

Joker<?>

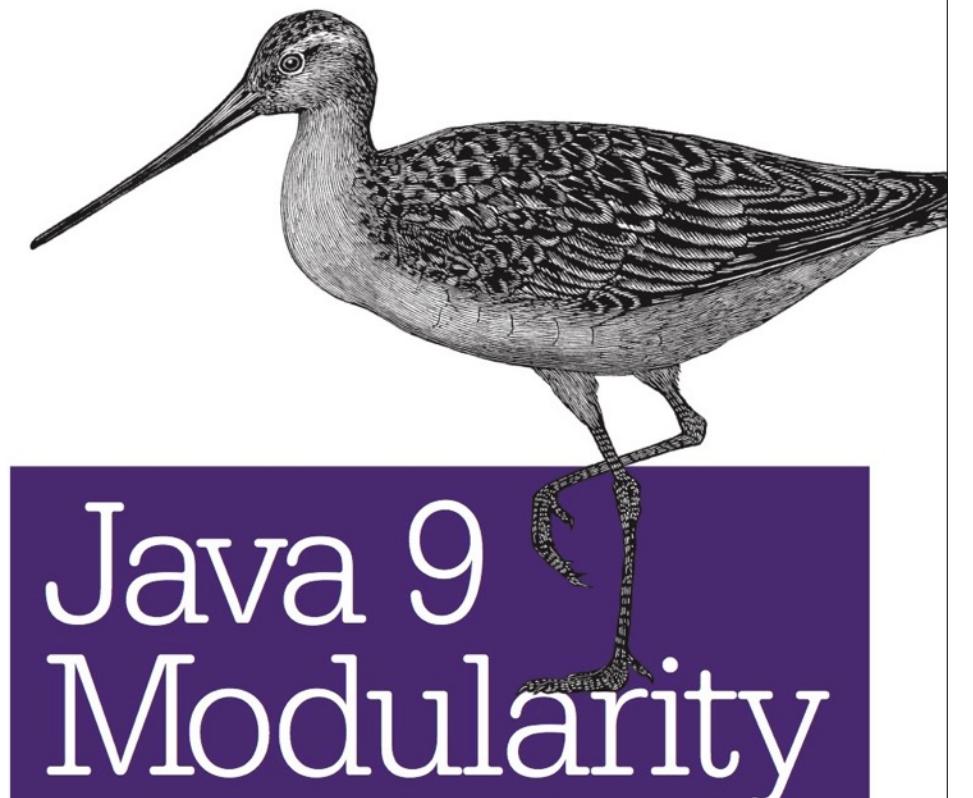
Java 9 Modularity

in Action

By Paul Bakker & Sander Mak



O'REILLY®



Sander Mak & Paul Bakker

@Sander_Mak

Today's journey

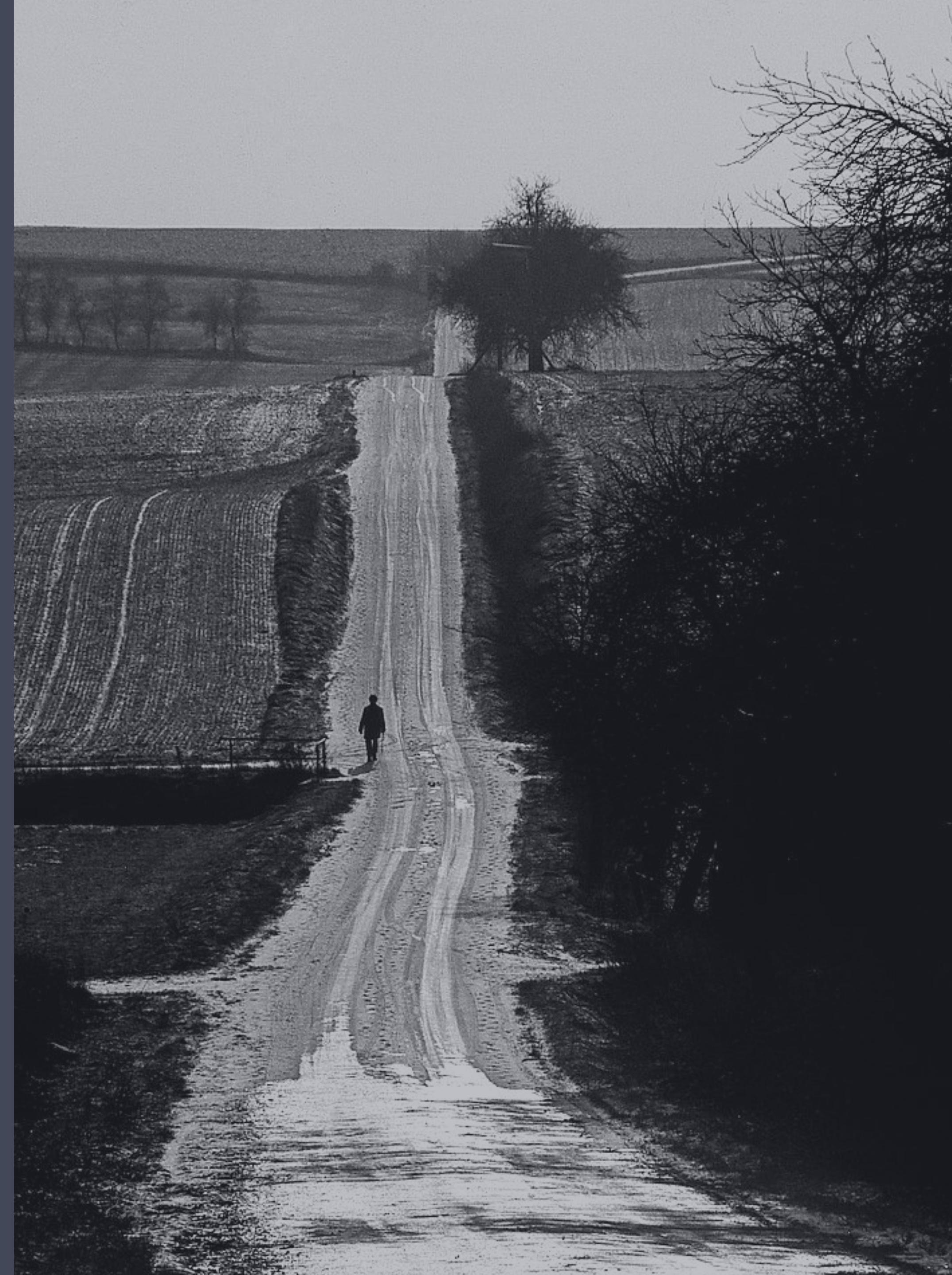
Modularity matters

Java 9 modules

Services

Linking

Migration

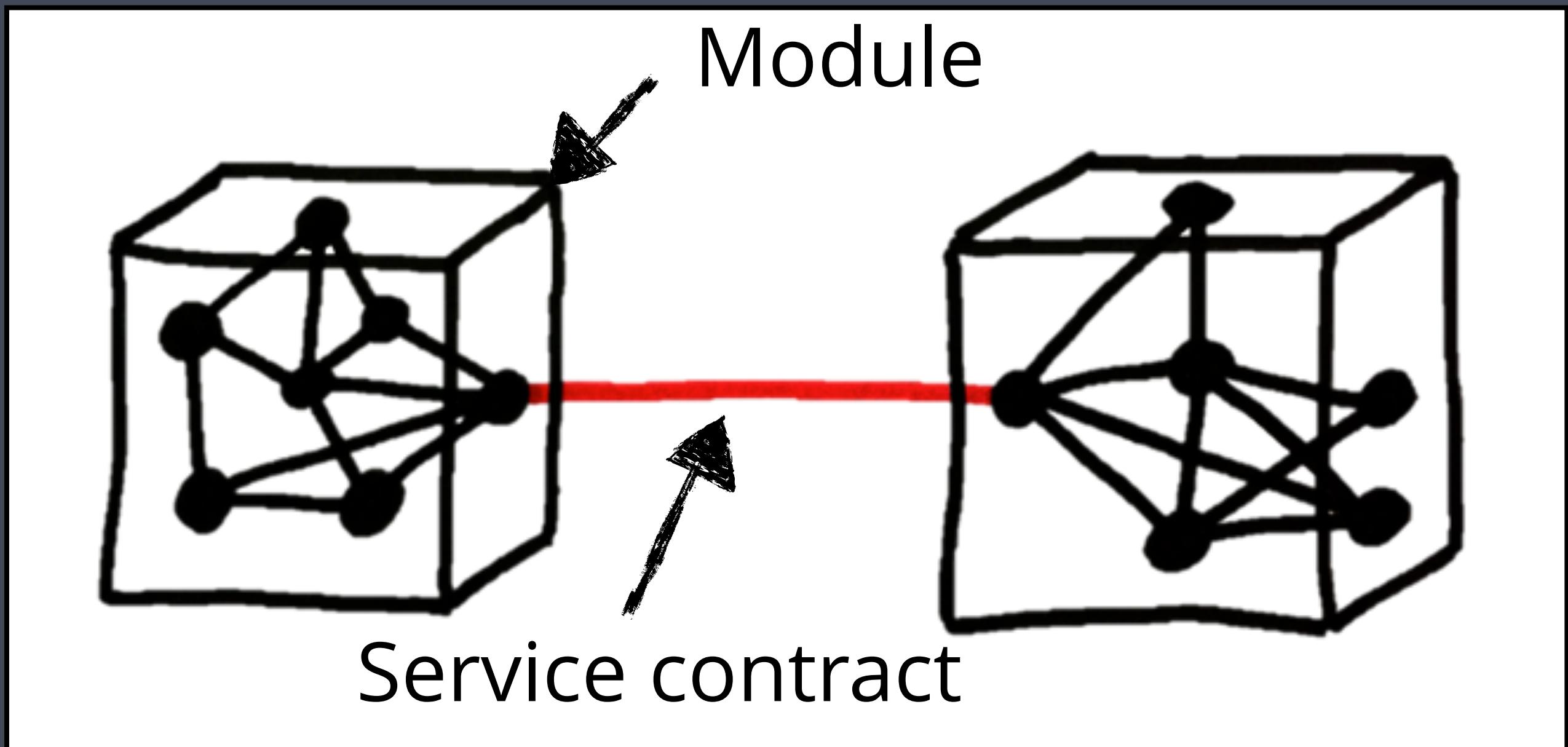




Modularity matters

Modularity is the ultimate
agile tool

Good fences make good neighbours



Hide your internals!



Java 9: Jigsaw, JSR-376



CAUTION CAUTION CAUTION

Work in progress!

Goals

- ▶ Modularise the JDK
- ▶ Reliable application composition
- ▶ Strong encapsulation - hide platform internals
- ▶ Improved security

