

Know Your Sources – Decoding Inputs / Outputs of any SAS Program

Sandeep Juneja
SAS Institute Inc., Cary, NC ,USA



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Agenda

- Understand Problem
- Solution Design
- Solution Components Introduction
 - SAS Drug Development (SDD)
 - Job Log Manifest (jlgxml)
 - XML Mapper
- Solution Implementation Process
- Questions

Problem:

- No Consistent way of knowing the Input(s) / Output(s) of any source program
- No Standard way to generate Traceability Matrix with Input(s) / Output(s) of source program(s)
- No way to carry out Impact Analysis of any program(s) update(s)

Solution Design:

- Generate Traceability Matrix (TM) with Source Program and their Input(s) / Output(s)
- If available, capture the version number of various Input (s) / Output(s)
- Use Traceability Matrix to analyze impact of any revision / update to one / multiple source program(s) / output(s)

Solution Design:

- **Job Log Manifest (jlgxml) in SAS Drug Development (SDD).**
- SDD provides versioning functionality. It lets you maintain multiple version(s) of the file.
- Job Log Manifest contains information about various input(s) / output(s) along with their versioning information.

Introduction: SAS Drug Development

Actions										New	Loader	
	Name	Size	Type	Owner	Created	Modified	Modified by	Signed	ESign Status	Versioned ▾	Locked	Checked out
	NICSAH001_protocol.doc	31 KB	document	sajune	8/22/11 5:04:33 PM GMT	8/22/11 5:10:35 PM GMT	sajune					
	Documenter results.zip	84 KB	document	sajune	8/22/11 9:53:04 PM GMT	8/22/11 9:53:04 PM GMT	sajune					
	test1.sas	9 KB	process	sajune	8/22/11 5:17:00 PM GMT	9/12/11 5:23:57 PM GMT	sajune					
	adverse.sas7bdat	608 KB	sasDataTable	sajune	8/22/11 5:07:36 PM GMT	9/21/11 11:08:37 PM GMT	sajune					

- SAS Drug Development provides a common repository for data, files, and documents and is 21 CFR Part 11 compliant.
- Web-based user interface and a set of integrated Java applications enable you to easily perform the following tasks:
 - organize and browse information
 - manage and analyze data
 - create reports manually and automatically
 - maintain reliable information to meet regulatory guidelines

Introduction: Job Log Manifest

Job

File

Me

<?xml version="1.0" encoding="UTF-8"?>

<joblog itemid="-273d6589:12fc571a226:-7fff" itemlabel="Run of task demo.sas on Fri May 06 09:14:43 EDT 2011" filetype="txt" autolaunch="N" sessionid="12fc571a226:-7fff" />

<tasklogs>

<tasklog outputsSaved="N" itemid="0000001" itemlabel="demo.sas" filetype="txt" autolaunch="N">

<parameterValues>

<codedMessage code="52" packageName="com.sas.biomatics.pacman.server" messageType="1" defaultMessage="%7B0%7D">

<parameters>

<parm1 val1="LOG* (SAS log), of type LOGFILE (SAS log), was not assigned a value.." />

</parameters>

</codedMessage>

<codedMessage code="52" packageName="com.sas.biomatics.pacman.server" messageType="1" defaultMessage="%7B0%7D">

<parameters>

<parm1 val1="LST* (SAS output), of type LSTFILE (SAS output), was not assigned a value.." />

</parameters>

</codedMessage>

<codedMessage code="52" packageName="com.sas.biomatics.pacman.server" messageType="1" defaultMessage="%7B0%7D">

<parameters>

<parm1 val1="PGM* (PaCMan process), of type PGMFILE (SAS program), was not assigned a value.." />

</parameters>

</codedMessage>

<codedMessage code="52" packageName="com.sas.biomatics.pacman.server" messageType="1" defaultMessage="%7B0%7D">

<parameters>

<parm1 val1="FOLDER (Folder), of type FOLDER (Folder), was assigned value: /sddshared/sas_tmp/SAS_work3F57000042B3_sddmccartney/SAS_w

