Eclipse 4

Eclipse Day Toulouse 24 mai 2012

OPC 12 ECD PRE E4A 01 A

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Eclipse 4

Introduction / OPCoach

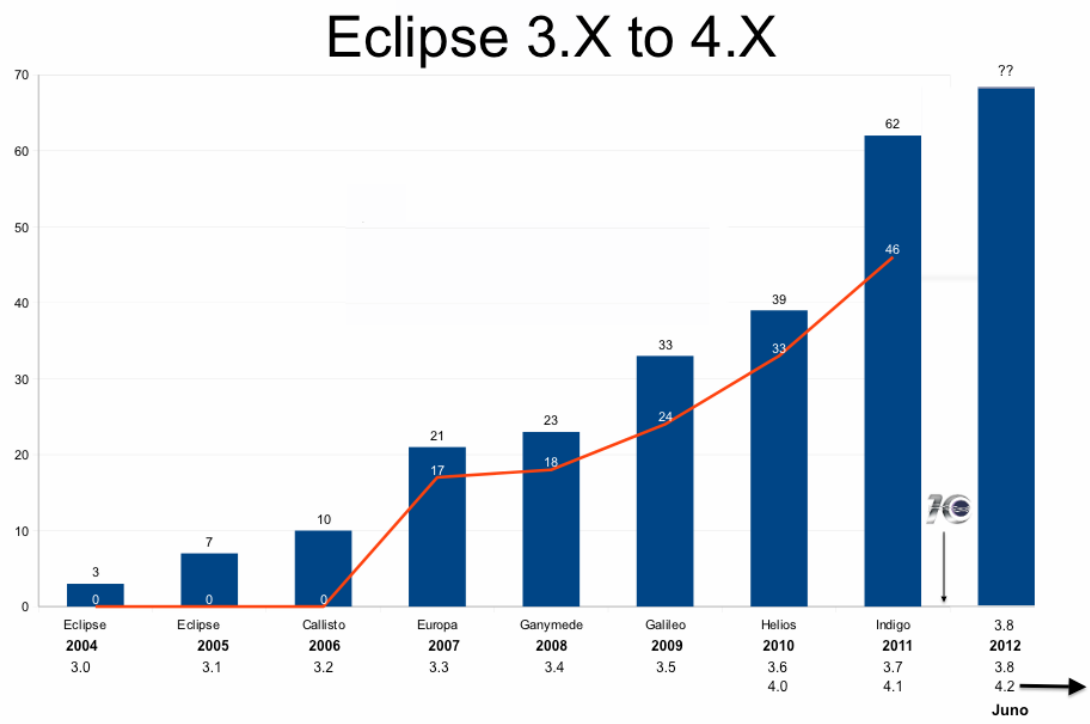
- Company founded in June 2009 *http://www.opcoach.com*
- Member of the Eclipse Foundation (Solution Member)
- 3 Eclipse-based activities:
  - Expertise
  - Training
  - Employment

Agenda

This talk will focus on :

- 3.X history, advantages and disadvantages
- E4 architecture: the application model
- Injection and annotations
- CSS Styling
- Compatibility layer
- Questions : keep 3.X ? use 4.X ?

3.X deliveries



Eclipse 3.X History

Reasons for change

The benefits of Eclipse 3.X / RCP:

- rich software platform
- architecture based on OSGi
- extension point concept
- portable to all environments
- advanced Tooling (JDT, PDE, EMF, ...)
- adopted by many providers
- EPL : open source license

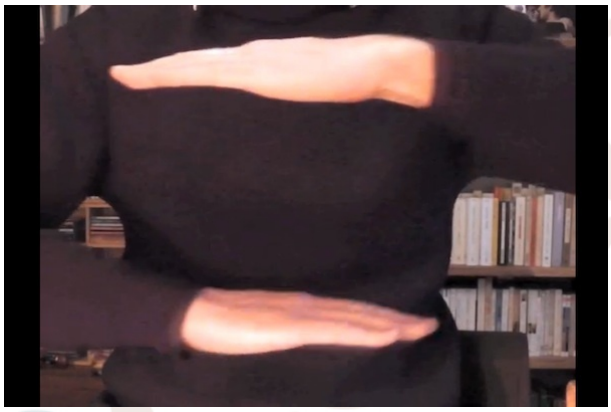
But ...

