CSE 333
Mini-lecture 13 - revisiting references

Hal Perkins
Department of Computer Science & Engineering
University of Washington
∃ 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:

(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
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.

(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
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?

(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
see ret1.cc
Never return a reference to a local (stack allocated) variable; it’s the same error as returning a pointer to one.

(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
see Complex1.h
Complex1.h

(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

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
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

(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

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
(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

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
(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

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 Wednesday!