Lotusphere2011
IBM Software

# BP203 Leverage the New Java APIs in IBM Lotus Notes® 8.5.1 and 8.5.2!

**Karsten Lehmann** | CEO | Mindoo GmbH
**Tammo Riedinger** | CEO | Mindoo GmbH

Smarter software for a Smarter Planet.

# Agenda

- Introduction
- Extending Lotus Notes in Java
- Extending Domino Designer in Java
- Added value for classic Lotus Notes and XPages development
- Best practices
- Q&A

# About us

- Mindoo is IBM Business Partner and Notes/Domino Design Partner
- Focused on the „new“ IBM Lotus Notes development areas
  - Eclipse/Expeditor plugins and rich client applications
  - XPages applications and controls
  - Composite Application architectures
  - LiveText extensions
- Karsten Lehmann and Tammo Riedinger
  - Founders of Mindoo
  - Since 2004 developers of the MindPlan® application, Mindmapping and Project Management for Lotus Notes, IBM Award Winner 2008
- More company information: http://www.mindoo.com

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# Motivation

- „Notes can do that too“ - yes, but why must it be so complicated?
  - Until now, Eclipse and XPages developers had to use far too many workarounds to interact with the classic Notes UI
  - Think of “using Notes.ini for data exchange” or “opening pages that close themselves, just to run some LotusScript® code in the QueryClose event”
  - The purpose of the new APIs is to make this gap a little smaller and life quite a bit easier
- We participated in the discussion about required features for the new Notes and Designer extensibility APIs
  - Discussion with IBM dev about API draft at Lotusphere 2009 and conference calls
  - Design feedback / test reports within the Design Partner program
- As always for a new API, there is still room for improvements
  - But we think this is already a **huge step** forward!

# Disclaimer

- We cannot cover all APIs in detail in this session!
  - We'll focus on some "hot" areas instead:
  - namely the new Java UI APIs and the Designer Java-API
- We hope to give you a good impression, what you can really do with the Notes 8.5.1/8.5.2 APIs.
  - Hopefully you will leave this session with some ideas of your own already
  - We have created up to 10 demos for you!
- We try not to bore you to death with code today!
- Watch our blog for an upcoming series with details about how our demos work instead:
- http://blog.mindoo.com

# Getting started

- The following APIs and demos are based on
  - Eclipse 3.4.2
  - Lotus Expeditor® toolkit 6.2.2
  - IBM Lotus Notes 8.5.2
- Install Expeditor into Eclipse and set Lotus Notes 8.5.2 as target platform

- Create a plugin-in project to develop your code
- For the UI API, add the following dependency
  - com.ibm.notes.java.ui
- For the DDE API, add two dependencies:
  - com.ibm.designer.domino.ui.commons
  - com.ibm.designer.domino.ide.resources

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# The Notes UI API – a Management Summary

