

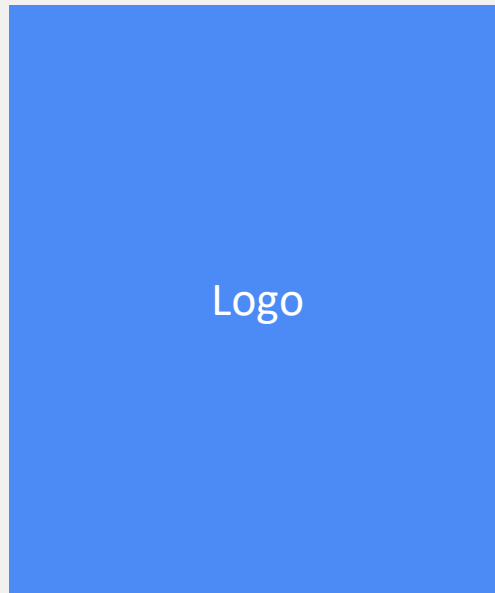
# CONTENTS

- General
  - Tools & Plugins
  - Languages
  - Libraries
- Details
  - Implementation
  - Development
  - Architecture
- Live Preview
  - Algorithms and Features

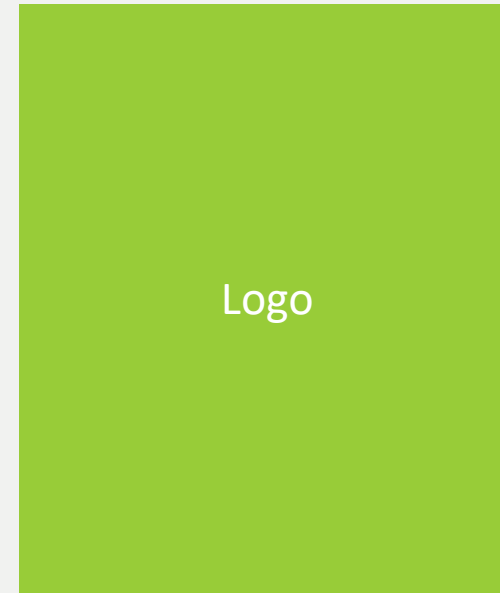
# TOOLS & PLUGINS



**PhpStorm 2017.2.4**



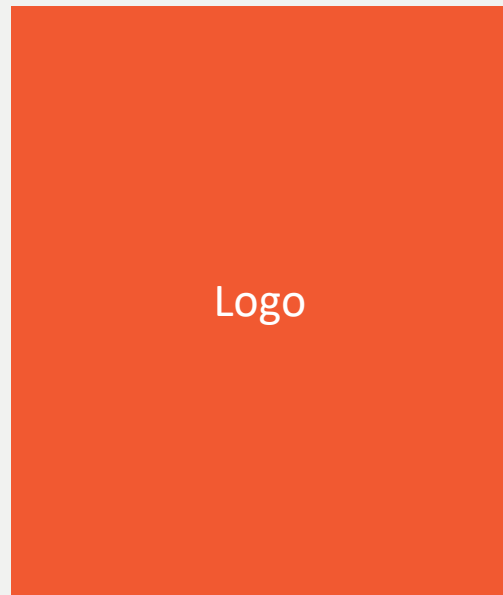
**Chrome**



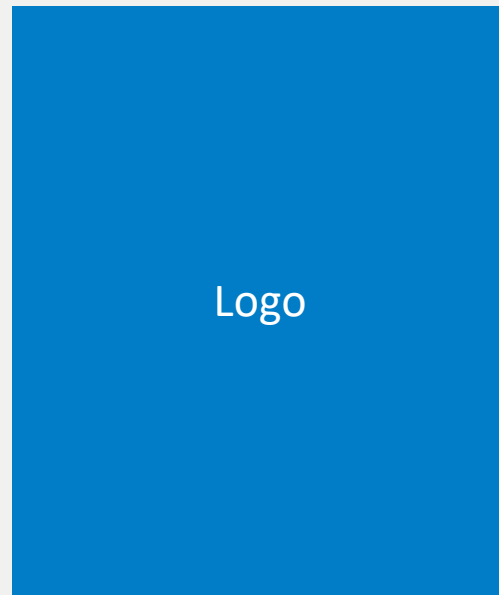
**JsTestDriver**

**Fig. 1.1:** Logos of Chrome-Browser, IDE PhpStorm and Unit-Test -Environment JsTestDriver [P2, P3]

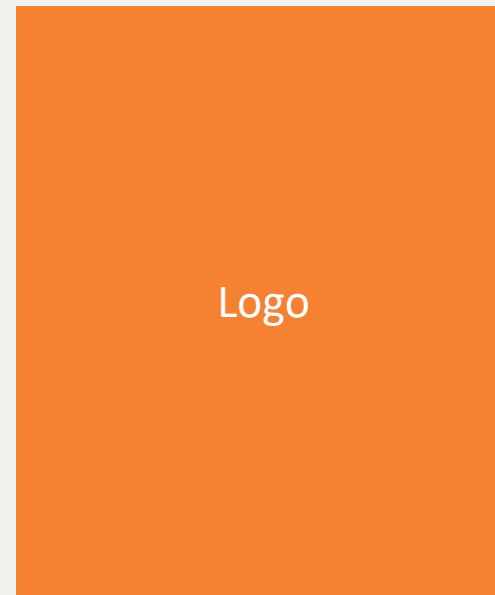
# LANGUAGES



**HTML 5**



**CSS 3**



**JavaScript**  
(ECMAScript 5.1)

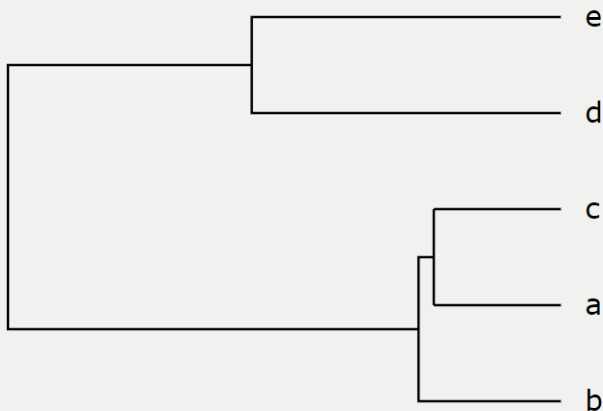
**Fig. 1.2:** Logos of HTML 5, CSS 3 and JavaScript [P4]

*jQuery*

namespace.js

***Knockout***

FileSaver.js



***jsPhyloSVG***

**Fig. 1.4:** Phylogenetic Tree  
created with jsPhyloSVG

**Fig. 1.3:** Logos of used libraries [P5-P7]

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# DETAILS

IMPLEMENTATION, DEVELOPMENT  
& ARCHITECTURE

# IMPLEMENTATION

## OBJECT-ORIENTED PROGRAMMING

```
1 (function() {  
2   // namespace name, "static" methods  
3   namespace("needlemanWunsch", NeedlemanWunsch);  
xx   ...  
12  function NeedlemanWunsch() {  
13    // inheritance  
14    alignmentInstance = new bases.alignment.Alignment(this);  
15  
16    this.setInput = alignmentInstance.setLinearAlignmentInput;  
17    this.compute = alignmentInstance.compute;  
18    this.getOutput = alignmentInstance.getOutput;  
19  
20    // public methods (available through an instance)  
21    this.getSuperclass = getSuperclass;  
22  }  
xx  ...  
89 }());
```

