E4 Spies and tools

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OPCoach

OPCoach

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- About **OPCoach**
  - Company founded in June 2009
  - Member of the Eclipse Foundation (as Solution Member)
  - Web site : [1]*http://www.opcoach.com*
  - Provides Eclipse training and consulting

1 - http://www.opcoach.com

- Some references :

Image 1

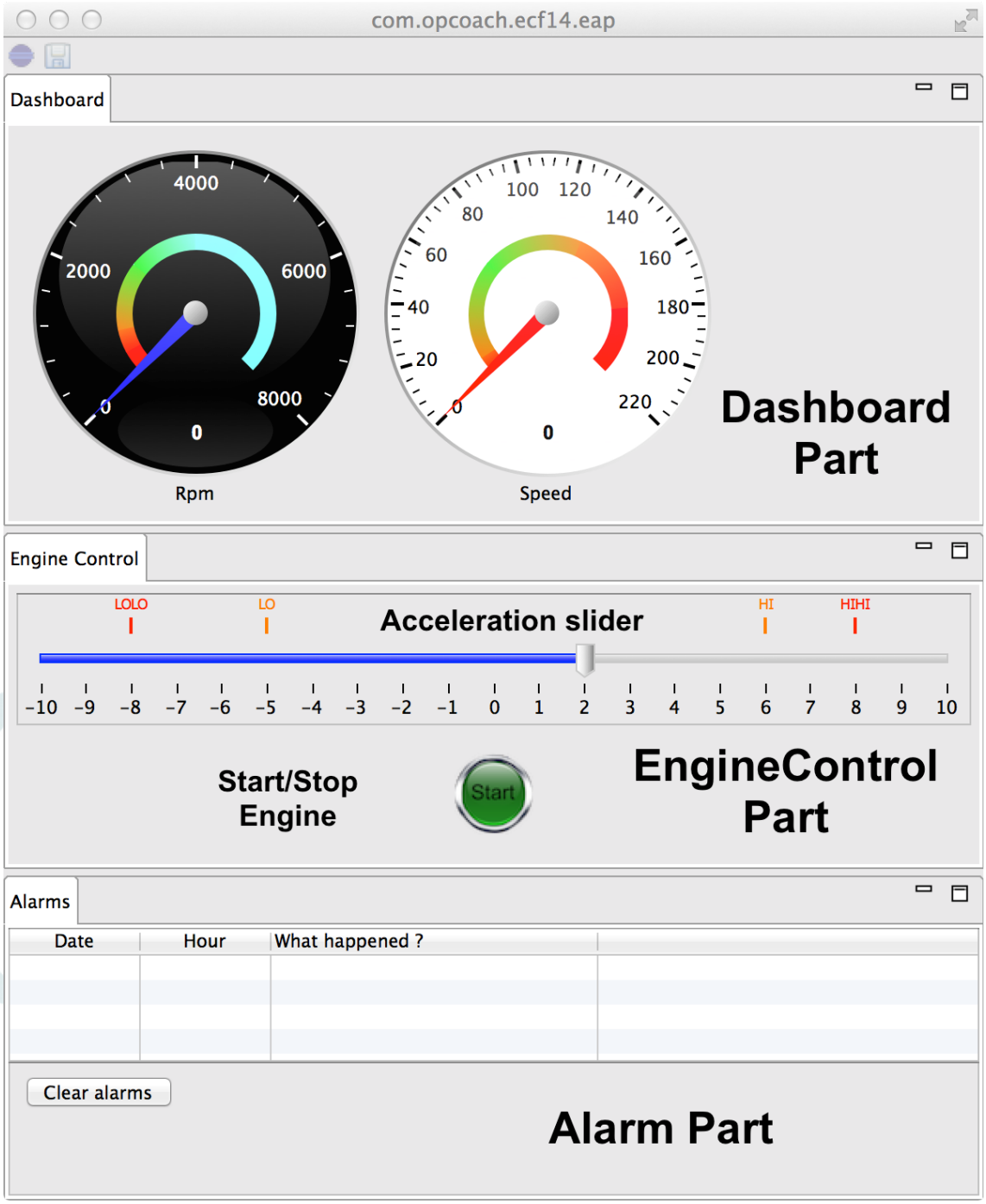
E4 Spies

Agenda

- A sample application
- Using the spies
  - model spy
  - context spy
  - event spy
  - css spy
- Coding new spies :
  - bundle spy
- Other tools
  - The migration E3->E4 statistics view

Sample application

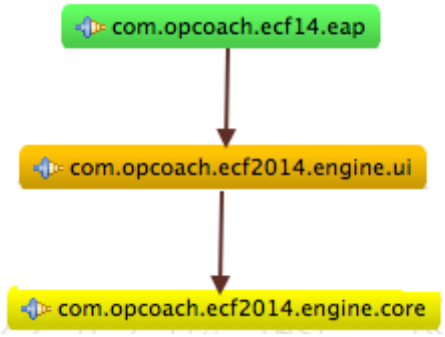
To have interesting cases to use the spies, we will use this application :



Application overview

Application architecture and location

This application is built using this architecture :



Architecture

- **ecf14.eap** plug-in contains :
  - the Application model
- **ecf2014.engine.ui** plug-in contains :
  - the 3 parts : Dashboard, Engine Control, Alarm Viewer
- **ecf2014.engine.core** plug-in contains :
  - the EngineSimulator
  - the Alarm model
  - the EngineLogger
  - the EngineWatcher
  - A context function to create the logger

Application Links

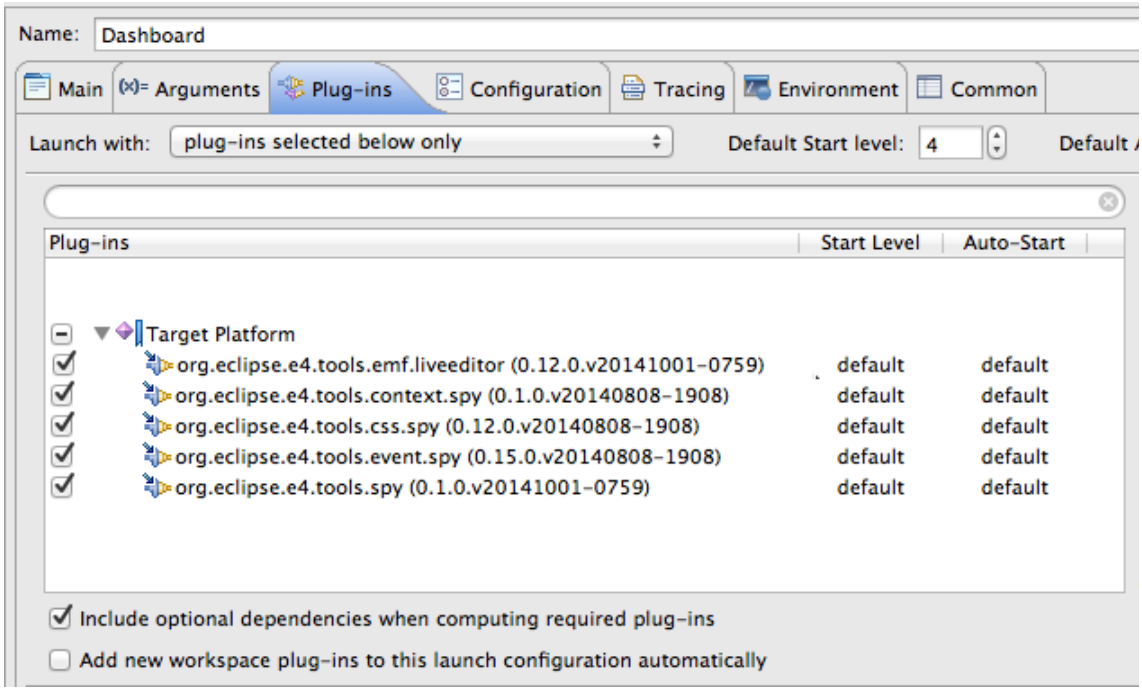
- This application can be downloaded from github :
  - *https://github.com/opcoach/Conferences*
  - Get it from the **ECF14** folder.
- The 'howto' make this application was explained during a workshop at Eclipse Con France 2014
  - get the pdf and explainations here : *http://www.opcoach.com/en/eclipse4_workshop/*

Spies concept

- Spies display dynamic information from a developper point of view
- They are not delivered to the end user
- E4 introduces new concepts like application model, injection, event, css...
- Each concept has its own spy
- You can add you own spies for you specific concepts (IOT, statistics, encode/decode operations...)

