Use Cases

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Outline

• What is a use case?
• Specifying use cases
• Steps for creating a use case
What is a use case?
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A written description of the user's interaction with the software product to accomplish a goal.

• It is an example behavior of the system.
• 3-9 clearly written steps lead to a “main success scenario.”
• Written from an actor's point of view, not the system's.
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**Use cases capture functional requirements of a system.**
Benefits of use cases

- Establish an understanding between the customer and the system developers of the requirements (success scenarios)
- Alert developers of problematic situations, error cases to test (extension scenarios)
- Capture a level of functionality to plan around (list of goals)
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  • Starts with a request from an actor to the system.
  • Ends with the production of all the answers to the request.
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  • Does not describe internal system activities.
  • Does not describe the GUI in detail.
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• Concise, clear, accessible to non-programmers
  • Easy to read.
  • Summary fits on a page.
  • Main success scenario and extensions.
Use cases versus internal features

Consider the software to run a mobile phone …
Use cases versus internal features

Use cases
• call someone
• receive a call
• send a message
• memorize a number

Point of view: user

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Point of view: user

Internal functions
- transmit / receive data
- energy (battery)
- user I/O (display)
- phone-book mgmt.

Point of view: developer
Use cases and requirements

• Special deals may not run longer than 6 months.
• Customers only become preferred after 1 year.
• A customer has one and only one sales contact.
• Database response time is less than 2 seconds.
• Web site uptime requirement is 99.8%.
• Number of simultaneous users will be 200 max.

Which of these requirements should be represented directly in a use case?
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None! These are properties but not user-driven behaviors of the system, so the use cases wouldn't mention them.
Specifying use cases
Terminology
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  - Person, external hardware (like a timer), or another system.
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- **Level**
  - User goals (accomplished in one sitting)
  - Summary goals (accomplished in multiple sittings)
  - Subfunction goals (required to carry out user goals)
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Use cases are always initiated by actors and describe the **flow of events** that these actors are involved in.
Styles of use cases

**Use case diagram**
- in UML, the Unified Modeling Language

**Informal use case**
- a short paragraph or outline

**Formal use case**
- a multi-part structured description
Use case diagram

The overall list of the system's use cases can be drawn as high-level diagrams, with:

- **actors as stick-men**, with their names (nouns)
- **use cases as ellipses**, with their names (verbs)
- **line associations**, connecting an actor to a use case in which that actor participates
- **use cases can be connected to other cases that they rely on or extend**

![Diagram example]

Library patron  
Check out book
## Actor-goal lists: function content of the system

<table>
<thead>
<tr>
<th>Actor</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library Patron</td>
<td>Search for a book</td>
</tr>
<tr>
<td></td>
<td>Check out a book</td>
</tr>
<tr>
<td></td>
<td>Return a book</td>
</tr>
<tr>
<td>Librarian</td>
<td>Search for a book</td>
</tr>
<tr>
<td></td>
<td>Check availability</td>
</tr>
<tr>
<td></td>
<td>Request a book from another library</td>
</tr>
</tbody>
</table>

It can be useful to create a list or table of primary actors and their "goals" (use cases they start). The diagram will then capture this material.
Use case summary diagrams

Library System

- Check out
- Search
- Return
- Check avail.
- Request

Library Patron

Librarian
Use case summary diagrams

Trading Manager

Actor

Trader

Set Limits

Update Accounts

Accounting System

Analyze Risk

Price Deal

Valuation

Capture Deal

Salesperson

Limits Exceeded

Use Case

Extension.
What is an extension?
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• A possible branch in a use case scenario, often triggered by an error or failure in the process.
  • Useful for finding edge cases that need to be handled and tested.
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• Do
  • Think about how every step of the use case could fail.
  • Give a plausible response to each extension from the system.
  • Response should either jump to another step of the case, or end it.
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• Don’t
  • List things outside the use case ("User's power goes out").
  • Make unreasonable assumptions ("DB will never fail").
  • List a remedy that your system can’t actually implement.
Informal use case

Patron loses a book

• The library patron reports to the librarian that she has lost a book. The librarian prints out the library record and asks patron to speak with the head librarian, who will arrange for the patron to pay a fee. The system will be updated to reflect lost book, and patron's record is updated as well. The head librarian may authorize purchase of a replacement book.
Informal use case with structured text

Although not ideal, it is almost always better than unstructured natural language.

