

GDG Izhevsk

GDG Mobile Meetup

Izhevsk, 20/02

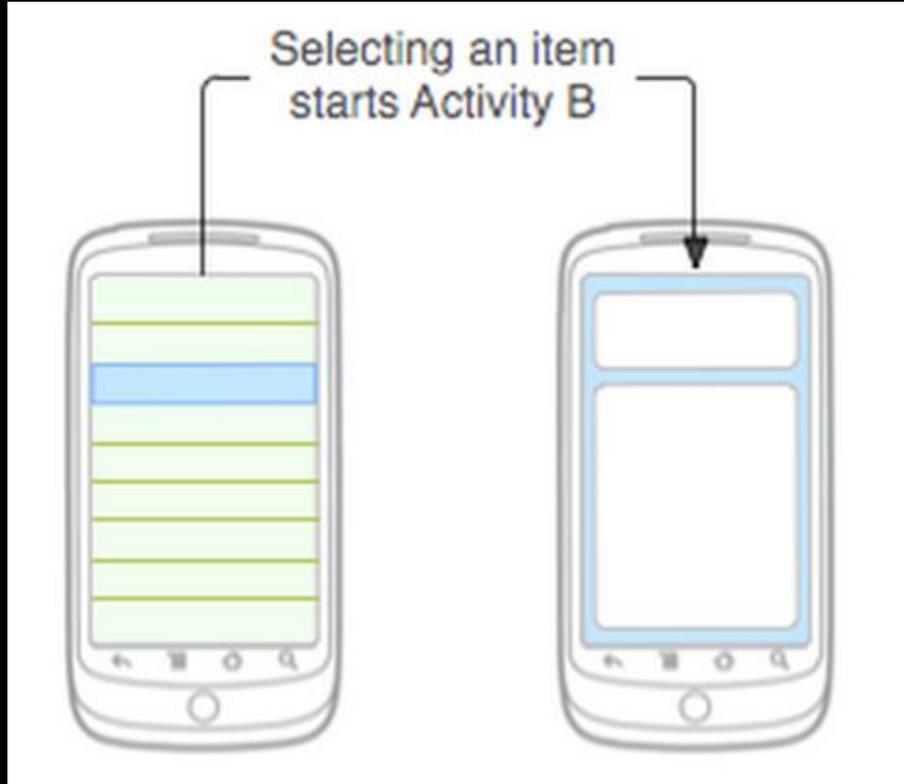
Навигация в Android с Kotlin

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Master-details



Java - Junior way

```
public void itemChosen(SomeModel model) {  
    Intent intent = new Intent( packageContext: this, DetailsActivity.class);  
    intent.putExtra(DetailsActivity.MODEL_KEY, model);  
    startActivity(intent);  
}
```

Минусы:

- Дублирование, многословность
- Неочевиден контракт передачи данных

Java - The way: Factory-method

```
public class DetailsActivity extends AppCompatActivity {
```

```
    private static final String MODEL_KEY = "modelKey";
```

```
    public static void start(Context context, SomeModel model) {  
        Intent intent = new Intent(context, DetailsActivity.class);  
        intent.putExtra(MODEL_KEY, model);  
        context.startActivity(intent);  
    }
```

```
@Override
```

```
protected void onCreate(@Nullable Bundle savedInstanceState) {  
    super.onCreate(savedInstanceState);  
    SomeModel model = (SomeModel) getIntent().getSerializableExtra(MODEL_KEY);  
}
```



