104KM Enterprise Information System

Topic: OO Analysis and Design – Part 1

Learning outcomes for today

- Object-oriented System Development Life Cycle
- Rational Unified Process (RUP)
- Understanding needs of stakeholders and working with project teams when developing IT solutions
- Unified Modelling Language (UML)

Software Development Process

What is a System Development Methodology?

Why are methodologies used?

What is a System Development Methodology?

Any logical process used by a ***System Analyst*** *or* ***Business Analyst*** *to develop an* ***Information System*****.**

The methodology results in a high quality system that:

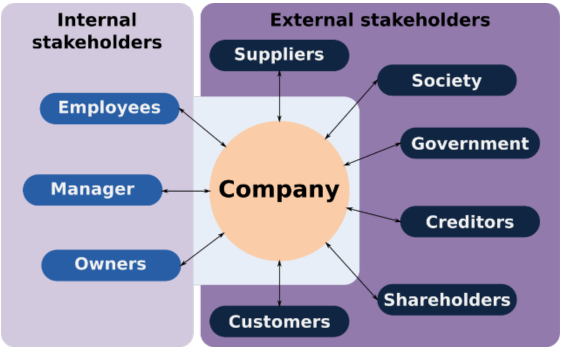
- *meets or exceeds customer expectations*
- *within time and cost estimates*
- *works effectively and efficiently in the current and planned Information Technology infrastructure*
- *cheap to maintain and cost-effective to enhance*

The need for different approaches…

Different methodologies place emphasis on different aspects of the system development process.

Issues to consider

- Who are the stakeholders?
- What type of system is being developed?
- What are the principal features of the environment in which the systems is to be developed? (*Most difficult to address*)

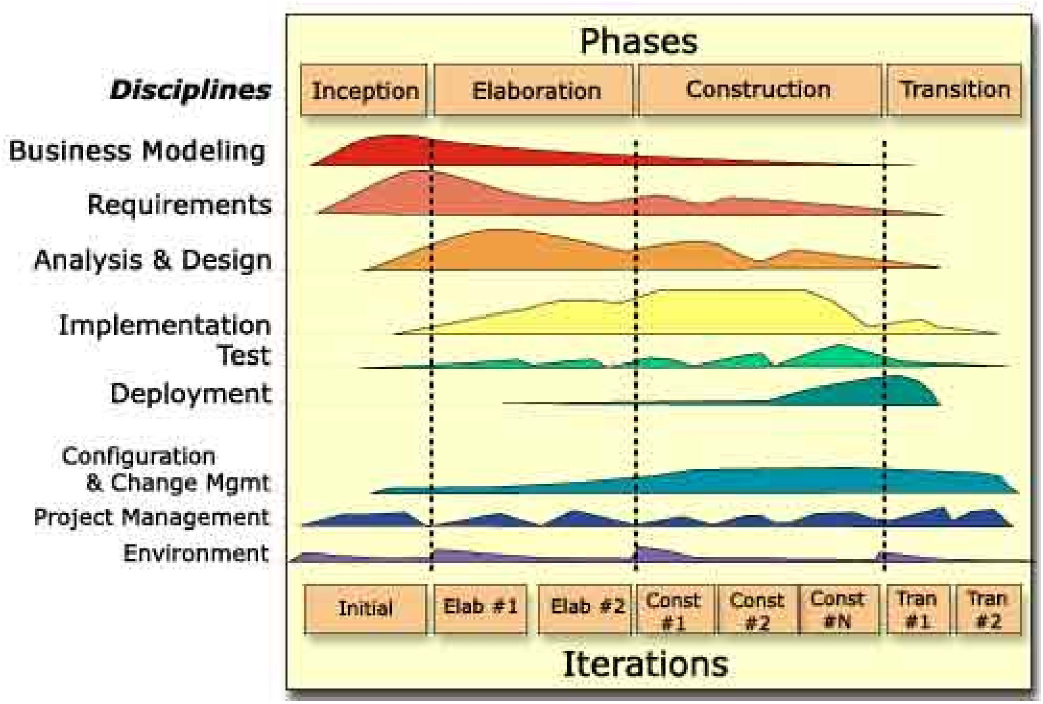


Rational Unified Process (RUP)

- Rational Unified Process is a
  - ➔ unified software development process
- Developed by IBM encompassing **Information Systems** development best practices.