Code 2.1: OOP-Simulation

# IMPLEMENTATION

## OBJECT-ORIENTED PROGRAMMING

```
1 (function() {  
2   // namespace name, "static" methods  
3   namespace("needlemanWunsch", NeedlemanWunsch);  
xx  
12  function NeedlemanWunsch() {  
xx    ...  
20    // public methods (available through an instance)  
21    this.getSuperclass = getSuperclass;  
22  }  
23  
24  function a() { // private, because not defined in constructor  
xx    ...  
25  }  
xx  ...  
86  function getSuperclass() { // public, because in constructor  
87    return alignmentInstance;  
88  }  
89 }());
```

**Code 2.1:** OOP-Simulation

## DEVELOPMENT EXTENSIVELY TESTED

- 52 Unit-Tests
  - step-by-step PDF-files
  - implementations with **JsTestDriver**

### T-Coffee

$$\begin{aligned} EL_{1,1}^{a,c} &= L_{1,1}^{a,c} + \sum_{x \in \{b\}} \sum_{k \in \{1,2\}} \min(L_{1,k}^{a,x}, L_{k,1}^{x,b}) \\ &= \frac{200}{3} + \min(L_{1,1}^{a,b}, L_{1,1}^{b,c}) + \min(L_{1,2}^{a,b}, L_{2,1}^{b,c}) \\ &= \frac{200}{3} + \min(100, 0) + \min(0, 50) \end{aligned}$$

$$\begin{aligned} EL_{2,2}^{a,c} &= L_{2,2}^{a,c} + \sum_{x \in \{b\}} \sum_{k \in \{1,2\}} \min(L_{2,k}^{a,x}, L_{k,2}^{x,b}) \\ &= \frac{200}{3} + \min(L_{2,1}^{a,b}, L_{1,2}^{b,c}) + \min(L_{2,2}^{a,b}, L_{2,2}^{b,c}) \\ &= \frac{200}{3} + \min(0, 50) + 0 \end{aligned}$$

