7.5 – Accesso ai membri di una classe

Libro di testo:

- Capitolo 18.5

DIPARTIMENTO
DI INGEGNERIA
DELL'INFORMAZIONE

Agenda

- Accesso tramite `get` vs. `operator[]`

Accesso al vettore

- Come facciamo ad accedere in lettura/scrittura agli elementi di `vector`?
  - Una possibilità è implementare delle funzioni membro `get()` e `set()`

```
vector v1;
v1.set(0, 2.2);
std::cout<< "elemento 0 di vector: " << v1.get(0) << std::endl;
```

- Tuttavia è più naturale un'interfaccia con `operator[]`
  - In lettura? In scrittura?

```
class vector {
    int sz;
    double* elem;

   public:
       double operator[] (int n) { return elem[n]; }
       // ...
};
```

Accesso al vettore

- Al momento, `operator[]` permette la lettura e non la scrittura!

```
vector v(10);
double x = v[2];   // ok
v[3] = x;          // errore: v[3] non è un lvalue
```

- Possibile soluzione: usare un puntatore

```
    double* operator[] (int n) { return &elem[n]; }
```

- Problemi?

```
*v[3] = x;     // ok, ma brutto e interazione
               // innaturale
```

dobbiamo dereferenziare → non elegante

Accesso tramite reference

- Le reference risolvono il problema

```
class vector {
    int sz;
    double* elem;

public:
    double& operator[] (int n) { return elem[n]; }
    // ...
};
```

- Problemi?
  - Non è utilizzabile per oggetti const
- Perché?

```
void f(const vector& cv) {
    double d = cv[1];
    cv[1] = 2.0;
}
```

Overloading su const

- È possibile fare l'overloading di una funzione `const` e non `const`

```
class vector {
    int sz;
    double* elem;

public:
    double& operator[] (int n);          // per vettori non costanti
    double operator[] (int n) const;     // per vettori costanti
    // ...
};
```

- Versione `const`: è possibile ritornare una copia o una `const` reference

Overloading su const

- È ora possibile scrivere:

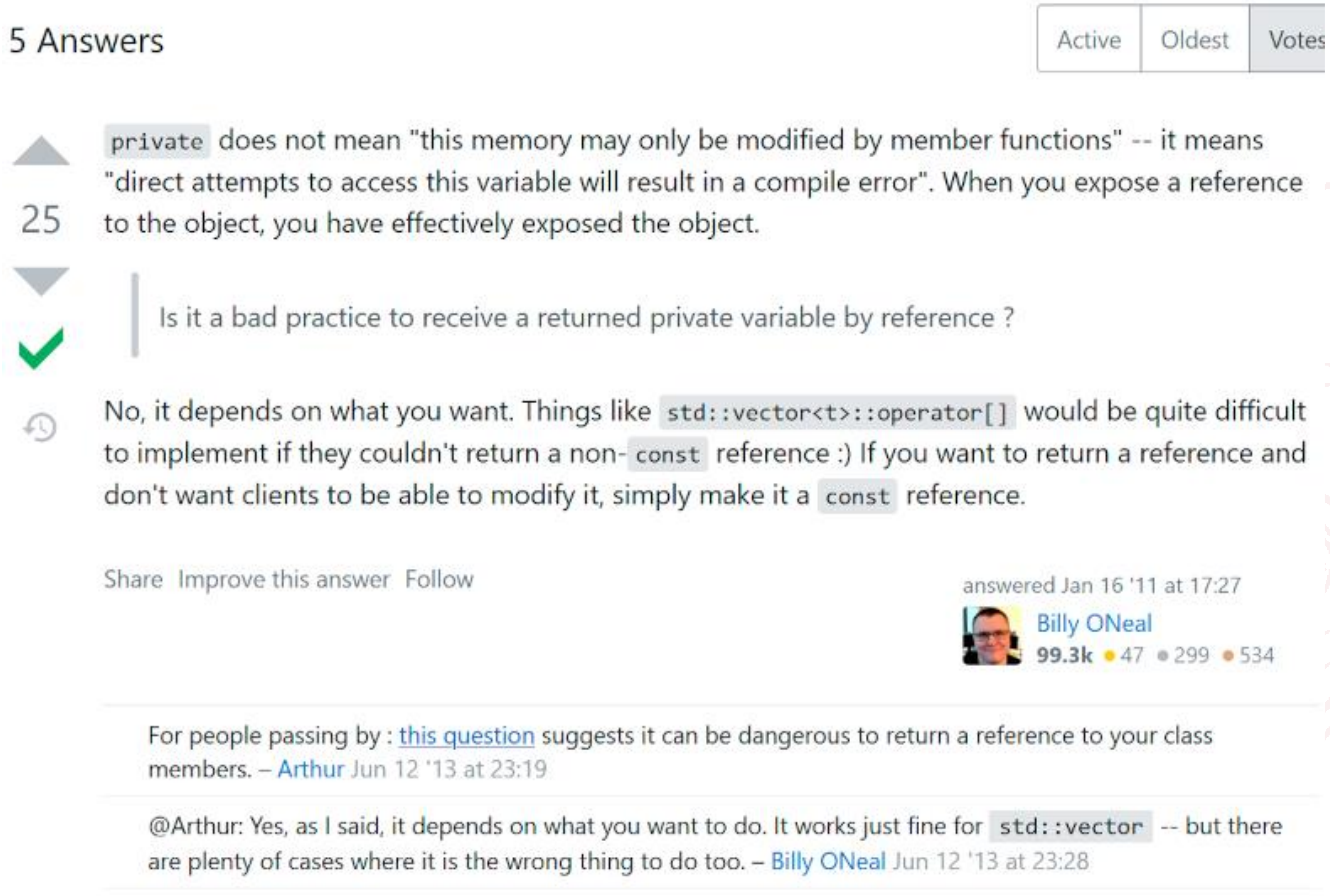
```
void ff(const vector& cv, vector& v)
{
    double d = cv[1];     // ok: usa const []
    cv[1] = 2.0;          // errore: usa const []
    d = v[1];             // ok: usa non-const []
    v[1] = 2.0;           // ok: usa non-const []
}
```

