CS 2110, SP24

Discussion 8: Loop invariants

Task 1

Precondition:

0   c.length

c: [?   ]

Invariant:

0   k   c.length

c: [== 0 | ?   ]
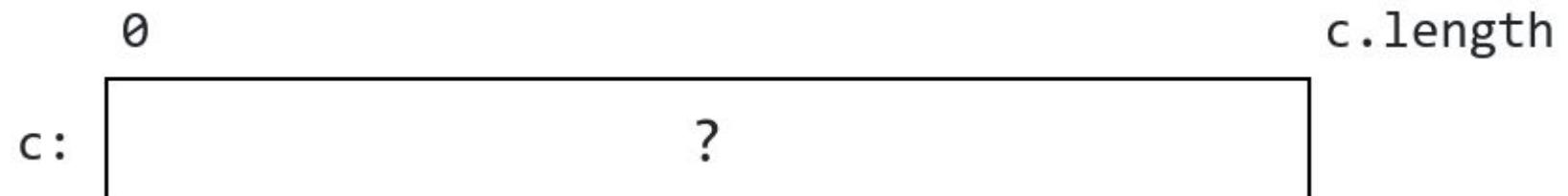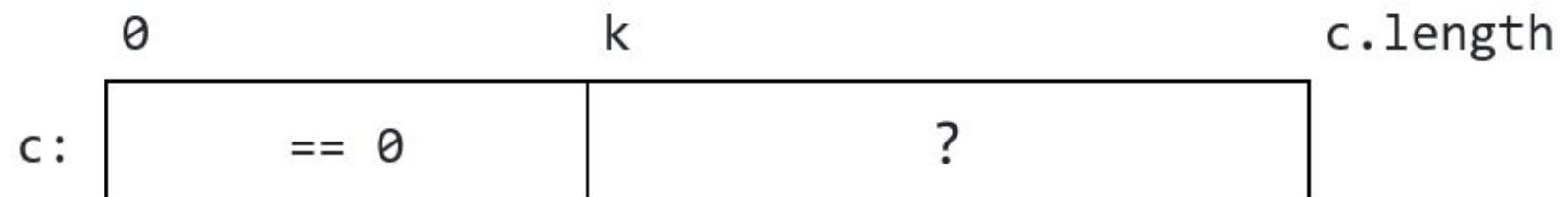
Loop template

```
/* A: loop initialization */

// inv: loop invariant (e.g. c[0..k) == 0)
while ( /* B: loop guard */ ) {

    /* C: loop body */

}
```

Dutch National Flag

- Problem proposed by Edsger Dijkstra, a foundational computer scientist
    - His "shortest path algorithm" will feature prominently later in the course

Task 2

Precondition:

```
          0                                    f.length
f:  ┌──────────────────────────────────────────┐
    │                     ?                      │
    └──────────────────────────────────────────┘
```

Postcondition:

```
          0                                    f.length
f:  ┌──────────────┬──────────────┬──────────────┐
    │     Red      │    White     │     Blue     │
    └──────────────┴──────────────┴──────────────┘
```
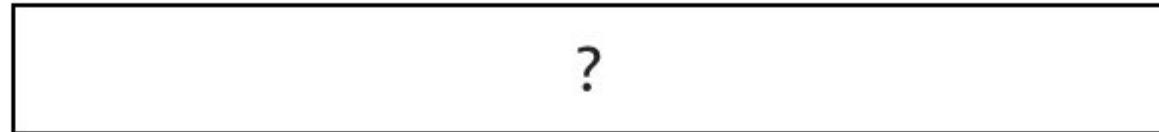
Loop template

```
/* A: loop initialization */

// inv: loop invariant
while ( /* B: loop guard */ ) {

    /* C: loop body */

}
```