Launching your application

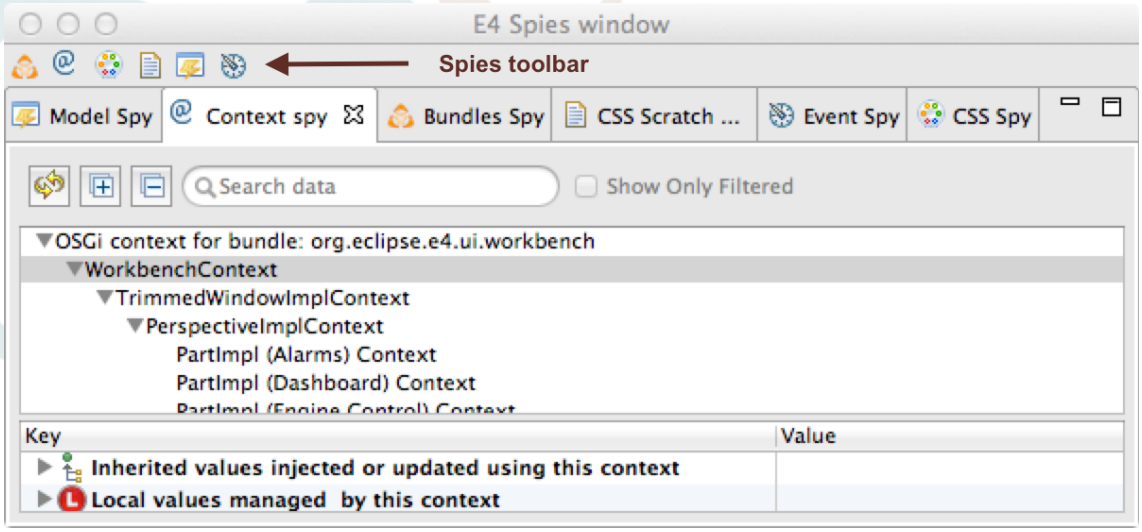
To have the spies in your application, you must set your launch configuration with :



Spy Launch Config

The E4 Spies window

- All the spies will open in the E4 spy window
- But you can move them in another window after

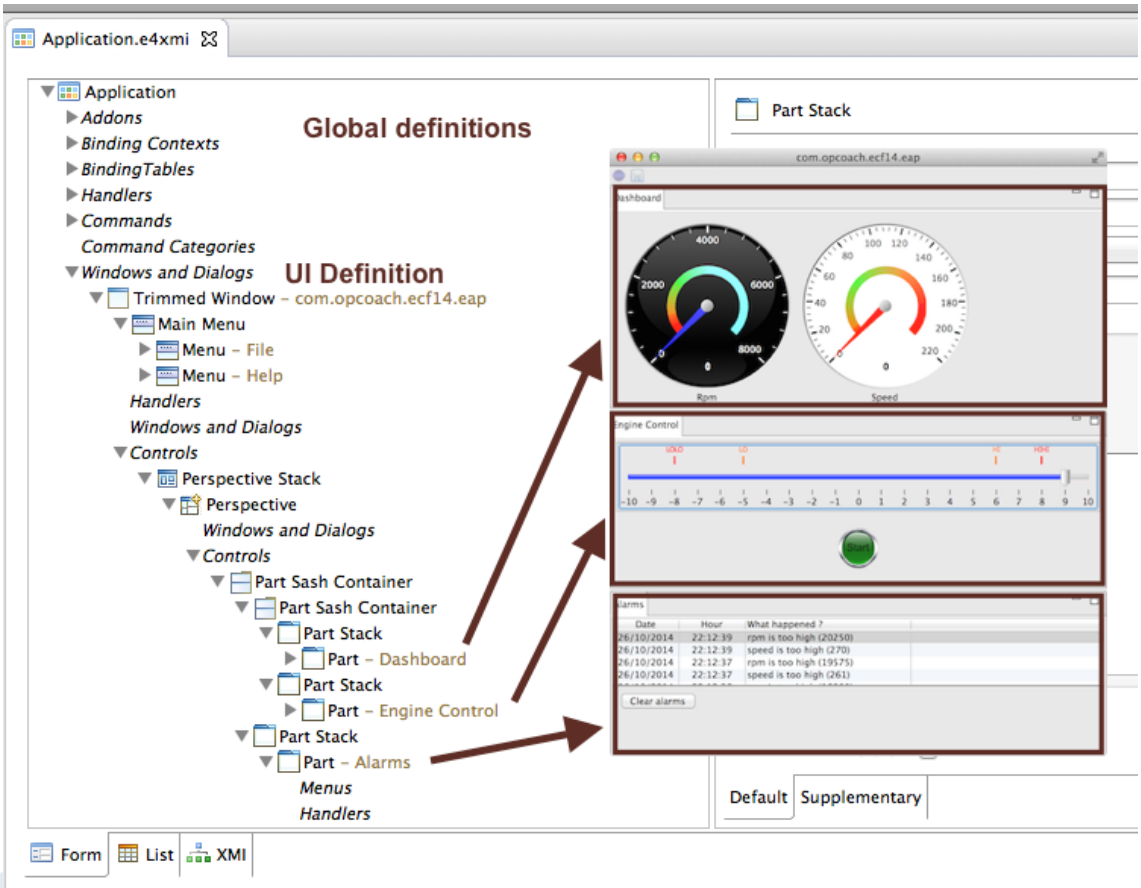


E4 spies window

Concept 1 : Application model

- The application model describes the content of the application
- It is a UI agnostic skeleton
- It is bound to Pojo classes (parts, handlers, ...)
- It is rendered by a specific renderer depending on the content of the Pojo (JavaFx, Swt..)

