

# Lotusphere2012

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## BP115 Deploying and Managing Your IBM Lotus® Domino® XPages Applications

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- IBM Champion





## Before we get started

- At the simplest level once you sign the database XPages will just work
- What we're talking about is the best practice for improving
  - Stability
  - Performance
  - Manageability (not sure that is a word!)
- Really, this is all quite new. So don't be worried if it feels that way!
  - We did too....



## Agenda

- What are XPages?
- Installing
- Performance
- Deploying
- Security



## x-what? Do-who?

- Hint to the admins here: You're going to find all sorts of new stuff today!
- XPages - New tool for developing web and client applications
  - Built using modern web techniques, separating data from UI
- Code written in two kinds of Javascript
  - Server Side JavaScript executes on your server (like agents)
  - Client Side JavaScript executes in the client
- Dojo - Framework downloaded to browser to run code locally (like iNotes does)
  - Provides the common stuff (date/time picker etc)
  - Stored on your Domino server and automatically downloaded to browsers



# XPages overview

Browser

XPages App

JVM

HTTP Task



NSF



RDBMS



File System



## XPages Extension Library

- The first question an Admin is likely to be asked
- A set of server side javascript tools
- Written by IBM and available for free on OpenNTF
  - <http://extlib.openntf.org>
- Provides developers a jump start to develop apps
  - Such as a a grid function or UI
- Warning! These are updated very, very frequently - monthly or weekly!



## XPages in the client

- Sometimes known as XPiNC
- XPages runs in the client too
  - Write once, run anywhere(ish!)
  - Actually runs IN the client, using a local JVM
  - Available from 8.5.1
- If the Extension Library is used, it must also be in the client
  - We'll talk about how to deploy these



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## 'Installing' XPages

- XPages and Dojo parts are optional installs but installed by default
  - So you very likely already have it!
- Extension Library is not installed by default
- Be careful when upgrading servers
  - Remember to upgrade the extension library to match
  - Functionality and code VARIES between point releases
  - Upgrading randomly will (may) break apps!
  - Admins - talk to your developers!



## Installing the Extension Library - Lotus® Domino® 8.5.2

- This is effectively a manual installation - for EVERY server
  - go to <http://extlib.openntf.org>
  - make sure you download the 8.5.2 (not the 8.5.3) version
- Extract updatesite.zip from the download and extract it
- Copy to  
c:\domino\data\domino\workspace\applications\eclipse
- Restart HTTP
- To verify the load, type  
“tell http osgi ss com.ibm.xsp.extlib”



## Installing the Extension Library - Lotus Domino 8.5.3

- Download the 8.5.3 version from OpenNTF
- Domino server now supports installation from an update site too (cool eh?)
  - Create an update site on *one* server using the “Eclipse Update Site (8.5.3)” template
  - Extract updatesite.zip to a folder and import the Extension Library to the update site
  - Important! The signer of the *update site documents* must have ‘run unrestricted’
  - Add “OSGI\_HTTP\_DYNAMIC\_BUNDLES=updateSite1.nsf” to servers’ notes.ini (hint: use a configuration document!)
  - Restart HTTP
  - To verify the load, type  
“tell http osgi ss com.ibm.xsp.extlib”
- This method will work multiple servers and is much more scalable
- NOTE: The extension library will be stored in memory using this method
  - This will have an impact on performance in more ways than one



## Installing the Extension Library - Notes clients

- Can be included in original installation package
  - But this ties you to a certain version
- Best maintained in an update site
  - Can (should?) be the same one as the server uses
- There are many ways to trigger this
  - All documented in the Domino admin help
- Recommended method is to push this via a widget
  - This is quite involved
  - Sadly we don't have time to show you in detail
  - But we have documented it - check the references slide at the end
- Or.... include the extension Library features and plugins into a composite Application



## Installing UP-1

- What Is UP-1?
  - IBM Lotus Notes and Domino Upgrade Pack 1
  - Packaged version of the Extension Library
  - Updated Teamroom and Discussion templates
  - Domino Access Services (JSON based REST services for Domino data)
  - FULLY SUPPORTED by IBM
- Separate executable installer (ie, nothing like the previous install) for server and client
  - Installs version 8.5.3.20111208-0717
  - Does NOT update the client or server version number
  - Check for an UP1 directory on the server. On the client, start digging!
- UP-1 can be deployed via update site
  - Run client install and extract to a directory. Updatesite.zip will be created
  - Use this to create an internal update site
  - **This is not recommended for the client (server is OK)**
  - Future upgrade packs will work REGARDLESS of current version
  - Hence smart upgrade should work from now on

Update!



