

# UML

and XMI, OCL, MOF, etc.

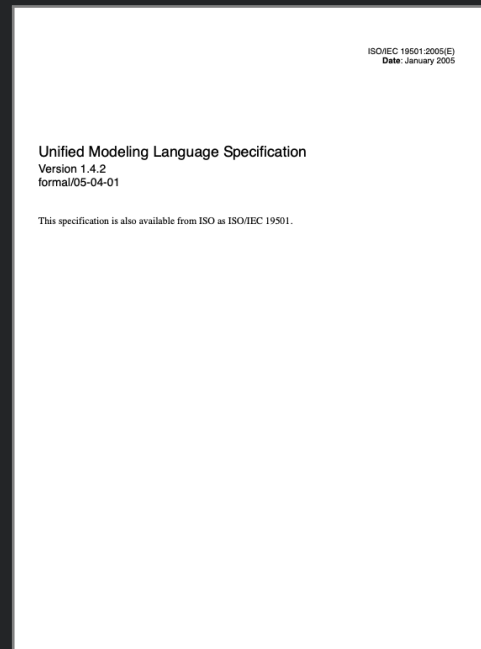
YEGOR BUGAYENKO

Lecture #7 out of 16

90 minutes

All videos are in [this YouTube playlist](#).

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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.”

— ISO/IEC 19501:2005, Information technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2

Class Diagram

Some Other Diagrams

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

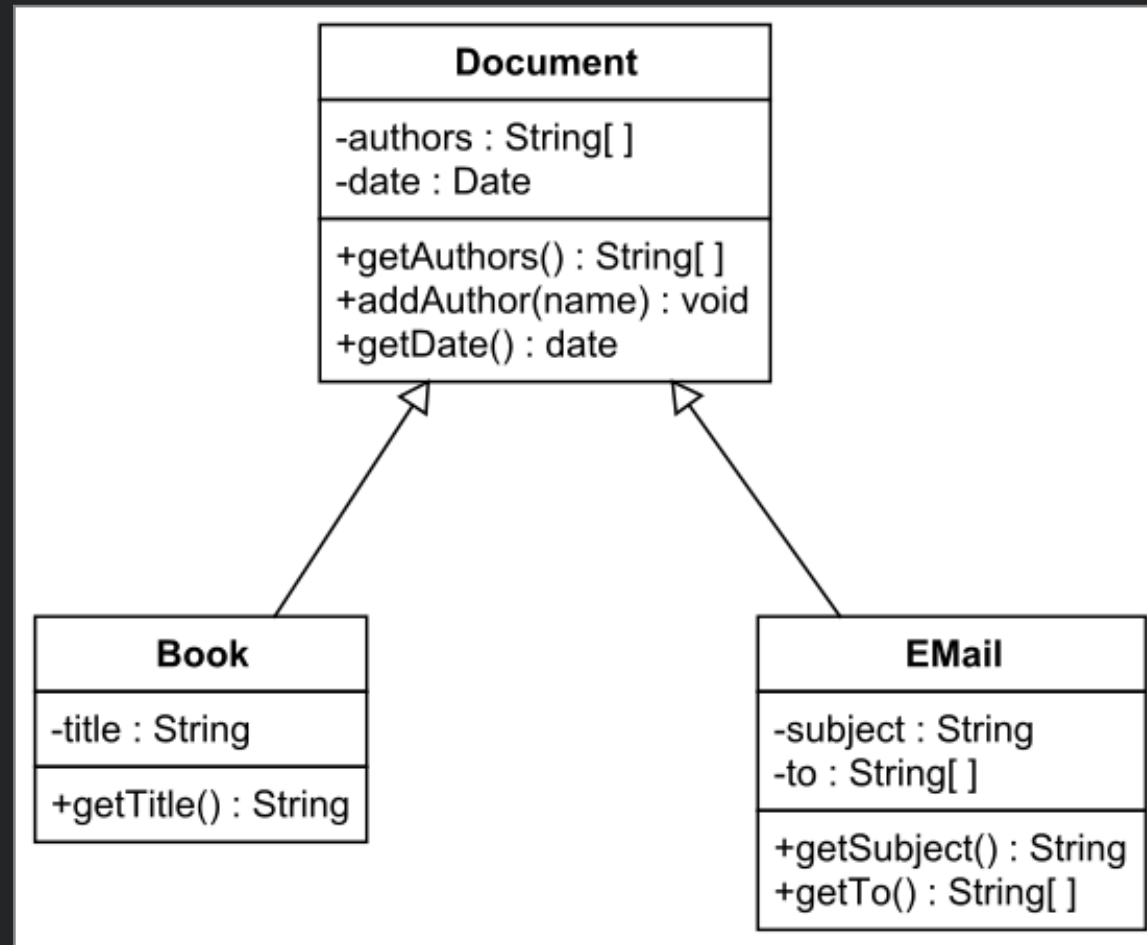
Books, Venues, Call-to-Action

Chapter #1:

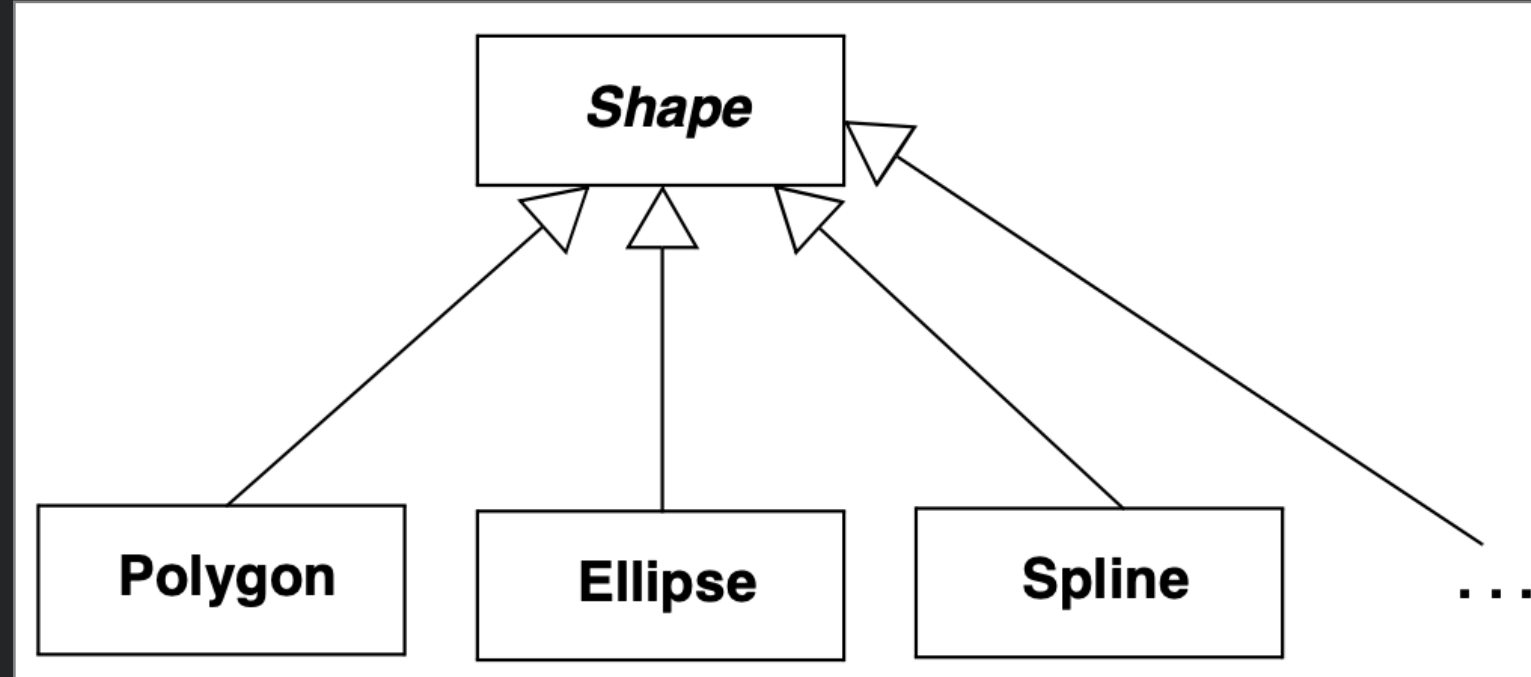
# Class Diagram

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

## Classes

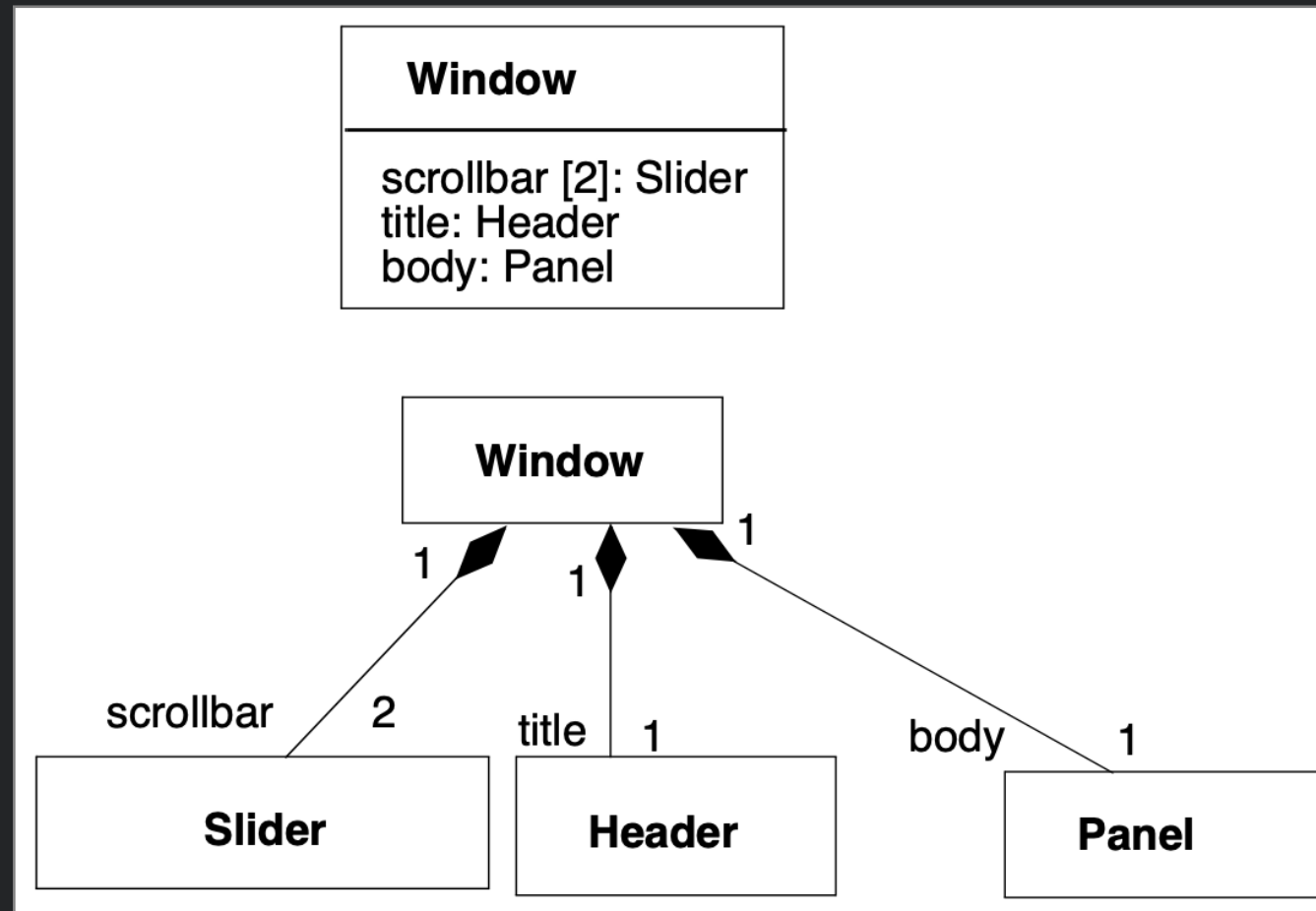


## Generalization



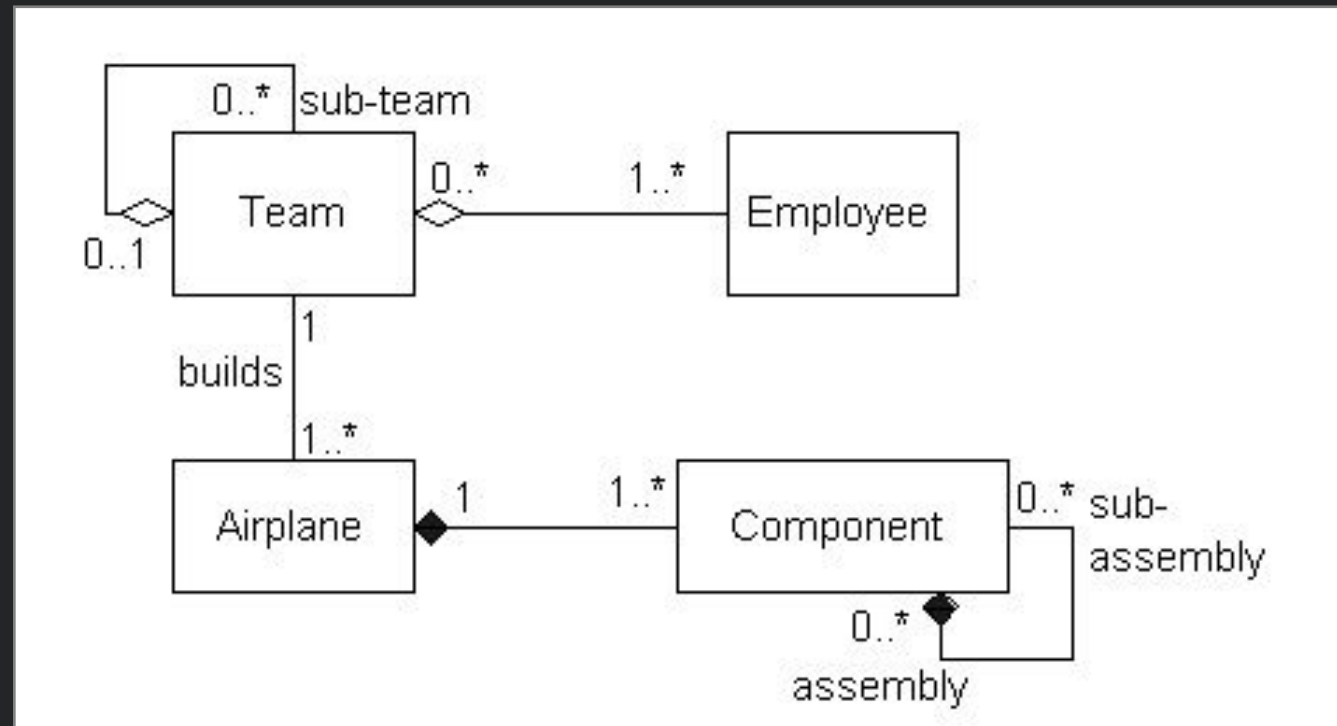
[ Classes Generalization Composition Aggregation Association Dependency ]

## Composition



[ Classes Generalization Composition Aggregation Association Dependency ]

