

UML

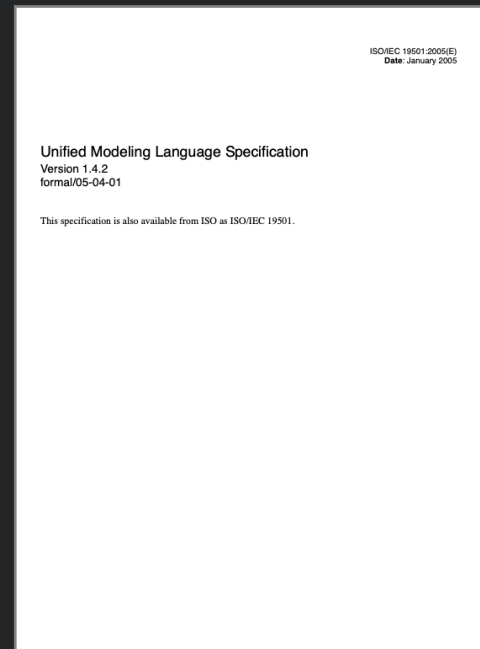
and XMI, OCL, MOF, etc.

YEGOR BUGAYENKO

Lecture #7 out of 16

90 minutes

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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

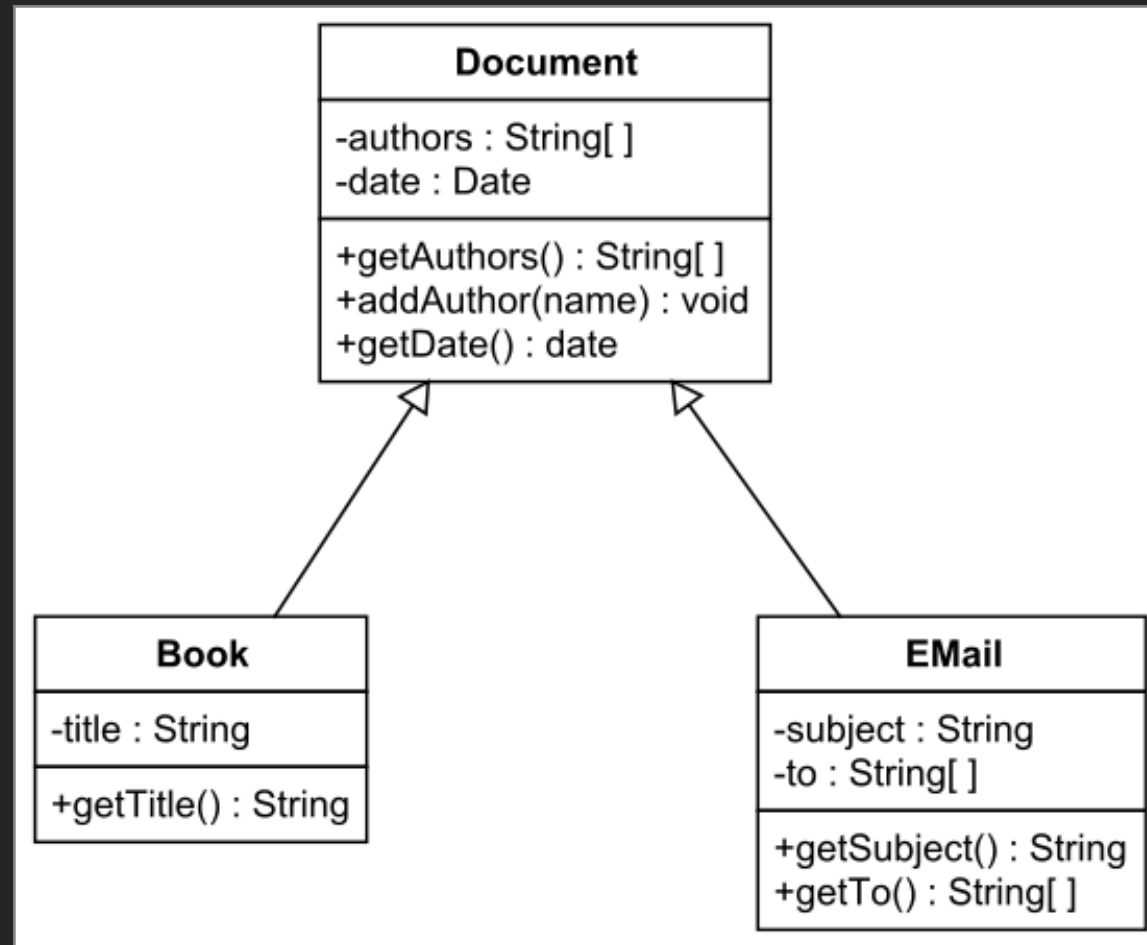
MDA: MOF, XMI, OCL, QVT, fUML, ...

Books, Venues, Call-to-Action

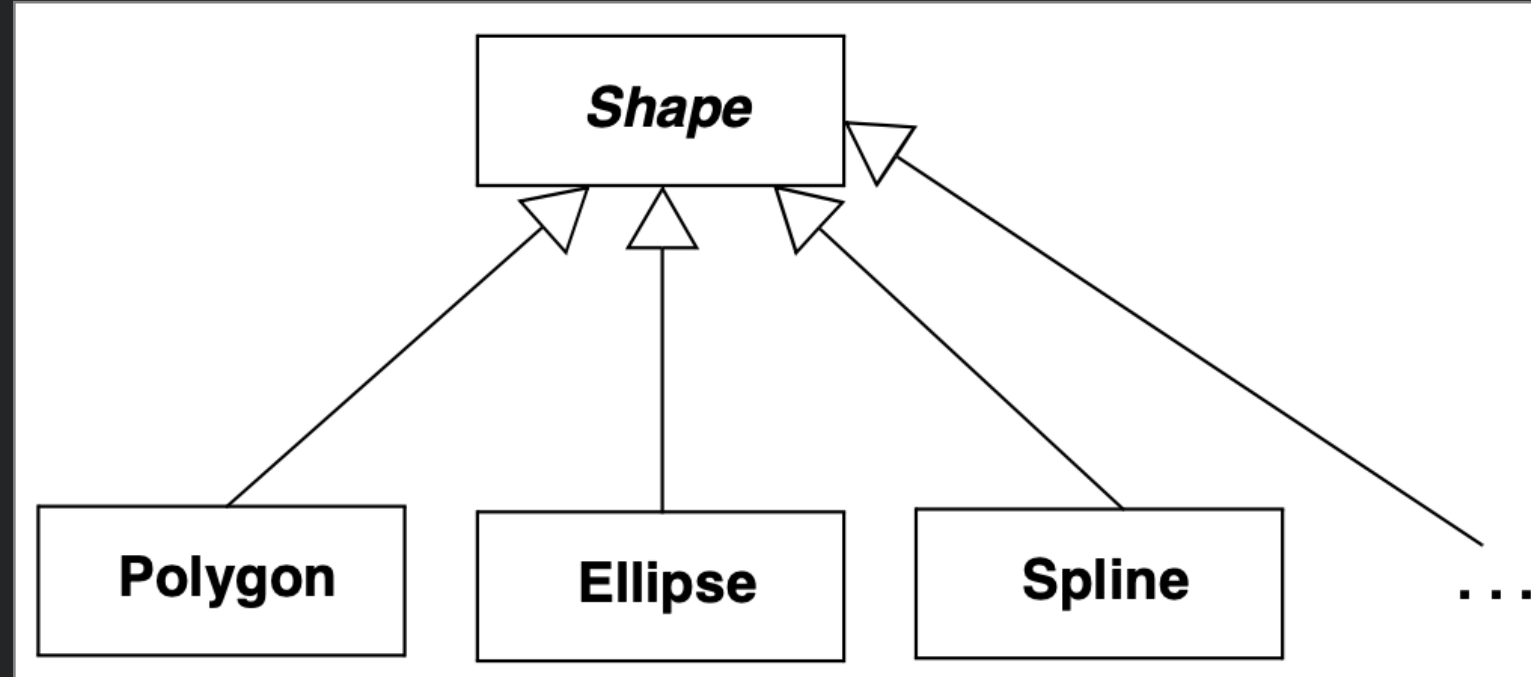
Chapter #1:

Class Diagram

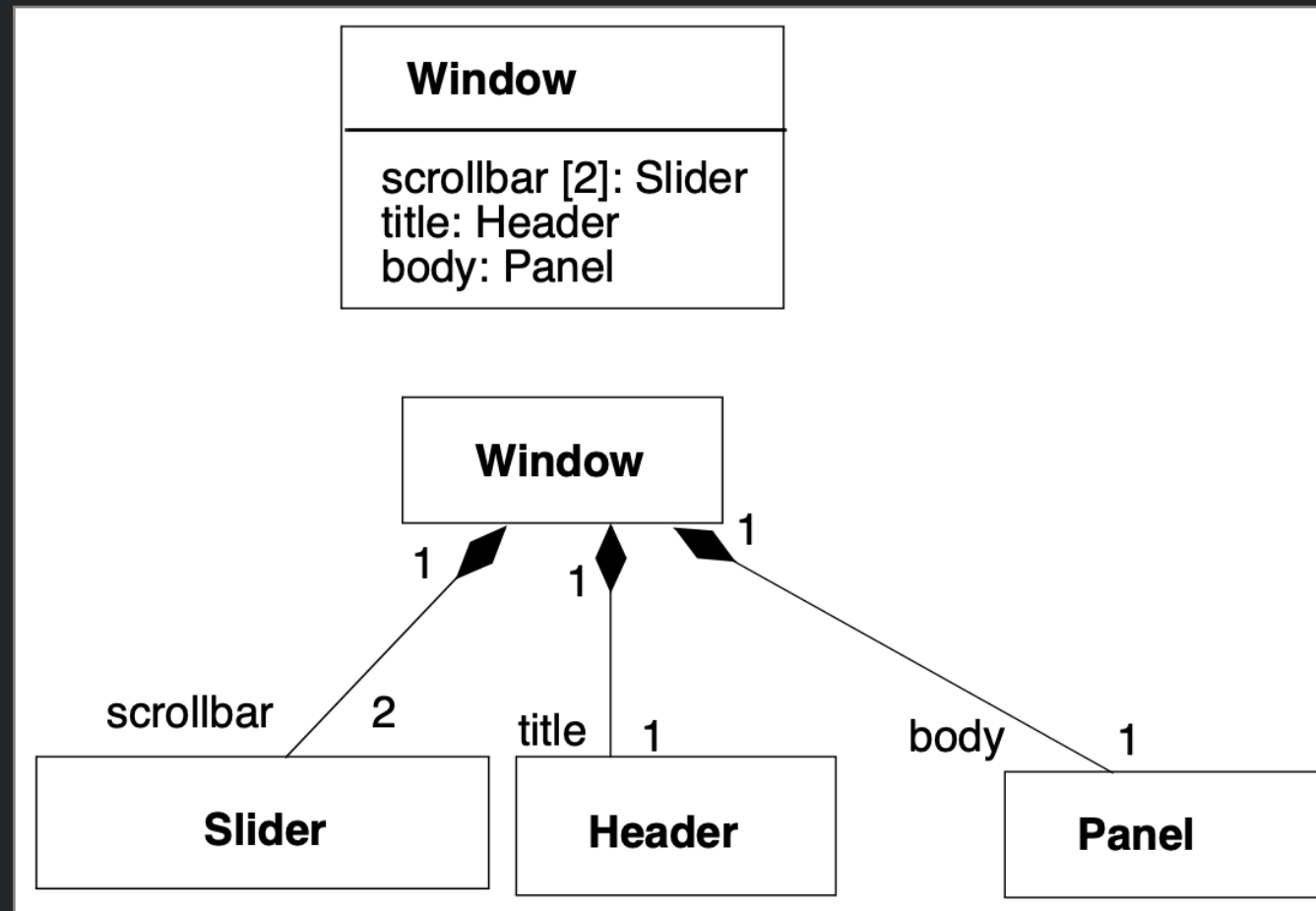
Classes



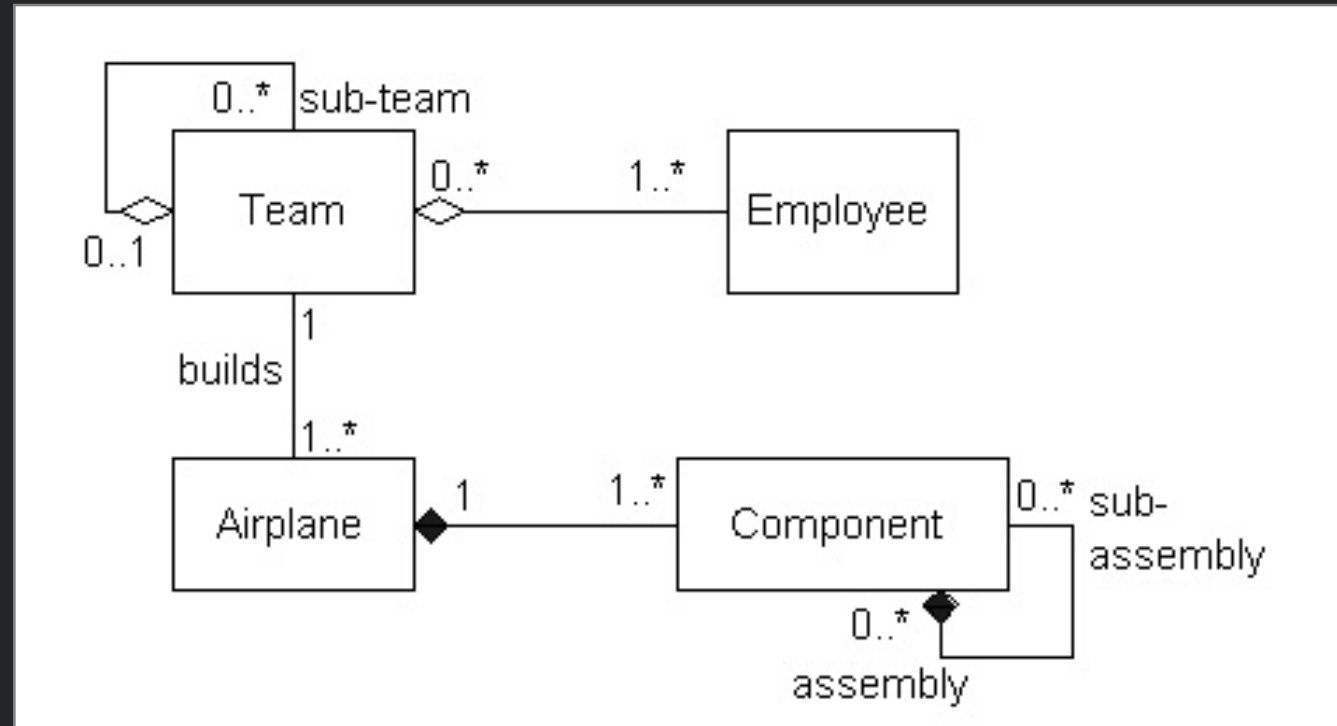
Generalization



