Lecture Material

- QT graphical user interface framework

QT

- Multiplatform GUI (Graphical User Interface) library
- Available at https://www.qt.io/
- Single API (Application Programming Interface) used in multiple environments (Unix, Windows, Mac)
  - Adaptation to a different environment requires only a recompilation
  - Compilation in multiple environment makes it easier to detect errors not surfacing when working with a given compiler under a given operating system
- Look of the application consistent with other programs working in given environment

Simple Button

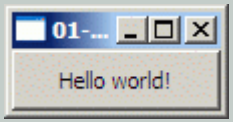
Simple button:

```
#include <QApplication>
#include <QPushButton>

int main(int argc, char *argv[])
{
    QApplication app(argc, argv);

    QPushButton hello("Hello world!");
    hello.resize(100, 30);

    hello.show();
    return app.exec();
}
```

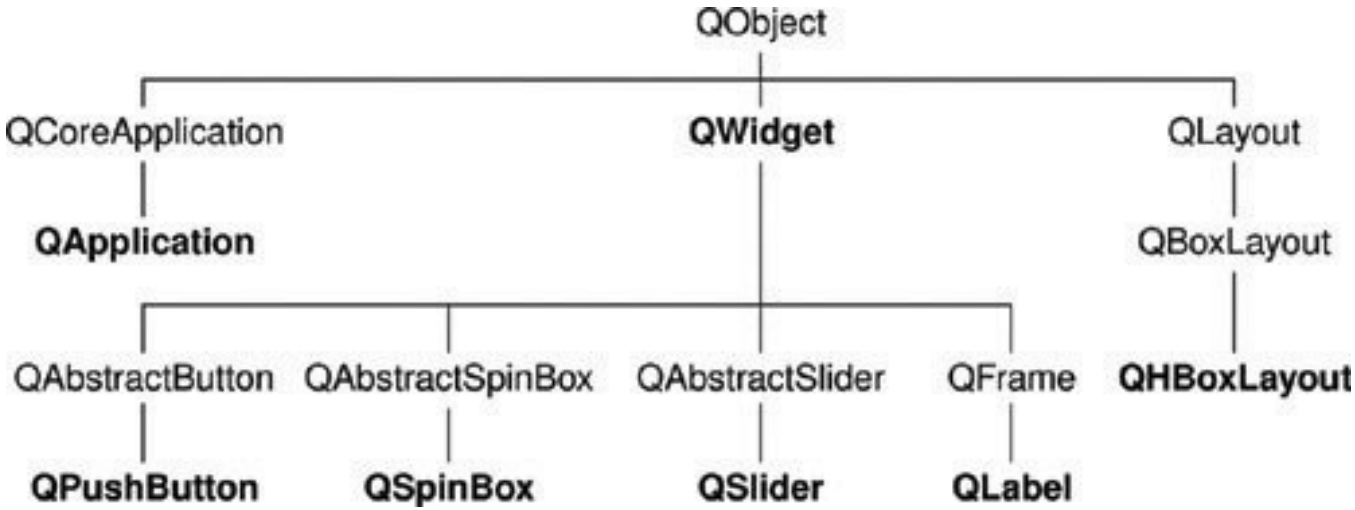


Compilation:

```
qmake -project
qmake QT+=widgets
make
```

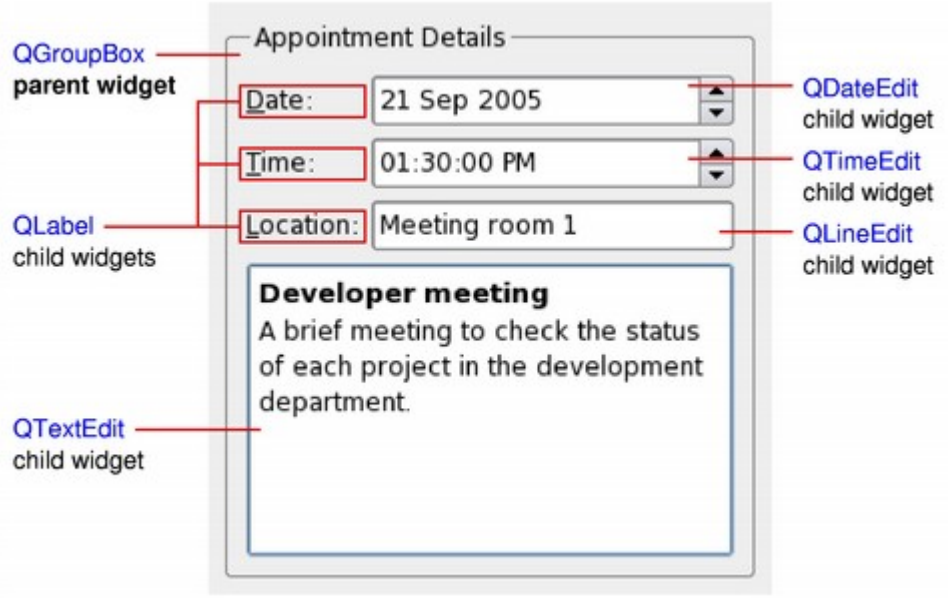
Widget

- Visible user interface component
- Shorthand for *window gadget*
- Buttons, menus, frames, sliders are all widgets
- Widget can contain other widgets



