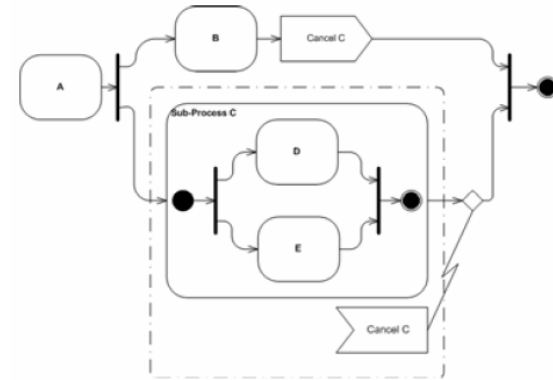


UML 2



Insights, Impact, Influences and Initiatives

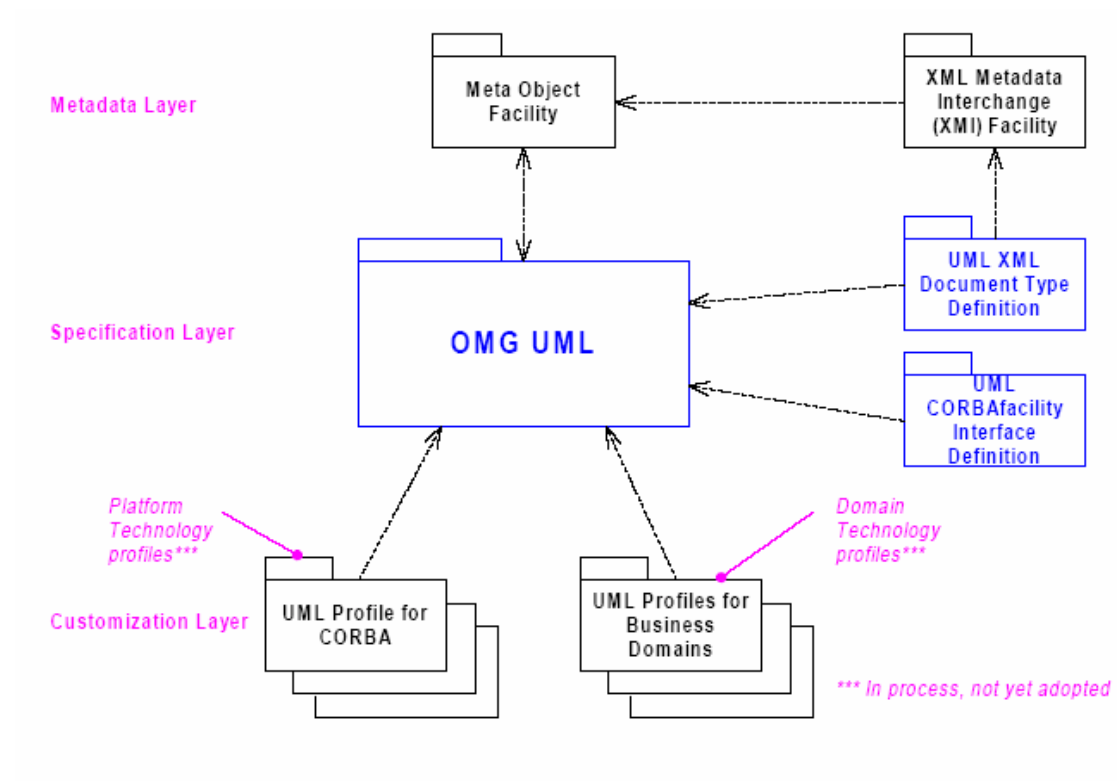
UML 2.0, the latest version of UML, was standardized in June 2003, completing the definition of this major upgrade of the industry standard modelling notation. The previous generation of the language, UML 1.x was essentially designed for analysis and modelling of small-scale software.