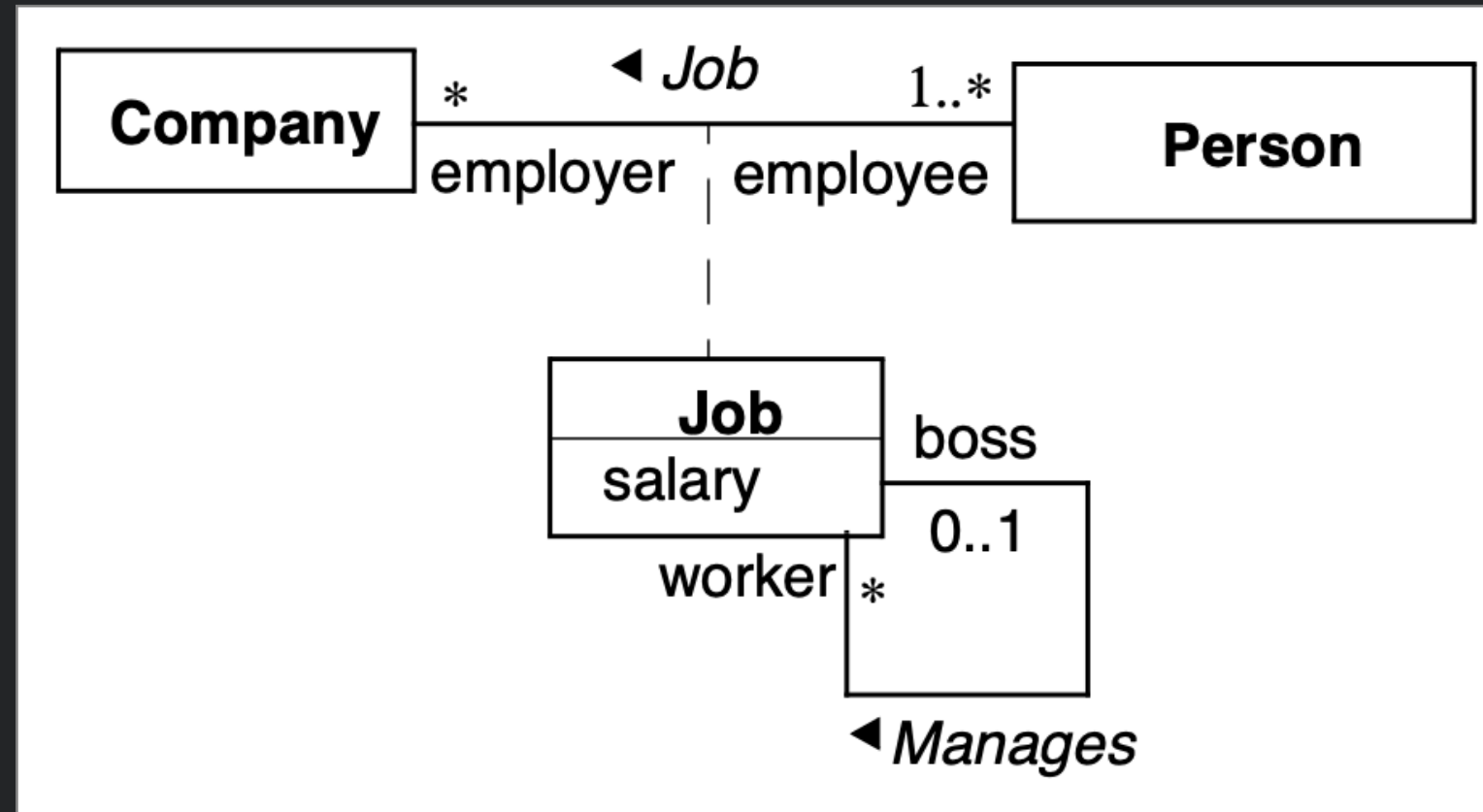
## Aggregation





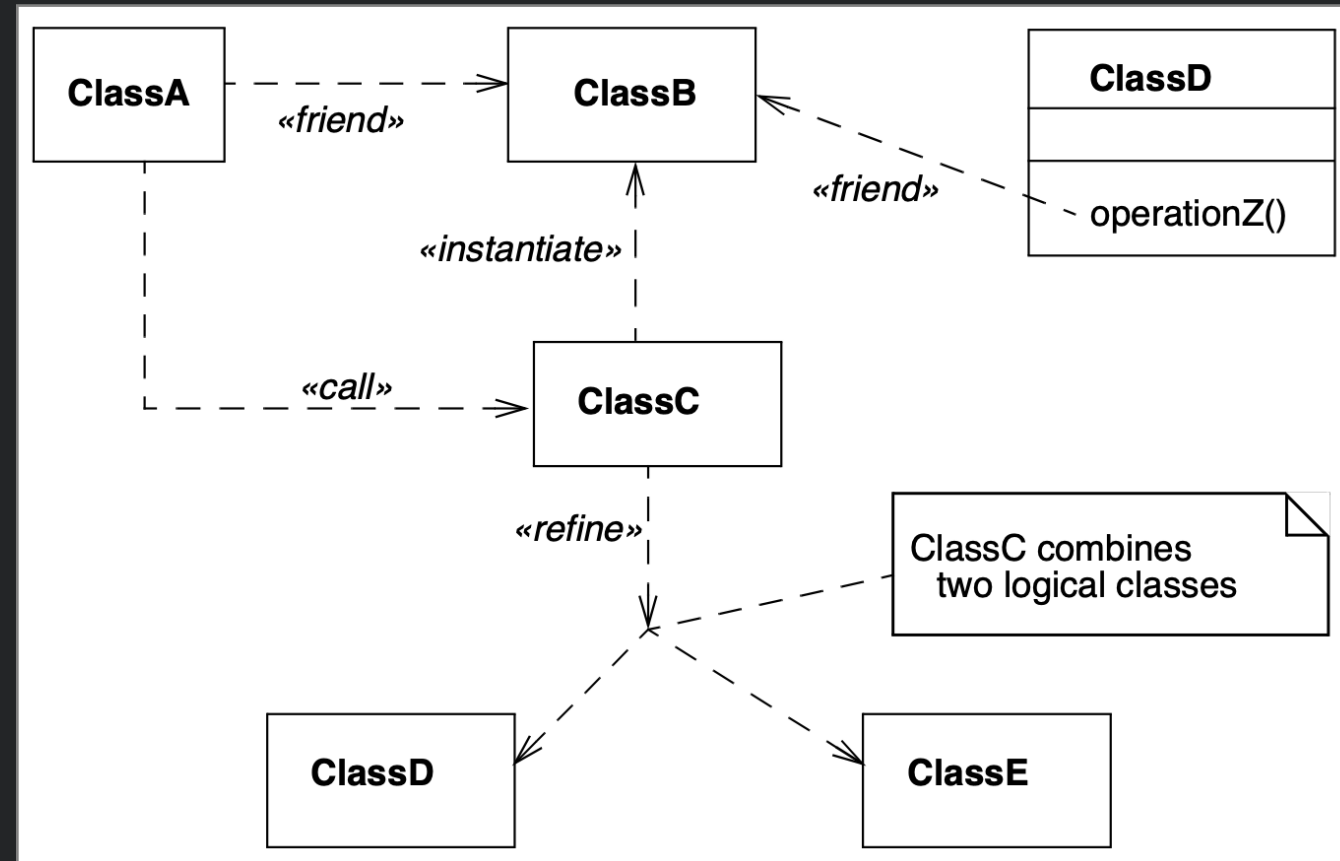
[ Classes Generalization Composition Aggregation Association Dependency ]

