Kotlin meets Gadsu

Christoph Pickl

Kotlin Vienna Meetup – 2017-01-31

Agenda

1 **Introduction to Gadsu**

2 Kotlin in the wild

3 Code “*Schmankerln*”

4 Lessons Learned

Agenda

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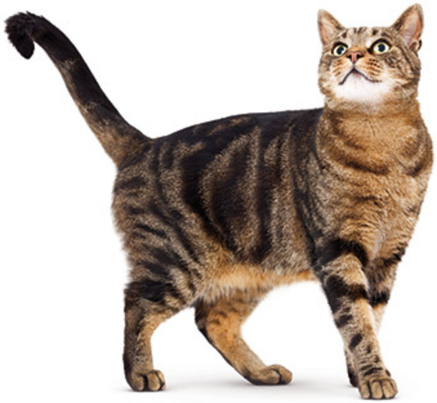
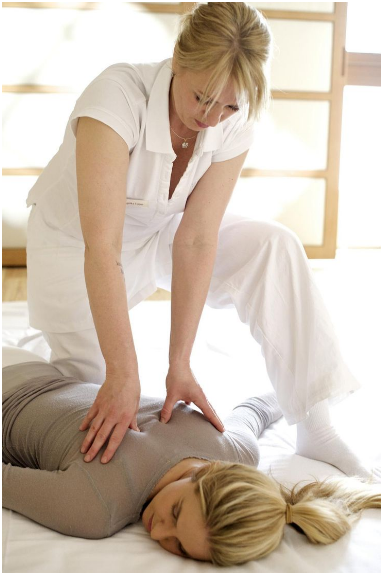
Introduction to Gadsu



This is a cat.



This is Shiatsu . . .

. . . so is this.

Gadsu is . . .

Gadsu is . . .

Gadse

Gadsu is . . .

Gadse

+ Shiat**su**

Gadsu is . . .

Gadse

+ Shiat**su**

= **Gadsu**

Shiatsu is . . .

. . . Japanese!

Shiatsu is . . .

. . . Japanese! Food!

Shiatsu is . . .

. . . Japanese! Food! Yam yam!

Shiatsu is . . .

- Massage, Physiotherapy, Bodywork
- Acupuncture, Meridiantherapy
- Nervous system stimulation

Shiatsu is . . .

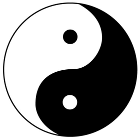
- Massage, Physiotherapy, Bodywork
- Acupuncture, Meridiantherapy
- Nervous system stimulation

- Based on the **T**raditional **C**hinese **M**edicine
  - Concept of **Qi** flowing through the body and everything
  - Body and mind seen as a unit, not separated from each other

Shiatsu is . . .

- Massage, Physiotherapy, Bodywork
- Acupuncture, Meridiantherapy
- Nervous system stimulation

- Based on the **T**raditional **C**hinese **M**edicine
  - Concept of **Qi** flowing through the body and everything
  - Body and mind seen as a unit, not separated from each other



Taiji Symbol, Theory of Yin and Yang

Gadsu can ...

Features:

- Client database
- Manage medical records
- Generate reports
- Google integration
- Auto update, auto backup

Gadsu can . . .

Features:

- Client database
- Manage medical records
- Generate reports
- Google integration
- Auto update, auto backup

Roadmap:

- Pain indicator, 5 Elements
- Statistics
- TCM intelligence
- Doodle integration
- Invoicing

Technology Stack

- Gradle

Technology Stack

- Gradle
- Swing

Technology Stack

- Gradle
- Swing
- Guice

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- Gradle
- Swing
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- Spring JDBC, HSQLDB, Flyway

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- Jasper, Pdfbox, Freemarker
- TestNG, Mockito, Hamcrest, UISpec4J