Presentation Summary

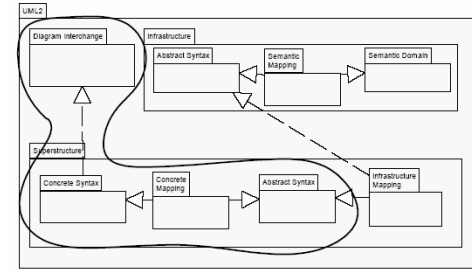
- Environmental Context
- Language Architecture
- Specifications
- Features
- Evolutionary Improvements
- Language Dependencies
- Dependent Standards
- Adoption and Usage
- Initiatives
- Insights

Environmental context

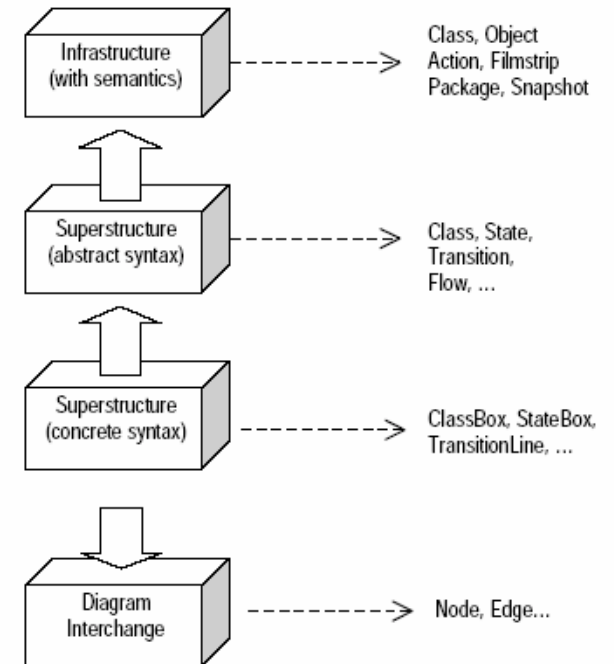
Relationship with other Object Management Group Initiatives



Language Architecture



- Infrastructure: primitive modelling concepts, along with a precise, modelled definition of their semantics.
- Superstructure - abstract syntax: a richer set of concepts that are defined in terms of primitive infrastructure concepts. These concepts provide a definition of commonly used modelling abstractions in UML, including state, transition, and so on.
- Superstructure – concrete syntax: a presentation layer, in which the diagrams used by UML are translated to superstructure concepts



Specifications

- **Infrastructure RFP**
 - The infrastructure proposals address the semantic definitions and core meta-model fabric of the language. Profiles, OCL and MDA based reuse initiative across the OMG standards frameworks has resulted in a smaller set of more consistent concepts in the core.
- **SuperStructure RFP**
 - The superstructure proposal addresses the diagrammatic and notational changes designed to improve the expressive capability of the language. allows specifications to zoom in and out of details [black and white box views of components]
- **Object Constraint Language RFP**
 - Additional constructs being added to the language to allow for the definition of behavioural constraints and invariants

Features

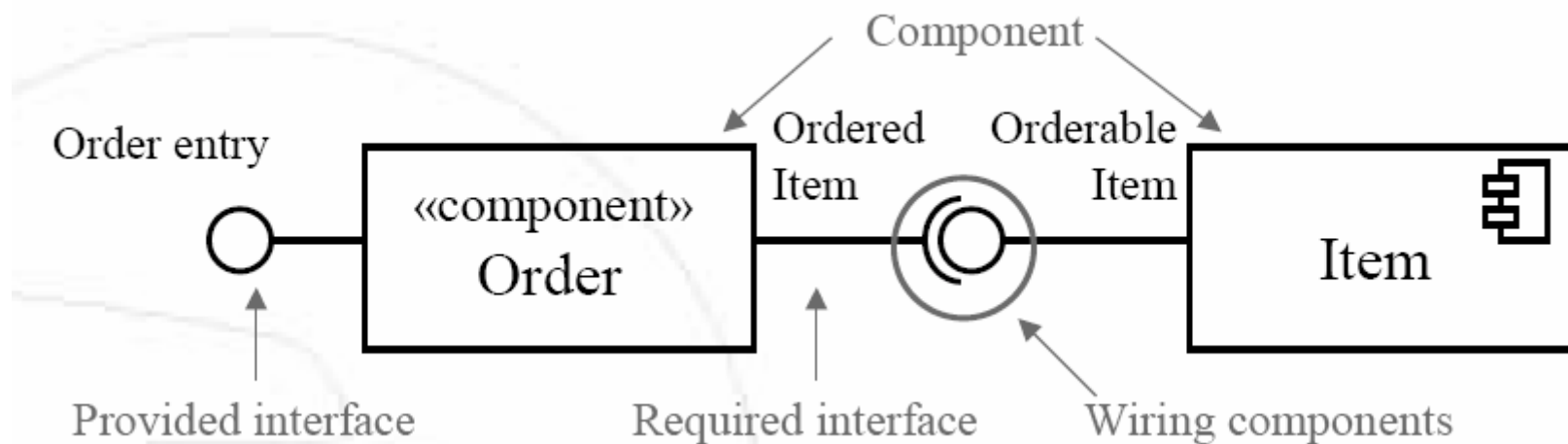
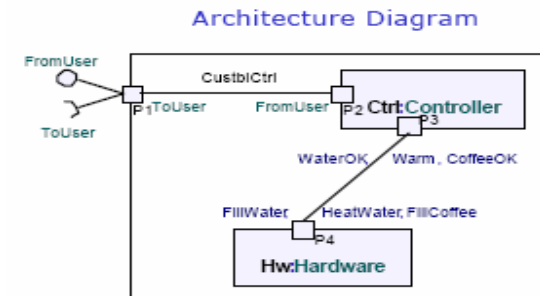
- What can be done with a model?
 - **Visualised** [diagrams]
 - **Stored** [meta-model and schema]
 - **Shared** [XMI model and diagram interchange]
 - **Executed** [Action Semantics specification]
 - **Simulated** [MOF 2 core micro-Kernel]
 - **Validated** [object constraint language]
 - **Archived and maintained** [HUTN - Human usable textual notation]

