Agenda

- The Unified Process of Software Development
  - The Unified process and its iterations
  - The phases of the Unified Process
  - Best practices in the Unified Process
  - Workflows of the Unified Process

Various Processes of Software Development

- Various processes have evolved over the years.
  - Sequential Life-cycle process (e.g. .Waterfall)
  - Prototyping process
  - Rapid Application Development process,
  - Iterative Development process and
  - Unified Software Development Process.
  - …

Unified Process

- Adaptable methodology for Object-Oriented Software production
- Iterative and Incremental

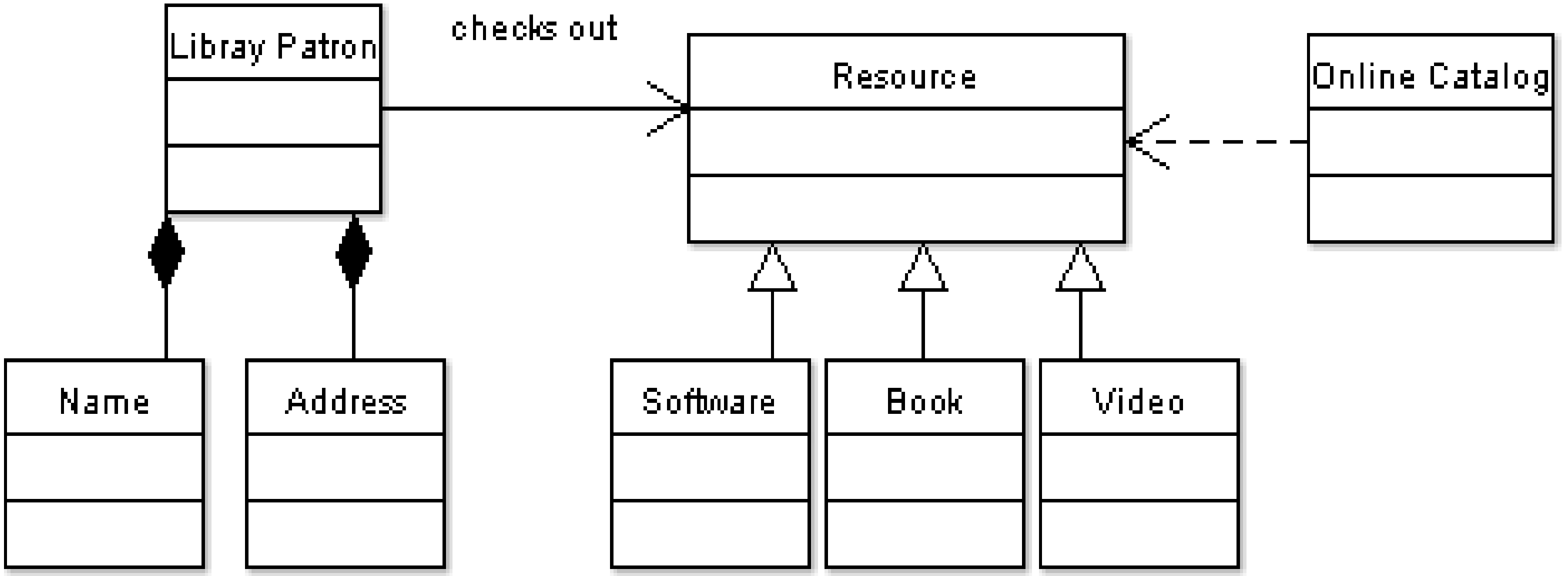
Iterative

- – Each successive version is intended to be closer to its target than its predecessor

