otlin 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

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2. **Kotlin in the wild**
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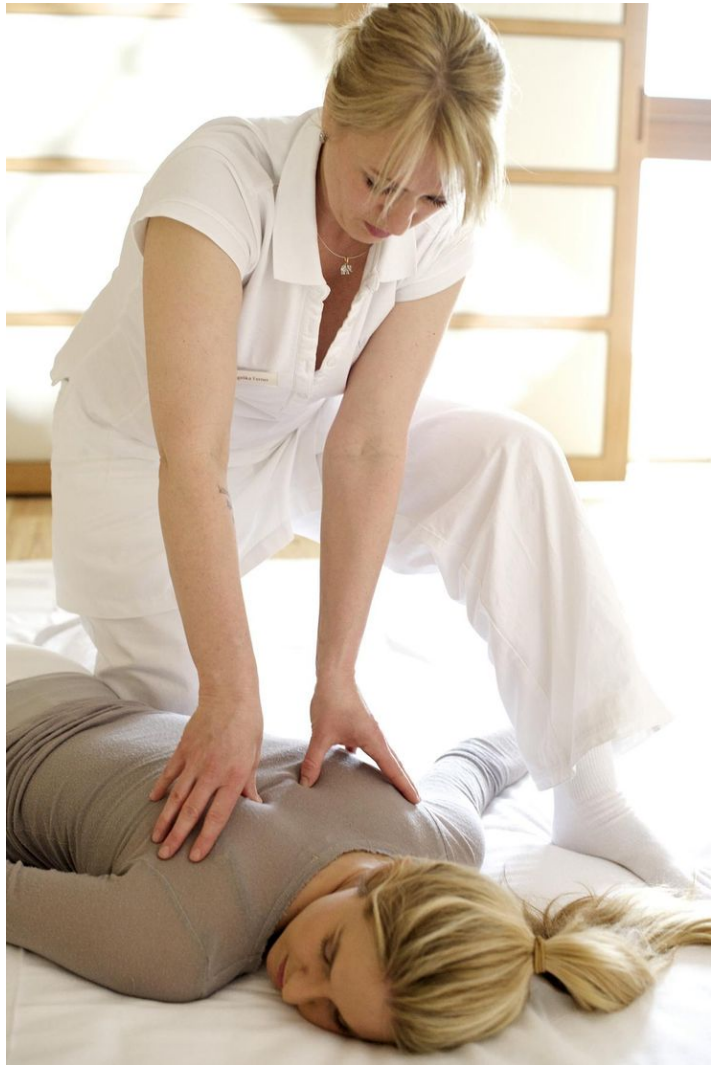
3. Code "*Schmankerln*"
4. **Lessons Learned**

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 . . .

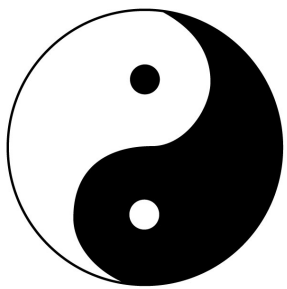
- Massage, Physiotherapy, Bodywork
- Acupuncture, Meridiantherapy
- Nervous system stimulation

- 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 . . .

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- 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

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- Swing

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- Guice

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- Spring JDBC, HSQLDB, Flyway

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- TestNG, Mockito, Hamcrest, UISpec4J