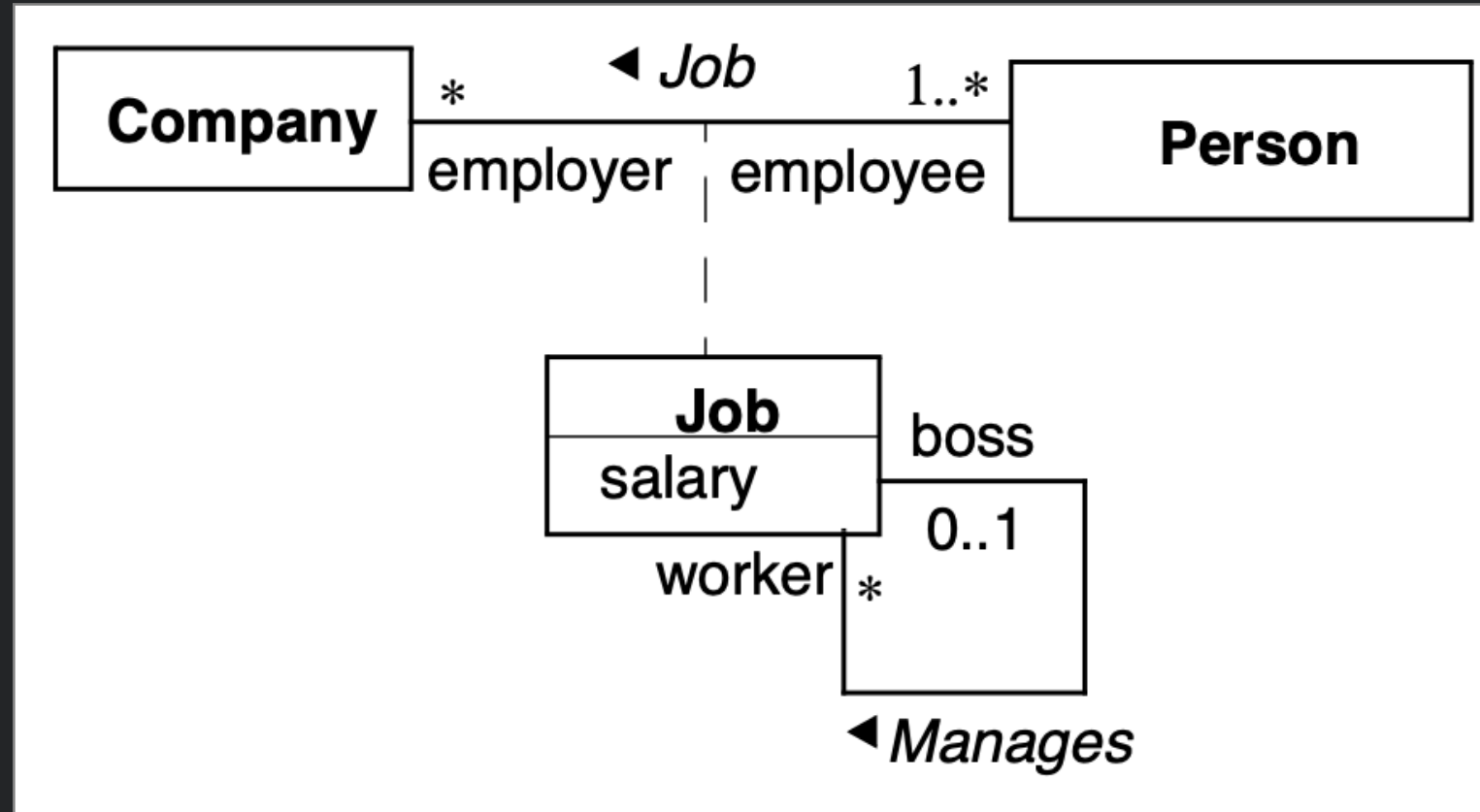
Composition



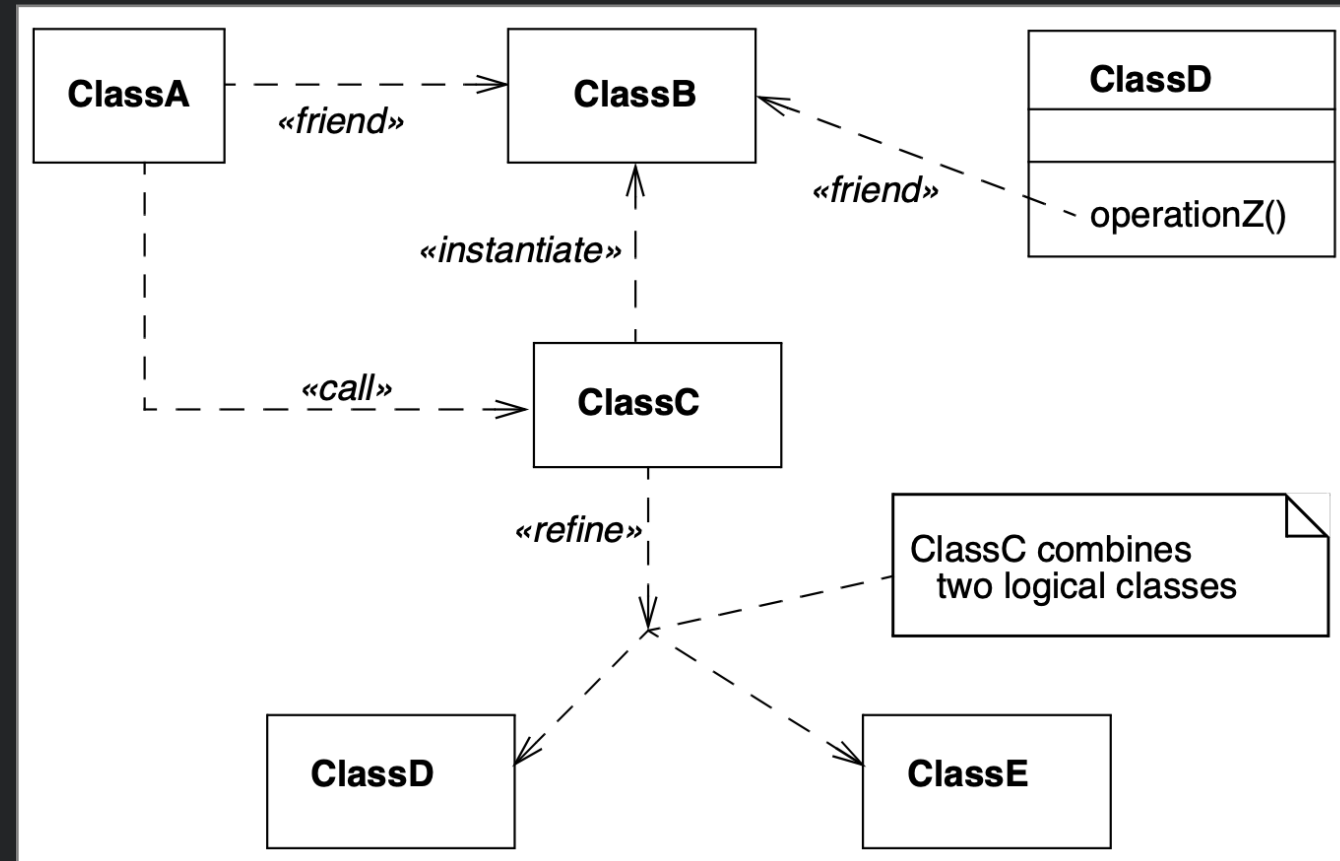
Aggregation



