23. Framework Documentation

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References

- Obligatory:
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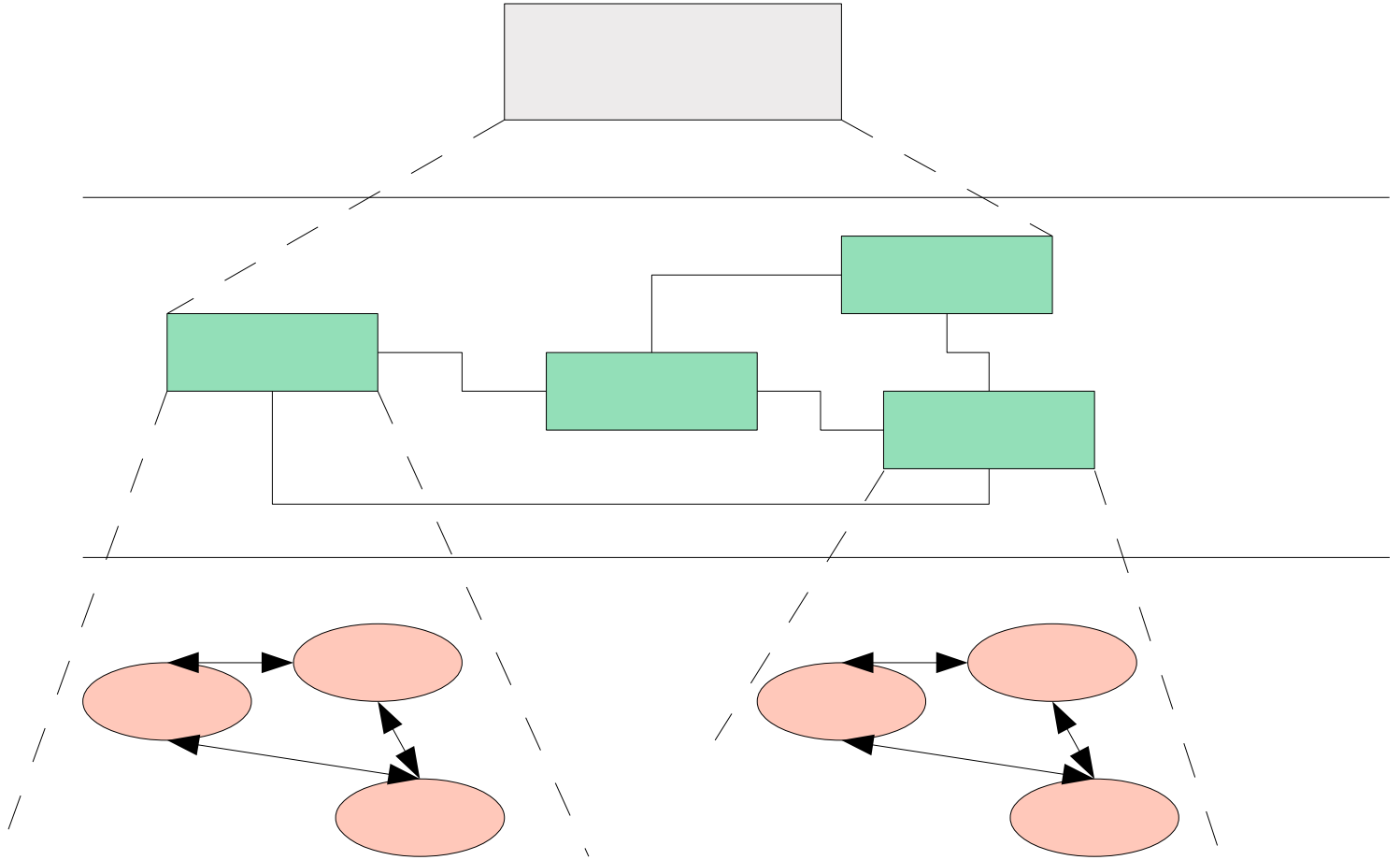
- Other:
- B. Minto. The Pyramid Principle. Part One: Logic in Writing. Pitman Publishing, London, 1991. First published by Minto International Inc. in 1987.
- G. Jimenz-Diaz, M. Gomez-Albarran. A Case-Based Approach for Teaching Frameworks.
- Andreas Bartho. Creating and Maintaining Tutorials with DEFT. ICPC 2009
- T. Vestdam. Generating Consistent Program Tutorials. Technical Report, University of Aalborg, Denmark.
- T. Vestdam. Pulling Threads Through Documentation.Technical Report, University of Aalborg, Denmark.
- T. Vestdam. Contributions to Elucidative Programming. PhD thesis, January 2003, University of Aalborg, Denmark.