</parameters>

</codedMessage>

<codedMessage code="52" packageName="com.sas.biomatics.pacman.server" messageType="1" defaultMessage="%7B0%7D">

<parameters>

<parm1 val1="FOLDER2 (Folder), of type FOLDER (Folder), was assigned value: /sddshared/sas_tmp/SAS_work3F57000042B3_sddmccartney/SAS_w

</parameters>

</codedMessage>

<codedMessage code="52" packageName="com.sas.biomatics.pacman.server" messageType="1" defaultMessage="%7B0%7D">

<parameters>

<parm1 val1="FMTFOLDER (Folder), of type FOLDER (Folder), was assigned value: /sddshared/sas_tmp/SAS_work3F57000042B3_sddmccartney/SAS

</parameters>

</codedMessage>

<codedMessage code="52" packageName="com.sas.biomatics.pacman.server" messageType="1" defaultMessage="%7B0%7D">

</codedMessage>

19 File demo_remains.sas/0001 successfully copied to the server.

20 File fube.sas/0001 successfully copied to the server.

21 File support2.sas successfully copied to the server.

■ XML file which contains information about

■ Input(s) / Output(s)

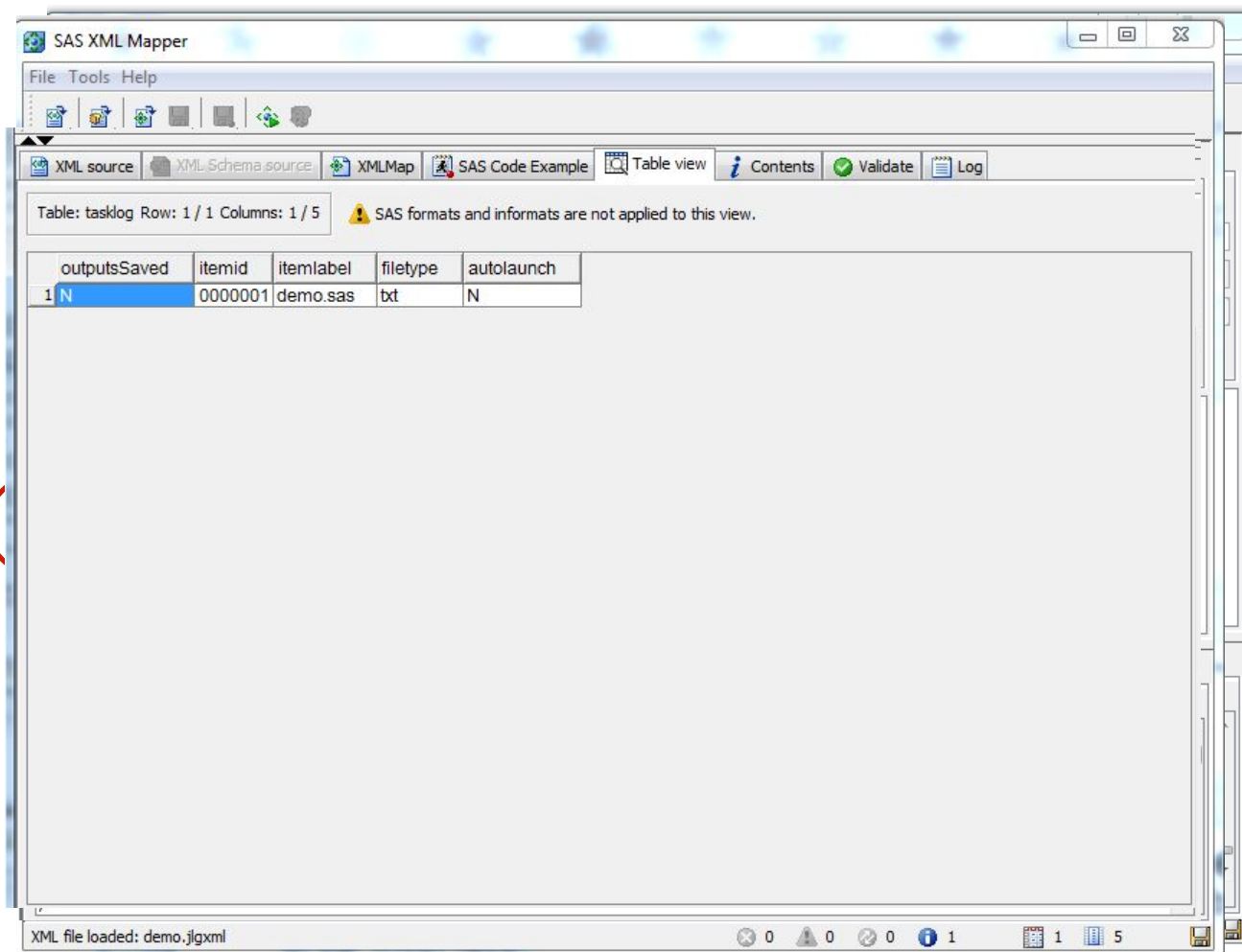
■ Folder(s) / File(s)

