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Отчёт по лабораторной работе № 3

Дисциплина: Проектирование мобильных приложений

Тема: Lifesycle компоненты. Навигация в приложении.

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1. Цели работы

- Познакомиться с Google Codelabs и научиться его использовать как способ быстрого изучения новых фреймворков и технологий
- Изучить основные возможности навигации внутри приложения: создание новых activity, navigation graph

2. Задачи работы

- Ознакомление с Jetpack Compose
- Навигация (startActivityForResult)
- Навигация (флаги Intent/атрибуты Activity)
- Навигация (Fragments, Navigation Graph)

3. Ход работы (вариант 16 = Navigation Drawer)

Задача 1.

Был пройден codelab по основам Jetpack Compose. Были изучены:

- базовые компоненты Compose
- как реализовать состояния UI (с помощью mutableState)
- базовые контейнеры.
- базовая анимация DP

Задача 2.

Исходный код: https://github.com/timatify/alarmpers/tree/lab3-activities/navigation_demo

Реализуем навигацию между экранами одного приложения согласно изображению ниже с помощью Activity, Intent и метода startActivityForResult.



Рис. 2.1 Исходное задание

Для этого создадим 4 Activity и объявим их манифесте (рис. 2) (иначе при попытке открытия Activity будет `ActivityNotFoundException`).

```
<activity
    android:name=".about.ActivityAbout"
    android:exported="true"
    android:label="@string/about" />
<activity
    android:name=".main_screens.Activity3"
    android:exported="true"
    android:label="Activity 3" />
<activity
    android:name=".main_screens.Activity2"
    android:exported="true"
    android:label="Activity 2" />
<activity
    android:name=".main_screens.Activity1"
    android:exported="true"
    android:label="Activity 1">
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />

        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
```

Рис. 2 Application в манифесте проекта

Листинг 2.1 Activity1.kt

```
class Activity1 : AppCompatActivity() {

    private lateinit var binding: Activity1Binding

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        binding = Activity1Binding.inflate(layoutInflater)
        setContentView(binding.root)

        binding.btnToSecond.setOnClickListener {
            navToActivity2()
        }

        setupDrawer(binding.drawer, binding.drawerNav)
    }

    private fun navToActivity2() {
        startActivity(Intent(this, Activity2::class.java))
    }

}
```

```

class Activity2 : AppCompatActivity() {

    private lateinit var binding: Activity2Binding

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        binding = Activity2Binding.inflate(layoutInflater)
        setContentView(binding.root)

        binding.btnToFirst.setOnClickListener {
            navToActivity1()
        }

        binding.btnToThird.setOnClickListener {
            navToActivity3()
        }

        setupDrawer(binding.drawer, binding.drawerNav)
    }

    override fun onActivityResult(requestCode: Int, resultCode: Int, data: Intent?) {
        if (requestCode == REQUEST_CODE_THIRD) {
            when (resultCode) {
                RESULT_CODE_TO_FIRST -> {
                    navToActivity1()
                }
                RESULT_CODE_TO_SECOND -> return
                else -> return
            }
            return
        }
        super.onActivityResult(requestCode, resultCode, data)
    }

    private fun navToActivity1() {
        finish()
    }

    private fun navToActivity3() {
        startActivityForResult(
            Intent(
                this,
                Activity3::class.java
            ), REQUEST_CODE_THIRD
        )
    }

    companion object {
        private const val REQUEST_CODE_THIRD = 100
        const val RESULT_CODE_TO_FIRST = REQUEST_CODE_THIRD + 1
        const val RESULT_CODE_TO_SECOND = REQUEST_CODE_THIRD + 2
    }
}

```

```

class Activity3 : AppCompatActivity() {

    private lateinit var binding: Activity3Binding

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)

        binding = Activity3Binding.inflate(layoutInflater)
        setContentView(binding.root)

        binding.btnToFirst.setOnClickListener {
            navToActivity1()
        }

        binding.btnToSecond.setOnClickListener {
            navToActivity2()
        }

        setupDrawer(binding.drawer, binding.drawerNav)
    }

    private fun navToActivity1() {
        setResult(Activity2.RESULT_CODE_TO_FIRST)
        finish()
    }

    private fun navToActivity2() {
        setResult(Activity2.RESULT_CODE_TO_SECOND)
        finish()
    }
}

```

```

fun Activity.setupDrawer(drawer: DrawerLayout, navigationView: NavigationView) {
    navigationView.setNavigationItemSelectedListener {
        if (it.itemId == R.id.nav_about) {
            drawer.closeDrawer(GravityCompat.START, true)
            startActivity(Intent(this, ActivityAbout::class.java))
        }
        true
    }
}

```

Проверим работу со стэком. Откроем приложение и нажмем на кнопку.

