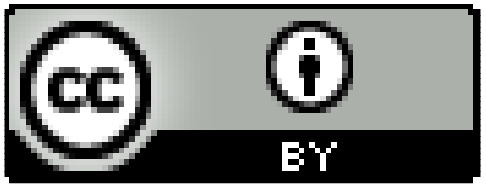
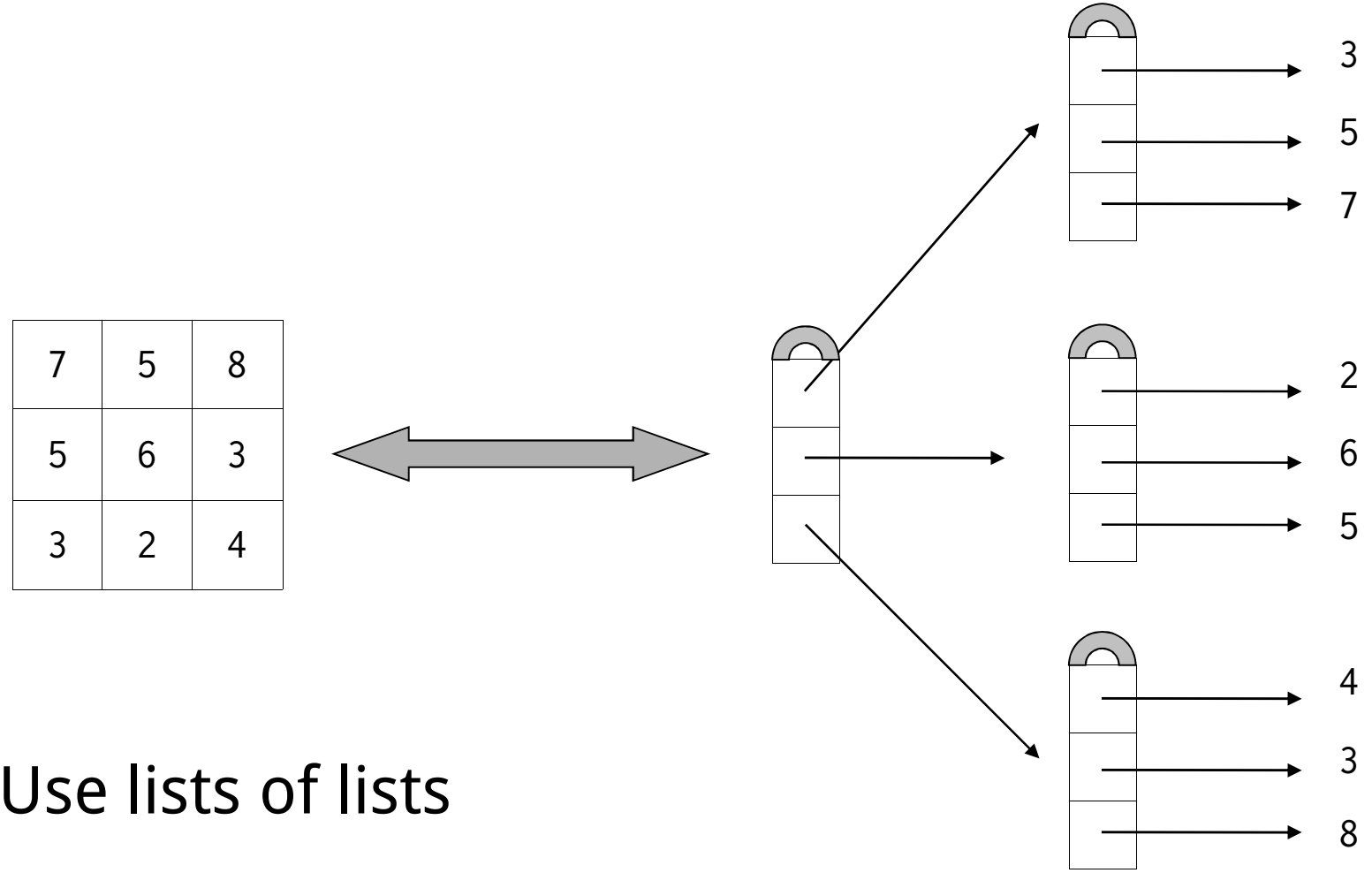
Program Design

