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

1. Overview of Single Inheritance Scheme..
2. Multiple Inheritance
3. Locating the Right Member Function
4. Computing the Right 'This' reference

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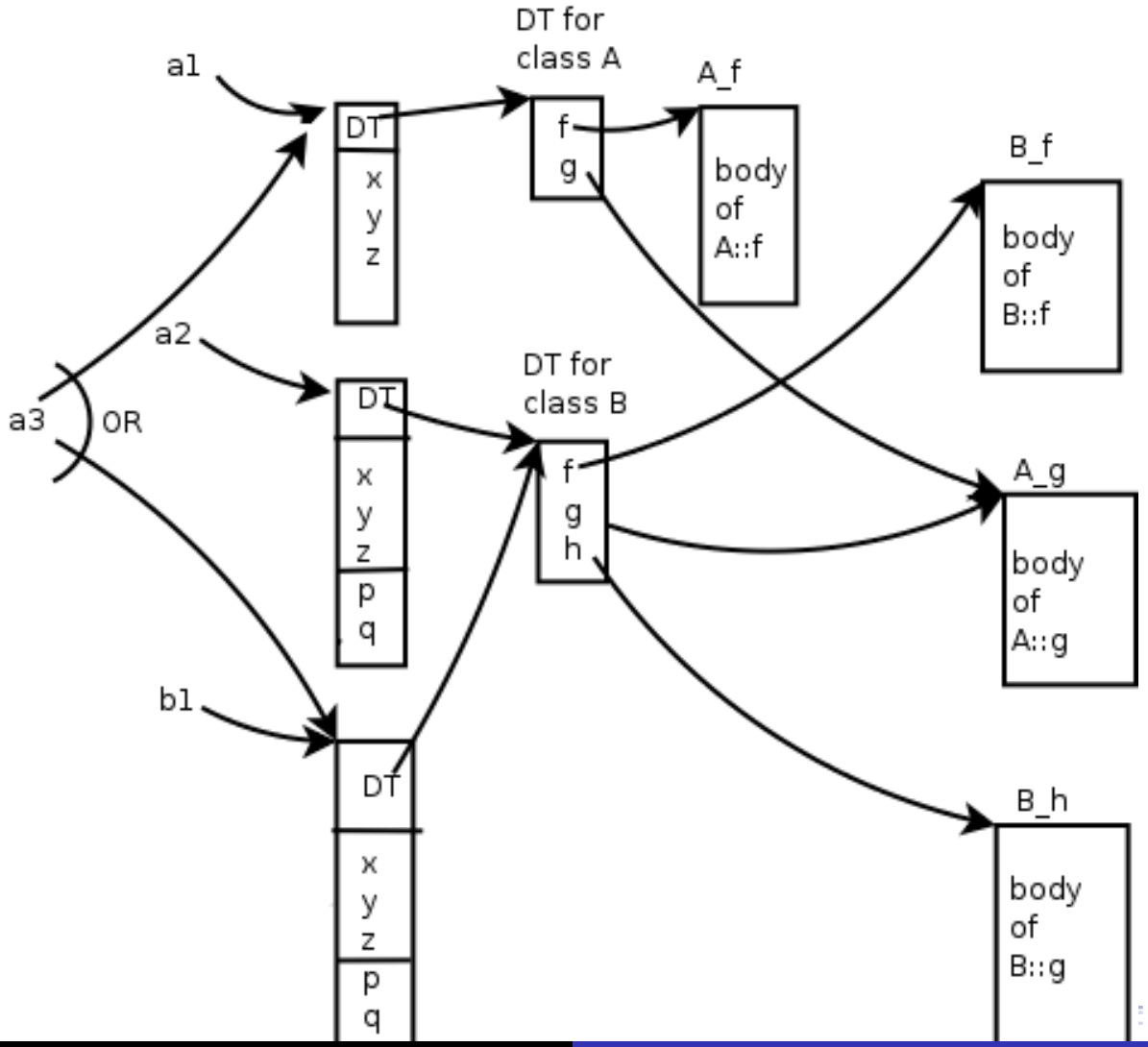
Dispatch Tables, and Sharing Them



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