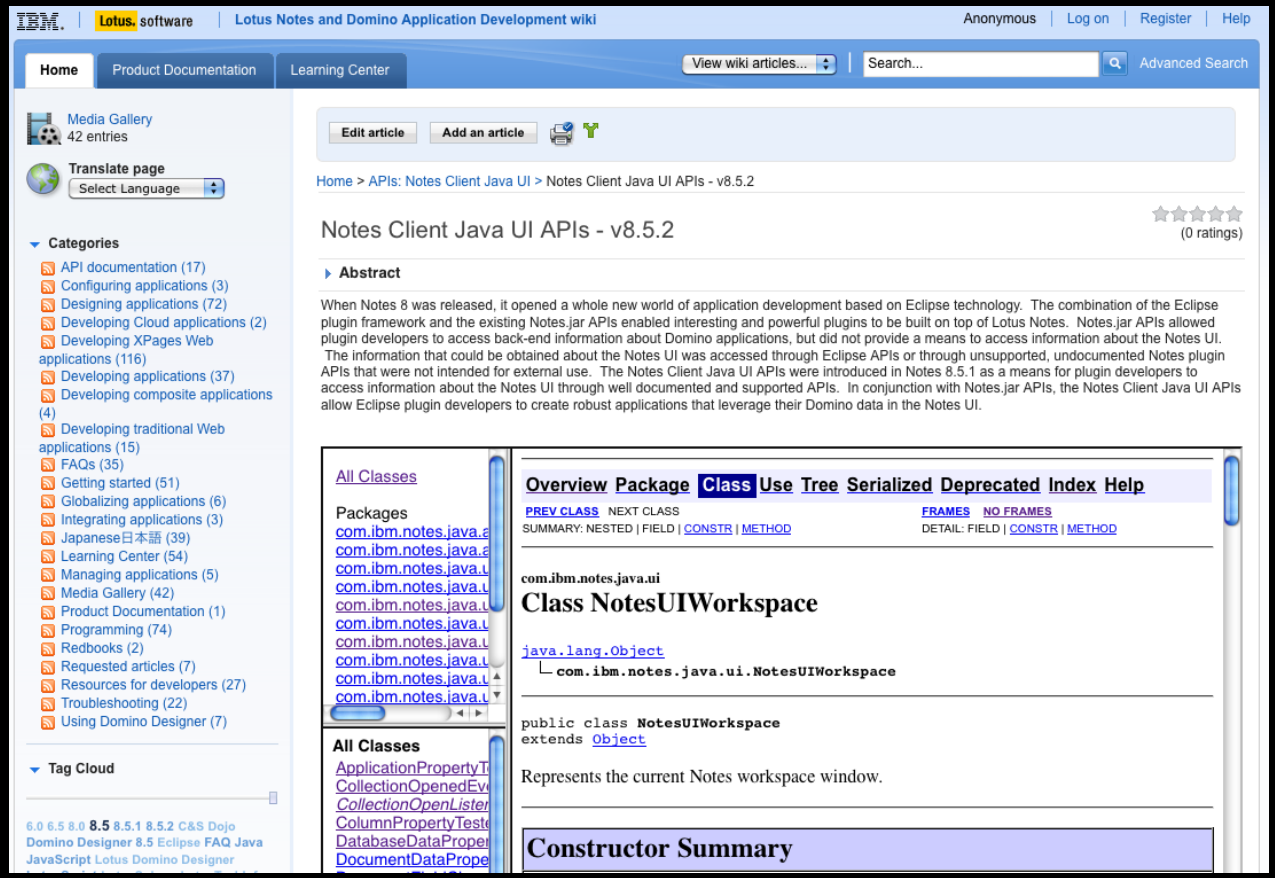
- API new in 8.5.1
  - A few additional features added in 8.5.2
- Further improves the integration between Eclipse and the classic Lotus Notes client
  - Eclipse plugins can finally receive information about the state of forms and views of the classic client
  - New ways of interaction between these two worlds
- Makes existing functionality easier to use
  - Opening of design elements
  - Printing documents and views from Eclipse
  - Compose a new document and fill it with default items
  - Getting a temporary document to store and pass data
  - Execute Notes code in a background thread with proper memory management (NotesSessionJob)
  - Reading the selected documents and column information in a view (8.5.2)

# The Notes UI API – a Management Summary

- Adds new functionality and further closes the gap between Eclipse and Lotus Notes
  - Read/modify contents of documents in edit mode
  - Document listener (detect edit mode on/off, modifications and document closing)
  - Get Eclipse selection for focused fields and new unsaved documents
  - Add database to workspace
  - Prompt methods of NotesUIWorkspace, e.g. to choose a database
  - Lots of Eclipse property testers (a kind of "hide when" for Eclipse elements like e.g. actions)
  - Execute LotusScript agents in the UI (they can display dialogs), pass data back and forth and attach callbacks
- What if you're only focusing on XPages?
  - UI API is great to integrate existing Notes apps with XPages apps in the Notes Client
  - We'll show you how to call the UI API from XPages in the client later on!

