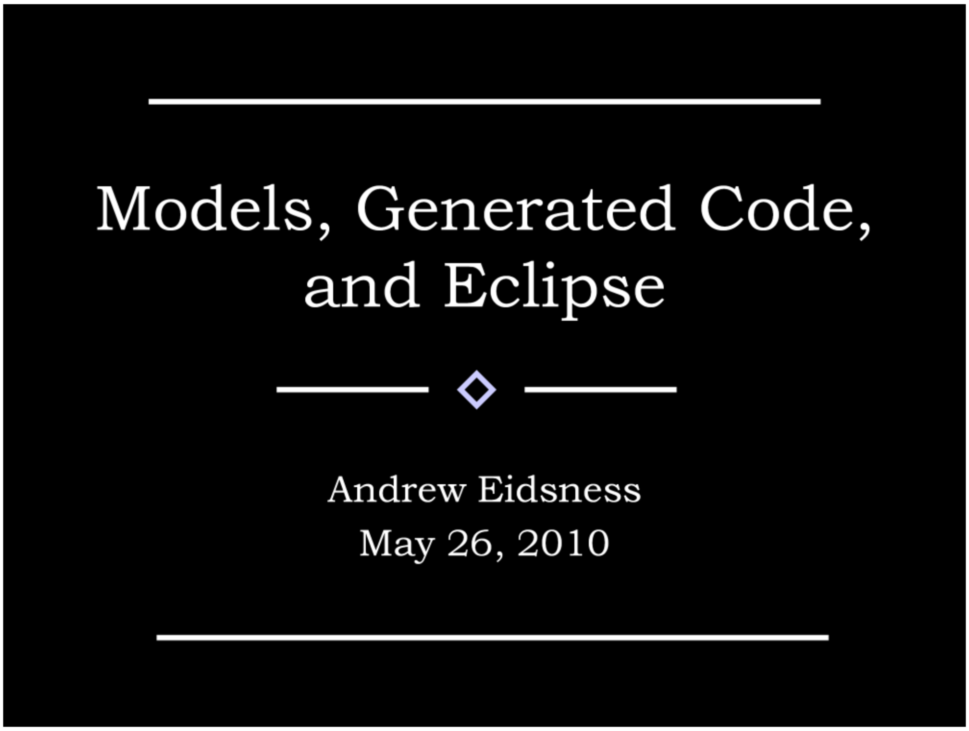

Models, Generated Code, and Eclipse

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May 26, 2010

Who

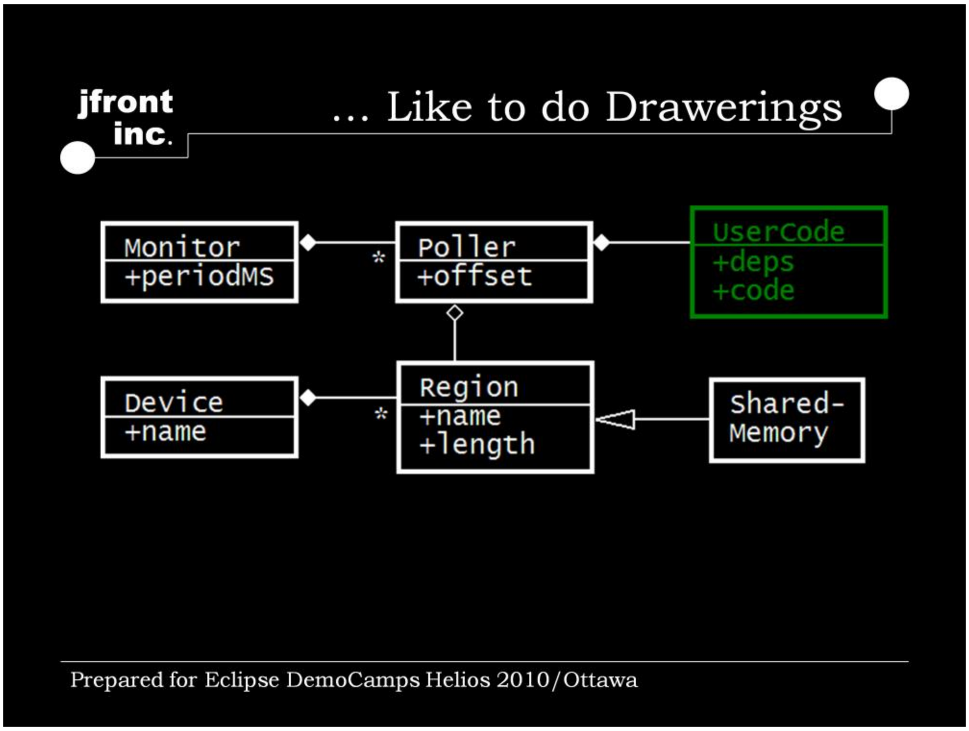
Why:

