Architecture

Software Architecture and Software Architect

T-Systems RUS.
JavaSchool

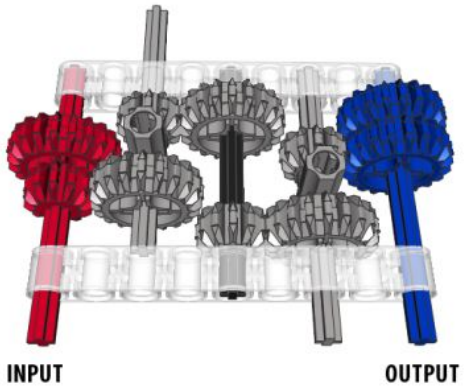
Saint-Petersburg,
July'15

Sergey N Lukin

Intro

Agenda

Content



Why we need Architects?

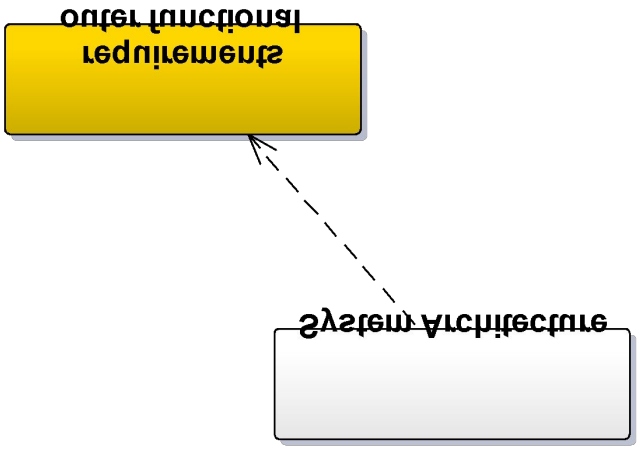
Why we need Architects? Short Answer.

I know Java and SQL, why I need Architect for our product?

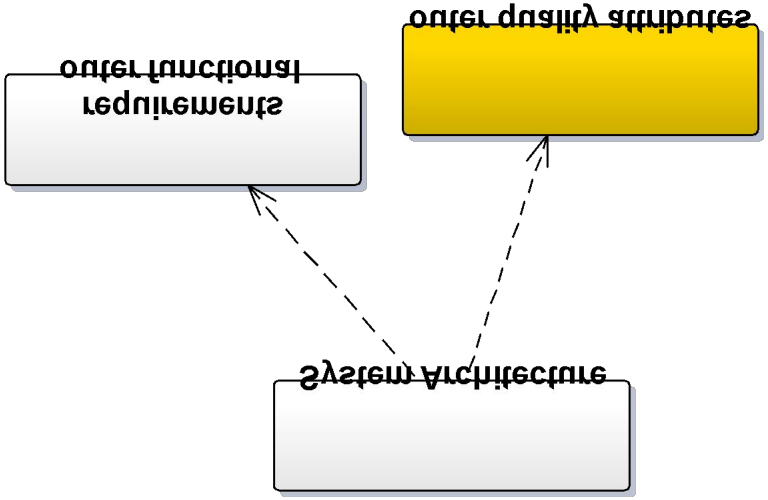
Because your product has **Architecture**

Different architectures

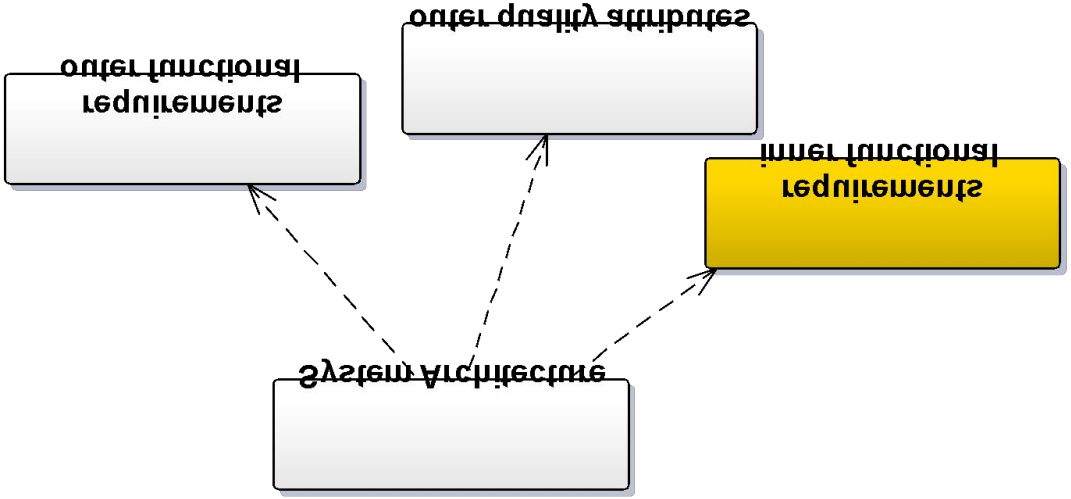
Outer Function requirements



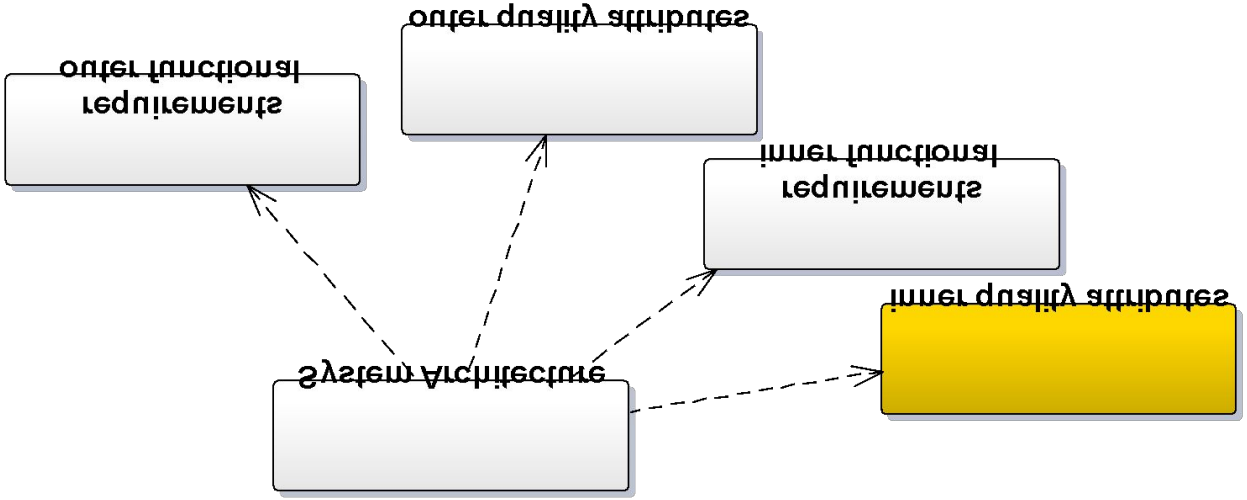
Outer quality attributes



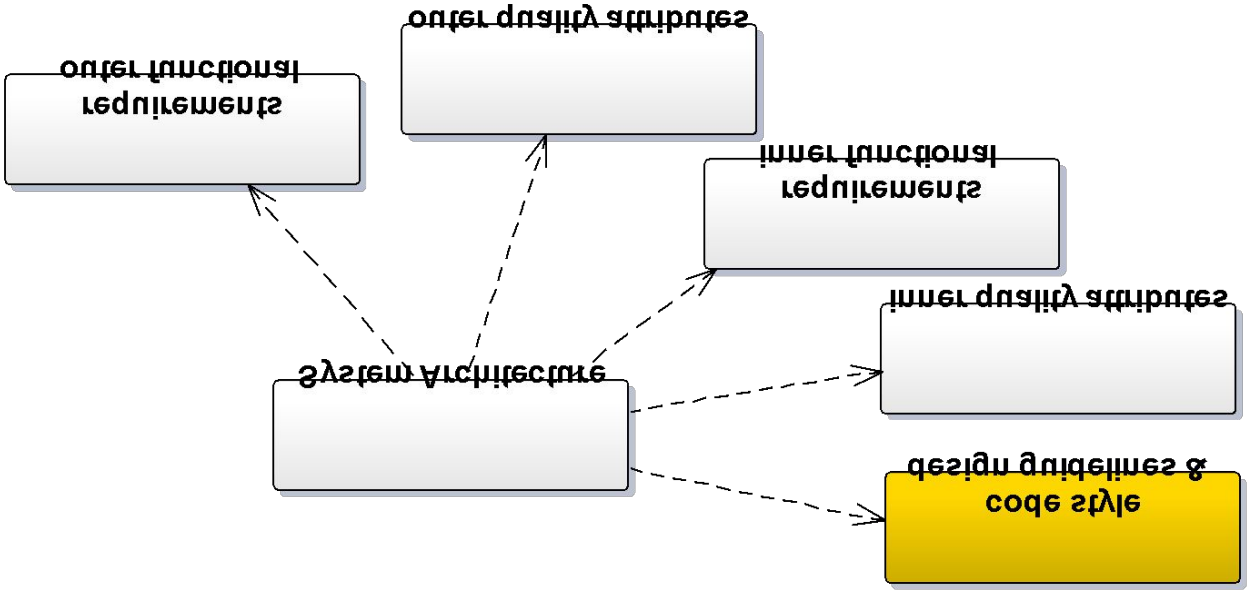
Our internal functional requirements



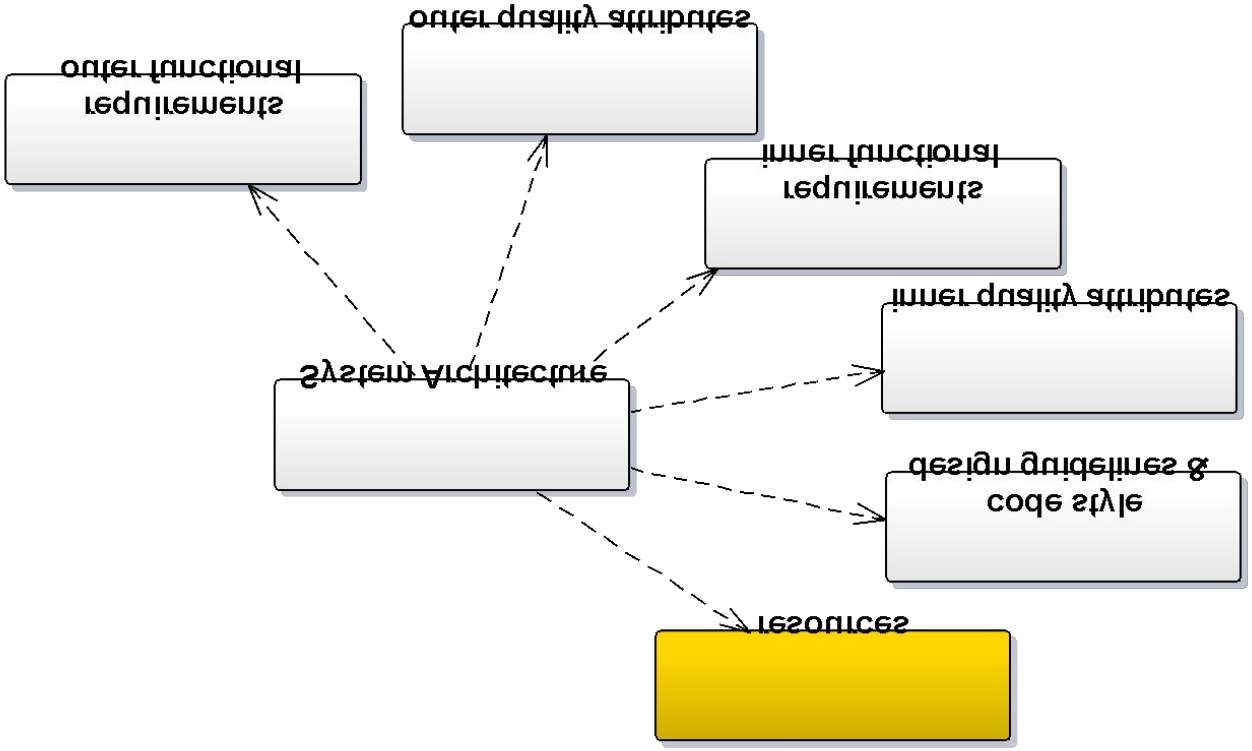
Our internal quality requirements



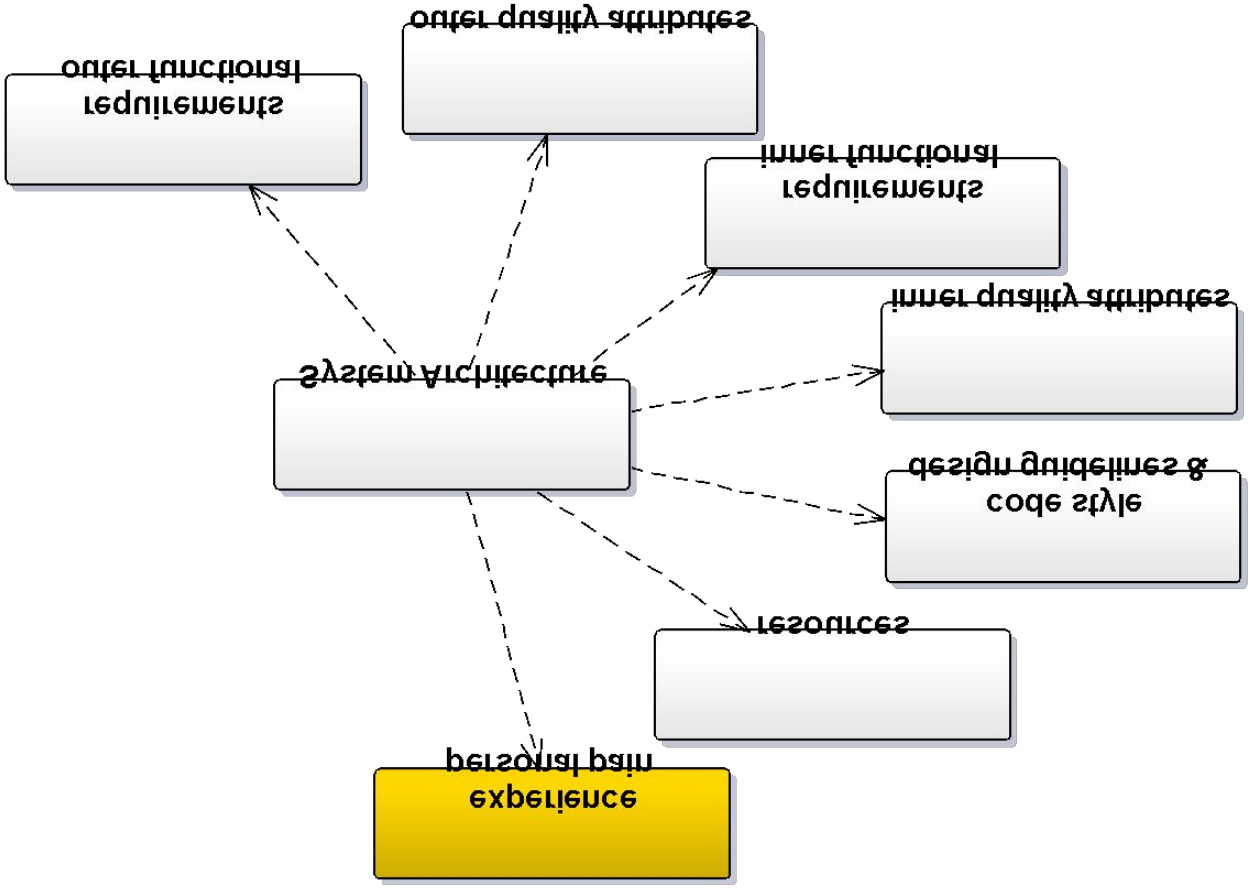
Design Guidlines



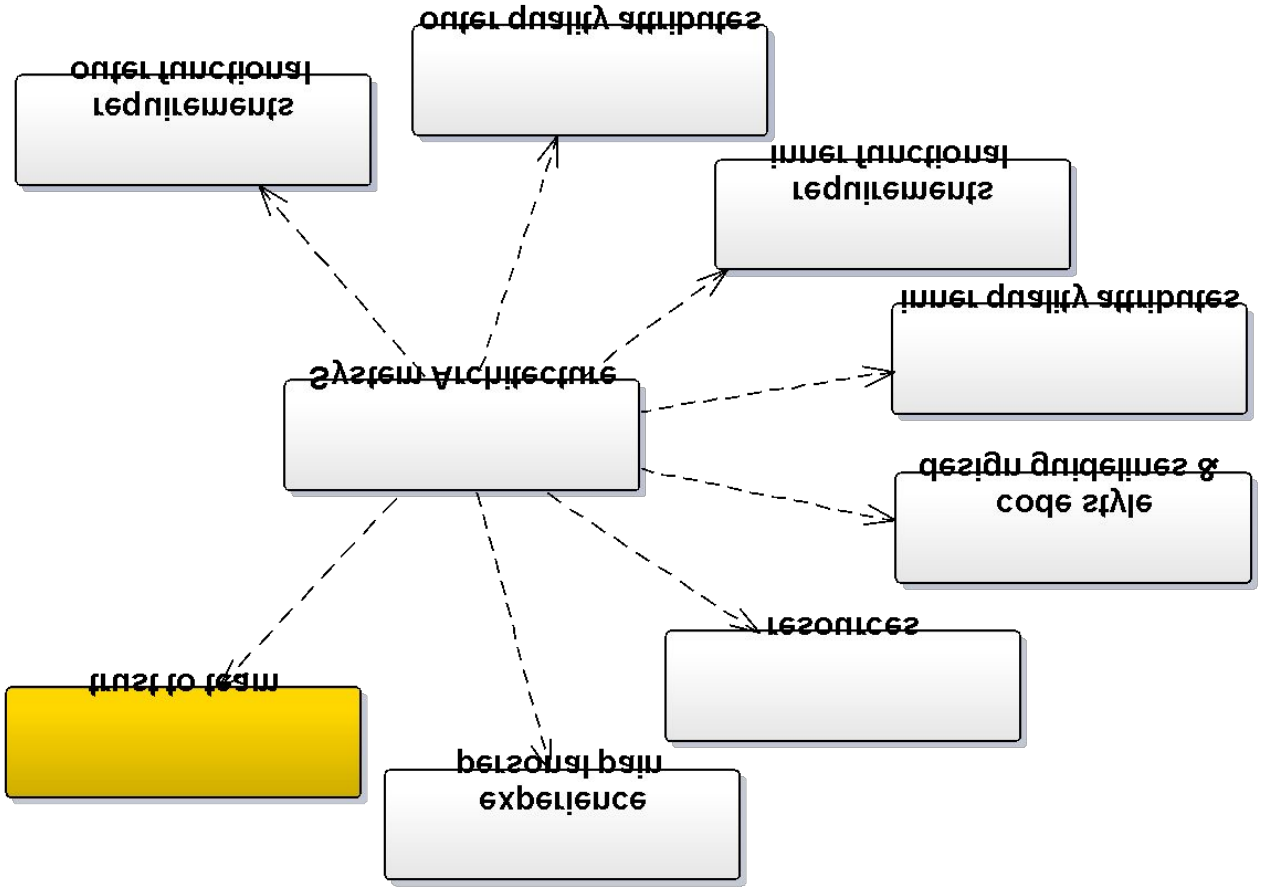
Resources


resources
code style
design guidelines &
System Architecture
inner quality attributes
requirements
inner functional
outer quality attributes
requirements
outer functional