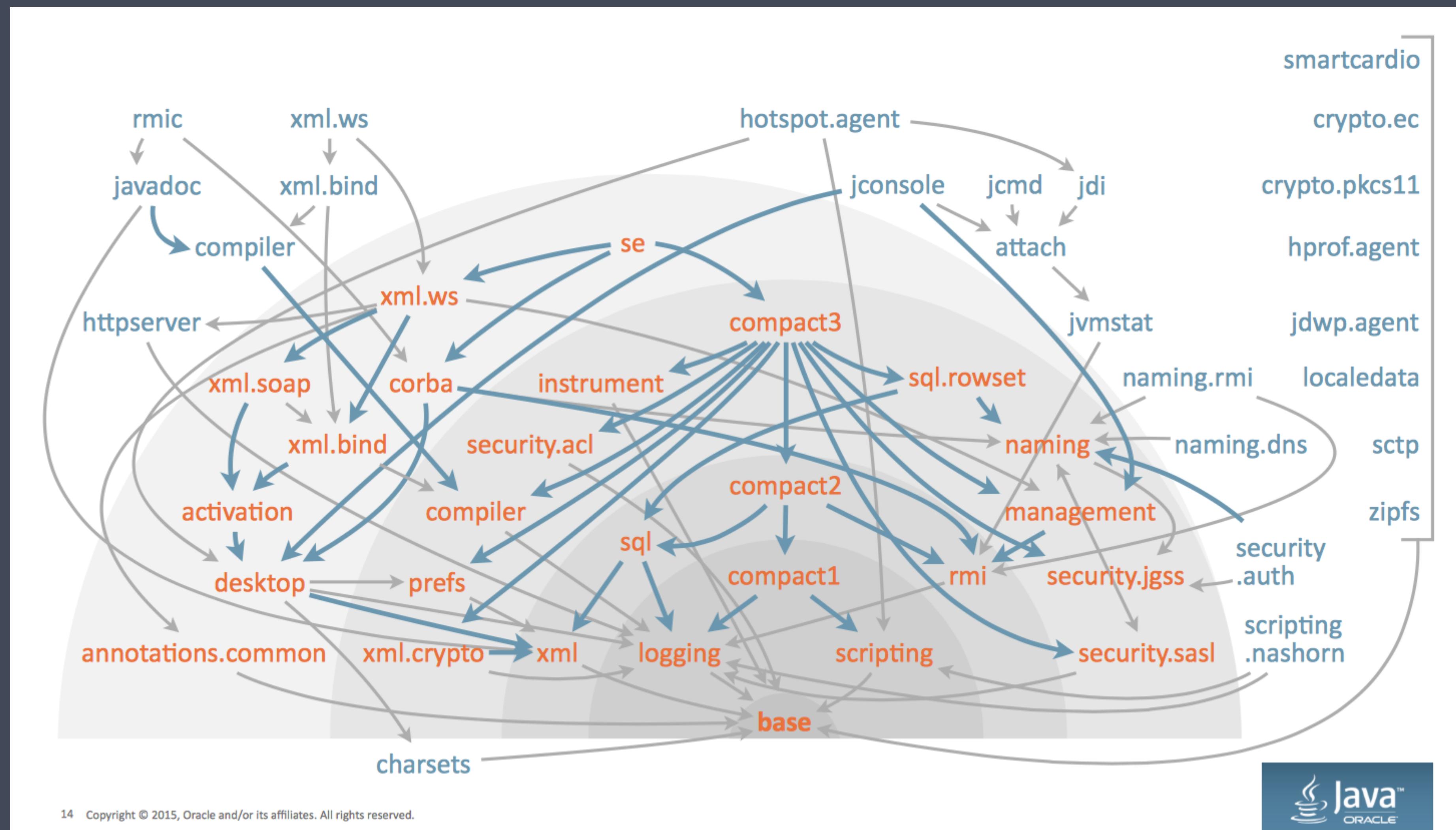
Current status

- ▶ JDK 9 modularised
- ▶ JSR 376 prototype (Jigsaw)
- ▶ No finalized spec yet

History of Jigsaw



JEP 200: The Modular JDK



Goodbye classpath

Reliable configuration

```
sbmak      31627  0.0  0.0  4523840  8376 s005 S+  Mon04PM  1:23.12 /Library/Java/JavaVir
tualMachines/jdk1.8_0_60.jdk/Contents/Home/bin/java -server -Xms32m -Xmx512m -cp /usr/local/Cellar/
orientdb/2.1.5/libexec/lib/activation-1.1.jar:/usr/local/Cellar/orientdb/2.1.5/libexec/lib/annotati
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sbmak      35871  0.0  0.0  2441988  696 s008 S+  10:20PM  0:00.00 grep activation
SanderMBP:~ sbmak$
```



Goodbye classpath

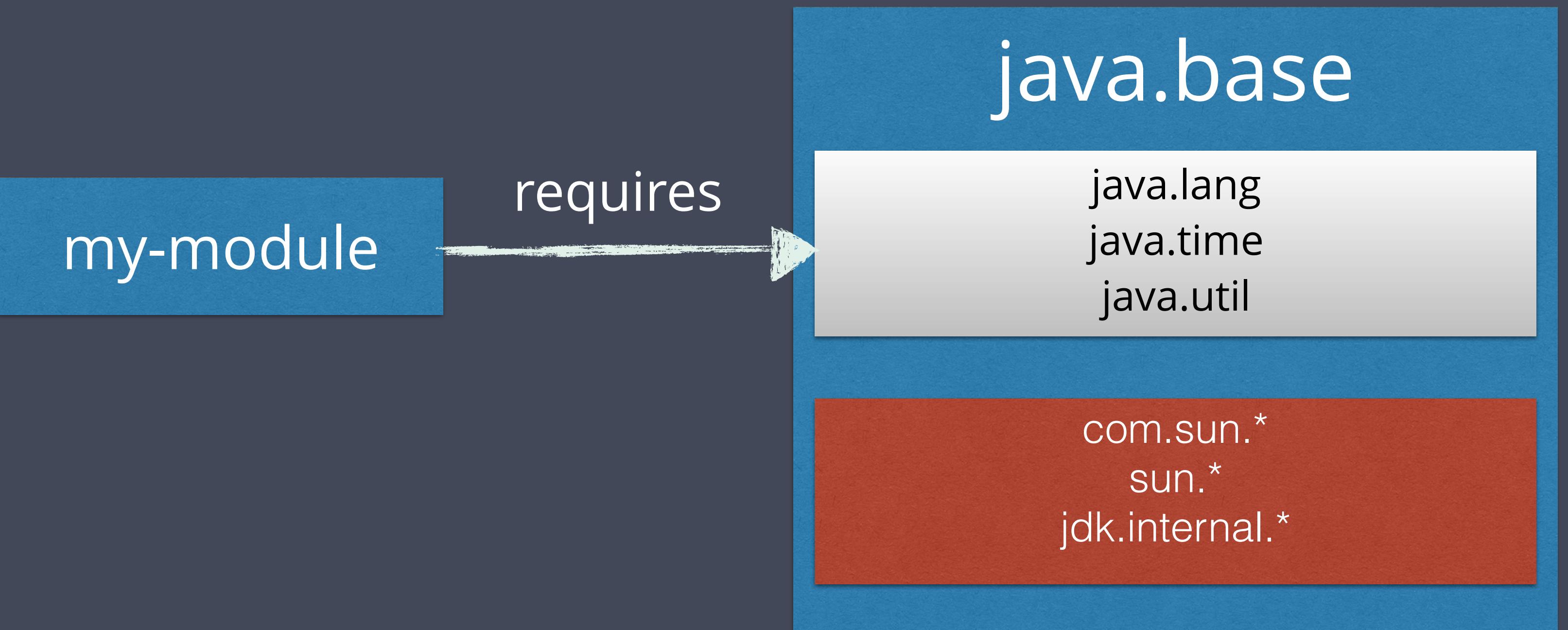
Modules with explicit dependencies





Strong encapsulation

Hide your internals



Access checks at VM level (even reflection)