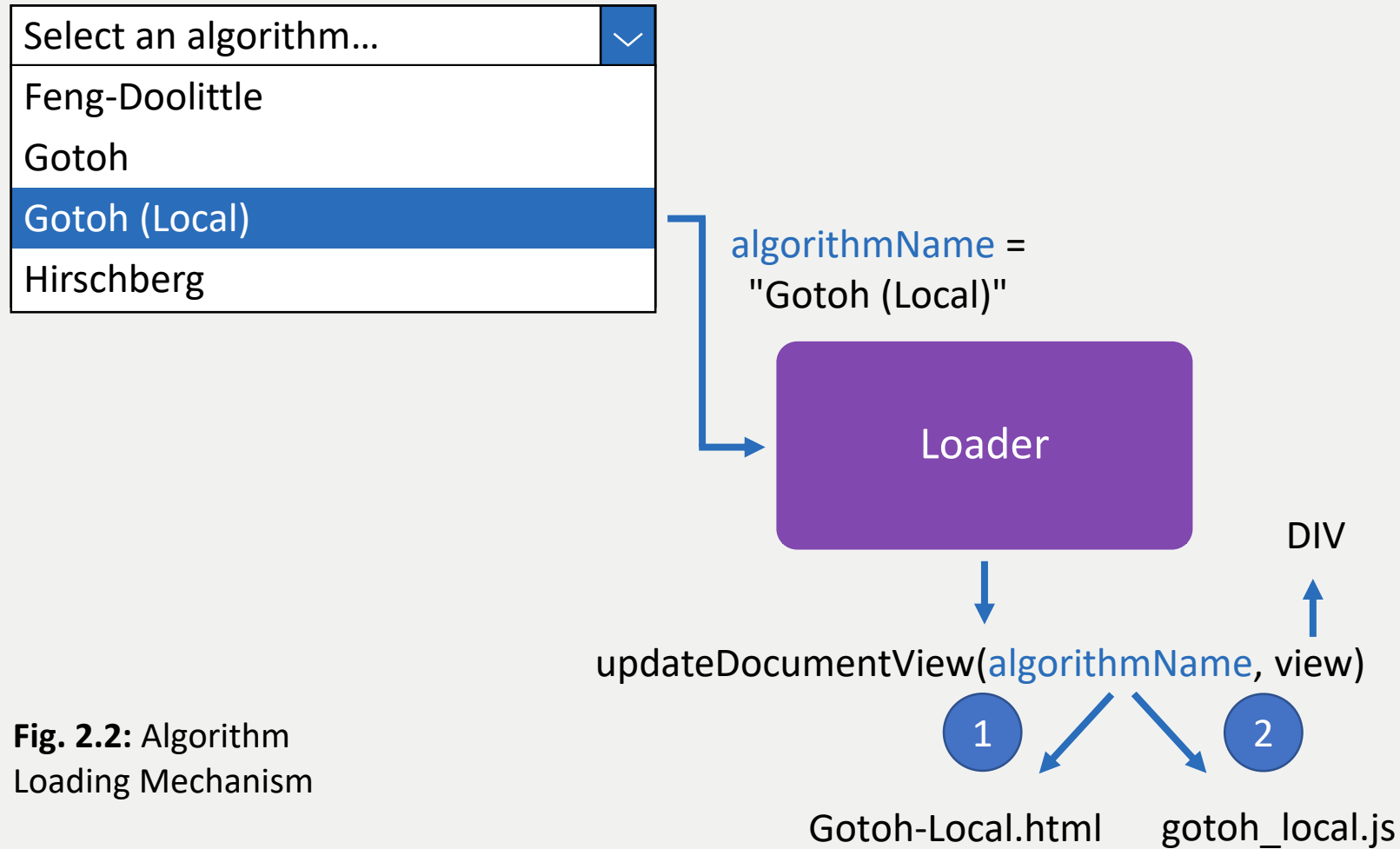
PDF

**Fig. 2.1:**  
Excerpt from unit-test  
Notredame-Higgins-Heringa