■ Source Program(s) / Dataset(s)

■ Version Number of the Source Program(s) / Dataset(s)

■ Log text (optional)

Introduction – XML Mapper



- Represents top-down hierarchy of XML elements and attributes
- Represents XPath

SDD Source Program with Input(s) / Output(s)

Process Editor - demo.sas- <version not available> (/SDD/USERS/sajune/test/IOD/gap5) from SAS Drug Development Domain

```
19 %include &inputfile;          * Input File;
20 options mautosource sasautos=("&FOLDER"); * Macros Folder;
21 libname indata "&folder3";    * Data Folder;
22 libname niclfmts "&FMTFOLDER"; * Formats Folder;
23 libname here "&folder2";     * Output Folder;
24
25 options fmtsearch=( WORK niclfmts.nicsahl);
26
27 %convertdemo(indata.demo);
28 %mac1;
29
30 data test;  * Read Input Dataset;
31   set indata.demo;
32 run;
33 ods pdf file=&file;  * Output File 1;
34 proc print data=_last_;
35 run;
36 ods pdf close;
37
38 data here.DEMO_NEWUNITS; * Output Dataset;
39   set DEMO_NEWUNITS;
40 run;
41
42 ods rtf file=&file2;  * Output File 2;
43 proc print data=indata.fube;
44   format fubegos gos.;
45   var subjid fubegos;
46 run;
```

Parameters						
#	Var Name	Type	Label	Enabled	Required	Default
1	*LOG*	SAS log	SAS log	☐	☐	SAS Log File
2	*LST*	SAS output	SAS output	☐	☐	SAS Output File
3	*PGM*	SAS program	PacMan pro...	☐	☐	SAS Program File
4	INPUTFILE	Input process	Input process	☐	☐	support.sas-*(.) from RELATIVE
5	FOLDER	Folder	Folder	☐	☐	./macros (relative)
6	FOLDER3	Folder	Folder	☐	☐	./data (relative)
7	FMTFOLDER	Folder	Folder	☐	☐	./formats (relative)
8	FOLDER2	Folder	Folder	☐	☐	./output (relative)
9	FILE	Output file	Output file	☐	☐	PDF File
10	FILE2	Output file	Output file	☐	☐	RTF File

Customizing Output file - FILE2

Attributes

Label: Output file

☐ Enabled ☐ Required

Tab Name: Parameters

Description:

Hide parameter values: No

Depends on: <None> ☐ Disable on match

File Type: RTF File

Path Option: User can select absolute or relative paths from any system.