# Where is the documentation?

- The most current version of the UI API can be found in the AppDev wiki
  - http://www-10.lotus.com/ldd/ddwiki.nsf/dx/Notes_Client_Java_UI_APIs-v8.5.2
- DDE API Javadocs available in the Notes client help



# Start small – Your first example

- Toolbar action that changes fields in an open form
- Add this to a standard Eclipse toolbar action:

```
NotesUIWorkspace ws = new NotesUIWorkspace();
NotesUIDocument uidoc = ws.getCurrentDocument();
if (uidoc != null) {
   NotesUIField field = uidoc.getField("Subject");
   if (field != null)
      field.setText("Hello World!");
}
```

# Start small – Your first example

- For backend document fields:

```
NotesUIWorkspace ws = new NotesUIWorkspace();
NotesUIDocument uidoc = ws.getCurrentDocument();
if (uidoc != null) {
   NotesBEDocument beDoc = uidoc.getBEDocument();
   String oldValue = beDoc.getItemString("Flag");
   // do something here
   beDoc.setItemValue("Flag", "1");
   //optional to see your changes in the UI:
   uidoc.reload();
}
```

- Due to technical restrictions no full access to the document from Java

# Demo

- Access and modify the UI document with Eclipse actions

# Digging deeper - Exploring NotesUIWorkspace

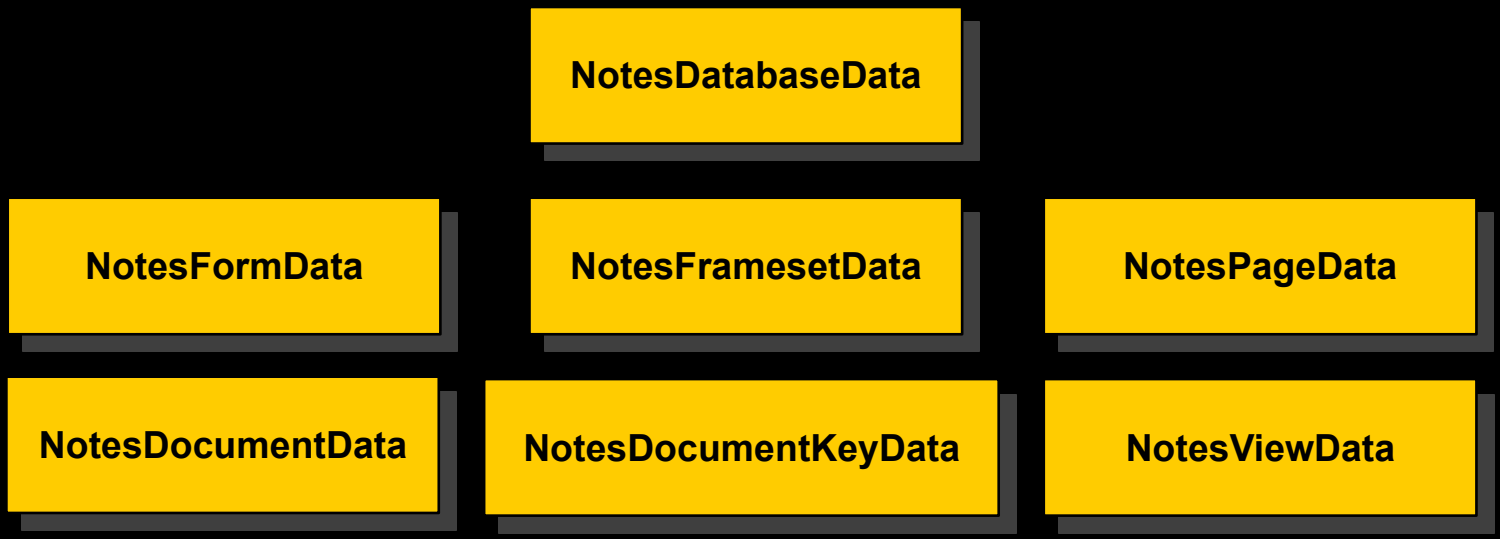
- Composing new documents with preset fields

```
NotesUIWorkspace ws = new NotesUIWorkspace();
NotesDatabaseData dbData =
   new NotesDatabaseData("Server/Org", "main/jdoe.nsf");
NotesFormData formData =
   new NotesFormData(dbData, "Memo");
formData.addComposeItem("SendTo", "Peter Smith/Org");

ws.composeDocument(formData);
```