## Versions

- XPages need to be compiled for the right version of Notes and Domino
  - Consistency across the environment is important
  - It is possible to save applications in Domino Designer 8.5.3 to run on earlier versions
- Dojo for each version
  - 1.6.1 with 8.5.3
  - 1.4.3 with 8.5.2
  - 1.3.2 with 8.5.1
  - 1.1 with 8.5.0
- OneUI for each version
  - Similar to Dojo the versions of OneUI continue to change as XPages is upgraded
- Update Pack 1 (2,3 etc)
  - Applications using these features will need to be co-ordinated between admins and developers.



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## Quick Server Performance tips

- Give the server lots and lots and lots of RAM. And then some more.
- Use a 64-bit OS
- Devote fast disk or SSD to your servers' *program files* volume
  - This is where the XPages code is called from
- Isolate heavily used XPages apps
  - Especially from other memory intensive apps such as Traveler
- Consider dedicated Domino instances for large applications



## Performance

- Use runtime optimized JavaScript and CSS resources
  - Can dramatically improve perceived performance
  - Especially on high latency networks (e.g. mobile)
  
- Server Page Persistence
  - Controlled from Application Properties in Domino Designer
  - Use “Keep Pages In Memory” for smaller numbers of users
  - Use “Keep Pages On Disk” for larger numbers of users



## Performance

- Single copy XPage design
  - An option in Application Properties in Domino Designer
  - Allows lots of applications using the same template to share XPage code
  - Saves loading more XPAGES into server memory
  - Good example is the Discussion template
  - Another example is from Declan Lynch who has 96,000 databases which share the same design thus saving approximately 6mb per database (that's 562gb!)
- XPages ToolBox application
  - Free application on OpenNTF
  - Used to monitor code performance and memory usage
- Pre-load XPage engine to improve startup times (Notes and Domino 8.5.3 onwards)
  - XPagesPreload=1
  - XPagesPreloadDB=servername!!path/mydb.nsf/myxpage.xsp,servername!!path/anotherdb.nsf



# Memory

- XPages run in a server side JVM
- RAM is used to cache Extension Library, run code in a JVM and store state information
  - on top of everything else
  - Use memory wisely. Caching is good.
- Check your CPU and Disk I/O
  - In IBM's testing, an XPages discussion db uses 2x the CPU and 4x the Disk I/O to a standard discussion db, but less than half the network I/O
- XPages will only run as fast as your server can
  - Don't throttle it for disk, CPU or RAM
  - Domino is disk intensive. Slow disk will slow everything
- Use 64-bit Domino if possible, at least a 64-bit OS



## HTTPJVMMMaxHeapSizeSet

- XPages apps crashing, or acting weird until you restart the server?
- Check log files for 'stack overflow' or "out of memory" - most likely there's a lack of memory
- Check the servers' Notes.ini for HTTPJVMMMaxHeapSize
  - in 8.5.1 - Set to 256M by default
  - in 8.5.2 - will be reset to 64M automatically
  - Set HTTPJVMMMaxHeapSizeSet = 1 to stop this being reset
  - Ideally, set to 1/4 of total RAM
- Note: This is only for 32-bit servers. For 64-bit, this defaults to 1 Gigabyte
  - did we mention lots of RAM helps?



## Scoped Variables

- A new concept with XPages they allow the developer to store data temporarily in memory
- Makes applications much faster as you don't need to access data from disk as often
- But...
  - Scoped Variables need memory
  - We will talk about the notes.ini options
  - Scoped Variables are not shared across clusters



