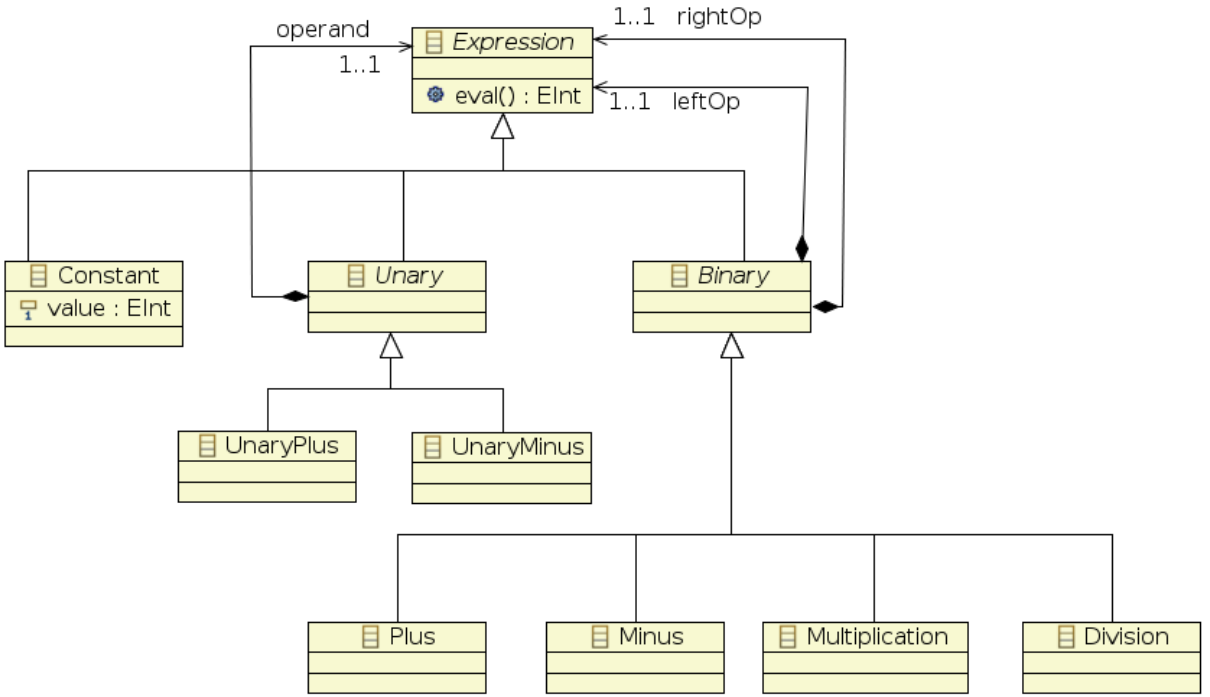
A <Basic> C++ Course

10 - SumUp

Julien Deantoni

Object-Oriented concepts

- A class diagram gives
  - structural aspects
  - relational aspects



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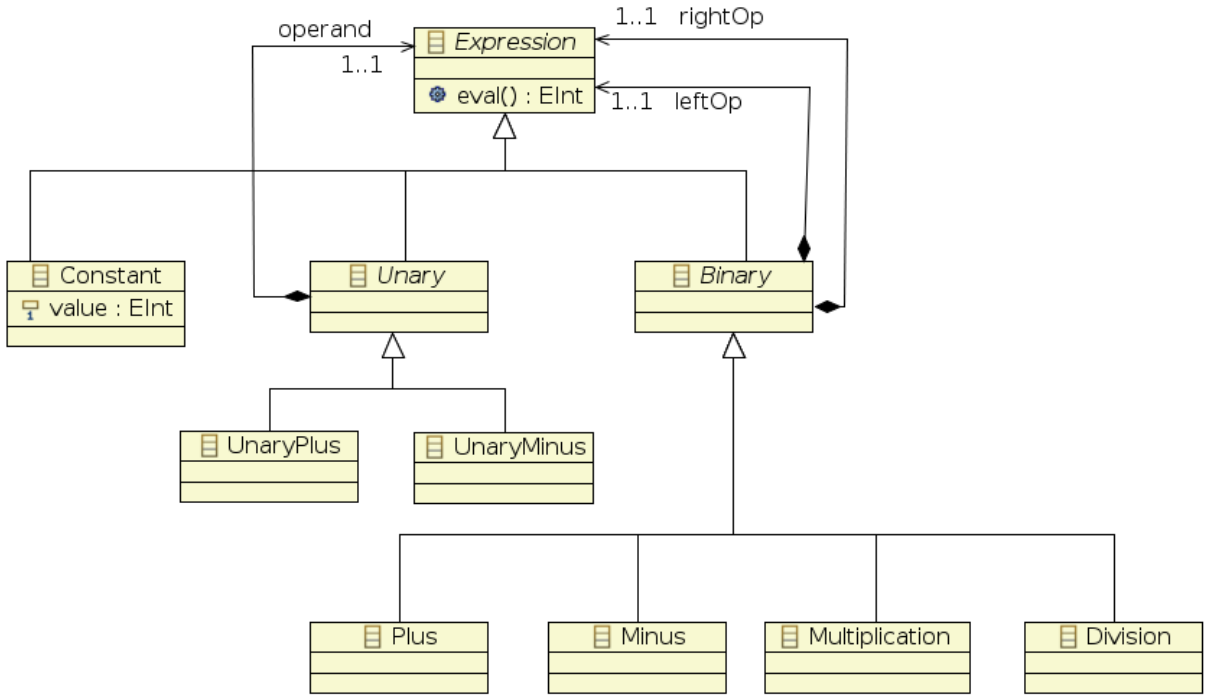

No description of the behaviours

How does `eval()` behave ?

Object-Oriented concepts

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class Expression
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    class ZeroDivide : public exception
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    public:
        const char* what() const throw () {return "Division
         by 0";}
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    virtual ~Expr() {}
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Expression.h

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protected:
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    Unary_Plus(Expr& pe);
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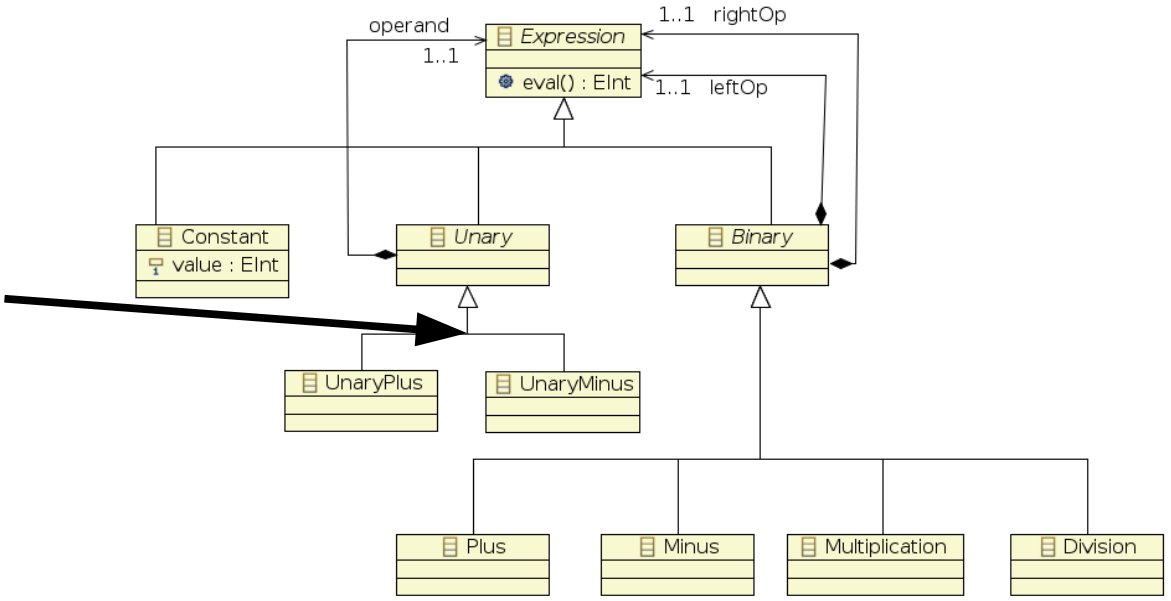