Java - The way

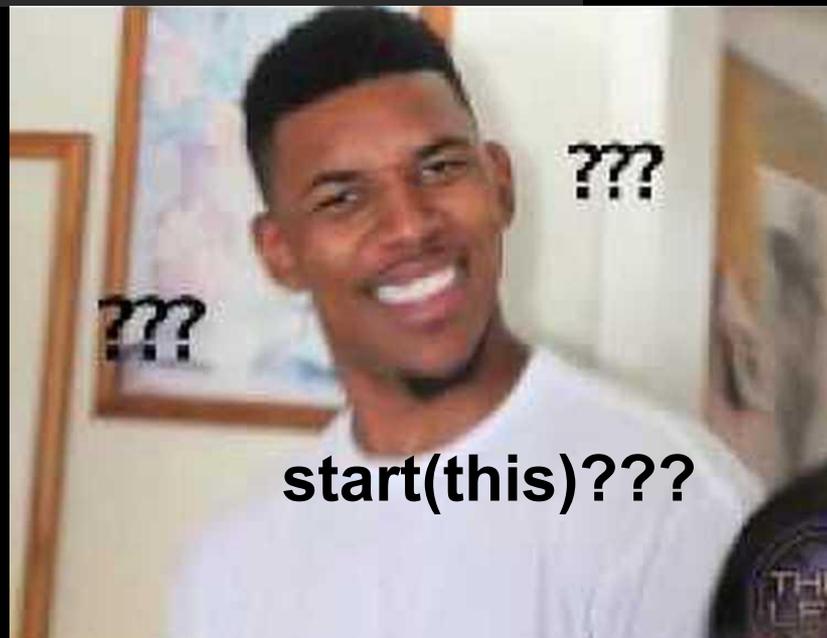
```
public void itemChosen(SomeModel model) {  
    DetailsActivity.start(context: this, model);  
}
```

Плюсы:

- Лаконичность вызова

Минусы:

- Неочевидность
- Boilerplate code
- Нагрузка статикой, нарушение SR



Java -> Kotlin



Convert Java to Kotlin

Some code in the rest of your project may require corrections after performing this conversion. Do you want to find such code and correct it too?

Cancel

OK

Java -> Kotlin

```
class DetailsActivity : AppCompatActivity() {  
  
    companion object {  
        private const val MODEL_KEY = "modelKey"  
  
        fun start(context: Context, model: SomeModel) {  
            val intent = Intent(context, DetailsActivity::class.java)  
            intent.putExtra(MODEL_KEY, model)  
            context.startActivity(intent)  
        }  
    }  
  
    override fun onCreate(savedInstanceState: Bundle?) {  
        super.onCreate(savedInstanceState)  
        val model : SomeModel = intent.getSerializableExtra(MODEL_KEY) as SomeModel  
    }  
}
```

Kotlin - a way

```
fun Context.startDetailsActivity(model: SomeModel) {  
    Intent(packageContext: this, DetailsActivity::class.java)  
        .apply { putExtra(MODEL_KEY, model) }  
        .also(::startActivity)  
}
```

```
fun itemChosen(model: SomeModel) {  
    startDetailsActivity(model)  
}
```

- ~~Неочевидность~~
- Boilerplate code
- Нагрузка статикой, нарушение SR

Kotlin - better way

```
private const val MODEL_KEY = "modelKey"

fun Context.startDetailsActivity(model: SomeModel) {
    Intent( packageContext: this, DetailsActivity::class.java)
        .apply { putExtra(MODEL_KEY, model) }
        .also(::startActivity)
}

class DetailsActivity : AppCompatActivity() {

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        val model : SomeModel = intent.getSerializableExtra(MODEL_KEY) as SomeModel
    }
}
```

- Boilerplate code
- ~~Нагрузка статикой, нарушение SR~~

Kotlin - better way

```
fun Context.startDetailsActivity() {  
    Intent(packageContext, this, DetailsActivity::class.java)  
        .also(::startActivity)  
}
```

Kotlin - better way

```
fun Context.start(clazz: Class<out AppCompatActivity>) {  
    Intent(packageContext: this, clazz)  
        .also(::startActivity)  
}
```

```
start(DetailsActivity::class.java)
```

