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shaping tomorrow with you

Remastering Legacy Java

2019.5.15

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Fujitsu and Java

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- One of the oldest Java related products vendor

  Including Java for mainframe

- Interstage Application Server since 1998

  Java EE certified GlassFish base application server

- Interstage Studio

  Eclipse base

  classic GUI library for client desktop

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History of Client Java

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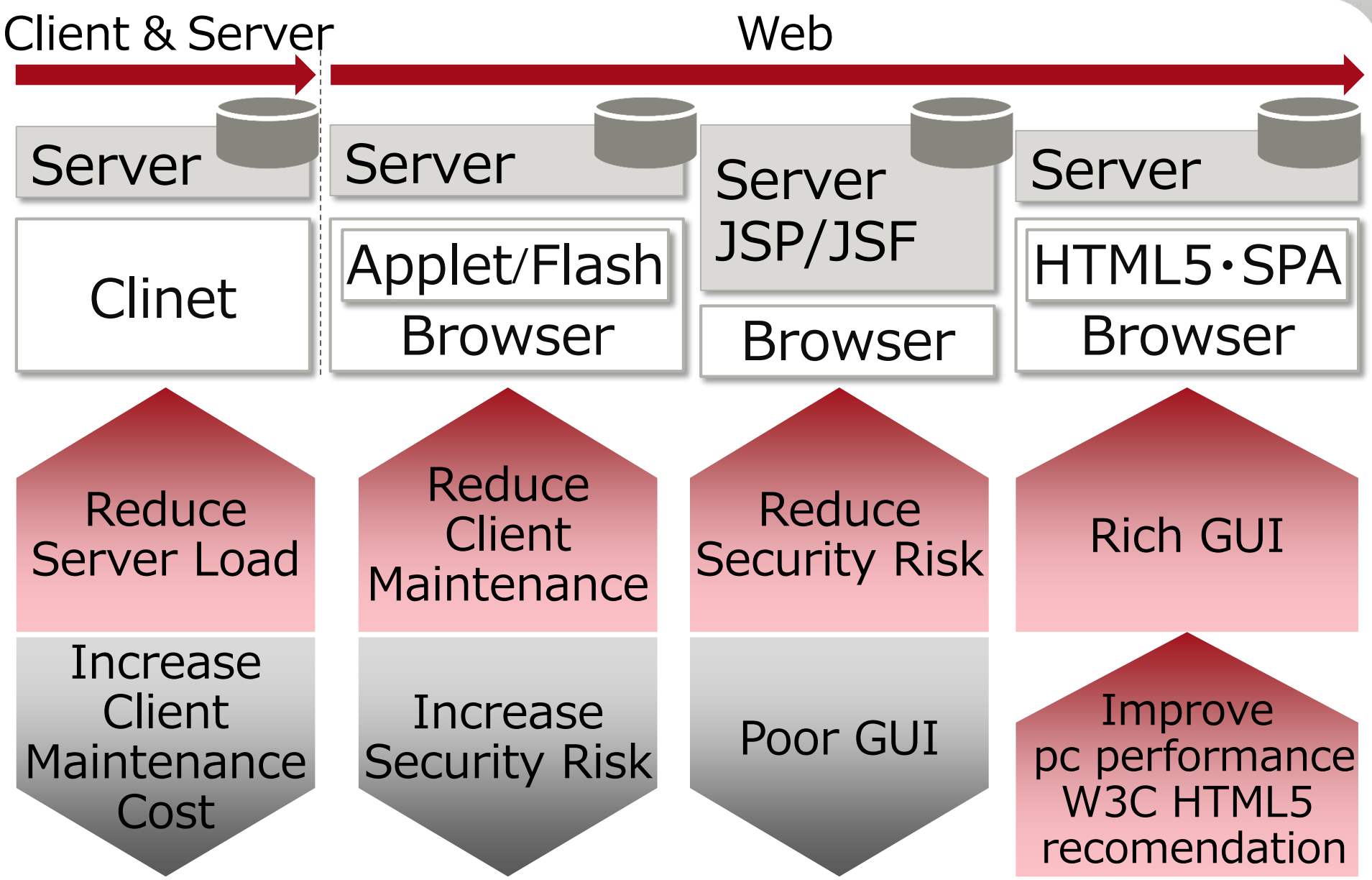

