

KAUNAS UNIVERSITY OF TECHNOLOGY

FACULTY OF INFORMATICS

T120B169 App Development for Smart Mobile Systems

*FitMax*

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| --- |
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# **Description of Your app**

1. What type is your application/game?
   * *Fitness Tracker App - allows users to track their daily physical activities, set fitness goals, and monitor their progress over time:*
2. Description.
   * **User Interface Design:**
     + Design a user-friendly interface with screens for tracking different types of physical activities, such as running, cycling, or weightlifting.
     + Include screens for setting fitness goals, viewing activity history, and monitoring progress.
   * **Data Storage:**
     + Use SQLite database or Room Persistence Library to store and retrieve activity data, user profiles, and fitness goals persistently.
     + Implement functions to save and update activity data, user profiles, and fitness goals.
   * **User Input Handling:**
     + Implement features for users to input their daily physical activities, including duration, distance, intensity, and calories burned.
     + Include options for users to manually enter activity data or sync data from external fitness tracking devices or apps.
   * **Graphical Data Visualization:**
     + Use charts or graphs to visually represent users' activity data, progress towards fitness goals, and trends over time.
     + Implement features for users to view their activity history, track changes in performance, and identify areas for improvement.
   * **Goal Setting and Monitoring:**
     + Allow users to set personalized fitness goals, such as daily step count, weekly running distance, or monthly weightlifting targets.
     + Implement features for users to track their progress towards fitness goals, receive notifications or reminders to stay on track, and adjust goals as needed.
   * **Social Sharing and Community Features:**
     + Include social sharing functionality to allow users to share their fitness achievements, progress updates, and workout routines with friends or on social media platforms.
     + Implement community features such as leaderboards, challenges, or virtual fitness groups to encourage interaction and motivation among users.
   * **Additional Features:**
     + Integrate with external APIs or services to provide additional features such as weather forecasts for outdoor activities, nutritional information for calorie tracking, or workout recommendations based on user preferences.
     + Implement features for users to track other health metrics such as sleep quality, heart rate, or body measurements.

# **Functionality of your app**

1. Press ”Start” in the main menu:

A screen shot of a phone

Description automatically generated

1. Click on “sign up” to create an account:

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Description automatically generated

1. Fill in the form:

A screenshot of a phone

Description automatically generated

1. Log in with new account:

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Description automatically generated

1. Fill out questionnaire:

A screenshot of a phone

Description automatically generated

1. Go to “Home” screen to see your daily tasks:

A screen shot of a phone

Description automatically generated

## **List of functions (adapt to your own app)**

1. Create a database to store user data.
2. Create a functional sing up system that checks if fields are properly filed.
3. Add a functioning login system that stores user session.
4. (Defense) Add a tracker for every time a user logs in inside the profile tab.

# **Solution**

## **Task #1. Create a database to store user data.**

The database was built using Room Persistence Library. Editing it was possible through the “App Inspection” tool. The User table is split into a User class, which stores the table’s model data, and a DAO class for storing related queries.

A screenshot of a computer program

Description automatically generated

Figure 1. Database layout

@Entity(indices = {@Index(value = {"email"}, unique = true)})  
public class User {  
 @PrimaryKey(autoGenerate = true)  
 private long id;  
  
 @NonNull  
 @ColumnInfo(name = "email")  
 private String email;  
  
 @NonNull  
 @ColumnInfo(name = "username")  
 private String username;  
  
 @NonNull  
 @ColumnInfo(name = "password")  
 private String password;

Figure 2 User class code

@Dao  
public interface UserDAO {  
 @Insert  
 void insert(User user);  
  
 @Query("DELETE FROM user")  
 void deleteAll();  
  
 @Query("SELECT \* FROM user ORDER BY username ASC")  
 List<User> getAllUsers();  
  
 @Query("SELECT COUNT(\*) FROM user WHERE email = :email\_string;")  
 boolean checkIfEmailAvailable(String email\_string);  
  
 @Query("SELECT id FROM user WHERE email = :email\_string AND password = :password\_string;")  
 long getIdByLogin(String email\_string, String password\_string);  
  
