Developing Reusable “Server Control” Applications

Exchange Network Users’ Meeting

Denver, Colorado

April 26, 2011

Department of
ECOLOGY
State of Washington

What is a Server Side Control ?

Definition – a custom dll that is run on the server to enrich the user experience on the user interface without extending the browser.

It also:

1. Generates dynamic HTML
2. Encapsulating reusable code
3. Simplifies the application programming model
4. Expose properties, methods, and events

A quick look at reuse of code

Code reuse is the idea that a partial or complete computer program written at one time can be, should be, or is being used in another program written at a later time. The reuse of programming code is a common technique which attempts to save time and energy by reducing redundant work.

Thanks to Wikipedia at
http://en.wikipedia.org/wiki/Code_reuse

The Washington Approach to Reuse

Our understanding is as follows.

1. Development of computer system is expensive and becoming more expensive over time.
2. By design we will create custom software that meets requirements but with each customization the expense rises.
3. When designing and developing custom software solutions certain parts of systems can be developed as reusable components and when we identify one of these opportunities we will design, construct, and implement accordingly.
4. To potentially drive down the cost of developing custom software solutions we encourage and promote the creation of code one time and reused as many times as possible.

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OpenNode2 and Reusability

What is reusable in **our** Nodes today?

1. You installed an operating system ✓

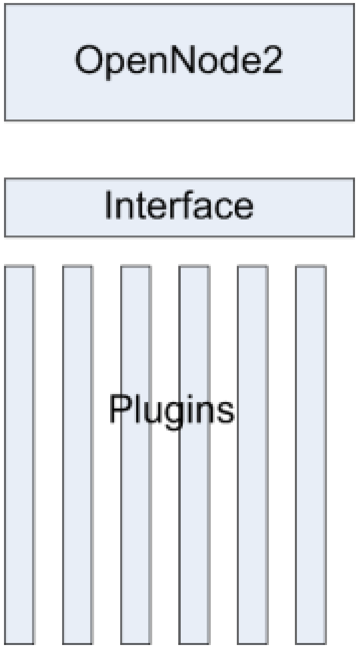
2. You installed database software ✓

3. You installed connectivity to the Internet ✓

4. You installed a node ✓

5. You installed plugins ✓

6. You installed a staging database ✓



Extending one more step - CROMERR

I am going to assume we all know about the Cross-Media Electronic Reporting Regulation, CROMERR and the requirement to meet certain security standards for data collected under a delegated authority, and for data we are going to flow on the Exchange Network.

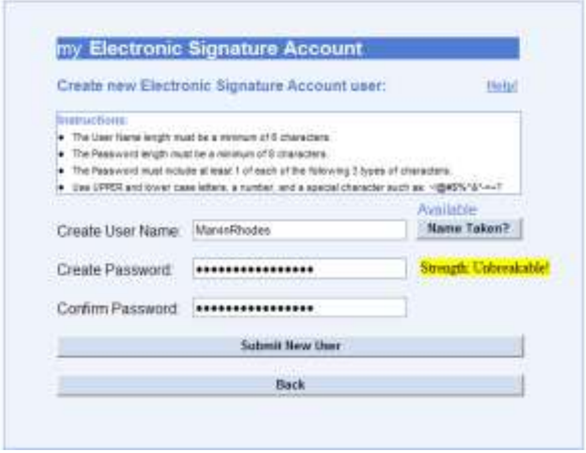
That said, Washington State has implemented a CROMERR solution using a server side .NET 3.5 control that is reusable in any application of like architecture. It was first implemented in the Washington webDMR system in 2010 and has processed approximately 30k internal and external submissions. It currently has about 60k associated images, and supports 850 signing accounts.

The parts of the CROMERR control

CROMERR has the following parts:

1. **The CROMERR User Management Control** – a fully configurable custom control that allows users to perform all the needed steps to support signing documents.
2. **The CROMERR Document Loader Control** - a fully configurable custom control that allows users to upload attachments to their submissions.
3. **The CROMERR User Management Interface** – an administrative UI for account and document management.
4. **The CROMERR signing process** – prototype c# code that can be pasted into a consuming application to perform document signing or finaling.