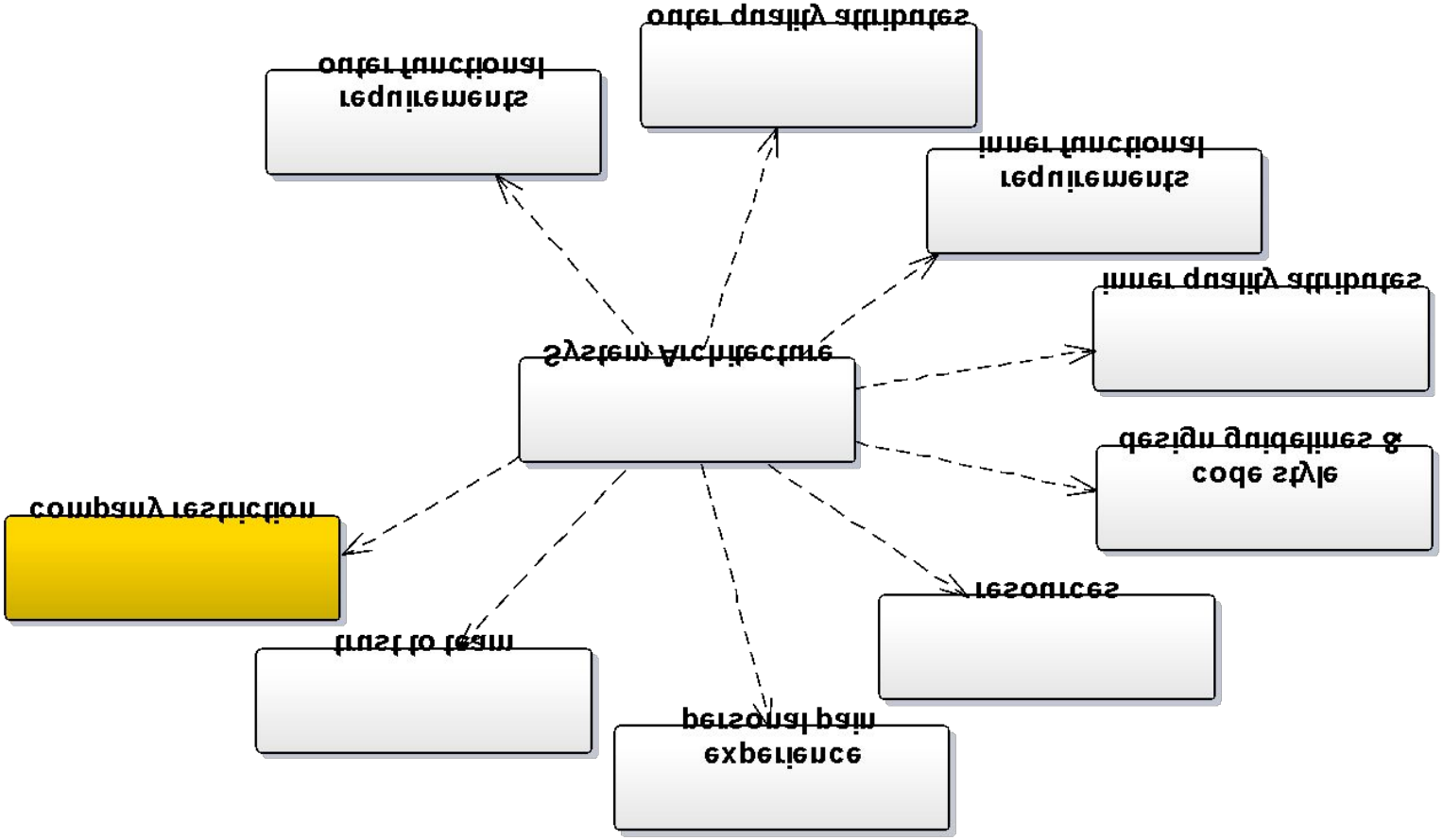
Personal pain experience



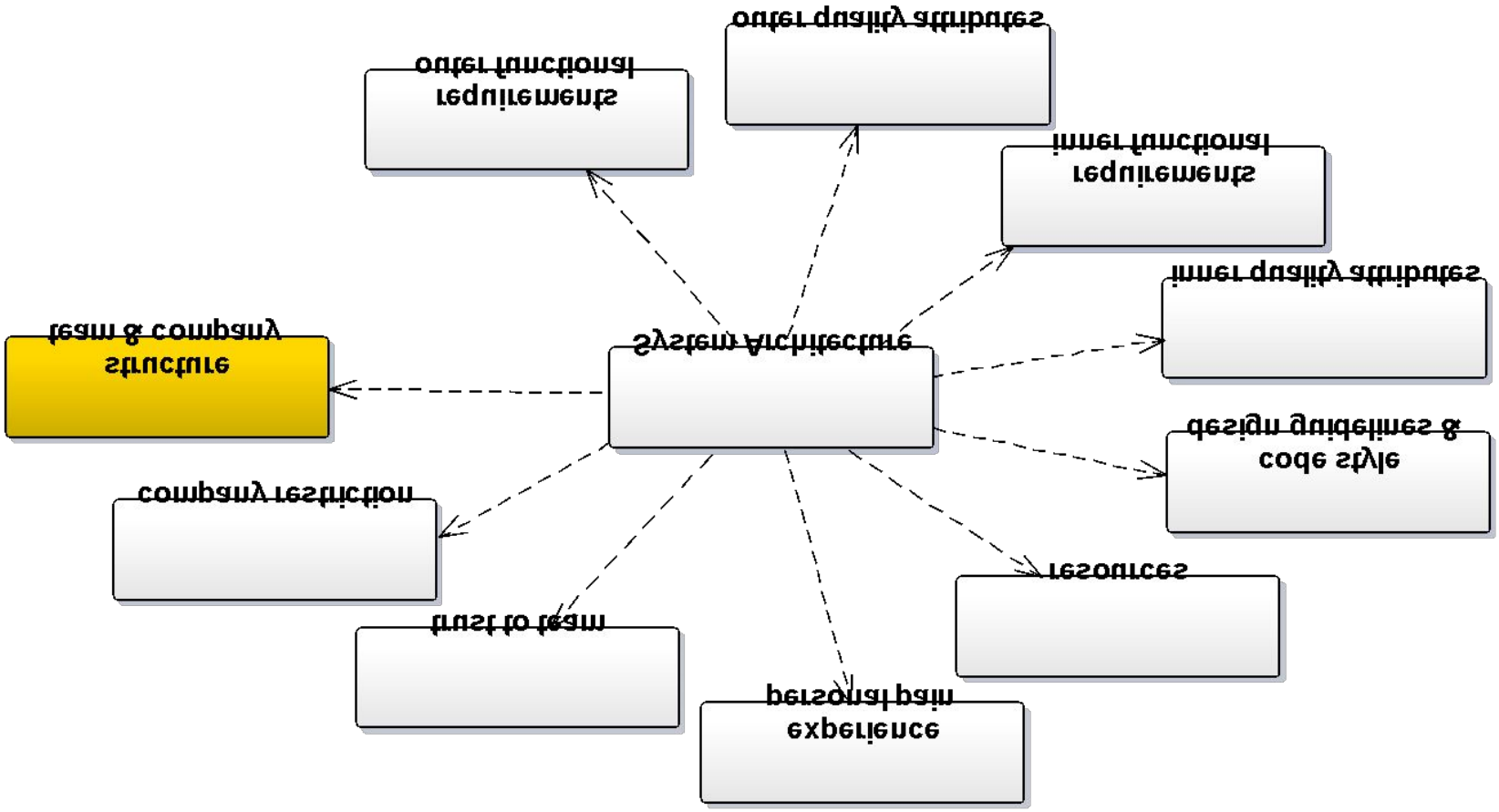
Development team



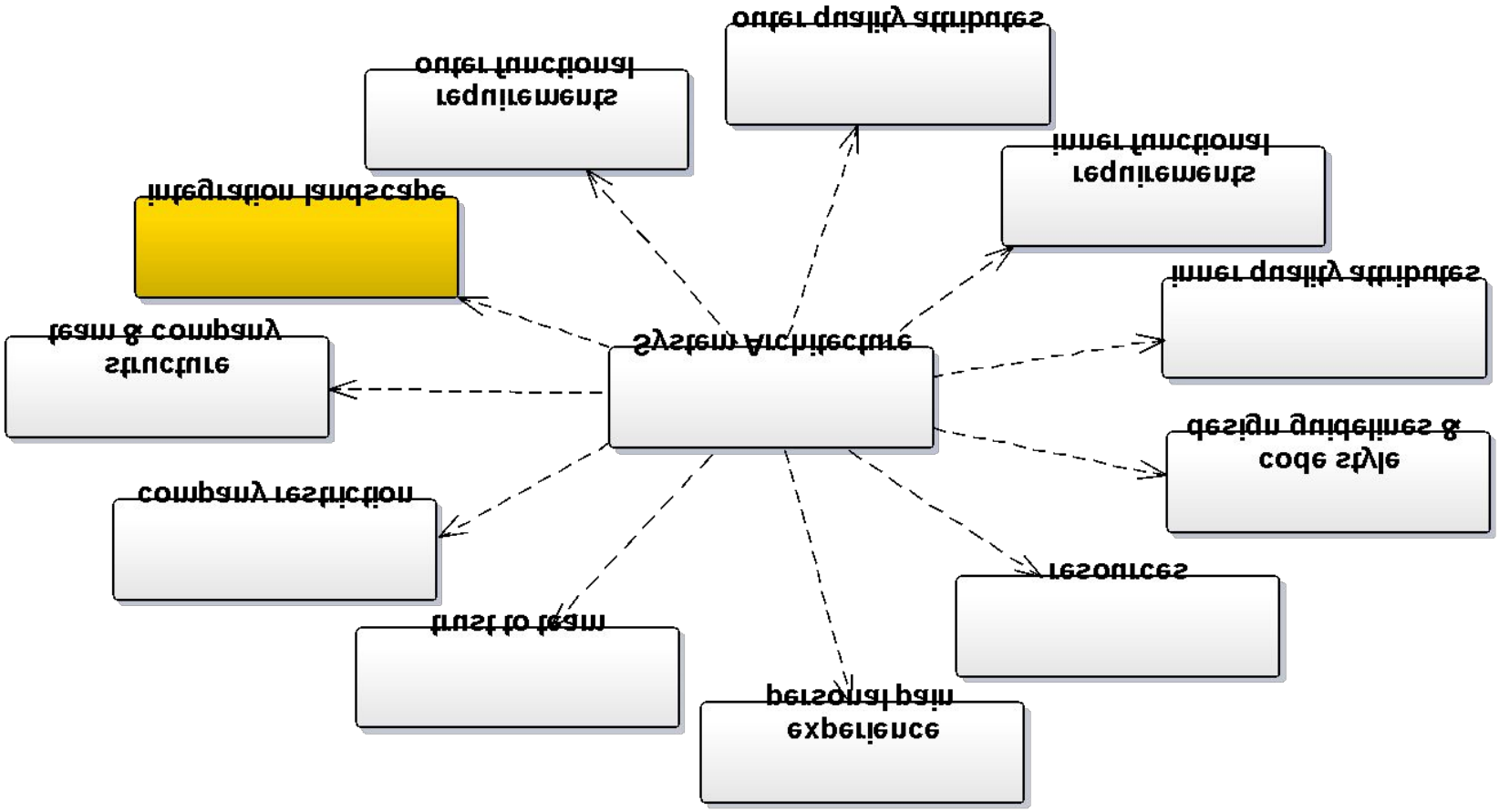
Company restriction



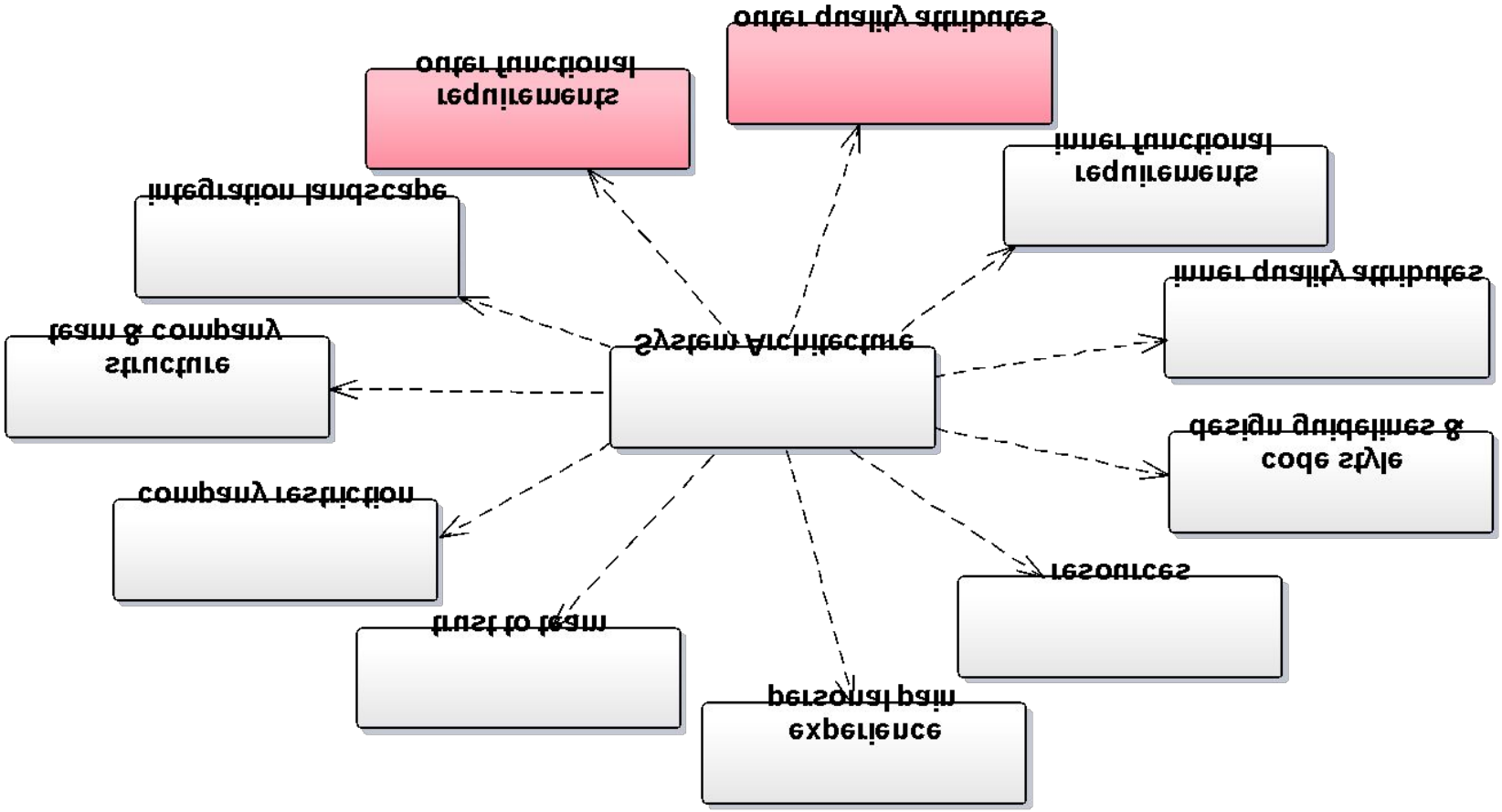
Architecture depends on



Architecture depends on



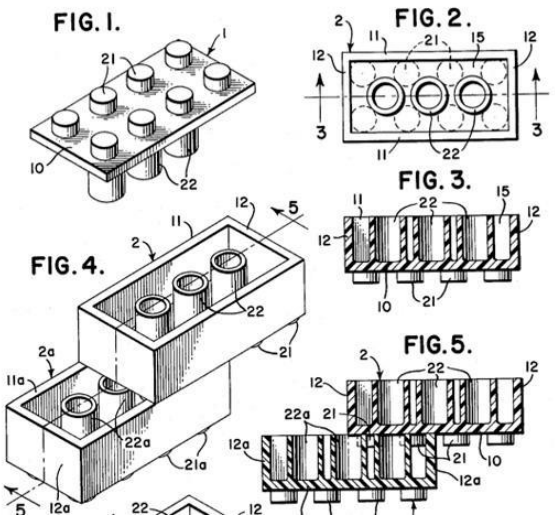
But outer requirement is more important



What means good architecture?

Quality attributes

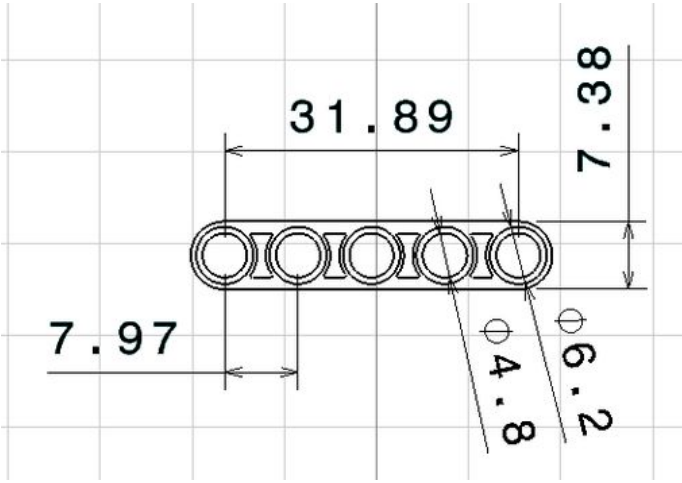
- Meet requirements
- Ready for change
- Ready for scaling and distribution
- Minimize cost
- Other NFR



ISO 9126 Software quality

Quality attributes

- Functionality
- Reliability
- Usability
- Efficiency
- Maintainability
- Portability



Key architecture principles and practice

Principles

- Separation of concerns.
- Single Responsibility principle.
- Principle of Least Knowledge.
- Don’t repeat yourself (DRY).