RUP

Hump chart



RUP

- An engineering process that provides a disciplined approach to assigning and managing tasks and responsibilities to developing software systems.

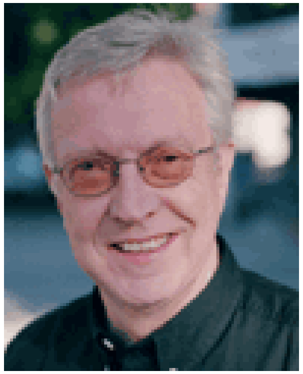
- An object-oriented systems development methodology.

- Uses UML for visual notation and provides guidelines in how to use the UML effectively.

UNIFIED
MODELING
LANGUAGE TM

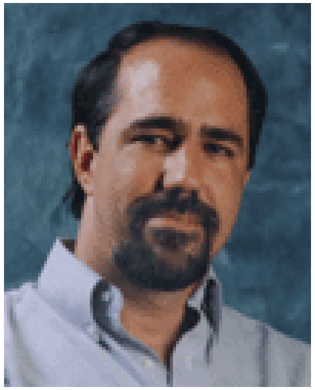
UML - Developer

Software Engineers best known for developing the UML.



Ivar Jacobson

James Rumbaugh



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RUP

- RUP is a method of managing Object-Oriented Software Development.
- It can be viewed as a **Software Development Framework** which is extensible and features:

→ Iterative and incremental development

→ Component based development

→ Requirements driven development

→ Configurability

→ Architecture centrism

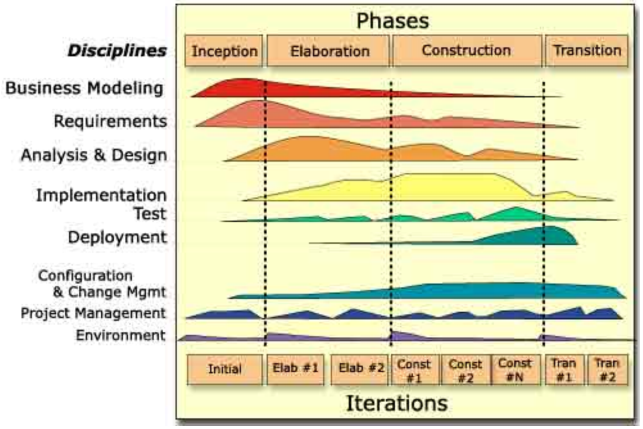
→ Visual modelling techniques

<< ***Progress is measured against clear milestones*** >>

RUP - Phases

RUP establishes 4 phases of development. Each phases is organized into a number of separate iterations.

- **Inception** – scope of the project
- **Elaboration** – requirements of product being built
- **Construction** – software is developed in this phase
- **Transition** – software is rolled out to customers



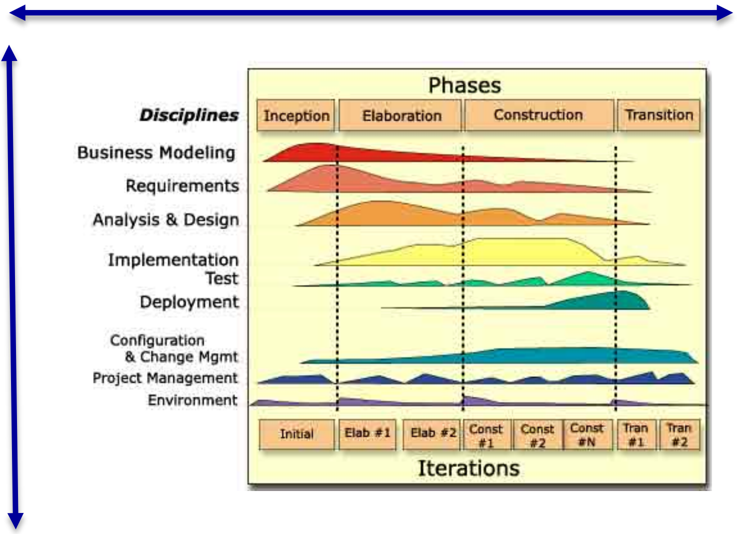
RUP - Project Structure

The RUP project structure is in **two dimensions**:

- The horizontal axis represents **time** and show the lifecycle aspects of the process as it unfolds.
- The vertical axis represents **disciplines**, which group activities logically by nature: how it is described in terms of activities, artifacts, workers and workflow.