…il compilatore decide di usare…

Reference a membro privato

- La seconda versione di `operator[]` ritorna una reference a membro privato
  - È corretto?
  - Ci sono caveat?

Reference a membro privato



`private` does not mean "this memory may only be modified by member functions" -- it means "direct attempts to access this variable will result in a compile error". When you expose a reference to the object, you have effectively exposed the object.

> Is it a bad practice to receive a returned private variable by reference ?

No, it depends on what you want. Things like `std::vector<t>::operator[]` would be quite difficult to implement if they couldn't return a non-`const` reference :) If you want to return a reference and don't want clients to be able to modify it, simply make it a `const` reference.

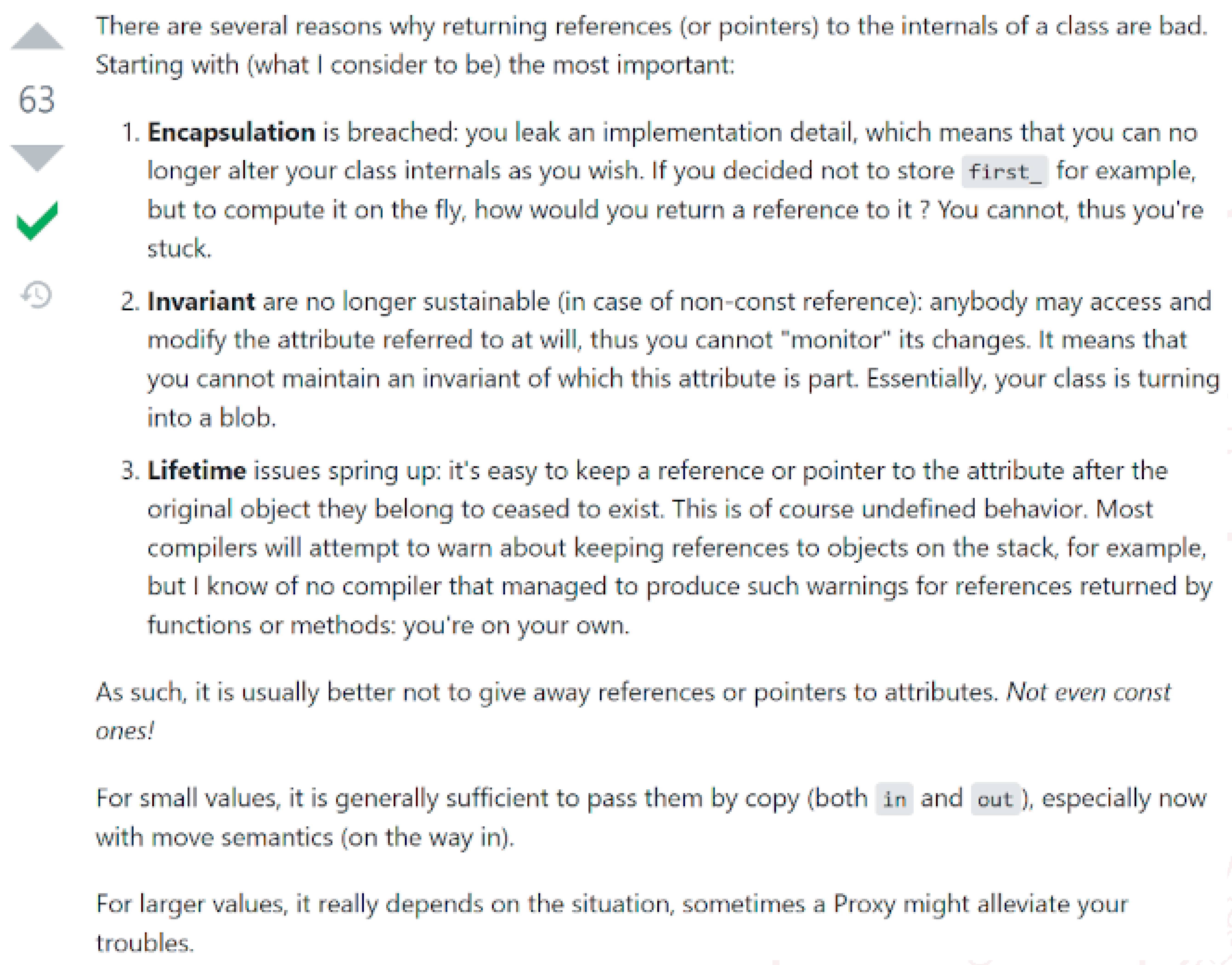
answered Jan 16 '11 at 17:27
Billy ONeal
99.3k ● 47 ● 299 ● 534

For people passing by : this question suggests it can be dangerous to return a reference to your class members. – Arthur Jun 12 '13 at 23:19

@Arthur: Yes, as I said, it depends on what you want to do. It works just fine for `std::vector` -- but there are plenty of cases where it is the wrong thing to do too. – Billy ONeal Jun 12 '13 at 23:28

https://stackoverflow.com/questions/4706788/why-can-i-expose-private-members-when-i-return-a-reference-from-a-public-member

Reference a membro privato



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There are several reasons why returning references (or pointers) to the internals of a class are bad. Starting with (what I consider to be) the most important:

1. **Encapsulation** is breached: you leak an implementation detail, which means that you can no longer alter your class internals as you wish. If you decided not to store `first_` for example, but to compute it on the fly, how would you return a reference to it ? You cannot, thus you're stuck.
2. **Invariant** are no longer sustainable (in case of non-const reference): anybody may access and modify the attribute referred to at will, thus you cannot "monitor" its changes. It means that you cannot maintain an invariant of which this attribute is part. Essentially, your class is turning into a blob.
3. **Lifetime** issues spring up: it's easy to keep a reference or pointer to the attribute after the original object they belong to ceased to exist. This is of course undefined behavior. Most compilers will attempt to warn about keeping references to objects on the stack, for example, but I know of no compiler that managed to produce such warnings for references returned by functions or methods: you're on your own.

As such, it is usually better not to give away references or pointers to attributes. *Not even const ones!*

For small values, it is generally sufficient to pass them by copy (both `in` and `out`), especially now with move semantics (on the way in).

For larger values, it really depends on the situation, sometimes a Proxy might alleviate your troubles.

https://stackoverflow.com/questions/8005514/is-returning-references-of-member-variables-bad-practice