OSI Model			
	Data unit	Layer	Function
Host layers	Data	7. Application	Network process to application
		6. Presentation	Data representation, encryption and decryption, convert machine dependent data to machine independent data
		5. Session	Interhost communication, managing sessions between applications
	Segments	4. Transport	Reliable delivery of packets between points on a network.
Media layers	Packet/Datagram	3. Network	Addressing, routing and (not necessarily reliable) delivery of datagrams between points on a network.
	Bit/Frame	2. Data link	A reliable direct point-to-point data connection.
	Bit	1. Physical	A (not necessarily reliable) direct point-to-point data connection.

Key architecture principles and practices

Common design practices

- Prefer composition to inheritance
- Separate the areas of concern between layers
- Be explicit about how layers communicate with each other.
- Define a clear contract for components.
- Keep design patterns consistent within each layer
- Do not mix different types of components in the same logical layer.
- Keep the data format consistent within a layer or component
- A component /object should not rely on internal details of other components/objects.
- Do not overload the functionality of a component.
- Keep crosscutting code abstracted from the application business logic as far as possible
- Establish a coding style and naming convention for development.
- Maintain system quality using automated QA techniques during development.
- Consider the operation of your application

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Design example

Design Example: Simple Enterprise Search (SES)

Description:

SES is software of search information within an enterprise data.

Requirements (plain style):

Users from our company should be able to search across office document. Initially documents can be stored on external storages (ftp, corporative web server, windows shared folder). Also it should be possible to upload document directly to system. Only managers and dedicated persons should be able to search across finance documentation. All our user have browser Chrome on their PCs.

Trying to rewrite requirements

UR01. Users should be able to search accross documents.

UR02. Users can have different access right.

UR03. Document types: Word, XLS.

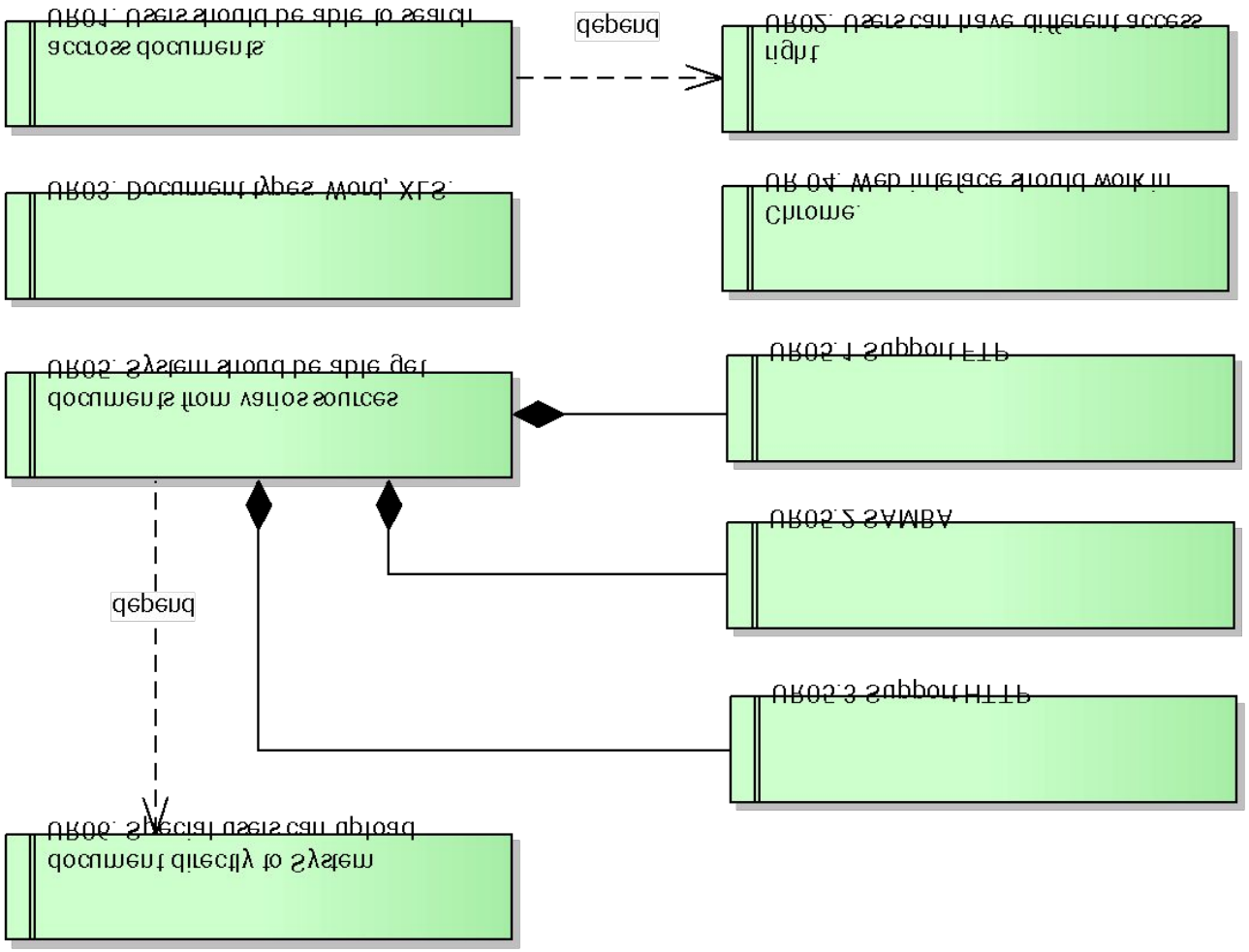
UR04. Web inteface should work in Chrome.

UR05. System should be able to get document via:

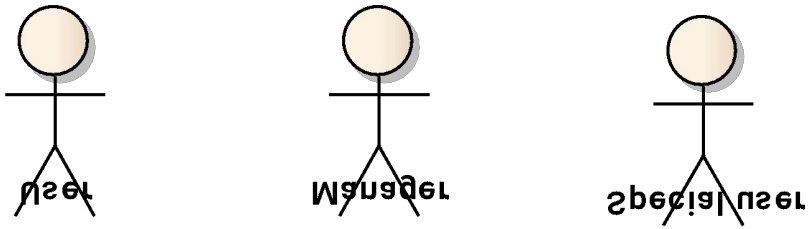
1. FTP
2. SAMBA
3. HTTP

UR 06. Special users can upload document directly to System

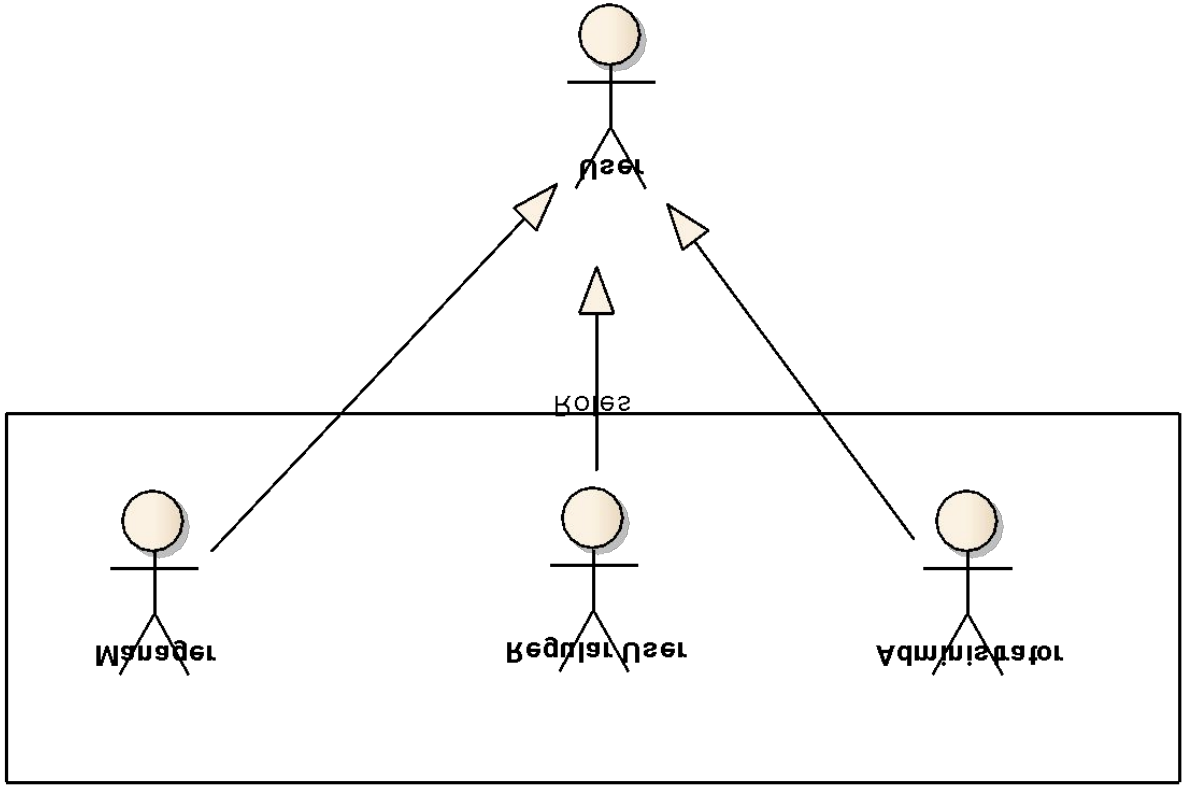
Trying to rewrite requirements



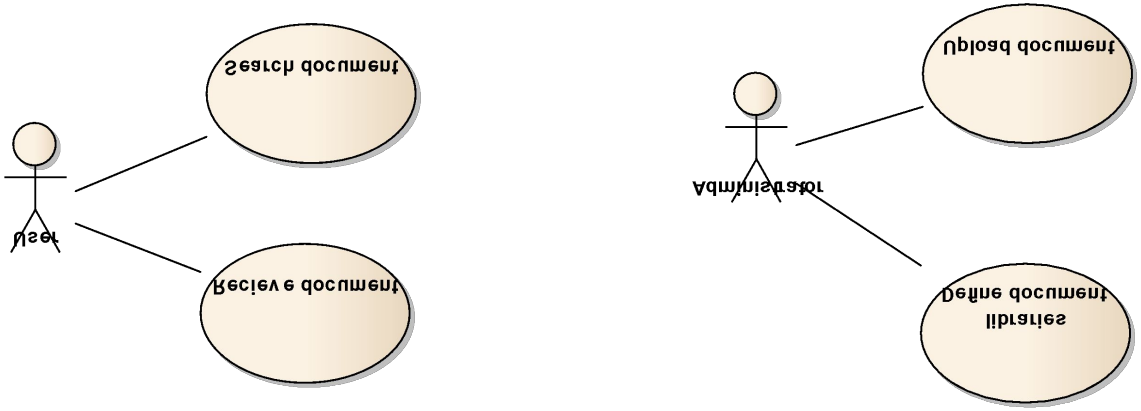
Looking for Actors



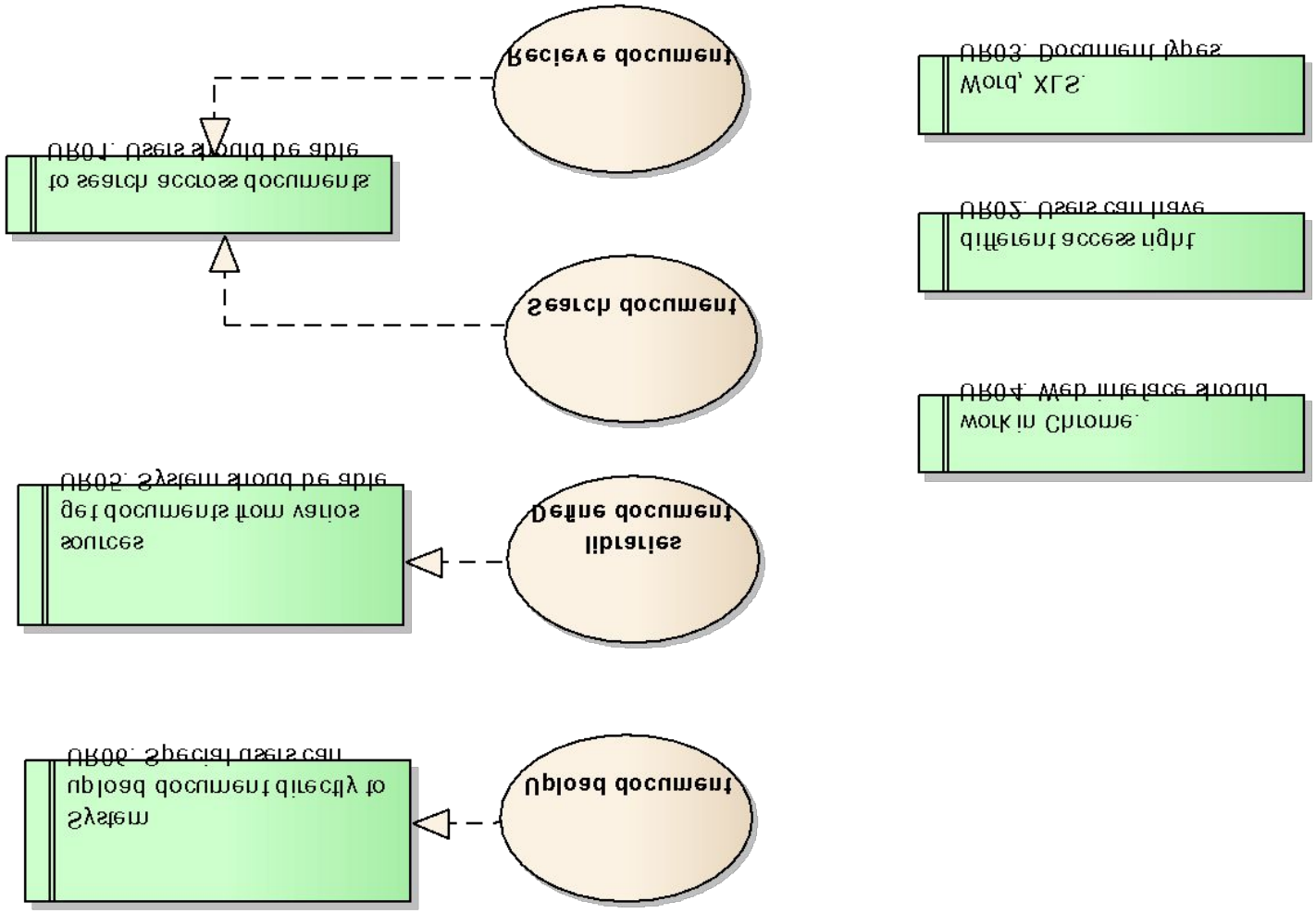
Actors generalization



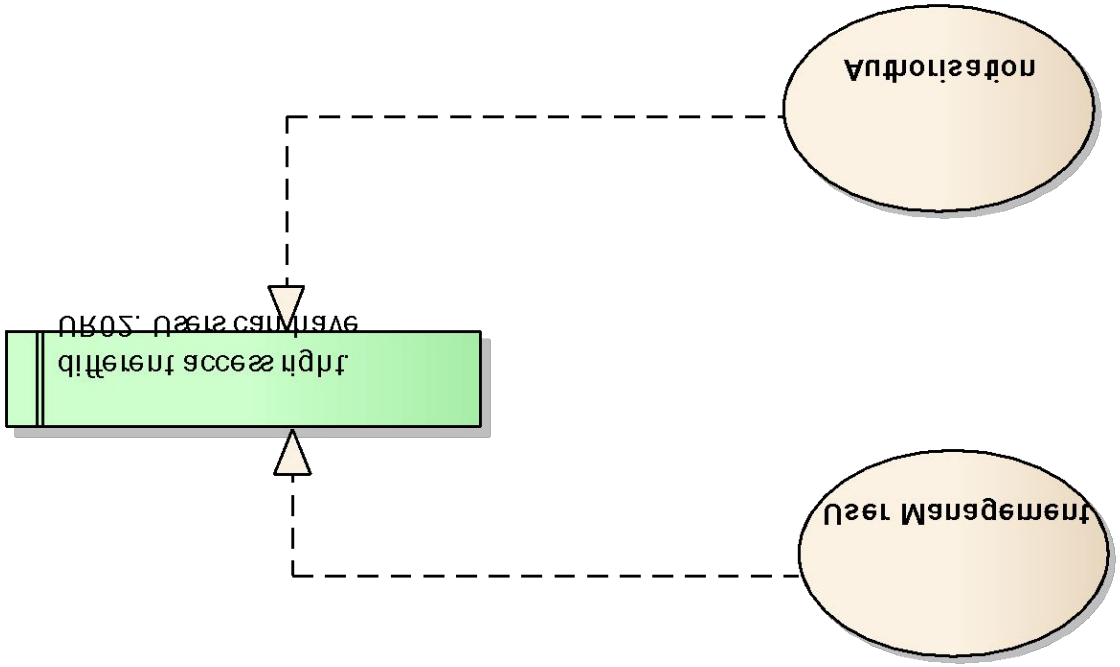
UseCase analyzes



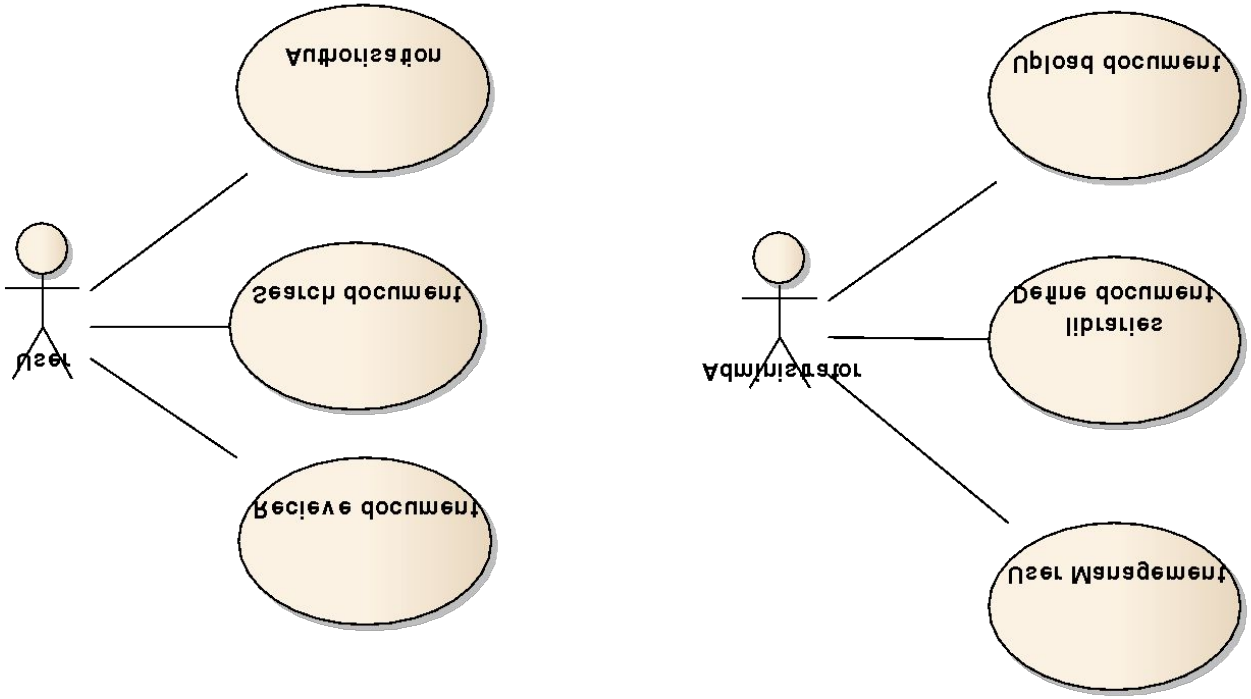
UseCase analyzes. Traceability



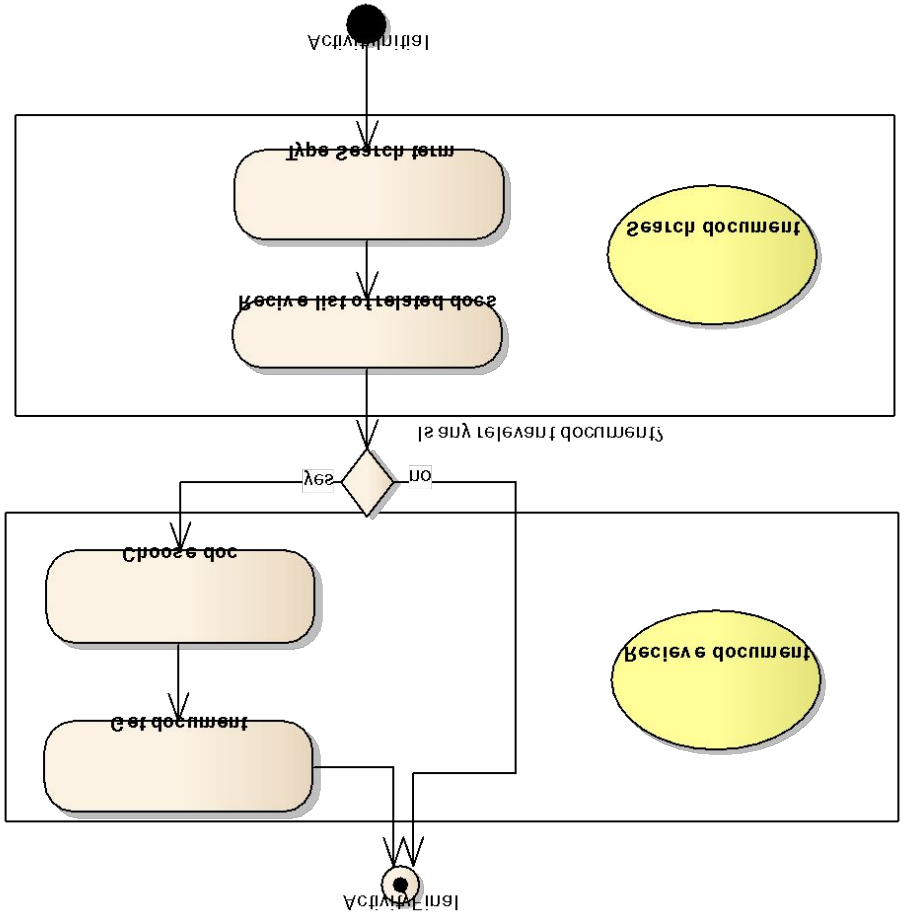
UseCase analyzes. Traceability



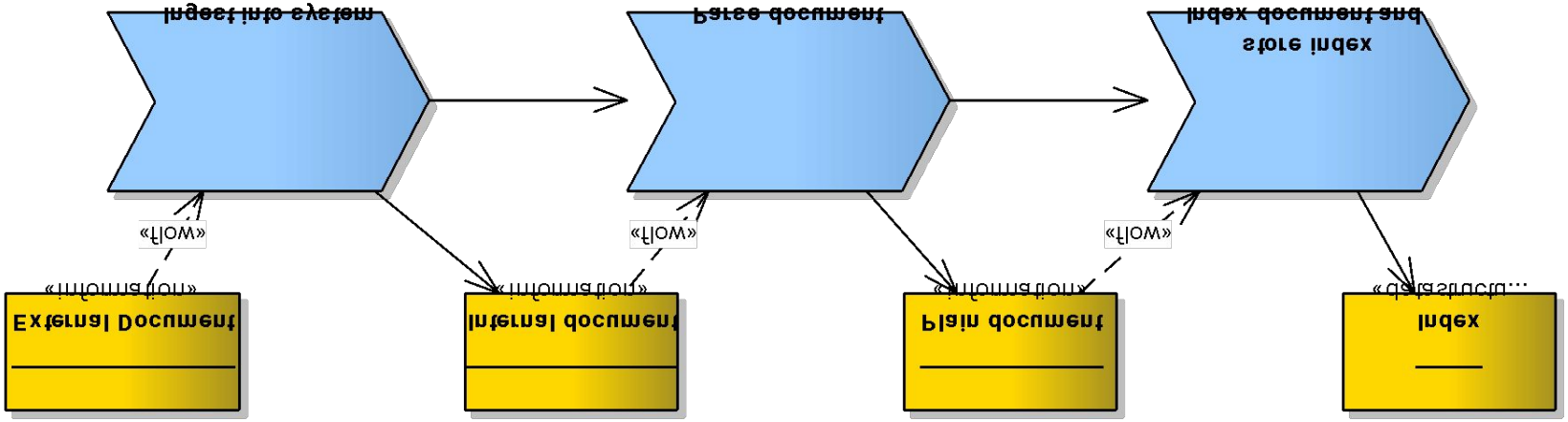
UseCase analyzes. Finally



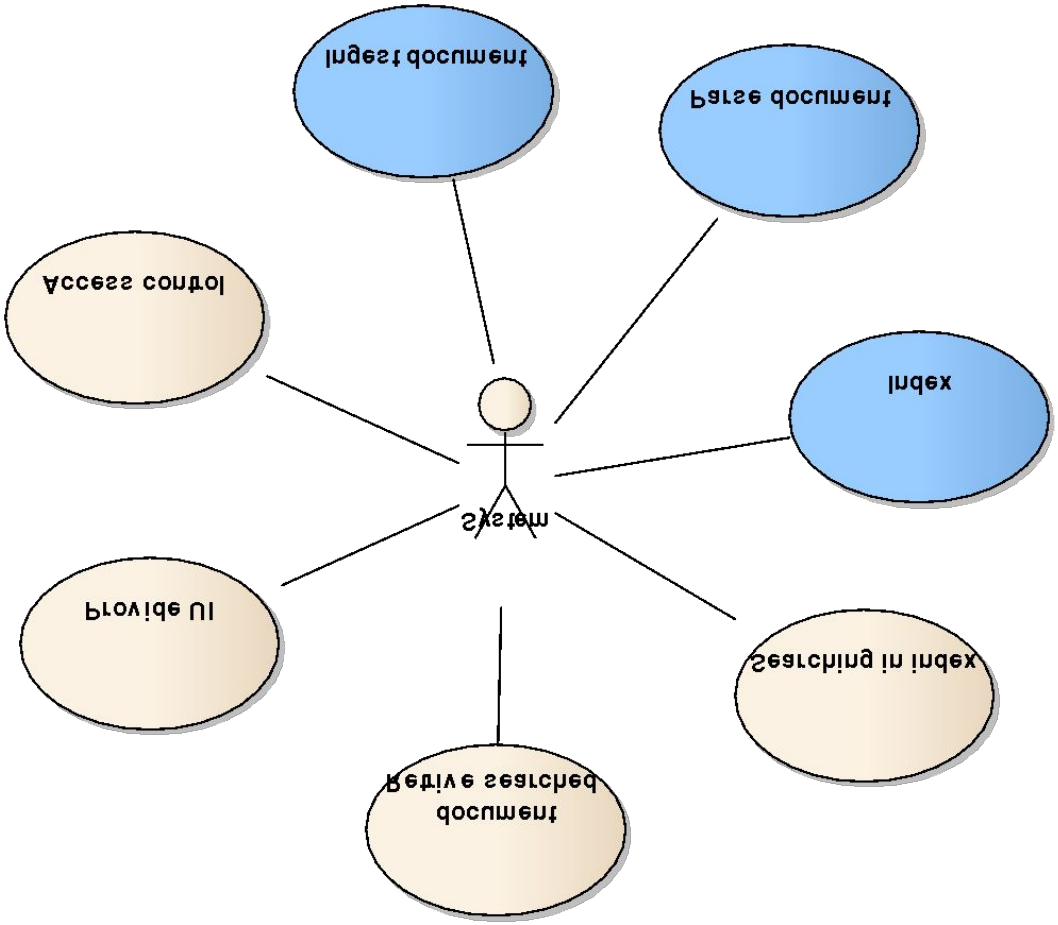
Activity


ActivityInitial
Receive document
Get document
Choose doc
ActivityFinal
yes
no
Is any relevant document?
Receive list of related docs
Type search term
Search document

