

4 x 4

1

Android research assignment

4 X 4

Android game + Firebase

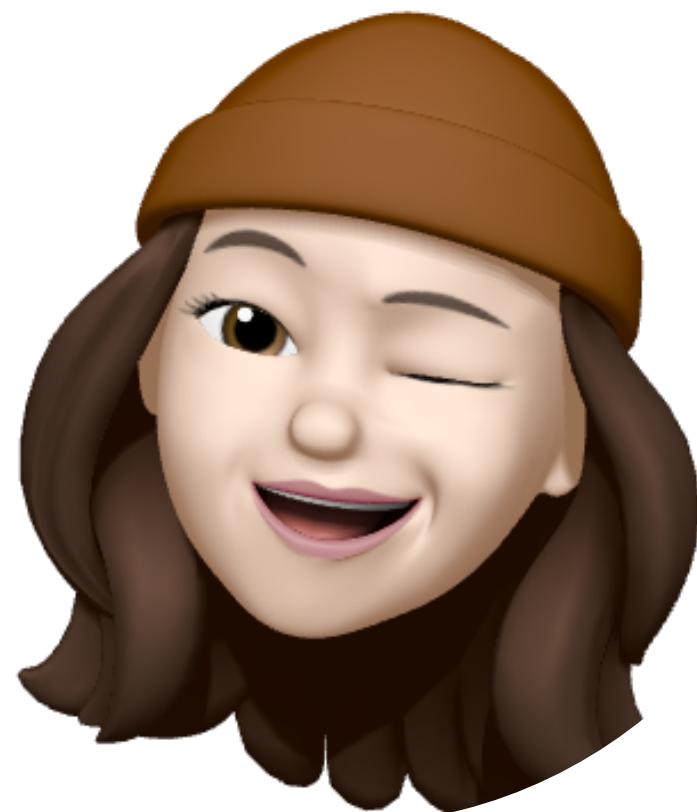
Android research assignment

4 x 4

# TEAM



Kornkanok Sangwichien  
N3570



Anna Paszcza  
N2305

What are we  
going to talk  
today?

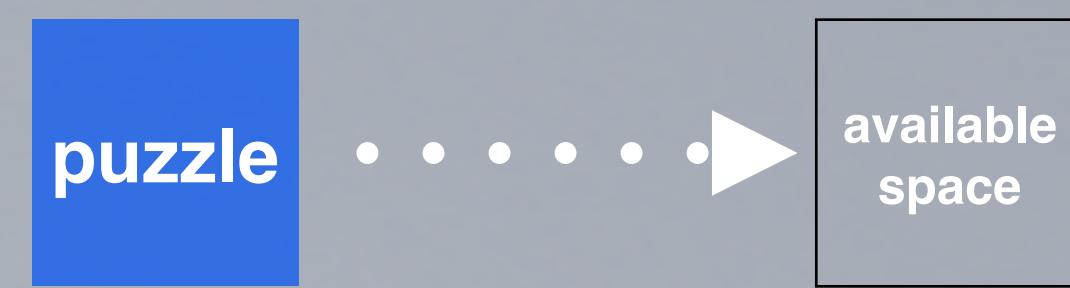
- Idea
- ReactiveX
- Firebase
- Our game

