**Лабораторная работа 4.**

**Наследование. Полиморфизм**

**Теория**

<https://metanit.com/java/tutorial/>

<https://metanit.com/java/android/>

**Практика**

**Задание 1**

Разработать приложение, позволяющее создавать 3 класса (1 базовый и 2 производных) и выводить их поля на экран.

Содержание класса **Device**

**package** com.example.test;  
  
**import** androidx.annotation.NonNull;  
  
**import** java.io.Serializable;  
  
**public class** Device **implements** Serializable {  
 **int** serial\_number;  
 **private** String status = **"Off"**;  
  
 Device() { }  
  
 Device(**int** serial\_numberValue) {  
 serial\_number = serial\_numberValue;  
 }  
  
 **public void** TurnOn() {  
 status = **"On"**;  
 }  
  
 **public void** TurnOff() {  
 status = **"Off"**;  
 }  
  
 **public** String GetStatus() {  
 **return "Device is "** + status;  
 }  
  
 @Override  
 **public** String toString() {  
 **return "Serial number: "** + serial\_number;  
 }  
}

Содержание класса **Computer**

**package** com.example.test;  
  
**import** java.io.Serializable;  
  
**public class** Computer **extends** Device **implements** Serializable {  
 **int RAM**;  
 **float CPUfrequency**;  
  
 @Override  
 **public** String toString() {  
 **return super**.toString() + **"\nRAM: "** + **RAM** + **"\nCPU frequency: "** + **CPUfrequency**;  
 }  
}

Содержание класса **Printer**

**package** com.example.test;  
  
**import** java.io.Serializable;  
  
**public class** Printer **extends** Device **implements** Serializable {  
 **int speed**;  
 String **format**;  
  
 @Override  
 **public** String toString() {  
 **return super**.toString() + **"\nSpeed: "** + **speed** + **"\nFormat: "** + **format**;  
 }  
}

Содержание **MainActivity**

**package** com.example.test;  
  
**import** androidx.appcompat.app.AppCompatActivity;  
  
**import** android.content.Intent;  
**import** android.os.Bundle;  
**import** android.view.View;  
  
**public class** MainActivity **extends** AppCompatActivity {  
  
 @Override  
 **protected void** onCreate(Bundle savedInstanceState) {  
 **super**.onCreate(savedInstanceState);  
 setContentView(R.layout.***activity\_main***);  
 }  
  
 **public void** createDevice(View view) {  
 Intent intent = **new** Intent(**this**, ResultActivity.**class**);  
 startActivity(intent);  
 }  
  
 **public void** createComputer(View view) {  
 Intent intent = **new** Intent(**this**, ComputerActivity.**class**);  
 startActivity(intent);  
 }  
  
 **public void** createPrinter(View view) {  
 Intent intent = **new** Intent(**this**, PrinterActivity.**class**);  
 startActivity(intent);  
 }  
}

Содержание **activity\_main.xml**

*<?***xml version="1.0" encoding="utf-8"***?>*<**androidx.constraintlayout.widget.ConstraintLayout  
 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:layout\_width="match\_parent"  
 android:layout\_height="match\_parent"  
 android:paddingTop="50dp"  
 android:paddingBottom="50dp"  
 android:paddingLeft="25dp"  
 android:paddingRight="25dp"  
 tools:context=".MainActivity"**>  
  
 <**TextView  
 android:id="@+id/header"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Create new device"  
 android:textSize="20dp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toTopOf="parent"**/>  
  
 <**Button  
 android:id="@+id/button1"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Create device"  
 android:onClick="createDevice"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/header"**/>  
  
 <**Button  
 android:id="@+id/button2"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Create computer"  
 android:onClick="createComputer"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/button1"**/>  
  
 <**Button  
 android:id="@+id/button3"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Create printer"  
 android:onClick="createPrinter"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/button2"**/>  
  
</**androidx.constraintlayout.widget.ConstraintLayout**>

Содержание **DeviceActivity**

**package** com.example.test;  
  
**import** androidx.appcompat.app.AppCompatActivity;  
  
**import** android.content.Intent;  
**import** android.os.Bundle;  
**import** android.view.View;  
**import** android.widget.TextView;  
  
**public class** DeviceActivity **extends** AppCompatActivity {  
  
 @Override  
 **protected void** onCreate(Bundle savedInstanceState) {  
 **super**.onCreate(savedInstanceState);  
 setContentView(R.layout.***activity\_device***);  
 }  
  
 **public void** createDevice(View view) {  
 TextView nameTxtResult = (TextView) findViewById(R.id.***editTextSerial***);  
 **int** serial = Integer.*parseInt*(nameTxtResult.getText().toString());  
 Device device = **new** Device(serial);  
 Intent intent = **new** Intent(**this**, ResultActivity.**class**);  
 intent.putExtra(**"device"**, device);  
 startActivity(intent);  
 }  
}

Содержание **activity\_device.xml**

*<?***xml version="1.0" encoding="utf-8"***?>*<**androidx.constraintlayout.widget.ConstraintLayout  
 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:layout\_width="match\_parent"  
 android:layout\_height="match\_parent"  
 android:paddingTop="50dp"  
 android:paddingBottom="50dp"  
 android:paddingLeft="25dp"  
 android:paddingRight="25dp"  
 tools:context=".DeviceActivity"**>  
  