More integration between Eclipse components; esp. EMF/CDT

Some problems with the approach

How: Making use of extensibility of base Eclipse platform

What: Integrating EMF/CDT with a code generator



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… Like to do Drawerings

Monitor
+periodMS

Poller
+offset

UserCode
+deps
+code

Device
+name

Region
+name
+length

Shared-
Memory

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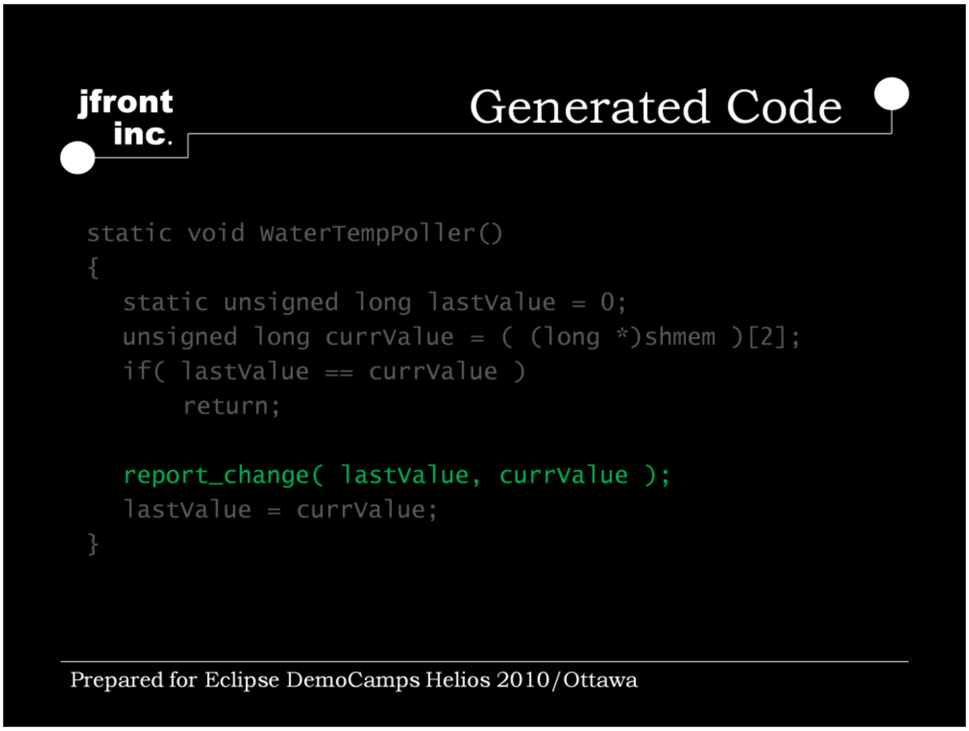
Users have their own code mixed with the rest of the generated code



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Generated Code

```
static void WaterTempPoller()
{
   static unsigned long lastValue = 0;
   unsigned long currValue = ( (long *)shmem )[2];
   if( lastValue == currValue )
        return;

   report_change( lastValue, currValue );
   lastValue = currValue;
}
```

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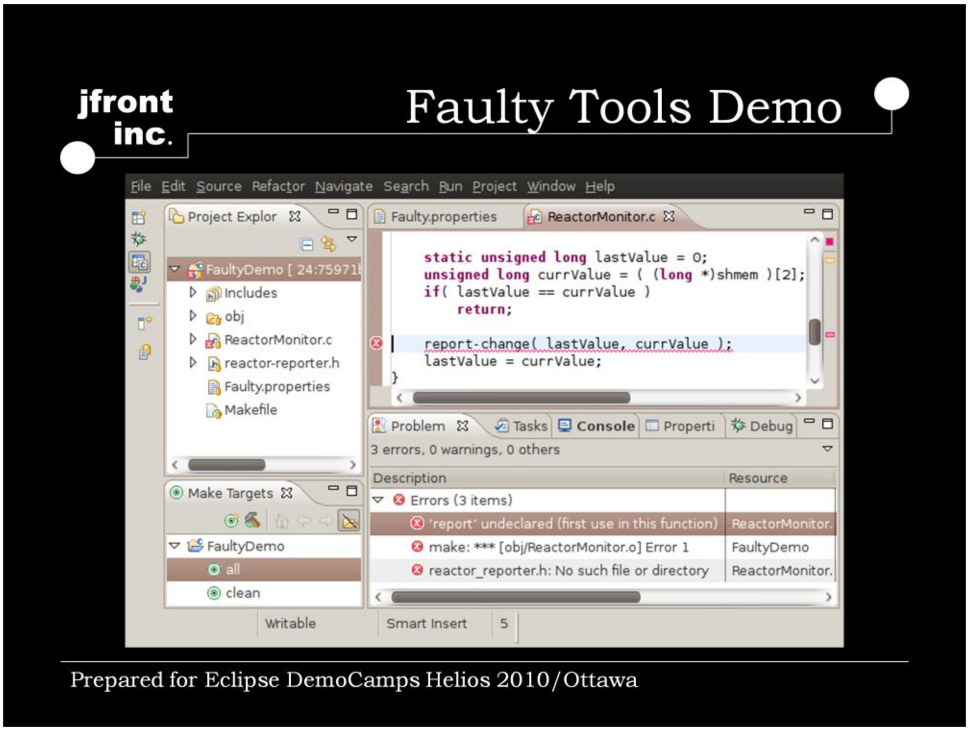