What it looks like



my Electronic Signature Account

Create new Electronic Signature Account user:

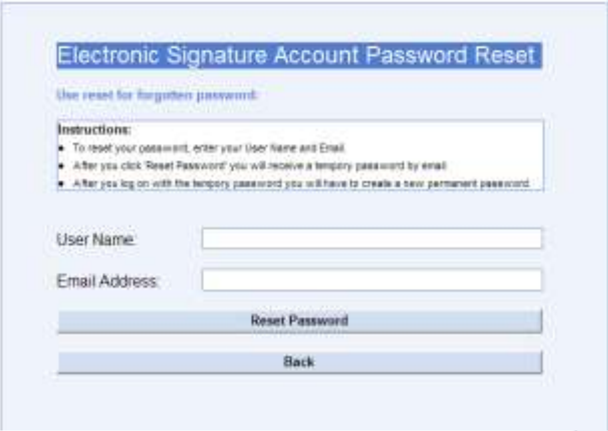
Instructions:
- The User Name length must be a minimum of 6 characters.
- The Password length must be a minimum of 8 characters.
- The Password must include at least 1 of each of the following 3 types of characters.
- Use UPPER and lower case letters, a number, and a special character such as: ~!@#$%^&*-=+?

Available

Create User Name: ManinRhodes

Create Password: ●●●●●●●●●●●●●●●●● Strength: Unbreakable!

Confirm Password: ●●●●●●●●●●●●●●●●●



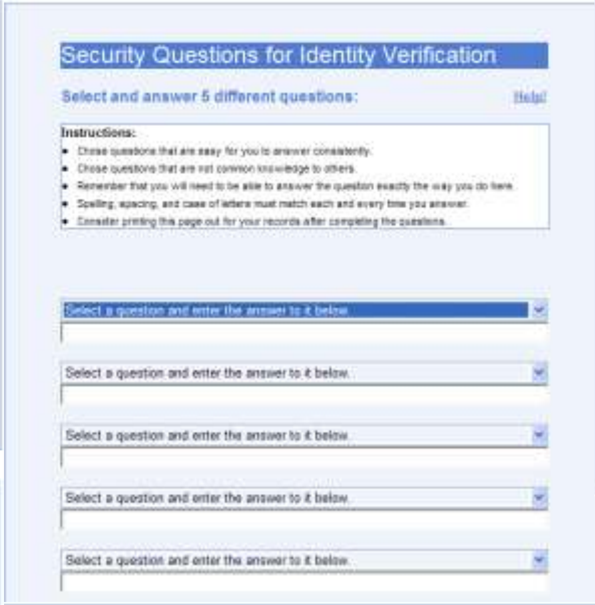
Electronic Signature Account Password Reset

Use reset for forgotten password:

Instructions:
- To reset your password, enter your User Name and Email.
- After you click 'Reset Password' you will receive a tempory password by email.
- After you log on with the tempory password you will have to create a new permanent password.

User Name:

Email Address:

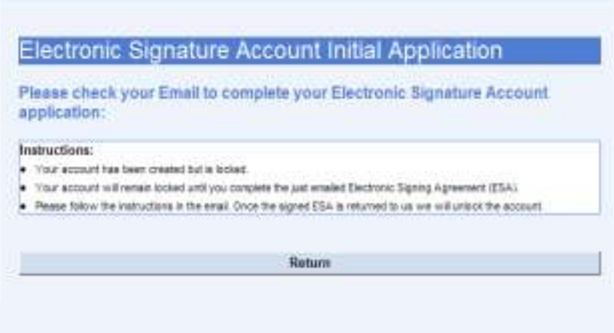


Security Questions for Identity Verification

Select and answer 5 different questions:

Instructions:
- Chose questions that are easy for you to answer consistently.
- Chose questions that are not common knowledge to others.
- Remember that you will need to be able to answer the question exactly the way you do here.
- Spelling, spacing, and case of letters must match each and every time you answer.
- Consider printing this page out for your records after completing the questions.

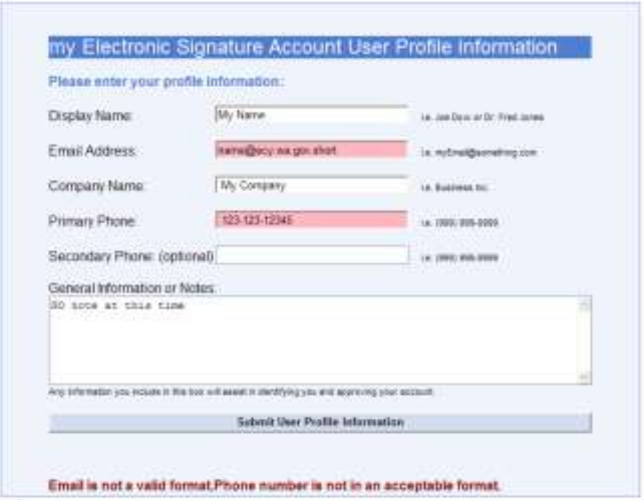
Select a question and enter the answer to it below.
Select a question and enter the answer to it below.
Select a question and enter the answer to it below.
Select a question and enter the answer to it below.
Select a question and enter the answer to it below.



