Multi-device Content Display
&
Smart Use of Annotation Processing

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Speakers

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- Java developer since 1999
- R&D Team Mentor at

- Coder, DevOps, Agile Coach
  - From idea to production
- eXo Platform
  - VP Quality

@gdigugli

- Java developer since 1999
- Software architect at

- ILOG - IBM
  - ✓ 2D graphic toolkit
  - ✓ Rule engine
- Prima-Solutions
  - ✓ Services platform for J2EE
  - ✓ Domain models code generators

Let’s talk about visible quality

Effective Content Display

The case

Effective Content Display

- Multi device & languages
  - Labels
  - Layout & images
- Clean code
  - Strong Quality
  - Easy Maintenance

with APT Tooling

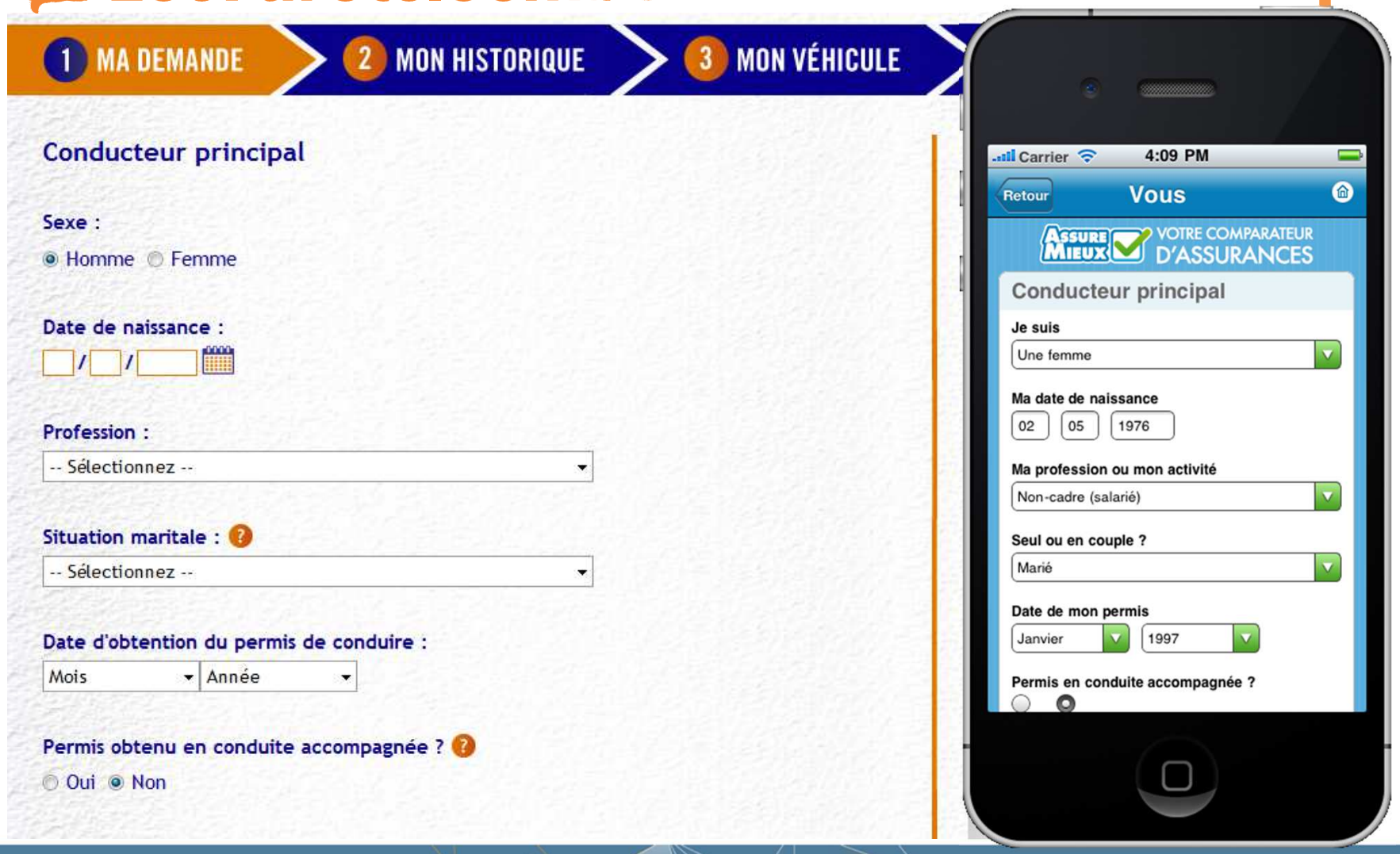
- APT Engine
- APT Processors
  - Generate technical code
  - Generate reports
  - Generate Helpers

based on i18n

- @Message
- @MessageBundle

https://github.com/dbaeli/ez18n

LesFurets.com mobile & desktop



LesFurets.com mobile & desktop

1 MA DEMANDE | 2 MON HISTORIQUE | 3 MON VÉHICULE

Conducteur principal

Assuré(e) sans interruption depuis :
13 ans ou plus

Résilié(e) par un assureur auto au cours des 3 dernières années :
Non

Bonus-malus actuel :
50% de bonus depuis 3 ans

Nombre de sinistres ou incidents déclarés depuis 3 ans :
0

< Étape précédente

CONTINUEZ

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1 MA DEMANDE 2 MON HISTORIQUE 3 MON VÉHICULE

Le véhicule à assurer

Date de 1ère mise en circulation : Comment la retrouver ?