# ARCHITECTURE

## LOADING



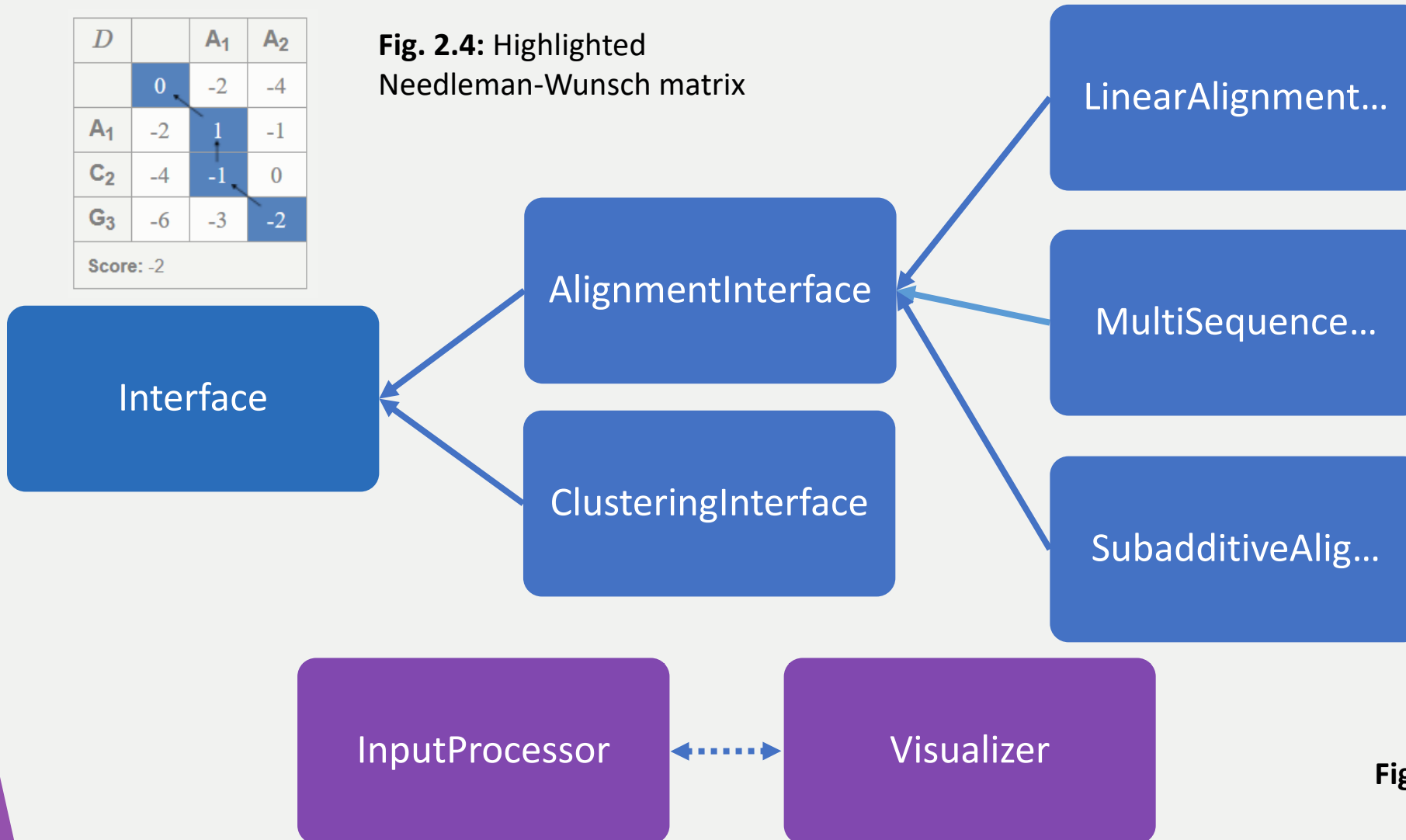
**Fig. 2.2:** Algorithm Loading Mechanism