Problem: How to Document a Framework?

- Framework understanding is hampered by many problems
  - Good documentation should help to solve them
- Lack of knowledge of domain of the framework
- Unknown mapping between domain concepts and framework classes
  - Often not 1:1, but n:m mappings
- Unknown framework functionality
  - Does this framework fit?
- Lack of knowledge of interactions between framework classes
  - Impact of instantiations cannot be estimated
- Lack of knowledge of the architecture of the framework
  - Framework integrity is related
- Multiple solutions possible with the framework
- Technical problems (platform knowledge, ..)

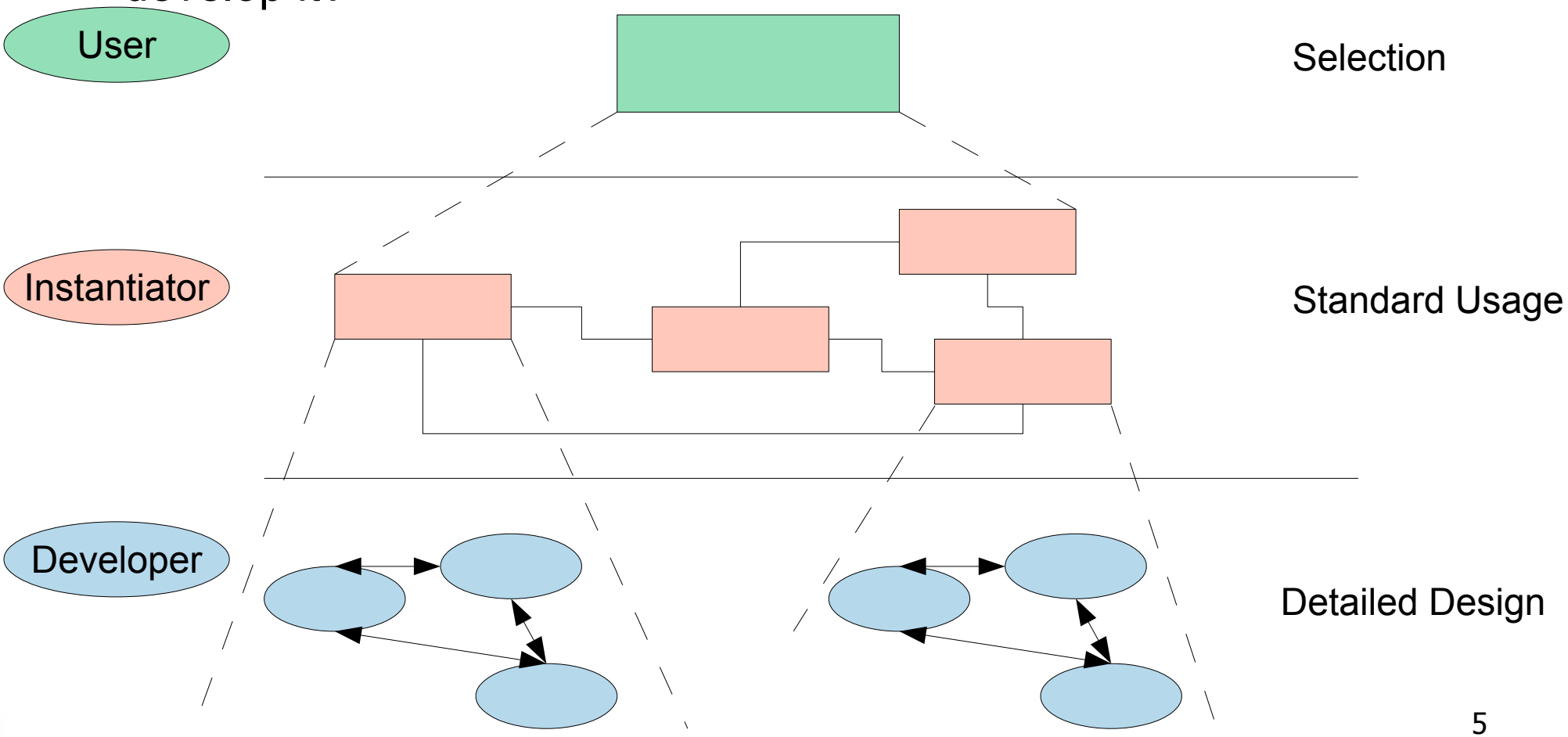
The Pyramid Principle

- Documents (also documentation) should consist of several *abstraction levels*
- A top node is refined into lower levels [Minto]
- A *reducible* structure results (see ST-II)



The Pyramid Principle in Framework Documentation

- Framework Selection: Does the framework address my problem?
- Framework Standard Usage: How to use it?
- Framework Detailed Design: How does it work? How to further develop it?



