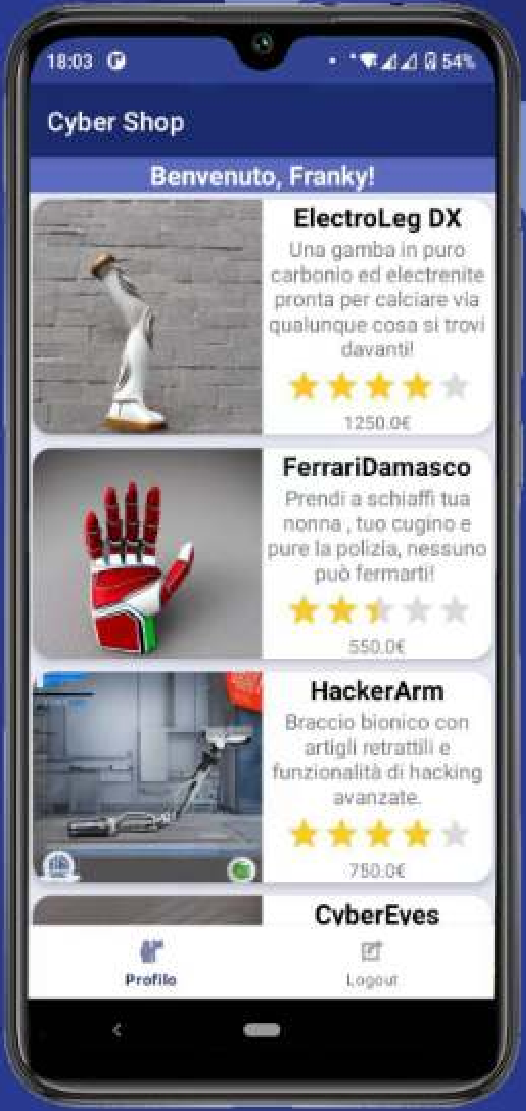
CyberShop

Siena Lorenzo 1000015814

Ingegneria informatica


18:03 54%

Cyber Shop

Benvenuto, Franky!

ElectroLeg DX
Una gamba in puro carbonio ed electrenite pronta per calciare via qualunque cosa si trovi davanti!
★★★★☆
1250.0€

FerrariDamasco
Prendi a schiaffi tua nonna , tuo cugino e pure la polizia, nessuno può fermarti!
★★½☆☆
550.0€

HackerArm
Braccio bionico con artigli retrattili e funzionalità di hacking avanzate.
★★★★☆
750.0€

CyberEyes

What is CyberShop?

Cybershop is an app for managing a fictional cyberpunk-themed business in 2079.

Its goal is to sell cybernetic prosthetics that can be viewed in the app through augmented reality or in 3D in the form of STL files, a CAD format, which, once purchased, can be printed at home using your own 3D printer enabled for printing biocompatible electronic implants and circuits.

All images were generated with an AI tool: **Scribble Diffusion**

(derived from ControlNet) capable of transforming prompts

and simple hand-drawn drawings into neural network-generated images.

The project is Open Source and licensed under the MIT license.

"a goofy owl"

What is CyberShop?

The app itself meets the project specifications and

allows:

User registration and authentication.

Access to a home page with the products available in the store.

The ability to add a product to the user's wishlist and/or review
it by giving 1 to 5 stars.

Access the authenticated user's profile to view their wishlist.

Access to an admin dashboard where you can add, edit, and delete
products directly from the app, while viewing your store's basic data
and statistics.

Architecture, paradigm and development

Several possible approaches to application development were evaluated:

Activity and fragment with layout reuse.
A single Activity architecture and many fragments to be reached with a Navigator.
But due to the complexity of the design and the generality of the object-oriented paradigm, where the possible implementations are virtually infinite, a KISS (Keep it simple, stupid!) approach was chosen, using one Activity and one layout per screen, maintaining the application state through Intents in order to display the necessary information.

The database

The following FireBase services were chosen to save the information to be loaded and displayed dynamically by the client:

Authentication: to manage email, user UID and authentication.

Realtime Database: list of products ,users and wishlist.

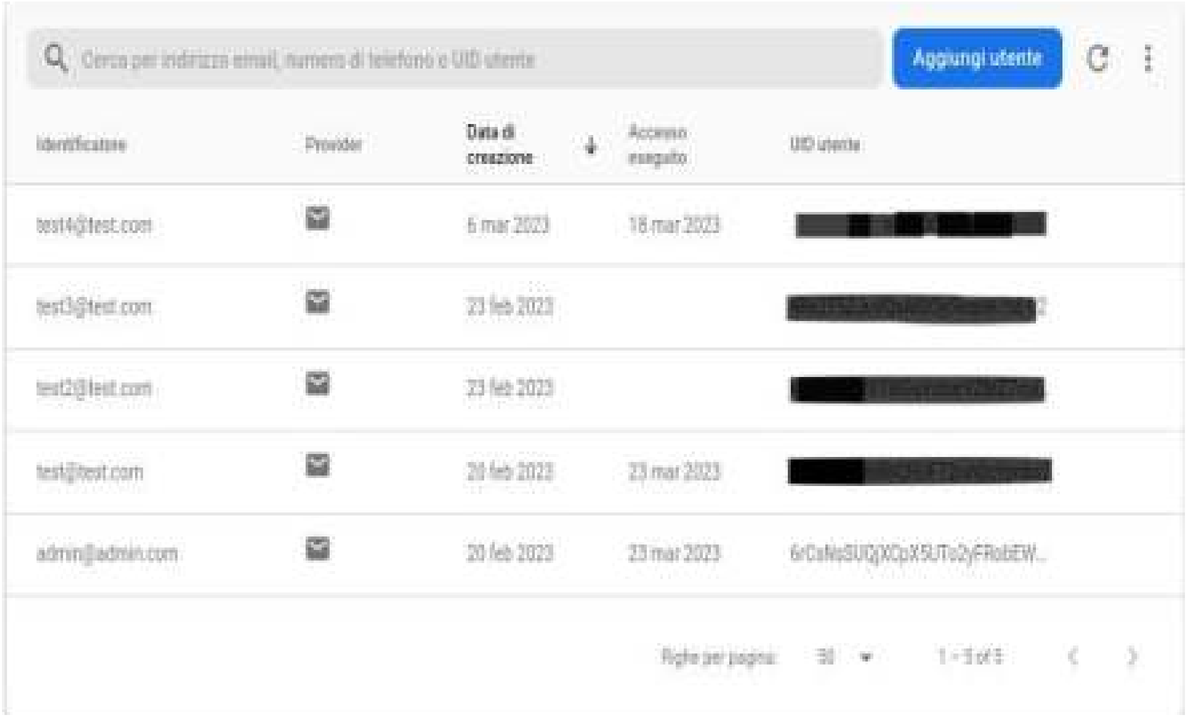
Storage: where the product image and STL are saved

Authentication database

Profiles are saved here for use in the application. For testing purposes, each user has the following password:**password**” except the administrator of the shop that accesses with

user: **admin@admin.com**
password: **administrator**

It is possible to register and `SignupActivity`
e logger then `LoginActivity`



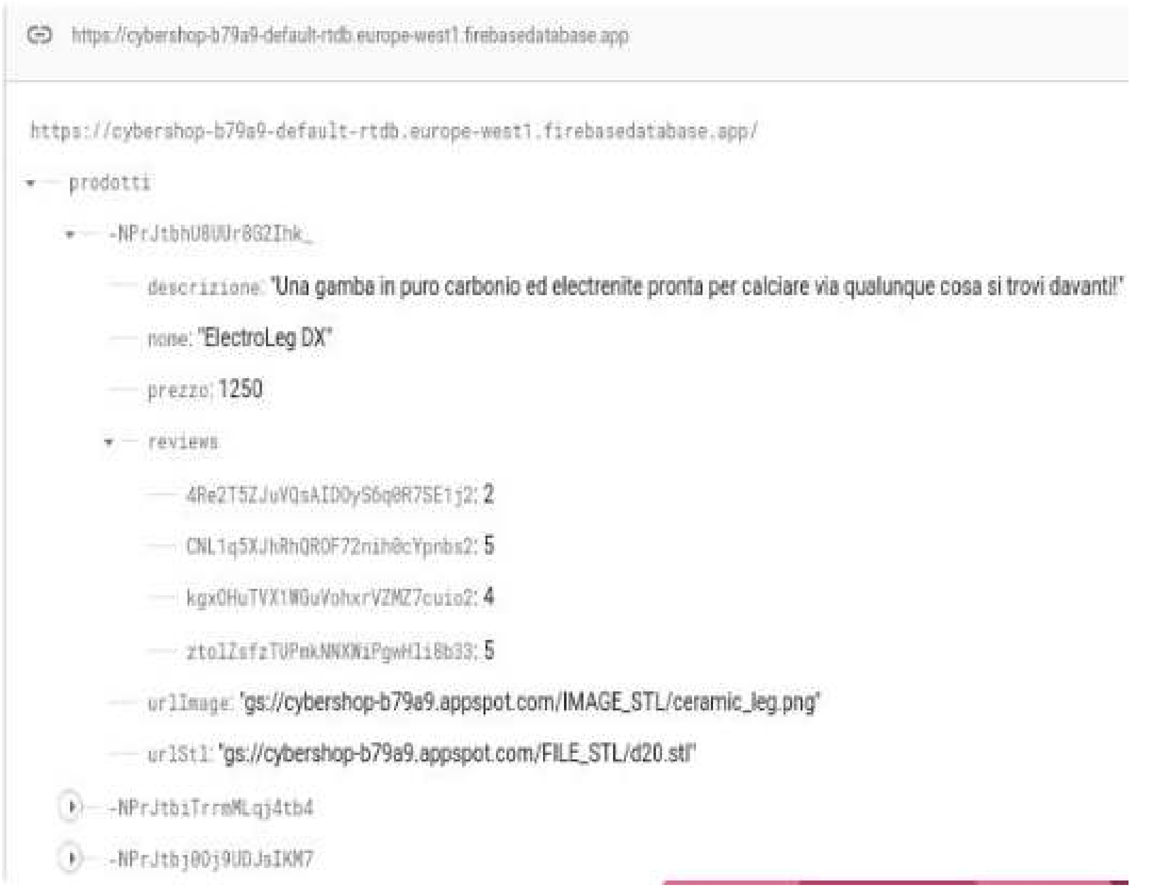
Identificatore	Provider	Data di creazione ↓	Accesso eseguito	UID utente
test4@test.com	✉	6 mar 2023	18 mar 2023	[redacted]
test3@test.com	✉	23 feb 2023		[redacted]
test2@test.com	✉	23 feb 2023		[redacted]
test@test.com	✉	20 feb 2023	23 mar 2023	[redacted]
admin@admin.com	✉	20 feb 2023	23 mar 2023	6rCaNoSUQjXCpX5UTo2yFRobEW...