You will probably use something in this general style.
### Formal use case

<table>
<thead>
<tr>
<th>Goal</th>
<th>Patron wishes to reserve a book using the online catalog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary actor</td>
<td>Patron</td>
</tr>
<tr>
<td>Scope</td>
<td>Library system</td>
</tr>
<tr>
<td>Level</td>
<td>User</td>
</tr>
<tr>
<td>Precondition</td>
<td>Patron is at the login screen</td>
</tr>
<tr>
<td>Success end</td>
<td>Book is reserved</td>
</tr>
<tr>
<td>Failure end condition</td>
<td>Book is not reserved</td>
</tr>
<tr>
<td>Trigger</td>
<td>Patron logs into system</td>
</tr>
</tbody>
</table>

Parts that make up a formal use case (continued on the next slide).
**Formal use case (continued)**

| Main success scenario | 1. Patron enters account and password  
|                       | 2. System verifies and logs patron in  
|                       | 3. System presents catalog with search screen  
|                       | 4. Patron enters book title  
|                       | 5. System finds match and presents location choices  
|                       | 6. Patron selects location and reserves book  
|                       | 7. System confirms reservation and re-presents catalog |

| Extensions (error scenarios) | 2a. Password is incorrect  
|                             | 2a.1 System returns patron to login screen  
|                             | 2a.2 Patron backs out or tries again  
|                             | 5a. System cannot find book  
|                             | 5a.1 … |

| Variations (alternative scenarios) | 4. Patron enters author or subject |
What notation is good?

There are standard templates for requirements documents, diagrams, etc. with specific rules. Is this a good thing? Should we use these standards or make up our own?

• Standards are helpful as a template or starting point.
• But don't be a slave to formal rules or use a model/scheme that doesn't fit your project's needs.

Figure 7.3. UML use cases—so simple a child could do it!
Steps for creating a use case
Steps for creating a use case

1. Identify actors and goals
2. Write the main success scenario
3. List the failure extensions
4. List the variations
1. Identify actors and goals

• What computers, subsystems and people will drive our system? (actors)
• What does each actor need our system to do? (goals)
• Exercise: actors/goals for your projects

Come up with 4 use case names for your software, draw a UML use case summary diagram for it, and write out one complete (formal) use case.
2. **Write the main success scenario**

- Main success scenario is the preferred "happy path"
  - easiest to read and understand
  - everything else is a complication on this

- Capture each actor's intent and responsibility, from trigger to goal delivery
  - say what information passes between them
  - number each line
3. List the failure extensions

- Usually, almost every step can fail (bad credit, out of stock)
  - Note the failure condition separately, after the main success scenario
- Describe failure-handling
  - recoverable: back to main course (low stock + reduce quantity)
  - non-recoverable: fails (out of stock, or not a valued customer)
  - each scenario goes from trigger to completion
- Label with step number and letter:
  - 5a failure condition
    - 5a.1 use case continued with failure scenario
    - 5a.2 continued

Exercise: describe one failure extension for your project’s use case.
4. List the variations

• Many steps can have alternative behaviors or scenarios
• Label with step number and alternative
  • 5’. Alternative 1 for step 5
  • 5”. Alternative 2 for step 5
Pulling it all together: how much is enough?

You have to find a balance

- comprehensible vs. detailed
- graphics vs. explicit wording and tables
- short and timely vs. complete and late

Your balance may differ with each customer depending on your relationship and flexibility
Summary

- Uses case describe example system behaviors (contracts) from the user’s point of view.
- Can be diagrams, informal paragraphs, formal use cases.
- 4 steps to create use cases.