Technology Stack

- Gradle
- Swing
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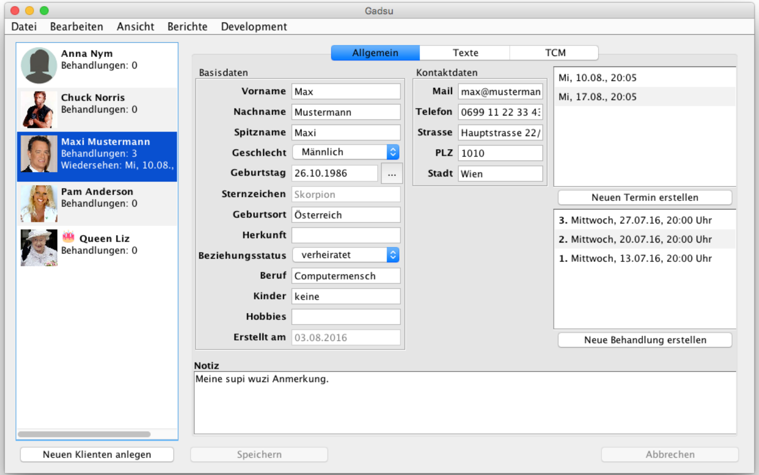
- Spring JDBC, HSQLDB, Flyway
- Jasper, Pdfbox, Freemarker
- TestNG, Mockito, Hamcrest, UISpec4J
- *Initial implementation used Kotlin 0.6* ;)



Anna Nym
Behandlungen: 0

Chuck Norris
Behandlungen: 0

Maxi Mustermann
Behandlungen: 3
Wiedersehen: Mi, 10.08.,

Pam Anderson
Behandlungen: 0

Queen Liz
Behandlungen: 0

Basisdaten

Vorname	Max
Nachname	Mustermann
Spitzname	Maxi
Geschlecht	Männlich
Geburtstag	26.10.1986
Sternzeichen	Skorpion
Geburtsort	Österreich
Herkunft	
Beziehungsstatus	verheiratet
Beruf	Computermensch
Kinder	keine
Hobbies	
Erstellt am	03.08.2016

Kontaktdaten

Mail	max@musterman
Telefon	0699 11 22 33 4:
Strasse	Hauptstrasse 22/
PLZ	1010
Stadt	Wien

Mi, 10.08., 20:05
Mi, 17.08., 20:05

Neuen Termin erstellen

3. Mittwoch, 27.07.16, 20:00 Uhr
2. Mittwoch, 20.07.16, 20:00 Uhr
1. Mittwoch, 13.07.16, 20:00 Uhr

Neue Behandlung erstellen

Notiz
Meine supi wuzi Anmerkung.

Neuen Klienten anlegen
Speichern
Abbrechen

Gadsu got something like 30,000 LoC :)

Let's see some app . . .

Kotlin in the wild

build.gradle

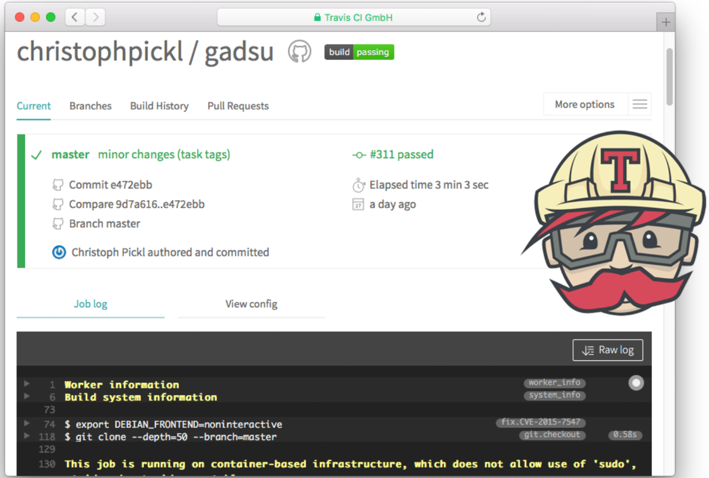
```
apply plugin: "kotlin"
```

build.gradle

```
apply plugin: "kotlin"
buildscript {
  ext.kotlin_version = '1.0.6'
  dependencies {
    classpath "org.jetbrains.kotlin:kotlin-
        gradle-plugin:$kotlin_version"
  }
}
```

build.gradle

```
apply plugin: "kotlin"
buildscript {
  ext.kotlin_version = '1.0.6'
  dependencies {
    classpath "org.jetbrains.kotlin:kotlin-
       gradle-plugin:$kotlin_version"
  }
}
dependencies {
  compile "org.jetbrains.kotlin:kotlin-
     stdlib:$kotlin_version"
  compile "org.jetbrains.kotlin:kotlin-
     reflect:$kotlin_version"
}
```



master minor changes (task tags)