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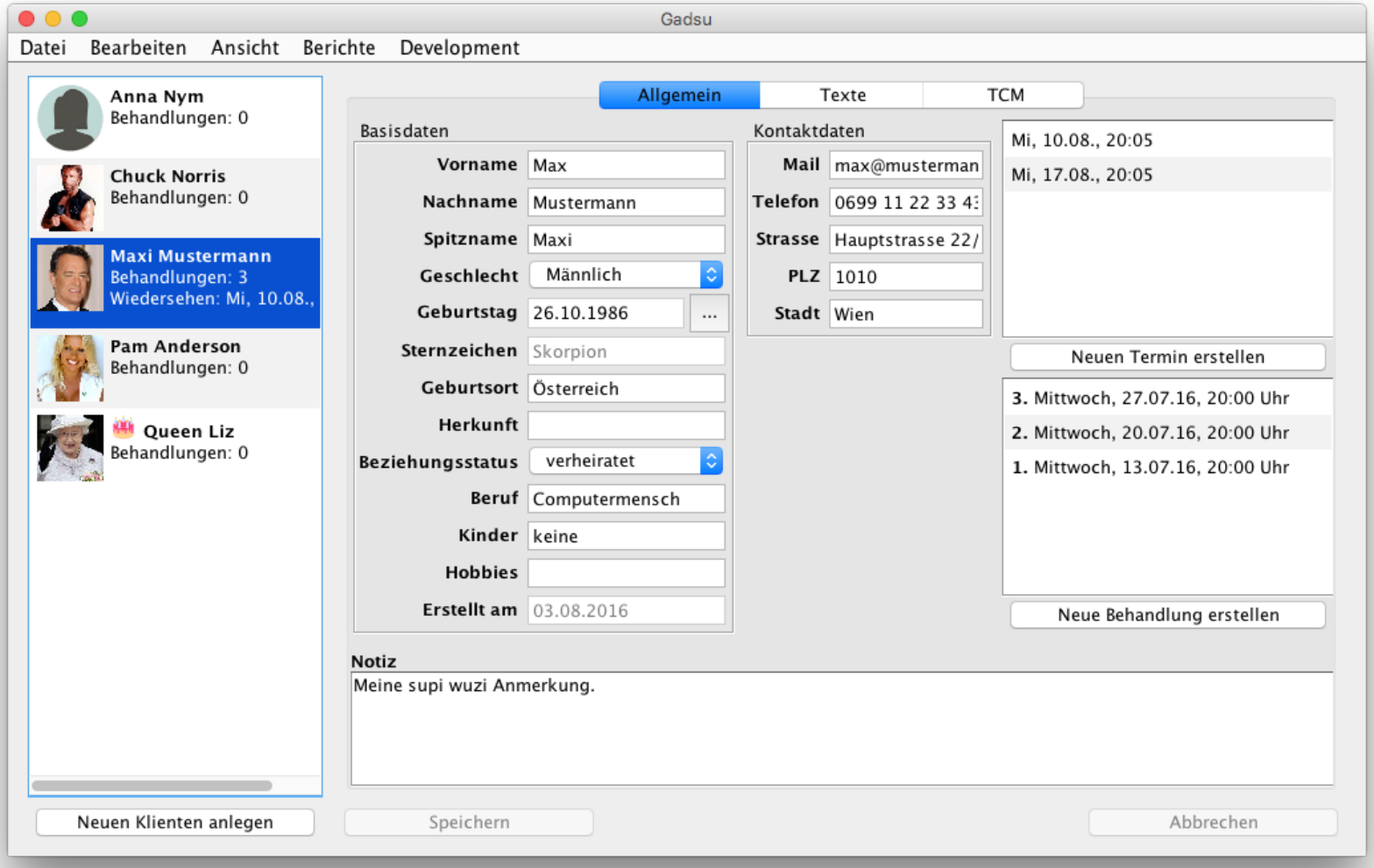
- Jasper, Pdfbox, Freemarker
- TestNG, Mockito, Hamcrest, UISpec4J
- *Initial implementation used Kotlin 0.6* ;)



Gadsu got something like 30,000 LoC :)

Let's see some app . . .

