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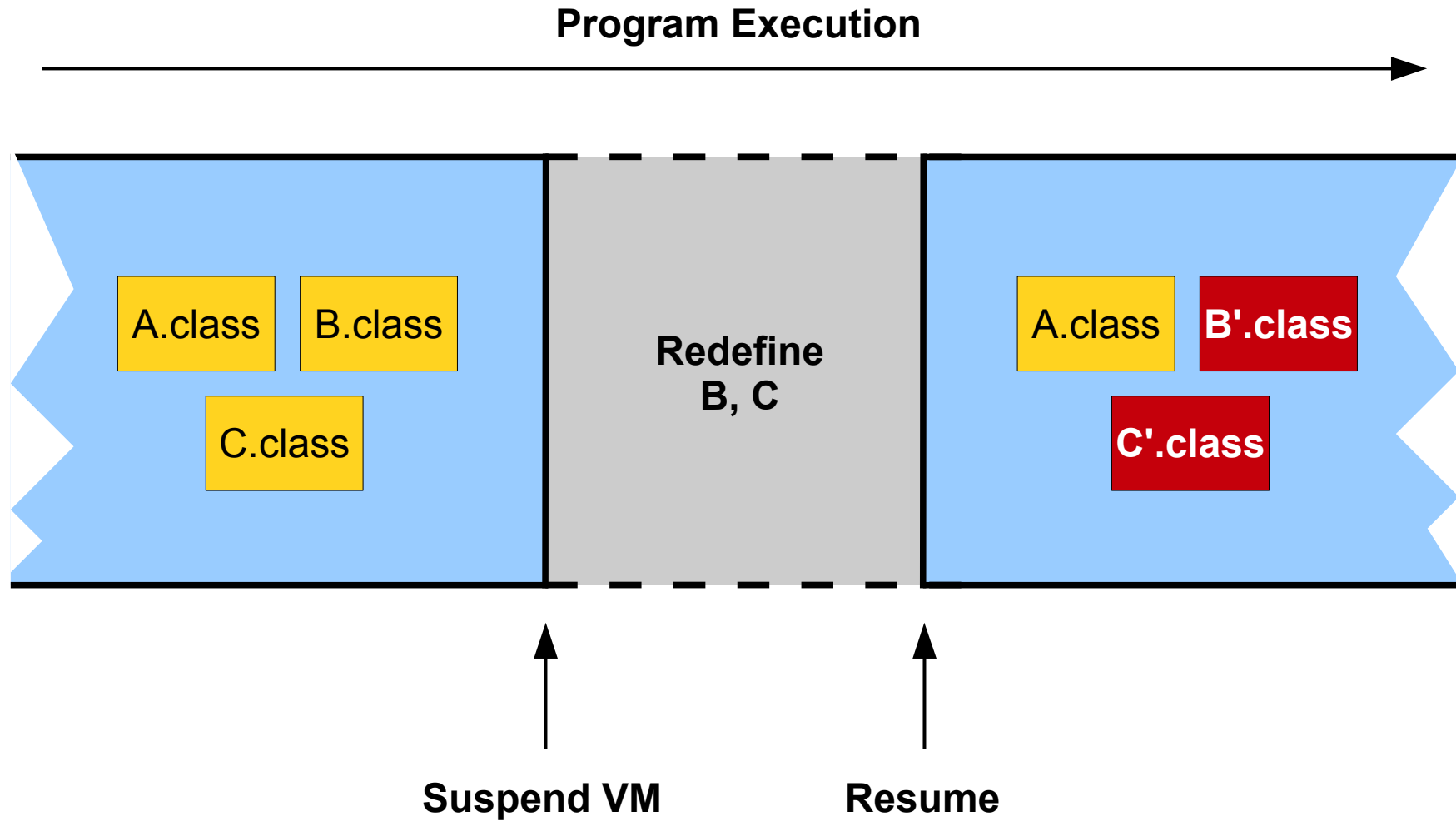
Dynamic Code Evolution