- This model is read at runtime and can be modified on live

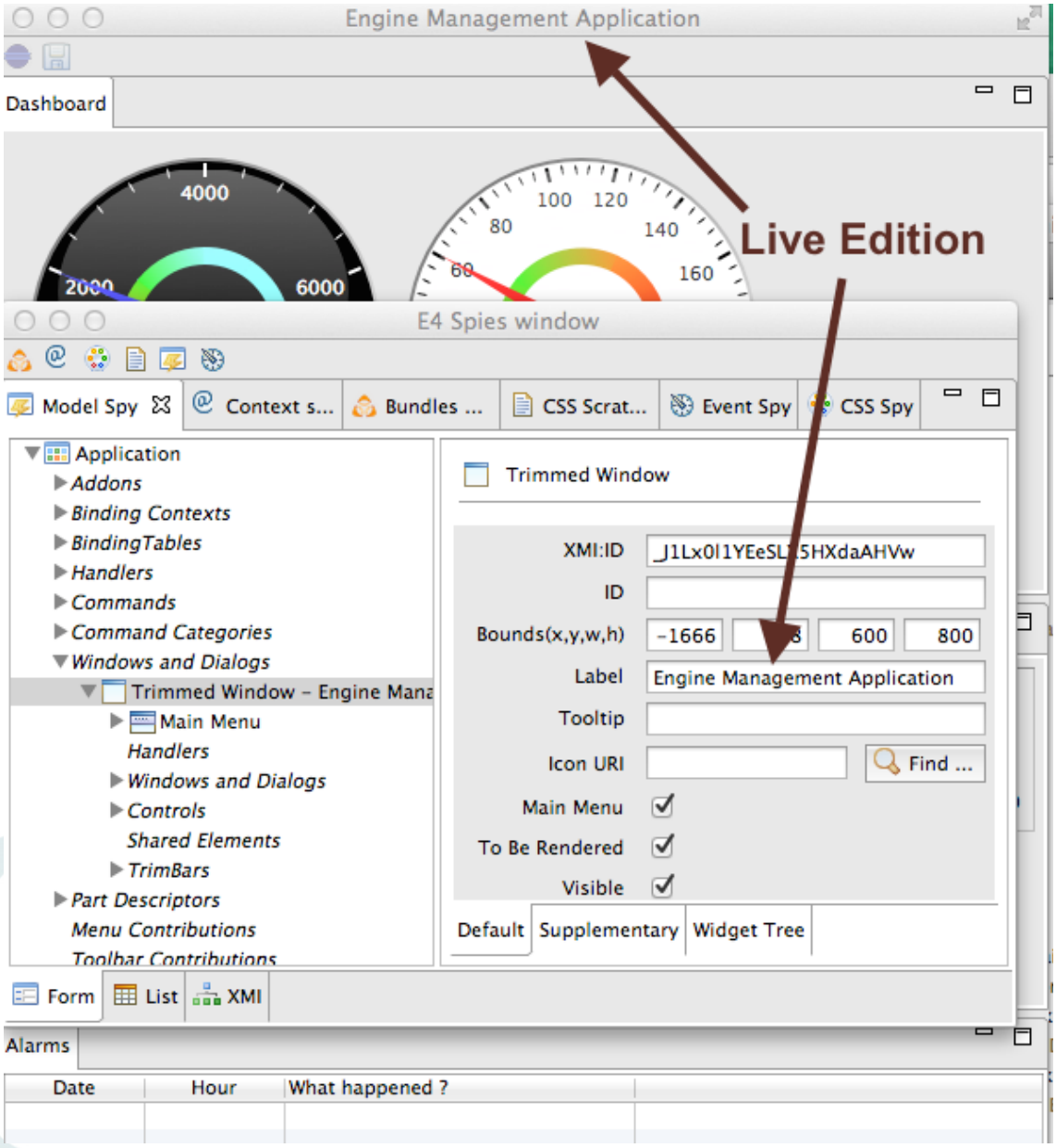


Application model

Model Spy

You can open it with the shortcut : Alt Shift F9

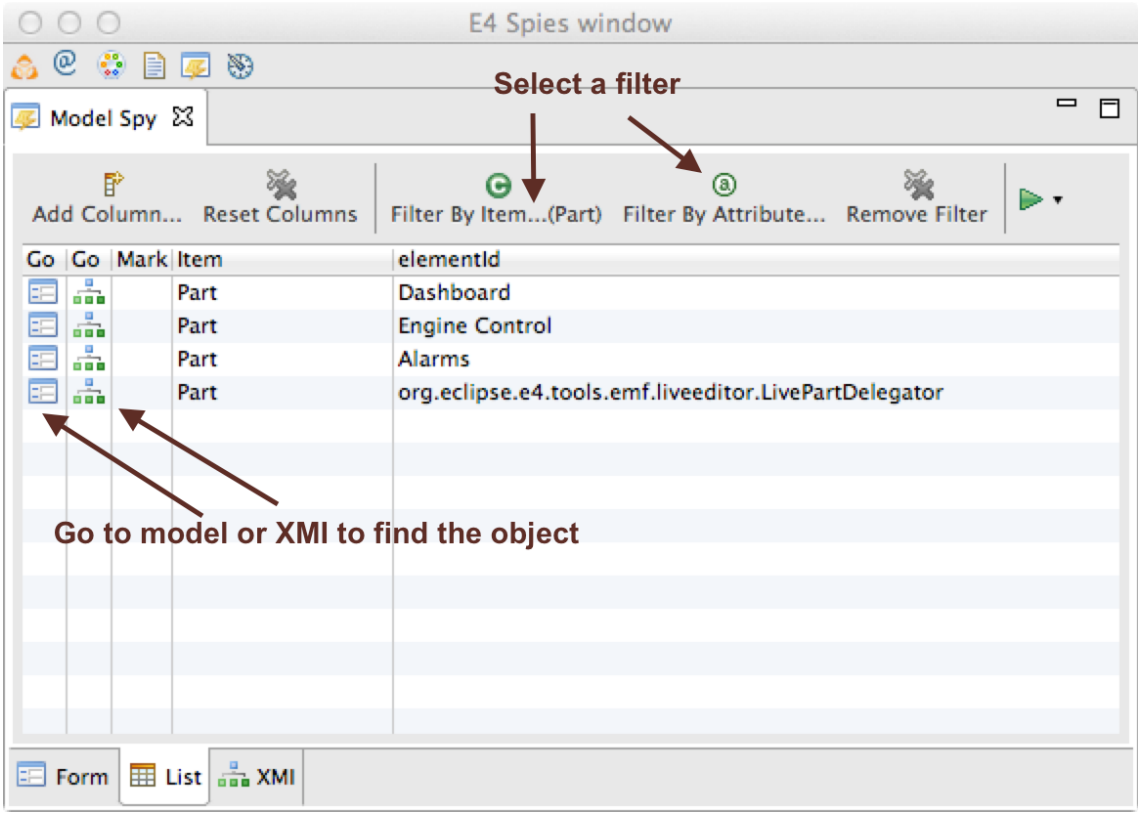
It displays the model and you can change it live



Model Spy

Model Spy, search

- The 'List' tab allows you to search an element
- Select the filter and navigate in the model



Model Spy filters

Model spy in action

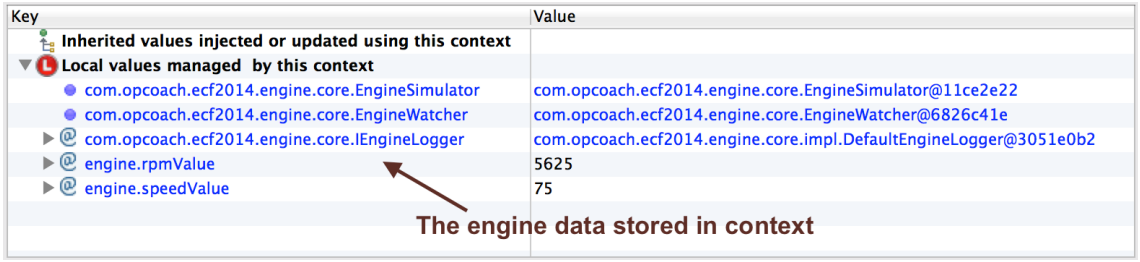
Demo

Concept 2 : Injection

- The goal of injection is to delegate the field or parameters initializations to a framework
- Injection uses a context containing the values
- Use the annotation **@ Inject** (javax.inject) to inject the values
- It can be applied to a constructor, a method or a field.
- In E4, the context is a tree of maps.