otlin in the wild

build.gradle

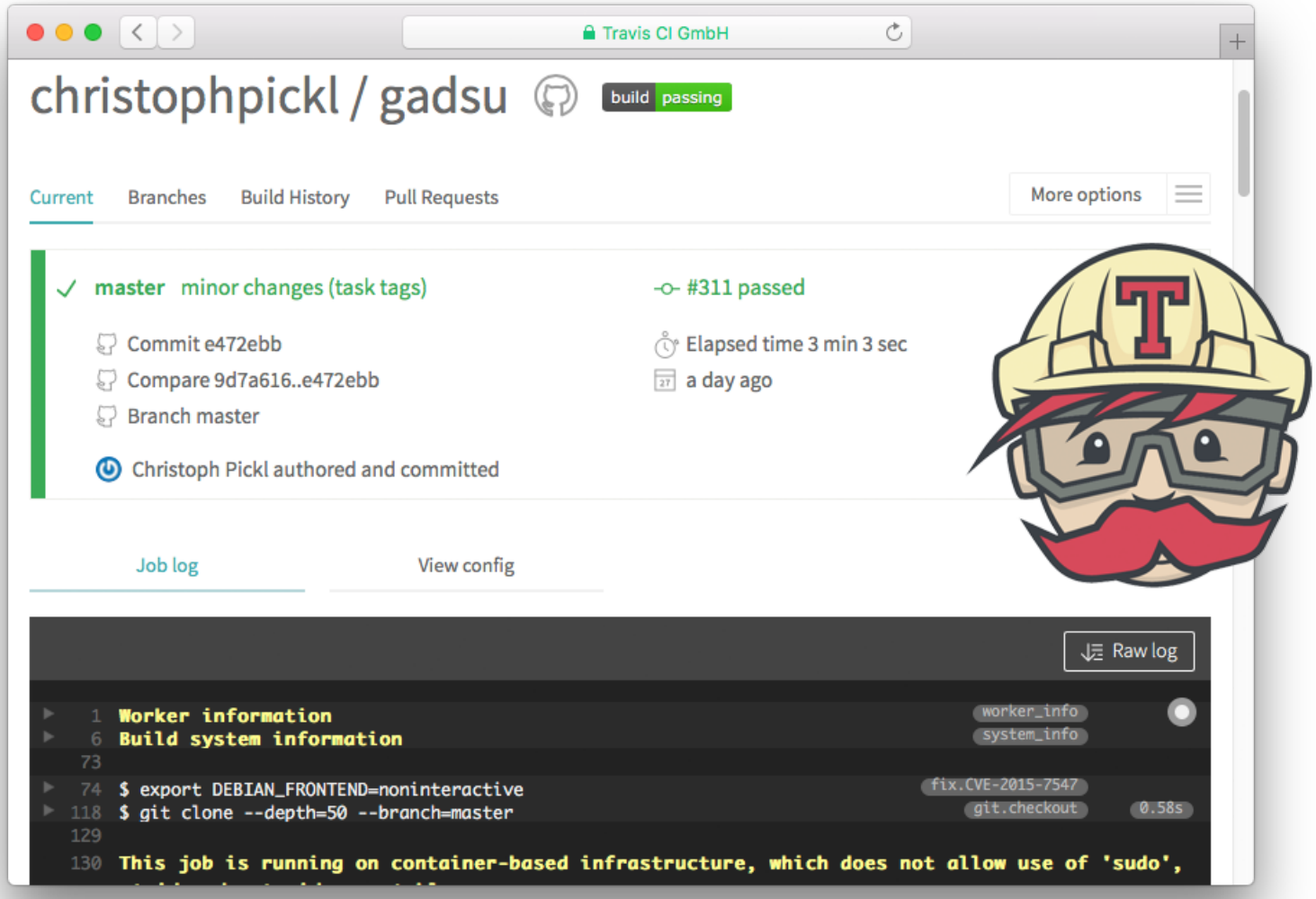
```
1 apply plugin: "kotlin"
```

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"
}
```



travis-ci.org

.travis.yml