 @Query("SELECT username FROM user WHERE id = :id;")  
 String getUsernameById(Long id);  
}

Figure 3 UserDAO code

public class AppActivity extends Application {  
 private static AppDatabase *db*;  
  
 @Override  
 public void onCreate() {  
 super.onCreate();  
 *db* = Room.*databaseBuilder*(this, AppDatabase.class, "fitmax\_db")  
 .allowMainThreadQueries().build();  
 }  
  
 public static AppDatabase getDatabase() {  
 return *db*;  
 }  
}

Figure 4 AppActivity code

@Database(entities = {User.class, LoginDate.class}, version = 1)  
public abstract class AppDatabase extends RoomDatabase {  
 public abstract UserDAO userDAO();  
 public abstract LoginDateDAO loginDateDAO();  
}

Figure 5 AppDatabase code

## **Task #2. Create a functional sing up system that checks if fields are properly filed.**

The sign-up screen takes in 4 String values, if any of them are empty – an error is shown to the user. Before creating an account, a query is executed, checking whether the given email is taken or not. If it is, an appropriate error is shown. On successful creation, the user is sent back to the login screen.

A screen shot of a phone

Description automatically generated

Figure 6 Sign up page with invalid data

public class SignUp extends AppCompatActivity {  
 private AppDatabase db;  
 private Button signUpButton;  
  
 @Override  
 protected void onCreate(Bundle savedInstanceState) {  
  
 ActivitySignUpBinding binding;  
 super.onCreate(savedInstanceState);  
 binding = ActivitySignUpBinding.*inflate*(getLayoutInflater());  
 View view = binding.getRoot();  
 setContentView(view);  
  
 db = AppActivity.*getDatabase*();  
  
  
 // sign up function  
 binding.signUp.setOnClickListener(new View.OnClickListener() {  
 @Override  
 public void onClick(View v) {  
  
 boolean isValid = true;  
  
 // username ------------------------------------------------------------------------  
 String username\_string = binding.username.getText().toString().trim();  
 if (username\_string.isEmpty()) {  
 isValid = false;  
 binding.usernameContainer.setHelperText("Username invalid");  
 } else binding.usernameContainer.setHelperTextEnabled(false);  
  
 // email ---------------------------------------------------------------------------  
 String email\_string = binding.email.getText().toString().trim();  
 if (email\_string.isEmpty()){  
// || Patterns.EMAIL\_ADDRESS.matcher(email\_string).matches()) {  
 isValid = false;  
 binding.emailContainer.setHelperText("Email invalid");  
 } else if (db.userDAO().checkIfEmailAvailable(email\_string)) {  
 isValid = false;  
 binding.emailContainer.setHelperText("Email already in use");  
 } else binding.emailContainer.setHelperTextEnabled(false);  
  
 // password ------------------------------------------------------------------------  
 String password\_string = binding.password.getText().toString().trim();  
 if (password\_string.isEmpty()) {  
 isValid = false;  
 binding.passwordContainer.setHelperText("Password invalid");  
 } else binding.passwordContainer.setHelperTextEnabled(false);  
  
 // password confirm ----------------------------------------------------------------  
 String password\_confirm\_string = binding.passwordConfirm.getText().toString().trim();  
 if (password\_confirm\_string.isEmpty()) {  
 isValid = false;  
 binding.passwordConfirmContainer.setHelperText("Password invalid");  
 } else if (!password\_string.equals(password\_confirm\_string)) {  
 isValid = false;  
 binding.passwordConfirmContainer.setHelperText("Password does not match");  
 } else binding.passwordConfirmContainer.setHelperTextEnabled(false);  
  
 if (isValid){  
 User user = new User();  
 user.setUsername(username\_string);  
 user.setEmail(email\_string);  
 user.setPassword(password\_string);  
 db.userDAO().insert(user);  
  
 String message = "Account successfully created!";  
 Log.*v*("MMMM", message);  
 openLogin();  
 }  
 }  
  
 private boolean checkEmail(String email) {  
 return db.userDAO().checkIfEmailAvailable(email);  
 }  
 });  
 }  
  
 public void openLogin(){  
 Intent intent = new Intent(this, Login.class);  
 startActivity(intent);  
 }  
}

Figure 7 Sign up code

## **Task #3. Add a functioning login system that stores user session.**

Log in sessions were achieved by using SharedPreferences to store login information. First, the page checks if there is a matching password for the given email and password. If a match is found, an appropriate id is stored in SharedPreferences, and the user is sent to the main tab screen.