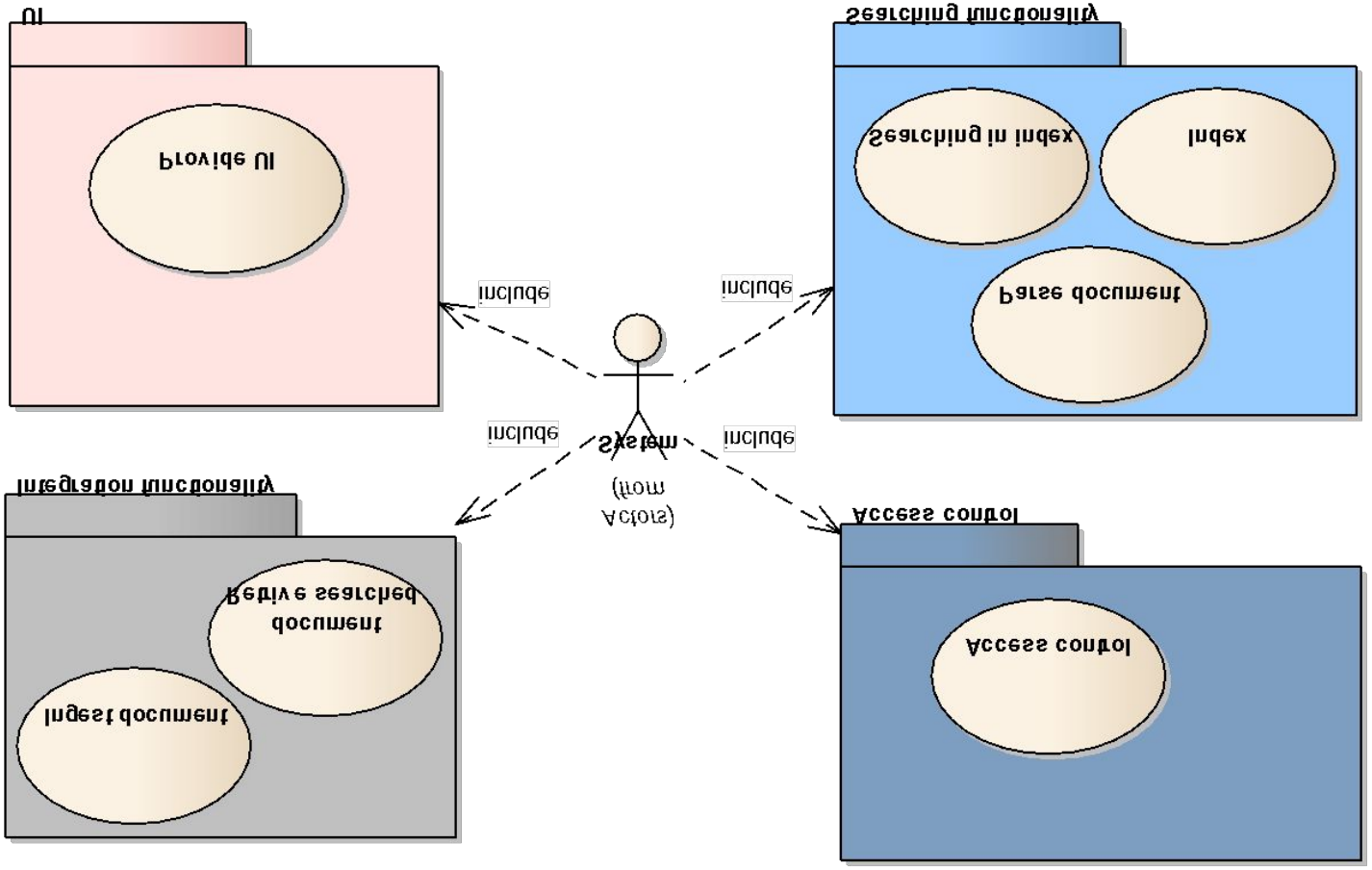
System analyses



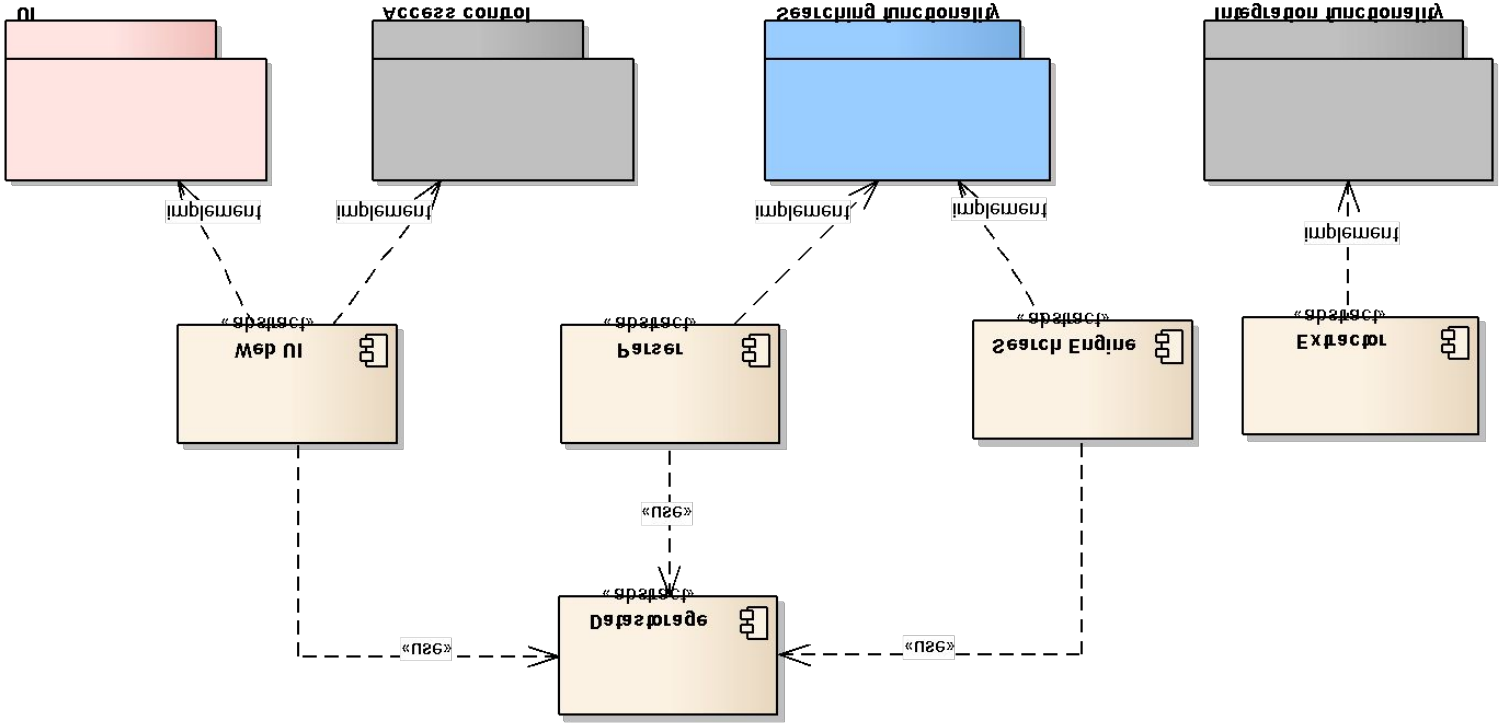
System UseCases



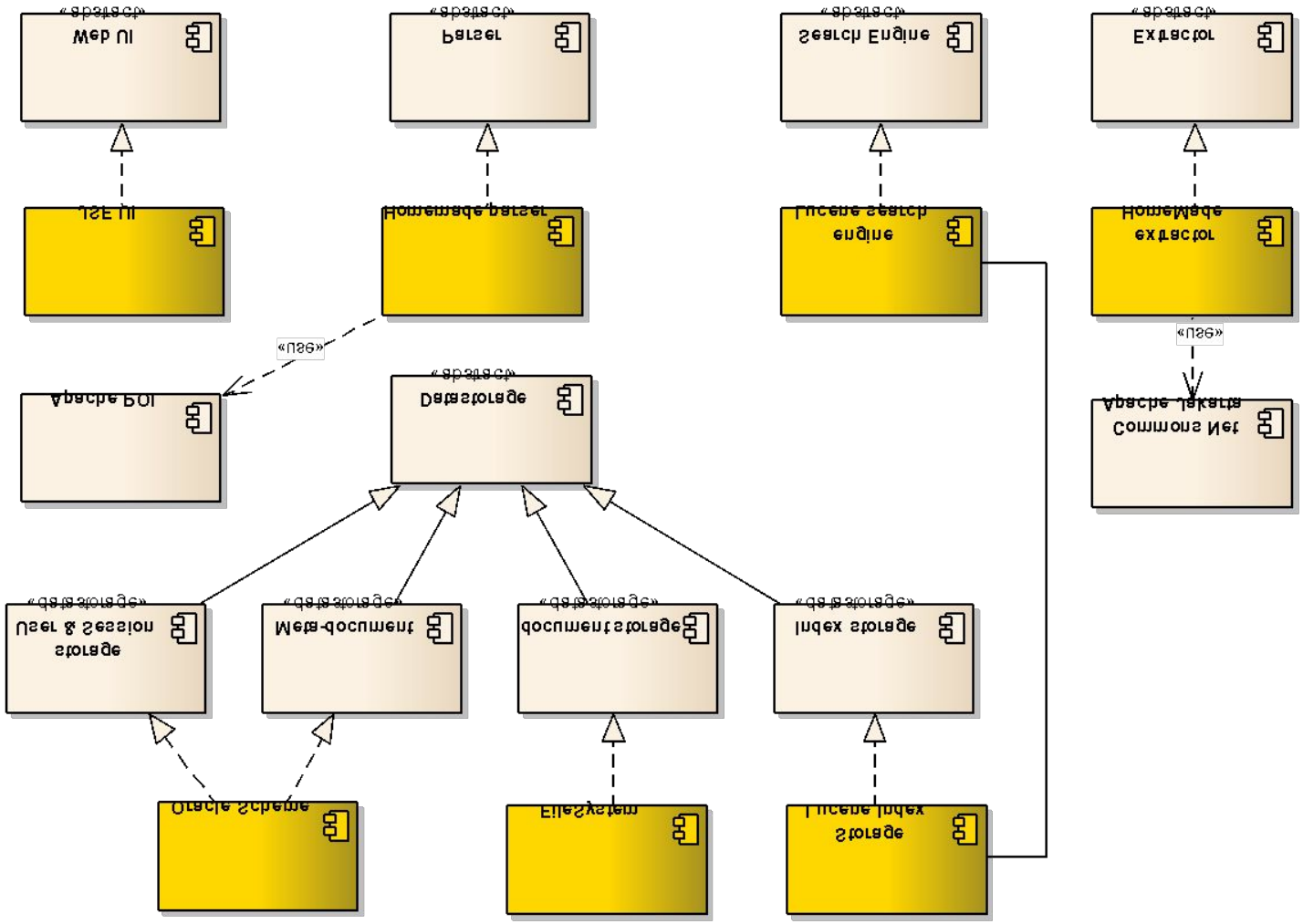
System Functional decomposition



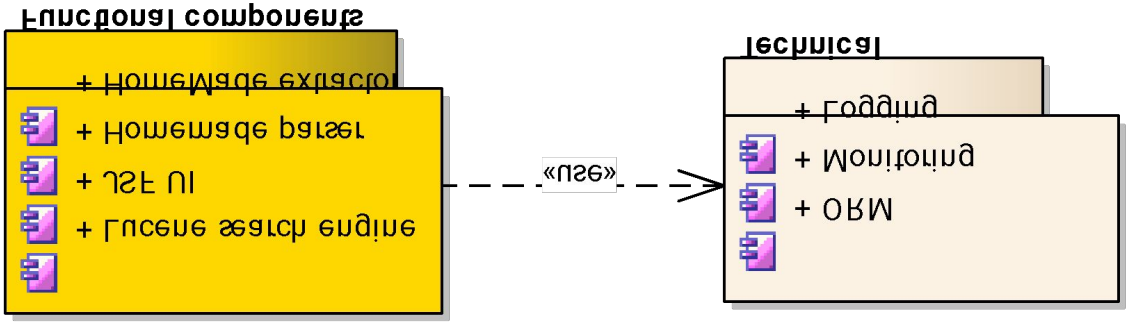
System Components: A-architecture



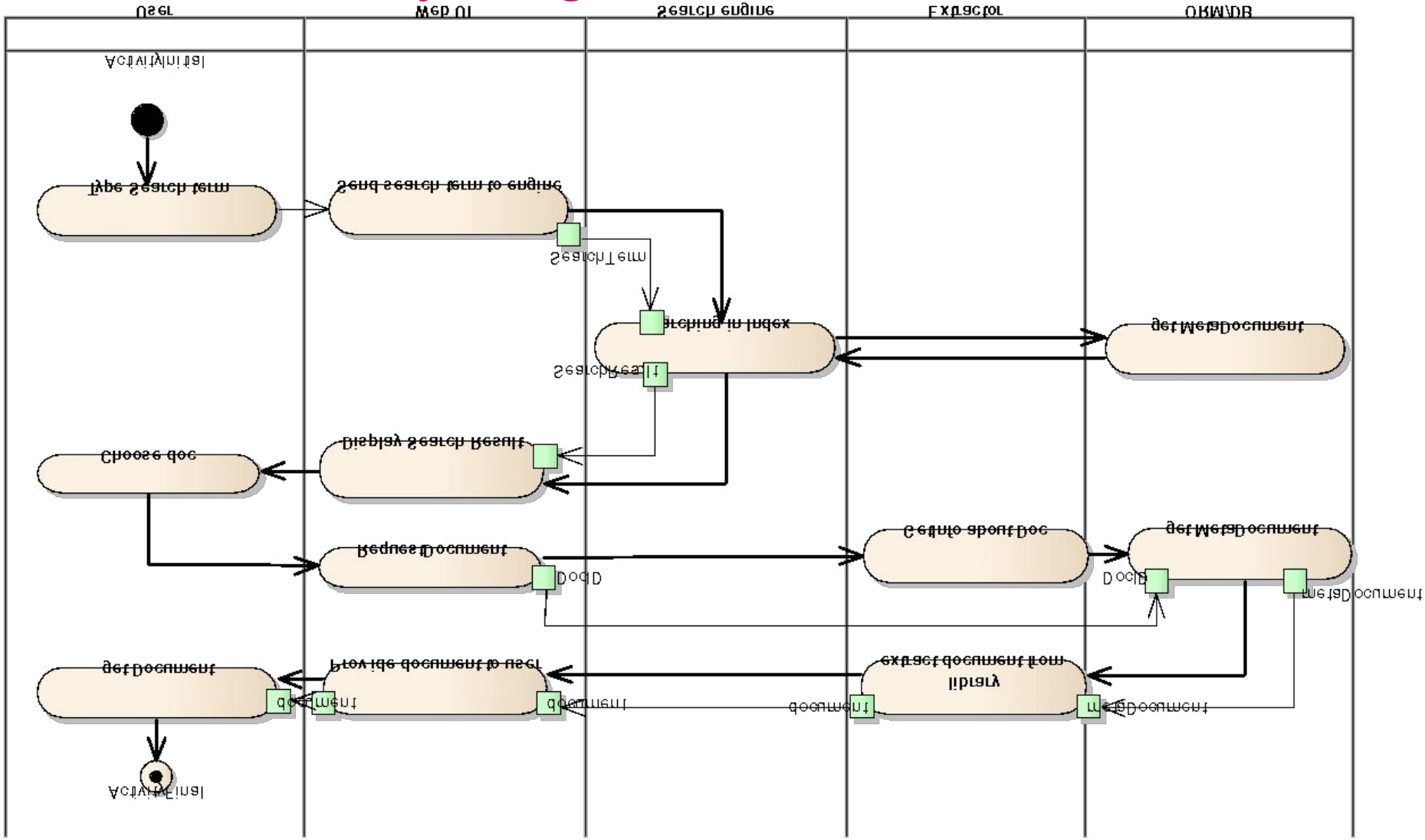
System Components



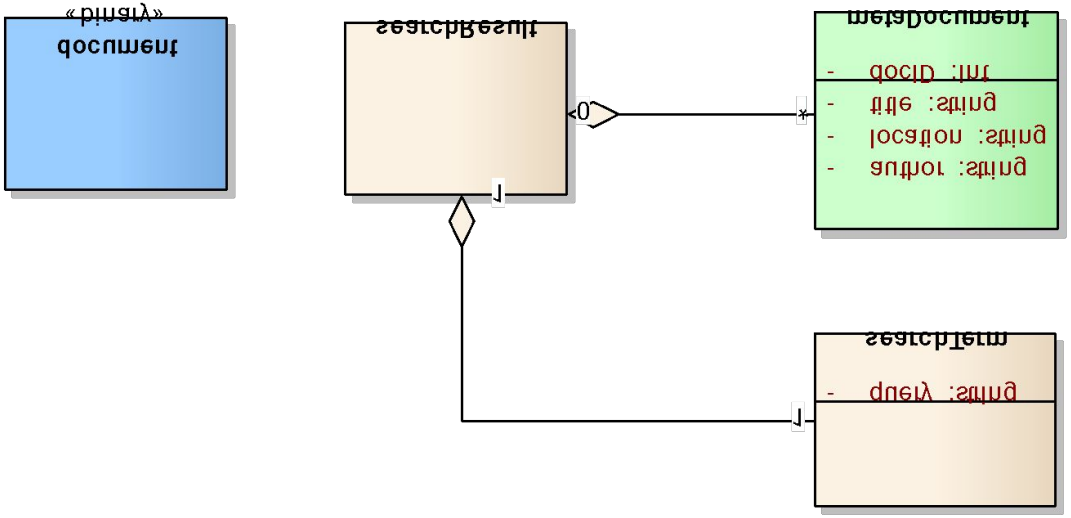
Application Components + Technical components



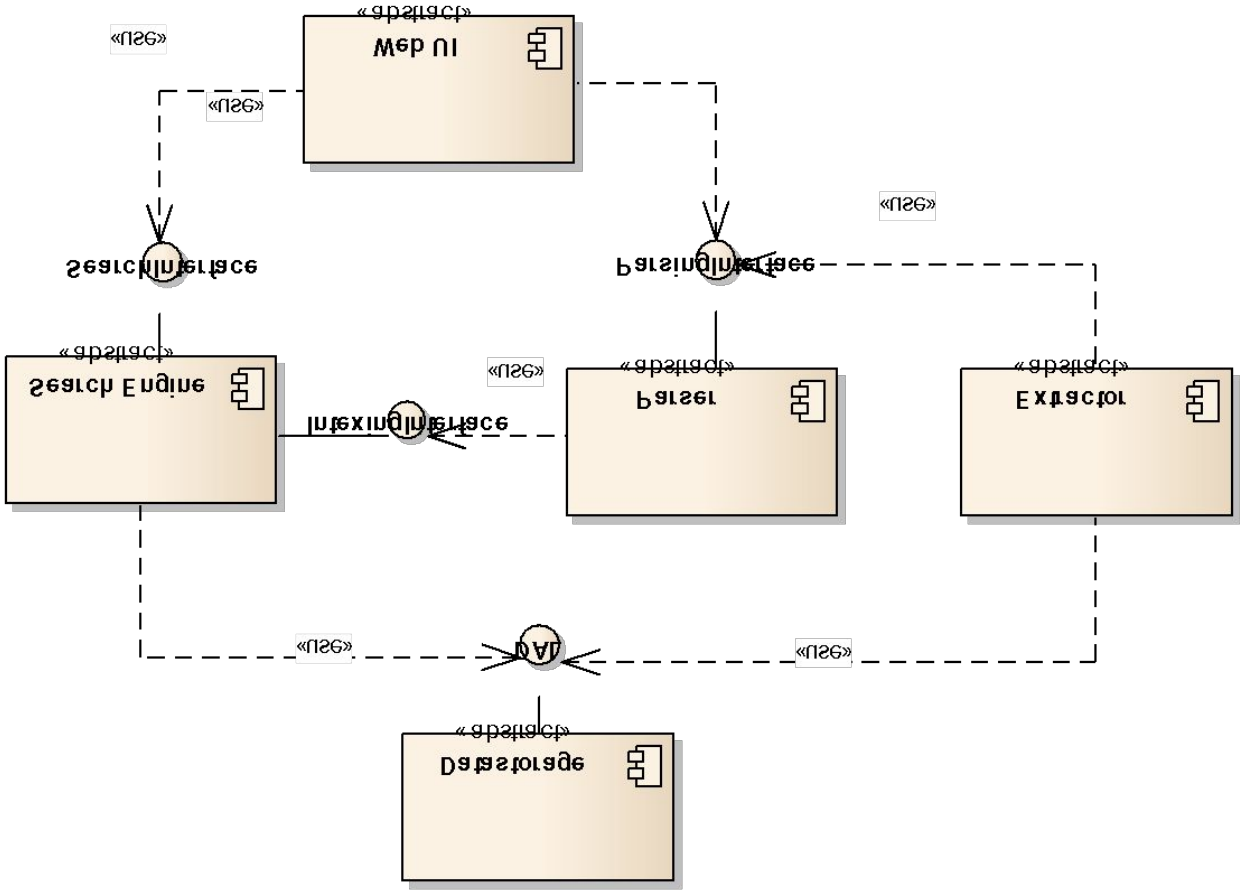
Detailed Activity Diagram



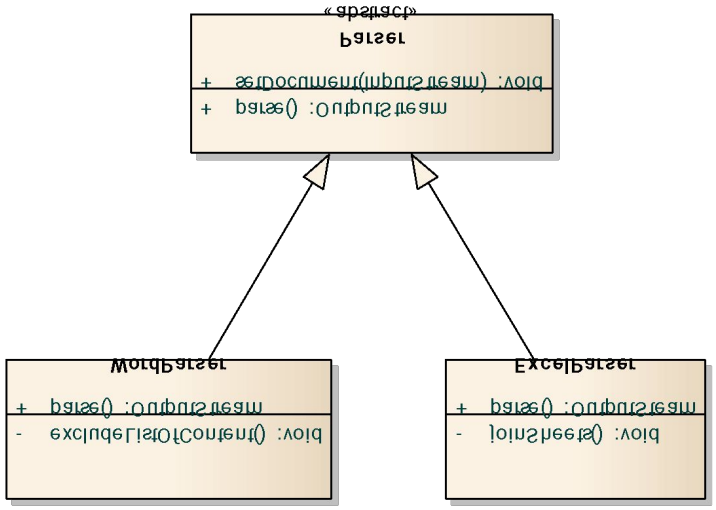
Entity Classes



Interfaces


«use»
«abstract»
Web UI
«use»
«use»
SearchInterface
ParsingInterface
«abstract»
Search Engine
«use»
IndexingInterface
«abstract»
Parser
«abstract»
Extractor
«use»
DAL
«use»
«abstract»
Datastorage

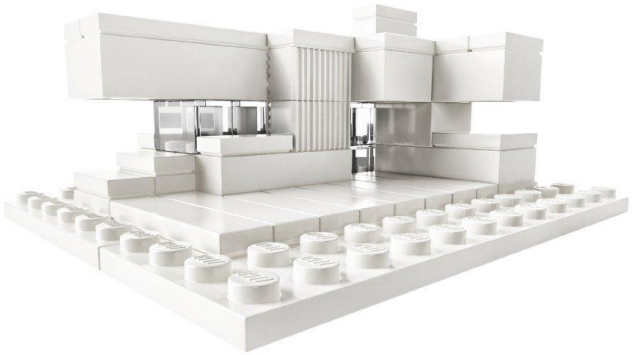
Behavior classes



Questions?

Design example

?



Coffe

10 minutes
18:50

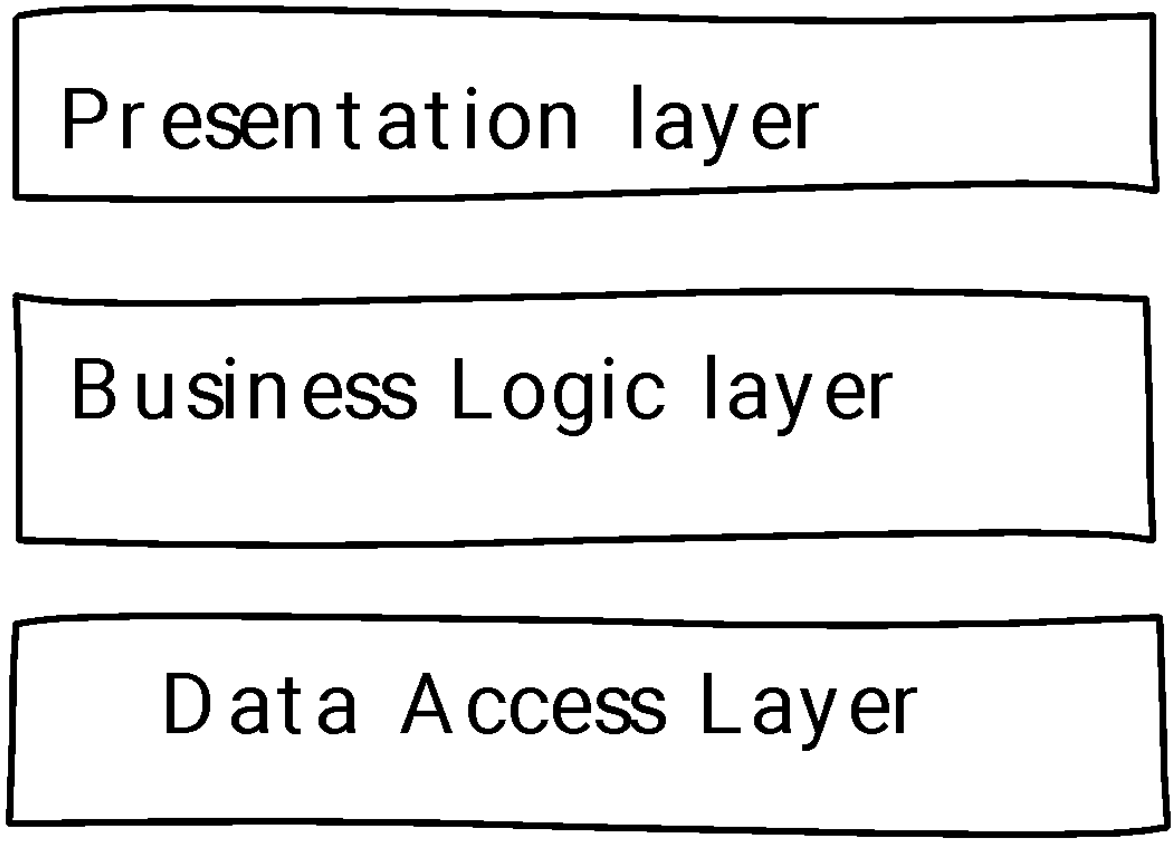
Multilayer application pattern

Multilayered architecture: Why?

