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Object-Oriented Analysis & Design (OAD)

Use Cases & Prioritization

https://youtu.be/eobQeJgkku8

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„Big Picture“

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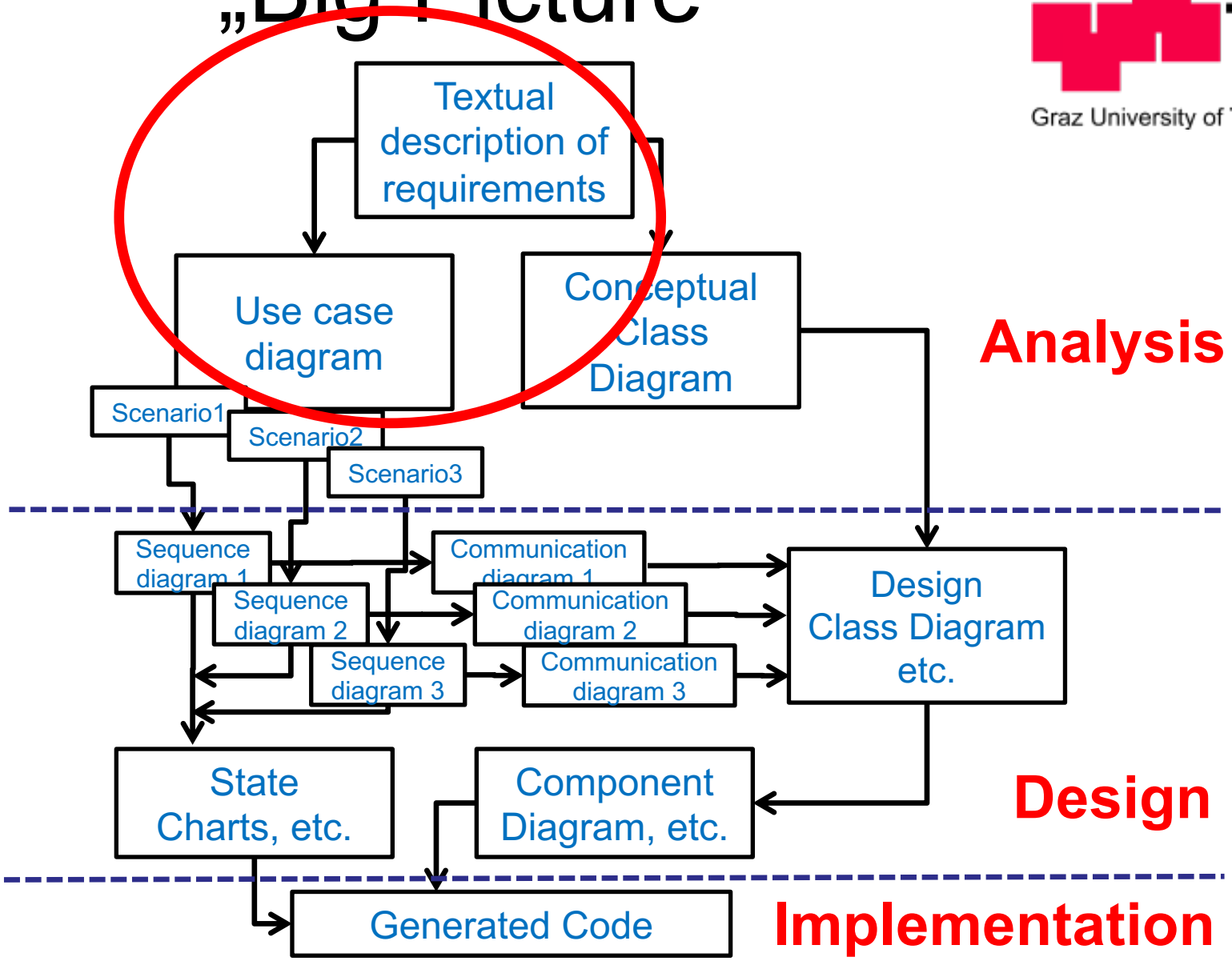

Requirements Specification

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- Description of the needs and desires for a product
- Must be described …
  - **unambiguously**
  - in a form that is **understandable** for the client and for development teams