# Digging deeper - Exploring NotesUIWorkspace

- Data classes are used in the API to store data between Notes session
- You can safely pass them between calls to the API and store them locally
- sometimes, data (like the database's filepath) is missing
  - This is due to technical restrictions
  - Use the open-method to let Notes fill in the missing fields
  - e.g. NotesDatabaseData.open(Session)



# Digging deeper - Exploring NotesUIWorkspace

- Composing new documents based on other documents (1/2)

```
NotesUIWorkspace ws = new NotesUIWorkspace();
session.setConvertMIME(false); // Do not convert MIME to RT

Document tmpDoc = ws.getTemporaryDocument(session);
setBasicMailFields(tmpDoc);    // e.g. set subject, receipient

//Create the body as a MIME entity
MIMEEntity body = tmpDoc.createMIMEEntity("Body");
Stream stream = session.createStream();
stream.writeText("<ul><li>hello</li><li>world</li></ul>");
body.setContentFromText(stream, "text/html;charset=UTF-8",
   MIMEEntity.ENC_IDENTITY_7BIT);

//Save the document
tmpDoc.save(true, true);
```

# Digging deeper - Exploring NotesUIWorkspace

- Composing new documents based on other documents (2/2)

```
//now compose a new document in the mail database
//based on the temporary document

Database mailDb = openMailDatabase();
NotesDatabaseData mailDbData = new NotesDatabaseData(mailDb);
ws.composeDocument(mailDbData, tmpDoc);

//don't forget to restore conversion
session.setConvertMime(true);
```

# Digging deeper - Exploring NotesUIView

- New in 8.5.2: Uniform way to access the selection of a view
- Works in Java views and classic views

```
NotesUIWorkspace ws = new NotesUIWorkspace();
NotesUIElement uiElement = ws.getCurrentElement();

if (uiElement instanceof NotesUIView) {
  NotesUIView uiview = (NotesUIView) uiElement;
  NotesUIViewEntryCollection entryCol = uiview.getActionableEntries();

  //things we can get without opening the entry collection
  NotesUIViewEntry firstEntry = entryCol.getFirstEntry();
  int nrOfEntries = entryCol.size();

  //to access more than the first entry, we need to open the collection
}
```

# Digging deeper - Exploring NotesUIView

- New in 8.5.2: Uniform way to access the selection of a view

```
//to access all entries, we need to open the collection
entryCol.open( new CollectionOpenListener() {
 public void collectionOpened( CollectionOpenedEvent evt ) {

  If ( evt.getError() == null ) {
   NotesUIViewEntryCollection loadedCol = evt.getCollection();
   Iterator<NotesUIViewEntry> iterator = loadedCol.iterator();

   //iterate over entries here:
   //NotesUIDocumentEntry, NotesUITotalEntry, NotesUICategoryEntry
  }
 }
}, false);
```

# Demo

- Flexible report generator
  - Process view selection
  - Produce report by execution formula or JavaScript on selection
  - compose document with result in richtext field

# Digging deeper - Calling agents in the UI

- Until now, you could only execute LotusScript agents in the backend
- No way to change the Notes UI from an agent
  - This has changed in 8.5.1
  - New function to execute an agent in the Notes UI
  - E.g. to access the current document/view and display dialogs
  - Even run agents from a different database!
- Handy for functions that are not yet part of the UI API
  - Put your code in a Lotusscript agent
  - Call NotesUIWorkspace.runAgent
  - Use a callback listener to get notified when the agent is done
  - Pass data between Eclipse and LotusScript

# Improved Eclipse selection

- In 8.5: Eclipse selection limited to selected documents in a view and already saved documents
  - Based mainly on passing around Notes-URLs
  - No access to "in-memory" documents
- In 8.5.1: get information about unsaved documents and even about focused fields
  - You can track what the user is editing
  - Introduction of classes that can be queried directly for more information than just the URL (e.g. NotesUIElement, NotesUIDocument and NotesUIField)
  - Uses standard Eclipse concept (adapters) to provide additional data!
- In 8.5.2: extended list of “Property Testers” and more adapter support
  - Property Testers are used like “Hide When's” in top-level and context menu entry definitions
  - For e.g. a list of these property testers, see OpenNTF “Java UI API Exerciser”