Kotlin - The best way

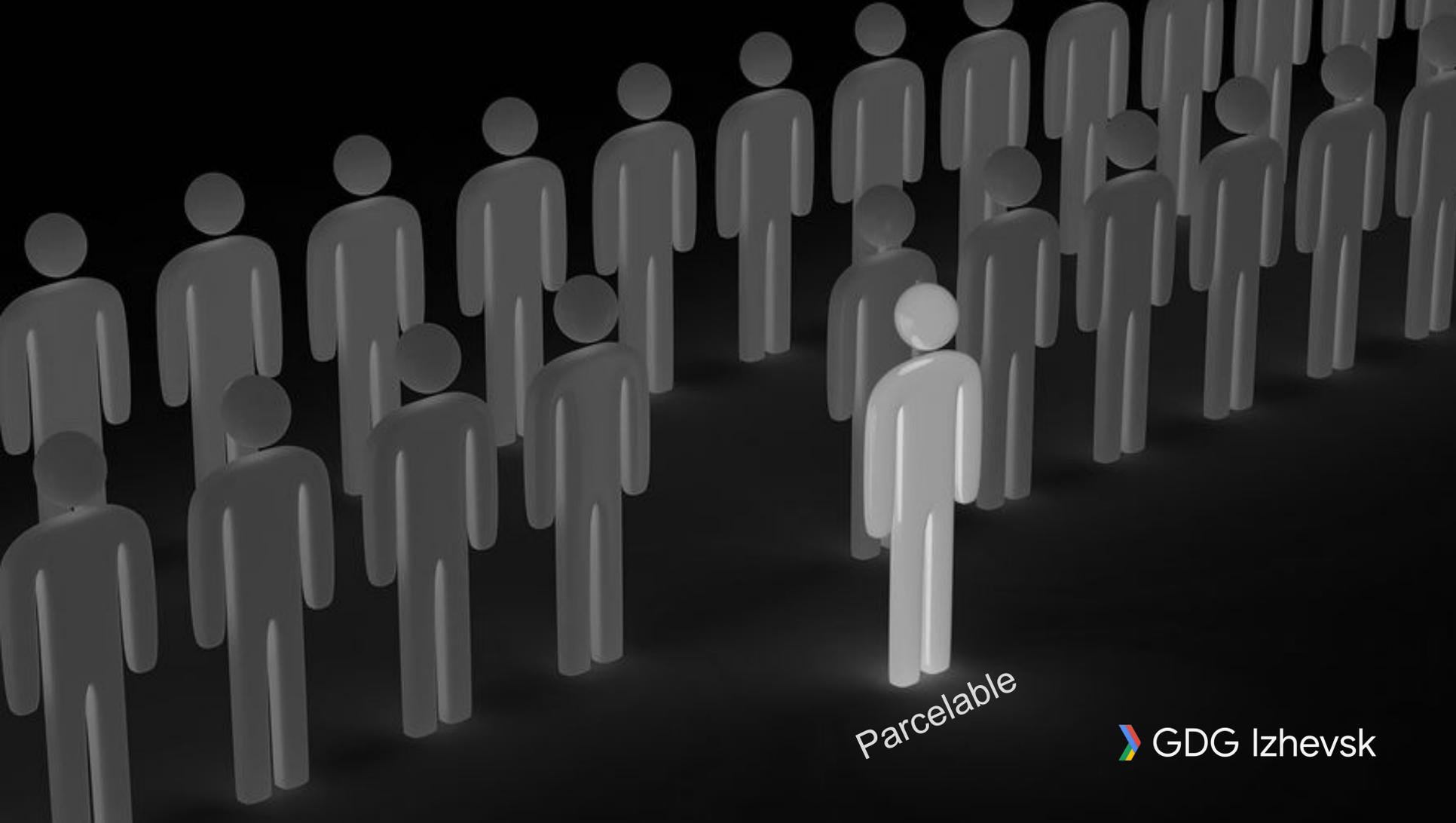
```
inline fun <reified T : AppCompatActivity> Context.start() {  
    Intent( packageContext: this, T::class.java)  
        .also(::startActivity)  
}
```

```
start<DetailsActivity>()
```

Decompiled byte-code:

```
public final void itemChosen() {  
    Intent var2 = new Intent( packageContext: this, DetailsActivity.class);  
    ((Context)this).startActivity(var2);  
}
```





Parcelable

Model wrapping - pervy' blin komom

Обертка над каждой моделью:

```
private const val SOME_MODEL_KEY = "SOME_MODEL_KEY"

infix fun Intent.with(oneModel: SomeModel): Intent = putExtra(SOME_MODEL_KEY, oneModel)

fun Intent.getSomeModelOrNull(): SomeModel? = getSerializableExtra(SOME_MODEL_KEY) as? SomeModel
```

Плюсы:

- Инкапсуляция
- Читабельность

Минусы:

- Boilerplate
- Несколько объектов одного типа

Model wrapping - pervy' blin komom

```
inline fun <reified T : AppCompatActivity> Context.start(vararg items: Any?) {
    startActivity(Intent( packageContext: this, T::class.java).apply { this: Intent
        for (item : Any? in items) {
            when (item) {
                null -> { }
                is SomeModel -> this with item
                is AnotherModel -> this with item
                else -> throw IllegalArgumentException("Not supported type of item $item")
            }
        }
    })
}
```

Плюсы:

- Единая точка обработки
- Расширяемость (ха-ха)

Минусы:

- Необходимость расширения
- RuntimeException  GDG Izhevsk
- Неоформляемо

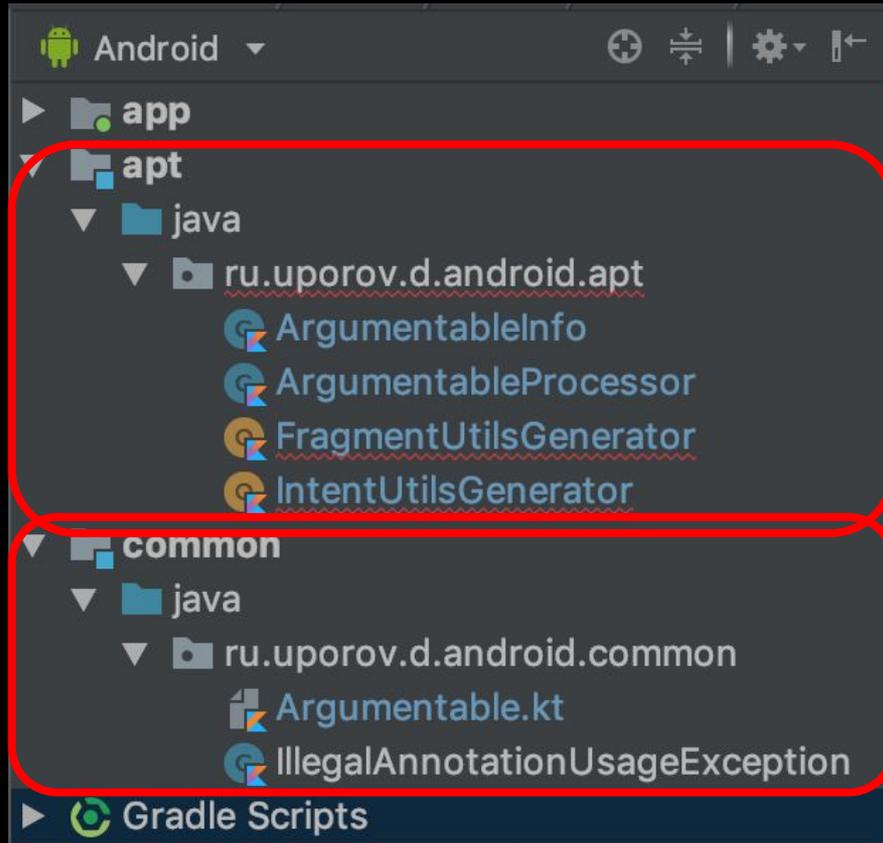




КОДОГЕНЕРА
ЦИЯ!!! >:D



Model wrapping - Wrong way



Annotation processor

```
@AutoService(Processor::class) // For registering the service
@SupportedSourceVersion(SourceVersion.RELEASE_8) // to support Java 8
@SupportedOptions(ArgumentableProcessor.KAPT_KOTLIN_GENERATED_OPTION_NAME)
class ArgumentableProcessor : AbstractProcessor() {

    companion object {
        const val KAPT_KOTLIN_GENERATED_OPTION_NAME = "kapt.kotlin.generated"
        const val PACKAGE = "d.gorov.argumentable"
    }

    override fun getSupportedAnnotationTypes(): MutableSet<String> {
        return mutableSetOf(Argumentable::class.java.name)
    }

    override fun getSourceVersion(): SourceVersion {
        return SourceVersion.latest()
    }

    override fun process(set: MutableSet<out TypeElement>?, roundEnvironment: RoundEnvironment): Boolean {
        roundEnvironment.getElementsAnnotatedWith(Argumentable::class.java)
            .map { it:Element! }
            .if (it.kind == ElementKind.CLASS) ^map it
            else throw IllegalArgumentException(Argumentable::class)
        }
        .map { it:Element! }
            .if (it is Symbol.ClassSymbol) ^map it
            else throw IllegalArgumentException(Argumentable::class)
        }
        // needed to skip processing round
        .ifEmpty { return false }
        .toArgumentableInfoList()
        .also { it:List<ArgumentableInfo> }
            generateIntUtils(PACKAGE, it).write()
            generateFragmentUtils(PACKAGE, it).write()
        }
        return true
    }

    private fun List<Symbol.ClassSymbol>.toArgumentableInfoList(): List<ArgumentableInfo> {
        val list :MutableList<ArgumentableInfo> = mutableListOf()
        forEach { element ->
            var argumentName = ""
            val type = ArgumentableType.SERIALIZABLE
            for (annotation :Attribute.Compound! in element.annotations) {
                for (pair :Pair<Symbol.MethodSymbol!, Attribute!> in annotation.values) {
                    when (pair.first.simpleName.toString()) {
                        "argumentName" -> argumentName = pair.second.value as String
                        "argumentType" -> type = pair.second.value as ArgumentableType
                    }
                }
            }
            element.toArgumentableInfo(argumentName, type).let { list::add }
        }
        return list
    }

    private fun Symbol.ClassSymbol.toArgumentableInfo(argumentName: String, type: ArgumentableType): ArgumentableInfo =
        asClassName().let { it:ClassName }
            ArgumentableInfo(it, type, if (argumentName.isEmpty()) it.simpleName else argumentName)
        }

    private fun FileSpec.write() = writeTo(File(processingEnv.options[KAPT_KOTLIN_GENERATED_OPTION_NAME]))
}
```