The context of this application

An E4 application can use the context to store its own data :



Engine data in the main context

Setting data using a class key

```
41
42    @Inject
43    public DashBoard(MApplication appli)
44    {
45        // We will use the application context to store and inject values.
46        IEclipseContext appliContext = appli.getContext();
47
48        // We also need an ImageRegistry for the application
49        appliContext.set(ImageRegistry.class, new ImageRegistry());
50
51        // Step 5 : create and start Engine.
52        EngineSimulator simu = ContextInjectionFactory.make(EngineSimulator.class, appliContext);
53        appliContext.set(EngineSimulator.class, simu);
54
55        // Step 8 : create the engine alarm watcher and keep a reference on it !
56        EngineWatcher watcher = ContextInjectionFactory.make(EngineWatcher.class, appliContext);
57        appliContext.set(EngineWatcher.class, watcher);
58    }
```

Get application context

Use class as key

Call make

Use a class as a key

Setting data using a name

```
56
57    @Inject
58    IEclipseContext ctx; // The context where values will be injected
59
60    public void stop()
61    {
62        if (timer != null)
63        {
64            timer.cancel();
65            speed = 0;
66            rpm = 0;
67            ctx.set(ENGINE_SPEED_VALUE, 0);
68            ctx.set(ENGINE_RPM_VALUE, 0);
69        }
70        timer = null;
71    }
```

Inject context

Setting a named value in context

Setting context with a named value

How to inject values from the context ?

```
59
60    @Inject @Optional
61    public void listenToRpmValue(final @Named(EngineSimulator.ENGINE_RPM_VALUE) int value, UISynchronize sync)
62    {
63        if (rpmCounter != null)
64            sync.asyncExec(new Runnable()
65                {
66                    @Override public void run()
67                    {
68                        rpmCounter.setValue(value);
69                    }
70                });
71    }
```

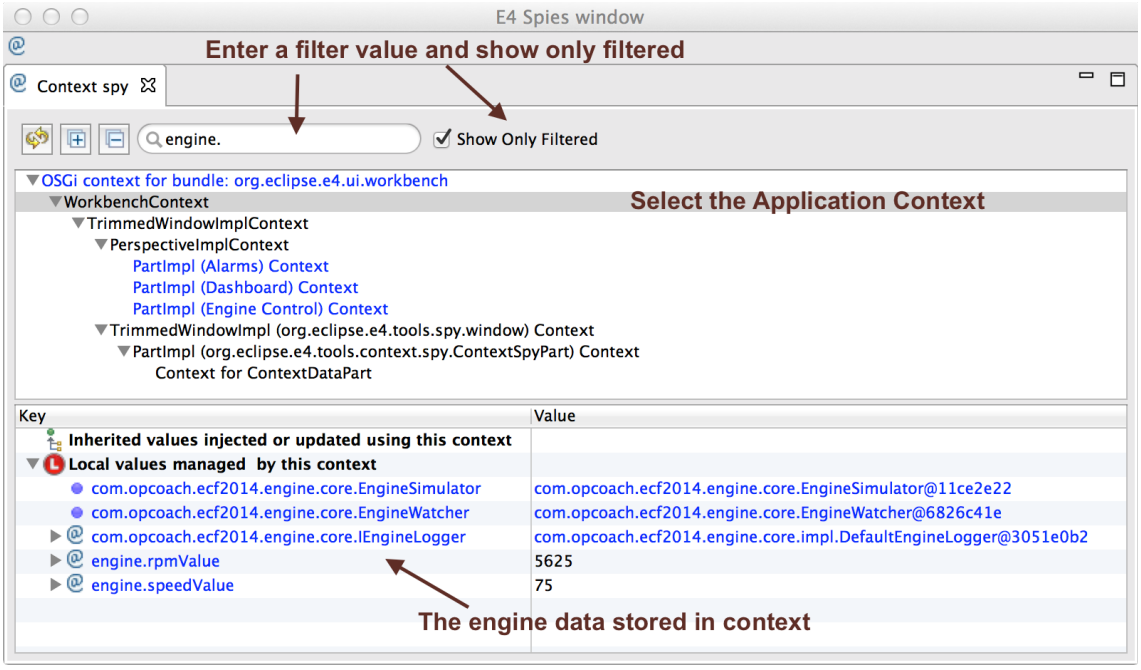
Inject the value

Will be invoked when value changes in context

Inject value

The context spy

- It can be opened with Alt Shift F10
- It displays the tree context and provide a filter to find data



Context content

Local values managed by this context ?

- This part of the tree contains for the selected context, all the values directly set in this context.
- Parent context can not see these values
- Only the current context and child context can access them

Inherited values injected or updated using this context ?

- This part of the tree displays only values defined in parent context(s)
- These values are injected using the current selected context
- It is possible to open it and to check where injection is used (method or field)
- The values injected with @PostConstruct are never displayed (because called once)

Context spy in action

Demo

Concept 3 : Event management

- A good framework must provide an event management mechanism
- Usually, to be notified of an event, a listener must be defined
- And for each case a specific method must be defined
- Example: if you want to listen to what is going on with xxx, we would have:
  - xxxListener with xxxCreated (xxxEvent), xxxModified (xxxEvent) ...
  - or you can use the EMF adapters.
- This is painful

IEventBroker

- In E4 there is a more simple mechanism: the **IEventBroker.**
- All events occuring on the Application model are sent (see **UIEvents** class)

- moving a window
- adding a part
- activating a part
- etc...

- You can define your own events

Sending events

```
9  public class EngineWatcher
10 {
11     // Define the sent topics                    Define event keys
12     public static final String ALARM_TOPIC = "Alarm/*";
13     public static final String ALARM_RPM_TOO_HIGH = "Alarm/RpmTooHigh";
14     public static final String ALARM_SPEED_TOO_HIGH = "Alarm/SpeedTooHigh";
15
16     // Get the event broker by injection
17     @Inject
18     IEventBroker ebroker;    Receive the Event Broker using injection
19
20     @Optional
21     @Inject
22     public void checkRpmValue(final @Named(EngineSimulator.ENGINE_RPM_VALUE) int value)
23     {                                          Inject the RPM value from context
24         if (value > 5000)
25         {
26             // Send an alarm
27             Alarm a = new Alarm("rpm is too high (" + value + ")", value);
28             ebroker.send(ALARM_RPM_TOO_HIGH, a);
29         }                                      Send the event
30     }
31
```

Sending events

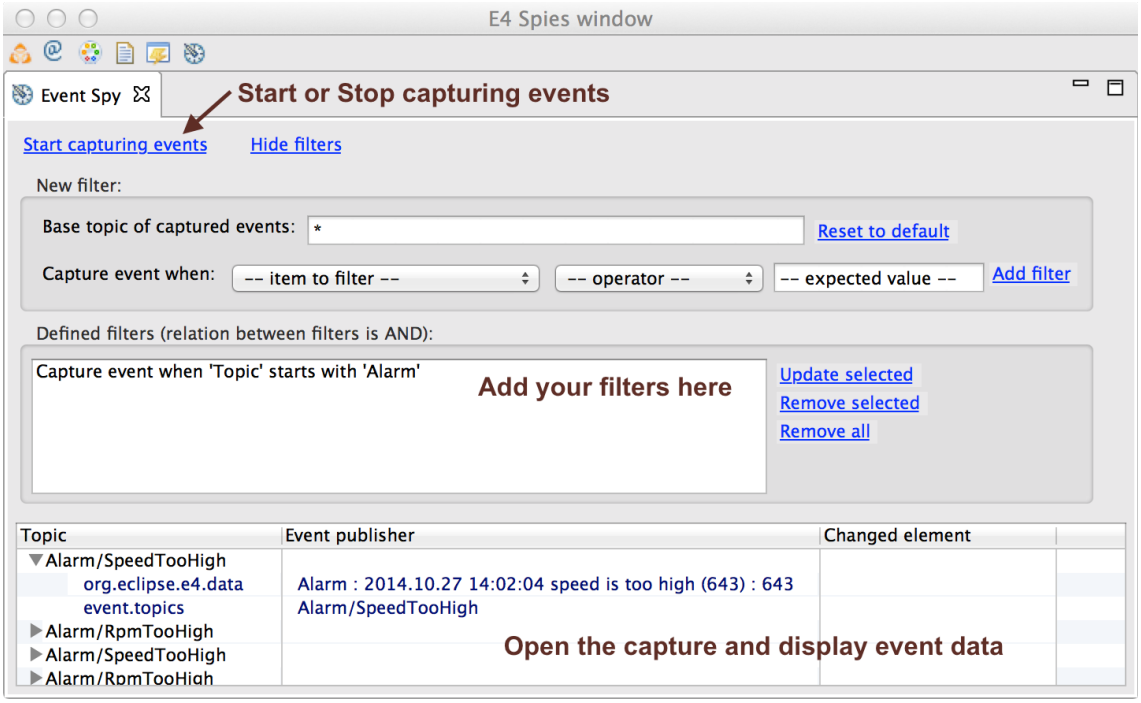
Receiving events

```
118
119     @Inject @Optional
120     public void listenToAlarms(@UIEventTopic(EngineWatcher.ALARM_TOPIC) Alarm a)
121     {                                          Receive event by injection
122         alarms.insertElementAt(a, 0);
123         if (viewer != null)
124         {
125             viewer.refresh();
126             viewer.setSelection(new StructuredSelection(a));
127         }
128     }
```