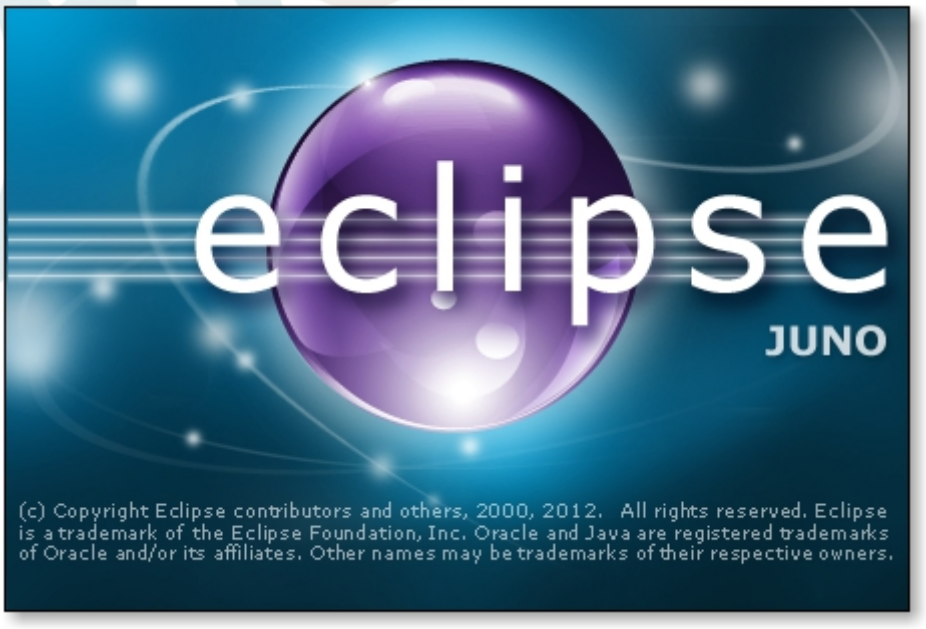
Eclipse 3.X / RCP drawbacks

- 'old' software (8 years)
- many extension points and extensions dispersed
- the developed application depends largely on the framework (inheritance, dependencies ...)
- not always consistent API
- many singletons
- injection mechanisms are not implemented
- no separation of content and appearance (no renderer)
- no CSS : difficult to parametrize the UI
- low usage of OSGi services

Change

... is now!





Juno

E4 vs. E3

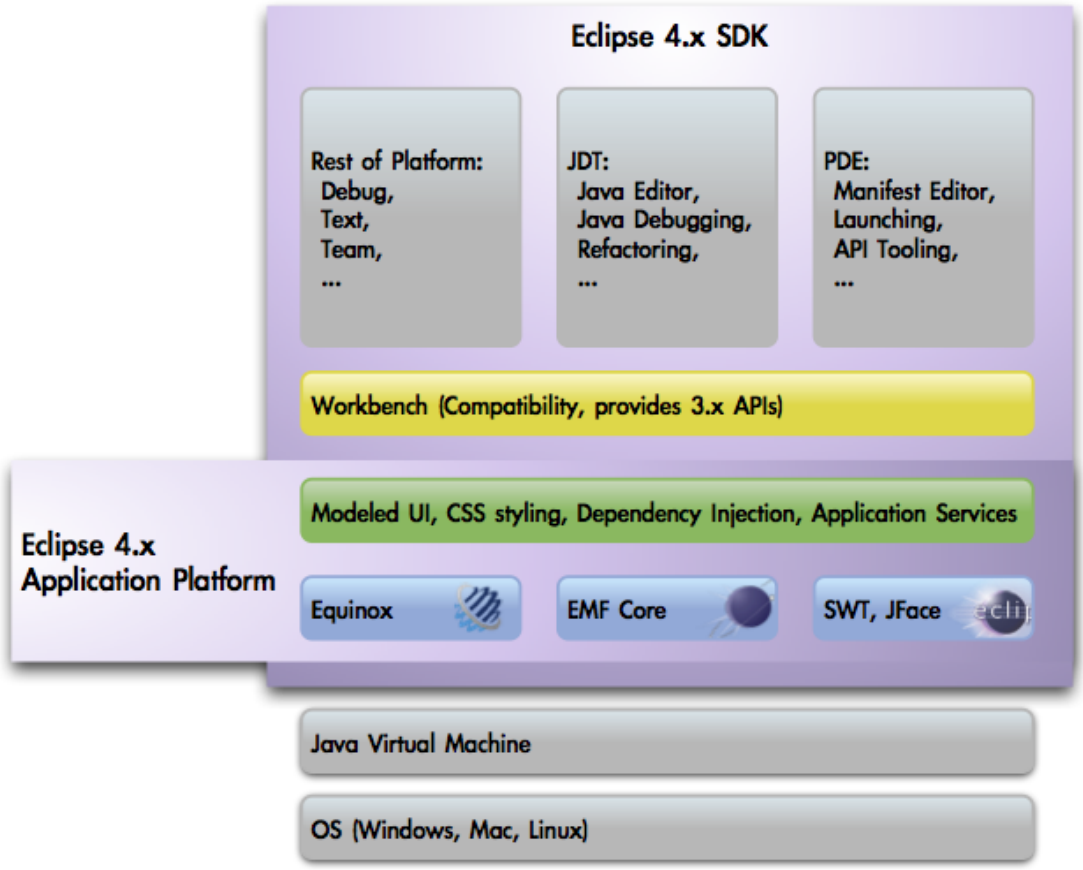
strengths of E4

- Definition of an application model : centralizes all components of the application
- Unified concepts of UI components : view, editor, perspective is no more mandatory
- Support injection and annotations
- CSS Styling
- Compatibility layer

What is kept from E3:

- some extension points (those that are not managed by the application model)
- SWT / JFace and the business code
- architecture principles: bundle, plugins, fragments

e4 Architecture



e4 Architecture

What will change in the code:

- accessing the platform (using the injection)
- removing many inheritance relations (ViewPart, AbstractHandler, etc ...)
- moving some extensions to the model (views, handlers..)