```
1 language: kotlin
```

.travis.yml

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

.travis.yml

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

.travis.yml

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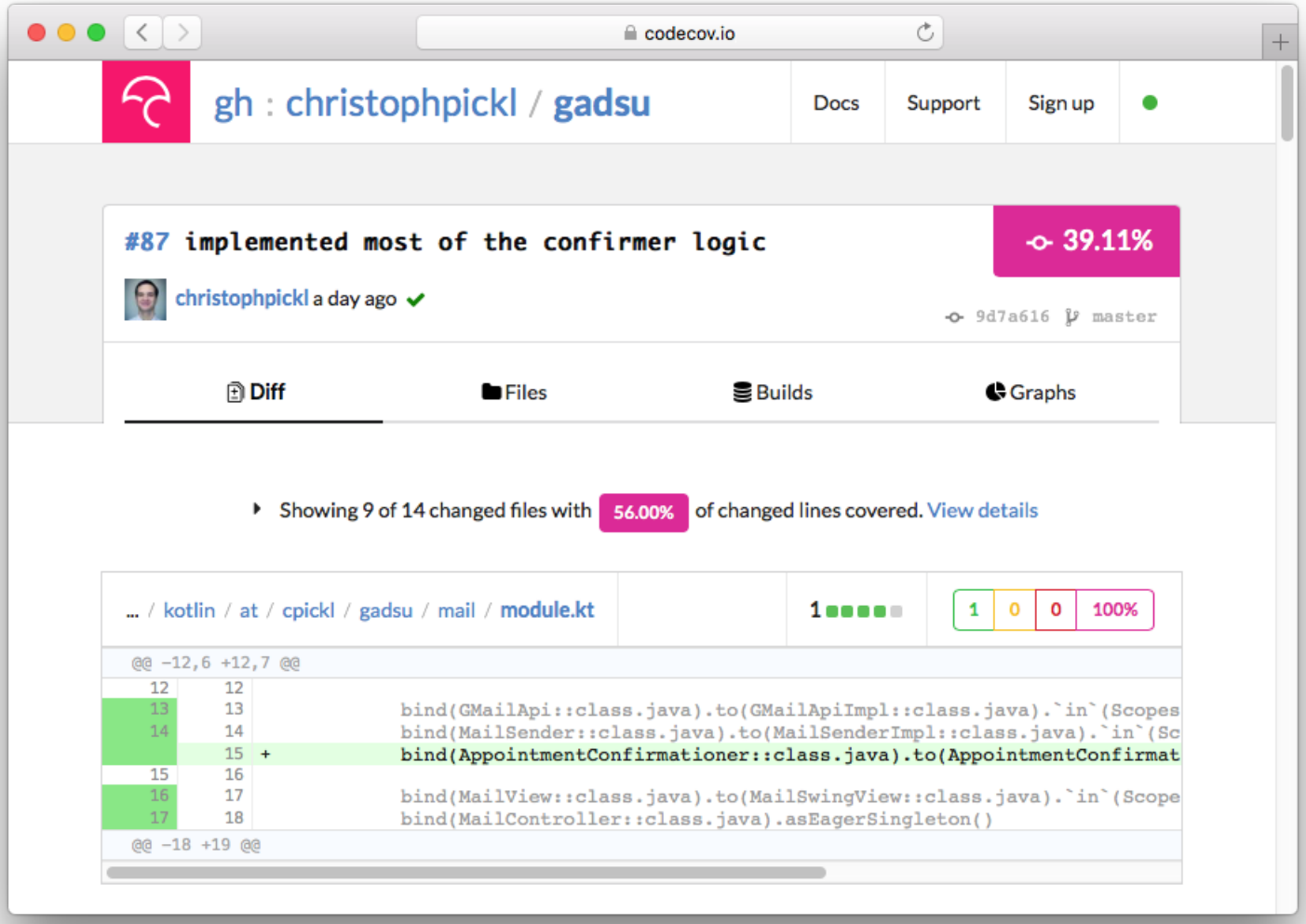
language: kotlin
sudo: false
jdk:
  - oraclejdk8
before_install:
  - "chmod +x gradlew"
  - "export DISPLAY=:99.0"
  - "sh -e /etc/init.d/xvfb start"
script:
  - "./gradlew test ..."
notifications:
  email:
    - "MLtravis@gadsu.com"
```


codecov.io
gh : christophpickl / gadsu
Docs
Support
Sign up
#87 implemented most of the confirmer logic
39.11%
christophpickl a day ago
9d7a616
master
Diff
Files
Builds
Graphs
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:

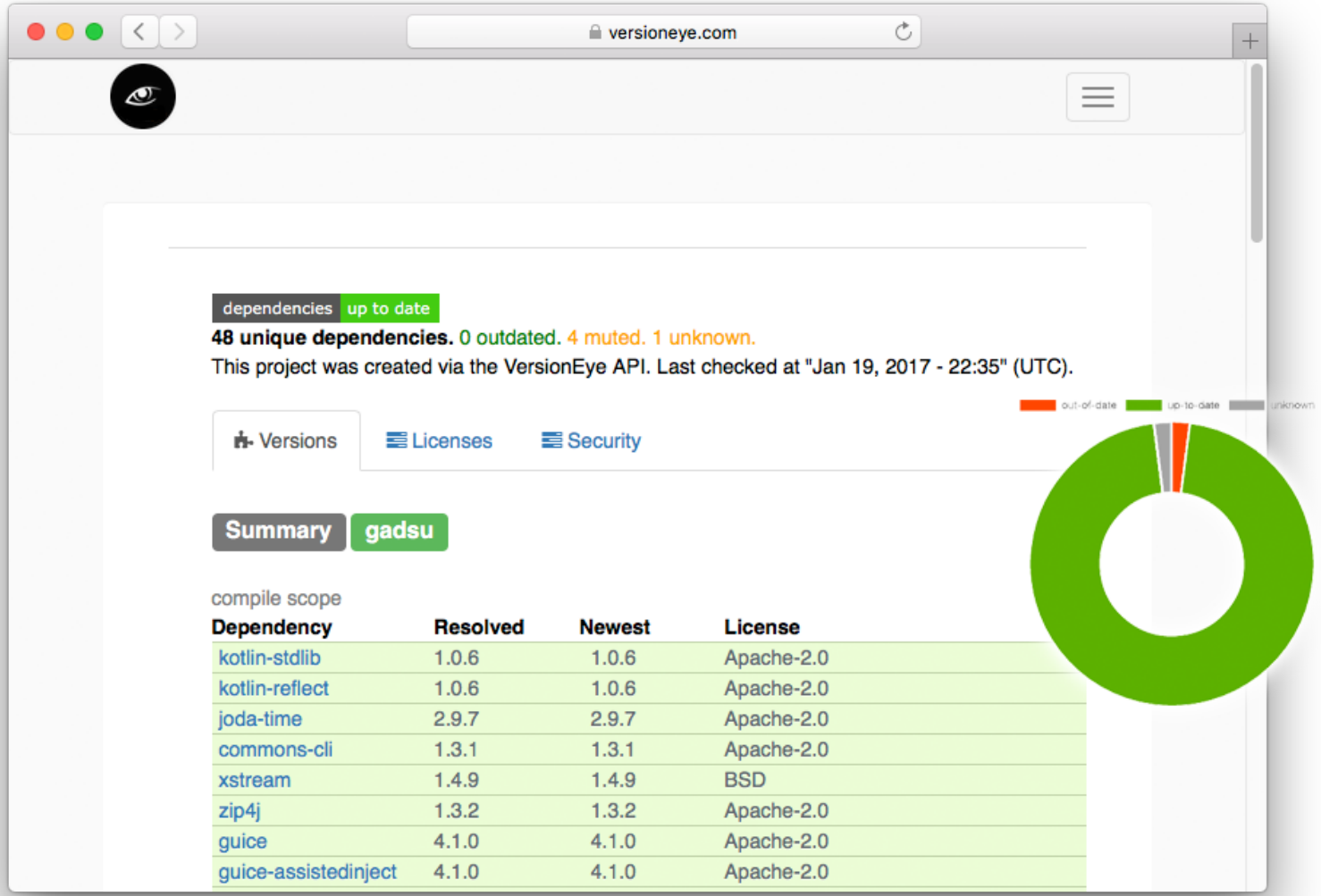
```
script:
  - "./gradlew ... jacocoTestReport ..."
after_success:
  - bash <(curl -s https://codecov.io/bash)
```

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%

```
47  // extension methods
48  fun ImageIcon.toMyImage(): MyImage = ImageIconImage(this)
49  fun BufferedImage.toMyImage(): MyImage = ImageIconImage(ImageIcon(this))
50  fun File.toMyImage(): MyImage = FileImage(this)
51  fun String.toMyImage(): MyImage = ClasspathImage(this)
52  fun ByteArray.toMyImage(): MyImage = this.readBufferedImage().toMyImage()
53
54  val Gender.defaultImage: MyImage get() =
55      when(this) {
56          Gender.MALE -> MyImage.DEFAULT_PROFILE_MAN
57          Gender.FEMALE -> MyImage.DEFAULT_PROFILE_WOMAN
58          else -> MyImage.DEFAULT_PROFILE_ALIEN
59      }
```



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 ..."
```

Code Schmankerln

Null Handling

Trust no one!

```
@Data
class Contact {
    String mail;
}
```

Trust no one!

```
@Data
class Contact {
    String mail;
}
@Data
class Client {
  Contact contact;
  public boolean hasContact() {
    return contact != null;
  }
}
```

Trust no one!

```
1  @Data
2  class Contact {
3      String mail;
4  }
5  @Data
6  class Client {
7    Contact contact;
8    public boolean hasContact() {
9      return contact != null;
10   }
11 }
12
13 if (client.hasContact()) {
14   process(client.getContact());
15 }
```

Explicit handling in Kotlin

```kotlin
data class Contact(val mail: String)
```

Explicit handling in Kotlin

```kotlin
data class Contact(val mail: String)
data class Client(val contact: Contact?)
```

Explicit handling in Kotlin

```kotlin
data class Contact(val mail: String)
data class Client(val contact: Contact?)

client.contact.ifNotNull(::process)
```

Explicit handling in Kotlin

```kotlin
data class Contact(val mail: String)
data class Client(val contact: Contact?)