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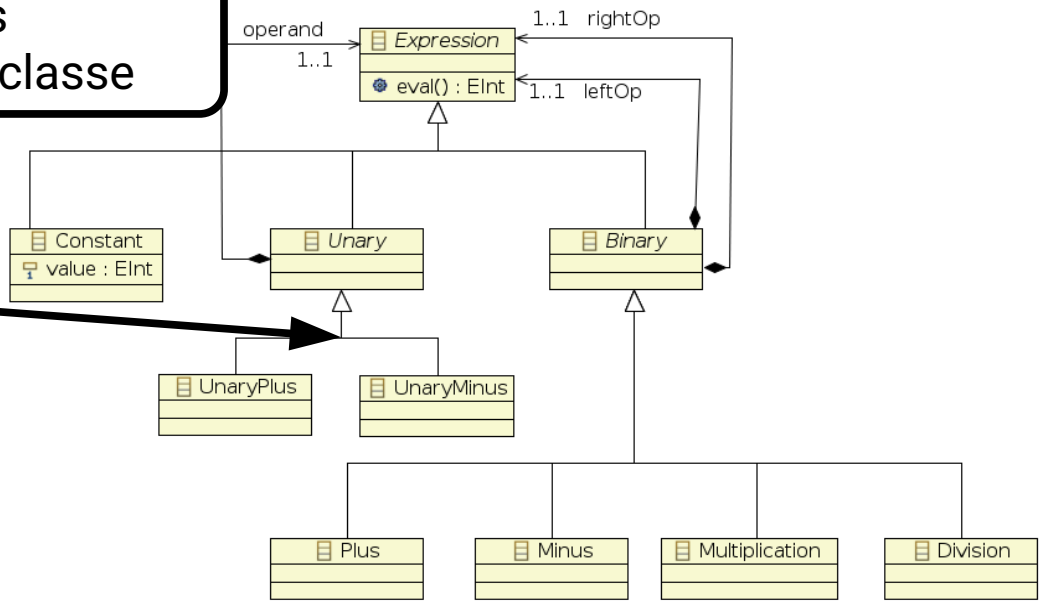
Différents types d'héritages
pour « modifier » l'interface de la classe

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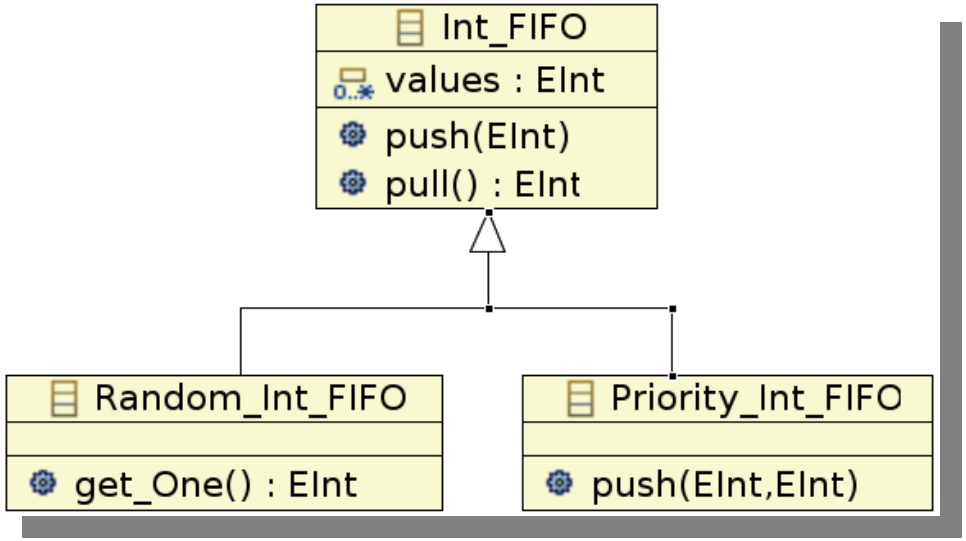
Derivation public / private



- What if we declare Random_Int_FIFO like that ?

```
class Random_Int_FIFO : private Int_FIFO
{
 public:
   int get_One();
}
```

Derivation public / private

- The private derivation
  - All members of derived class become private
  - The “interface” of the derived class is lost...

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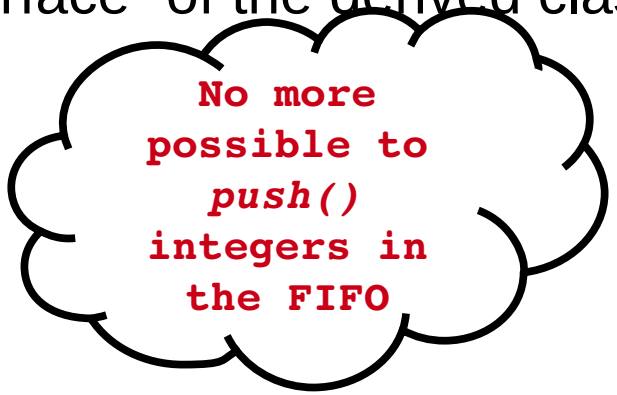


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Derivation public / private

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  - All members of derived class become private
  - The “interface” of the derived class is lost...
  - But some parts of the interface can be set public again

```
class Random_Int_FIFO : private Int_FIFO
{
 public:
   int get_One();
   using Int_FIFO::push;
}
```

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```
class Unary : public Expression
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protected:
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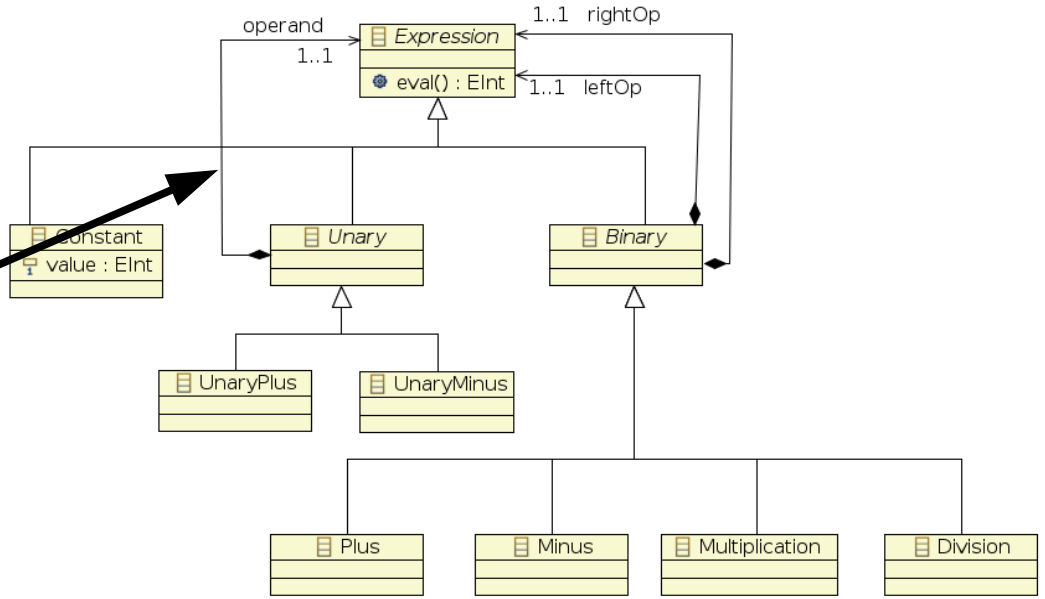

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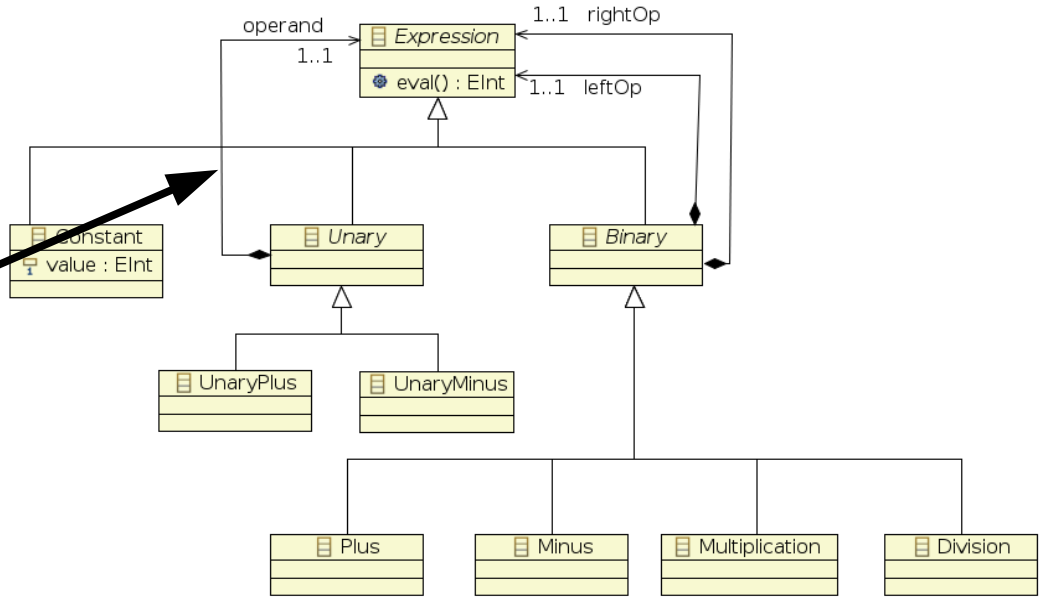