- services : ESelectionService, EMenuService,
- the CSS management

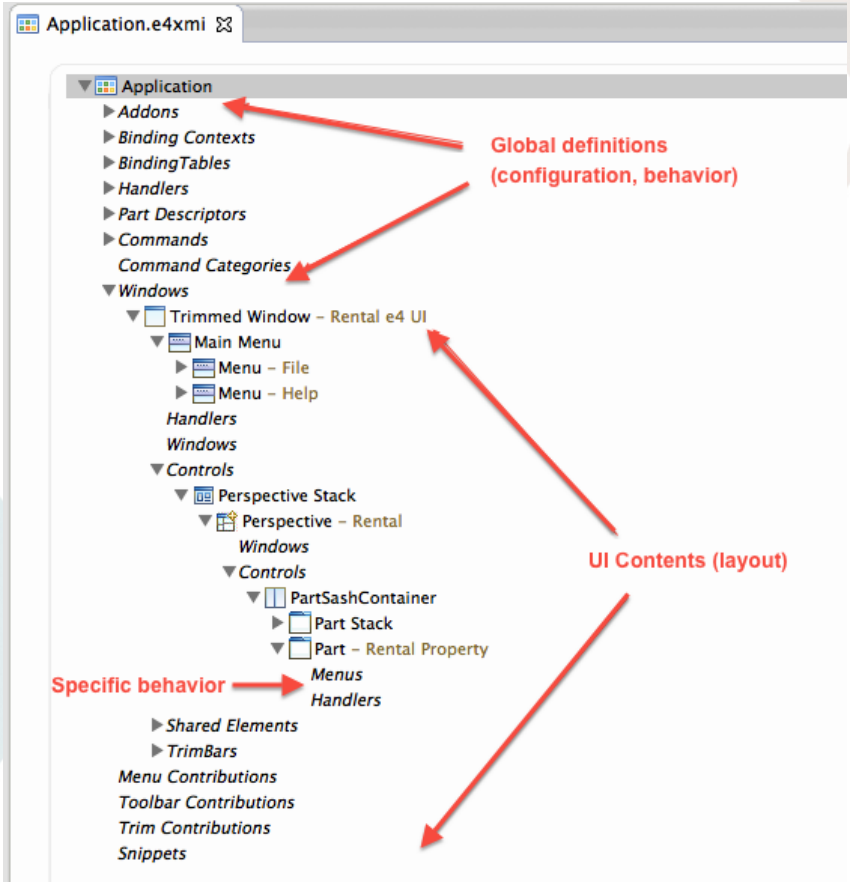
A. Application Model

The application model

This is a global model that gathers the usual extension points :

- view, perspective
- commande, handlers, menu

The application model



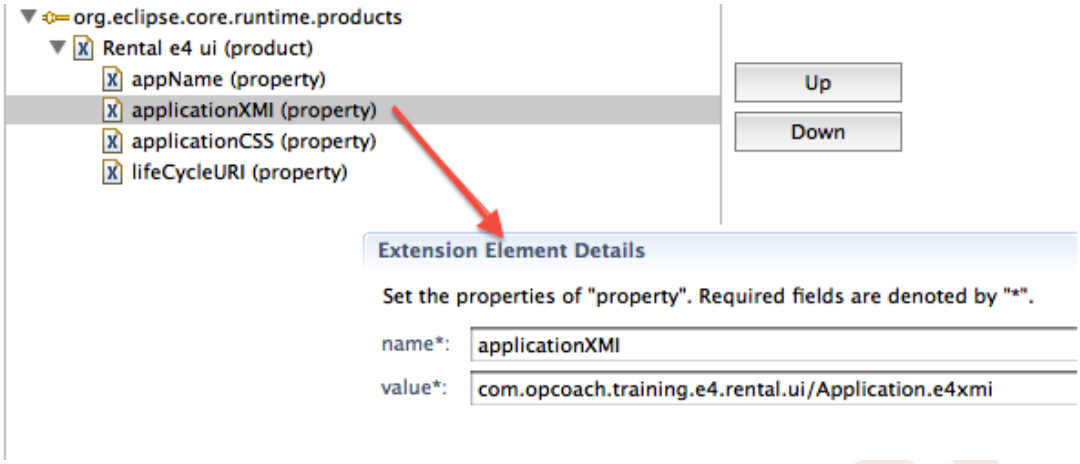
Application Model

The contents of pure UI or commands are defined by the code

Use Cases

In the case of a 3.X application running on 4.X engine, the model is filled by the compatibility layer.

In the case of an 4.X application the model is associated to a product (using extension point):



product extension point

Use cases

In all cases:

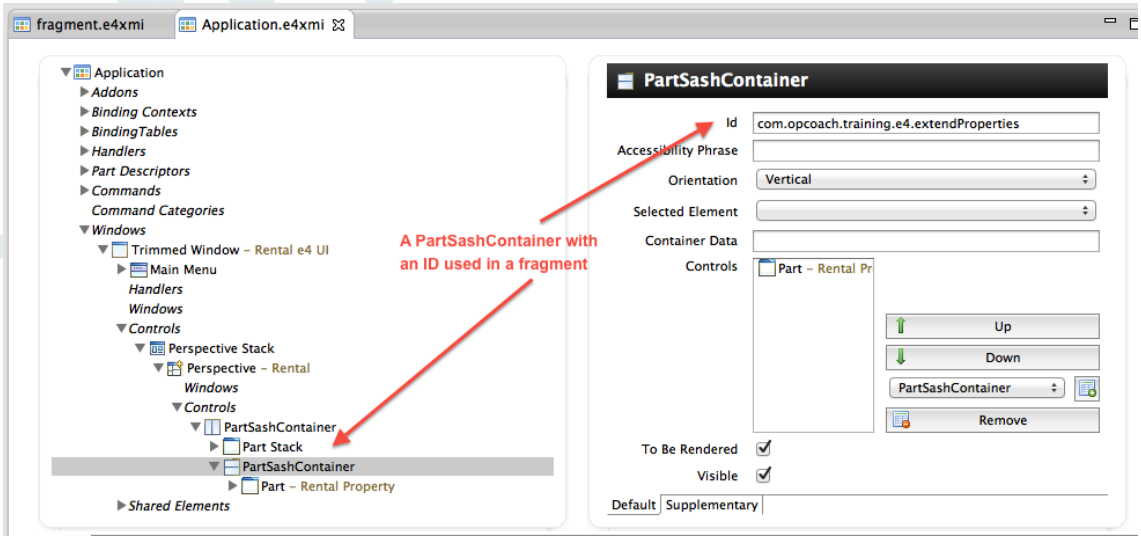
- The model is interpreted dynamically -> any changes will be released on the UI
- You can view the current model with the Alt Shift F9 shortcut

Model fragment

The fragment model behaves similarly to a fragment plugin
It complements an existing application model
The links are made by matching ID

Model fragment

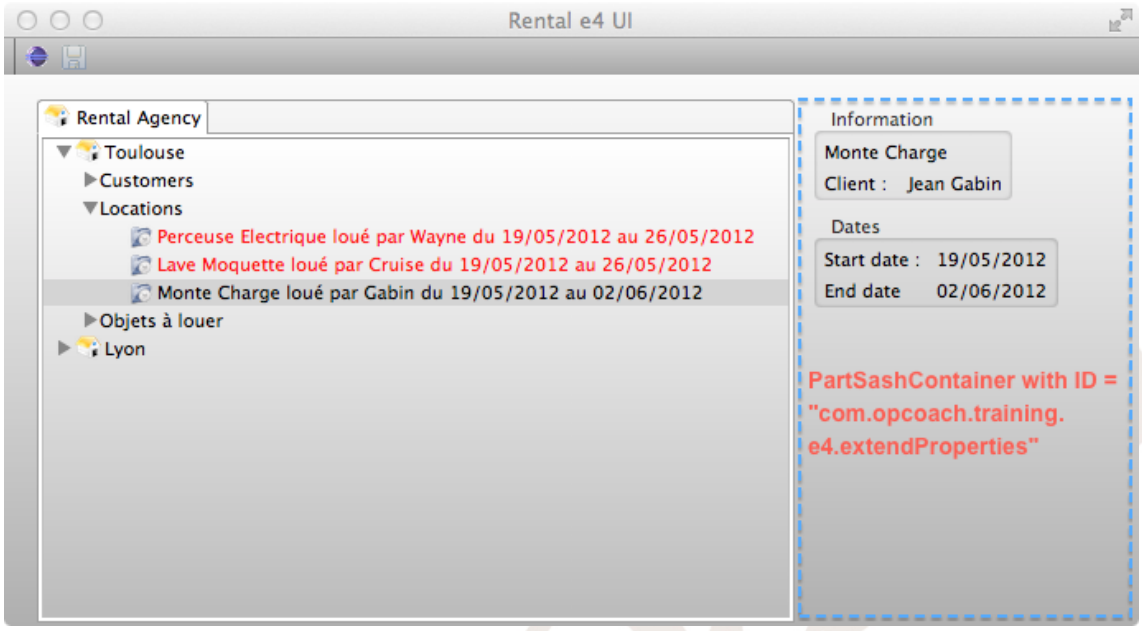
Locate the ID of a model component that will be completed :



Model sample

Model fragment

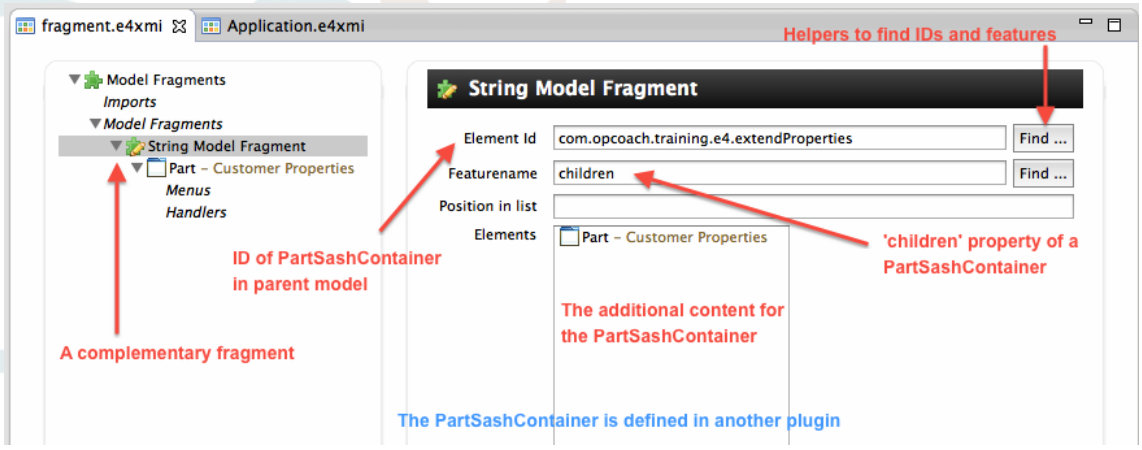
The model without the fragment, produces this application:



UI without fragment

Model fragment

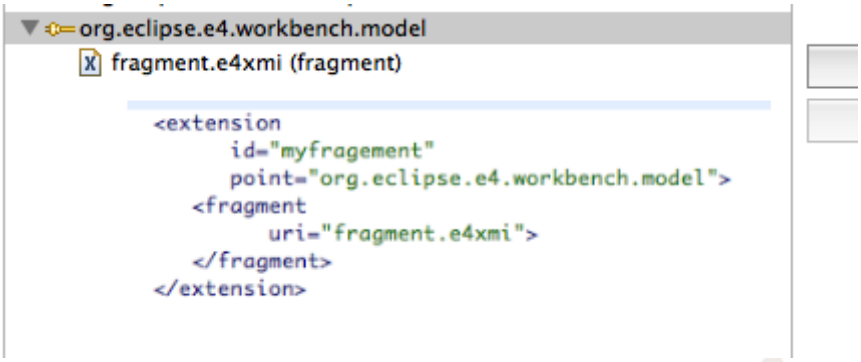
Referencing this ID in the fragment (created in another plugin):



Model Fragment

Template fragment

Adding the fragment in an extension (**org.eclipse.e4.workbench.model**)



Model Fragment

Model fragment result

UI with fragment

B. E4 injection and annotations

Introduction / Principle

The injection mechanism delegates to a framework the initialization of class fields or method parameters.

Using the @ Inject annotation applied to a constructor, method or field.

Use:

The GUI renderer of E4, will call the Parts by instantiating and injecting the expected values.

```
15
16 public class SampleView
17 {
18     // This field is initialized by injector
19     @Inject
20     private ESelectionService selectionService;
21
22     // Constructor called with 2 injected parameters, second is optional
23     @Inject
24     public SampleView(Composite parent, @Optional IStylingEngine styleEngine)
25     {
26         // Code to create the view...
27     }
28
29 }
30
```

Inject sample

The framework introspects classes and finds the methods, constructors and annotations (@ Inject ...)

Injection: advantages / disadvantages

Benefits :

- significant reduction in the coupling (the inheritance with the framework is no longer necessary)
- the injector gathers all shared objects (hierarchical contexts)
- the dependencies are only on very high level interfaces

Disadvantages :

- when debugging an injected method, the caller code is introspection code
- requires knowledge of the objects that can be injected
- must master the lifecycle of the framework:
  - see: *http://www.vogella.com/articles/Eclipse4RCP/article.html* : Chapter 16 Behavior
- there is less code control when editing:
  - classes are referenced by name in non-java editors (application model editor)
  - errors can be found only at runtime (no message 'never initialized object')

What can you inject?

- it depends on where you are.
- Eclipse e4 creates the contexts when needed (creating a view, gains focus ...).
- See: *http://wiki.eclipse.org/Eclipse4/RCP/EAS/List_of_All_Provided_Services*

Other annotations

Annotations JSR 330 standard

- **@ Named** : For injecting an object by its name
- **@ Singleton** : To indicate that a class should be instantiated only once
- **@ Provider <T>** : Delegates the construction of objects to a Provider

E4AP specific annotations

- **@ Optional** : Injects a null if no object is found (no exception thrown)
- **@Active** : Retrieves the current active part
- **@ Preference** : Used to inject the value stored in the preferences
- **@ Creatable** : Allows injection of a non-existent object in the injector

Example:

```
116    @Inject
117    public void setSelection(@Optional @Named(IServiceConstants.ACTIVE_SELECTION) Object o,
118                             Adapter adapter)
119    {
120        Rental r = adapter.adapt(o, Rental.class);
121        setRental(r);
122
123    }
124
```

@Inject @Named @Optional

Other annotations used in e4

Annotations set on methods:

- **@ PreDestroy** : Called before deleting an instance
- **@ PostConstruct** : Called after instanciation and all fields injected
- **@ Focus** : Called when the Part gets focus
- **@ Persist** : Called to handle the storage of an editor
- **@ Execute** : Called to execute a Handler
- **@ CanExecute** : Called to check if a handler can run

And more annotations (for the life cycle of the application):
@ PostContextCreate, ProcessAdditions @, @ ProcessRemovals, Presave @, @ EventTopic ...

