



当Dubbo遇上Arthas 排查问题的实践

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Arthas/阿尔萨斯

- Alibab开源的Java诊断工具
- 9月份开源，Star 6000+
- Github: <https://github.com/alibaba/arthas>
- Wiki: <https://alibaba.github.io/arthas/>
- Arthas开源交流QQ群：916328269
- Arthas开源交流钉钉群：21965291

Arthas微信交流群

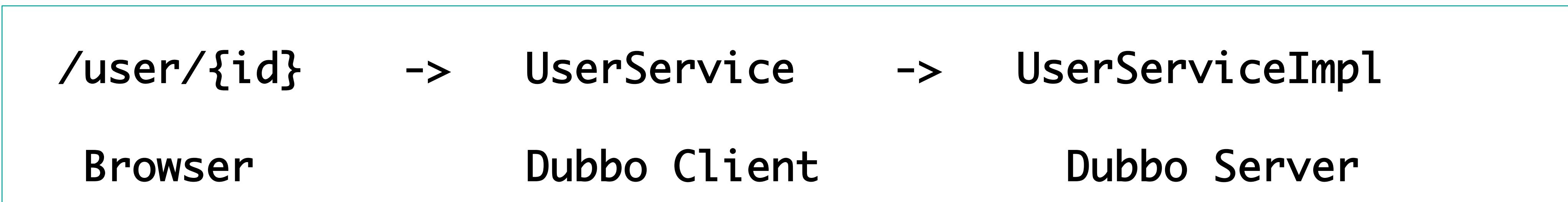


排查Dubbo问题

- Dubbo线上服务抛出异常，怎么获取调用参数？
- 怎样线上调试Dubbo服务代码？
- 怎样动态修改Dubbo的logger级别？
- 怎样减少测试小姐姐重复发请求的麻烦？
- Dubbo运行时有哪些Filter？耗时是多少？
- Dubbo动态代理是怎样实现的？

Dubbo-arthas-demo

<https://github.com/hengyunabc/dubbo-arthas-demo>



```
@RestController
public class UserController {

    @Reference(version = "1.0.0")
    private UserService userService;

    @GetMapping("/user/{id}")
    public User findUserById(@PathVariable Integer id) {
        return userService.findUser(id);
    }
}
```

```
@Service(version = "1.0.0")
public class UserServiceImpl implements UserService {
    @Override
    public User findUser(int id) {
        if (id < 1) {
            throw new IllegalArgumentException("user id < 1, id: " + id);
        }
        for (User user : users) {
            if (user.getId() == id) {
                return user;
            }
        }
        throw new RuntimeException("Can not find user, id: " + id);
    }
}
```

Arthas 快速开始

```
$ wget https://alibaba.github.io/arthas/arthas-boot.jar  
$ java -jar arthas-boot.jar
```

```
hengyunabcdeMacBook-Air:tmp hengyunabc$ java -jar arthas-boot.jar
* [1]: 22342
[2]: 42200 ClientDemoApplication
[3]: 42142 ServerDemoApplication
3
[INFO] arthas home: /Users/hengyunabc/.arthas/lib/3.0.5/arthas
[INFO] Try to attach process 42142
[INFO] Attach process 42142 success.
[INFO] arthas-client connect 127.0.0.1 3658
,---. ,-----.
/ 0 \ | .--. '---. .--' | '---' | / 0 \ |
| .-. || '---.' | | | .--. || .-. || .-. |
| | | || \| \| | | | | | | | | | | | | | |
`--' '--' '--' '--' | | | | | | | | | | | | | |
```

```
wiki: https://alibaba.github.io/arthas
version: 3.0.5
pid: 42142
time: 2018-11-30 21:13:50
$ █
```