D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatify | findStr Hist

* Hist #1: ActivityRecord{1fb871f u0 dev.timatify.navigation_demo/.main_screens.Activity2 t44}

* Hist #0: ActivityRecord{2d4e968 u0 dev.timatify.navigation_demo/.main_screens.Activity1 t44}

Откроем ActivityAbout через Drawer.

```
D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatify | findStr Hist
* Hist #2: ActivityRecord{c477afe u0 dev.timatify.navigation_demo/.about.ActivityAbout t44}
* Hist #1: ActivityRecord{1fb871f u0 dev.timatify.navigation_demo/.main_screens.Activity2 t44}
* Hist #0: ActivityRecord{2d4e968 u0 dev.timatify.navigation_demo/.main_screens.Activity1 t44}
```

Нажмем кнопку назад и перейдем к Activity3.

```
D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatify | findStr Hist
* Hist #2: ActivityRecord{9636ed1 u0 dev.timatify.navigation_demo/.main_screens.Activity3 t44}
* Hist #1: ActivityRecord{1fb871f u0 dev.timatify.navigation_demo/.main_screens.Activity2 t44}
* Hist #0: ActivityRecord{2d4e968 u0 dev.timatify.navigation_demo/.main_screens.Activity1 t44}
```

Нажмем кнопку to first.

```
D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatify | findStr Hist
* Hist #0: ActivityRecord{2d4e968 u0 dev.timatify.navigation_demo/.main_screens.Activity1 t44}
```

Убеждаемся, что все работает корректно.

Задача 3.

Исходный код: https://github.com/timatify/alarmper/tree/lab3-activities-flag/navigation_demo

Переделаем написанный код без использования startActivityForResult.

Листинг 3.1 Activity2.kt

```
class Activity2 : AppCompatActivity() {  
    private lateinit var binding: Activity2Binding  
  
    override fun onCreate(savedInstanceState: Bundle?) {  
        super.onCreate(savedInstanceState)  
        binding = Activity2Binding.inflate(layoutInflater)  
        setContentView(binding.root)  
  
        binding.btnToFirst.setOnClickListener {  
            navToActivity1()  
        }  
  
        binding.btnToThird.setOnClickListener {  
            navToActivity3()  
        }  
  
        setupDrawer(binding.drawer, binding.drawerNav)  
    }  
  
    private fun navToActivity1() {  
        finish()  
    }  
  
    private fun navToActivity3() {  
        startActivity(Intent(this, Activity3::class.java))  
    }  
}
```

Листинг 3.2 Activity3.kt

```
class Activity3 : AppCompatActivity() {  
    private lateinit var binding: Activity3Binding  
  
    override fun onCreate(savedInstanceState: Bundle?) {  
        super.onCreate(savedInstanceState)  
  
        binding = Activity3Binding.inflate(layoutInflater)  
        setContentView(binding.root)  
  
        binding.btnToFirst.setOnClickListener {  
            navToActivity1()  
        }  
    }  
}
```



```

        binding.btnToSecond.setOnClickListener {
            navToActivity2()
        }

        setupDrawer(binding.drawer, binding.drawerNav)
    }

    private fun navToActivity1() {
        startActivity(Intent(this, Activity1::class.java)
            .addFlags(Intent.FLAG_ACTIVITY_CLEAR_TOP)
        )
    }

    private fun navToActivity2() {
        finish()
    }
}

```

Прделаем проверку с помощью adb

Откроем приложение и перейдем на Activity 2

```

D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatifeY | findStr Hist
* Hist #1: ActivityRecord{cb2c533 u0 dev.timatifeY.navigation_demo/.main_screens.Activity2 t54}
* Hist #0: ActivityRecord{6cd51db u0 dev.timatifeY.navigation_demo/.main_screens.Activity1 t54}

```

Перейдем на Activity 3

```

D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatifeY | findStr Hist
* Hist #2: ActivityRecord{895d19b u0 dev.timatifeY.navigation_demo/.main_screens.Activity3 t54}
* Hist #1: ActivityRecord{cb2c533 u0 dev.timatifeY.navigation_demo/.main_screens.Activity2 t54}
* Hist #0: ActivityRecord{6cd51db u0 dev.timatifeY.navigation_demo/.main_screens.Activity1 t54}

```

Перейдем на ActivityAbout через Drawer

```

D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatifeY | findStr Hist
* Hist #3: ActivityRecord{991e144 u0 dev.timatifeY.navigation_demo/.about.ActivityAbout t54}
* Hist #2: ActivityRecord{895d19b u0 dev.timatifeY.navigation_demo/.main_screens.Activity3 t54}
* Hist #1: ActivityRecord{cb2c533 u0 dev.timatifeY.navigation_demo/.main_screens.Activity2 t54}
* Hist #0: ActivityRecord{6cd51db u0 dev.timatifeY.navigation_demo/.main_screens.Activity1 t54}