Base Path: <None>

Override the save location

Location: ./output (relative)

Name: rtfoutput.rtf

☐ Download for Viewing

Dependent Files for Viewing

FILE

SDD Source Program with Input(s) / Output(s)

Input / Output	Type	File/ Folder Variable Name	File Name(s) (Version)	Comments
Input	File	InputFile	Support.sas (1)	Include file (s)
Input	Folder	Folder	Convertdemog.sas (2), mac1.sas	Macro Files
Input	Folder	Folder3	Demo.sas7bdat (3), fube.sas7bdat (1), support2.sas (1)	Data Files
Input	Folder	FmtFolder	Nicsah1.sas7bcat	Format Catalog
Output	Folder	Folder2	Demo_newunits.sas7bdat (14)	Data Folder
Output	File	File	Testme.pdf (22)	PDF File
Output	File	File2	Rtfoutput.rtf	RTF File

Extracting Source File Information

The screenshot illustrates the process of extracting source file information from an XML map in SAS XML Studio. The interface is divided into three main sections:

- Left Pane (XML Map Structure):** Displays the hierarchical structure of the XML map. Key nodes are highlighted with red boxes and blue arrows pointing to the right pane:
 - `joblog [1] {1}` (parent of `Attributes [1] {1}`)
 - `Attributes [1] {1}` (parent of `itemid [1] {1}`)
 - `itemid [1] {1}` (parent of `itemlabel [1] {1}`)
 - `tasklogs [1] {1}` (parent of `tasklog [1] {1}`)
 - `tasklog [1] {1}` (parent of `Attributes [1] {1}`)
 - `Attributes [1] {1}` (parent of `outputsSaved [1] {1}`)
 - `outputsSaved [1] {1}` (parent of `itemid [1] {1}`)
 - `itemid [1] {1}` (parent of `itemlabel [1] {1}`)
 - `itemlabel [1] {1}` (parent of `filetype [1] {1}`)
 - `filetype [1] {1}` (parent of `autolaunch [1] {1}`)
 - `autolaunch [1] {1}` (parent of `parameterValues [1] {1}`)
 - `parameterValues [1] {1}` (parent of `container [4] {4}`)
 - `container [4] {4}` (parent of `appitem [1] {1}`)
 - `appitem [1] {1}` (parent of `Attributes [1] {1}`)
 - `Attributes [1] {1}` (parent of `selectedfile [1] {1}`)
 - `selectedfile [1] {1}` (parent of `receivedfile [1] {1}`)
 - `receivedfile [1] {1}` (parent of `task [1] {1}`)
 - `task [1] {1}` (parent of `Attributes [1] {1}`)
 - `Attributes [1] {1}` (parent of `longchecks [1] {1}`)
 - `longchecks [1] {1}` (parent of `file [1] {1}`)
 - `file [1] {1}` (parent of `Attributes [1] {1}`)
 - `Attributes [1] {1}` (parent of `system [1] {1}`)
 - `system [1] {1}` (parent of `source [1] {1}`)
 - `source [1] {1}` (parent of `displaypath [4] {1}`)
 - `displaypath [4] {1}` (parent of `displayname [1] {1}`)
 - `displayname [1] {1}` (parent of `id [1] {1}`)
 - `id [1] {1}` (parent of `itemtype [1] {1}`)
 - `itemtype [1] {1}` (parent of `type [1] {1}`)
 - `type [1] {1}` (parent of `fileinfoversion [1] {1}`)
- Right Pane (Properties):** Shows the properties of the selected `SourceFileFolder` node. The `Path` property is set to `/joblog/tasklogs/tasklog/appitem/task/file/@displaypath`. The `End Path` property is empty. The `Begin/End` dropdown is set to `Begin/End`. The `Retain` checkbox is checked, and the `Replace` checkbox is unchecked.
- Bottom Pane (Table):** Displays the extracted data in a table format. The table has columns for `JobLog`, `SourceFileID`, `SourceFileName`, `SourceFilePath`, `SourceFileVersion`, and `SourceFileFolder`. The data row shows the results for the first tasklog entry.