Idea

01 —————



Idea



# Idea



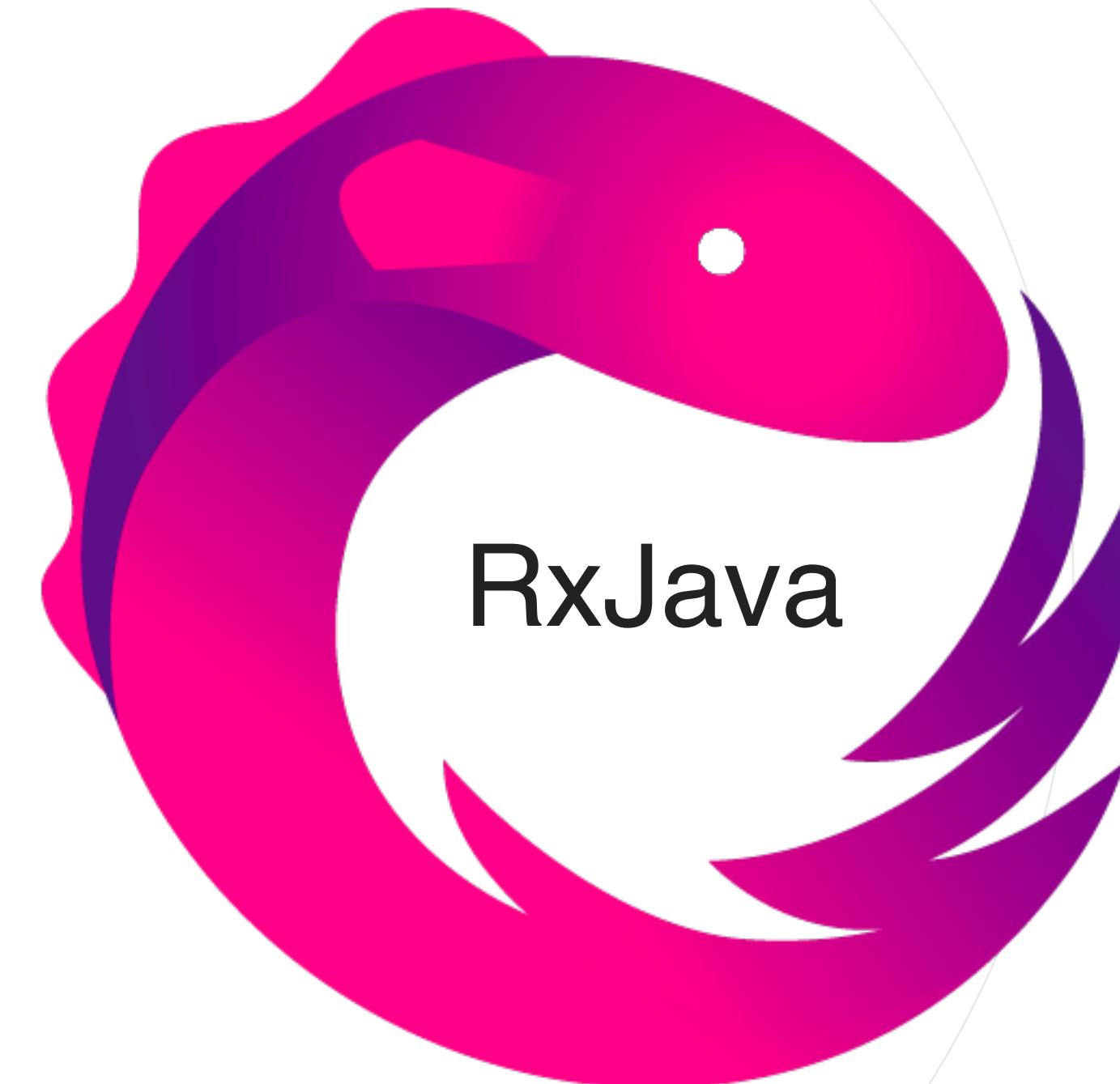
available  
space

puzzle

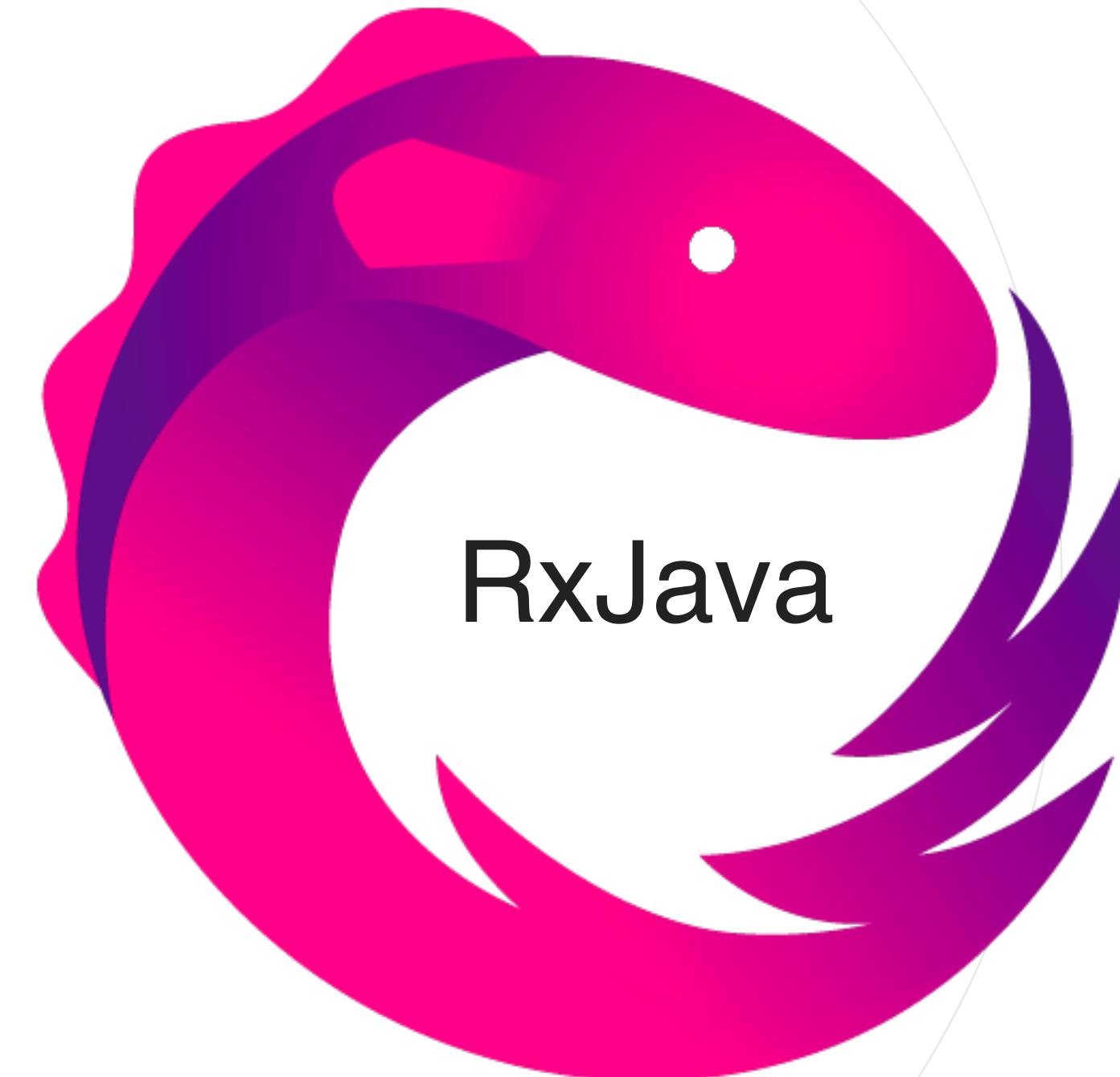
Idea

# ReactiveX

02 —



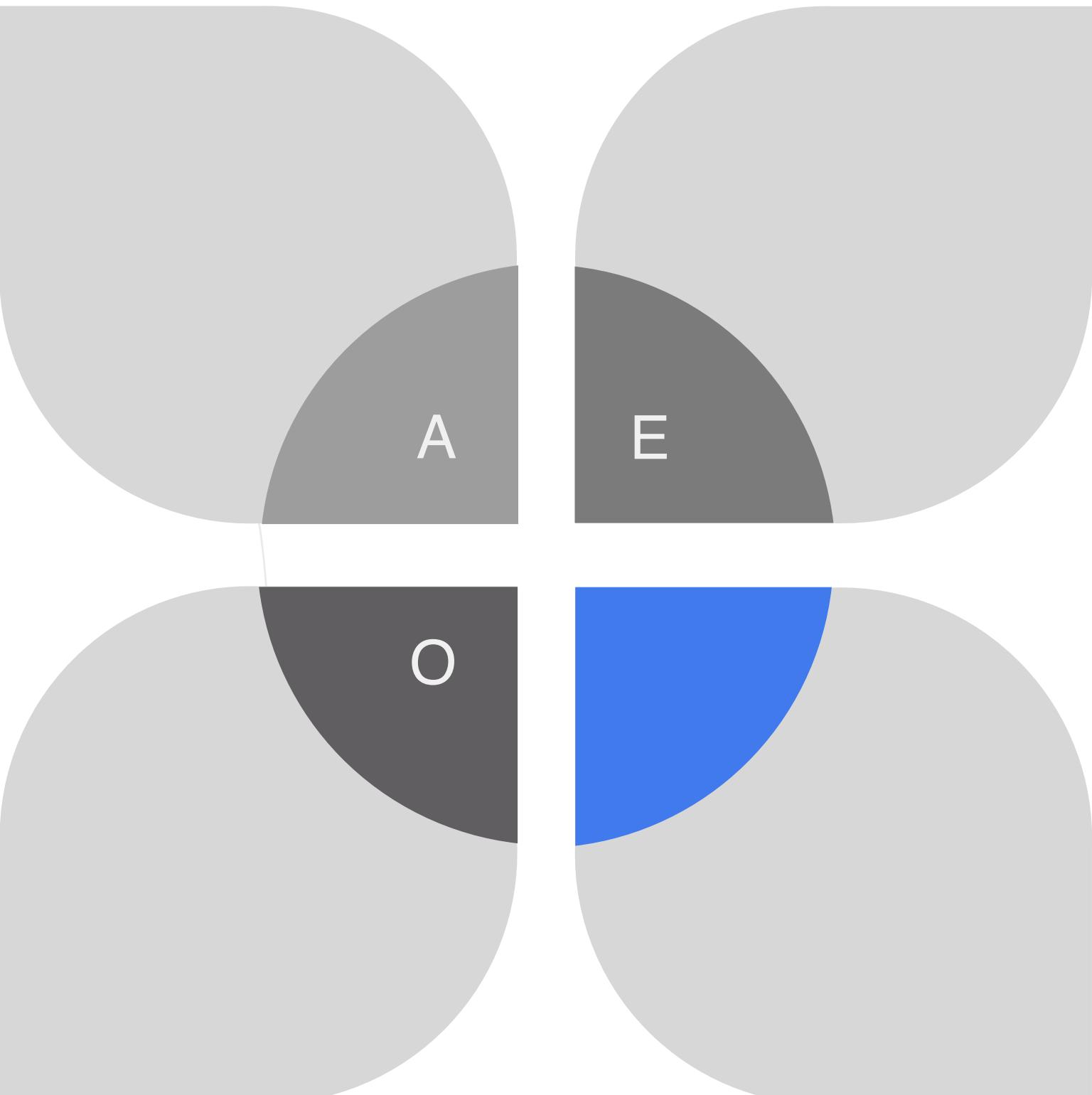
“ Java VM implementation  
of Reactive Extensions ”



Reactive Extension(ReactiveX)  
as a library for composing  
asynchronous and event-based  
programs by using observable  
sequences.