Organisation along time

Organisation along content/disciplines



***** Core Process Workflows: Business modeling, Requirements, Analysis & Design, Implementation, Test, Deployment***

***** Core Supporting Workflows: Configuration & Chg Mgmt, Project Management, Environment***

RUP - An Iteration Development Process

- Recognizes the reality of changing requirements.

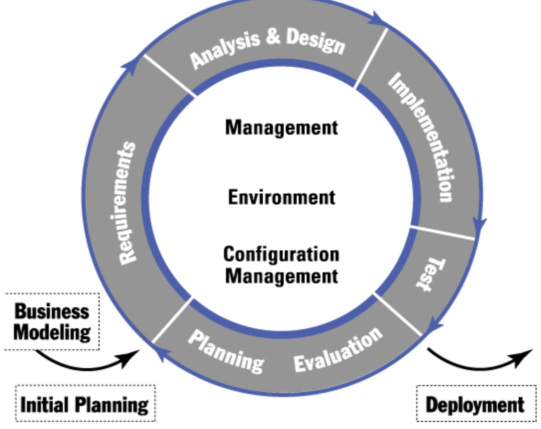
- Promotes early risk mitigation, by breaking down the system into mini projects and focusing on the riskier elements first.

- Allows you to "*plan a little, design a little and code a little*".

- Encourages all participants, including testers, technical developers to be involved at the early stage.

- Allows the process itself to modulate with each iteration, allowing you to correct errors sooner and put into practice lessons learned in the prior iteration.

- Focuses on components architecture.



Business Modeling

Business modelling (BM) is the analysis and documentation of the enterprise structure, which is the plan implemented by a company to generate revenue and make a profit from operations. It involves:

Assess business status

Describe current business

Identify business processes

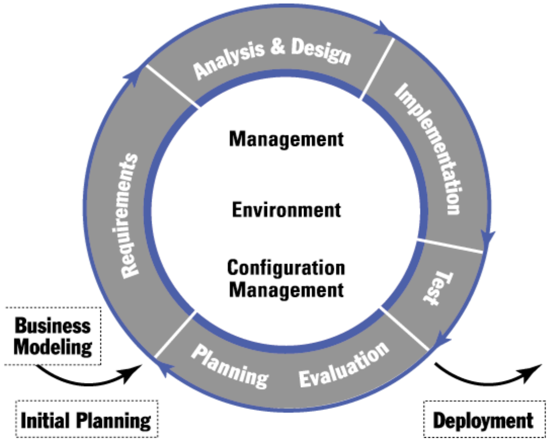
Refine business process definitions

Design business process realisation

Refine roles and responsibilities

Explore process automation

Develop a domain model



Inception Phase *(Requirements)*

This involves the establishment of the business case for the system to be developed which include the following:

Analyse the problem

Understand stakeholders needs

Define the system

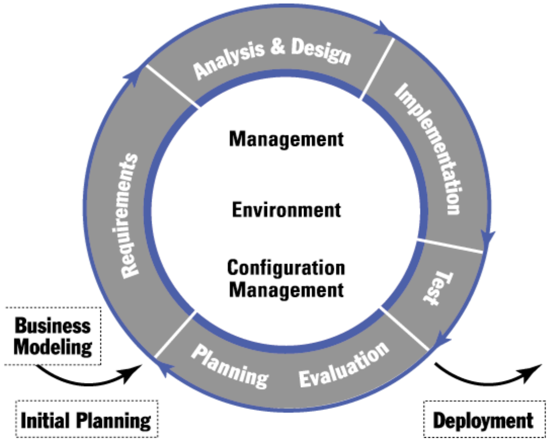
Manage the scope of the system

Refine the system definition

Manage changing requirements

Outcome:

- *A vision document*
- *An initial use case model (10 - 20% complete)*
- *An initial business case*
- *An initial risk assessment*
- *A project plan*
- *One or more prototypes*



*** A use case is a formal way of representing how a business system interacts with its environment to achieve a set goal. ***

Elaboration Phase *(Analysis and Design)*

The purpose of the elaboration phase is to analyze the problem domain further. This involves:

Define candidate architecture

Perform architecture synthesis

Refine the architecture

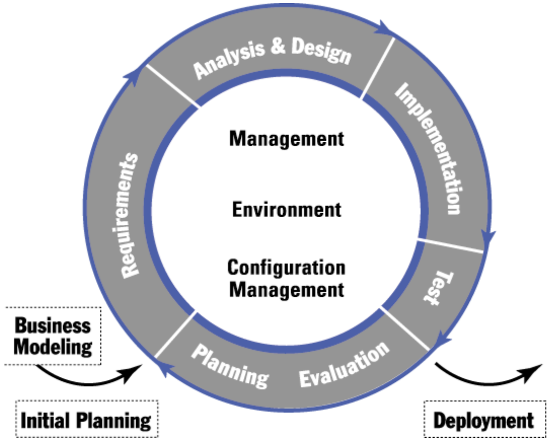
Analyse behaviour

Design components

Design the database

Outcome:

- ***A use case model (at least 80% complete)***
- ***Supplementary requirements***
- ***A software architecture description***
- ***A executable architectural prototype***
- ***A revised risk list and a revised business case***
- ***A development plan for the overall project***



Construction Phase *(Implementation)*

During this phase, all remaining components are developed and integrated into the product and all features are thoroughly tested. This involves:

Structure the impl. model

Plan the integration

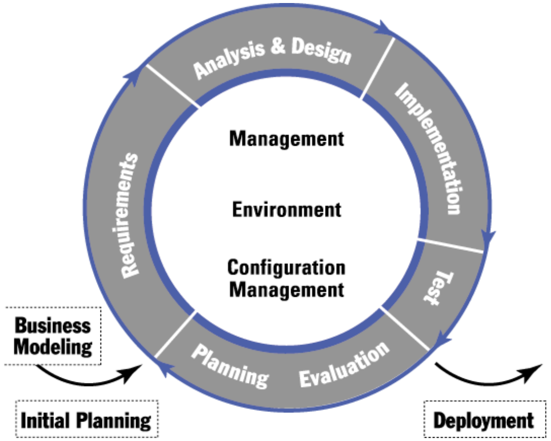
Implement components

Integrate each sub-system

Integrate the system

Outcome:

- ***The software product integrated on adequate platforms.***
- ***The user manuals.***
- ***A description of current release.***



Test

This testing and evaluation for the construction phase involves:

Define evaluation mission

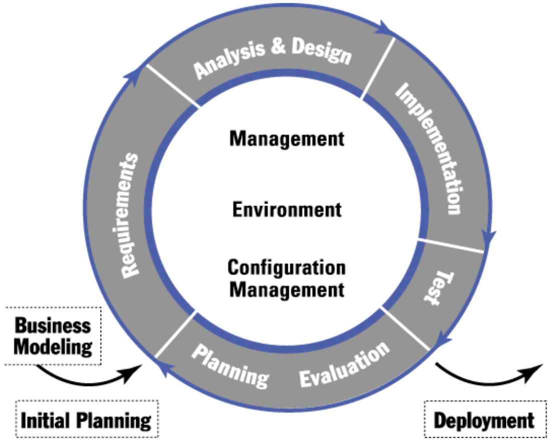
Verify test approach

Validate build stability

Test and evaluate

Achieve acceptable mission

Improve test assets



Configuration and Change Management (CM)

This configuration and change management involves:

Plan Project Configuration & Change Control

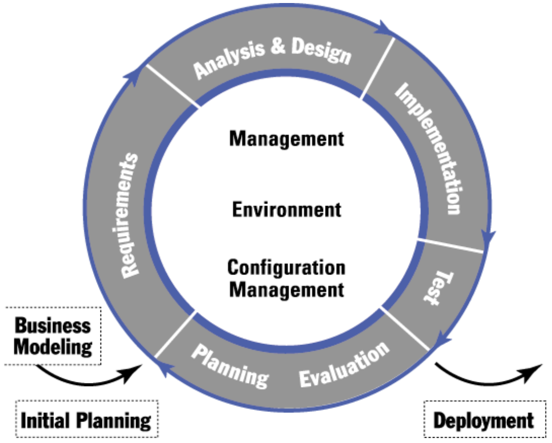
Create Project Change Management Environments

Change and deliver configuration items

Manage baselines and releases

Monitor and report configuration status

Manage change requests



Transition Phase *(Deployment)*

The purpose of the transition phase is to transition the software product to the user community. It involves:

Plan deployment

Develop support material

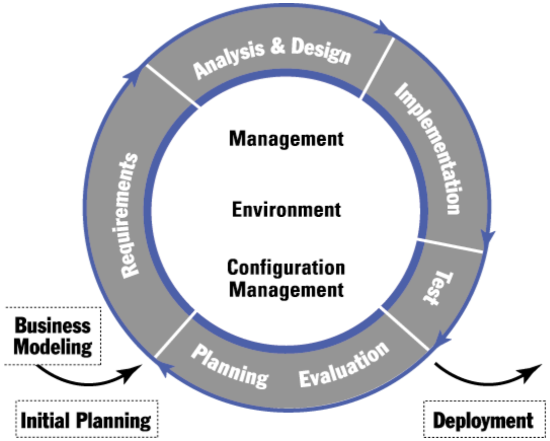
Manage acceptance test

Product Unit

Package Product

Provide access to download site

Beta test product



Project Management

Project management activities involves:

Conceive new project

Evaluate project scope and risk

Develop software development plan

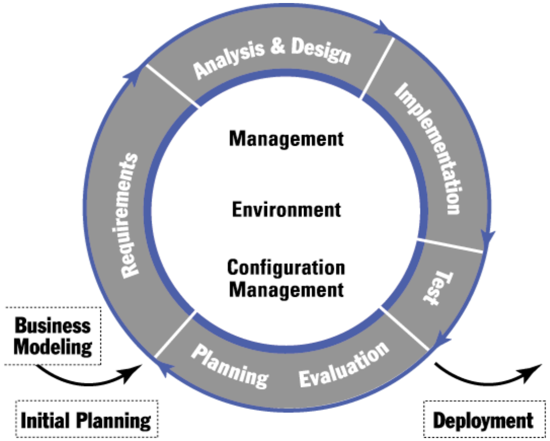
Monitor and control project

Plan for next iteration

Manage iteration

Close-out phase

Close-out project



Environment

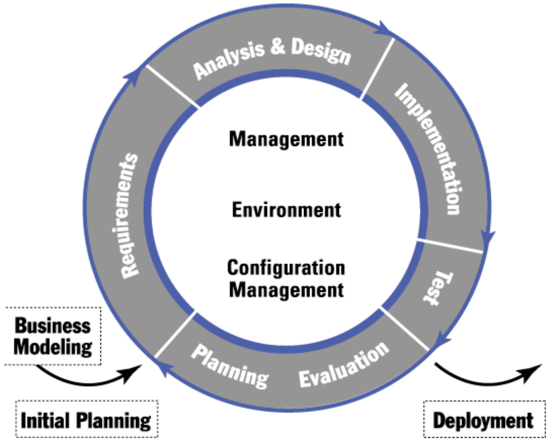
Project management activities involves:

Prepare environment for project

Prepare Environment for an iteration

Prepare guidelines for an iteration

Support environment during an iteration

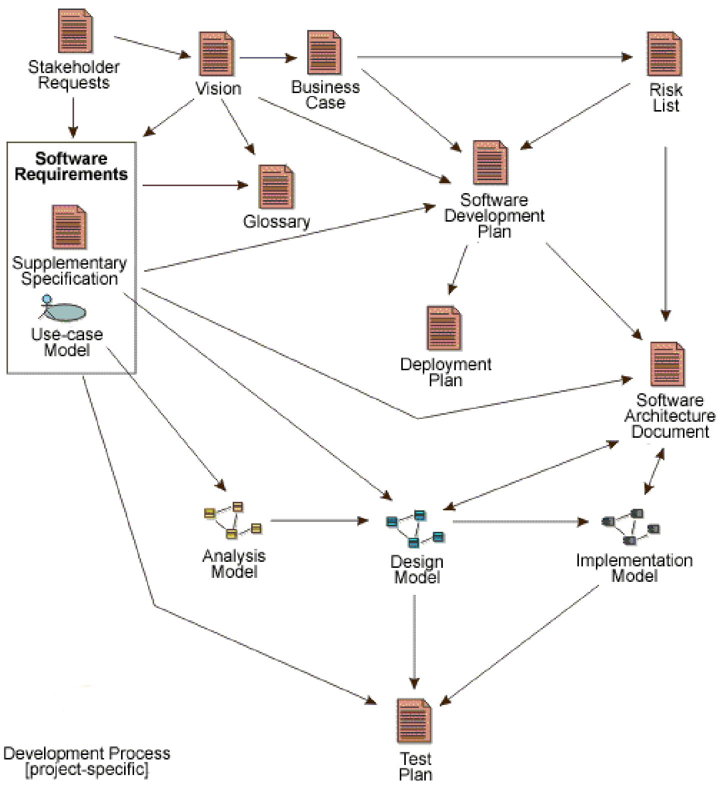


Major Artifacts of RUP

- *An artifacts is a piece of information that is produced, modified, or used by a process.*

- *Artifacts are used as **input** to perform an activity, and are the result or **output** of such activities.*

- *Artifacts may take various shapes or forms:*
  - ➔ ***Use Case model***
  - ➔ ***Design model***
  - ➔ ***Business case***
  - ➔ ***Source Code***
  - ➔ ***Executables***



Summary RUP

- *RUP is a method of managing OO Software Development Process*
- *Graphical UML*
- *RUP can be viewed as an iterative and incremental development process*

  (incl. iteration and milestones)

Object-oriented SDLC (OOSDLC) Methodologies

Approach

Focuses on improving, maintaining and reusability of software systems through a set of techniques, notations, tools and criteria.

Activities

Conceptualization
OO analysis and modeling
OO design
Implementation
Maintenance

Object-oriented SDLC (OOSDLC) Methodologies

Conceptualization

To establish the vision and core requirements of the software system to be developed.

Object-oriented analysis and modeling

To build models of the system's desired behavior, using notations such as the Unified Modeling Language (UML).

To capture the essential relevant aspects of the real world and to define the services to be provided and/or the problems to be solved.

To simplify reality to better understand the system to be developed.

Object-oriented SDLC (OOSDLC) Methodologies

Object-oriented design

To create an architecture for implementation,

Represents in terms of objects and classes and the relationship among them.

Implementation

To implement the design by using and object-oriented programming language (e.g. Java).

