

# UML

and XMI, OCL, MOF, etc.

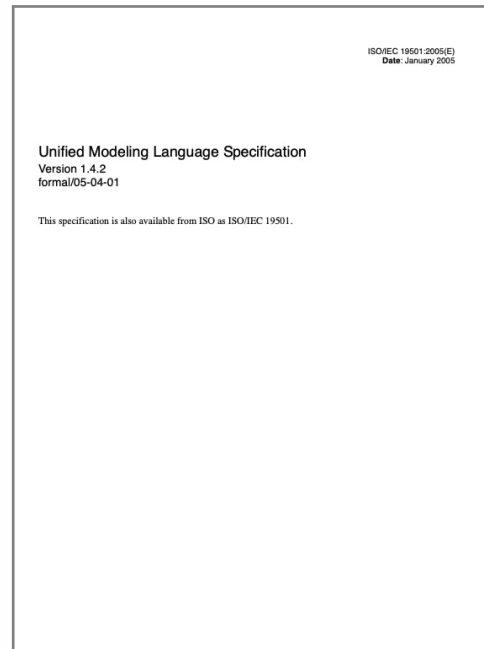
YEGOR BUGAYENKO

Lecture #8 out of 16

80 minutes

The slidedeck was presented by the author in this [YouTube Video](#)

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“The primary audience for this detailed description consists of the OMG, other standards organizations, tool builders, metamodelers, methodologists, and expert modelers. The authors assume familiarity with metamodeling and advanced object modeling. Readers looking for an introduction to the UML or object modeling should consider another source.”

— International Standardization Organization ISO. ISO/IEC 19501:2005: Information Technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2, 2005



Class Diagram

Some Other Diagrams

MDA: MOF, XMI, OCL, QVT, fUML, ...

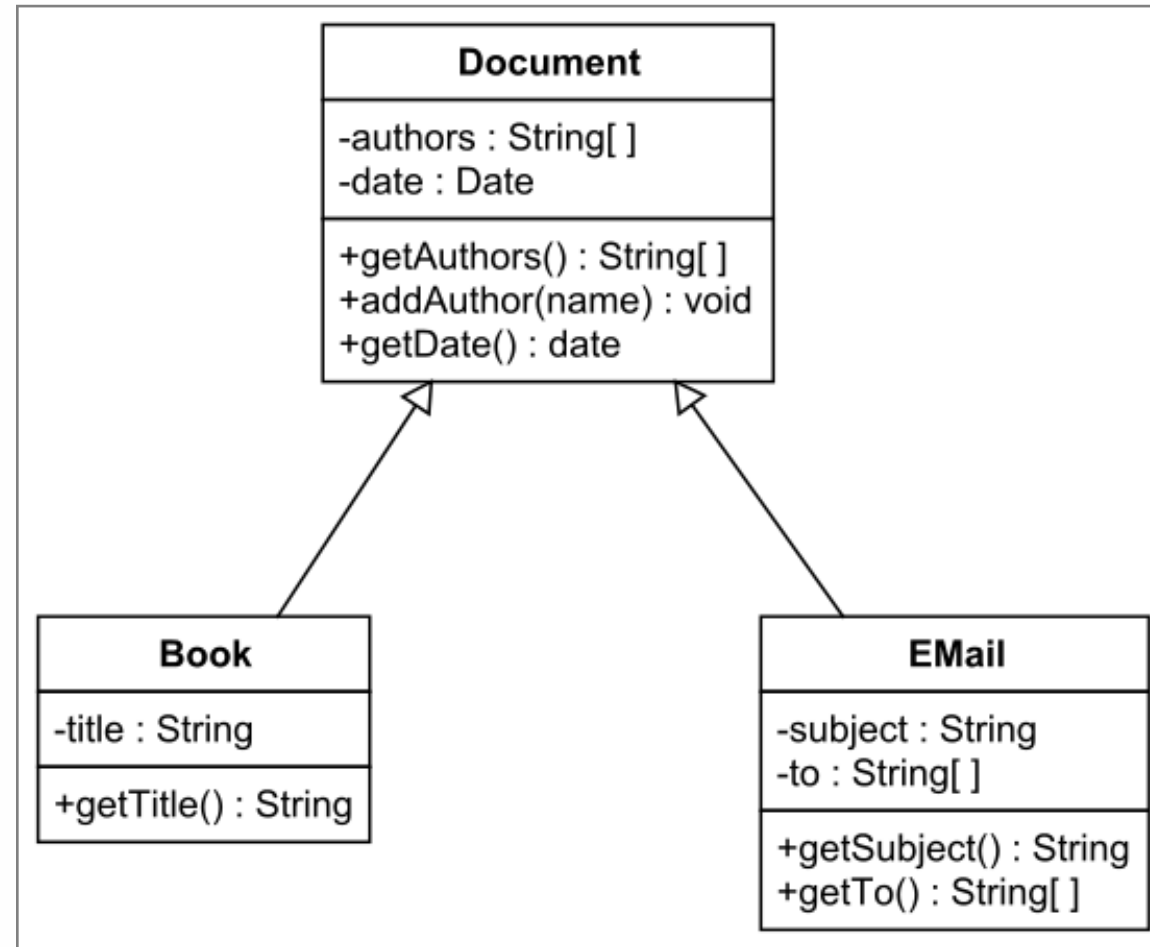
Books, Venues, Call-to-Action

Chapter #1:

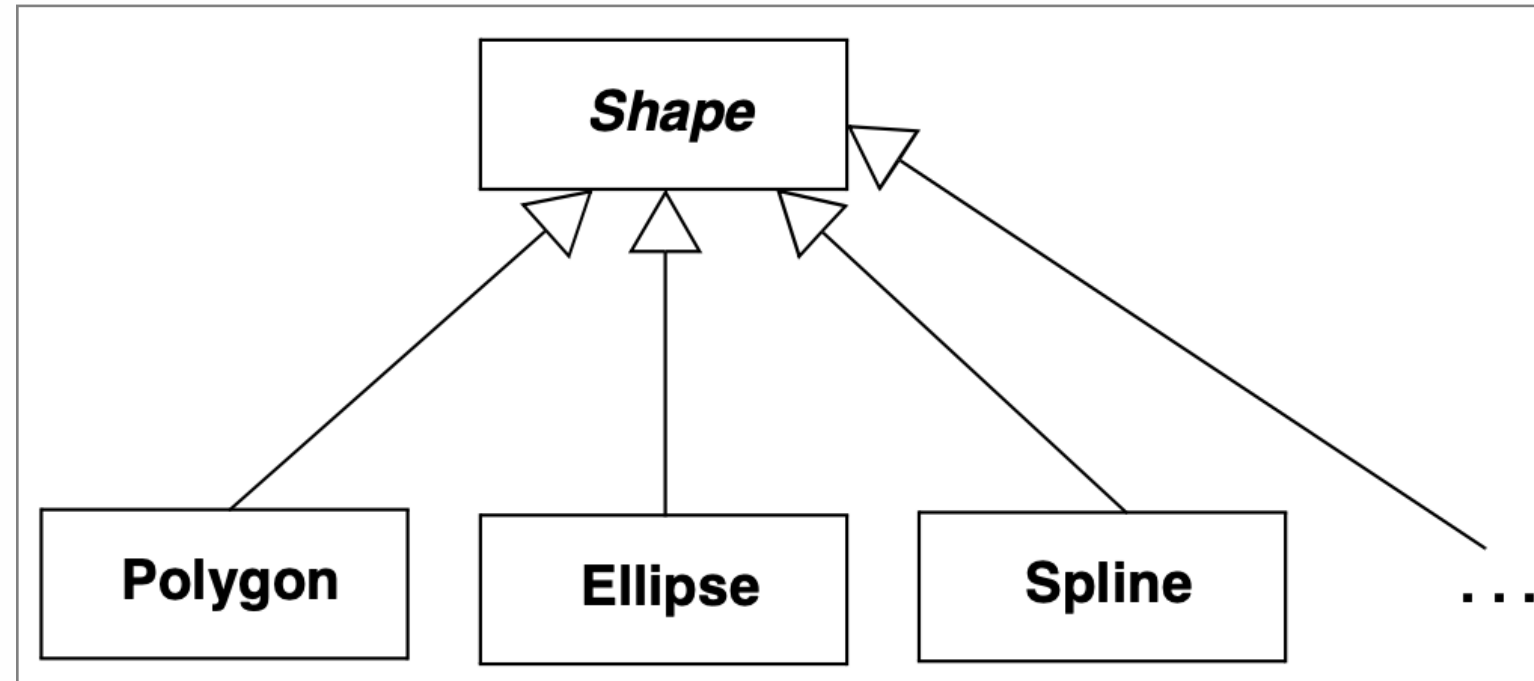
# Class Diagram

[ [Classes](#) Generalization Composition Aggregation Association Dependency ]

## Classes

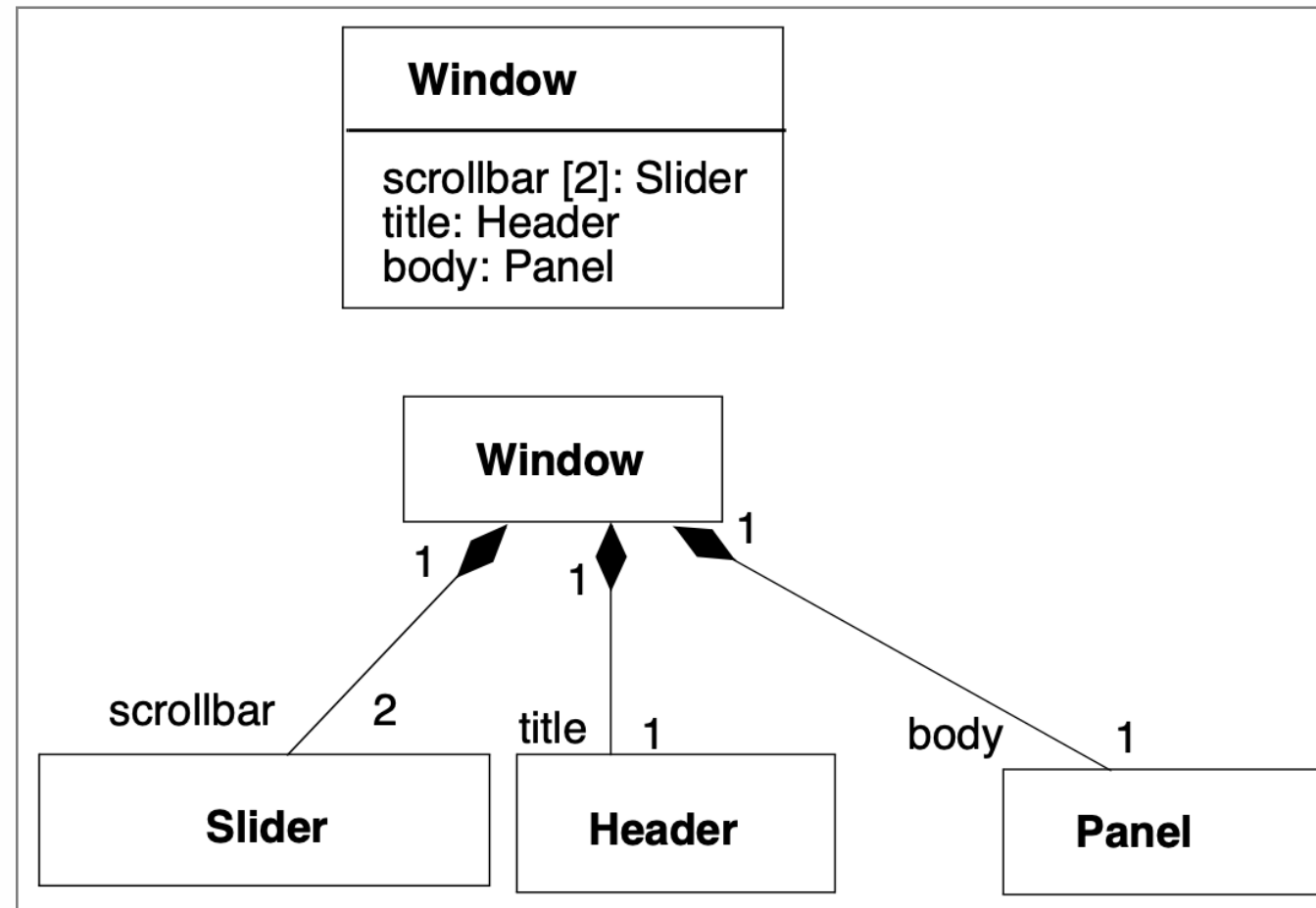


## Generalization



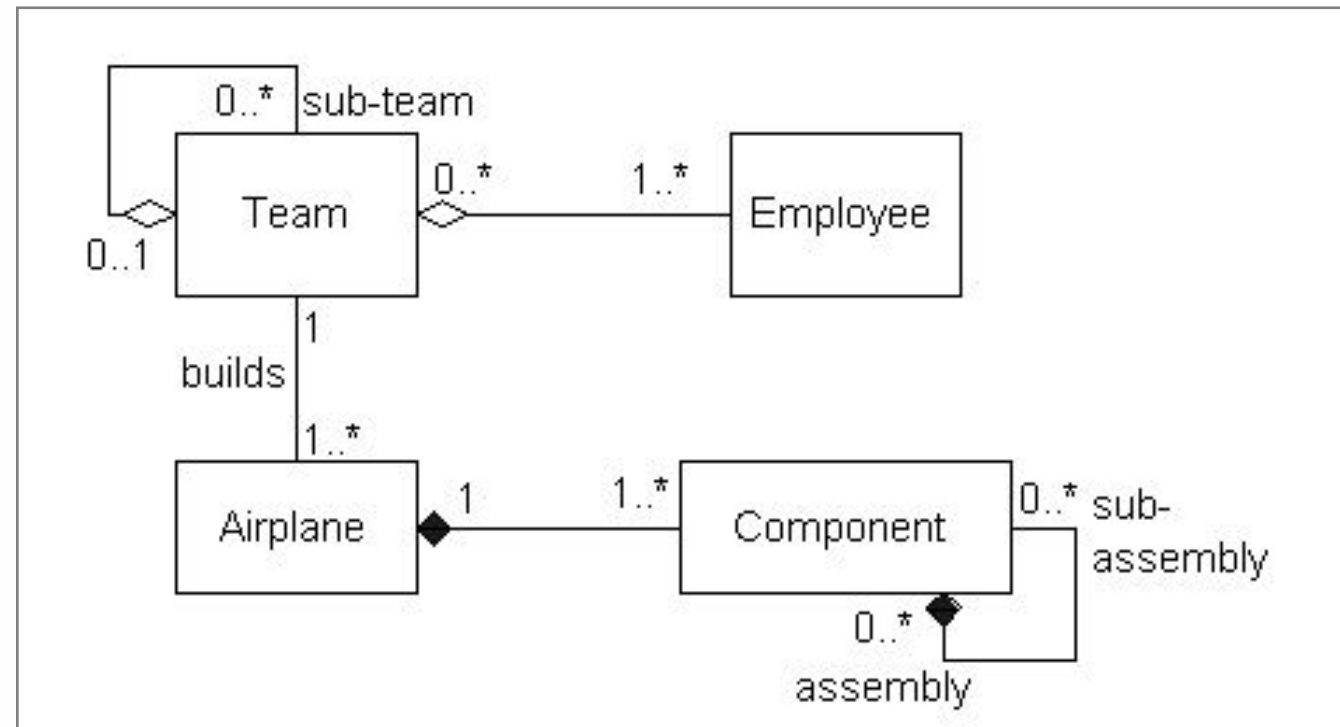
[ Classes Generalization [Composition](#) Aggregation Association Dependency ]