Evolutionary Improvements

- UML 2.0 has been revised to better meet the real challenges of systems engineers and software developers by providing better scalability and enhanced support for:
 - component based development
 - architecture modelling, and
 - dynamic behaviour descriptions
- The emphasis has been on scalability and precision
 - Scalability addresses the recursive top down nature of system specifications relating to structure and behaviour
 - Superstructure semantics clarified around the decomposition of composite structures
- The fundamental atomic unit of execution is an action
 - Consistent interpretation across state machines, activity diagrams and sequence diagrams. Representative of some transformation or processing. Expressed with precise procedural semantics.
- Interactions
 - A concept supporting role based descriptions of responsibility allocated to composite structures like components

Component Based Development

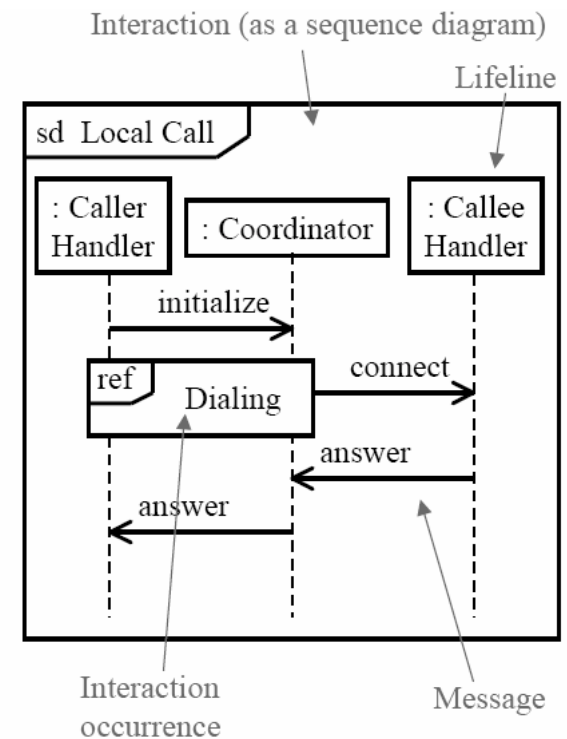
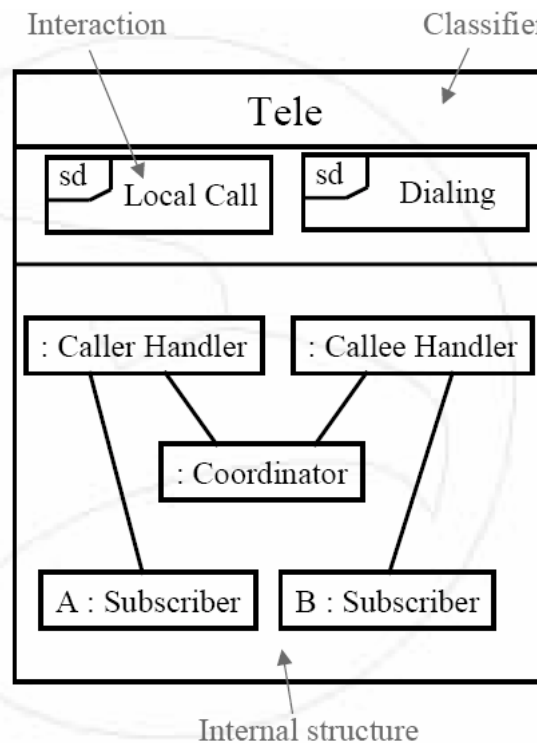
- Systems now conceived in terms of Parts, connectors and ports
- Plug and play reuse
- Supplied and required interfaces simplify system assembly
- Internal and external perspectives clarify specifications