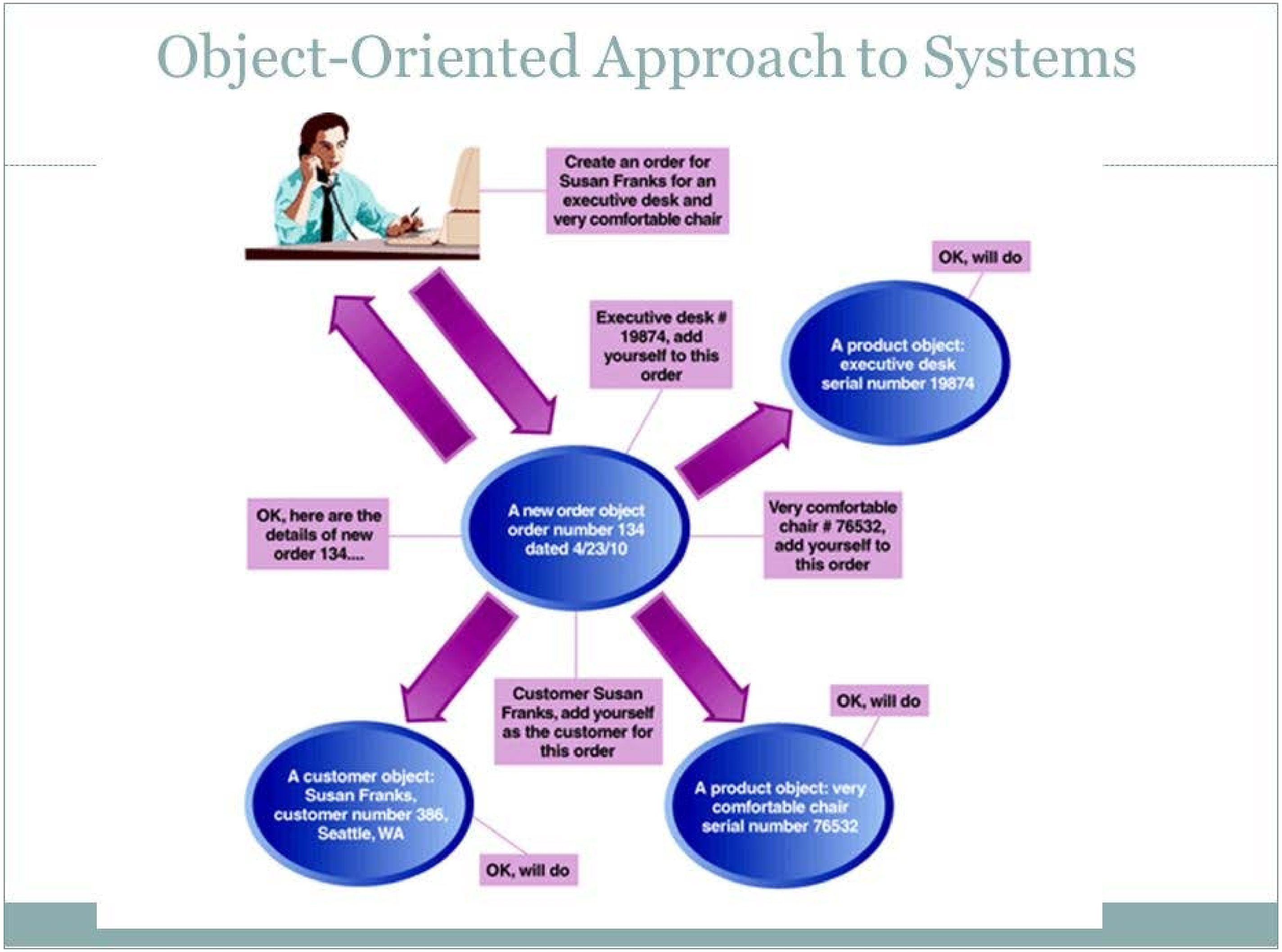
Maintenance

To manage post delivery evolution effectively.

Object-oriented SDLC (OOSDLC) Methodologies

- Completely different approach to Information Systems
- Views information system as collection of interacting **objects** that work together to accomplish tasks
- Objects – things in computer system that can respond to messages
- Conceptually, no processes, programs, data entities or files are defined – just objects

Example



Object-Oriented Approach to Systems

Create an order for Susan Franks for an executive desk and very comfortable chair

OK, here are the details of new order 134....