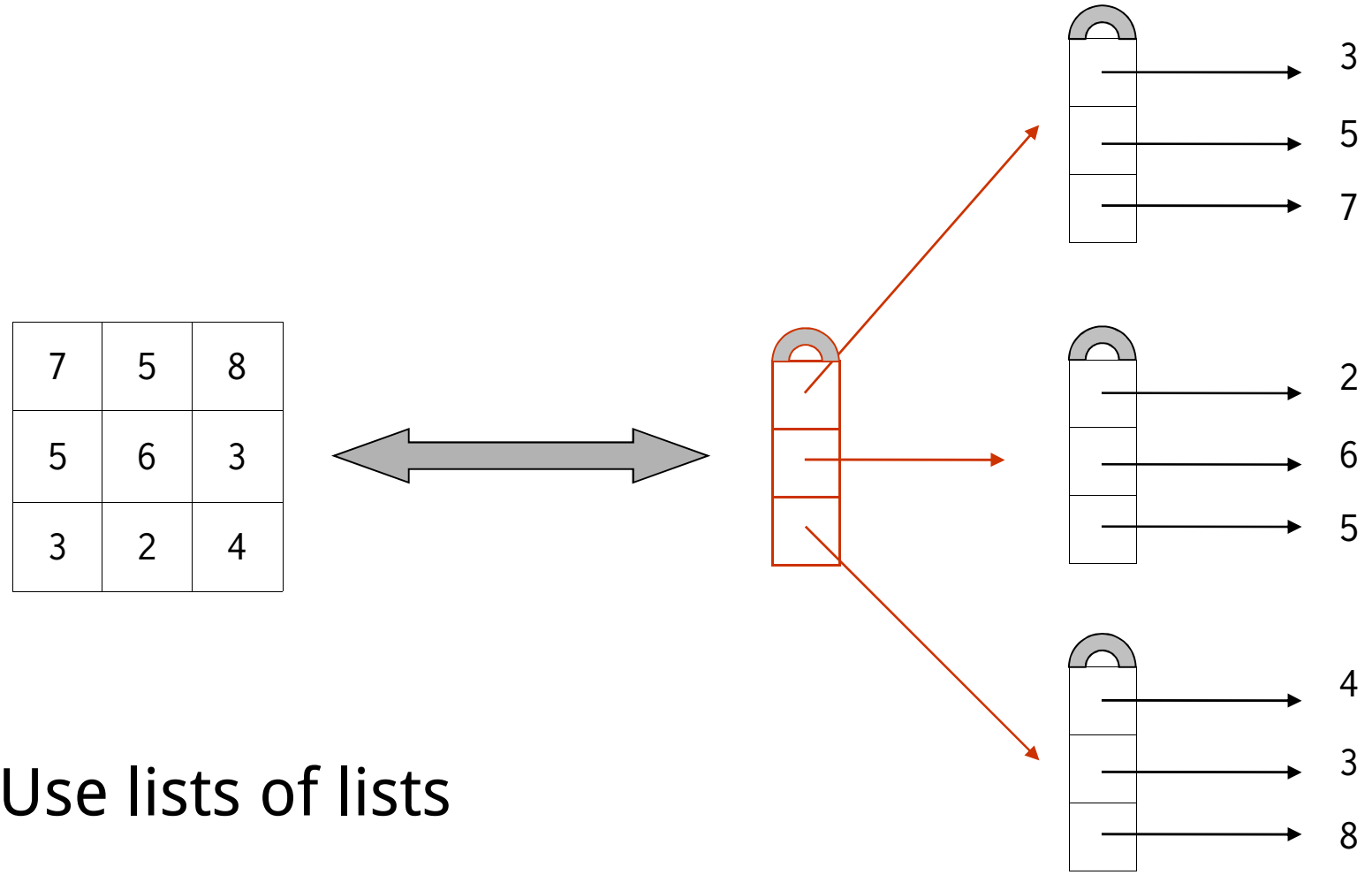
Invasion Percolation: Aliasing





Use lists of lists

to implement a 2D grid



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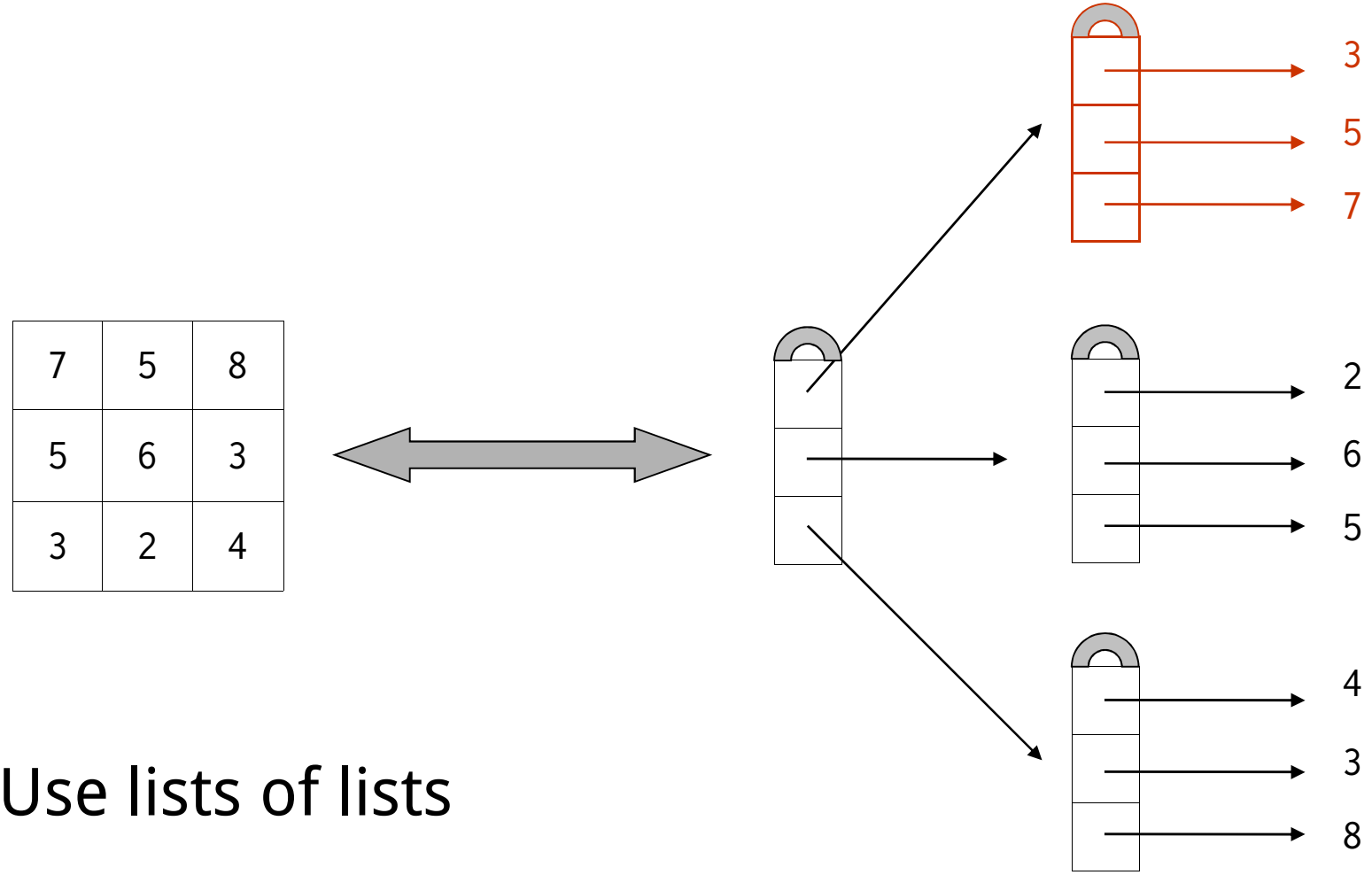

Use lists of lists

to implement a 2D grid

```
# Correct code
assert N > 0, "Grid size must be positive"
assert N%2 == 1, "Grid size must be odd"
grid = []
for x in range(N):
  grid.append([])
  for y in range(N):
    grid[-1].append(1)
```

```
# Incorrect code
assert N > 0, "Grid size must be positive"
assert N%2 == 1, "Grid size must be odd"
grid = []
EMPTY = []
for x in range(N):
  grid.append(EMPTY)
  for y in range(N):
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```
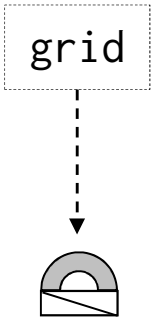

"Aren't meaningful variable names supposed to be a good thing?"