# ARCHITECTURE

## SEPARATION OF ALGORITHM AND INTERFACE LOGIC

<i>D</i>		<i>A</i> <sub>1</sub>	<i>A</i> <sub>2</sub>
	0	-2	-4
<i>A</i> <sub>1</sub>	-2	1	-1
<i>C</i> <sub>2</sub>	-4	-1	0
<i>G</i> <sub>3</sub>	-6	-3	-2
Score: -2			

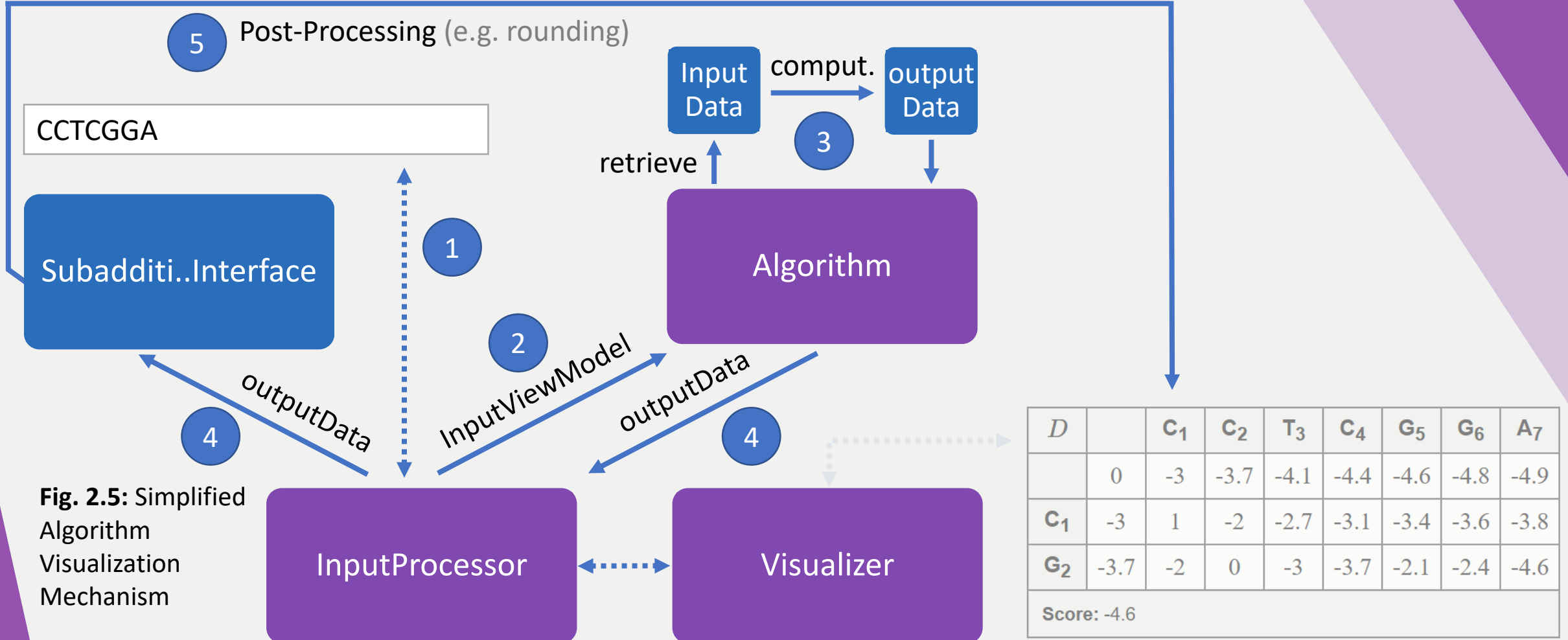
**Fig. 2.4:** Highlighted Needleman-Wunsch matrix