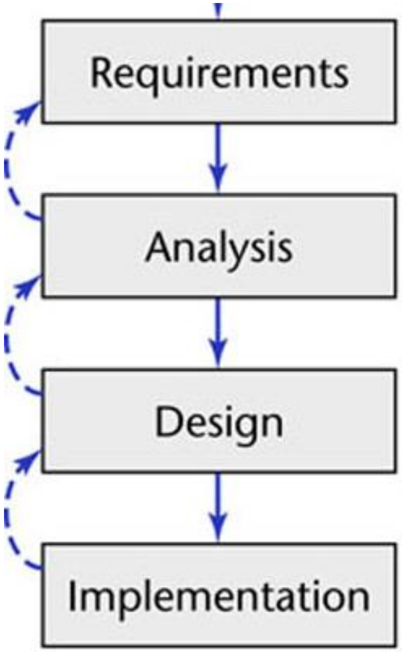
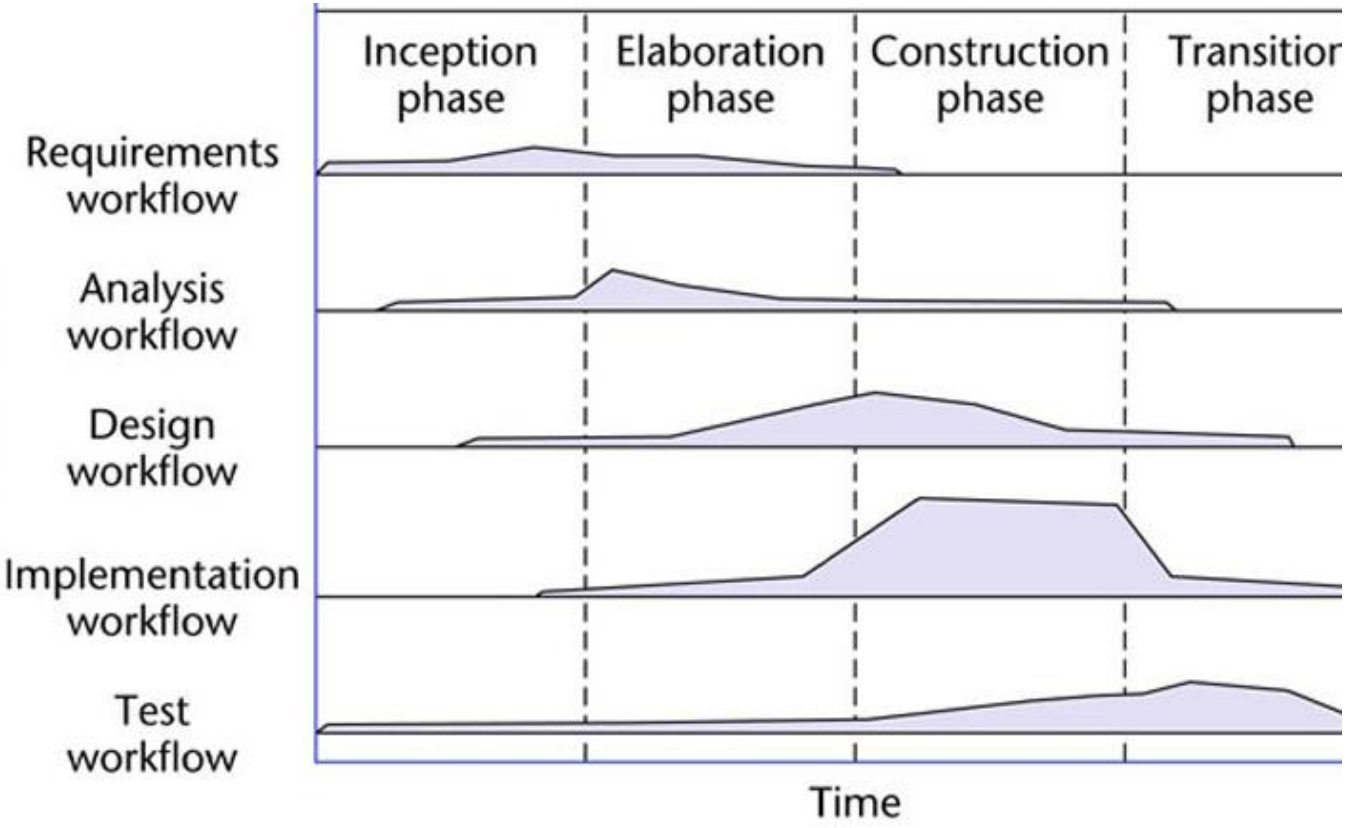
- UML diagrams
  - – Unified Modeling Language (UML)
  - – Redrawn as more knowledge about system is gained (more accurate, extended)

