

6. Exercises

See the book for exercises using [helgrind](#), i.e. [valgrind](#) --tool=helgrind

Example: Q1,2 [main-race.c](#)

```
1  #include <stdio.h>
2
3  #include "mythreads.h"
4
5  int balance = 0;
6
7  void* worker(void* arg) {
8      balance++; // unprotected access
9      return NULL;
10 }
11
12 int main(int argc, char *argv[]) {
13     pthread_t p;
14     Pthread_create(&p, NULL, worker, NULL);
15     balance++; // unprotected access
16     Pthread_join(p, NULL);
17     return 0;
18 }
```

```
$ valgrind --tool=helgrind ./main-race
```

```
...
==25147== Possible data race during read of size 4 at 0x30A040 by thread #1
==25147== Locks held: none
...
==25147== This conflicts with a previous write of size 4 by thread #2
==25147== Locks held: none
...
```

Fix using a lock.