

The Modular Java Platform & Project Jigsaw

Mark Reinhold (@mreinhold)
Chief Architect, Java Platform Group
Oracle

2014/2/4

MAKE THE
FUTURE
JAVA

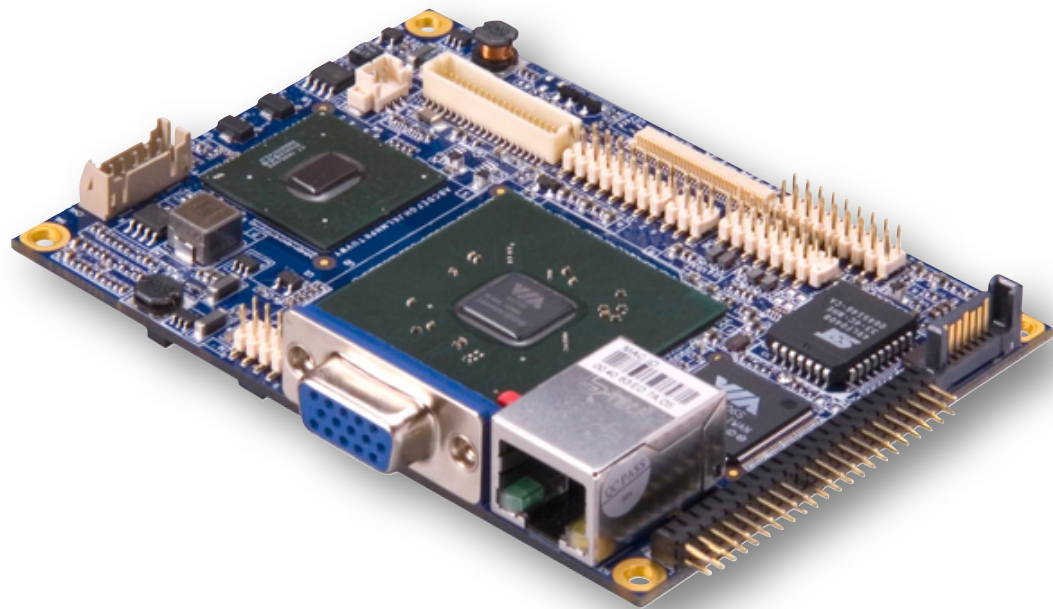
ORACLE®



Scalability

Performance

Security

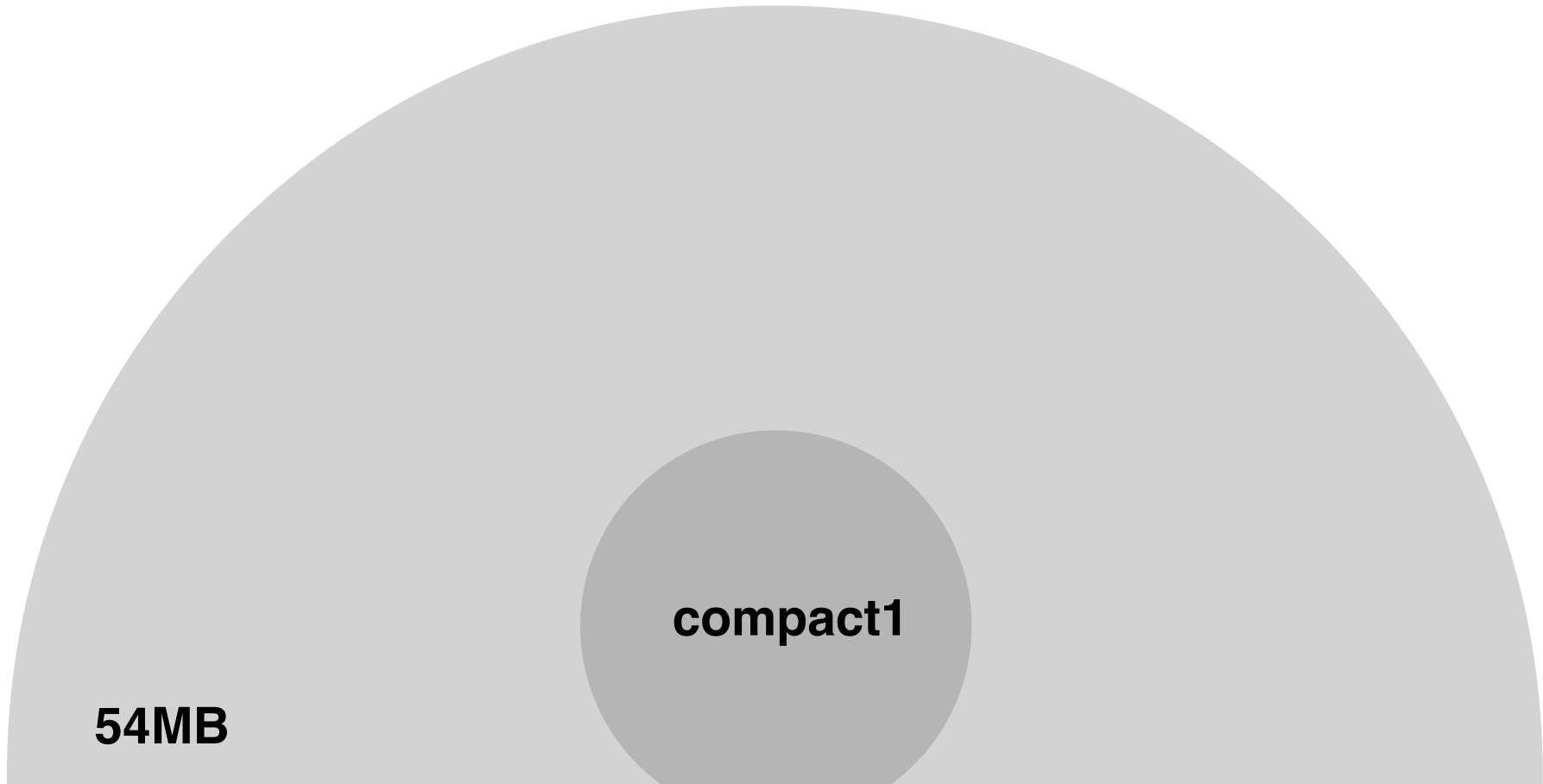






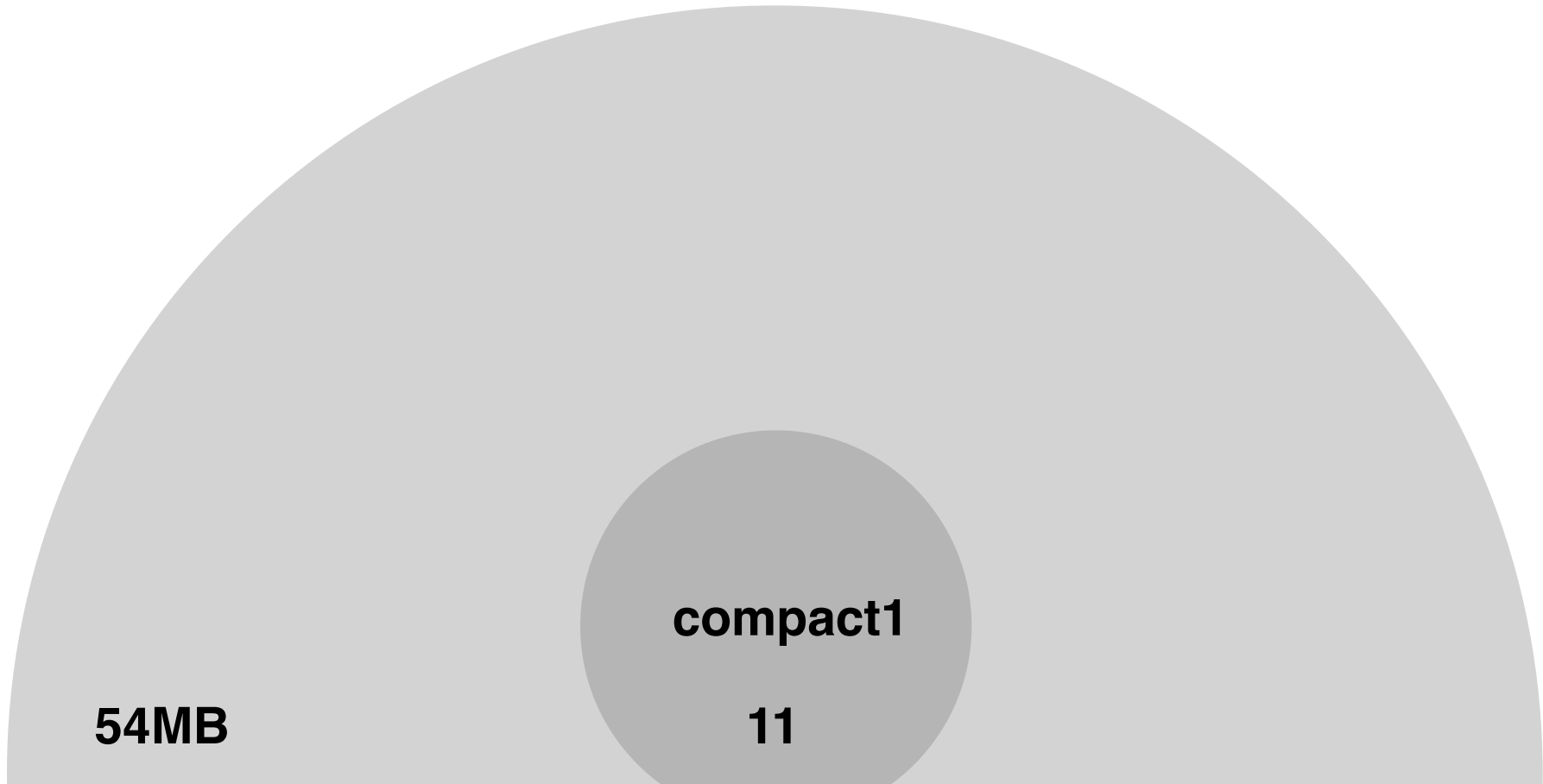


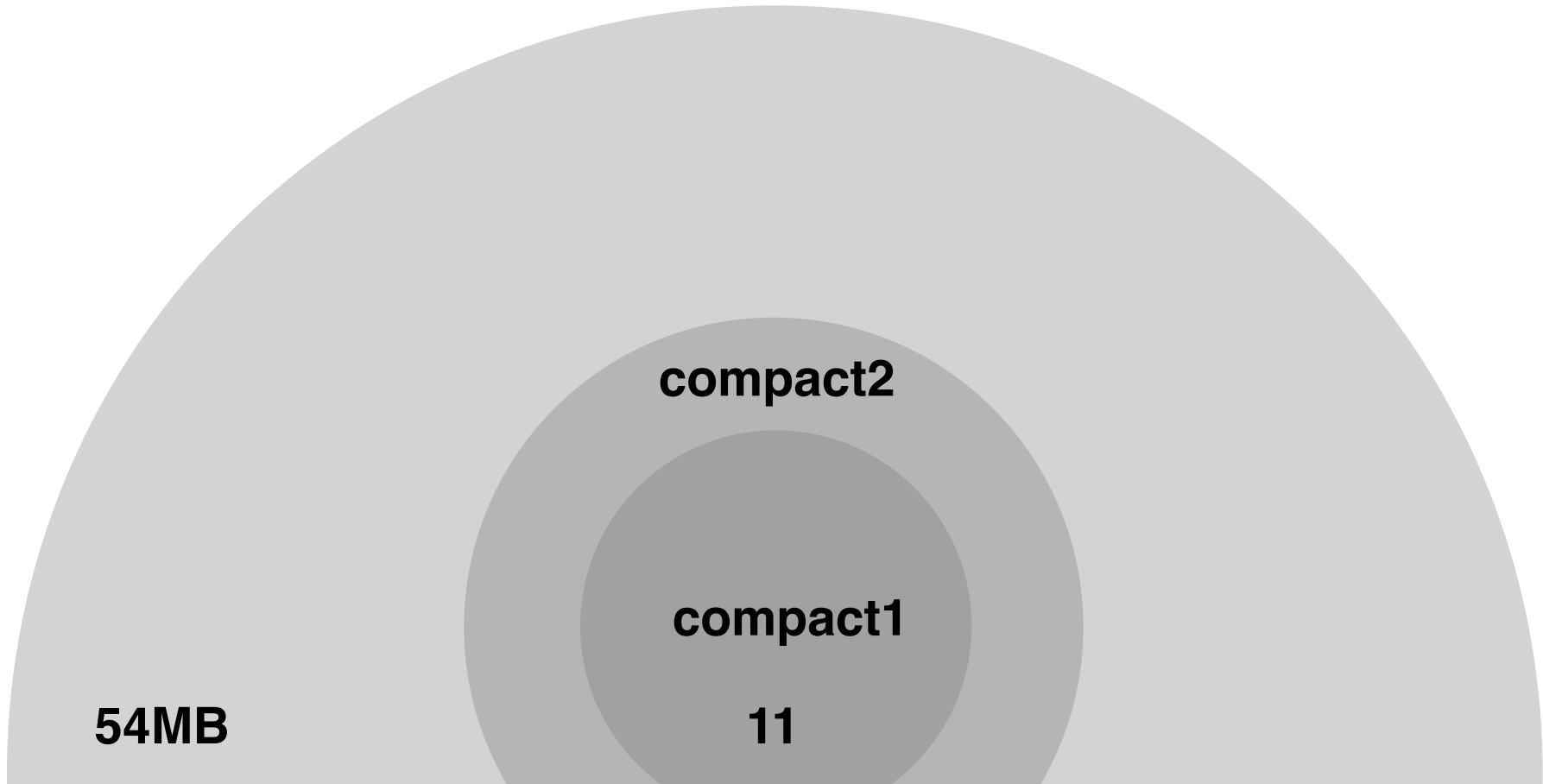
54MB



54MB

compact1



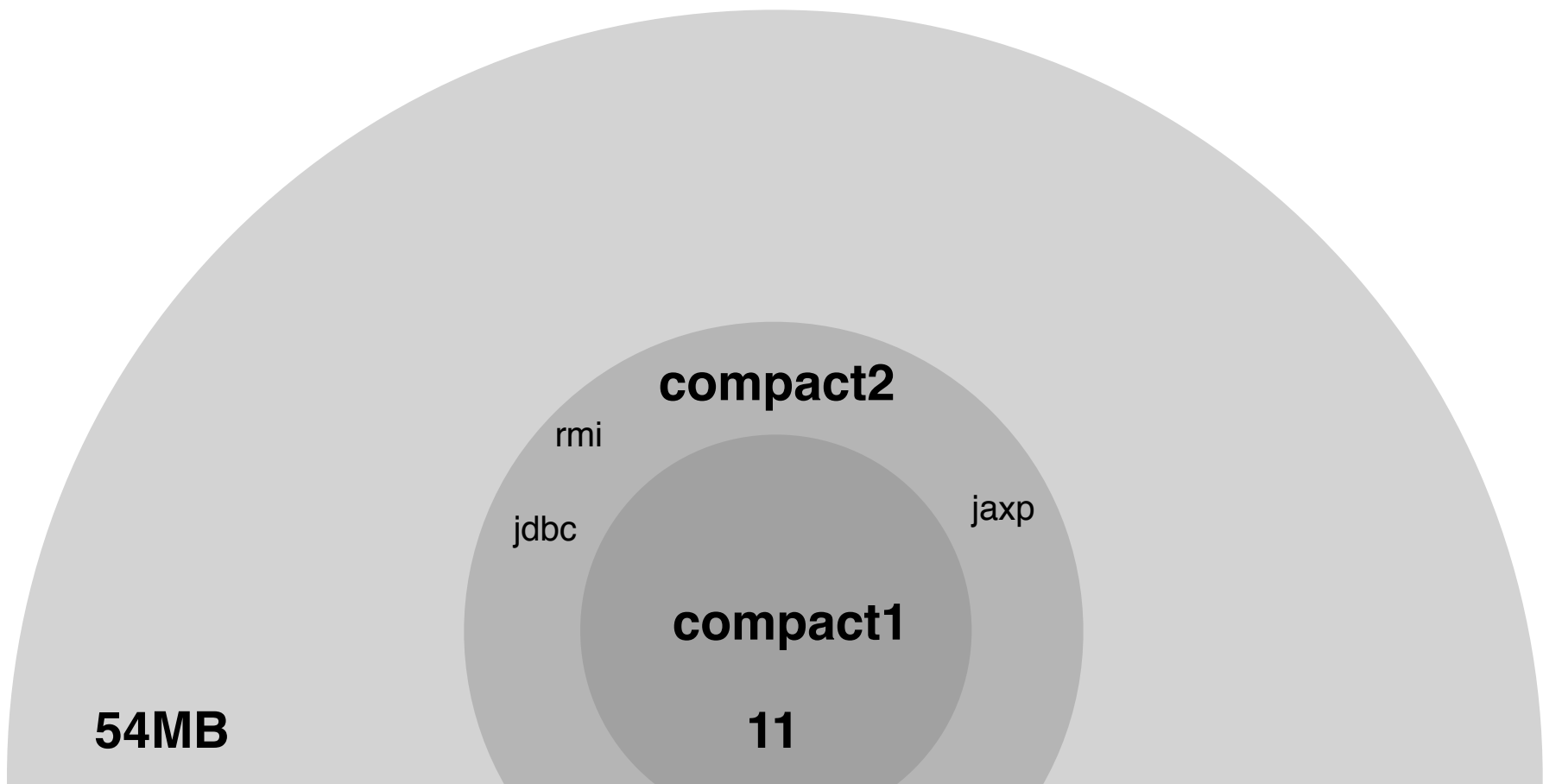


54MB

compact2

compact1