A screen shot of a phone

Description automatically generated

Figure 8 Login page

public class Login extends AppCompatActivity {  
 private AppDatabase db;  
 private Button loginButton;  
 private Button signupButton;  
 private TextView email\_field;  
 private TextView password\_field;  
 SharedPreferences sharedPrefs;  
  
 @Override  
 protected void onCreate(Bundle savedInstanceState) {  
 super.onCreate(savedInstanceState);  
 setContentView(R.layout.*activity\_login*);  
  
 db = AppActivity.*getDatabase*();  
 loginButton = findViewById(R.id.*log\_in*);  
 signupButton = findViewById(R.id.*sing\_up\_link*);  
 email\_field = findViewById(R.id.*email*);  
 password\_field = findViewById(R.id.*password*);  
  
  
 db.userDAO().getAllUsers();  
  
 loginButton.setOnClickListener(new View.OnClickListener() {  
 @Override  
 public void onClick(View v) {  
 String email = email\_field.getText().toString().trim();  
 String password = password\_field.getText().toString().trim();  
 long id = db.userDAO().getIdByLogin(email, password);  
  
 // in case user doesn't exist  
 if (id <= 0)  
 return;  
  
 // store user id for session  
 sharedPrefs = getSharedPreferences("user", Context.*MODE\_PRIVATE*);  
 SharedPreferences.Editor editor = sharedPrefs.edit();  
 editor.putLong("user", id);  
 editor.apply();  
 openTabActivity();  
 }  
 });  
 signupButton.setOnClickListener(new View.OnClickListener() {  
 @Override  
 public void onClick(View v) {  
 openSingUp();  
 }  
 });  
 }  
  
 public void openTabActivity() {  
 Intent intent = new Intent(this, TabScreen.class);  
 startActivity(intent);  
 }  
  
 public void openSingUp() {  
 Intent intent = new Intent(this, SignUp.class);  
 startActivity(intent);  
 }  
}

Figure 9 Login page code

## **Task #4. (Defense) Add a tracker for every time a user logs in inside the profile tab.**

For loogin information storage, a LoginDate table was created. Before the main tab activity switch happens in the login screen, the LoginDate table is updated. Through the use of SharedPreferences, login dates are accessible in the profile screen through an sql query.

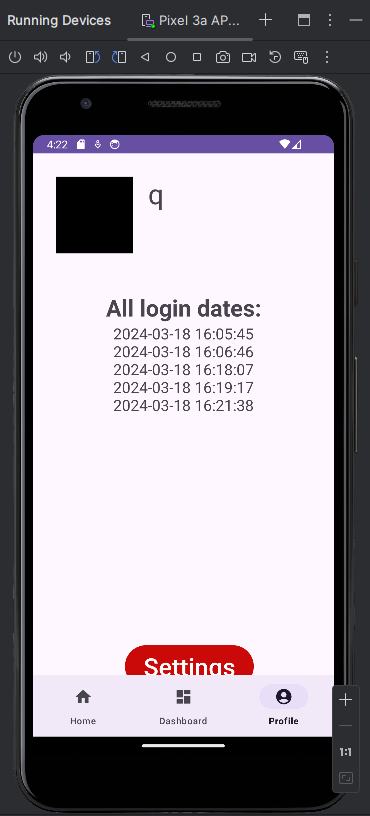


Figure 10 Login date tracker

// date setup  
SimpleDateFormat sdf = new SimpleDateFormat("yyyy-MM-dd HH:mm:ss");  
String currentDateAndTime = sdf.format(new Date());  
LoginDate loginDate = new LoginDate();  
loginDate.setLogin\_date(String.*valueOf*(currentDateAndTime));  
loginDate.setId\_user(id);  
  
db.loginDateDAO().insert(loginDate);