## Composition



[ Classes Generalization Composition Aggregation Association Dependency ]

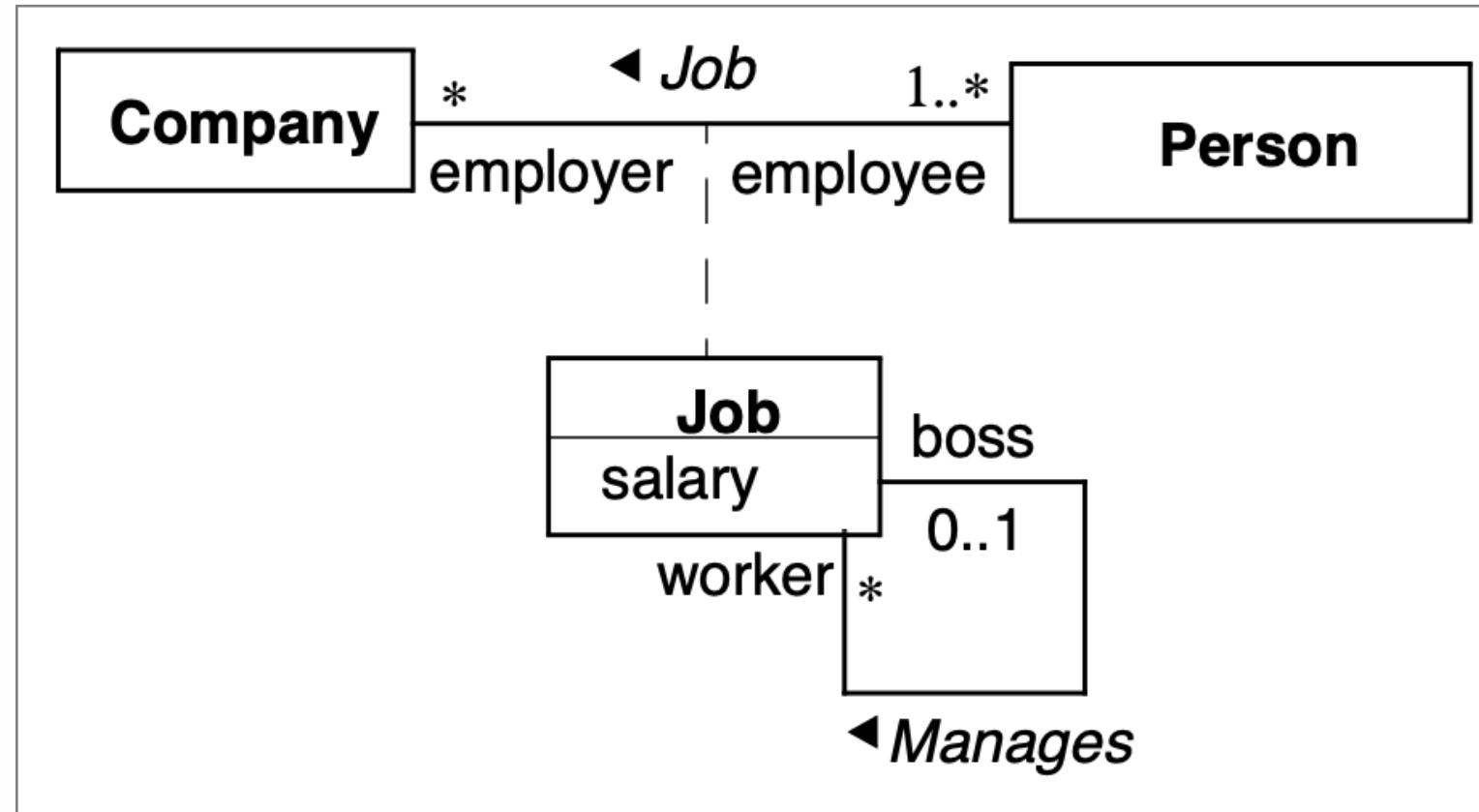
## Aggregation





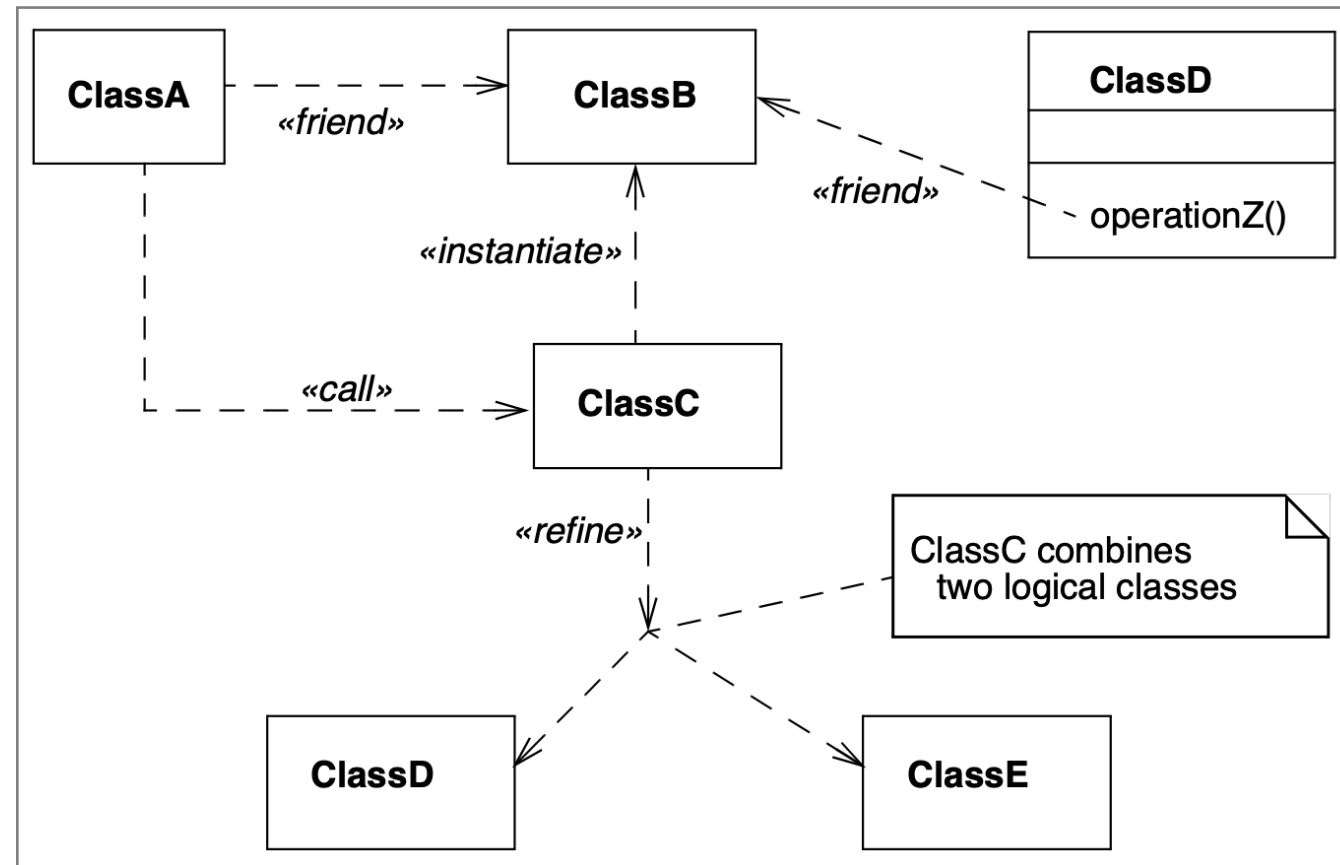
[ Classes Generalization Composition Aggregation [Association](#) Dependency ]