Why not just use OSGi?

- ▶ OSGi is built on top of the JVM
- ▶ Can't be used to modularise the JDK itself

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- ▶ Can't be used to modularise the JDK itself

Why not only modularise the JDK?

- ▶ Fair point :-)
- ▶ OSGi has never seen mass adoption, Java 9 will bring modularity to all of us

instantaneous Conquest of a very delicate
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s some of the most experienced and ra-
us Debauchees are always upon the Watch
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wise, was this amorous Son of *Sodom* so ex-
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Demo: EasyText

Analyze text complexity

easytext.cli

requires

easytext.analyis

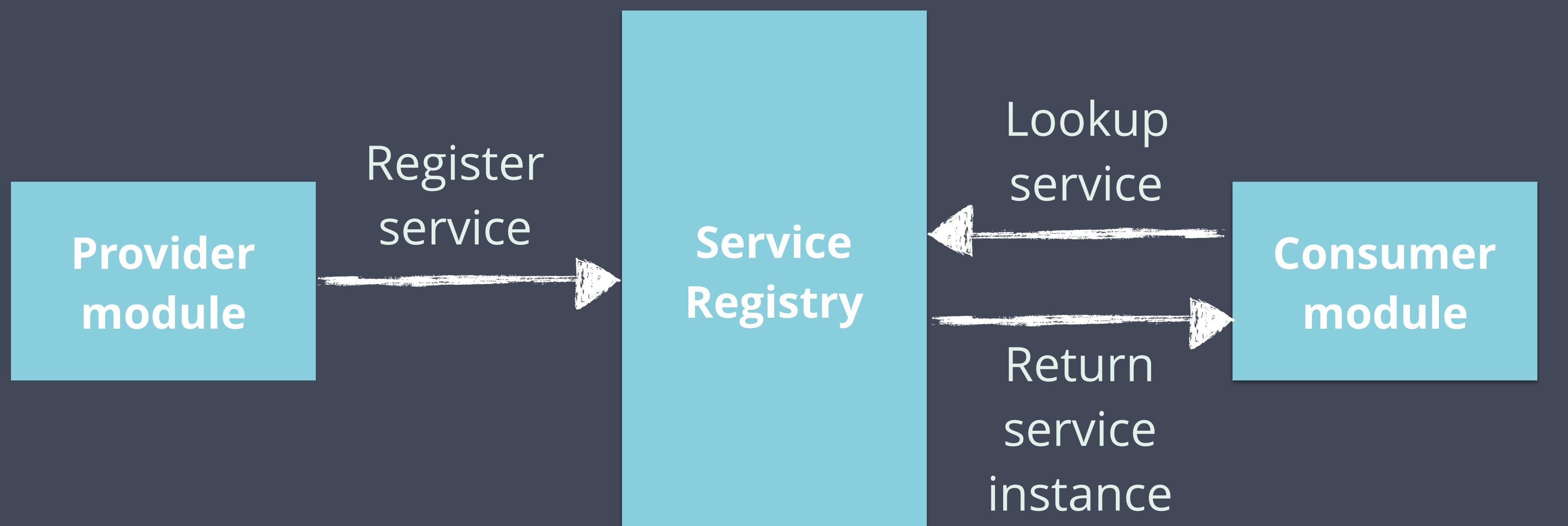
Contracts & Services

~~MyInterface i = new MyImpl();~~

How to use code
that you can't access?



