

Commuter Project Report

commuter

环境建立

- qemu运行ubuntu 16.04虚拟机，内核版本为4.13
- git clone <https://github.com/aclements/commuter.git>
 - 按照readme进行运行过程

运行与Debug

- 编译错误
 - has_trival_default_constructor, 在查资料过程中，发现此函数已经改为is_trivially_default_constructable，对应的很多函数都改为此风格。一开始我考虑可以对所有的函数改一下名字，后来发现会有一个static_assert()一直造成panic,从而采取把这些代码注释的方法暂时解决。
 - __thread，已经改为thread_local

```
lib/malloc.cc: In member function 'T* (anonymous)::linear_allocator::default_allocator()':
lib/malloc.cc:113:26: error: 'template-class 'struct std::has_trivial_default_constructor' is deprecated [-Werror=deprecated-declarations]
    static_assert(std::has_trivial_default_constructor::value,
                  ^~~~~~
In file included from stdlib/memory.h:
from lib/malloc.cc:11:
/usr/include/c++/5/type_traits:138:12: note: declared here
struct has_trivial_default_constructor
      ^
lib/malloc.cc: At global scope:
lib/malloc.cc:166:48: error: non-local variable '(anonymous)::free_runs' declared '___thread' needs dynamic initialization
    __thread block_list free_runs[MAX_ARRAY_SIZE];
                                                ^
lib/malloc.cc:166:23: note: C++11 'thread_local' allows dynamic initialization and destruction
    __thread block_list free_runs[MAX_ARRAY_SIZE];
                        ^
lib/malloc.cc:550:40: error: non-local variable '(anonymous)::free_fragments' declared '___thread' needs dynamic initialization
    __thread block_list free_fragments[13];
                                ^
```

- tsc_hint[256],定义了但是没有使用，采取注释未使用的变量的方法将其注释掉。

```
bin/linkbench.cc:52:40: error: 'tsc_hist' defined but not used [-Werror=unused-variable]
static histogram_log<uint64_t, 1024> tsc_hist[256];
                                         ^
ccplus: all warnings being treated as errors
Makefile:138: recipe for target 'o.mtrace/bin/linkbench.o' failed
make: *** [o.mtrace/bin/linkbench.o] Error 1
make: *** Waiting for unfinished jobs....
CXX o.mtrace/bin/mailbench.o
Traceback (most recent call last):
File './setup', line 282, in <module>
main()
File './setup', line 78, in main
(failure)
File './setup', line 278, in component svcs
```

- Makefile 175: recipe for target "o.mtrace/fs.img"失败，使用ftruncate(fsfd, 128 * 1024 * 1024);设置文件大小。

```
STRIP o.mtrace/bin/crpbench
LD o.mtrace/bin/benchhdr.unstripped
STRIP o.mtrace/bin/benchhdr
LD o.mtrace/bin/monkstats.unstripped
STRIP o.mtrace/bin/monkstats
LD o.mtrace/bin/countbench.unstripped
STRIP o.mtrace/bin/countbench
LD o.mtrace/bin/rev.unstripped
STRIP o.mtrace/bin/rev
LD o.mtrace/bin/local_server.unstripped
STRIP o.mtrace/bin/local_server
LD o.mtrace/bin/local_client.unstripped
STRIP o.mtrace/bin/local_client
LD o.mtrace/bin/mailbench.unstripped
STRIP o.mtrace/bin/mailbench
LD o.mtrace/bin/mailfilter.unstripped
STRIP o.mtrace/bin/mailfilter
LD o.mtrace/bin/based4.unstripped
STRIP o.mtrace/bin/based4
LD o.mtrace/bin/tee.unstripped
STRIP o.mtrace/bin/tee
LD o.mtrace/bin/ln.unstripped
STRIP o.mtrace/bin/ln
LD o.mtrace/bin/forktest.unstripped
STRIP o.mtrace/bin/forktest
LD o.mtrace/bin/fdbench.unstripped
STRIP o.mtrace/bin/fdbench
LD o.mtrace/bin/mail-envelope.unstripped
STRIP o.mtrace/bin/mail-envelope
LD o.mtrace/bin/mail-gmail.unstripped
STRIP o.mtrace/bin/mail-gmail
LD o.mtrace/bin/mail-deliver.unstripped
STRIP o.mtrace/bin/mail-deliver
LD o.mtrace/bin/disktest.unstripped
STRIP o.mtrace/bin/disktest
LD o.mtrace/bin/dd.unstripped
STRIP o.mtrace/bin/dd
CXX o.mtrace/bin/fsfstest.o
LD o.mtrace/bin/fsfstest.unstripped
STRIP o.mtrace/bin/fsfstest
LD o.mtrace/bin/memtest_string_match.unstripped
STRIP o.mtrace/bin/memtest_string_match
LD o.mtrace/bin/memtest_matrix_mult.unstripped
STRIP o.mtrace/bin/memtest_matrix_mult
LD o.mtrace/bin/memtest_wmm.unstripped
STRIP o.mtrace/bin/memtest_wmm
WFS o.mtrace/fs.img
used 41 (bit 1 minode 38) free 41 total 4096
read: success
Makefile:175: recipe for target 'o.mtrace/fs.img' failed
make: *** [o.mtrace/fs.img] Error 1
```