Parts of Requirements Specification

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- **Overview**: functionality in short and connection to other existing systems
- **Business case**: the *customer's* view of product
- **Glossary**: definitions of all relevant terms
- **System functions** (functional requirements)
- **System attributes** (non-functional requirements)
- **Conceptual models**: models of important concepts in the application domain

Business Case Tourism Recommender

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- More customers visit region
- Less admin. overheads for hotels
- Higher conversion rates
- Less errors in offering phase (automated availability check for resources)
- Open innovation for service providers
  - improvements for status quo
  - new ideas

Glossary

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- **Destination**: specific region, e.g., „Schiwelt Amadé“ or „Lappland“ …
- **Activities**: what can a tourist do in a specific hotel, e.g., sauna, swimming, …
- **Interest themes**: general dimensions of interest, e.g., sports, adventure, …
- **MAUT**: Multi Attribute Utility Theory …

System Functions

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- are describing what a system is supposed to do (**referable with ID**)
- test: "**the system should do X**"
- for example: "easy of use" is not a functional requirement (test failed)
- types:
  - evident (visible to user, e.g., "rank hotels")
  - hidden (not directly visible, e.g., "optimize DB")

System Functions

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ID	requirement	type	priority
1.1	rank hotels for each customer according to price	*evident*	*average*
1.2	record „click on details“	*hidden*	*high*
2.1	capture customer preferences regarding activities	*evident*	*high*
2.2	capture customer preferences regarding interest themes	*evident*	*high*
2.3	record preference history	*hidden*	*average*
2.4	increment max customer-ID before inserting a new customer	*hidden*	*high*
1.3	show recommendation results as a list of hotels (resp. destinations)	*evident*	*high*
3.1	show welcome message on entry page	*evident*	*average*

System Attributes

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attribute	constraint	priority
response time	when logging in as a new user on the entry page, the next page should appear within 1 second	*high*
response time	the calculation of recommendation s must not last longer than 2 seconds	*high*
fault tolerance	minimum precision factor of predictions of 0.5	*high*
operating system	Microsoft Windows XP	*high*

Modeling Systems

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- Needed for building software models
- Modeling concepts
  - e.g., classes, associations, part-of
- Representation concepts
  - e.g., rectangles, continuous lines, continuous line with diamond
- Modeling system
  - Modeling concepts + representation concepts

Use Cases

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- use cases are exploited **to scope the functionality** of the system
- they define **which functions will be included**
- on a level of granularity s.t. we can be sure that **we did not miss important aspects**
- **elements of a use case model**: actors, use cases (and their relationships ☞ **Use Case Diagram**), prototype screens, scenarios

Use Cases

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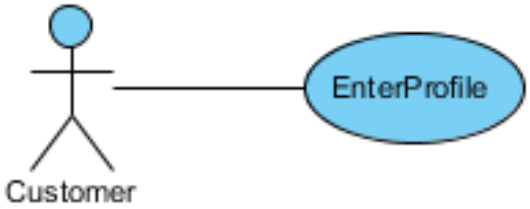
- **use case**
  - a "**procedure"** by which an actor uses the system
  - **collection of <u>scenarios</u>**
  - **activated** by an **actor**



- **actor**
  - **outside the system** under consideration
  - **linked** to some use case(s)
  - **person**, **system**, other external **entities**
  - **activates** the use case

Example Use Cases

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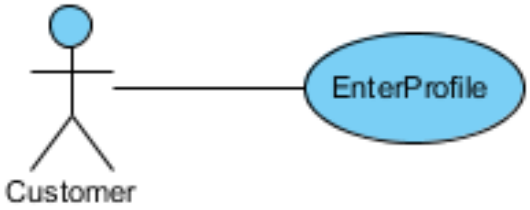
- **Enter Profile**
- Enter New Order
- Apply For Course
- Enter New Course
- …



One Scenario of "Enter Profile"