Contracts & Services



Use an **interface** as contract



JSR-376 services

```
module myApi {  
    exports com.api;  
}
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JSR-376 services

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    uses com.api.MyService;  
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```
module myProvider {  
    requires myApi;  
    provides com.api.MyService  
        with myProvider.MyServiceImpl;  
}
```

- ▶ Services resolved and wired by modular runtime
- ▶ Use with 'enhanced' ServiceLoader API

JSR-376 services

```
module myApi {  
    exports com.api;  
}
```

```
module myConsumer {  
    requires myApi;  
    uses com.api.MyService;  
}
```

```
Iterable<MyService> services =  
    ServiceLoader.load(MyService.class);  
  
for(MyService svc: services) {  
    svc.doSomething();  
}
```

```
module myProvider {  
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Extensibility

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Demo: EasyText

Extensibility

- ▶ Multiple algorithms:
- ▶ Flesch-Kincaid
- ▶ Coleman-Liau

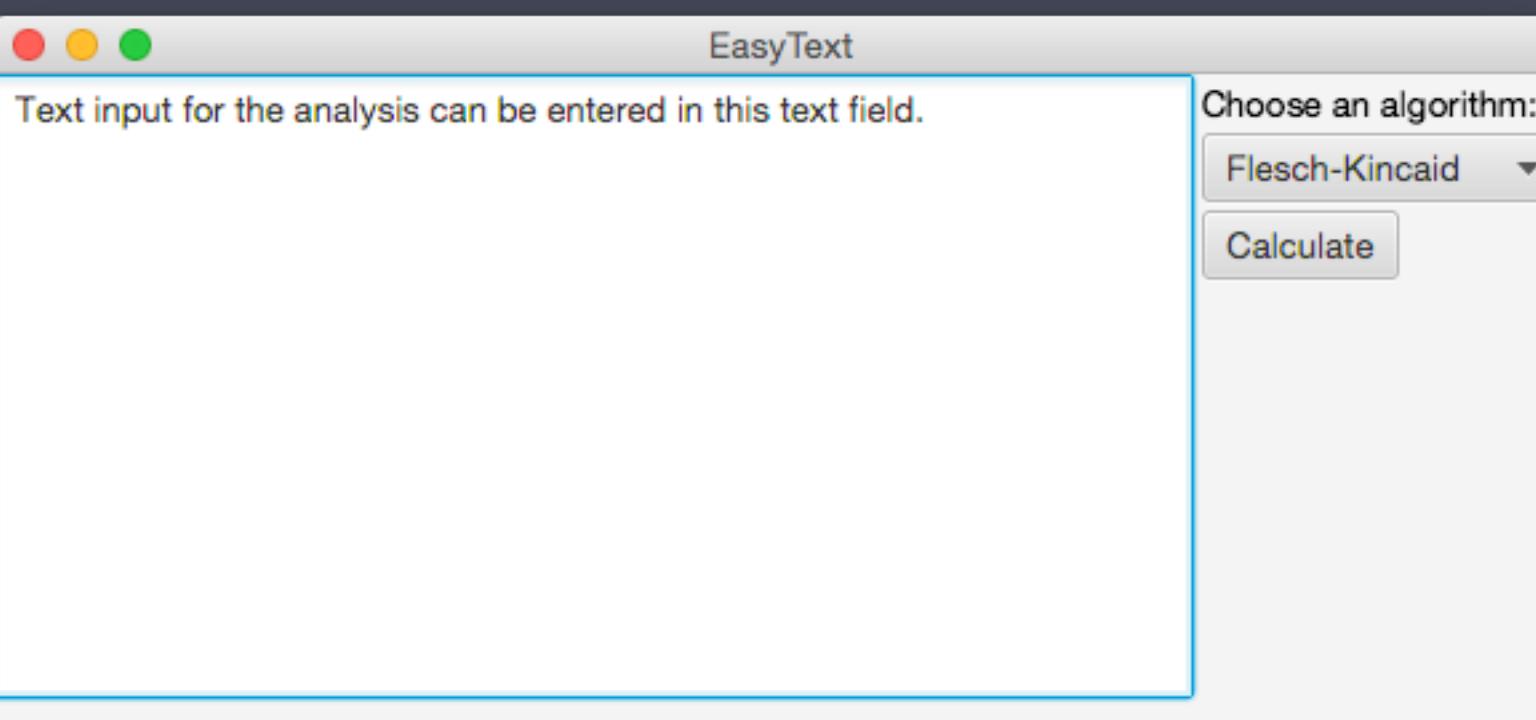
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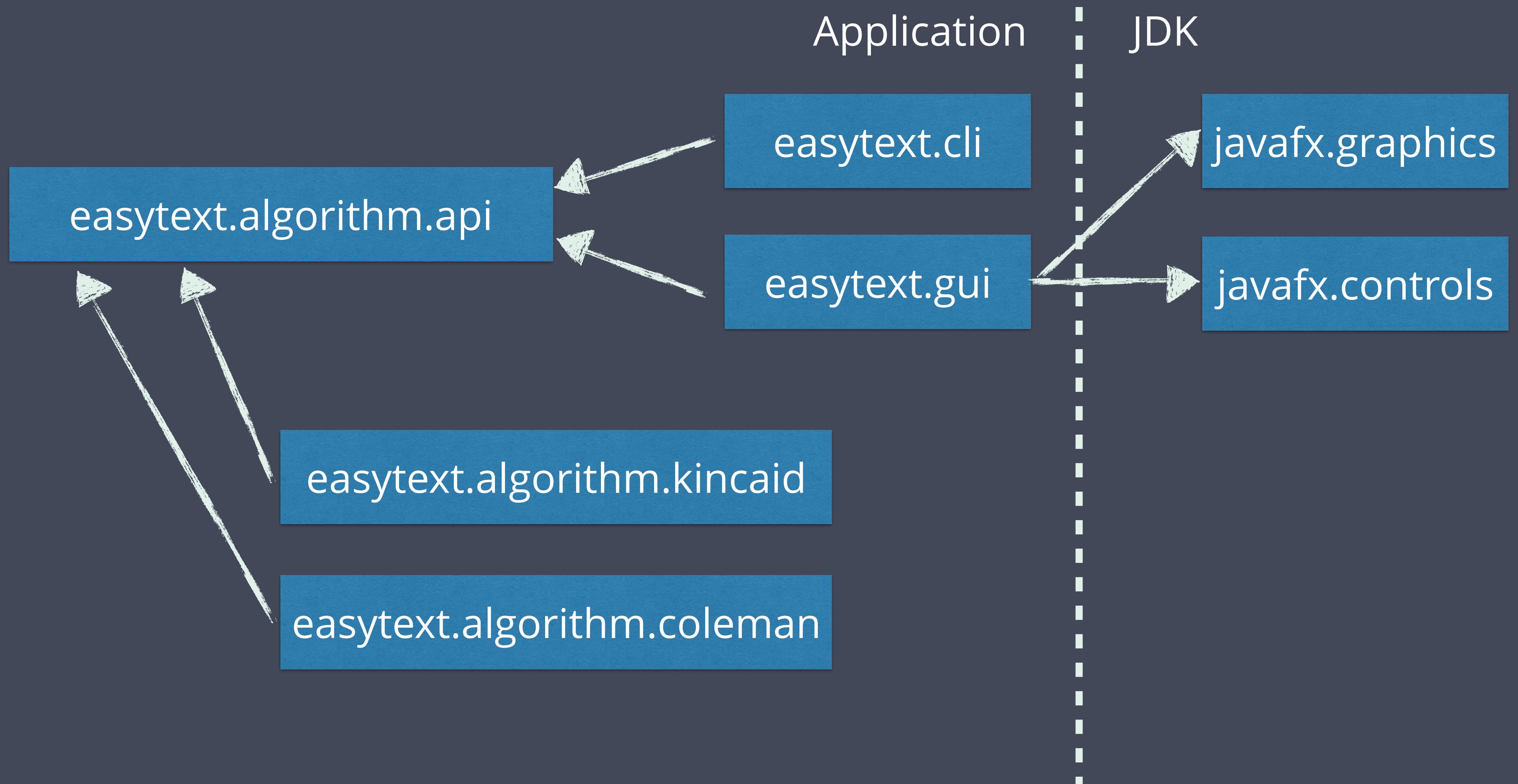
Extensibility

CLI & GUI?

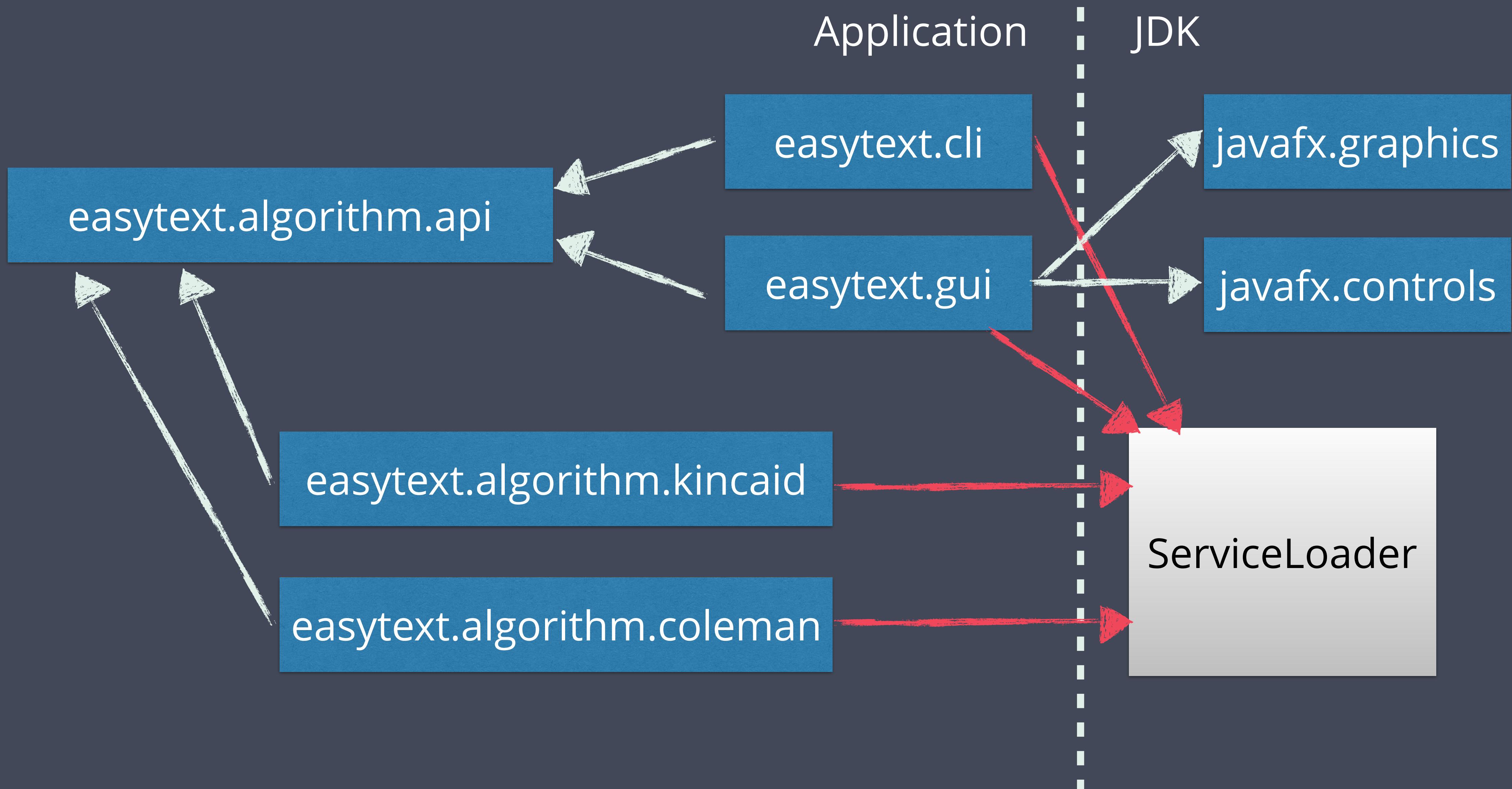