Electronic Signature Account Initial Application

Please check your Email to complete your Electronic Signature Account application:

Instructions:
- Your account has been created but is locked.
- Your account will remain locked until you complete the just emailed Electronic Signing Agreement (ESA).
- Please follow the instructions in the email. Once the signed ESA is returned to us we will unlock the account.



my Electronic Signature Account User Profile Information

Please enter your profile information:

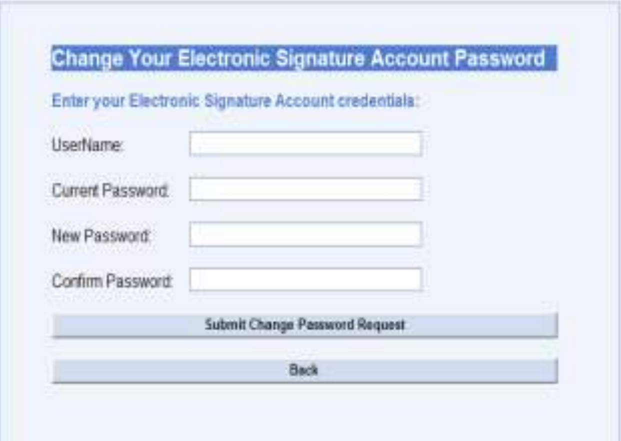
Display Name:	My Name	i.e. Joe Doe or Dr. Fred Jones
Email Address:	name@ecy.wa.gov.short	i.e. myEmail@something.com
Company Name:	My Company	i.e. Business Inc.
Primary Phone:	123-123-12345	i.e. (999) 999-9999
Secondary Phone: (optional)		i.e. (999) 999-9999

General Information or Notes:

No note at this time

Any information you include in this box will assist in identifying you and approving your account.

Email is not a valid format.Phone number is not in an acceptable format.



Change Your Electronic Signature Account Password

Enter your Electronic Signature Account credentials:

UserName:

Current Password:

New Password:

Confirm Password:

All these images and 10 others are generated from 1 control.

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The Washington CROMERR UI

This Custom C# server side Control:

1. Has numerous different and distinct UI presentations to the user. These include surfaces where the user can:
   a. Apply for a credential
   b. Change their password
   c. Update their profile
   d. Review recent activity
   e. Select and answer their security questions
   f. Update the answers to their security questions
   g. Update their profile information
   h. Lock their account
   i. Leave a note to the administrator
   j. Request a blank copy of the ESA to be sent to them
   k. More….

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Washington CROMERR cont.

2. Meets or exceeds the approved Washington Checklist.
3. Supports encryption of data and hashing of all necessary components.
4. Automatically emails the Electronic Signing Agreement to users who have requested credentials for a specific system.
5. Notifies uses by external email when the password to their credential changes.
6. Notifies the user by external email at both the old and new email address when the email address in the user profile changes.
7. Manages password strength.
8. Allows the user to sign in and get a token for signing.
9. Manages the length of time the signing token is live.
10. It logs the activity of the user and the internal activity for debug, user activity management etc.
11. There is more but there is not time….

The Washington Document Loader

The DocumentLoader Custom C# server side Control:

1. Allows the user from their remote stations to upload documents.
2. Inline scans the image being loaded from the user and rejects infested images.
3. Allows the uploading of the following document types
    - doc, docx
    - xls, xlsx
    - txt
    - pdf,
    - gif, jpeg, jpg, bmp, tif
4. The same code that uploads the images allows the user to view the images later.
5. The images can be used as attachments in signed CROMERR submissions.

Washington CROMERR Reuse Story

CROMERR as a control with the supporting engine, interface and all the controls includes between 15 and 20,000 lines of code.

The Bottom Line is this:

In a test harnesses we have had the entire package functional within that harness in less than 1 hour.

The signing process has been implemented from cloned code in less than a days work.

In development we have had 5 applications running and available at one time.

The second production implementation of the controls is underway now. The developer has been contacting the webDMR developer for assistance and it is working well.

