



AspectJ-Scripting

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Passion to Perform



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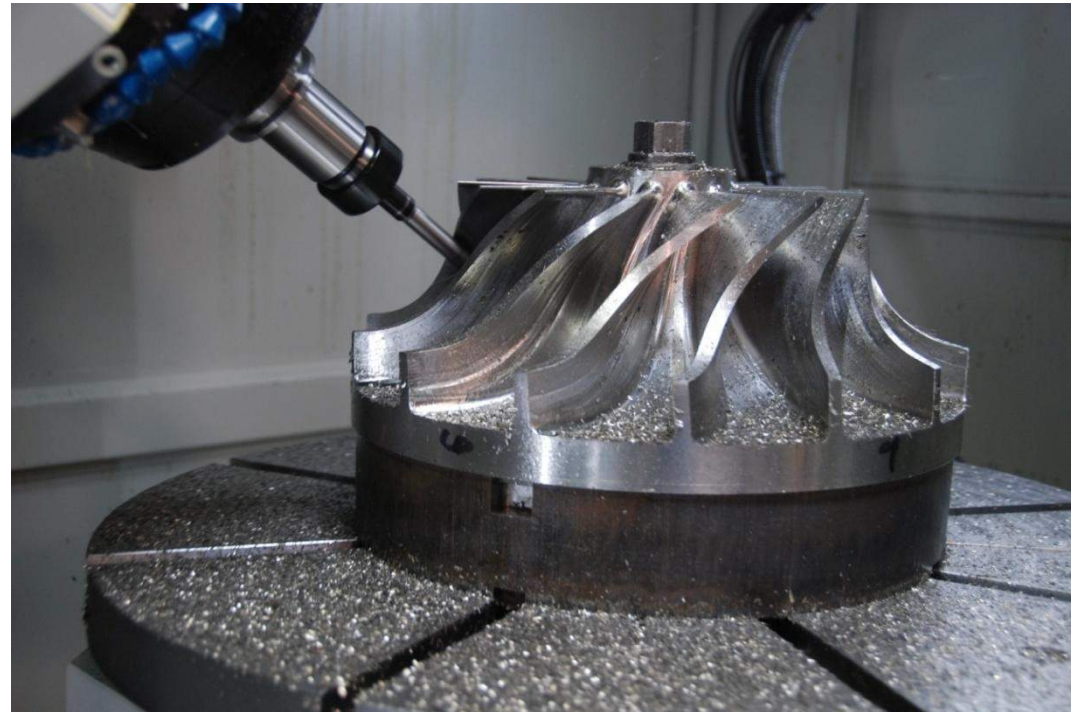
Какие задачи решает АОП



Тестирование и модификация существующего приложения



Модификация
Итеративность изменений
Доступность исходных кодов
Перепаковка





Распространение изменений: classpath, конфигурация





BTrace

btrace <pid> <btrace-script>

```
01. // import all BTrace annotations
02. import com.sun.btrace.annotations.*;
03. // import statics from BTraceUtils class
04. import static com.sun.btrace.BTraceUtils.*;
05.
06. // @BTrace annotation tells that this is a BTrace program
07. @BTrace
08. class HelloWorld {
09.
10.     // @OnMethod annotation tells where to probe.
11.     // In this example, we are interested in entry
12.     // into the Thread.start() method.
13.     @OnMethod(
14.         clazz="java.lang.Thread",
15.         method="start"
16.     )
17.     void func() {
18.         sharedMethod(msg);
19.     }
20.
21.     void sharedMethod(String msg) {
22.         // println is defined in BTraceUtils
23.         println(msg);
24.     }
25. }
```



Byteman

```
-javaagent:${BYTEMAN_HOME}/lib/byteman.jar=script:appmain.btm
```

```
RULE trace main entry  
CLASS AppMain  
METHOD main  
AT ENTRY  
IF true  
DO traceln("entering main")  
ENDRULE
```



AspectJ

-javaagent:aspectjweaver.jar, aop.xml

```
@Aspect public class ProceedAspect {  
  
    @Pointcut("call(* setAge(..)) && args(i)")  
    void setAge(int i) {}  
  
    @Around("setAge(i)")  
    public Object twiceAsOld(ProceedingJoinPoint thisJoinPoint, int i) {  
        return thisJoinPoint.proceed(new Object[]{i*2});  
    }  
}
```