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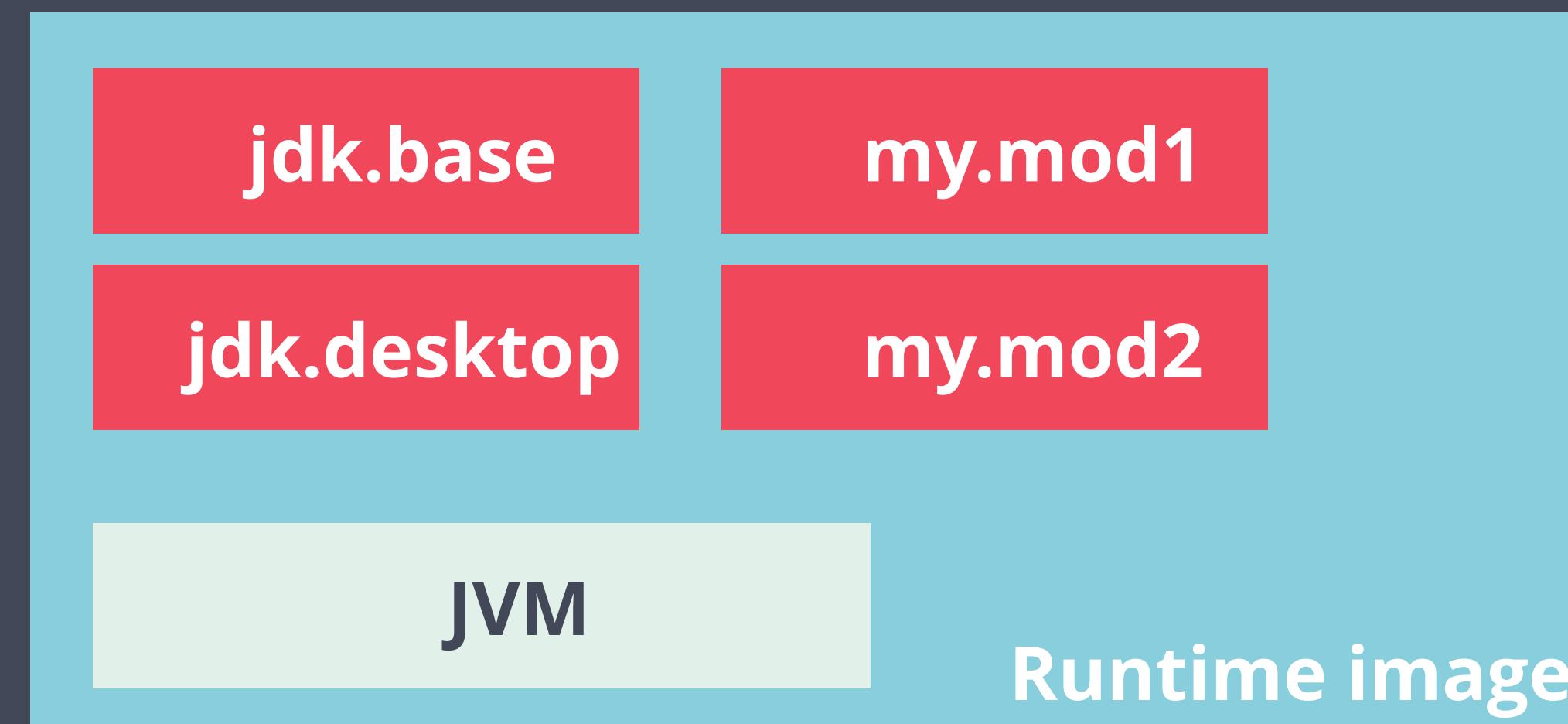


Demo: EasyText



JSR-376 linking

- ▶ Use a linking tool (jlink) to create a custom 'runtime image' with only the modules you need
- ▶ Uses explicit dependencies from module-info.class
- ▶ Allows for whole-program optimization



Demo: EasyText linking

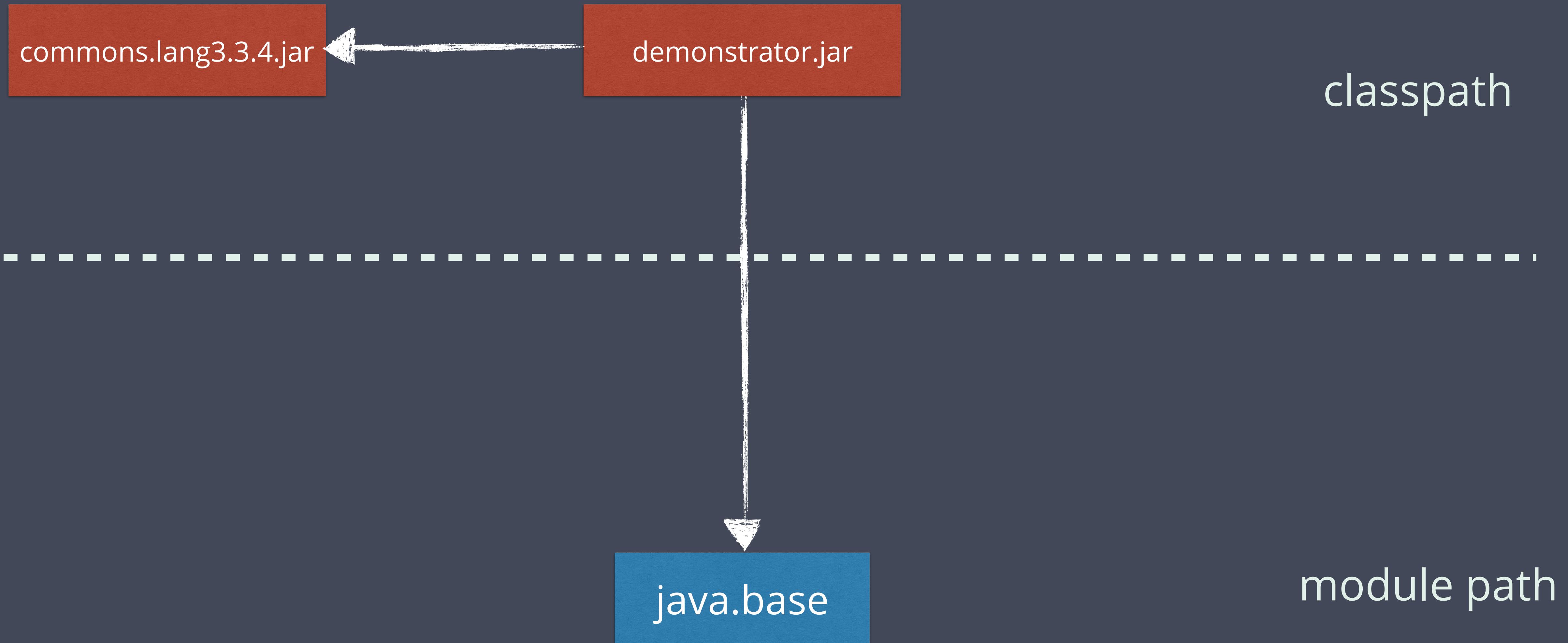


Preparing for Java 9

- ▶ Use jdeps to audit your code
- ▶ Escape hatch:
--add-exports java.base/javax.security.auth.x500=mymod
- ▶ Gradual migration possible
- ▶ Mix classpath & modulepath
- ▶ Automatic modules



Top down migration



Classic classpath

