From Java 8 to Java 13

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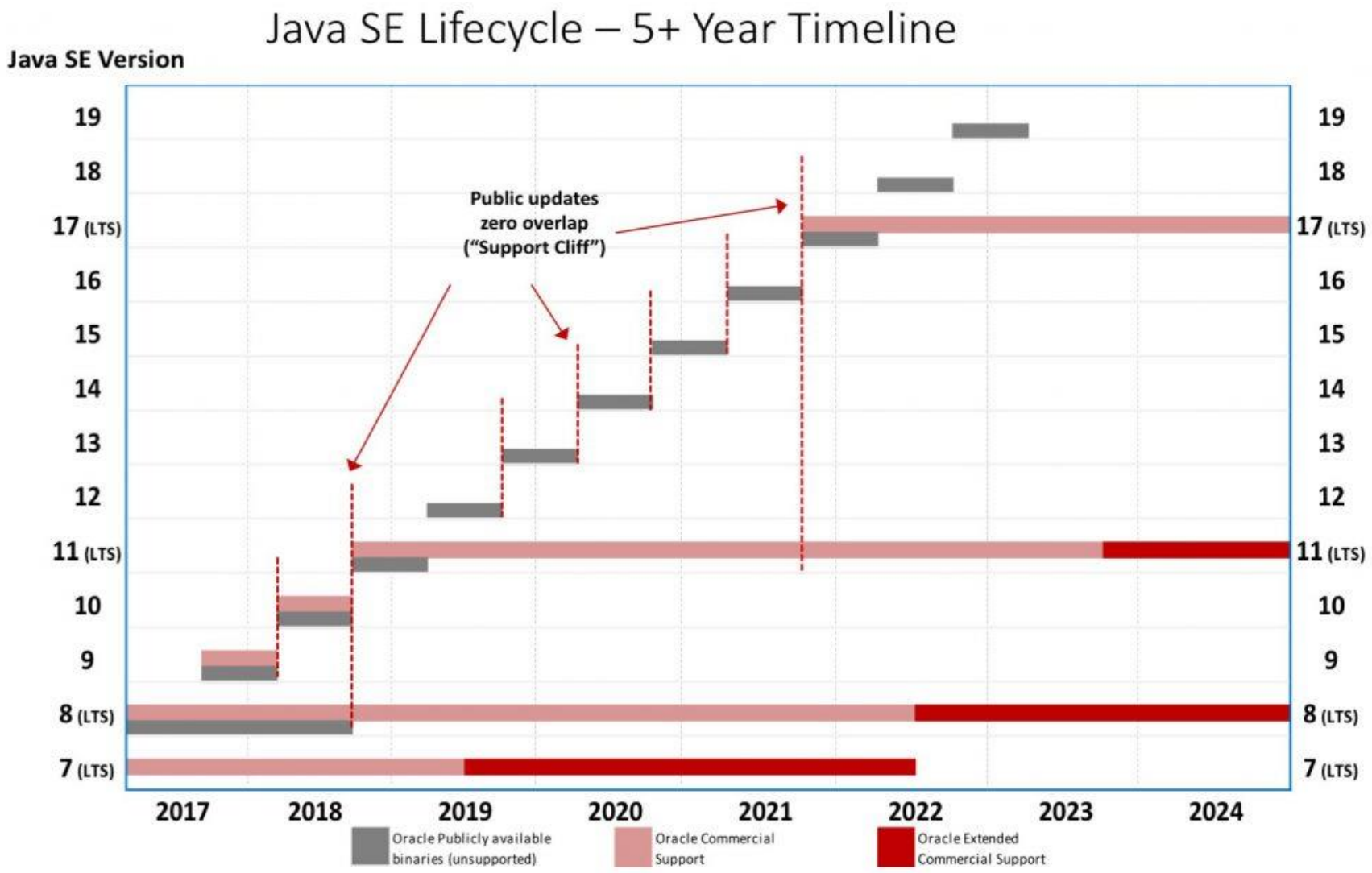
Summary