Faulty Tools Demo

```
    static unsigned long lastValue = 0;
    unsigned long currValue = ( (long *)shmem )[2];
    if( lastValue == currValue )
        return;

    report-change( lastValue, currValue );
    lastValue = currValue;
}
```

3 errors, 0 warnings, 0 others

Description	Resource
Errors (3 items)	
'report' undeclared (first use in this function)	ReactorMonitor.
make: *** [obj/ReactorMonitor.o] Error 1	FaultyDemo
reactor_reporter.h: No such file or directory	ReactorMonitor.

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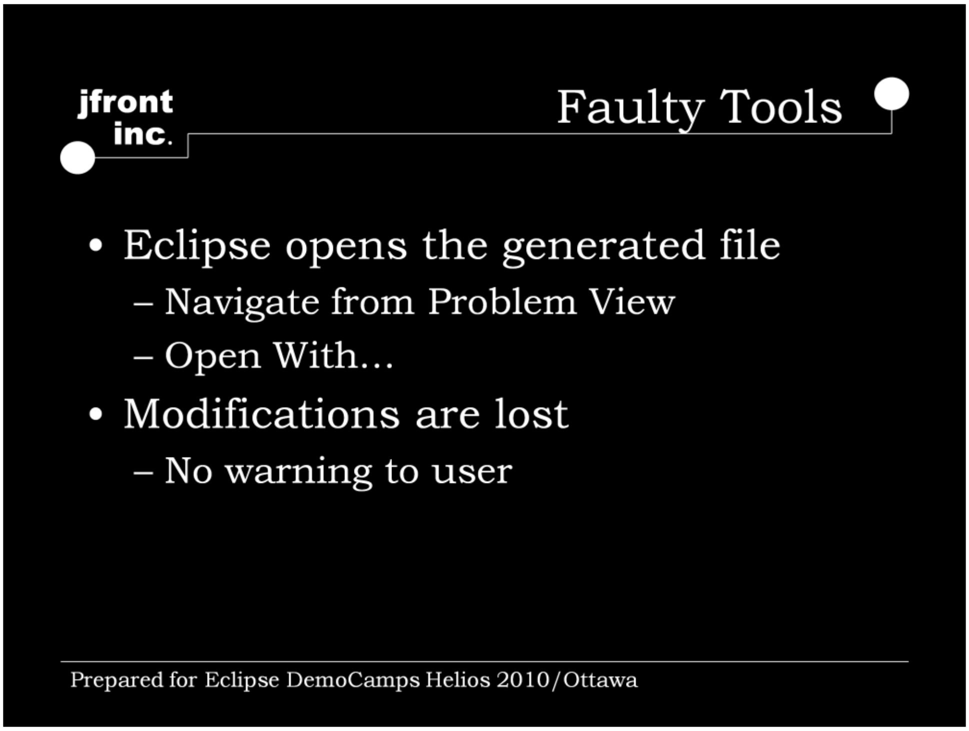
- Model is a .properties file – no EMF in this demo
- The user has made a typo so the compiler complains
    - There is also a warning from the #include section



Faulty Tools

- Eclipse opens the generated file
  - Navigate from Problem View
  - Open With…
- Modifications are lost
  - No warning to user

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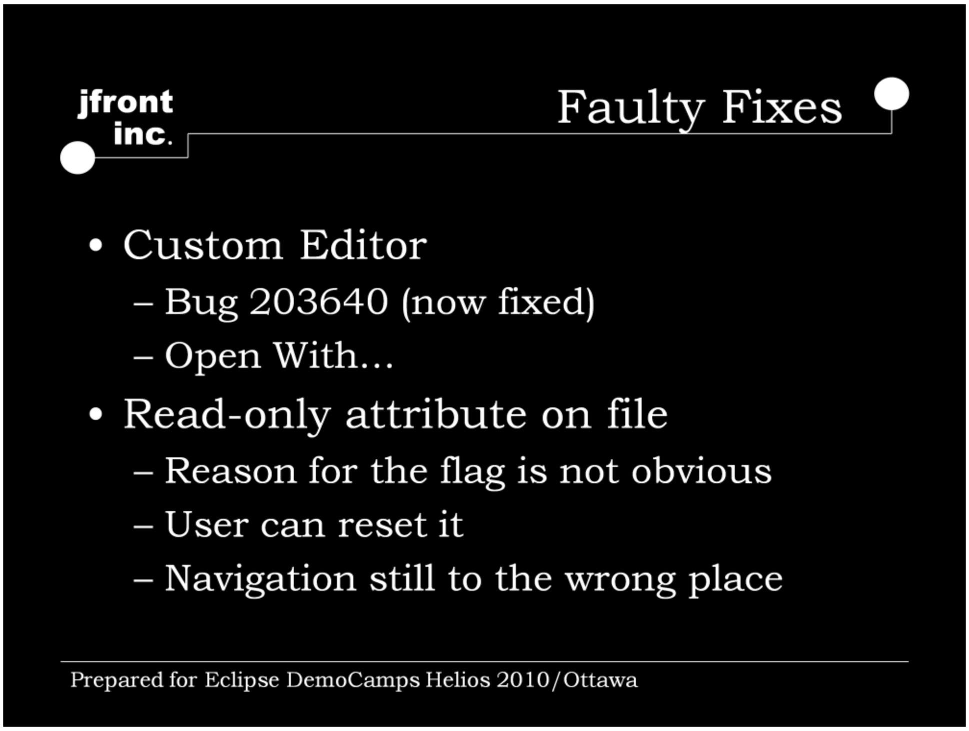
- The user sees the entire stack (Eclipse, EMF, CDT) as a single tool
- The user double-clicked a problem, fixed the error, saved their change
  - -- no feedback that this is a bad idea



