

## **Races and locks**

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How many data races does the following two-thread program have?

```
int counter = 0;
```

---

thread t

```
int cnt;
```

```
1 cnt = counter;  
2 counter = cnt + 1;
```

thread u

```
int cnt;
```

```
cnt = counter;           3  
cnt = cnt + 1;          4  
System.out.println(cnt); 5
```

1. One
2. Two
3. None
4. It depends on the run

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1. It always prints 0
2. It always prints 1
3. It sometimes prints 0 and sometimes prints 1
4. It sometimes prints 1 and sometimes prints 2

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What does the following two-thread program print?

```
Lock one = new Lock(); Lock two = new Lock();
```

---

thread t

```
1 one.lock();
2 two.lock();
3 System.out.println("t");
4 two.unlock();
5 one.unlock();
```

thread u

```
6 one.lock();
7 two.lock();
8 System.out.println("u");
9 two.unlock();
10 one.unlock();
```

1. It prints "t" followed by "u".
2. It prints "u" followed by "t".
3. Either of the answers above.
4. Either of the answers above or it does not print anything.

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