 <**TextView  
 android:id="@+id/header"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Set parametrs"  
 android:textSize="20dp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toTopOf="parent"**/>  
  
 <**EditText  
 android:id="@+id/editTextSerial"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:hint="Serial number"  
 android:textSize="18sp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/header"**/>  
  
 <**Button  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Create device"  
 android:onClick="createDevice"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@id/editTextSerial"**/>  
  
</**androidx.constraintlayout.widget.ConstraintLayout**>

Содержание **ComputerActivity**

**package** com.example.test;  
  
**import** androidx.appcompat.app.AppCompatActivity;  
  
**import** android.content.Intent;  
**import** android.os.Bundle;  
**import** android.view.View;  
**import** android.widget.TextView;  
  
**public class** ComputerActivity **extends** AppCompatActivity {  
  
 @Override  
 **protected void** onCreate(Bundle savedInstanceState) {  
 **super**.onCreate(savedInstanceState);  
 setContentView(R.layout.***activity\_computer***);  
 }  
  
 **public void** createComputer(View view) {  
 TextView serialTxtResult = (TextView) findViewById(R.id.***editTextSerial***);  
 TextView ramTxtResult = (TextView) findViewById(R.id.***editTextRam***);  
 TextView cpuTxtResult = (TextView) findViewById(R.id.***editTextCpu***);  
 **int** serial = Integer.*parseInt*(serialTxtResult.getText().toString());  
 **int** ram = Integer.*parseInt*(ramTxtResult.getText().toString());  
 **float** cpu = Float.*parseFloat*(cpuTxtResult.getText().toString());  
 Computer computer = **new** Computer();  
 computer.**serial\_number** = serial;  
 computer.**RAM** = ram;  
 computer.**CPUfrequency** = cpu;  
 Intent intent = **new** Intent(**this**, ResultActivity.**class**);  
 intent.putExtra(**"device"**, computer);  
 startActivity(intent);  
 }  
}

Содержание **activity\_computer.xml**

*<?***xml version="1.0" encoding="utf-8"***?>*<**androidx.constraintlayout.widget.ConstraintLayout  
 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:layout\_width="match\_parent"  
 android:layout\_height="match\_parent"  
 android:paddingTop="50dp"  
 android:paddingBottom="50dp"  
 android:paddingLeft="25dp"  
 android:paddingRight="25dp"  
 tools:context=".ComputerActivity"**>  
  
 <**TextView  
 android:id="@+id/header"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Set parametrs"  
 android:textSize="20dp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toTopOf="parent"**/>  
  
 <**EditText  
 android:id="@+id/editTextSerial"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:hint="Serial number"  
 android:textSize="18sp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/header"**/>  
  
 <**EditText  
 android:id="@+id/editTextRam"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:hint="RAM"  
 android:textSize="18sp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/editTextSerial"**/>  
  
 <**EditText  
 android:id="@+id/editTextCpu"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:hint="CPU"  
 android:textSize="18sp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/editTextRam"**/>  
  
 <**Button  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Create device"  
 android:onClick="createComputer"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@id/editTextCpu"**/>  
  
</**androidx.constraintlayout.widget.ConstraintLayout**>

Содержание **PrinterActivity**

**package** com.example.test;  
  
**import** androidx.appcompat.app.AppCompatActivity;  
  
**import** android.content.Intent;  
**import** android.os.Bundle;  
**import** android.view.View;  
**import** android.widget.TextView;  
  
**public class** PrinterActivity **extends** AppCompatActivity {  
  
 @Override  
 **protected void** onCreate(Bundle savedInstanceState) {  
 **super**.onCreate(savedInstanceState);  
 setContentView(R.layout.activity\_printer);  
 }  
  
 **public void** createPrinter(View view) {  
 TextView serialTxtResult = (TextView) findViewById(R.id.editTextSerial);  
 TextView formatTxtResult = (TextView) findViewById(R.id.editTextFormat);  
 TextView speedTxtResult = (TextView) findViewById(R.id.editTextSpeed);  
 **int** serial = Integer.parseInt(serialTxtResult.getText().toString());  
 String format = formatTxtResult.getText().toString();  
 String speed = speedTxtResult.getText().toString();  
 Printer printer = **new** Printer();  
 printer.serial\_number = serial;  
 printer.format = format;  
 printer.speed = Integer.parseInt(speed);  
 Intent intent = **new** Intent(**this**, ResultActivity.**class**);  
 intent.putExtra(**"device"**, printer);  
 startActivity(intent);  
 }  
}

Содержание **activity\_printer.xml**

*<?***xml version="1.0" encoding="utf-8"***?>*<**androidx.constraintlayout.widget.ConstraintLayout  
 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:layout\_width="match\_parent"  
 android:layout\_height="match\_parent"  
 android:paddingTop="50dp"  
 android:paddingBottom="50dp"  
 android:paddingLeft="25dp"  
 android:paddingRight="25dp"  
 tools:context=".PrinterActivity"**>  
  