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Faulty Fixes

- Custom Editor
  - – Bug 203640 (now fixed)
  - – Open With…
- Read-only attribute on file
  - – Reason for the flag is not obvious
  - – User can reset it
  - – Navigation still to the wrong place

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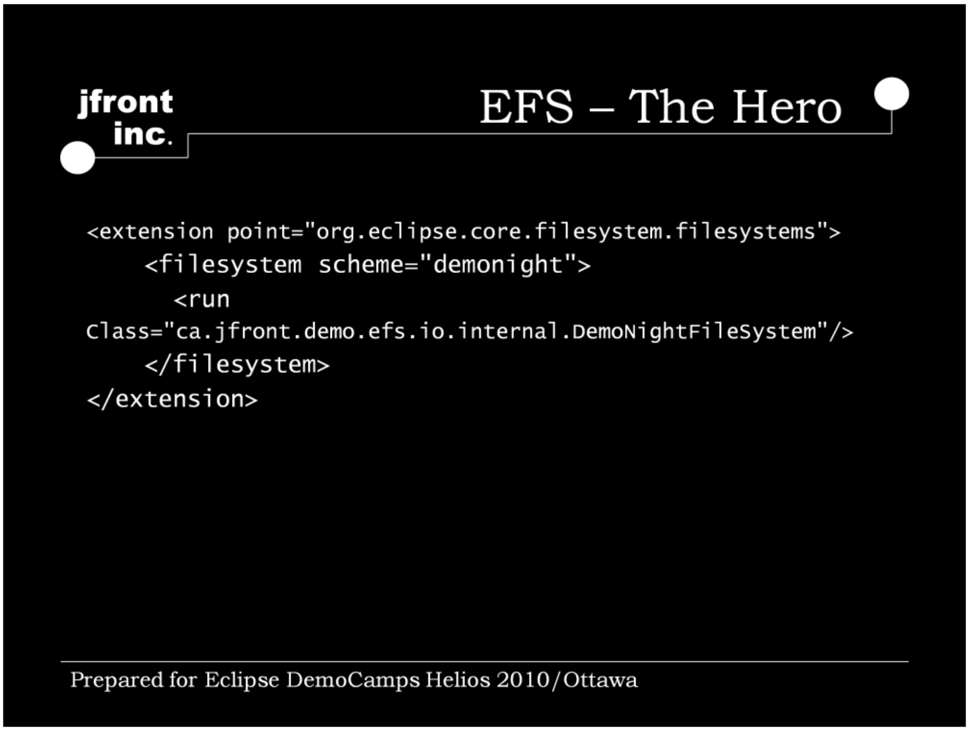
- 203640 is fixed for 3.6, doesn't help with older (3.3. and 3.4) installations

    -- user can circumvent custom editor with 'Open With…'

- other locks are confusing, the user can see the error and knows the fix, why can't it be applied?

    -- there's no feedback at the point in time when the user is trying to make the change



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EFS – The Hero

```
<extension point="org.eclipse.core.filesystem.filesystems">
    <filesystem scheme="demonight">
      <run
Class="ca.jfront.demo.efs.io.internal.DemoNightFileSystem"/>
    </filesystem>
</extension>
```