Level 1: Framework Selection Sheet

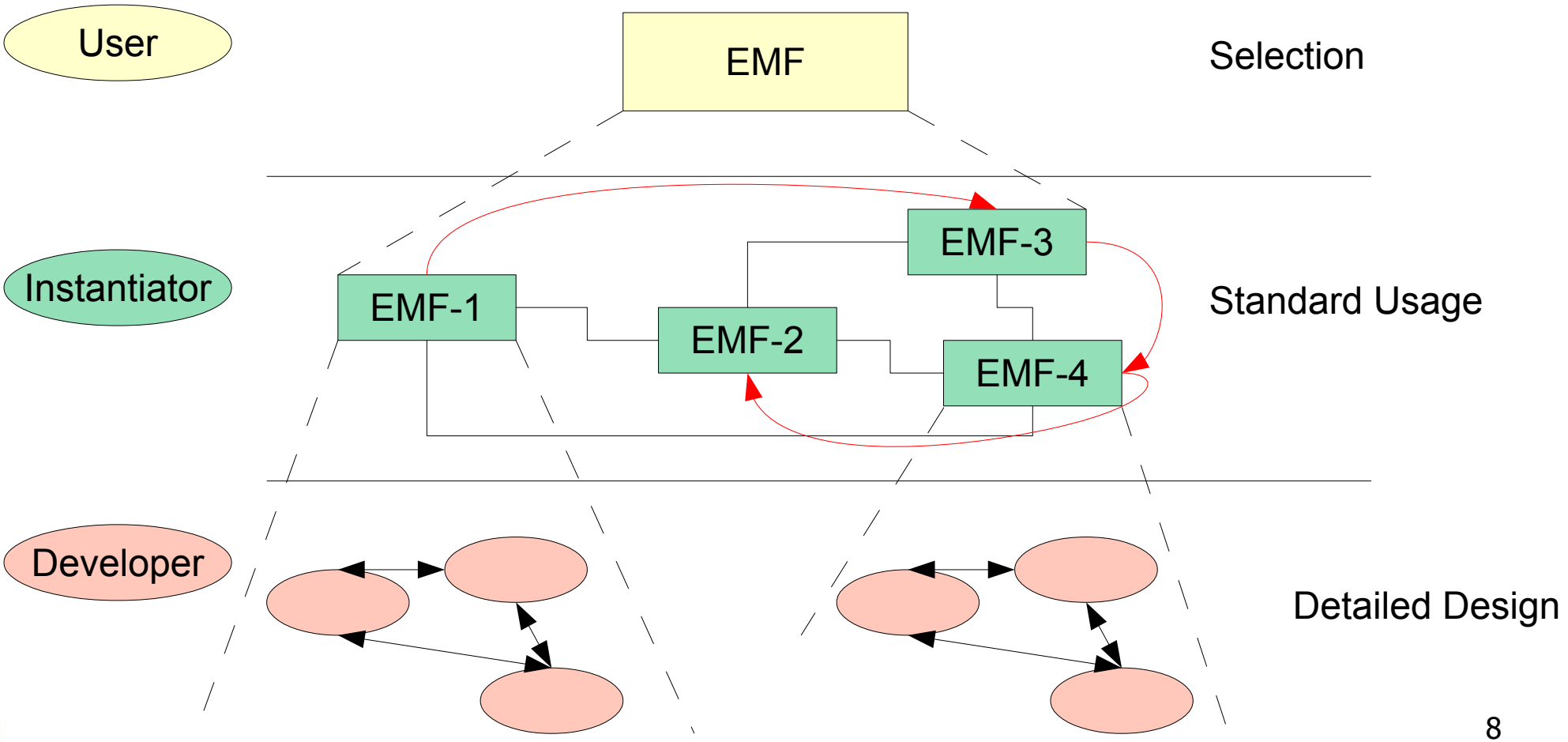
- Basically a short description (fact sheet), comparable to a Linux LSM:
  - **Name**: EMF (Eclipse Modelling Framework)
  - **Keywords**: modelling, editor, development environment, UML
  - **Problem description (application domain)**: EMF facilitates the construction of graphic editors, providing basic functionality for diagrams, nodes, edges, including the workspace of an IDE
  - **Solution (features, design concepts)**: EMF is an extensible framework, and itself an Eclipse plugin
  - **Examples (typical applications):** UML-EMF application
  - **Other related frameworks:** JDT (Java Development Tools)