Realtime Database

"products"

Here is the list of products
in the shop.

The **product** branch has as its children
random **UID** keys generated
during product creation
with the following attributes:
name: string
description: string
price: float
urlImage: Path to Firebase that
identifies the resource to be used
as an image for the product
urlStl: Path to Firebase that
identifies the resource to be used
as a 3D file in STL format for
the product



```
https://cybershop-b79a9-default-rtdb.europe-west1.firebasedatabase.app

https://cybershop-b79a9-default-rtdb.europe-west1.firebasedatabase.app/
▾ prodotti
    ▾ -NPrJtbhU8UUr8G2Ihk_
        descrizione: "Una gamba in puro carbonio ed electrenite pronta per calciare via qualunque cosa si trovi davanti!"
        nome: "ElectroLeg DX"
        prezzo: 1250
        ▾ reviews
            4Re2T5ZJuVQsAIDOyS6q0R7SE1j2: 2
            CNL1q5XJhRhQROF72nih8cYprbs2: 5
            kgxOHuTVX1WGuVohxrVZMZ7cuio2: 4
            ztolZsfzTUPmkNNXWiPgwH1i8b33: 5
        urlImage: "gs://cybershop-b79a9.appspot.com/IMAGE_STL/ceramic_leg.png"
        urlStl: "gs://cybershop-b79a9.appspot.com/FILE_STL/d20.stl"
    ▸ -NPrJtbiTrrmMLqj4tb4
    ▸ -NPrJtbj0Oj9UDJsIKM7
```

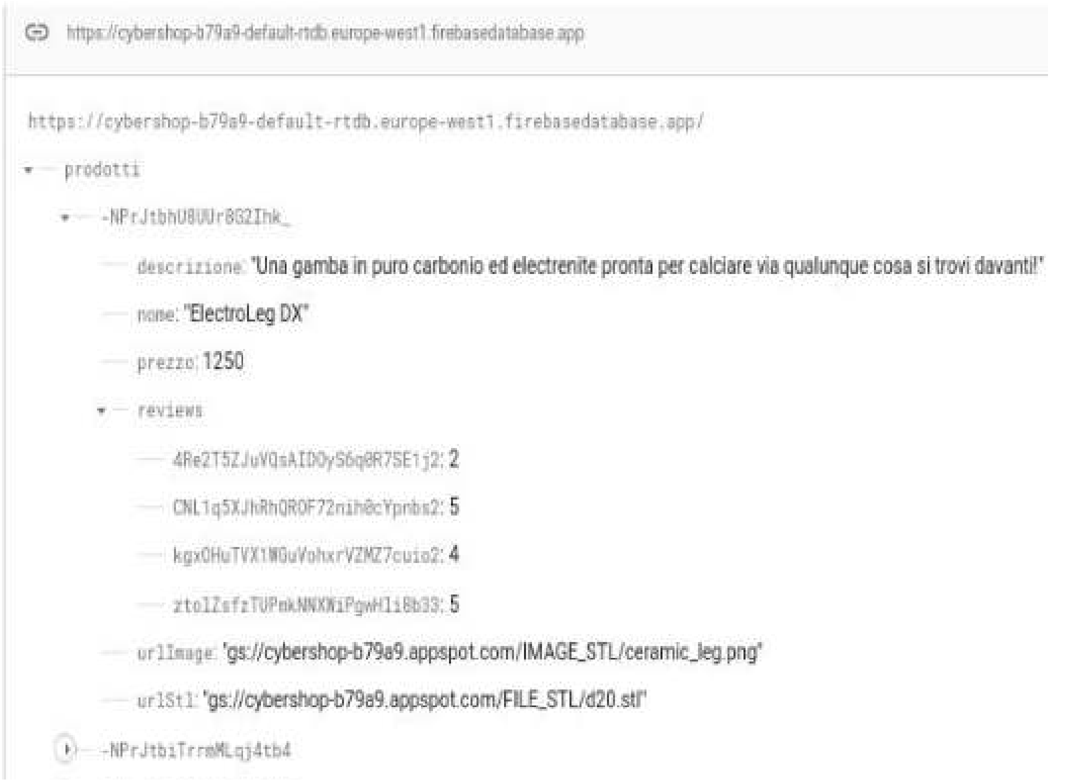
Realtime Database

"products"

reviews:
here are the ratings from
1 in 5 of users according to the
structure

UID user :rating the average rating of the product is calculated by the class
`RecycleViewAdapterLong`
when the product is displayed
as card.

admin: true for admin only
and false by default when creating a new user
mail: which matches the email saved in
Authentication **name:** user's real name
surname: user's real surname



```
https://cybershop-b79a9-default-rtdb.europe-west1.firebasedatabase.app

https://cybershop-b79a9-default-rtdb.europe-west1.firebasedatabase.app/
▾ — prodotti
    ▾ — -NPrJtbhU8UUr8G2Ihk_
          — descrizione: "Una gamba in puro carbonio ed electrenite pronta per calciare via qualunque cosa si trovi davanti!"
          — nome: "ElectroLeg DX"
          — prezzo: 1250
        ▾ — reviews
              — 4Re2T5ZJuVQsAIDOyS6q0R7SE1j2: 2
              — CNL1q5XJhRhQROF72nih8cYpnbs2: 5
              — kgxOHuTVX1WGuVohxrVZMZ7cuio2: 4
              — ztolZsfzTUPmkNNXWiPgwH1i8b33: 5
          — urlImage: "gs://cybershop-b79a9.appspot.com/IMAGE_STL/ceramic_leg.png"
          — urlStl: "gs://cybershop-b79a9.appspot.com/FILE_STL/d20.stl"
    ▸ — -NPrJtbiTrrmMLqj4tb4
```

wishlist: a list containing the product key and the entire product duplicated by the branch "products".

N.B. This type of redundancy is a design pattern known as **Denormalization** and one best practices per `Firebase`
both for the class methods `FirebaseRecyclerOptions` which belongs to FirebaseUI and which accepts entire objects when building and does not allow using a list of keys.
Added to this is the fact that when scaling the application, database access times in the event of joins become a significant latency and that the Nosql nature of Realtime does not allow joins.

Realtime Database

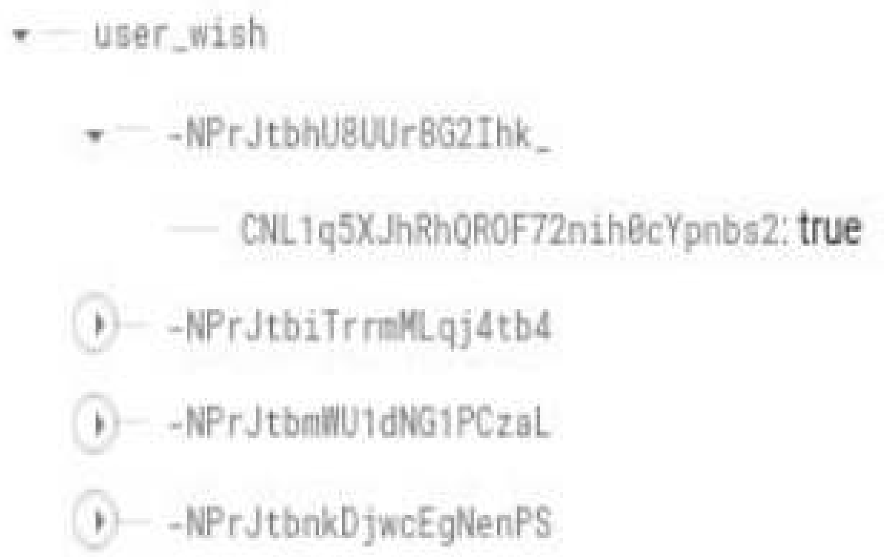
"user_wish"

To solve the problem of multiple product paths and therefore multiple ratings that could compromise data consistency and the average rating calculation, a look-up table has been implemented that takes into account the products in the wishlist per user.

The **user_wish** branch holds a child node identified by the **UIDuser**. This node contains a product map, where a **true** value signifies that a product is on the user's wish list.

When a user adds a product to the wishlist, an entry is created;
when it is deleted, the node is deleted.

This look up table is consulted when assigning a rating to a product and must be propagated to all the necessary paths.



```
▾ user_wish
    ▾ -NPrJtbhU8UUr8G2Ihk_
          CNL1q5XJhRhQROF72nih0cYpnbs2: true
    ▸ -NPrJtbiTrrmMLqj4tb4
    ▸ -NPrJtbmWU1dNG1PCzaL
    ▸ -NPrJtbnkDjwcEgNenPS
```

Realtime Database

“multipath update”

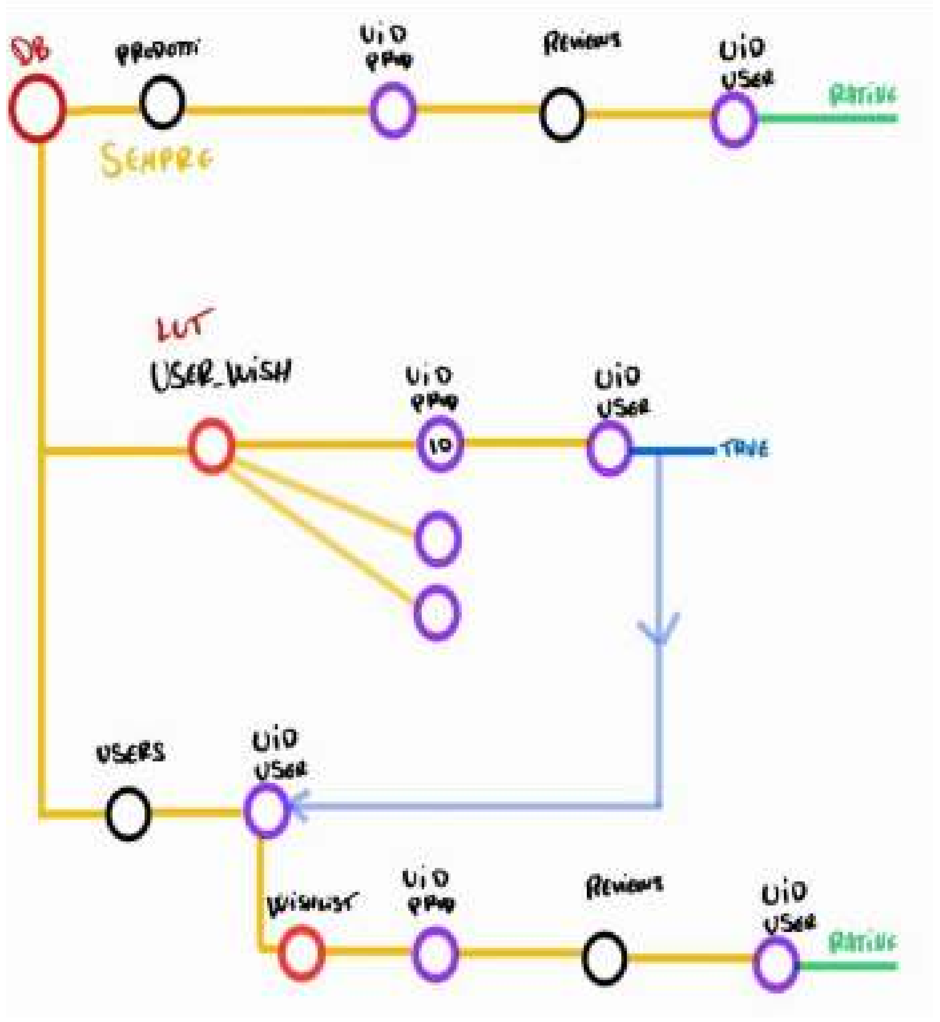
PATH:

‟products/product”

“users/(UID_USER)/wishlist/product”

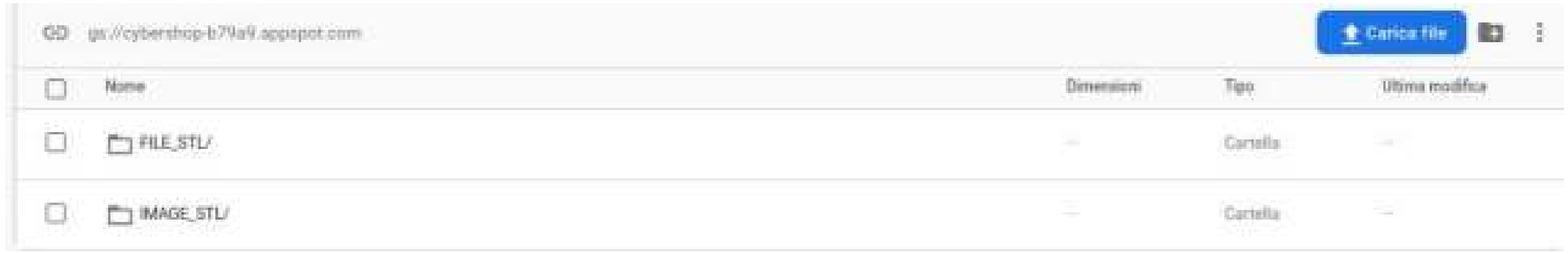
“user_wish/(UID_USER)/(UID_product:true)”

On the right you can see the routes for the “*multipath update*” which happens as an **atomic operation** in `FullProductActivity` synchronizing products and ratings.



Storage database

Here are saved the images and stl to be loaded in the previews, and to be downloaded



gs://cybershop-b79a9.appspot.com

Nome	Dimensioni	Tipo	Ultima modifica
FILE_STL/	—	Cartella	—
IMAGE_STL/	—	Cartella	—

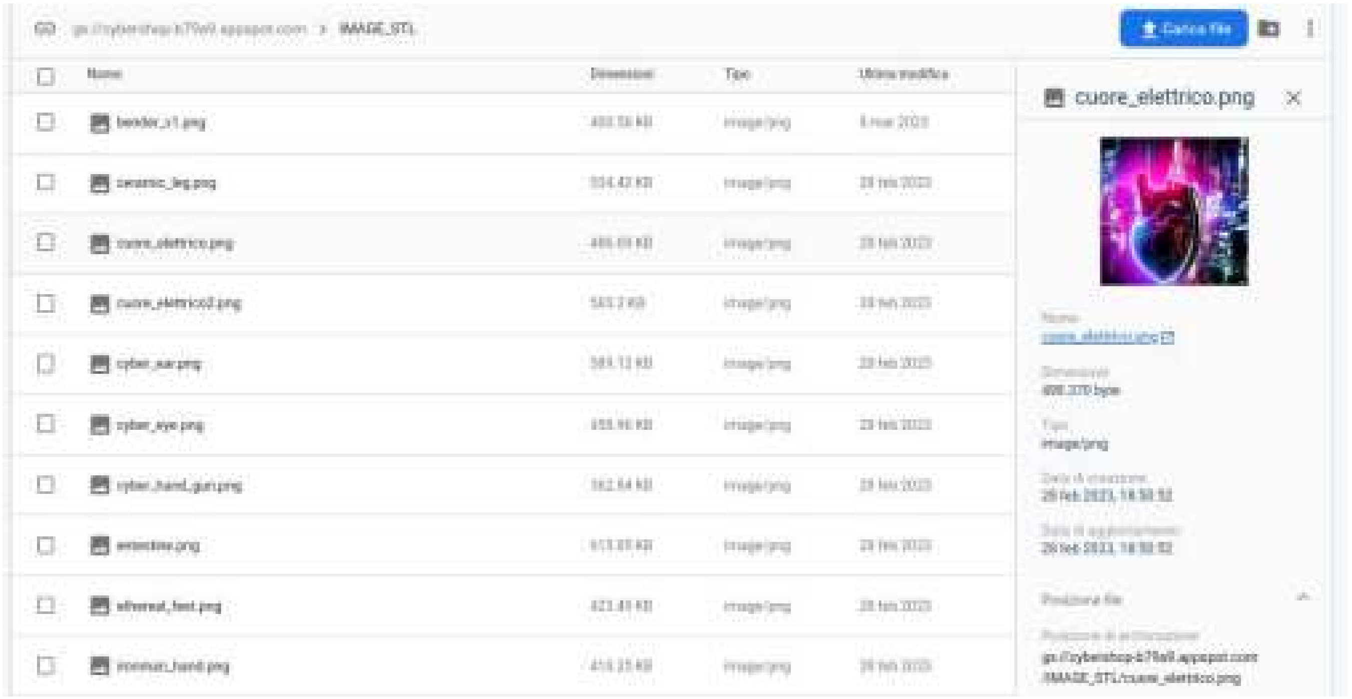
Product positions in RealTime database,**urlImage** and **urlStl**
reflect the format

gs://xxxxxxx.appspot.com/IMAGE_STL/file_name.png
gs://xxxxxxx.appspot.com/IMAGE_STL/file_name.png

Storage database

“IMAGE_STL”

Images in IMAGE_STL are loaded
by the application using the Glide plugin,
which takes the storage location and
sets its reference to the ImageView, which then
requests it.



gs://cybershop-b77e9.appspot.com > IMAGE_STL

Nome	Dimensioni	Tipo	Ultima modifica
bender_v1.png	400.56 KB	image/png	3 mar 2023
ceramic_leg.png	534.42 KB	image/png	28 feb 2023
cuore_elettrico.png	486.69 KB	image/png	28 feb 2023
cuore_elettrico2.png	565.2 KB	image/png	28 feb 2023
cyber_ear.png	589.13 KB	image/png	28 feb 2023
cyber_eye.png	455.96 KB	image/png	28 feb 2023
cyber_hand_gun.png	562.64 KB	image/png	28 feb 2023
[illegible].png	613.85 KB	image/png	28 feb 2023
ethereal_feet.png	423.49 KB	image/png	28 feb 2023
ironman_hand.png	416.23 KB	image/png	28 feb 2023

cuore_elettrico.png

Nome
cuore_elettrico.png

Dimensioni
498.370 byte

Tipo
image/png

Data di creazione
28 feb 2023, 18:50:52

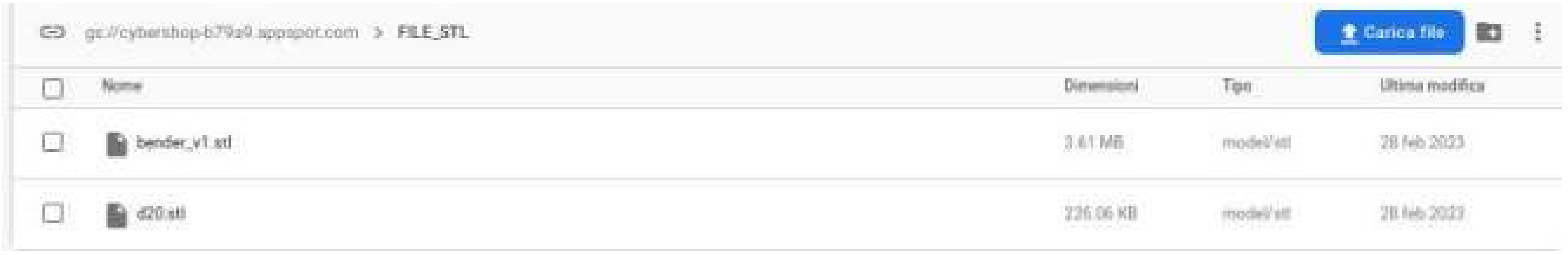
Data di aggiornamento
28 feb 2023, 18:50:52

Posizione file

Posizione di archiviazione
gs://cybershop-b77e9.appspot.com/IMAGE_STL/cuore_elettrico.png

Storage database

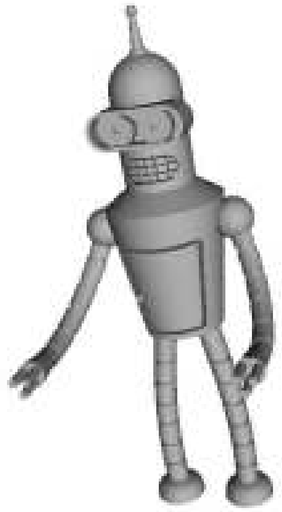
"FILE_STL"



