

高级操作系统 实验报告

学号： 2015310652
姓名： 高伟

一、 实验内容

HyperKernel

Commuter

二、 HyperKernel

1. 实验环境

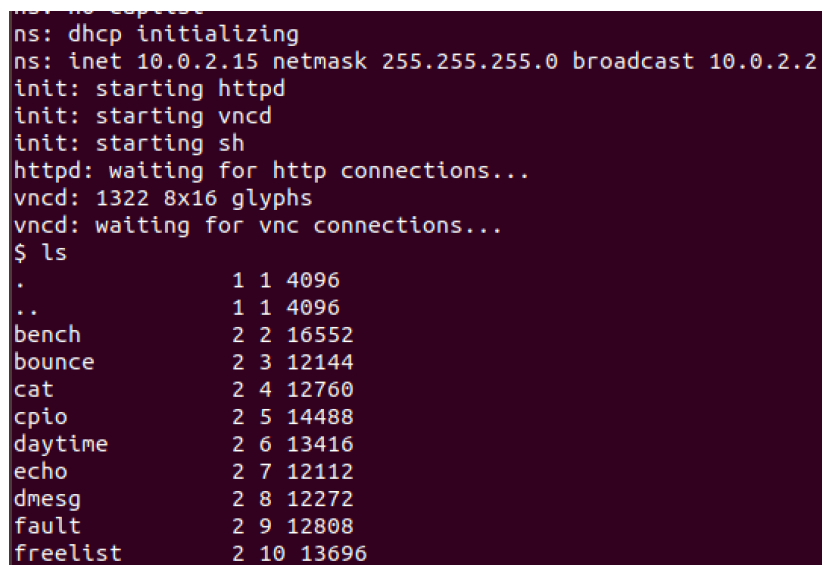
Ubuntu 17.10 虚拟机

GCC : 7.2

2. 运行测试

安装 QEMU, Binutil

make && make qemu



```
ns: dhcp initializing
ns: inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.2
init: starting httpd
init: starting vncd
init: starting sh
httpd: waiting for http connections...
vncd: 1322 8x16 glyphs
vncd: waiting for vnc connections...
$ ls
.          1 1 4096
..         1 1 4096
bench     2 2 16552
bounce    2 3 12144
cat        2 4 12760
cpio       2 5 14488
daytime    2 6 13416
echo       2 7 12112
dmesg      2 8 12272
fault      2 9 12808
freelist   2 10 13696
```

3. 验证

安装 LLVM

Sudo apt-get install llvm-5.0 llvm-5.0-dev

安装 Clang

Sudo apt-get install clang-5.0 clang-5.0-dev

安装 Z3

需要注意的是，需要配置安装的位置，从而指定 Z3 包的位置，否则出现找不到 z3 的情况。

```
python scripts/mk_make.py --  
prefix=/home/zhenyanjie/gaowei_zhenbao/os/z3install2 -  
-python --  
pypkgdir=/home/zhenyanjie/gaowei_zhenbao/os/z3install2  
/lib/python-2.7/site-packages
```

运行测试

```
cg@ubuntu:~/workspace/os/test/hv6$ make hv6-verify  
CC_IR      o.x86_64/hv6/device.ll  
CC_IR      o.x86_64/hv6/fd.ll  
CC_IR      o.x86_64/hv6/invariants.ll  
CC_IR      o.x86_64/hv6/ioport.ll  
CC_IR      o.x86_64/hv6/ipc.ll  
CC_IR      o.x86_64/hv6/mmap.ll  
CC_IR      o.x86_64/hv6/proc.ll  
CC_IR      o.x86_64/hv6/syscall.ll  
CC_IR      o.x86_64/hv6/sysctl.ll  
CC_IR      o.x86_64/hv6/vm.ll  
GEN        o.x86_64/hv6/hv6.ll  
C++        o.x86_64/irpy/compiler/PyEmitter.o  
C++        o.x86_64/irpy/compiler/Emitter.o  
C++        o.x86_64/irpy/compiler/PyLLVMEmitter.o  
C++        o.x86_64/irpy/compiler/irpy.o  
C++        irpy/compiler/irpy  
IRPY       o.x86_64/hv6/hv6.py  
Parsing took 30.444 ms.  
Emitting took 12471.6 ms.  
PY2        hv6-verify  
Using z3 v4.8.0.0  
.....
```

