A6：SPECjvm2008基准测试

1.下载和安装 SPECjvm2008

1.1配置java环境

将解压后的【java-se-8u41-ri】里的数据拷贝至java目录下

配置和修改Linux环境变量

sudo vim /etc/profile

```
wangwenqing@ubuntu:~/Desktop/java/java-se-8u41-ri$ sudo vim /etc/profile
[sudo] password for wangwenqing:
Sorry, try again.
[sudo] password for wangwenqing:
wangwenqing@ubuntu:~/Desktop/java/java-se-8u41-ri$
```

通过命令source /etc/profile 让profile文件立即生效

用javac 测试是否安装成功 是否会出现command not found

```
wangwenqing@ubuntu:~/Desktop/java/java-se-8u41-ri$ source /etc/profile
wangwenqing@ubuntu:~/Desktop/java/java-se-8u41-ri$ javac
Usage: javac <options> <source files>
where possible options include:
  -g                         Generate all debugging info
  -g:none                    Generate no debugging info
  -g:{lines,vars,source}     Generate only some debugging info
  -nowarn                    Generate no warnings
  -verbose                   Output messages about what the compiler is doing
  -deprecation               Output source locations where deprecated APIs are u
sed
  -classpath <path>          Specify where to find user class files and annotati
on processors
  -cp <path>                 Specify where to find user class files and annotati
on processors
  -sourcepath <path>         Specify where to find input source files
  -bootclasspath <path>      Override location of bootstrap class files
  -extdirs <dirs>            Override location of installed extensions
  -endorseddirs <dirs>       Override location of endorsed standards path
  -proc:{none,only}          Control whether annotation processing and/or compil
ation is done.
  -processor <class1>[,<class2>,<class3>...] Names of the annotation processors
```

java -version 查看版本

```
wangwenqing@ubuntu:~/Desktop/java/java-se-8u41-ri$ java -version
openjdk version "1.8.0_41"
OpenJDK Runtime Environment (build 1.8.0_41-b04)
OpenJDK 64-Bit Server VM (build 25.40-b25, mixed mode)
wangwenqing@ubuntu:~/Desktop/java/java-se-8u41-ri$
```

echo $PATH

```
wangwenqing@ubuntu:~/Desktop/java/java-se-8u41-ri$ echo $PATH
/home/wangwenqing/.local/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/
sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/home/wangwenqing/Desktop/java/j
ava-se-8u41-ri/bin
wangwenqing@ubuntu:~/Desktop/java/java-se-8u41-ri$
```

至此 安装完成

1.2 安装 SPECjvm2008

1.下载jar包后需要安装SPECjvm，命令如下，注意需要添加参数-i console。

$ java -jar SPECjvm2008_1_01_setup.jar -i console

```
   /home/wangwenqing/Desktop/SPECjvm2008

PRESS <ENTER> TO INSTALL:



===============================================================================
Installing...
-------------

 [==================|==================|==================|==================]
 [------------------|------------------|------------------|------------------]



===============================================================================
Installation Complete
---------------------

Congratulations. SPECjvm2008 has been successfully installed to:

   /home/wangwenqing/Desktop/SPECjvm2008

PRESS <ENTER> TO EXIT THE INSTALLER:
```

2.测试SPECjvm是否安装成功

在安装目录下找到脚本run-specjvm.sh

./run-specjvm.sh startup.helloworld -ikv

startup.helloworld 用于测试helloworld程序的启动时间，选择这个测试用例是考虑到运行速度比较快。 -ikv的意思是跳过签名检查

```
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$ ./run-specjvm.sh startup.helloworld -i
kv

SPECjvm2008 Base
  Properties file:   none
  Benchmarks:        startup.helloworld

  WARNING: Run will not be compliant.
  Not a compliant sequence of benchmarks for publication.
  Property specjvm.run.checksum.validation must be true for publication.


--- --- --- --- --- --- --- --- ---

  Benchmark:   check
  Run mode:    static run
  Test type:   functional
  Threads:     1
  Iterations:  1
  Run length:  1 operation

Iteration 1 (1 operation) begins: Sun Nov 21 22:26:38 PST 2021
Iteration 1 (1 operation) ends:   Sun Nov 21 22:26:39 PST 2021
```

```
--- --- --- --- --- --- --- --- ---

  Benchmark:   startup.helloworld
  Run mode:    static run
  Test type:   single
  Threads:     1
  Iterations:  1
  Run length:  1 operation

Iteration 1 (1 operation) begins: Sun Nov 21 22:26:39 PST 2021
Iteration 1 (1 operation) ends:   Sun Nov 21 22:26:39 PST 2021
Iteration 1 (1 operation) result: 164.84 ops/m

Valid run!
Score on startup.helloworld: 164.84 ops/m

Results are stored in:
/home/wangwenqing/Desktop/SPECjvm2008/results/SPECjvm2008.001/SPECjvm2008.001.ra
w
Generating reports in:
/home/wangwenqing/Desktop/SPECjvm2008/results/SPECjvm2008.001

Noncompliant composite result: 164.84 ops/m
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$
```