gs://cybershop-b79a9.appspot.com > FILE_STL

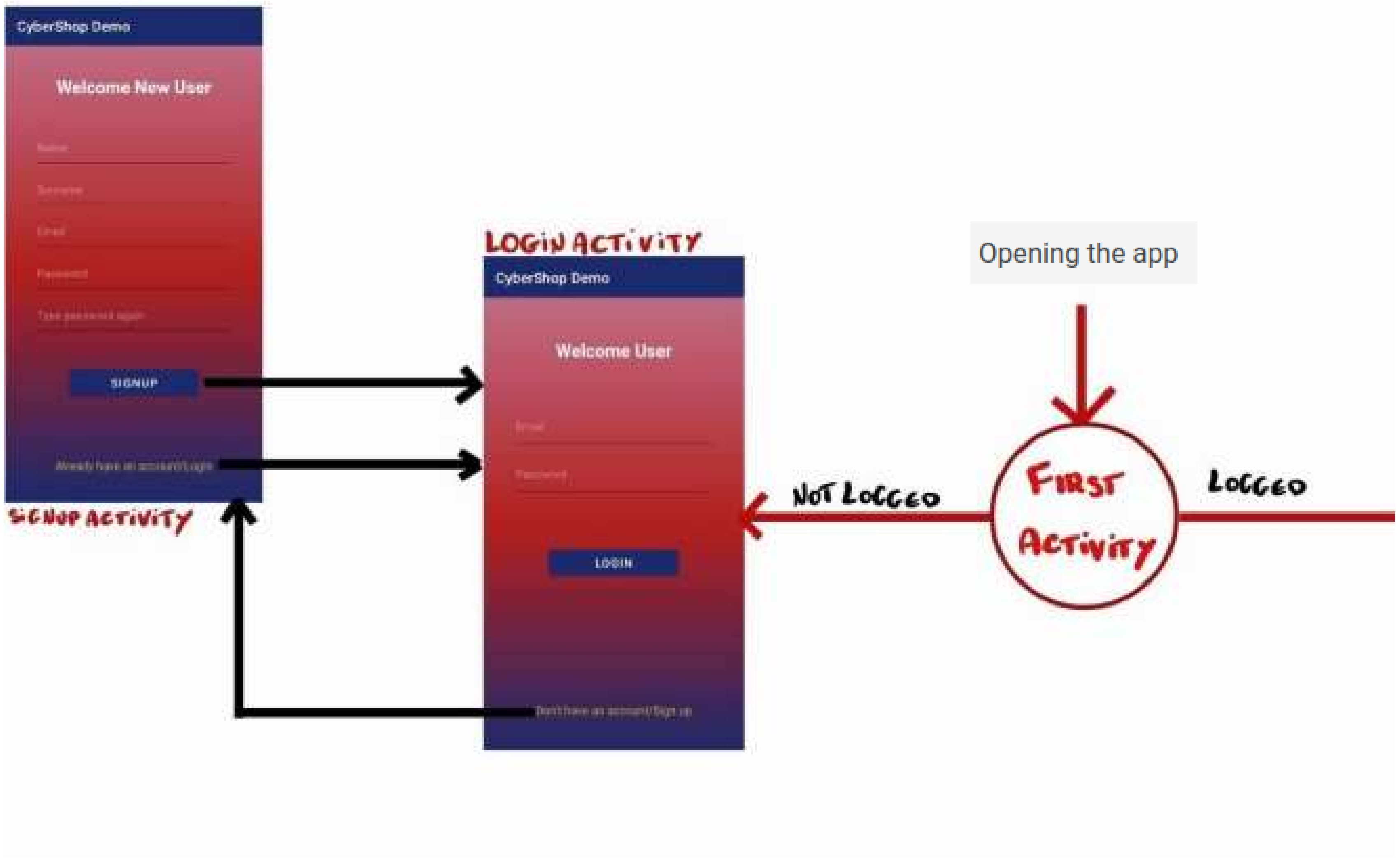
Nome	Dimensioni	Tipo	Ultima modifica
bender_v1.stl	3.61 MB	model/stl	28 feb 2023
d20.stl	226.06 KB	model/stl	28 feb 2023

Here are 2 test stl files ready to use and to print, that leave room for future implementations not present in this demo, as the library ARCore is **not** implemented as per specifications.

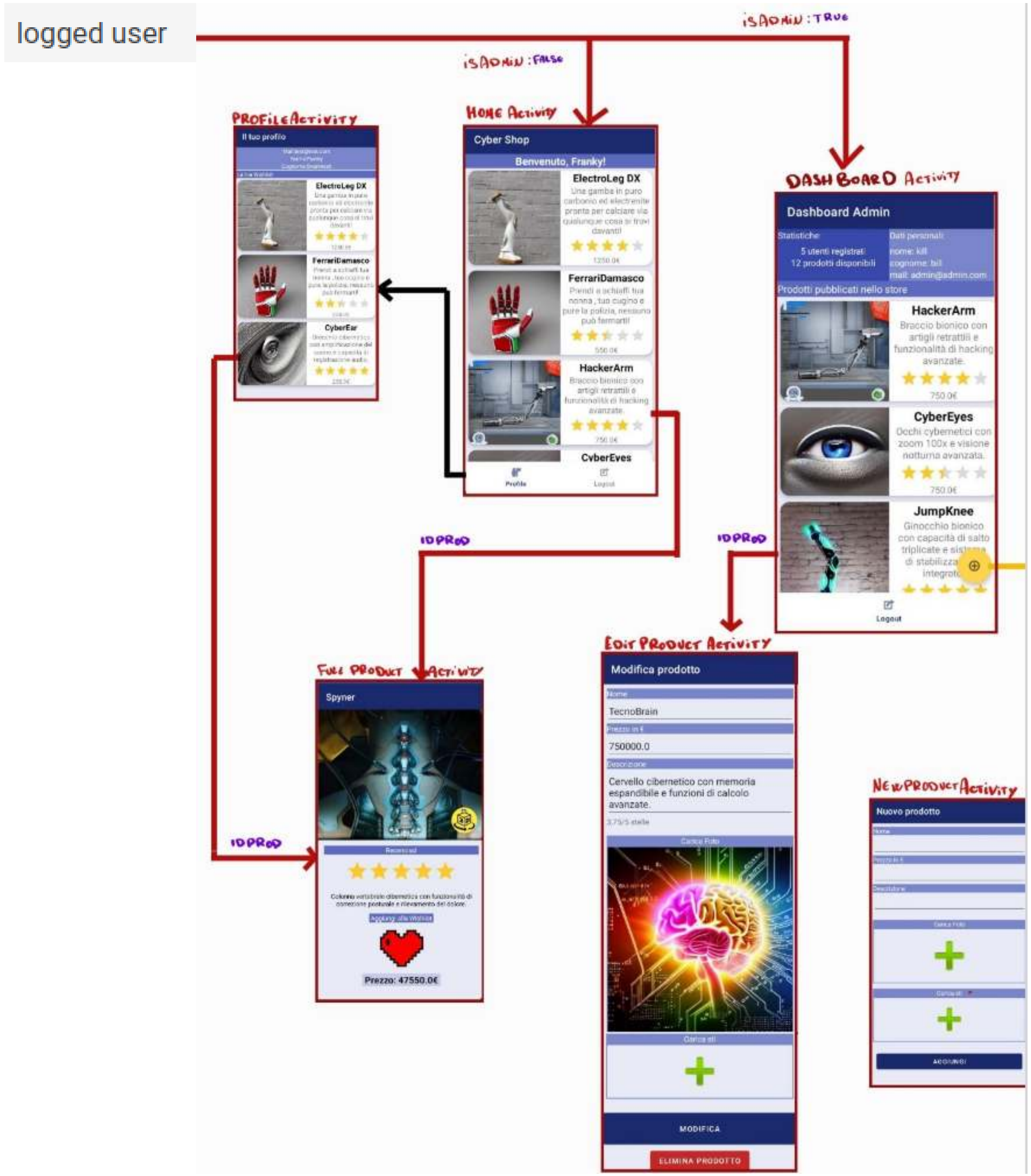


Navigation structure

Not Logged in



Navigation structure
Logged in



FirstActivity

An entry activity that redirects the user into 3 possible states:

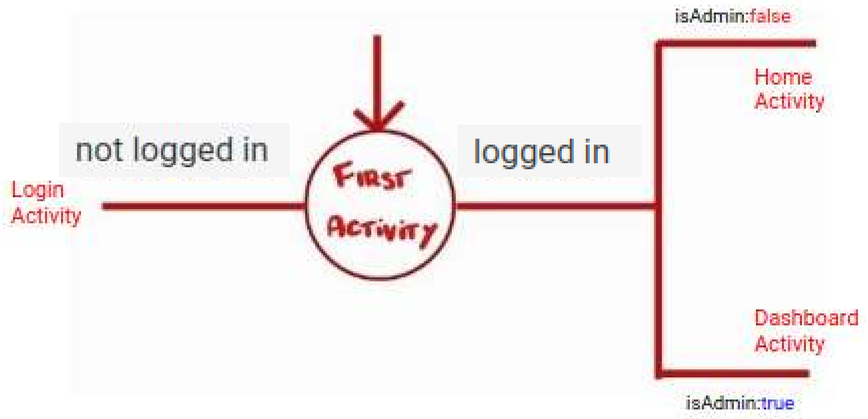
Logged in with User rights sent to the `HomeActivity`

Logged in with Superuser rights sent to the `DashboardActivity`

Not logged in sent to the `LoginActivity`

DATABASES INVOLVED:
FirebaseAuth and Realtime Database

It checks whether the current user is authenticated, exists in the database, and is an admin.



LoginActivity

Activity that sets 2 listeners on the login button and on the signup text

If clicked login:

It checks the credentials entered and, based on the user type, sends an intent to the home or the dashboard.

If clicked Don't have an account/Sign up

it sends the user to the registration page.

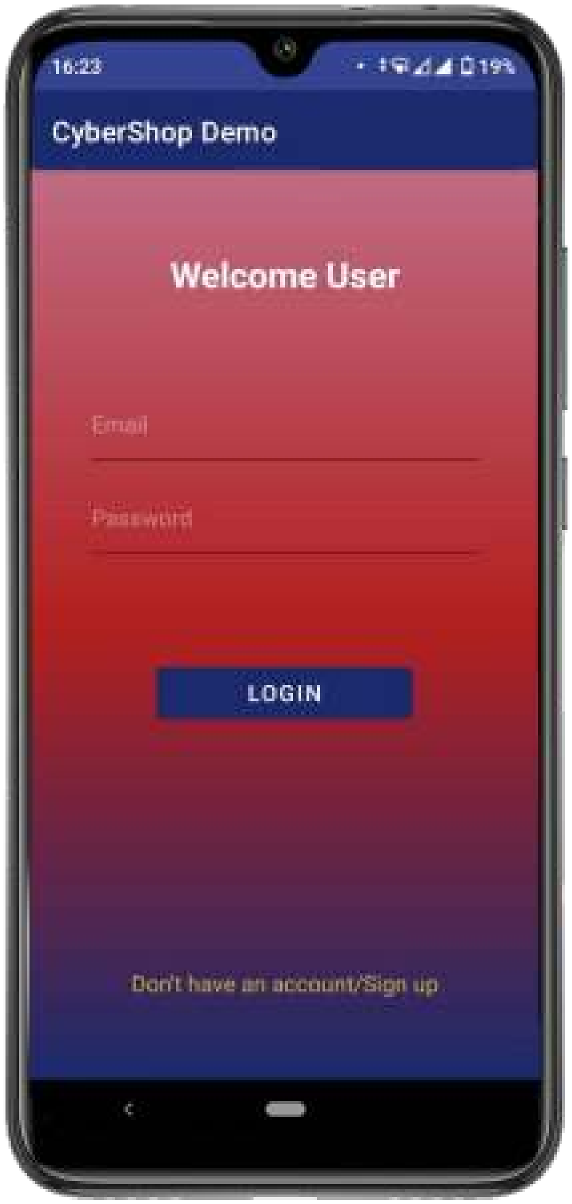
Databases involved

[*FirebaseAuth*]

for User Authentication.