# Improved Eclipse selection

- Using IAdaptable on selections

```
// iterate over a selection and print the form-name
for(Iterator<?>
  i=((IStructuredSelection)selection).iterator();
  i.hasNext(); ) {
   Object item = i.next();
   if (item instanceof IAdaptable) {
       NotesUIDocument uidoc = (NotesUIDocument)
         ((IAdaptable)item).getAdapter(NotesUIDocument.class);

       if (uidoc != null)
          System.out.println( uidoc.getForm() );
   }
}
```

# Demo

- Universal context-based online help system
  - Sidebar help for current Notes content or XPage
  - Call agents from Eclipse and transfer data

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# Domino Designer Extensibility API

- The DDE API allows for programmatic Java extensions of the Domino Designer IDE
- Adds new functionality
  - Get design element information about the current Eclipse selection
  - Set basic design element and database data
  - Refresh the project/single design element after a backend change (e.g. DXL import)
  - Open databases in the DDE navigator
- Main use cases:
  - React on the user selection -
    e.g. display additional data in your own display areas (Eclipse views)
  - Offer automated processing of data, e.g. set flags for all selected images
    or let code generators create the design
- Additional extensibility gained by leveraging the standard Eclipse APIs
  - An NSF project is an extended Eclipse IProject
- API is unchanged in 8.5.2

# Convert Eclipse selection into DDE API objects

- Convert Eclipse IProject into DesignerProject
  - An IProject is a generic development project in the Eclipse IDE

```
DesignerProject nsfProject =
   DesignerResource.getDesignerProject(iproject);
String dbServer = nsfProject.getServerName();
String dbPath = nsfProject.getDatabaseName();

//
//modify db design here, then notify DDE about changes
//

nsfProject.refresh();
```

# Convert Eclipse selection into DDE API objects

- Convert Eclipse IResource into DesignerDesignElement
  - An IResource is a generic subelement of an Eclipse IProject

```
DesignerDesignElement de =
    DesignerResource.getDesignElement(iresource);
String oldName = de.getName();

//
//modify design element here, then notify DDE about changes
//

de.refresh();
```

# Demo

- Custom properties for Notes design elements
- Automatic design element modification

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# Limitations of the API

- Sounds great! But where is the catch?
  - We do not only want to show what's possible, but also what's not possible
- Only a small subset of the LotusScript API available
- Event listeners not blocking form/view events
  - No replacement for LotusScript events, e.g. QuerySave
- Eclipse => classic Notes only
  - Does only empower the Eclipse world, no improvements for the classic client world
- Any benefits for XPages developers?

So how can we bring classic client, XPages apps and Eclipse closer together?

→ How can we leverage the Eclipse functions from LotusScript?

→ Is the UI API relevant for XPages developers?