Association



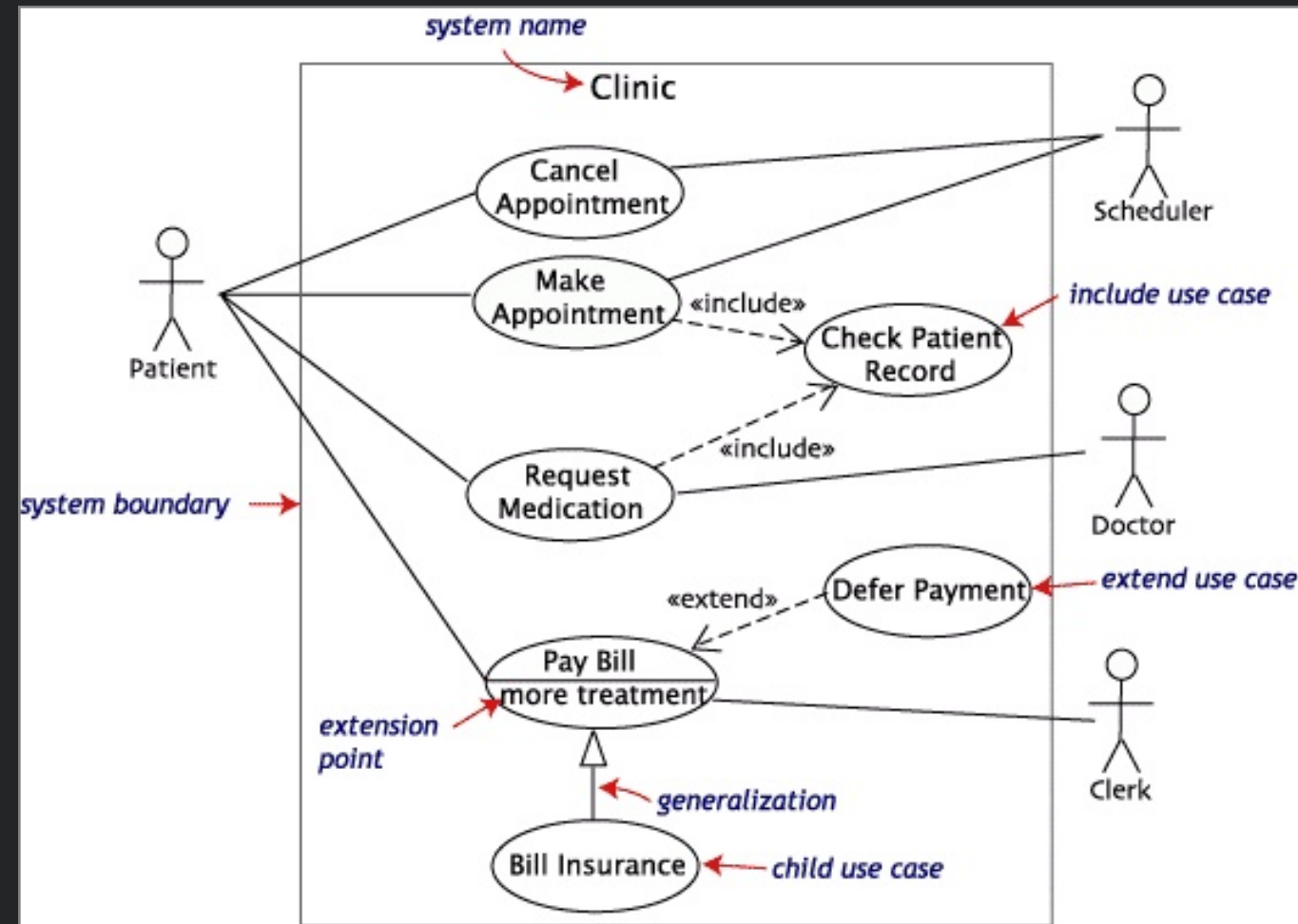
Dependency



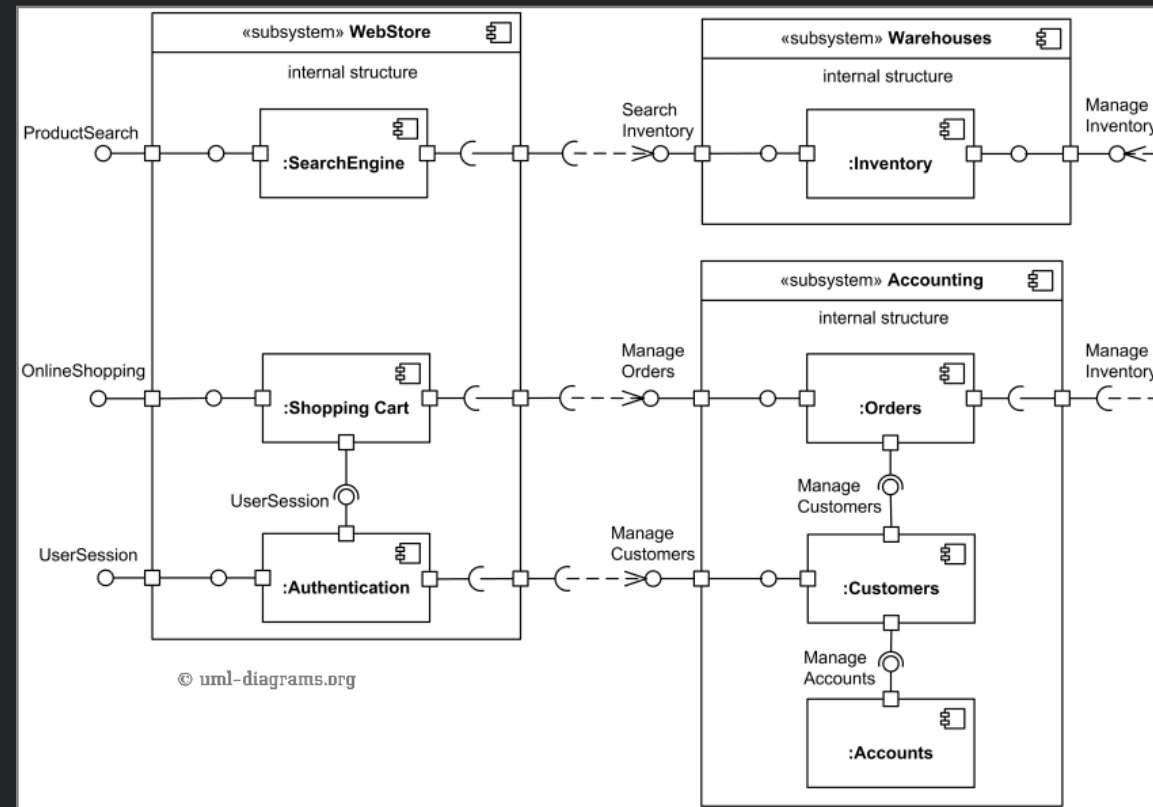
Chapter #2:

Some Other Diagrams

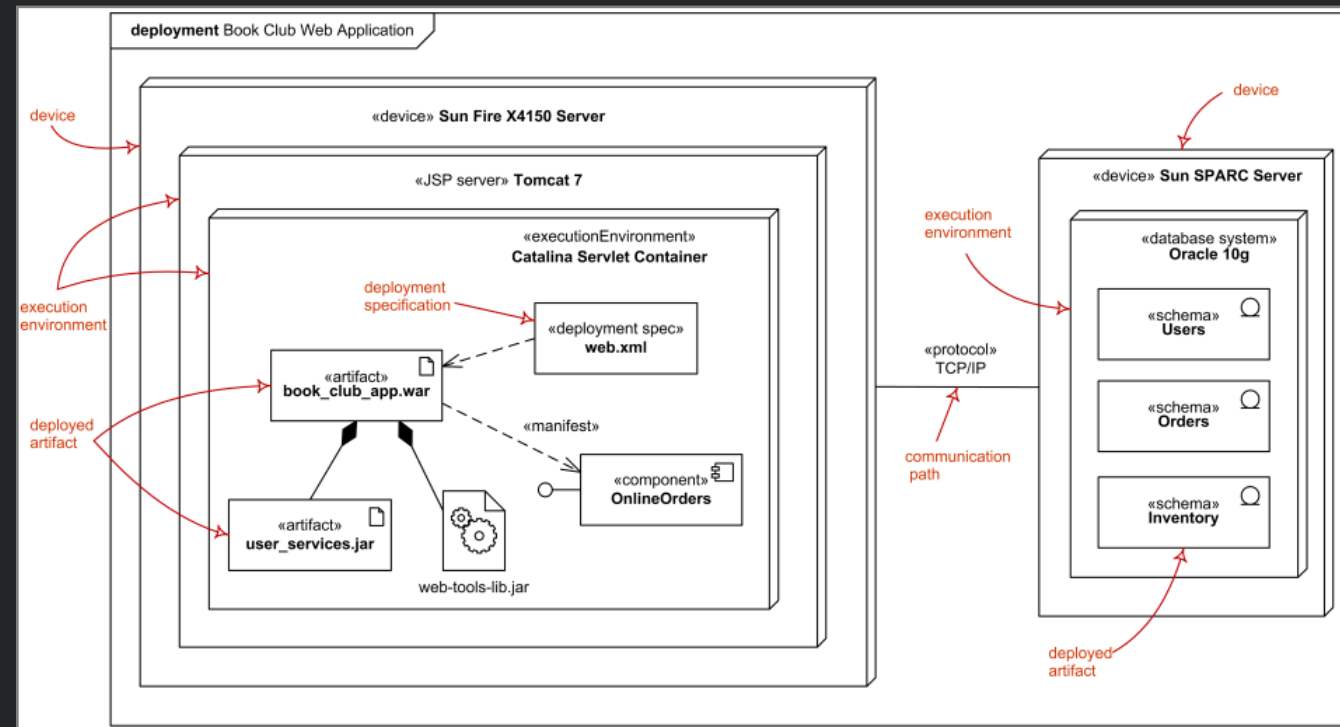
Use Case Diagram



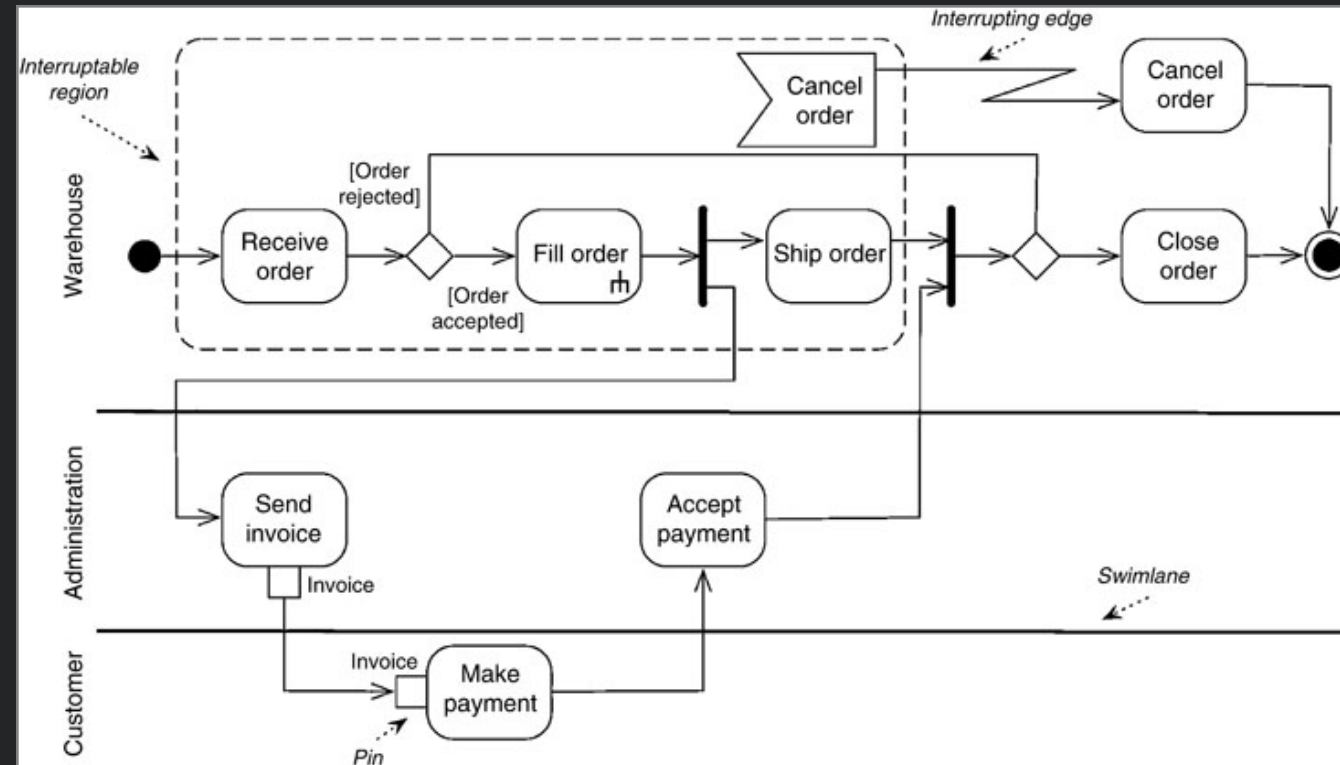
Component Diagram



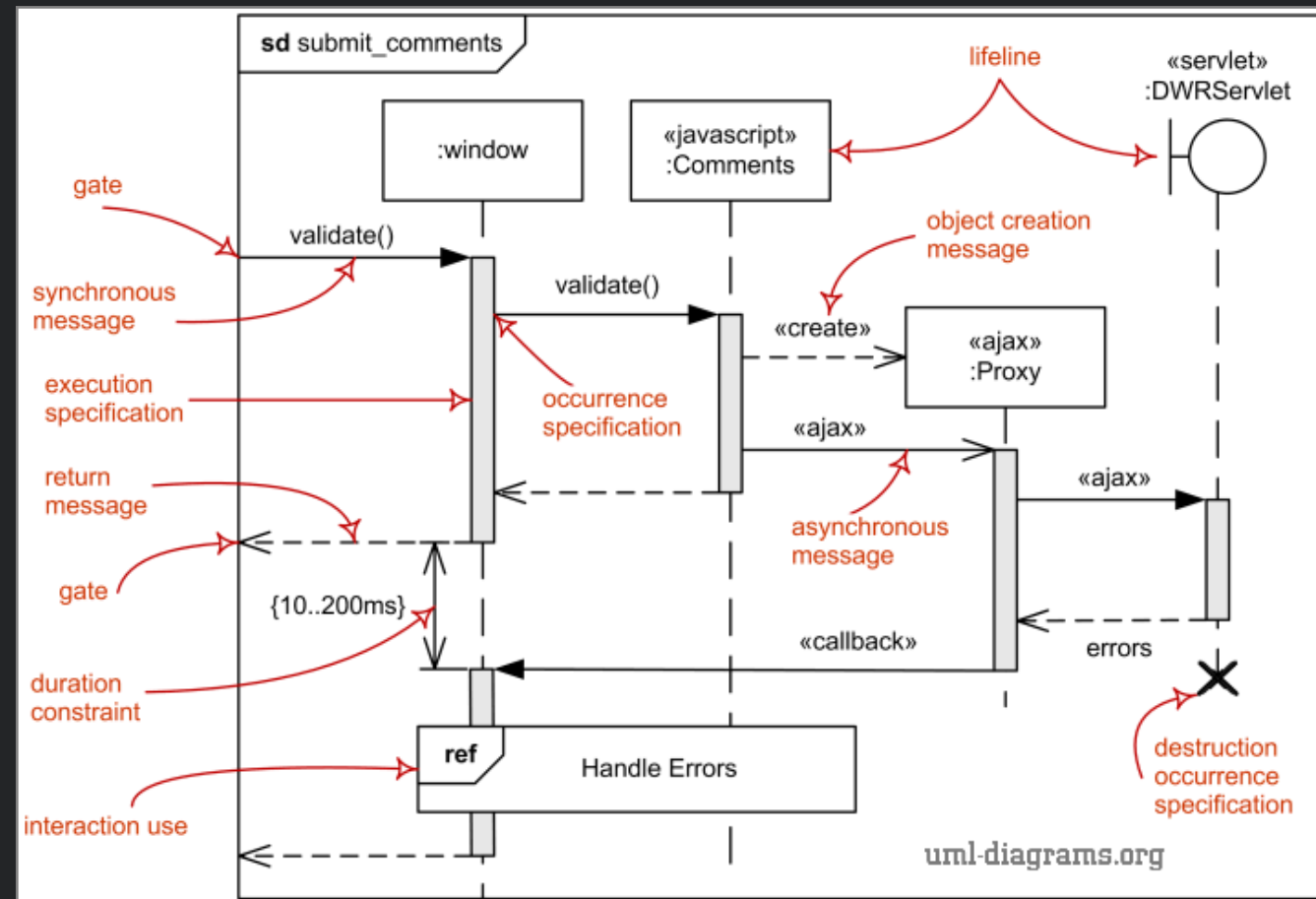