[*Realtime Database*]

for checking that the user is properly registered.



SignupActivity

Registration activity that sets 2 listeners on the signup button and on the login text

When the user clicks on **signup**:

Check that the data entered is not empty and that it is valid. If so, redirect to the login page.

If clicked Already have an account/Login:

sends the user back to the login page.

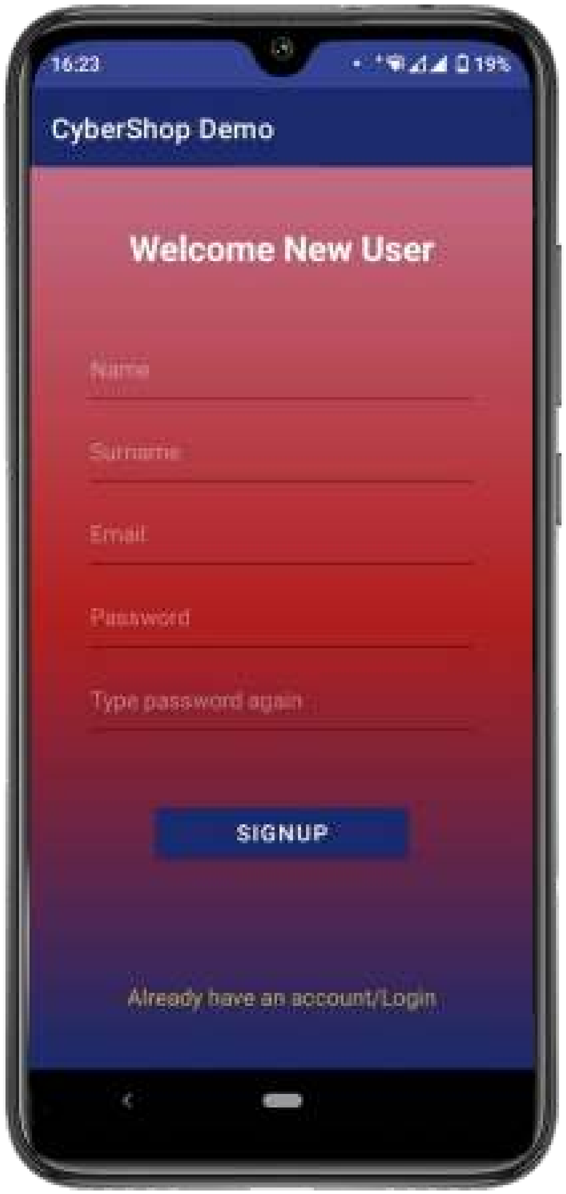
Databases involved

[*FirebaseAuth*]

for User creation

[*Realtime Database*]

for checking that the user has been created



HomeActivity

Initialize a menu to be placed below that leads
to: user profile [`ProfileActivity`]
or to logout [`LoginActivity`]

Extracts the list of products from the database and inserts it into the recyclerView where it displays the products one by one in the form of a card [long_card.xml]

Implement and set up a listener for each card that sends the user and product id clicked to [`FullProductActivity`] so you can view it in full detail.

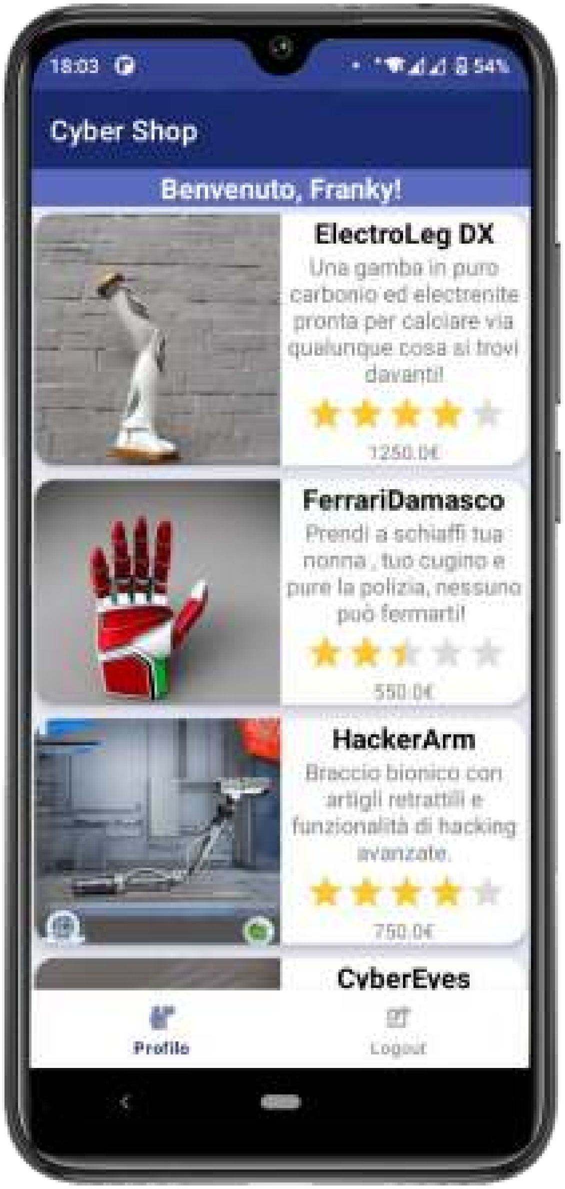
Databases involved

[*FirebaseAuth*]

Read the username to greet the user in the top screen

[*Realtime Database*]

Reads the “products” list and displays them on the screen.



Benvenuto, Franky!

ElectroLeg DX
Una gamba in puro carbonio ed electrenite pronta per calciare via qualunque cosa si trovi davanti!
★★★★☆
1250.0€

FerrariDamasco
Prendi a schiaffi tua nonna , tuo cugino e pure la polizia, nessuno può fermarti!
1250.0€

HackerArm
Braccio bionico con artigli retrattili e funzionalità di hacking avanzate.
★★★★☆
750.0€

CyberEyes

FullProductActivity

Activity that has the task of displaying a product in the shop
(if it comes from HomeActivity)
or in the wishlist (if it comes from ProfileActivity)

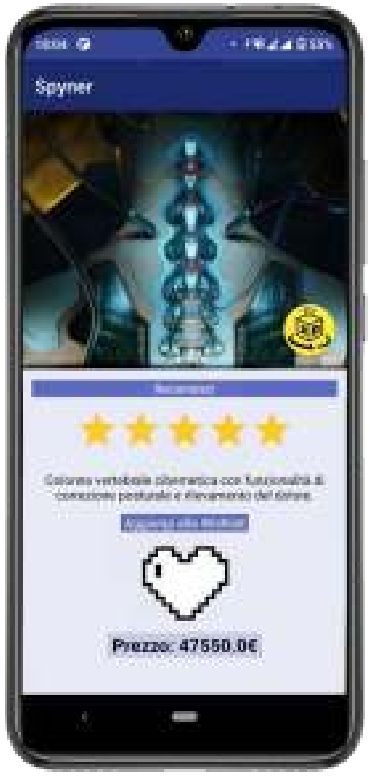
It receives from the previous Activity an intent with the id of the product to display

From here you can:

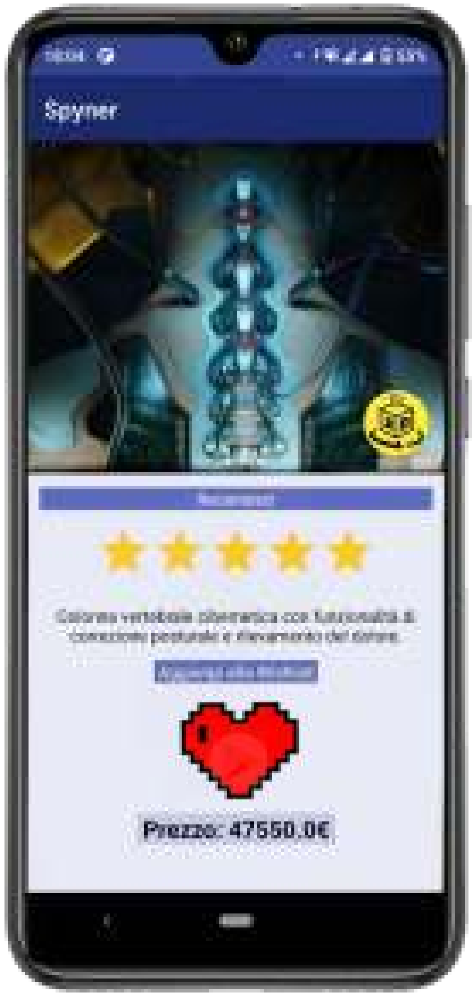
- View **name**, **description**, **image**, **price** and previous **reviews** with 1 to 5 stars, with 0 stars if never reviewed.
- View* the product's STL in 3D through a **fab**.

- Add the product to your wishlist
- Add a new product review [1-5] stars

*[Feature not present in this demo as ARCore is not supported nor implemented as per specifications, by pressing the fab a Snackbar message warns the user,
The stl file is in any case available and functional in the database [*Storage*] for later implementation]*



Colonna vertebrale cibernetica con funzionalità di correzione posturale e rilevamento del dolore.

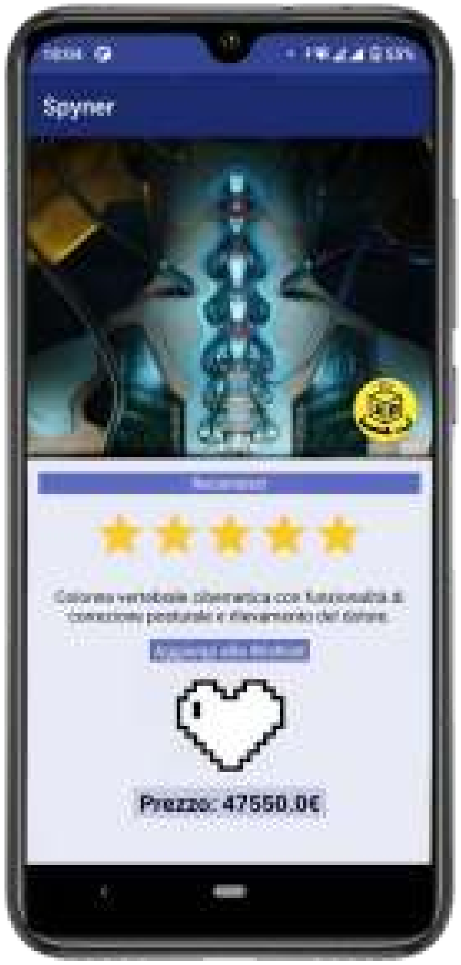


Colonna vertebrale cibernetica con funzionalità di correzione posturale e rilevamento del dolore.