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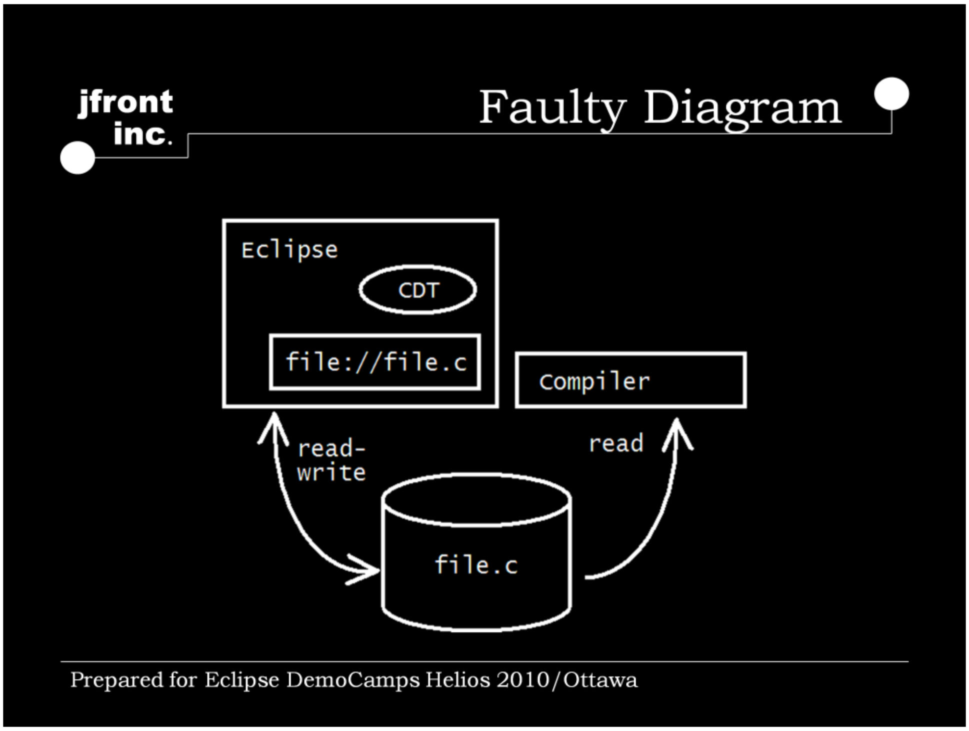
Eclipse platform has an extension-point for this



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Faulty Diagram

Eclipse

CDT

file://file.c

Compiler

read-write

read

file.c

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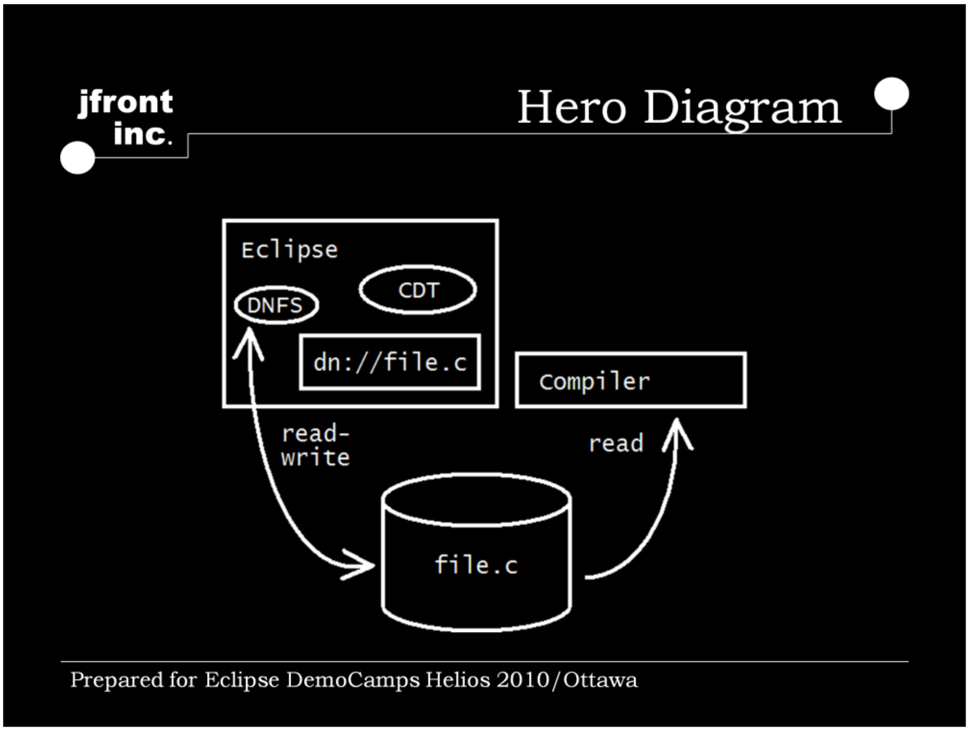
- In the faulty approach, Eclipse sees the generated content as a simple file, and says “I know what to do with files”