Level 2: Standard Use Cases with Application Patterns

- An *application pattern* is a standard usage pattern (use case) of a framework
- Example:
  - **Name:** EMF-1
  - **Short Description:** “Creating a Petri-Net Editor”
  - **Context**: “EMF is the eclipse-based modelling framework, which can be tailored towards more specific editors”
  - **Problem**: How can I draw a Petri-Net?
  - **Instantiation Explanation (Solution Explanation)**
    - This can be a petri net, statechart, activity diagram, or flowchart to describe the framework instantiation process. Description step by step:
    - “1) write a plugin.xml file
    - 2) write a Java Plugin class and name it in the plugin.xml
    - 3) describe the extended extension points in the plugin.xml
    - 4) load the .jar file into the eclipse plugin directory”
  - **Instantiation Chart (Instantiation Solution):** <<a chart showing the process>>
  - **Example applications:** PN Editor
  - **Design information:** << info about extension points, extended points>>
  - And many more.

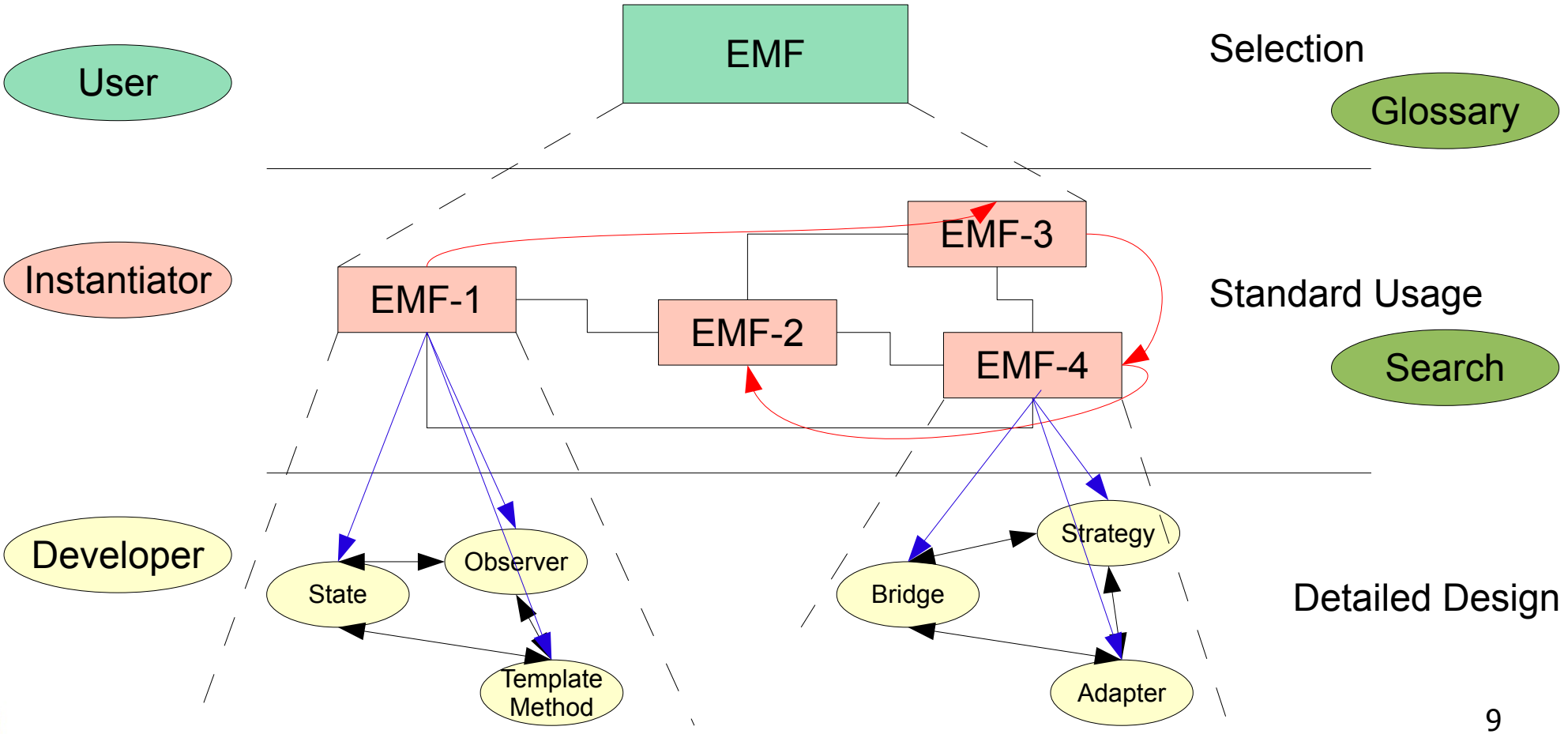
Application Pattern Documentation is Threaded