UML Class Diagram

Models the classes needed and relationship associations, inheritance, compositions and dependencies



Waterfall vs. Unified Process

Waterfall	Iterative and Incremental Model: Unified Process
	

Waterfall vs. Unified Process

Waterfall

- One dimensional
- Each phase must be completed before you begin the next phase.

Unified Process

- Incremental and Iterative
- Two dimensional
- Task is divided into **increments** (phases)
- Within each increment the developers have to **iterate** (workflows) until task is complete
- Consecutive series of waterfall models

The Unified Process of Software Development

- The key feature: Software development is done in a series of fixed periods, for example, between 2 and 6 weeks. Each period is called as iteration.
- At the end of each iteration, we have an executable system.
- Each iteration has its own requirement analysis, design, coding and testing.
- The software development is incremental.
  - Implement new features added and the user's suggested changes.

Timeboxing an Iteration

- Each iteration is timeboxed i.e. fixed in length.
- The UP recommends each iteration to be between 2 and 6 weeks.
- It has no provision for the extension of an iteration period.
- If software developers are unable to complete coding the given requirements within fixed time, then decrease the number of requirements to code.

Advantages of Timeboxing an Iteration

- Team forced to identify core architecture and high-risk, high-value requirements early. So the prioritization of requirements automatically takes place.
- Increase in confidence level of the stakeholders in the development team and the project.
- Increase in confidence of the team-members in their own ability leading to team satisfaction.

UP Phases

- The Unified Process consists of four phases:
  - Inception,
  - Elaboration,
  - Construction and
  - Transition.

- Each phase is completed in a series of iterations.

Inception

- A vision of the product is created. Questions discussed are:
  - What is the product supposed to do?
  - Does my organization have the resources to build this product?
  - Is it feasible to do so?
  - How much will this product cost and how much will it bring in?
  - What will be the duration of the project?
  - Risk analysis is performed.
  - Decision whether to go ahead with the project or not is taken.

Elaboration

- System to be built is analyzed in detail.
- Use cases used to document the requirements. Main aim: Get the core architecture and as many use cases as possible.
- The core architecture is coded.
- Other high-risk requirements are identified and coded.
- A project plan is drawn in this phase, resources are allocated and a schedule is planned.
- UML diagrams are used to model the system under design.

Construction

- Remaining use cases are implemented.
- If any new use cases are discovered, they are implemented.
- Test cases are written, actual tests are carried out and a test report is prepared.
- Documentation for the system as well as guides for the users are written.

Transition

- System is installed in its environment and beta-tested.

- Feedback is received and System is refined and tuned to adapt in response to the feedback.

- It also includes activities like marketing of the product and training of users.

User feedback at every step

- UP stresses on continuous dialogue with the users and receives their feedback at every stage.
- Unlike traditional Waterfall process model where the entire system is shown to the users only after the testing phase is over.
- In UP, customers can suggest changes at the end of every iteration and the cost of implementing these changes early is minimal.
- Actual users are automatically familiarized with the software during the development process.

The Five Workflows of UP

- Requirements Workflow
- Analysis Workflow
- Design Workflow
- Implementation Workflow
- Test Workflow

Requirements Workflow

- Before developing a product, the developers must have an idea of what the product is expected to do.
- The aim: To achieve the above task by gathering the functional requirements as well as the constraints.
- A document describing the vision and scope of the project.
- Actors and use cases are identified and described in detail.
- The constraints are also documented.