**Fig. 2.3:** Partial class diagram

# ARCHITECTURE

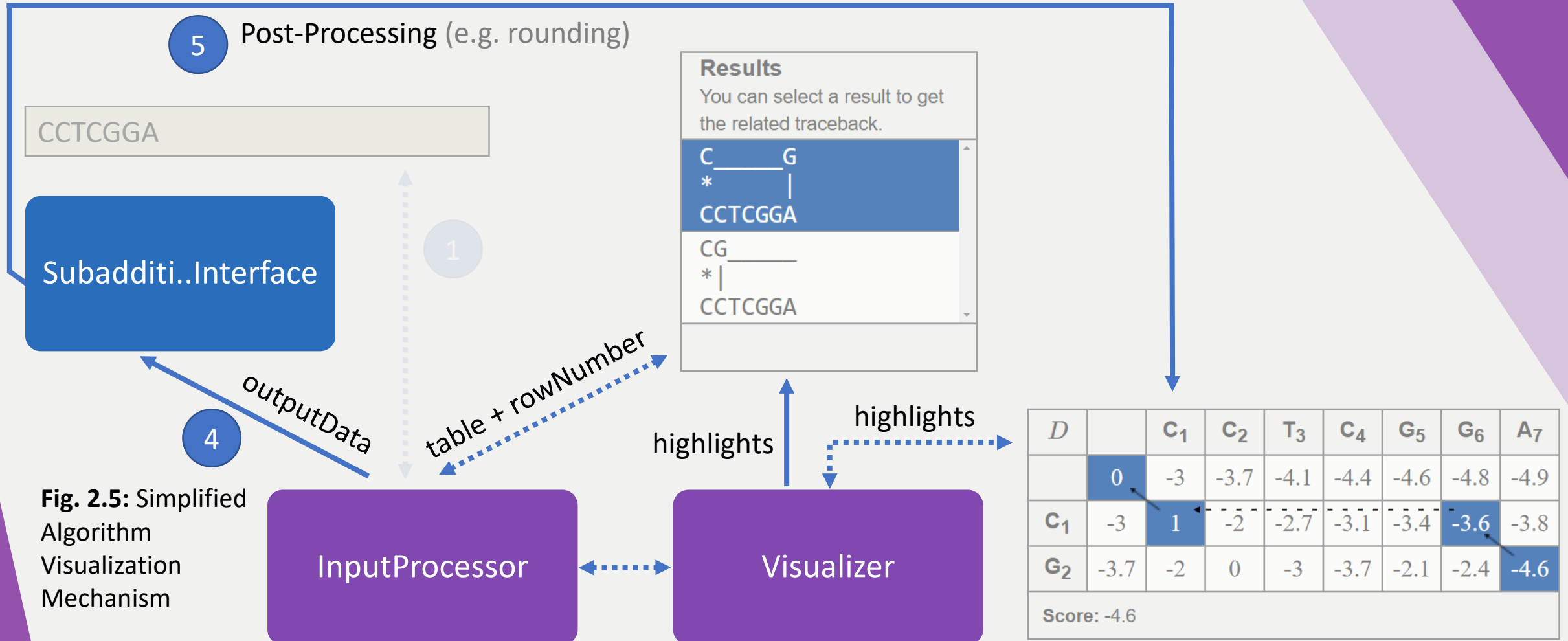
## SEPARATION OF ALGORITHM AND INTERFACE LOGIC