Терминология

- Аспект (англ. Aspect)
- Совет (advice), типы совета(advice type): AROUND, BEFORE, AFTER, AFTER_RETURNING, AFTER_THROWING
- Точка соединения (join point)
- Срез (pointcut)
- Внедрение (Introduction/inter-type declaration)



AspectJ: Pointcut syntax

`execution(* org.sonar.server.app.WebServer.start(..))`

`call(* org.sonar.server.app.WebServer.start(..))`

`initialization(ConstructorPattern) execution(* *.new(..))`

`staticinitialization(ConstructorPattern)`

`get(FieldPattern)`

`set(FieldPattern)`

Пример: JDBC



```
@Around("execution(* oracle.net.ns.NetInputStream.read*(..)) ")
public Object emulateDbTimeout(ProceedingJoinPoint joinPoint){
    Thread.sleep( jdbcTimeout + SAFE_PERCENT * jdbcTimeout );
}
```

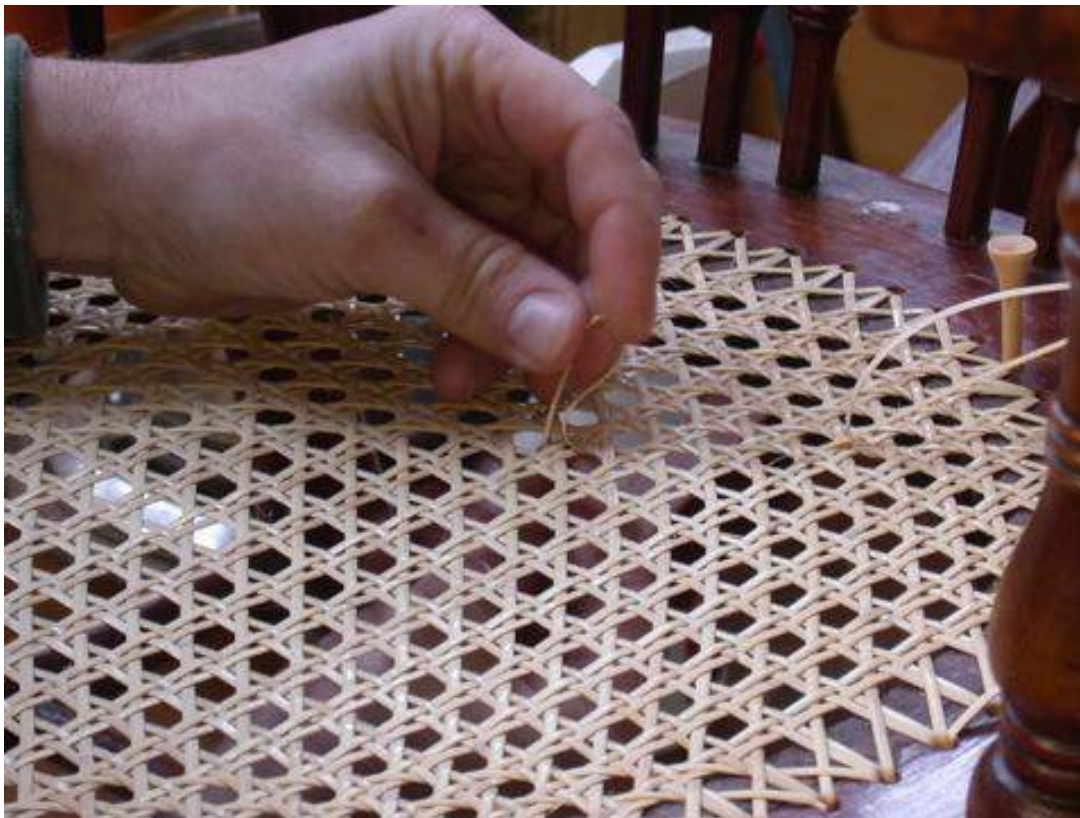
```
@Around("execution(*
    oracle.jdbc.driver.OracleStatement.cancel*(..)) ")
{
    cancelled.set(true);
}
```