由于时间较长，于是单独测试了样例。

```
cg@ubuntu:~/workspace/os/test/hv6$ make hv6-verify -- -v --failfast HV6.test_sys_dup  
PY2        hv6-verify  
Using z3 v4.8.0.0  
test_sys_dup (__main__.HV6) ... ok  
  
-----  
Ran 1 test in 21.152s  
  
OK
```

```

cgn@ubuntu:~/workspace/os/test/hv6$ make hv6-verify -- -v --failfast HV6.test_sys_alloc_frame
PY2      hv6-verify
Using z3 v4.8.0.0
test_sys_alloc_frame (__main__.HV6) ... ok

-----
Ran 1 test in 31.555s

OK
cgn@ubuntu:~/workspace/os/test/hv6$ make hv6-verify -- -v --failfast HV6.test_sys_free_frame
PY2      hv6-verify
Using z3 v4.8.0.0
test_sys_free_frame (__main__.HV6) ... ok

-----
Ran 1 test in 14.744s

OK

```

```

cgn@ubuntu:~/workspace/os/test/hv6$ make hv6-verify -- -v --failfast HV6.test_sys_set_runnable
PY2      hv6-verify
Using z3 v4.8.0.0
test_sys_set_runnable (__main__.HV6) ... ok

-----
Ran 1 test in 4.728s

I
OK
cgn@ubuntu:~/workspace/os/test/hv6$ make hv6-verify -- -v --failfast HV6.test_sys_map_pml4
PY2      hv6-verify
Using z3 v4.8.0.0
test_sys_map_pml4 (__main__.HV6) ... ok

-----
Ran 1 test in 15.009s

OK