- For a tutorial, the application patterns will be **threaded**



Third Level: Detailed Design

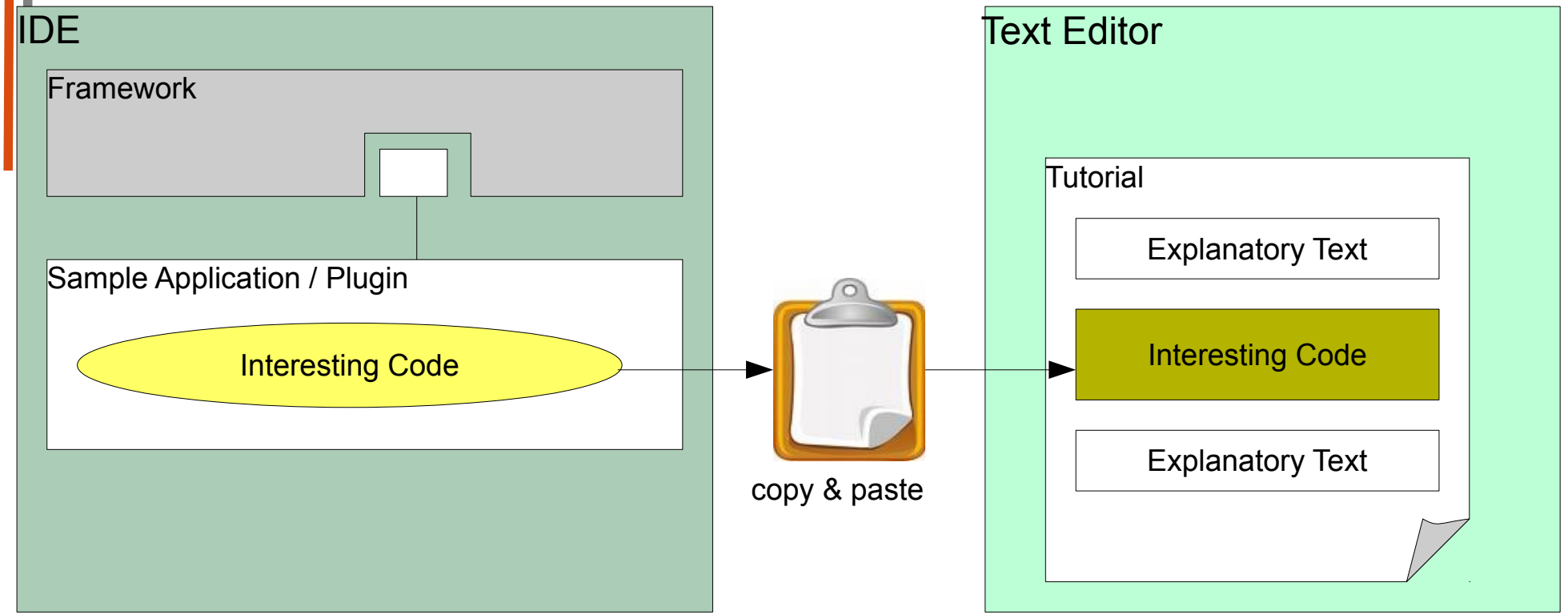
- On this level, the framework is documented by
  - Design patterns within the framework
  - Design patterns at the border of the framework (framework hook patterns)
- Additionally, a glossary and a search engine can be provided