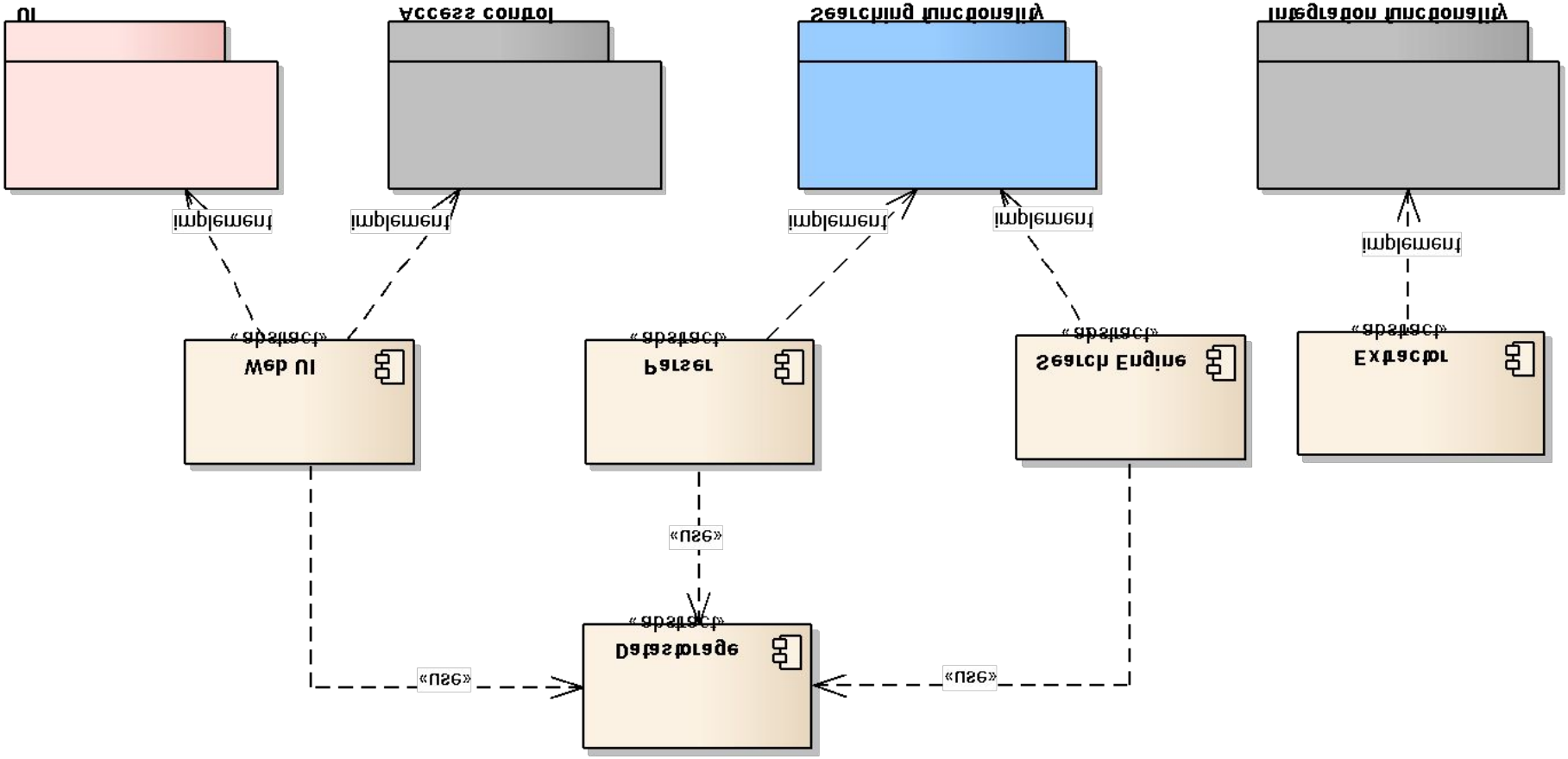
Benefits from the box

- Abstraction
- Isolation
- Manageability
- Performance
- Reusability
- Testability

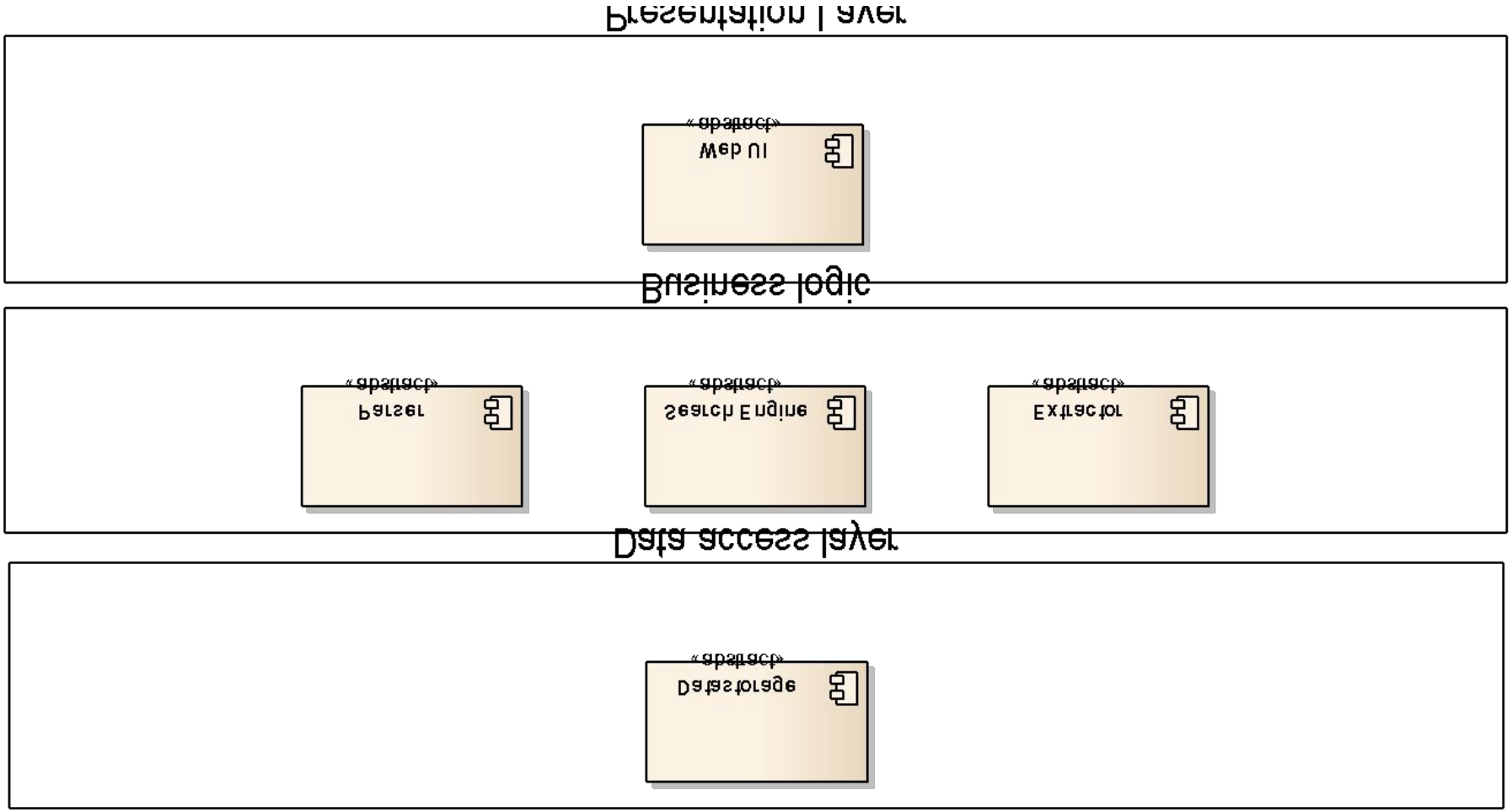
3-tier Architecture



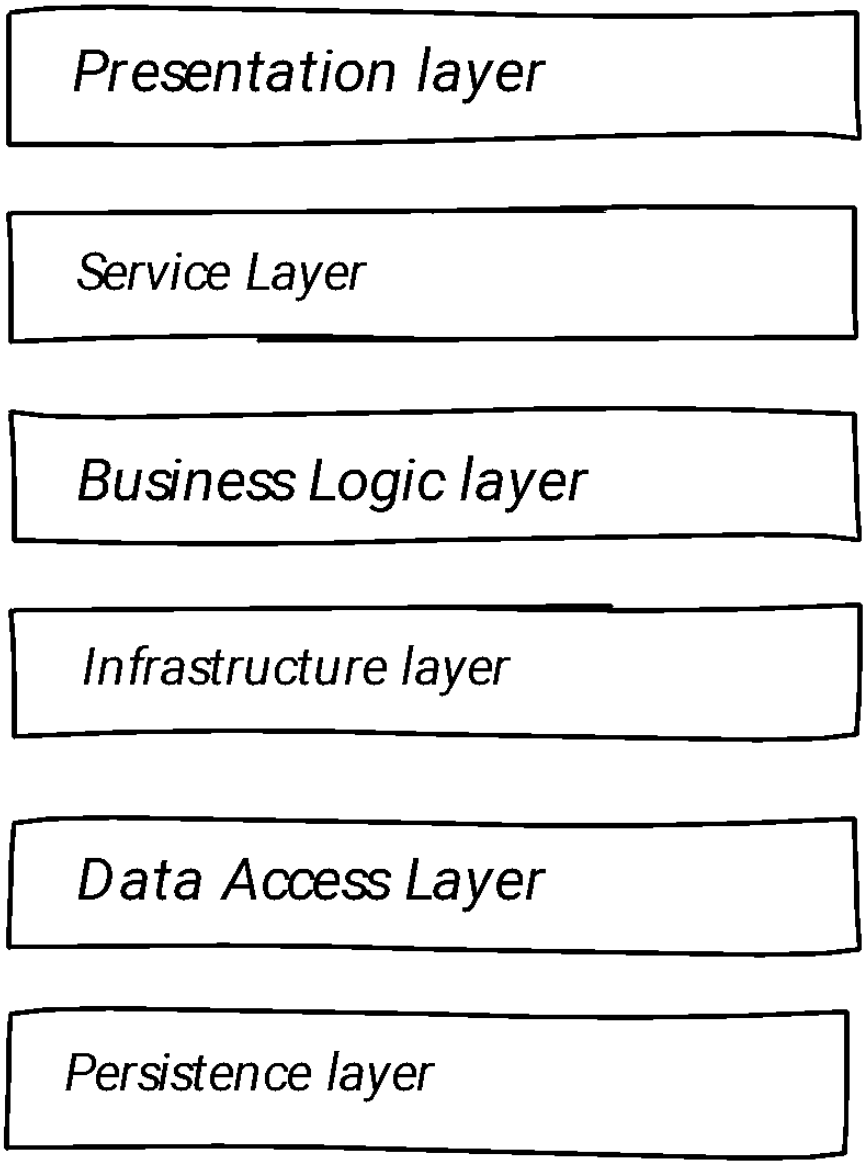
3-tier Architecture: our application



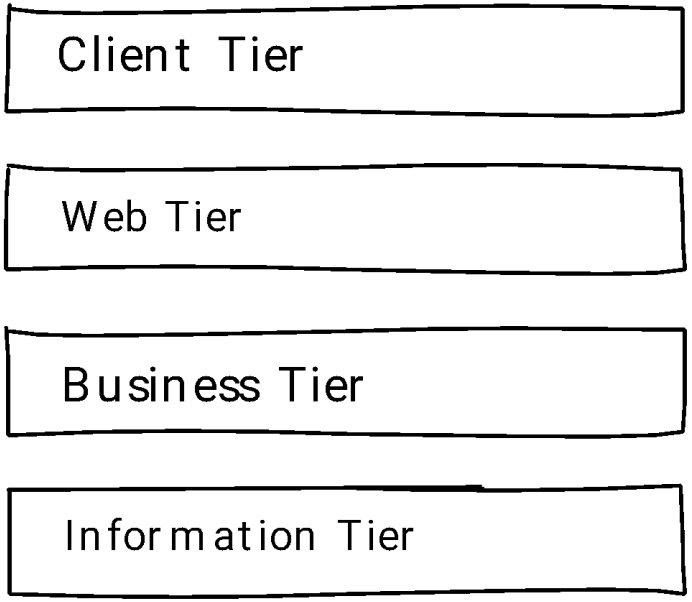
3-tier Architecture: our application



n-tier Architecture

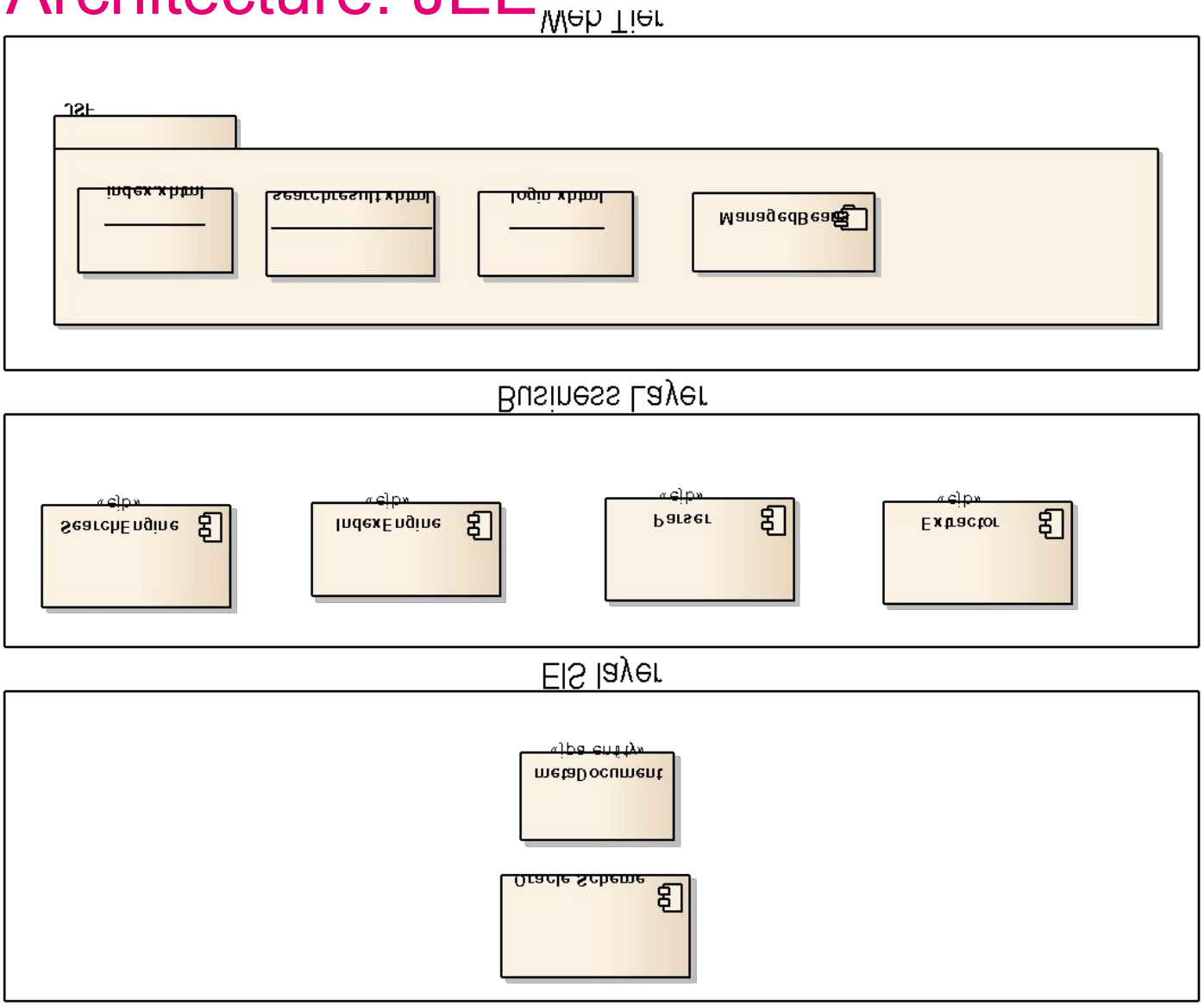


n-tier Architecture: JEE



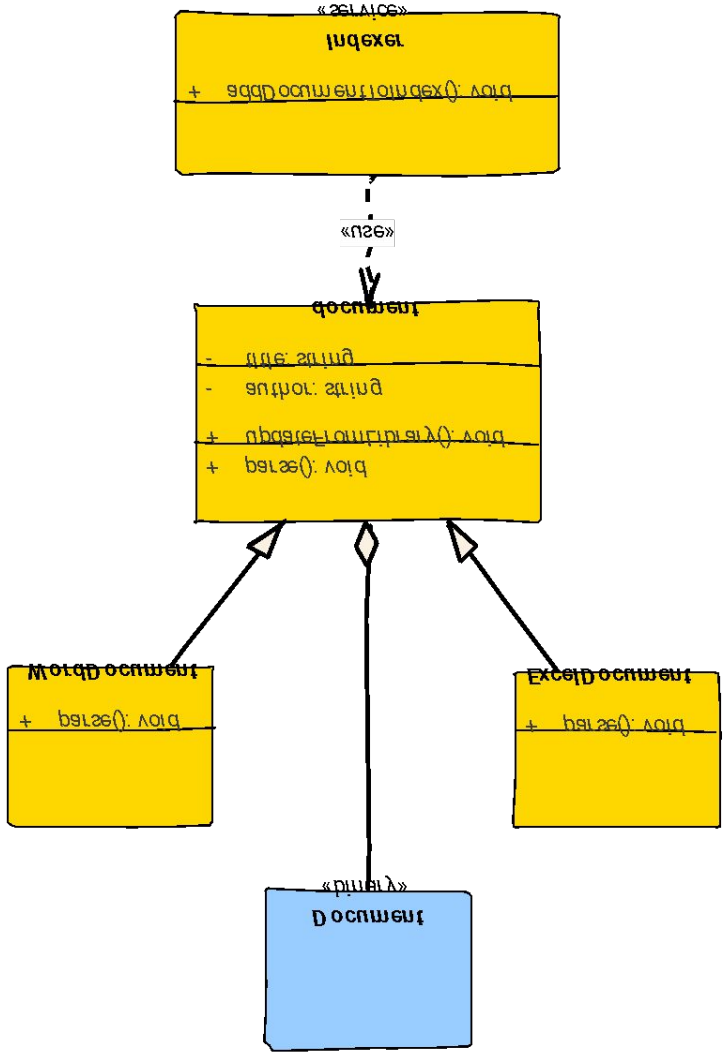
- Rich application or JS/Html application
- JSP / JSF / Struts / Spring MVC …
- EJ
  B
- JPA +
  Database