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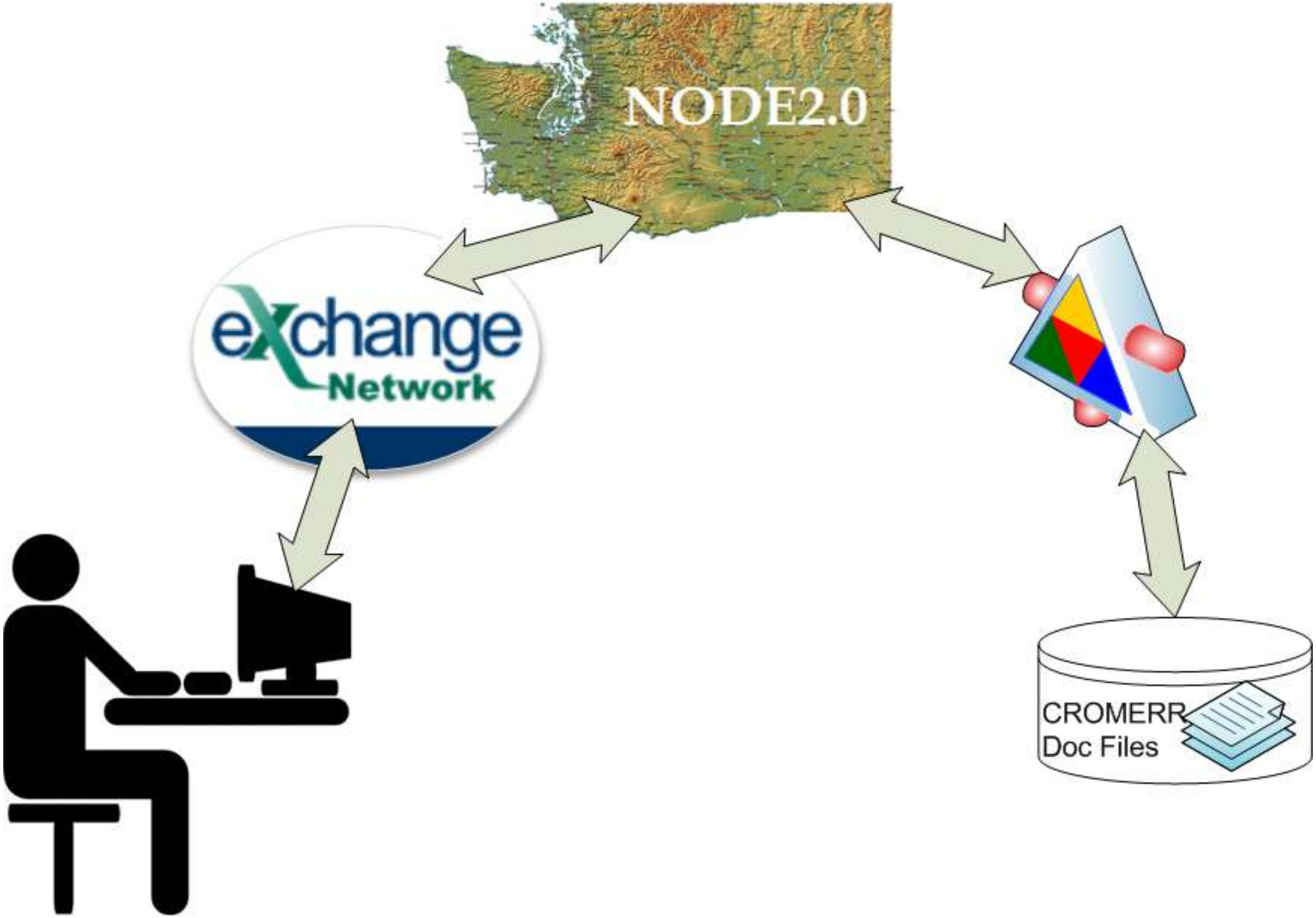
Node related idea - flow the CROMERR Documents