## Association



[ Classes Generalization Composition Aggregation Association Dependency ]

## Dependency

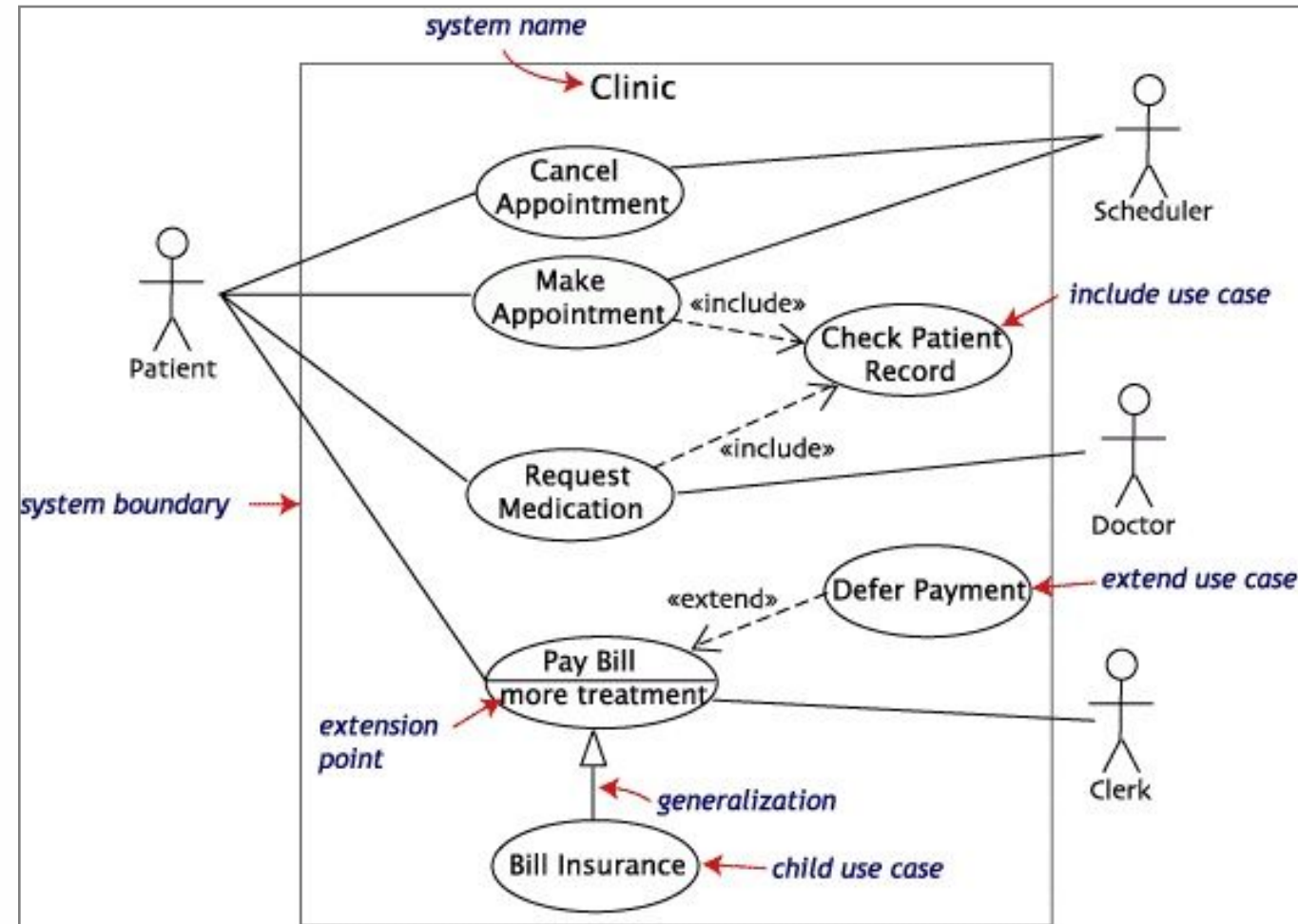


Chapter #2:

## Some Other Diagrams

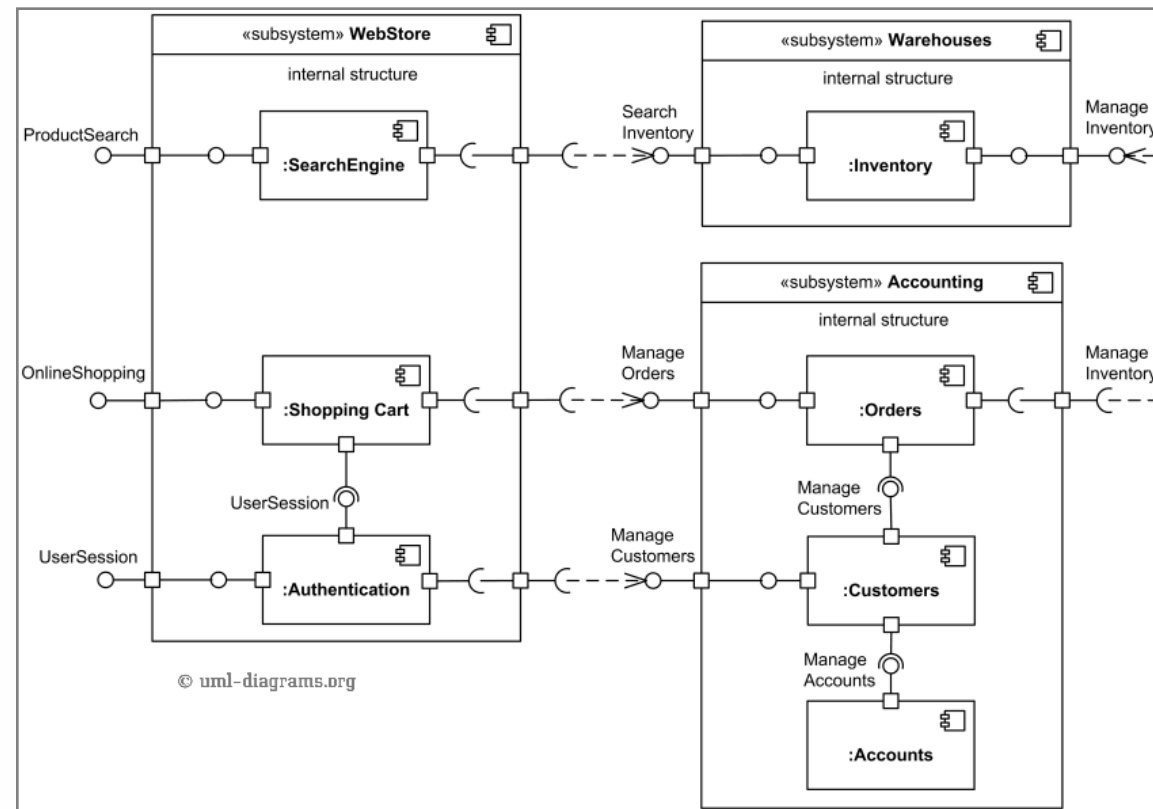
[ [UC](#) Component Deployment Activity Sequence ]

