

Standard Template Library (STL)

Structure definitions

For `std::string`

```
struct string {
    union {
        char _Buf[16];
        wchar_t _BufW[8];
        char * _Ptr;
        wchar_t * _PtrW;
    } _Bx;
    size_t _Mysize;
    size_t _Myres;
};
```

For `std::vector`

```
struct vector {
    void *_Myfirst;
    void *_Mylast;
    void *_Myend;
};
```

For `std::set` and `std::map`

```
// Struct header only
struct NodeHdr {
    void *_Left;
    void *_Parent;
    void *_Right;
    char _Color;
    char _Isnll;
    short padding;
};
```

String

Comparison against 0x10: ASCII

Comparison against 8: Wide

Inferring Vector Value Type Size

	If you see...	→	You should think:
	<code>(this[1] - *this) / 0x44</code>	→	0x44
	<code>(v2->_Mylast - v2->_Myfirst) / 0x44</code>	→	0x44
	<code>(_Mylast - this->_Myfirst) >> 5</code>	→	2^5 = 0x20
	<code>(v91 - v90) >= 0x20</code>	→	0x20
	<code>return 0x3fffffff;</code>	→	0xffffffff / 0x3fffffff = 4

Map Data Type Example (Example: `int` -> `string` mapping)

Node Composition for `std::map`

```
struct pair_n_str {
    int n;
    string s;
}; // Size 0x18 on x86

struct Node2Ch_n_str {
    struct NodeHdr node;
    struct pair_n_str n_s;
}; // Size 0x2C on x86
```

Recognizing Tree Node Construction

```
Node2Ch *new_Node_size2Ch()
{
    Node2Ch *result;

    result = (Node2Ch *)operator new(0x2Cu);
    if ( result )
        result->NodeHdr._Left = (int)result;
    if ( result != (Node2Ch *)0xFFFFFFFFC )
        result->NodeHdr._Parent = (int)result;
    if ( result != (Node2Ch *)0xFFFFFFFF8 )
        result->NodeHdr._Right = (int)result;
    *(_WORD *)&result->NodeHdr._Color = 0x101;
    return result;
}
```

Component Object Model (COM)

Terminology and Identification Tactics

CoClass	COM class aka COM object aka COM server
Interface	Definition of how a Vtable of functions will be laid out
Vtable	Set of function pointers
ProgID	Friendly CoClass name, e.g. <code>SAPI.SpVoice</code> or <code>WScript.Dictionary</code>
CLSID	Class ID, a GUID identifying one CoClass
IID	Interface ID, a GUID identifying an interface

Identification Tactics:

1. IDA: set IID type to CLSID
2. Search HKCR
3. Search WinSDK headers

Hunting Typelibs:

- DLL/EXE itself, *.tlb, *.olb, *.dll
- olevew: File -> View TypeLib

Interfaces and Layout

IUnknown	IDispatch : IUnknown	p → <div>lpVtbl</div> → <table><tr><td>QueryInterface</td></tr><tr><td>AddRef</td></tr><tr><td>Release</td></tr><tr><td>...</td></tr></table>	QueryInterface	AddRef	Release	...
QueryInterface						
AddRef						
Release						
...						
<ol style="list-style-type: none">1. QueryInterface2. AddRef3. Release	<ol style="list-style-type: none">1. QueryInterface2. AddRef3. Release4. GetTypeInfoCount5. GetTypeInfo6. GetIDsOfNames7. Invoke					
(All COM objects)	(Automation objects)					

Obtaining an Interface Pointer

```
CoCreateInstance(CLSID_Something, ..., IID_ISomething, ppv)  
ppv->QueryInterface(IID_SomethingElse, ppv2)
```

COM Registration

Example: `SAPI.SpVoice` (InprocServer32)

ProgID to CLSID	[HKCR\ <code>SAPI.SpVoice</code> \CLSID] (Default) = {96749377-3391-11D2-9EE3-00C04F797396}
CLSID to DLL	[HKCR\clsid\{96749377-3391-11D2-9EE3-00C04F797396}\InprocServer32] (Default) = %SystemRoot%\System32\Speech\Common\sapi.dll

Example: `InternetExplorer.Application` (LocalServer32)

ProgID to CLSID	[HKCR\InternetExplorer.Application\CLSID] (Default) = {0002DF01-0000-0000-C000-000000000046}
CLSID to DLL	[HKCR\clsid\{0002DF01-0000-0000-C000-000000000046}\LocalServer32] (Default) = "C:\Program Files\Internet Explorer\IEXPLORE.EXE"