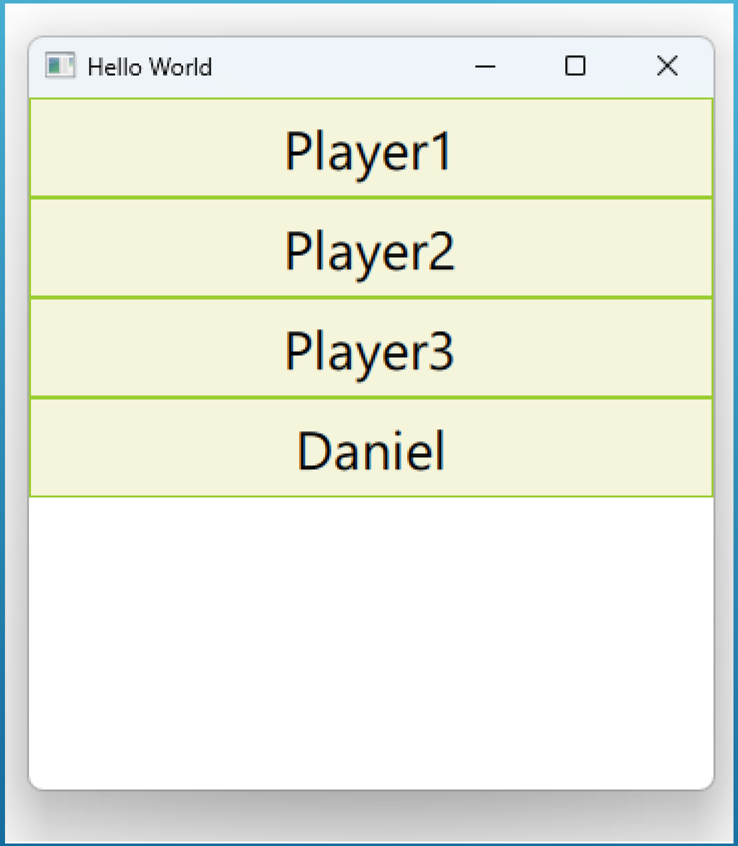
Notes to self

```
. Exploring the building of attached properties for your C++ types :
        . You have to provide :
            . An attached class
            . An attaching class

        . An attached class provides the bulk of the features. In our example
            we want to provide timing capabilities. The attached class,
            TimerAttached explses the [interval, running] properties :
                    Q_PROPERTY(int interval READ interval WRITE setInterval NOTIFY intervalChanged)
                    Q_PROPERTY(bool running READ running WRITE setRunning NOTIFY runningChanged)


        . The attached class provides the timing infrastructure using QTimer. Notice that
            we start and stop the timer when the running propery is set. It also emits
            the timerout signal at given intervals.

        . The attaching class has two requirements :

            . Providing a
                    static TimerAttached *qmlAttachedProperties(QObject * object);
               method that returns an instance of the attached class,

            . Putting in the
                    QML_DECLARE_TYPEINFO(Timer,QML_HAS_ATTACHED_PROPERTIES)
               macro, as seen in our Timer "attaching" class.

        . Once we have these class, we have to register them through the QML engine.
            Notice that the attached class isn't meant to be used externally so
            we expose it as uncreatable.

        . With the proper plumbing in place we can use our Timer attached property like so :

                Person {
                    name : "Johnson"
                    age : 33

                    Timer.running : false
                    Timer.interval : 2000
                    Timer.onTimerOut : {
                        console.log("Timer out for person")
                    }
                }

                Rectangle {
                    id : mRect
                    width: 200
                    height: 200
                    color: "yellowgreen"

                    Timer.running : true
                    Timer.interval : 500
                    Timer.onTimerOut : {
                        console.log("Timer out for rect")
                    }
                }

        . Play with the running and interval properties and show the console.log
            messages to really drive the point home.

        . Use the QT5 course as a reference and improvise.
```

Attached Properties



Player1

Player2

Player3

Daniel

Attached Properties

- Attached Type
- Attaching Type

Attached Type

- Provides the bulk of the features.
- Is used internally by Qt
- Has a few coding reqirements

The Goal

```
Person {
    name : "Johnson"
    age : 33

    Timer.running : false
    Timer.interval : 2000
    Timer.onTimerOut : {
        console.log("Timer out for person")
    }
}
```

The Goal

```
Rectangle {
    id : mRect
    width: 200
    height: 200
    color: "yellowgreen"

    Timer.running : true
    Timer.interval : 500
    Timer.onTimerOut : {
        console.log("Timer out for rect")
    }
}
```

Attached Type : TimerAttached

```
class TimerAttached : public QObject
{
    Q_OBJECT
    Q_PROPERTY(int interval READ interval WRITE setInterval NOTIFY intervalChanged)
    Q_PROPERTY(bool running READ running WRITE setRunning NOTIFY runningChanged)
public:
    explicit TimerAttached(QObject *parent = nullptr);
    int interval() const;
    bool running() const;
    void setInterval(int interval);
    void setRunning(bool running);
signals:
    void timerOut();
    void intervalChanged(int interval);
    void runningChanged(bool running);
private :
    QTimer * m_timer;
    int m_interval;
    bool m_running;
};
```

Attached Type : TimerAttached

```
TimerAttached::TimerAttached(QObject *parent) : QObject(parent),
    m_timer(new QTimer(this)),
    m_interval(2000),
    m_running(false)
{
    qDebug() << "Creating the timer attached object";
    connect(m_timer,&QTimer::timeout,[=](){
        qDebug() << "Timeout for interval :" << m_interval;
        emit timerOut();

    });
}
```

Attached Type : Starting and Stoping the Timer

```cpp
void TimerAttached::setRunning(bool running)
{
    if (m_running == running)
        return;

    m_running = running;
    if (!m_running){
        m_timer->stop();
    }else{
        m_timer->start(m_interval);
    }
    emit runningChanged(m_running);
}
```

Attaching Type : Timer

```
class Timer : public QObject
{
    Q_OBJECT
public:
    explicit Timer(QObject *parent = nullptr);

    static TimerAttached *qmlAttachedProperties(QObject * object);

signals:

public slots:
};
QML_DECLARE_TYPEINFO(Timer,QML_HAS_ATTACHED_PROPERTIES)
```

Attached Type : TimerAttached

```
TimerAttached *Timer::qmlAttachedProperties(QObject *object)
{
    return new TimerAttached(object);
}
```

Register the types

```
qmlRegisterUncreatableType<TimerAttached>("com.blikoon.Football", 1,0, "TimerAttached",
                                           "Can not create TimerAttached in QML.Not allowed.");
qmlRegisterType<Timer>("Timing",1,0,"Timer");
qmlRegisterType<Person>("People", 1,0, "Person");
```

Attached Type : TimerAttached

```
Person {
    name : "Johnson"
    age : 33

    Timer.running : false
    Timer.interval : 2000
    Timer.onTimerOut : {
        console.log("Timer out for person")
    }
}

Rectangle {
    id : mRect
    width: 200
    height: 200
    color: "yellowgreen"

    Timer.running : true
    Timer.interval : 500
    Timer.onTimerOut : {
        console.log("Timer out for rect")
    }
}
```