19.10.15

MITK Subject / Observer Pattern

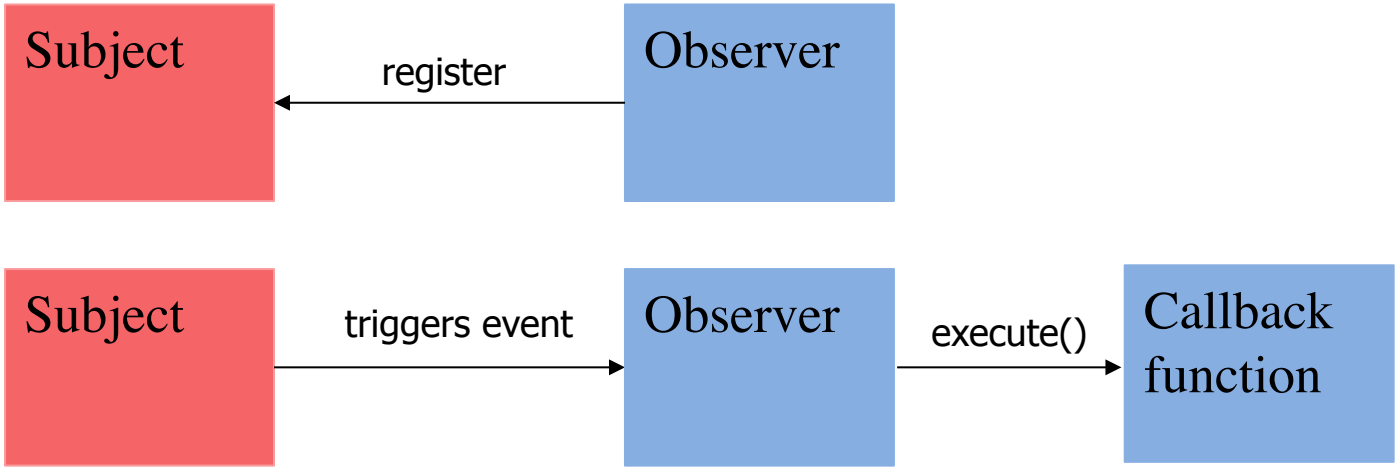
Introduction

- MITK uses the subject/observer pattern
- many objects (mitk, itk) can trigger events, for which observers can be registered
- example: mitk::PointSet
    - PointSetSizeChangeEvent
    - PointSetAddEvent
    - PointSetMoveEvent
- observers are also known as listeners

Event Handling

- Principle: a subject triggers an event and you want to handle it by calling a function (callback function)

- What do you need for Implementation?
  - an observer (event listener), a command that is
  - a callback function



Observer

- to handle a certain event of a subject you need to add an observer using the following function

*unsigned long AddObserver(const itk::EventObject & event, itk::Command *);*

- observer is not implemented, but notified by itk::Command

```
mitk::PointSet::Pointer pointSet = mitk::PointSet:: New();
itk::MemberCommand< Self > addPointCommand = itk::MemberCommand< Self > ::New();
addPointCommand->SetCallbackFunction( this, &MyClass::ValidatePointSet );

unsigned long  m_ObserverTag = pointSet->AddObserver(mitk::PointSetAddEvent(), addPointCommand );
```

http://www.itk.org/Doxygen/html/classitk_1_1Command.html

Callback function

- the parameters a callback function gets, depends on which command you choose
- implementation of the callback function for itk::MemberCommand:

  - this command needs a itk::Object caller and the itk::EventObject

```
void MyClass::ValidatePointSet(itk::Object *caller, const itk::EventObject &event)
{
        if(dynamic_cast<mitk::PointSet*>(caller))
        {
                mitk::PointSet::Pointer pointset = dynamic_cast<mitk::PointSet*>(caller);
                { do something with the pointset ... }
        }
}
```

Problems

- The observer pattern can cause memory leaks, known as the lapsed listener problem [1]

- so eventually the observer should be removed in your code, at least in your destructor

```
pointSet->RemoveObserver( m_ObserverTag );
```

[1] https://en.wikipedia.org/wiki/Observer_pattern (09.10.2015)

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