Deployment Diagram



Activity Diagram



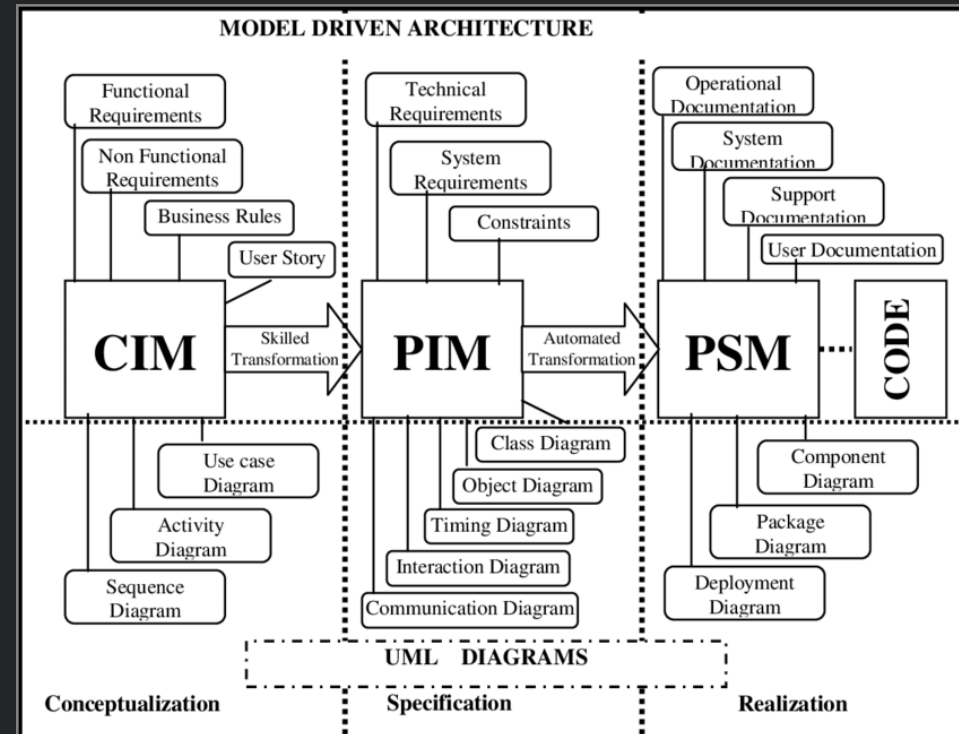
Sequence Diagram



Chapter #3:

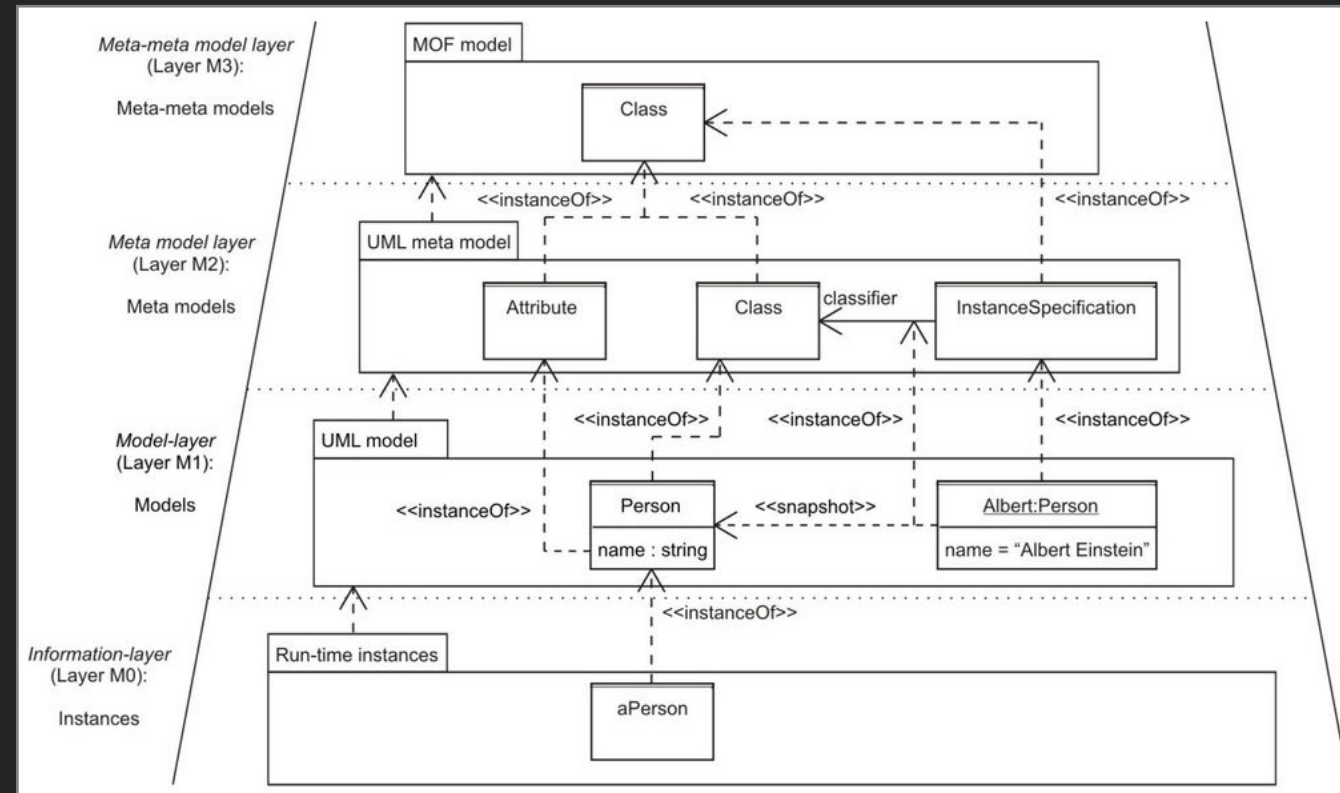
MDA: MOF, XMI, OCL, QVT, fUML, ...

Model Driven Architecture (MDA)



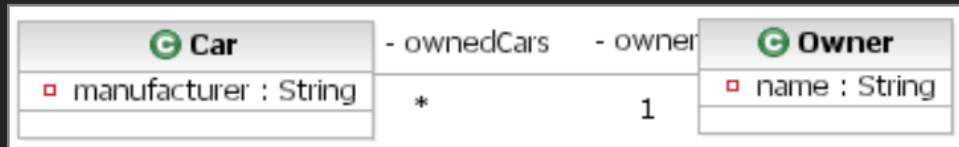
Computation Independent Model (CIM), Platform Independent Model (PIM), Platform Specific Model (PSM).