#311 passed

Commit e472ebb

Compare 9d7a616..e472ebb

Branch master

Elapsed time 3 min 3 sec

a day ago

Christoph Pickl authored and committed

```
Worker information                                                   worker_info
Build system information                                             system_info

$ export DEBIAN_FRONTEND=noninteractive                             fix.CVE-2015-7547
$ git clone --depth=50 --branch=master                              git.checkout   0.58s

This job is running on container-based infrastructure, which does not allow use of 'sudo',
```

travis-ci.org

.travis.yml

```
language: kotlin
```

.travis.yml

```
language: kotlin
sudo: false
```

.travis.yml

```yaml
language: kotlin
sudo: false
jdk:
  - oraclejdk8
```

.travis.yml

```yaml
language: kotlin
sudo: false
jdk:
  - oraclejdk8
before_install:
  - "chmod +x gradlew"
```

.travis.yml

```
language: kotlin
sudo: false
jdk:
  - oraclejdk8
before_install:
  - "chmod +x gradlew"
  - "export DISPLAY=:99.0"
  - "sh -e /etc/init.d/xvfb start"
```

.travis.yml

```
language: kotlin
sudo: false
jdk:
  - oraclejdk8
before_install:
  - "chmod +x gradlew"
  - "export DISPLAY=:99.0"
  - "sh -e /etc/init.d/xvfb start"
script:
  - "./gradlew test ..."
```

.travis.yml

```yaml
language: kotlin
sudo: false
jdk:
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before_install:
  - "chmod +x gradlew"
  - "export DISPLAY=:99.0"
  - "sh -e /etc/init.d/xvfb start"
script:
  - "./gradlew test ..."
notifications:
  email:
    - "MLtravis@gadsu.com"
```
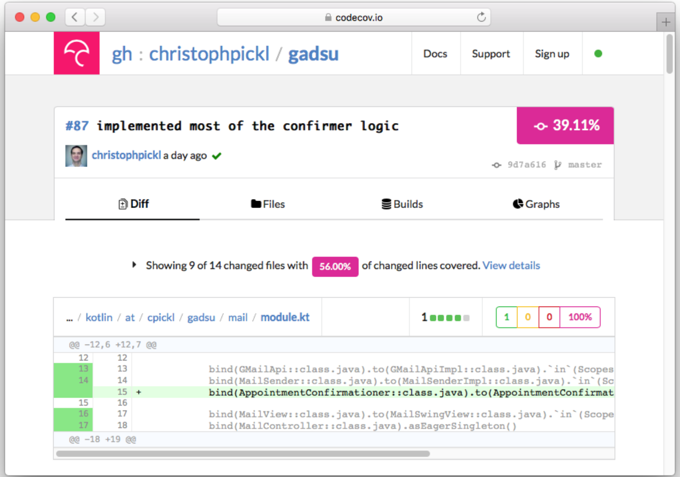



#87 implemented most of the confirmer logic 39.11%

christophpickl a day ago ✓ 9d7a616 master

Showing 9 of 14 changed files with 56.00% of changed lines covered. View details

... / kotlin / at / cpickl / gadsu / mail / module.kt 1 1 0 0 100%

```
@@ -12,6 +12,7 @@
12 12
13 13        bind(GMailApi::class.java).to(GMailApiImpl::class.java).`in`(Scopes
14 14        bind(MailSender::class.java).to(MailSenderImpl::class.java).`in`(Sc
   15  +    bind(AppointmentConfirmationer::class.java).to(AppointmentConfirmat
15 16
16 17        bind(MailView::class.java).to(MailSwingView::class.java).`in`(Scope
17 18        bind(MailController::class.java).asEagerSingleton()
@@ -18 +19 @@
```

codecov.io

Codecov

Gradle Configuration:

```
plugins {
  id 'jacoco'
  id 'com.github.kt3k.coveralls'
}
```