## Use Case Diagram



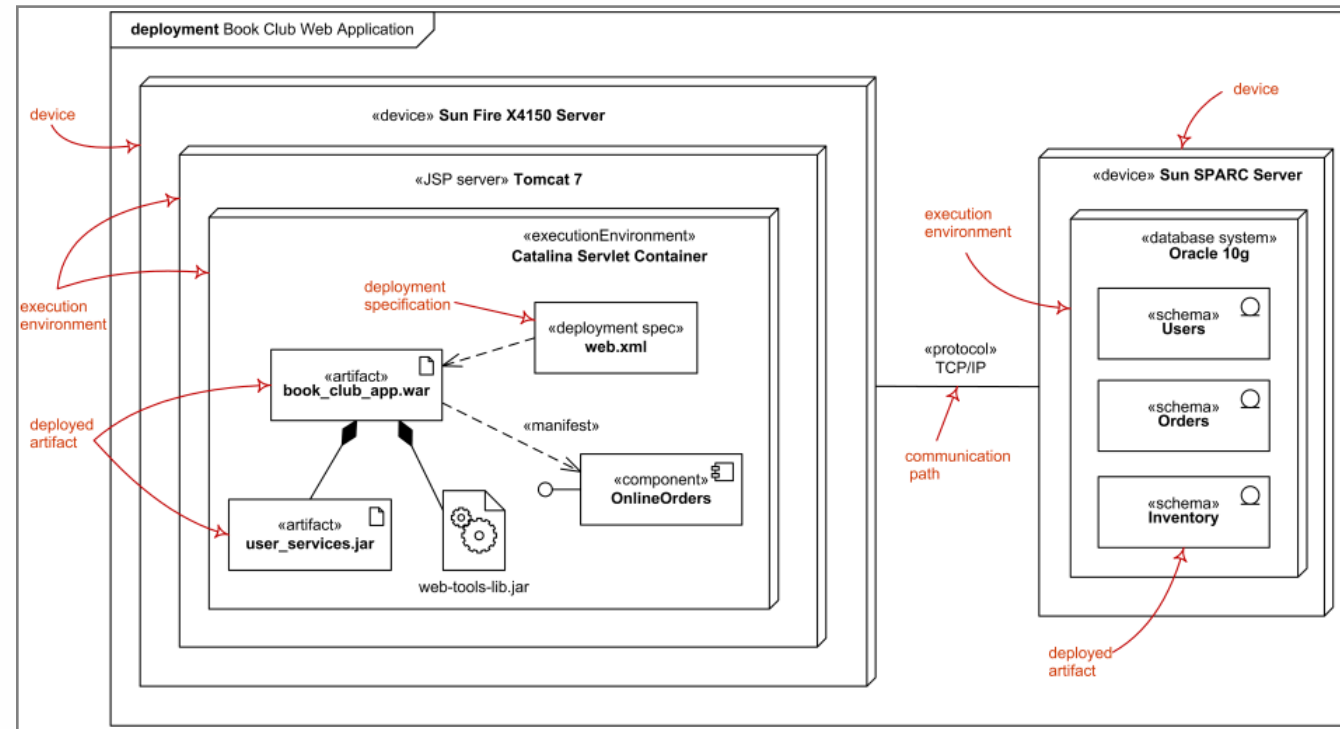
[ UC [Component](#) Deployment Activity Sequence ]

# Component Diagram



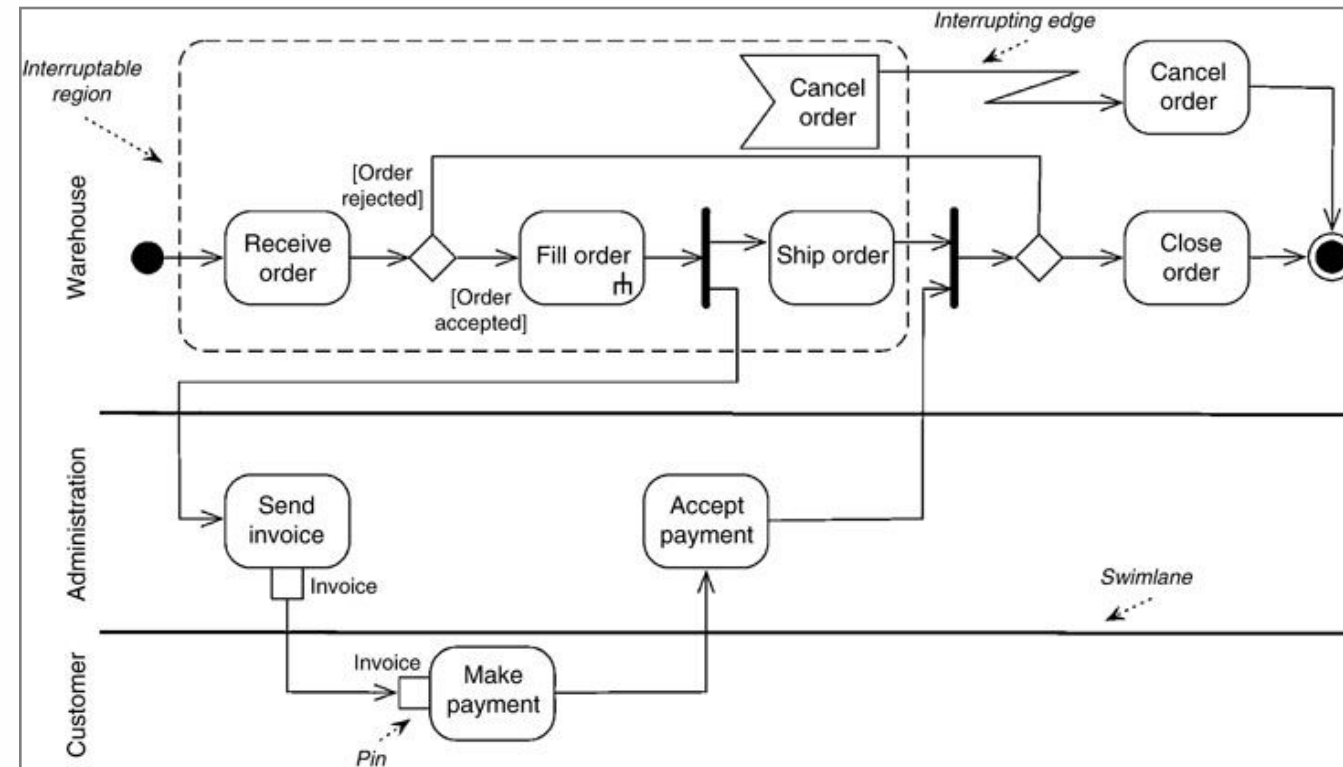
[ UC Component [Deployment](#) Activity Sequence ]