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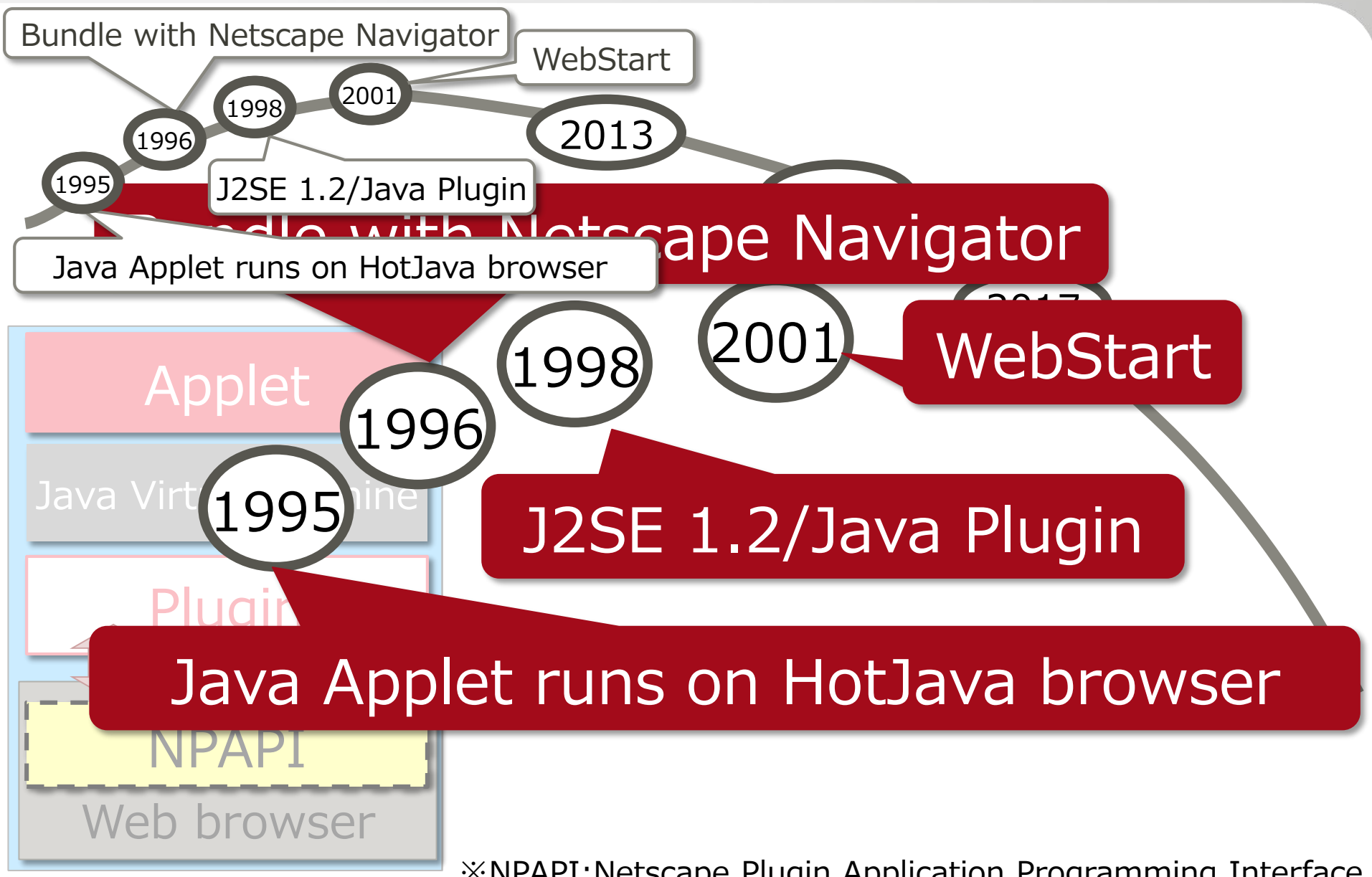
Applet Technology



※NPAPI:Netscape Plugin Application Programming Interface

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Applet Technology

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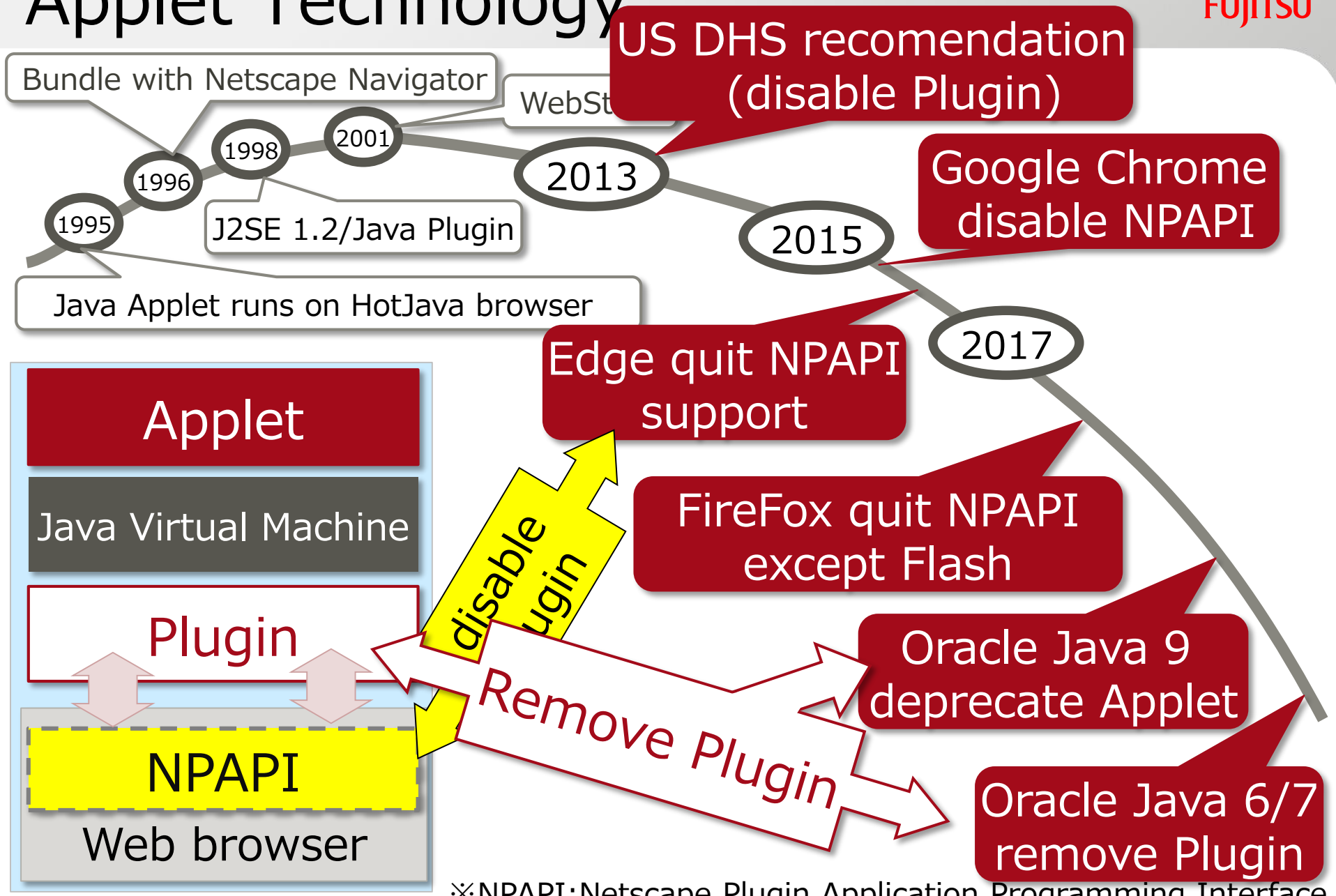

※NPAPI:Netscape Plugin Application Programming Interface

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Applet Resources

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How much are there Applet ?

