

Object Oriented Analysis & Design Using UML

MCA- 4th Sem

Unit-4

Topics Covered: System Development Stages, System Conception, Domain Analysis, Domain Class Model, Domain State Model, Iterating the analysis.

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System development life cycle in UML

The Unified Process divides the project into four phases:

- Inception
- Elaboration
- Construction
- Transition

Inception

Inception is the smallest phase in the project.

The following are typical goals for the Inception phase.

1. Establish a justification or business case for the project.
2. Establish the project scope and boundary conditions .
3. Outline the use cases and key requirements that will drive the design tradeoffs .
4. Outline one or more candidate architectures .
5. Identify risks .
6. Prepare a preliminary project schedule and cost estimate

The Lifecycle Objective Milestone marks the end of the Inception phase.

Elaboration

- During the Elaboration phase the project team is expected to capture a healthy majority of the system requirements.
- The primary goals of Elaboration are to address known risk factors and to establish and validate the system architecture.
- Common processes undertaken in this phase include the creation of use case diagrams, conceptual diagrams (class diagrams with only basic notation) and package diagrams (architectural diagrams).

Construction

- Construction is the largest phase in the project.
- In this phase the remainder of the system is built on the foundation laid in Elaboration.
- System features are implemented in a series of short, time boxed iterations. Each iteration results in an executable release of the software.
- Common UML (Unified Modelling Language) diagrams used during this phase include Activity, Sequence, Collaboration, State (Transition) and Interaction Overview diagrams.
- Initial Operational Capability Milestone marks the end of the Construction phase.

Transition

- The final project phase is Transition.
- In this phase the system is deployed to the target users.
- Feedback received from an initial release (or initial releases) may result in further refinements to be incorporated over the course of several Transition phase iterations.
- The Transition phase also includes system conversions and user training.
- The Product Release Milestone marks the end of the Transition phase.

System Conception

- System conception deals with the genesis of an application.
- The intention of system conception is to recognize the big picture, that is, what requirements does the proposed system meet, can it be developed at a reasonable cost?, etc.
- **System conception is considered as a requirement analysis phase.**
- Requirements describe how system behaves from the user's point of view.
- True customer requirements should be separated from design decisions.
- Solution should be deferred until a problem is fully understood.
- Various steps involved in system conception is described below:

Devising a System Concept

Some ways to find new system concepts:

- **New functionality:** add functionality to existing system
- **Streamlining:** remove restriction the way system work
- **Simplification:** let ordinary person perform task
- **Automation:** automate manual process
- **Integration:** combine functionality from different system
- **Globalisation:** travel to other country & observe their cultural & business practice

Elaboration

Elaboration is the point where you want to have a better understanding of the problem:

Who is the application for?

- understand which person & organization are stakeholder (financial sponsors & end user) for new system
- financial sponsors are important because they are paying for system & expect the project to be success & within budget
- user will determine success of system

What problem will it solve?

- determine which feature will be in new system & which will not

Elaboration

Where it will be used?

- determine new system is complement of existing system, it will be used locally or distributed via a network or it just a new capability that you deploy without disrupting workflow

When is it needed?

- Feasible time: the time in which system can be developed within cost & resources
- Required time: when system needed to meet business goals

Why it is needed?

- understand motivation for new system
- business case will give you insight what stakeholders expect
- How it will work?

In the Elaboration Phase, we are concerned with exploring the problem in detail, understanding the customer's requirements and their business, and to develop the plan further.

Preparing a Problem Statement

- A problem statement is a clear concise description of the issues that need to be addressed by a problem solving team and should be presented to them (or created by them) before they try to solve the problem.
- A good problem statement should answer these questions:

Preparing a Problem Statement

1. What is the problem?

- This should explain why the team is needed.

2. Who has the problem or who is the client/customer?

- This should explain who needs the solution and who will decide the problem has been solved.

3. What form can the resolution be?

- What is the scope and limitations (in time, money, resources, and technologies) that can be used to solve the problem? Does the client want a white paper? A web-tool? A new feature for a product? A brainstorming on a topic?

Conclusion:

Object-oriented analysis (OOA) looks at the problem domain, with the aim of producing a conceptual model of the information that exists in the area being analyzed.

Analysis models do not consider any implementation constraints that might exist, such as concurrency, distribution, persistence, or how the system is to be built.

Implementation constraints are dealt with during object-oriented design (OOD). Analysis is done before the Design.

The result of object-oriented analysis is a description of what the system is functionally required to do, in the form of a conceptual model.

DOMAIN ANALYSIS

Domain Analysis Model

- Domain model illustrates meaningful conceptual classes in a problem domain.
- It is a representation of real-world concepts, not software components.
- Its development entails identifying a rich set of conceptual classes, and is at the heart of object oriented analysis.
- OO domain analysis model contain class models, often state models, but seldom has an interaction model.
- Analysis models can be used as an effective means of communication among business experts and system design experts.

Domain Class Model

The following steps are performed to construct domain class model:

1. Find classes
2. Prepare data dictionary
3. Find association
4. Find attribute of objects & links
5. Combine classes using inheritance
6. Verify that access paths exists
7. Iterate & refine model
8. Reconsider the level of abstraction
9. Group classes into packages

Domain State Model

- Objects passes through distinct states during their lifetime.
- Describes various states of objects,
- Properties & constrains of object in various state
- Events that take object from one state to Another

Steps for constructing a domain state model:

1. Identify class with state
2. Find state
3. Find event
4. Build state diagram

Iterating the Analysis

- Iterating the analysis requires more than one pass to complete. Problem statement often contains circularities and cannot be approached in a linear way because different parts of problem interact.
- Prepare a model first and then iterate it as your understanding increases.

Refine the Analysis Model

- Overall analysis model shows inconsistencies and imbalance.

Iterating the Analysis

- Try to refine classes to increase sharing and improve structure.
- Some constructs won't fit in model; You probably missed or miscast a general concept; re-examine them & change model.
- Include exception, special case
- Remove classes or association that seemed to be useful at first but now appears extra; you can combine two classes in analysis can be combined.
- A good model have few small areas & don't have extra details.

Iterating the Analysis

Restating the Requirements

- Most of real requirements will be part of model.
- Other requirements specify method of solution and should be separated if possible.
- During analysis some requirements may appear to be incorrect & impractical; confirm correction to requirements.
- Business expert verify it to make sure that it correctly models the real world.
- Final model serves as basis for system architecture, design & implementation.

Iterating the Analysis

Analysis & Design

- Goal of analysis is to specify the problem without implementation details but it is impossible to avoid all taints of implementation.
- There is no absolute line between various development stages nor is there any such thing as a perfect analysis.

THANKS