client.contact.ifNotNull(::process)
client.contact?.mail ?: "default@mail.at"
```

Explicit handling in Kotlin

```kotlin
data class Contact(val mail: String)
data class Client(val contact: Contact?)

client.contact.ifNotNull(::process)
client.contact?.mail ?: "default@mail.at"
```

Write your own, custom *if-loop*:

```kotlin
fun <T> T?.ifNotNull(action: (T) -> Unit):
  T? {
  if (this == null) {
    return null
  }
  action(this)
  return this
}
```

Extension Methods

Domain Object

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

```
1 package at.cpickl.gadsu.client
2
3 data class Client(
4   val id: String,
5   val name: String
6 )
```

Persistence Extensions

Persistence specific functionality:

```
1 package at.cpickl.gadsu.persistence
2
3 data class ClientDbo(
4   val TXT_ID: String,
5   val TXT_NAME: String
6 )
```

Persistence Extensions

Persistence specific functionality:

```
1 package at.cpickl.gadsu.persistence
2
3 data class ClientDbo(
4   val TXT_ID: String,
5   val TXT_NAME: String
6 )
7 fun Client.toDbo() =
8         ClientDbo(id, name)
9
```

Persistence Extensions

Persistence specific functionality:

```
1  package at.cpickl.gadsu.persistence
2
3  data class ClientDbo(
4    val TXT_ID: String,
5    val TXT_NAME: String
6  )
7  fun Client.toDbo() =
8          ClientDbo(id, name)
9
10 class ClientRepo {
11     fun save(client: Client) {
12         saveSomewhere(client.toDbo())
13     }
14 }
```

Nullable Persistence Extensions

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

```
1 package at.cpickl.gadsu.persistence
2
3 fun Client?.toDbo() =
4   if (this == null) null
5   else ClientDbo(id, name)
```

Nullable Persistence Extensions

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

```
1 package at.cpickl.gadsu.persistence
2
3 fun Client?.toDbo() =
4   if (this == null) null
5   else ClientDbo(id, name)
6
7 val client: Client? = ....
8 val dbo = client.toDbo()
9   ?: ClientDbo.defaultInstance()
```

Extend Swing Components

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

```
1 fun <T : JComponent> T.bold(): T {
2   font = font.deriveFont(Font.BOLD)
3   return this
4 }
5
```

Extend Swing Components

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

```
1  fun <T : JComponent> T.bold(): T {
2    font = font.deriveFont(Font.BOLD)
3    return this
4  }
5
6  val myLabel = JLabel("text").bold().italic()
7  val myTextField = JTextField("text").bold()
8  val myTextArea = JTextArea("text").bold()
9
10 val panel = JPanel().transparent()
```

Extension Properties

Testee Properties

Possible replacement of common **test factories**:

```
1 package at.cpickl.gadsu.test
2
3 val Client.Companion.testee1: Client
4   get() = Client(
5     id = "",
6     name = "Max Muster"
7 )
```

Testee Properties

Possible replacement of common **test factories**:

```
1 package at.cpickl.gadsu.test
2
3 val Client.Companion.testee1: Client
4   get() = Client(
5     id = "",
6     name = "Max Muster"
7 )
```

Unfortunately Kotlin requires to have some *placeholder*:

```
1 package at.cpickl.gadsu.client
2
3 data class Client( ... ) {
4     companion object {}
5 }
```

Integration Testee

Use those testees in your **tests**:

```
1  package at.cpickl.gadsu.test
2
3  @Test class ClientIT {
4
5    @Inject lateinit var repo: ClientRepo
6
7    fun `reference test scoped testee`() {
8      repo.save(
9        Client.testee1.copy(name = "Otto")
10     )
11     // ... assertions ...
12   }
13 }
```

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());
```