2.一次完整的基准测试

2.1运行java -jar SPECjvm2008.jar --base

```
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$ java -jar SPECjvm2008.jar --base

SPECjvm2008 Base
  Properties file:   none
  Benchmarks:        startup.helloworld startup.compiler.compiler startup.compiler.sunflow startup.compr
ess startup.crypto.aes startup.crypto.rsa startup.crypto.signverify startup.mpegaudio startup.scimark.ff
t startup.scimark.lu startup.scimark.monte_carlo startup.scimark.sor startup.scimark.sparse startup.seri
al startup.sunflow startup.xml.transform startup.xml.validation compiler.compiler compiler.sunflow compr
ess crypto.aes crypto.rsa crypto.signverify derby mpegaudio scimark.fft.large scimark.lu.large scimark.s
or.large scimark.sparse.large scimark.fft.small scimark.lu.small scimark.sor.small scimark.sparse.small
scimark.monte_carlo serial sunflow xml.transform xml.validation

  Kit signature and checksum is validated.
  This can take several minutes.
  Use argument '-ikv' to skip this.
  ....................................passed.

--- --- --- --- --- --- --- --- ---

  Benchmark:   check
  Run mode:    static run
  Test type:   functional
  Threads:     1
  Iterations:  1
  Run length:  1 operation

Iteration 1 (1 operation) begins: Mon Nov 22 19:01:05 PST 2021
Iteration 1 (1 operation) ends:   Mon Nov 22 19:01:06 PST 2021
```

2.2在sunflow卡住

```
--- --- --- --- --- --- --- --- ---

  Benchmark:   startup.compiler.sunflow
  Run mode:    static run
  Test type:   single
  Threads:     1
  Iterations:  1
  Run length:  1 operation

Iteration 1 (1 operation) begins: Mon Nov 22 01:06:41 PST 2021
```

问题重现

```
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$ java -jar SPECjvm2008.jar -ikv startup.compiler.sunflow

SPECjvm2008 Base
  Properties file:   none
  Benchmarks:        startup.compiler.sunflow

  WARNING: Run will not be compliant.
  Not a compliant sequence of benchmarks for publication.
  Property specjvm.run.checksum.validation must be true for publication.


--- --- --- --- --- --- --- --- ---

  Benchmark:   check
  Run mode:    static run
  Test type:   functional
  Threads:     1
  Iterations:  1
  Run length:  1 operation

Iteration 1 (1 operation) begins: Mon Nov 22 18:39:16 PST 2021
Iteration 1 (1 operation) ends:   Mon Nov 22 18:39:17 PST 2021
Iteration 1 (1 operation) result: PASSED

Valid run!
```

如下图，可以看到原始进程号7427，状态为Sl+，测试进程号7443，状态为Sl+。首先可以明确的是进程状态为Sl+表示此进程处于休眠状态（S，即进程陷入了内核态未返回，但是可以接收信号，如果是D的话则表示陷入了内核态未返回，而且不能接受信号，如果是R的话表示仍处于用户态可运行状态）。

```
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$ ps aux | grep --color java
wangwen+    7427  1.3  2.6 2390812 53272 pts/0   Sl+  18:39   0:00 java -jar SPECjvm2008.jar -ikv startu
p.compiler.sunflow
wangwen+    7443 13.4  7.3 2391764 145800 pts/0  Sl+  18:39   0:07 /home/wangwenqing/Desktop/java/java-s
e-8u41-ri/jre/bin/java -classpath SPECjvm2008.jar -Dspecjvm.home.dir=. spec.harness.Launch -bt 1 -ops 1
-crf false -ict -icsv -ss SMALL compiler.sunflow
wangwen+    7490  0.0  0.0  17540   664 pts/1    S+   18:40   0:00 grep --color=auto --color java
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$
```

运行`cat /proc/7443/syscall`可以看到如下信息：

```
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$ sudo cat /proc/7443/syscall
[sudo] password for wangwenqing:
202 0x7f3c250ce9d0 0x0 0x1d16 0x0 0x0 0x7f3c250ce700 0x7ffd73e43da0 0x7f3c26585cd7
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$
```

运行ausyscall

```
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$ ausyscall 202
futex
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$
```