11



54MB

compact2

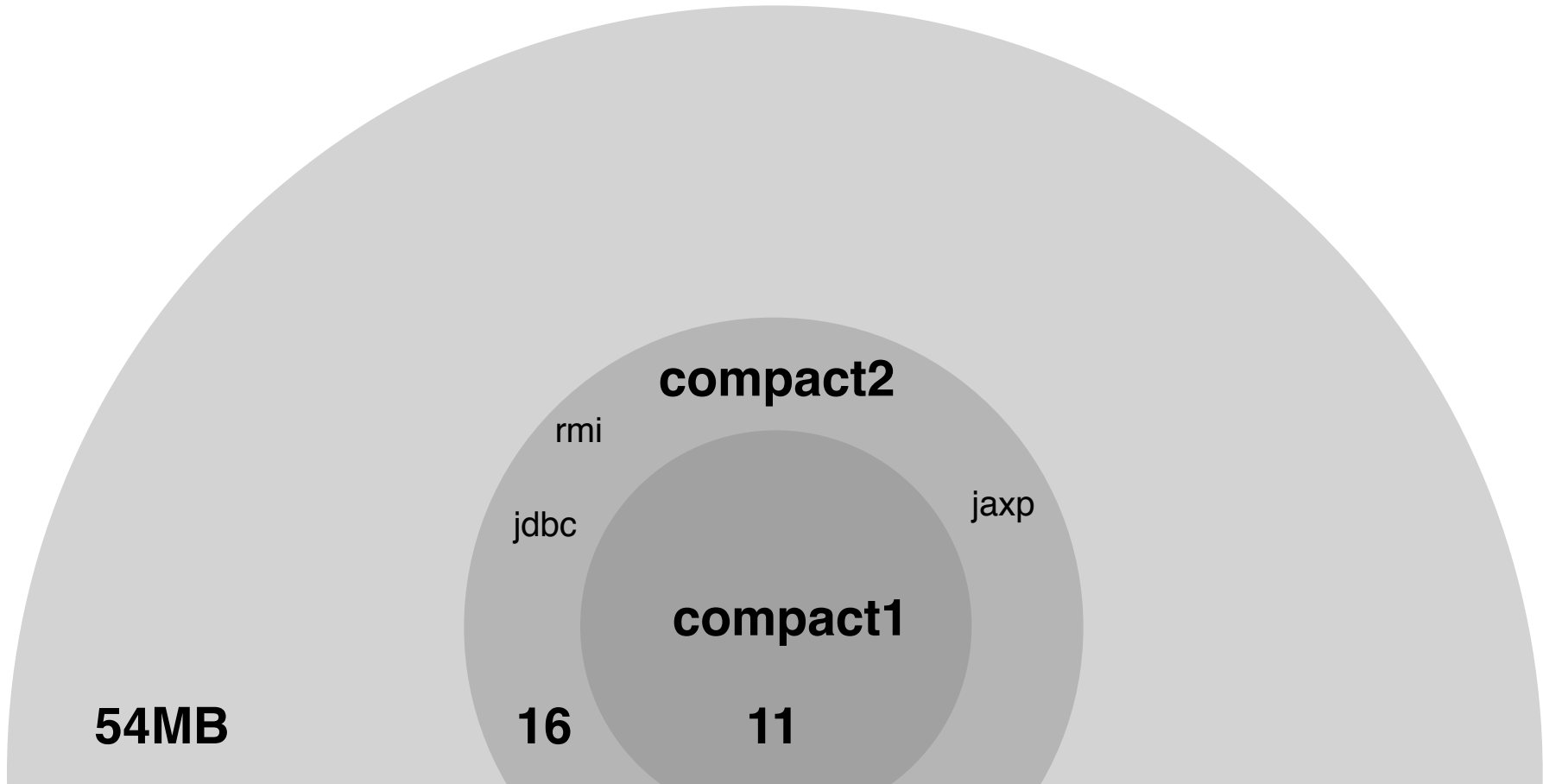
rmi

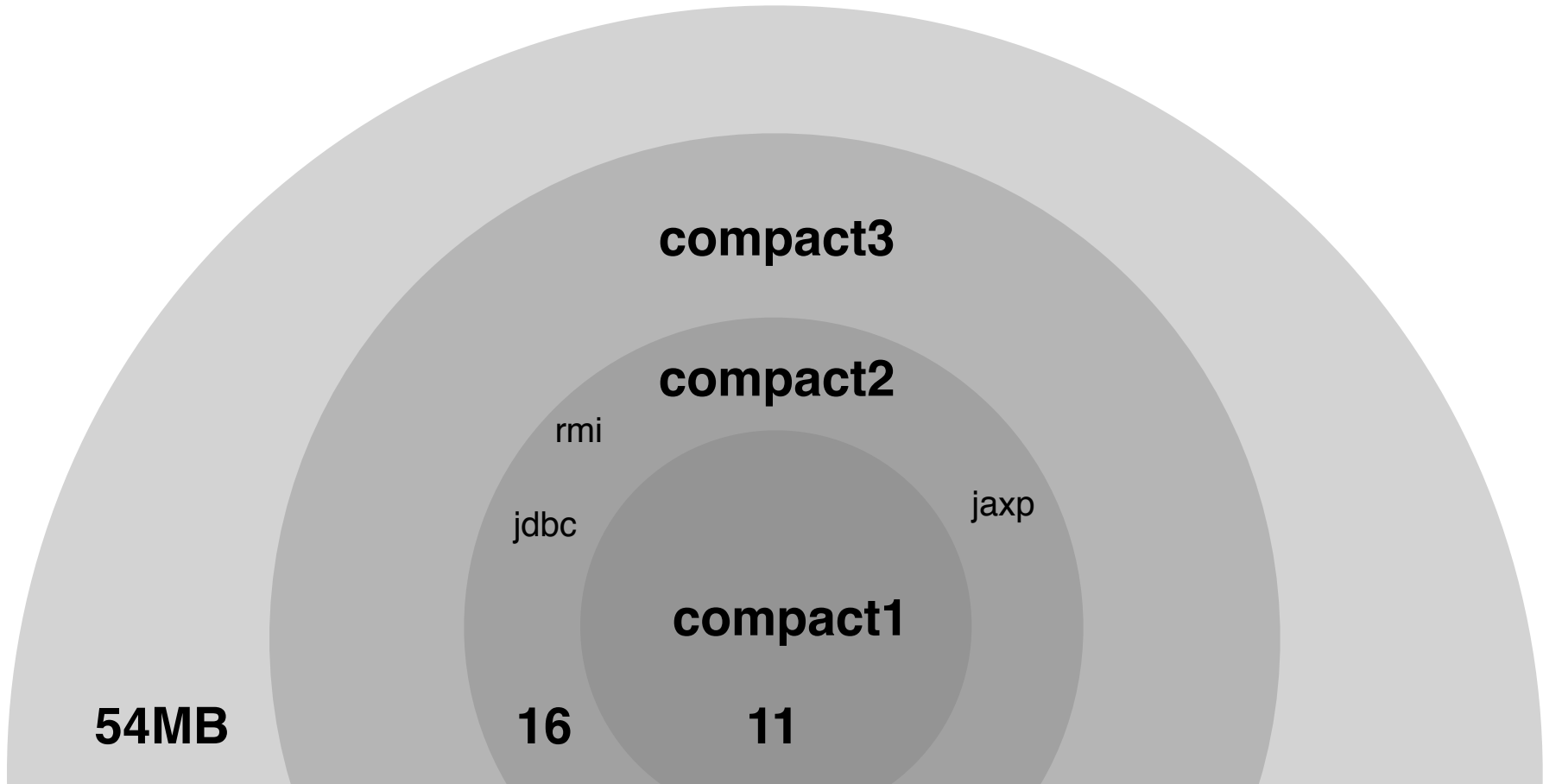
jdbc

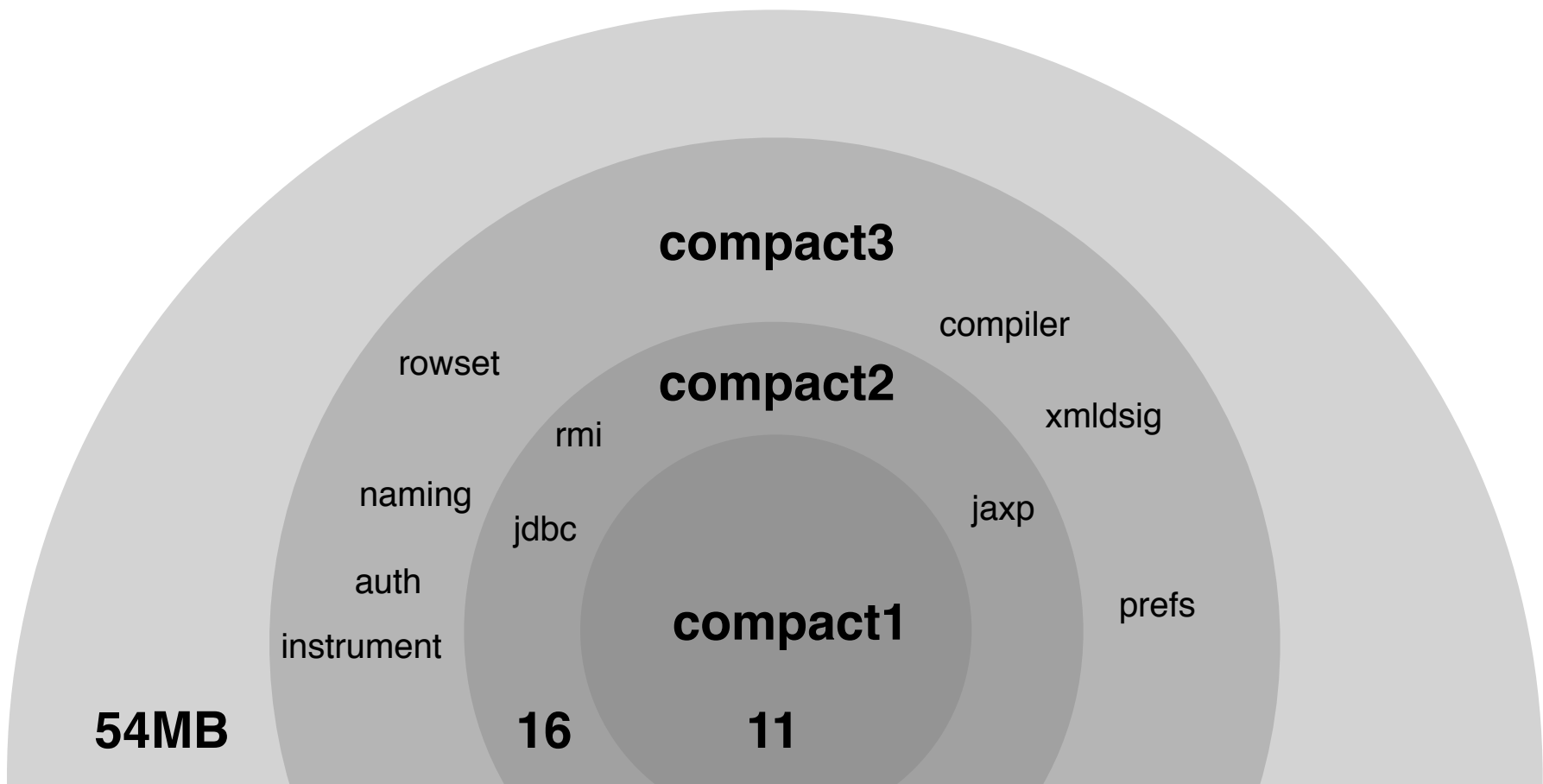
jaxp

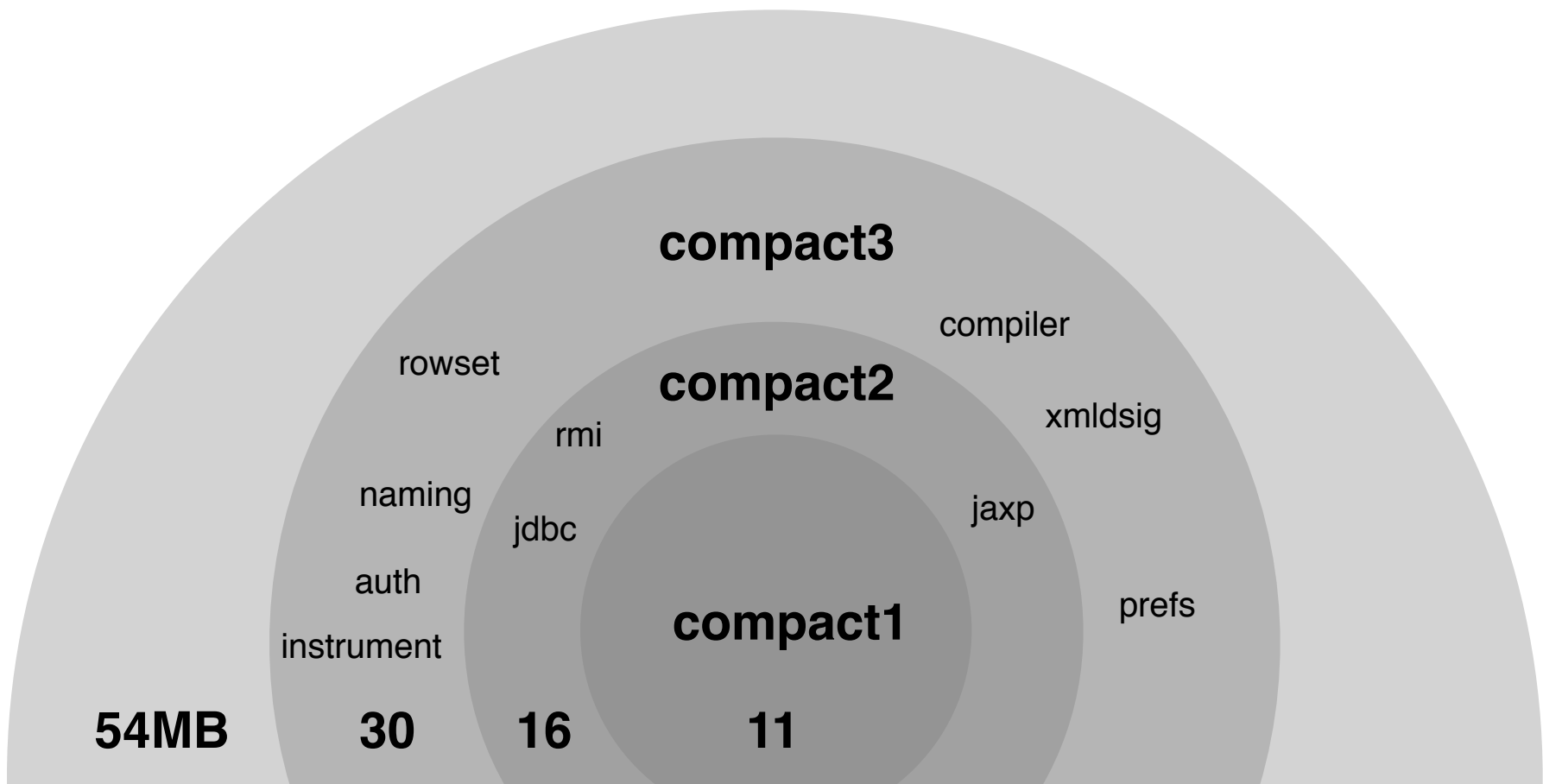
compact1

11









54MB

30

16

11

compact3

compact2

compact1

rowset

compiler

rmi

xmldsig

naming

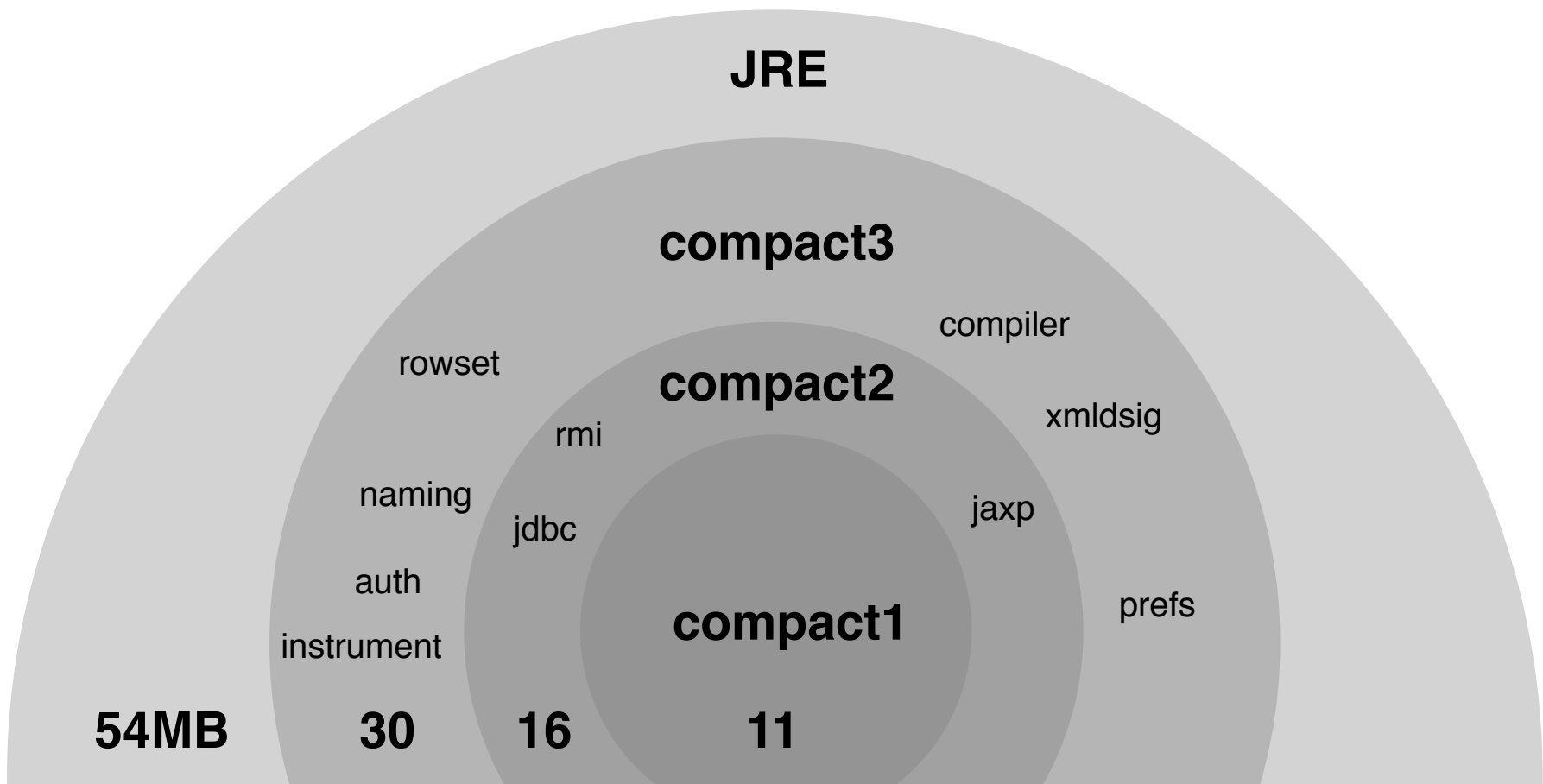
jaxp

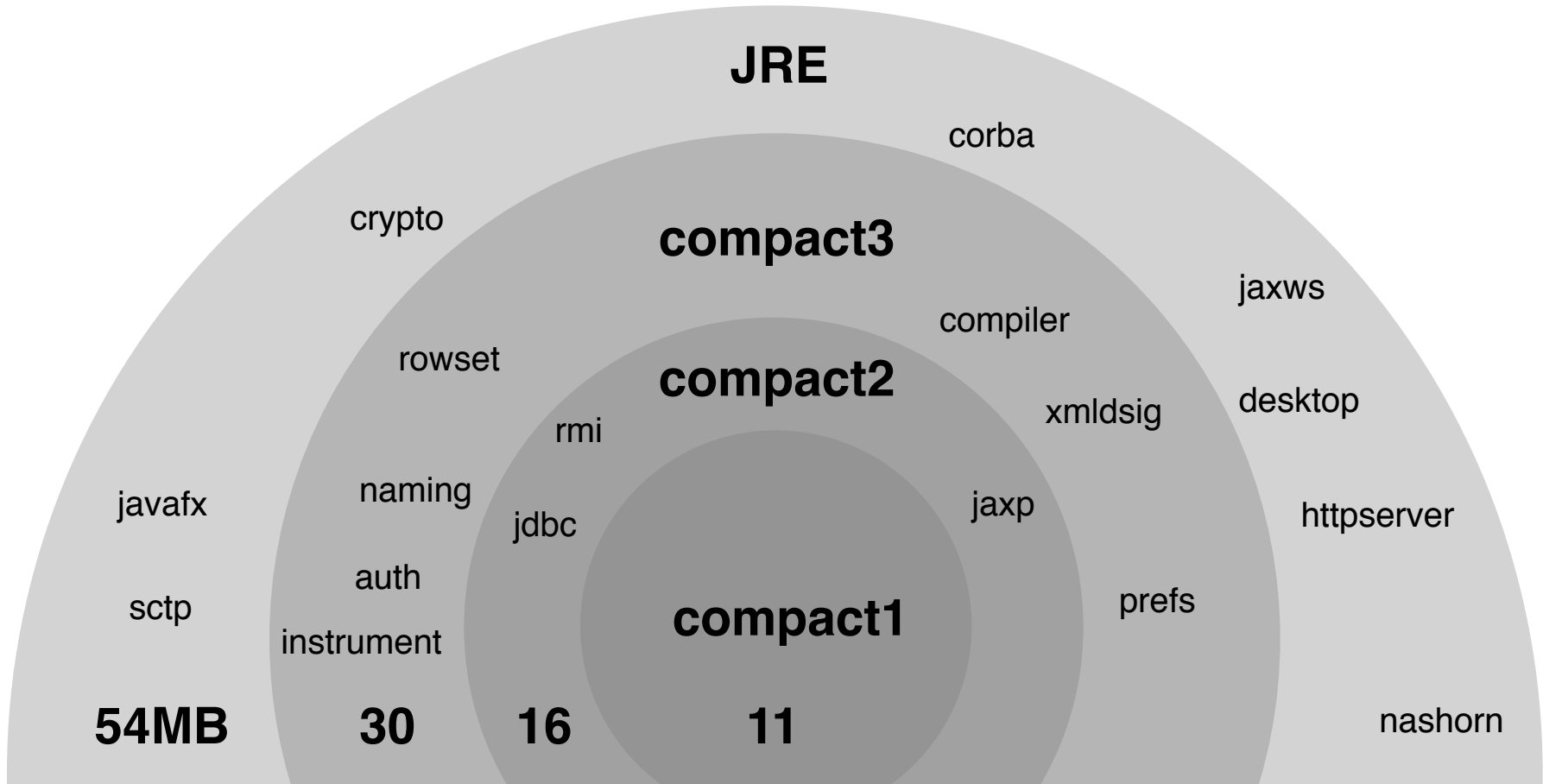
jdbc

auth

prefs

instrument





JRE

corba

compact3