## Association



[ Classes Generalization Composition Aggregation Association Dependency ]

## Dependency

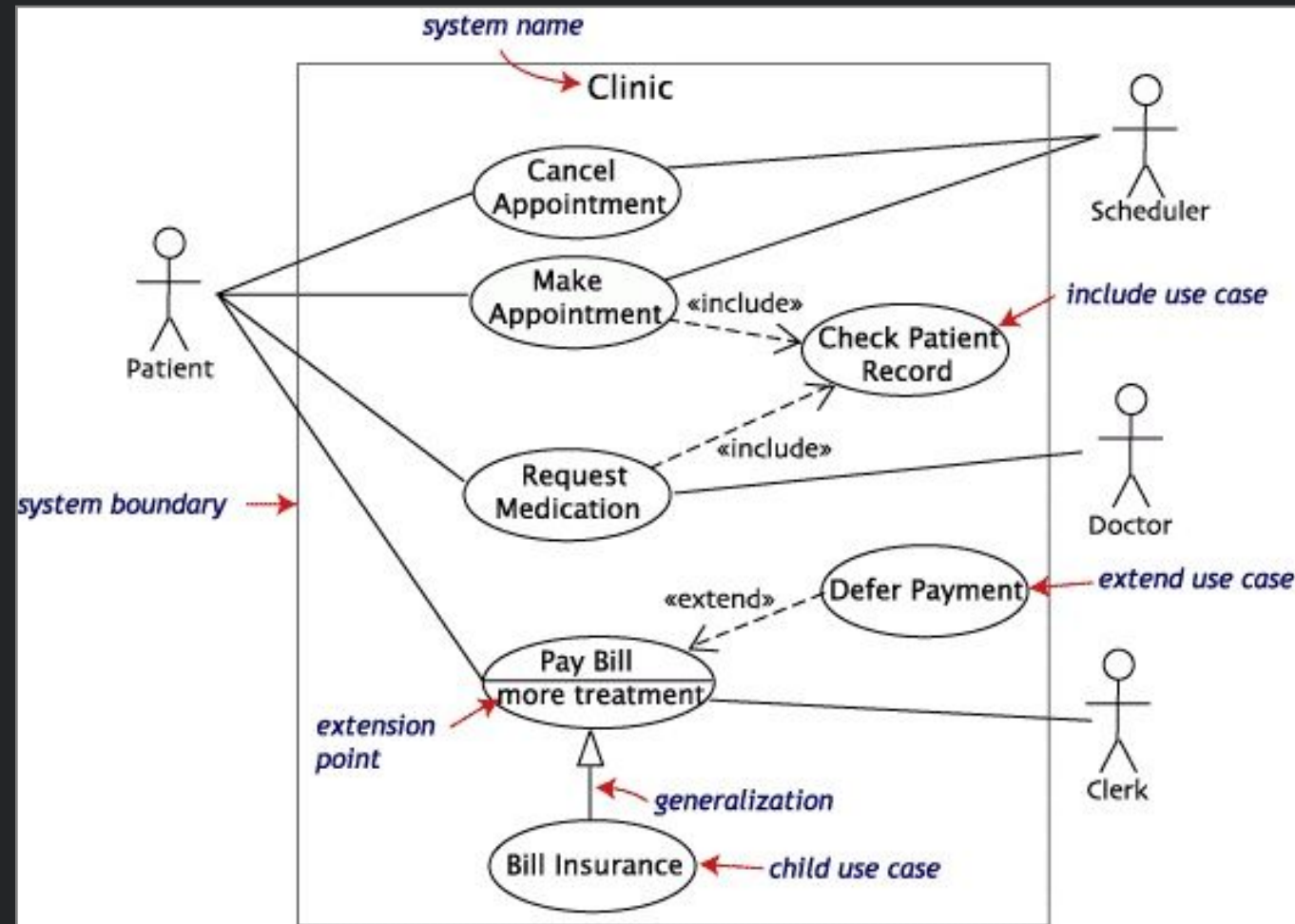


Chapter #2:

## Some Other Diagrams

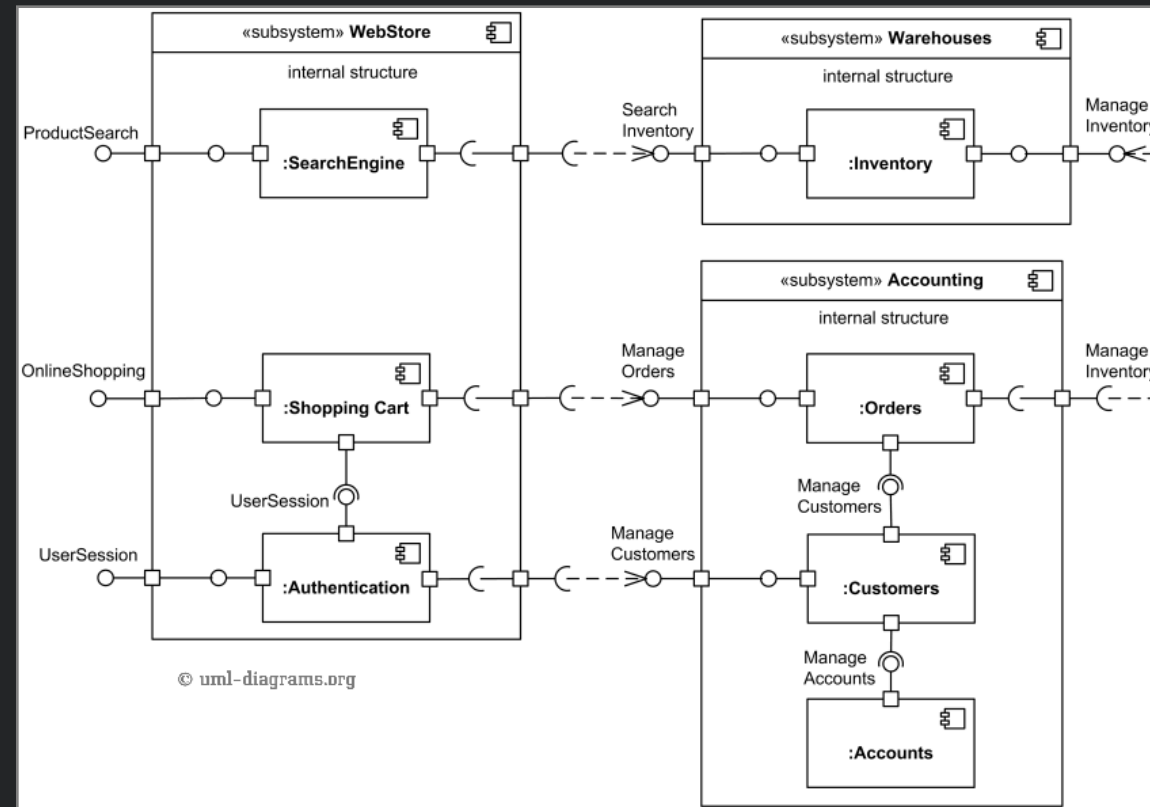
[ [UC](#) Component Deployment Activity Sequence ]

## Use Case Diagram



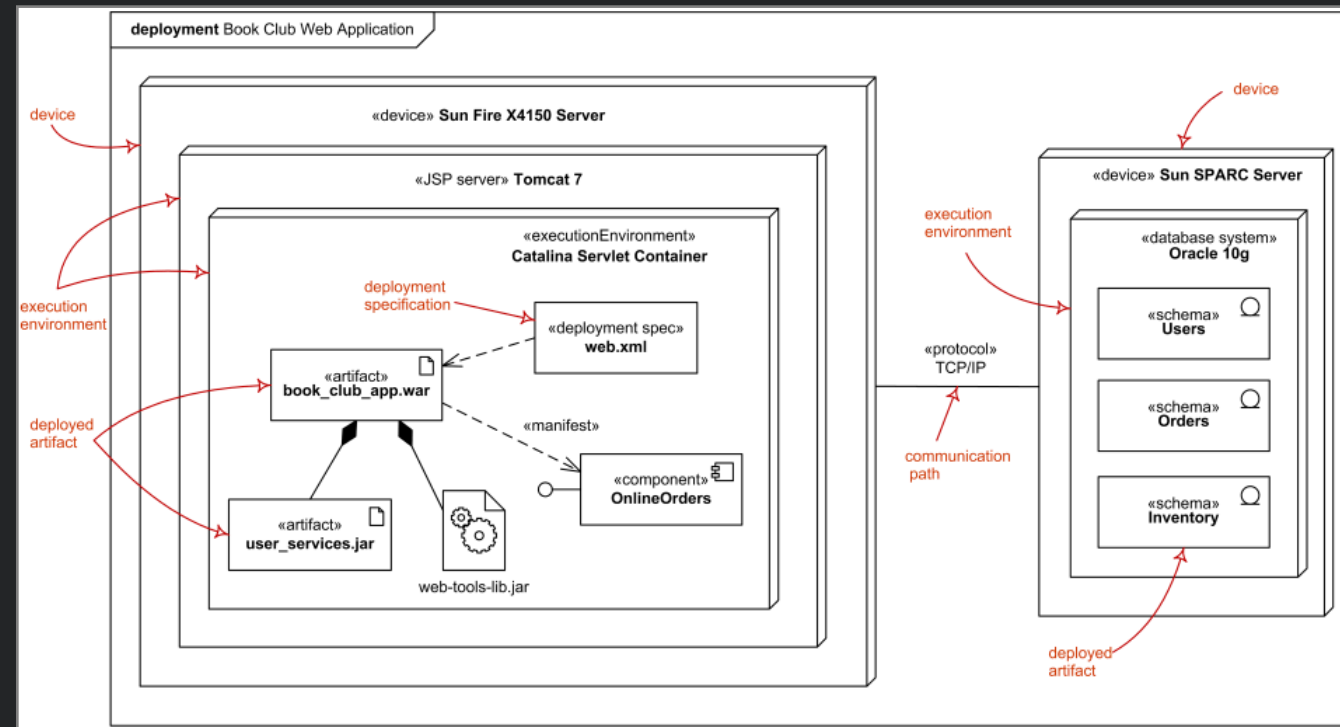
[ UC Component Deployment Activity Sequence ]