Fujitsu Customers	# of client pc
A Company	90,000
B Company	70,000
C Company	54,000
D Company	21,000
E Company	5,000
F Company	3,500
G Company	3,000
H Company	3,000
Total	249,500

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Migration Plans

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1 Use Applet

until end of IE11

2 Use JSP/JSF

JavaServer Faces

Not so much used ?

3 use HTML5/JavaScript

favorite!?

ANGULARJS by Google

jQuery write less, do more.

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Jakarta EE survey (used API)

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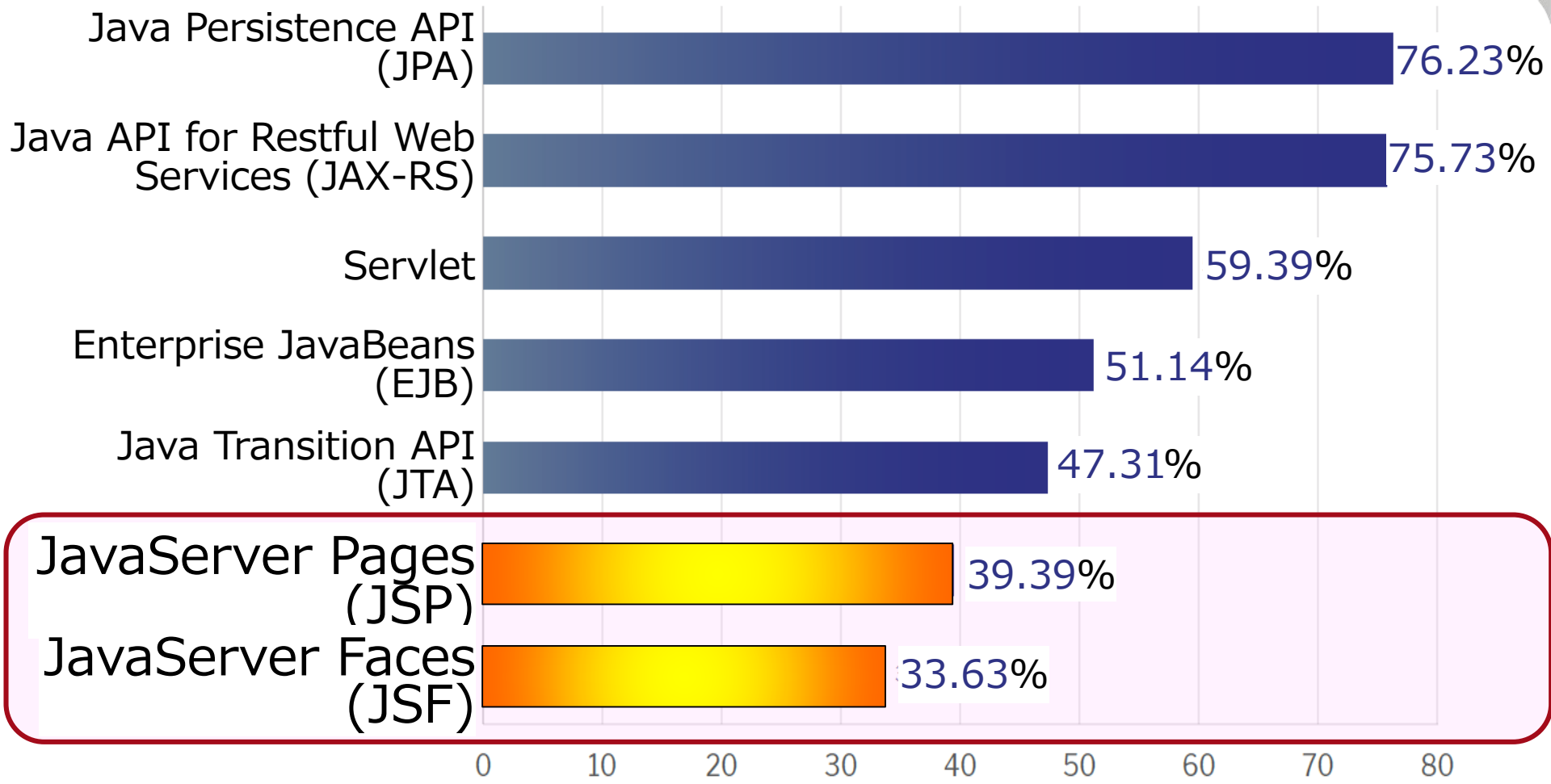

※https://jakarta.ee/news/2018/04/24/jakarta-ee-community-survey/

JSP/JSF are not used so much

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Migration Technologies

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DukeScript	Java app runs on browser without Plugin https://dukescript.com/
jpro	JavaFX app runs on browser https://www.jpro.io
JSweet	Transpiler from Java to JavaScript http://www.jsweet.org/

jpro

jsweet

assert Java.equals(JavaScript)