crypto

jaxws

compiler

rowset

compact2

xmlldsig

desktop

rmi

javafx

naming

jaxp

httpserver

jdbc

sctp

auth

prefs

instrument

compact1

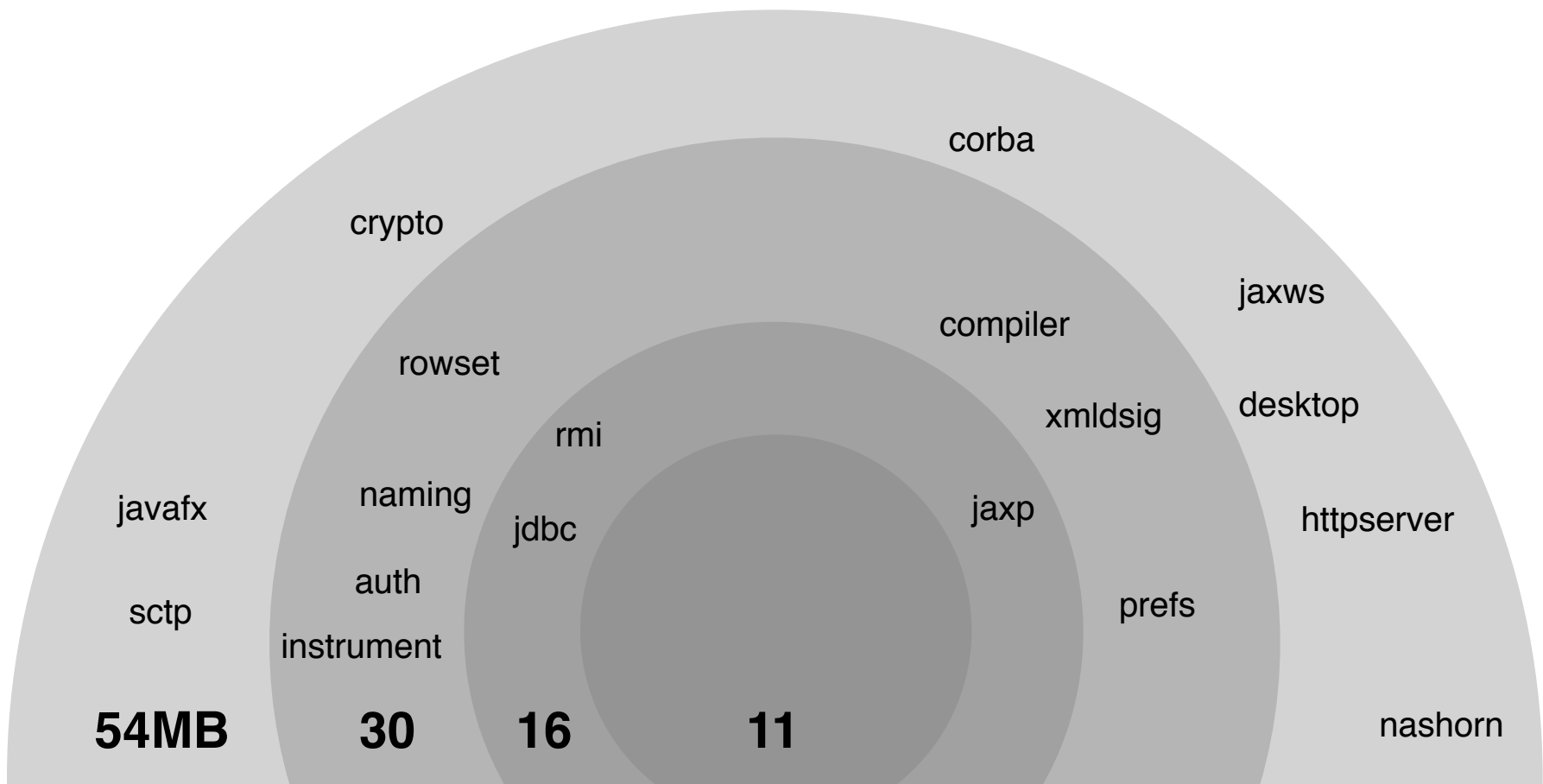
nashorn

54MB

30

16

11



54MB

30

16

11

corba

crypto

jaxws

rowset

compiler

desktop

rmi

xmldsig

javafx

naming

jaxp

httpserver

jdbc

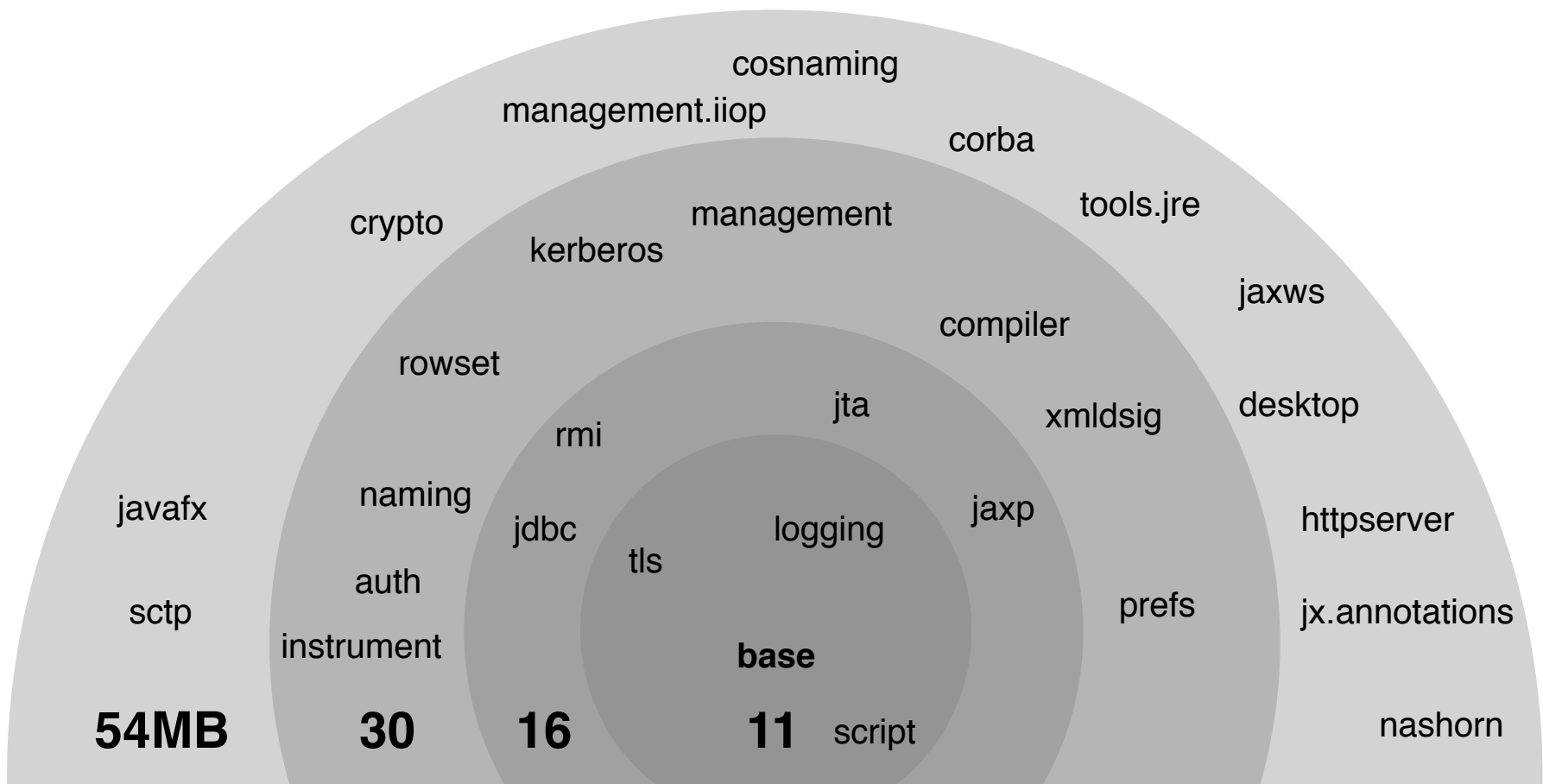
auth

prefs

sctp

instrument

nashorn



54MB

30

16

11

script

nashorn

base