Model wrapping - Wrong way

```
@Argumentable(argumentName = "special")
class SomeModel(val name: String) : Serializable

private const val SOME_MODEL_KEY = "SOME_MODEL_KEY"

infix fun Intent.with(oneModel: SomeModel): Intent = putExtra(SOME_MODEL_KEY, oneModel)

fun Intent.getSomeModelOrNull(): SomeModel? = getSerializableExtra(SOME_MODEL_KEY) as? SomeModel

inline fun <reified T : AppCompatActivity> Context.start(vararg items: Any?) {
    startActivity(Intent(packageContext: this, T::class.java).apply { this: Intent
        for (item : Any? in items) {
            when (item) {
                null -> { }
                is SomeModel -> this with item
                is AnotherModel -> this with item
                else -> throw IllegalArgumentException("Not supported type of item $item")
            }
        }
    })
}
```

Java Mirror API



APT == MirrorAPI != Reflection

- Нет информации о реализованных интерфейсах

```
@Target(AnnotationTarget.CLASS)
@Retention(AnnotationRetention.SOURCE)
annotation class Argumentable<T>(
    val argumentName: String = "",
    val argumentType: KClass<T>
) where T : Serializable, T : Parcelable
```

- Нет ограничения реализации “Или то, или другое”
- Нет гарантии, что пользователь подставит в аннотацию свой класс
- Невозможно явно сказать пользователю, что мы хотим от него реализации интерфейса



“Используй дженерики..”



Kotlin - Wrapped model getting

```
inline fun <reified T> Intent.getArgOrNull(byKey: String = T::class.java.simpleName): T? {  
    return when {  
        T::class.isParcelable() -> getParcelableExtra<Parcelable>(byKey) as? T  
        T::class.isSerializable() -> getSerializableExtra(byKey) as? T  
        else -> throw IllegalArgumentException("${Intent::class} cannot have arguments by type ${T::class}")  
    }  
}
```

```
fun KClass<*>.isSerializable() = Serializable::class.java.isAssignableFrom(this.java)
```

```
fun KClass<*>.isParcelable() = Parcelable::class.java.isAssignableFrom(this.java)
```

```
intent.getArgOrNull<SomeModel>()
```

- RuntimeException

There is way to avoid RuntimeException?

```
inline fun <reified T : Serializable> Intent.getArgOrNull(): T? {  
    return getSerializableExtra(T::class.java.simpleName) as? T  
}
```

```
inline fun <reified T : Parcelable> Intent.getArgOrNull(): T? {  
    return getParcelableExtra(T::class.java.simpleName) as? T  
}
```

No way, but...

Input

Any?



Parcelable
Serializable

Model wrapping - Kotlin better way

```
inline fun <reified T : AppCompatActivity> Context.createIntent(vararg items: Any?): Intent {  
    return Intent( packageContext: this, T::class.java).apply { this: Intent  
        for (item : Any? in items) {  
            when (item) {  
                null -> Unit  
                is Serializable -> this with item  
                is Parcelable -> this with item  
                else -> throw IllegalArgumentException(  
                    "Class ${item::class} must implement "  
                    Parcelable::class + " or " + Serializable::class  
                )  
            }  
        }  
    }  
}  
  
infix fun <T : Parcelable> Intent.with(parcelable: T): Intent = apply { this: Intent  
    putExtra(parcelable::class.java.simpleName, parcelable)  
}  
  
infix fun <T : Serializable> Intent.with(serializable: T): Intent = apply { this: Intent  
    putExtra(serializable::class.java.simpleName, serializable)
```

How to filter Serializable or Parcelable?