A new order object order number 134 dated 4/23/10

Executive desk # 19874, add yourself to this order

A product object: executive desk serial number 19874

OK, will do

Very comfortable chair # 76532, add yourself to this order

Customer Susan Franks, add yourself as the customer for this order

A customer object: Susan Franks, customer number 386, Seattle, WA

OK, will do

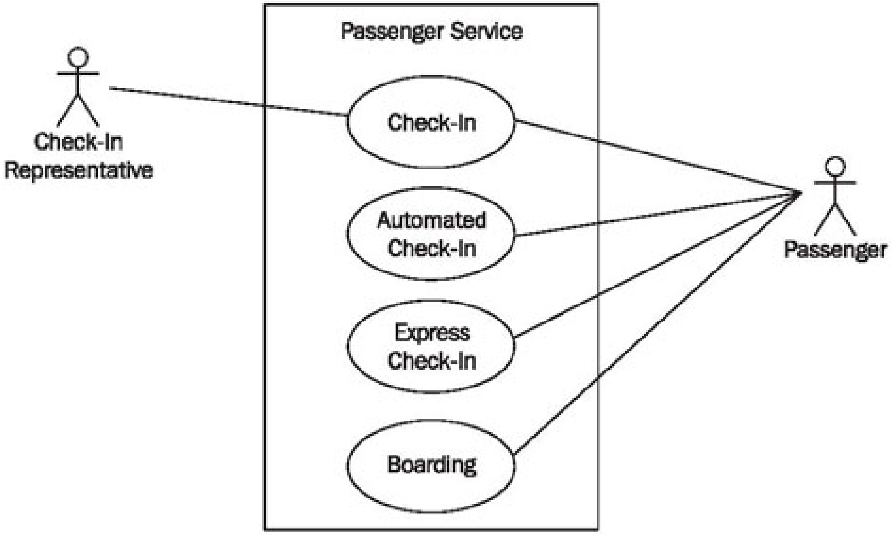
A product object: very comfortable chair serial number 76532

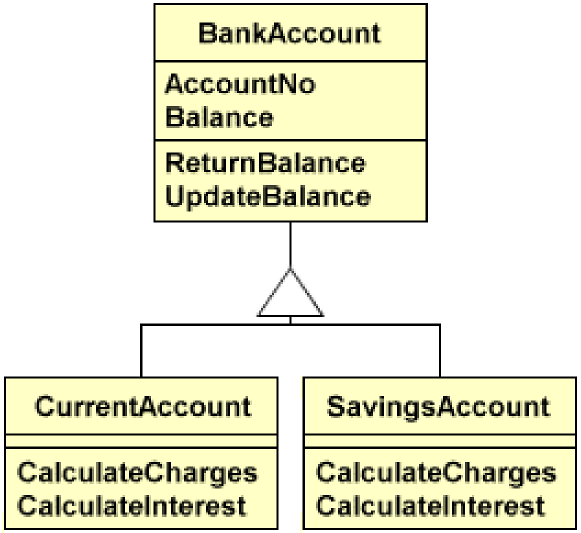
OK, will do

Object-Oriented Approach to Systems

- **Object-oriented analysis (OOA)**
  - → *Defines types of objects users deal with*
  - → *Shows use cases are required to complete tasks*
- **Object-oriented design (OOD)**
  - → *Defines object types needed to communicate with people and devices in system*
  - → *Refines each type of object for implementation with specific language of environment*
- **Object-oriented programming (OOP)**
  - → *Writing statements in programming language to define what each type of object does*

Examples: Use Case Diagram and Class Diagram





Computer Aided System Engineering (CASE) Tools

- CASE tools are software tools designed to help **Systems Analyst** to complete development tasks.

- The CASE tool contains a database of information called a repository.

- The repository stores information about the system, including models, descriptions and references that link the various model together.

- Information stored in repository can be used in a variety of ways by the development team.

Computer Aided System Engineering (CASE) Tools

- Every time a team member adds information about the system, it is immediately available for everyone else.

- CASE tools can check the models to make sure they are complete and follow the correct diagramming rules.

- CASE tools can check one model against another to make sure they are consistent.

CASE Tools - Examples

- Microsoft Visio
- Rational Rose
- **StarUML**

Note:

The above are drawing tools suitable for any system model comes with a collection of drawing templates (including symbols used in a variety of business and engineering applications: flowcharts, DFDs, ERDs, UML diagrams).

- Oracle Designer *(A tool set for recording definitions and automating the rapid constructions of flexible, graphical client-server applications)*
- C++, JAVA – OO Programming Languages

Next Week

UML