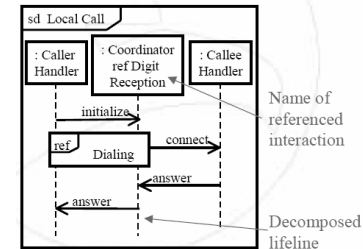
Architectural Modelling

- Behavioural decomposition allows an architect to start from the top down

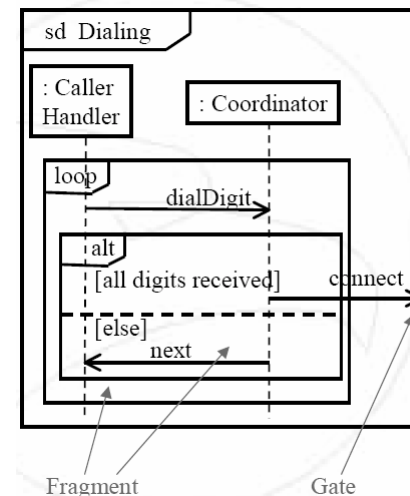
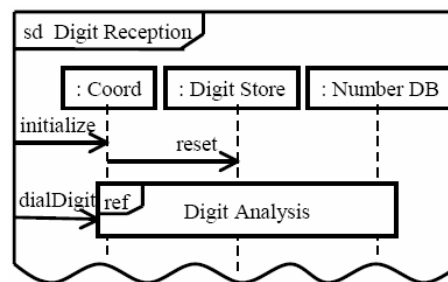
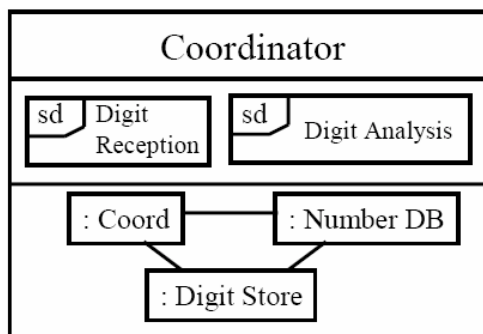
Classifiers and not just collaborations now have interactions