The table data is as follows:

JobLog	SourceFileID	SourceFileName	SourceFilePath	SourceFileVersion	SourceFileFolder
1 Run of task demo.sas on Fri May 06 09:14:43 EDT 2011	0000001	demo.sas	/SDD/USERS/sajune/test/IOD/gap5	3.0	/SDD/USERS/sajune/test/IOD/gap5

XML file loaded: demo.jlxml

Extracting Folder

The screenshot displays the SAS Studio interface. On the left, a hierarchical XML tree is shown with several nodes highlighted by red boxes. Blue arrows indicate the mapping of these XML nodes to SAS variables in the IOFolder object on the right. The mappings are as follows:

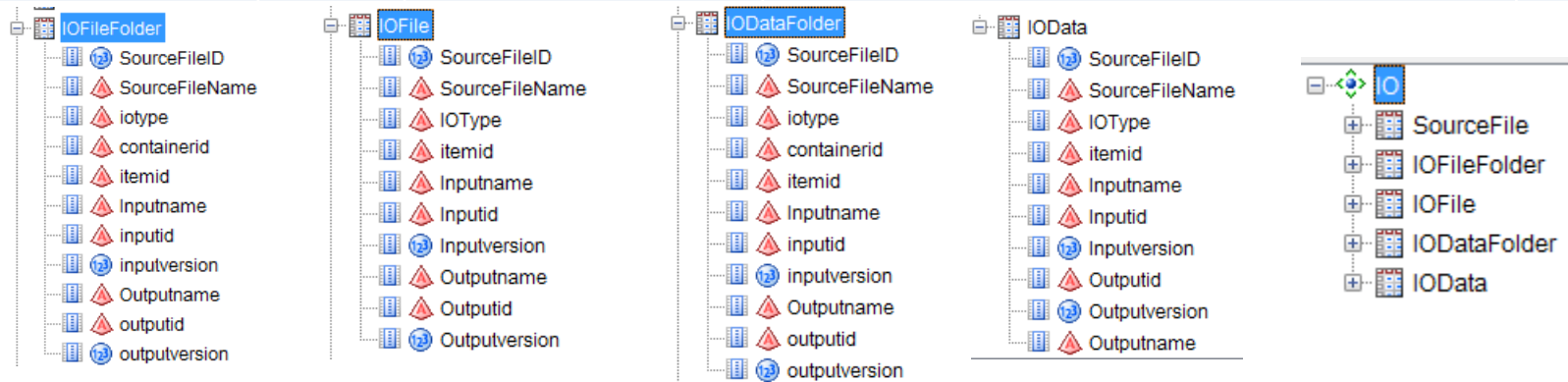
- itemid [1] (1)** maps to **SourceFileID**
- itemlabel [1] (1)** maps to **SourceFileName**
- filetype [1] (1)** maps to **IOType**
- autolaunch [1] (1)** maps to **Containerid**
- itemid [1] (4)** maps to **Itemid**
- itemlabel [1] (4)** maps to **InputName**
- filetype [1] (4)** maps to **InputFilePath**
- autolaunch [1] (4)** maps to **InputFileVersion**
- itemid [1] (5)** maps to **OutputFileName**
- itemlabel [1] (5)** maps to **OutputFilePath**
- filetype [1] (5)** maps to **OutputFileVersion**
- parameterid [1] (5)** maps to **OutputFileVersion**
- selectedfile [1] (15)** maps to **SourceFileID**
- file [1] (15)** maps to **SourceFileName**
- system [1] (15)** maps to **IOType**
- source [1] (15)** maps to **Containerid**
- displayname [1] (15)** maps to **Itemid**
- id [1] (15)** maps to **InputName**
- itemtype [1] (15)** maps to **InputFilePath**
- type [1] (15)** maps to **InputFileVersion**
- version [1] (4)** maps to **OutputFileName**
- fileinfoversion [1] (15)** maps to **OutputFilePath**
- receivedfile [1] (11)** maps to **SourceFileID**
- file [1] (11)** maps to **SourceFileName**
- system [1] (11)** maps to **IOType**
- source [1] (11)** maps to **Containerid**
- displayname [1] (11)** maps to **Itemid**
- id [1] (11)** maps to **InputName**
- itemtype [1] (11)** maps to **InputFilePath**
- type [1] (11)** maps to **InputFileVersion**
- version [1] (3)** maps to **OutputFileName**
- fileinfoversion [1] (11)** maps to **OutputFilePath**