Receiving events

The event spy

- A specific spy receives all events and display their values.
- The Event spy can be opened with **Alt Shift F8**



Event Spy

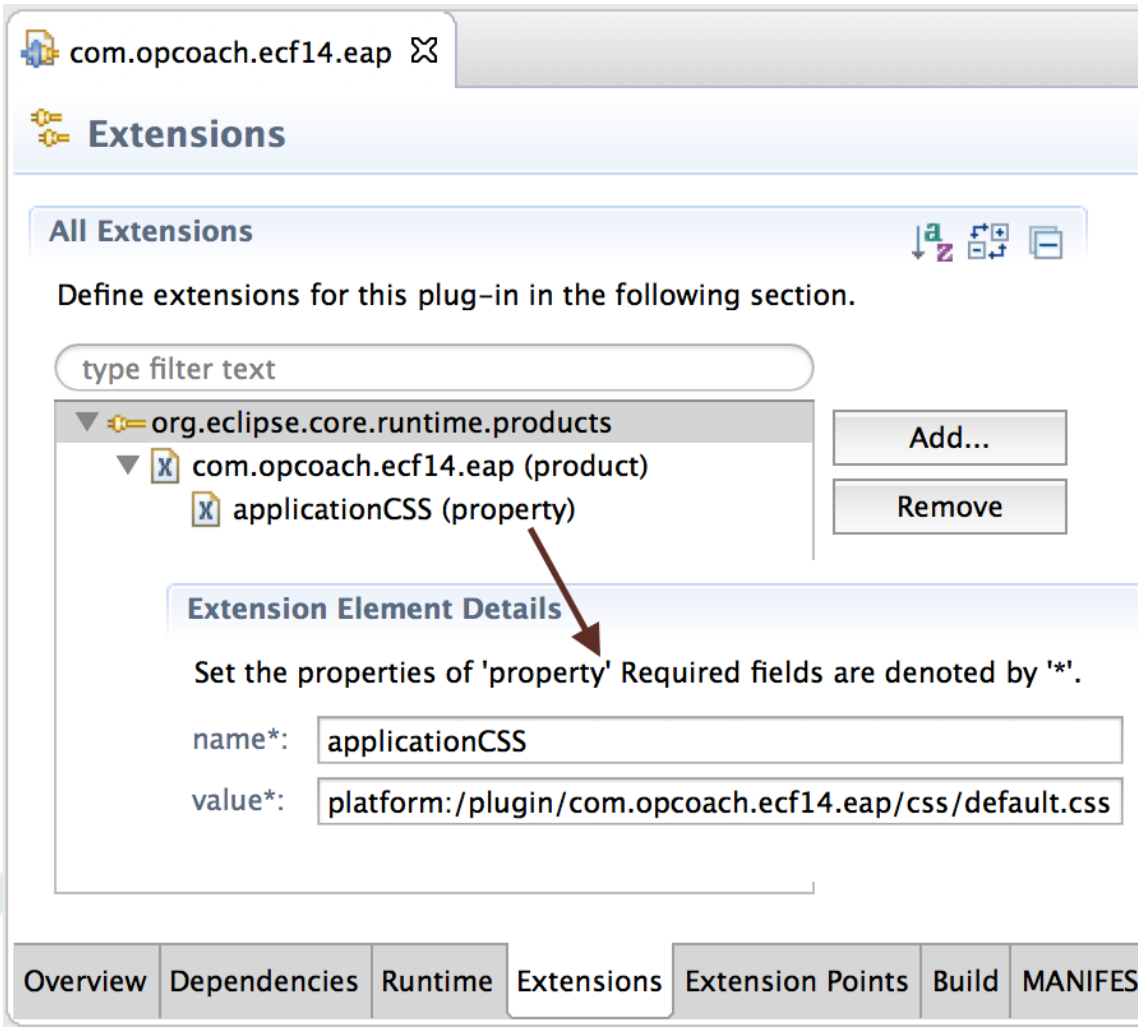
Event spy in action

Demo

Concept 4 : CSS

- It is possible to easily define a static CSS for an E4 application.

- Create a css file, and add it in the product parameters :



Using CSS

CSS Result

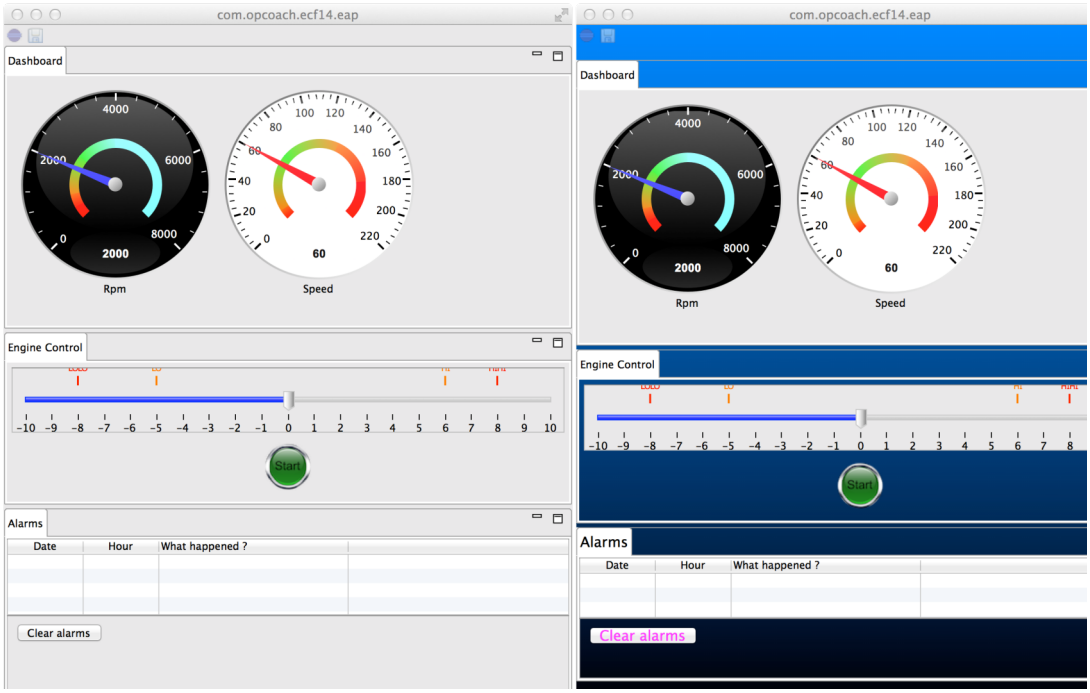
For the following CSS :

sample.css

```
1
2  Button {                    Use SWT class names as CSS classes
3    color: #FF00FF;
4    font-family: "Lucida Grande";
5    font-size: 15;
6    font-style: bold;
7  }
8
9  CTabFolder#com-opcoach-ecf14-eap-partstack-1 {
10     font-family: "Lucida Grande";  Can access to the specific widget
11     font-size: 15;                  of a rendered model element
12 }
13
14 .MTrimmedWindow.topLevel {
15     margin-top:15px;                    Can configure
16     margin-bottom:15px;                 model elements
17     background-color: #08F #000 100%
18
19 }
```