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](#)

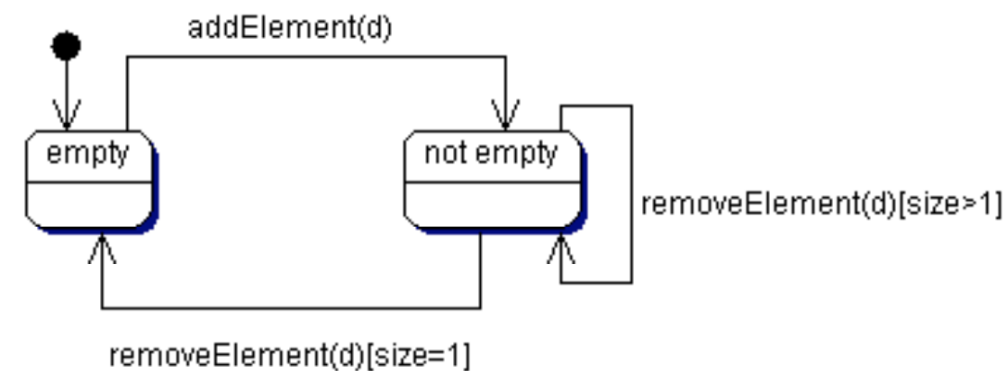
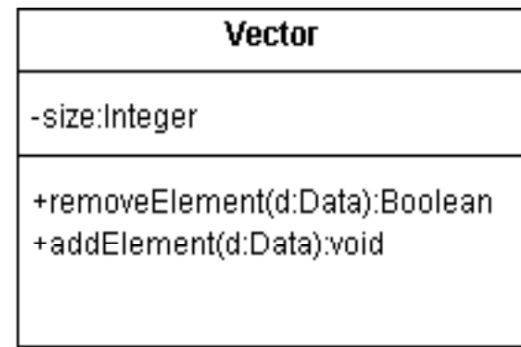
XML Metadata Interchange (XMI)



```
<?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

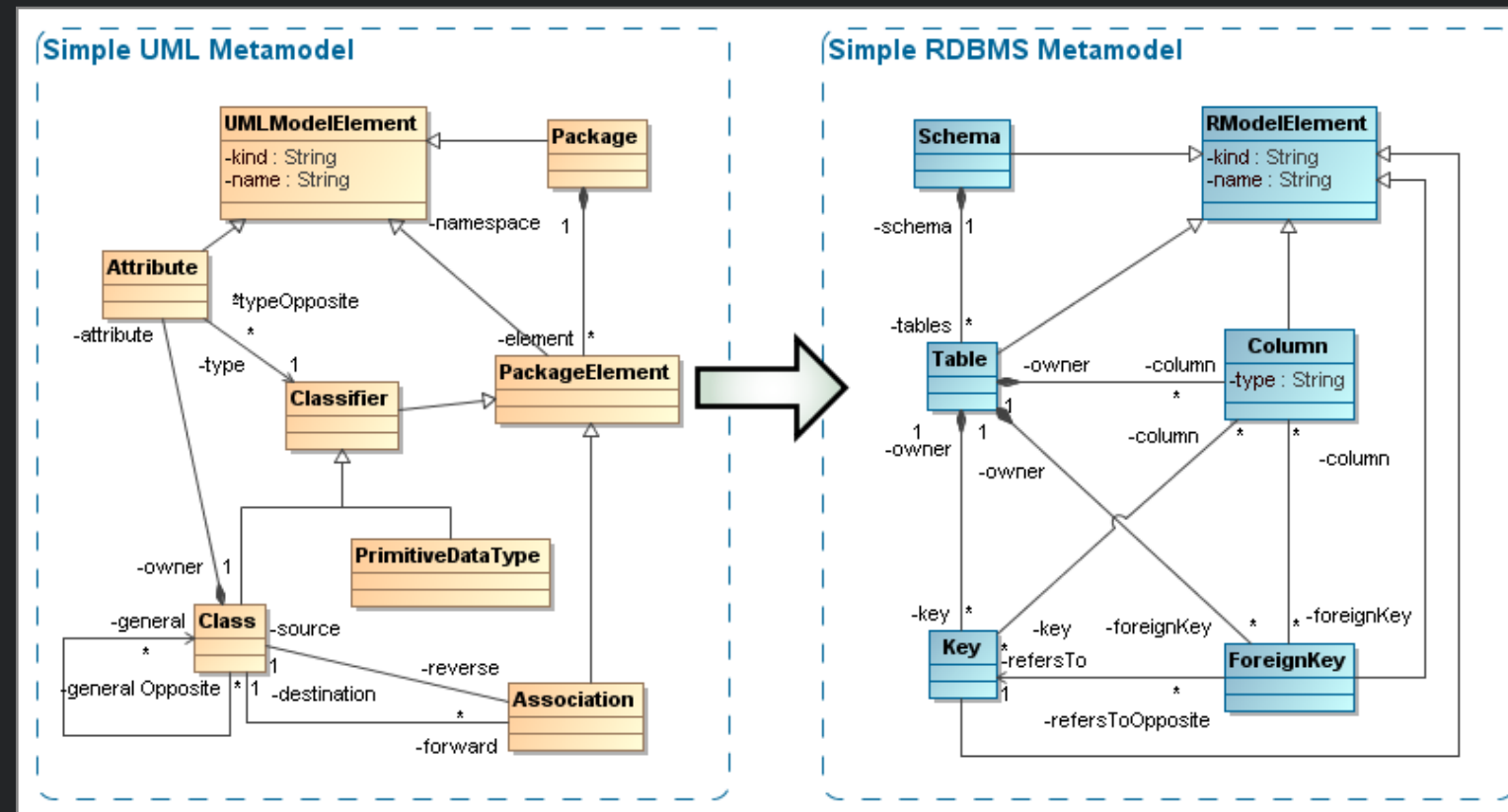


context Vector::removeElement(d: Data)

pre: oclInState(notEmpty)

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

UML and XMI, OCL, MOF, etc.

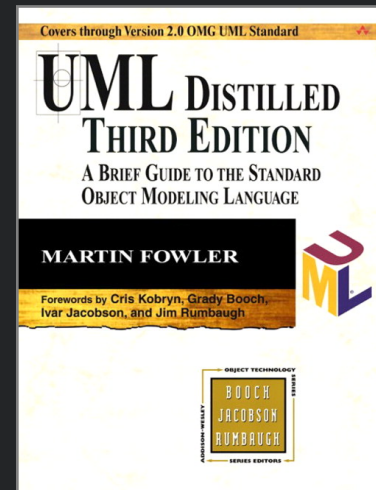


Executable UML, fUML, Alf

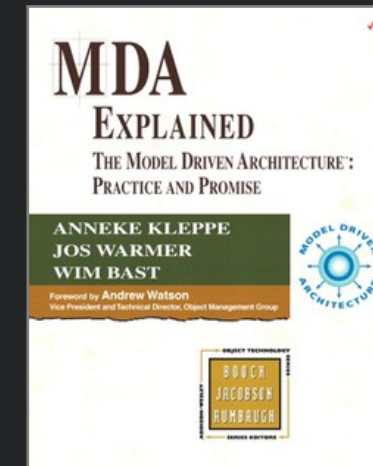
```
private import CustomerAccounts;  
activity SumBalances(in customer : Customer) : Integer {  
    totalBalance = 0;  
    for (balance in customer.accounts.balance) {  
        totalBalance += balance;  
    }  
    return totalBalance;  
}
```

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?