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Hero Diagram

Eclipse

DNFS

CDT

dn://file.c

Compiler

read-write

read

file.c

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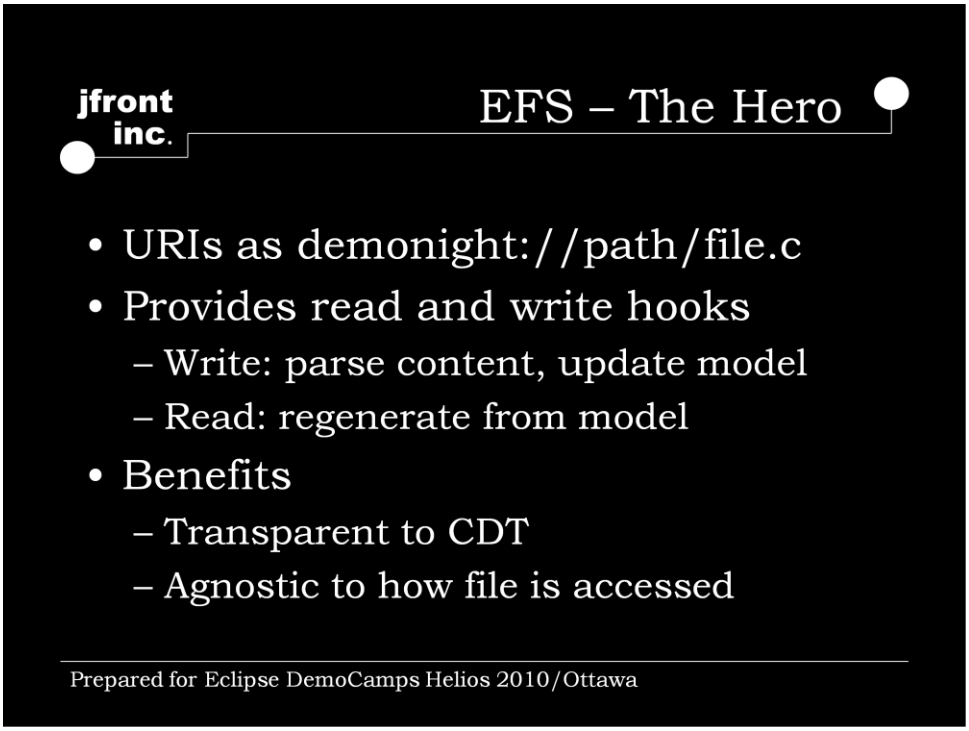
Using the EFS, the content gets wrapped in our own code, this allows hooks for reads and writes

In this case the DemoNightFileSystem takes ownership of putting the file on disk for the compiler to find



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EFS – The Hero

- URIs as demonight://path/file.c
- Provides read and write hooks
  - Write: parse content, update model
  - Read: regenerate from model
- Benefits
  - Transparent to CDT
  - Agnostic to how file is accessed

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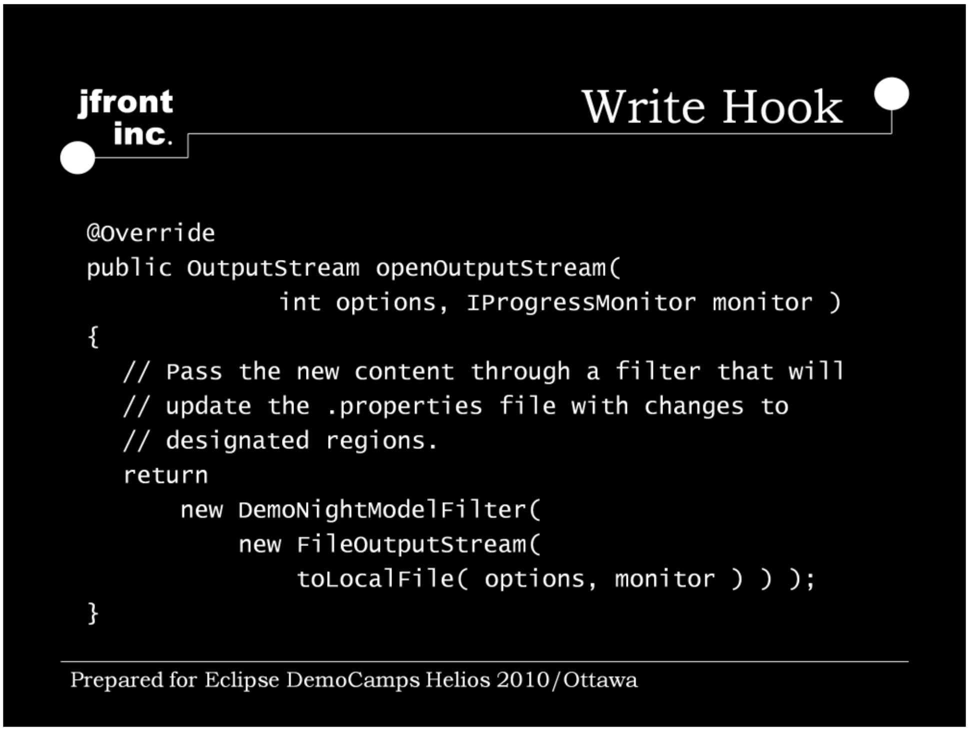
- The code generator produces files with the needed URI
- Our FileSystem implementation uses the URI to implement a write hook
  - the hook parses the content, and writes changes back to the source model
  - marker comments are used to associate code regions with model attributes