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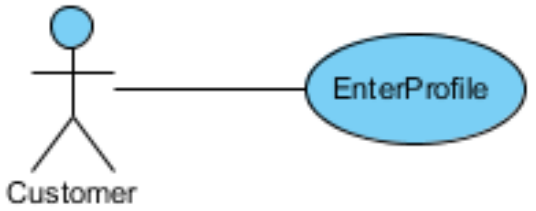
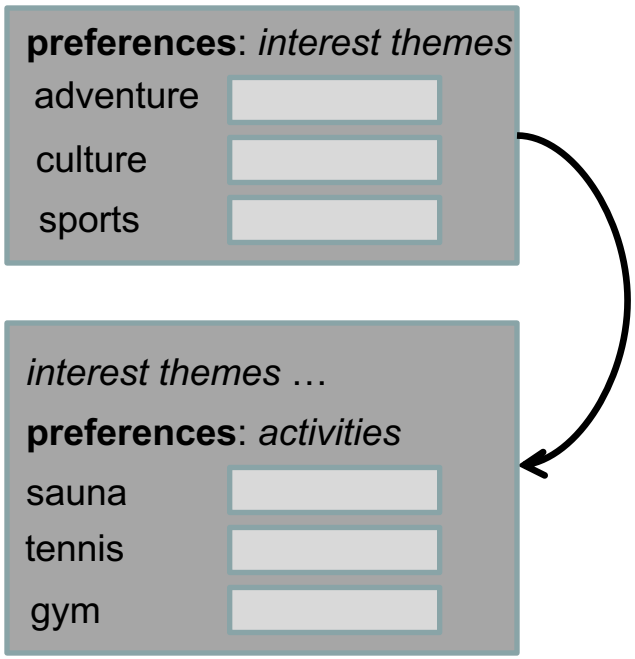
1. the **user** activates "EnterProfile"
2. the **system** asks for preferences regarding interest themes
3. the **user** enters his/her preferences
4. the **system** displays a summary of the user input
5. the **system** asks for preferences regarding activities
6. the **user** enters his/her preferences
7. the **system** displays a complete summary of the user input
8. the **user** confirms the preferences





…

Relationships Between Use Cases

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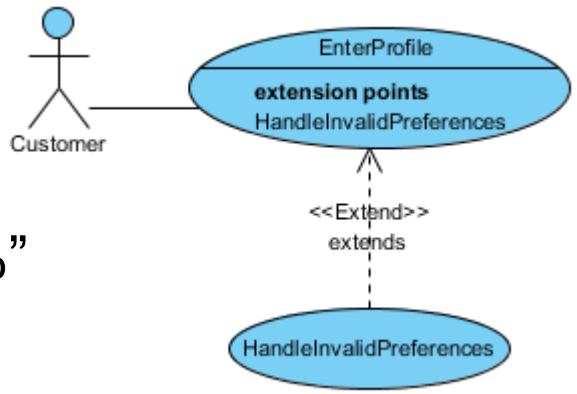
- **Generalization**: variation on normal behavior [e.g., *Order Via Internet/Phone* →**spezialisation** *Order*]
- **Include**: common behavior (reuse) "must" relationship [e.g., *Book Hotel* →**includes** *Login*]
- **Extend**: additional actions performed at specific entry points "optional" relationship [e.g., *Handle Invalid Preferences* →**extends** *Enter Profile*]

1. if at **3.** or **6.** the sum of the user preferences is not 100%
2. the system displays the message "sum(preferences) must be 100%"
3. the use case restarts with 3. (respectively 6.)