AspectJ + MVEL + Maven = AspectJ-scripting



AspectJ: Bytecode modification

AspectJ: LTW jvm agent / compile-time weaving



AspectJ + MVEL + Maven = AspectJ-scripting



MVEL

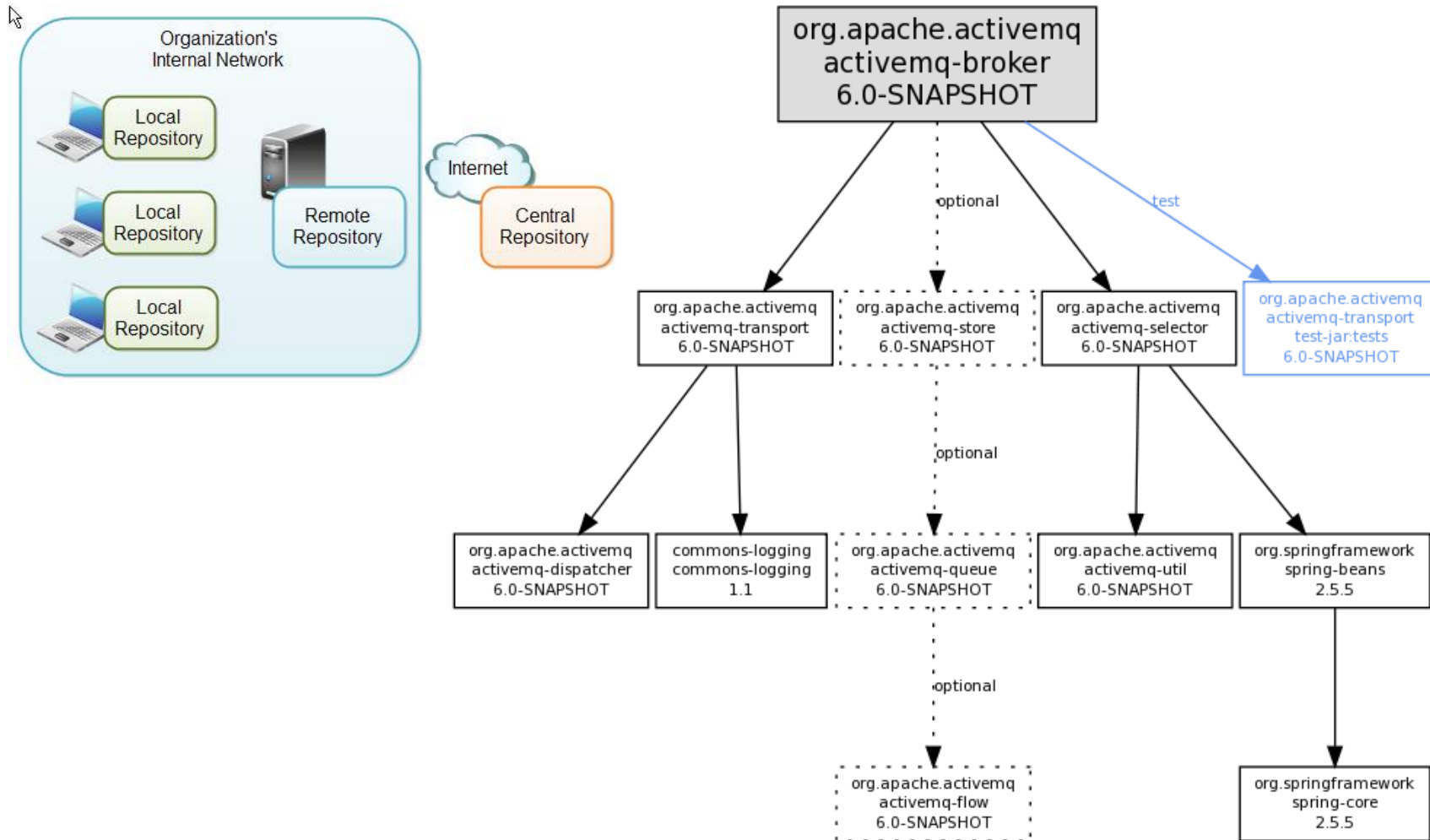
```
res = joinPoint.proceed();  
gson = new GsonBuilder().setPrettyPrinting().create();  
FileUtils.writeStringToFile(new File("report.json"),  
    gson.toJson(res));  
xstream = new XStream(); xstream.alias("issue",  
    org.apache.maven.plugin.issues.Issue);  
FileUtils.writeStringToFile(new File("report.xml"),  
    xstream.toXML(res));  
res;
```