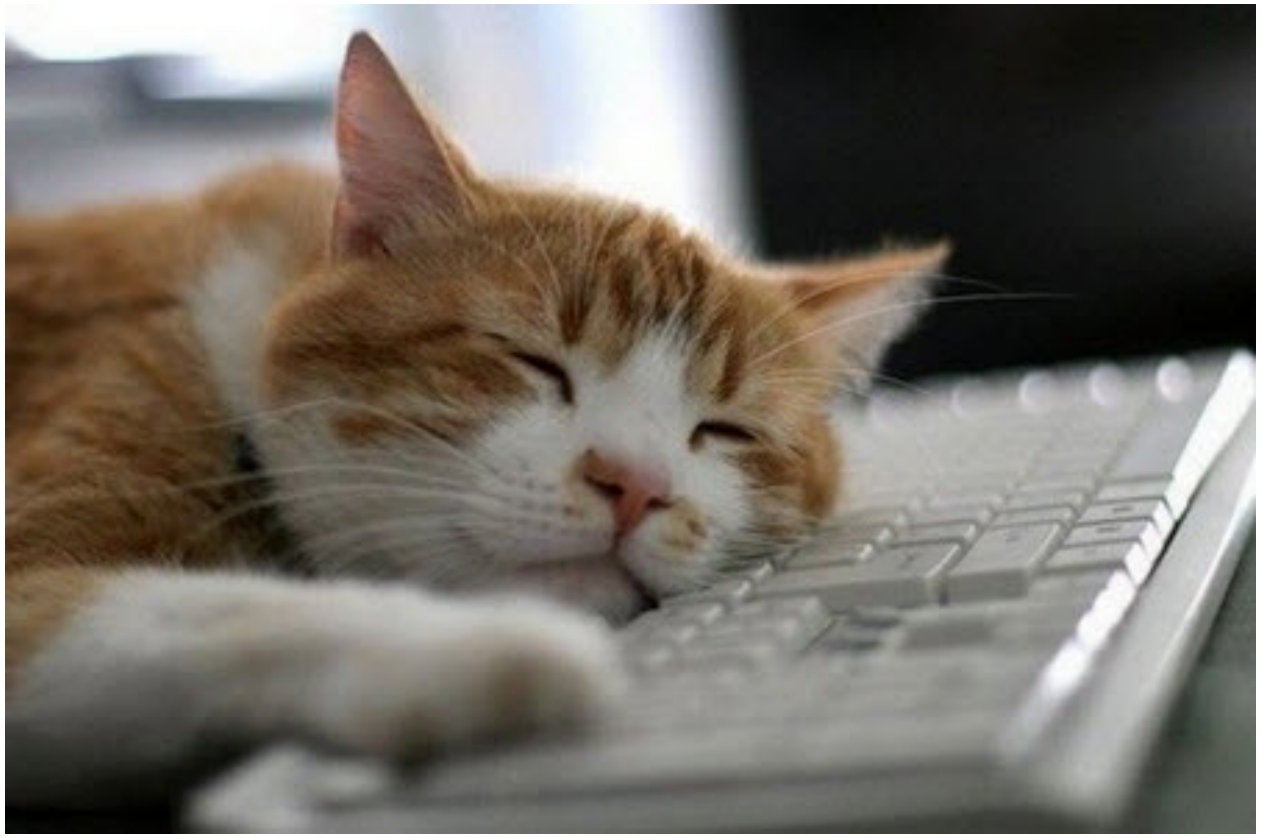
Kotlin (implicit `it` variable)

```
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:

```
1  public class NaiveSingleton {
2    private Object lazyField = null;
3
4    public Object getLazyField() {
5      if (lazyField == null) {
6        lazyField = expensiveInit();
7      }
8      return lazyField;
9    }
10 }
```

Lazy in Java8

```
1  public class Java8 {
2    private Supplier<Object> lazyField=() -> {
3      Object value = expensiveInit();
4      lazyField = () -> value;
5      return value;
6    };
7
8    public Object getLazyField() {
9      return lazyField.get();
10   }
11 }
```

Lazy in Kotlin

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

Lazy in Kotlin

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

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

Lazy in Kotlin

```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

```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

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

Delegate by Kotlin

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

Standard delegates in Kotlin:

- **lazy**
- observable
- map properties

Let's do the Swing!

Common Swing Component

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

Common Swing Component

```
1 class ClientTabMain(modifications, ...) {
2   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

```
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)
  }
}
```

Event Driven Swing

Dispatch events via `EventBus` and subscribe in Controller:

```
1 open class ClientViewController
```

Event Driven Swing

Dispatch events via `EventBus` and subscribe in Controller:

```
1 open class ClientViewController @Inject
2   constructor(val bus: EventBus, ...) {
```

Event Driven Swing

Dispatch events via `EventBus` and subscribe in Controller:

```
1 open class ClientViewController @Inject
2   constructor(val bus: EventBus, ...) {
3
4   @Subscribe open fun onAppStartupEvent(
5     event: AppStartupEvent) {
```