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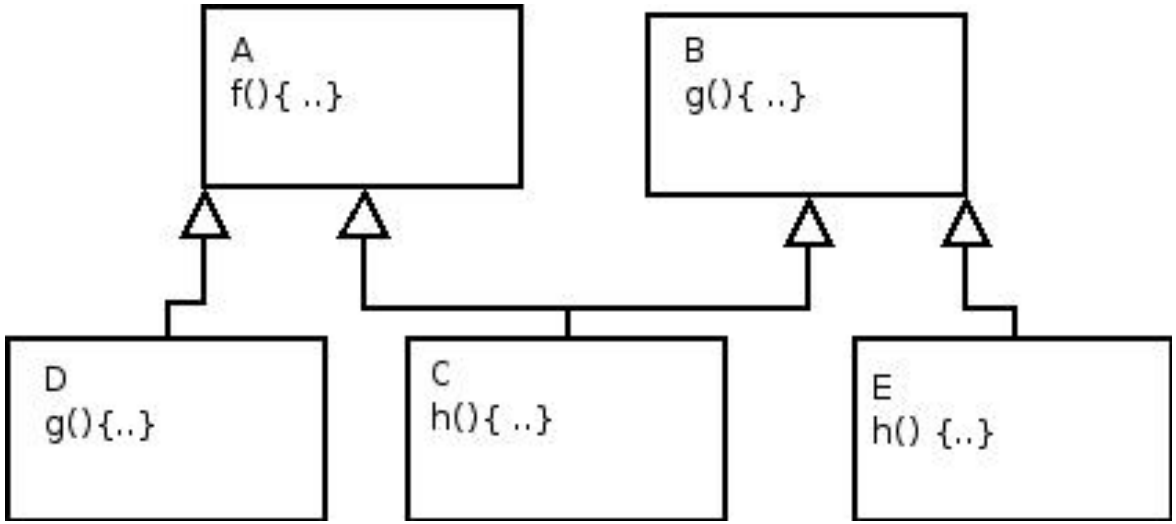
A Case of Multiple Inheritance



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