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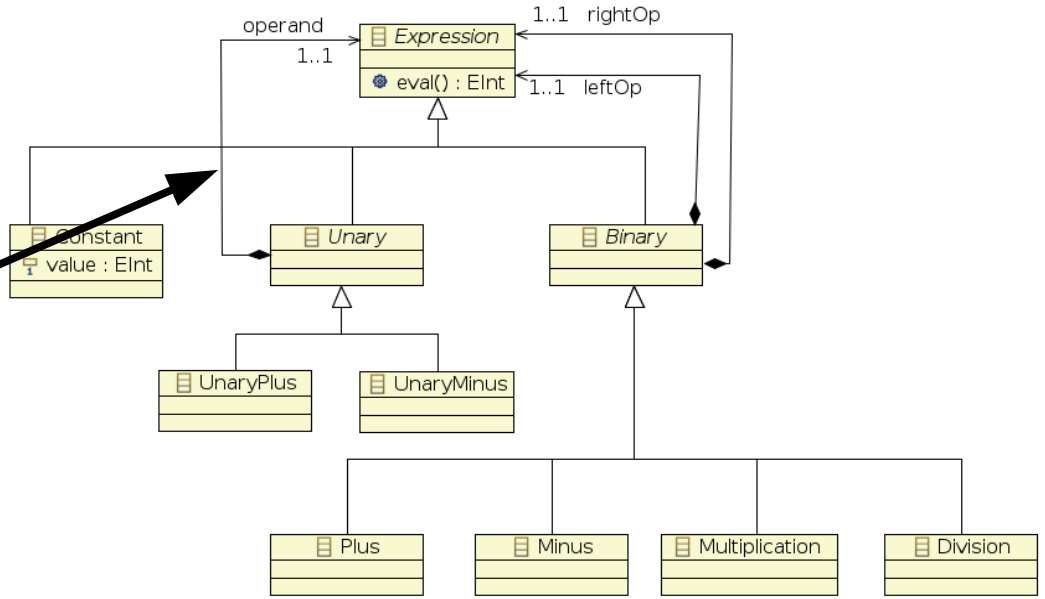

Réflexe associé ?

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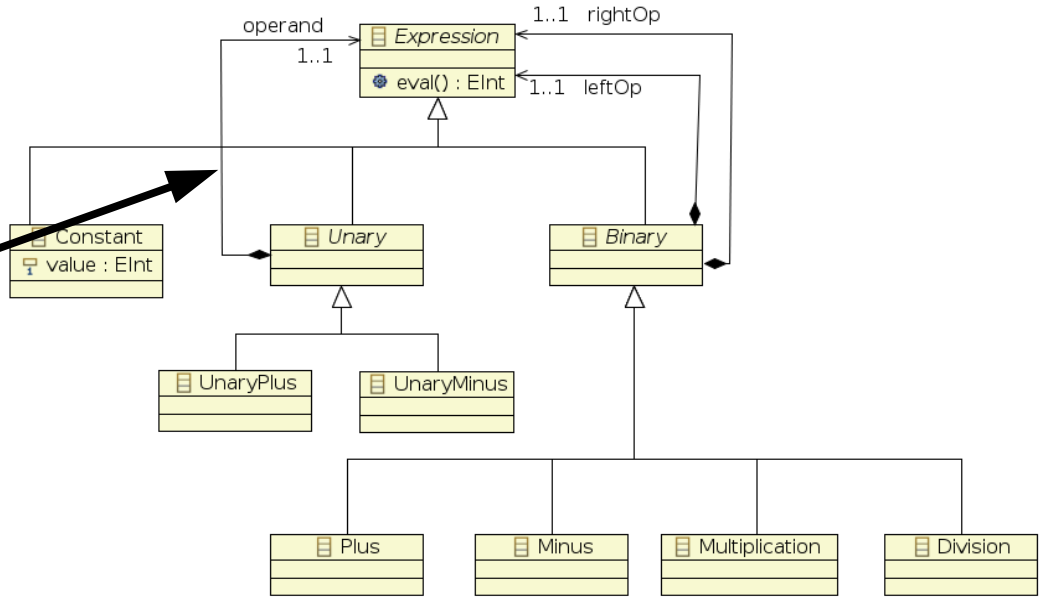

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Remember the impact of the containment

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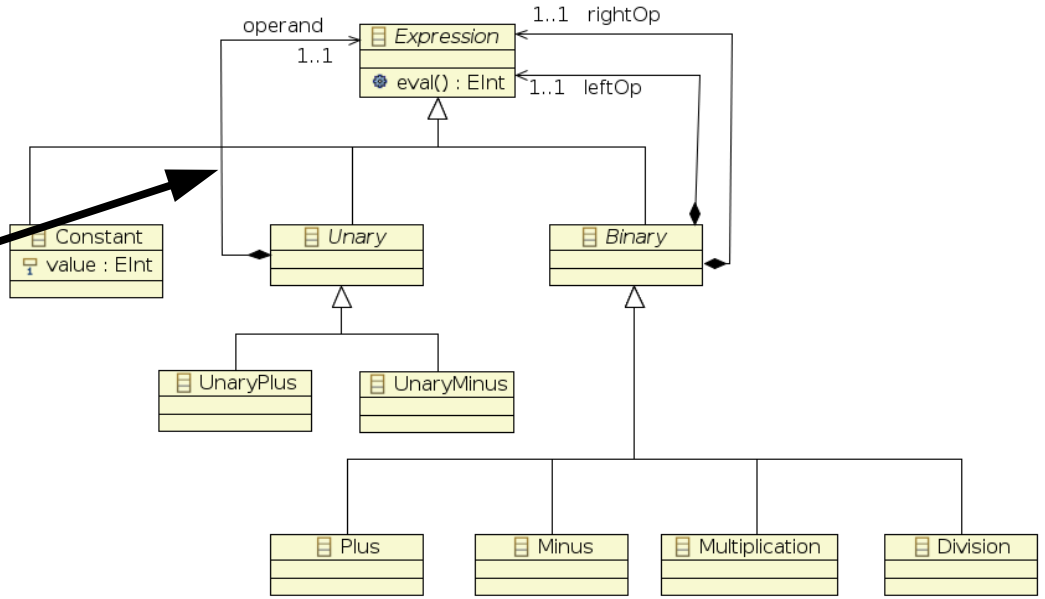