**Asynchronous:**  
It implies that the different parts of a program run simultaneously

**Observable sequences:**  
It will be better understood by the mechanics of it. So, we will come back to it later in this article



**Event-Based:**  
The program executes the codes based on the events generated while the program is running. For Example, a Button click triggers an event and then the program's event handler receives this event

RxJava free us from the callback hell by providing the composing style of programming. We can plug in various transformations that resembles the Functional programming.

4 x 4

12

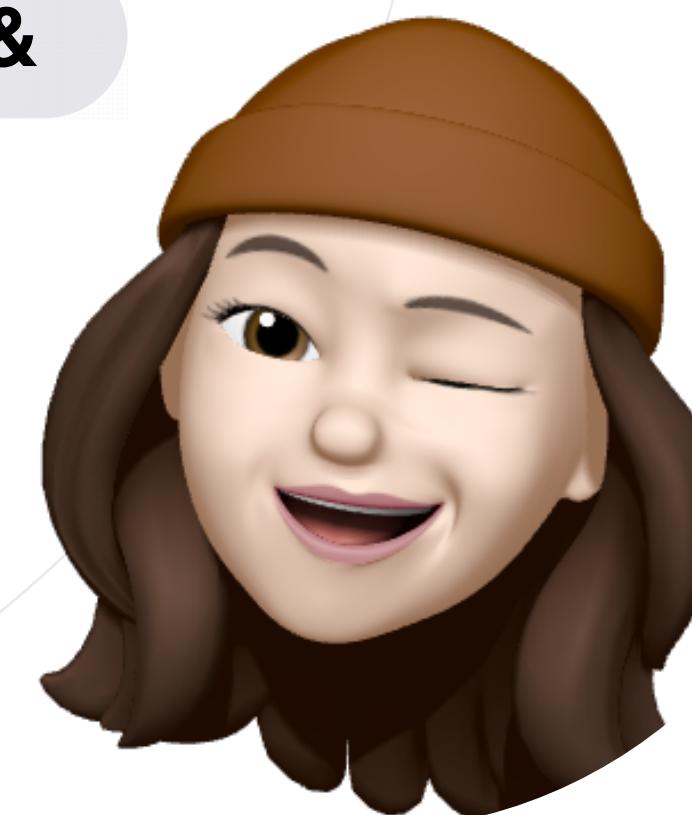
Reactivex

**Exam**

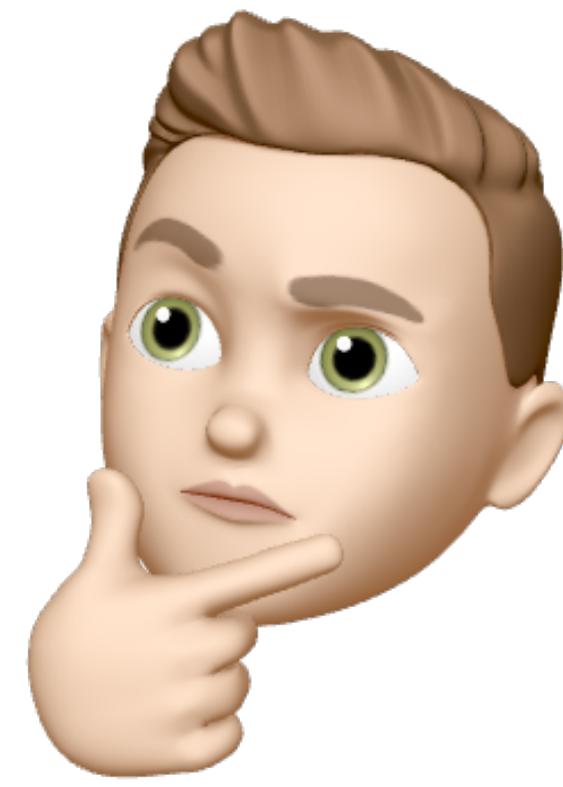


**Muta**

!@#\$%^&



**Anna**



**Michał**



**Teacher**

Android research assignment

# Exam

Cheating...