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Transpiler

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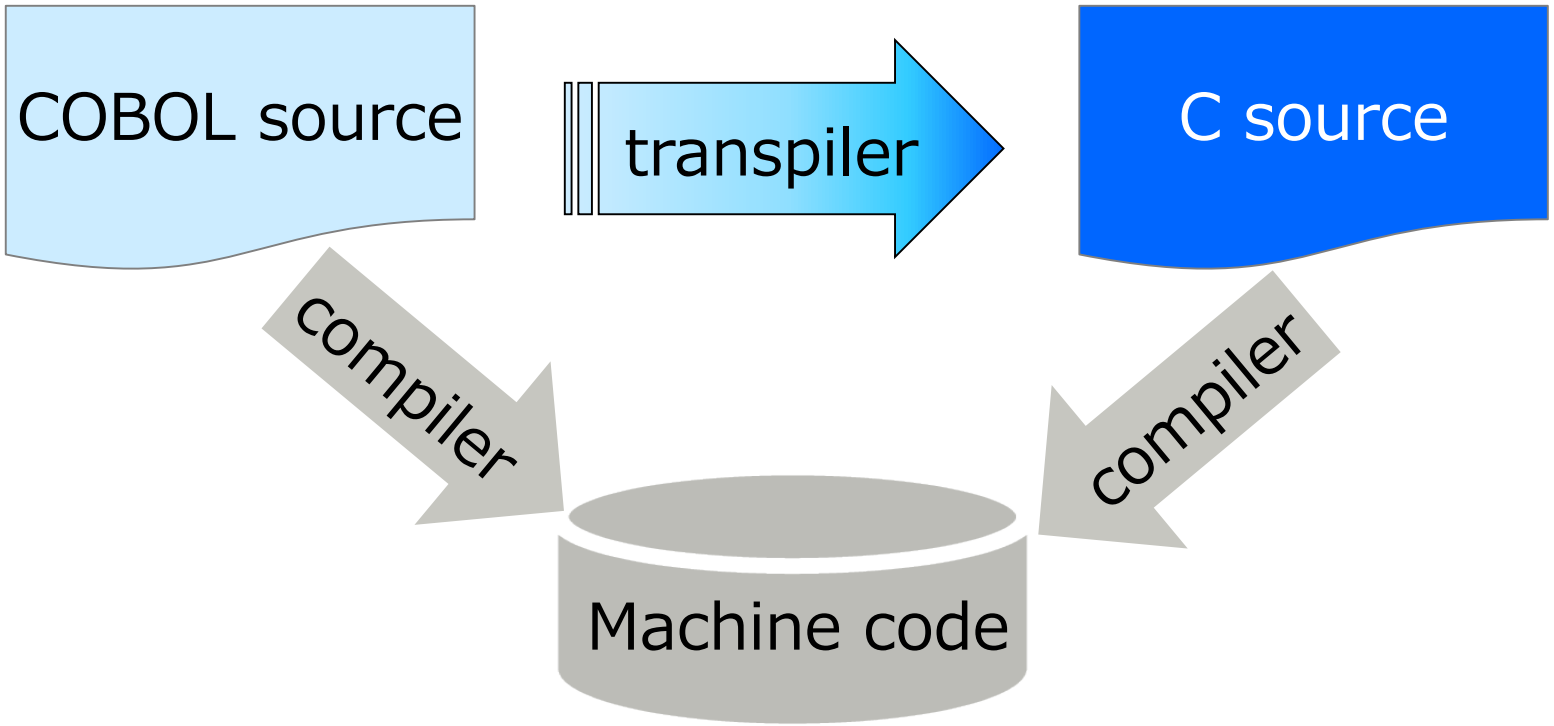
Change source code in a language to same code in a different language

Difference between transpiler and compiler



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Examples of transpiler

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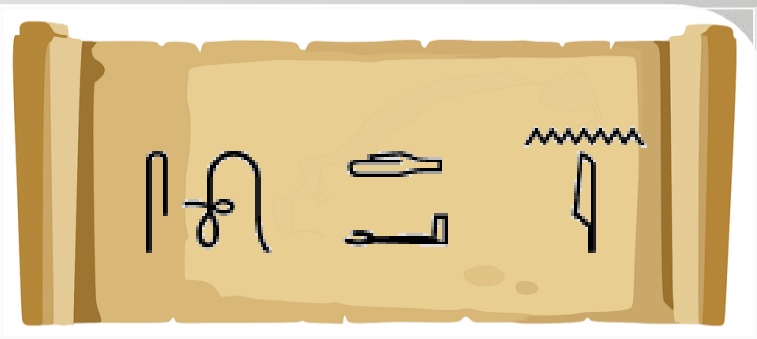
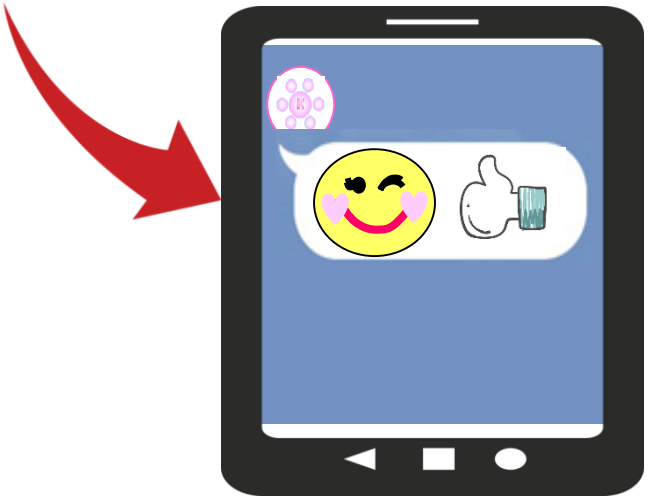
- Legacy language
  - Fortran → C (f2c)
  - C++ → C (cfront)