Janvier 2012

Date à laquelle le véhicule a été acheté :

Janvier 2012

Marque du véhicule à assurer :

Choisissez votre véhicule

Combien d'années avez-vous conservé votre précédent véhicule ?

Moins d'une année

Lieu ou adresse de stationnement la nuit :

rue de l'essai

How to manage text display ?

Java i18n pattern

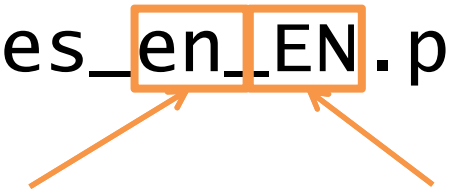
- The provided tooling for :
  - Dynamically bind the content
  - Texts, but also CSS and images (urls)

- Tooling :
  - java.util.ResourceBundle : for .properties reading
  - java.util.MessageFormat : tiny templating
  - .properties files with naming pattern

java.util.ResourceBundle

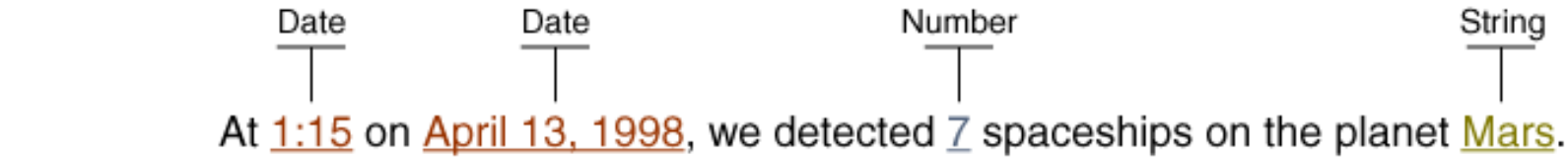
- The .properties loader for a given Locale
- Key / Value in .properties
- Naming convention for the storage

```
Messages_en_EN.properties
```




```
ResourceBundle myResources =
     ResourceBundle.getBundle("MyResources", currentLocale);
```

java.util.MessageFormat




```
template = At {2,time,short} on {2,date,long}, \
    we detected {1,number,integer} spaceships on \
    the planet {0}.
```

```
currentLocale = en_US
At 10:16 AM on July 31, 2009, we detected 7
spaceships on the planet Mars.
currentLocale = de_DE
Um 10:16 am 31. Juli 2009 haben wir 7 Raumschiffe
auf dem Planeten Mars entdeckt.
```

- Tiny templating
- format("<pattern>", args)
- Date, numbers are formatted according to the Locale
- Options, conditional values easy to use

.properties issues

- Low quality control
  - Keys are strings in the code
  - Poor IDE support
    - No warning on unused or wrong keys
  - Encoding Hell
    - use \uxxxx or you're in trouble
- Forces you to maintain two files in sync
  - key declaration / value in .properties
  - Key usage in the .java files

Improved i18n

Improved i18n

- Interfaces representing each set of .properties
- The methods acts as keys

```java
@MessageBundle
public interface Messages {

 @Message(value = "Love Me Tender")
 String loveMeTender();

 @Message("I love {0}")
 String doYouLove(String name);

}
```

Messages.java

```
loveMeTender=Love Me Tender
doYouLove=I love {0}
```

Messages.properties

Annotations and Code generation

- Same pattern as in GWT, but for J2SE
- Annotate your code :
  - @MessageBundle to mark interfaces
    - ➔ represents a ResourceBundle
  - @Message to mark methods
    - ➔represents a localization key
- Generate :
  - .properties file (for ‘default’)
  - A ResourceBundle for each .properties
  - Manage other languages out-side your code