```

Вернемся нажатием кнопки назад

```

D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatifeY | findStr Hist
* Hist #2: ActivityRecord{895d19b u0 dev.timatifeY.navigation_demo/.main_screens.Activity3 t54}

```

* Hist #1: ActivityRecord{cb2c533 u0 dev.timatify.navigation_demo/.main_screens.Activity2 t54}

* Hist #0: ActivityRecord{6cd51db u0 dev.timatify.navigation_demo/.main_screens.Activity1 t54}

Перейдем на Activity 1 с помощью нажатия на кнопку to first

D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatify | findStr Hist

* Hist #0: ActivityRecord{91b2b09 u0 dev.timatify.navigation_demo/.main_screens.Activity1 t54}

Убеждаемся, что все работает корректно.

Задача 4.

Добавим на Activity 1 открытие Activity 2 без сохранения истории. То есть, например, после перехода из Activity 2 в Activity 3 и нажатия кнопки назад мы должны сразу переходить на Activity 1.

Листинг 4.1 Activity1.kt

```
class Activity1 : AppCompatActivity() {  
  
    private lateinit var binding: Activity1Binding  
  
    override fun onCreate(savedInstanceState: Bundle?) {  
        super.onCreate(savedInstanceState)  
        binding = Activity1Binding.inflate(layoutInflater)  
        setContentView(binding.root)  
  
        binding.btnToSecond.setOnClickListener {  
            navToActivity2()  
        }  
  
        binding.btnToSecondNoHistory.setOnClickListener {  
            navToActivity2NoHistory()  
        }  
  
        setupDrawer(binding.drawer, binding.drawerNav)  
    }  
  
    private fun navToActivity2() {  
        startActivity(Intent(this, Activity2::class.java))  
    }  
  
    private fun navToActivity2NoHistory() {  
        startActivity(  
            Intent(this, Activity2::class.java)  
                .addFlags(Intent.FLAG_ACTIVITY_NO_HISTORY)  
        )  
    }  
}
```

Запустим приложение

```
D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatifyey | findStr Hist
```

```
* Hist #0: ActivityRecord{fb11148 u0 dev.timatifyey.navigation_demo/.main_screens.Activity1 t56}
```

Нажмем на кнопку с новым переходом без сохранения истории

```
D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatifyey | findStr Hist
```

```
* Hist #1: ActivityRecord{b31ee4e u0 dev.timatifyey.navigation_demo/.main_screens.Activity2 t56}
```

```
* Hist #0: ActivityRecord{fb11148 u0 dev.timatifyey.navigation_demo/.main_screens.Activity1 t56}
```

Перейдем для примера в ActivityAbout

```
D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatify | findStr Hist
* Hist #2: ActivityRecord{20c3b62 u0 dev.timatify.navigation_demo/.about.ActivityAbout t56}
* Hist #1: ActivityRecord{b31ee4e u0 dev.timatify.navigation_demo/.main_screens.Activity2 t56 f}
* Hist #0: ActivityRecord{fb11148 u0 dev.timatify.navigation_demo/.main_screens.Activity1 t56}
mLastNoHistoryActivity: ActivityRecord{b31ee4e u0 dev.timatify.navigation_demo/.main_screens.Activity2 t56 f}
```

Нажмем кнопку назад – открылась Activity 1

```
D:\Projects\alarmper\navigation_demo>adb shell dumpsys activity activities | findStr timatify | findStr Hist
* Hist #0: ActivityRecord{fb11148 u0 dev.timatify.navigation_demo/.main_screens.Activity1 t56}
```

Убеждаемся, что работает корректно.

Задача 5.

Исходный код: https://github.com/timatify/alarmpcr/tree/lab3-fragments/navigation_demo

Реализуем исходную задачу через Fragment и Arch Nav Component от Google.

Листинг 5.1 MainActivity.kt

```
class MainActivity : AppCompatActivity() {

    private lateinit var binding: ActivityMainBinding
    private lateinit var navController: NavController

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)

        binding = ActivityMainBinding.inflate(layoutInflater)
        setContentView(binding.root)

        val navHostFragment = supportFragmentManager
            .findFragmentById(R.id.fragmentContainerView) as NavHostFragment
        navController = navHostFragment.navController

        setupActionBarWithNavController(
            navController,
            AppBarConfiguration.Builder(navController.graph).build()
        )

        with(binding) {
            drawerNav.setNavigationItemSelectedListener {
                if (it.itemId == R.id.nav_about) {
                    drawer.closeDrawer(GravityCompat.START, true)
                    navController.navigate(R.id.action_to_activityAbout)
                }
                true
            }
        }
    }

    override fun onSupportNavigateUp(): Boolean {
        return navController.navigateUp() || super.onSupportNavigateUp()
    }
}
```