Analysis Workflow

- Requirements Workflow
- Analysis Workflow
- Design Workflow
- Implementation Workflow
- Test Workflow

Analysis Workflow

- The primary activities of the Analysis workflow are aimed at building the analysis model, which helps the developers refine and structure the functional requirements captured within the use case model. This model contains realizations of use cases that lend themselves to design and implementation work better than the use cases.

Design Workflow

- Requirements Workflow
- Analysis Workflow
- Design Workflow
- Implementation Workflow
- Test Workflow

Design Workflow

- The primary activities of the Design workflow are aimed at building the design model, which describes the physical realizations of the use cases from the use case model, and also the contents of the analysis model.
- Initially, only the core architectural design can be done without paying much attention to details.

Implementation Workflow

- Requirements Workflow
- Analysis Workflow
- Design Workflow
- Implementation Workflow
- Test Workflow

Implementation Workflow

- The primary activities of the Implementation workflow are aimed at building the implementation model, which describes how the elements of the design model are packaged into software components, such as source code files, dynamic link libraries (DLLs)
- How to convert the design model to code?
  - (To code and build the system)

Test Workflow

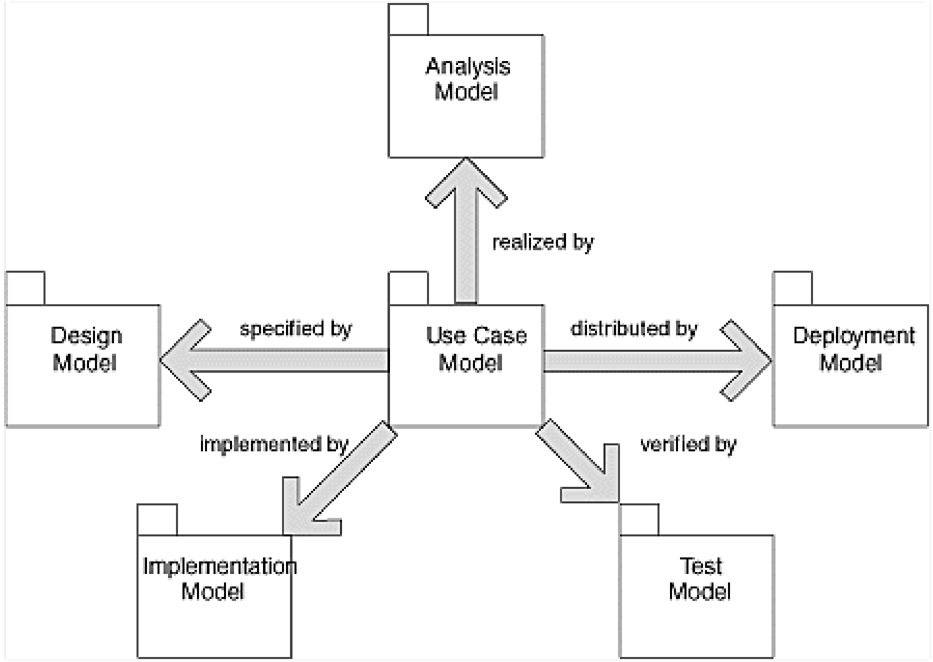
- Requirements Workflow
- Analysis Workflow
- Design Workflow
- Implementation Workflow
- Test Workflow

Test Workflow

- The primary activities of the Test workflow are aimed at building the test model
- The test model contains test cases that are often derived directly from use cases.
- Testers perform black-box testing using the original use case text, and white-box testing of the realizations of those use cases, as specified within the analysis model.
- Testing must be done throughout the project in an iterative manner.
- Testing includes :
  - The verification whether software has been developed according to the user requirements.

Use of Use Cases

- The UP recommends the use of use cases.
- It also advises the use of the UML to model software visually.
- The use case model also serves as the foundation for all other development work



PostDelivery Maintenance

- Common problem: Lack of existing documentation
- A proper record must be kept of all changes made and reasons for the change.
- Testing ensures that:
  - Required changes have been made
  - No faults have been introduce

Question ?