for the

Java HotSpot™ Virtual Machine

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10/12/09

Class Evolution



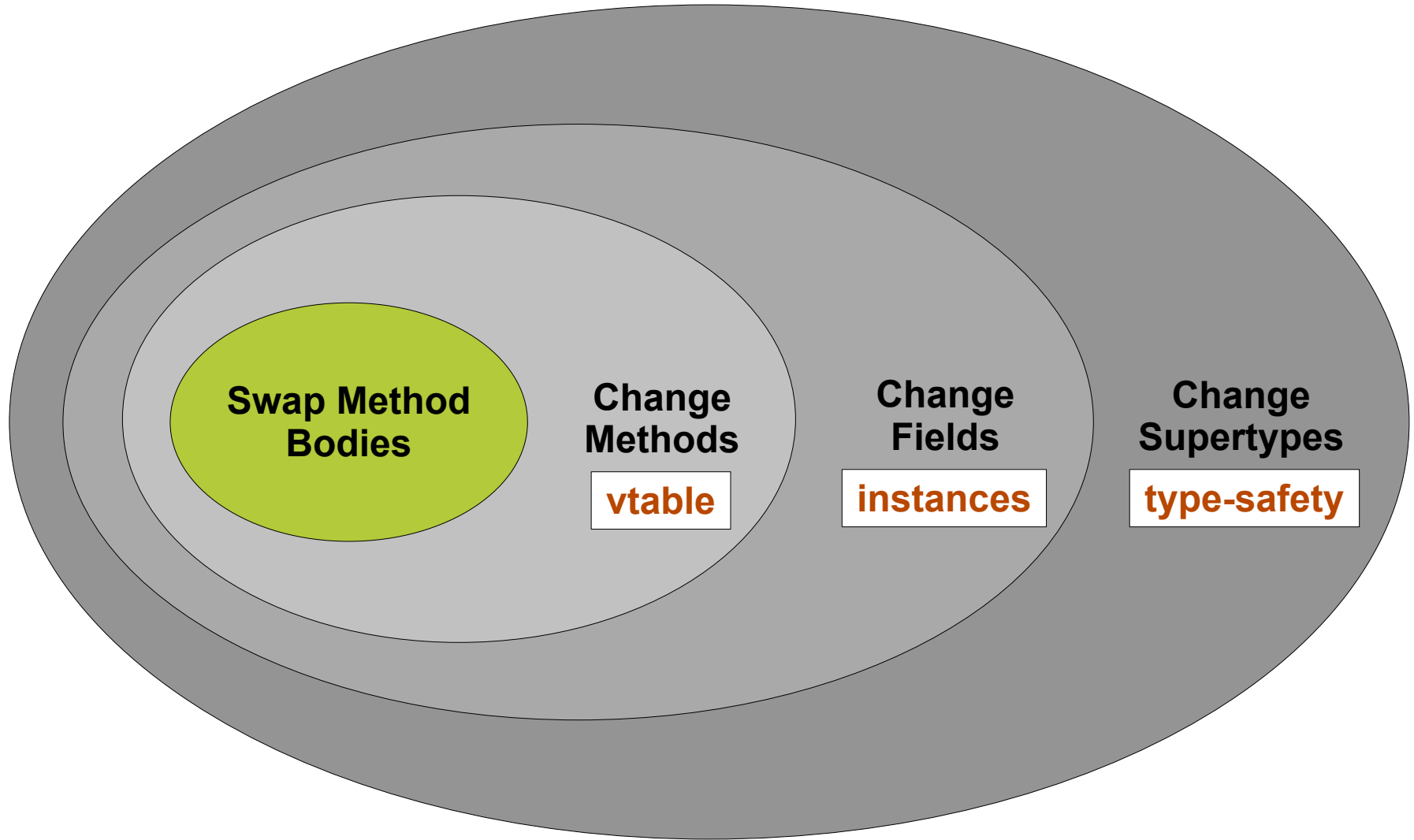
Applications

Debugging

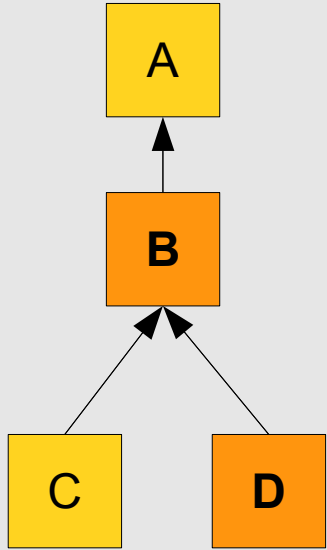
Long-Living Server Applications

Scripting Languages

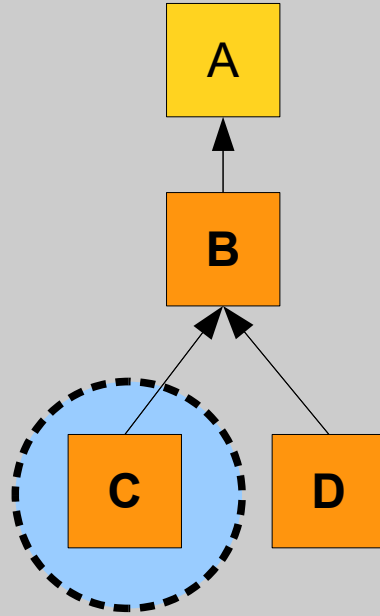
Levels