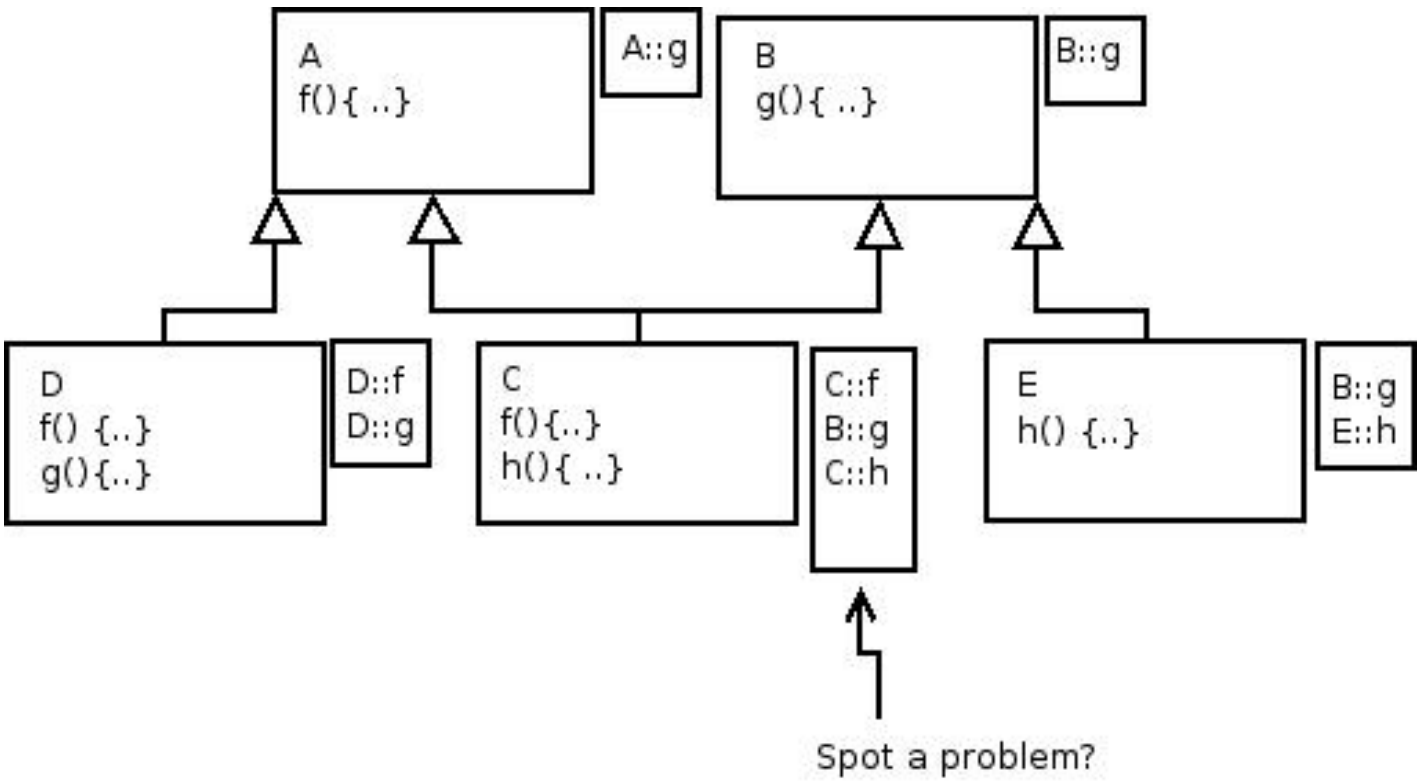
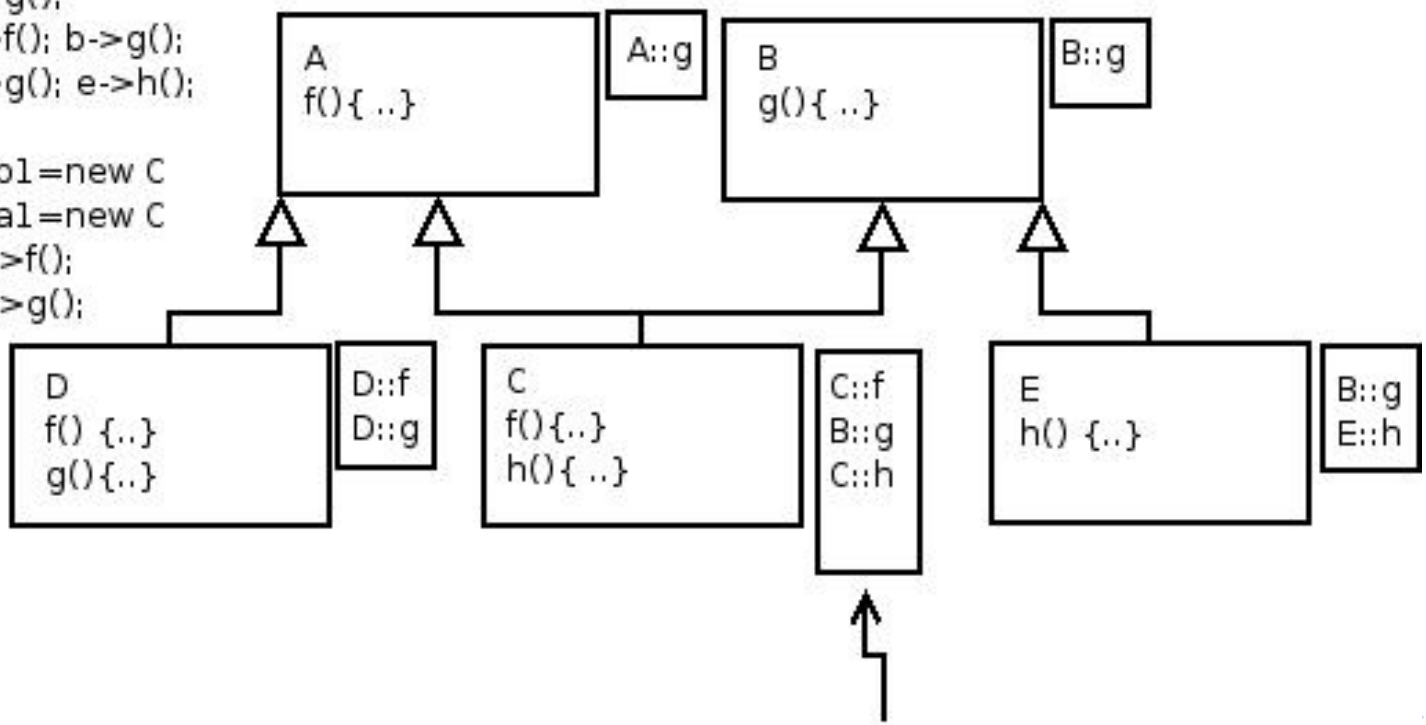
Attempting Alignments

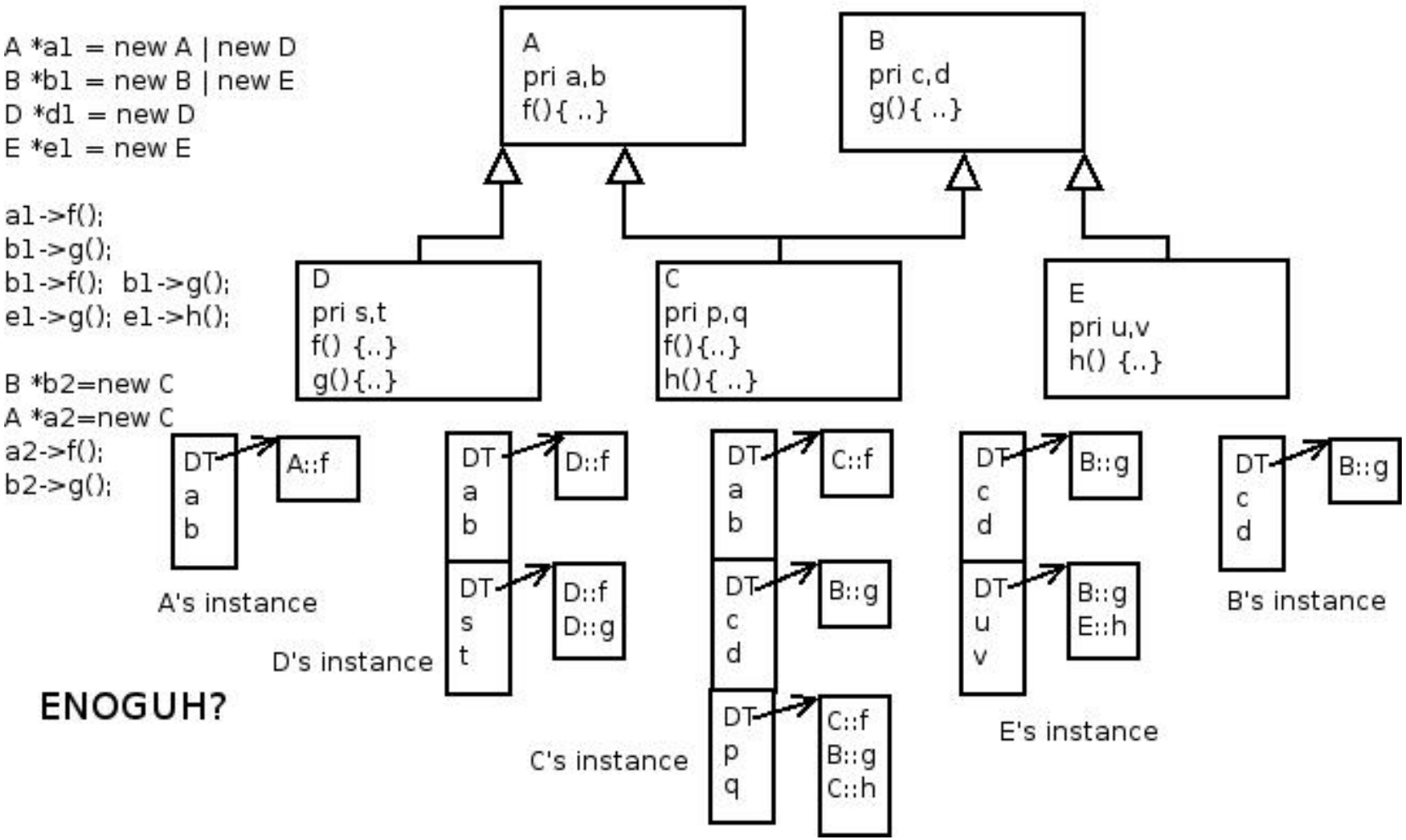


..for which case does it fail?