FullProductActivity

The Activity also sets listeners to:
Add a review to the product from 1 to 5 stars, via **onRatingChanged** checking and filling the bar with the previous review, if present.

(Full implementation in the documentation for the FullProductActivity class)



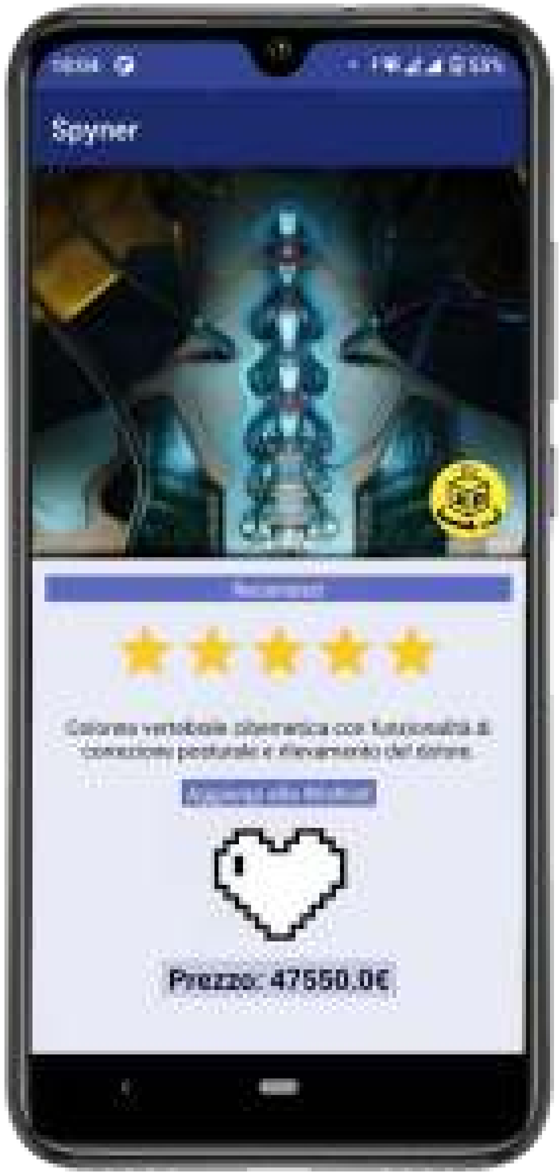
Colonna vertebrale cibernetica con funzionalità di correzione posturale e rilevamento del dolore.

Prezzo: 47550.0€

FullProductActivity

Add the product to the wishlist through **buttonWishlist.setOnClickListener** checking whether the product is already in the wishlist and consequently the associated “heart” icon.

(full implementation in the FullProductActivity class documentation)



Colonna vertebrale cibernetica con funzionalità di correzione posturale e rilevamento del dolore.

Prezzo: 47550.0€

FullProductActivity

Here the Databases involved are:

[*FirebaseAuth*]

To get the uid of the logged in user.

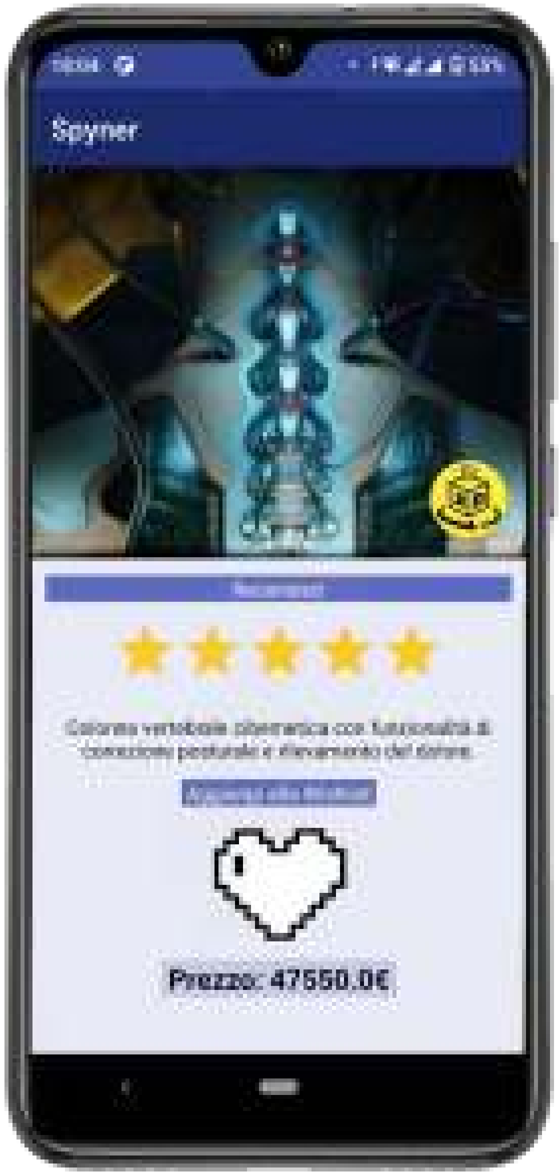
[*Realtime Database*]

To view the product and to add/remove it from the logged in user's wishlist.

To maintain the lookup table in the path “user_wish/(UID_PROD)/(UID_USER)”

[*Storage*]

To display the product image and, if applicable, the STL to be displayed with Glide.



ProfileActivity

Extracts the list of products in the wishlist from the database of the user and inserts it into the recyclerView where it shows one by one the products in the form of cards (`long_card.xml`)

Implement and set up a listener for each card that sends the user and product id clicked to [`FullProductActivity`] so you can view it in full detail.

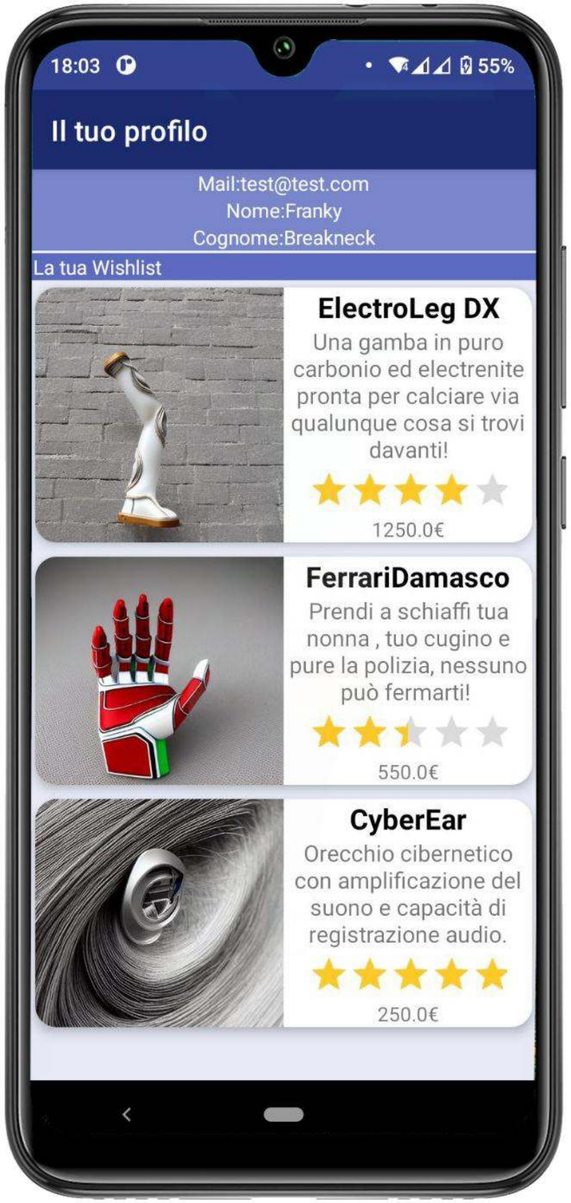
Databases involved

[*FirebaseAuth*]

View and print: name, surname and email.

[*Realtime Database*]

Read the list of products from "users/(UID_USER)/wishlist/product" and displays them on the screen.



18:03 55%

Il tuo profilo

Mail:test@test.com
Nome:Franky
Cognome:Breakneck

La tua Wishlist

ElectroLeg DX
Una gamba in puro carbonio ed electrenite pronta per calciare via qualunque cosa si trovi davanti!
1250.0€

FerrariDamasco
Prendi a schiaffi tua nonna , tuo cugino e pure la polizia, nessuno può fermarti!
550.0€

CyberEar
Orecchio cibernetico con amplificazione del suono e capacità di registrazione audio.
250.0€

DashboardActivity

This is the home page for the admin which displays:

Administrator's data: name, surname, and email.

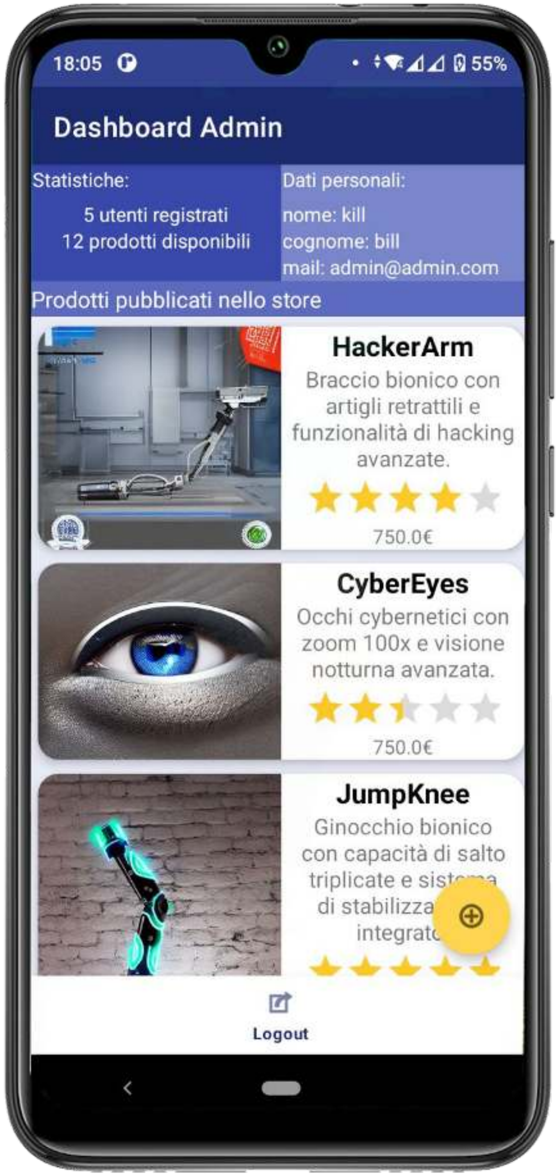
Store statistics: number of products in the store and number of registered users.