- Java Versions
- Private methods in interfaces *(Java 9)*
- Resources declared outside of the try-with-resources *(Java 9)*
- *var* type-reserved word *(Java 10)*
- Factory methods in collections *(Java 9)*
- JShell *(Java 9)*
- Jigsaw Project: Modules *(Java 9)*

Java versions



Private methods in interfaces

```
public interface A {

    void m1();

    default void m2() {
        System.out.println("Hello");
    }

    static void m3() {
        System.out.println(":)");
    }

    private void m4() {
        System.out.println(":o");
    }
}
```

Java 7 and before

Java 8

Java 9

Resources declared outside of the try-with-resources

```
try (FileInputStream fis = new FileInputStream( name: "./file.txt");
     BufferedInputStream bis = new BufferedInputStream(fis)) {

    //...
}
```

Starting from Java 7

```
FileInputStream fis =
        new FileInputStream( name: "./file.txt");

BufferedInputStream bis =
        new BufferedInputStream(fis);

try (fis; bis) {
    // ...
}
```

Starting from Java 9

var type-reserved word

```
Map<String, Map.Entry<Character, Integer>> map = new HashMap<>();
```

```
var map = new HashMap<>();
```

var naming rules

```
public class A {

    public static void main(String[] args) {
        var var = 3;
    }

    private void var() {
        //..
    }

    class var {
        //...
    }
}
```

var usage rules

```
public class A {

    var x;

    public static void main(var[] args) {
        var y = 3;

        var z;

        var a = 0, b = 0;

        var c = "Hello";
        c = 3.14;

        Predicate<Integer> pred = (var x) -> x % 2 == 0;
    }
}
```

Factory methods in collections

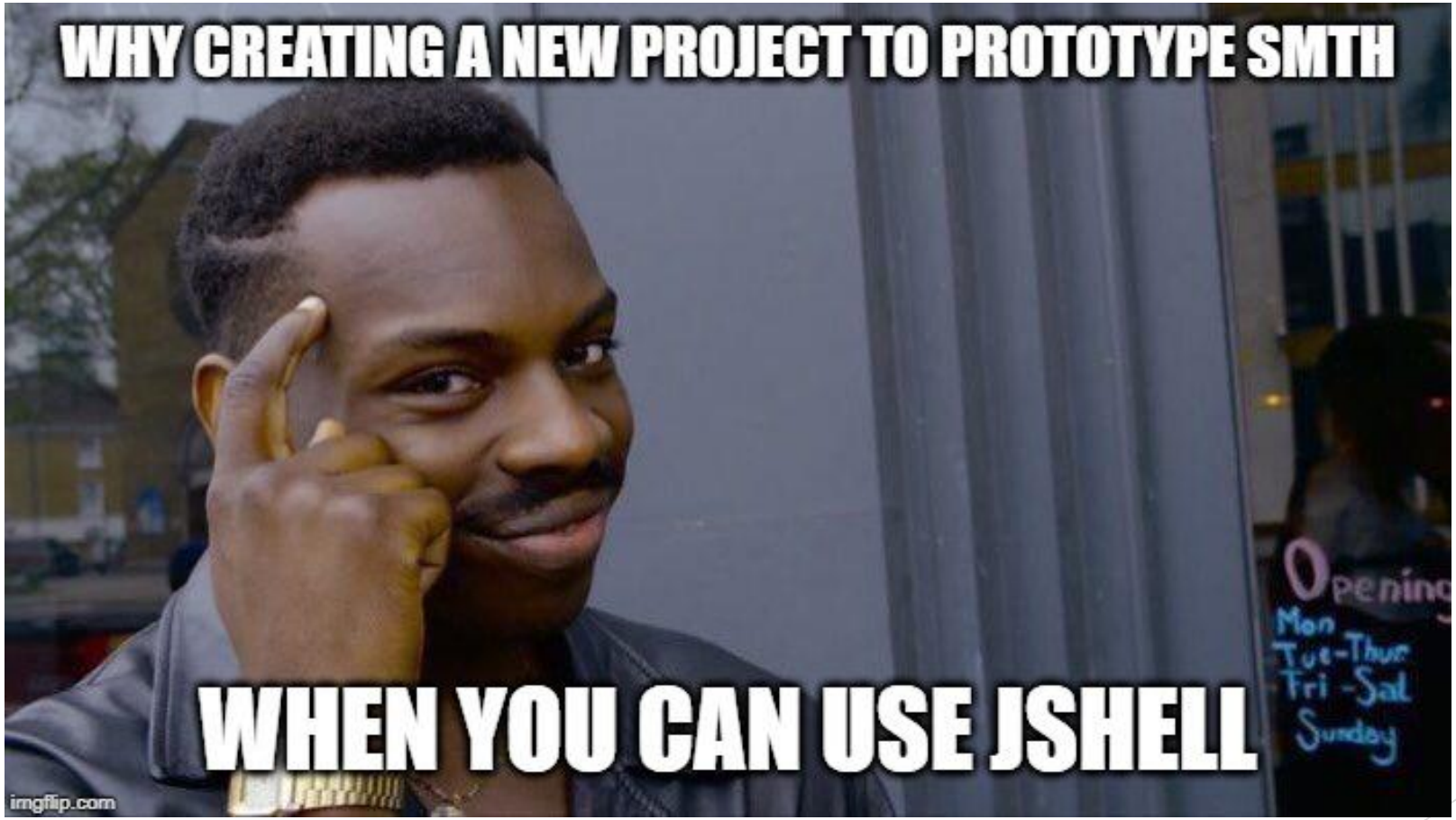
```
Set<Integer> set = new HashSet<>();

set.add(3); set.add(0); set.add(9);
```

```
Set<Integer> set = new HashSet<>(
        Arrays.asList(3, 0, 9)
);
```

```
Set<Integer> set = Set.of(3, 0, 9);
```