AspectJ + MVEL + Maven = AspectJ-scripting



Мaven репозитарий, зависимости

Dependency Graph for ActiveMQ :: Broker



AspectJ + MVEL + Maven = AspectJ-scripting



AspectJ-scripting

-javaagent:aspectj-scripting-1.0-agent.jar

-Dorg.aspectj.weaver.loadtime.configuration=config:file:database_console.xml

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<configuration>
  <aspects>
    <name>com.github.igorsuhorukov.H2Console</name>
    <type>AFTER</type>
    <pointcut>execution(* org.sonar.server.app.WebServer.start(..))</pointcut>
    <artifacts>
      <artifact>com.h2database:h2:1.3.176</artifact>
      <classRefs>
        <variable>Console</variable>
        <className>org.h2.tools.Console</className>
      </classRefs>
    </artifacts>
    <process>
      <expression>
        Console.main("-web", "-browser", "-url", "jdbc:h2:tcp://localhost:9092/sonar", "-driver", "org.h2.D
river", "-user", "sonar", "-password", "sonar");
      </expression>
    </process>
  </aspects>
</configuration>
```

Примеры: hawt.io



hawt.io interface showing JVM properties for Tomcat. The left sidebar shows a tree view of JVM components. The main panel displays a table of properties and values.

Property	Value
Cache size	5640
Cache size max	16384
Exclusive	false
File read count	1030
File size	54142
File write count	30
file write count total	51491
Log mode	2
Mode	REGULAR
Multi threaded	false
Mvcc	false

hawt.io interface showing system metrics for Tomcat. The left sidebar shows a tree view of JVM components. The main panel displays a table of system metrics.

Metric	Value
Available processors	4.0
Committed virtual memory size	3.4G
Free physical memory size	570M
Free swap space size	0.0
Max file descriptor count	4.1
Open file descriptor count	290
Process cpu load	2.4m
Process cpu time	1300s
System cpu load	0.2
System load average	1.0
Total physical memory size	4.0G
Total swap space size	0.0

H2 Console - Mozilla Firefox. The console displays a SQL query result for 'SELECT * FROM ISSUES'. The table has columns: ID, KEY, COMPONENT_UUID, PROJECT_UUID, RULE_ID, SEVERITY, MANUAL_SEVERITY, MESSAGE, LINE, EFFORT_TO_FIX, TECHNICAL_DEBT, STATUS, RESOLUTION, CHECKSUM, REPORTER, AS.

ID	KEY	COMPONENT_UUID	PROJECT_UUID	RULE_ID	SEVERITY	MANUAL_SEVERITY	MESSAGE	LINE	EFFORT_TO_FIX	TECHNICAL_DEBT	STATUS	RESOLUTION	CHECKSUM	REPORTER	AS
1	020c9093-b28-4f15-b400-46c9e99d1733	0bc84a10-0582-4961-073a042d-3568-1b4f032c11b0	3d3b-4bc0-2804-4d49cc8b065a0	59	MAJOR	FALSE	Make this "cursor" field final.	36	null	15	OPEN	null	bd276e5c3ba7e0880fed6ba2b35c07	null	null
2	0604d980-c02e-41c0-0bc84a10-0582-4961-073a042d-			100	MINOR	FALSE	Move this constructor	77	null	5	OPEN	null	83d280d455bc2c27732c3106d0es8471	null	null

Примеры: hawt.io



```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<configuration>
  <aspects>
    <name>com.github.igorsuhorukov.HawtIo</name>
    <type>BEFORE</type>
    <pointcut>execution(* org.sonar.server.app.WebServer.start(..))</pointcut>
    <artifacts>
      <artifact>io.hawt:hawtio-app:jar:2.0.0</artifact>
      <classRefs>
        <variable>App</variable>
        <className>io.hawt.app.App</className>
      </classRefs>
    </artifacts>
    <process>
      <expression>
        cl = java.lang.Thread.currentThread().getContextClassLoader();
        java.lang.Thread.currentThread().setContextClassLoader(App.getClassLoader());
        App.main({"--port", "10090"});
        java.lang.Thread.currentThread().setContextClassLoader(cl);
      </expression>
    </process>
  </aspects>
</configuration>
```

Примеры: метрики