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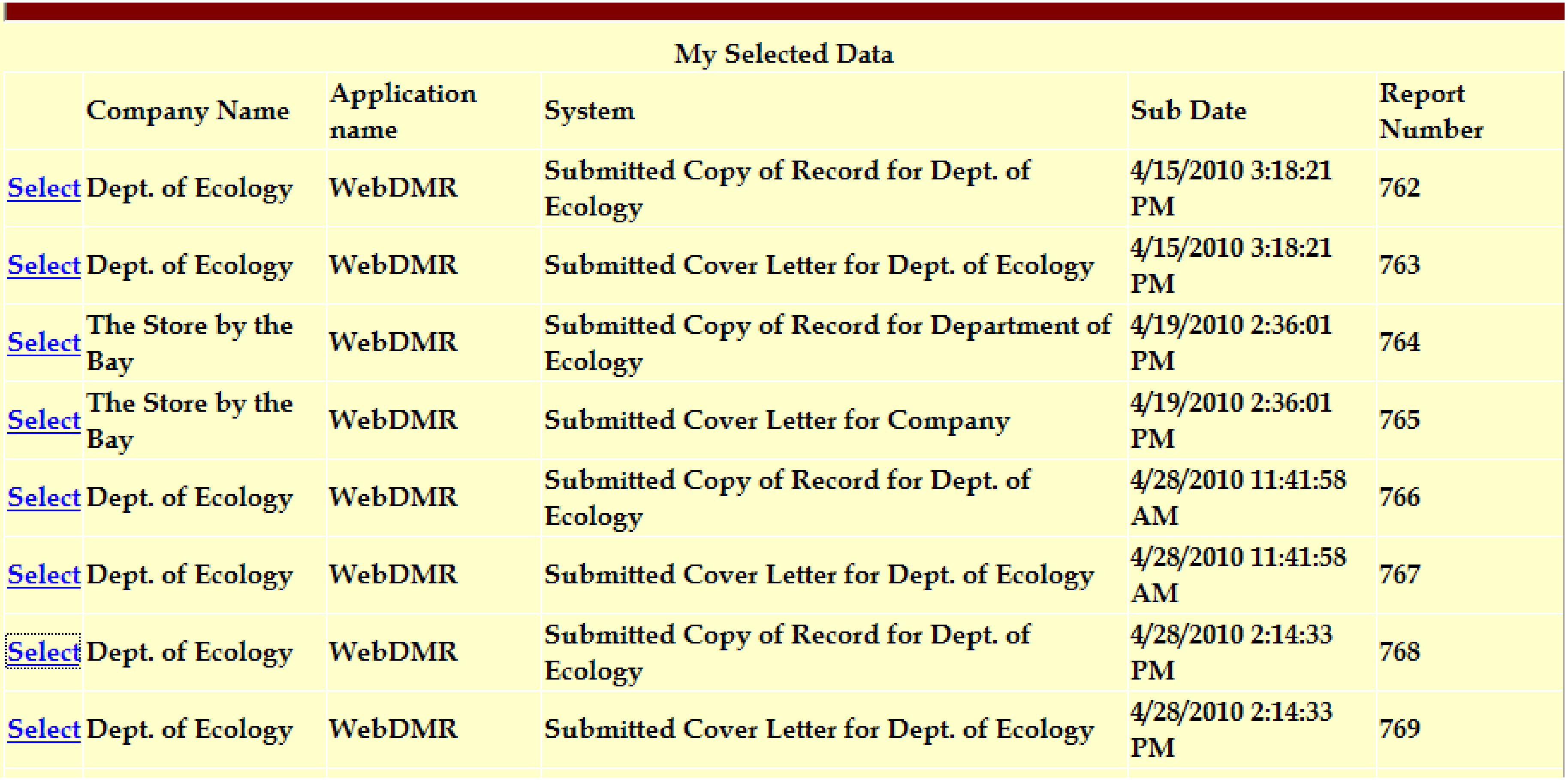
Flowing CROMERR step 1