# Component Diagram



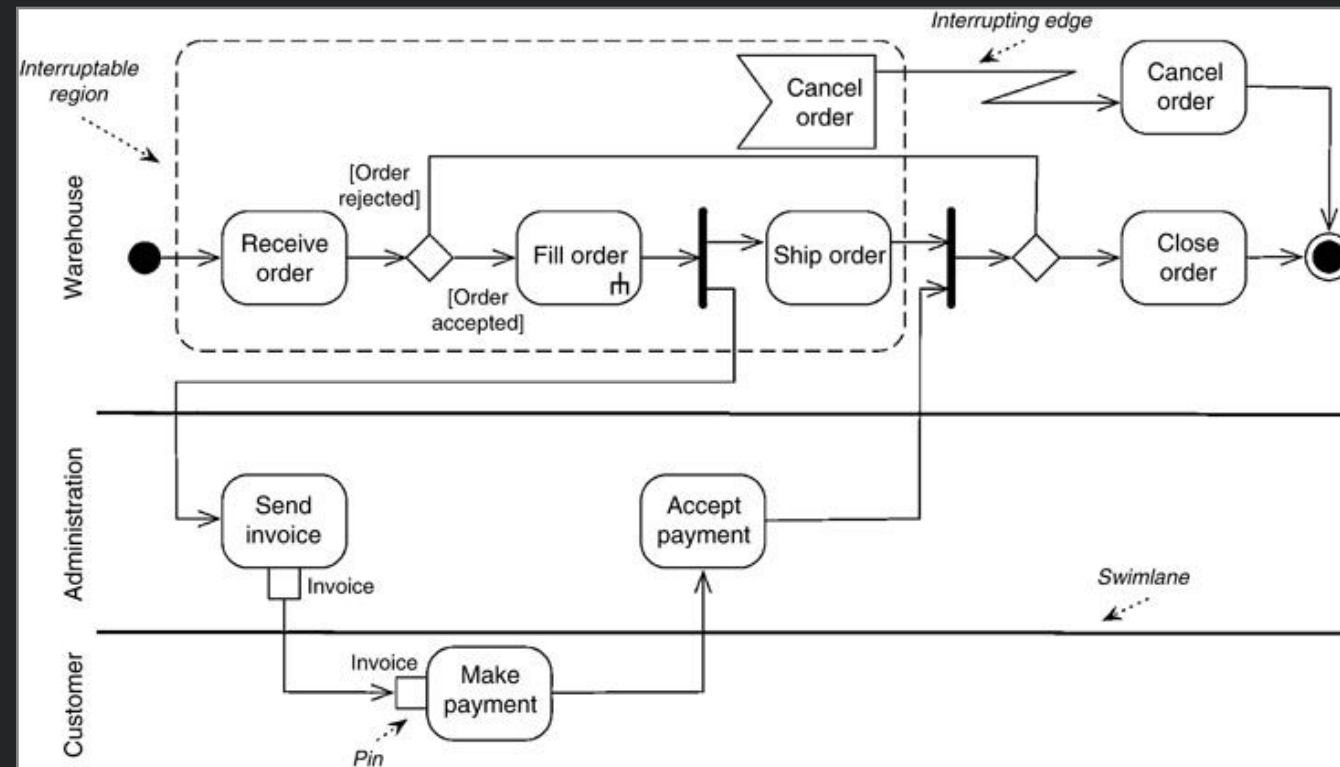
[ UC Component Deployment Activity Sequence ]

# Deployment Diagram



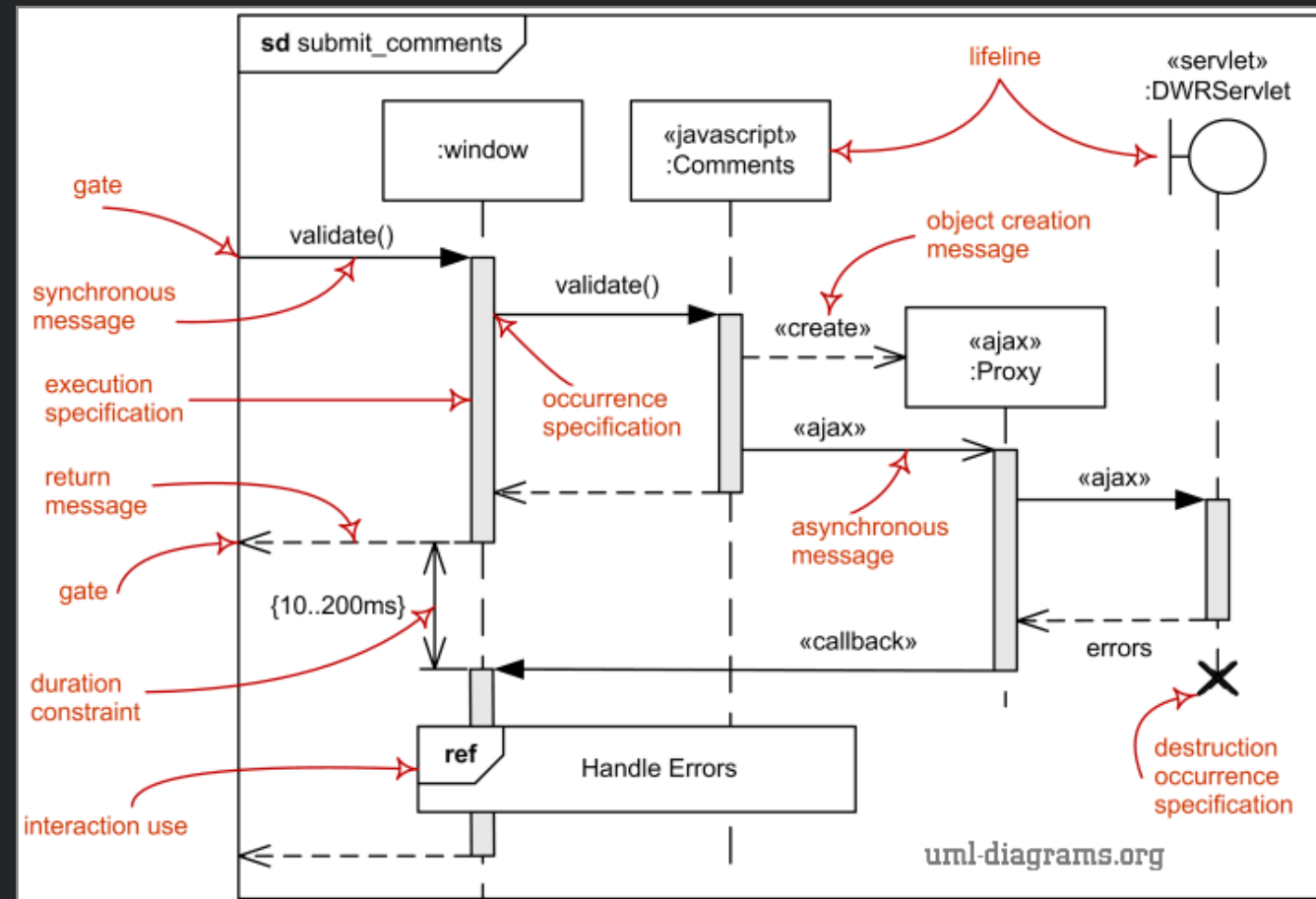
[ UC Component Deployment Activity Sequence ]

# Activity Diagram



[ UC Component Deployment Activity Sequence ]