Object-Oriented concepts

- Impact of containment:
  - The life of contained object(s) is your responsibility

```
Unary::Unary(Expression& pe)
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  operand = pe.clone();
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Expression* UnaryPlus::clone()
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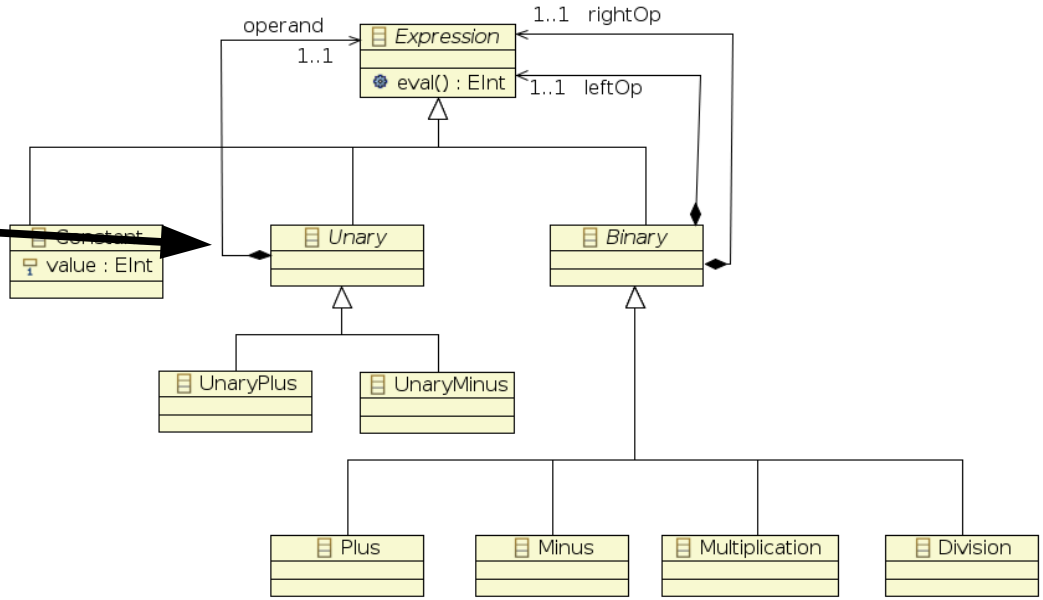

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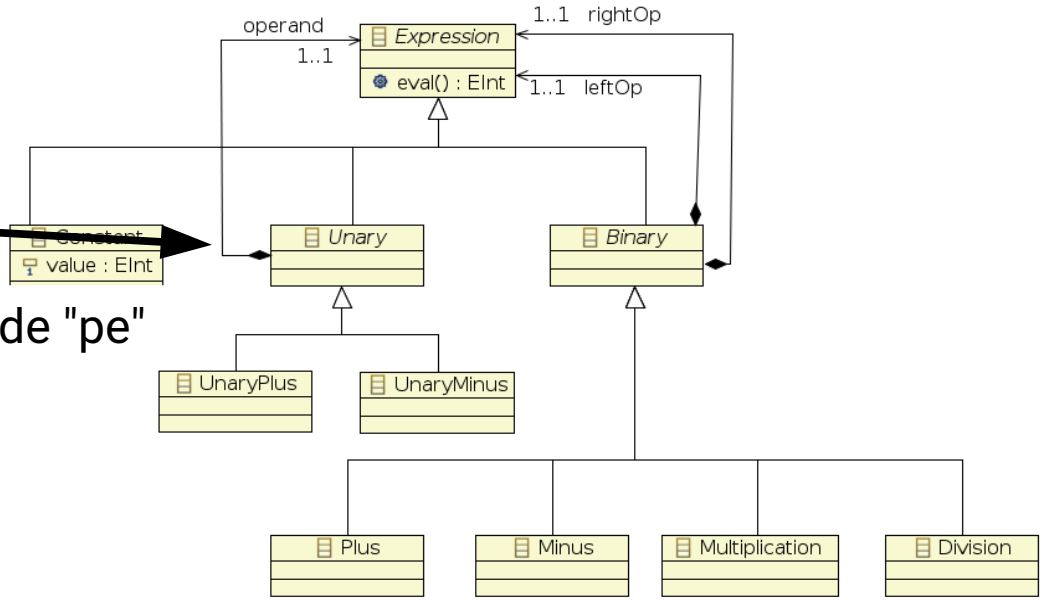
Du type dynamique de "pe"



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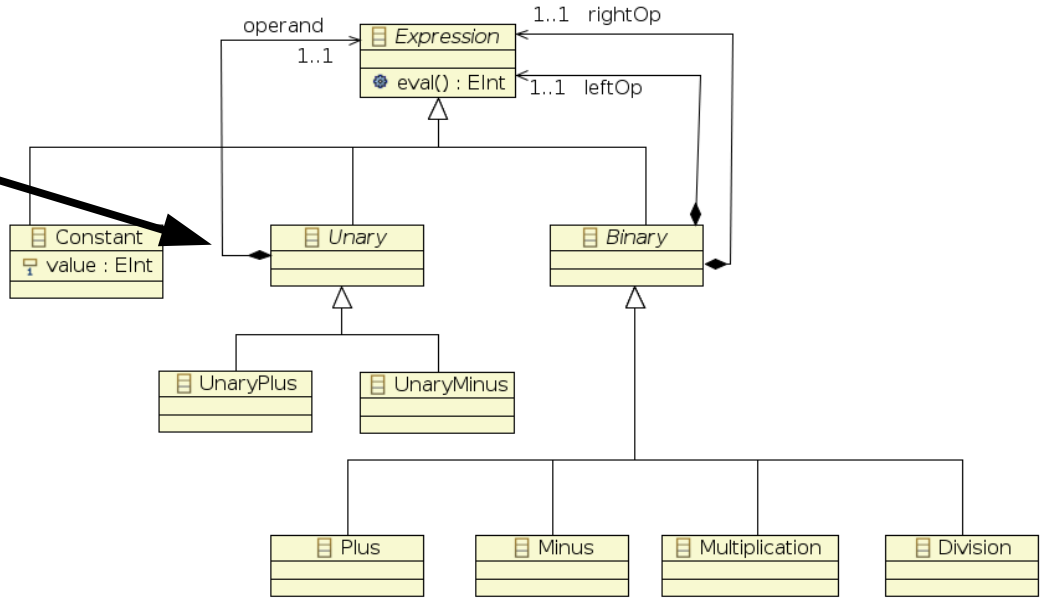

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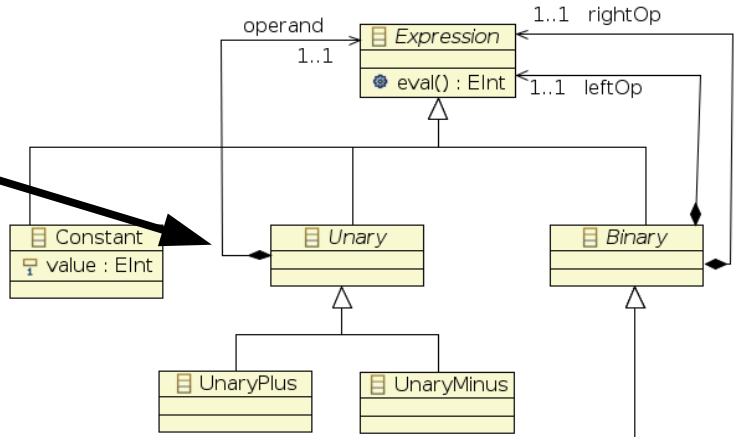
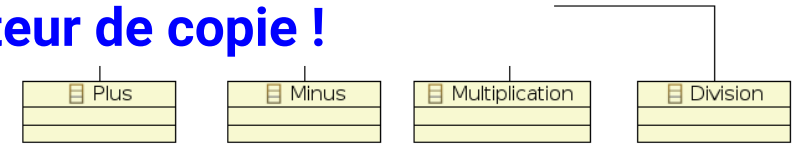


Appel au constructeur de copie !



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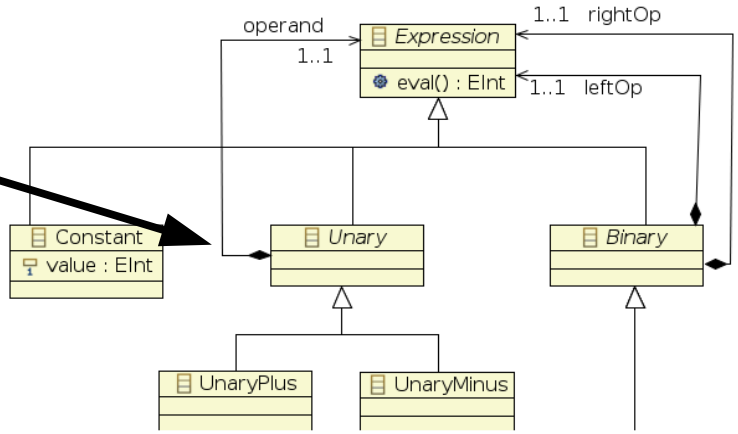
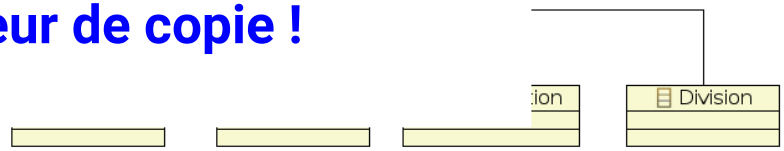


Appel au constructeur de copie !
À définir ?



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```
