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#include <iostream>
#include <memory>

using namespace std;

int main() {
    // the deprecated way to access an allocator
    std::allocator<int> a1;
    std::allocator<double> a2;

    int* i = a1.allocate(1);
    cout << i << ": " << *i << "\n";
    a1.construct(i, 123);
    cout << i << ": " << *i << "\n";

    cout << "allocating 5 doubles\n";
    double* d = a2.allocate(5);

    for (int i = 0; i < 5; i++) {
        cout << &d[i] << ": " << d[i] << "\n";
    }

    cout << "constructing d and d[2] only\n";
    a2.construct(&d[2], 3.14159);
    a2.construct(d, 999.123);

    for (int i = 0; i < 5; i++) {
        cout << &d[i] << ": " << d[i] << "\n";
    }

    a1.destroy(i);
    a1.deallocate(i, 1);

    a2.destroy(d);
    a2.destroy(&d[2]);
    a2.deallocate(d, 5);

    // The correct way to access an allocator
    int* x = allocator_traits<std::allocator<int>>::allocate(a1, 1);
    allocator_traits<std::allocator<int>>::construct(a1, x, 9876);

    cout << "x addr=" << x << ": " << *x << "\n";
    allocator_traits<std::allocator<int>>::deallocate(a1, x, 1);
    return 0;
}
```