## Sequence Diagram



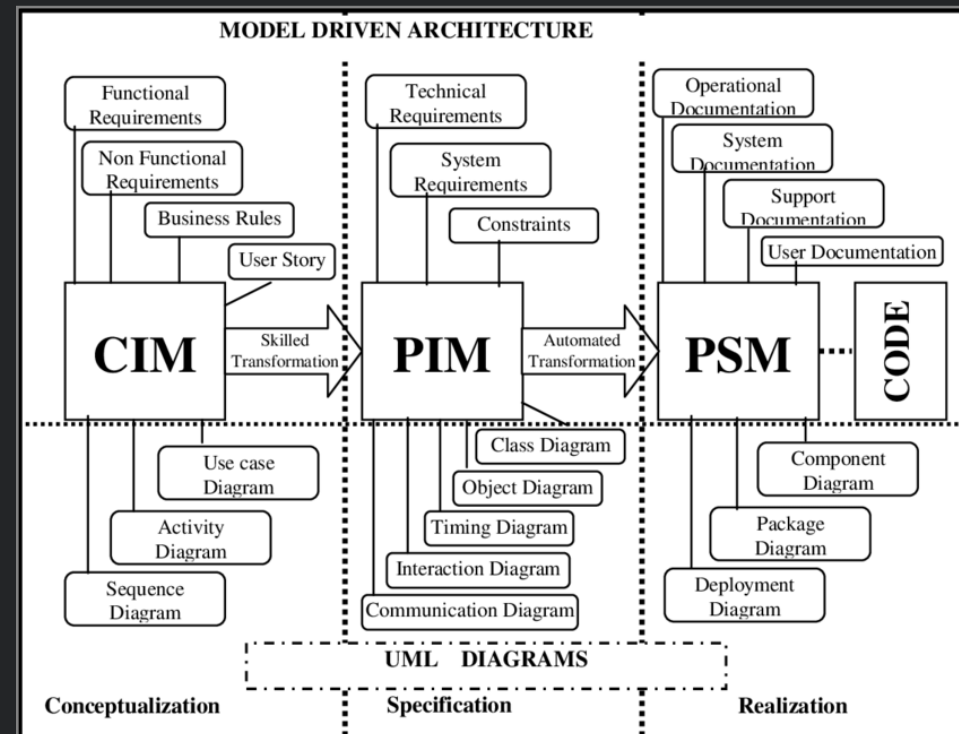


Chapter #3:

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

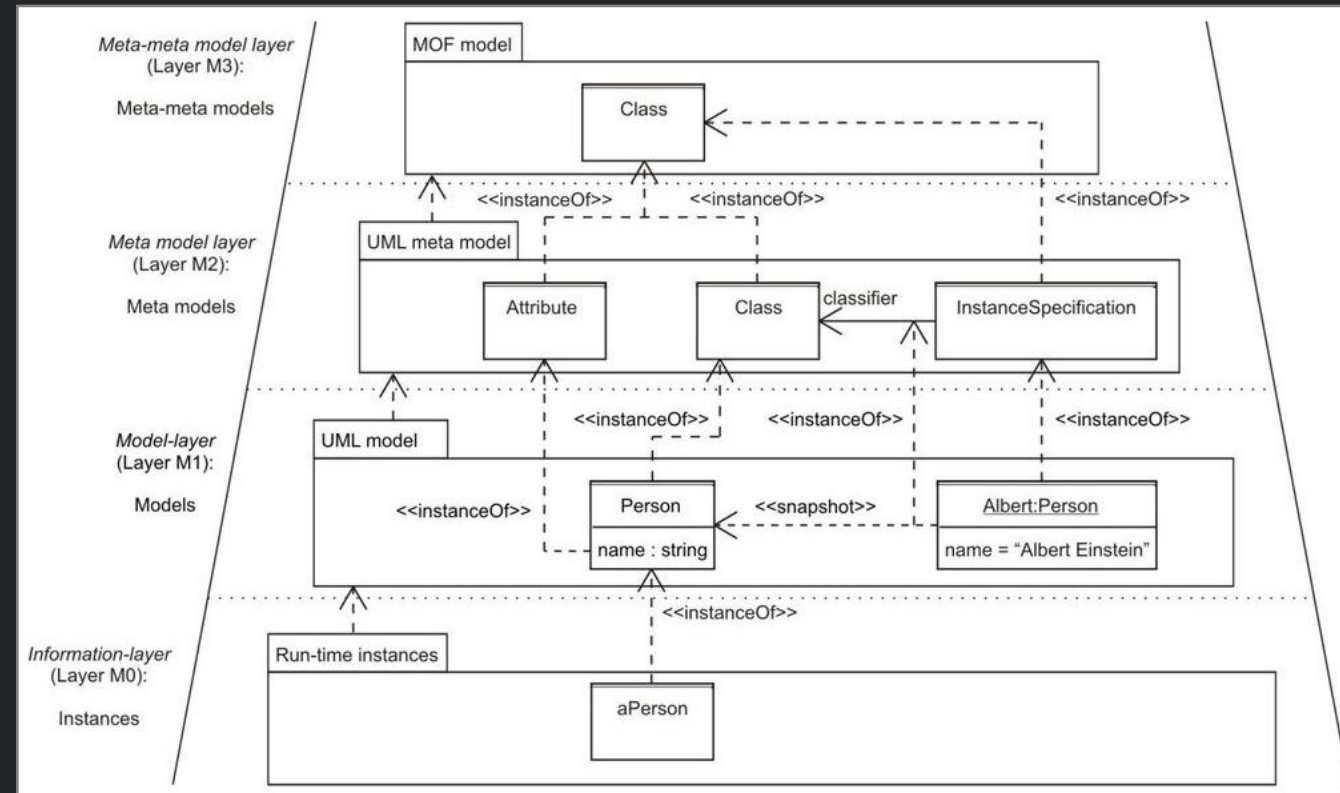
[ [MDA](#) MOF XMI OCL QVT fUML ]

## Model Driven Architecture (MDA)



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

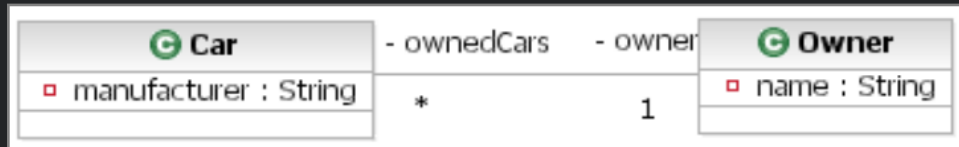
# Meta-Object Facility (MOF)



“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 ]