Watch - 参数/返回值/异常

```
$ watch com.example.UserService * -e -x 2 '{params,throwExp}'
```

```
$ watch com.example.UserService * -e -x 2 '{params,throwExp}'  
Press Ctrl+C to abort.  
Affect(class-cnt:1 , method-cnt:4) cost in 38 ms.  
ts=2018-11-30 23:18:33; [cost=16.570092ms] result=@ArrayList[  
  @Object[] [  
    @Integer[-1],  
  ],  
  java.lang.IllegalArgumentException: user id < 1, id: -1  
    at com.example.UserServiceImpl.findUser(UserServiceImpl.java:25)  
    at com.alibaba.dubbo.common.bytecode.Wrapper3.invokeMethod(Wrapper3.java)  
    at com.alibaba.dubbo.rpc.proxy.javassist.JavassistProxyFactory$1.doInvoke(JavassistPro  
xyFactory.java:45)  
    at com.alibaba.dubbo.rpc.proxy.AbstractProxyInvoker.invoke(AbstractProxyInvoker.java:7  
1)  
    at com.alibaba.dubbo.config.invoker.DelegateProviderMetaDataInvoker.invoke(DelegatePro  
viderMetaDataInvoker.java:48)  
    at com.alibaba.dubbo.rpc.protocol.InvokerWrapper.invoke(InvokerWrapper.java:52)  
    at com.alibaba.dubbo.rpc.filter.ExceptionFilter.invoke(ExceptionFilter.java:61)  
    at com.alibaba.dubbo.rpc.protocol.ProtocolFilterWrapper$1.invoke(ProtocolFilterWrapper  
.java:68)  
    at com.alibaba.dubbo.monitor.support.MonitorFilter.invoke(MonitorFilter.java:74)  
    at com.alibaba.dubbo.rpc.protocol.ProtocolFilterWrapper$1.invoke(ProtocolFilterWrapper  
.java:68)
```

Redefine – 动态更新代码

```
$ redefine -p classes/com/example/UserServiceImpl.class
```

\$ redefine -h

USAGE:

```
redefine [-c <value>] [-h] [-p <value>]
```

SUMMARY:

Redefine classes. @see Instrumentation#redefineClasses(ClassDefinition...)

EXAMPLES:

```
redefine -p /tmp/Test.class
```

```
redefine -c 327a647b -p /tmp/Test.class /tmp/Test\$Inner.class
```

WIKI:

<https://alibaba.github.io/arthas/redefine>

OPTIONS:

-c, --classloader <value>

classLoader hashcode

-h, --help

this help

-p, --path <value>

.class file paths

```
$ redefine -p /Users/hengyunabc/code/java/dubbo/dubbo-arthas-demo/server-demo/target/classes/com/example/UserServiceImpl.class
redefine success, size: 1
```

Ognl – 执行任意代码

```
$ ognl '@org.apache.log4j.LogManager@getRootLogger()'  
$ sc -d org.apache.log4j.Logger  
$ ognl '@org.slf4j.LoggerFactory@getLogger("root")  
    .setLevel(@ch.qos.logback.classic.Level@DEBUG)'  
$ ognl '@org.slf4j.LoggerFactory@getLogger("root")  
    .getLevel().toString()'  
@String[DEBUG]
```

```
$ ognl '@org.slf4j.LoggerFactory@getLogger("root").setLevel(@ch.qos.logback.classic.Level@DEBU  
null  
$ ognl '@org.slf4j.LoggerFactory@getLogger("root").getLevel().toString()'  
@String[DEBUG]  
$ sc -d org.apache.log4j.Logger  
class-info          org.apache.log4j.Logger  
code-source         /Users/hengyunabc/.m2/repository/org/slf4j/log4j-over-slf4j/1.7.25/log4j-o  
ver-slf4j-1.7.25.jar  
name               org.apache.log4j.Logger
```

TimeTunnel – 录制回放调用

```
$ tt -t com.example.UserServiceImpl findUser  
$ tt -i 1002 -w 'throwExp'
```

```
$ tt -t com.example.UserServiceImpl findUser  
Press Ctrl+C to abort.  
Affect(class-cnt:1 , method-cnt:1) cost in 75 ms.  
INDE  TIMESTAMP      COST(m  IS-R  IS-  OBJECT      CLASS          METHOD  
X           s)        ET     EXP  
-----  
1000  2018-12-01 0  0.3333  true   fal  0x11313e8  UserServiceImpl  findUser  
      1:12:57       45          se    3  
1001  2018-12-01 0  0.3386  true   fal  0x11313e8  UserServiceImpl  findUser  
      1:13:06       1          se    3  
1002  2018-12-01 0  2.4407  fals   tru  0x11313e8  UserServiceImpl  findUser  
      1:13:19       09         e     e    3  
$ tt -i 1002 -w 'throwExp'  
java.lang.RuntimeException: Can not find user, id: 9999  
  at com.example.UserServiceImpl.findUser(UserServiceImpl.java:32)  
  at com.alibaba.dubbo.common.bytecode.Wrapper3.invokeMethod(Wrapper3.java)  
  at com.alibaba.dubbo.rpc.proxy.javassist.JavassistProxyFactory$1.doInvoke(JavassistProxyFactory.java:45)  
  at com.alibaba.dubbo.rpc.proxy.AbstractProxyInvoker.invoke(AbstractProxyInvoker.java:71)  
  at com.alibaba.dubbo.config.invoker.DelegateProviderMetadataInvoker.invoke(DelegatePro
```