```

三、Commuter

Commuter 安装过程繁杂困难，重点介绍下 BUG

1. 系统

一开始采用 17.10，但是最后发现编译 linux-mtrace 的时候，总是报
pic 错误，调试不过，就换成了 16.04

2. Z3

直接使用 setup 安装，发现 Z3 编译不通过，通过添加—z3-commit

add8d26，即最新的版本通过

3. 安装 mtrace

由于系统没有安装 pkg-config，一直报 libelf 错，以为是 libelfin 安装错误，卡了很久，最后发现是 pkg-config 没装。

4. 安装 linux-mtrace

开始在 17.10 安装一直报错，最后在 16.04 下使用 gcc 5.4 安装成功。

5. Sv6

SV6 下载之后，需要修改几个地方，参考谭院士的修改

[修改了 timeconst.pl373 行@val](#) 和添加了

compiler-gcc5.h。

关闭 Werror，-std=c++11，以及修改 thread_local，和 pagefault 问题。

6. 测试运行

产生大量的数据

debug.py	model.out.034	model.out.073	model.out.112	model.out.151	model.out.190	model.out.229	testgen.c.013	testgen.c.052	testgen.c.091	testgen.c.130	testgen.c.169	testgen.c.208
ext	model.out.035	model.out.074	model.out.113	model.out.152	model.out.191	model.out.230	testgen.c.014	testgen.c.053	testgen.c.092	testgen.c.131	testgen.c.170	testgen.c.209
graph.py	model.out.036	model.out.075	model.out.114	model.out.153	model.out.192	model.py	testgen.c.015	testgen.c.054	testgen.c.093	testgen.c.132	testgen.c.171	testgen.c.210
graph.pyc	model.out.037	model.out.076	model.out.115	model.out.154	model.out.193	model.pyc	testgen.c.016	testgen.c.055	testgen.c.094	testgen.c.133	testgen.c.172	testgen.c.211
model.out	model.out.038	model.out.077	model.out.116	model.out.155	model.out.194	models	testgen.c.017	testgen.c.056	testgen.c.095	testgen.c.134	testgen.c.173	testgen.c.212
model.out.000	model.out.039	model.out.078	model.out.117	model.out.156	model.out.195	NOTES	testgen.c.018	testgen.c.057	testgen.c.096	testgen.c.135	testgen.c.174	testgen.c.213
model.out.001	model.out.040	model.out.079	model.out.118	model.out.157	model.out.196	par-mcan.py	testgen.c.019	testgen.c.058	testgen.c.097	testgen.c.136	testgen.c.175	testgen.c.214
model.out.002	model.out.041	model.out.080	model.out.119	model.out.158	model.out.197	par-mtrace.py	testgen.c.020	testgen.c.059	testgen.c.098	testgen.c.137	testgen.c.176	testgen.c.215
model.out.003	model.out.042	model.out.081	model.out.120	model.out.159	model.out.198	par-spec.py	testgen.c.021	testgen.c.060	testgen.c.099	testgen.c.138	testgen.c.177	testgen.c.216
model.out.004	model.out.043	model.out.082	model.out.121	model.out.160	model.out.199	progress.py	testgen.c.022	testgen.c.061	testgen.c.100	testgen.c.139	testgen.c.178	testgen.c.217
model.out.005	model.out.044	model.out.083	model.out.122	model.out.161	model.out.200	progress.pyc	testgen.c.023	testgen.c.062	testgen.c.101	testgen.c.140	testgen.c.179	testgen.c.218
model.out.006	model.out.045	model.out.084	model.out.123	model.out.162	model.out.201	README.md	testgen.c.024	testgen.c.063	testgen.c.102	testgen.c.141	testgen.c.180	testgen.c.219
model.out.007	model.out.046	model.out.085	model.out.124	model.out.163	model.out.202	setup	testgen.c.025	testgen.c.064	testgen.c.103	testgen.c.142	testgen.c.181	testgen.c.220
model.out.008	model.out.047	model.out.086	model.out.125	model.out.164	model.out.203	setup.py	testgen.c.026	testgen.c.065	testgen.c.104	testgen.c.143	testgen.c.182	testgen.c.221
model.out.009	model.out.048	model.out.087	model.out.126	model.out.165	model.out.204	sinsyn.py	testgen.c.027	testgen.c.066	testgen.c.105	testgen.c.144	testgen.c.183	testgen.c.222
model.out.010	model.out.049	model.out.088	model.out.127	model.out.166	model.out.205	sinsyn.pyc	testgen.c.028	testgen.c.067	testgen.c.106	testgen.c.145	testgen.c.184	testgen.c.223
model.out.011	model.out.050	model.out.089	model.out.128	model.out.167	model.out.206	sintest.py	testgen.c.029	testgen.c.068	testgen.c.107	testgen.c.146	testgen.c.185	testgen.c.224
model.out.012	model.out.051	model.out.090	model.out.129	model.out.168	model.out.207	sintest.pyc	testgen.c.030	testgen.c.069	testgen.c.108	testgen.c.147	testgen.c.186	testgen.c.225
model.out.013	model.out.052	model.out.091	model.out.130	model.out.169	model.out.208	spec.py	testgen.c.031	testgen.c.070	testgen.c.109	testgen.c.148	testgen.c.187	testgen.c.226