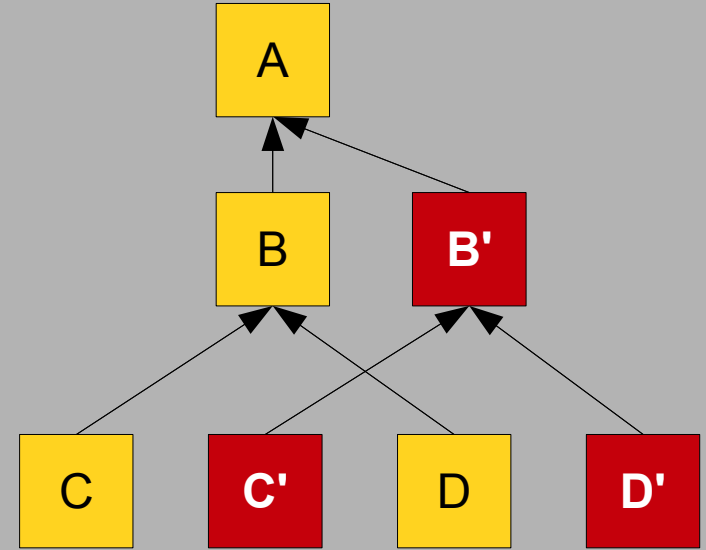
Redefine B, D



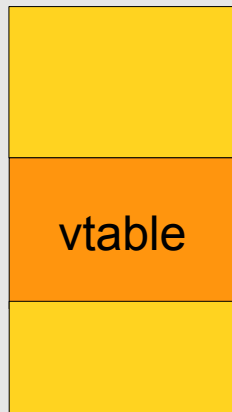
Find Affected Classes



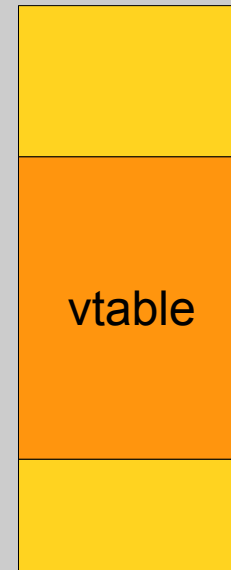
Build Side Universe



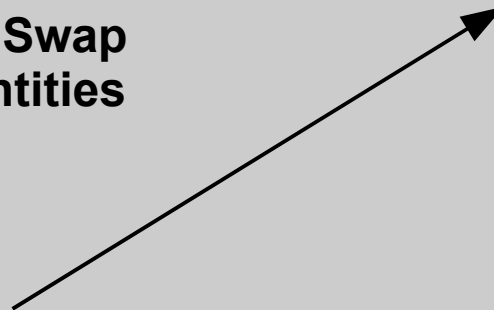
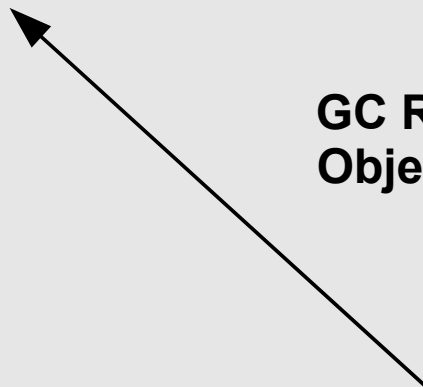
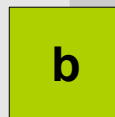
Old Class B