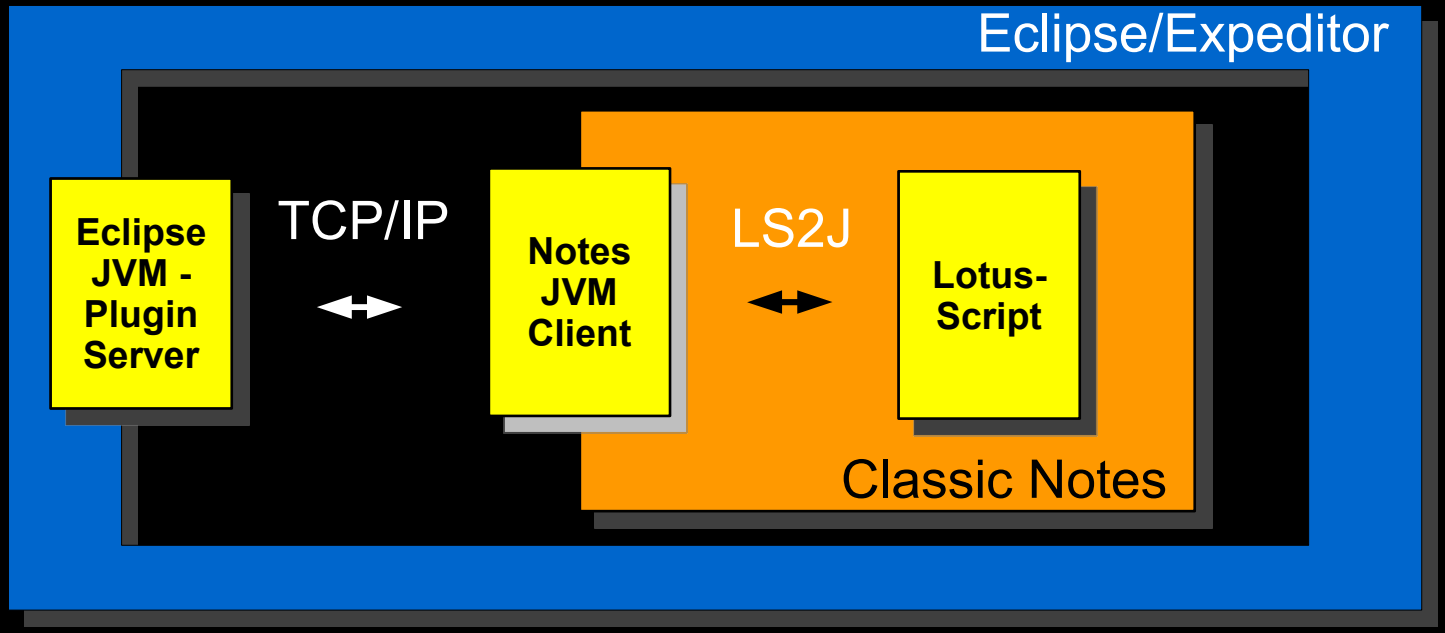
# How to connect two worlds

- At LS10* we discussed various approaches to integrate classic Notes with Eclipse and came up with a solution:
- Two JVMs: Eclipse JVM and classic Notes JVM
  - No direct connection between Eclipse plugins and Notes agents
- Use local network communication between them
  - Open a server port in Eclipse, connect from the classic JVM
- Use your own protocol or industry standards like Java RMI
  - And remotely call Eclipse plugin code from classic Notes
- Optional: Use LS2J to use the remote Java API in LotusScript

* Presentation available on our blog

# How to connect two worlds

- The result was pretty impressive:
  - Combination of LotusScript and Eclipse plugins opens up new design patterns
  - E.g. background threads for long-running LotusScript code or creating Eclipse tabs and layouts from LotusScript on the fly