Muta



Anna



Michał



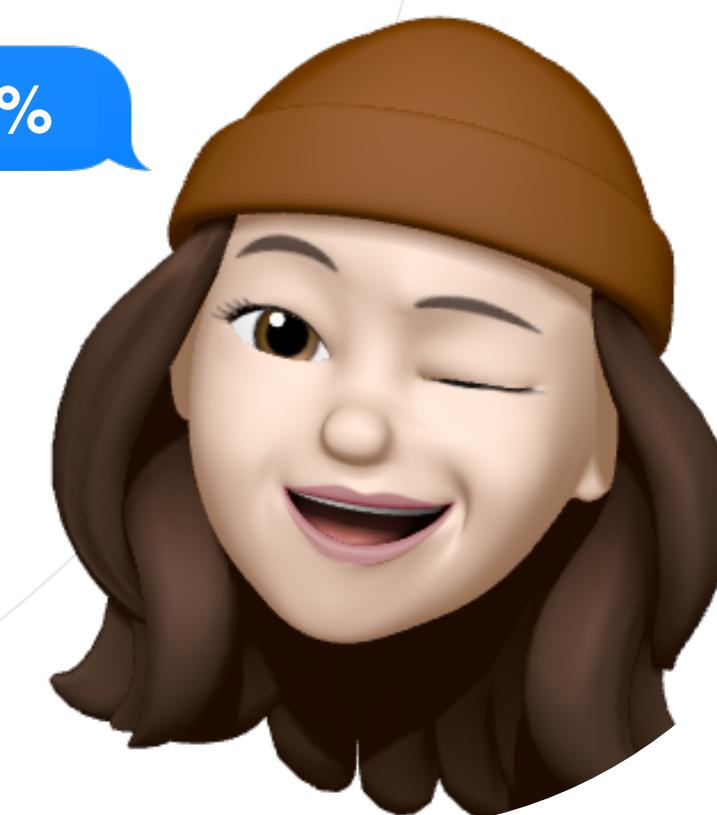
Teacher

# Reactivex

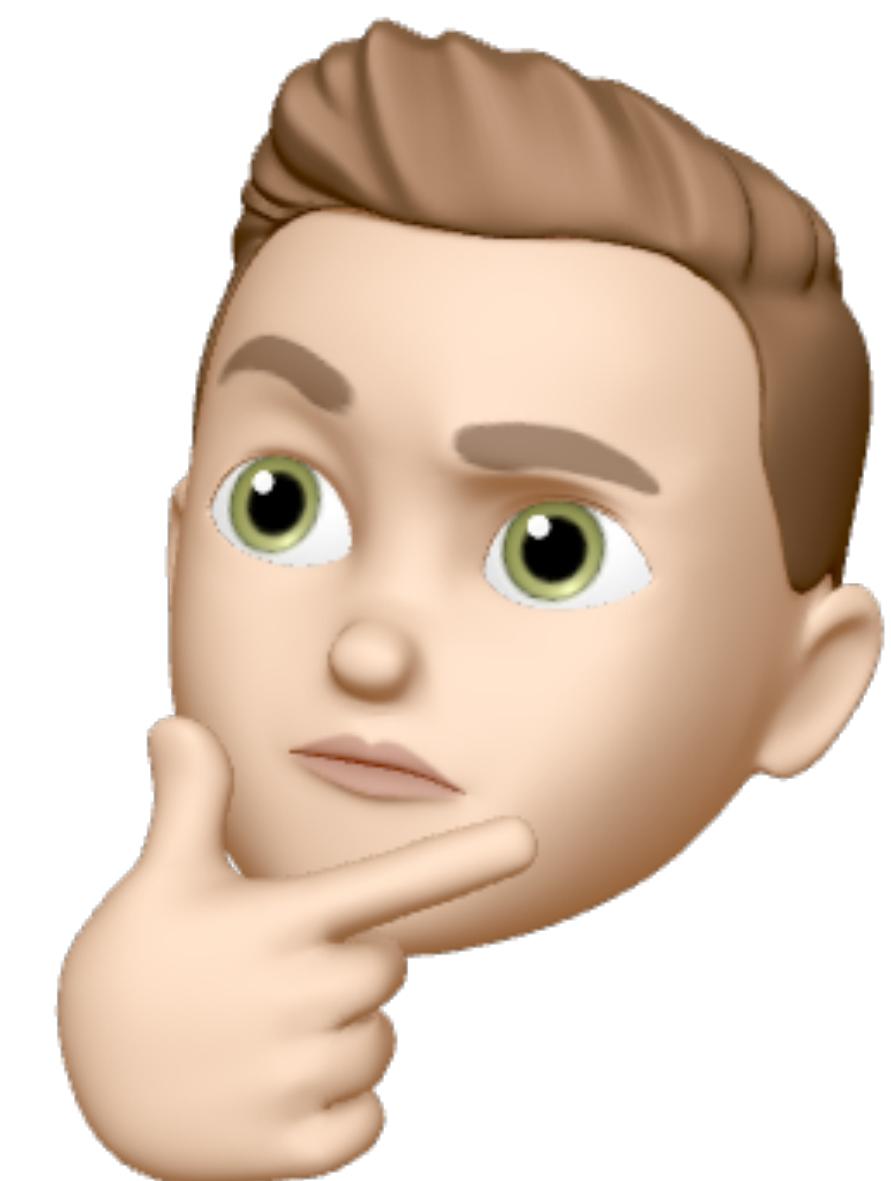


Muta

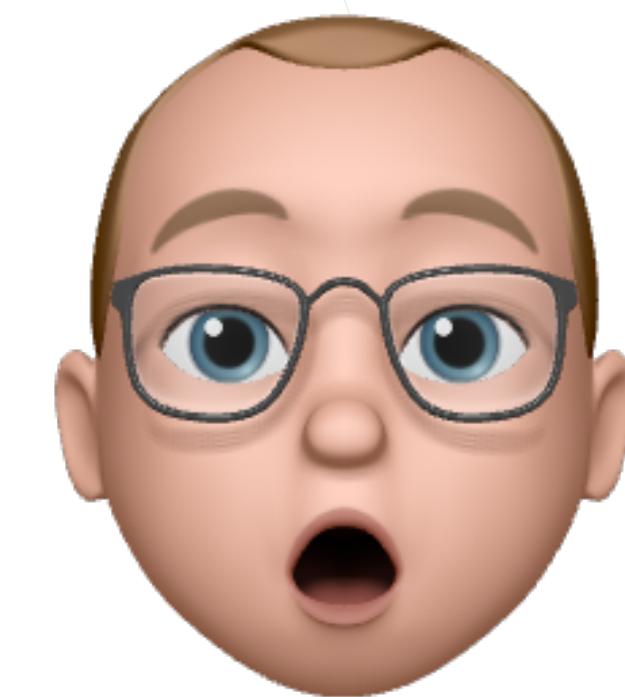
!@#\$%^&  
!@#\$%



Anna



Michał



Teacher

Exam

**Michał watching Anna closely**

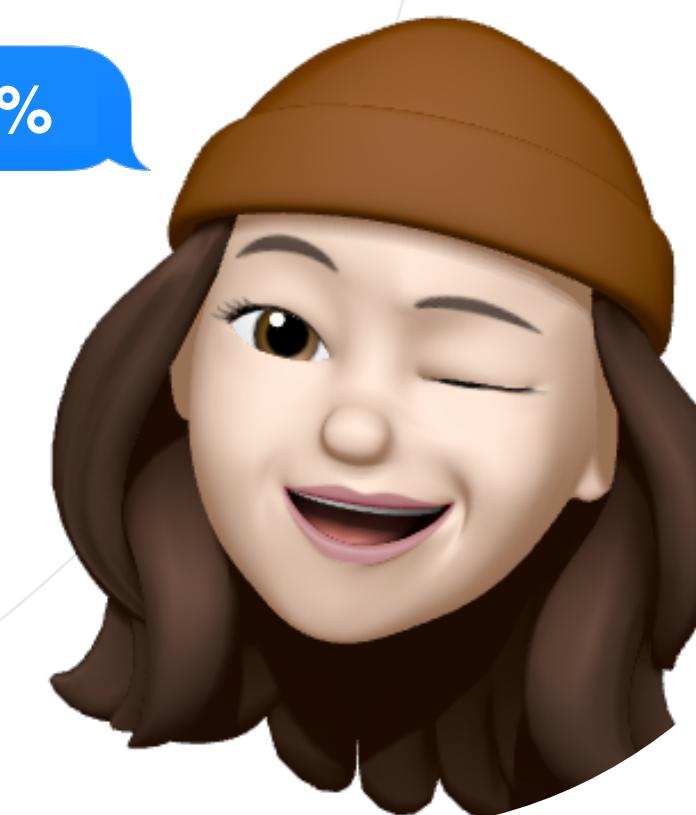
Exam

**Michał reporting to teacher as the events took place**



Muta

!@#\$%^&  
!@#\$%



Anna



Michał