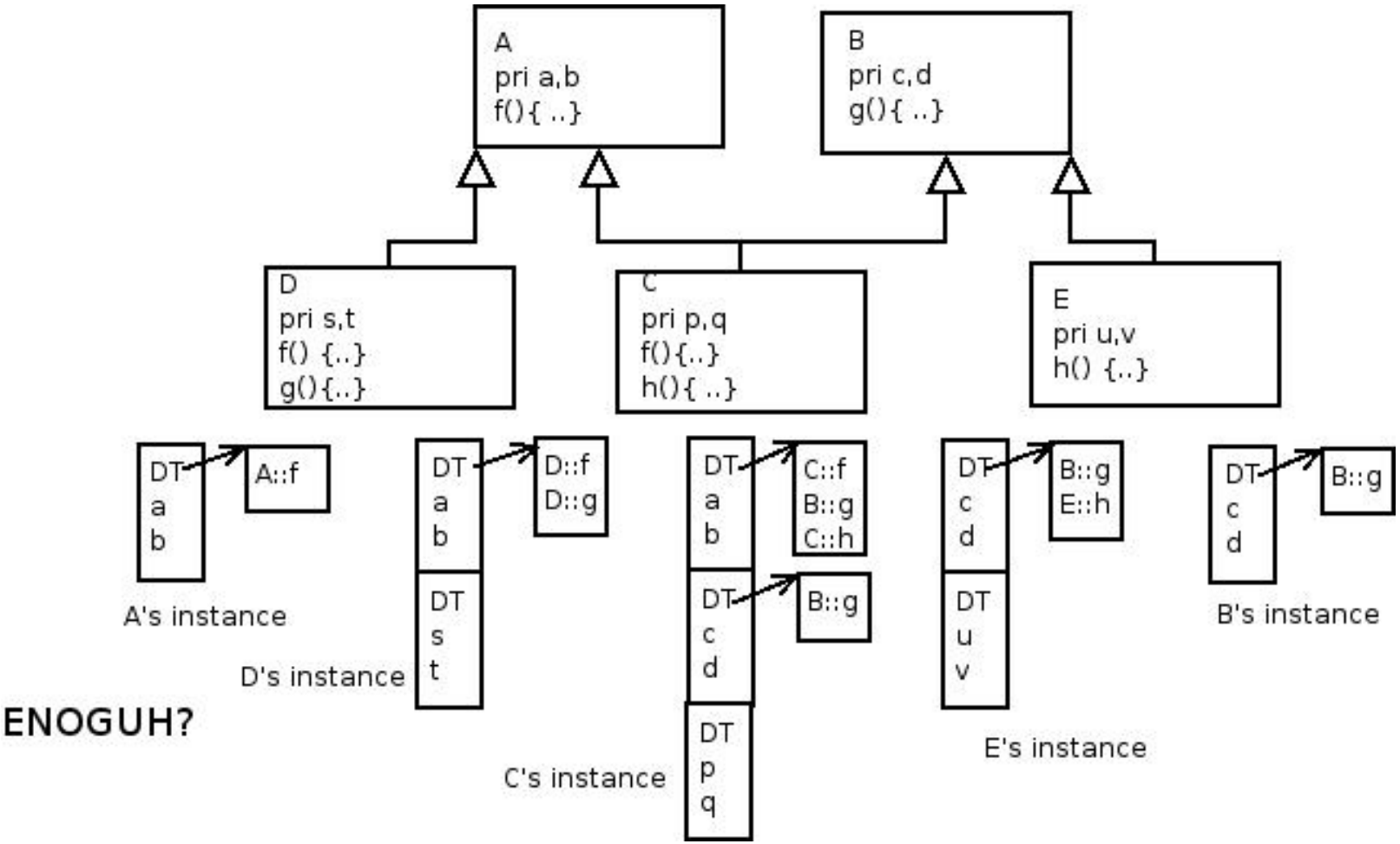
```
A *a = new A | new D
B *b = new B | new E
D *d = new D
E *e = new E

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

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



Dispatch table per subobject



Sharing Dispatch Tables