Unary::Unary(const Unary& un)
{
  operand = un.op->clone();
}
Unary::Unary(Expression& pe)
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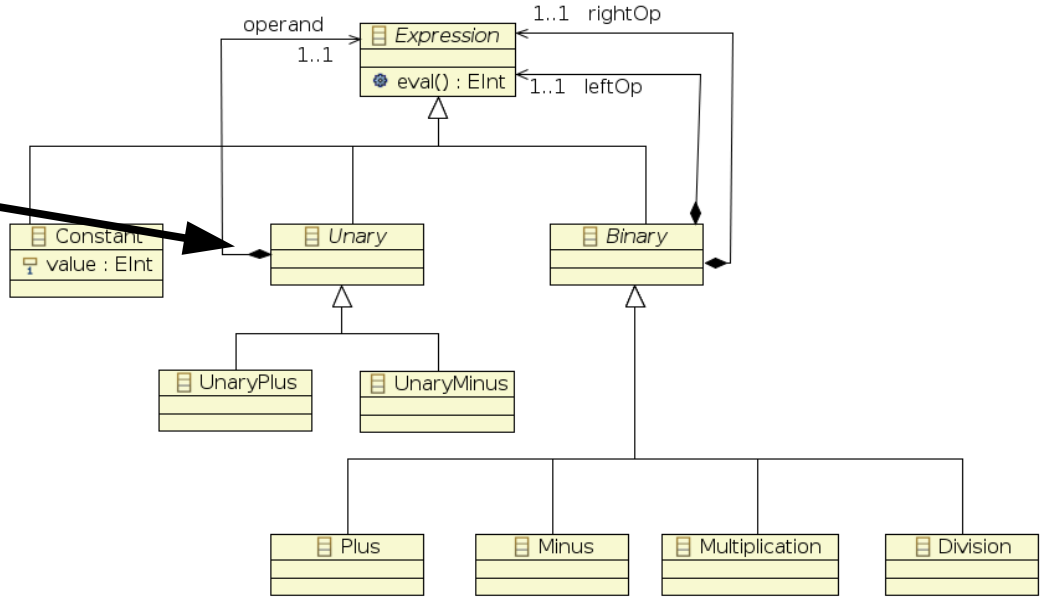
Suffisant ou à redéfinir dans UnaryPlus ?



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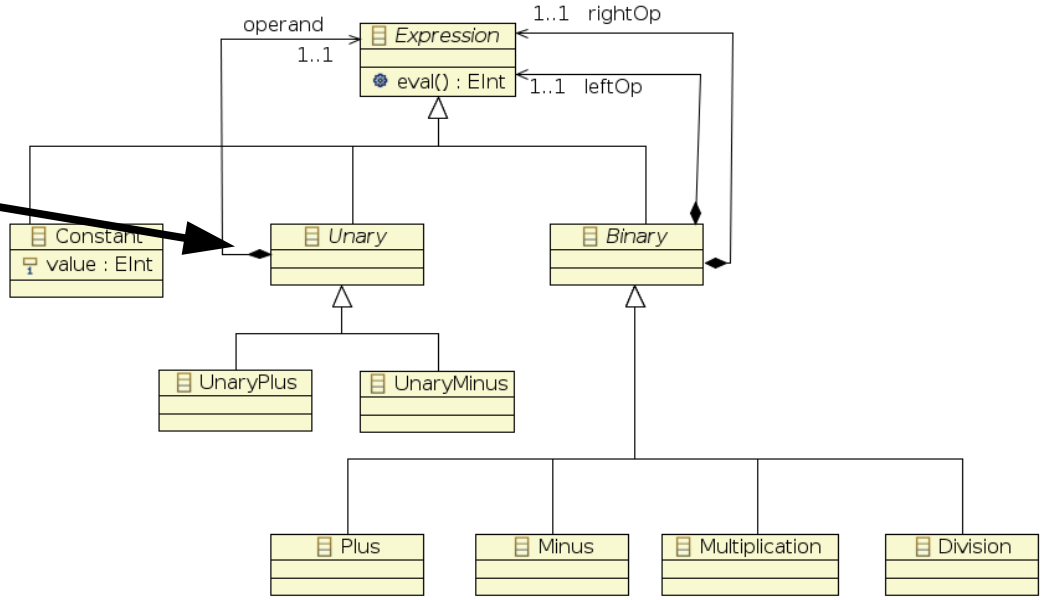

Et bien sûr ça impose la définition de l'opérateur d'affectation...

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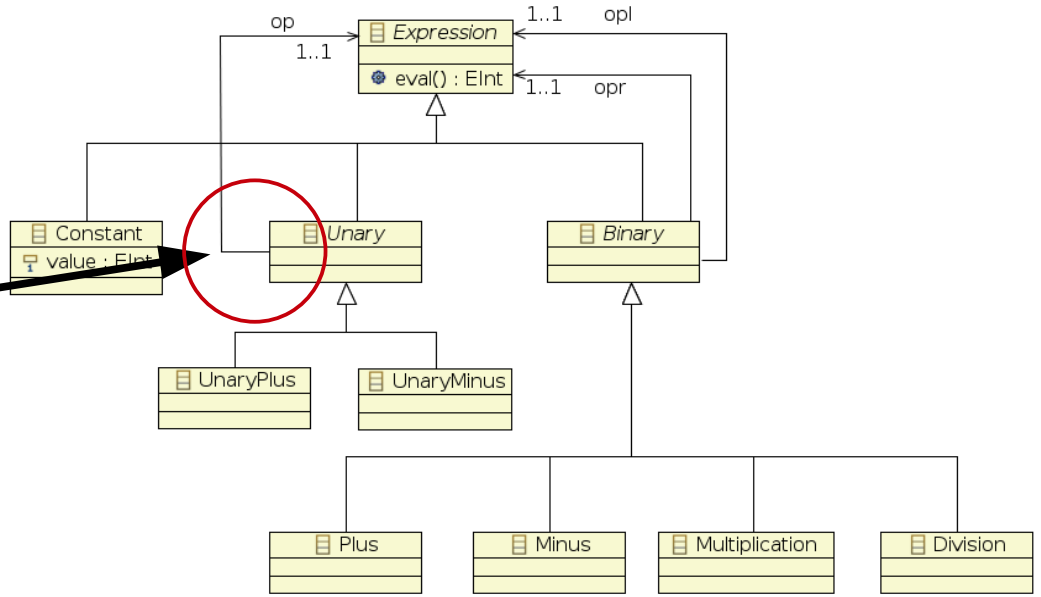

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- Take care of object life duration

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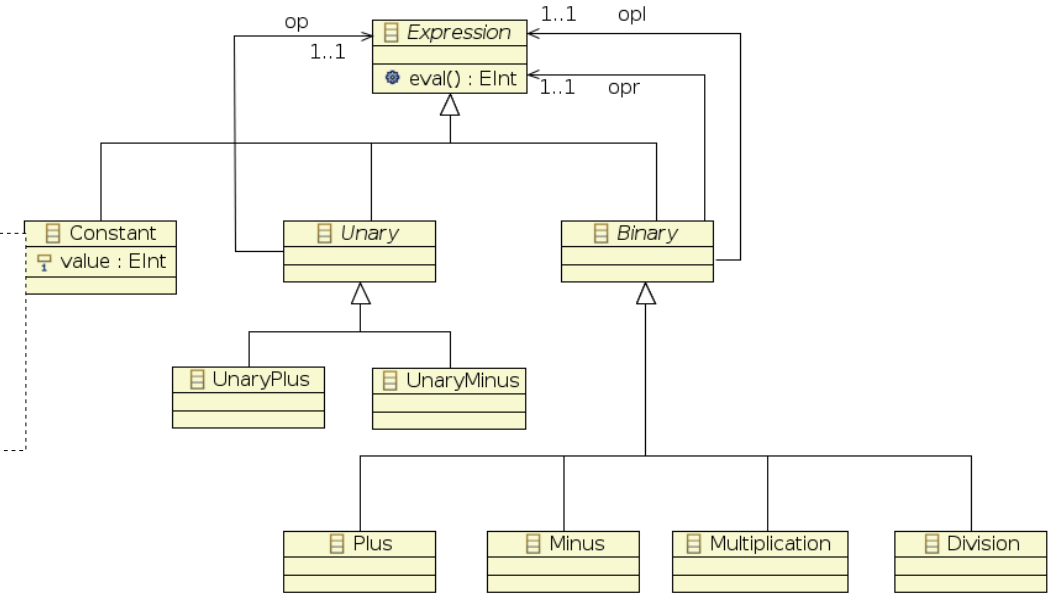

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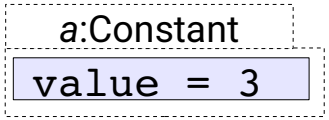


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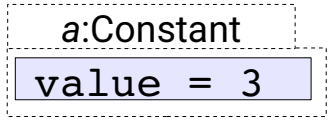

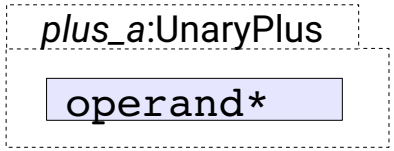

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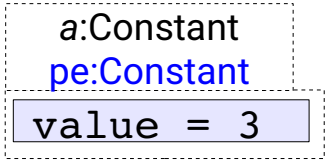