Листинг 5.2 Fragment1.kt

```
class Fragment1 : Fragment() {

    private var binding: Fragment1Binding? = null

    override fun onCreateView(
        inflater: LayoutInflater,
        container: ViewGroup?,
        savedInstanceState: Bundle?
    ) {
```

```

): View {
    binding = Fragment1Binding.inflate(inflater, container, false)
    return binding!!.root
}

override fun onViewCreated(view: View, savedInstanceState: Bundle?) {
    super.onViewCreated(view, savedInstanceState)
    with(binding!!) {
        btnToSecond.setOnClickListener {
            findNavController().navigate(R.id.action_fragment1_to_fragment2)
        }
    }
}

override fun onDestroyView() {
    super.onDestroyView()
    binding = null
}
}

```

Листинг 5.3 Fragment2.kt

```

class Fragment2 : Fragment() {

    private var binding: Fragment2Binding? = null

    override fun onCreateView(
        inflater: LayoutInflater,
        container: ViewGroup?,
        savedInstanceState: Bundle?
    ): View {
        binding = Fragment2Binding.inflate(inflater, container, false)
        return binding!!.root
    }

    override fun onViewCreated(view: View, savedInstanceState: Bundle?) {
        super.onViewCreated(view, savedInstanceState)
        with(binding!!) {
            btnToFirst.setOnClickListener {
                findNavController().navigate(R.id.action_fragment2_to_fragment1)
            }

            btnToThird.setOnClickListener {
                findNavController().navigate(R.id.action_fragment2_to_fragment3)
            }
        }
    }

    override fun onDestroyView() {
        super.onDestroyView()
        binding = null
    }
}

```

```

class Fragment3: Fragment() {

    private var binding: Fragment3Binding? = null

    override fun onCreateView(
        inflater: LayoutInflater,
        container: ViewGroup?,
        savedInstanceState: Bundle?
    ): View {
        binding = Fragment3Binding.inflate(inflater, container, false)
        return binding!!.root
    }

    override fun onViewCreated(view: View, savedInstanceState: Bundle?) {
        super.onViewCreated(view, savedInstanceState)
        with(binding!!) {
            btnToFirst.setOnClickListener {
                findNavController().navigate(R.id.action_fragment3_to_fragment1)
            }

            btnToSecond.setOnClickListener {
                findNavController().navigate(R.id.action_fragment3_to_fragment2)
            }
        }
    }

    override fun onDestroyView() {
        super.onDestroyView()
        binding = null
    }
}

```

```

<?xml version="1.0" encoding="utf-8"?>
<navigation xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/app_graph"
    app:startDestination="@id/fragment1">

    <fragment
        android:id="@+id/fragment1"
        android:name="dev.timatifey.navigation_demo.main_screens.Fragment1"
        android:label="Fragment1">
        <action
            android:id="@+id/action_fragment1_to_fragment2"
            app:destination="@id/fragment2" />
        </fragment>
    <fragment
        android:id="@+id/fragment2"
        android:name="dev.timatifey.navigation_demo.main_screens.Fragment2"
        android:label="Fragment2">
        <action

```

```
        android:id="@+id/action_fragment2_to_fragment3"
        app:destination="@id/fragment3" />
    <action
        android:id="@+id/action_fragment2_to_fragment1"
        app:destination="@id/fragment1"
        app:popUpTo="@id/fragment1"
        app:popUpToInclusive="true" />
</fragment>
<fragment
    android:id="@+id/fragment3"
    android:name="dev.timatifey.navigation_demo.main_screens.Fragment3"
    android:label="Fragment3">
    <action
        android:id="@+id/action_fragment3_to_fragment1"
        app:destination="@id/fragment1"
        app:popUpTo="@id/fragment1"
        app:popUpToInclusive="true" />
    <action
        android:id="@+id/action_fragment3_to_fragment2"
        app:destination="@id/fragment2"
        app:popUpTo="@id/fragment2"
        app:popUpToInclusive="true" />
</fragment>
<activity
    android:id="@+id/activityAbout"
    android:name="dev.timatifey.navigation_demo.about.ActivityAbout"
    android:label="activity_about"
    tools:layout="@layout/activity_about" />
    <action
        android:id="@+id/action_to_activityAbout"
        app:destination="@id/activityAbout" />
</navigation>
```


4. Статистика (работа выполнялось с параллельным написанием отчета)

- Задача 1: 15 мин
- Задача 2: 1 ч 30 мин (в основном мучился с Drawer)
- Задача 3: 45 мин
- Задача 4: 10 мин
- Задача 5: 30 мин

Итого: 3 ч 10 мин

5. Вывод

В ходе работы были продемонстрированы способы навигации в Android приложении. Была изучена навигация между Activity и управление стеком с помощью Intent-флагов. Использовали `activityForResult`. Также была решена исходная задача с помощью Google Nav Component и фрагментов.