CSS Sample

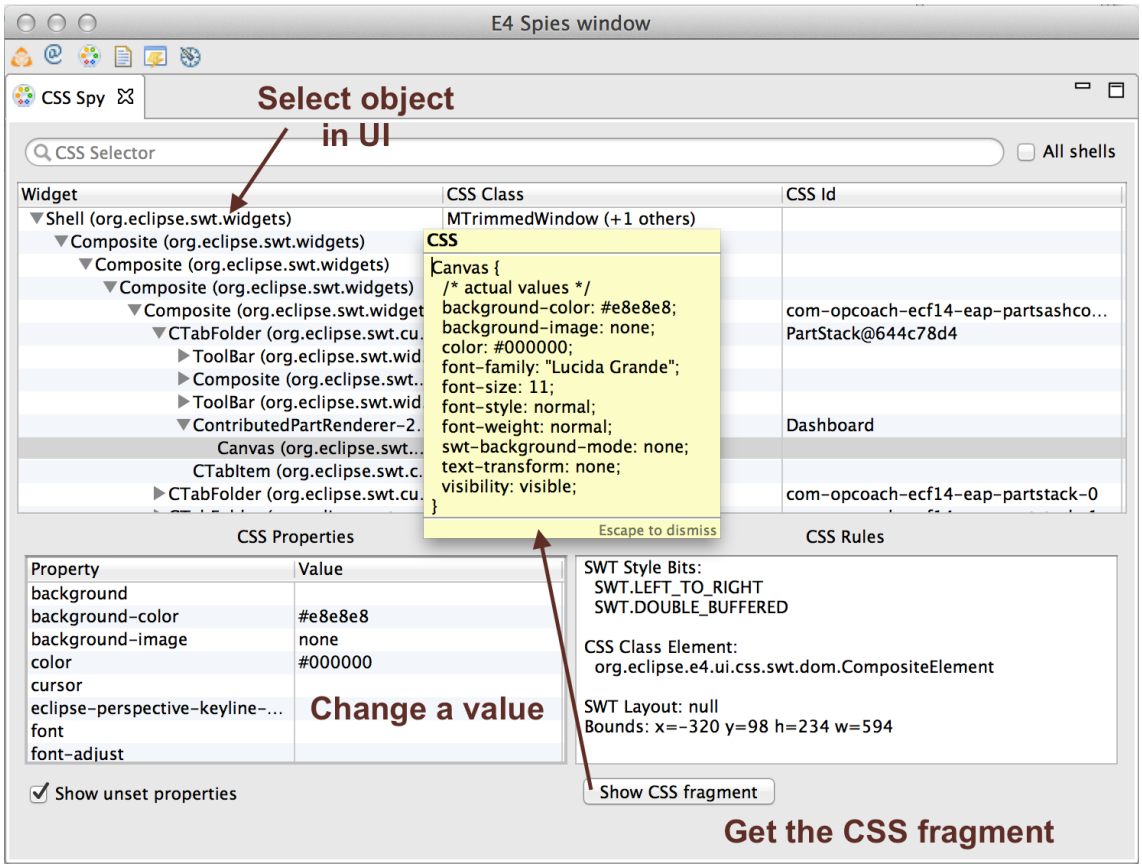
You will get :



Css effect

The CSS Spy

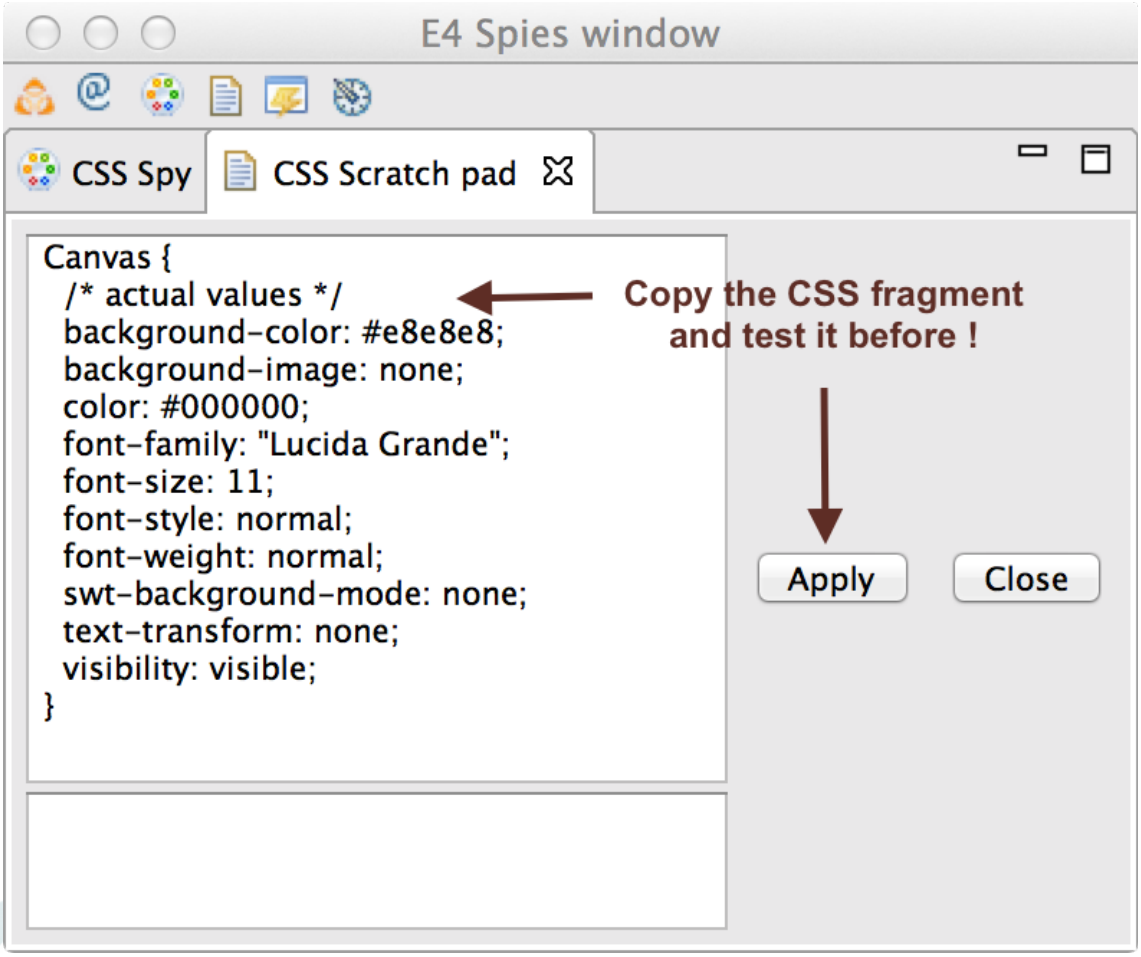
- How can you guess the content of your CSS ?
- Use the CSS Spy and the scratch pad to test.
- Open it with **Alt Shift F5** and the scratch pad with **Alt Shift F6**
- Click on a widget in your application and check the style



CSS Spy

The CSS Scratch pad

- Use it to test your CSS fragment on your application
- When it is ok, put it in your final CSS file
- CSS Scratchpad is functionnal if you add a theme engine
  - add an extension of **org.eclipse.e4.ui.css.swt.theme**



