02_abstract

This is the code:

```cpp
#include <iostream>
#include <stdio.h>

class AbstractClass {
    public:
        virtual void func(int x) = 0;
};

class ConcreteClass : public AbstractClass {

    private:
        int x;
    public:
        virtual void func(int x) {
            int i = 0;
            for(i = 0; i < 3; i++)
            {
                this->x *= (x*i);
                printf("[counter> %d]\n", this->x);
            }
        }
};

int
main(int argc, char *argv[])
{
    ConcreteClass c;
    c.func(10);

    return 0;
}
```

All we have here is an abstract class and a concrete class. The abstract class only has the virtual method `func` which the concrete class implements. In addition, the concrete class has a single variable as a member. The assembly is similar to that of `01_virtual`.

The constructor is the same as for `01_virtual`:

```
undefined __thiscall ConcreteClass(Concrete
      undefined     w0:1               <RETURN>
      ConcreteCl    x0:8 (auto)        this
      undefined8    Stack[-0x8]:8      var_this
      undefined8    Stack[-0x20]:8     local_20
  _ZN13ConcreteC
  _ZN13ConcreteC
  ConcreteClass:
  00100bcc stp        x29,x30,[sp, #local_20]!
  00100bd0 mov        x29,sp
  00100bd4 str        this,[sp, #var_this]
  00100bd8 ldr        this,[sp, #var_this]
  00100bdc bl         AbstractClass::AbstractClass
  00100be0 adrp       this,0x111000
  00100be4 add        x1,this,#0xd68
  00100be8 ldr        this,[sp, #var_this]

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; this is what PTR_func_00111d68 below contains:
PTR_func_00111d68
00111d68 30 0b       addr     ConcreteClass::func
         10 00
         00 00
; the address of the implementation of
; ConcreteClass::func
  ────────────────────────────────────────────────────


  00100bec str        x1=>PTR_func_00111d68,[this]
  00100bf0 nop
  00100bf4 ldp        x29=>local_20,x30,[sp], #0x20
  00100bf8 ret
```

The main function is also not a surprise:

```
undefined main()
      undefined     w0:1               <RETURN>
      undefined4    Stack[-0x14]:4     local_14
      undefined8    Stack[-0x20]:8     local_20
      undefined8    Stack[-0x30]:8     local_30
  main
  00100a84 stp        x29,x30,[sp, #local_30]!
  00100a88 mov        x29,sp
  00100a8c str        w0,[sp, #local_14]
```

```
00100a90 str        x1,[sp, #local_20]
00100a94 add        x0,sp,#0x20
00100a98 bl         ConcreteClass::ConcreteClass
00100a9c add        x0,sp,#0x20
00100aa0 mov        w1,#0xa
00100aa4 bl         ConcreteClass::func
00100aa8 mov        w0,#0x0
00100aac ldp        x29=>local_30,x30,[sp], #0x30
00100ab0 ret
```