```
grid = []
```



```
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```

```
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```
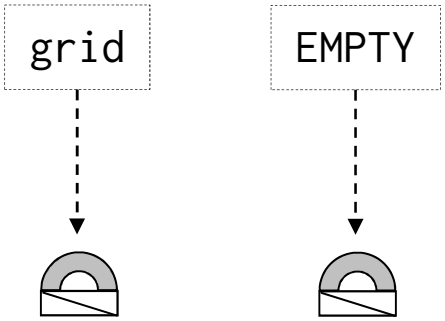
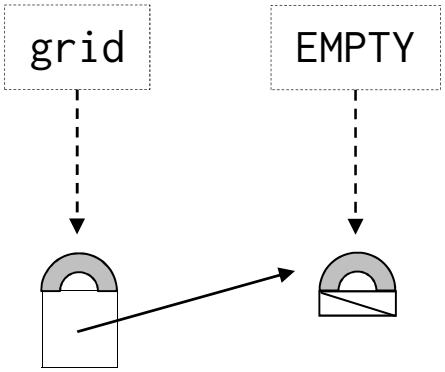
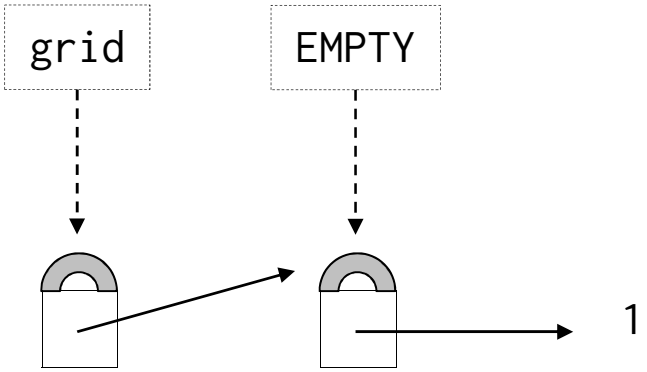
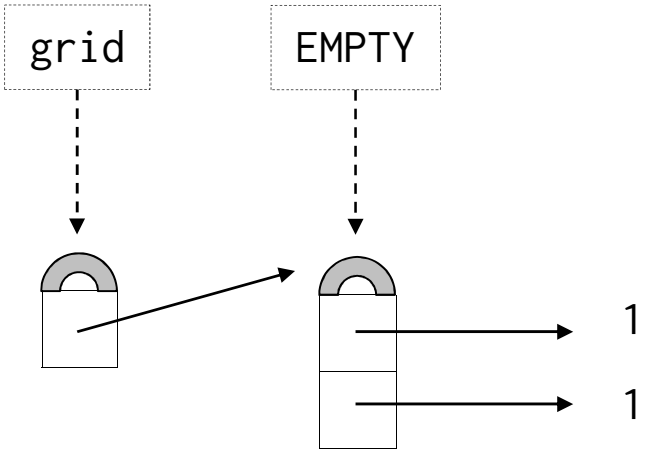






```
grid = []
EMPTY = []
for x in range(N): # x == 0
  grid.append(EMPTY)
```




```
grid = []
EMPTY = []
for x in range(N): # x == 0
  grid.append(EMPTY)
  for y in range(N): # y == 0
    grid[-1].append(1)
```

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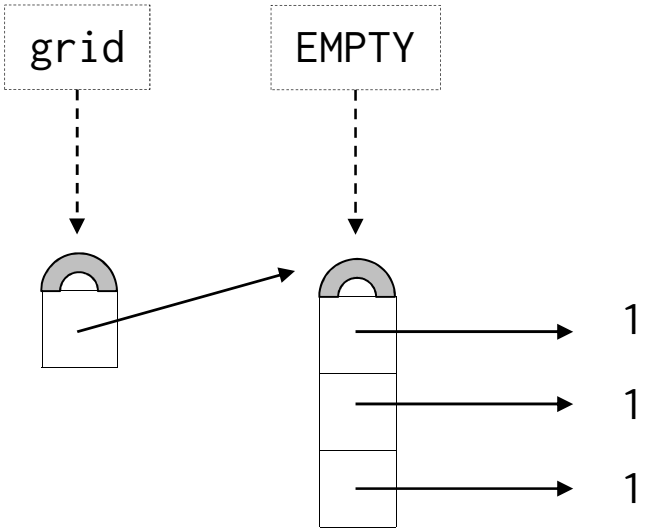
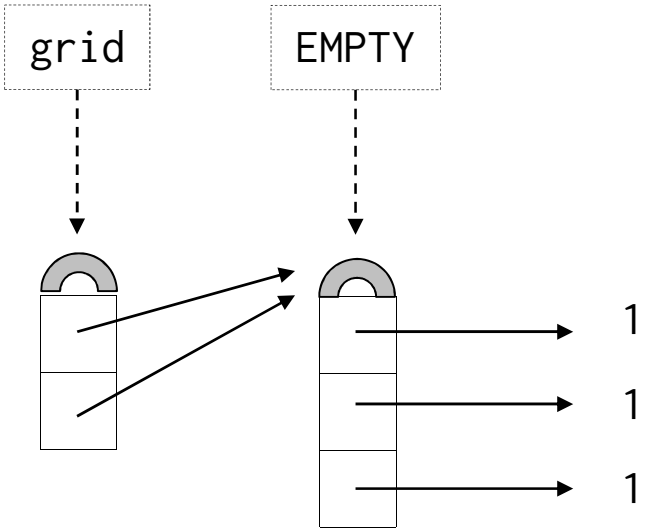
grid = []
EMPTY = []
for x in range(N): # x == 0
  grid.append(EMPTY)
  for y in range(N): # y == 1
    grid[-1].append(1)
```




```
grid = []
EMPTY = []
for x in range(N): # x == 0
  grid.append(EMPTY)
  for y in range(N): # y == 2
    grid[-1].append(1)
```