- JavaScript (altJS)
  - TypeScript → JavaScript
  - CoffeeScript → JavaScript



- Legacy to JavaScript
  - Java → JavaScript (GWT, JSweet)
  - Haskell → JavaScript (GHCJS)

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Java→JavaScript transpiler

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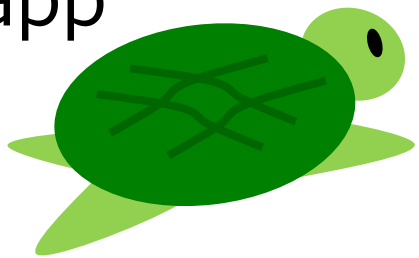
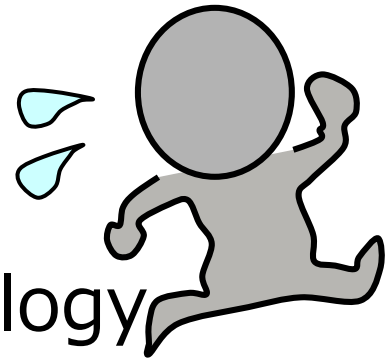
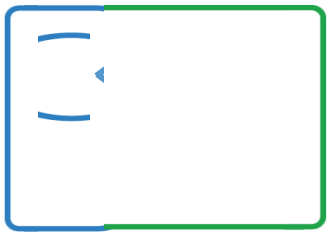
- pros
  - Need not know JavaScript
  - Easy to migration of legacy Java app
  - IDE support



- cons
  - Rapid frontend technology
  - API mismatch





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JSweet

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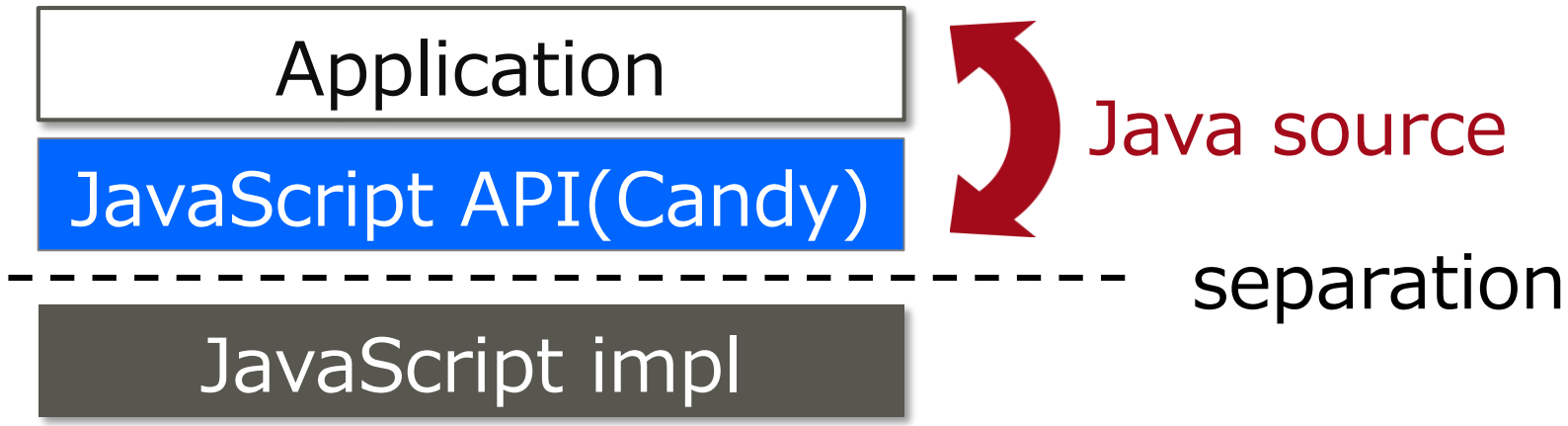
- Java → TypeScript(JavaScript) transpiler
  - http://jsweet.org
- Syntax Mapper
  - Only Syntax conversion
  - Use JavaScript API in Java code
- Resolve existing problems of transpiler



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Existing transpiler (API conversion)

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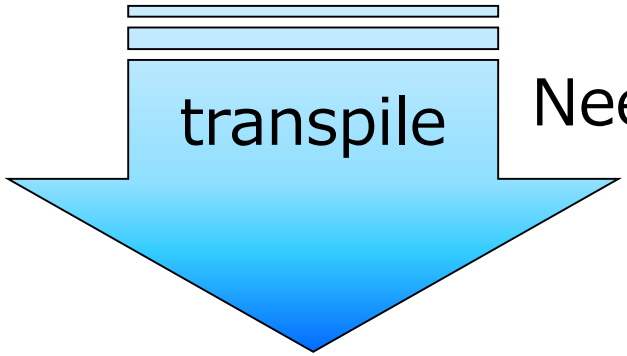
Input Java source

```
Button button = new Button();
button.setLabel(“click me”);
```



Need not modify Java source

Output JavaScript

```
var button = document.createElement(“button”);
button.innerText = “click me”;
```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JSweet transpiler (Syntax Mapper)

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Input Java source

```
Button button = new Button();
button.setLabel("click me");
```

Modify Java source

API conversion

Modified Java source

```
HTMLButtonElement button =
                    document.createElement(StringTypes.button);
button.innerText = "click me";
```

transpile

Syntax Mapper

Output TypeScript

```
let button : HTMLButtonElement=
                    document.createElement("button")
button.innerText = "click me";
```