```
package com.javamodularity.demonstrator;

import org.apache.commons.lang3.StringUtils;

public class Demo {

    public static void main(String args[]) {
        String output = StringUtils.leftPad("Leftpad FTW!", 20);
        System.out.println(output);
    }
}
```

Classic classpath

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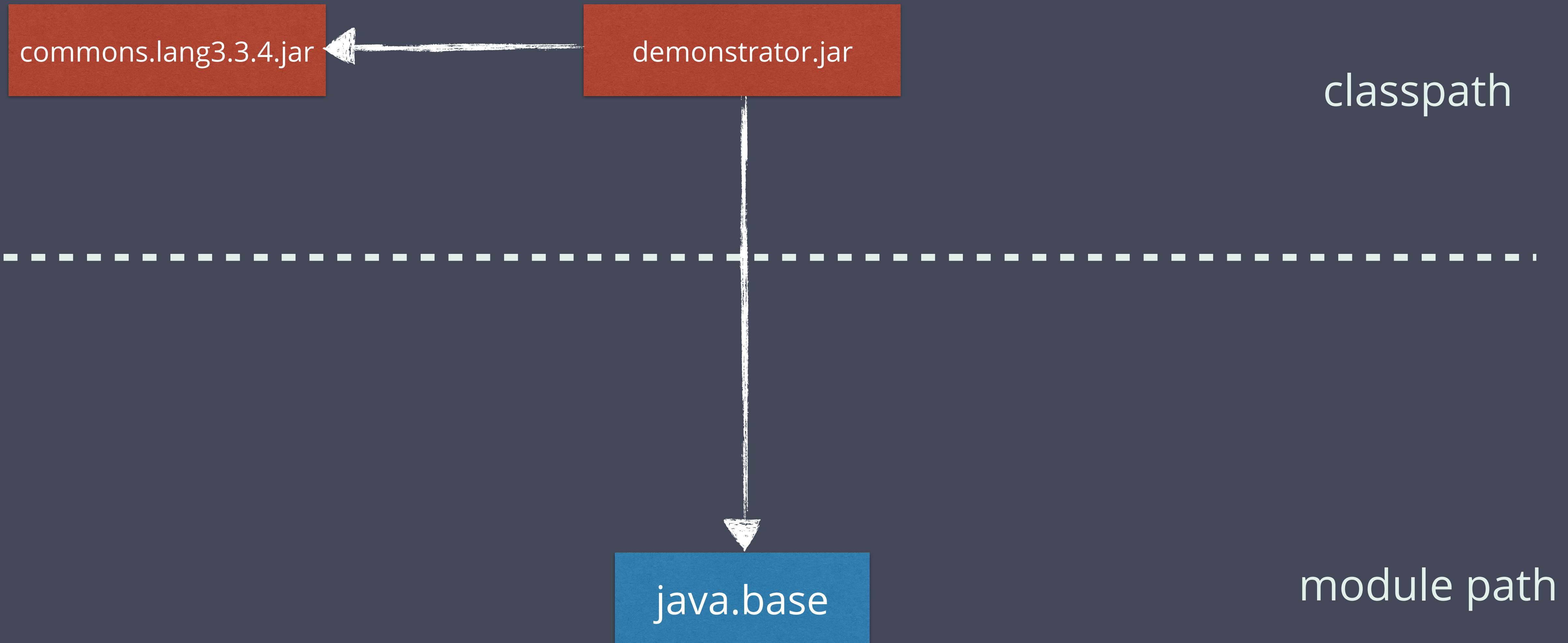
Compile

```
javac -cp lib/commons-lang3-3.4.jar
      -d out $(find src -name '*.java')
```

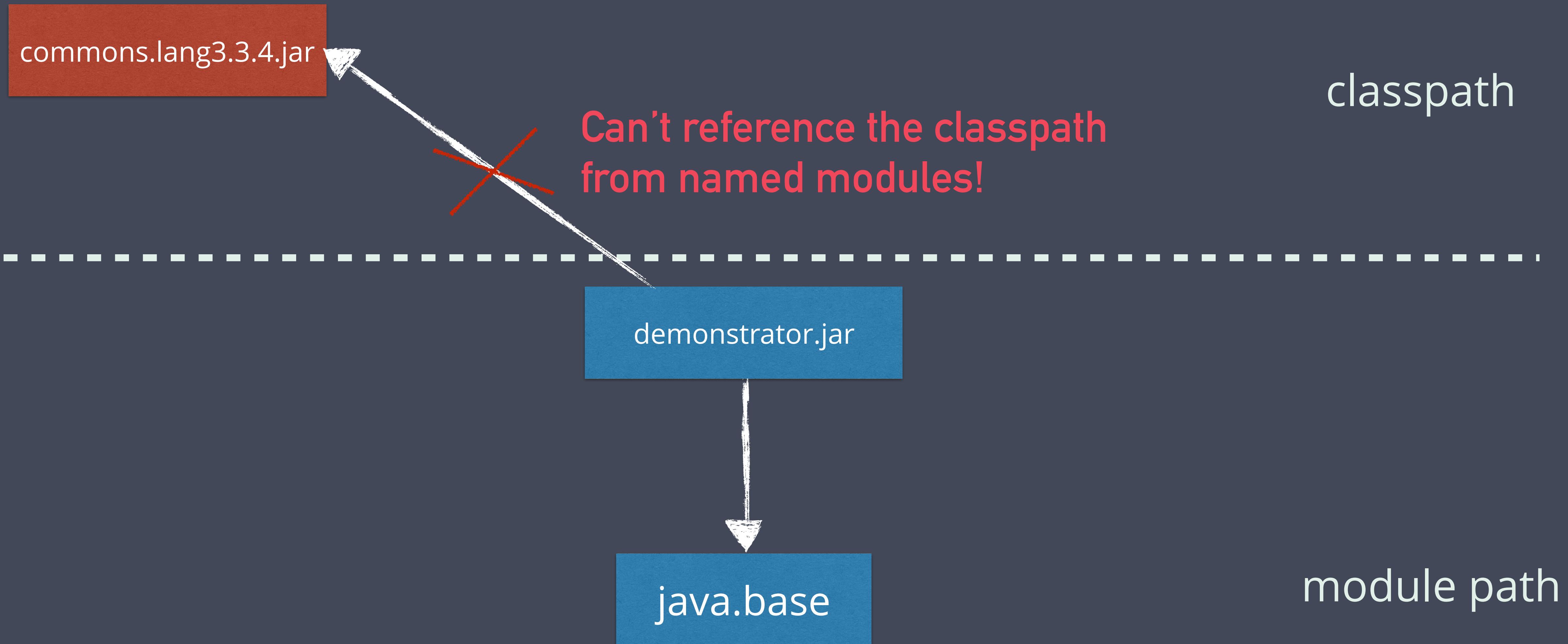
Run

