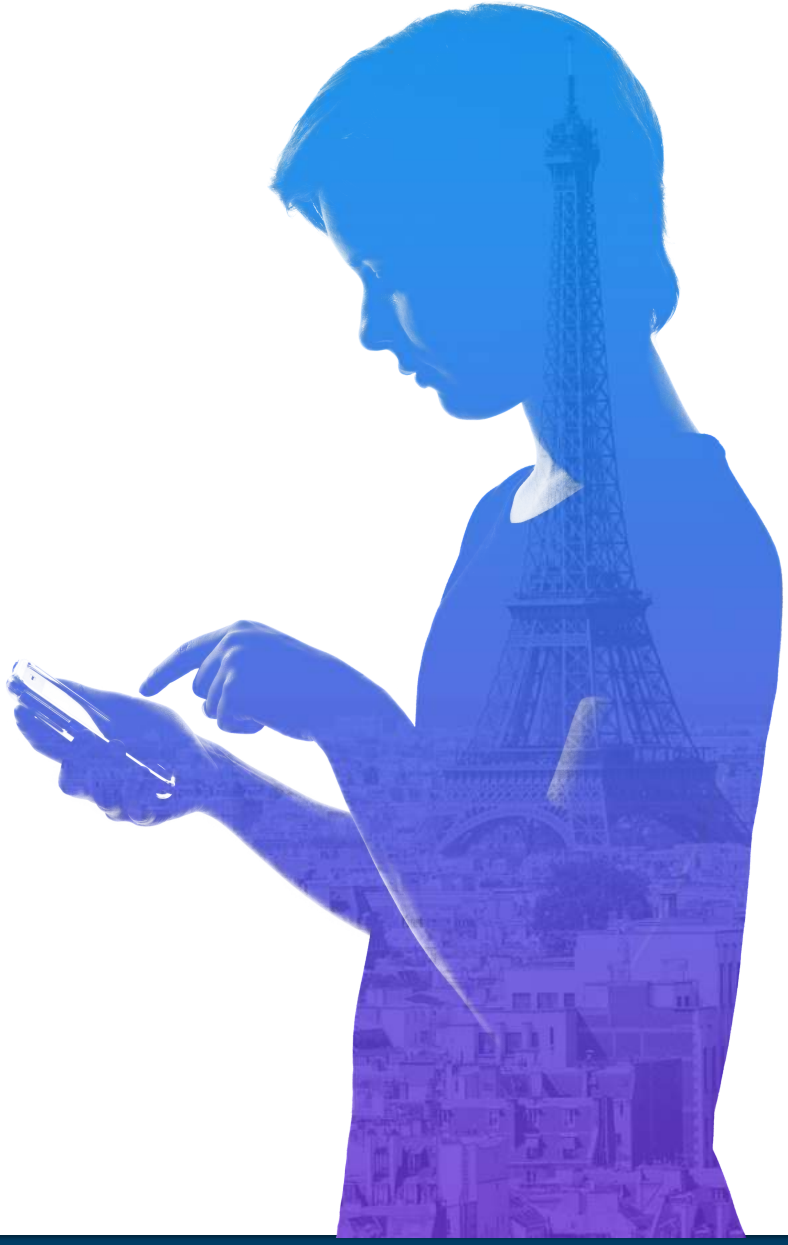
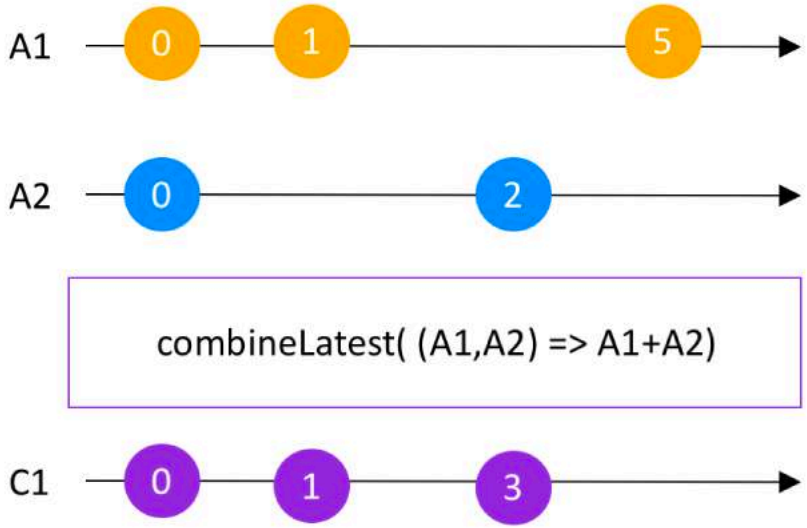
RxJava – the good and the bad