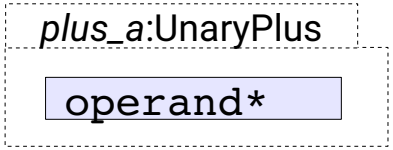

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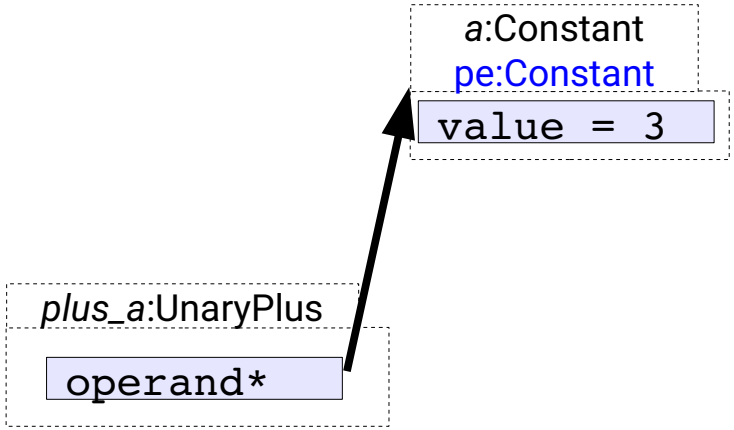

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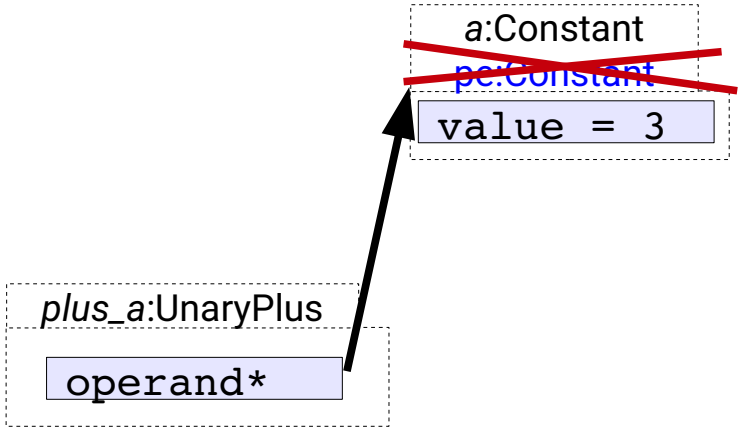

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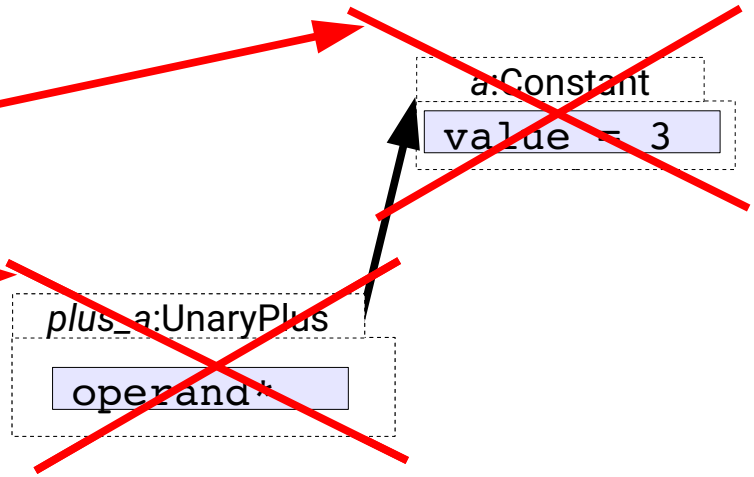

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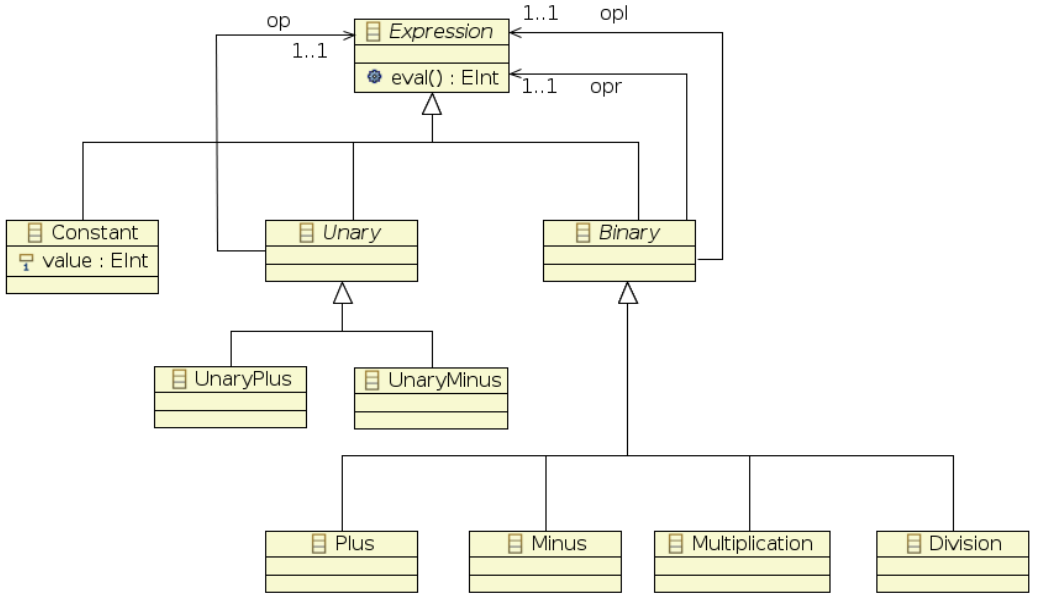

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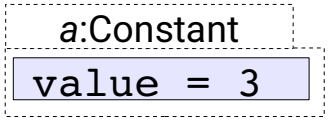


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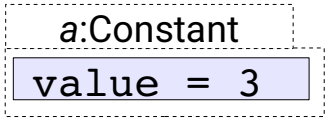

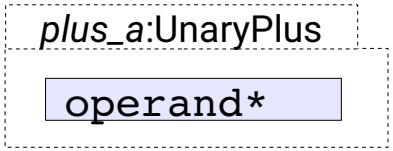

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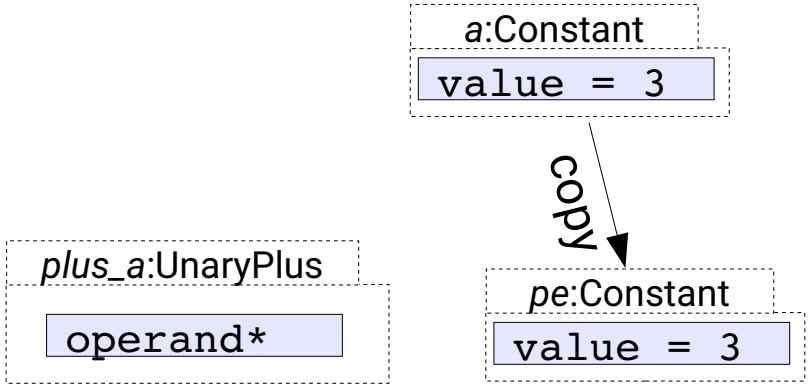

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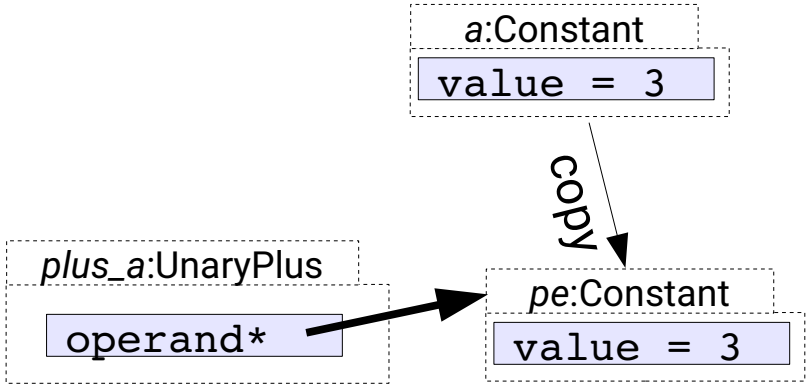

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UnaryPlus::UnaryPlus(Expression pe)
{
  operand = &pe
}
```
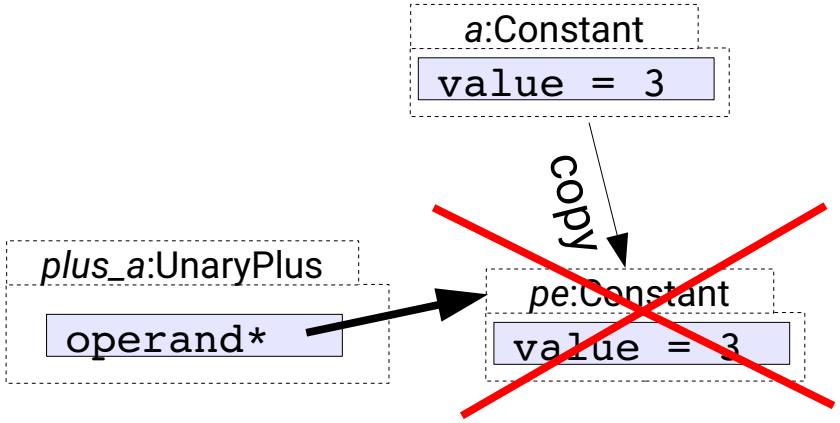
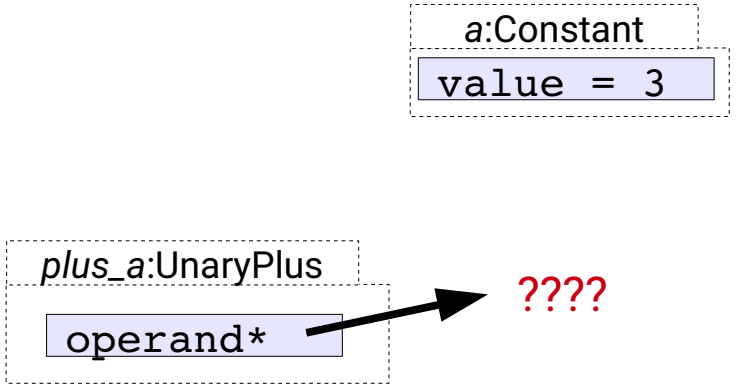