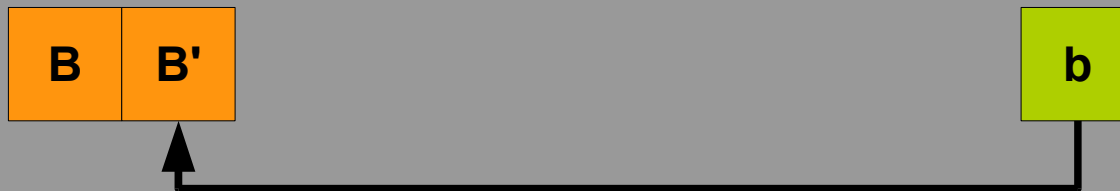
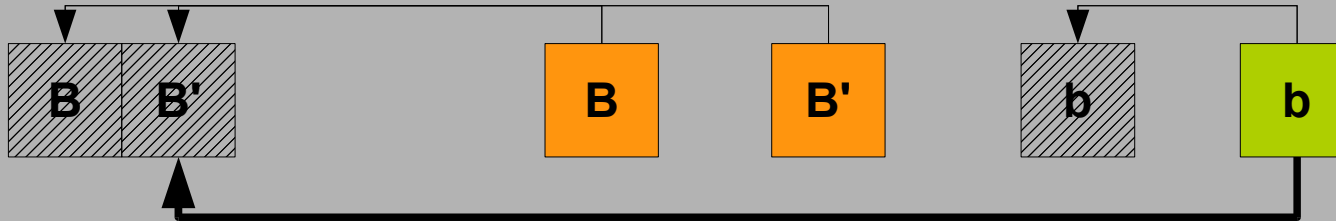
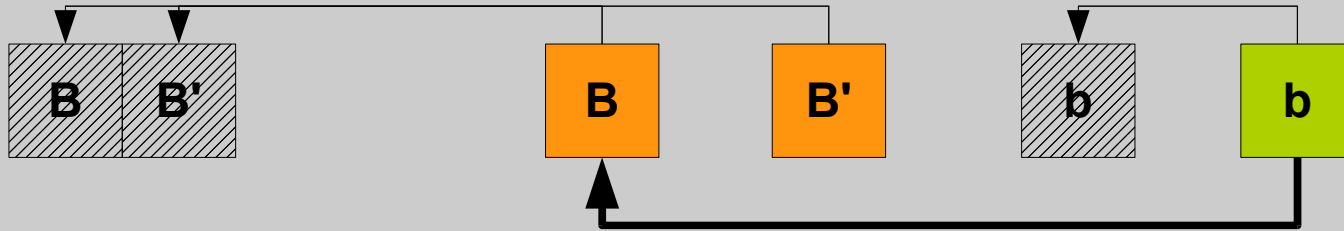
New Class B'



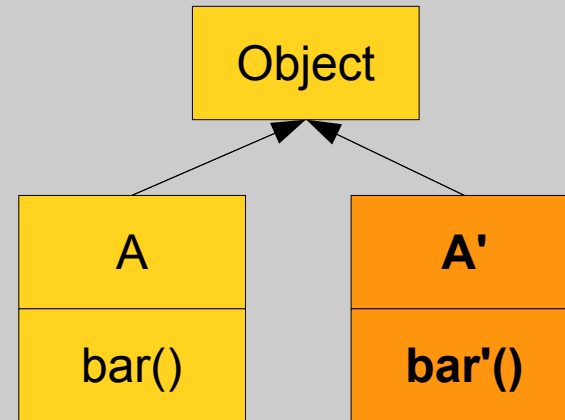
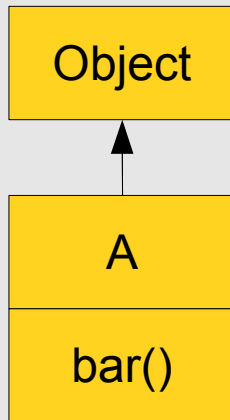
GC Run to Swap
Object Identities



Swap (B, B')



Changing Active Method



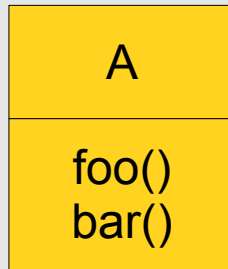
```
void foo() {  
    // <= REDEFINE  
    a.bar();  
    ...  
}
```

Deoptimization

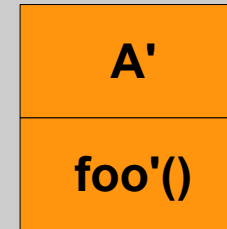
Update Constant
Pool Cache

```
void foo() {  
    // <= RESUME  
    a.bar'();  
    ...  
}
```