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grid = []
EMPTY = []
for x in range(N): # x == 1
  grid.append(EMPTY)
```

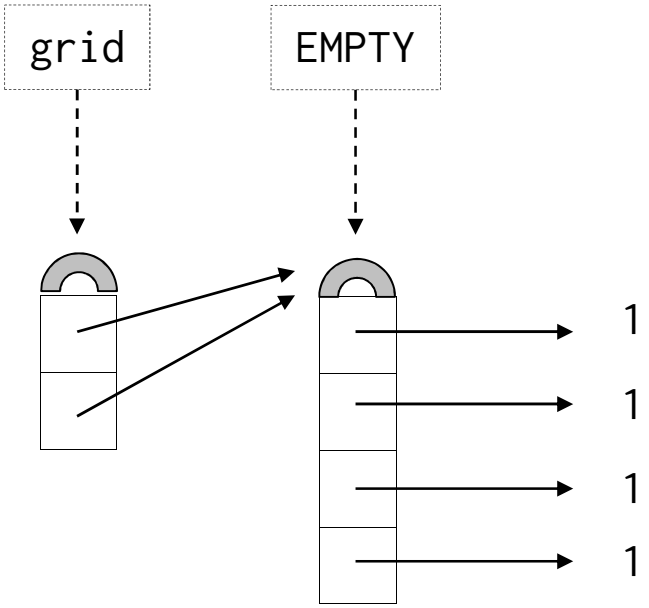


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grid = []
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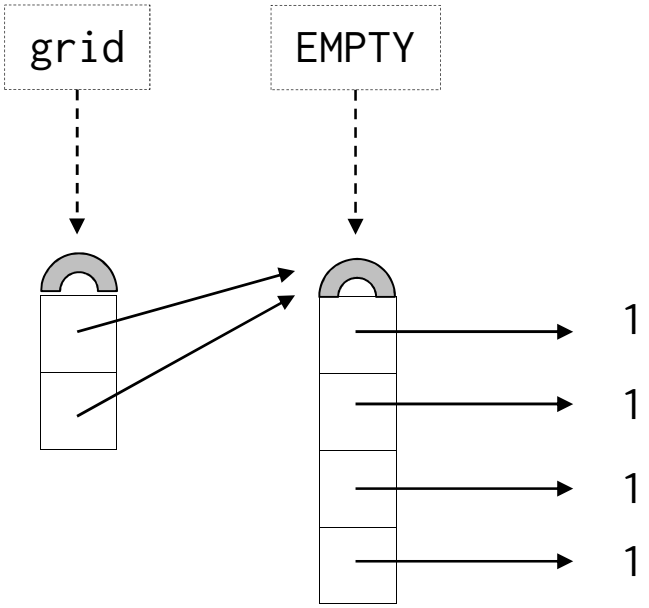
for x in range(N): # x == 1
  grid.append(EMPTY)
  for y in range(N): # y == 0
    grid[-1].append(1)
```

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grid = []
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for x in range(N): # x == 1
  grid.append(EMPTY)
  for y in range(N): # y == 0
    grid[-1].append(1)
```

You see the problem...

Indirection allows aliasing

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Aliasing can be useful

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(In fact, sometimes it's indispensible)

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But it's also a rich source of bugs

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When in doubt, draw a picture!

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Tools that do this automatically exist...

Indirection allows aliasing

Aliasing can be useful

(In fact, sometimes it's indispensible)

But it's also a rich source of bugs

When in doubt, draw a picture!

Tools that do this automatically exist...

...but none has really taken off (yet)

created by

Greg Wilson

May 2010