Object-Oriented concepts

- Take care of object life duration

```
main(){
Constant a(3);
UnaryPlus plus_a(a);
plus_a.eval()     // problem
                  (segmentation fault)
}
```

```
UnaryPlus::UnaryPlus(Expression pe)
{
  operand = &pe
}
```



Object-Oriented concepts

- Take care to truncation..

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main(){
Constant a(3);
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}
```

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UnaryPlus::UnaryPlus(Expression pe)
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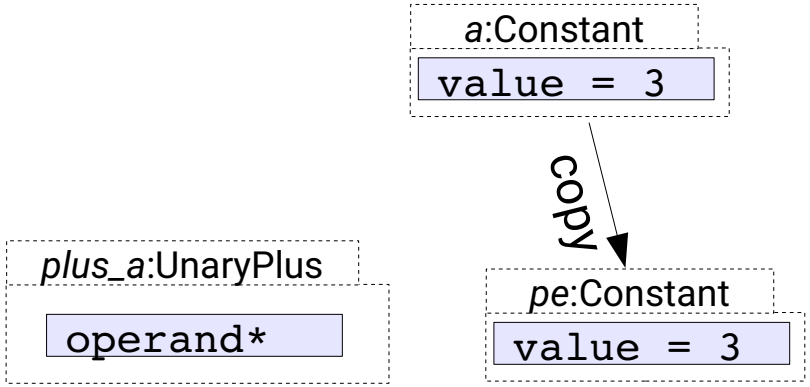

Object-Oriented concepts

- Take care to truncation..

Triple wrong because here:
1. Expression is abstract
2. truncation occurred
3.@ of temporary object is stored

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}
```

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UnaryPlus::UnaryPlus(Expression pe)
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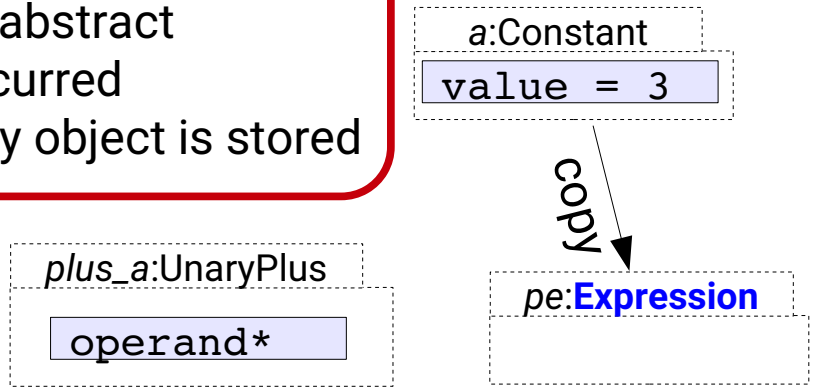


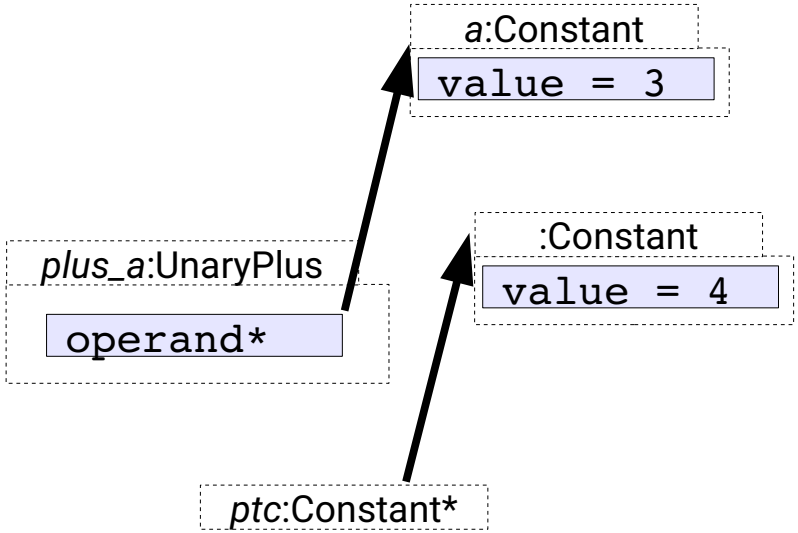
Object-Oriented concepts

- Take care of object life duration

```
Main(){
Constant* ptc = new Constant(4);

Constant a(3);
UnaryPlus plus_a(a);
}
```

```
UnaryPlus::UnaryPlus(Expression& pe)
{
  operand = &pe
}
```



Object-Oriented concepts

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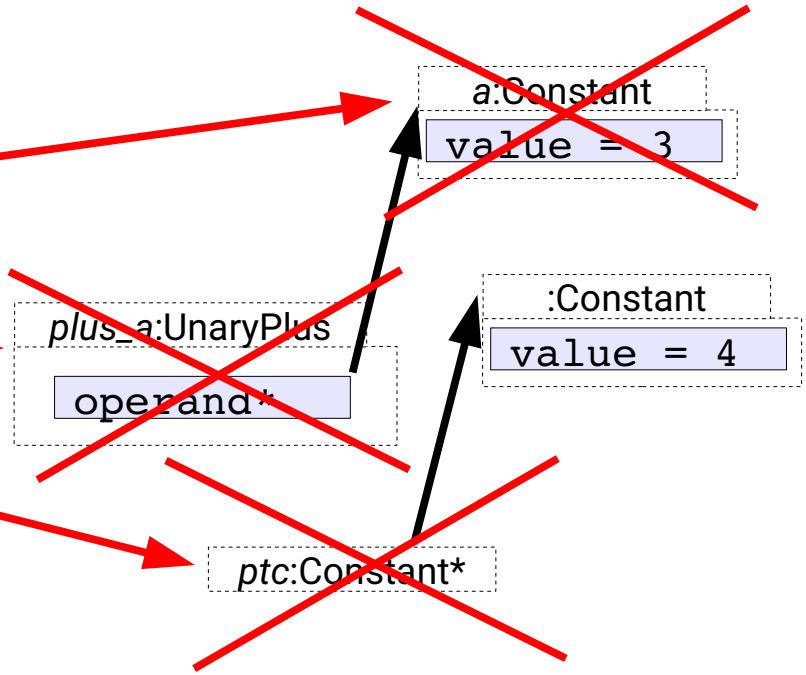
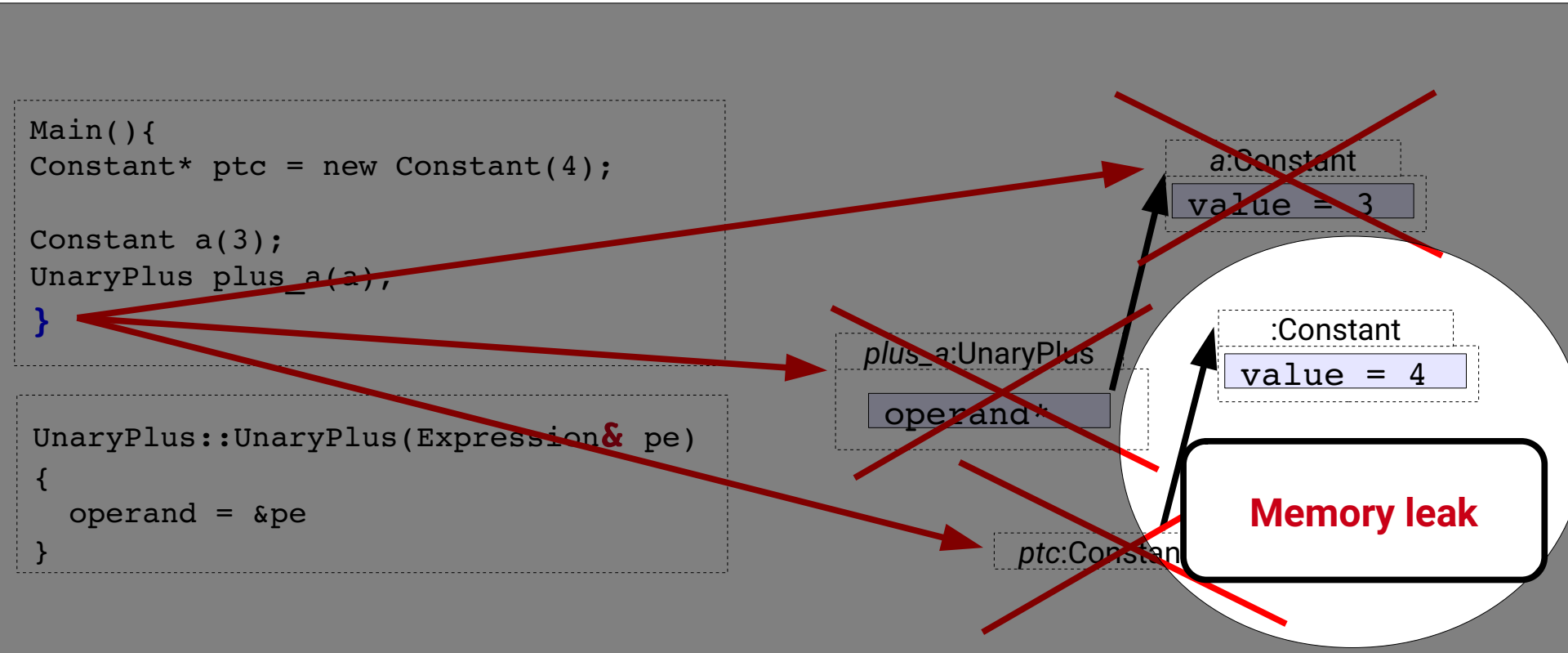