Realization with Elucidative Programming

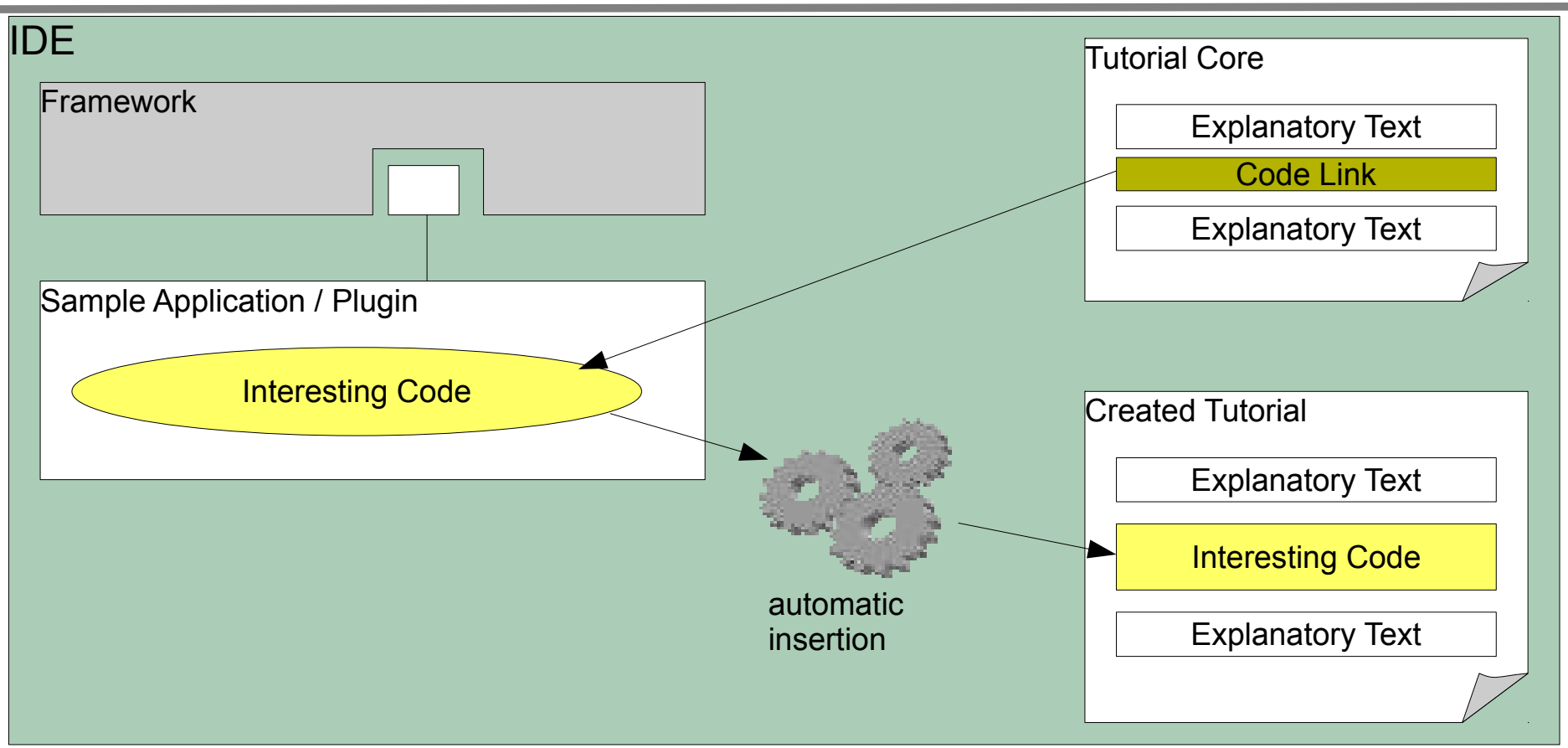
- **Elucidative programming** is programming by example
  - Basically cross-linked implementation documentation
  - Better form of literate programming (non-linear, but hypertext)
- 2 screens
  - Left: documentation
  - Right: source code
- A markup language marks up source code and puts fragments into the documentation
  - Crosslinking between source and documentation possible
- Documentation threads (as required for tutorials on level 2)
- Tools
  - Java elucidator http://elucidator.sf.net
  - Scheme elucidator
  - DocSewer tools for tutorial threads
    - DEFT http://deftproject.org