From here you can manipulate the shop database and products to:

1) Modify or delete a product by clicking on an item in the product list which, once clicked, redirects to `EditProductActivity` [with the product id to edit]

2) add a product to the store by clicking on the fab (+) floating above the store's product list, being redirected to `NewProductActivity` .

Clicking the navigation bar at the bottom logs you out.


18:05 55%

Dashboard Admin

Statistiche:
5 utenti registrati
12 prodotti disponibili

Dati personali:
nome: kill
cognome: bill
mail: admin@admin.com

Prodotti pubblicati nello store

HackerArm
Braccio bionico con artigli retrattili e funzionalità di hacking avanzate.
750.0€

CyberEyes
Occhi cybernetici con zoom 100x e visione notturna avanzata.
750.0€

JumpKnee
Ginocchio bionico con capacità di salto triplicate e sist... di stabilizza... integrat...

Logout

DashboardActivity

Databases involved

[FirebaseAuth]

The user's privileges are checked on the page

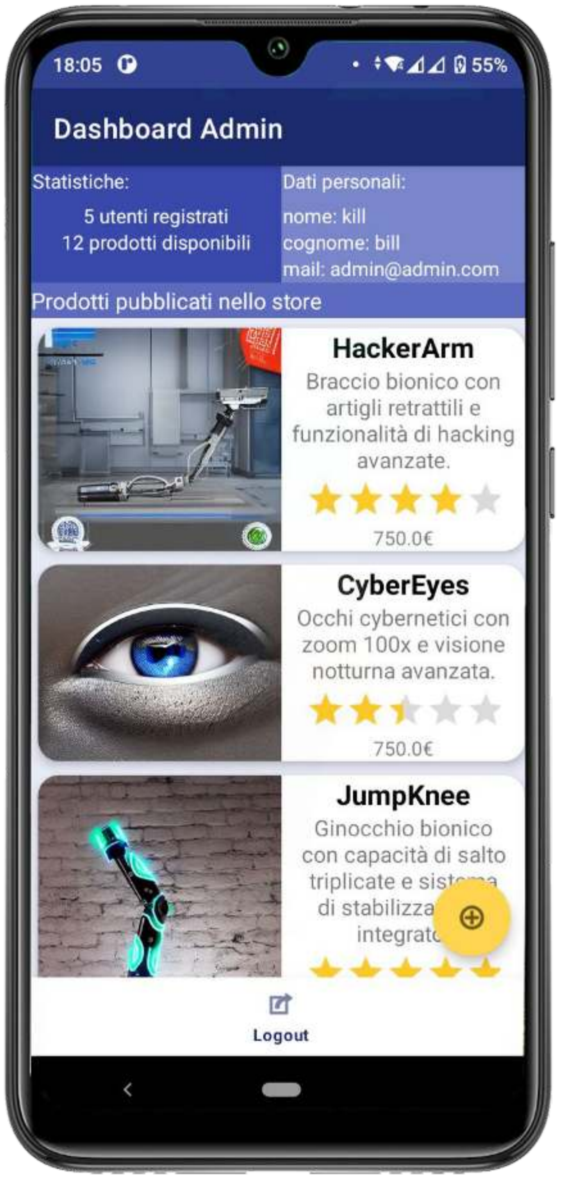
[*Realtime Database*]

The products are displayed

The admin's first name, last name, and email address are displayed.

The number of registered users is counted.

The number of products in the store is counted.


18:05 55%

Dashboard Admin

Statistiche:

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nome: kill
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CyberEyes
Occhi cybernetici con zoom 100x e visione notturna avanzata.
750.0€

JumpKnee
Ginocchio bionico con capacità di salto triplicate e sist di stabilizza integrat

NewProductActivity

After clicking on the fab (+) in the activity dashboard this activity opens, where you can add:

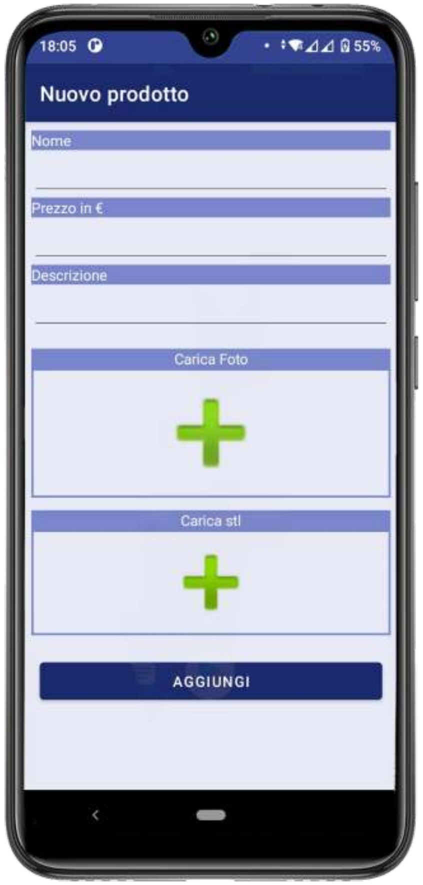
name,
description ,
price ,
image of the product
and the **file stl** of the product [which will go into Storage].

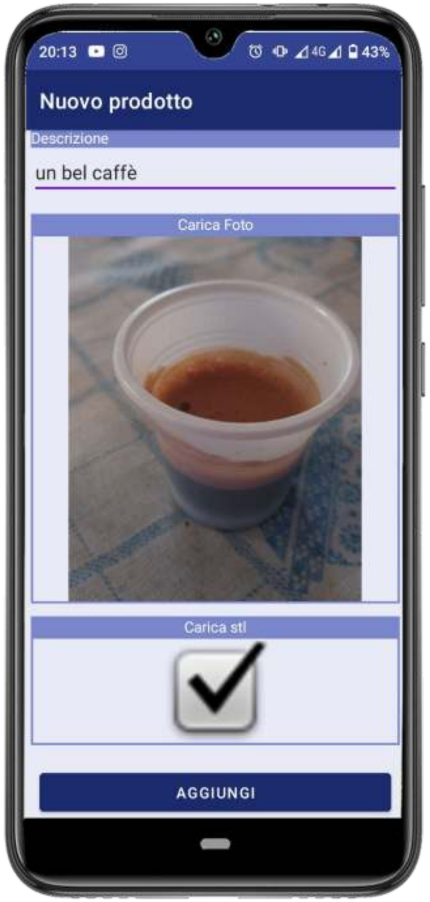
Under Upload Photo there is an ImageButton **previewImage** with a listener that invokes **selectImage()** to choose the image from the device memory that:

Set the file path locally to **mImageUri** through a ***onActivityResult*** and that sets the image in the **previewImage**

Under Upload stl there is an ImageButton **previewStl** with a listener that invokes **fileChooser()** to choose the stl file from the device memory that:

Set the file path locally to**mStlUs** through a***onActivityResult*** and what sect [✔] in the **previewStl**





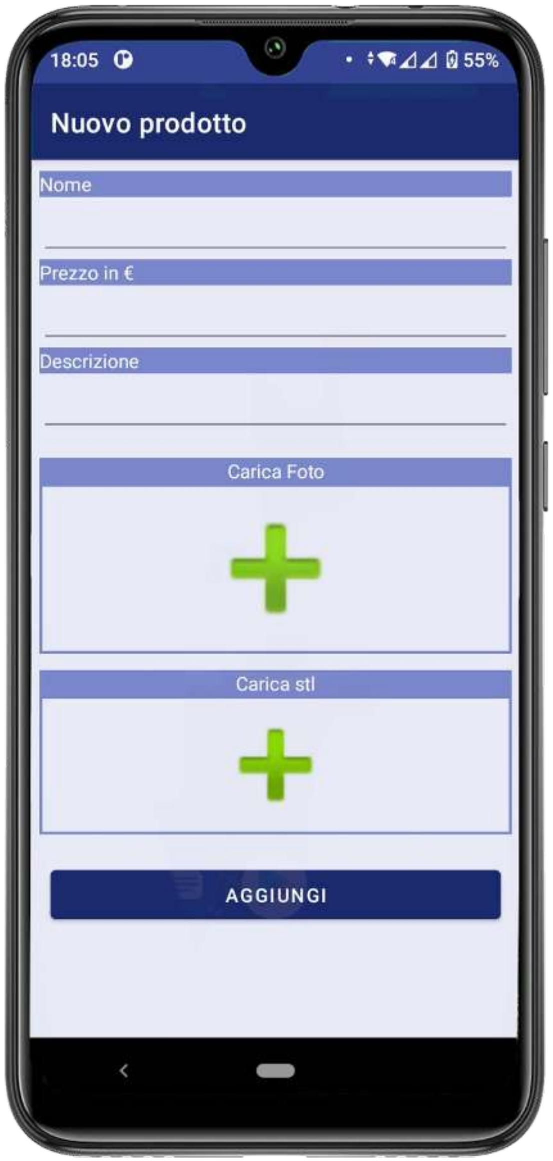
NewProductActivity

At the bottom it is present ADD button with a listener set that once clicked invokes **addNewItemToDatabase()** That :

Check that the data entered are all valid and not null by shifting the focus of the user if some field is not present and finally contact the db in order to:
insert it into the database [*Realtime Database*] the new product with references **mStorageRef** and **mStorageRef2** and to insert the image and stl into [*Storage*].

If the activity is destroyed because the phone is rotated through **onSaveInstanceState** they get recharged and checked **mStlUs** and**mImageUri** so you don't have to re-enter them.

If the product is inserted correctly you will be redirected to`DashboardActivity` with a confirmation toast.