Trace – 跟踪调用栈/定位性能瓶颈

```
$ trace com.alibaba.dubbo.rpc.Filter *
$ trace javax.servlet.Servlet *
```

```
$ trace com.alibaba.dubbo.rpc.Filter *
Press Ctrl+C to abort.
Affect(class-cnt:19 , method-cnt:59) cost in 1098 ms.
`---ts=2018-12-01 01:20:28;thread_name=DubboServerHandler-192.168.0.6:20880-thread-25;id=57;is_daemon=true;priority=5;TCCL=sun.misc.Launcher$AppClassLoader@5c647e05
  `---[12.774396ms] com.alibaba.dubbo.rpc.filter.EchoFilter:invoke()
    +---[0.131866ms] com.alibaba.dubbo.rpc.Invocation:getMethodName()
    +---[0.035554ms] java.lang.String>equals()
    `---[12.066301ms] com.alibaba.dubbo.rpc.Invoker:invoke()
      `---[11.789352ms] com.alibaba.dubbo.rpc.filter.ClassLoaderFilter:invoke()
        +---[min=0.005886ms,max=0.051385ms,total=0.072802ms,count=3] java.lang.Thread:currentThread()
          +---[0.034193ms] java.lang.Thread:getContextClassLoader()
          +---[0.03543ms] com.alibaba.dubbo.rpc.Invoker:getInterface()
          +---[0.008347ms] java.lang.Class:getClassLoader()
          +---[min=0.003737ms,max=0.031166ms,total=0.034903ms,count=2] java.lang.Thread:setContextClassLoader()
            `---[11.133971ms] com.alibaba.dubbo.rpc.Invoker:invoke()
              `---[10.937465ms] com.alibaba.dubbo.rpc.filter.GenericFilter:invoke()
                +---[0.022315ms] com.alibaba.dubbo.rpc.Invocation:getMethodName()
```

Jad – 即时反编绎

```
$ jad com.alibaba.dubbo.common.bytecode.Wrapper3  
$ jad com.sun.proxy.$Proxy1
```

```
$ jad com.alibaba.dubbo.common.bytecode.Wrapper3

ClassLoader:  
+-sun.misc.Launcher$AppClassLoader@5c647e05  
  +-sun.misc.Launcher$ExtClassLoader@4b54b685

Location:  
/Users/hengyunabc/.m2/repository/com/alibaba/dubbo/2.5.10/dubbo-2.5.10.jar

/*
 * Decompiled with CFR 0_132.
 *
 * Could not load the following classes:
 *  com.example.User
 *  com.example.UserServiceImpl
 */
package com.alibaba.dubbo.common.bytecode;

import com.alibaba.dubbo.common.bytecode.ClassGenerator;
import com.alibaba.dubbo.common.bytecode.NoSuchMethodException;
```

Thread – 消耗CPU线程

```
$ thread -i 5000  
$ thread -i 5000 -n 3
```

```
$ thread -i 5000  
Threads Total: 229, NEW: 0, RUNNABLE: 12, BLOCKED: 0, WAITING: 211, TIMED_WAITING: 6, TERMINATED: 0
```

