Overview of Single Inheritance Scheme
Multiple Inheritance
Locating the Right Member Function
Computing the Right 'This' reference

CS 617 Object Oriented Systems
Lecture 13
Implementations of Dynamic Dispatch: Multiple Inheritance
3:30-5:00 pm, Mon Feb 25

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Outline

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2. Multiple Inheritance
3. Locating the Right Member Function
4. Computing the Right 'This' reference
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Dispatch Tables, and Sharing Them
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Translating Assignments and Invocations

A *a1 = new A();
B* b1 = new B();
A *a3; ...
if C1, a3 = a1; else a3 = b1;
   a->f(val1);
   a->g(val2);

The Scheme of Implementation:

A *a1 = allocate_A()
a1->DT=A’s DT
B* b1 = allocate_B()
b1->DT=B’s DT
A *a3; ...
if C1, a3 = a1; else a3 = b1;
   a3->(DT[0])(a3,val1);
   a3->(DT[1])(a3,val2);
Multiple Inheritance

Will MI pose new problems?
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A Case of Multiple Inheritance

![Diagram of multiple inheritance](image)
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Attempting Alignments

Spot a problem?
..for which case does it fail?

```c++
A *a = new A | new D
B *b = new B | new E
D *d = new D
E *e = new E

a->f();
b->g();
b->f(); b->g();
e->g(); e->h();

B *b1=new C
A *a1=new C
a1->f();
b1->g();
```

```
A
f() { .. }

B
f() { .. }
h() { .. }
```

```
D
f() { .. }
g() { .. }
```

```
C
f() { .. }
h() { .. }
```

```
E
h() { .. }
```

```
B::g
```

```
A::g
```

```
B::g
```

```
C::f
B::g
C::h
```

```
E
h() { .. }
```

```
B::g
E::h
```
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Dispatch table per subobject
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Sharing Dispatch Tables

ENOGUH?
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Offset Adjustments
A *a; B *b; C *c; D *d; E *e;
c = new C;
a = c;
b = c; \text{(implement as } b = c+dA)\)
b->f(arg); \text{(implement as } (b->DT[0].fn) (b+(b->DT[0].delta),arg))\)
Offset Adjustments: Another Example..