

Lab 8: Object Layout and Vtables

Learning objectives:

- Understand object layout with inheritance
- Understand vtable layout in object inheritance hierarchies

This lab does not have any distribution code.

1. *Vtables*. Consider the following C++ code:

```
struct A {
    void foo() {
        cout << "A::foo()" << endl;
    }
    virtual void bar() {
        cout << "A::bar()" << endl;
    }
};

struct B : A {
    virtual void foo() {
        cout << "B::foo()" << endl;
    }
    void bar() {
        cout << "B::bar()" << endl;
    }
};

int main() {
    A *aptr = new B;
    aptr->foo();
    aptr->bar();
}
```

This code prints the following when run:

```
A::foo()
B::bar()
```

- a) Draw the vtables for A and B. Clearly indicate the name of each member as well as which type contains its definition (e.g. T::member).
- b) Briefly explain how the compiler translates the method calls in main().

2. *Vtable and object layout*. Consider the following C++ code:

```
#include <iostream>

using std::cout;
using std::endl;

struct A {
    int x;
    virtual void spam() { cout << "A::spam()" << endl; }
```

```

    virtual void eggs() { cout << "A::eggs()" << endl; }
};

struct B : A {
    int x;
    virtual void eggs() { cout << "B::eggs()" << endl; }
};

struct C : B {
    int z;
    virtual void spam() { cout << "C::spam()" << endl; }
};

```

- a) Draw a picture illustrating the contents of an **object** of type C. Clearly indicate what each entry in the object is, and if it is a member, which type contains its definition (e.g. T::member).
- b) Draw the layout of the **vtable** for type B. Clearly indicate the name of each member as well as which type contains its definition.
- c) Draw the layout of the **vtable** for type C. Clearly indicate the name of each member as well as which type contains its definition.