model.out.014	model.out.053	model.out.092	model.out.131	model.out.170	model.out.209	spec.pyc	testgen.c.032	testgen.c.071	testgen.c.110	testgen.c.149	testgen.c.188	testgen.c.227
model.out.015	model.out.054	model.out.093	model.out.132	model.out.171	model.out.210	split-testgen.py	testgen.c.033	testgen.c.072	testgen.c.111	testgen.c.150	testgen.c.189	testgen.c.228
model.out.016	model.out.055	model.out.094	model.out.133	model.out.172	model.out.211	syntest.py	testgen.c.034	testgen.c.073	testgen.c.112	testgen.c.151	testgen.c.190	testgen.c.229
model.out.017	model.out.056	model.out.095	model.out.134	model.out.173	model.out.212	syntypes.py	testgen.c.035	testgen.c.074	testgen.c.113	testgen.c.152	testgen.c.191	testgen.c.230
model.out.018	model.out.057	model.out.096	model.out.135	model.out.174	model.out.213	syntypes.pyc	testgen.c.036	testgen.c.075	testgen.c.114	testgen.c.153	testgen.c.192	testgen.py
model.out.019	model.out.058	model.out.097	model.out.136	model.out.175	model.out.214	TASKS	testgen.c.037	testgen.c.076	testgen.c.115	testgen.c.154	testgen.c.193	testgen.pyc
model.out.020	model.out.059	model.out.098	model.out.137	model.out.176	model.out.215	testgen.c	testgen.c.038	testgen.c.077	testgen.c.116	testgen.c.155	testgen.c.194	tools
model.out.021	model.out.060	model.out.099	model.out.138	model.out.177	model.out.216	testgen.c.000	testgen.c.039	testgen.c.078	testgen.c.117	testgen.c.156	testgen.c.195	viewer
model.out.022	model.out.061	model.out.100	model.out.139	model.out.178	model.out.217	testgen.c.001	testgen.c.040	testgen.c.079	testgen.c.118	testgen.c.157	testgen.c.196	web
model.out.023	model.out.062	model.out.101	model.out.140	model.out.179	model.out.218	testgen.c.002	testgen.c.041	testgen.c.080	testgen.c.119	testgen.c.158	testgen.c.197	z3util.py
model.out.024	model.out.063	model.out.102	model.out.141	model.out.180	model.out.219	testgen.c.003	testgen.c.042	testgen.c.081	testgen.c.120	testgen.c.159	testgen.c.198	z3util.pyc
model.out.025	model.out.064	model.out.103	model.out.142	model.out.181	model.out.220	testgen.c.004	testgen.c.043	testgen.c.082	testgen.c.121	testgen.c.160	testgen.c.199	
model.out.026	model.out.065	model.out.104	model.out.143	model.out.182	model.out.221	testgen.c.005	testgen.c.044	testgen.c.083	testgen.c.122	testgen.c.161	testgen.c.200	
model.out.027	model.out.066	model.out.105	model.out.144	model.out.183	model.out.222	testgen.c.006	testgen.c.045	testgen.c.084	testgen.c.123	testgen.c.162	testgen.c.201	
model.out.028	model.out.067	model.out.106	model.out.145	model.out.184	model.out.223	testgen.c.007	testgen.c.046	testgen.c.085	testgen.c.124	testgen.c.163	testgen.c.202	
model.out.029	model.out.068	model.out.107	model.out.146	model.out.185	model.out.224	testgen.c.008	testgen.c.047	testgen.c.086	testgen.c.125	testgen.c.164	testgen.c.203	
model.out.030	model.out.069	model.out.108	model.out.147	model.out.186	model.out.225	testgen.c.009	testgen.c.048	testgen.c.087	testgen.c.126	testgen.c.165	testgen.c.204	
model.out.031	model.out.070	model.out.109	model.out.148	model.out.187	model.out.226	testgen.c.010	testgen.c.049	testgen.c.088	testgen.c.127	testgen.c.166	testgen.c.205	
model.out.032	model.out.071	model.out.110	model.out.149	model.out.188	model.out.227	testgen.c.011	testgen.c.050	testgen.c.089	testgen.c.128	testgen.c.167	testgen.c.206	
model.out.033	model.out.072	model.out.111	model.out.150	model.out.189	model.out.228	testgen.c.012	testgen.c.051	testgen.c.090	testgen.c.129	testgen.c.168	testgen.c.207	

运行：正在运行，比较慢

```
ballocc: write bitmap block at sector 40
CC      o.mtrace/kernel/incbin.o
GEN     o.mtrace/kernel/sysvectors.cc
GEN     o.mtrace/kernel/version.cc
CXX     o.mtrace/kernel/version.o
GEN     o.mtrace/kernel/kconfig.cc
LD       o.mtrace/kernel.elf
awk: line 14: syntax error at or near *
Running...
```