tls

logging

jaxp

jdbc

rmi

jta

xmlsig

desktop

rowset

compiler

jaxws

kerberos

management

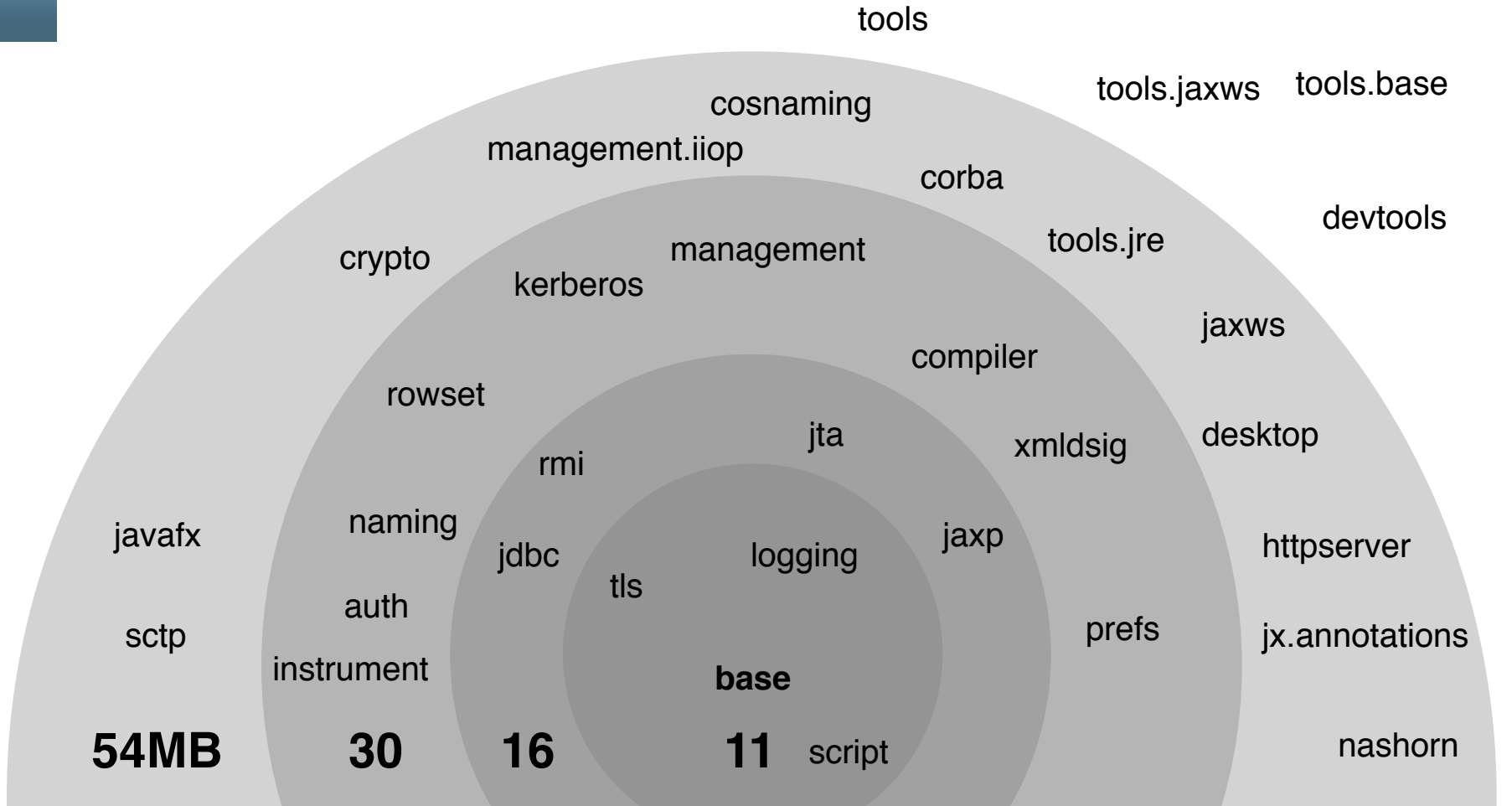
tools.jre

crypto

management.iiop

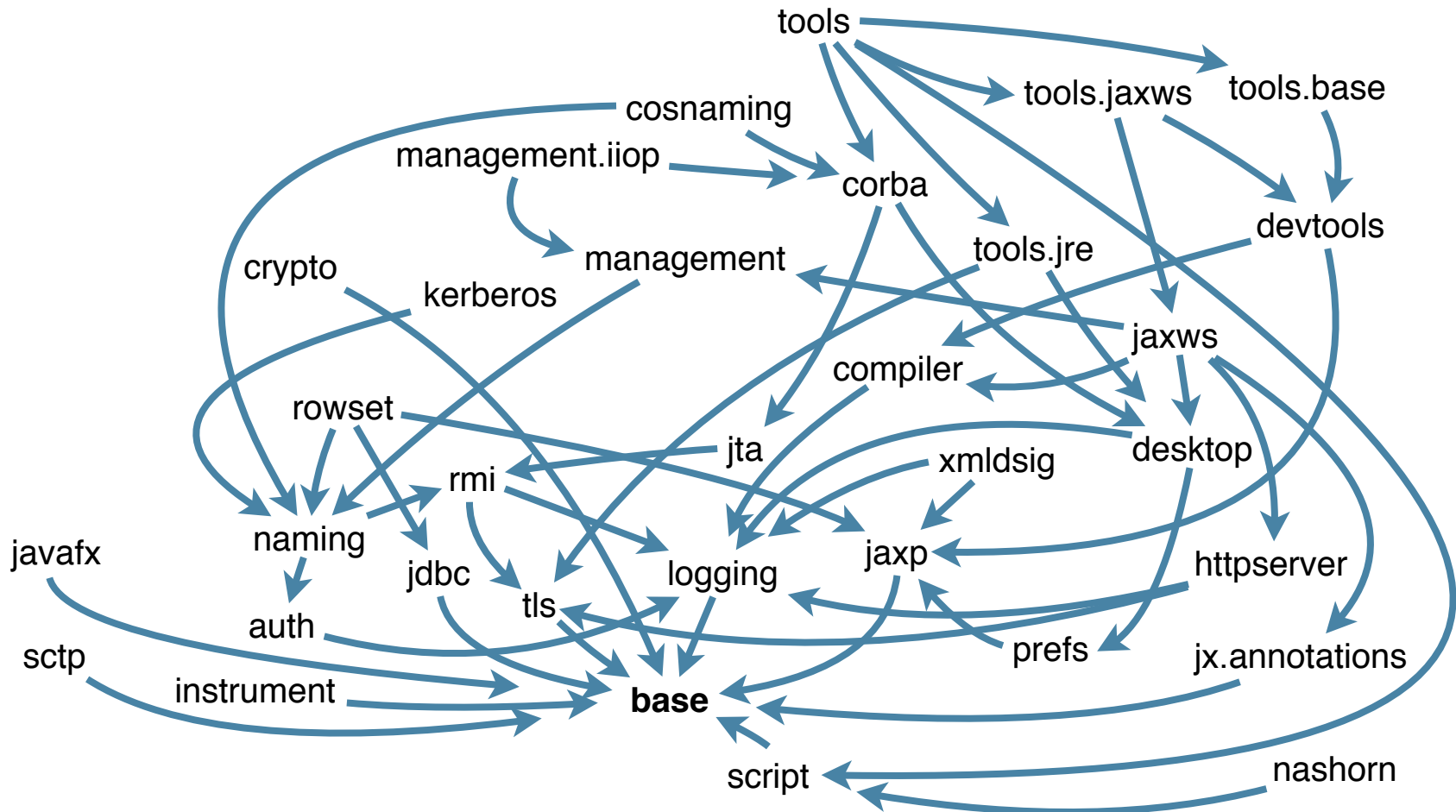
corba

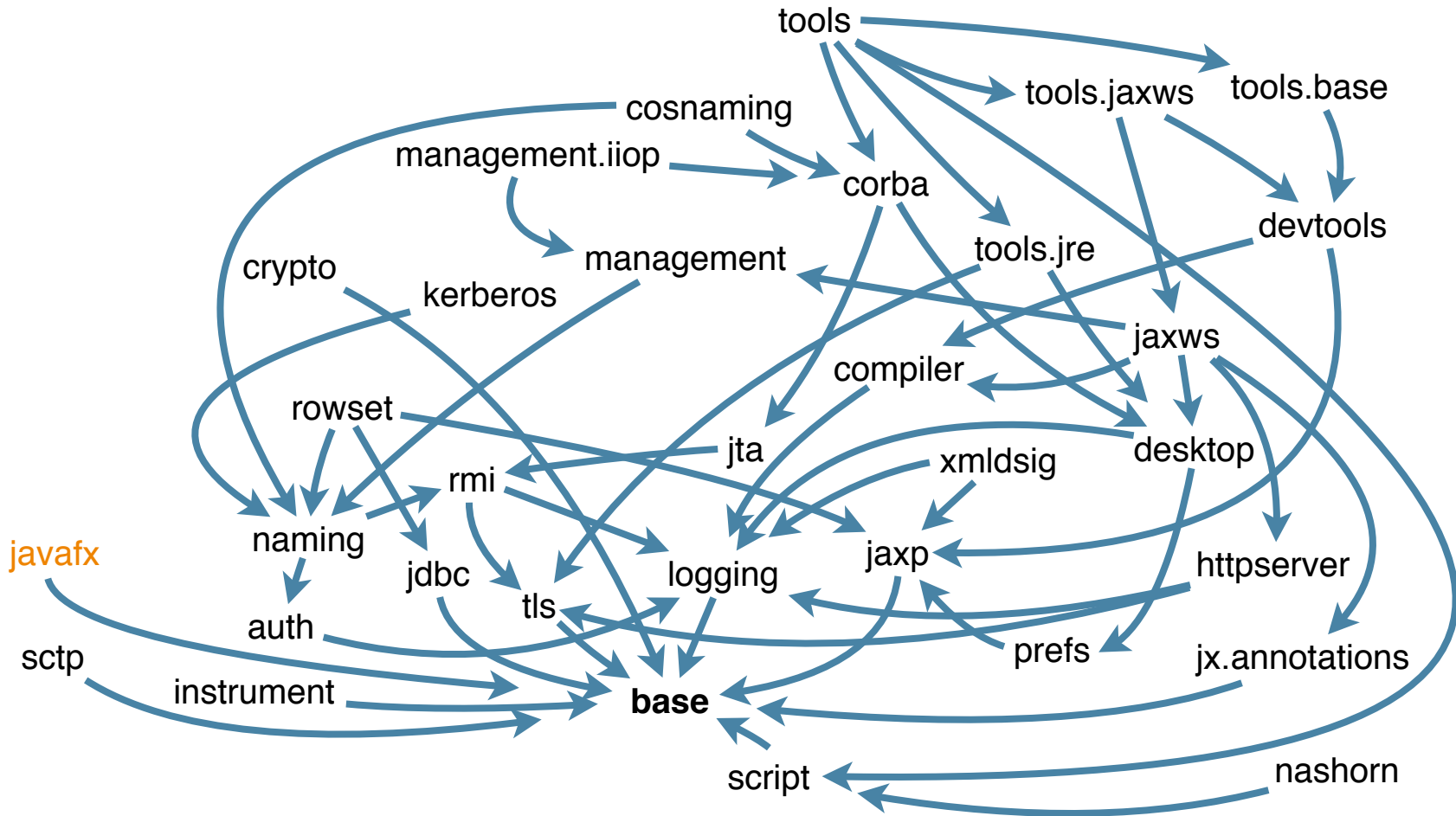
cosnaming

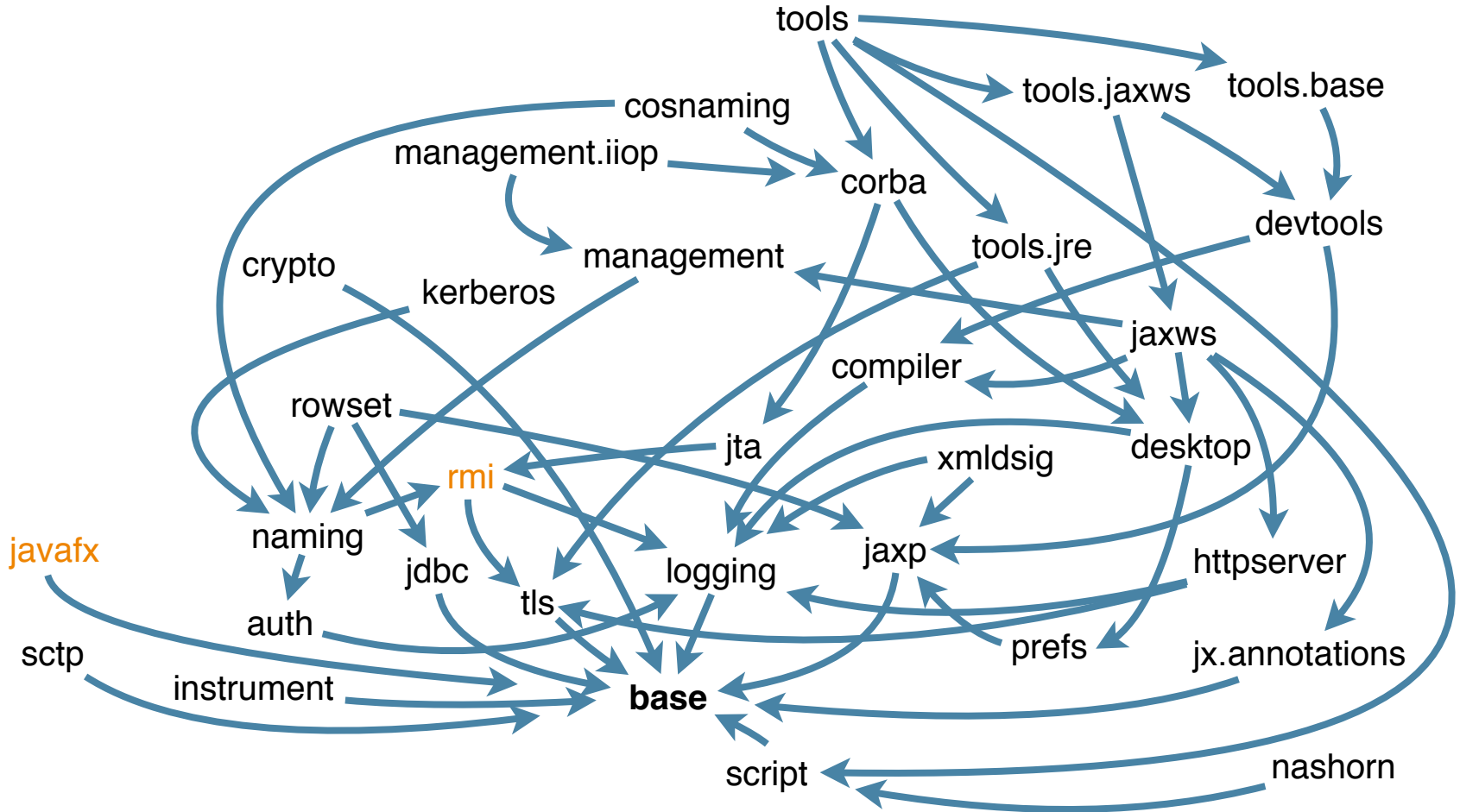


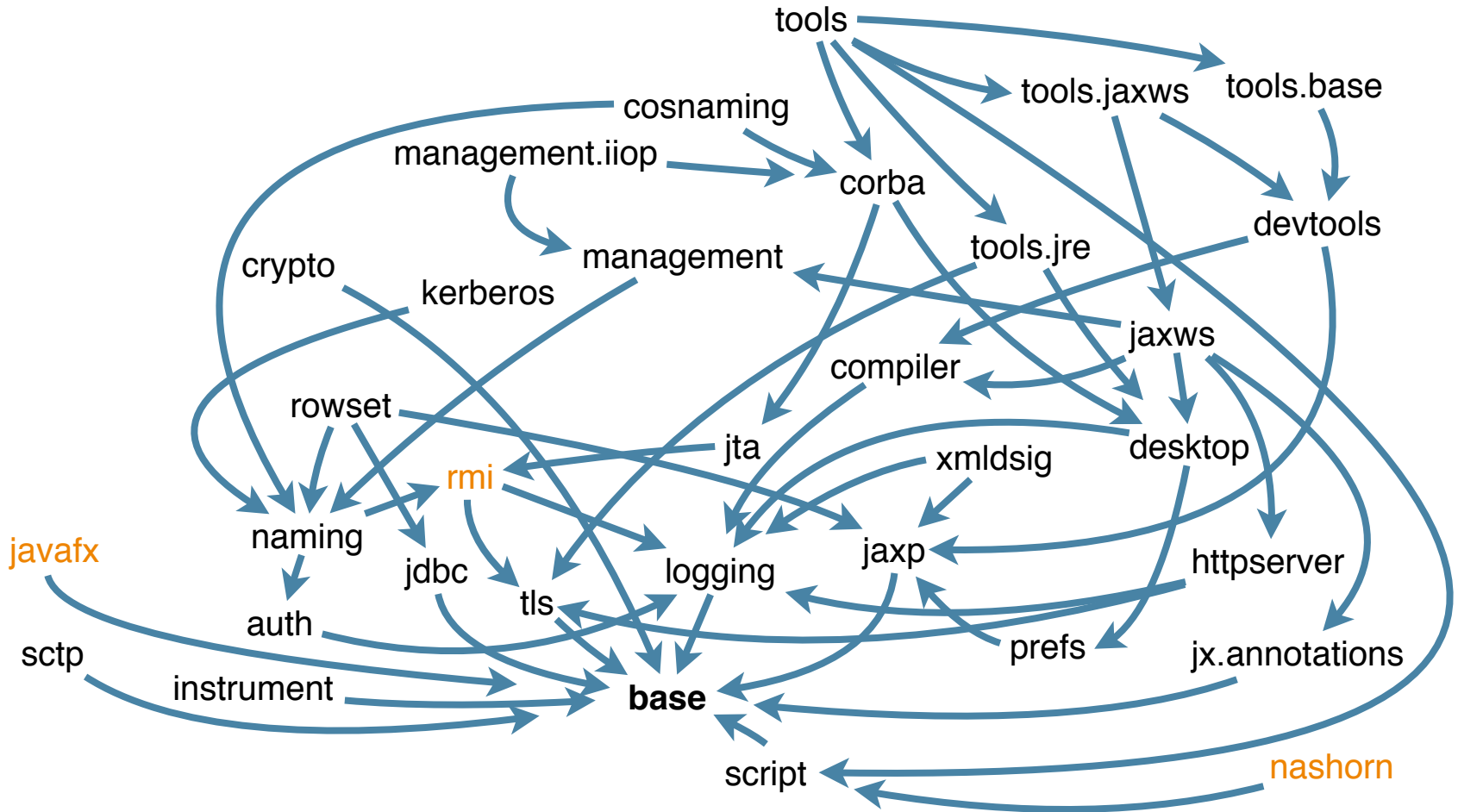


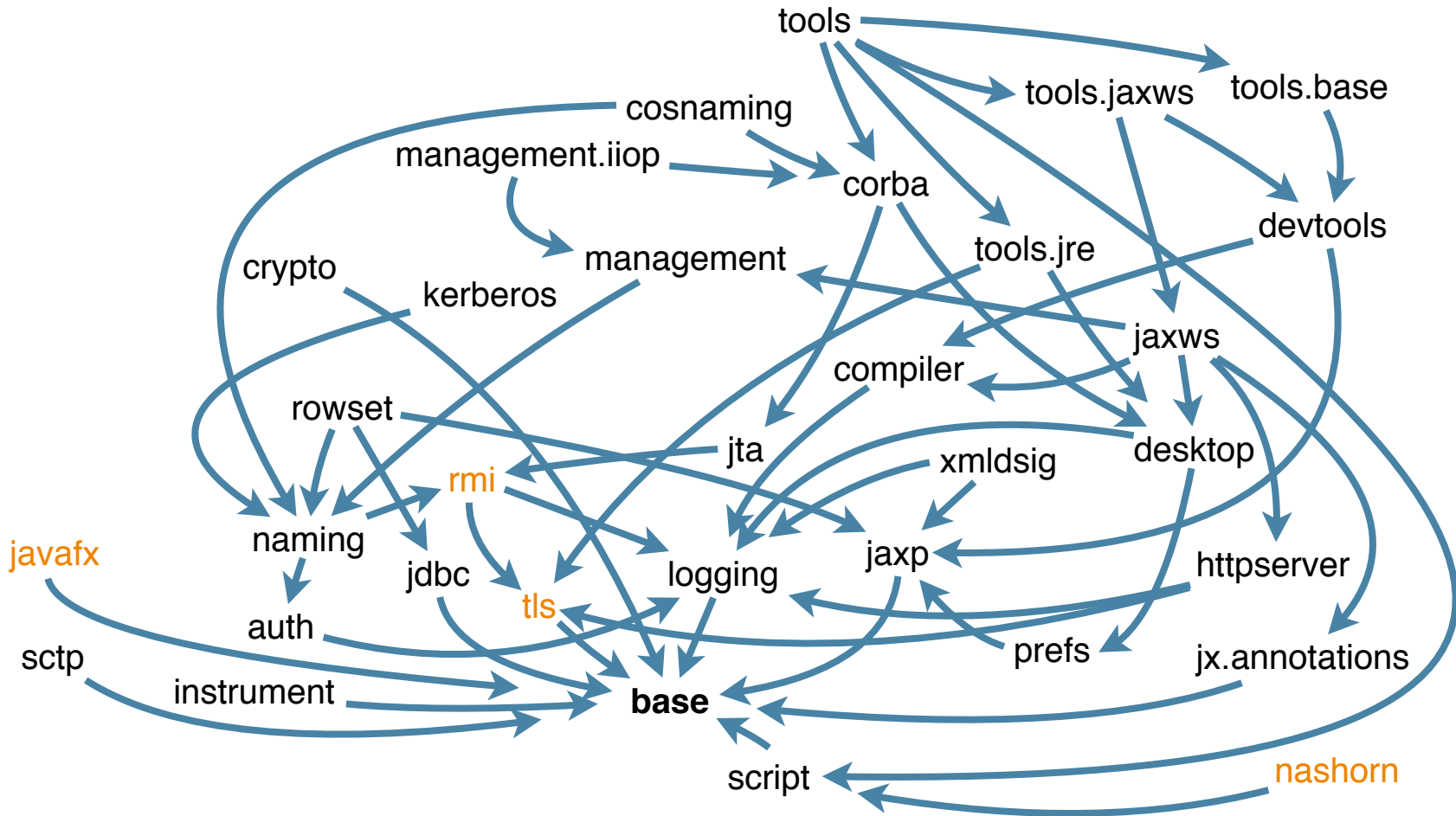
tools
cosnaming tools.jaxws tools.base
management.iiop corba