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Write Hook

```
@Override
public OutputStream openOutputStream(
            int options, IProgressMonitor monitor )
{
   // Pass the new content through a filter that will
   // update the .properties file with changes to
   // designated regions.
   return
       new DemoNightModelFilter(
           new FileOutputStream(
               toLocalFile( options, monitor ) ) );
}
```

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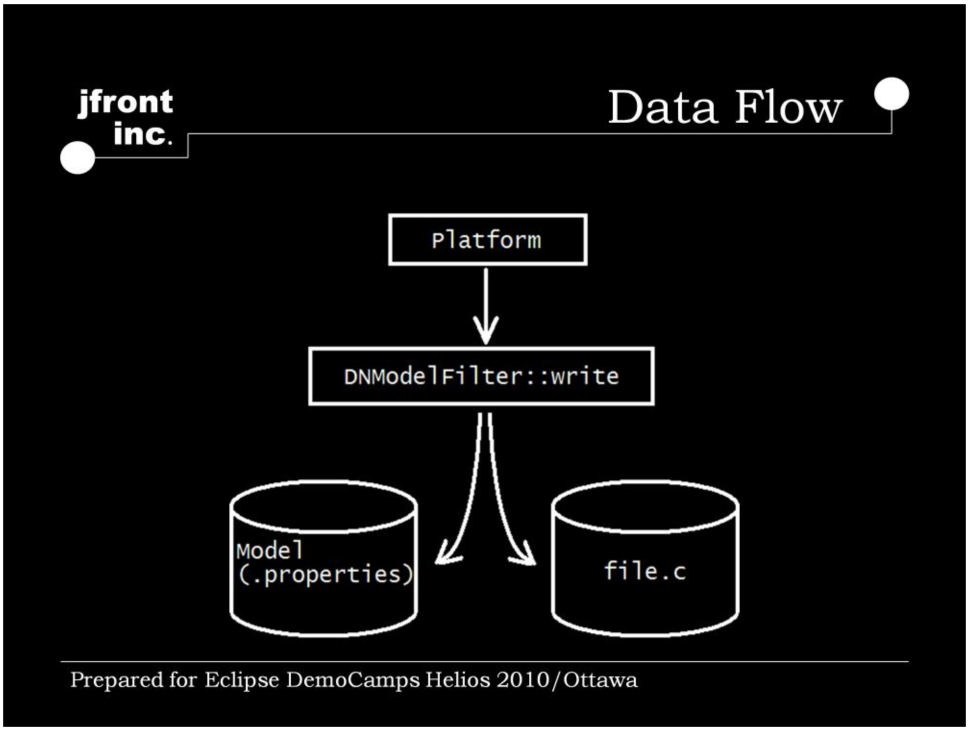
- The FileStore returns a stream that is used by the Platform to write the updated content

- This stream includes a parser, which looks for the special marker tags, and updates the .properties file

- The stream also writes the content to disk, for the compiler to find

    - Eclipse doesn’t know anything about the on-disk version



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Data Flow

Platform

DNModelFilter::write

Model (.properties)

file.c

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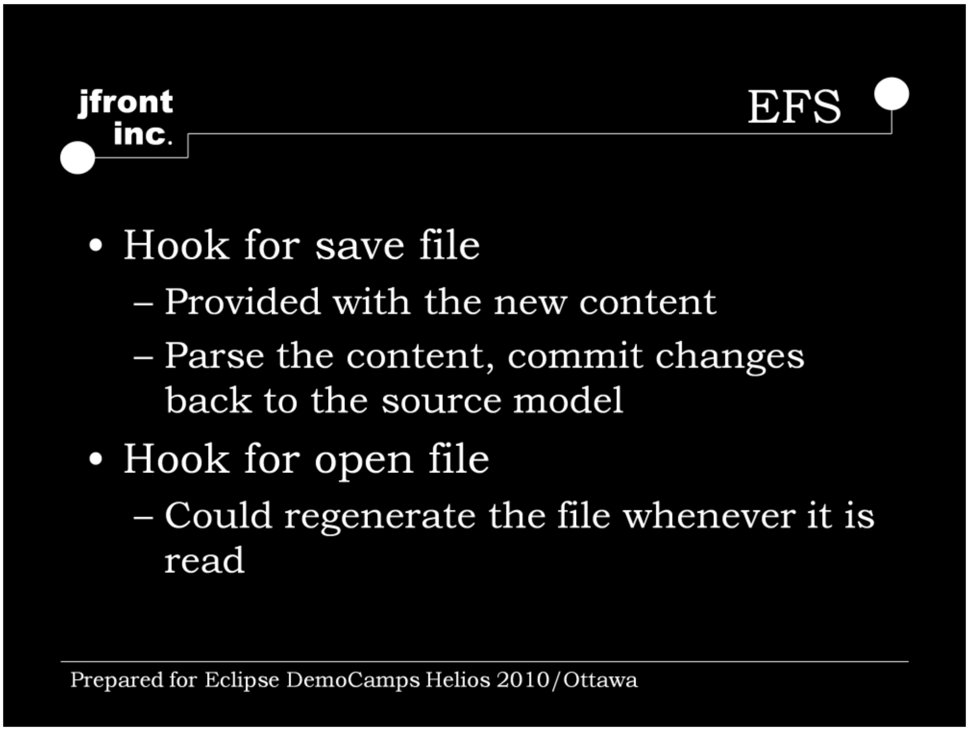
-The content is written to disk for the compiler, it’s not needed by any of the Eclipse elements