The right pane shows the **IO** object with the **IOFolder** object selected. The bottom pane shows a table with the following data:

SourceFileID	SourceFileName	iotype	containerid	itemid	inputname	inputid	inputversion	outputname	outputid	outputversion
0000001	demo.sas	inputfiles	FOLDER	convertdemog.sas	convertdemog.sas	/SDD/USERS/sajune/test/OD/gap5/macros/convertdemog.sas	*	convertdemog.sas	/SDD/USERS/sajune/test/OD/gap5/macros/convertdemog.sas	2
0000001	demo.sas	inputfiles	FOLDER	mac1.sas	mac1.sas	/SDD/USERS/sajune/test/OD/gap5/macros/mac1.sas	*	mac1.sas	/SDD/USERS/sajune/test/OD/gap5/macros/mac1.sas	
0000001	demo.sas	inputfiles	FOLDER3	support2.sas	support2.sas	/SDD/USERS/sajune/test/OD/gap5/data/support2.sas	*	support2.sas	/SDD/USERS/sajune/test/OD/gap5/data/support2.sas	1
0000001	demo.sas	inputfiles	FMTFOLDER	nicshah1.sas7bcat	nicshah1.sas7bcat	/SDD/USERS/sajune/test/OD/gap5/formats/nicshah1.sas7bcat	*	nicshah1.sas7bcat	/SDD/USERS/sajune/test/OD/gap5/formats/nicshah1.sas7bcat	

Reconcile Information

Input / Output	Type	File/ Folder Variable Name	File Name(s) (Version)	Comments
Input	File	InputFile	Support.sas (1)	Include file(s)
Input	Folder	Folder	Convertdemog.sas (2), mac1.sas	Macro Files
Input	Folder	Folder3	Demo.sas7bdat (3), fube.sas7bdat (1), support2.sas (1)	Data Files
Input	Folder	FmtFolder	Nicsah1.sas7bcat	Format Catalog
Output	Folder	Folder2	Demo_newunits.sas7bdat (14)	Data Folder
Output	File	File	Testme.pdf (22)	PDF File
Output	File	File2	Rtfoutput.rtf	RTF File



SourceFileID	SourceFileName	IOType	itemid	Inputname	Inputid	Inputversion	Outputid	Outputversion	Outputname	outputversion	on
1								3		3	
2								1		1	
3								14		22	
4											

Generate Traceability Matrix

A	B	C	D	E	F	G
JobLogXML File(s) Path: /user_folders/sajune/GAP5/jlgxml						Input/Output Summary Report
JobLog XML FileName	Source FileNan	Source FilePath (Version)	Input/ Output Type	Category	Display Name	Input File (Version)
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	INPUT	DATASET	demo.sas7bdat	/SDD/USERS/sajune/test/IOD/gap5/data/demo.sas7bdat (3)
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	INPUT	DATASET	fube.sas7bdat	/SDD/USERS/sajune/test/IOD/gap5/data/fube.sas7bdat (1)
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	INPUT	FILE	convertdemog.sas	/SDD/USERS/sajune/test/IOD/gap5/macros/convertdemog.sas (2)
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	INPUT	FILE	mac1.sas	/SDD/USERS/sajune/test/IOD/gap5/macros/mac1.sas
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	INPUT	FILE	nicsh1.sas7bcat	/SDD/USERS/sajune/test/IOD/gap5/formats/nicsh1.sas7bcat
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	INPUT	FILE	support.sas	/SDD/USERS/sajune/test/IOD/gap5/support.sas (1)
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	INPUT	FILE	support2.sas	/SDD/USERS/sajune/test/IOD/gap5/data/support2.sas (1)
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	OUTPUT	DATASET	demo_newunits.sas7bdat	
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	OUTPUT	FILE	rtfoutput.rtf	
demo.jlgxml	demo.sas	/SDD/USERS/sajune/test/IOD/gap5/demo.sas	OUTPUT	FILE	testme.pdf	