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New problem

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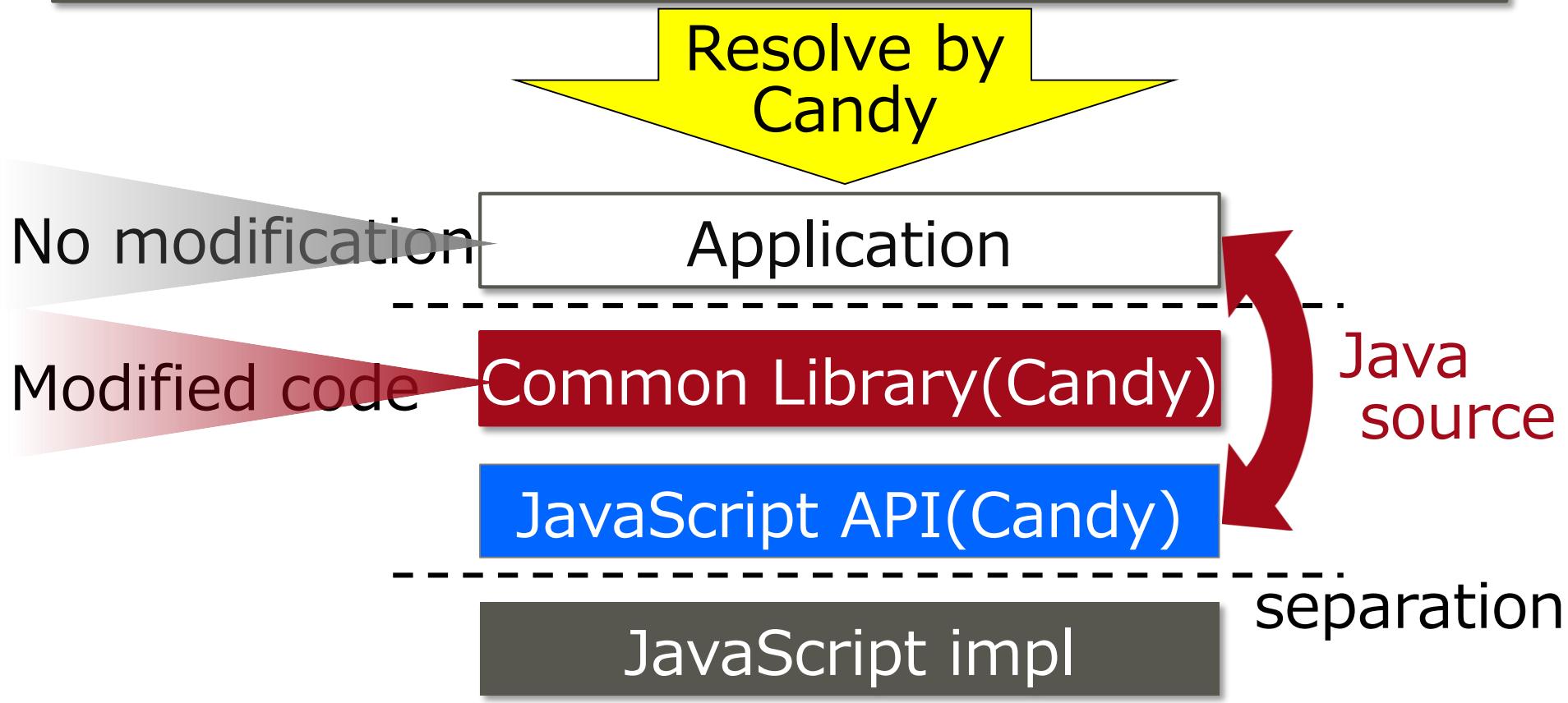
Need source modification before transpilation



Good for systems using common library/framework

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JSweet (practical way)

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Input Java source

```
Button button = new Button();
button.setLabel("click me");
```

```
public class Button extends JButton {
  public void setLabel(String label) {
    this.label = label;
  }
```

No modification for app

Modify only library (API conversion)

```
Button button = new Button();
button.setLabel("click me");
```

```
public class Button {
  public Button {
    button =
     document.createElement(StringTypes.button);
  }
  public void setLable(String label);
    button.innerText = label;
  }
```

transpile

Syntax Mapper

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Candy (JSweet library)

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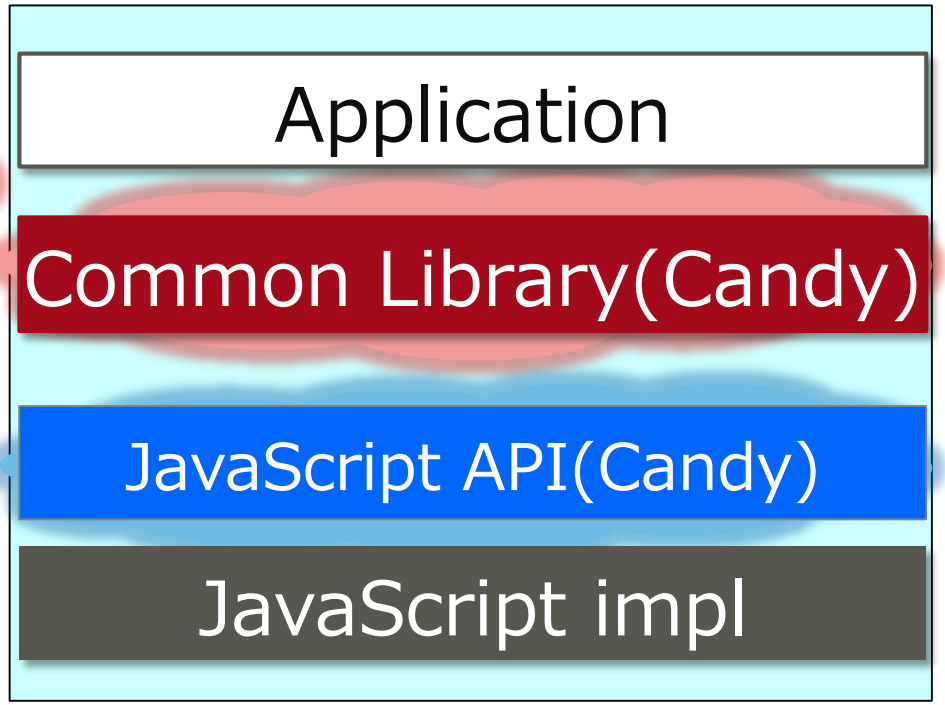
- Bridge between Java and JavaScript
  - There are 1744 Candy registered (as of 2018/5)
    http://www.jsweet.org/candies-releases/
  - Can create your own
- Candy types
  - Java Candy: common Java library can be used by JSweet
  - JavaScript Candy: bridge to existing JavaScript