A Simple Example

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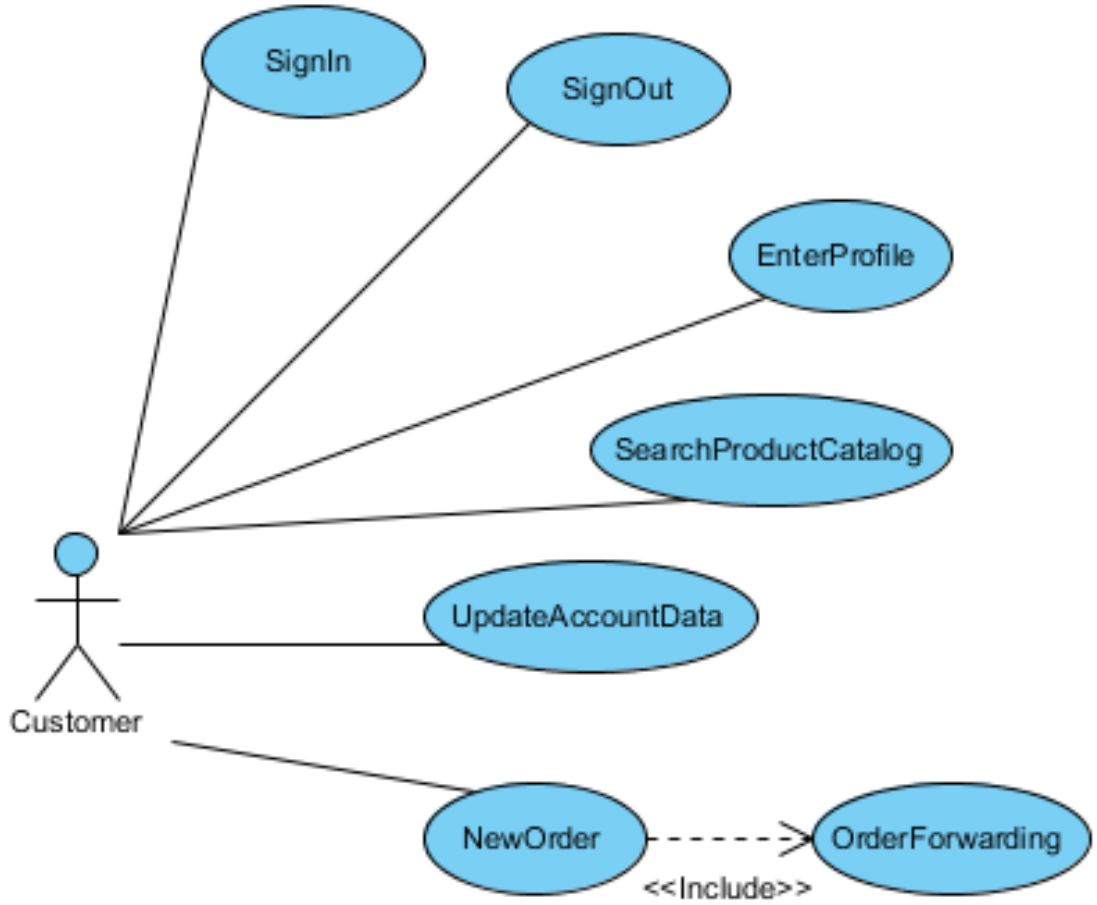

Prioritizing Requirements

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- **Interest dimensions**, for example:
  - profit, effort, risk
- **Properties** of use cases:
  - id, name, description
- **Use cases** (e.g. computer watch):

id	name	description
1	show time	…
2	set time	…
3	stopwatch	…
4	conference timer	…
5	moods	…

Prioritizing Requirements: Scoring Rules

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- A must?
- Increases profits?
- Acceptable efforts?
- Not risky?

Evaluation of use cases by individual stakeholders (users)

id	profit	effort	risk
1	-	-	-
2	-	-	-
3	3	8	10
4	8	4	3
5	9	2	1

val(use case u, dim)

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stakeholder (user=1)

id	profit	effort	risk
1	-	-	-
2	-	-	-
3	3	8	10
4	8	4	3
5	9	2	1

stakeholder (user=2)

id	profit	effort	risk
1	-	-	-
2	-	-	-
3	2	7	9
4	6	3	3
5	9	3	2

$$val(use\ case\ u, dim) = \frac{\sum_{user=1}^{m} eval(u, user, dim)}{m}$$

- A must?
- Increases profits?
- Acceptable efforts?
- Not risky?

id	profit	effort	risk
1	-	-	-
2	-	-	-
3	2,5	7,5	9,5
4	7	3,5	3
5	9	2,5	1,5

utility(use case u)

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- Example importance distribution (d):
  - Increases profits? → d=20%
  - Acceptable efforts? → d=65%
  - Not risky? → d=15%

$$\boldsymbol{utility(use\ case\ u)} = \sum_{dim=1}^{n} \mathrm{val}(u, dim) * importance(dim)$$

id	profit	d	effort	d	risk	d	utility
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	2,5	0.2	7,5	0.65	9,5	0.15	**6,8**
4	7	0.2	3,5	0.65	3	0.15	4,125
5	9	0.2	2,5	0.65	1,5	0.15	3,65

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Thanks!

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