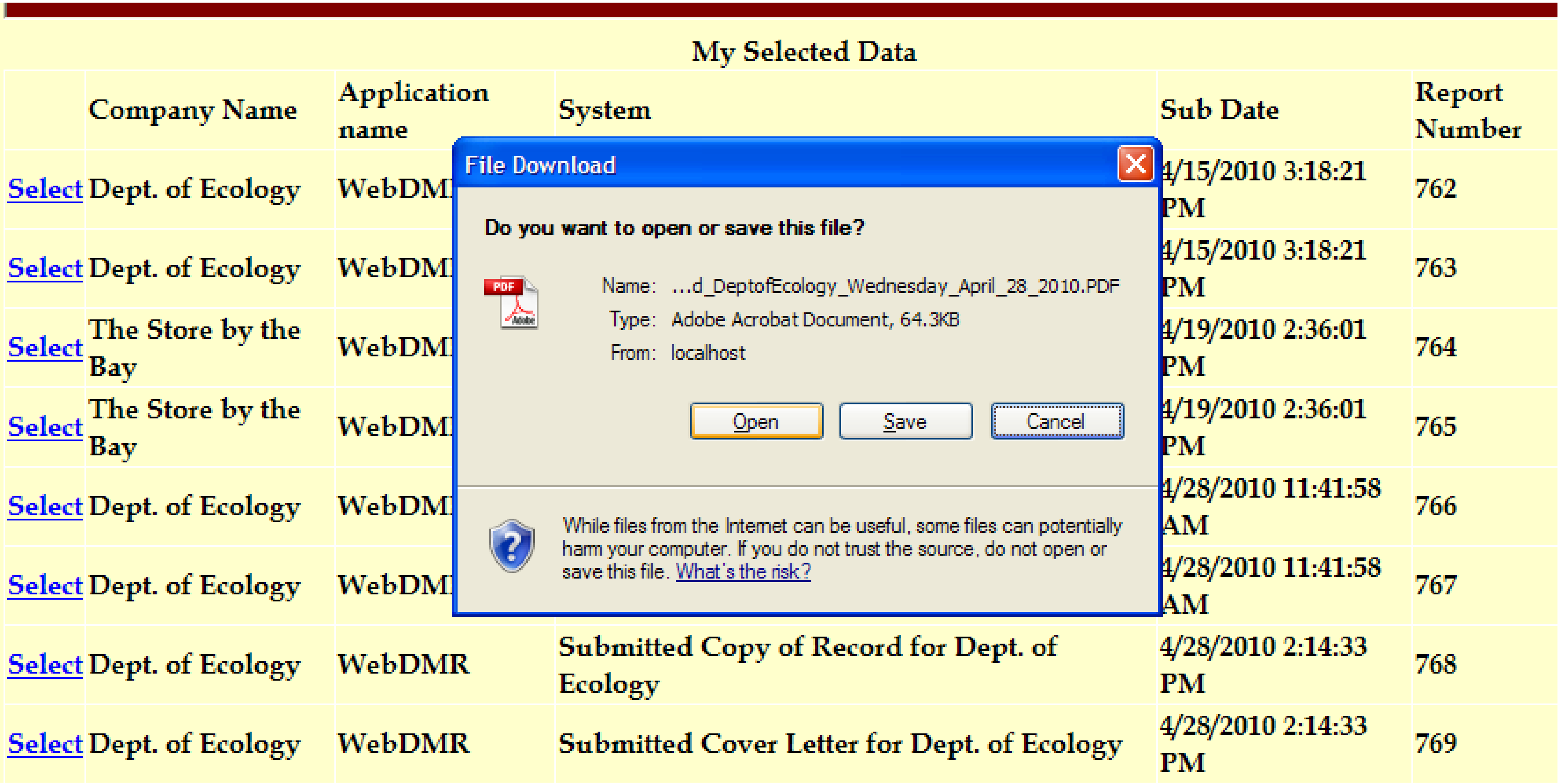


My Selected Data

	Company Name	Application name	System	Sub Date	Report Number
Select	Dept. of Ecology	WebDMR	Submitted Copy of Record for Dept. of Ecology	4/15/2010 3:18:21 PM	762
Select	Dept. of Ecology	WebDMR	Submitted Cover Letter for Dept. of Ecology	4/15/2010 3:18:21 PM	763
Select	The Store by the Bay	WebDMR	Submitted Copy of Record for Department of Ecology	4/19/2010 2:36:01 PM	764
Select	The Store by the Bay	WebDMR	Submitted Cover Letter for Company	4/19/2010 2:36:01 PM	765
Select	Dept. of Ecology	WebDMR	Submitted Copy of Record for Dept. of Ecology	4/28/2010 11:41:58 AM	766
Select	Dept. of Ecology	WebDMR	Submitted Cover Letter for Dept. of Ecology	4/28/2010 11:41:58 AM	767
Select	Dept. of Ecology	WebDMR	Submitted Copy of Record for Dept. of Ecology	4/28/2010 2:14:33 PM	768
Select	Dept. of Ecology	WebDMR	Submitted Cover Letter for Dept. of Ecology	4/28/2010 2:14:33 PM	769

This prototype web application interface was built in C# .NET 3.5, and the data on the screen was provided by the Wa Dev Node2.0 prototype plugin.