Tutorial Creation – Conventional Approach



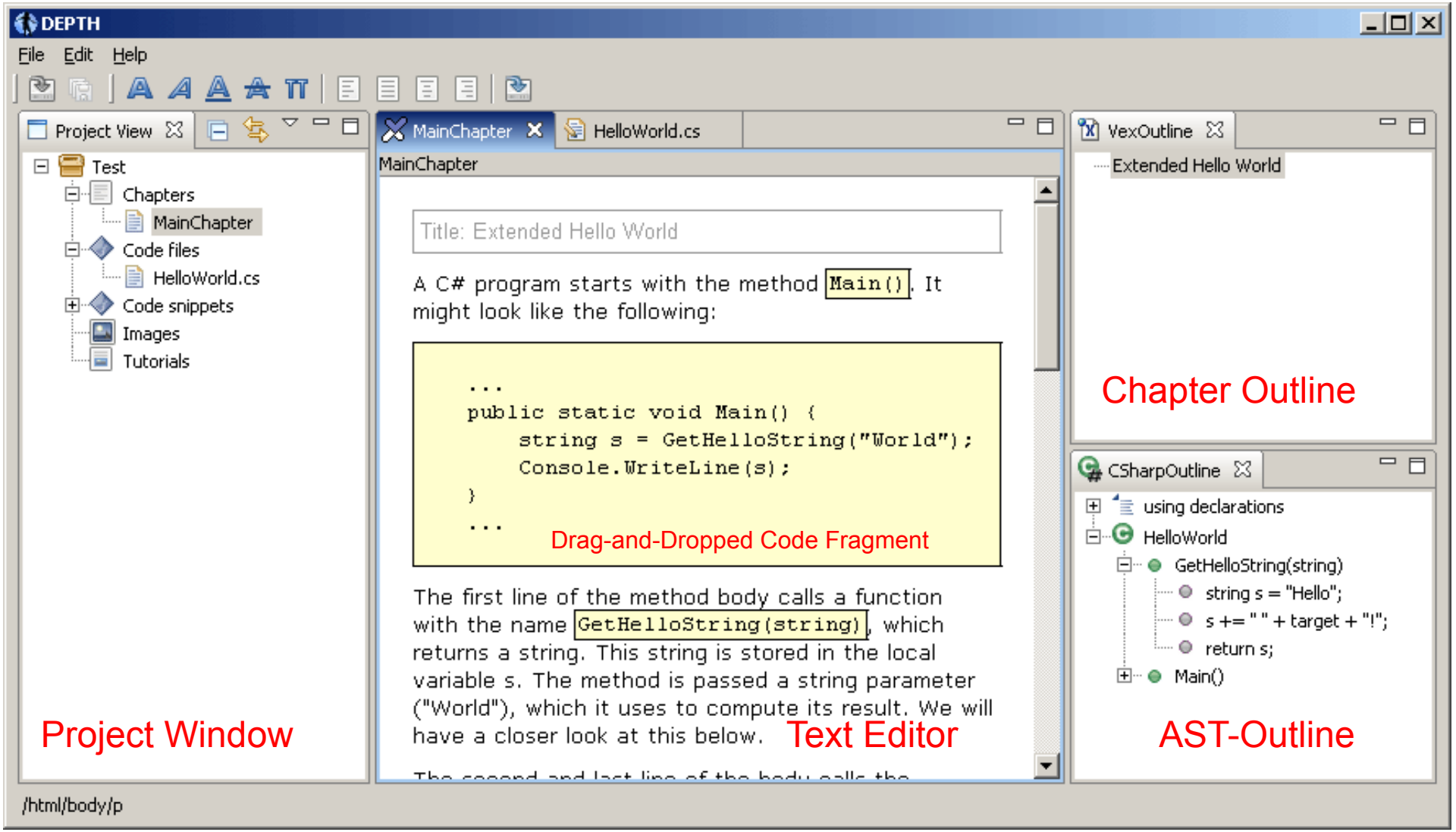
- Framework and Sample Plugin can be developed side by side
- Tutorial is detached and needs special treatment
  - code fragments are copied manually
  - documented code fragments can become inconsistent when framework and Sample Plugin evolve

Solution - Tutorial Generation Environment



- Tutorial can be developed along with Framework and Sample Application
  - code not included directly, only linked
  - automatic tutorial update when original code changes

Documenting HelloWorld with DEFT (Development Env. for Tutorials)