Codecov

Gradle Configuration:

```
plugins {
  id 'jacoco'
  id 'com.github.kt3k.coveralls'
}
jacocoTestReport {
  reports {
    xml.enabled = true
}}
```

Codecov

Gradle Configuration:

```
plugins {
  id 'jacoco'
  id 'com.github.kt3k.coveralls'
}
jacocoTestReport {
  reports {
    xml.enabled = true
}}
```

Travis Configuration:

```
script:
  - "./gradlew ... jacocoTestReport ..."
```

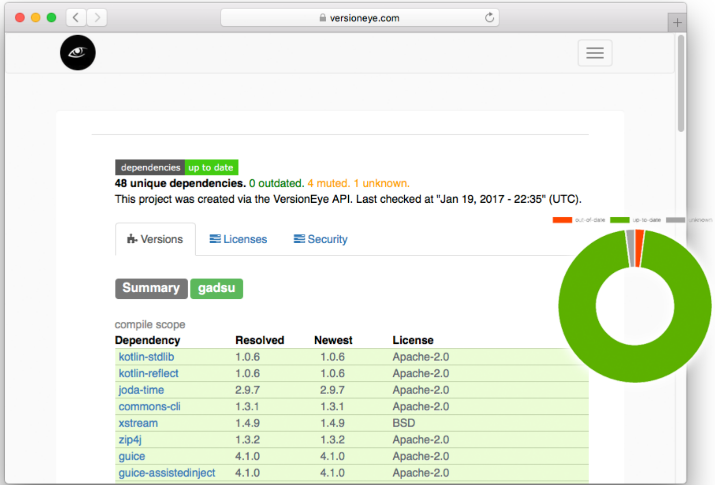
Codecov

Gradle Configuration:

```
plugins {
  id 'jacoco'
  id 'com.github.kt3k.coveralls'
}
jacocoTestReport {
  reports {
    xml.enabled = true
}}
```

Travis Configuration:

```
script:
  - "./gradlew ... jacocoTestReport ..."
after_success:
  - bash <(curl -s https://codecov.io/bash)
```



48 unique dependencies. 0 outdated. 4 muted. 1 unknown.
This project was created via the VersionEye API. Last checked at "Jan 19, 2017 - 22:35" (UTC).

compile scope

Dependency	Resolved	Newest	License
kotlin-stdlib	1.0.6	1.0.6	Apache-2.0
kotlin-reflect	1.0.6	1.0.6	Apache-2.0
joda-time	2.9.7	2.9.7	Apache-2.0
commons-cli	1.3.1	1.3.1	Apache-2.0
xstream	1.4.9	1.4.9	BSD
zip4j	1.3.2	1.3.2	Apache-2.0
guice	4.1.0	4.1.0	Apache-2.0
guice-assistedinject	4.1.0	4.1.0	Apache-2.0

versioneye.com

VersionEye

Gradle Configuration:

```
plugins {
  id "org.standardout.versioneye"
    version "1.4.0"
}
```

VersionEye

Gradle Configuration:

```
plugins {
  id "org.standardout.versioneye"
    version "1.4.0"
}
```

Gradle Properties:

```
versioneye.projectid=572880644a0f...00b78206
```

VersionEye

Gradle Configuration:

```
plugins {
  id "org.standardout.versioneye"
    version "1.4.0"
}
```

Gradle Properties:

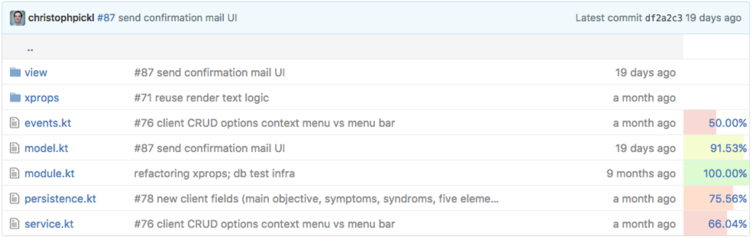
```
versioneye.projectid=572880644a0f...00b78206
```