NewProductActivity

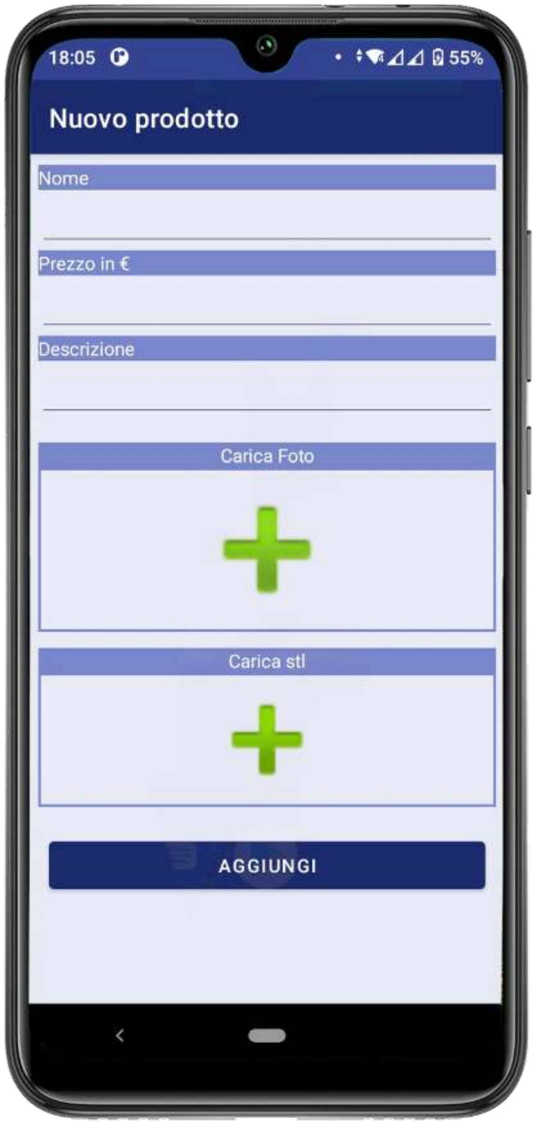
Databases involved

[*Realtime Database*]

Contacted to add the new product

[*Storage*]

Contacted to add the image in **gs://cybershop.../IMG_STL/file.png** and the Stl file in **gs://cybershop.../FILE_STL/file.stl**



EditProductActivity

After clicking on a product in the list in the `DashboardActivity` this activity opens where it is possible to **modify** the product using the received product id:

name, **description**, **price**, **image** of the product and the **file stl** of the product [which will go into Storage]

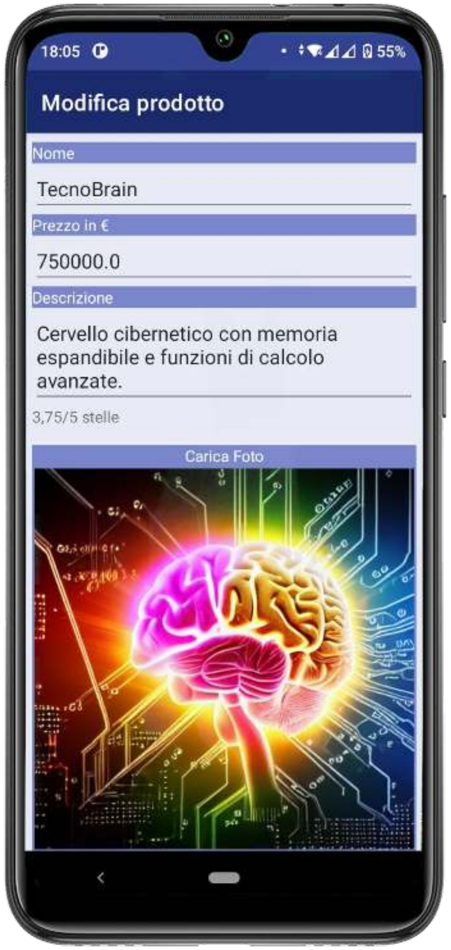
Fields are **precompiled** with the product data to be modified.

Under Upload Photo there is an ImageButton **previewImage** with a listener that invokes **selectImage()** to choose the image from the device memory that:

Set the file path locally to **mImageUri** through an ***onActivityResult*** and that sets the image in the **previewImage** *replacing the previous reference*

Under Upload stl there is an ImageButton **previewStl** with a listener that invokes **fileChooser()** to choose the stl file from the device memory that:

Set the file path locally to **mStlUs** via an ***onActivityResult*** and set [✔] in the **previewStl** *replacing the previous reference*


18:05 · 55%

Modifica prodotto

Nome

TecnoBrain

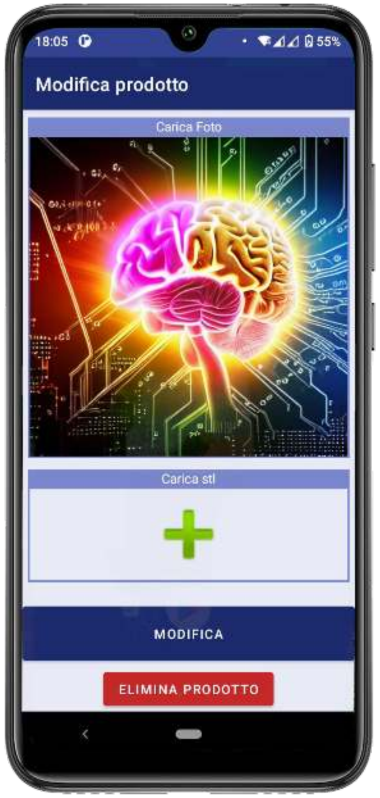
Prezzo in €

750000.0

Descrizione

Cervello cibernetico con memoria espandibile e funzioni di calcolo avanzate.

3,75/5 stelle


18:05 · 55%

Modifica prodotto

EditProductActivity

It's present an EDIT button with a listener set that once clicked invokes **modItemToDatabase()** That :

Check that all the data entered is valid, shifting the user focus if any field is missing, and contact the db to insert into the database [*Realtime Database*] the modified product keeping the id with the references **mStorageRef** and **mStorageRef2** to insert the image and stl into [*Storage*] in case of modification.

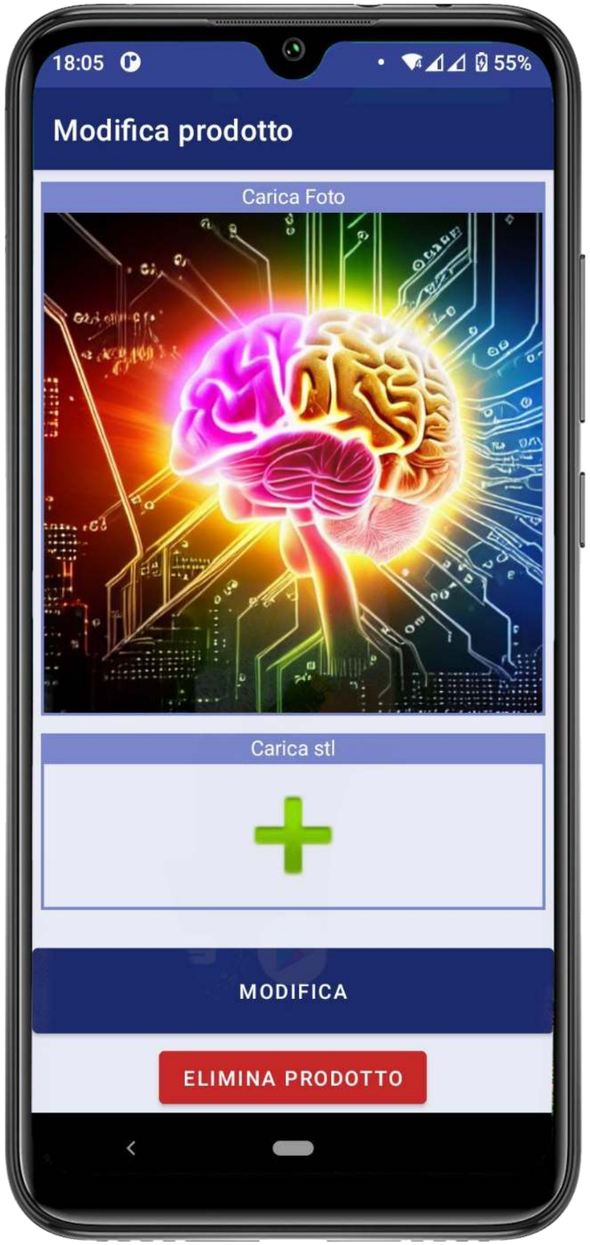
Obviously, when changing the stl and/or image files, the old files in storage will be deleted.

To maintain a tight consistency of cases and optimize access to [*Storage*] during editing there are 4 possible cases

1. Don't change either stl or png
2. Change only the stl
3. Change only the png
4. Change both

If no data is changed, the initial product data will be used.

If the product is modified successfully, user will be redirected to DashboardActivity with a confirmation toast.



EditProductActivity

It's present a DELETE PRODUCT button with a listener set that once clicked invokes **deleteItemToDatabase(id)** That :

will query the database for the product id and delete it from the entry in [Realtime Database] and its associated files in [Storage]

Databases involved

[*Realtime Database*]

Query the database to read, modify and delete the product

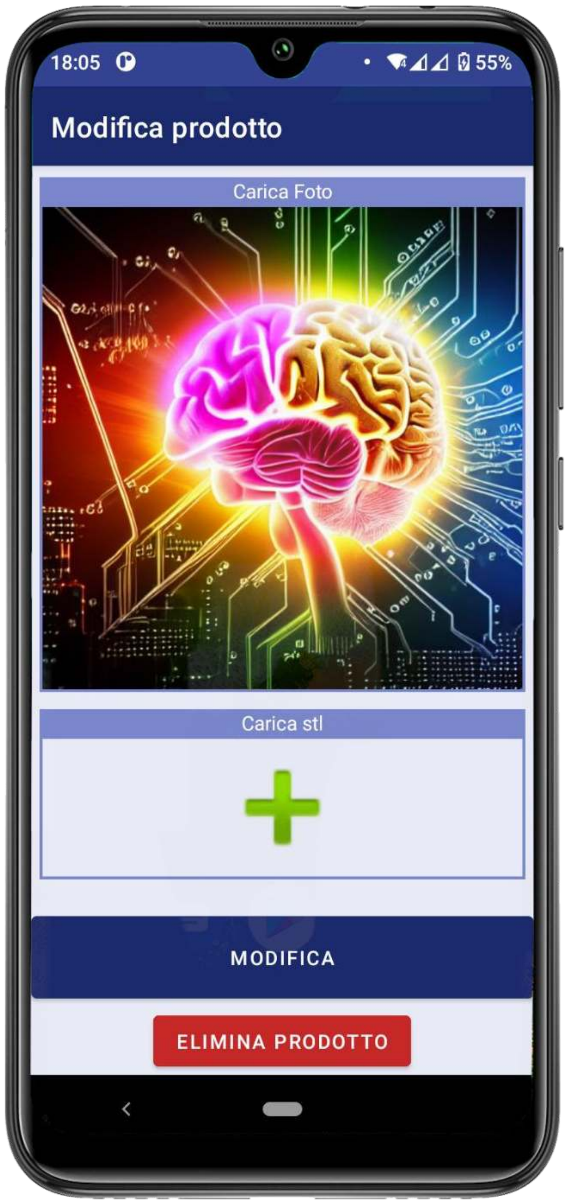
[*Storage*]

is contacted for:

uploading the product image to edit

delete the stl and png file to replace

add image in **gs://cybershop.../IMG_STL/nome.png**
and the Stl file in **gs://cybershop.../FILE_STL/nome.stl**



Style and colors

For the colors it was chosen the material palette 50,100,200 of a shade of purple.

The naming convention was followed:
NameActivity -> **activity_name.xml**

Each Activity works both vertically and horizontally without content overflow thanks to careful layout design.
So it’s fully responsive.

Thank you for your attention.

All code, resources , android studio project and documentation are present inside the github repository.