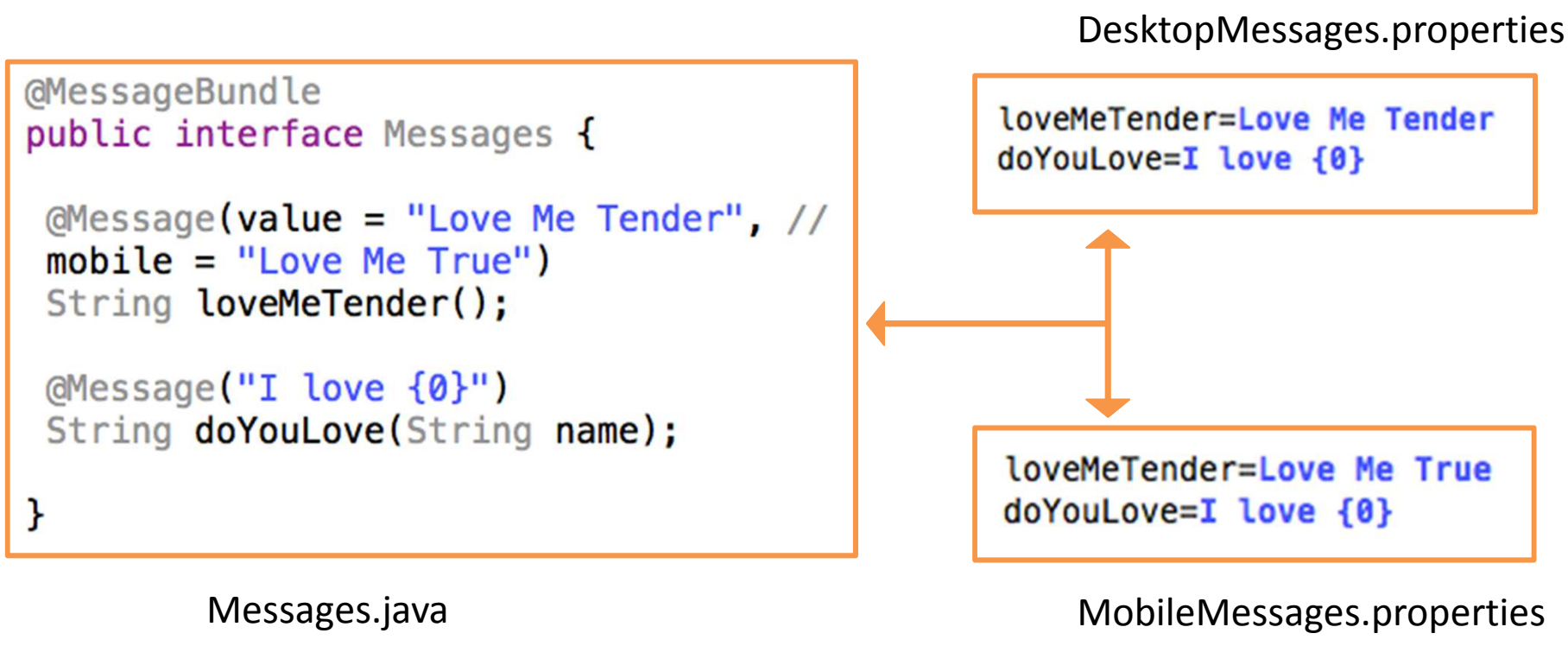
Improved i18n benefits

- Now you can
  - Refactor your keys
  - Maintain the ‘default’ in Java
  - Never change a .properties file for default locale
- And use it with other libs:
  - GWT (done on GitHub)
  - Even JQuery, Dojo, CoffeeScript (planned)

Extend this pattern for Multi-display

Extended to displays

- Add mobile support in @Message declaration



Extended to displays

- One ResourceBundle by kind of display
- All driven by @MessageBundle annotation
- Fallback on the default display
- Keep the plumbing generated

APT to generate .properties and ResourceBundle classes from annotations

Behind the scene
How APT works

APT basics

- APT - Annotation Processing Tool
- Kind of old-school pre-processing
- But not on the file it-self
- No runtime overload
- Based on annotations in source code
- Standard since JDK 1.6 (available in Sun JDK 1.5)

APT annotations

- Use @Retention, @Target

```
@Retention(RetentionPolicy.SOURCE)
@Target(ElementType.TYPE)
public @interface MessageBundle {
```

```
@Retention(RetentionPolicy.SOURCE)
@Target(ElementType.METHOD)
public @interface Message {
```

APT Processors

- javax.annotation.processing.Processor
- Code parsing similar to Reflection
  - No need of compiled code
  - Some limitations
- 2 key elements :
  - @SupportedAnnotationTypes to declare the matching annotations
  - FileObject : the future generated file

Processor code sample

- Processor declaration

```
@SupportedAnnotationTypes(value = "org.ez18n.MessageBundle")
@SupportedSourceVersion(RELEASE_6)
public final class CSVReportProcessor extends AbstractProcessor {

    @Override
    public boolean process(Set<? extends TypeElement> annotations,
                           RoundEnvironment roundEnv) {
```

- Use a FileObject to generate the content

```
final FileObject file = processingEnv.getFiler()
    .createResource(SOURCE_OUTPUT, "", "i18n_report.csv");
final Writer writer = file.openWriter();
for (TypeElement bundleType : labelBundles.keySet()) {
    for (LabelTemplateMethod templateMethod : labelBundles.get(bundleType)) {
        writer.write('\"');
        writer.write(bundleType.getQualifiedName().toString());
```

Similarities with java.lang.reflect

Java.lang.reflect	Javax.annotation.processing
java.lang.Class	TypeElement
Constructor	ExecutableElement
Field, Parameter	VariableElement
Method	ExecutableElement
java.lang.Package	PackageElement

- NO Class.newInstance()
- NO instanceOf, NO isAssignable()
- NO getConstructor, getMethod, …
- Weak inheritance management

APT command line

```
javac
  -cp $CLASSPATH
  -proc:only
  -encoding UTF-8
  -processor $PROCESSOR
  -d $PROJECT_HOME\target\classes
  -s $PROJECT_HOME\target\generated-sources\apt
  -sourcepath $SOURCE_PATH
  -verbose
  $FILES
```

-proc:none

processors fqcn list

optional

APT tooling

- Maven integration
  - maven-processor-plugin (google-code)
- Ant integration
  - javac
- IDE integration
  - Extend the JDK compilation options

APT usages

- Generate required repetitive code :
  - Not always possible at runtime
  - Unit tests, JMX declarations
  - Utility code with coverage and debug
- Build your reports on your code
  - Your Metrics without runtime overload
  - Even fail the build if you want !

One or Two phase compilation

- One phase
  - APT runs during the compilation
  - Generated code is directly produced as bytecode (.class)
  - Harder to debug (no .java created)
- Two phases
  - javac with proc:only then with proc:none
  - Creates .java files in the sourcepath
  - Not really supported by IDEs, ok with maven.