Object-Oriented concepts

- Take care of object life duration

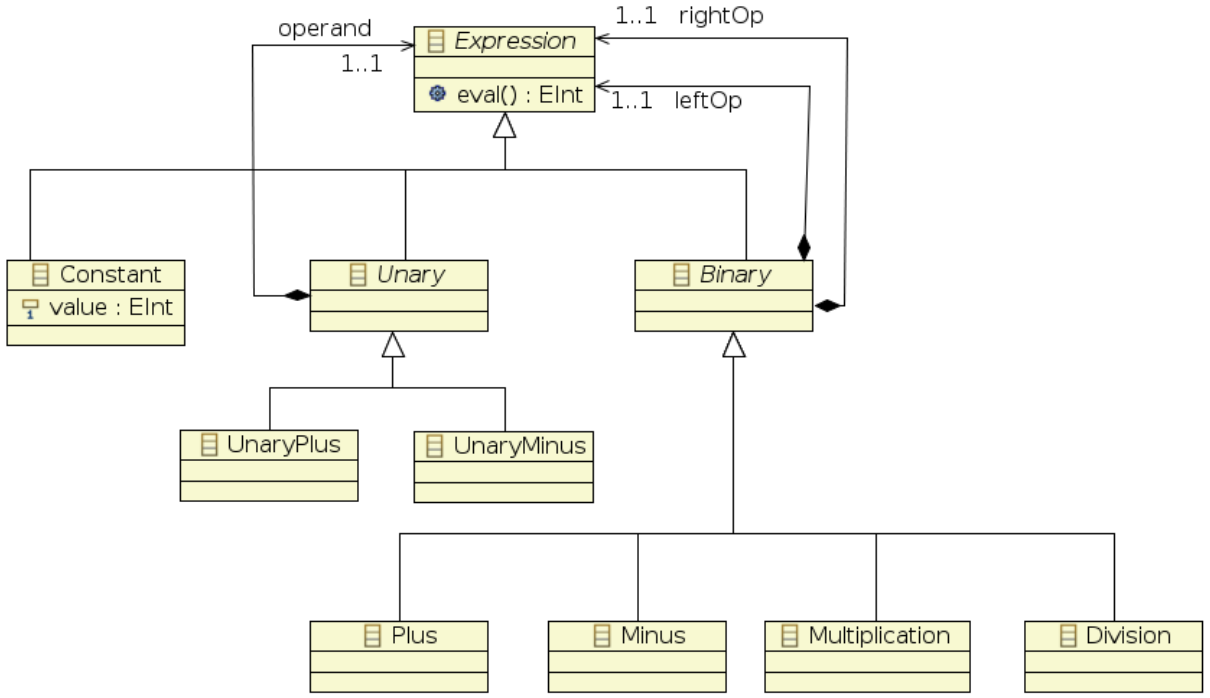


Object-Oriented concepts

- A class diagram gives
  - structural aspects
  - relational aspects

Almost equivalent to a set of .h files:

Expression.h
Unary.h
UnaryPlus.h
...

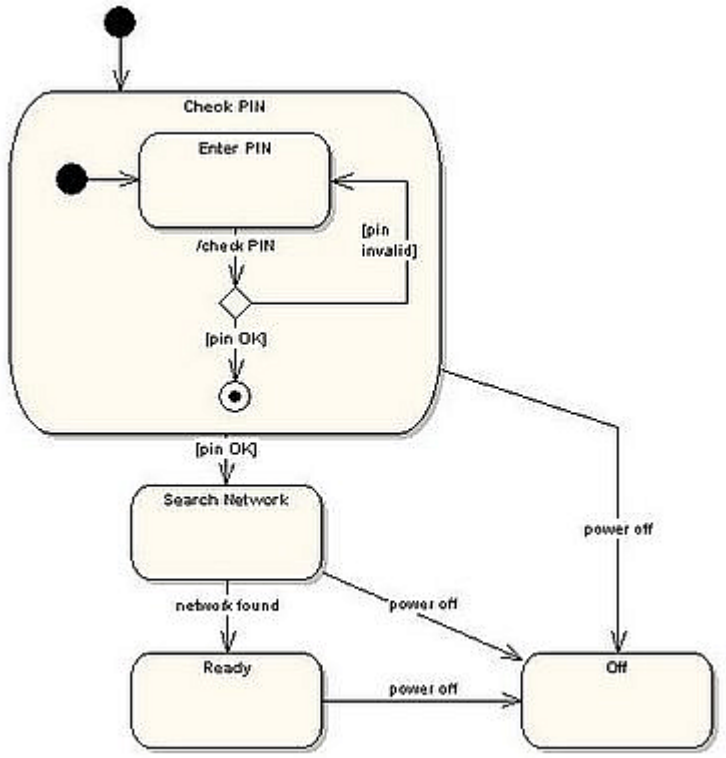


Be aware of previous comments !!

Object-Oriented concepts

- UML can give much more (caricature)
  - Behavioral aspects
- Textual specification

`myFunction()`
should
behave like that



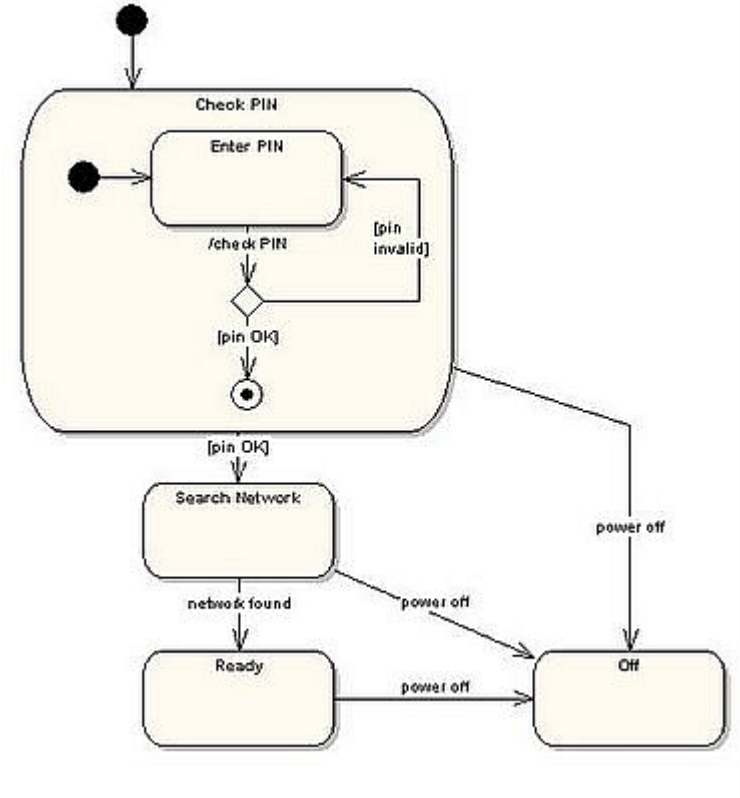
Object-Oriented concepts

- UML can give much more (caricature)
  - Behavioral aspects
- Textual specification

Almost equivalent to a set of .cpp files:

Expression.cpp
Unary.cpp
UnaryPlus.cpp
...

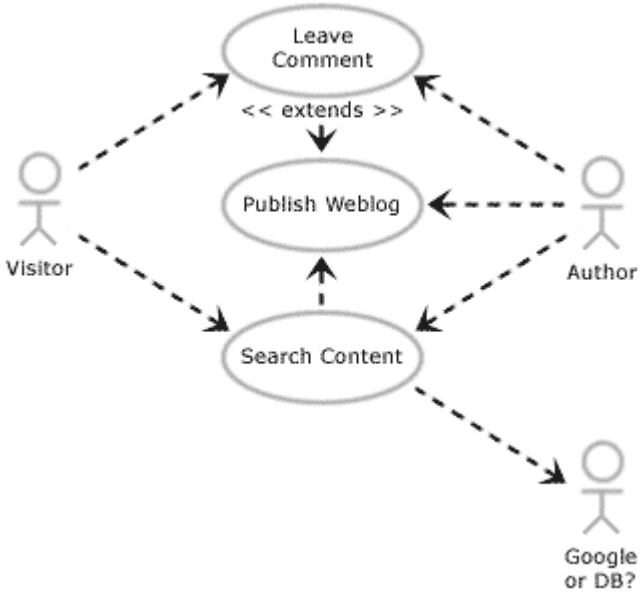
should



Object-Oriented concepts

- UML can give much more (caricature)
  - Behavioral aspects
  - …

Almost equivalent to
how the *main* uses objects:
system.h
system.cpp
main.cpp



The system behave like that

In a nutshell...

- Implementing a system:
  1. **Classes realization**
     - Declaration / definition of the class(es) --> .h
       - ≃ reflects the class diagram
     - Implementing the class(es) --> .cpp
       - ≃ implements the (member) function(s) (activity diagram, stateCharts, sequence diagram, ...)
  2. **`system` realization**
     - Make use of class(es)
       - Predefined classes (for instance the STL ones)
       - The one previously defined (at step 1.)
       - Definition / implementation / uses of a « system » class

TEST !!

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