- Перегрузка метода == ограничение всех параметров одним интерфейсом
- Ограничения реализации “Или то, или другое” (невозможно)
- 2 массива: Serializable и Parcelable. Ограниченный порядок аргументов

Model wrapping - Kotlin the best way

```
data class Argument<T> internal constructor(val arg: T)

fun <T : Parcelable> T.asArg() = Argument( arg: this)

fun <T : Serializable> T.asArg() = Argument( arg: this)
```

Model wrapping - Kotlin the best way

```
inline fun <reified T : AppCompatActivity> Context.createIntent(vararg items: Argument<*>) Intent {  
    return Intent( packageContext: this, T::class.java).apply { this.intent.putExtra  
        for (item : Argument<*> in items) {  
            when (item.arg) {  
                is Serializable -> this with item.arg  
                is Parcelable -> this with item.arg  
                else -> Unit  
            }  
        }  
    }  
}
```

```
start<DetailsActivity>(SomeModel().asArg())
```

Improvements time

```
data class Argument<T> internal constructor(val arg: T)

fun <T : Parcelable> T.asArg() = Argument( arg: this)

fun <T : Serializable> T.asArg() = Argument( arg: this)
```

```
class SomeModel() : Serializable, Parcelable
```

```
73
74     SomeModel().asArg()
75
```

Cannot choose among the following candidates without completing type inference:

- **public fun** <T : Parcelable> SomeModel.asArg(): Argument<SomeModel> defined in com.htc_cs.vkurse
- **public fun** <T : Serializable> SomeModel.asArg(): Argument<SomeModel> defined in com.htc_cs.vkurse

Improvements time

```
(SomeModel() as Parcelable).asArg()
```

Improvements time

```
data class Argument<T> internal constructor(val arg: T)

fun <T : Parcelable> T.asArg() = Argument( arg: this)

fun <T : Serializable> T.asArg() = Argument( arg: this)

fun <T> T.asArg() where T : Serializable, T : Parcelable = Argument( arg: this)
```

```
data class Argument<T> internal constructor(val arg: T)

fun <T : Parcelable> T.asArg() = Argument( arg: this)

fun <T : Serializable> T.asArg() = Argument( arg: this)

fun <T> T.asArg() where T : Parcelable, T : Serializable = Argument( arg: this)
```

Improvements time

```
@NotNull
public static final Argument asArg(@NotNull Parcelable $receiver) {
    Intrinsic.checkParameterIsNotNull($receiver, "receiver$0");
    return new Argument($receiver);
}
```

```
@NotNull
public static final Argument asArg(@NotNull Serializable $receiver) {
    Intrinsic.checkParameterIsNotNull($receiver, "receiver$0");
    return new Argument($receiver);
}
```

```
@NotNull
public static final Argument asArg(@NotNull Serializable $receiver) {
    Intrinsic.checkParameterIsNotNull($receiver, "receiver$0");
    return new Argument($receiver);
}
```

Kotlin magic time

```
data class Argument<T> internal constructor(val arg: T)

fun <T : Parcelable> T.asArg() = Argument( arg: this)

fun <T : Serializable> T.asArg() = Argument( arg: this)

fun <T> T.asArg() where T : Any?, T : Parcelable, T : Serializable = Argument( arg: this)
```

```
data class Argument<T> internal constructor(val arg: T)

fun <T : Parcelable> T.asArg() = Argument( arg: this)

fun <T : Serializable> T.asArg() = Argument( arg: this)

fun <T> T.asArg() where T : Parcelable, T : Serializable, T : Any? = Argument( arg: this)
```

Improvements time

```
@NotNull
public static final Argument asArg(@NotNull Parcelable $receiver) {
    Intrinsic.checkParameterIsNotNull($receiver, "receiver$0");
    return new Argument($receiver);
}
```

```
@NotNull
public static final Argument asArg(@NotNull Serializable $receiver) {
    Intrinsic.checkParameterIsNotNull($receiver, "receiver$0");
    return new Argument($receiver);
}
```

```
@NotNull
public static final Argument asArg(Object $receiver) {
    return new Argument($receiver);
}
```