Problems with APT

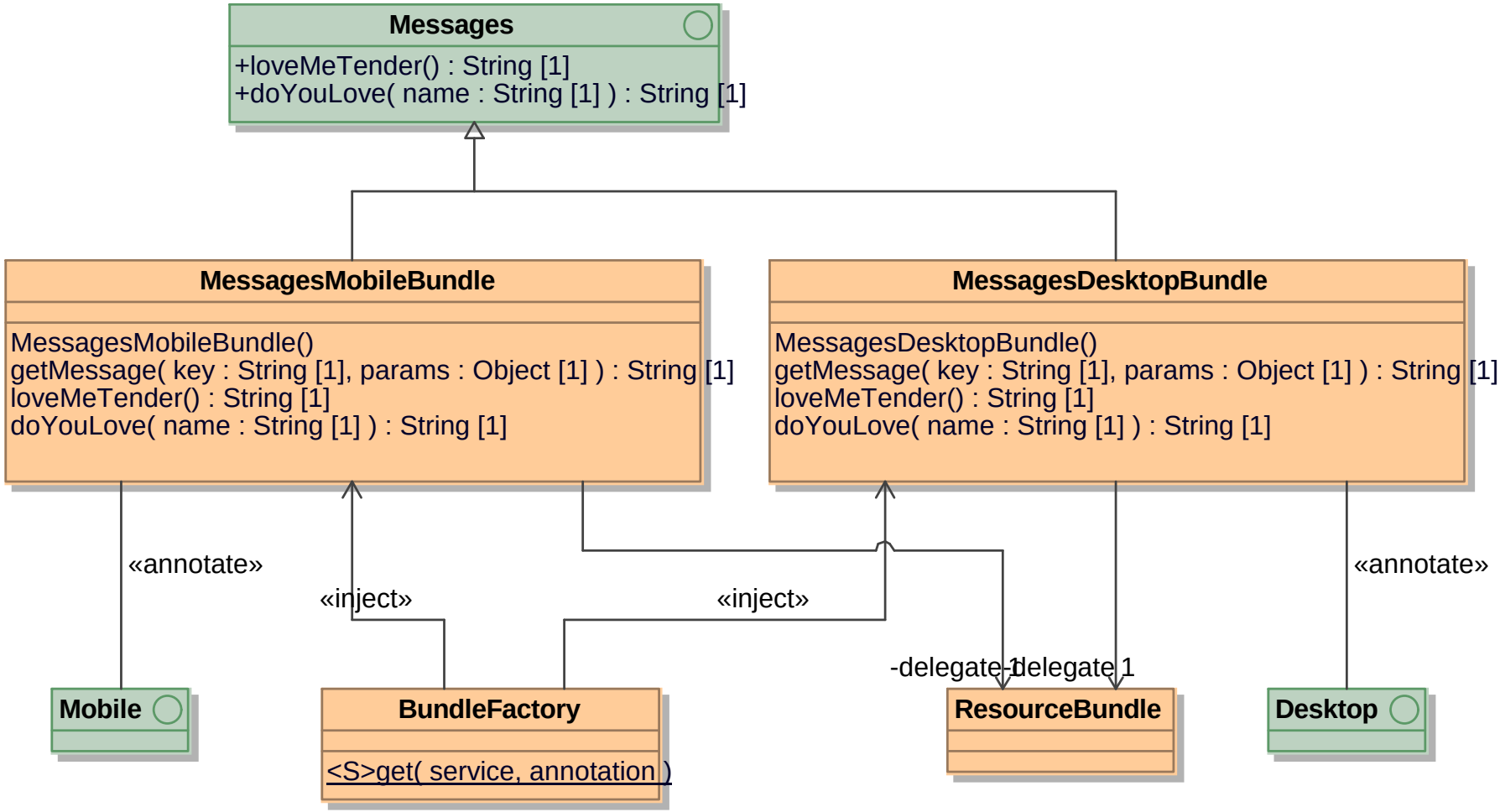
- Beware of the “Generate” golden hammer
  - generate needed code
- APT Processors can be tricky:
  - hard to test / maintain
  - bad error management (hidden errors !)
  - Not really (well) documented
- No built in templating mechanism
- Enforced file path creation
- Beware of maven // builds
  - javac is not thread safe

It’s time to convince your team

- APT parses the source code to generate
  - Java Files & .class, Reports (.csv, …)
  - Build log information or even build failures
- It allows you to have a source level DSL
  - Annotate your code
  - Generate the plumbing
  - Compile / Debug the real code
- APT framework is compact
- Learning curve is low