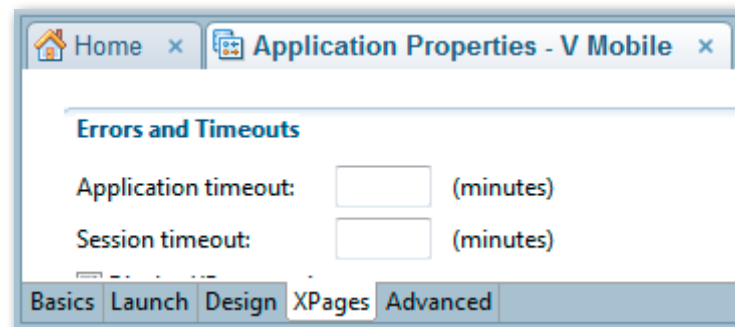
## XPages Performance in the Client

- Be careful if deploying client applications using XPages
  - They are effectively Eclipse plug-ins, like the Sametime client
- Remember, XPages run IN the client on a local server
  - This may tax already overloaded clients
- As they run locally, memory and CPU overhead will increase
  - This may tax already overloaded clients
- The Initial XPage download to the client may be large
  - Make sure to enable Network Compression
  - Think about pre-loading XPages objects here too, but be careful of memory!



## Sessions

- Classic Domino web apps have SSO timeouts set in the server or website document
- XPages uses these and session and application timeouts configured in the Application Properties in Domino Designer
- It's easy to get them confused





## Sessions

- By Default the session and application timeouts will be 30 minutes but these can be increased
  - For applications where users have long periods of inactivity
- It is possible they may also want to be decreased for very large, heavily used applications
- Work with your developer before changing these
- If you are going to change these then generally you'll want to set the session and application timeouts to be longer than SSO timeouts
  - But make sure your server has enough memory to support this



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## Server Configuration

- Some development tools will require files added or changed in the server install
- These are usually to do with Java plugins
- JDBC allows integration with relational databases
  - Easiest with the Extension Library
  - copy the relevant file into the server:
    - ...\\domino\\xsp\\shared\\lib\\[jdbcdriver].jar
- You may need to open ports to connect to the database server
  - For example MySQL operates on 3306 by default



## Server Configuration

- PD4ML is an example of a Java library which needs extra permissions to run
  - Open ...\\domino\\jvm\\lib\\security\\java.policy
  - Extra line needs to be added:

```
permission
java.lang.RuntimePermission
"getClassLoader"
```

```
5 // Licensed materials - Property of IBM
6 // "Restricted Materials of IBM"
7 //
8 // IBM SDK, Java(TM) Technology Edition, v6
9 // (C) Copyright IBM Corp. 1999, 2005. All Rights Reserved
10 //
11 // US Government Users Restricted Rights - Use, duplication or disclosure
12 // restricted by GSA ADP Schedule Contract with IBM Corp.
13 //
14 //
15 //
16 // Standard extensions get all permissions by default
17 //
18 grant codeBase "file:${java.home}/lib/ext/*" {
19     permission java.security.AllPermission;
20 };
21 //
22 // default permissions granted to all domains
23 //
24 grant {
25     permission java.lang.RuntimePermission "getClassLoader";
26     // Allows any thread to stop itself using the java.lang.Thread.stop()
27     // method that takes no argument.
28     // Note that this permission is granted by default only to remain
29     // backwards compatible.
30     // It is strongly recommended that you either remove this permission
31     // from this policy file or further restrict it to code sources
32     // that you specify, because Thread.stop() is potentially unsafe.
33     // See "http://java.sun.com/notes" for more information.
34     permission java.lang.RuntimePermission "stopThread";
35 //
36 // allows anyone to listen on un-privileged ports
37 permission java.net.SocketPermission "localhost:1024-", "listen";
38 //
39 // "standard" properties that can be read by anyone
40 //
41 permission java.util.PropertyPermission "java.version", "read";
42 permission java.util.PropertyPermission "java.vendor", "read";
43 permission java.util.PropertyPermission "java.vendor.url", "read";
44 permission java.util.PropertyPermission "java.class.version", "read";

```



## Server Configuration

- It is possible to change the version of Dojo which an application uses
- If the developer needs this then the different version of Dojo would need to be downloaded and copied onto the server
- Dojo versions live in: `..\domino\data\domino\js\..`



## Clustering and high availability

- XPages apps store state information in memory rather than on disk
  - So you must be careful when using clusters
  - Developers - take heed!
- Deploy a load balancer carefully
  - Use 'stickyness' to ensure users stay on the same server
  - Distribute users evenly between servers
  - Try never to fail over a user unless you *have* to
  - Developers - what if a server in a cluster fails? Can your code rebuild the users' state?