Teacher

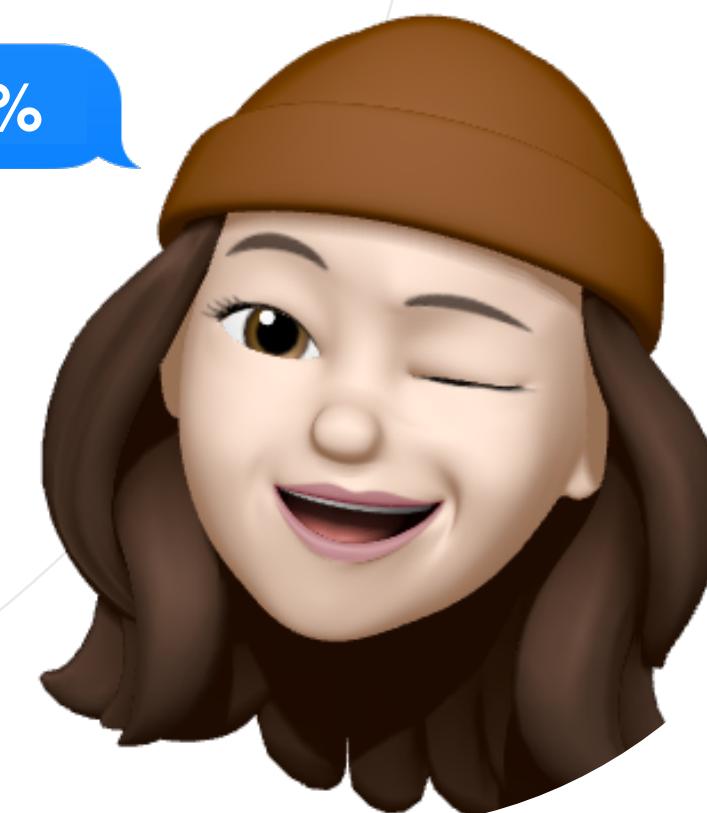
Exam

# Observer

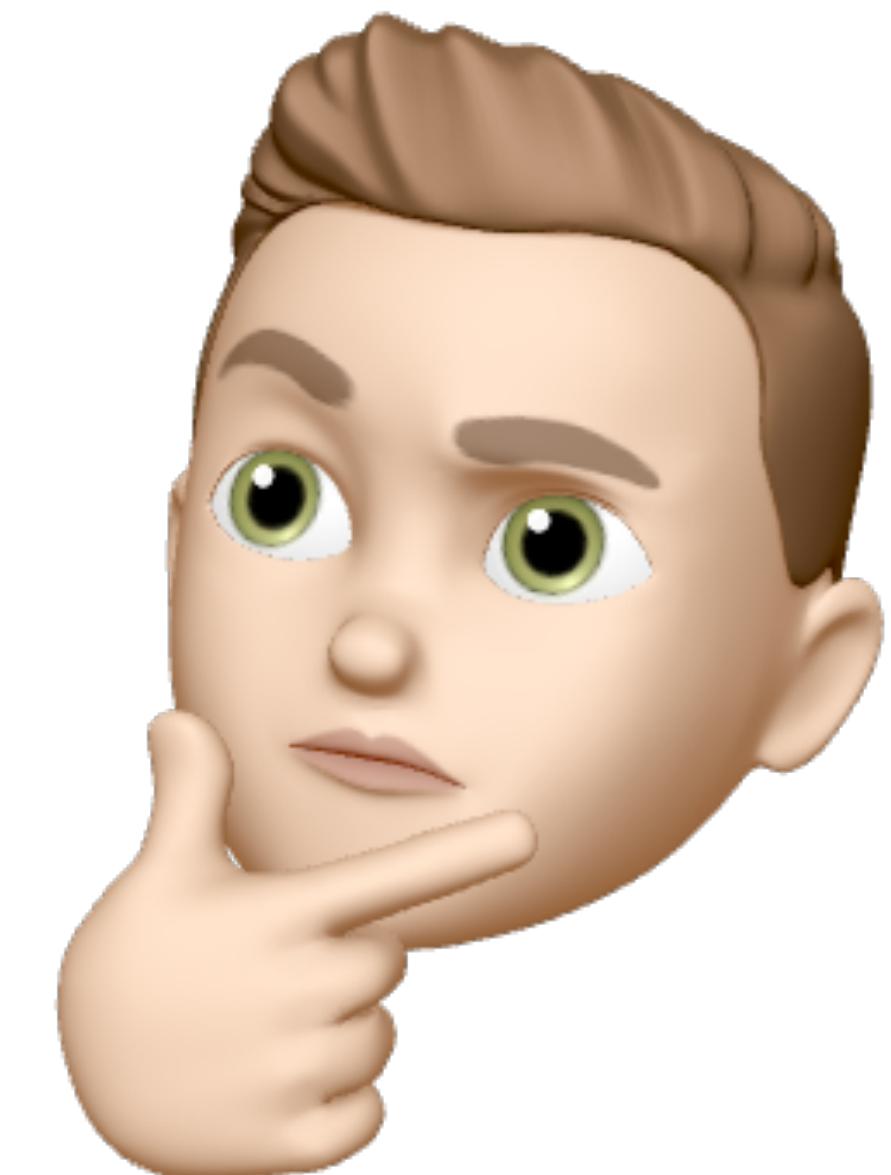


Muta

!@#\$%^&  
!@#\$%



Anna



Michał

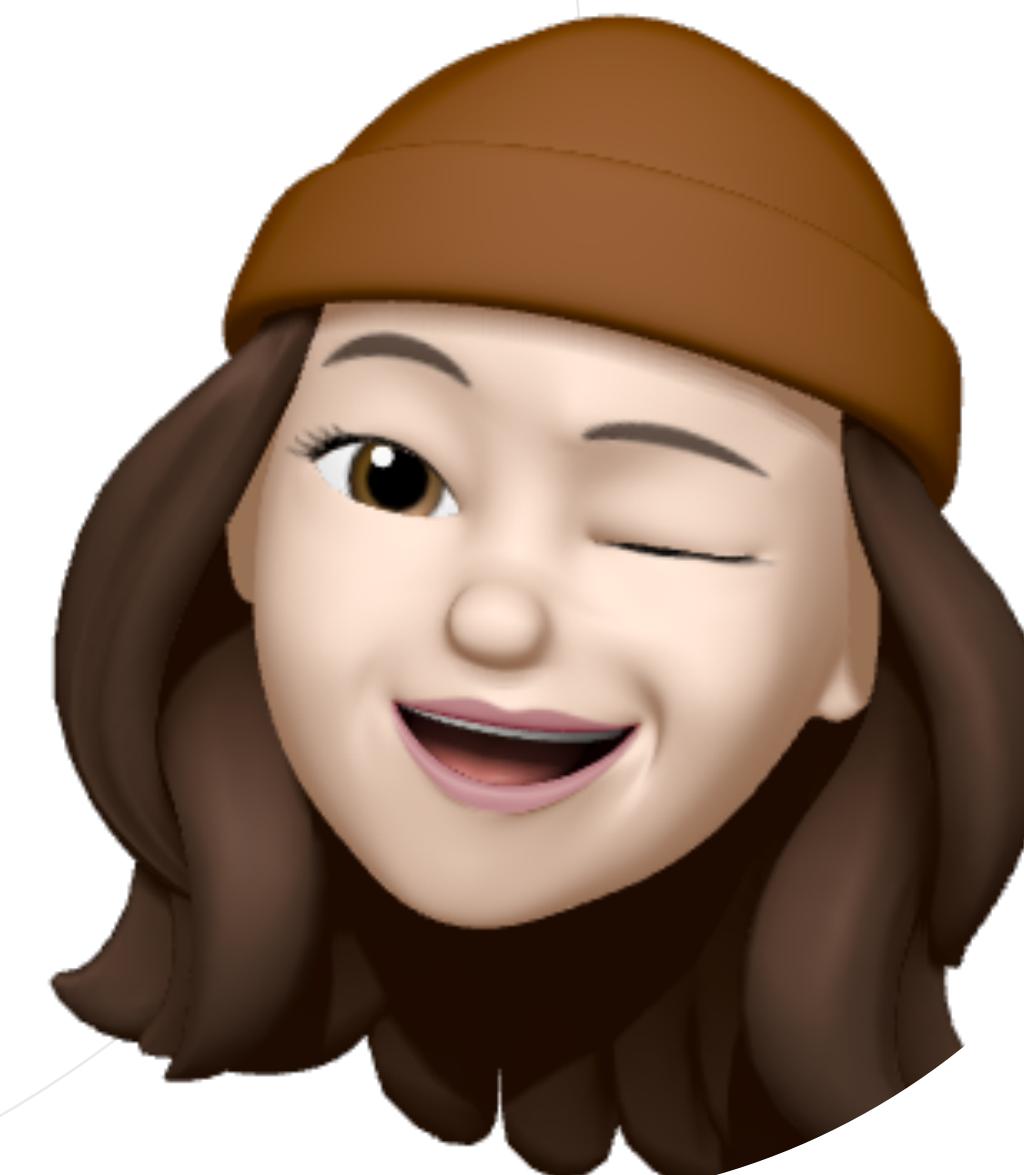


Teacher

Reactivex



Muta



Anna



Michał



Teacher

Data

Exam

Observer

# Exam

**Michał was told to watch and report Anna as her state changes, and he's to make a callback to whoever is listening to him (the teacher)**