Go deep in Ez18n

Ez18n - Big picture



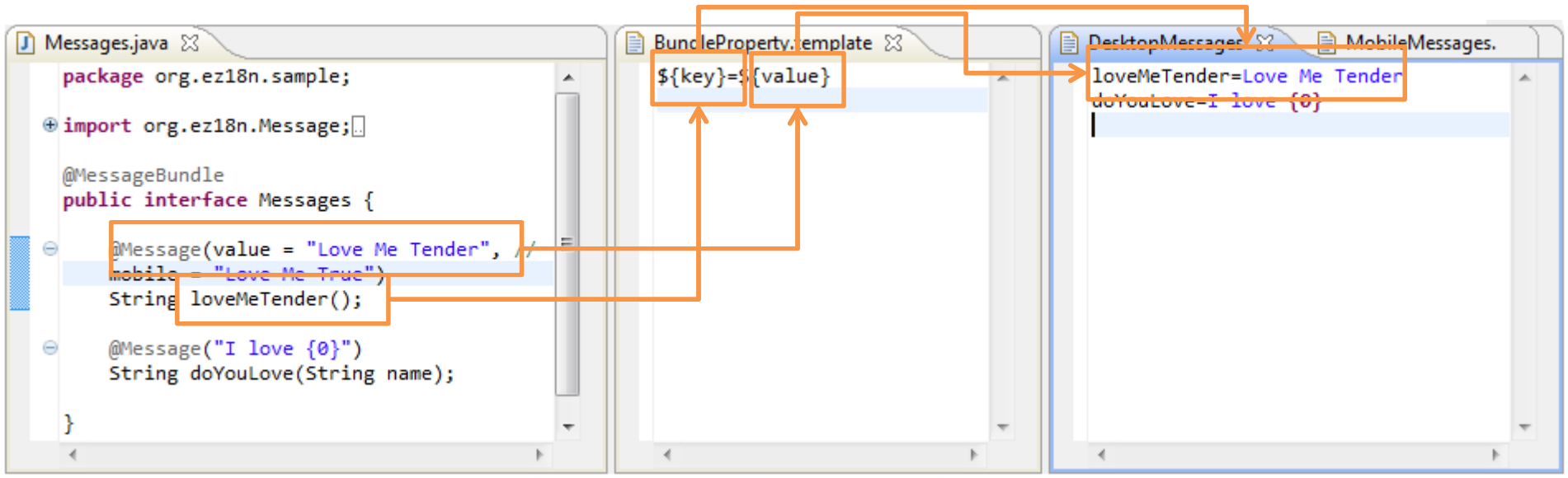
Ez18n - APT chaining

```
<plugin>
  <groupId>org.bsc.maven</groupId>
  <artifactId>maven-processor-plugin</artifactId>
  <executions>
    <execution>
      <id>generate-i18n-source</id>
      <goals>
        <goal>process</goal>
      </goals>
      <phase>generate-sources</phase>
      <configuration>
        <compilerArguments>-encoding UTF-8</compilerArguments>
        <outputDirectory>${project.build.directory}/generated-sources/apt</outputDirectory>
        <processors>
          <processor>org.ez18n.apt.processor.MobileBundleProcessor</processor>
          <processor>org.ez18n.apt.processor.MobileBundlePropertiesProcessor</processor>
          <processor>org.ez18n.apt.processor.DesktopBundleProcessor</processor>
          <processor>org.ez18n.apt.processor.DesktopBundlePropertiesProcessor</processor>
          <processor>org.ez18n.apt.processor.CSVReportProcessor</processor>
          <processor>org.ez18n.apt.processor.MetaInfServicesProcessor</processor>
        </processors>
      </configuration>
    </execution>
```

- 5 APT processors to obtain the default pattern
- Optional CSV files for analysis/tooling

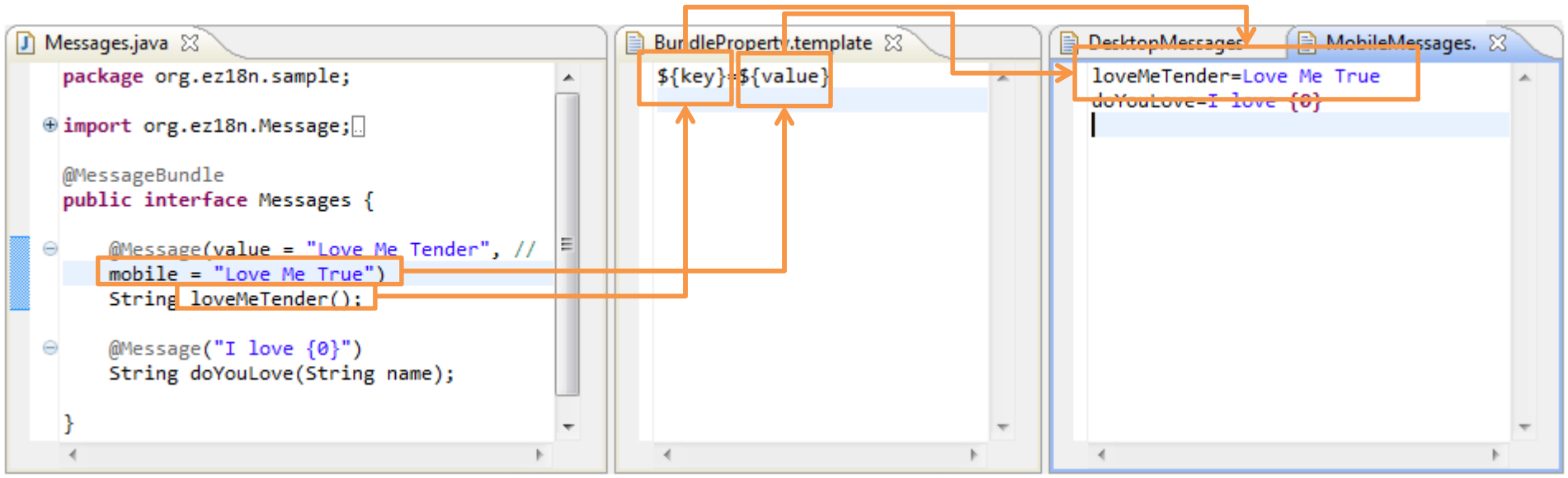
From Messages to DesktopMessages.properties

- One property file per interface with **@MessageBundle**
- One property entry per method with **@Message**