Figure 11 Added date insert to login page

@Entity(foreignKeys = @ForeignKey(entity = User.class,  
 parentColumns = "id",  
 childColumns = "id\_user",  
 onDelete = ForeignKey.*CASCADE*))  
  
public class LoginDate {  
 @PrimaryKey(autoGenerate = true)  
 private long id\_login;  
  
 @NonNull  
 private long id\_user;  
  
 @NonNull  
 @ColumnInfo(name = "login\_date")  
 private String login\_date;  
  
 public long getId\_login() {  
 return id\_login;  
 }  
  
 public long getId\_user() {  
 return id\_user;  
 }  
  
 @NonNull  
 public String getLogin\_date() {  
 return login\_date;  
 }  
  
 public void setId\_login(long id\_login) {  
 this.id\_login = id\_login;  
 }  
  
 public void setId\_user(long id\_user) {  
 this.id\_user = id\_user;  
 }  
  
 public void setLogin\_date(@NonNull String login\_date) {  
 this.login\_date = login\_date;  
 }  
}

Figure 12 LoginDate model code

## **Task #5. Store physical activity and plan information on app start.**

For this task 3 more database tables were added: PhysicalActivity, Plan and PlansFromActivities. The table “PlansFromActivities” simulates a many to many relationship between PhysicalActivity and Plan. These tables are later filled at program start by using a separate class “BaseData” to store data query in string.

enum ActivityType {  
 *Core*,  
 *Holistic*,  
 *Lower*,  
 *Upper*}  
  
@Entity  
public class PhysicalActivity {  
  
 @PrimaryKey(autoGenerate = true)  
 private long id\_activity;  
  
 @NonNull  
 @ColumnInfo(name = "activity\_name")  
 private String activity\_name;  
  
 @NonNull  
 @ColumnInfo(name = "duration")  
 private String duration;  
  
 @NonNull  
 @ColumnInfo(name = "activity\_type")  
 private ActivityType type;  
  
 @NonNull  
 @ColumnInfo(name = "met")  
 private Float met;  
  
 // methods -------------------------------------------------------------------------------------  
 public long getId\_activity() {  
 return id\_activity;  
 }  
  
 @NonNull  
 public String getActivity\_name() {  
 return activity\_name;  
 }  
  
 @NonNull  
 public String getDuration() {  
 return duration;  
 }  
  
 @NonNull  
 public ActivityType getType() {  
 return type;  
 }  
  
 @NonNull  
 public Float getMet() {  
 return met;  
 }  
  
 public void setId\_activity(long id\_activity) {  
 this.id\_activity = id\_activity;  
 }  
  
 public void setActivity\_name(@NonNull String activity\_name) {  
 this.activity\_name = activity\_name;  
 }  
  
 public void setDuration(@NonNull String duration) {  
 this.duration = duration;  
 }  
  
 public void setType(@NonNull ActivityType type) {  
 this.type = type;  
 }  
  
 public void setMet(@NonNull Float met) {  
 this.met = met;  
 }  
}

Figure 13 PhysicalActivity table code fragment

package com.example.fitmax.Database;  
  
import androidx.annotation.NonNull;  
import androidx.room.ColumnInfo;  
import androidx.room.Entity;  
import androidx.room.PrimaryKey;  
  
@Entity  
public class Plan {  
  
 @PrimaryKey(autoGenerate = true)  
 private long id\_plan;  
  
 @NonNull  
 @ColumnInfo(name = "plan\_name")  
 private String plan\_name;  
  
 public long getId\_plan() {  
 return id\_plan;  
 }  
  
 @NonNull  
 public String getPlan\_name() {  
 return plan\_name;  
 }  
  
 public void setId\_plan(long id\_plan) {  
 this.id\_plan = id\_plan;  
 }  
  
 public void setPlan\_name(@NonNull String plan\_name) {  
 this.plan\_name = plan\_name;  
 }  
}

Figure 14 Plan table code fragment

package com.example.fitmax.Database;  
  
import androidx.room.ColumnInfo;  
import androidx.room.Entity;  
import androidx.room.ForeignKey;  
import androidx.room.Index;  
import androidx.room.PrimaryKey;  
  
enum Weekday {  
 *Monday*,  
 *Tuesday*,  
 *Wednesday*,  
 *Thursday*,  
 *Friday*,  
 *Saturday*,  
 *Sunday*}  
  