Travis Configuration:

```
script:
  - "./gradlew ... versioneye-update ..."
```

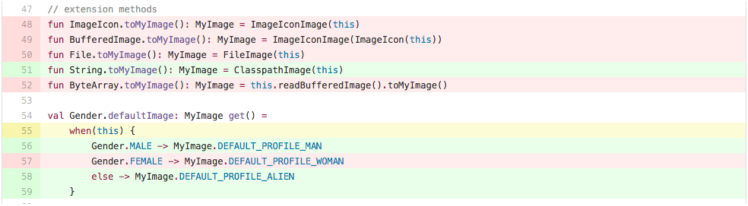
VersionEye GitHub Integration

Display coverage data via the Codecov Browser Extension:



christophpickl #87 send confirmation mail UI — Latest commit df2a2c3 19 days ago

..			
view	#87 send confirmation mail UI	19 days ago	
xprops	#71 reuse render text logic	a month ago	
events.kt	#76 client CRUD options context menu vs menu bar	a month ago	50.00%
model.kt	#87 send confirmation mail UI	19 days ago	91.53%
module.kt	refactoring xprops; db test infra	9 months ago	100.00%
persistence.kt	#78 new client fields (main objective, symptoms, syndroms, five eleme...	a month ago	75.56%
service.kt	#76 client CRUD options context menu vs menu bar	a month ago	66.04%



```
// extension methods
fun ImageIcon.toMyImage(): MyImage = ImageIconImage(this)
fun BufferedImage.toMyImage(): MyImage = ImageIconImage(ImageIcon(this))
fun File.toMyImage(): MyImage = FileImage(this)
fun String.toMyImage(): MyImage = ClasspathImage(this)
fun ByteArray.toMyImage(): MyImage = this.readBufferedImage().toMyImage()

val Gender.defaultImage: MyImage get() =
    when(this) {
        Gender.MALE -> MyImage.DEFAULT_PROFILE_MAN
        Gender.FEMALE -> MyImage.DEFAULT_PROFILE_WOMAN
        else -> MyImage.DEFAULT_PROFILE_ALIEN
    }
```

Code Schmankerln

Extension Methods

Domain Object

Implement a straight-forward, *clean* **domain object**:

```
package at.cpickl.gadsu.client

data class Client(
  val id: String,
  val name: String
)
```

Persistence Extensions

Persistence specific functionality:

```
package at.cpickl.gadsu.persistence

data class ClientDbo(
  val TXT_ID: String,
  val TXT_NAME: String
)
```

Persistence Extensions

Persistence specific functionality:

```
package at.cpickl.gadsu.persistence

data class ClientDbo(
  val TXT_ID: String,
  val TXT_NAME: String
)
fun Client.toDbo() =
        ClientDbo(id, name)
```

Persistence Extensions

Persistence specific functionality:

```
package at.cpickl.gadsu.persistence

data class ClientDbo(
  val TXT_ID: String,
  val TXT_NAME: String
)
fun Client.toDbo() =
        ClientDbo(id, name)

class ClientRepo {
    fun save(client: Client) {
        saveSomewhere(client.toDbo())
    }
}
```

Nullable Persistence Extensions

Or for those masochists out there who prefer **nullables**:

```
package at.cpickl.gadsu.persistence

fun Client?.toDbo() =
  if (this == null) null
  else ClientDbo(id, name)
```

Nullable Persistence Extensions

Or for those masochists out there who prefer **nullables**:

```
package at.cpickl.gadsu.persistence

fun Client?.toDbo() =
  if (this == null) null
  else ClientDbo(id, name)

val client: Client? = ....
val dbo = client?.toDbo()
  ?: ClientDbo.defaultInstance()
```

Extend Swing Components

Add a **fluent API** to an existing classes:

```
fun <T : JComponent> T.bold(): T {
  font = font.deriveFont(Font.BOLD)
  return this
}
```