```
java -cp out:lib/commons-lang3-3.4.jar
      com.javamodularity.demonstrator.Demo
```

Top down migration

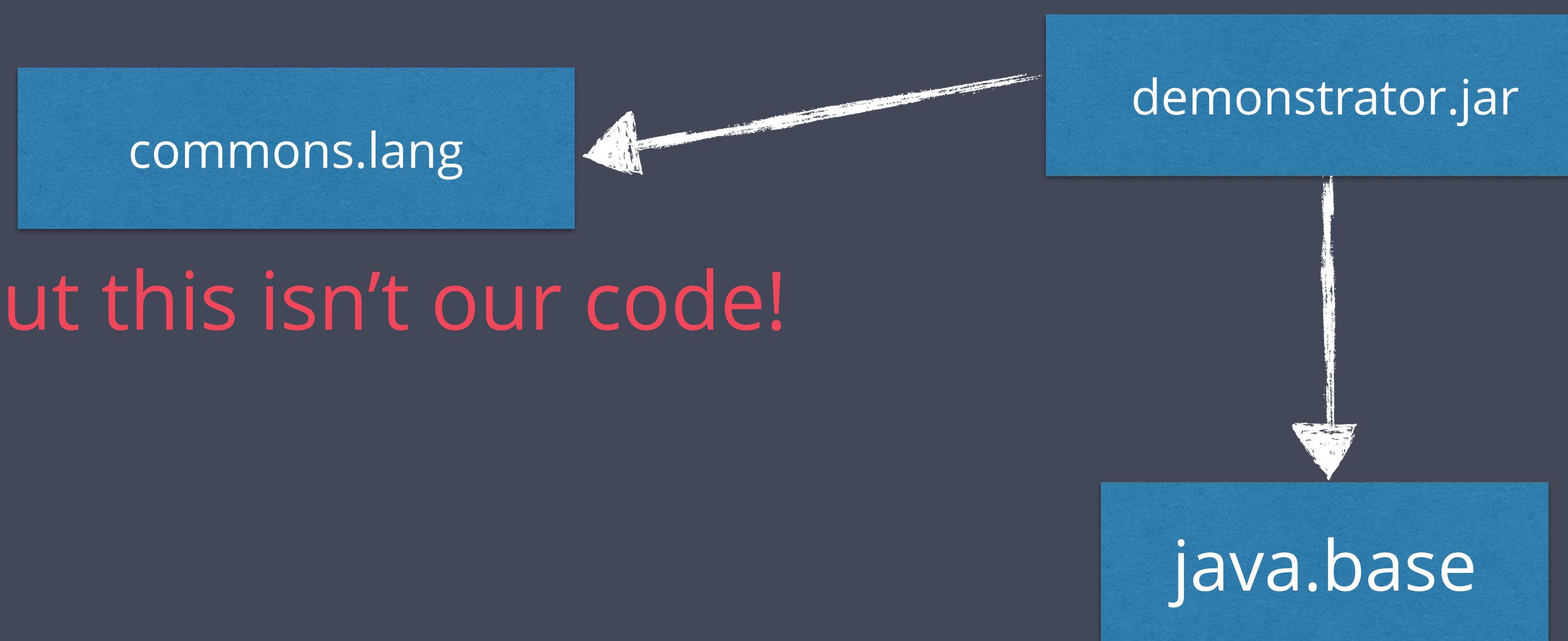


Top down migration



Top down migration

classpath



But this isn't our code!

module path

Automatic Modules

- ▶ A plain JAR on the module path becomes an **Automatic Module**
- ▶ Module name derived from JAR name
- ▶ Exports everything
- ▶ Reads all other modules

Using Automatic Modules

```
module demonstrator {  
    requires commons.lang3;  
}
```

Using Automatic Modules

```
module demonstrator {  
    requires commons.lang3;  
}
```

Compile

```
javac --module-path lib  
--module-source-path src  
-d mods $(find src -name '*.java')
```

Run

```
java --module-path mods:lib  
-m demonstrator/com.javamodularity.demonstrator.Demo
```

Open issues

- ▶ List of open issues
<http://openjdk.java.net/projects/jigsaw/spec/issues/>
- ▶ ~~Optional dependencies~~
- ▶ ~~Resource Encapsulation~~
- ▶ ~~'Open' Reflection~~
- ▶ ~~Module versioning~~



Java 9's promise

- ▶ JSR-376 forces module-aware tooling
- ▶ Modularity throughout all development phases

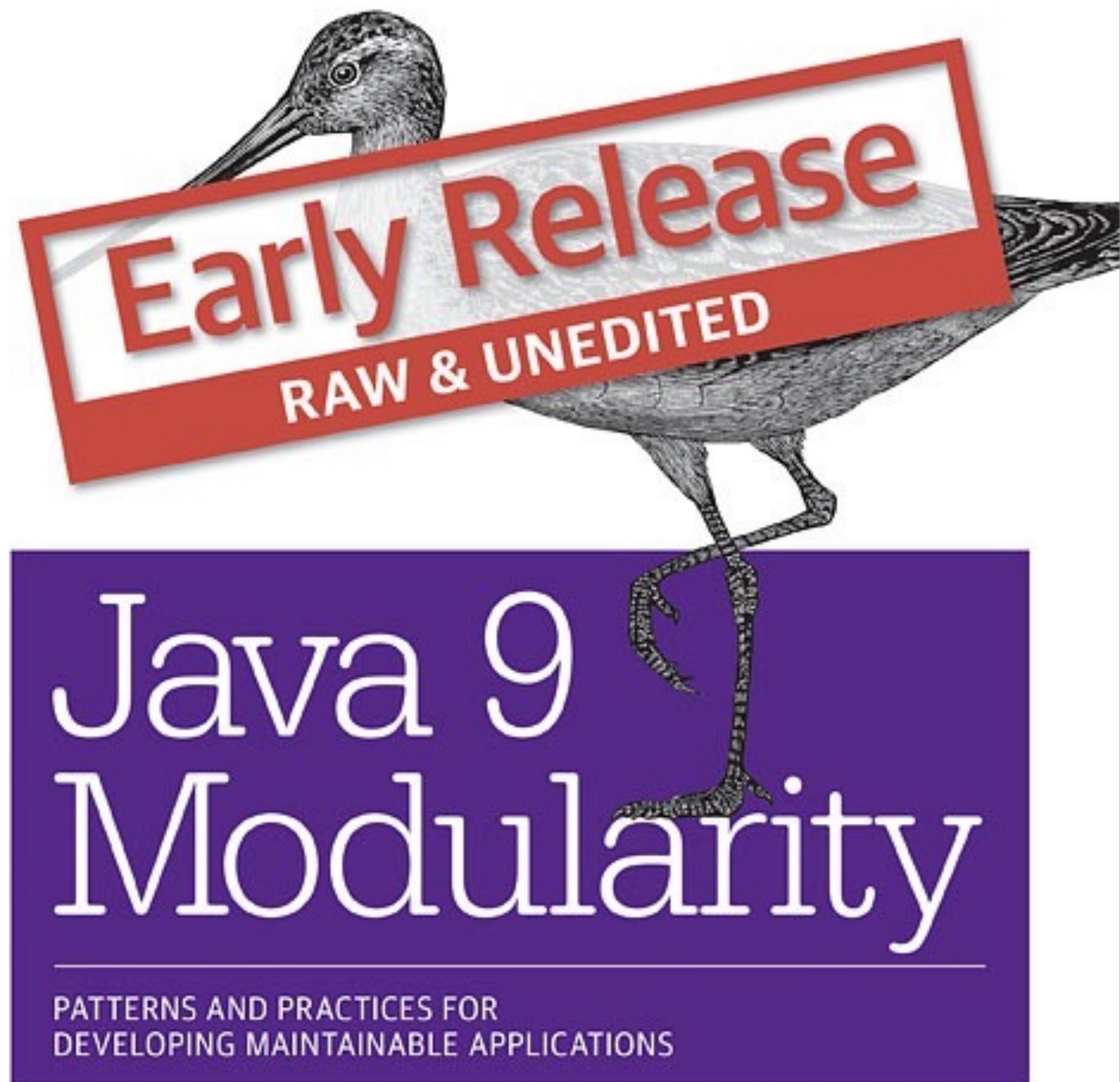


Java 9's promise

- ▶ JSR-376 forces module-aware tooling
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Spotlight on modularity == good



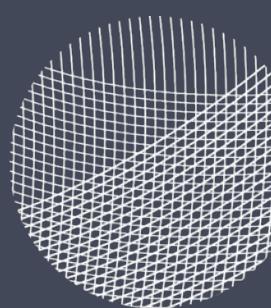


Sander Mak & Paul Bakker

Thank you.

see: bit.ly/java9book

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