@Entity(foreignKeys = {  
 @ForeignKey(entity = PhysicalActivity.class,  
 parentColumns = "id\_activity",  
 childColumns = "id\_activity",  
 onDelete = ForeignKey.*CASCADE*),  
 @ForeignKey(entity = Plan.class,  
 parentColumns = "id\_plan",  
 childColumns = "id\_plan",  
 onDelete = ForeignKey.*CASCADE*)},  
  
 indices = {  
 @Index(value = {"id\_activity"}),  
 @Index(value = {"id\_plan"})  
 }  
)  
  
public class PlansFromActivities {  
  
 @PrimaryKey(autoGenerate = true)  
 private long id\_pfa;  
  
 private long id\_plan;  
  
 private long id\_activity;  
  
 @ColumnInfo(name = "weekday")  
 private Weekday weekday;  
  
 // methods -------------------------------------------------------------------------------------  
  
  
 public void setId\_pfa(long id\_pfa) {  
 this.id\_pfa = id\_pfa;  
 }  
  
 public void setId\_plan(long id\_plan) {  
 this.id\_plan = id\_plan;  
 }  
  
 public void setId\_activity(long id\_activity) {  
 this.id\_activity = id\_activity;  
 }  
  
 public void setWeekday(Weekday weekday) {  
 this.weekday = weekday;  
 }  
  
 public long getId\_pfa() {  
 return id\_pfa;  
 }  
  
 public long getId\_plan() {  
 return id\_plan;  
 }  
  
 public long getId\_activity() {  
 return id\_activity;  
 }  
  
 public Weekday getWeekday() {  
 return weekday;  
 }  
}

Figure 15 PlansFromActivities table code fragment

try {  
 SupportSQLiteDatabase sqLiteDatabase = *db*.getOpenHelper().getWritableDatabase();  
 String[] queries = BaseData.*base\_data*.split(";");  
 for (String query : queries) {  
 if (!query.trim().isEmpty()) {  
 sqLiteDatabase.execSQL(query);  
 }  
 }  
} catch (SQLException e) {  
 System.*out*.println("Error executing query: " + e.getMessage());  
 e.printStackTrace();  
}

Figure 16 Added code to store initial database data in „AppActivity“ class

## **Task #6. Create a questionnaire that stores user preferences.**

Upon finishing account creation, you are sent to a questionnaire that adds additional info about the user. This data is stored in the “User” table, which has been extended. From there you can input your weight and choose a desirable activity plan from a spinner.

A screenshot of a phone

Description automatically generated

Figure 17 Questionnaire activity

// date setup  
SimpleDateFormat sdf = new SimpleDateFormat("yyyy-MM-dd HH:mm:ss");  
String currentDateAndTime = sdf.format(new Date());  
LoginDate loginDate = new LoginDate();  
loginDate.setLogin\_date(String.*valueOf*(currentDateAndTime));  
loginDate.setId\_user(id);  
  
db.loginDateDAO().insert(loginDate);

Figure 18 Added date insert to login page

@Entity(foreignKeys = @ForeignKey(entity = User.class,  
 parentColumns = "id",  
 childColumns = "id\_user",  
 onDelete = ForeignKey.*CASCADE*))  
  
public class LoginDate {  
 @PrimaryKey(autoGenerate = true)  
 private long id\_login;  
  
 @NonNull  
 private long id\_user;  
  
 @NonNull  
 @ColumnInfo(name = "login\_date")  
 private String login\_date;  
  
 public long getId\_login() {  
 return id\_login;  
 }  
  
 public long getId\_user() {  
 return id\_user;  
 }  
  
 @NonNull  
 public String getLogin\_date() {  
 return login\_date;  
 }  
  
 public void setId\_login(long id\_login) {  
 this.id\_login = id\_login;  
 }  
  
 public void setId\_user(long id\_user) {  
 this.id\_user = id\_user;  
 }  
  
 public void setLogin\_date(@NonNull String login\_date) {  
 this.login\_date = login\_date;  
 }  
}