JShell

- a REPL *(Read Evaluate Print Loop)* shell used for testing Java features



JShell

```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.17763.973]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Dell>cd C:\Program Files\Java\jdk-13.0.2\bin

C:\Program Files\Java\jdk-13.0.2\bin>jshell
```

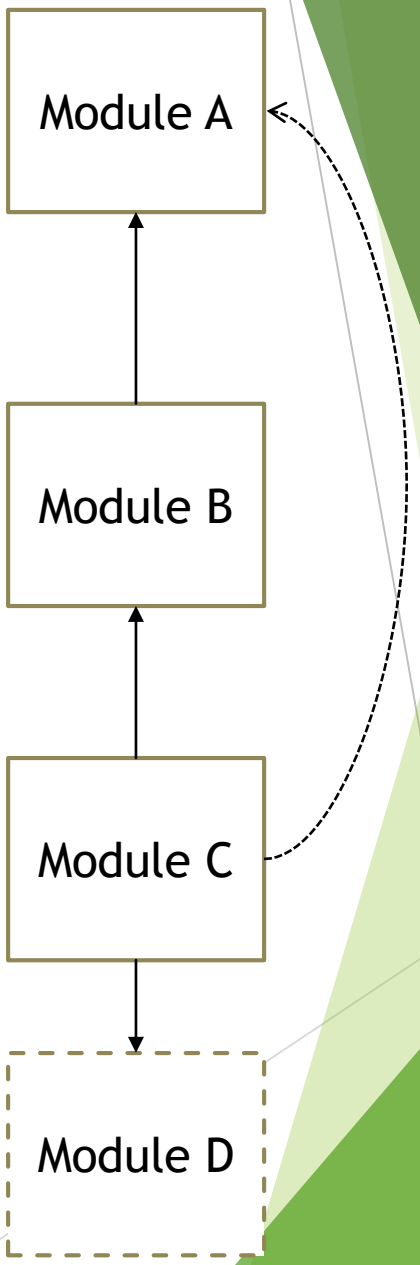
```
C:\Program Files\Java\jdk-13.0.2\bin>jshell
|  Welcome to JShell -- Version 13.0.2
|  For an introduction type: /help intro

jshell> System.out.println("Hello JShell")
Hello JShell

jshell>
```