## Deployment Diagram



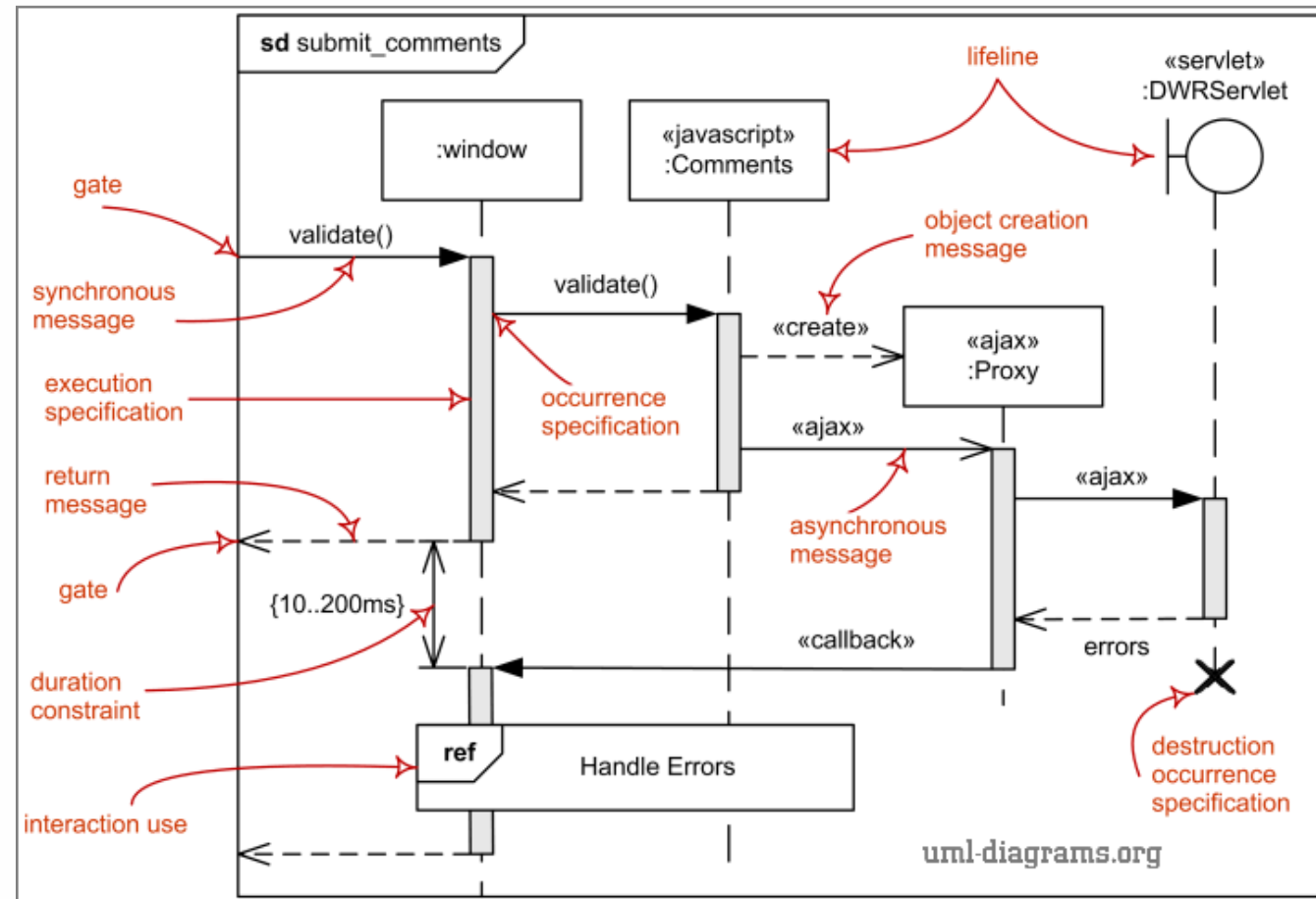
[ UC Component Deployment [Activity](#) Sequence ]

# Activity Diagram



[ UC Component Deployment Activity [Sequence](#) ]

## Sequence Diagram



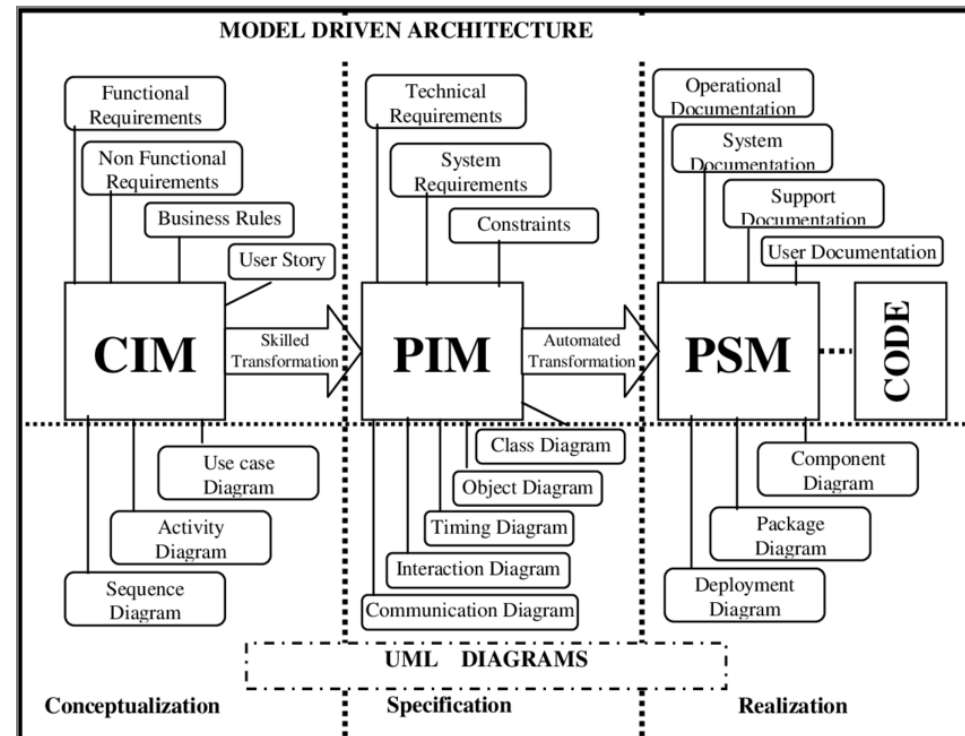


Chapter #3:

**MDA: MOF, XMI, OCL, QVT, fUML, ...**

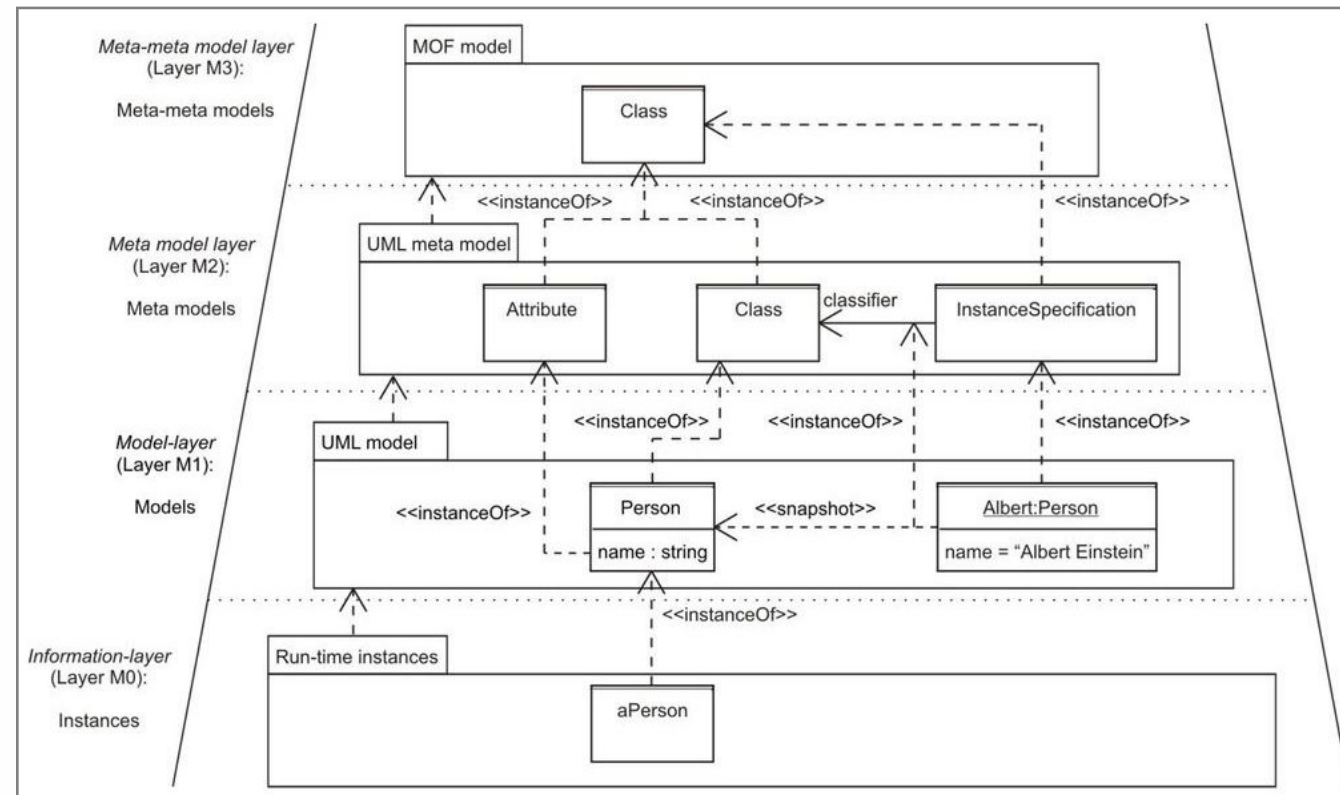
[ [MDA](#) MOF XMI OCL QVT fUML ]

## Model Driven Architecture (MDA)



Computation Independent Model (CIM), Platform Independent Model (PIM), Platform Specific Model (PSM).

# Meta-Object Facility (MOF)



“MOF is a Domain Specific Language (DSL) used to define metamodels, just as EBNF is a DSL for defining grammars” — [Wikipedia](#)

[ MDA MOF [XMI](#) OCL QVT fUML ]