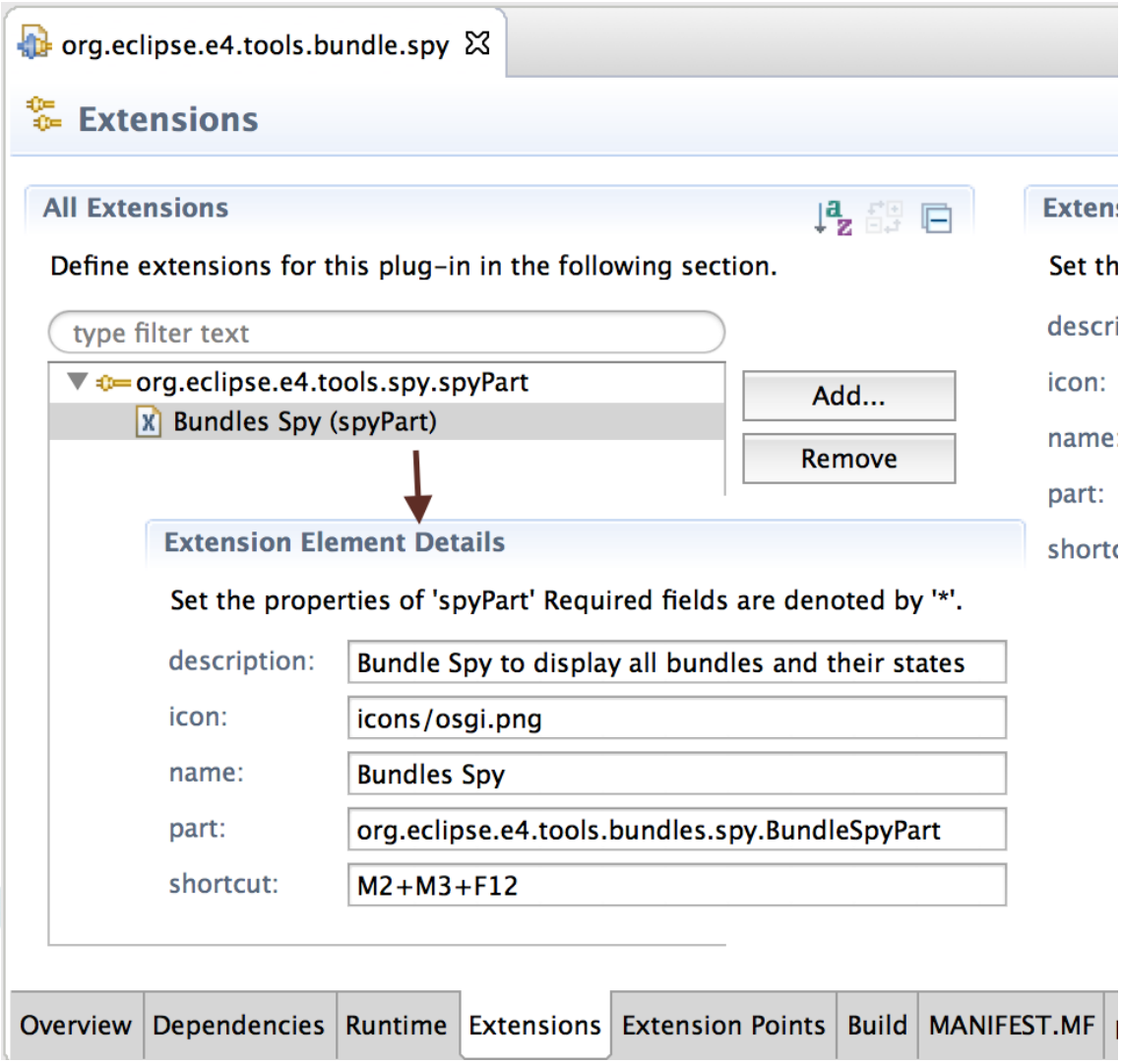
CSS scratch pad

CSS spy in action

Demo

Adding new spies

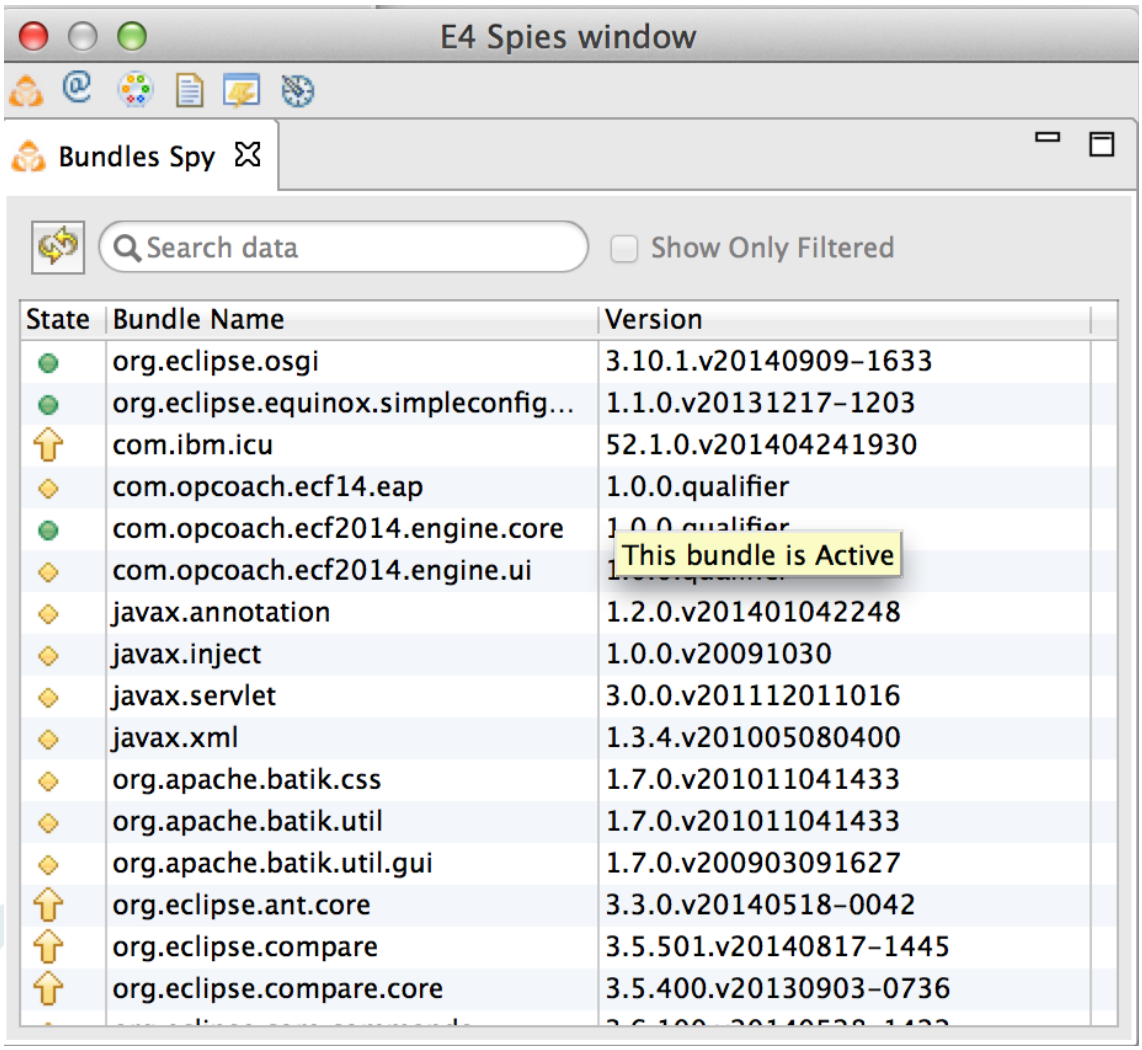
- It is very easy to add your own spy.
- Add a dependency to **org.eclipse.e4.tools.spy**
- Extend **org.eclipse.e4.tools.spy.spyPart**
- Your part is a pure E4 part (POJO, Injection...)
- The key binding is handled automatically



Bundle spy definition

The bundle spy

- Is bound **on Alt Shift F12**
- It displays the bundle statuses like in the OSGi console
- Will add command start/stop later



Bundle Spy

Next steps for bundle spy

- It could be included in the E4 tools master branch
- For the moment Bundle spy is hosted on github :
  - *https://github.com/opcoach/Conferences/tree/master/ECE14*
- You can improve it !