Flowing CROMERR step 2



My Selected Data

	Company Name	Application name	System	Sub Date	Report Number
Select	Dept. of Ecology	WebDM		4/15/2010 3:18:21 PM	762
Select	Dept. of Ecology	WebDM		4/15/2010 3:18:21 PM	763
Select	The Store by the Bay	WebDM		4/19/2010 2:36:01 PM	764
Select	The Store by the Bay	WebDM		4/19/2010 2:36:01 PM	765
Select	Dept. of Ecology	WebDM		4/28/2010 11:41:58 AM	766
Select	Dept. of Ecology	WebDM		4/28/2010 11:41:58 AM	767
Select	Dept. of Ecology	WebDMR	Submitted Copy of Record for Dept. of Ecology	4/28/2010 2:14:33 PM	768
Select	Dept. of Ecology	WebDMR	Submitted Cover Letter for Dept. of Ecology	4/28/2010 2:14:33 PM	769

File Download

Do you want to open or save this file?

Name: …d_DeptofEcology_Wednesday_April_28_2010.PDF

Type: Adobe Acrobat Document, 64.3KB

From: localhost

While files from the Internet can be useful, some files can potentially harm your computer. If you do not trust the source, do not open or save this file. What's the risk?

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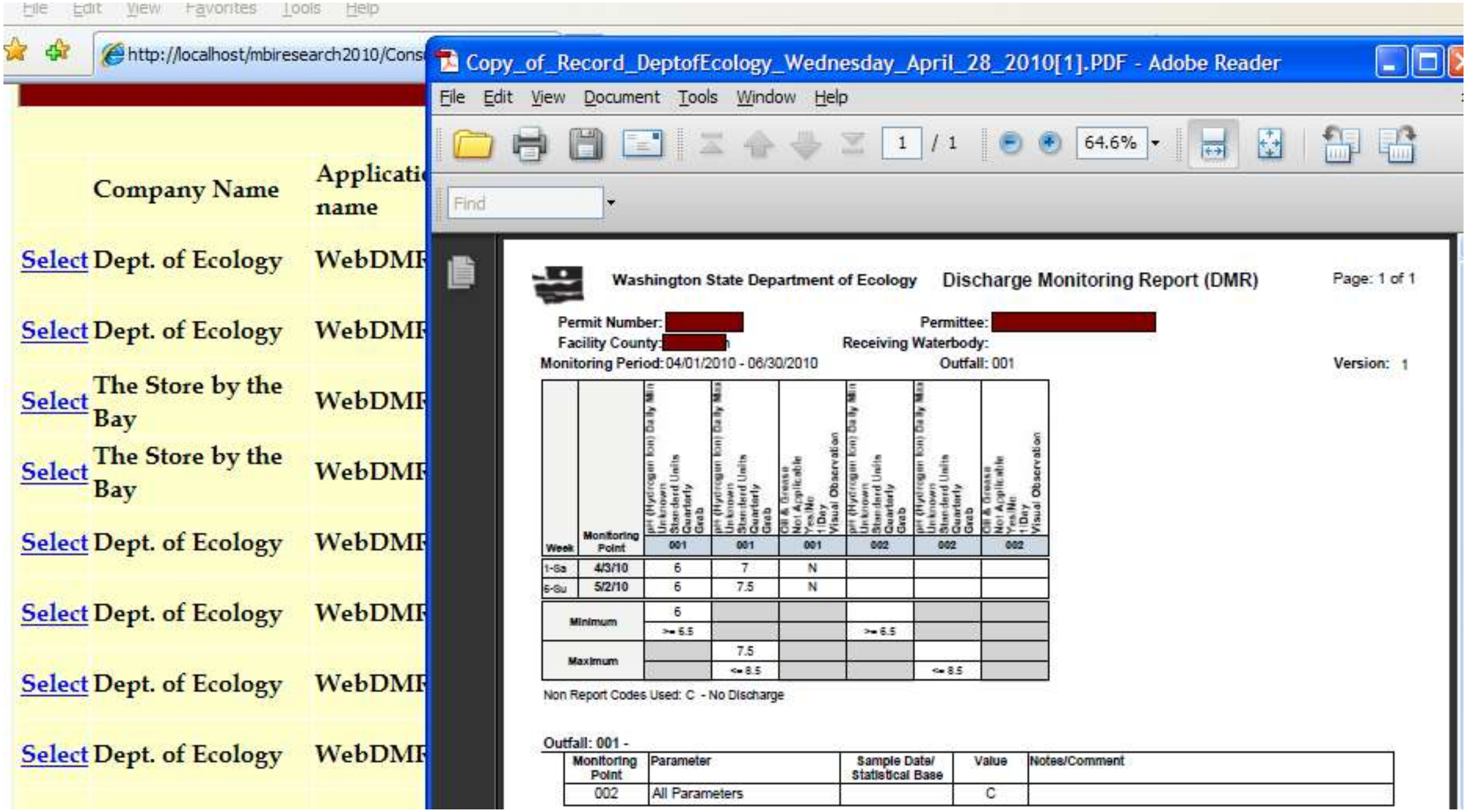
When you click on the Select on the right the node plugin returns the selected document . When you click open -