Event Driven Swing

Dispatch events via `EventBus` and subscribe in Controller:

```
1 open class ClientViewController @Inject
2   constructor(val bus: EventBus, ...) {
3
4   @Subscribe open fun onAppStartupEvent(
5     event: AppStartupEvent) {
6     reinitClients()
7     bus.post(ChangeMainContentEvent(view))
8       ...
```

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

```
1 @Test(groups = arrayOf("uiTest"))
2 class ClientUiTest : UiTest() {
3  fun `save client should change UI`() {
4   val client = Client.unsavedValidInstance()
5   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)
   ...
```

Spec4J UI Driver

```
1 class ClientDriver(
2   test: UiTest, window: Window) {
```

Spec4J UI Driver

```
class ClientDriver(
  test: UiTest, window: Window) {

  val list = window.getListBox(
    ViewNames.Client.List)!!
  val createButton = window.getButton(
    ViewNames.Client.CreateButton)!!
```

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  val list = window.getListBox(
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  fun assertNoChangesDetected() {
    test.assertThat(
      test.not(saveButton.isEnabled))
    test.assertThat(
      test.not(cancelButton.isEnabled))
  }
  ...
```

Lessons Learned

Tooling infrastructure grows

- *Mostly* as good as for Java

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- **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

Remember me?!

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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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1 class MainPanel : JPanel() {
2   init {
3     val subPanel = JPanel()
4     subPanel.background = Color.RED
5     add(subPanel)
6   }
7 }
```

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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- 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

1. Compiler plugins (open-by-default, no-arg ctor)

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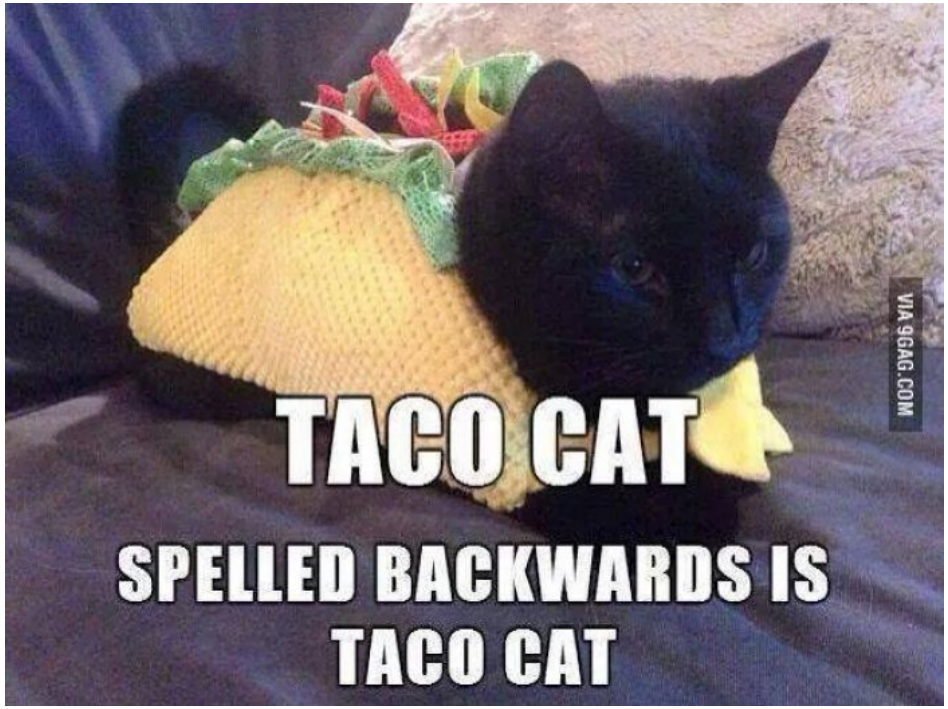
10. Underscore for unused parameters
11. Underscore in numeric literals

Links

- Visit Gadsu **website**:
  https://github.com/christophpickl/gadsu
- LaTeX **sources** of slides:
  https://github.com/christophpickl/gadsu_meetup
- Kotlin Vienna **Meetup**:
  https://www.meetup.com/Kotlin-Vienna
- Kotlin **Slack** Channel:
  https://kotlinlang.slack.com/messages/vienna/

One more thing . . .


OBLIGATORY
MEME
memegenerator.net


TACO CAT
SPELLED BACKWARDS IS
TACO CAT
VIA 9GAG.COM


INVISIBLE BIKE


I HATE
CAT MEMES