crypto management tools.jre devtools
kerberos compiler jaxws
rowset jta xmlldsig desktop
rmi logging jaxp httpserver
javafx naming jdbc tls logging jaxp httpserver
auth instrument base prefs jx.annotations
sctp instrument base script nashorn

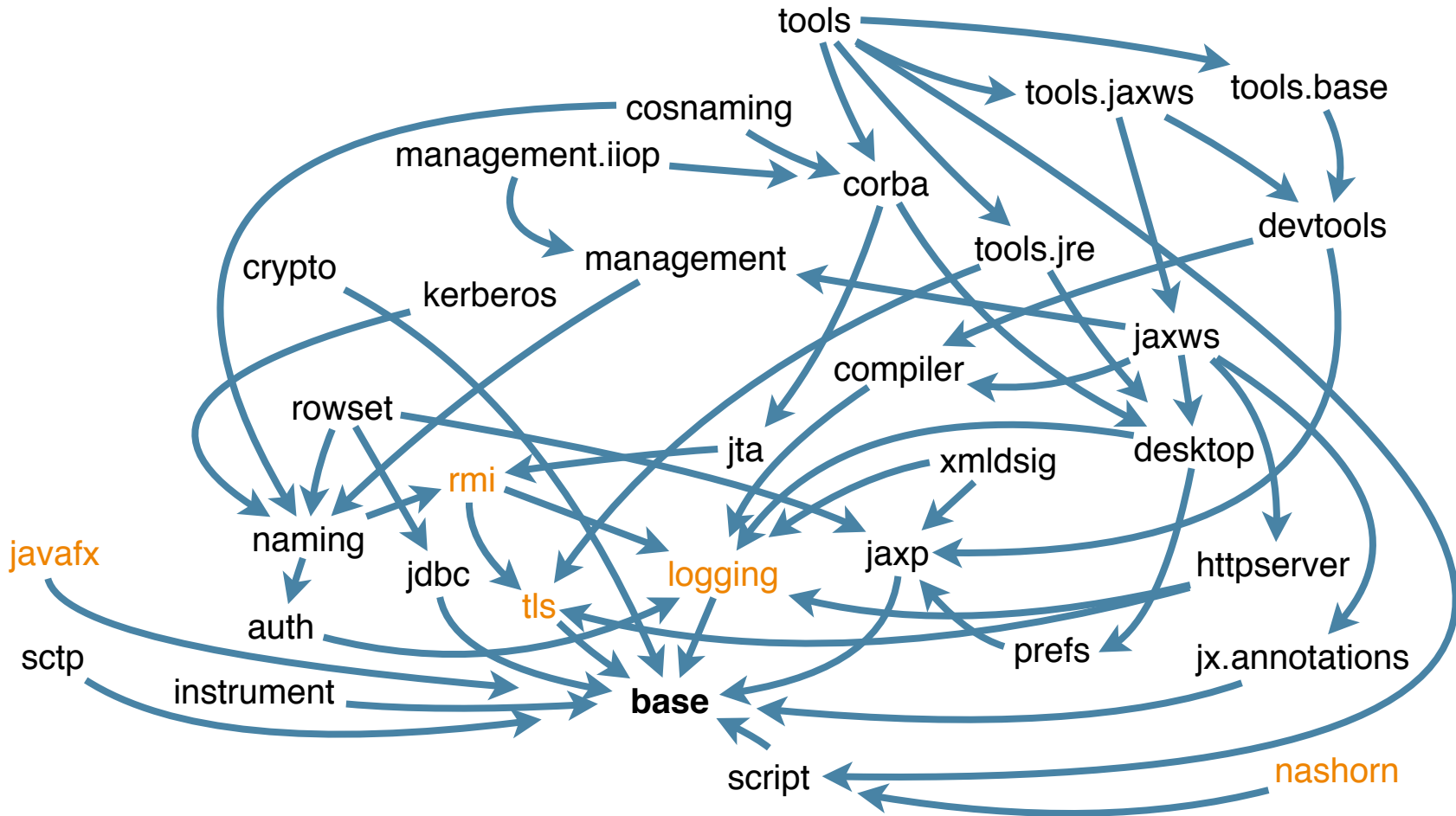


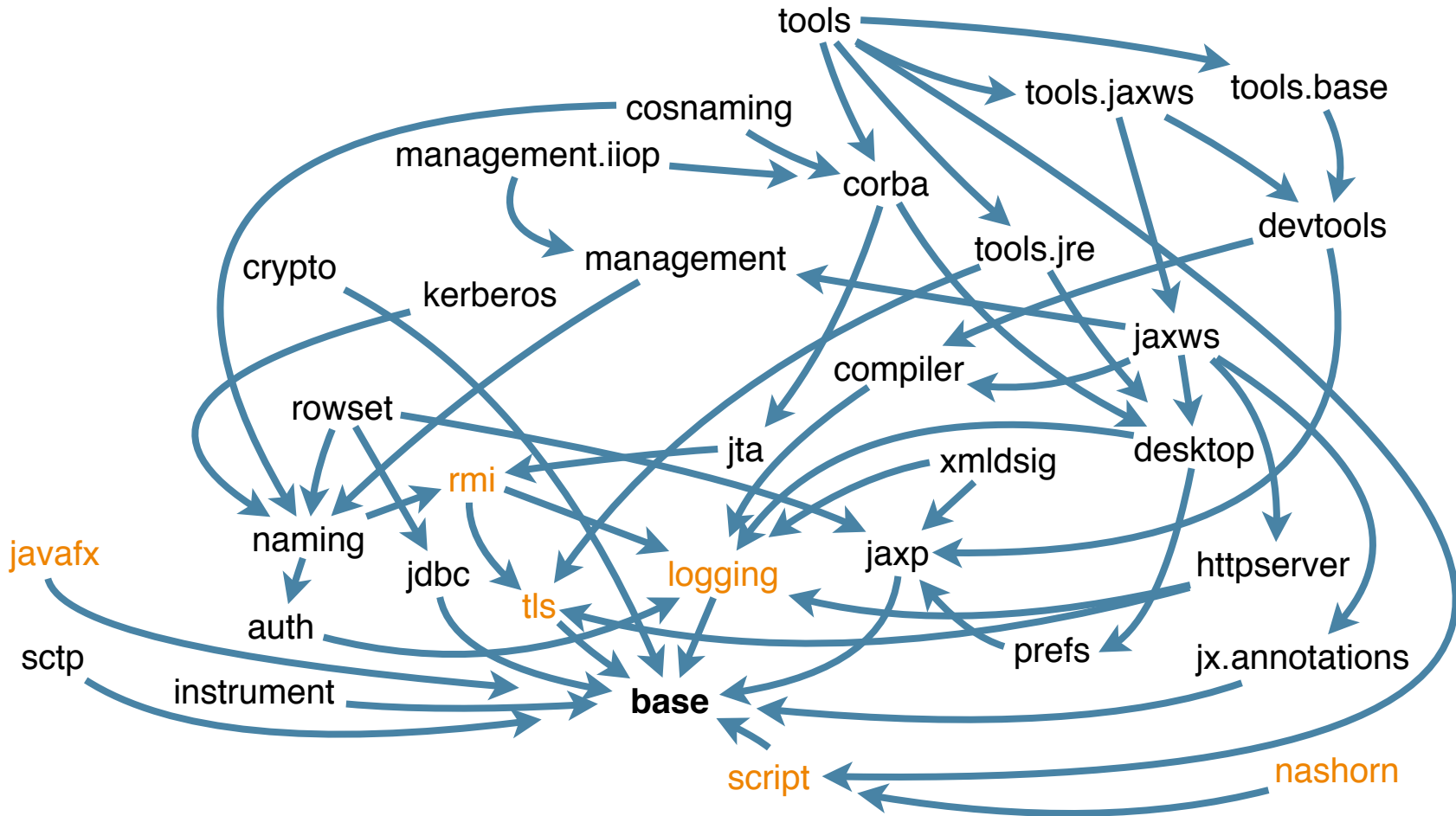


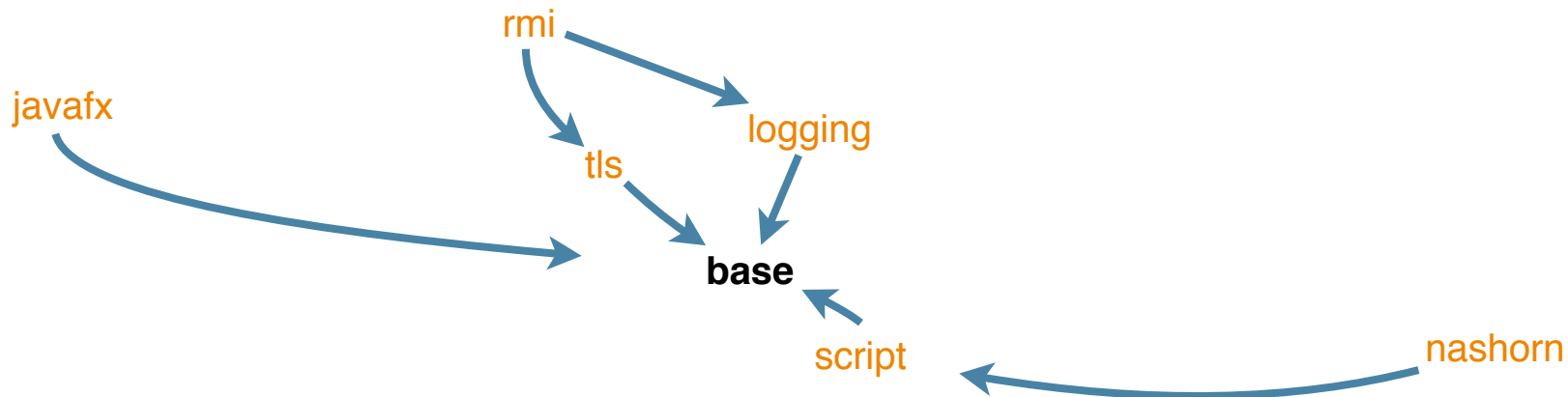












*.jmod

*.jmod

\$JRE/bin/java
/lib/...




```
$ jlink -mods javafx,rmi,nashorn -d $JRE
```

```
$ jlink -mods javafx,rmi,nashorn -d $JRE  
$ $JRE/bin/java -jar app.jar:... ..
```

```
$ jlink -mods javafx,rmi,nashorn -d $JRE  
$ $JRE/bin/java -jar app.jar:... ..
```

```
$ javac -mods javafx,rmi,nashorn -d classes *.java
```


```
$ jlink -mods javafx,rmi,nashorn -d $JRE  
$ $JRE/bin/java -jar app.jar:... ..
```

```
$ javac -mods javafx,rmi,nashorn -d classes *.java
```

```
$ java -mods javafx,rmi,nashorn -jar app.jar:... ..
```