Extend Swing Components

Add a **fluent API** to an existing classes:

```
fun <T : JComponent> T.bold(): T {
  font = font.deriveFont(Font.BOLD)
  return this
}

val myLabel = JLabel("text").bold().italic()
val myTextField = JTextField("text").bold()
val myTextArea = JTextArea("text").bold()

val panel = JPanel().transparent()
```

Extension Properties

Testee Properties

Possible replacement of common **test factories**:

```
package at.cpickl.gadsu.test

val Client.Companion.testee1: Client
  get() = Client(
    id = "",
    name = "Max Muster"
)
```

Testee Properties

Possible replacement of common **test factories**:

```
package at.cpickl.gadsu.test

val Client.Companion.testee1: Client
  get() = Client(
    id = "",
    name = "Max Muster"
)
```

Unfortunately Kotlin requires to have some *placeholder*:

```
package at.cpickl.gadsu.client

data class Client( ... ) {
    companion object {}
}
```

Integration Testee

Use those testees in your **tests**:

```
package at.cpickl.gadsu.test

@Test class ClientIT {

  @Inject lateinit var repo: ClientRepo

  fun ‘reference test scoped testee‘() {
    repo.save(
      Client.testee1.copy(name = "Otto")
    )
    // ... assertions ...
  }
}
```

λ

Functional done right!

Java 8 being veeery verbose as always:

```
List<Integer> numbers = asList(1, 2, 3);
List<String> numbers2 = numbers
   .stream()
   .filter(i -> i % 2 == 0)
   .map(Object::toString)
   .collect(toList());
```

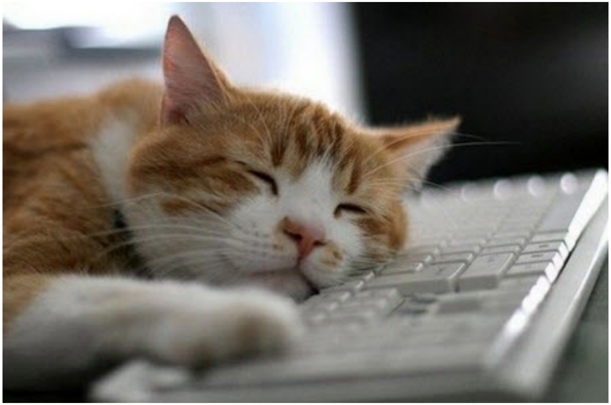
Kotlin (implicit `it` variable)

```
val numbers = listOf(1, 2, 3)
val numbers2 = numbers
   .filter { it % 2 == 0 }
   .map(Int::toString)
```

Java sometimes behaves like good old *Aunt Chatty*.

Kotlin Basic Functionals?!

- `fun <T, R> T.let(f: (T) -> R): R = f(this)`
- `fun <T> T.apply(f: T.() -> Unit): T { f(); return this }`
- `fun <T, R> with(receiver: T, f: T.() -> R): R = receiver.f()`
- `fun <T, R> T.run(f: T.() -> R): R = f()`



Sometimes I feel so lazy . . .

Lazy in Java

Given there is a *very expensive* `expensiveInit()` method:

Lazy in Java

Given there is a *very expensive* `expensiveInit()` method:

```
public class NaiveSingleton {
  private Object lazyField = null;

  public Object getLazyField() {
    if (lazyField == null) {
      lazyField = expensiveInit();
    }
    return lazyField;
  }
}
```

Lazy in Java8

```java
public class Java8 {
  private Supplier<Object> lazyField=() -> {
    Object value = expensiveInit();
    lazyField = () -> value;
    return value;
  };

  public Object getLazyField() {
    return lazyField.get();
  }
}
```

Lazy in Kotlin

```
class LazyKotlin {
  val lazyField by lazy {
    expensiveInit()
  }
}
```

Lazy in Kotlin

```
class LazyKotlin {
  val lazyField by lazy {
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  }
}

// part of stdlib:
fun <T> lazy(initializer: ()->T): Lazy<T> =
  SynchronizedLazyImpl(initializer)
```

Lazy in Kotlin

```
class LazyKotlin {
  val lazyField by lazy {
    expensiveInit()
  }
}

// part of stdlib:
fun <T> lazy(initializer: ()->T): Lazy<T> =
  SynchronizedLazyImpl(initializer)
```

Thanks to type inference, we don't need to specify types explicity.

