20150527 윤형준

Pintos PJ #0

우선 pintos/src/threads/build 에서 make check 를 통하여 수정한 makefile 을 실행한다. Make.tests 에서 수정할 부분은 다음과 같다.

```
# Test names.
tests/threads_TESTS = $(addprefix tests/threads/, alarm-single    \
hello                                                             \
alarm-multiple alarm-simultaneous alarm-priority alarm-zero   \
alarm-negative priority-change priority-donate-one      \
priority-donate-multiple priority-donate-multiple2      \
priority-donate-nest priority-donate-sema priority-donate-lower   \
priority-fifo priority-preempt priority-sema priority-condvar   \
priority-donate-chain                                                \
mlfqs-load-1 mlfqs-load-60 mlfqs-load-avg mlfqs-recent-1 mlfqs-fair-2 \
mlfqs-fair-20 mlfqs-nice-2 mlfqs-nice-10 mlfqs-block)

# Sources for tests.
tests/threads_SRC  = tests/threads/tests.c
tests/threads_SRC += tests/threads/hello.c
tests/threads_SRC += tests/threads/alarm-wait.c
tests/threads_SRC += tests/threads/alarm-simultaneous.c
tests/threads_SRC += tests/threads/alarm-priority.c
tests/threads_SRC += tests/threads/alarm-zero.c
tests/threads_SRC += tests/threads/alarm-negative.c
tests/threads_SRC += tests/threads/priority-change.c
tests/threads_SRC += tests/threads/priority-donate-one.c
tests/threads_SRC += tests/threads/priority-donate-multiple.c
tests/threads_SRC += tests/threads/priority-donate-multiple2.c
tests/threads_SRC += tests/threads/priority-donate-nest.c
tests/threads_SRC += tests/threads/priority-donate-sema.c
tests/threads_SRC += tests/threads/priority-donate-lower.c
tests/threads_SRC += tests/threads/priority-fifo.c
tests/threads_SRC += tests/threads/priority-preempt.c
tests/threads_SRC += tests/threads/priority-sema.c
tests/threads_SRC += tests/threads/priority-condvar.c
tests/threads_SRC += tests/threads/priority-donate-chain.c
tests/threads_SRC += tests/threads/mlfqs-load-1.c
tests/threads_SRC += tests/threads/mlfqs-load-60.c
tests/threads_SRC += tests/threads/mlfqs-load-avg.c
tests/threads_SRC += tests/threads/mlfqs-recent-1.c
tests/threads_SRC += tests/threads/mlfqs-fair.c
tests/threads_SRC += tests/threads/mlfqs-block.c
```

name 과 source 에 각각 추가한 hello 를 추가하여 주자.

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pintos run ~를 실행하게 되면, pintos/src/utils/pintos 명령을 통하여 pintos/src/tests/threads/tests.c 의 void 형 함수 run_test 가 실행되게 된다.

```
void
run_test (const char *name)
{
  const struct test *t;

  for (t = tests; t < tests + sizeof tests / sizeof *tests; t++)
    if (!strcmp (name, t->name))
      {
        test_name = name;
        msg ("begin");
        t->function ();
        msg ("end");
        return;
      }
  PANIC ("no test named \"%s\"", name);
}
```

t 는 상위의 tests 집합의 원소들을 가르키고,

```
static const struct test tests[] =
  {
    {"alarm-single", test_alarm_single},
    {"hello", test_hello},
    {"alarm-multiple", test_alarm_multiple},
    {"alarm-simultaneous", test_alarm_simultaneous},
    {"alarm-priority", test_alarm_priority},
    {"alarm-zero", test_alarm_zero},
    {"alarm-negative", test_alarm_negative},
    {"priority-change", test_priority_change},
    {"priority-donate-one", test_priority_donate_one},
    {"priority-donate-multiple", test_priority_donate_multiple},
    {"priority-donate-multiple2", test_priority_donate_multiple2},
    {"priority-donate-nest", test_priority_donate_nest},
    {"priority-donate-sema", test_priority_donate_sema},
    {"priority-donate-lower", test_priority_donate_lower},
    {"priority-donate-chain", test_priority_donate_chain},
    {"priority-fifo", test_priority_fifo},
    {"priority-preempt", test_priority_preempt},
    {"priority-sema", test_priority_sema},
    {"priority-condvar", test_priority_condvar},
    {"mlfqs-load-1", test_mlfqs_load_1},
    {"mlfqs-load-60", test_mlfqs_load_60},
    {"mlfqs-load-avg", test_mlfqs_load_avg},
    {"mlfqs-recent-1", test_mlfqs_recent_1},
    {"mlfqs-fair-2", test_mlfqs_fair_2},
    {"mlfqs-fair-20", test_mlfqs_fair_20},
    {"mlfqs-nice-2", test_mlfqs_nice_2},
    {"mlfqs-nice-10", test_mlfqs_nice_10},
    {"mlfqs-block", test_mlfqs_block},
    {"hello", test_hello},
  };
```

예시에서는 name 인 hello 를 찾아 func 인 test_hello 를 시작하게 된다.
이는 tests.h 에 extern 을 통하여 test_func 으로서 선언되어 있다.

이를 통해 만든 hello.c 의 test_hello funciton 이 실행되게 된다.

```c
/* prints "hello, world!" */

#include <stdio.h>
#include "tests/threads/tests.h"

void
test_hello(void)
{
  printf("hello, world!");
  pass();
}
```

실행된 boch 에서는 hello world 의 출력이 begin 된다.

```
cs20150527@cs330-7:~/pintos/src/threads$ pintos -v -- -q run hello
Writing command line to /tmp/zU097ERi7t.dsk...
squish-pty bochs -q
========================================================================
                       Bochs x86 Emulator 2.2.6
               Build from CVS snapshot on January 29, 2006
========================================================================
00000000000i[     ] reading configuration from bochsrc.txt
00000000000i[     ] installing nogui module as the Bochs GUI
00000000000i[     ] using log file bochsout.txt
Kernel command line: -q run hello
Pintos booting with 4,096 kB RAM...
375 pages available in kernel pool.
374 pages available in user pool.
Calibrating timer...  204,600 loops/s.
Boot complete.
Executing 'hello':
(hello) begin
hello, world!(hello) PASS
(hello) end
Execution of 'hello' complete.
Timer: 33 ticks
Thread: 0 idle ticks, 36 kernel ticks, 0 user ticks
Console: 364 characters output
Keyboard: 0 keys pressed
Powering off...
========================================================================
Bochs is exiting with the following message:
[UNMP ] Shutdown port: shutdown requested
========================================================================
```