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System of Company A

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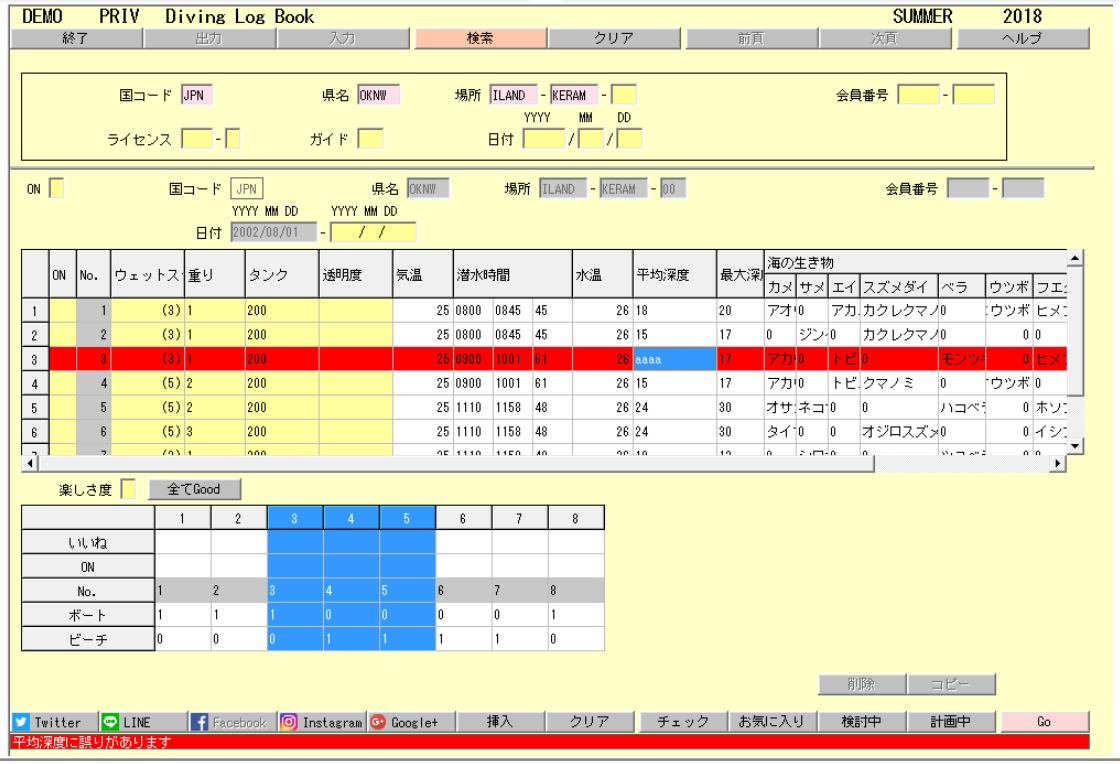
Summary of system

- 22K LoC Applet
- Created more than 10years ago
- Use Fujitsu GUI product

Requirements

- Migrate to JavaScript with less cost and time
- Must be same as before for Looks and operation



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Fujitsu product for Client

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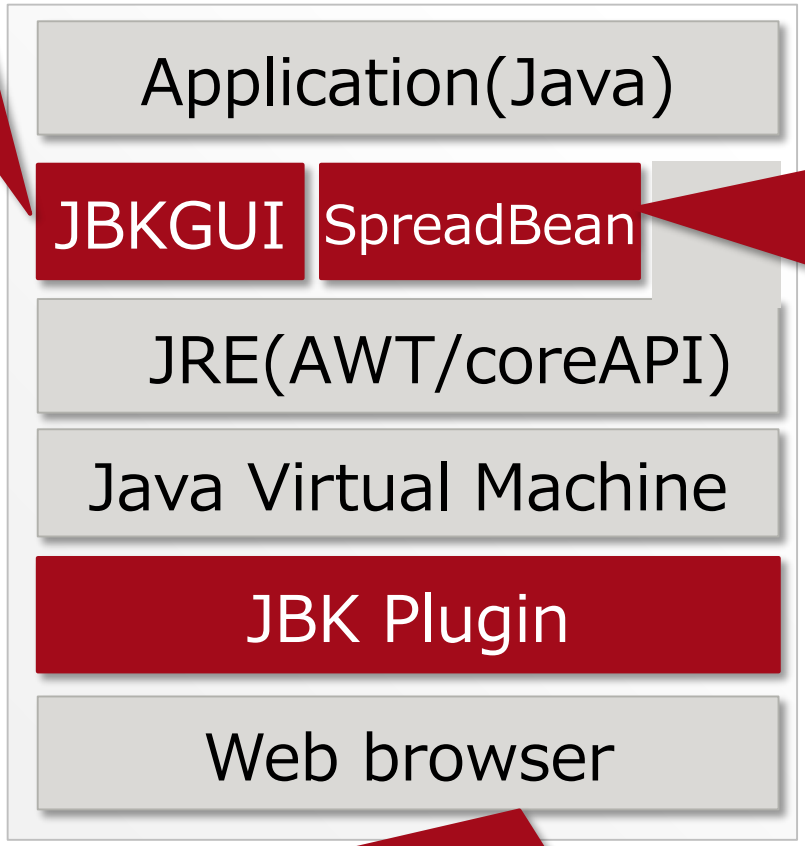
provide button,label,frame and dialog for Java GUI application