Delegates

Class Delegation

Given the existing classes:

```
interface Step {
  fun take()
}
```

Class Delegation

Given the existing classes:

```
interface Step {
  fun take()
}

class StepImpl : Step {
  override fun take() {}
}
```

Class Delegation

Given the existing classes:

```
interface Step {
  fun take()
}

class StepImpl : Step {
  override fun take() {}
}
```

We now want some new service to implement this interface, but **delegate** all its methods to the StepImpl implementation.

Reimplement in Java

```
public class MyService implements Step {

  private final Step step;

  public MyService(Step step) {
    this.step = step;
  }

  @Override public void take() {
    step.take();
  }
}
```

Delegate by Kotlin

```kotlin
class MyService(step: Step) : Step by step
```

Delegate by Kotlin

```
class MyService(step: Step) : Step by step
```

Standard delegates in Kotlin:

- **lazy**
- observable
- map properties

Let's do some Swing!

Common Swing Component

```
class ClientTabMain(modifications, ...) {
```

Common Swing Component

```
class ClientTabMain(modifications, ...) {
  val fields = Fields<Client>(modifications)
```

Common Swing Component

```
class ClientTabMain(modifications, ...) {
  val fields = Fields<Client>(modifications)
  val inpNote = fields
    .newTextArea("Notiz", { it.note },
       ViewNames.Client.InputNote, bus)
```

Common Swing Component

```
class ClientTabMain(modifications, ...) {
  val fields = Fields<Client>(modifications)
  val inpNote = fields
    .newTextArea("Notiz", { it.note },
       ViewNames.Client.InputNote, bus)
  init {
    add(VFillFormPanel().apply {
      addFormInput(inpNote)
    })}
```

Common Swing Component

```kotlin
class ClientTabMain(modifications, ...) {
  val fields = Fields<Client>(modifications)
  val inpNote = fields
    .newTextArea("Notiz", { it.note },
       ViewNames.Client.InputNote, bus)
  init {
    add(VFillFormPanel().apply {
      addFormInput(inpNote)
    })}
  fun isModified(client: Client) =
    fields.isAnyModified(client)
```

Common Swing Component

```
class ClientTabMain(modifications, ...) {
  val fields = Fields<Client>(modifications)
  val inpNote = fields
    .newTextArea("Notiz", { it.note },
       ViewNames.Client.InputNote, bus)
  init {
    add(VFillFormPanel().apply {
      addFormInput(inpNote)
    })}
  fun isModified(client: Client) =
    fields.isAnyModified(client)
  fun updateFields(client: Client) {
    fields.updateAll(client)
  }
}
```

Spec4J UI Test

```
@Test(groups = arrayOf("uiTest"))
class ClientUiTest : UiTest() {
 fun ‘save client should change UI‘() {
```

Spec4J UI Test

```
@Test(groups = arrayOf("uiTest"))
class ClientUiTest : UiTest() {
 fun ‘save client should change UI‘() {
  val client = Client.unsavedValidInstance()
```

Spec4J UI Test

```
@Test(groups = arrayOf("uiTest"))
class ClientUiTest : UiTest() {
 fun ‘save client should change UI‘() {
  val client = Client.unsavedValidInstance()
  with(driver) {
```

Spec4J UI Test

```
@Test(groups = arrayOf("uiTest"))
class ClientUiTest : UiTest() {
 fun ‘save client should change UI‘() {
  val client = Client.unsavedValidInstance()
  with(driver) {
   assertSaveButtonTextEquals("Neu anlegen")
```

Spec4J UI Test

```
@Test(groups = arrayOf("uiTest"))
class ClientUiTest : UiTest() {
 fun ‘save client should change UI‘() {
  val client = Client.unsavedValidInstance()
  with(driver) {
   assertSaveButtonTextEquals("Neu anlegen")

   saveClient(client)
   assertSaveButtonTextEquals("Speichern")
```

Spec4J UI Test

```
@Test(groups = arrayOf("uiTest"))
class ClientUiTest : UiTest() {
 fun ‘save client should change UI‘() {
  val client = Client.unsavedValidInstance()
  with(driver) {
   assertSaveButtonTextEquals("Neu anlegen")

   saveClient(client)
   assertSaveButtonTextEquals("Speichern")

   assertListContains(client)
   assertListSelected(client)
   ...
```

Let's see some code . . .