RxJava vs Threads/AsyncTask/Event bus frameworks

```
@NonNull
public Observable<Integer> getImage() {
    return mDataModel.getGreeting()
                     .filter(greeting -> greeting.contains(BERLIN))
                     .map(__ -> R.drawable.berlin);
}
```

Stream composability FTW!



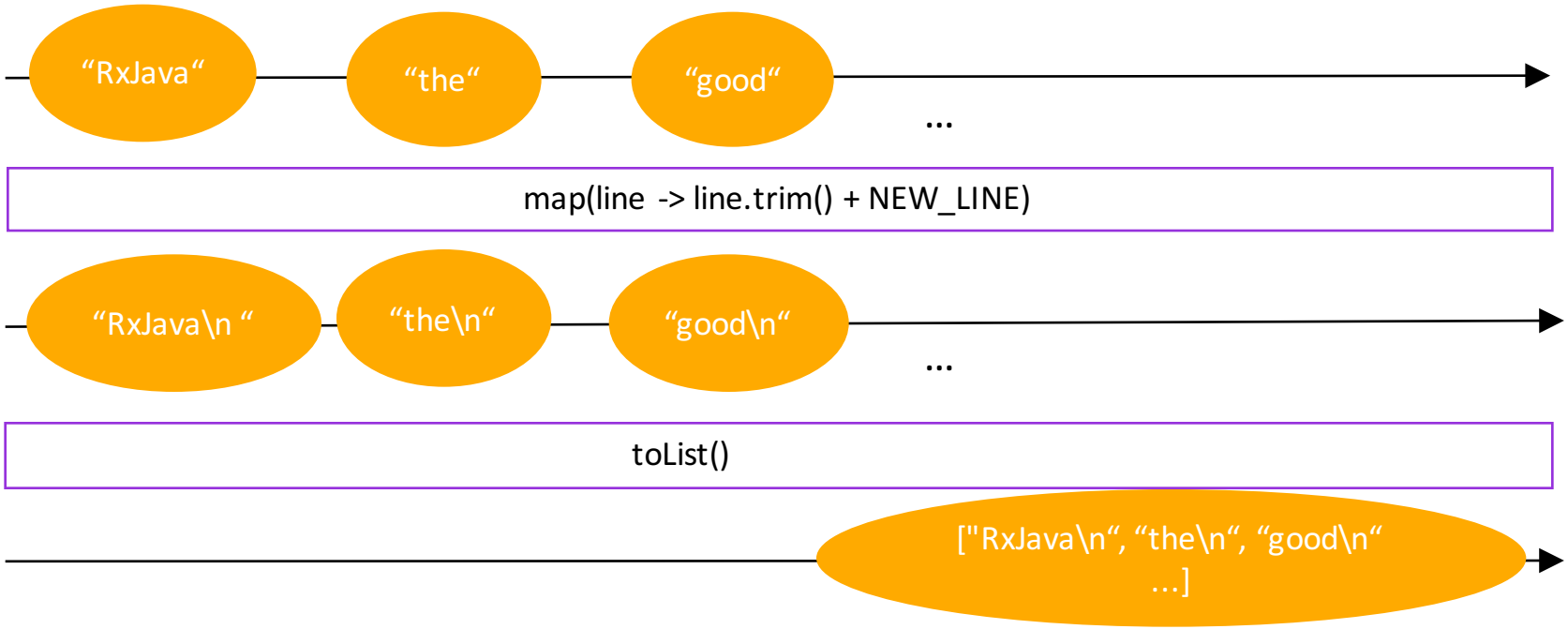

```
@NonNull
public Observable<Integer> getSum(@NonNull final Observable<Integer> a1,
                                  @NonNull final Observable<Integer> a2) {
    return Observable.combineLatest(a1,
                                    a2,
                                    (value1, value2) -> value1 + value2);
}
```