**Data**



**Muta**

**Observer**



**Anna**



**Michał**



**Teacher**

# Reactivex

```
val anna: Observable<Mistakes>
val michal: Subscriber
Anna = Observable.just(
    Mistakes("Wrong change"),
    Mistakes("Dropped change"),
    Mistakes("Wrong change")
)
michal = anna.subscribe({ whatHappened -> reportToTeacher(whatHappened) })
```



**Muta**



**Anna Data**



**Michał  
Observer**



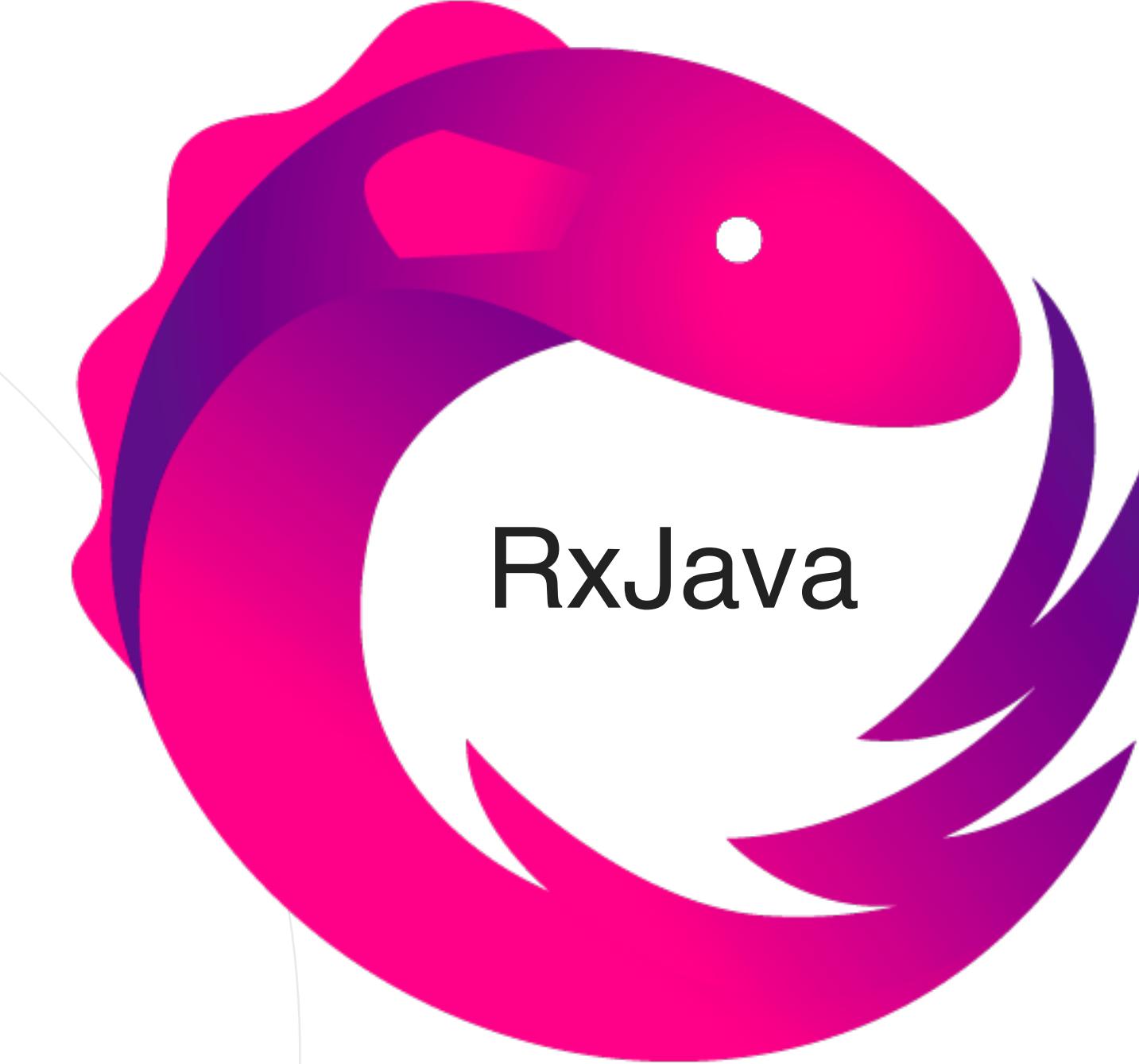
**Teacher**

4 x 4

Reactivex



**<http://reactivex.io/documentation>**



+



# Reactivex

```
dependencies {  
    ...  
    implementation "io.reactivex.rxjava2:rxjava:2.2.7"  
    implementation "io.reactivex.rxjava2:rxandroid:2.1.1"  
}
```

# ReactiveX

```
mergeClicks().switchMap { it: Boolean
    if (it) timerObservable() ^switchMap
    else Observable.empty() ^switchMap
} .subscribe(text_view_countdown::setText)
    .let(disposable::add)

private fun mergeClicks(): Observable<Boolean> =
listOf(
    button_start.clicks().map { true },
    button_reset.clicks().map { false })
    .merge()
    .doOnNext(::buttonStateManager)

private fun timerObservable(): Observable<String> =
Observable.interval(initialDelay: 0, period: 1, TimeUnit.SECONDS)
    .takeWhile { it <= MAXIMUM_STOP_WATCH_LIMIT }
    .map(timeFormatter)
    .observeOn(AndroidSchedulers.mainThread())
    .doOnComplete { buttonStateManager(boolean: false) }
```