## Scaling

- View Designs and View Indexing
  - If anything more important than with classic Notes and Domino applications
  - Column sorting and re-sorting makes indexes larger
  - The more documents in a view the slower it will be
  - Use of readers fields on documents will effect performance
- Full Text Indexes
  - Can be used by XPages in much the same way as classic Notes and Domino



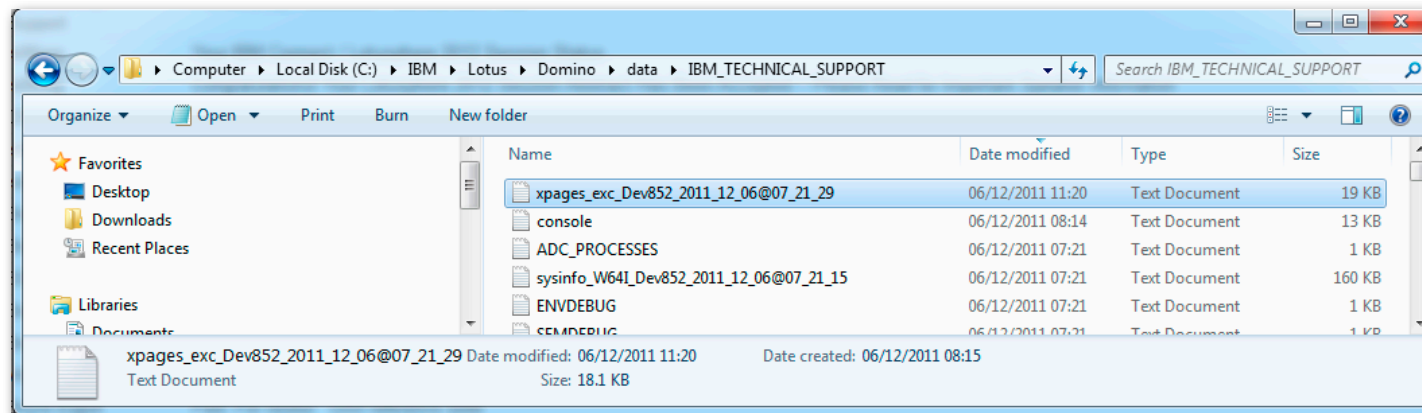
# Logging

- Some sort of logging needs to be set up
  - OpenLog is a good free option
  - <http://www.openntf.org/projects/pmt.nsf/ProjectLookup/OpenLog>
  - Look at the slide deck for “Write Better Java Code: Debugging, Logging, and Unit Tests (SHOW114)” for more information
- Error Page
  - Configured in Application Properties in Domino Designer
  - Allows the developer to control what is displayed when there is an error
  - Errors will still be written to the server console
  - Error 500 means there’s something wrong with the application!



## Logging

- From the server side unhandled errors are written to the server console
- Further detail is available in the `..\domino\data\IBM_TECHNICAL_SUPPORT` folder
- Files will be prefixed “`xpages_`”





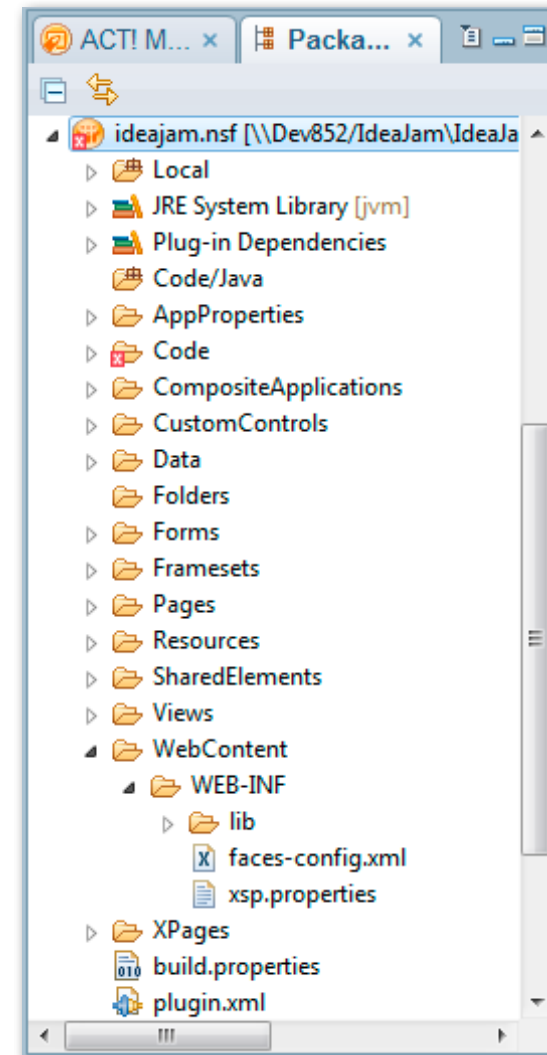
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## Hidden Code