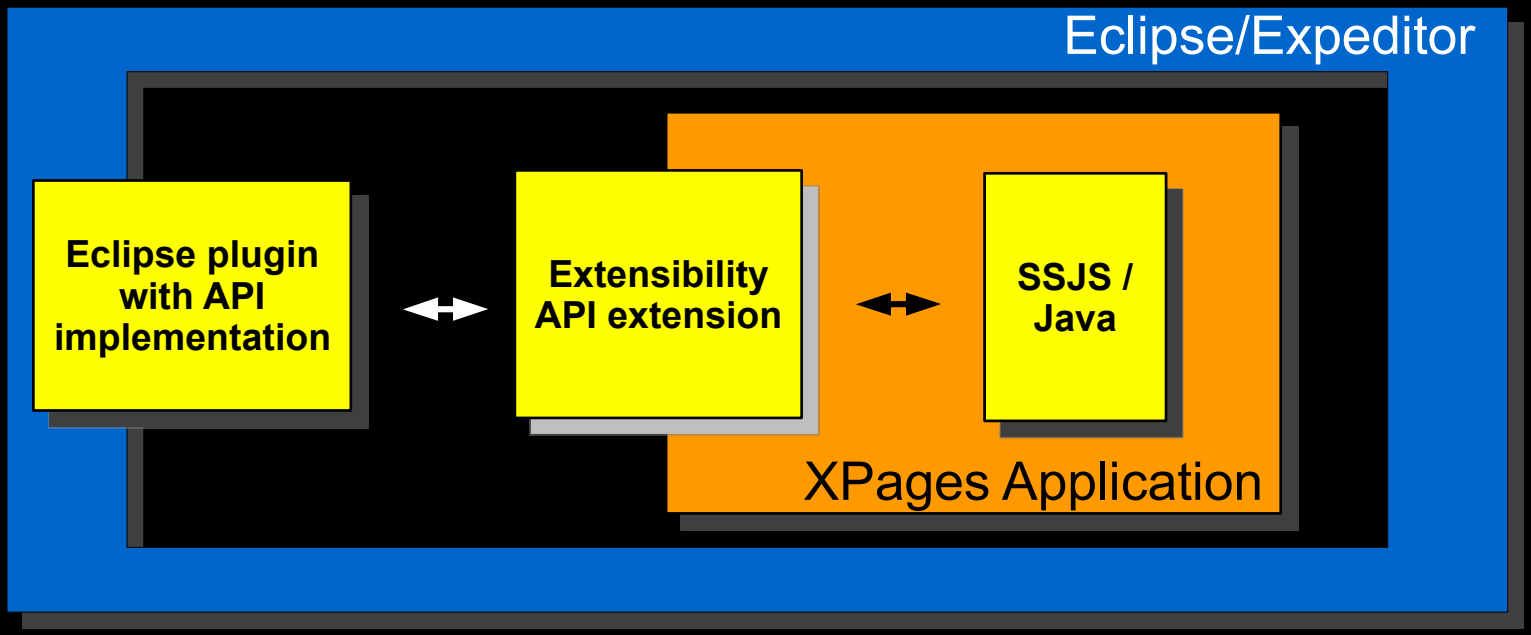


# Demo

- LotusScript registering context menu actions
- Multithreaded LotusScript application