Figure 19 LoginDate model code

public class Questionnaire extends AppCompatActivity {  
 private AppDatabase db;  
  
 @Override  
 protected void onCreate(Bundle savedInstanceState) {  
 super.onCreate(savedInstanceState);  
 // binding ---------------------------------------------------------------------------------  
 QuestionnaireBinding binding;  
 binding = QuestionnaireBinding.*inflate*(getLayoutInflater());  
 View view = binding.getRoot();  
 setContentView(view);  
  
 db = AppActivity.*getDatabase*();  
 // tool bar --------------------------------------------------------------------------------  
 setSupportActionBar(binding.toolbar.toolbar);  
 Objects.*requireNonNull*(getSupportActionBar()).setDisplayHomeAsUpEnabled(true);  
 setTitle(getTitle());  
 // -----------------------------------------------------------------------------------------  
  
 List<Plan> plans = db.planDAO().getAll();  
 populateSpinner(binding.planSpinner, plans);  
  
  
 // sign up function  
 binding.confirmButton.setOnClickListener(new View.OnClickListener() {  
 @Override  
 public void onClick(View v) {  
  
 Float weight = Float.*parseFloat*(binding.weight.getText().toString().trim());  
 if (weight.isNaN()) {  
 binding.weightContainer.setHelperText("Weight required");  
 return;  
 } else if (weight <= 0) {  
 binding.weightContainer.setHelperText("Weight must be positive number");  
 return;  
 } else binding.weightContainer.setHelperTextEnabled(false);  
  
  
 long id\_user = getIntent().getLongExtra("id\_user", -1);  
 if (id\_user < 0) {  
 Toast.*makeText*(getApplicationContext(),  
 "Error, id: " + id\_user + " is incorrect",  
 Toast.*LENGTH\_SHORT*).show();  
 return;  
 }  
  
 String plan\_string = binding.planSpinner.getSelectedItem().toString();  
 Plan selectedPlan = GetPlanFromName(plan\_string, plans);  
 db.userDAO().FinishQuestionnaire(id\_user, weight, selectedPlan.getId\_plan());  
  
 Toast.*makeText*(getApplicationContext(), "Account updated successfully",  
 Toast.*LENGTH\_SHORT*).show();  
  
 SessionManager.*storeLoginSession*(getApplicationContext(), id\_user);  
 SessionManager.*GoToMain*(view.getContext());  
 }  
 });  
 }  
  
 private Plan GetPlanFromName(String name, List<Plan> list) {  
 Plan foundPlan = null;  
 for (Plan plan : list) {  
 if (plan.getPlan\_name() == name)  
 foundPlan = plan;  
 }  
 return foundPlan;  
 }  
  
 private void populateSpinner(Spinner spinner, List<Plan> list) {  
  
 List<String> spinner\_list = new ArrayList<>();  
 for (Plan plan : list) {  
 spinner\_list.add(plan.getPlan\_name());  
 }  
 ArrayAdapter<String> adapter = new ArrayAdapter<>(this,  
 R.layout.*s\_plan\_layout*, spinner\_list);  
  
 adapter.setDropDownViewResource(android.R.layout.*simple\_spinner\_dropdown\_item*);  
 spinner.setAdapter(adapter);  
 }  
}

Figure 20 Questionnaire activity code

## **Task #7. Display daily tasks based off selected plan.**

To display user activities based on the current weekday, a custom query was created.

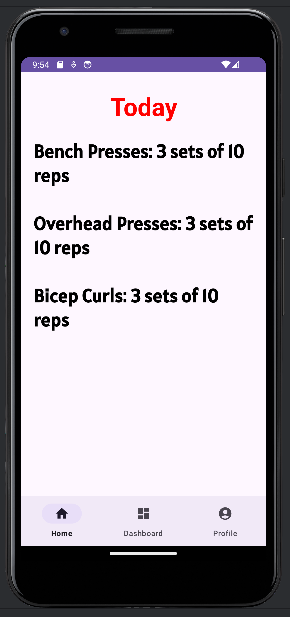


Figure 21 Displayed tasks in home fragment

# **Reference list**

1. https://www.youtube.com/watch?v=9Ga1lZ-Xn24