修改完上述文件后，可以编译通过，此时按照commuter github上的介绍进行下一步的运行。

- 运行

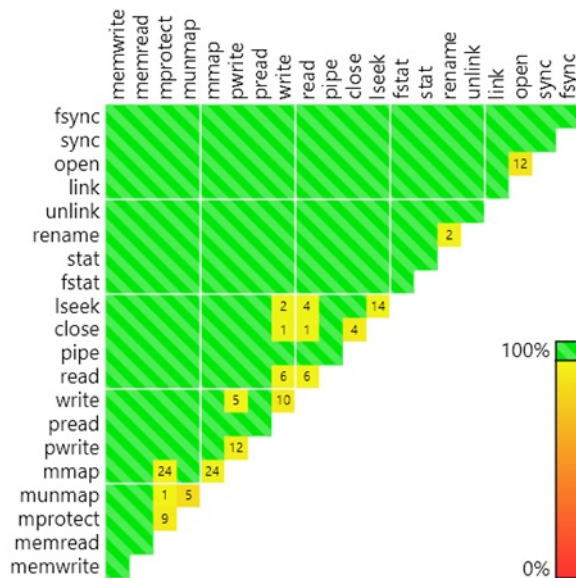
- 运行前，先按照提示信息，设置环境变量，source ext/env.sh
- 生成测试样例，时间很长，可以考虑做其他的事情。

```
./par-spec.py models.fs -t testgen.c -m model.out --max-tests-per-path 500
./split-testgen.py -d ext/sv6/libutil < testgen.c
```

- 运行并行版本，提高效率

```
cd ext/sv6
../../par-mtrace.py -m xv6
../../par-mscan.py --kernel o.mtrace/kernel.elf > mscan-sv6.out
```

- Page_fault. 参照谭同学的关于FS寄存器初始化的代码，添加到相关文件中，修复此错误。
- mscan提示找不到动态链接库动态链接库libdwf+++.so，locate libdwf+++.so,发现是libelf里的动态链接库，因此考虑增加环境变量。在env.sh中进行如下修改：
LD_LIBRARY_PATH=/home/ubuntu/commuter/ext/libelfin/elf:/home/ubuntu/commuter/ext/libelfin/dwarf:/home/ubuntu/
- 运行过程中，由于实体机资源有限，核数设置为16，内存大小为4G,最后运行结果中，mtrace.out.*平均有1.5G,差不多共24G，运行时间比较长。一开始跑了几次，发现要等很久，以为是程序有问题；后来与人沟通发现就是要跑很久；后来又遇到磁盘空间不够的情况，只能扩大空间。
- 结果运行完成后，可以使用tools文件下的summarize和make-heatmaps对结果进行可视化,SVG图片格式可以使用chrome下的插件SVG-Viewer进行查看。



总结

本次实验将commuter在高版本的GCC环境下运行了起来，并且通过实践了解了mtrace的使用，具有指导意义。