Parent and Child Widgets

- Widget without a parent is always a separate window
- The remaining widgets are displayed inside the parent widget
- The parent widget will free the resources allocated by its child widgets

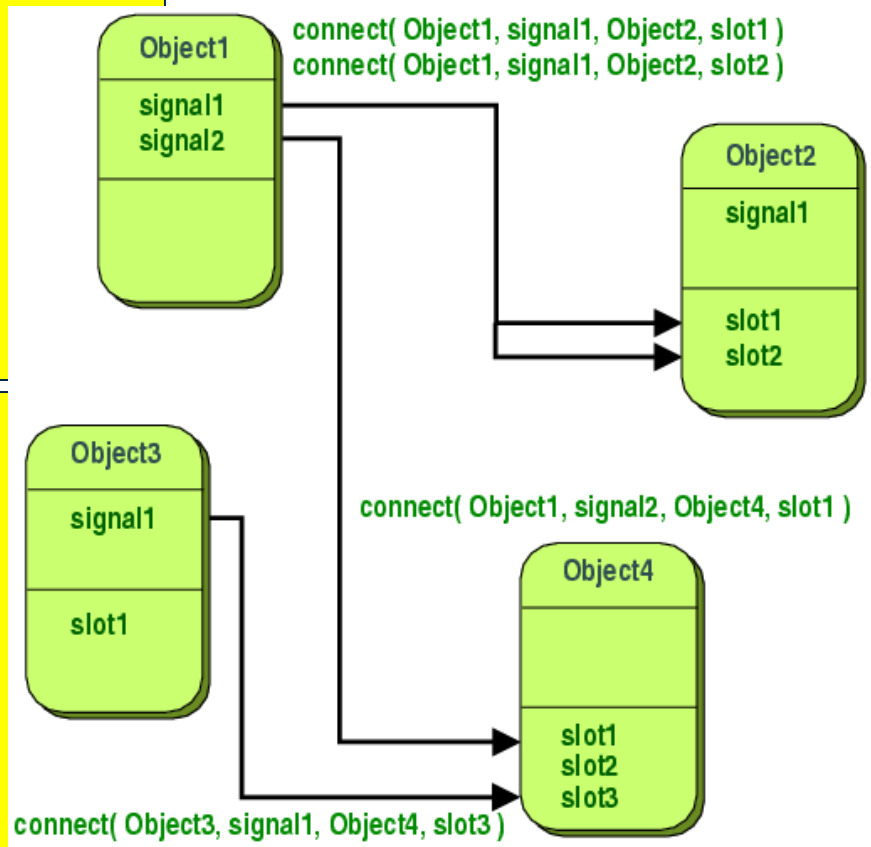


Signals and Slots

```
#include <QObject>

class Counter : public QObject
{
     Q_OBJECT
public:
     Counter() { m_value = 0; }
     int value() const { return m_value; }
public slots:
     void setValue(int value);
signals:
     void valueChanged(int newValue);
private:
     int m_value;
};
```

```
#include "sigslots.h"
#include <iostream>
using namespace std;
void Counter::setValue(int value)
{
     if (value != m_value) {
          m_value = value;
          emit valueChanged(value);
     }
}
int main()
{
 Counter a, b;
 QObject::connect(&a, SIGNAL(valueChanged(int)),
                  &b, SLOT(setValue(int)));
 a.setValue(12);
 cout << "a="<<a.value()<<",b="<<b.value()<<endl;
 b.setValue(48);
 cout << "a="<<a.value()<<",b="<<b.value()<<endl;
}
```



Internationalization

- Mark texts for translation:

```
QPushButton(tr("Quit"));
```

- Install the translator in the program:

```
#include <QtGui>
...
int main(int argc, char *argv[])
{
  QApplication app(argc, argv);
  QString locale = QLocale::system().name();
  QTranslator translator;
  translator.load(QString("app_") + locale);
  app.installTranslator(&translator);
```

- Modify the project file:

```
TRANSLATIONS=app_pl.ts
```

- Extract strings: lupdate
- Provide translations: linguist
- Compile the database: lrelease