Fast class lookup




Fast class lookup

Aggressive inlining



Fast class lookup
Aggressive inlining
Ahead-of-time compilation



Fast class lookup
Aggressive inlining
Ahead-of-time compilation
JVM-specific memory images

Fast class lookup
Aggressive inlining
Ahead-of-time compilation
JVM-specific memory images
Removal of unused fields/methods/classes



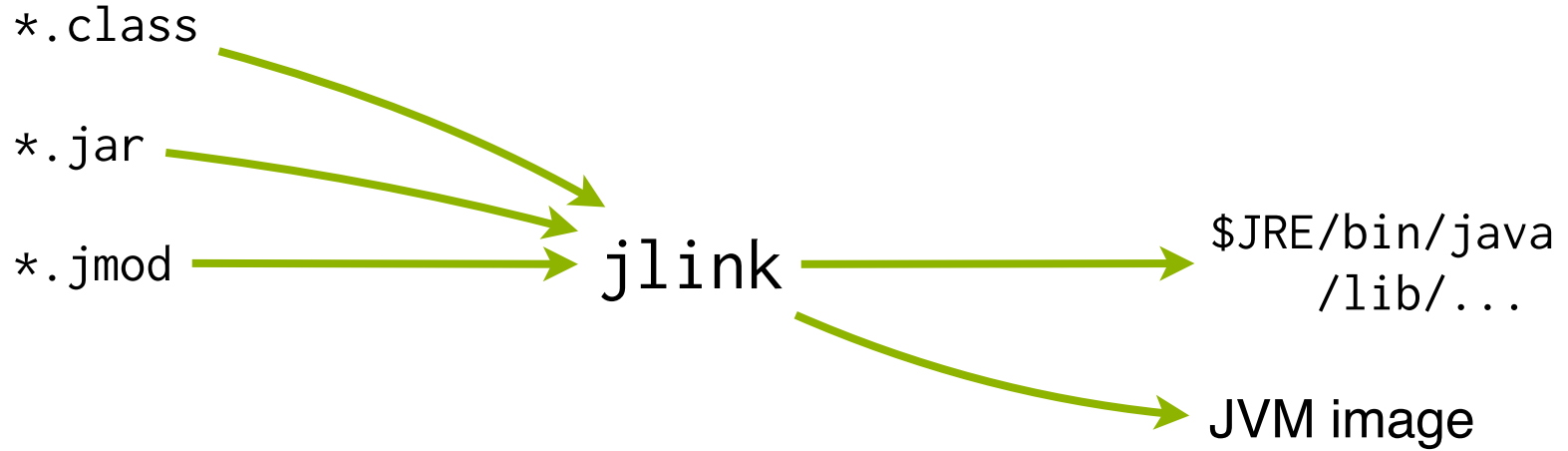
*.class

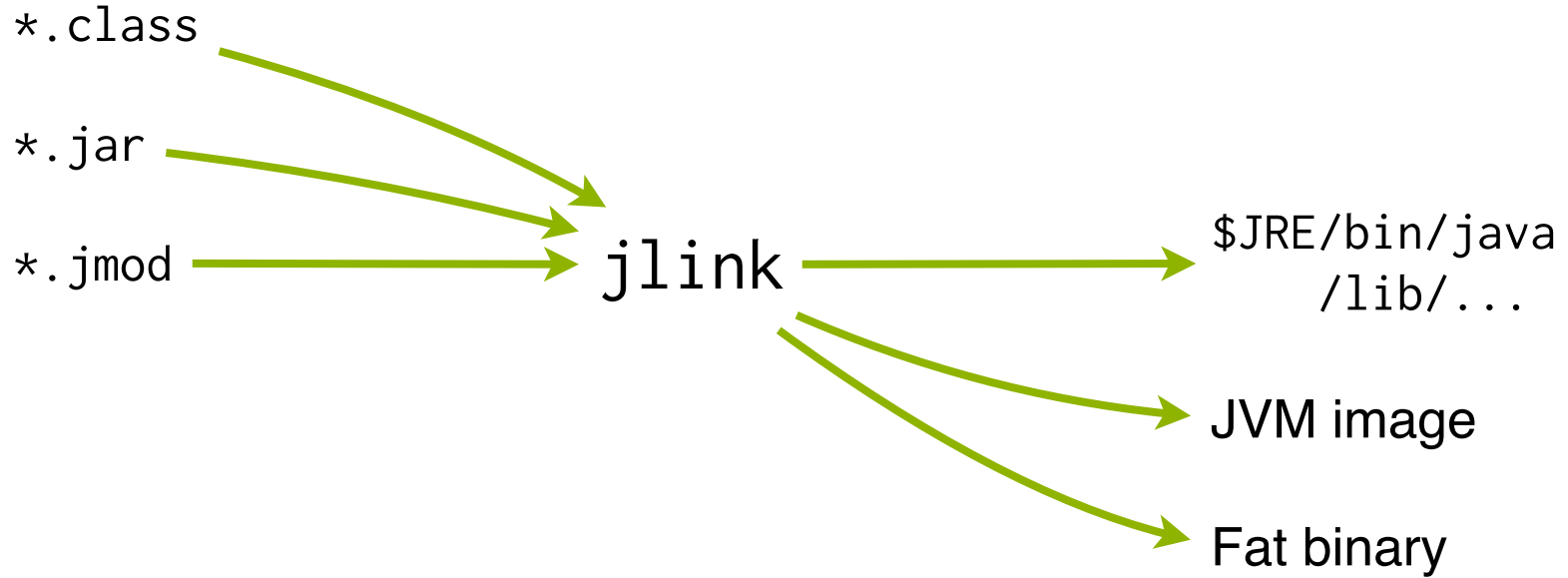
*.jar

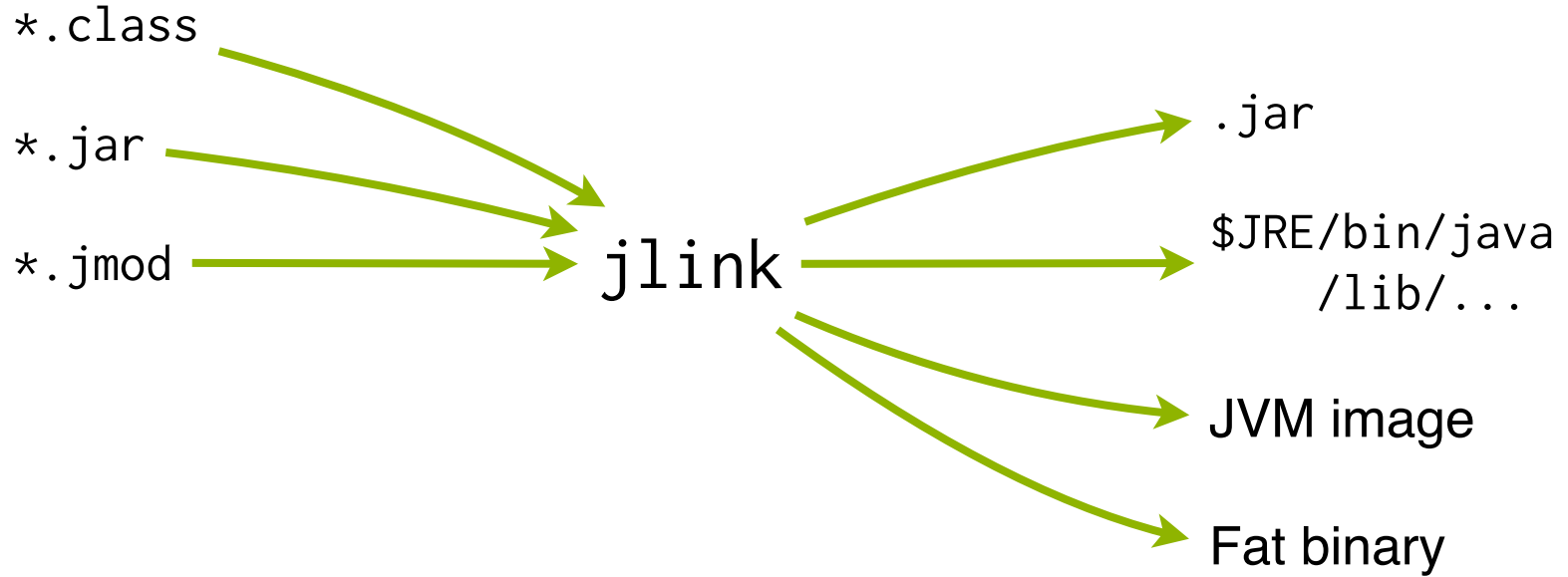
*.jmod

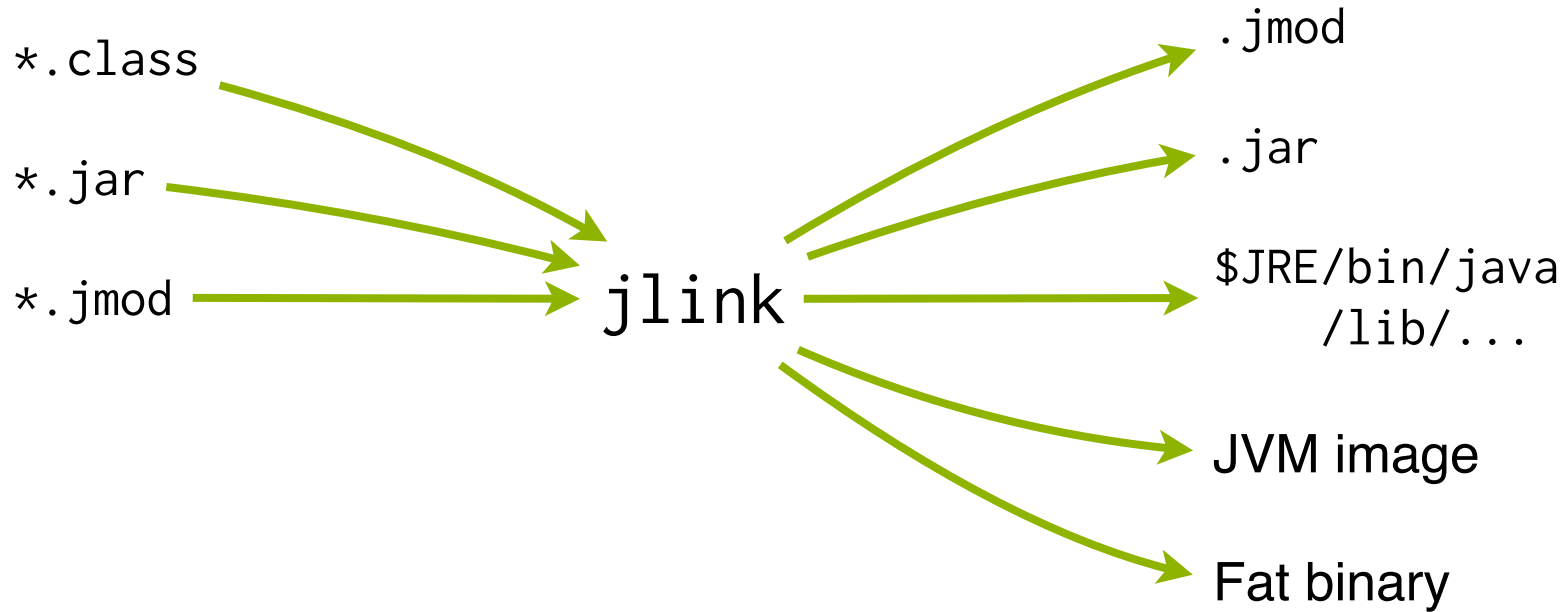
jlink

\$JRE/bin/java
/lib/...










```
$ jlink -mods javafx,rmi,nashorn -cp app.jar -d $JRE
```

```
$ jlink -mods javafx,rmi,nashorn -cp app.jar -d $JRE  
$ $JRE/bin/app ...
```

```
$ jlink -mods javafx,rmi,nashorn -cp app.jar -d $JRE  
$ $JRE/bin/app ...
```

```
$ jlink -mods javafx,rmi,nashorn -cp app.jar -o app.jai
```

```
$ jlink -mods javafx,rmi,nashorn -cp app.jar -d $JRE
$ $JRE/bin/app ...
```

```
$ jlink -mods javafx,rmi,nashorn -cp app.jar -o app.jai
$ java -jai app.jai
```