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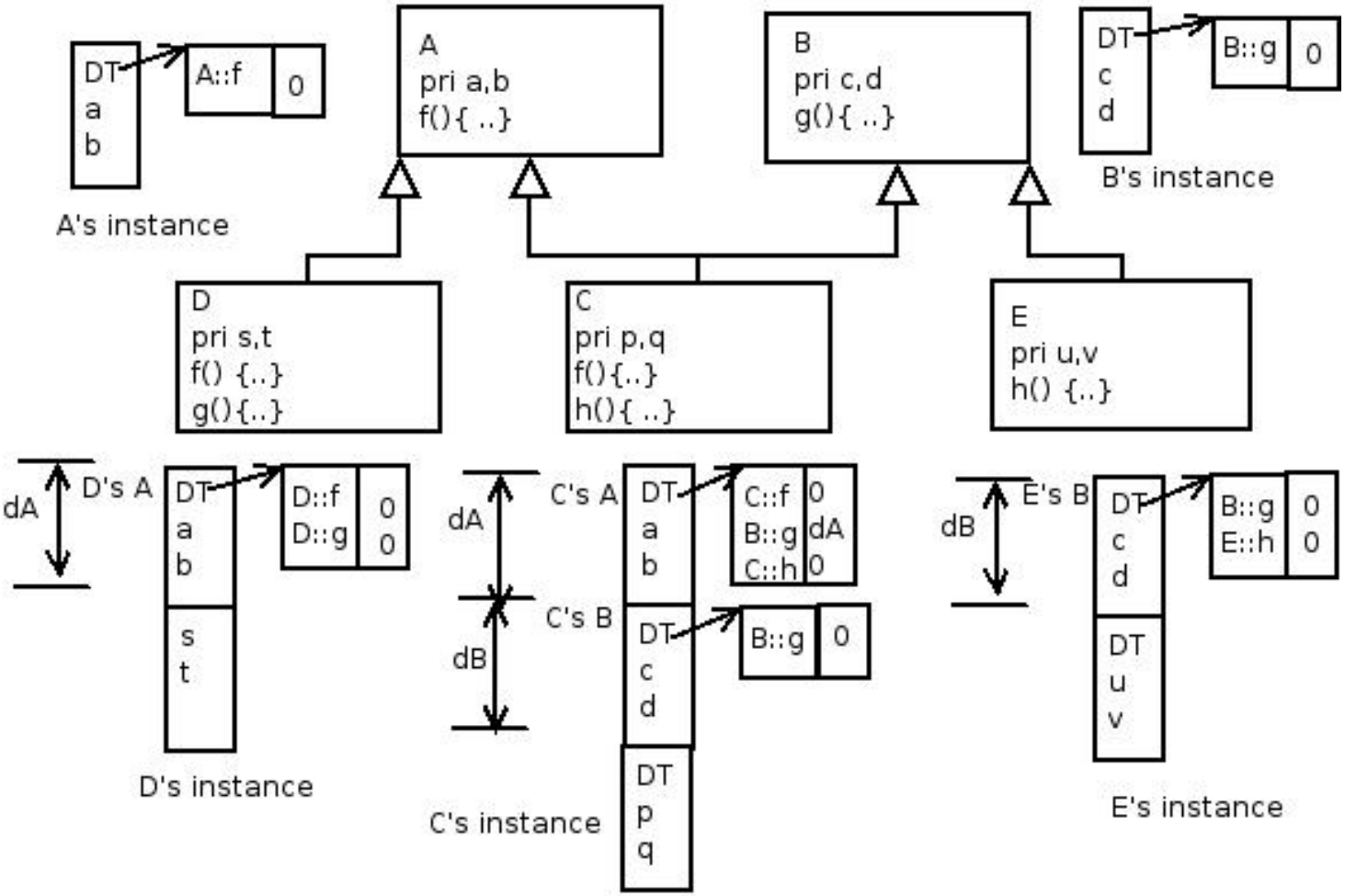
Offset Adjustments



The Program

```
A *a; B *b; C *c; D *d; E *e;
c = new C;
a = c;
b = c;              (implement as b = c+dA)
b->f(arg);          (implement as (b->DT[0].fn) (b+(b->DT[0].delta),arg))
```

Offset Adjustments: Another Example..