# Firebase

03 —

set of tools offered by  
GOOGLE to build scalable  
applications in the cloud



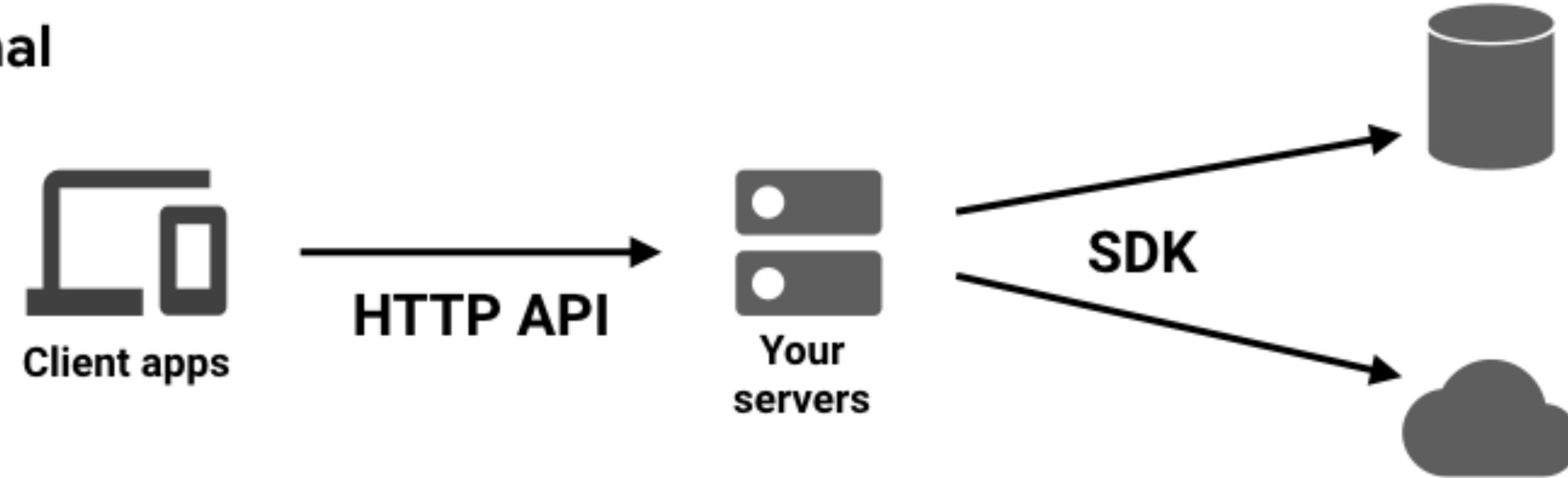
Firebase is Google's mobile application development platform that helps you build, improve, and grow your app.

REALTIME

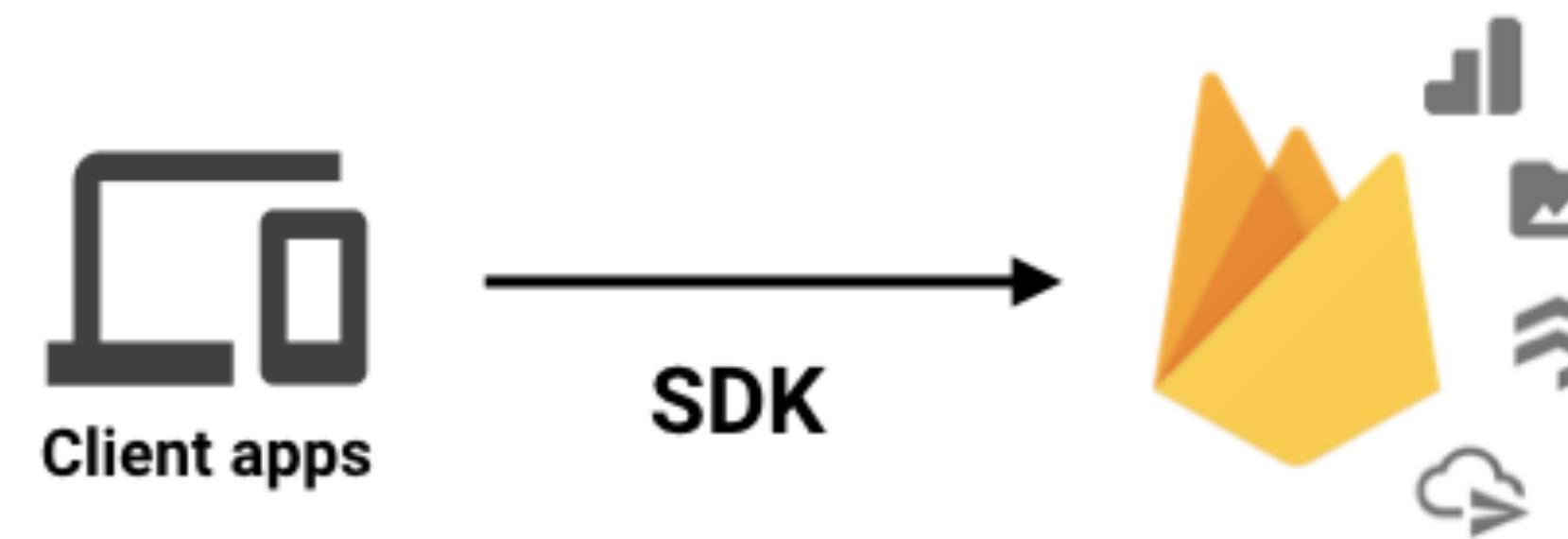


# FIREBASE

## Traditional



## Firebase



## Your Firebase projects

1

[Add project](#)

AndroidGame

androidgame-95656



## WeatherApp

weatherapp-6f3c9



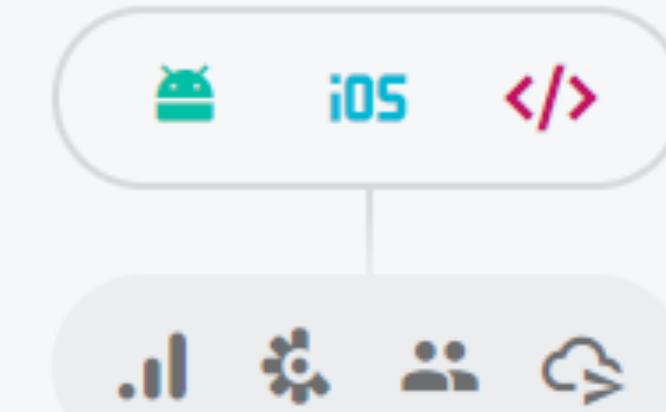
## Explore a demo project



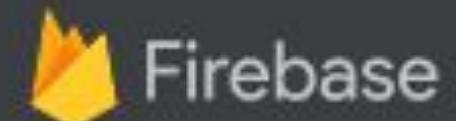
Firebase projects are containers for your apps

Apps in a project share features like Realtime Database and Analytics

 [Learn more](#)



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Firebase gives you the tools and infrastructure from Google to help you develop, grow and earn money from your app. [Learn more](#)

► **Analytics**

Measure user activity and engagement with free, easy, and unlimited analytics. [More info](#)

► **Cloud Messaging**

Deliver and receive messages and notifications reliably across cloud and device. [More info](#)

► **Authentication**

Sign in and manage users with ease, accepting emails, Google Sign-In, Facebook and other login providers. [More info](#)

▼ **Realtime Database**

Store and sync data in realtime across all connected clients. [More info](#)

► [Save and retrieve data](#)

► **Storage**

Store and retrieve large files like images, audio, and video without writing server-side code. [More info](#)

► **Remote Config**

Customize and experiment with app behavior using cloud-based configuration parameters. [More info](#)

► **Test Lab**

Test your apps against a wide range of physical devices hosted in Google's cloud. [More info](#)

► **App Indexing**

Get your app content into Google Search. [More info](#)

► **Dynamic Links**

Create web URLs that can be shared to drive app installs and deep-linked into relevant content of your app. [More info](#)

## Save and retrieve data

Our cloud database stays synced to all connected clients in realtime and remains available when your app goes offline. Data is stored in a JSON tree structure rather than a table, eliminating the need for complex SQL queries.