Success!

```
data class Argument<T> internal constructor(val arg: T)

fun <T : Parcelable> T.asArg() = Argument( arg: this)

fun <T : Serializable> T.asArg() = Argument( arg: this)

fun <T> T.asArg() where T : Any?, T : Parcelable, T : Serializable = Argument( arg: this)
```

Improvements time 2

```
class SomeModel

fun main() {
    SomeModel().asArg()
}
```

Improvements time 2

```
@Suppress( ...names: "DeprecatedCallableAddReplaceWith")
@Deprecated(
    message = "Serializable's or Parcelable's child allowed only.",
    level = DeprecationLevel.ERROR
)
fun Any?.asArg(): Nothing = throw IllegalArgumentException()
```

Success 2!

```
47 fun main() {  
48     SomeModel().asArg()  
49 }  
51
```

Using 'asArg(): Nothing' is an error. Serializable's or Parcelable's child allowed only.

Improvements time 3 - ArgumentWithKey

```
data class ArgumentWithKey<T> internal constructor(val arg: T, val key: String)

fun <T : Parcelable> T.asArg(key: String = this::class.java.simpleName) = ArgumentWithKey( arg: this, key)

fun <T : Serializable> T.asArg(key: String = this::class.java.simpleName) = ArgumentWithKey( arg: this, key)
```

```
fun <T> ArgumentWithKey<T>.asIntent() = Intent().apply {
    when (arg) {
        is Serializable -> putExtra(key, arg)
        is Parcelable -> putExtra(key, arg)
    }
}
```

Improvements time 4: `Intent.() -> Unit`

```
Context.start(intentSettings: Intent.() -> Unit = {})
```

```
start<DetailsActivity> { this: Intent  
    flags = FLAG_ACTIVITY_SINGLE_TOP  
}
```

Improvements time 5: Other components

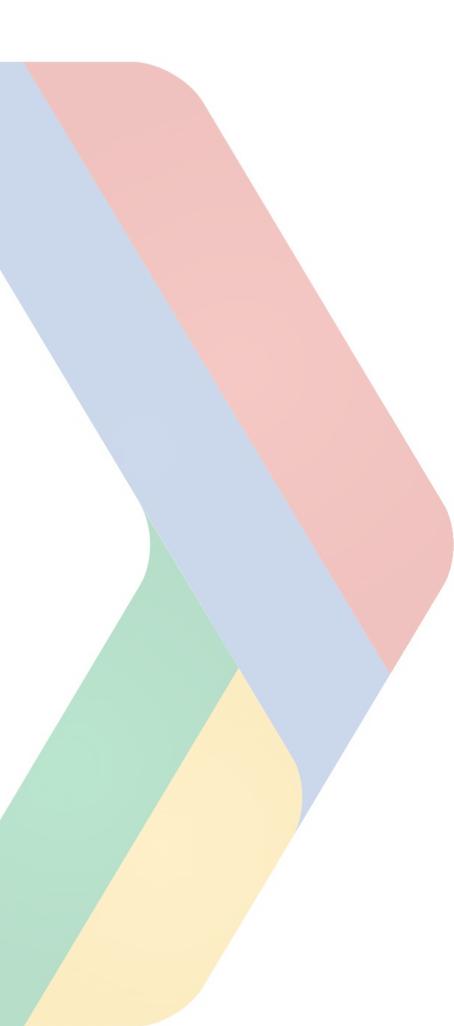
Fragment way:

```
newInstance<DetailsFragment>(SomeModel().asArg())
```

Service way:

```
start<SomeService>()
```

to be continued..



easyargs

Download [0.0.3](#)

With this small library you can easy navigate to activity or fragment. Convenient API allows you to put arguments (into Intent or Bundle) and to get them later.

```
class MasterActivity: AppCompatActivity {  
  
    fun onItemClick(item: Model) {  
        start<DetailsActivity>(item.asArg())  
    }  
}  
  
class DetailsActivity: AppCompatActivity {  
  
    override fun onCreate(savedInstanceState: Bundle?) {  
        super.onCreate(savedInstanceState)  
        val item: Model = getArg()  
    }  
}
```

Download

Project `build.gradle`

```
buildscript {  
    repositories {  
        jcenter()  
    }  
}
```

Module `build.gradle`

```
dependencies {  
    implementation 'com.github.udy18rus:easyargs:$easyargs_version'  
}
```



Спасибо за внимание!

Упоров Дмитрий

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