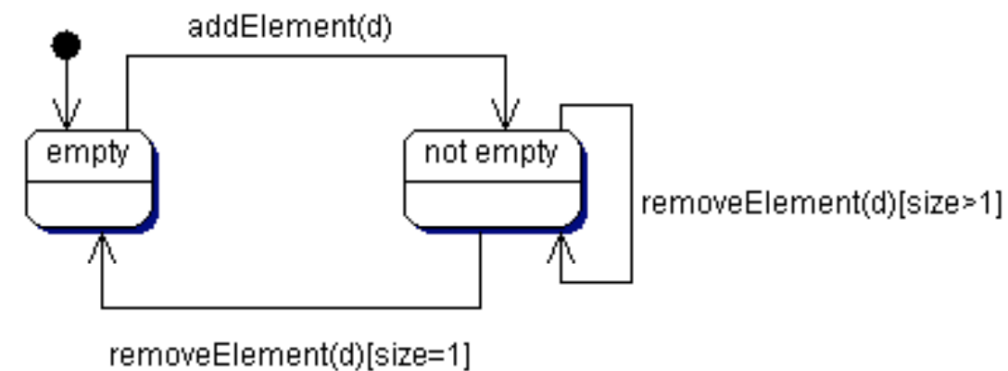
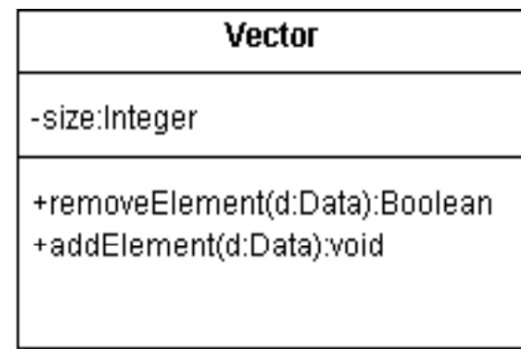
# XML Metadata Interchange (XMI)



```
<?xml version='1.0' encoding='UTF-8'?>
<xml: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)

**oclInState(s: OclState) : Boolean**

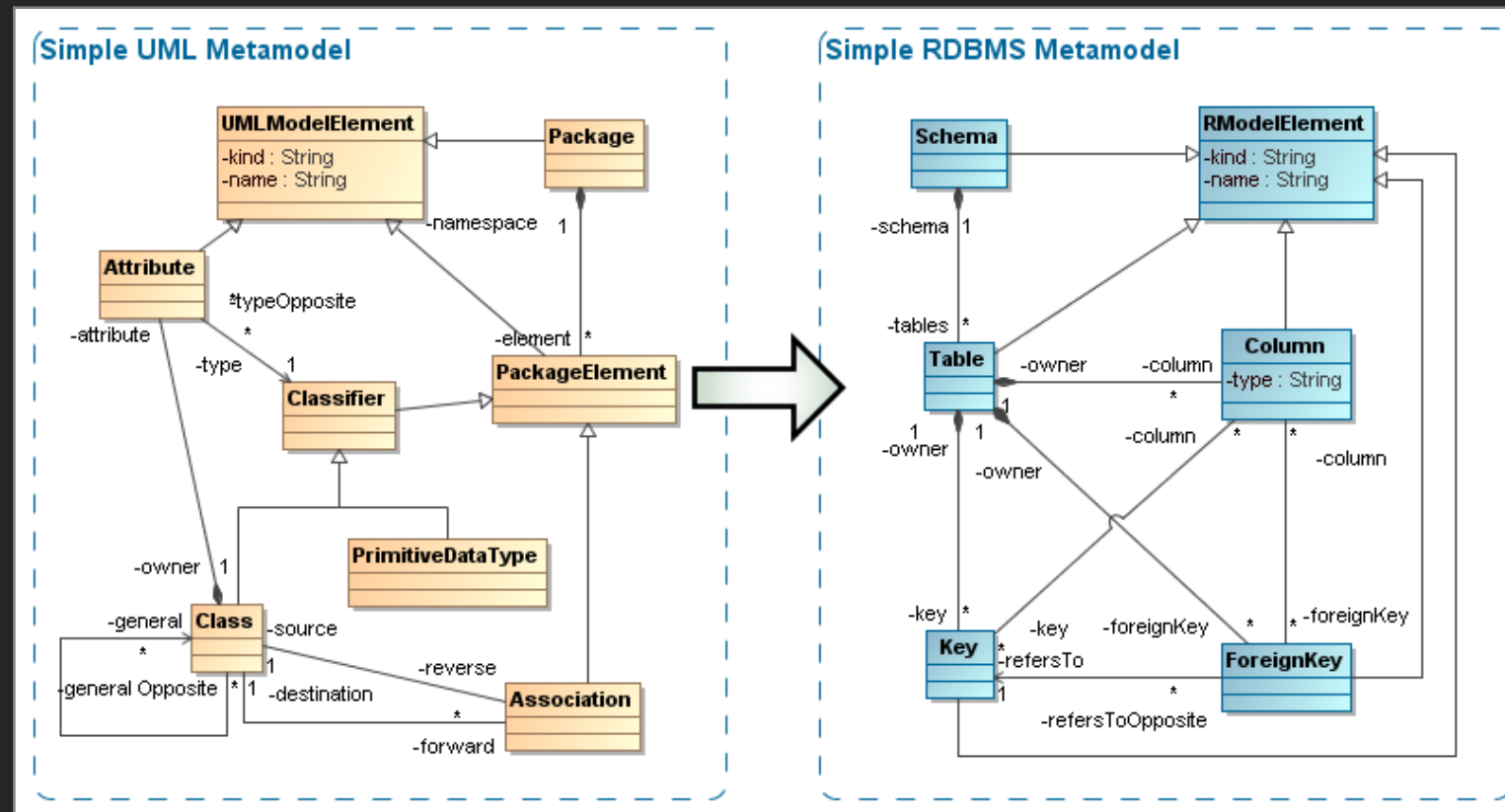


**context Vector::removeElement(d: Data)**

**pre: oclInState(notEmpty)**

**post: size@pre = 1 implies **oclInState(empty)****

## Query/View/Transformation (QVT)



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

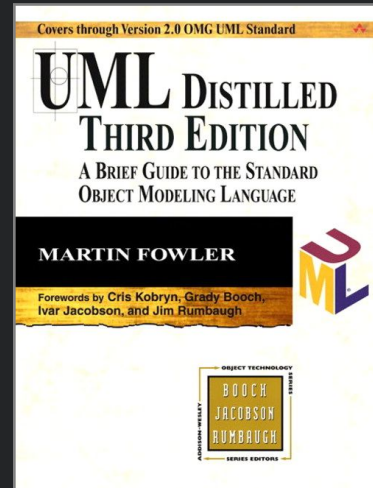
## Executable UML, fUML, Alf

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

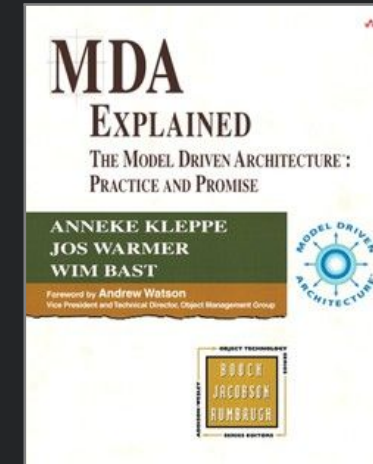
Chapter #4:

## Books, Venues, Call-to-Action





“UML Distilled” by MARTIN FOWLER



“MDA Explained: The Model Driven Architecture: Practice and Promise” by ANNEKE KLEPPE ET AL.

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?