Split a string using a regular expression and append a new line to each item in the resulting list

“RxJava – the good and the bad”

[“RxJava\n”, “the\n”, “good\n”, ”and\n”, “the\n”, ”bad\n”]

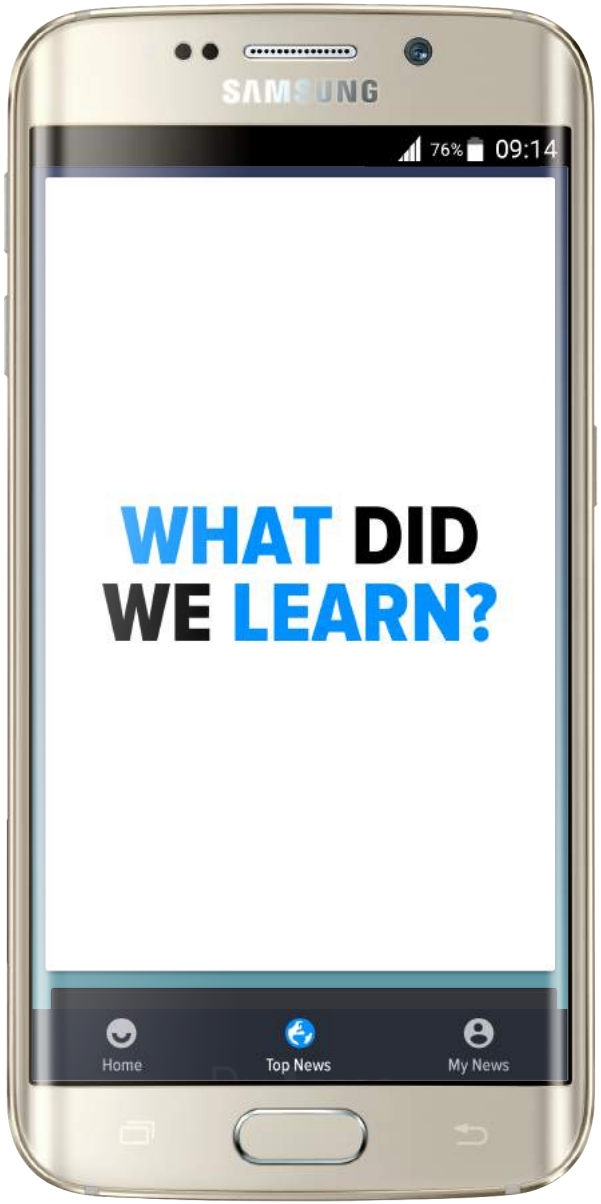
```
private static List<String> splitDeclarative(@NonNull final String text) {
    return Observable.from(text.split(SEPARATOR))
                     .map(line -> line.trim() + NEW_LINE)
                     .toList()
                     .toBlocking()
                     .single();
}
```



Split a string using a regular expression and append a new line to each item in the resulting list

```
private static List<String> splitDeclarative(@NonNull final String text) {
    return Observable.from(text.split(SEPARATOR))
                     .map(line -> line.trim() + NEW_LINE)
                     .toList()
                     .toBlocking()
                     .single();
}
```

```
private static List<String> splitIterative(@NonNull final String text) {
    String[] splitString = text.split(SEPARATOR);
    List<String> strings = new ArrayList<>();
    for (final String line : splitString) {
        strings.add(line.trim() + NEW_LINE);
    }
    return strings;
}
```



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RxJava and MVVM the perfect mix

Exclusive to Samsung

Simple MVVM example: https://github.com/florina-muntenescu/DroidconMVVM
MVP vs MVVM example: https://github.com/florina-muntenescu/MVPvsMVVM

upday tech blog: **https://upday.github.io/**

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