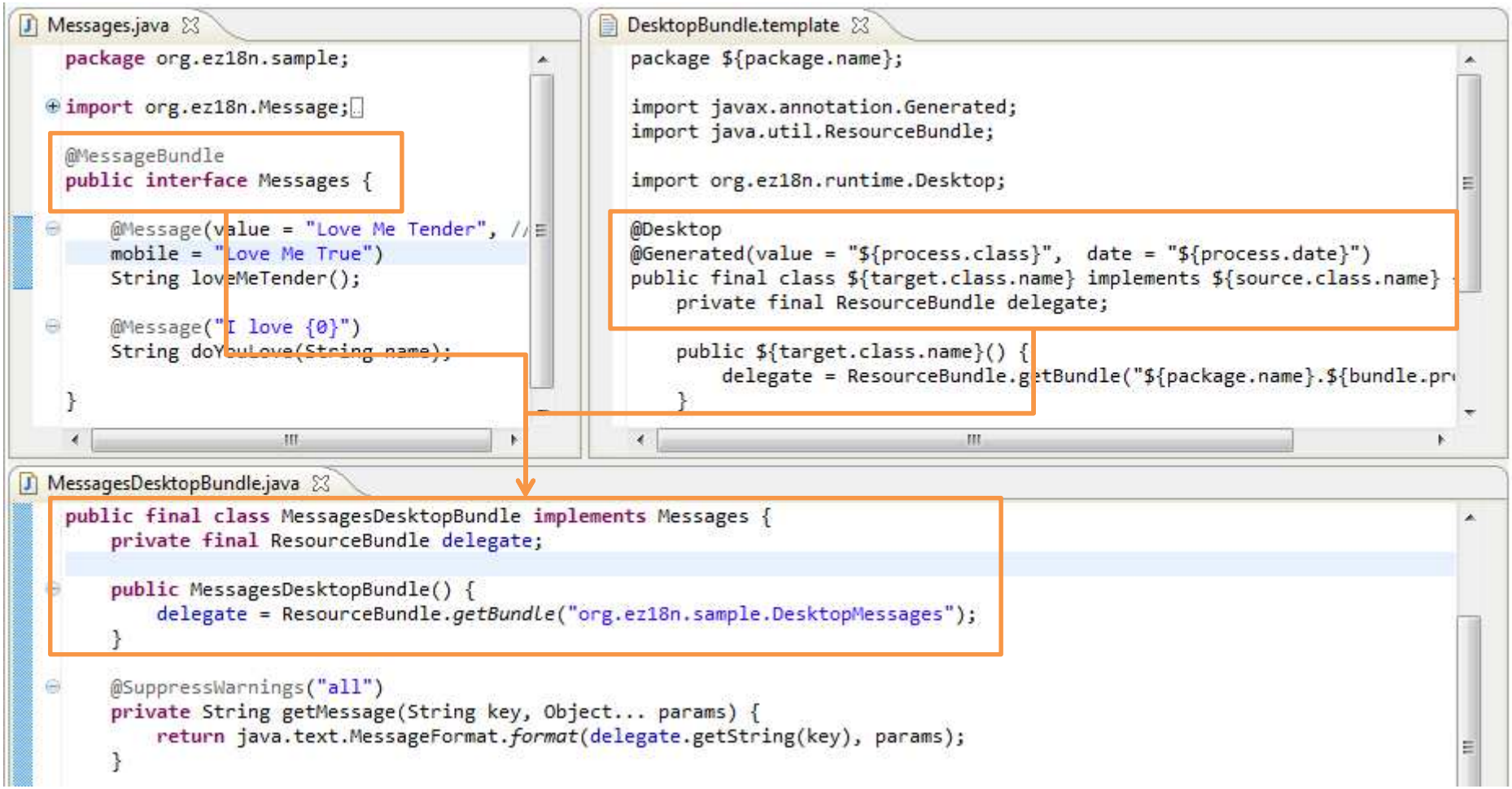


From Messages to MobileMessages.properties

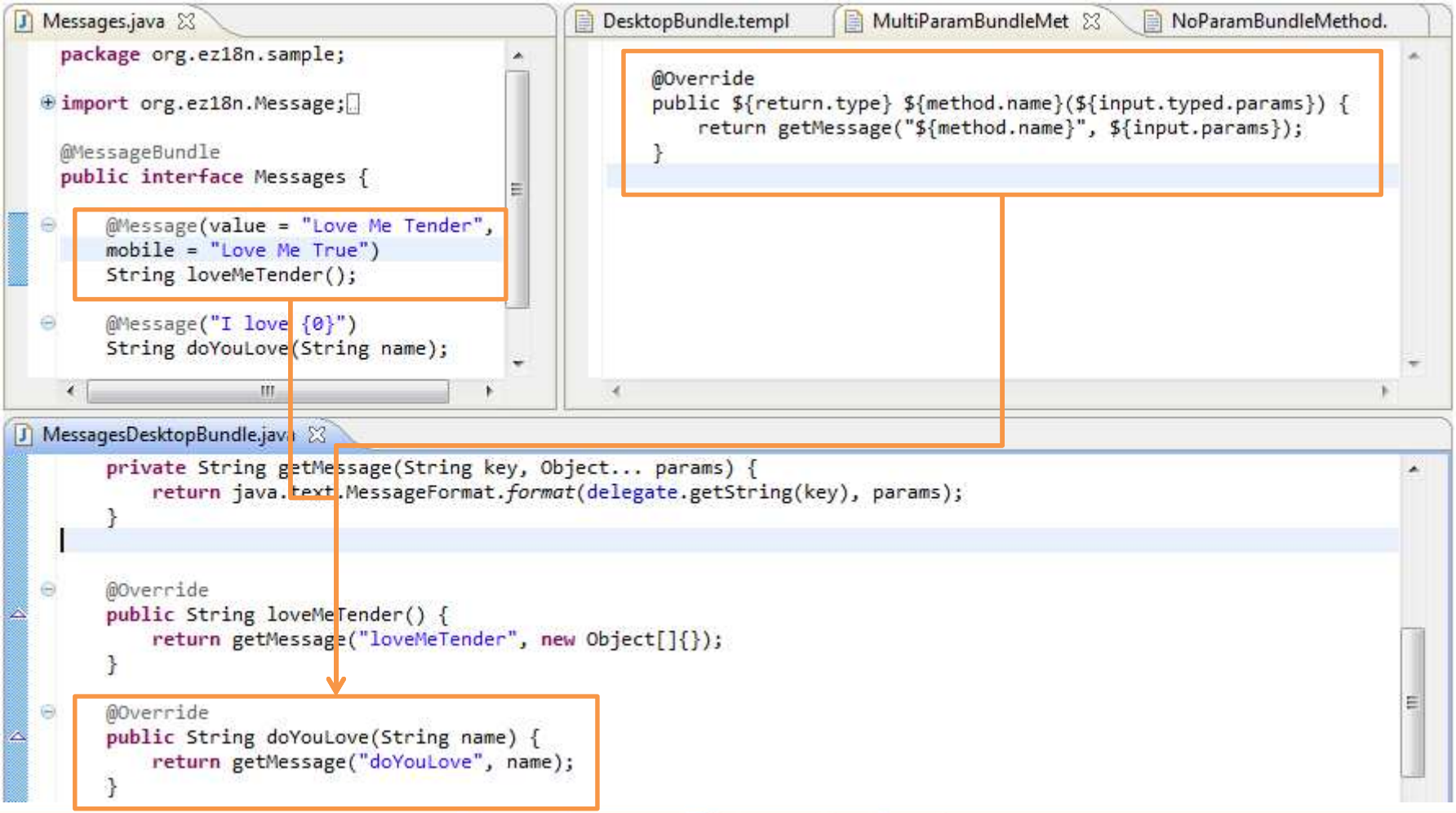
- Another property file is generated for the mobile content
- If **@Message#mobile** is empty, the **@Message#value** is used as fallback



