

# Java Annotation Processing

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By Robert Smieja

# Overview

- Java Annotations
  - What are they? How do we define them?
- Java Annotation Processors
  - How do we use annotations?
- Examples
  - “Hello World”
  - PofProcessor

# What are Annotations?

- Formally introduced in Java 6
- Annotations are metadata that can be placed on Java elements
  - Some examples include Fields, Types, Methods
  - Full list of Java elements in `java.lang.annotation.ElementType`
- All annotations start with `@`
- Defined as an `@interface`:
- Able to take arguments

- ```
public @interface HelloWorld {}
```

- ```
public @interface Autowired
{
    boolean required() default true;
}
```

# What are Annotations? - Examples

- Built-in Annotations:
  - `@Override` - Instructs the compiler to check if the method is overridden from a parent class or interface, and generated a compile error if it is not.
  - `@Deprecated` - Mark method as deprecated, and generate a warning when used
  - `@SuppressWarnings` - Ignore compile time warnings
  - `@SafeVarargs` - Suppresses warnings related to unsafe usages of varargs (Since Java 7)
  - `@FunctionalInterface` - Marks an interface as functional one, i.e. a lambda expression (Since Java 8)

# Processing Annotations

- Annotations can be stored in 3 places:
  - `java.lang.annotation.RetentionPolicy` :
    - Source, Class, Runtime
- 2 ways to process annotations
  - Java Annotation Processing API
    - A Service Provider Interface (SPI) that allows plugging of an annotation processor at compile time
    - Using an SPI implementing the correct interface, and pointing to the implementation using a properties file.
  - Reflection API
    - The Reflection API allows accessing a list of annotations on Java elements
    - Ex. `Field.getDeclaredAnnotations()`, `Class.getAnnotations()`, etc

# Processing Annotations - Examples

- Let's look at “hello world” annotation
  - Contains examples of both SPI and Reflections

# Processing Annotations - Examples

- Let's take a look at the PofProcessor source code
  - Example of code generation during compile-time, based on annotations

Questions?



# Additional Resources

- Java SPI Tutorial - <https://docs.oracle.com/javase/tutorial/ext/basics/spi.html>
- Javadoc for javax.annotation.processing - <https://docs.oracle.com/javase/8/docs/api/javax/annotation/processing/package-summary.html>
- Code from presentation - <https://github.com/robertsmieja/java-annotation-examples>