```
... <artifact>com.github.igor-suhorukov:jvm-metrics:1.1</artifact> ...
```

```
<process>
```

```
<expression>
```

```
    jmxCollect = new JmxCollect();
```

```
    System.out.println(jmxCollect.getJsonJmxInfo("java.lang:type=Memory",  
new java.util.Date()));
```

```
    System.out.println(new SigarCollect().getJsonFullInfo());
```

```
    performanceCounters = new PerformanceCounters();
```

```
    System.out.println(performanceCounters.getJsonBaseInfo("sun.*"));
```

```
</expression>
```

```
</process>
```

```
</aspects>
```

```
</configuration>
```

Примеры: CRaSH



```
igor@igor-comp: ~/dev/projects/sonar-demo/sonarqube-5.1.2
igor@igor-comp:~/dev/projects/sonar-demo/sonarqube-5.1.2$ clear

igor@igor-comp:~/dev/projects/sonar-demo/sonarqube-5.1.2$ ssh admin@localhost -p 2000
Password authentication
Password:

CRASH 1.3.1

Follow and support the project on http://www.crashub.org
Welcome to igor-comp + !
It is Mon Aug 31 00:32:38 MSK 2015 now
% habrahabrShell displayBest
R01 + Timeweb, ваши сайты под угрозой [http://habrahabr.ru/post/265711/]
[Перевод] Интервью с Nenad Rakocevic о языке Red, преемнике Rebol [http://habrahabr.ru/post/265685/]
Как мы участвовали в хакатоне Data Science Week 2015 [http://habrahabr.ru/post/265721/]
Мультиселект и автокомплит на AngularJS [http://habrahabr.ru/post/265663/]
Дайджест интересных материалов из мира веб-разработки и IT за последнюю неделю №174 (23 – 30 августа 2015) [http://
Дайджест интересных материалов для мобильного разработчика #118 (24-30 августа) [http://habrahabr.ru/post/265715/]
```

```
igor@igor-comp: ~/dev/projects/sonar-demo/sonarqube-5.1.2
top
-----
ID      NAME                GROUP      PRIORITY  STATE   %CPU   TIME   INTERRUPT  DAEMON
-----
107    pool-12-thread-14  main       5          RUNNABLE 46     0:3    false     false
40     H2 File Lock Watchdog /home main       9          TIMED_WA 23     0:0    false     true
14     elasticsearch[sonar-1440967 main       5          TIMED_WA 12     0:0    false     true
24     elasticsearch[sonar-1440967 main       5          TIMED_WA 11     0:1    false     true
41     H2 Log Writer SONAR main       5          TIMED_WA 6      0:1    false     true
2      Reference Handler  system     10         WAITING  0      0:0    false     true
3      Finalizer          system     8          WAITING  0      0:0    false     true
4      Signal Dispatcher system     9          RUNNABLE  0      0:0    false     true
1      main               main       5          TIMED_WA 0      0:3    false     false
10     Stop Watcher       main       5          TIMED_WA 0      0:0    false     false
11     NioBlockingSelector.BlockPo main       5          RUNNABLE  0      0:0    false     true
15     elasticsearch[sonar-1440967 main       5          TIMED_WA 0      0:0    false     true
-----
procs          env            jvm
-----
NAME          VALUE          width: 115      Heap:
-----
java.runtime.name session: [shell, prompt, run, welcome Non heap:
, crash]
attributes: []
Code Cache:
-----
java.vm.version 24.79-b02     PS Eden Space:
e:
-----
java.vm.vendor  Oracle       PS Survivor
Space:
-----
ration         PS Old Gen:
-----
```

Примеры: Логирование в Elasticsearch



Kibana | Explore & Visualize Your Data



See the Value in Your Data

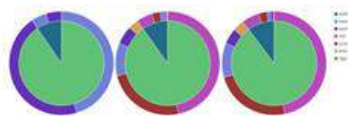
- Flexible analytics and visualization platform
- Real-time summary and charting of streaming data
- Intuitive interface for a variety of users
- Instant sharing and embedding of dashboards

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SUBSCRIPTIONS

Explore & Visualize Your Data with Kibana 4

WATCH NOW



Seamless Integration with Elasticsearch

Architected to work with Elasticsearch, Kibana gives shape to any kind of data — structured and unstructured — indexed into Elasticsearch. It also benefits from Elasticsearch's powerful search and analytics capabilities.



Give Shape to Your Data

To better understand large volumes of data, easily create bar charts, line and scatter plots, histograms, pie charts, and maps.



Sophisticated Analytics

Leverage the power of Elasticsearch analytics capabilities to analyze your data intelligently, perform mathematical transformations, and slice and dice your data as you see fit.

Примеры: Логирование в Elasticsearch