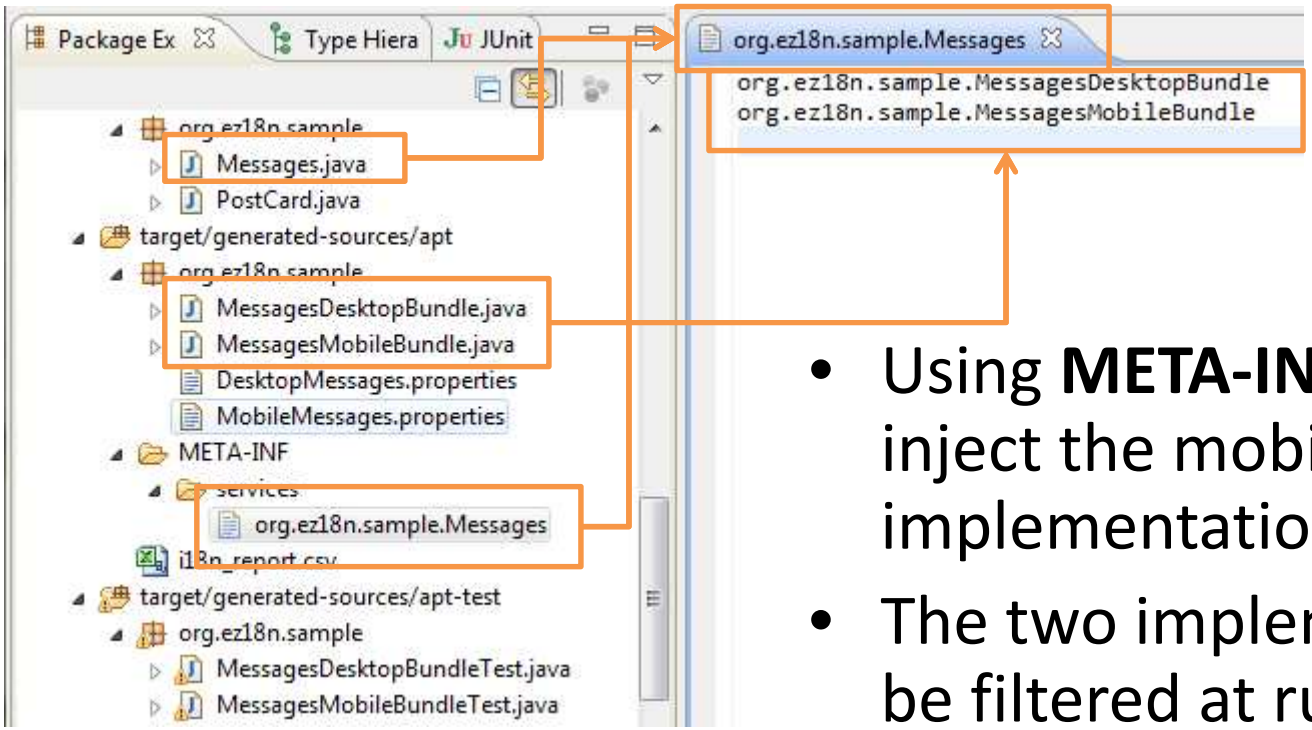
From Messages to MessagesDesktopBundle.java (1/2)



From Messages to MessagesDesktopBundle.java (2/2)



From Messages to META-INF/services/org.ez18n.sample.Messages



- Using **META-INF/services** to inject the mobile & desktop implementation
- The two implementation could be filtered at runtime using **annotations** and **ServiceLoader**
  - **@Mobile**
  - **@Desktop**