n-tier Architecture: JEE



Alternatives

Domain Driven Design



Specific

- No strict layers
- Entity and their behavior combined

Pro

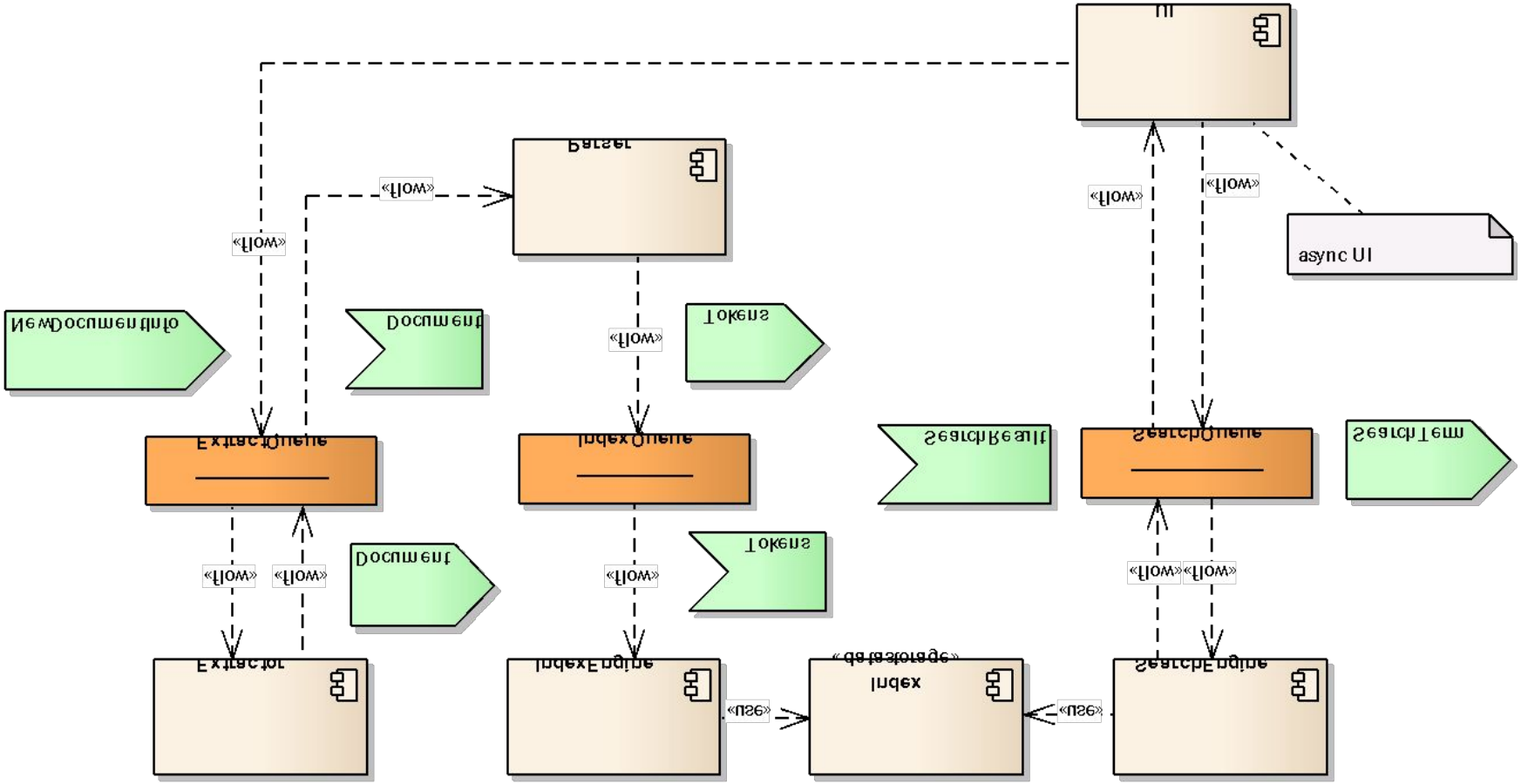
- Easy to extend domain model
- Easy to test
- Easy to map

Cons

- Hi-efforts/costs

Alternatives

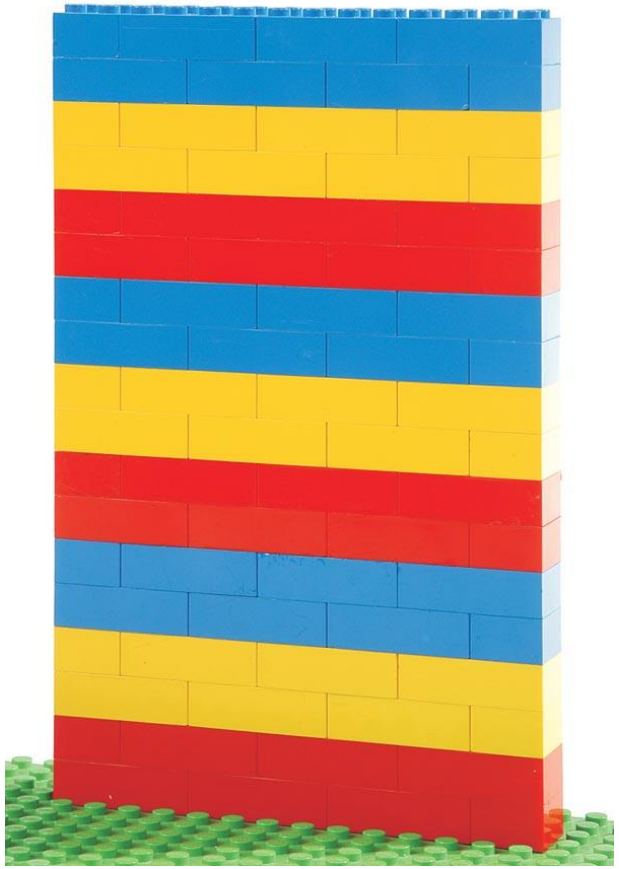
Event Based



Important

Please start your enterprise application from n-tiers architecture

- It is clear and easy to understand
- It is proven by time
- Most current EA using layered architecture
- JEE designed for layered architecture
- You don’t have any strong NFR



Questions?

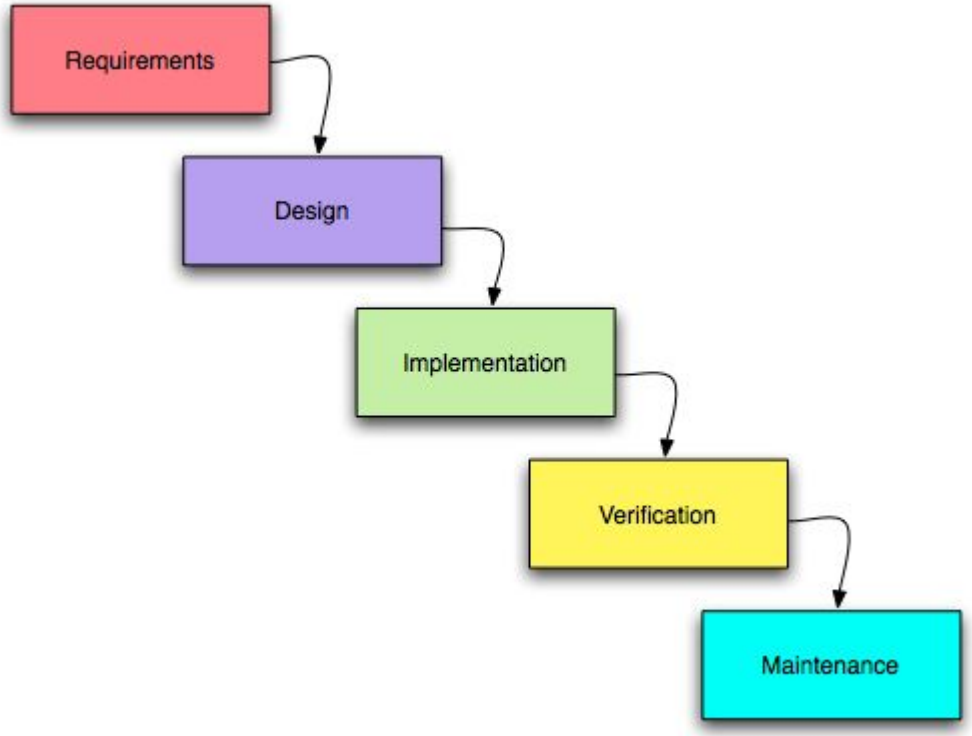
Multilayered architecture

Coffe

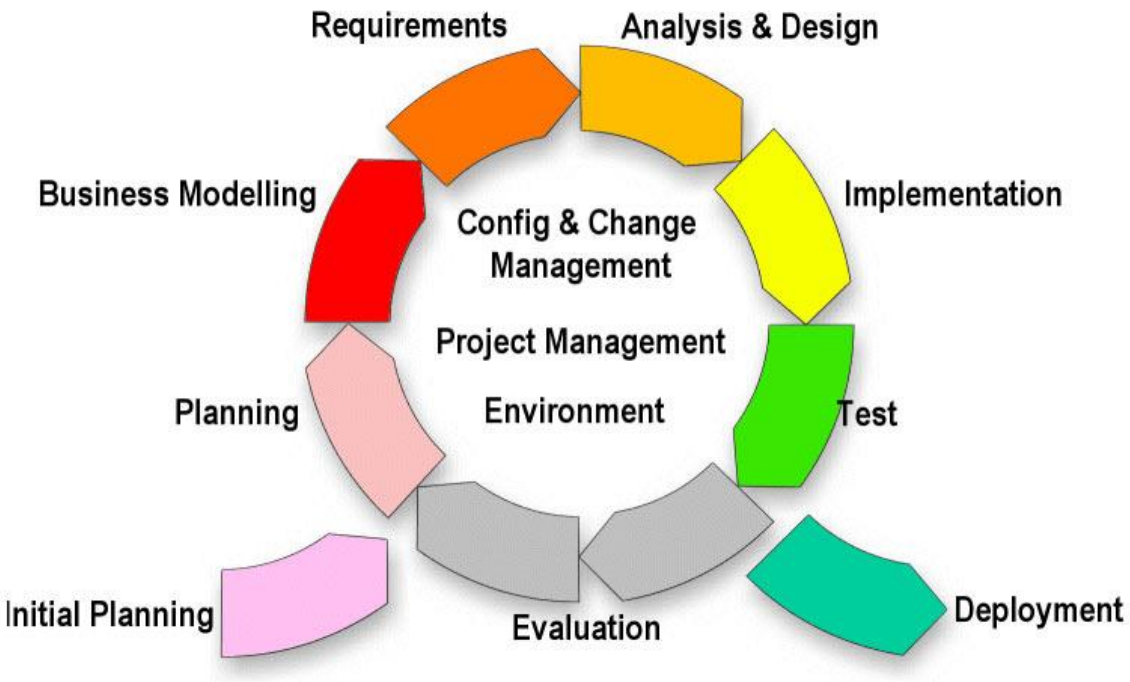
15 minutes
xx:xx

Architect Role in PLC

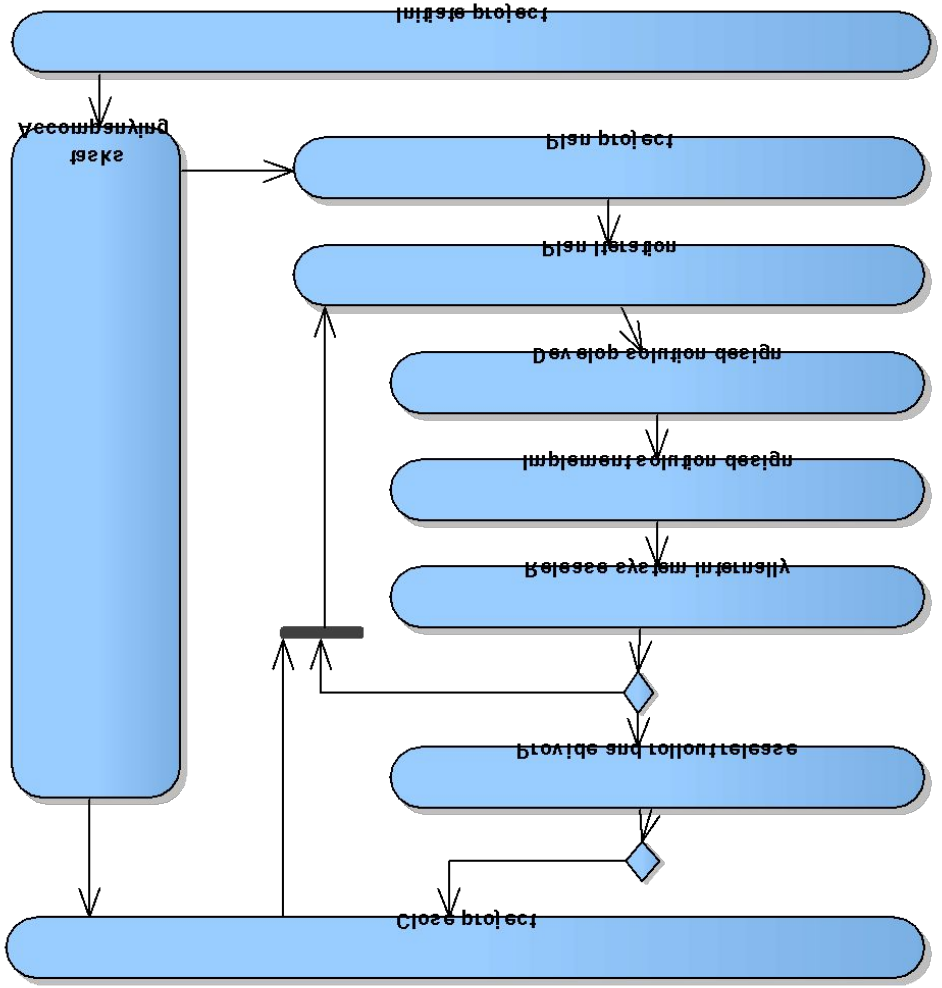
PLC Waterfall

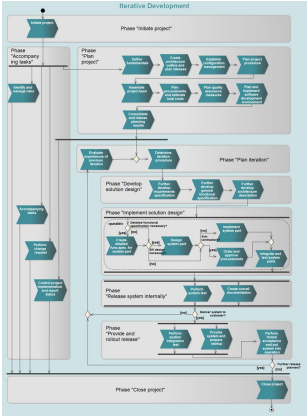


PLC RUP


Requirements
Analysis & Design
Business Modelling
Implementation
Config & Change Management
Project Management
Environment
Planning
Test
Initial Planning
Evaluation
Deployment

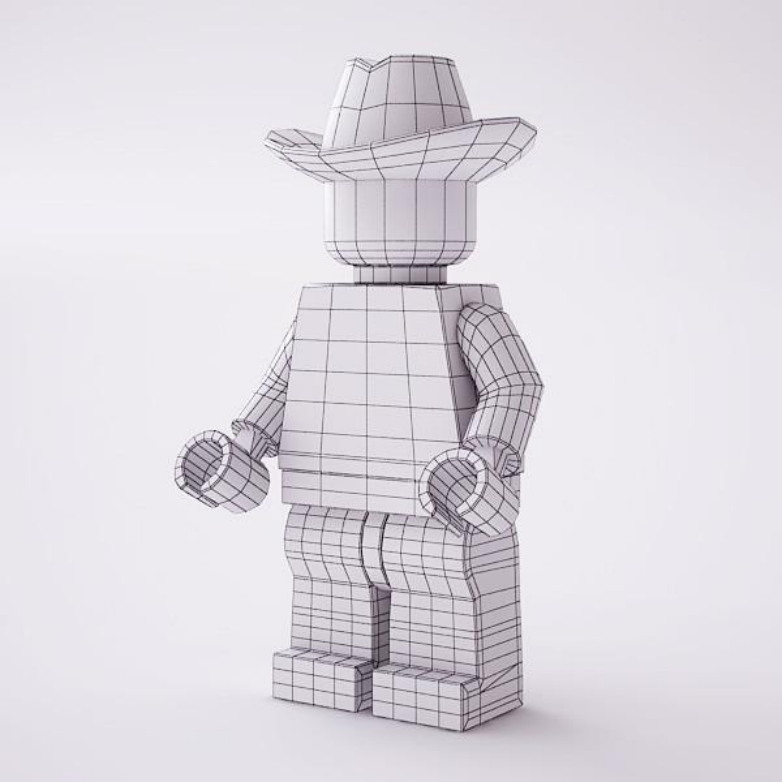
PLC SE-Book Iterative development





Details:
http://sebook.t-systems.com/en/11116135a14c0b91.html

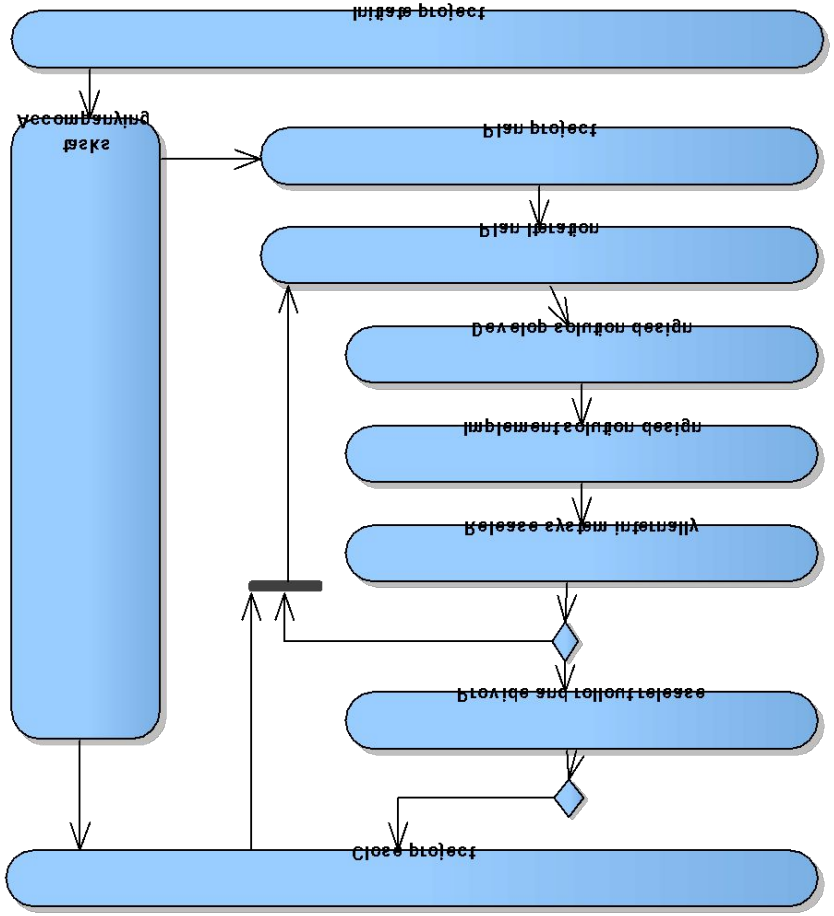
PLC SE-Book Architect in PLC



Discussion: In which project steps Architect should be involved?