[Launch in browser](#)

### ① Connect your app to Firebase

✓ Connected

### ② Add the Realtime Database to your app

✓ Dependencies set up correctly

### ③ Configure Firebase Database Rules

The Realtime Database provides a declarative rules language that allows you to define how your data should be structured, how it should be indexed, and when your data can be read from and written to. By default, read and write access to your database is restricted so only authenticated users can read or write data. To get started without setting up [Authentication](#), you can [configure your rules for public access](#). This does make your database open to anyone, even people not using your app, so be sure to restrict your database again when you set up authentication.

### ④ Write to your database

Retrieve an instance of your database using `getInstance()` and reference the location you want to write to.

```
// Write a message to the database
FirebaseDatabase database = FirebaseDatabase.getInstance();
DatabaseReference myRef = database.getReference("message");
```

# FIREBASE

4 x 4

Your apps

Add app

Android apps

AndroidGame  
com.example.androidgame

Download the latest config file

[google-services.json](#)

App ID ⓘ  
1:1034946675171:android:b7a7a4825c245c77eda0d6

App nickname  
AndroidGame 

Package name  
com.example.androidgame

SHA certificate fingerprints ⓘ Type ⓘ

|  |         |
|--|---------|
| 78:4d:06:a6:d9:a5:0e:a9:54:04:48:7d:2e:24:4b:9f:bd:57:ef:71        | SHA-1   |
| 53:40:5e:0f:3b:6c:49:e2:5a:cb:78:84:58:73:97:76:38:76:65:80        | SHA-1   |
| 85:35:7a:8c:21:b9:95:91:5a:f7:f5:da:26:48:d6:bd:93:d4:2a:b0:79:... | SHA-256 |

Add fingerprint

Remove this app

# FIREBASE

4 x 4

Your apps

Android apps

 **AndroidGame**  
com.example.androidgame

**Add app**

**Download the latest config file**

This file contains configuration details, such as keys and identifiers, for the services that you have just enabled.

**google-services.json**

**App ID** ②  
1:1034946675171:android:b7a7a4825c245c77eda0d6

**App nickname**  
AndroidGame 

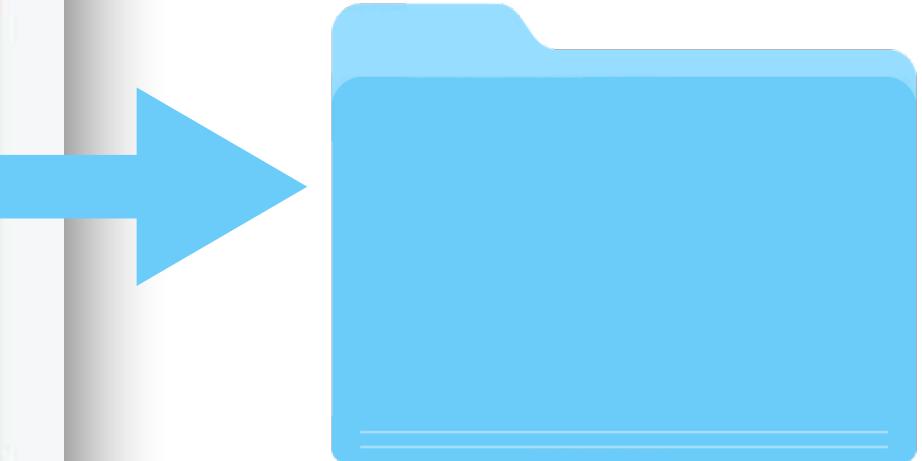
**Package name**  
com.example.androidgame

**SHA certificate fingerprints** ② **Type** ②

|   |         |
|---|---------|
| 78:4d:06:a6:d9:a5:0e:a9:54:04:48:7d:2e:24:4b:9f:bd:57:ef:71       | SHA-1   |
| 53:40:5e:0f:3b:6c:49:e2:5a:cb:78:84:58:73:97:76:38:76:65:80       | SHA-1   |
| 85:35 7a:8c:21:b9:95:91:5a:f7:f5:da:26:48:d6:bd:93:d4:2a:b0:79:.. | SHA-256 |

**Add fingerprint**

**Remove this app**



ApplicationFolder

## FIREBASE

```
implementation 'com.google.firebaseio:firebase-database:18.0.1'  
implementation 'com.google.firebaseio:firebase-analytics:17.2.0'
```

```
ref = FirebaseDatabase.getInstance().reference  
scoreReading(ref)
```

```
ref.child(scoreId).setValue(userScore)
```

# FIREBASE

```
fun scoreReading(reference: DatabaseReference){  
    reference.addValueEventListener(object : ValueEventListener {  
        override fun onDataChange(dataSnapshot: DataSnapshot) {  
  
            .  
            .  
            .  
  
            for (scoreSnapshot in dataSnapshot.children) {  
  
                .  
                .  
                .  
  
            }  
        }  
        textView_highscore.setText("Highest score: "+highestString.toString())  
    }  
    override fun onCancelled(error: DatabaseError) {  
        // Failed to read value  
        println("Failed to read value.")  
    }  
})  
}
```

# FIREBASE

4 x 4

AndroidGame ▾

## Database

Realtime Database ▾

Data   Rules   Backups   Usage

The screenshot shows the Firebase Realtime Database console. At the top, there is a URL bar with the address <https://androidgame-95656.firebaseio.com/>. Below the URL bar are three buttons: a plus sign (+), a minus sign (-), and a three-dot menu icon.

The main area displays a list of database nodes under the root reference "androidgame-95656". The nodes are listed vertically, each preceded by a small square icon. The first node is highlighted with a red rectangular selection box. The nodes are:

- LtGd5aP7o\_02NnBuLVY: "0:2"
- LtGd78TBZbxJXHRkWWi: "0:4" (highlighted)
- LtGdB42EaOBne6ZnwP8: "0:1"
- LtGdBUExgHEgL6GQrYr: "0:1"
- LtGdB\_COFDLZK6smgUW: "0:1"
- LtGdBgd6D0die8MTvn8: "0:1"
- LtGdBzQh0pFIW1GRN6E: "0:1"
- LtGdC61Xc7JwB-QmJGN: "0:1"
- LtGdPYSo6BW65NaO9Li: "0:4"
- LtGdU\_imHEMTdM5Jwhi: "0:1"
- LtGdUr-Wq9qmBphCk5r: "0:1"
- LtGdUyC8NlihMcNfe4V: "0:1"
- LtGdV2dy-rFw9JmfwHY: "0:1"
- LtGdVnH7KHKy3z-LZHe: "0:2"
- LtGdWNypFCu7De24Glf: "0:1"
- LtGdXUYuPijZIB2-fHV: "0:1"
- LtGdYdKHEcnzzJkQ9fd: "0:1"
- LtGdYfVZllqfGDls8uS: "0:1"
- LtGdZk-BPJVIHF2Z1g: "0:1"
- LtGd\_pStTN6C1pAQhlv: "0:1"
- LtGdb6CXCSXH2LigNL: "0:1"

# Our game

04 —

# OUR GAME

4 x 4



THANK YOU

**ASK ME ANYTHING,  
SUGGEST ME AN IDEA**

THANK YOU

**ASK ME ANYTHING,  
SUGGEST ME AN IDEA**