**Fig. 2.5:** Simplified Algorithm Visualization Mechanism

# ARCHITECTURE

## SEPARATION OF ALGORITHM AND INTERFACE LOGIC



**Fig. 2.5:** Simplified Algorithm Visualization Mechanism

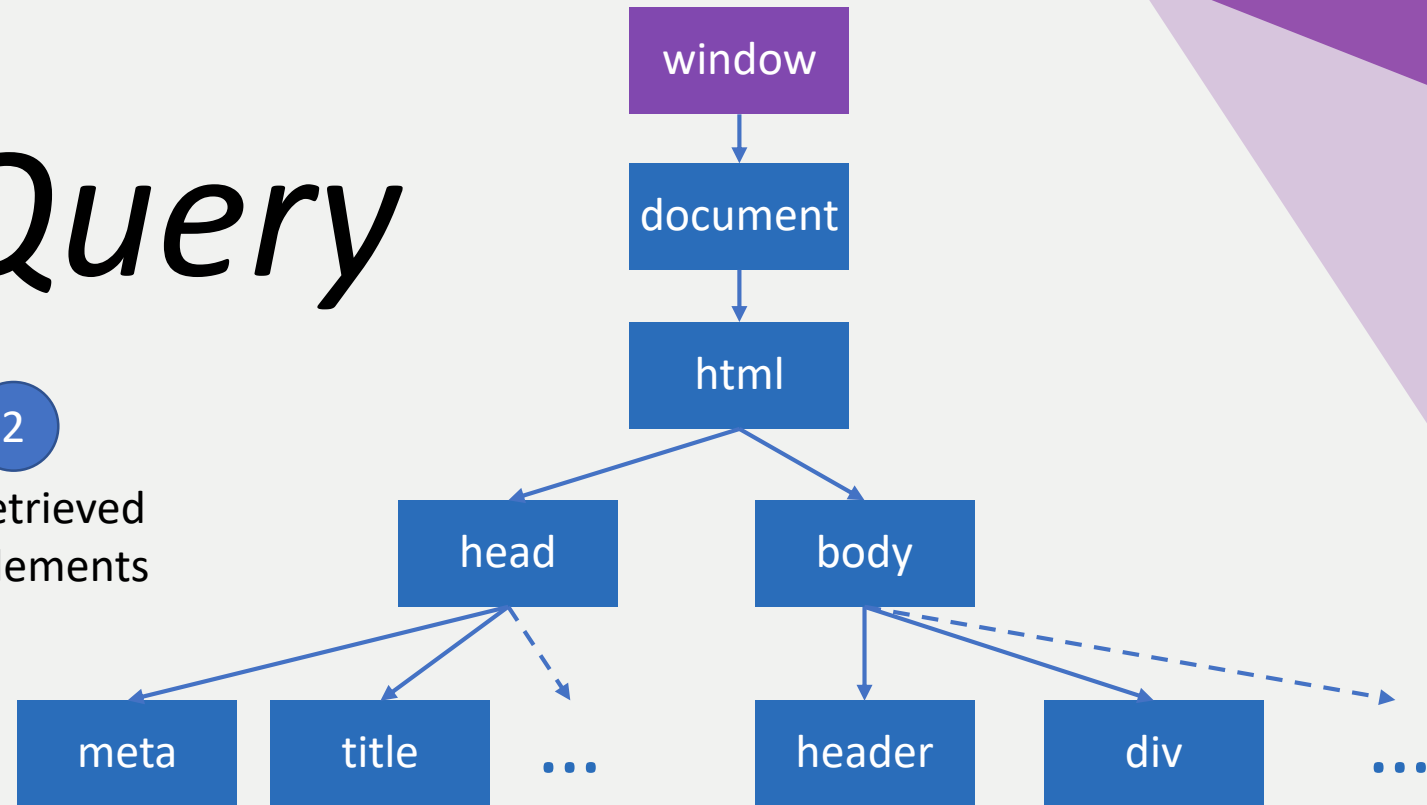
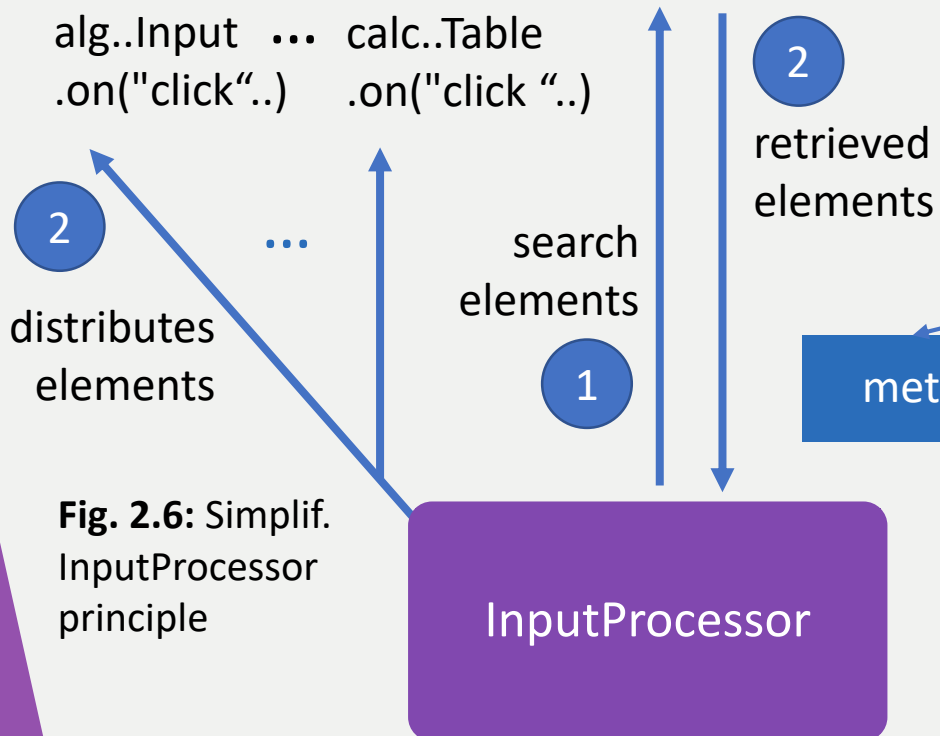
# ARCHITECTURE

## ADVANTAGES – IDEA BEHIND

# *jQuery*

### bindings:

alg..Input ... calc..Table  
.on("click"..) .on("click "..)



**Fig. 2.6:** Simplif.  
InputProcessor  
principle

**Important!**  
Only InputProcessor is allowed to  
retrieve HTML-elements.

# SOURCES

- [1] 2017.12.09, jQuery Traversing,  
URL: [https://www.w3schools.com/jquery/jquery\\_traversing.asp](https://www.w3schools.com/jquery/jquery_traversing.asp)