# XML Metadata Interchange (XMI)

Car

manufacturer : String

- ownedCars

\*

- owner

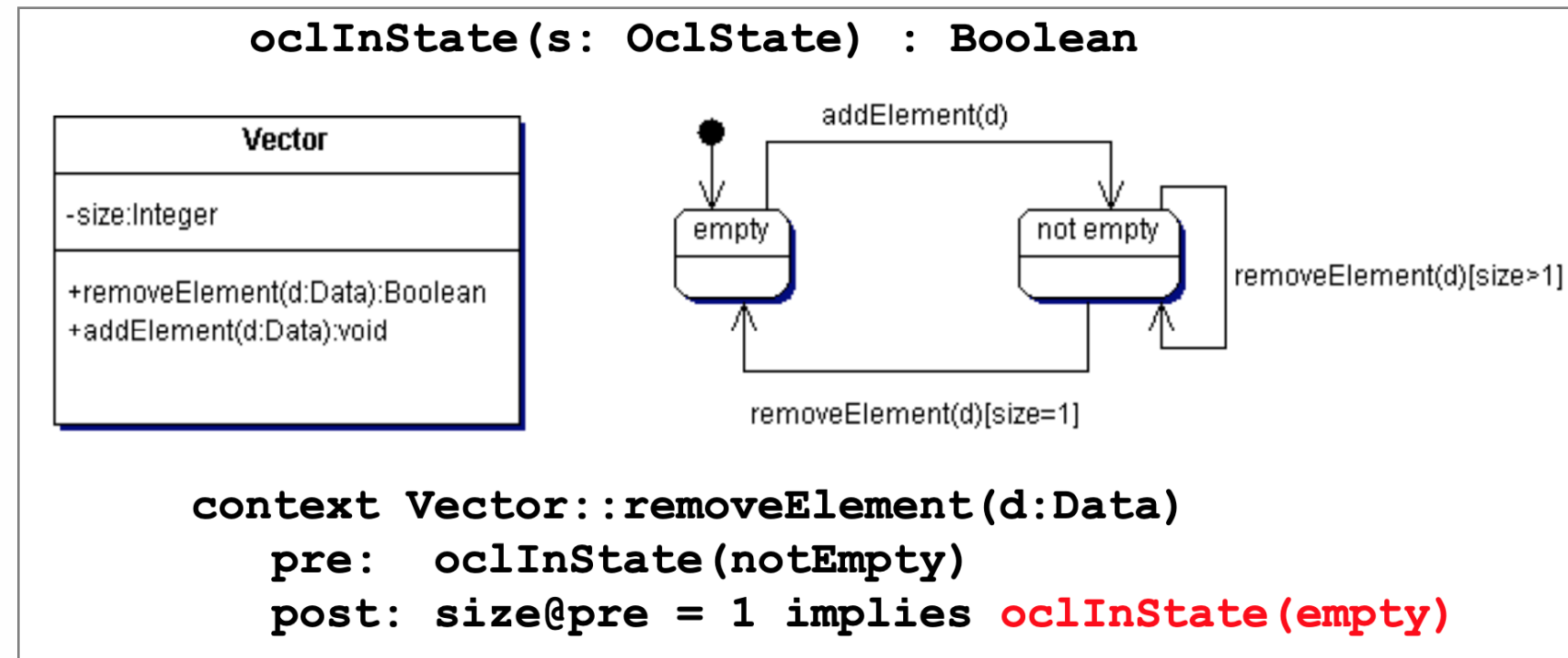
1

Owner

name : String

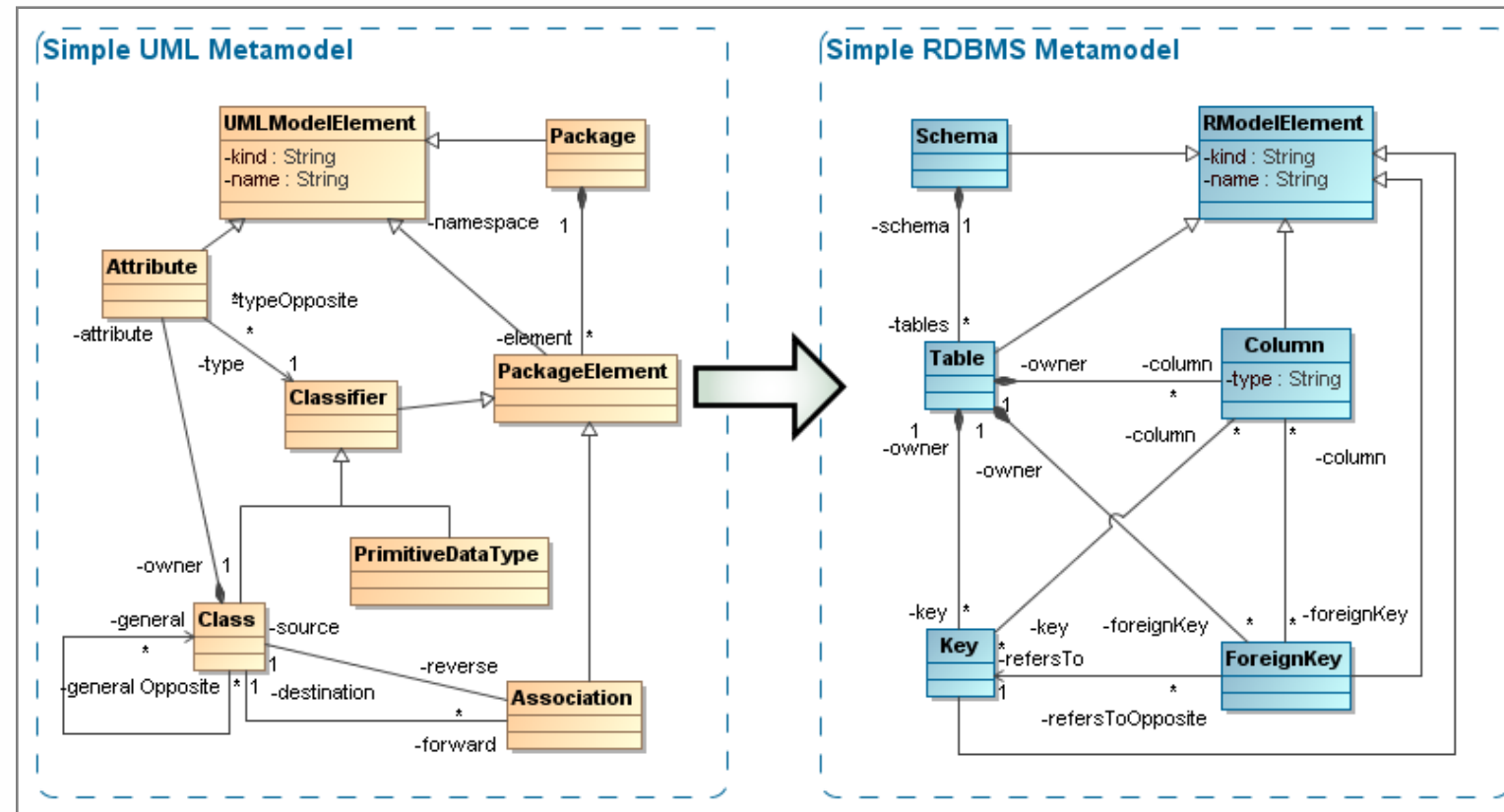
```
<?xml version='1.0' encoding='UTF-8'?>
<xmi:XMI xmi:version='2.1' xmlns:uml='http://schema.omg.org/spec/UML/2.1.2'
        xmlns:xmi='http://schema.omg.org/spec/XMI/2.1'>
<uml:Model xmi:id='eee_1045467100313_135436_1' name='Data' visibility='public'>
  <packagedElement xmi:type='uml:Class' xmi:id='_477' name='Car' visibility='public'>
    <ownedAttribute xmi:type='uml:Property' xmi:id='_628' name='owner'
      visibility='private' type='_498' association='_627'>
      <upperValue xmi:type='uml:LiteralUnlimitedNatural' xmi:id='_680' visibility='public' value='1' />
      <lowerValue xmi:type='uml:LiteralInteger' xmi:id='_679' visibility='public' value='1' />
    </ownedAttribute>
    <ownedAttribute xmi:type='uml:Property' xmi:id='_681' name='manufacturer' visibility='private'>
      <type xmi:type='uml:PrimitiveType' href='http://schema.omg.org/spec/UML/2.0/uml.xml#String' />
    </ownedAttribute>
  </packagedElement>
  <packagedElement xmi:type='uml:Class' xmi:id='_498' name='Owner' visibility='public'>
    <ownedAttribute xmi:type='uml:Property' xmi:id='_629' name='ownedCars'
      visibility='private' type='_477' association='_627'>
      <upperValue xmi:type='uml:LiteralUnlimitedNatural' xmi:id='_678' visibility='public' value='-1' />
      <lowerValue xmi:type='uml:LiteralUnlimitedNatural' xmi:id='_677' visibility='public' value='-1' />
    </ownedAttribute>
    <ownedAttribute xmi:type='uml:Property' xmi:id='_685' name='name' visibility='private'>
      <type xmi:type='uml:PrimitiveType' href='http://schema.omg.org/spec/UML/2.0/uml.xml#String' />
    </ownedAttribute>
  </packagedElement>
  <packagedElement xmi:type='uml:Association' xmi:id='_627' visibility='public'>
    <memberEnd xmi:idref='_628' />
    <memberEnd xmi:idref='_629' />
  </packagedElement>
</uml:Model>
</xmi:XMI>
```

# Object Constraint Language (OCL)



[ MDA MOF XMI OCL [QVT](#) fUML ]

## Query/View/Transformation (QVT)



[ MDA MOF XMI OCL QVT [fUML](#) ]

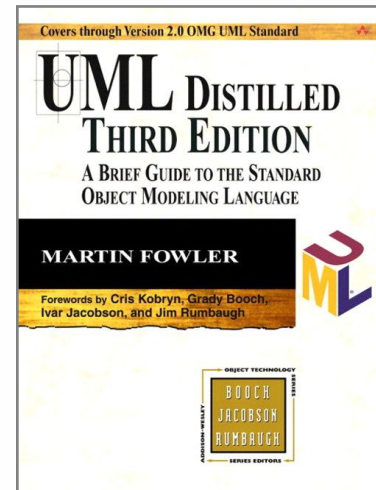
## Executable UML, fUML, Alf

```
private import CustomerAccounts;  
activity SumBalances(in customer : Customer) : Integer {  
    totalBalance = 0;  
    for (balance in customer.accounts.balance) {  
        totalBalance += balance;  
    }  
    return totalBalance;  
}
```

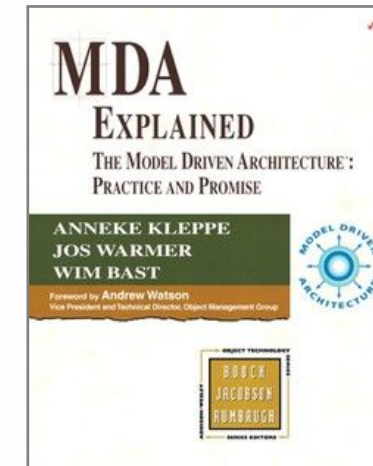
Chapter #4:

## Books, Venues, Call-to-Action





Martin Fowler. *UML Distilled: A Brief Guide to the Standard Object Modeling Language*. Addison-Wesley, 3 edition, 2004



Anneke G. Kleppe, Jos B. Warmer, and Wim Bast. *MDA Explained: The Model Driven Architecture: Practice and Promise*. Addison-Wesley, 2003

## Where to go:

OMG Certified UML Professional 2 (OCUP 2)



## Call to Action:

For your application, make one class, one component, one deployment, and three sequence diagrams.

## Still unresolved issues:

- How to reverse code to a model?
- How to sync a model with the code?
- How to simplify UML for practical programming?
- How to restore faith in MDA?

# Bibliography

Martin Fowler. *UML Distilled: A Brief Guide to the Standard Object Modeling Language*. Addison-Wesley, 3 edition,

2004.

International Standardization Organization ISO. ISO/IEC 19501:2005: Information Technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2, 2005.

Anneke G. Kleppe, Jos B. Warmer, and Wim Bast. *MDA*

*Explained: The Model Driven Architecture: Practice and Promise*. Addison-Wesley, 2003.