Removing a Method



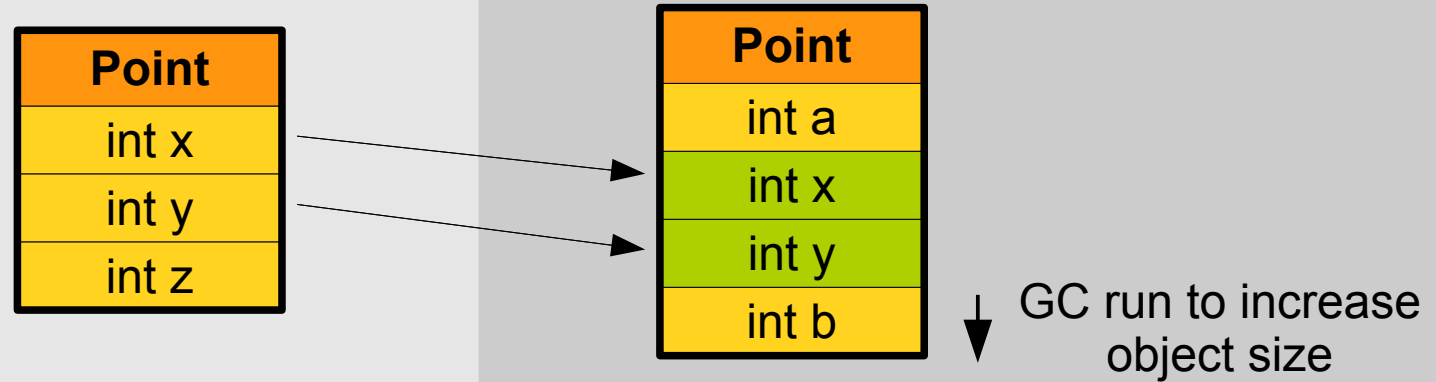
```
int foo() {  
    // <= REDEFINE  
    return bar();  
}
```



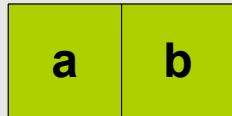
```
int foo'() {  
    return 5;  
}
```

**throws NoSuchMethodException
in foo()**

Instance Updates



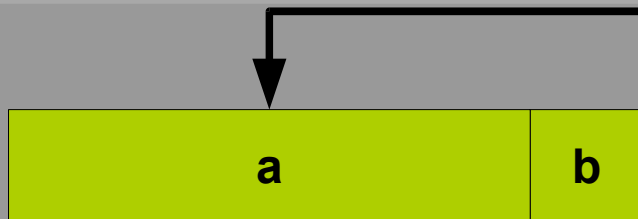
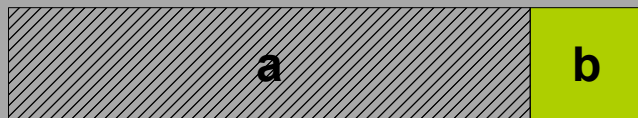
Future Plans: Connect with the NetBeans refactoring facilities



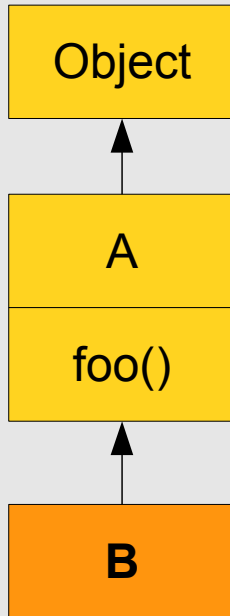
GC with increased object size



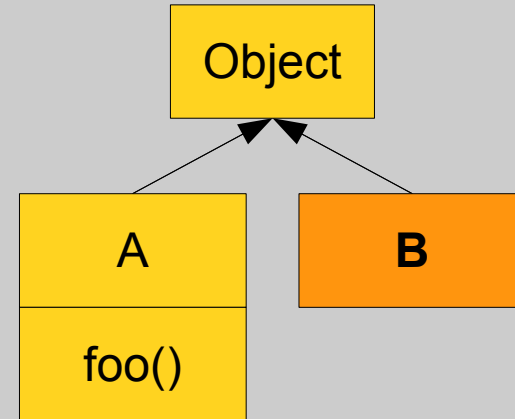
Side Buffer:



Supertype Change Problem



A a = new B();



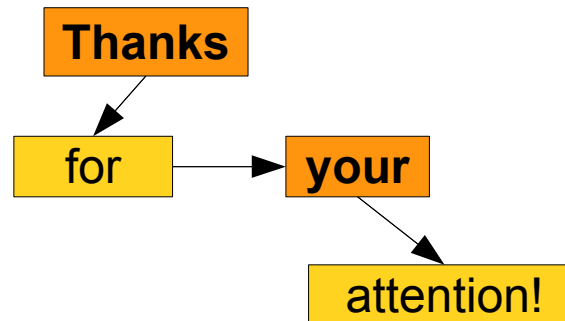
a.foo(); // ?!

Patch + detailed technical documentation available at

<http://wikis.sun.com/display/mlvm/HotSwap>

Feel free to post any questions to

mlvm-dev@openjdk.java.net or wuerthinger@ssw.jku.at



Q & A