Final example code of 'Part'

```
16 public class SampleView
17 {
18     @Inject
19     private ESelectionService selectionService;
20
21     @Inject
22     private EMenuService menuService; // This field is initialized by injector
23
24     @Inject
25     public SampleView(Composite parent, @Optional IStylingEngine styleEngine)
26     {
27         // Code to create the view...
28     }
29
30     @Inject
31     public void anotherMethod(@Optional EMenuService service)
32     {
33          // This method will be called
34     }
35
36     @PostConstruct
37     void initializeListeners(@Active MPart part)
38     {
39         // A method called after all injected method have been called
40     }
41
42     @PreDestroy
43     public void dispose()
44     {
45         // Call this method before deleting object;
46     }
47
48     @Focus
49     public void onFocus()
50     {
51         // This method is called when part takes focus
52     }
53
54 }
55
```

A viewPart with annotations

Annotations: advantages / disadvantages

Benefits :

- The code is simplified
- An annotation simplifies the code: if we use the selection, you will be notified when it changes
- Associated with injection, we can centralize the needs of a method in its API:
  - ex: if the focus needs the service selection: @Focus void myFocus (ESelectionService serv)

Disadvantages :

- annotations are not always intuitive
- many annotations defined by different frameworks (e4, ejb, java, ...)
- one must know the annotations to use and where to apply
  - search the descendants of **javax.lang.Annotation**
- annotated classes derive no more from high-level classes (harder to understand)
- the java editor does not know what is a class at the start: it is understood by seeing the annotations
  - if @ Persist inside, it is an editor, @ Execute is used to define an Handler
- we can forget to implement necessary methods for a class
  - if we do not put the @ Persist editor does not save its contents, or @ Execute for the handler it does not run

C. CSS Styling

In the java code

E4AP has its own CSS rendering engine

Refering to a css class in the source code :

```
25    @Inject
26    public SampleView(Composite parent, @Optional IStylingEngine styleEngine)
27    {
28        // Code to create the view...
29        TreeViewer agencyViewer = new TreeViewer(parent);
30        // ...more code
31
32
33        // Add the e4 styling
34        if (styleEngine != null)
35        {
36            styleEngine.setClassname(agencyViewer.getControl(), "agencyViewer");
37        }
38    }
```

Styling in Java

Content of the css

Writing a CSS:

default.css

```
1
2
3  .MTrimmedWindow.topLevel {
4      margin-top: 15px;
5      margin-bottom: 2px;
6      margin-left: 20px;
7      margin-right: 20px;
8      background-color: #FFF #AAA 100%
9  }
10
11 .MTrimBar {
12     background-color:  #CFCFCF #A8A8A8 100%;
13 }
14
15 .agencyViewer {
16      background-color: #FFFFFF #0000FF 100%
17 }
```

Use UI Model java class

Use the CSS class defined in the java code

Css

Using the CSS

The CSS is defined in the product extension point :

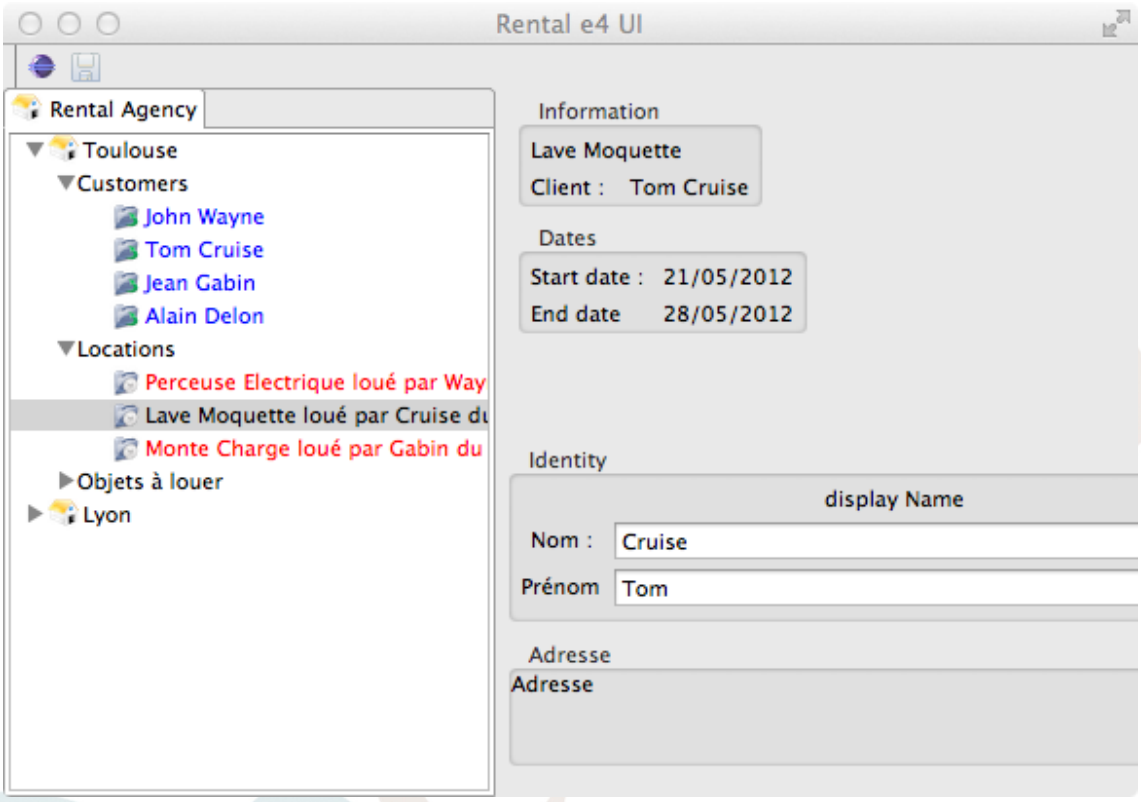
com.opcoach.training.e4.rental.ui

```
37  <extension
38        id="product"
39        point="org.eclipse.core.runtime.products">
40     <product
41           application="org.eclipse.e4.ui.workbench.swt.E4Application"
42           description="Rental ui made over e4"
43           name="Rental e4 ui">
44        <property
45              name="appName"
46              value="Rental e4">
47        </property>
48        <property
49              name="applicationXMI"
50              value="com.opcoach.training.e4.rental.ui/Application.e4xmi">
51        </property>
52        <property
53              name="applicationCSS"
54              value="platform:/plugin/com.opcoach.training.e4.rental.ui/css/default.css">
55        </property>
56     </product>
57  </extension>
58
```

