Mini-lecture 13 - revisiting references

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∃ confusion about references

When should they be used?
  as arguments?
  as return values?

When can using them cause trouble?
Let’s go through examples

I’ll show you some code, you tell me whether:

we must use a reference

it’s OK and encouraged to use a reference

it’s OK but discouraged to use a reference

we must NOT use a reference
see arg1.cc
For simple primitive types (int, float, etc.), passing in a const reference results in a correct program, but the performance benefit is questionable.
see arg2.cc
For complex types (structs, object instances), passing in a const reference results in a correct program and likely gives you some performance benefits.

pop quiz: why not pass in a pointer instead?

- we must use a reference
- it’s OK and encouraged to use a reference
- it’s OK but discouraged to use a reference
- we must NOT use a reference
see ret1.cc
ret1.cc

(a) we must use a reference

(b) it’s OK and encouraged to use a reference

(c) it’s OK but discouraged to use a reference

(d) we must NOT use a reference

Never return a reference to a local (stack allocated) variable; it’s the same error as returning a pointer to one.
see Complex1.h
Complex1.h

(a) we must use a reference

it’s OK and encouraged to use a reference

it’s OK but discouraged to use a reference

we must NOT use a reference

A copy constructor must have a reference parameter (that identifies it as a copy ctr). const could be omitted but is almost always used. It is correct, safe, and efficient.
see Complex2.h
Complex2.h

we must use a reference

it’s OK and encouraged to use a reference

it’s OK but discouraged to use a reference

(d) we must NOT use a reference

Because we don’t want to return <a reference to *this>, but instead <a copy of a local variable>, we cannot use a reference in this case.

pop quiz: does chaining work if we correct the code?
see Complex3.h
Complex3.h

(a) we must use a reference

it’s OK and encouraged to use a reference

it’s OK but discouraged to use a reference

we must NOT use a reference

We must use a reference so chaining works correctly. It is also more efficient to use a reference.

pop quiz: why does chaining break if we don’t use a reference? give an example of chained code that breaks.
see Complex4.h
Complex4.h

(a) we must use a reference

it’s OK and encouraged to use a reference

it’s OK but discouraged to use a reference

we must NOT use a reference

This is the same case as the plain assignment operator; we must return a reference so that chaining works.
see Complex5.h
Complex5.h

(a) we must use a reference
it’s OK and encouraged to use a reference
it’s OK but discouraged to use a reference
we must NOT use a reference

This is the same case as the assignment operator; we must return a reference so that chaining works. More so, copying std::cout doesn’t make sense (and is prevented)!
See you on Monday!