Lessons Learned

Tooling infrastructure grows

- *Mostly* as good as for Java

Tooling infrastructure grows

- *Mostly* as good as for Java
- **IntelliJ** support feels already superb

Tooling infrastructure grows

- *Mostly* as good as for Java
- **IntelliJ** support feels already superb
- **Build** system support (Gradle Script Kotlin!)

Tooling infrastructure grows

- *Mostly* as good as for Java
- **IntelliJ** support feels already superb
- **Build** system support (Gradle Script Kotlin!)
- Static code analysis tools **missing**

Tooling infrastructure grows

- *Mostly* as good as for Java
- **IntelliJ** support feels already superb
- **Build** system support (Gradle Script Kotlin!)
- Static code analysis tools **missing**
- Syntax highlighting mostly **missing**

8 reasons to use Kotlin

1. **Null handling** is a MUST!

I DON'T ALWAYS CODE IN JAVA
BUT WHEN I DO, IT'S A NULLPOINTEREXCEPTION
memegenerator.net

Remember me?!

8 reasons to use Kotlin

1. **Null handling** is a MUST!

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8. **Data** classes replaces Lombok

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- **Data classes** are still somehow restricted in their usage (v1.1)
- Paradigm shift of **final**-by-default clashes with existing libs
- Requires young padawan to be more **disciplined**
    - Several classes in one (big) file gets common
    - Explicit type declaration for documentation
    - Overuse of single-expression functions
    - Overuse of functionals like `apply{}`

Apply – Who is this?

```
class MainPanel : JPanel() {
  init {
    val subPanel = JPanel()
    subPanel.background = Color.RED
    add(subPanel)
  }
}
```

Apply – Who is this?

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```

We can **refactor** this to get rid of the variable reference.

Apply – This is not this anymore!

```
class MainPanel : JPanel() {
  init {
    JPanel().apply {
      background = Color.RED
      add(this)
    }
  }
}
```

Apply – This is not this anymore!

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class MainPanel : JPanel() {
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IllegalArgumentException: adding container's parent to itself
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- The solution is to use: `this@MainPanel.add(this)`

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- But what happens if there are **two nested** `JPanels`?!

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`IllegalArgumentException: adding container's parent to itself`

- The solution is to use: `this@MainPanel.add(this)`
- But what happens if there are **two nested** `JPanels`?!
- PS: Kotlin 1.1 will come with a new function called `also()`

```
JPanel().also {
  this.add(it)
}
```

11 Kotlin 1.1 News

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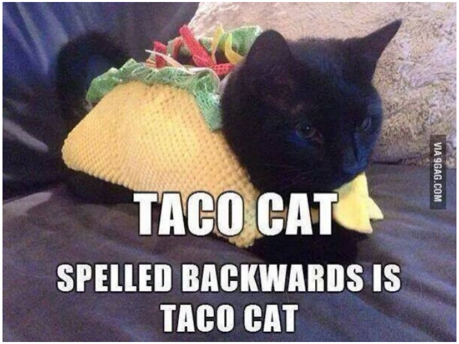
10. Underscore for unused parameters
11. Underscore in numeric literals

Links

- Visit the website:
  https://github.com/christophpickl/gadsu
- LaTeX sources of the slides:
  https://github.com/christophpickl/gadsu_meetup
- Kotlin-Vienna Usergroup:
  https://www.meetup.com/Kotlin-Vienna

One more thing . . .

OBLIGATORY
MEME
memegenerator.net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INVISIBLE BIKE

http://ifun.ru

I HATE
CAT MEMES