- */vars* : see variables declared in the current session
- */list* : get the history of executed statements
- */<index>* : execute again the statement indexed by the given *<index>*
- */methods* : see methods defined in current session
- */reset* : erase the data from the current session
- */exit*

Jigsaw Project: Modules

- Module: set of encapsulated java packages and resources, configured by the *module-info.java* file
- Advantages
  - project modularization
  - strong encapsulation: using modules, we can expose only the functionalities that we want to be exposed. Any other unexposed functionality will not be accessible outside the module, not even with *reflection*.
  - JDK fragmentation: we can include in our project build only the modules that we need from JDK. This functionality is achieved using JLink.
  - Dependencies checking at runtime

```
module A {
    exports service; // exposing all the public structures
                     // (classes, interfaces, etc.) from the
                     // "service" package from module "A"

    requires java.base; // base java module, required by default
                        // (like java.lang package)

}

module B {
    requires transitive A; // declares a dependency on module "A".
                           // "transitive" means that all the modules
                           // that will depend on "B", will also depend
                           // on "A" from now on
}

module C {
    requires B; // implicitly, "C" is requiring "A"
                // because "B" requires "A" in a
                // transitive manner

    requires static D; // "static" means that the dependency
                       // on "D" is optional, so the application
                       // will start even if "D" doesn't exist
}
```



Service Loader with modules

- Used to get all the implementations available for a given interface, without knowing the implementing class and without requiring the module that exposes the implementation

Suppose we have the following:

A service interface inside *"service"* package, in module "*A*"

```
public interface HelloService {

    String sayHello(String name);
}
```

The *"EnglishHelloService"* inside module *"B"*

```
public class EnglishHelloService implements HelloService {
    @Override
    public String sayHello(String name) {
        return "Hello, " + name + "!";
    }
}
```

The *"RomanianHelloService"* inside module *"C"*

```
public class RomaniaHelloService implements HelloService {
    @Override
    public String sayHello(String name) {
        return "Buna, " + name + "!";
    }
}
```

```
module A {
    exports service; // exposing the "service" package, where
                     // the "HelloService" interface resides

    uses HelloService; // this statement is telling to the compiler
                       // that module "A" is looking for implementations
                       // of "HelloService" interface
}

module B {
    requires A; // used to have access to the "HelloService"
                // interface, which is inside module "A"

    // exposing an implementation of "HelloService" interface
    provides HelloService with b.service.impl.EnglishHelloService;

}

module C {
    requires A; // used to have access to the "HelloService"
                // interface, which is inside module "A"

    // exposing an implementation of "HelloService" interface
    provides HelloService with c.service.impl.RomaniaHelloService;
}
```

- Now we can obtain the required implementations of the *"HelloService"* interface using the *"ServiceLoader"* class

```
public static void main(String[] args) {
    ServiceLoader<HelloService> services =
            ServiceLoader.load(HelloService.class);

    services.stream() Stream<ServiceLoader<S>.Provider<HelloService>>
            .map(ServiceLoader.Provider::get) Stream<HelloService>
            .map(helloService -> helloService.sayHello( name: "Alex")) Stream<String>
            .forEach(System.out::println);
}
```

- After executing the main method above, the output will consist in the corresponding "*hello*" messages from the existing implementations of *"HelloService"*: *"EnglishHelloService"* and *"RomanianHelloService"*

```
Main (1)
"C:\Program Files\Java\jdk-13.0.2\bin\java.exe"
Hello, Alex!
Buna, Alex!

Process finished with exit code 0
```