Behavioural Decomposition

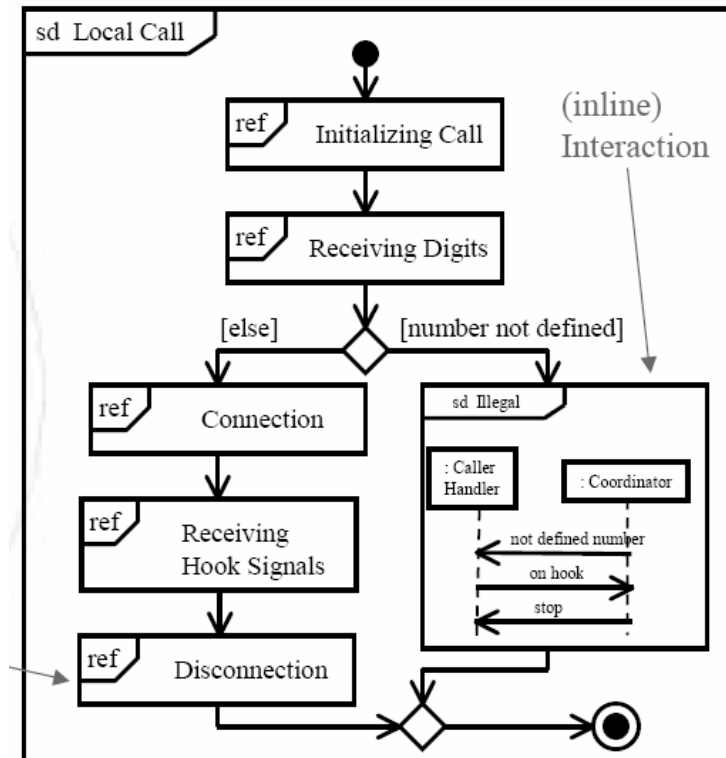


- Lifelines represent lower levels of detail represented by a part/component that can in turn be decomposed in a recursive manner
- Fragments of behaviour can be combined. make use of conditions and expressions



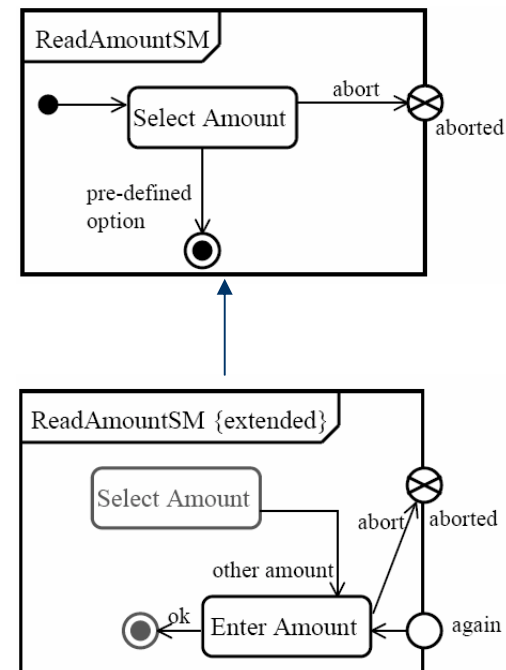
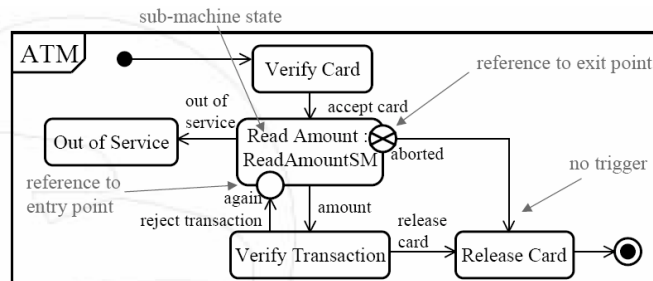
Interaction Overviews

- Presented with the syntax of an activity diagram
- The activities are either interactions or interaction occurrences



Behavioural Inheritance

- State machines can be refined through generalised



Influences

- Model driven architecture [MDA]
 - This standard will enable
 - A clearer separation between execution environments and a systems design and specification
 - Domain driven development techniques
- Meta Object Facility [MOF]
 - This standard is responsible for driving the following capabilities
 - Executable models
 - Model Interchange and transformation
 - Conceptual reuse and integration across other important OMG initiatives - cwm

Initiatives

- The following UML profiles are nearing completion and will soon become OMG standards:
 - Systems Engineering [se]
 - Enterprise Application Integration [EAI]
 - Enterprise Distributed Object Computing [EDOC]
 - Testing
 - Scheduling
 - many more industry specific task force profiles are coming...

Insights

- Someday soon, the idea of writing an application in Java or C++ will seem as absurd as writing an application in assembler does today. And the code generated from an Executable UML model will be as uninteresting and typically unexamined as the assembler pass of a third generation language compile is today.
- This shift is made possible by the confluence of four factors:
 - The development of the Model Driven Architecture (MDA) standards by the Object Management Group (OMG)
 - The adoption of the Precise Action Semantics for the Unified Modelling Language specification by the OMG in November of 2001
 - A proposed profile of UML—Executable UML—supports creating a complete and implementation-neutral self-contained expression of application functionality. Steven J. Mellor and Marc J. Balcer define this profile in their book [Executable UML: A Foundation for Model-Driven Architecture](#)
 - The availability of high-quality Model Compilers and Virtual Execution Environments (VEE) that provide "out of the box" platforms upon which Executable UML models can execute.