Output File (Version)	Comments	Last Run Date/Time
		THU SEP 22 21:28:15 EDT 2011
		THU SEP 22 21:28:15 EDT 2011
		THU SEP 22 21:28:15 EDT 2011
		THU SEP 22 21:28:15 EDT 2011
		THU SEP 22 21:28:15 EDT 2011
		THU SEP 22 21:28:15 EDT 2011
/SDD/USERS/sajune/test/IOD/gap5/output/demo_newunits.sas7bdat (14)		THU SEP 22 21:28:15 EDT 2011
/SDD/USERS/sajune/test/IOD/gap5/output/rtfoutput.rtf		THU SEP 22 21:28:15 EDT 2011
/SDD/USERS/sajune/test/IOD/gap5/output/testme.pdf (22)		THU SEP 22 21:28:15 EDT 2011

- Use ExcelXP Tagset to generate Excel File
- Capture JobLog, Source Files, Input(s) / Output(s) along with their version(s) and location information.

Impact Analysis

- Dataset Demo.sas7bdat is input to which program(s)?

Input/Output Summary Report						
JobLogXML File(s) Path: /user_folders/sajune/prg5/jlgxml						
JobLog XML FileName	Source FileNan	Source FilePath (Version)	Input/ Output Type	Category	Display Name	Input File (Version)
prg5.jlgxml	prg5.sas	/SDD/USERS/sajune/test/IOD/prg5/prg5.sas	INPUT	DATASET	demo.sas7bdat	/SDD/USERS/sajune/test/IOD/prg5/data/demo.sas7bdat (1)
prg5_test.jlgxml	prg5test.sas	/SDD/USERS/sajune/test/IOD/prg5/prg5test.sas (14)	INPUT	DATASET	demo.sas7bdat	/SDD/USERS/sajune/test/IOD/prg5/data/demo.sas7bdat (1)
prg5_test2.jlgxml	prg5test2.sas	/SDD/USERS/sajune/test/IOD/prg5/prg5test2.sas	INPUT	DATASET	demo.sas7bdat	/SDD/USERS/sajune/test/IOD/prg5/data/demo.sas7bdat (1)
prg5_test3.jlgxml	prg5test3.sas	/SDD/USERS/sajune/test/IOD/prg5/prg5test3.sas	INPUT	DATASET	demo.sas7bdat	/SDD/USERS/sajune/test/IOD/prg5/data/demo.sas7bdat (1)
Multiple.jlgxml	prg5.sas	/SDD/USERS/sajune/test/IOD/prg5/prg5.sas	INPUT	DATASET	demo.sas7bdat	/SDD/USERS/sajune/test/IOD/prg5/data/demo.sas7bdat (1)
Multiple.jlgxml	prg5test.sas	/SDD/USERS/sajune/test/IOD/prg5/prg5test.sas (14)	INPUT	DATASET	demo.sas7bdat	/SDD/USERS/sajune/test/IOD/prg5/data/demo.sas7bdat (1)

H	I	J

Output File (Version)	Comments	Last Run Date/Time
		APR 25 13:48:19 EDT 2011
		APR 25 13:39:25 EDT 2011
		TUE APR 19 15:44:09 EDT 2011
		WED APR 20 17:37:46 EDT 2011
		FRI APR 29 10:13:54 EDT 2011
		FRI APR 29 10:13:54 EDT 2011

Conclusion

- This process provides
 - Traceability Matrix
 - Better control over the updates
 - Ability to carry out Impact Analysis
 - Controlled Environment

Questions





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