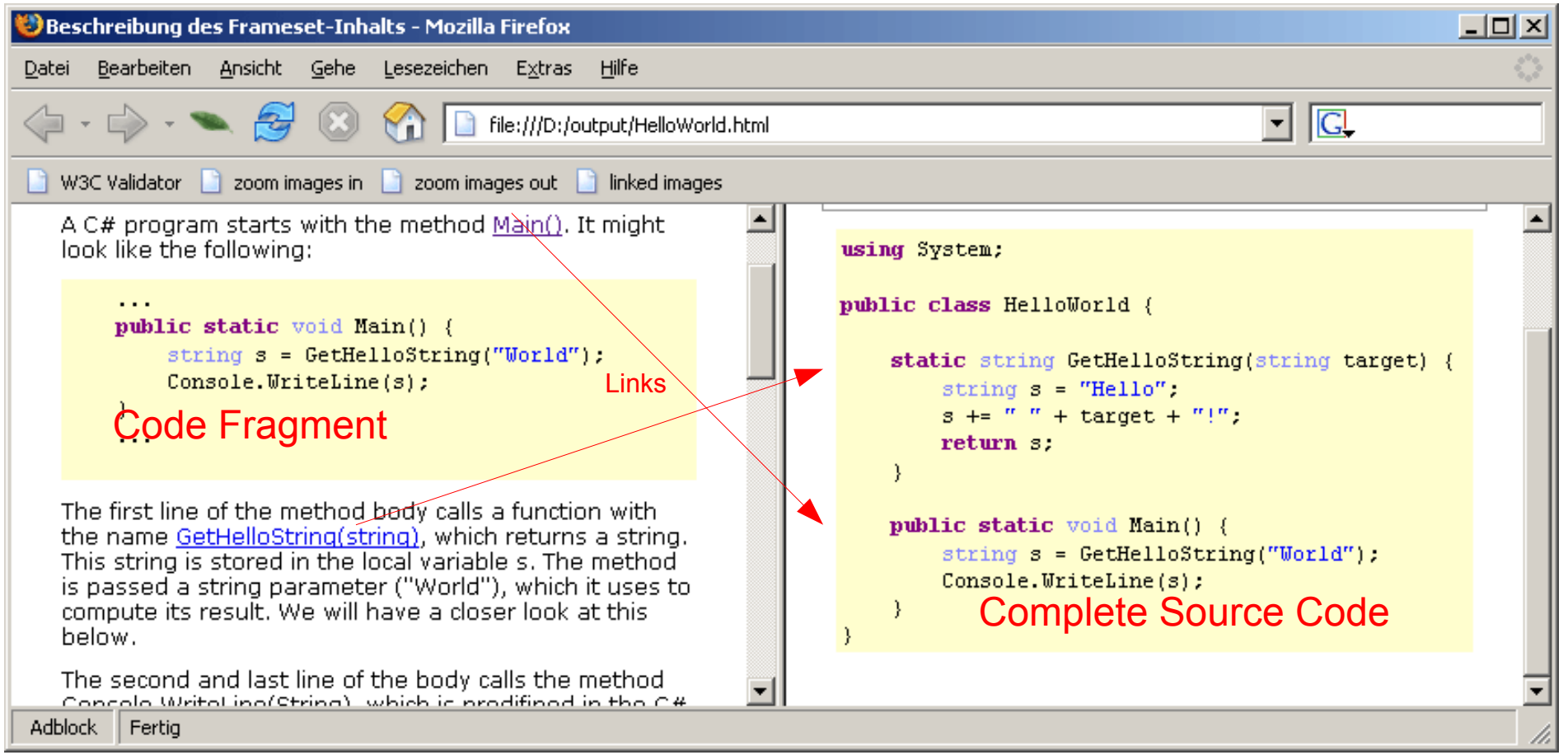


- http://deftproject.org

Documenting HelloWorld

- write explanatory text
- embed code fragments via drag&drop
- set different styles for code fragments
  - code snippets
  - in-line fragments for variable-/method names
- select output format (HTML, PDF, ...)
- compile tutorial to output format

HTML Output


Beschreibung des Frameset-Inhalts - Mozilla Firefox
Datei Bearbeiten Ansicht Gehe Lesezeichen Extras Hilfe
file:///D:/output/HelloWorld.html
W3C Validator zoom images in zoom images out linked images
A C# program starts with the method Main(). It might look like the following:
...
public static void Main() {
string s = GetHelloString("World");
Console.WriteLine(s);
}
...
Code Fragment
Links
The first line of the method body calls a function with the name GetHelloString(string), which returns a string. This string is stored in the local variable s. The method is passed a string parameter ("World"), which it uses to compute its result. We will have a closer look at this below.
The second and last line of the body calls the method
using System;
public class HelloWorld {
static string GetHelloString(string target) {
string s = "Hello";
s += " " + target + "!";
return s;
}
public static void Main() {
string s = GetHelloString("World");
Console.WriteLine(s);
}
}
Complete Source Code
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The End