ID	NAME	GROUP	PRIORITY	STATE	%CPU	TIME	INTERRUPTIONS	DAEMON
230	DubboServerHandler-192	main	5	RUNNABLE	72	0:1	false	true
31	New I/O server worker	main	5	RUNNABLE	24	0:0	false	true
241	as-command-execute-dae	system	10	RUNNABLE	1	0:0	false	true
233	AsyncAppender-Worker-a	system	9	WAITING	0	0:0	false	true
230	DubboServerHandler-192	main	5	RUNNABLE	66	0:0	false	true

```
$ thread -i 5000 -n 3  
"DubboServerHandler-192.168.0.6:20880-thread-200" Id=230 cpuUsage=66% WAITING on java.util.concurrent.SynchronousQueue$TransferStack@618fc4c4  
    at sun.misc.Unsafe.park(Native Method)  
    - waiting on java.util.concurrent.SynchronousQueue$TransferStack@618fc4c4  
    at java.util.concurrent.locks.LockSupport.park(LockSupport.java:175)  
    at java.util.concurrent.SynchronousQueue$TransferStack.awaitFulfill(SynchronousQueue.java:458)  
    at java.util.concurrent.SynchronousQueue$TransferStack.transfer(SynchronousQueue.java:362)
```

Dashboard

ID	NAME	GROUP	PRIORITY	STATE	%CPU	TIME	INTERRU	DAEMON
155	Timer-for-arthas-dashb	system	10	RUNNABLE	76	0:0	false	true
242	DubboServerHandler-192	main	5	WAITING	14	0:0	false	true
31	New I/O server worker	main	5	RUNNABLE	9	0:0	false	true
123	AsyncAppender-Worker-a	system	9	WAITING	0	0:0	false	true
118	Attach Listener	system	9	RUNNABLE	0	0:0	false	true
23	Curator-ConnectionStat	main	5	WAITING	0	0:0	false	true
26	Curator-Framework-0	main	5	WAITING	0	0:0	false	true
29	DestroyJavaVM	main	5	RUNNABLE	0	0:53	false	false
22	DubboRegistryFailedRet	main	5	TIMED_WAITING	0	0:0	false	true
27	DubboSaveRegistryCache	main	5	WAITING	0	0:0	false	true
Memory	used	total	max	usage	GC			
heap	387M	727M	1820M	21.27%	gc.ps_scavenge.count	87		
ps_eden_space	363M	663M	663M	54.77%	gc.ps_scavenge.time(ms)	709		
ps_survivor_space	8M	9M	9M	89.83%	gc.ps_marksweep.count	1		
ps_old_gen	15M	54M	1365M	1.16%		107		
Runtime								
os.name	Mac OS X							
os.version	10.13.4							
java.version	1.8.0_162							

JVM

```
$ jvm
RUNTIME
-----
MACHINE-NAME          42142@hengyunabcdeMacBook-Air.local
JVM-START-TIME        2018-11-30 20:58:00
MANAGEMENT-SPEC-VERSION 1.2
SPEC-NAME             Java Virtual Machine Specification
SPEC-VENDOR            Oracle Corporation
SPEC-VERSION           1.8
VM-NAME               Java HotSpot(TM) 64-Bit Server VM
VM-VENDOR              Oracle Corporation
VM-VERSION             25.162-b12
INPUT-ARGUMENTS        -Dfile.encoding=UTF-8

CLASS-PATH             /Library/Java/JavaVirtualMachines/jdk1.8.0_162.jdk/Contents/Home/
                      jre/lib/resources.jar:/Library/Java/JavaVirtualMachines/jdk1.8.0_
                      162.jdk/Contents/Home/jre/lib/rt.jar:/Library/Java/JavaVirtualMac
                      hines/jdk1.8.0_162.jdk/Contents/Home/jre/lib/jsse.jar:/Library/Ja
                      va/JavaVirtualMachines/jdk1.8.0_162.jdk/Contents/Home/jre/lib/jce
                      .jar:/Library/Java/JavaVirtualMachines/jdk1.8.0_162.jdk/Contents/
                      Home/jre/lib/charsets.jar:/Library/Java/JavaVirtualMachines/jdk1.
                      8.0_162.jdk/Contents/Home/jre/lib/jfr.jar:/Library/Java/JavaVirtu
```

更多疯狂的想法

- 获取spring context
- 获取dubbo的配置状态
- 更多的命令: help
- Tab补全
- 快捷键: keymap



Thank you !