A factory for the Messages implementations

- Using **java.util.ServiceLoader** to inject the interface with **@MessageBundle**
- **@Desktop** and **@Mobile** used to filter the injection result

```
@MessageBundle
public interface Messages {

    @Message(value = "Love Me Tender", //
    mobile = "Love Me True")
    String loveMeTender();

    @Message("I love {0}")
    String doYouLove(String name);

}
```

```
@Retention(RetentionPolicy.RUNTIME)
@Target(ElementType.TYPE)
public @interface Mobile {
```

```
@Retention(RetentionPolicy.RUNTIME)
@Target(ElementType.TYPE)
public @interface Desktop {
```

```
public class BundleFactory {
    public static final <S> S get(Class<S> service, Class<? extends Annotation> annotation) {
        final ServiceLoader<S> loader = ServiceLoader.<S> load(service);
        for (S bundle : loader) {
            if (bundle.getClass().getAnnotation(annotation) != null)
                return bundle;
        }
        throw new IllegalStateException("bundle not found for " + service.getName());
    }
}
```

Client code sample with JUnit

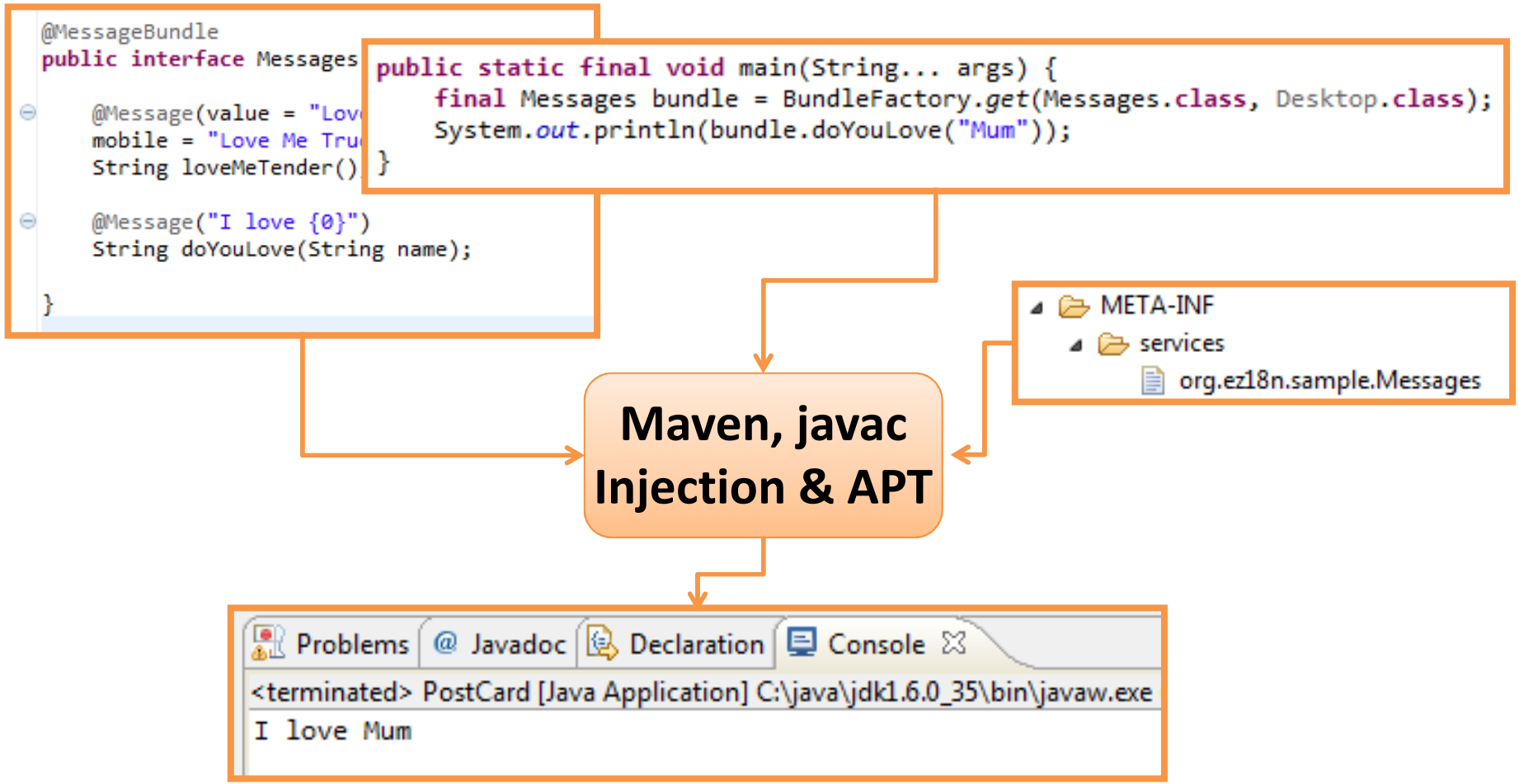
- Some basic JUnit test using the API

```
@Generated(value = "org.ez18n.apt.processor.TestDesktopBundleProcessor", date = "9/14/12 7:07 PM")
public class MessagesDesktopBundleTest {

    private Messages bundle;

    @org.junit.Before
    public void setUp() {
        bundle = BundleFactory.get(Messages.class, Desktop.class);
    }

    @org.junit.Test
    public void loveMeTender() {
        assertNotNull(bundle.loveMeTender());
    }

    @org.junit.Test
    public void doYouLove() {
        assertNotNull(bundle.doYouLove(null));
    }
```

The unit tests are generated using APT too ☺

BundleFactory.get(…) usage in the test @Before to retrieve the bundle implementation

Ez18n - Summary



Thank you !

Ez18n is on GitHub.
Just fork it !

https://github.com/dbaeli/ez18n