03_template

The next piece of code contains a template class, all of the code is taken from cplusplus.com.

```
// class templates: https://cplusplus.com/doc/oldtutorial/templates/
#include <iostream>
using namespace std;

template <class T>
class mypair {
    T a, b;
  public:
    mypair (T first, T second)
      {a=first; b=second;}
    T getmax ();
};

template <class T>
T mypair<T>::getmax ()
{
  T retval;
  retval = a>b? a : b;
  return retval;
}

int main () {
  mypair <int> myobject (100, 75);
  cout << myobject.getmax();
  return 0;
}
```

Now for the assembly... Starting at the main:

```
undefined main()
      undefined     w0:1                <RETURN>
      undefined8    Stack[-0×20]:8      local_20
  main
  001008f4 stp         x29,x30,[sp, #local_20]!
  001008f8 mov         x29,sp

  001008fc add         x0,sp,#0×18
  00100900 mov         w2,#0×4b
  00100904 mov         w1,#0×64
```

```
  ; constructor call, argument at x0, also note the arguments in w1,w2
  00100908 bl         mypair<int>::mypair

  0010090c add        x0,sp,#0×18
  00100910 bl         mypair<int>::getmax
  00100914 mov        w1,w0
  00100918 adrp       x0,0×110000
  0010091c ldr        x0⇒std::cout,[x0, #offset →std::cout]
  00100920 bl         <EXTERNAL>::std::basic_ostream<char,std::char_tra
  00100924 mov        w0,#0×0
  00100928 ldp        x29⇒local_20,x30,[sp], #0×20
  0010092c ret
```

The constructor looks like this:

```
undefined __thiscall mypair(mypair<int> * t
      undefined     w0:1              <RETURN>
      mypair<int    x0:8 (auto)       this
      int           w1:4              param_1
      int           w2:4              param_2
      undefined8    Stack[-0×8]:8     var_this
      undefined4    Stack[-0×c]:4     arg_one
      undefined4    Stack[-0×10]:4    arg_two
  _ZN6mypairIiEC
  _ZN6mypairIiEC
  mypair<int>::m
  001009ac sub        sp,sp,#0×10
  001009b0 str        this,[sp, #var_this]
  001009b4 str        param_1,[sp, #arg_one]
  001009b8 str        param_2,[sp]⇒arg_two
  001009bc ldr        this,[sp, #var_this]
  001009c0 ldr        param_1,[sp, #arg_one]
  ; store the first argument into the member a
  001009c4 str        param_1,[this]
  001009c8 ldr        this,[sp, #var_this]
  001009cc ldr        param_1,[sp]⇒arg_two
  ; store the second argument into the member b
  001009d0 str        param_1,[this, #0×4]
  001009d4 nop
  001009d8 add        sp,sp,#0×10
  001009dc ret
```

The `getmax` method is what you'd expect, nothing interesting there. As soon as you know what the constructor does, it is trivial to find out the function of `getmax`.