- In Domino Designer it is possible to create Java code which does not show up by default
- Java created this way is not a normal design element
  - It is not signed in the same way
- Accessed via the menu system:
  - Window -> Show Eclipse Views -> Other -> Package Explorer
- There's all sorts of extra configuration which can be done here as well
- If code changes here you may need to restart HTTP to pick up the change





## Security

- In XPages we have three types of session
  - session - runs as current user
  - sessionAsSigner - runs with the rights of the XPage signer
  - sessionAsSignerWithFullAdminRights - runs with full admin rights
- For audit purposes make sure you understand what is being used
- Full Admin rights should never be given unless there's an *extremely* good reason!



## Security

- Access Control, Readers and Authors work exactly as we're used to
- Each XPage and Custom Control can also have its own ACL
  - The user may get prompted to login
  - Or sections of the page may become invisible or read only
  - Depends on settings in the application design



## Security and Signing

- The usual best practises apply - use Signing IDs
- XPages apps respect Server security settings in the Server Doc
- There is a gotcha - “*Sign or run unrestricted methods and operations*”
- Admins will almost certainly need to include your XPages signing ID in this field
  - Means you allow people in this group to run unrestricted code OR call external code
  - The Extension Library and much of XPages is ‘external’ code
  - Therefore you will need this for almost all XPages applications



## Signing

- XPages which are not signed with the correct ID will give an Error 403 - Insufficient Rights to Perform Operation
- Admins - sign apps as usual!
  - Domino will use 'lowest common denominator' of code signatures
- Extension Library
  - code runs within domino server jvm so *not* affected by server doc security
  - C:\Lotus\Domino\jvm\lib\security\java.policy - for any java code
  - You have limited control here



## XPages in the client

- XPages in the client
  - Check the NoExternalApps notes.ini variable (this would stop most XPages working!)
- Will support and honour client ECLs - but...
  - XPages run using Java APIs
  - Notes will map Java Security Manager requests to Notes ECL
  - If you are using external java code (Extension Library...) that will need to be trusted too
- Code should be signed too
  - But features and plugins can't be signed by Notes IDs
  - You will need a public code certificate to sign this code
  - Check out our references for a link to do this.



## Other stuff

- XPages can be used to target lower level databases
  - Perhaps old databases that are on R7?
  - Deploy an XPages application server, use your current server as a data store only
- XPage server must be 8.5 and system TEMPLATES must be 8.5 too
  - You may need to create a separate domain for the application servers
  - Remember to setup cross certification and ACLs appropriately
  - Your data can remain on an R7 server but you can deploy a shiny new interface!



## References

- XPages server performance testing -
  - <http://www.ibm.com/developerworks/lotus/library/domino85-xpages-perf/>
- Deploying Client plugins (ie Extension Library) via widgets - IBM documentation
  - [http://publib.boulder.ibm.com/infocenter/domhelp/v8r0/index.jsp?topic=/com.ibm.help.domino.admin85.doc/H\\_SPECIFYING\\_THE\\_SIGNED\\_PLUGINS\\_SERVER\\_USING\\_POLICY\\_5232\\_OVER.html](http://publib.boulder.ibm.com/infocenter/domhelp/v8r0/index.jsp?topic=/com.ibm.help.domino.admin85.doc/H_SPECIFYING_THE_SIGNED_PLUGINS_SERVER_USING_POLICY_5232_OVER.html)
- Deploying Client plugins (ie Extension Library) via widgets - Our documentation
  - <http://www.elsmore.net/ls12>
- Upgrade Pack 1
  - [https://www.ibm.com/developerworks/mydeveloperworks/blogs/social-media-marketing/entry/mobile\\_web\\_fortified\\_with\\_xpages\\_and\\_dojo12?lang=en](https://www.ibm.com/developerworks/mydeveloperworks/blogs/social-media-marketing/entry/mobile_web_fortified_with_xpages_and_dojo12?lang=en)



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