product extension

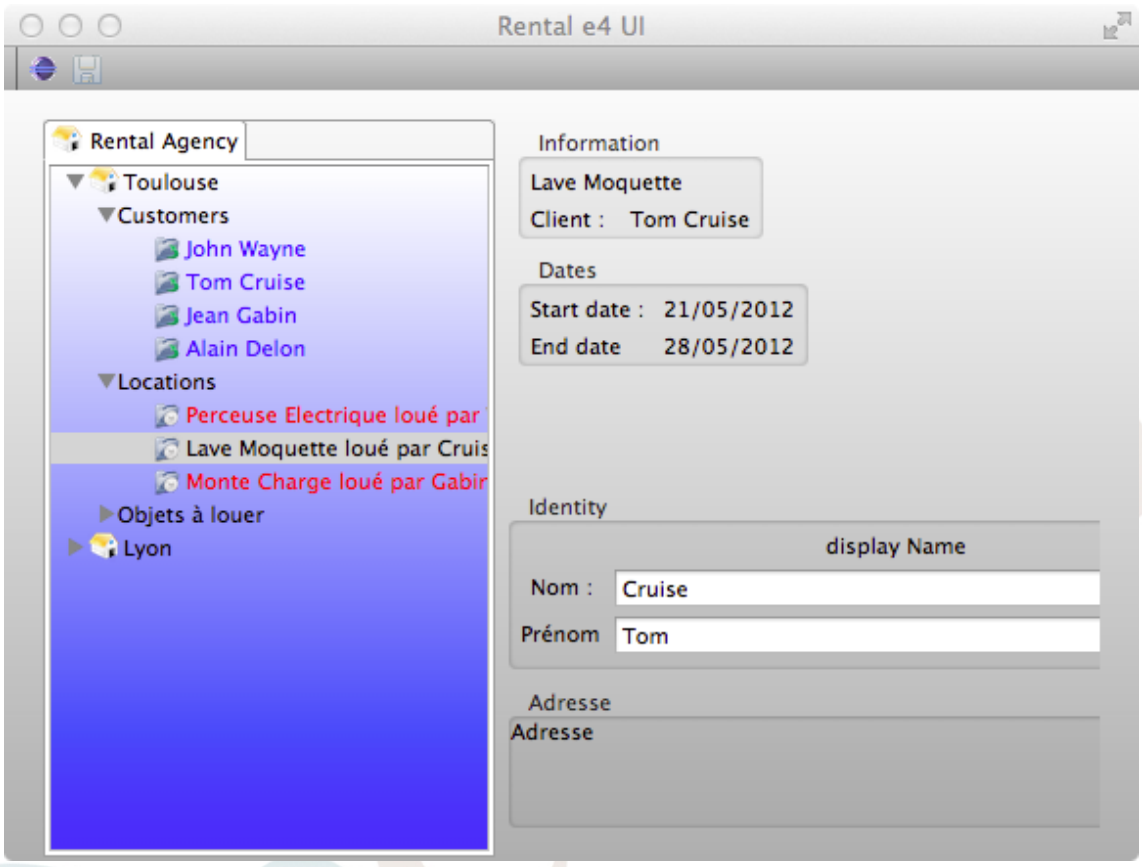
Result of CSS

Without CSS:



without css

CSS:



with css

D. Compatibility Layer

Introduction

E4 comes with a compatibility layer that allows:

- to launch an E3 application on the E4 platform
- to gradually migrate the application

Usage

Install Eclipse 4.2

Install an Eclipse 3.X projects in the workspace

Create a specific launch configuration :

- select your application's main plugin
- add the missing plugins:
  - **org.eclipse.equinox.ds**
  - **org.eclipse.equinox.event**
  - **org.eclipse.platform**
- To view the application model line (Alt Shift F9), also add:
  - **org.eclipse.e4.tools.emf.liveeditor**
- add required plugins

From 3.X to 4.X

- Create an application model : application.e4xmi
  - following the application model obtained with Alt Shift F9
  - or using the **LegacyIDE.e4xmi** (In org.eclipse.ui.workbench)
- Modify the code:
  - views and editors: removing inheritance on ViewPart, using injection
  - handlers: declaring commands and handlers in the model
  - advisors: moving the construction of menus in the model
  - selection: using ESelectionService and injection
  - changing the access to Platform, PlatformUI, ...
  - extracting the specific graphic in CSS
- Keeping :
  - all the business code (EMF, non UI specific code) and test unit
  - all non UI extensions (adapters, expression definition ...)
  - architecture with plugins and fragments
  - internationalization

E. Summary

What to do?