PLC SE-Book Architect in PLC

Short answer – Architect or Chief Architect should be involved in almost all project steps.



PLC SE-Book Architect tasks: Plan project

- Provide effort estimation
- Provide technical risks list
- Validate WBS and Dependencies in Project plan
- Support in Configuration management

432	Software development	80 days
433	DEM1-10597 - CSV Import - Mapping Tabellen Gateway - Interimslösu	20 day
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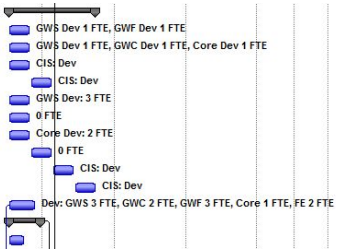
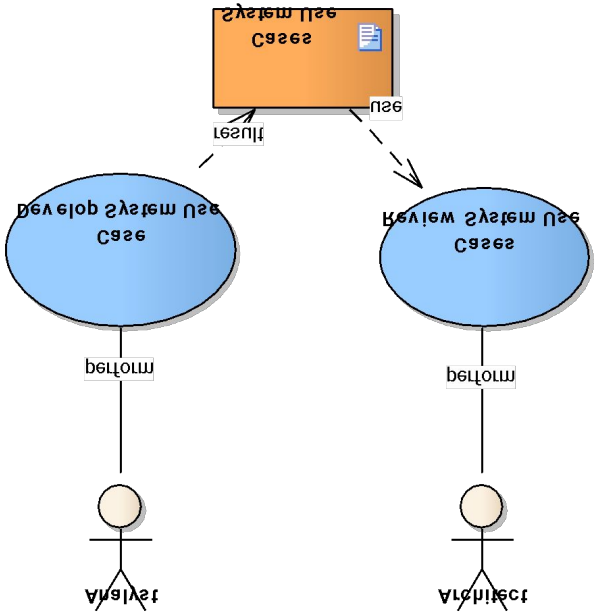


WBS - Work Breakdown Structure

PLC SE-Book Architect tasks
Requirements analyses

- Support requirements development
- Validate and review
  - System Use Cases
  - Requirements
  - GUI Prototype
  - Interface agreement
  - Traceability matrix (UC vs Req)
  - Logical Data Model



explained below

Example: Traceability Matrix Bonus

Relationships: - direct only	UC2: Check Order... Check Order Status	UC2.2: Basic Flow BEGIN The use case starts when the Shopper chooses to check on the status of a previous order. IDENTIFY SHOPPER The system requests information to...	UC2.3: TRACK... TRACK PACKAGES At BF VIEW ORDER DETAILS, the order has already shipped; the Shopper chooses to view tracking information for the order. The...	UC3.1 A Shop selecte consid purcha case c purcha allowin
FEAT1: Secure payment.. Secure payment method				
FEAT2: Easy browsing Easy browsing for available titles				
FEAT4: Ability to check... Ability to check the status of an order	↵	↵		
FEAT8: Shopper... Shoppers should be able to register once for all...				
FEAT9: Shipping Status Shoppers should be able track any package that has...			↵	

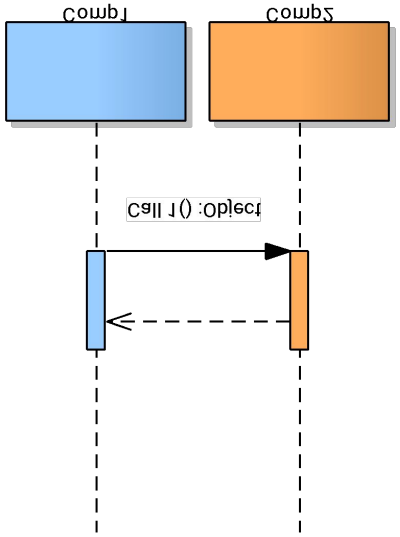
FEAT1: Secure payment method

UC2: Check Order Status

Rational RequisitePro

PLC SE-Book Architect tasks
Develop solution design

- Design:
  - Database
  - Components
  - Interfaces
- Review
  - Test Plan / Test Specification
- Provide/support:
  - Prototyping
  - Traceability (UC vs Comp)



Know your onions

PLC SE-Book Architect tasks: Implementation

- Create program
- Test program
- Defect fixing
- Ensure Code Quality
- Refactoring
- Align code and architecture

Yes, we can code, at least after worktime

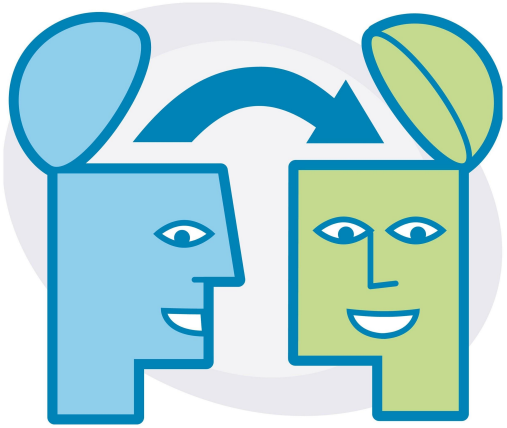
PLC SE-Book Architect tasks: Test

- Review test strategy
- Should be involved in Critical defect analyses

We hate QA activities, but we do it.

PLC SE-Book Architect tasks: Rollout

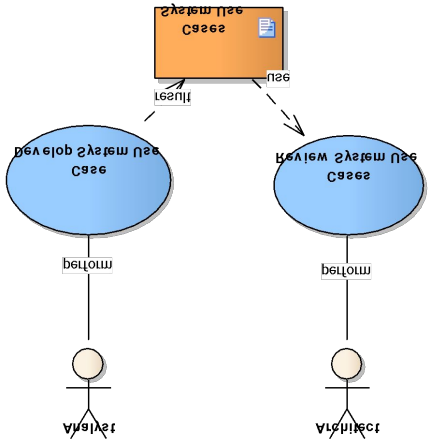
- Prepare Transfer to Operation
- Support Productive Operation

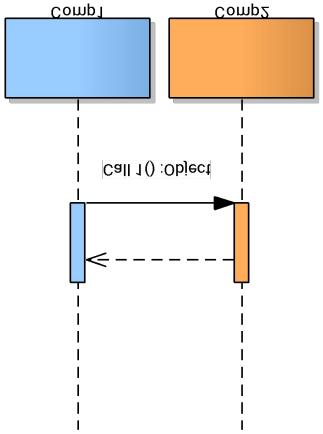


PLC SE-Book Architect tasks: Close project

- Determine and Analyze KPIs and Derive Measures

PLC SE-Book All activities should be documented





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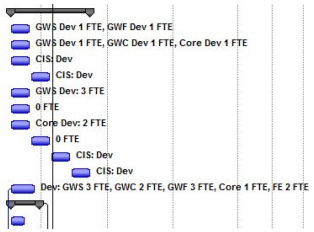

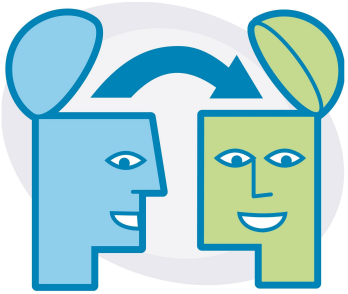

Many many documents…

Questions?

Architect in PLC

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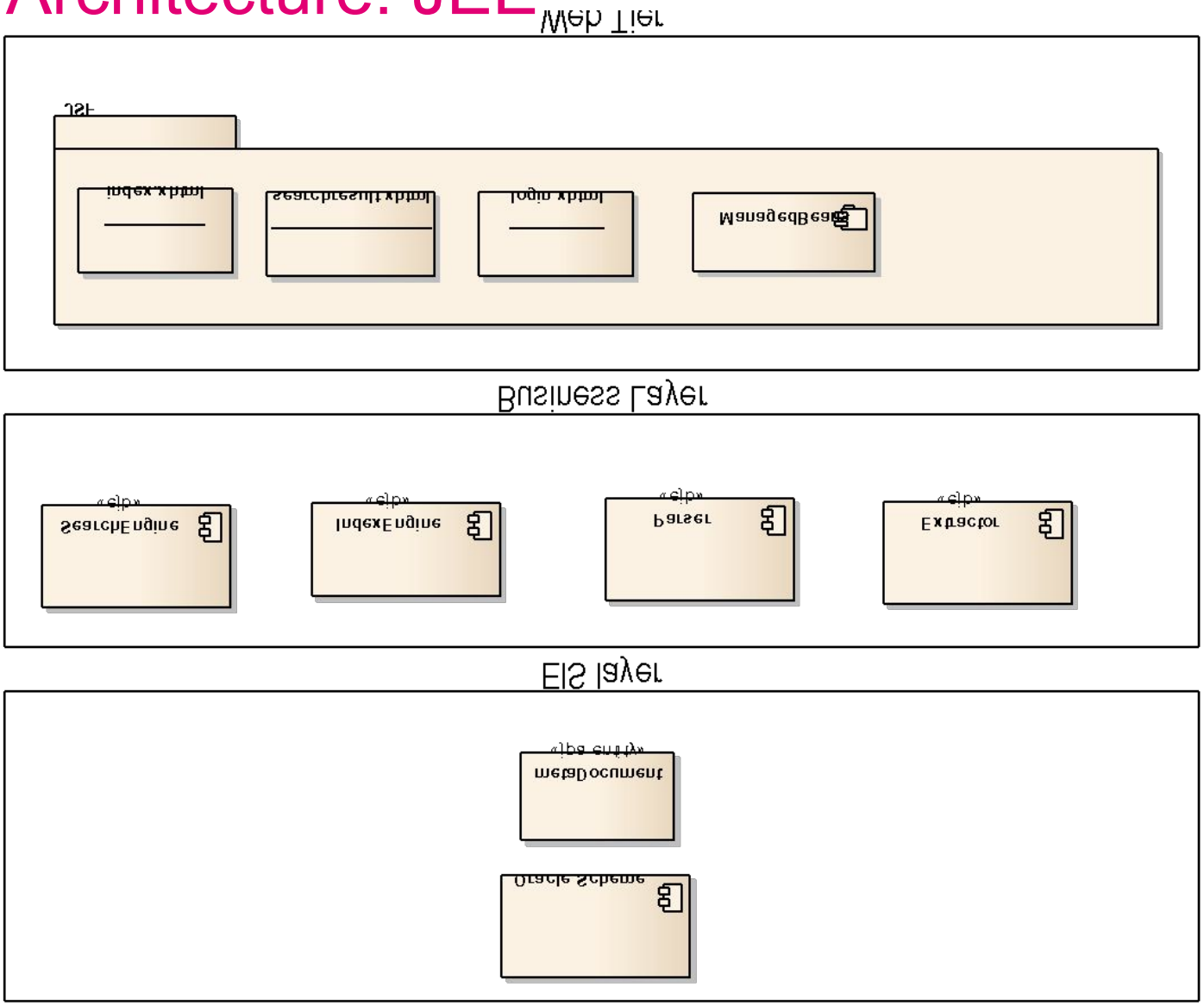
Resume

LIFE IS FOR SHARING.

n-tier Architecture: JEE



Key architecture principles and practices

Common design practices

- Prefer composition to inheritance
- **Separate the areas of concern between layers**
- Be explicit about how layers communicate with each other.
- Keep design patterns consistent within each layer
- Do not mix different types of components in the same logical layer.
- Keep the data format consistent within a layer or component
- **A component or an object should not rely on internal details of other components or objects.**
- **Do not overload the functionality of a component.**
- Keep crosscutting code abstracted from the application business logic as far as possible
- **Define a clear contract for components.**
- Establish a coding style and naming convention for development.
- Maintain system quality using automated QA techniques during development.
- Consider the operation of your application.

Thank you!

LIFE IS FOR SHARING.

References

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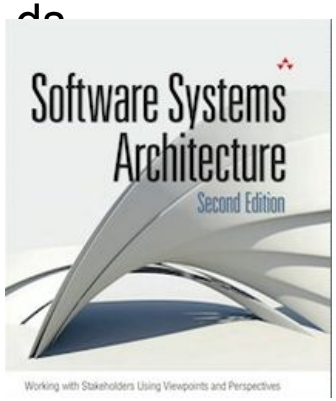
ds



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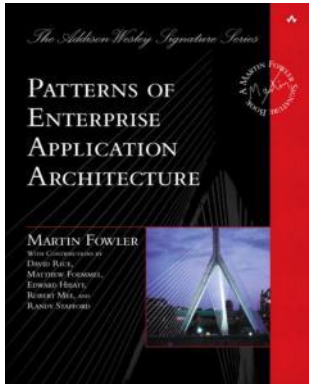
Fowl



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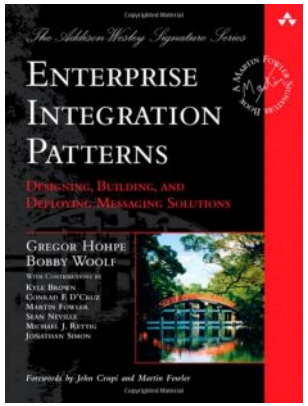

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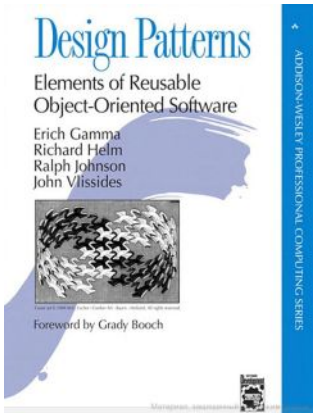

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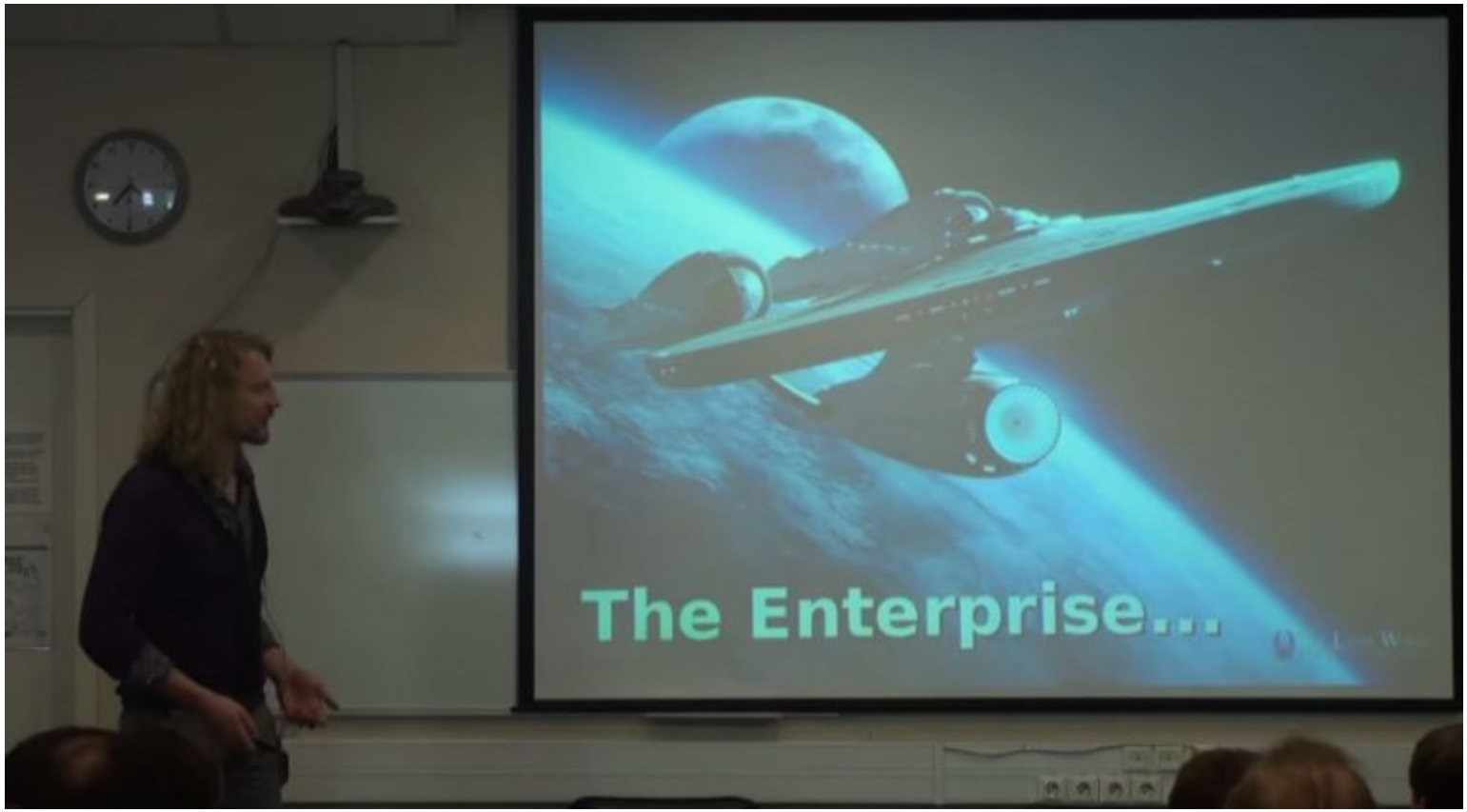
Alternative view on JEE and Architecture

Pure Simple Java (Антон Кекс - Как нам спасти Java?)



http://www.youtube.com/watch?v=TSAIj04_tkA