 <**TextView  
 android:id="@+id/header"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Set parametrs"  
 android:textSize="20dp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toTopOf="parent"**/>  
  
 <**EditText  
 android:id="@+id/editTextSerial"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:hint="Serial number"  
 android:textSize="18sp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/header"**/>  
  
 <**EditText  
 android:id="@+id/editTextSpeed"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:hint="Speed"  
 android:textSize="18sp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/editTextSerial"**/>  
  
 <**EditText  
 android:id="@+id/editTextFormat"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:hint="Format"  
 android:textSize="18sp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/editTextSpeed"**/>  
  
 <**Button  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Create device"  
 android:onClick="createPrinter"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@id/editTextFormat"**/>  
  
</**androidx.constraintlayout.widget.ConstraintLayout**>

Содержание **ResultActivity**

**package** com.example.test;  
  
**import** androidx.appcompat.app.AppCompatActivity;  
  
**import** android.os.Bundle;  
**import** android.view.View;  
**import** android.widget.TextView;  
**import** android.widget.Toast;  
**import** android.widget.ToggleButton;  
  
**public class** ResultActivity **extends** AppCompatActivity {  
  
 Device **device**;  
  
 @Override  
 **protected void** onCreate(Bundle savedInstanceState) {  
 **super**.onCreate(savedInstanceState);  
 setContentView(R.layout.***activity\_result***);  
 **device** = (Device) getIntent().getSerializableExtra(**"device"**);  
 TextView txtResult = (TextView) findViewById(R.id.***result***);  
 TextView txtState = (TextView) findViewById(R.id.***state***);  
  
 txtResult.setText(**device**.toString());  
 txtState.setText(**device**.GetStatus());  
 }  
  
 **public void** onToggleClicked(View view) {  
 **boolean** on = ((ToggleButton) view).isChecked();  
 **if** (on) {  
 **device**.TurnOn();  
 } **else** {  
 **device**.TurnOff();  
 }  
 TextView txtState = (TextView) findViewById(R.id.***state***);  
 txtState.setText(**device**.GetStatus());  
 }  
}

Содержание **activity\_result.xml**

*<?***xml version="1.0" encoding="utf-8"***?>*<**androidx.constraintlayout.widget.ConstraintLayout  
 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:layout\_width="match\_parent"  
 android:layout\_height="match\_parent"  
 android:paddingTop="50dp"  
 android:paddingBottom="50dp"  
 android:paddingLeft="25dp"  
 android:paddingRight="25dp"  
 tools:context=".ResultActivity"**>  
  
 <**TextView  
 android:id="@+id/result"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Set parametrs"  
 android:textSize="20dp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toTopOf="parent"**/>  
  
 <**TextView  
 android:id="@+id/state"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Device state"  
 android:textSize="20dp"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/result"**/>  
  
 <**ToggleButton  
 android:id="@+id/toggle"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:textOn="On"  
 android:textOff="Off"  
 android:onClick="onToggleClicked"  
 app:layout\_constraintLeft\_toLeftOf="parent"  
 app:layout\_constraintTop\_toBottomOf="@+id/state"**/>

</**androidx.constraintlayout.widget.ConstraintLayout**>

**Задание 2**

Переопределить методы GetStatus() производных классов.

Содержание класса **Device**

**package** com.example.lab4task1;  
  
**import** java.io.Serializable;  
  
**public class** Device **implements** Serializable {  
 **int serial\_number**;  
 **protected** String **status** = **"Off"**;  
  
 Device() { }  
  
 Device(**int** serial\_numberValue) {  
 **serial\_number** = serial\_numberValue;  
 }  
  
 **public void** TurnOn() {  
 **status** = **"On"**;  
 }  
  
 **public void** TurnOff() {  
 **status** = **"Off"**;  
 }  
  
 **public** String GetStatus() {  
 **return "Device is "** + **status**;  
 }  
  
 @Override  
 **public** String toString() {  
 **return "Serial number: "** + **serial\_number**;  
 }  
}

Содержание класса **Printer**

**package** com.example.lab4task1;  
  
**import** java.io.Serializable;  
  
**public class** Printer **extends** Device **implements** Serializable {  
 **int speed**;  
 String **format**;  
  
 @Override  
 **public** String toString() {  
 **return super**.toString() + **"\nSpeed: "** + **speed** + **"\nFormat: "** + **format**;  
 }  
  
 @Override  
 **public** String GetStatus() {  
 **return "Printer is "** + **status**;  
 }  
}

Содержание класса **Computer**

**package** com.example.lab4task1;  
  
**import** java.io.Serializable;  
  
**public class** Computer **extends** Device **implements** Serializable {  
 **int RAM**;  
 **float CPUfrequency**;  
  
 @Override  
 **public** String toString() {  
 **return super**.toString() + **"\nRAM: "** + **RAM** + **"\nCPU frequency: "** + **CPUfrequency**;  
 }  
  
 @Override  
 **public** String GetStatus() {  
 **return "Computer is "** + **status**;  
 }  
}

**Задание 3**

Реализовать свой производный класс с возможностью его создания и вывода на экран приложения.