202系统调用称为futex，这是一种常见的系统调用，只知道进程调用futex被困在内核中意味着进程正在等待共享锁，这实际上是进程进入s状态的最常见情况，但是共享锁被占用的原因很难确定。

解决方案

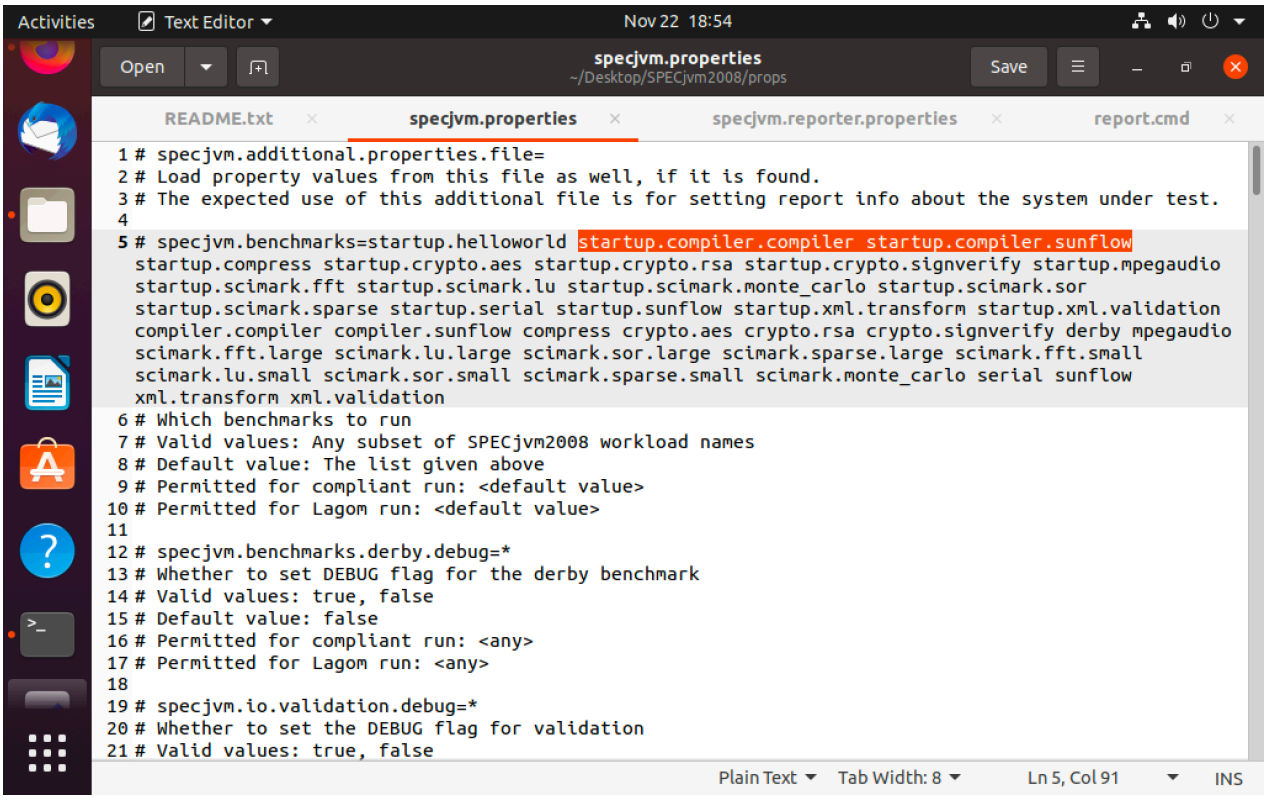
看到文档里说这几项不能运行

For Java SE 8 and later:

- The following SPECjvm2008 benchmarks are known to not work.
  - `startup.compiler.compiler`
  - `startup.compiler.sunflow`
  - `compiler.compiler`
  - `compiler.sunflow`
- However, you may be able to run the remaining benchmarks by us
- For information on how to do this, see:

同时删除startup.sunflow

需要修改配置文件删除了这几项接着跑



此外在更改后需要指定配置文件

运行指令为 ./run-specjvm.sh -base -pf props/specjvm.properties

```
wangwenqing@ubuntu:~/Desktop/SPECjvm2008$ ./run-specjvm.sh -base -pf props/specjvm.properties

SPECjvm2008 Base
  Properties file:   props/specjvm.properties
  Benchmarks:        startup.helloworld startup.compress startup.crypto.aes startup.crypto.rsa startup.c
rypto.signverify startup.mpegaudio startup.scimark.fft startup.scimark.lu startup.scimark.monte_carlo st
artup.scimark.sor startup.scimark.sparse startup.serial startup.xml.transform startup.xml.validation com
press crypto.aes crypto.rsa crypto.signverify derby mpegaudio scimark.fft.large scimark.lu.large scimark
.sor.large scimark.sparse.large scimark.fft.small scimark.lu.small scimark.sor.small scimark.sparse.smal
l scimark.monte_carlo serial xml.transform xml.validation

  WARNING: Run will not be compliant.
  Not a compliant sequence of benchmarks for publication.

  Kit signature and checksum is validated.
  This can take several minutes.
  Use argument '-ikv' to skip this.
  ....................
```