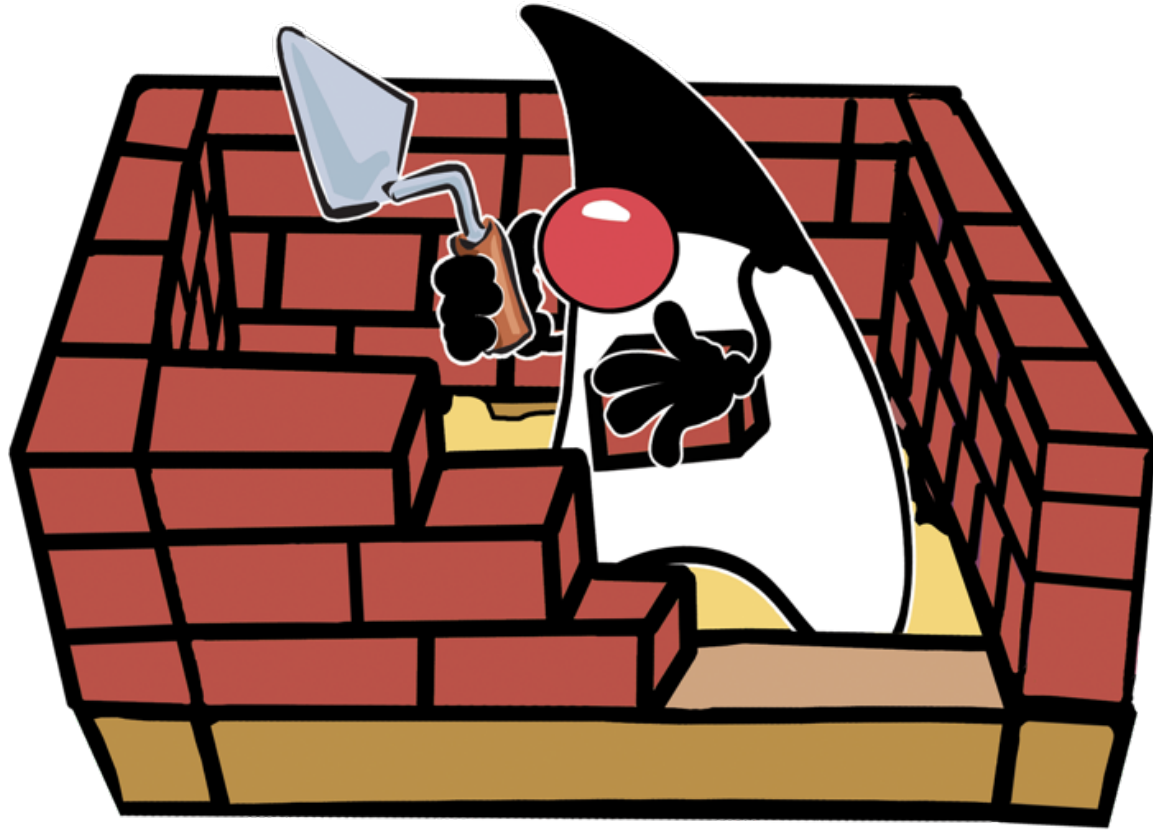



rt.jar
tools.jar





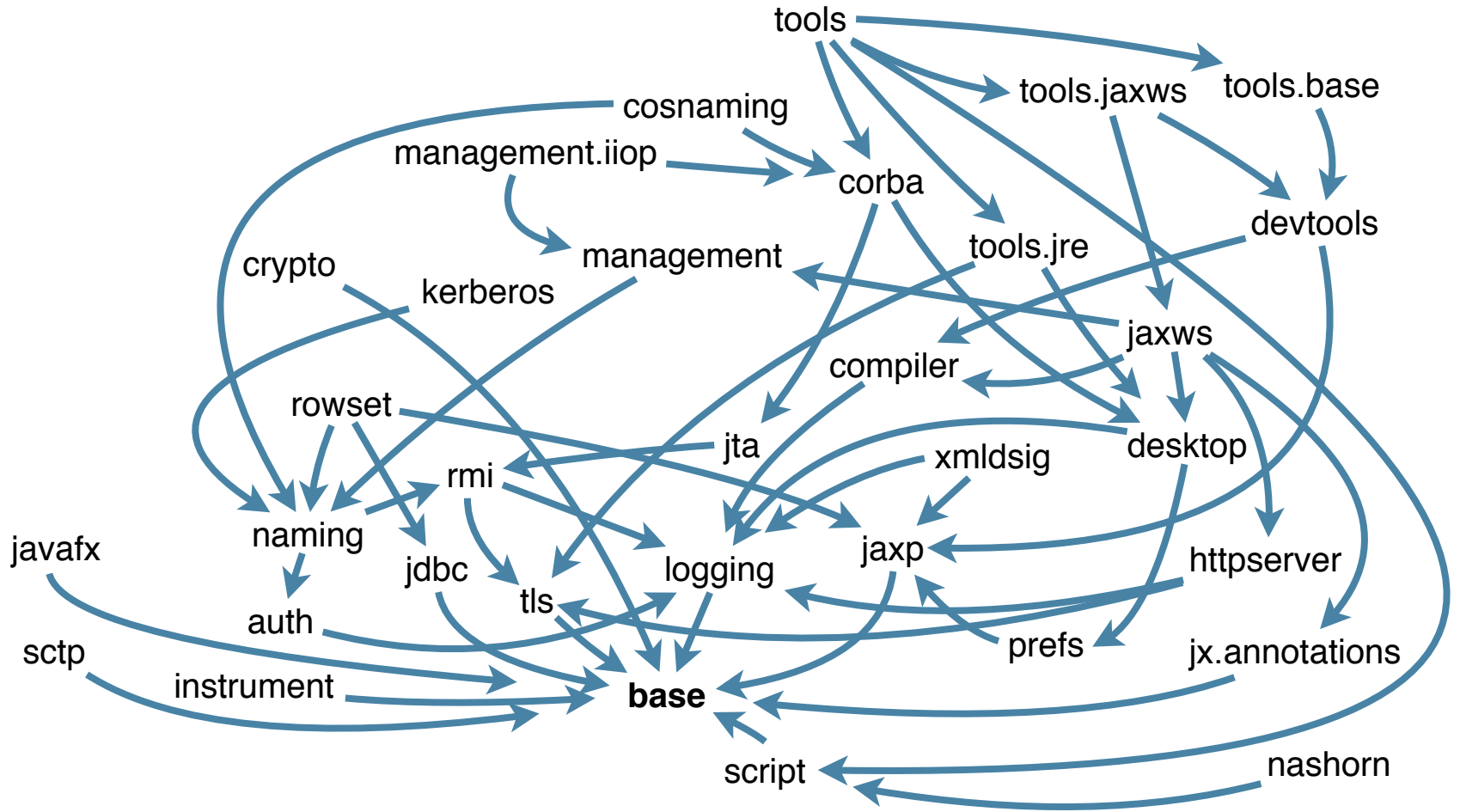
```
$JRE/bin/  
  /conf/  
  /ext/  
  /include/  
  /lib/$ARCH/*.so  
  /lib/$ARCH/$VM/*.so  
  /modules/
```



java.io	java.util.jar	sun.net.ftp	sun.security.pkcs12
java.lang	java.util.regex	sun.net.ftp.impl	sun.security.provider
java.lang.annotation	java.util.spi	sun.net.idn	sun.security.provider.certpath
java.lang.invoke	java.util.stream	sun.net.sdp	sun.security.rsa
java.lang.ref	java.util.zip	sun.net.smtp	sun.security.timestamp
java.lang.reflect	javax.crypto	sun.net.spi	sun.security.util
java.math	javax.crypto.interfaces	sun.net.spi.nameservice	sun.security.validator
java.net	javax.crypto.spec	sun.net.util	sun.security.x509
java.nio	javax.security.auth	sun.net.www	sun.text
java.nio.channels	javax.security.auth.callback	sun.net.www.content.text	sun.text.bidi
java.nio.channels.spi	javax.security.auth.login	sun.net.www.http	sun.text.normalizer
java.nio.charset	javax.security.auth.spi	sun.net.www.protocol.file	sun.text.resources
java.nio.charset.spi	javax.security.auth.x500	sun.net.www.protocol.ftp	sun.text.resources.cldr
java.nio.file	jdk	sun.net.www.protocol.http	sun.text.resources.cldr.en
java.nio.file.attribute	jdk.internal.org.objectweb.asm	sun.net.www.protocol.jar	sun.text.resources.en
java.nio.file.spi	jdk.internal.org.xml.sax	sun.net.www.protocol.mailto	sun.util
java.security	jdk.internal.util.xml	sun.net.www.protocol.netdoc	sun.util.calendar
java.security.cert	jdk.internal.util.xml.impl	sun.nio	sun.util.cldr
java.security.interfaces	jdk.jigsaw.module	sun.nio.ch	sun.util.locale
java.security.spec	jdk.jigsaw.tools.jlink	sun.nio.cs	sun.util.locale.provider
java.text	jdk.joptsimple	sun.nio.fs	sun.util.logging
java.text.spi	jdk.joptsimple.internal	sun.reflect	sun.util.logging.resources
java.time	jdk.joptsimple.util	sun.reflect.annotation	sun.util.resources
java.time.chrono	sun.invoke	sun.reflect.generics.factory	sun.util.resources.cldr
java.time.format	sun.invoke.anon	sun.reflect.generics.parser	sun.util.resources.cldr.en
java.time.temporal	sun.invoke.empty	sun.reflect.generics.scope	sun.util.resources.en
java.time.zone	sun.invoke.util	sun.reflect.generics.tree	sun.util.spi
java.util	sun.launcher	sun.reflect.generics.visitor	
java.util.concurrent	sun.launcher.resources	sun.reflect.misc	
java.util.concurrent.atomic	sun.misc	sun.security.action	
java.util.concurrent.locks	sun.misc.resources	sun.security.jca	
java.util.function	sun.net	sun.security.pkcs	

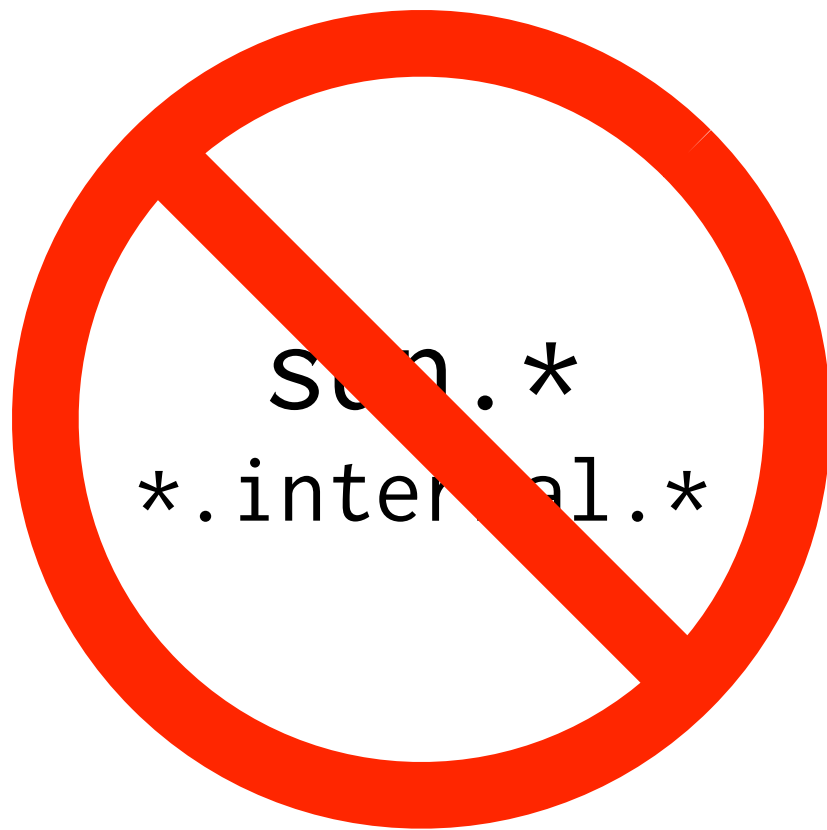
java.io	java.util.jar	sun.net.ftp	sun.security.pkcs12
java.lang	java.util.regex	sun.net.ftp.impl	sun.security.provider
java.lang.annotation	java.util.spi	sun.net.idn	sun.security.provider.certpath
java.lang.invoke	java.util.stream	sun.net.sdp	sun.security.rsa
java.lang.ref	java.util.zip	sun.net.smtp	sun.security.timestamp
java.lang.reflect	javax.crypto	sun.net.spi	sun.security.util
java.math	javax.crypto.interfaces	sun.net.spi.nameservice	sun.security.validator
java.net	javax.crypto.spec	sun.net.util	sun.security.x509
java.nio	javax.security.auth	sun.net.www	sun.text
java.nio.channels	javax.security.auth.callback	sun.net.www.content.text	sun.text.bidi
java.nio.channels.spi	javax.security.auth.login	sun.net.www.http	sun.text.normalizer
java.nio.charset	javax.security.auth.spi	sun.net.www.protocol.file	sun.text.resources
java.nio.charset.spi	javax.security.auth.x500	sun.net.www.protocol.ftp	sun.text.resources.cldr
java.nio.file	jdk	sun.net.www.protocol.http	sun.text.resources.cldr.en
java.nio.file.attribute	jdk.internal.org.objectweb.asm	sun.net.www.protocol.isis	sun.text.resources.en
java.nio.file.spi	jdk.internal.org.xml.bind	sun.net.www.protocol.latin1	sun.text.resources.es
java.security	jdk.internal.util.xml	sun.net.www.protocol.netdoc	sun.util.calendar
java.security.cert	jdk.internal.util.xml.impl	sun.nio	sun.util.cldr
java.security.interfaces	jdk.jigsaw.module	sun.nio.ch	sun.util.locale
java.security.spec	jdk.jigsaw.tools.jlink	sun.nio.cs	sun.util.locale.provider
java.text	jdk.joptsimple	sun.nio.fs	sun.util.logging
java.text.spi	jdk.joptsimple.internal	sun.reflect	sun.util.logging.resources
java.time	jdk.joptsimple.util	sun.reflect.annotation	sun.util.resources
java.time.chrono	sun.invoke	sun.reflect.generics.factory	sun.util.resources.cldr
java.time.format	sun.invoke.anon	sun.reflect.generics.parser	sun.util.resources.cldr.en
java.time.temporal	sun.invoke.empty	sun.reflect.generics.scope	sun.util.resources.en
java.time.zone	sun.invoke.util	sun.reflect.generics.tree	sun.util.spi
java.util	sun.launcher	sun.reflect.generics.visitor	
java.util.concurrent	sun.launcher.resources	sun.reflect.misc	
java.util.concurrent.atomic	sun.misc	sun.security.action	
java.util.concurrent.locks	sun.misc.resources	sun.security.jca	
java.util.function	sun.net	sun.security.pkcs	

java.lang.SecurityManager::checkPackageAccess





sun.*
.internal.





Scalability

Performance

Security

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The Modular Java Platform & Project Jigsaw

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2014/2/4

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JAVA

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