Spread functions similar to Excel for Java application

Run applet on Web browser

*JBK: J Business Kit

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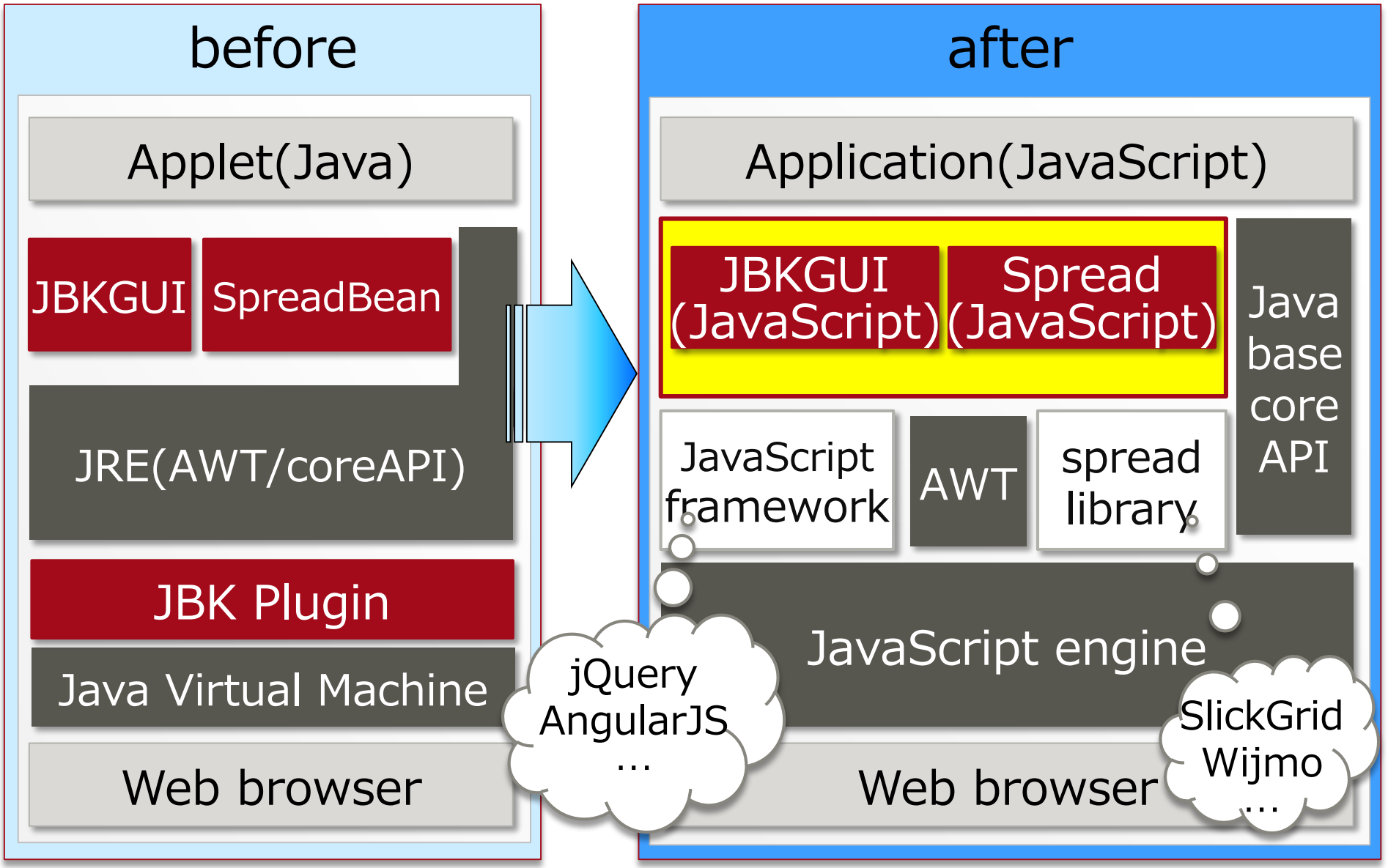
Applet transformation



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Result

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LoC of two windows

	LoC			%auto
	total	manual	auto	
A window	6,102	63	6,039	99.0%
B window	4,764	44	4,720	99.1%
common	11,789	849	10,940	92.8%
total	22,655	956	21,699	95.8%

manual: need to modify for transpiler

High auto transformation
by Candy of Fujitsu product

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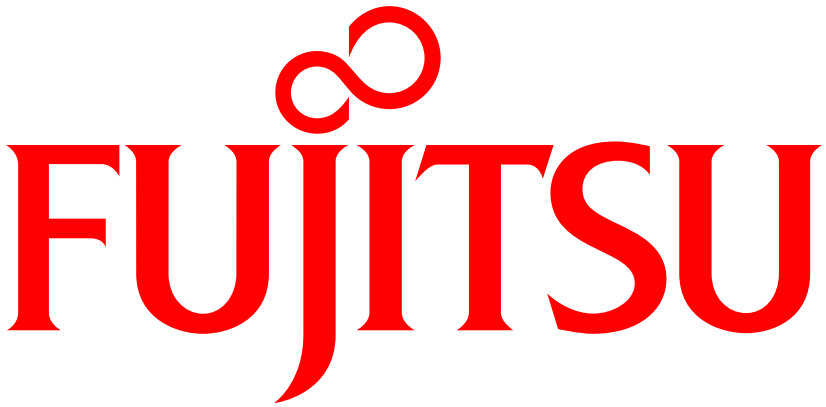

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