2.3获取测试结果

cd /SPECjvm2008/results/

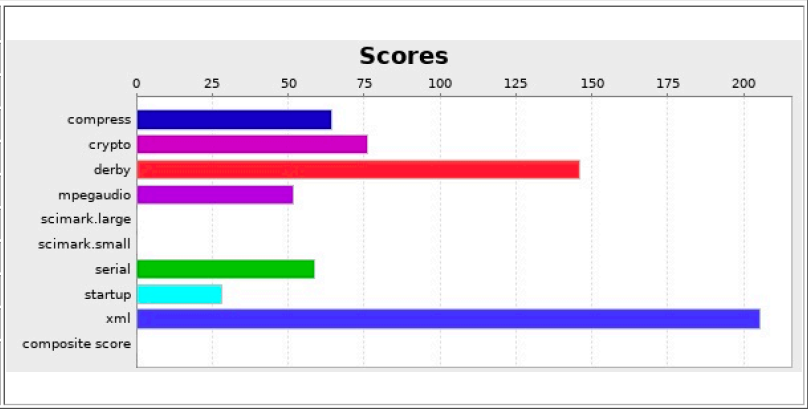
SPECjvm2008 Base

Noncompliant composite result: 0 ops/m

n/a n/a
Oracle Corporation OpenJDK 64-Bit Server VM
Tested by: n/a
Test date: Mon Nov 22 20:50:11 PST 2021

Run is valid, but not compliant

Benchmark	ops/m
compress	64.52
crypto	76.3
derby	145.92
mpegaudio	51.83
scimark.large	0
scimark.small	0
serial	58.61
startup	28.3
xml	205.37
Noncompliant composite result: 0 ops/m	



3.对比官方发布结果

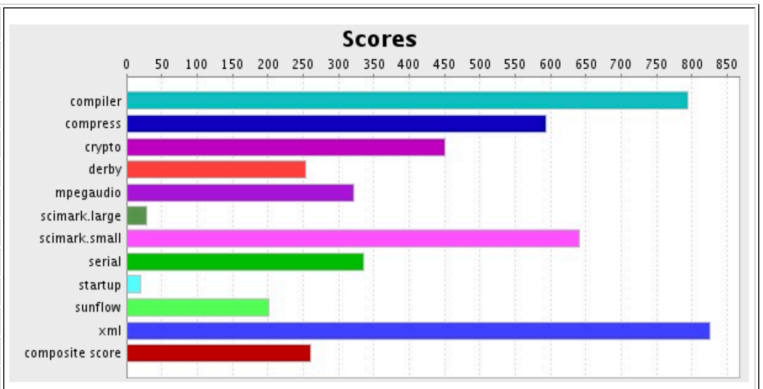
SPECjvm2008 Base

Composite result: 260.08 SPECjvm2008 Base ops/m

Sun Microsystems, Inc. Sun Fire X4450
Sun Microsystems, Inc. Java Hotspot(TM) 64-Bit Server VM on Solaris
Tested by: Sun Microsystems, Inc.
Test date: Wed Jun 04 04:54:27 EDT 2008

Run is compliant

Benchmark	ops/m
compiler	795.22
compress	593.68
crypto	451.6
derby	253.1
mpegaudio	321.72
scimark.large	28.48
scimark.small	641.19
serial	335.89
startup	20.82
sunflow	201.23
xml	825.51
Composite result: 260.08 SPECjvm2008 Base ops/m	



可以看到首先由于sunflow不能运行所以我最后的运行结果是not compliant的

和官方发布结果相比，我的运行结果中benchmark运行时间都要小一些.在我的运行结果中不管是使用大数据集还是小数据集进行迭代测试，在规定时间内都是0 ops/m.

4.谈谈自己运行一次标准的基准测试的感想和体会

在本次标准测试中，熟悉了软件的正确安装、参数设置和使用。此外，也根据原文档的tutorial进行改动。进行了堵塞测试的情景复现，通过参考官方文档以及谷歌博客进行问题排查和解决，最后比较了标准文档和测试结果的差异，并分析原因，收获颇丰。

5.Reference

https://blog.csdn.net/tylisitonny/article/details/114634878