

Exercise 3

E1

Implementation of Multiple Inheritance.

Assume a Java like language with multiple inheritance.

Draw a memory layout for this program in a system using trampolines:

```
class Animal {
    int legs = 4;
    String sound() {return "";}
}
class Movable {
    int x = 0;
    int y = 0;
    void move(int x1, int y1) {x = x1; y = y1;}
}
class Dog extends Animal, Movable {
    int eyes = 2;
    override String sound() {return "Voff!";}
}
void main() {
    Dog    d1 = new Dog();
    Animal a  = d1.asInstanceOf(Animal);
    Dog    d2 = a.asInstanceOf(Dog);
    Moveable b = d2.asInstanceOf(Movable);
    Dog    d3 = b.asInstanceOf(Dog);
}
```

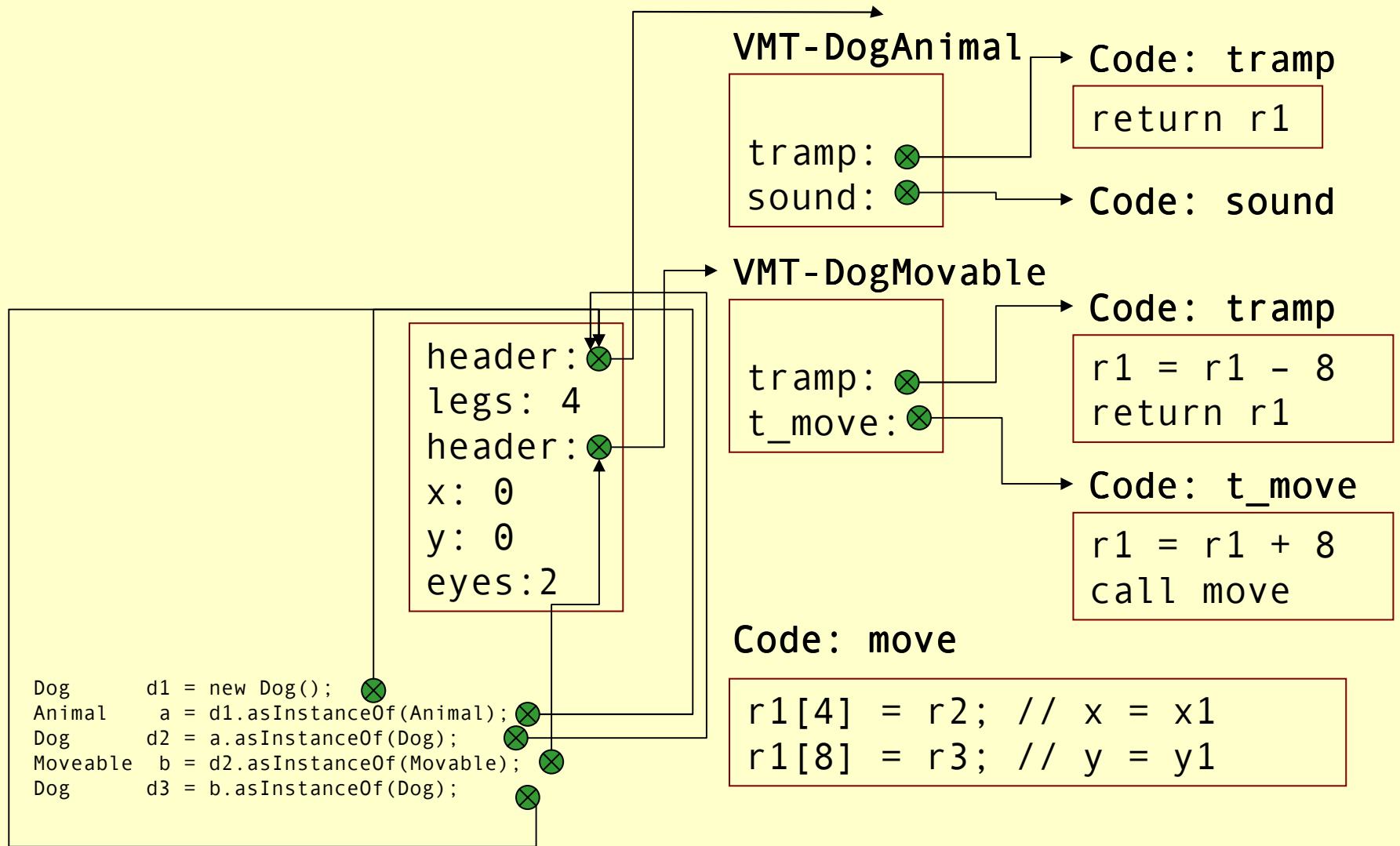
E2

Inlining

- ◆ Perform inline expansion on the following C program:

```
foo(int a, int b) {
    int c;
    c = a + b;
    if (c > 42)
        printf("OK: %d\n", c);
    else
        printf("To small %d\n", c);
}
int main() {
    int a = 2;
    int c = 43;
    foo(1, a);
    return c;
}
```

Multiple Inheritance: Trampolines



```
foo(int a, int b) {
    int c;
    c = a + b;
    if (c > 42)
        printf("OK: %d\n", c);
    else
        printf("To small %d\n", c);
}
int main() {
    int a = 2;
    int c = 43;
    int a_x=1,
    int b_x=a;
    int c_x;
    c_x = a_x + b_x;
    if (c_x > 42)
        printf("OK: %d\n", c_x);
    else
        printf("To small %d\n", c_x);
    return c;
}
```

```
foo(int a, int b) {
    int c;
    c = a + b;
    if (c > 42)
        printf("OK: %d\n", c);
    else
        printf("To small %d\n", c);
}
int main() {
    int a = 2;
    int c = 43;
    int a_x=1;
    int b_x=2;
    int c_x;
    c_x = 1 + 2;
    if (c_x > 42)
        printf("OK: %d\n", c_x);
    else
        printf("To small %d\n", c_x);
    return 43;
}
```

```
foo(int a, int b) {
    int c;
    c = a + b;
    if (c > 42)
        printf("OK: %d\n", c);
    else
        printf("To small %d\n", c);
}
int main() {
    int a = 2;
    int c = 43;
    int a_x=1;
    int b_x=2;
    int c_x;
    c_x = 3;
    if (3 > 42)
        printf("OK: %d\n", c_x);
    else
        printf("To small %d\n", c_x);
    return 43;
}
```

```
foo(int a, int b) {
    int c;
    c = a + b;
    if (c > 42)
        printf("OK: %d\n", c);
    else
        printf("To small %d\n", c);
}
int main() {
    int a = 2;
    int c = 43;
    int a_x=1;
    int b_x=2;
    int c_x;
    c_x = 3;
    printf("To small %d\n", 3);
    return 43;
}
```



```
int main() {  
    printf("To small %d\n", 3);  
    return 43;  
}
```