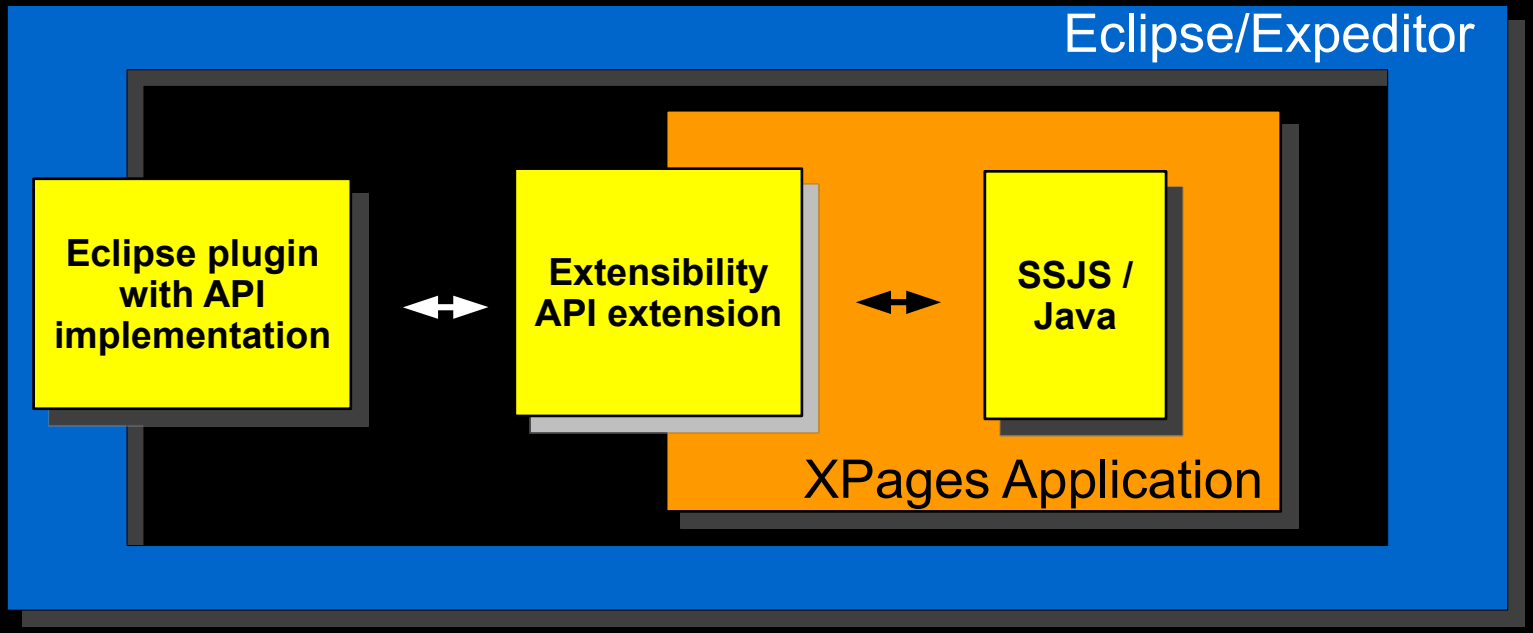
# How to connect two worlds

- Let's do the same with XPages in the Client!
  - Leverage Expeditor APIs when running locally
  - XPages applications no longer just local web apps
  - Use UI API to control classic Notes Client applications from XPages code
  - Easy integration thanks to the XPages Extensibility API of Lotus Notes 8.5.2
- Here's an overview:



# How to connect two worlds

- Some implementation details:
  - Leverages new OSGi support for XPages in 8.5.2
  - Extend XPages apps with java controls and code stored in Eclipse plugins
  - XPages editor adds a plugin dependency to the NSF the first time such a java control is added to an XPage
  - Eclipse plugins can run out of the scope of the XPages security manager (no SecurityExceptions!) and call Eclipse APIs



# Demo

- Create a new mail from an XPages application
- Visualize long-running SSJS tasks as Eclipse Jobs
- Execute dynamic LotusScript with Notes UI access
- Create perspectives and viewparts from SSJS

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# General advice

- Learn to work with threads
  - Don't do long running operations in the UI thread!
  - This blocks the whole client!
  - Do calculations in background jobs, then use a UIJob to update the UI:

```
NotesSessionJob job = new NotesSessionJob("BG Operation") {
  protected IStatus runInNotesThread(
      Session session, IProgressMonitor monitor)
        throws NotesException {
      //compute something here
      return Status.OK_STATUS;
  }
};
job.schedule();
```

# General advice

- Don't cache Notes objects
  - Can lead to severe memory issues
- The Notes Java API only has a limited amount of handles for data objects
  - And you are not alone in the client
  - Call .recycle() whenever possible
- Use NotesSessionJob for your Notes access
  - Executes in the background
  - Grabs a fresh session every time, safe even if the Notes ID has changed
  - Automatically recycles all the Notes objects created within the session
  - Copy the Notes data into your own objects
  - UI API data classes are safe (e.g. NotesDocumentData)

# General advice

- When building your own bridge between XPages and Eclipse, you may get SecurityExceptions calling restricted API operations
  - XPages runtime is protected by a SecurityManager, direct execution of restricted code not allowed
- Workaround: Wrap your restricted plugin code in AccessController calls
  - Disables SecurityManager check for a block of code

```
T result=
 AccessController.doPrivileged(new PrivilegedAction<T>() {
  public T run() {
    // this code runs out of security manager scope
    // be careful not to open security holes!
   T newT=buildT();
   return newT;
  }
 });
```

# Summary

- Eclipse developers get additional ways to interact with Lotus Notes UI
  - Existing Lotusscript code can be reused by calling it in UI agents
  - Can be used for a smooth transition of Notes code to XPages apps and Java plugins
- Classic Lotus Notes development can also benefit from the new APIs
  - By building a bridge between LotusScript and Eclipse plugins, the API functions can also be used from classic forms and views
  - Interesting new design patterns like multithreaded LotusScript applications and Eclipse UI control
- With 8.5.2, XPages developers can leverage Eclipse plugin code in their applications
  - UI and Eclipse APIs can be used to improve the local user experience and integrate classic design elements
- DDE can now be extended as well
  - Leverage the design element selection to modify design, add code/design generators to DDE

# Thank you!

# Time for Q&A

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