```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<configuration>
  <aspects>
    <name>com.github.igorsuhorukov.Logging</name>
    <type>AROUND</type>
    <pointcut>call(* org.slf4j.Logger.error(..)) || call(* org.slf4j.Logger.warn(..))
|| call(* org.slf4j.Logger.info(..)) || call(* org.slf4j.Logger.debug(..)) || call(*
org.slf4j.Logger.trace(..))</pointcut>
    <process>
      <expression>
        res = joinPoint.proceed();

        log = new java.util.HashMap();
        log.put("level", joinPoint.getSignature().getName());
        log.put("srcf",
joinPoint.getSourceLocation().getFileName().substring(0,
joinPoint.getSourceLocation().getFileName().length()-5));
        log.put("srcl", joinPoint.getSourceLocation().getLine());
```

Ограничения текущей реализации



try/catch

Debug



type transformation

performance



- Groovy + Grape
- Модификация загрузчиков классов
- Конфигурация в maven/scm/fs/web

```
@Grapes([
  @Grab(group='org.eclipse.jetty.aggregate', module='jetty-server', version='8.1.7.v20120910'),
  @Grab(group='org.eclipse.jetty.aggregate', module='jetty-servlet', version='8.1.7.v20120910'),
  @Grab(group='javax.servlet', module='javax.servlet-api', version='3.0.1')]

import org.eclipse.jetty.server.Server
import org.eclipse.jetty.servlet.*
import groovy.servlet.*

def runServer(duration) {
  def server = new Server(8080)
  def context = new ServletContextHandler(server, "/", ServletContextHandler.SESSIONS);
  context.resourceBase = "."
  context.addServlet(TemplateServlet, "*.gsp")
  server.start()
  sleep duration
  server.stop()
}

runServer(10000)
```

Заключение



	BTrace	Byteman	AspectJ	AspectJ-Scripting
Язык	Java	Event Condition Action script	Java, AspectJ language	XML/JSON + MVEL
Внедрение	Hotswap	Agent	Compile time/Agent	Agent
Действие	с момента присоедине ния к JVM	Старт JVM	Старт JVM	Старт JVM
Ресурсы	Classpath	Classpath	Classpath	Classpath/Maven
Конфигурация	файл	файл	файл	файл/http
Документация	Достаточно	Достаточно	Много	За счет документации по AspectJ/MVEL





Существующие решения

[BTrace](#)

[Byteman](#)

[AspectJ](#)

Технологии в основе AspectJ-Scripting

[MVEL Language Guide](#)

[AspectJ Pointcuts Language Semantics](#)

[Maven: Introduction to Repositories](#)

[Maven: Introduction to the Dependency Mechanism](#)



Примеры

[Протоколирование JDBC запросов и их параметров в существующем приложении](#)

[Внедрение веб консолей в jvm процесс на примере SonarQube](#)

[Публикация логов в Elasticsearch — жизнь без регулярных выражений и без logstash](#)

[Хабр шелл: встраиваем кроссплатформенный ssh server в java приложение](#)

[Напильники бывают разные или повествование про «напильник» для java программ](#)

[Диагностируем причину, выживаем в JAR hell: не дышим серой и не варимся в котле](#)

Roadmap

[Groovy](#)

[Grape](#)



Спасибо!

Игорь Сухоруков
igor.suhorukov@gmail.com

Passion to Perform