Next steps for E4 spies

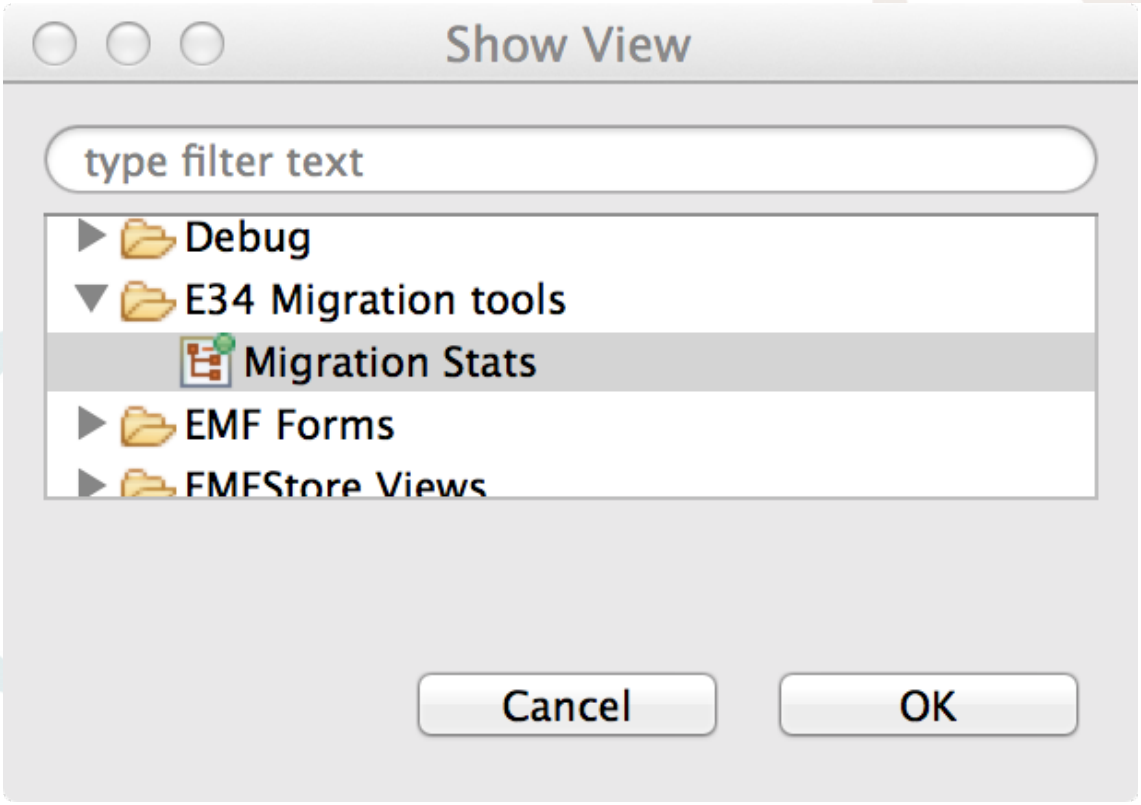
- Try it !
- Some ideas :
  - Memory spy
  - Objects suppliers (E4 concept)
  - OSGi service spy
  - Translation spy
  - System spy
  - Protocol spy (MQTT, HTTP, ...)
  - Encoding spy
  - Any spy specific to your business

E3E4 migration view

- If you want to migrate an E3 application it can be interesting to have an overview of the work to do.
- Use the E3E4 Statistics Migration view to get information
- It displays for each **org.eclipse.ui** extension point the number of extensions.
- It detects the deprecated attributes or extension points.
- This view could be improved but is already useful !

E3E4 migration view installation

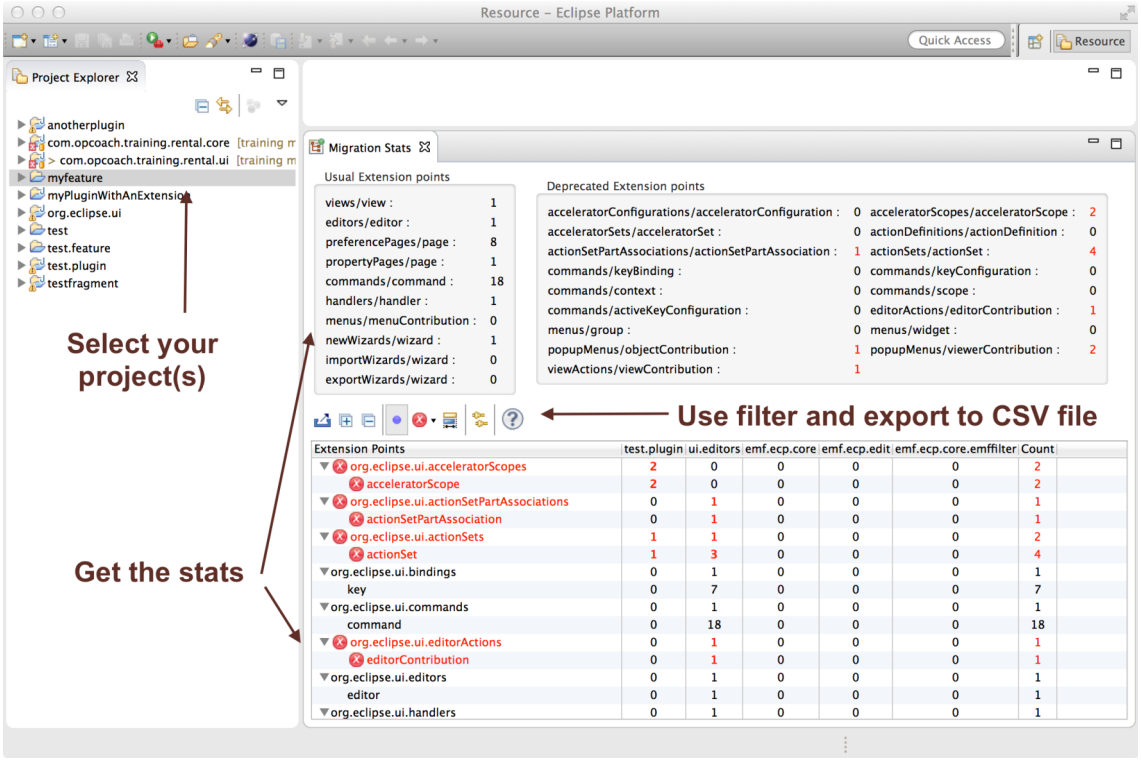
- Get the project from github :
  - *https://github.com/opcoach/E34MigrationTooling*
- Launch an Eclipse instance with the project
- Import the '**org.eclipse.ui**' plug-in in your workspace (very important)
  - This plugin must contain the extension points schemas
- Open the Migration View :



Show view

- Import the projects you want to analyze
- Select a plugin, several plugins, or a feature
- Export the result as CSV for your migration stats.

Migration view content :



Migration view

Migration Statistic view

Demo

Next step for migration view

- Import automatically the org.eclipse.ui with schemas or use it internally
- Convert count to time
- Compute some risk metrics

Questions

- Thank you for attending !
- Don't forget to evaluate this talk

- You can download the pdf of this presentation on the eclipse con web site
- Keep in touch :
  - **olivier.prouvost@opcoach.com**
  - **http://www.opcoach.com**