- DNModelFilter::read could generate content from the Model, or from the file on disk



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EFS

- Hook for save file
  - Provided with the new content
  - Parse the content, commit changes back to the source model
- Hook for open file
  - Could regenerate the file whenever it is read

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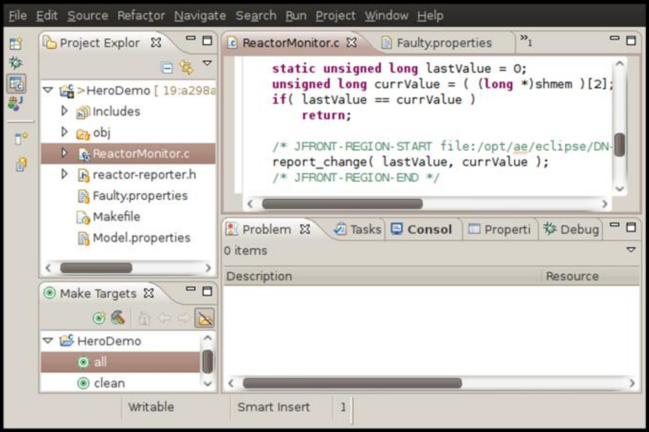
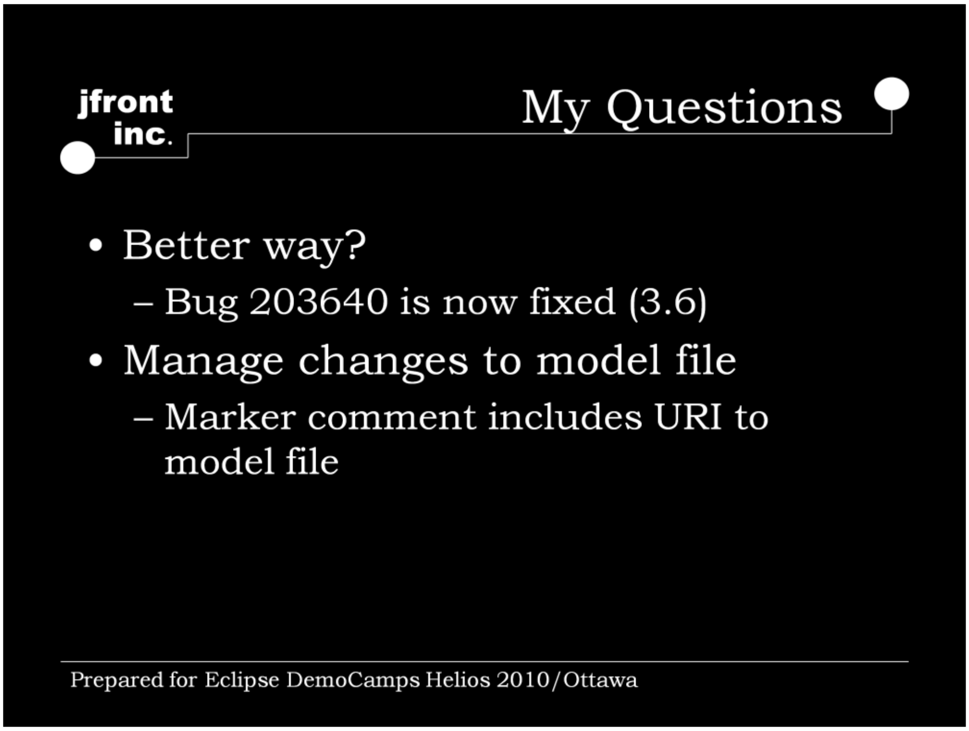
Hero Demo



```
    static unsigned long lastValue = 0;
    unsigned long currValue = ( (long *)shmem )[2];
    if( lastValue == currValue )
        return;

    /* JFRONT-REGION-START file:/opt/ae/eclipse/DN-
    report_change( lastValue, currValue );
    /* JFRONT-REGION-END */
```



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My Questions

- Better way?
  - – Bug 203640 is now fixed (3.6)
- Manage changes to model file
  - – Marker comment includes URI to model file

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- Basic problem is that the user should be aware of when their work could be lost

- When the model file changes the generated source still has marker comments to the old location