Your application is developed on 3.X

- it is almost finished -> keep the 3.X and go for 3.8
- it is under development, according to the progress, you can :
  - keep the 3.X and schedule later a migration
  - continue new developments using 4.X and 3.X code
  - bring the existing 4.X and migrate to this new version definitely

The development of your application has not yet started:

- You are pioneers : use eclipse 4.X !
- You have time constraints and want to be sure of 4.X: use eclipse 3.8 and schedule a gradual migration on 4.3

IN ALL CASES : Use Eclipse 4.2 as IDE in June 2012!

References

- Eclipse 4 home site : *http://eclipse.org/eclipse4/*
- Eclipse 4 forum : *http://www.eclipse.org/forums/index.php?t=thread&frm_id=12*
- Wiki Eclipse 4 : *http://wiki.eclipse.org/Eclipse4/RCP*
- Tutorial Lars : *http://www.vogella.com/articles/Eclipse4RCP/article.html*
- Tutorial Tom : *https://github.com/tomsontom/e4demo/raw/master/tutorial.pdf*
- Eclipse 4 DI : *http://wiki.eclipse.org/Eclipse4/RCP/Dependency_Injection*

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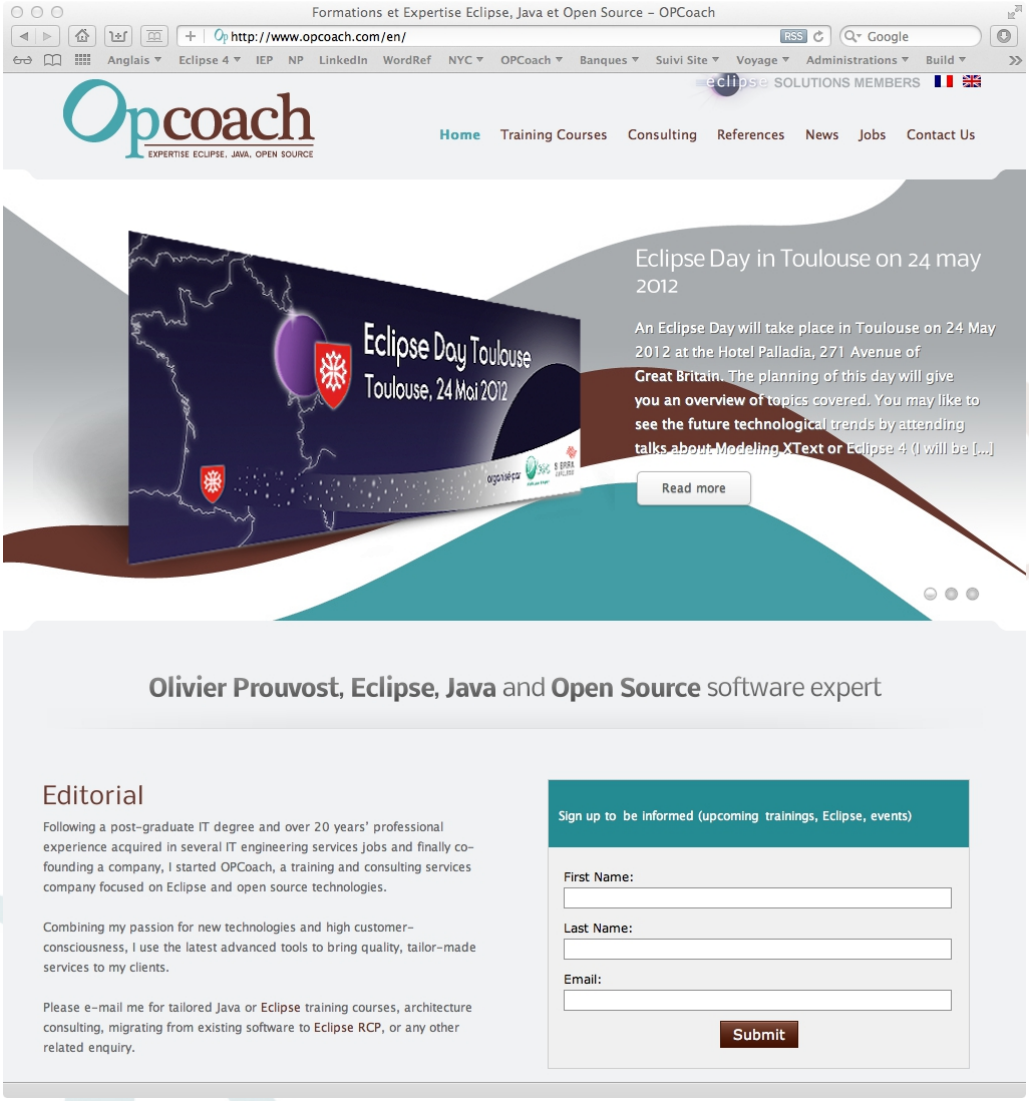
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Olivier Prouvost, Eclipse, Java and Open Source software expert
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