**INTRODUCTION**

Let's take a look at the example below:



Here we have a dialog box, with a number displayed on it, and a couple buttons which allow you to modify the number. Assume we program it with the MFC (Microsoft Foundation Classes), just simply double click on that dialog, add the message handlers for the 'Increment' and 'Decrement' buttons to update the number in the edit box. From now, we might think: where is the reusability?

A way to do this in MFC, would be inherit from the basic controls (CEditBox and CButton for example), then give them a common interface of some kind. We might want to add a couple of entry points to access and edit the number, 'CEditBox::Increment()' and 'CEditBox::Decrement()', then, the buttons need to implement 'OnClicked()' handlers that call the relevant member functions in CEditBox. And, the instance of CButton must hold the pointer to the exactly the instance of CEditBox that we want to modify.

It's better if we have a general purpose button, that run 'OnClicked()' when we clicked it, and an edit box can be directed to do somethings remotely. The edit box should not need to care what is calling it, and the buttons should not care what they are calling. An unmodified button class can be used to increment, decrement or clear edit box at this time and can be used to remotely turn off my television later.

**THE 'sigslot' LIBRARY**

The sigslot library is a C++ Signal/Slot library. The original version of sigslot library was written by Sarah Thompson while working at Trayport Computers Ltd. in London.

The author's personal website is at <http://www.findatlantis.com/>

Signals and Slots is a powerful mechanism, can be found in Qt framework or Boost C++ libraries, that used for communication between objects. But, we might have licensing requirements problem with Qt or Boost. So, the author created the 'sigslot' library for herself, and for free.

Signal/slot mechanism has a few advantages:

**Syntactically neater.** Signals and slots was made for very readable code. Just define your signals, and define your slots, wire them up, and that's all.

**Inherently robust.** This is the neat part again: when a signal/slot connection is destroyed, the connection is automatically removed. It is therefore impossible to emit a signal and have it arrive at an object that has already been deleted. Best of all, you don't need to write any explicit cleanup code. No problem either the caller goes out of scope or the called goes out of scope.

**Reusability.** The signal/slot mechanism does not require classes to have knowledge of each other, which makes it must easier to develop highly reusable classes.

**SIGNAL/SLOT PARADIGM**

Most of traditional C++ code ultimately packed in number of classes, which inter-operate by calling member functions. Allowing classes to inter-operate this way requires classes to 'know about' each other in some detail. For example, a home automation system might contain a couple of classes like the following:

class Light

{

public:

void ToggleState() { std::cout << "Toggle state" << std::endl; }

void TurnOn() { std::cout << "Turn on" << std::endl; }

void TurnOff() { std::cout << "Turn off" << std::endl; }

};

class Switch

{

public:

virtual void Clicked() = 0;

};

If we wanted to ‘wire up’ a switch to a light so that clicking the switch toggled the state of a light, assuming we can’t modify either Switch or Light directly, we’d need to do something like:

class ToggleSwitch : public Switch

{

public:

ToggleSwitch(Light& lp)

: m\_lp(lp)

{

}

virtual void Clicked()

{

m\_lp.ToggleState();

}

private:

Light& m\_lp;

};

Light lp1, lp2;

ToggleSwitch tsw1(lp1), tsw2(lp2);

A better solution is to use signals and slots. Signals and slots allow classes to be designed without needing to worry in too much detail how they will be connected together. Here is an alternative implementation of Switch and Light:

class Light : public has\_slots<>

{

public:

void ToggleState() { std::cout << "Toggle state" << std::endl; }

void TurnOn() { std::cout << "Turn on" << std::endl; }

void TurnOff() { std::cout << "Turn off" << std::endl; }

};

class Switch

{

public:

signal0<> Clicked;

};

Switch sw1, sw2;

Light lp1, lp2;

The main changes here are the pure virtual function, 'Clicked()' has gone, to be replaced by a signal. The Light class is largely unchanged, except that it inherits 'has slots'. Rather than needing to implement a messy derived class like ToggleSwitch, it is now possible to 'wire up' the switches to the lights:

sw1.Clicked.connect(&lp1, &Light::ToggleState);

sw2.Clicked.connect(&lp2, &Light::ToggleState);

It starts becoming very clear how much power is inherent in the signal/slot approach if you later decide you want to add two extra lights, each with their own toggle switch, plus a global 'all lights on' switch and a global 'all lights off' switch:

Switch all\_on, all\_off;

Light lp1, lp2, lp3, lp4;

all\_on.Clicked.connect(&lp1, &Light::TurnOn);

all\_on.Clicked.connect(&lp2, &Light::TurnOn);

all\_on.Clicked.connect(&lp3, &Light::TurnOn);

all\_on.Clicked.connect(&lp4, &Light::TurnOn);

all\_off.Clicked.connect(&lp1, &Light::TurnOff);

all\_off.Clicked.connect(&lp2, &Light::TurnOff);

all\_off.Clicked.connect(&lp3, &Light::TurnOff);

all\_off.Clicked.connect(&lp4, &Light::TurnOff);