Flowing CROMERR step 3


File Edit View Favorites Tools Help
http://localhost/mbiresearch2010/Cons
Copy_of_Record_DeptofEcology_Wednesday_April_28_2010[1].PDF - Adobe Reader
File Edit View Document Tools Window Help
1 / 1
64.6%
Find

	Company Name	Applicati name
Select	Dept. of Ecology	WebDMR
Select	Dept. of Ecology	WebDMR
Select	The Store by the Bay	WebDMR
Select	The Store by the Bay	WebDMR
Select	Dept. of Ecology	WebDMR
Select	Dept. of Ecology	WebDMR
Select	Dept. of Ecology	WebDMR
Select	Dept. of Ecology	WebDMR

Washington State Department of Ecology Discharge Monitoring Report (DMR) Page: 1 of 1

Permit Number: [redacted] Permittee: [redacted]

Facility County: [redacted] Receiving Waterbody:

Monitoring Period: 04/01/2010 - 06/30/2010 Outfall: 001 Version: 1

Week	Monitoring Point	pH (Hydrogen Ion) Daily Min Unknown Standard Units Quarterly Grab 001	pH (Hydrogen Ion) Daily Max Unknown Standard Units Quarterly Grab 001	Oil & Grease Not Applicable Yes/No 1/Day Visual Observation 001	pH (Hydrogen Ion) Daily Min Unknown Standard Units Quarterly Grab 002	pH (Hydrogen Ion) Daily Max Unknown Standard Units Quarterly Grab 002	Oil & Grease Not Applicable Yes/No 1/Day Visual Observation 002
1-Sa	4/3/10	6	7	N			
6-Su	5/2/10	6	7.5	N			
Minimum		6					
		>= 6.5			>= 6.5		
Maximum			7.5				
			<= 8.5			<= 8.5	

Non Report Codes Used: C - No Discharge

Outfall: 001 -

Monitoring Point	Parameter	Sample Date/ Statistical Base	Value	Notes/Comment
002	All Parameters		C	

You get the document in the toolset associated with the file extension. PDF = Adobe Reader, doc would open in word etc…

Other Node Reuse

What OpenNode2 has inside the box:

1. Built a common foundation with the common node technology
2. Supplied a source code example for plugins by supplying the NCT plugin as part of the standard set of source code.
3. Designed and implemented the NodeEndpointClientFactory as part of the node client, which is reusable in our applications against our local and remote users Nodes.

“If the developer is using .NET, I strongly recommend that you use the client assembly that is built into the node instead of brewing your own. We've spent man-months working out the kinks with all the various nodes and ECOS. “

From Windsor Oct 5, 2010

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What Washington has done with these

Note that these things are related to plugins, applications that access one or many nodes, or are used in systems that capture data that will be flowed on the node.

1. We have extended the NCT plugin, for our use but not for publication.
   a. We cloned a plugin from the NCT plugin and found that useful.
   b. We then extracted the ProcessExecute part of NCT and built a prototype execute plugin that consumes a web service and has been reused as the starting point for newer executes in development.
   c. We extracted both the Solicit and Query also and built prototypes.
   d. We have a draft prototype for a Submit Processor in the works.

(Cont.)

2. We are in the process of developing a C# wrapper class that encapsulates the NodeEndpointClientFactory.

Using this approach we have written code that will perform most of the elementary functions of the NodeEndpointClientFactory and limit the number of lines of code a developer needs to write to get data from a node.

We have also used this wrapper class to prototype an orchestration plugin process that performs multiple functions against three nodes.

As of Feb 2011, the wrapper class is still in development with parts of the wrapper being written as needed for each node related project. At that time it has been used in the orchestration as mentioned, an automated pull of WQX lists from EPA, and is in the early stages of an automated pull SRS lists.

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Contact Information and Questions

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QUESTION?